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TIA/EIA/IS-95

TIA/EIA INTERIM STANDARD

Mobile Station-Base Station Compatibility Standard for Dual-Mode Wideband Spread Spectrum Cellular System

TIA/EIA/IS-95

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TELECOMMUNICATIONS INDUSTRY ASSOCIATION



Representing the telecommunications industry
in association with the Electronic Industries Association



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PREFACE

1
2 These technical requirements form a compatibility standard for cellular mobile telecom-
3 munications systems. They ensure that a mobile station can obtain service in any cellular
4 system manufactured according to this standard. These requirements do not address the
5 quality or reliability of that service, nor do they cover equipment performance or
6 measurement procedures.

7 To ensure compatibility (see Note 1), both radio-system parameters and call-processing
8 procedures must be specified. The equipment and interface parameters commonly
9 encountered in two-way radio systems have been updated and expanded to reflect the
10 unique radio plan upon which cellular systems are based. The sequence of call-processing
11 steps that the dual-mode mobile stations and base stations execute to establish calls has
12 been specified along with the digital control messages and analog signals that are
13 exchanged between the two stations.

14 The base station is subject to fewer compatibility requirements than the dual-mode mobile
15 station. Radiated power levels, both desired and undesired, are fully specified for dual-
16 mode mobile stations to control the RF interference that one mobile station can cause
17 another. Base stations are fixed in location and their interference is controlled by proper
18 layout and operation of the system in which the station operates. Detailed call-processing
19 procedures are specified for mobile stations to ensure a uniform response to all base
20 stations. Base station call procedures are not specified in detail because they are a part of
21 the overall design of the individual land system. However, the base station call-processing
22 procedures must be compatible with those specified for the mobile station. This approach
23 to writing the compatibility specification provides the land system designer with sufficient
24 flexibility to respond to local service needs and to account for local topography and
25 propagation conditions.

26 The basic radio-system parameters and call-processing procedures for the analog mode of
27 operation embodied in the compatibility specification were originally derived from the
28 Chicago and Baltimore-Washington developmental cellular systems and include certain
29 additions and modifications gained by experience with the operation of commercial
30 systems.

31 The basic radio-system parameters and call-processing procedures for the wideband spread
32 spectrum (CDMA) mode of operation embodied in the compatibility specification were
33 originally derived from the San Diego developmental cellular system. Most functions have
34 been verified by field trial.

35 This specification includes provisions for future service additions and expansion of system
36 capabilities. The architecture defined by this specification permits such expansion without
37 the loss of backwards compatibility to older mobile stations.

SECTION SUMMARY

1
2 **1. General.** This section defines the terms and numeric indications used in this
3 document. This section also describes the time reference used in the CDMA system and
4 the tolerances used throughout the document.

5 **2. Requirements for Mobile Station Analog Operation.** This section describes the
6 requirements for CDMA-analog dual-mode mobile stations operating in the analog mode. A
7 mobile station complying with these requirements will be able to operate with analog base
8 stations complying with EIA/TIA-553, EIA/TIA/IS-54, and this document.

9 **3. Requirements for Base Station Analog Operation.** This section describes the
10 requirements for analog base stations. A base station complying with these requirements
11 will be able to operate in the analog mode with mobile stations complying with
12 EIA/TIA-553, EIA/TIA/IS-54, and this document.

13 **4. Requirements for Mobile Station Analog Options.** This section describes the
14 requirements for CDMA-analog dual-mode mobile stations which use the 32-digit dialing
15 option on the reverse analog control channel. In addition, this section describes mobile
16 station requirements for use of the optional extended protocol.

17 **5. Requirements for Base Station Analog Options.** This section describes the base
18 station requirements for using the 32-digit dialing option on the reverse analog control
19 channel. In addition, this section describes base station requirements for use of the
20 optional extended protocol.

21 **6. Requirements for Mobile Station CDMA Operation.** This section describes the
22 requirements for CDMA-analog dual-mode mobile stations operating in the CDMA mode. A
23 mobile station complying with these requirements will be able to operate with CDMA base
24 stations complying with this document.

25 **7. Requirements for Base Station CDMA Operation.** This section describes the
26 requirements for CDMA base stations. A base station complying with these requirements
27 will be able to operate in the CDMA mode with mobile stations complying with this
28 document.

29 **Appendix A. Message Encryption and Voice Privacy.** This appendix describes the
30 requirements for message encryption and voice privacy. This appendix is available as a
31 separate document whose distribution is controlled by TIA. The availability of this
32 appendix is governed under the U.S. International Traffic and Arms Regulation (ITAR) and
33 the Export Administration Regulations.

34 **Appendix B. CDMA Call Flow Examples.** This appendix provides examples of simple call
35 flow in the CDMA system.

36 **Appendix C. CDMA System Layering.** This appendix describes the layers of the CDMA
37 system: the physical layer (layer 1), the link layer (layer 2), the multiplex sublayer, and the
38 control process layer (layer 3).

39 **Appendix D. CDMA Constants.** This appendix contains tables that give specific values for
40 the constant identifiers found in Section 6 and Section 7. These identifiers take the forms
41 T_{20m} and N_{5m} . The subscripted numbers vary to identify the particular constant.

SECTION SUMMARY

Appendix E. CDMA Retrievable and Settable Parameters. This appendix describes the parameters that the base station can set and retrieve in the mobile station.

Appendix F. Mobile Station Database. This appendix describes a database model that can be used for dual-mode mobile stations complying with this document.

NOTES

1. Compatibility, as used in connection with this standard, is understood to mean: Any dual-mode mobile station that is able to place and receive calls in any cellular system. Conversely all systems are able to place and receive calls for any mobile station. In a subscriber's home system, all call placement must be automatic. Call placement preferably should be automatic when a mobile station is in roam status.
2. The term "dual-mode mobile station" indicates a mobile station capable of both analog (FM) and wideband spread spectrum (CDMA) operation. The term "wideband spread spectrum dual-mode mobile station" is used when a confusion might arise between a dual-mode mobile station complying with this document and EIA/TIA/IS-54.
3. This compatibility specification is based on the specific United States spectrum allocation for cellular systems.
4. Technical details are included for the operation of two systems in a geographic area, System A and System B, each with a separate set of control channels.
5. IS-98 "Recommended Minimum Performance Standards for Dual-Mode Wideband Spread Spectrum Cellular Mobile Stations," and IS-97 "Recommended Minimum Performance Standards for Base Stations Supporting Dual-Mode Wideband Spread Spectrum Cellular Mobile Stations," provide specifications and measurement methods for cellular equipment.
6. Each cellular system is identified by a unique 15-bit digital code, the SID code (see 2.3.8). The Federal Communications Commission assigns SID codes when cellular system construction permits are issued.
7. Each dual-mode mobile station is assigned a unique 32-bit binary serial number (ESN) which cannot be changed by the subscriber without rendering the mobile station inoperative (see 2.3.2).
8. In the message formats used between the dual-mode mobile stations and base stations, some bits are marked as reserved (RSVD or RESERVED). Some or all of these reserved bits may be used in the future for additional messages. Therefore, all dual-mode mobile stations and base stations must set all bits that they are programmed to treat as reserved bits to '0' (zero) in all messages that they transmit. All mobile stations and base stations must ignore the state of all bits that they are programmed to treat as reserved bits in all messages that they receive.

NOTES

- 1
2 9. Reserved.
- 3 10. RF Emissions. Minimum advisory standards of ANSI and the processing guidelines
4 of FCC are contained in ANSI C95.1-1982 Advisory Standards and FCC Rules and
5 Regulations respectively. Members should also take notice of the more stringent
6 exposure criteria for the general public and for radio frequency carriers with low
7 frequency amplitude modulation as given in NCRP Report No. 86.
- 8 11. For the optional analog extended protocol feature (see 4.2 and 5.2), the assignment
9 of message type codes (MST words) will be made using procedures described in
10 TSB39. This will ensure that the feature will be implemented in an orderly manner.
- 11 12. Reserved.
- 12 13. The allocation of SID numbers is under review by EIA/TIA TR45 for potential
13 revision to accommodate international requirements. Utilization of SID numbers
14 must be coordinated.
- 15 14. Although the analog mode of operation (Sections 2, 3, 4, and 5) draws upon
16 EIA/TIA/IS-54-B, some modifications have been made.
- 17 15. "Base station" refers to the functions performed on the land side, which are
18 typically distributed among a cell, a sector of a cell, and a mobile switching center.
- 19 16. Section 6, Section 7, and the appendices use the following verbal forms: "Shall"
20 and "shall not" identify requirements to be followed strictly to conform to the
21 standard and from which no deviation is permitted. "Should" and "should not"
22 indicate that one of several possibilities is recommended as particularly suitable,
23 without mentioning or excluding others; that a certain course of action is preferred
24 but not necessarily required; or that (in the negative form) that a certain possibility
25 or course of action is discouraged but not prohibited. "May" and "need not"
26 indicate a course of action permissible within the limits of the standard. "Can" and
27 "cannot" are used for statements of possibility and capability, whether material,
28 physical, or causal.
- 29 17. Footnotes appear at various points in this specification to elaborate and further
30 clarify items discussed in the body of the specification.
- 31 18. Unless indicated otherwise, this document presents numbers in decimal form.
32 Binary numbers are distinguished in the text by the use of single quotation marks.

NOTES

19. The following operators define mathematical operations:

\times indicates multiplication.

$\lfloor x \rfloor$ indicates the largest integer less than or equal to x : $\lfloor 1.1 \rfloor = 1, \lfloor 1.0 \rfloor = 1$.

$\lceil x \rceil$ indicates the smallest integer greater or equal to x : $\lceil 1.1 \rceil = 2, \lceil 2.0 \rceil = 2$.

$|x|$ indicates the absolute value of x : $|-17| = 17, |17| = 17$.

\oplus indicates exclusive OR.

$\min(x, y)$ indicates the minimum of x and y .

$\max(x, y)$ indicates the maximum of x and y .

$x \bmod y$ indicates the remainder after dividing x by y : $x \bmod y = x - (y \times \lfloor x/y \rfloor)$.

REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. ANSI and TIA maintain registers of currently valid national standards published by them.

—American National Standards:

1. ANSI/EIA/TIA-553, *Mobile Station - Land Station Compatibility Specification*, September 1989.
2. ANSI T1.607-1990, *Integrated Services Digital Network (ISDN)—Layer 3 Signaling Specification for Circuit Switched Bearer Service for Digital Subscriber Signaling System Number 1 (DSS1)*, July 1990

—Other Standards:

2. *Common Cryptographic Algorithms*.
3. CCITT Recommendation G.162, May-June 1964.
4. CCITT Recommendation P.76, *Determination of Loudness Ratings; Fundamental Principles*, 1988.
5. CCITT Recommendation P.79, *Calculation of Loudness Ratings*, 1988.
6. EIA/IS-19-B, *Recommended Minimum Standards for 800-MHZ Cellular Subscriber Units*, May 1988.
7. EIA/IS-20-A, *Recommended Minimum Standards for 800-MHZ Cellular Land Stations*, May 1988.

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- 6 10. EIA/TIA/IS-95, *Appendix A, Message Encryption and Voice Privacy*.
- 7 11. EIA/TIA/IS-97, *Recommended Minimum Performance Standards for Base Stations*
8 *Supporting Dual-Mode Wideband Spread Spectrum Cellular Mobile Stations*.
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1 **1 GENERAL**

2 **1.1 Terms and Numeric Information**

3 **1.1.1 Terms**

4 **Abbreviated Alert.** An abbreviated alert is used to remind the mobile station user that
5 previously selected alternative routing features are still active.

6 **AC.** See Authentication Center.

7 **Access Attempt.** A sequence of one or more access probe sequences on the Access
8 Channel containing the same message. See also Access Probe and Access Probe Sequence.

9 **Access Channel.** A Reverse CDMA Channel used by mobile stations for communicating to
10 the base station. The Access Channel is used for short signaling message exchanges such
11 as call originations, responses to pages, and registrations. The Access Channel is a slotted
12 random access channel.

13 **Access Channel Message.** The information part of an access probe consisting of the
14 message body, length field, and CRC.

15 **Access Channel Message Capsule.** An Access Channel message plus the padding.

16 **Access Channel Preamble.** The preamble of an access probe consisting of a sequence of
17 all-zero frames that is sent at the 4800 bps rate.

18 **Access Channel Request Message.** An Access Channel message that is autonomously
19 generated by the mobile station. See also Access Channel Response Message.

20 **Access Channel Response Message.** A message on the Access Channel generated to reply
21 to a message received from the base station.

22 **Access Channel Slot.** The assigned time interval for an access probe. An Access Channel
23 slot consists of an integer number of frames. The transmission of an access probe is
24 performed within the boundaries of an Access Channel slot.

25 **Access Probe.** One Access Channel transmission consisting of a preamble and a message.
26 The transmission is an integer number of frames in length and transmits one Access
27 Channel message. See also Access Probe Sequence and Access Attempt.

28 **Access Probe Sequence.** A sequence of one or more access probes on the Access Channel.
29 The same Access Channel message is transmitted in every access probe of an access
30 attempt. See also Access Probe and Access Attempt.

31 **Acknowledgement.** A Layer 2 response by the mobile station or the base station
32 confirming that a signaling message was received correctly.

33 **Action Time.** The time at which the action implied by a message should take effect.

34 **Active Set.** The set of pilots associated with the CDMA Channels containing Forward
35 Traffic Channels assigned to a particular mobile station.

1 **Aging.** A mechanism through which the mobile station maintains in its Neighbor Set the
2 pilots that have been recently sent to it from the base station and the pilots whose handoff
3 drop timers have recently expired.

4 **A-key.** A secret, 64-bit pattern stored in the mobile station. It is used to generate/update
5 the mobile station's Shared Secret Data. The A-key is used in the mobile station
6 authentication process.

7 **Analog Access Channel.** An analog control channel used by a mobile station to access a
8 system to obtain service.

9 **Analog Color Code.** An analog signal (see Supervisory Audio Tone) transmitted by a base
10 station on an analog voice channel and used to detect capture of a mobile station by an
11 interfering base station or the capture of a base station by an interfering mobile station.

12 **Analog Control Channel.** An analog channel used for the transmission of digital control
13 information from a base station to a mobile station or from a mobile station to a base
14 station.

15 **Analog Paging Channel.** A forward analog control channel that is used to page mobile
16 stations and send orders.

17 **Analog Voice Channel.** An analog channel on which a voice conversation occurs and on
18 which brief digital messages may be sent from a base station to a mobile station or from a
19 mobile station to a base station.

20 **Authentication.** A procedure used by a base station to validate a mobile station's identity.

21 **Authentication Center (AC).** An entity that manages the authentication information
22 related to the mobile station.

23 **Authentication Response (AUTHR).** An 18-bit output of the authentication algorithm. It
24 is used, for example, to validate mobile station registrations, originations and terminations.

25 **Autonomous Registration.** A method of registration in which the mobile station registers
26 without an explicit command from the base station.

27 **AWGN.** Additive White Gaussian Noise.

28 **Bad Frames.** Frames classified as erasures (frame category 10) or 9600 bps frames,
29 primary traffic only with bit errors (frame category 9). See also Good Frames.

30 **Base Station.** A station in the Domestic Public Cellular Radio Telecommunications
31 Service, other than a mobile station, used for communicating with mobile stations.
32 Depending upon the context, the term base station may refer to a cell, a sector within a cell,
33 an MSC, or other part of the cellular system. See also MSC.

34 **Base Station Authentication Response (AUTHBS).** An 18-bit pattern generated by the
35 authentication algorithm. AUTHBS is used to confirm the validity of base station orders to
36 update the Shared Secret Data.

37 **Base Station Random Variable (RANDBS).** A 32-bit random number generated by the
38 mobile station for authenticating base station orders to update the Shared Secret Data.

39 **BCH Code.** See Bose-Chaudhuri-Hocquenghem Code.

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1 No text.

2 -

- 1 **Blank-and-Burst.** The pre-emption of an entire Traffic Channel frame's primary traffic by
2 signaling traffic or secondary traffic. Blank-and-burst is performed on a frame-by-frame
3 basis.
- 4 **Bose-Chaudhuri-Hocquenghem Code (BCH Code).** A large class of error-correcting cyclic
5 codes. For any positive integers m , $m \geq 3$, and $t < 2^{m-1}$, there is a binary BCH code with a
6 block length n equal to $2^m - 1$ and $n - k \leq mt$ parity check bits, where k is the number of
7 information bits. The BCH code has a minimum distance of at least $2t + 1$.
- 8 **bps.** Bits per second.
- 9 **Busy-Idle Bits.** The portion of the data stream transmitted by a base station on a forward
10 analog control channel that is used to indicate the current busy-idle status of the
11 corresponding reverse analog control channel.
- 12 **Call Disconnect.** The process that releases the resources handling a particular call. The
13 disconnect process begins either when the mobile station user indicates the end of the call
14 by generating an on-hook condition or other call release mechanism, or when the base
15 station initiates a release.
- 16 **Call History Parameter (COUNT).** A modulo-64 event counter maintained by the mobile
17 station and Authentication Center that is used for clone detection.
- 18 **Candidate Set.** The set of pilots that have been received with sufficient strength by the
19 mobile station to be successfully demodulated, but have not been placed in the Active Set
20 by the base station. See also Active Set, Neighbor Set, and Remaining Set.
- 21 **CDMA.** See Code Division Multiple Access.
- 22 **CDMA Channel.** The set of channels transmitted between the base station and the mobile
23 stations within a given CDMA frequency assignment. See also Forward CDMA Channel and
24 Reverse CDMA Channel.
- 25 **CDMA Channel Number.** An 11-bit number corresponding to the center of the CDMA
26 frequency assignment.
- 27 **CDMA Frequency Assignment.** A 1.23 MHz segment of spectrum centered on one of the
28 30 kHz channels of the existing analog system.
- 29 **Code Channel.** A subchannel of a Forward CDMA Channel. A Forward CDMA Channel
30 contains 64 code channels. Code channel zero is assigned to the Pilot Channel. Code
31 channels 1 through 7 may be assigned to the either Paging Channels or the Traffic
32 Channels. Code channel 32 may be assigned to either a Sync Channel or a Traffic
33 Channel. The remaining code channels may be assigned to Traffic Channels.
- 34 **Code Division Multiple Access (CDMA).** A technique for spread-spectrum multiple-access
35 digital communications that creates channels through the use of unique code sequences.
- 36 **Code Symbol.** The output of an error-correcting encoder. Information bits are input to the
37 encoder and code symbols are output from the encoder. See Convolutional Code.
- 38 **Continuous Transmission.** A mode of operation in which Discontinuous Transmission is
39 not permitted.

- 1 **Control Mobile Attenuation Code (CMAC).** A 3-bit field in the Control-Filler Message that
2 specifies the maximum authorized power level for a mobile transmitting on an analog
3 reverse control channel.
- 4 **Convolutional Code.** A type of error-correcting code. A code symbol can be considered as
5 the convolution of the input data sequence with the impulse response of a generator
6 function.
- 7 **CRC.** See Cyclic Redundancy Code.
- 8 **Cyclic Redundancy Code (CRC).** A class of linear error detecting codes which generate
9 parity check bits by finding the remainder of a polynomial division.
- 10 **Data Burst Randomizer.** The function that determines which power control groups within
11 a frame are transmitted on the Reverse Traffic Channel when the data rate is lower than
12 9600 bps. The data burst randomizer determines, for each mobile station, the
13 pseudorandom position of the transmitted power control groups in the frame while
14 guaranteeing that every modulation symbol is transmitted exactly once.
- 15 **dBc.** The ratio (in dB) of the sideband power of a signal, measured in a given bandwidth at
16 a given frequency offset from the center frequency of the same signal, to the total inband
17 power of the signal. For CDMA, the total inband power of the signal is measured in a 1.23
18 MHz bandwidth around the center frequency of the CDMA signal.
- 19 **dBm.** A measure of power expressed in terms of its ratio (in dB) to one milliwatt.
- 20 **dBm/Hz.** A measure of power spectral density. dBm/Hz is the power in one Hertz of
21 bandwidth, where power is expressed in units of dBm.
- 22 **dBW.** A measure of power expressed in terms of its ratio (in dB) to one Watt.
- 23 **Dedicated Control Channel.** An analog control channel used for the transmission of
24 digital control information from either a base station or a mobile station.
- 25 **Deinterleaving.** The process of unpermuting the symbols that were permuted by the
26 interleaver. Deinterleaving is performed on received symbols prior to decoding.
- 27 **Digital Color Code (DCC).** A digital signal transmitted by a base station on a forward
28 analog control channel that is used to detect capture of a base station by an interfering
29 mobile station.
- 30 **Dim-and-Burst.** A frame in which primary traffic is multiplexed with either secondary
31 traffic or signaling traffic.
- 32 **Discontinuous Transmission (DTX).** A mode of operation in which a mobile station
33 transmitter autonomously switches between two transmitter power levels while the mobile
34 station is in the conversation state on an analog voice channel.
- 35 **Distance-Based Registration.** An autonomous registration method in which the mobile
36 station registers whenever it enters a cell whose distance from the cell in which the mobile
37 station last registered exceeds a given threshold.
- 38 **DTMF.** See Dual-Tone Multifrequency.

- 1 **Dual-Tone Multifrequency (DTMF).** Signaling by the simultaneous transmission of two
2 tones, one from a group of low frequencies and another from a group of high frequencies.
3 Each group of frequencies consists of four frequencies.
- 4 **E_b .** The energy of an information bit.
- 5 **E_c/I_0 .** The ratio in (dB) between the pilot energy accumulated over one PN chip period (E_c)
6 to the total power spectral density in the received bandwidth (I_0).
- 7 **Effective Radiated Power (ERP).** The transmitted power multiplied by the antenna gain
8 referenced to a half-wave dipole.
- 9 **Electronic Serial Number (ESN).** A 32-bit number assigned by the mobile station
10 manufacturer, uniquely identifying the mobile station equipment.
- 11 **Encoder Tail Bits.** A fixed sequence of bits added to the end of a block of data to reset the
12 convolutional encoder to a known state.
- 13 **ERP.** See Effective Radiated Power.
- 14 **ESN.** See Electronic Serial Number.
- 15 **Extended Protocol.** An optional expansion of the signaling messages between the base
16 station and mobile station to allow for the addition of new system features and operational
17 capabilities.
- 18 **Fade Timer.** A timer kept by the mobile station as a measure of Forward Traffic Channel
19 continuity. If the fade timer expires, the mobile station drops the call.
- 20 **Flash.** An indication sent on an analog voice channel or CDMA Traffic Channel indicating
21 that the user directed the mobile station to invoke special processing.
- 22 **Foreign NID Roamer.** A mobile station operating in the same system (SID) but a different
23 network (NID) from the one in which service was subscribed. See also Foreign SID Roamer
24 and Roamer.
- 25 **Foreign SID Roamer.** A mobile station operating in a system (SID) other than the one from
26 which service was subscribed. See also Foreign NID Roamer and Roamer.
- 27 **Forward Analog Control Channel (FOCC).** An analog control channel used from a base
28 station to a mobile station.
- 29 **Forward Analog Voice Channel (FVC).** An analog voice channel used from a base station
30 to a mobile station.
- 31 **Forward CDMA Channel.** A CDMA Channel from a base station to mobile stations. The
32 Forward CDMA Channel contains one or more code channels that are transmitted on a
33 CDMA frequency assignment using a particular pilot PN offset. The code channels are
34 associated with the Pilot Channel, Sync Channel, Paging Channels, and Traffic Channels.
35 The Forward CDMA Channel always carries a Pilot Channel and may carry up to one Sync
36 Channel, up to seven Paging Channels, and up to 63 Traffic Channels, as long as the total
37 number of channels, including the Pilot Channel, is no greater than 64.
- 38 **Forward Traffic Channel.** A code channel used to transport user and signaling traffic from
39 the base station to the mobile station.

- 1 **Frame.** A basic timing interval in the system. For the Access Channel, Paging Channel,
2 and Traffic Channel, a frame is 20 ms long. For the Sync Channel, a frame is 26.666... ms
3 long.
- 4 **Frame Category.** A classification of a received Traffic Channel frame based upon
5 transmission data rate, the frame contents (primary traffic, secondary traffic, or signaling
6 traffic), and whether there are detected errors in the frame.
- 7 **Frame Offset.** A time skewing of Traffic Channel frames from System Time in integer
8 multiples of 1.25 ms. The maximum frame offset is 18.75 ms.
- 9 **Frame Quality Indicator.** The CRC check applied to 9600 bps and 4800 bps Traffic
10 Channel frames.
- 11 **Global Positioning System (GPS).** A US government satellite system that provides location
12 and time information to users. See Navstar GPS Space Segment / Navigation User
13 Interfaces ICD-GPS-200 for specifications.
- 14 **Good Frames.** Frames not classified as bad frames. See also Bad Frames.
- 15 **GPS.** See Global Positioning System.
- 16 **Half Frame.** A 10 ms interval on the Paging Channel. Two half frames comprise a frame.
17 The first half frame begins at the same time as the frame.
- 18 **Handoff.** The act of transferring communication with a mobile station from one base
19 station to another.
- 20 **Hard Handoff.** A handoff characterized by a temporary disconnection of the Traffic
21 Channel. Hard handoffs occur when the mobile station is transferred between disjoint
22 Active Sets, the CDMA frequency assignment changes, the frame offset changes, or the
23 mobile station is directed from a CDMA Traffic Channel to an analog voice channel. See
24 also Soft Handoff.
- 25 **Hash Function.** A function used by the mobile station to select one out of N available
26 resources. The hash function distributes the available resources uniformly among a
27 random sample of mobile stations.
- 28 **HLR.** See Home Location Register.
- 29 **Home Location Register (HLR).** The location register to which a MIN is assigned for
30 record purposes such as subscriber information.
- 31 **Home System.** The cellular system in which the mobile station subscribes for service.
- 32 **Idle Handoff.** The act of transferring reception of the Paging Channel from one base
33 station to another, when the mobile station is in the *Mobile Station Idle State*.
- 34 **Implicit Registration.** A registration achieved by a successful transmission of an
35 origination or page response on the Access Channel.
- 36 **Interleaving.** The process of permuting a sequence of symbols.
- 37 **kHz.** Kilo-hertz (10^3 Hertz).
- 38 **ksps.** Kilo-symbols per second (10^3 symbols per second).

- 1 **Layering.** A method of organization for communication protocols. A layer is defined in
2 terms of its communication protocol to a peer layer in another entity and the services it
3 offers to the next higher layer in its own entity.
- 4 **Layer 1.** See Physical Layer.
- 5 **Layer 2.** Layer 2 provides for the correct transmission and reception of signaling
6 messages, including partial duplicate detection. See also Layering and Layer 3.
- 7 **Layer 3.** Layer 3 provides the control of the cellular telephone system. Signaling messages
8 originate and terminate at layer 3. See also Layering and Layer 2.
- 9 **Local Control.** An optional mobile station feature used to perform manufacturer-specific
10 functions.
- 11 **Long Code.** A PN sequence with period $2^{42} - 1$ that is used for scrambling on the Forward
12 CDMA Channel and spreading on the Reverse CDMA Channel. The long code uniquely
13 identifies a mobile station on both the Reverse Traffic Channel and the Forward Traffic
14 Channel. The long code provides limited privacy. The long code also separates multiple
15 Access Channels on the same CDMA channel. See also Public Long Code and Private Long
16 Code.
- 17 **Long Code Mask.** A 42-bit binary number that creates the unique identity of the long
18 code. See also Public Long Code, Private Long Code, Public Long Code Mask, and Private
19 Long Code Mask.
- 20 **LSB.** Least significant bit.
- 21 **Maximal Length Sequence (m-Sequence).** A binary sequence of period $2^n - 1$, n a positive
22 integer, with no internal periodicities. A maximal length sequence can be generated by a
23 tapped n -bit shift register with linear feedback.
- 24 **Mcps.** Megachips per second (10^6 chips per second).
- 25 **Mean Input Power.** The total received calorimetric power measured in a specified
26 bandwidth at the antenna connector, including all internal and external signal and noise
27 sources.
- 28 **Mean Output Power.** The total transmitted calorimetric power measured in a specified
29 bandwidth at the antenna connector when the transmitter is active.
- 30 **Message.** A data structure that conveys control information or application information. A
31 message consists of a length field (MSG_LENGTH), a message body (the part conveying the
32 information), and a CRC.
- 33 **Message Body.** The part of the message contained between the length field (MSG_LENGTH)
34 and the CRC field.
- 35 **Message Capsule.** A sequence of bits comprising a single message and padding. The
36 padding always follows the message and may be of zero length.
- 37 **Message CRC.** The CRC associated with a message. See also Cyclic Redundancy Check.
- 38 **Message Field.** A basic named element in a message. A message field may consist of zero
39 or more bits.

1 **Message Record.** An entry in a message consisting of one or more fields that repeats in the
2 message.

3 **MHz.** Megahertz (10^6 Hertz).

4 **MIN.** See Mobile Station Identification Number.

5 **Mobile Protocol Capability Indicator (MPCI).** A 2-bit field used to indicate the mobile
6 station's capabilities.

7 **Mobile Station.** A station in the Domestic Public Cellular Radio Telecommunications
8 Service intended to be used while in motion or during halts at unspecified points. Mobile
9 stations include portable units (e.g., hand-held personal units) and units installed in
10 vehicles.

11 **Mobile Station Class.** Mobile station classes define mobile station characteristics such as
12 slotted operation and transmission power. See Table 2.3.3-1.

13 **Mobile Station Identification Number (MIN).** The 34-bit number that is a digital
14 representation of the 10-digit directory telephone number assigned to a mobile station.

15 **Mobile Station Originated Call.** A call originating from a mobile station.

16 **Mobile Station Terminated Call.** A call received by a mobile station (not to be confused
17 with a disconnect or call release).

18 **Mobile Switching Center (MSC).** A configuration of equipment that provides cellular
19 radiotelephone service. Also called the Mobile Telephone Switching Office (MTSO).

20 **Modulation Symbol.** The output of the data modulator before spreading. On the Reverse
21 Traffic Channel, 64-ary orthogonal modulation is used and six code symbols are associated
22 with one modulation symbol. On the Forward Traffic Channel, each code symbol (when the
23 data rate is 9600 bps) or each repeated code symbol (when the data rate is less than 9600
24 bps) is one modulation symbol.

25 **ms.** Millisecond.

26 **MSB.** Most significant bit.

27 **MSC.** See Mobile Switching Center.

28 **Multiplex Option.** The ability of the multiplex sublayer and lower layers to be tailored to
29 provide special capabilities. A multiplex option defines such characteristics as the frame
30 format and the rate decision rules. See also Multiplex Sublayer.

31 **Multiplex Sublayer.** One of the conceptual layers of the system that multiplexes and
32 demultiplexes primary traffic, secondary traffic, and signaling traffic.

33 **NAM.** See Number Assignment Module.

34 **Neighbor Set.** The set of pilots associated with the CDMA Channels that are probable
35 candidates for handoff. Normally, the Neighbor Set consists of the pilots associated with
36 CDMA Channels that cover geographical areas near the mobile station. See also Active Set,
37 Candidate Set, and Remaining Set.

- 1 **Network.** A network is a subset of a cellular system, such as an area-wide cellular
2 network, a private group of base stations, or a group of base stations set up to handle a
3 special requirement. A network can be as small or as large as needed, as long as it is fully
4 contained within a system. See also System.
- 5 **Network Identification (NID).** A number that uniquely identifies a network within a
6 cellular system. See also System Identification.
- 7 **NID.** See Network Identification.
- 8 **Non-Autonomous Registration.** A registration method in which the base station initiates
9 registration. See also Autonomous Registration.
- 10 **Non-Slotted Mode.** An operation mode of the mobile station in which the mobile station
11 continuously monitors the Paging Channel when in the *Mobile Station Idle State*.
- 12 **ns.** Nanosecond.
- 13 **NULL.** Not having any value.
- 14 **Null Traffic Channel Data.** One or more frames of 16 '1's followed by eight '0's sent at the
15 1200 bps rate. Null Traffic Channel data is sent when no service option is active and no
16 signaling message is being sent. Null Traffic Channel data serves to maintain the
17 connectivity between the mobile station and the base station.
- 18 **Number Assignment Module (NAM).** A set of MIN-related parameters stored in the mobile
19 station.
- 20 **Numeric Information.** Numeric information consists of parameters that appear as
21 numeric fields in messages exchanged by the base station and the mobile station and
22 information used to describe the operation of the mobile station.
- 23 **OLC.** See Overload Class (CDMA) or Overload Control (analog).
- 24 **Optional Field.** A field defined within a message structure that is optionally transmitted to
25 the message recipient.
- 26 **Order.** A type of message that contains control codes for either the mobile station or the
27 base station.
- 28 **Ordered Registration.** A registration method in which the base station orders the mobile
29 station to send registration related parameters.
- 30 **Overhead Message.** A message sent by the base station on the Paging Channel to
31 communicate base-station-specific and system-wide information to mobile stations.
- 32 **Overload Class.** The means used to control system access by mobile stations, typically in
33 emergency or other overloaded conditions. Mobile stations are assigned one (or more) of
34 sixteen overload classes. Access to the CDMA system can then be controlled on a per class
35 basis by persistence values transmitted by the base station.
- 36 **Overload Control (OLC).** A means to restrict reverse analog control channel accesses by
37 mobile stations. Mobile stations are assigned one (or more) of sixteen control levels. Access
38 is selectively restricted by a base station setting one or more OLC bits in the Overload
39 Control Global Action Message.

- 1 **Packet.** The unit of information exchanged between the service option applications of the
2 base station and the mobile station.
- 3 **Padding.** A sequence of bits used to fill from the end of a message to the end of a message
4 capsule, typically to the end of the frame or half frame. All bits in the padding are '0'.
- 5 **Paging.** The act of seeking a mobile station when a call has been placed to that mobile
6 station.
- 7 **Paging Channel (Analog).** See Analog Paging Channel.
- 8 **Paging Channel (CDMA).** A code channel in a Forward CDMA Channel used for
9 transmission of control information and pages from a base station to a mobile station.
- 10 **Paging Channel Slot.** An 80 ms interval on the Paging Channel. Mobile stations operating
11 in the slotted mode are assigned specific slots in which they monitor messages from the
12 base station.
- 13 **Parameter-Change Registration.** A registration method in which the mobile station
14 registers when certain of its stored parameters change.
- 15 **Parity Check Bits.** Bits added to a sequence of information bits to provide error detection,
16 correction, or both.
- 17 **Persistence.** A probability measure used by the mobile station to determine if it should
18 transmit in a given Access Channel Slot.
- 19 **Physical Layer.** The part of the communication protocol between the mobile station and
20 the base station that is responsible for the transmission and reception of data. The
21 physical layer in the transmitting station is presented a frame by the multiplex sublayer
22 and transforms it into an over-the-air waveform. The physical layer in the receiving station
23 transforms the waveform back into a frame and presents it to the multiplex sublayer above
24 it.
- 25 **Pilot Channel.** An unmodulated, direct-sequence spread spectrum signal transmitted
26 continuously by each CDMA base station. The Pilot Channel allows a mobile station to
27 acquire the timing of the Forward CDMA Channel, provides a phase reference for coherent
28 demodulation, and provides a means for signal strength comparisons between base stations
29 for determining when to handoff.
- 30 **Pilot PN Sequence.** A pair of modified maximal length PN sequences with period 2^{15} used
31 to spread the Forward CDMA Channel and the Reverse CDMA Channel. Different base
32 stations are identified by different pilot PN sequence offsets.
- 33 **Pilot PN Sequence Offset Index.** The PN offset in units of 64 PN chips of a pilot, relative
34 to the zero offset pilot PN sequence.
- 35 **Pilot Strength.** The ratio of received pilot energy to overall received energy. See also
36 E_c/I_0 .
- 37 **PN Chip.** One bit in the PN sequence.
- 38 **PN Sequence.** Pseudonoise sequence. A periodic binary sequence.

- 1 **Power Control Bit.** A bit sent in every 1.25 ms interval on the Forward Traffic Channel to
2 signal the mobile station to increase or decrease its transmit power.
- 3 **Power Control Group.** A 1.25 ms interval on the Forward Traffic Channel and the Reverse
4 Traffic Channel. See also Power Control Bit.
- 5 **Power-Down Registration.** An autonomous registration method in which the mobile
6 station registers on power down.
- 7 **Power-Up Registration.** An autonomous registration method in which the mobile station
8 registers on power up.
- 9 **PPM.** Parts per million.
- 10 **Preamble.** See Access Channel Preamble and Traffic Channel Preamble.
- 11 **Primary CDMA Channel.** A CDMA Channel at a preassigned frequency assignment used
12 by the mobile station for initial acquisition. See also Secondary CDMA Channel.
- 13 **Primary Paging Channel (CDMA).** The default code channel (code channel 1) assigned for
14 paging on a CDMA Channel.
- 15 **Primary Traffic.** The main traffic stream carried between the mobile station and the base
16 station, supporting the active primary service option, on the Traffic Channel. See also
17 Secondary Traffic, Signaling Traffic, and Service Option.
- 18 **Private Long Code.** The long code characterized by the private long code mask. See also
19 Long Code.
- 20 **Private Long Code Mask.** The long code mask used to form the private long code. See
21 also Public Long Code Mask and Long Code.
- 22 **Public Long Code.** The long code characterized by the public long code mask.
- 23 **Public Long Code Mask.** The long code mask used to form the public long code. The
24 mask contains the ESN of the mobile station. See also Private Long Code Mask and Long
25 Code.
- 26 **Punctured Code.** An error-correcting code generated from another error-correcting code by
27 deleting (i.e., puncturing) code symbols from the coder output.
- 28 **Quick Repeats.** Additional transmissions of identical copies of a message within a short
29 interval to increase the probability that the message is received correctly.
- 30 **Receive Objective Loudness Rating (ROLR).** A perceptually weighted transducer gain of
31 telephone receivers relating electrical excitation from a reference generator to sound
32 pressure at the earphone. The receive objective loudness rating is normally specified in dB
33 relative to one Pascal per millivolt. See IEEE Standard 269-1992, IEEE Standard 661-
34 1979, CCITT Recommendation P.76, and CCITT Recommendation P.79.
- 35 **Registration.** The process by which a mobile station identifies its location and parameters
36 to a base station.
- 37 **Registration Zone.** A collection of one or more base stations treated as a unit when
38 determining whether a mobile station should perform zone-based registration.

- 1 **Release.** A process that the mobile station and base station use to inform each other of
2 call disconnect.
- 3 **Remaining Set.** The set of all allowable pilot offsets as determined by PILOT_INC,
4 excluding the pilot offsets of the pilots in the Active Set, Candidate Set, and Neighbor Set.
5 See also Active Set, Candidate Set, and Neighbor Set.
- 6 **Request.** A layer 3 message generated by either the mobile station or the base station to
7 retrieve information, ask for service, or command an action.
- 8 **Response.** A layer 3 message generated as a result of another message, typically a request.
- 9 **Reverse Analog Control Channel (RECC).** The analog control channel used from a mobile
10 station to a base station.
- 11 **Reverse Analog Voice Channel (RVC).** The analog voice channel used from a mobile
12 station to a base station.
- 13 **Reverse CDMA Channel.** The CDMA Channel from the mobile station to the base station.
14 From the base station's perspective, the Reverse CDMA Channel is the sum of all mobile
15 station transmissions on a CDMA frequency assignment.
- 16 **Reverse Traffic Channel.** A Reverse CDMA Channel used to transport user and signaling
17 traffic from a single mobile station to one or more base stations.
- 18 **Roamer.** A mobile station operating in a cellular system (or network) other than the one
19 from which service was subscribed. See also Foreign NID Roamer and Foreign SID Roamer.
- 20 **ROLR.** See Receive Objective Loudness Rating.
- 21 **SAT.** See Supervisory Audio Tone.
- 22 **Scan of Channels.** The procedure by which a mobile station examines the signal strength
23 of each forward analog control channel.
- 24 **SCI.** Synchronized Capsule Indicator bit.
- 25 **Search Window.** The range of PN sequence offsets that a mobile station searches for a
26 pilot.
- 27 **Secondary CDMA Channel.** A CDMA Channel at a preassigned frequency assignment
28 used by the mobile station for initial acquisition. See also Primary CDMA Channel.
- 29 **Secondary Traffic.** An additional traffic stream that can be carried between the mobile
30 station and the base station on the Traffic Channel. See also Primary Traffic and Signaling
31 Traffic.
- 32 **Seizure Precursor.** The initial digital sequence transmitted by a mobile station to a base
33 station on a reverse analog control channel.
- 34 **Service Option.** A service capability of the system. Service options may be applications
35 such as voice, data, or facsimile.
- 36 **Shared Secret Data (SSD).** A 128-bit pattern stored in the mobile station (in semi-
37 permanent memory) and known by the base station. SSD is a concatenation of two 64-bit
38 subsets: SSD_A, which is used to support the authentication procedures, and SSD_B.

- 1 which serves as one of the inputs to the process generating the encryption mask and
2 private long code.
- 3 **SID.** See System Identification.
- 4 **Signaling Tone.** A 10 kHz tone transmitted by a mobile station on an analog voice channel
5 to: 1) confirm orders, 2) signal flash requests, and 3) signal release requests.
- 6 **Signaling Traffic.** Control messages that are carried between the mobile station and the
7 base station on the Traffic Channel. See also Primary Traffic and Secondary Traffic.
- 8 **Slot Cycle.** A periodic interval at which a mobile station operating in the slotted mode
9 monitors the Paging Channel.
- 10 **Slotted Mode.** An operation mode of the mobile station in which the mobile station
11 monitors only selected slots on the Paging Channel when in the *Mobile Station Idle State*.
- 12 **Soft Handoff.** A handoff occurring while the mobile station is in the *Mobile Station Control*
13 *on the Traffic Channel State*. This handoff is characterized by commencing communications
14 with a new base station on the same CDMA frequency assignment before terminating
15 communications with the old base station. See also Hard Handoff.
- 16 **SOM.** Start-of-Message Bit.
- 17 **sps.** Symbols per second.
- 18 **Station Class Mark (SCM).** An identification of certain characteristics of a mobile station.
19 Classes are defined in Table 2.3.3-1.
- 20 **Status Information.** The following status information is used to describe mobile station
21 operation when using the analog system:
- 22 • **Serving-System Status.** Indicates whether a mobile station is tuned to channels
23 associated with System A or System B.
 - 24 • **First Registration ID Status.** A status variable used by the mobile station in
25 association with its processing of received Registration ID messages.
 - 26 • **First Location Area ID Status.** A status variable used by the mobile station in
27 association with its processing of received Location Area ID messages.
 - 28 • **Location Registration ID Status.** A status variable used by the mobile station in
29 association with its processing of power-up registrations and location-based
30 registrations.
 - 31 • **First Idle ID Status.** A status variable used by the mobile station in association with
32 its processing of the Idle Task.
 - 33 • **Local Control Status.** Indicates whether a mobile station must respond to local
34 control messages.
 - 35 • **Roam Status.** Indicates whether a mobile station is in its home system.
 - 36 • **Termination Status.** Indicates whether a mobile station must terminate the call
37 when it is on an analog voice channel.

1 **Supervisory Audio Tone (SAT).** One of three tones in the 6 kHz region that is transmitted
2 on the forward analog voice channel by a base station and transponded on the reverse
3 analog voice channel by a mobile station.

4 **Supplementary Digital Color Code (SDCC1, SDCC2).** Additional bits assigned to increase
5 the number of color codes from four to sixty four, transmitted on the forward analog control
6 channel.

7 **Symbol.** See Code Symbol and Modulation Symbol.

8 **Sync Channel.** Code channel 32 in the Forward CDMA Channel which transports the
9 synchronization message to the mobile station.

10 **Sync Channel Superframe.** An 80 ms interval consisting of three Sync Channel frames
11 (each 26.666... ms in length).

12 **System.** A system is a cellular telephone service that covers a geographic area such as a
13 city, metropolitan region, county, or group of counties. See also Network.

14 **System Identification (SID).** A number uniquely identifying a cellular system.

15 **System Time.** The time reference used by the system. System Time is synchronous to
16 UTC time (except for leap seconds) and uses the same time origin as GPS time. All base
17 stations use the same System Time (within a small error). Mobile stations use the same
18 System Time, offset by the propagation delay from the base station to the mobile station.
19 See also Universal Coordinated Time.

20 **Timer-Based Registration.** A registration method in which the mobile station registers
21 whenever a counter reaches a predetermined value. The counter is incremented an average
22 of once per 80 ms period.

23 **Time Reference.** A reference established by the mobile station that is synchronous with
24 the earliest arriving multipath component used for demodulation.

25 **TOLR.** See Transmit Objective Loudness Rating.

26 **Traffic Channel.** A communication path between a mobile station and a base station used
27 for user and signaling traffic. The term Traffic Channel implies a Forward Traffic Channel
28 and Reverse Traffic Channel pair. See also Forward Traffic Channel and Reverse Traffic
29 Channel.

30 **Traffic Channel Preamble.** A sequence of all-zero frames that is sent at the 9600 bps rate
31 by the mobile station on the Reverse Traffic Channel. The Traffic Channel preamble is sent
32 during initialization of the Traffic Channel.

33 **Transmit Objective Loudness Rating (TOLR).** A perceptually weighted transducer gain of
34 telephone transmitters relating sound pressure at the microphone to voltage at a reference
35 electrical termination. It is normally specified in dB relative to one millivolt per Pascal. See
36 IEEE Standard 269-1992, IEEE Standard 661-1979, CCITT Recommendation P.76, and
37 CCITT Recommendation P.79.

38 **Unique Challenge-Response Procedure.** An exchange of information between a mobile
39 station and a base station for the purpose of confirming the mobile station's identity. The
40 procedure is initiated by the base station and is characterized by the use of a challenge-

- 1 specific random number (i.e., RANDU) instead of the random variable broadcast globally
2 (RAND).
- 3 **Unique Random Variable (RANDU).** A 24-bit random number generated by the base
4 station in support of the Unique Challenge-Response procedure.
- 5 **Universal Coordinated Time (UTC).** An internationally agreed-upon time scale
6 maintained by the Bureau International de l'Heure (BIH) used as the time reference by
7 nearly all commonly available time and frequency distribution systems i.e., WWV, WWVH,
8 LORAN-C, Transit, Omega, and GPS.
- 9 **UTC.** Universal Temps Coordoné. See Universal Coordinated Time.
- 10 **Voice Channel.** See Analog Voice Channel.
- 11 **Voice Mobile Attenuation Code (VMAC).** A 3-bit field in the Extended Address Word
12 commanding the initial mobile power level when assigning a mobile station to an analog
13 voice channel.
- 14 **Voice Privacy.** The process by which user voice transmitted over a CDMA Traffic Channel
15 is afforded a modest degree of protection against eavesdropping over the air.
- 16 **Walsh Chip.** The shortest identifiable component of a Walsh function. There are 2^N Walsh
17 chips in one Walsh function where N is the order of the Walsh function. On the Forward
18 CDMA Channel, one Walsh chip equals $1/1.2288$ MHz, or 813.802... ns. On the Reverse
19 CDMA Channel, one Walsh chip equals $4/1.2288$ MHz, or 3.255... μ s.
- 20 **Walsh Function.** One of 2^N time orthogonal binary functions (note that the functions are
21 orthogonal after mapping '0' to 1 and '1' to -1).
- 22 **Zone-Based Registration.** An autonomous registration method in which the mobile station
23 registers whenever it enters a zone that is not in the mobile station's zone list.
- 24 **μ s.** Microsecond.

25 1.1.2 Numeric Information

26 Numeric information is used to describe the operation of the mobile station. The following
27 subscripts are used to clarify the use of the numeric information:

- 28 • "s" indicates a value stored in a mobile station's temporary memory.
- 29 • "sv" indicates a stored value that varies as a mobile station processes various tasks.
- 30 • "sl" indicates the stored limits on values that vary.
- 31 • "r" indicates a value received by a mobile station over a forward analog control
32 channel or a CDMA Forward Channel.
- 33 • "p" indicates a value set in a mobile station's permanent security and identification
34 memory.
- 35 • "s-p" indicates a value stored in a mobile station's semi-permanent security and
36 identification memory.

1 1.1.2.1 Analog Numeric Information

2 **ACCOLC_p** - A four-bit number used to identify which overload class field controls access
3 attempts.

4 **BIS_s** - Identifies whether a mobile station must check for an idle-to-busy transition on a
5 reverse analog control channel when accessing a system.

6 **CCLIST_s** - The list of analog control channels to be scanned by a mobile station processing
7 the Directed Retry Task (see 2.6.3.14).

8 **CMAX_s** - The maximum number of channels to be scanned by a mobile station when
9 accessing a system.

10 **COUNT_{s-p}** - A modulo-64 count held in the mobile station. **COUNT_{s-p}** is maintained during
11 power-off.

12 **CPA_s** - Identifies whether the access functions are combined with the paging functions on
13 the same set of analog control channels.

14 **DCC_s** - A DCC value stored in a mobile station's temporary memory.

15 **DTX_s** - Identifies in what way the mobile station is permitted to use the discontinuous
16 transmission mode on the analog voice channel.

17 **E_s** - The stored value of the E field sent on the forward analog control channel. **E_s**
18 identifies whether a home mobile station must send only **MIN1_p** or both **MIN1_p** and **MIN2_p**
19 when accessing the system.

20 **EX_p** - Identifies whether home mobile stations must send **MIN1_p** or both **MIN1_p** and **MIN2_p**
21 when accessing the system. **EX_p** differs from **E_s** in that the information is stored in the
22 mobile station's security and identification memory.

23 **FIRSTCHA_s** - The number of the first analog control channel used for accessing a system.

24 **FIRSTCHD_s** - The number for the first channel used as a dedicated control channel.

25 **FIRSTCHP_p** - The number of the first paging channel used as a paging channel in the
26 mobile station's "home" system.

27 **FIRSTCHP_s** - The number of the first analog control channel used for paging mobile
28 stations.

29 **HOME_SID_p** - Home System Identification. A 15-bit value that identifies the home system
30 for a MIN supported by the mobile station.

31 **LASTCHA_s** - The number of the last analog control channel used for accessing a system.

32 **LASTCHD_s** - The number for the last channel used as a dedicated control channel.

33 **LASTCHP_s** - The number of the last analog control channel used for paging mobile
34 stations.

35 **LOCAID_s** - The received location area identity.

36 **LOCAID_{s-p}** - Identifies the current location area.

37 **LRCC_s** - The last registration control channel used by a mobile station.

- 1 **LREG_s** - The stored value of the LREG field received in the most recent Location Area
2 Global Action Message.
- 3 **LT_s** - Identifies whether the next access attempt is required to be the last try.
- 4 **MAXBUSY_{al}** - The maximum number of busy occurrences allowed on a reverse analog
5 control channel.
- 6 **MAXSZTR_{al}** - The maximum number of seizure attempts allowed on a reverse analog
7 control channel.
- 8 **MIN1_p** - The 24-bit number that corresponds to the 7-digit directory telephone number
9 assigned to a mobile station.
- 10 **MIN2_p** - The 10-bit number that corresponds to the 3-digit area code assigned to a mobile
11 station.
- 12 **N_s** - The number of analog paging channels that a mobile station must scan.
- 13 **NBUSY_{sv}** - The number of times a mobile station attempts to seize a reverse analog control
14 channel and finds the reverse control channel busy.
- 15 **NSZTR_{sv}** - The number of times a mobile station attempts to seize a reverse analog control
16 channel and fails.
- 17 **NXTREG_{s-p}** - Identifies when a mobile station must make its next registration to a system.
- 18 **PDREG_s** - The stored value of the PDREG field received in the most recent Location Area
19 Global Action Message.
- 20 **PL_s** - The mobile station RF power level.
- 21 **PUREG_s** - The stored value of the PUREG field received in the most recent Location Area
22 Global Action Message.
- 23 **PUREG_{s-p}** - The semi-permanent value of PUREG_s.
- 24 **R_s** - Indicates whether registration is enabled or not.
- 25 **RAND_s** - The stored value of RAND. See 2.3.12.1.2.
- 26 **RCF_s** - Identifies whether the mobile station must read a Control Filler Message before
27 accessing a system on a reverse analog control channel.
- 28 **REGID_s** - The stored value of the last registration number (REGID_r) received on a forward
29 analog control channel.
- 30 **REGINCR_s** - Identifies increments between registrations by a mobile station.
- 31 **S_s** - Identifies whether the mobile station must send its serial number when accessing a
32 system.
- 33 **SCC_s** - A digital number that is stored and used to identify which SAT frequency a mobile
34 station should be receiving.
- 35 **SCM_p** - Station Class Mark. Defines mobile station parameters such as power class. See
36 Table 2.3.3-1.
- 37 **SDCC1_s** - The SDCC value stored in a mobile station's temporary memory.

- 1 **SDCC2_s** - The SDCC value stored in a mobile station's temporary memory.
- 2 **SID_p** - The home system identification stored in the mobile station's permanent security
3 and identification memory.
- 4 **SID_r** - The system identification received on a paging or access channel.
- 5 **SID_s** - The system identification received on a dedicated control channel.
- 6 **SID_{s-p}** - Identifies the system of current (last successful) registration.
- 7 **SSD_A_{s-p}** - The 64 most significant bits of the Shared Secret Data. SSD_A_{s-p} is used for
8 support of the authentication procedures.
- 9 **SSD_B_{s-p}** - The 64 least significant bits of the Shared Secret Data. SSD_B_{s-p} is used for
10 message encryption.
- 11 **WFOM_s** - Identifies whether a mobile station must wait for an Overhead Message Train
12 before accessing a system on a reverse analog control channel.

13 1.1.2.2 CDMA Numeric Information

- 14 The following are internal values stored by the mobile station in temporary memory which
15 are not sent over the air. See Appendix F for values stored by the mobile station in
16 permanent and semi-permanent memory.
- 17 **ACC_CHAN_s** - Number of Access Channels supported by the current Paging Channel.
- 18 **ACC_MSG_SEQ_s** - Last received *Access Parameters Message* sequence number.
- 19 **ACC_TMO_s** - Access Channel acknowledgement timeout, in units of 80 ms.
- 20 **ACK_WAITING_s[i]** - Acknowledgement status indicator for message sequence number i.
21 Set to YES if an acknowledgement is pending for the message; otherwise, set to NO.
- 22 **AGE_s** - Neighbor list age. For each pilot in the Neighbor Set, the mobile station increments
23 this counter each time a *Neighbor List Message* is received. When AGE_s exceeds
24 NGBHR_MAX_AGE, the pilot is deleted from the Neighbor Set.
- 25 **ANALOG_CHAN_s** - Analog channel number for CDMA-to-analog handoff.
- 26 **AUTH_s** - Current authentication mode.
- 27 **BAD_FRAMES_s** - Bad frames count. The number of received bad frames.
- 28 **BASE_CLASS_s** - Base station class of the current base station.
- 29 **BASE_ID_s** - Base station identification of the current base station.
- 30 **BASE_LAT_s** - Latitude of the current base station, in units of 0.25 seconds.
- 31 **BASE_LONG_s** - Longitude of the current base station, in units of 0.25 seconds.
- 32 **BKOFF_s** - Access Channel probe sequence backoff range.
- 33 **CDMACH_s** - CDMA Channel number. The CDMA Channel number currently used by the
34 mobile station.
- 35 **CHAN_LST_MSG_SEQ_s** - *CDMA Channel List Message* sequence number.

- 1 **CODE_CHAN_s** - Code channel for channel assignment or CDMA-to-CDMA handoff.
- 2 **CONFIG_MSG_SEQ_s** - Current message sequence number for the *System Parameters*
3 *Message*, *Neighbor List Message* and *CDMA Channel List Message*.
- 4 **COUNTER_ENABLED_s** - Timer-based registration indicator. Set to YES if timer-based
5 registration is enabled; otherwise, set to NO.
- 6 **CURR_ACC_MSG_SEQ** - Current *Access Parameter Message* sequence number.
- 7 **DAYLT_s** - Daylight Savings Time Indicator.
- 8 **DECORR** - Hashing function input used to decorrelate hashing function applications for
9 the same mobile station.
- 10 **DISTANCE** - Distance from registered base station to current base station, used for
11 distance-based registration.
- 12 **ENCRYPT_MODE_s** - Current message encryption mode.
- 13 **FOR_NID_REG_s** - Foreign NID roamer autonomous registration enable.
- 14 **FOR_SID_REG_s** - Foreign SID roamer autonomous registration enable.
- 15 **FRAME_OFFSET_s** - Current Traffic Channel frame offset, in units of 1.25 msec.
- 16 **HASH_KEY** - Hashing function input that determines the return value. Derived from either
17 the MIN or ESN, depending upon the application.
- 18 **HOME_REG_s** - Home (non-roaming) autonomous registration enable.
- 19 **INIT_PWR_s** - Initial power offset for Access Channel probes.
- 20 **LC_STATE_s** - Long code state obtained from the *Sync Channel Message*.
- 21 **LP_SEC_s** - Leap seconds count (offset of CDMA system time from UTC).
- 22 **LTM_OFF_s** - Local time offset from UTC, in units of 15 minutes.
- 23 **MAX_CAP_SZ_s** - Maximum number of Access Channel frames in an Access Channel
24 message capsule, less 3.
- 25 **MAX_REQ_SEQ_s** - Maximum number of access probe sequences for an Access Channel
26 request.
- 27 **MAX_RSP_SEQ_s** - Maximum number of access probe sequences for an Access Channel
28 response.
- 29 **MAX_SLOT_CYCLE_s** - Maximum value of the slot cycle index allowed by the current base
30 station.
- 31 **MEM_s** - Analog message encryption mode for CDMA-to-analog handoff.
- 32 **MIN_P_REV_s** - Minimum mobile station protocol revision level required for access to the
33 CDMA system.
- 34 **MOB_TERM_s** - Mobile station termination indicator. Set to '1' if the mobile station will
35 accept mobile station terminated calls in its current roaming status.
- 36 **MSG_PERSIST_s** - Persistence modifier for Access Channel message transmissions.

- 1 **MSG_SEQ_ACK_s** - Next message sequence number for messages requiring
2 acknowledgement.
- 3 **MSG_SEQ_NOACK_s** - Next message sequence number for messages not requiring
4 acknowledgement.
- 5 **MSG_SEQ_RCVD_s[i]** - Received message indicator for message sequence number i. Set to
6 YES if message sequence number i has been received. Set to NO when message sequence
7 number (i+4) modulo 8 has been received.
- 8 **MULT_NIDS_s** - Multiple NID storage indicator. Set to '1' if the mobile station may store
9 more than one entry in SID_NID_LIST_s for each SID.
- 10 **MULT_SIDS_s** - Multiple SID storage indicator. Set to '1' if the mobile station may store
11 entries in SID_NID_LIST_s having different SIDs.
- 12 **NGHBR_LST_MSG_SEQ_s** - *Neighbor List Message* sequence number.
- 13 **NGHBR_MAX_AGE_s** - Neighbor set maximum age for retention in the set.
- 14 **NID_s** - Network identification. A network is a subset of the base stations within a cellular
15 system.
- 16 **NOM_PWR_s** - Nominal transmit power offset. A correction factor to be used by mobile
17 stations in the open loop power estimate.
- 18 **NUM_STEP_s** - Number of access probes in a single access probe sequence.
- 19 **PAGECH_s** - Current CDMA Paging Channel number.
- 20 **PAGED** - Indicator for a page match detected while the mobile station is in the *System*
21 *Access State*.
- 22 **PAGE_CHAN_s** - Number of Paging Channels supported on the current CDMA channel.
- 23 **PAM_SZ_s** - Number of frames in the Access Channel preamble, less 1.
- 24 **PARAMETER_REG_s** - Parameter-change registration enable.
- 25 **PGSLOT** - Value obtained from the hashing function, used to determine the mobile station's
26 assigned Paging Channel slots.
- 27 **PILOT_ARRIVAL** - Time of occurrence, as measured at the mobile station antenna
28 connector, of the earliest arriving usable multipath component of the pilot. The arrival time
29 is measured relative to the mobile station's time reference.
- 30 **PILOT_INC_s** - Pilot PN sequence offset index increment. The interval between pilots, in
31 units of 64 PN chips, for base stations in a system.
- 32 **PILOT_PN_s** - Pilot Channel PN sequence offset, in units of 64 PN chips, for a base station.
- 33 **PILOT_PN_PHASE** - Calculated Pilot Channel PN phase, in chips, including the PN
34 sequence offset and the arrival time relative to the mobile station's time reference.
- 35 **POWER_DOWN_REG_s** - Power down registration enable indicator.
- 36 **POWER_UP_REG_s** - Power up registration enable indicator.
- 37 **PRAT_s** - Data rate of the Paging Channels.

- 1 **P_REV_s** - Protocol revision level supported by a base station.
- 2 **PROBE_BKOFF_s** - Access Channel probe backoff range, in slots.
- 3 **PROBE_PN_RAN_s** - Range for hashing function selection of the delay prior to transmission
4 of Access Channel probes. Value is $\log_2(\text{range} + 1)$.
- 5 **PSIST_s** - Persistence value for the mobile station's overload class.
- 6 **PWR_REP_DELAY_s** - Power report delay. The period that the mobile station waits following
7 an autonomous *Power Measurement Report* before restarting frame counting for power
8 control purposes.
- 9 **PWR_REP_FRAMES_s** - Power control reporting frame count. The number of frames over
10 which the mobile station is to count frame errors. Value is $2 \times \log_2(\text{frames} / 5)$.
- 11 **PWR_REP_MODE_s** - Power report mode indicator. Set to '1' if periodic reports are to be
12 made, and set to '0' if reports are made only on detection of a number of errors above the
13 specified threshold.
- 14 **PWR_REP_THRESH_s** - Power control reporting threshold. The number of bad frames to be
15 received in a measurement period before the mobile station is to generate a *Power*
16 *Measurement Report Message*.
- 17 **PWR_STEP_s** - Power increment for successive access probes, in units of 0.5 dB.
- 18 **RA** - Random access channel number. The Access Channel number generated (pseudo-
19 randomly) by the mobile station.
- 20 **RAND_s** - Authentication random challenge value.
- 21 **RANDOM_TIME** - Random time. A portion of SYS_TIME used to seed the random number
22 generator.
- 23 **REG_COUNT_s** - Timer-based registration count. The timer-based registration counter.
- 24 **REG_COUNT_MAX_s** - Timer-based registration count limit. The timer-based registration
25 counter expiration value computed from REG_PRR_r.
- 26 **REG_DIST_s** - Registration distance. Distance from last registration that causes a distance-
27 based registration to occur.
- 28 **REG_ENABLED_s** - Autonomous registrations enabled indicator.
- 29 **REG_PRR_s** - Registration period. The time interval between timer-based registrations.
30 Value is $4 \times \log_2(\text{time} / 0.08 \text{ s})$.
- 31 **REG_PSIST_s** - Persistence modifier for registration accesses (except ordered registrations).
- 32 **REG_ZONE_s** - Registration zone number of the base station.
- 33 **RETRY_COUNT_s** - Message retransmission count. Counter used to determine when the
34 maximum number of retransmissions has been exceeded for a given message.
- 35 **RN** - PN randomization delay. The delay in PN chips generated (pseudorandomly) by the
36 mobile station prior to performing an access attempt.

- 1 **RS** - Inter-probe sequence backoff. The delay in slots generated (pseudorandomly) by the
2 mobile station following an unsuccessful access probe sequence or prior to the first access
3 probe in a response attempt.
- 4 **RT** - Inter-probe backoff. The delay in slots generated (pseudorandomly) by the mobile
5 station following an unacknowledged access probe.
- 6 **SCC_s** - SAT color code for analog channel assignment and CDMA-to-analog handoff.
- 7 **SERVSYS_s** - Selected serving system indicator. Set to SYS_A if the current CDMA Channel
8 is in system A's frequency band. Otherwise set to SYS_B.
- 9 **SID_s** - System identifier.
- 10 **SID_NID_LIST_s** - Registration SID, NID list. The SID, NID pairs in which the mobile station
11 has registered.
- 12 **SLOT_CYCLE_INDEX_s** - Slot cycle index. Equal to the smaller of SLOT_CYCLE_INDEX_p
13 and the received maximum slot cycle index.
- 14 **SLOT_NUM** - Paging Channel slot number.
- 15 **SO_CUR_s** - Active service option number. The number of the service option active in the
16 mobile station.
- 17 **SO_REQ_s** - Service option request number. The number of the service option requested by
18 the mobile station.
- 19 **SRCH_WIN_A_s** - Search window size for the Active Set and Candidate Set.
- 20 **SRCH_WIN_N_s** - Search window size for the Neighbor Set.
- 21 **SRCH_WIN_R_s** - Search window size for the Remaining Set.
- 22 **SYS_PAR_MSG_SEQ_s** - System Parameters Message sequence number.
- 23 **SYS_TIME_s** - Current value of CDMA system time as received in the Sync Channel
24 Message.
- 25 **TA** - Acknowledgement response timeout.
- 26 **T_ADD_s** - Pilot detection threshold.
- 27 **T_COMP_s** - Active Set versus Candidate Set comparison threshold.
- 28 **T_DROP_s** - Pilot drop threshold.
- 29 **TOTAL_ZONES_s** - Number of registration zones to be retained in ZONE_LIST_s.
- 30 **TOT_FRAMES_s** - Total frames received. The total number of received frames, counted for
31 Forward Traffic Channel power control.
- 32 **T_TDROP_s** - Pilot drop timer value.
- 33 **VMAC_s** - Analog voice mobile station attenuation code for analog channel assignment or
34 CDMA-to-analog handoff.

1 **ZONE_LIST_s** - Registration zone list. List of zones in which the mobile station has
2 registered.

3 **ZONE_TIMER_s** - Zone timer length.

4 **1.2 CDMA System Time**

5 All base station digital transmissions are referenced to a common CDMA system-wide time
6 scale that uses the Global Positioning System (GPS) time scale, which is traceable to and
7 synchronous with Universal Coordinated Time (UTC). GPS and UTC differ by an integer
8 number of seconds, specifically the number of leap second corrections added to UTC since
9 January 6, 1980. The start of CDMA System Time is January 6, 1980 00:00:00 UTC, which
10 coincides with the start of GPS time.

11 System Time keeps track of leap second corrections to UTC but does not use these
12 corrections for physical adjustments to the System Time clocks.

13 Figure 1.2-1 shows the relation of System Time at various points in the CDMA system. The
14 long code and the zero offset pilot PN sequences for the I and Q channels (see 6.1.3.1.8,
15 6.1.3.1.9, 7.1.3.1.6, and 7.1.3.1.9) are shown in their initial states at the start of System
16 Time. The initial state of the long code is that state in which the output of the long code
17 generator is the first '1' output following 41 consecutive '0' outputs, with the binary mask
18 consisting of '1' in the MSB followed by 41 '0's. Referring to the shift register in Figure
19 6.1.3.1.8-1, this implies that the 42nd bit in the shift register equals '1' and that all other
20 bits in the shift register are equal to '0'. The initial state of the pilot PN sequence, both I
21 and Q, is that state in which the output of the pilot PN sequence generator is the first '1'
22 output following 15 consecutive '0' outputs. The alignment of the initial states of the long
23 code and the pilot PN sequence does not occur again for more than 37 centuries.

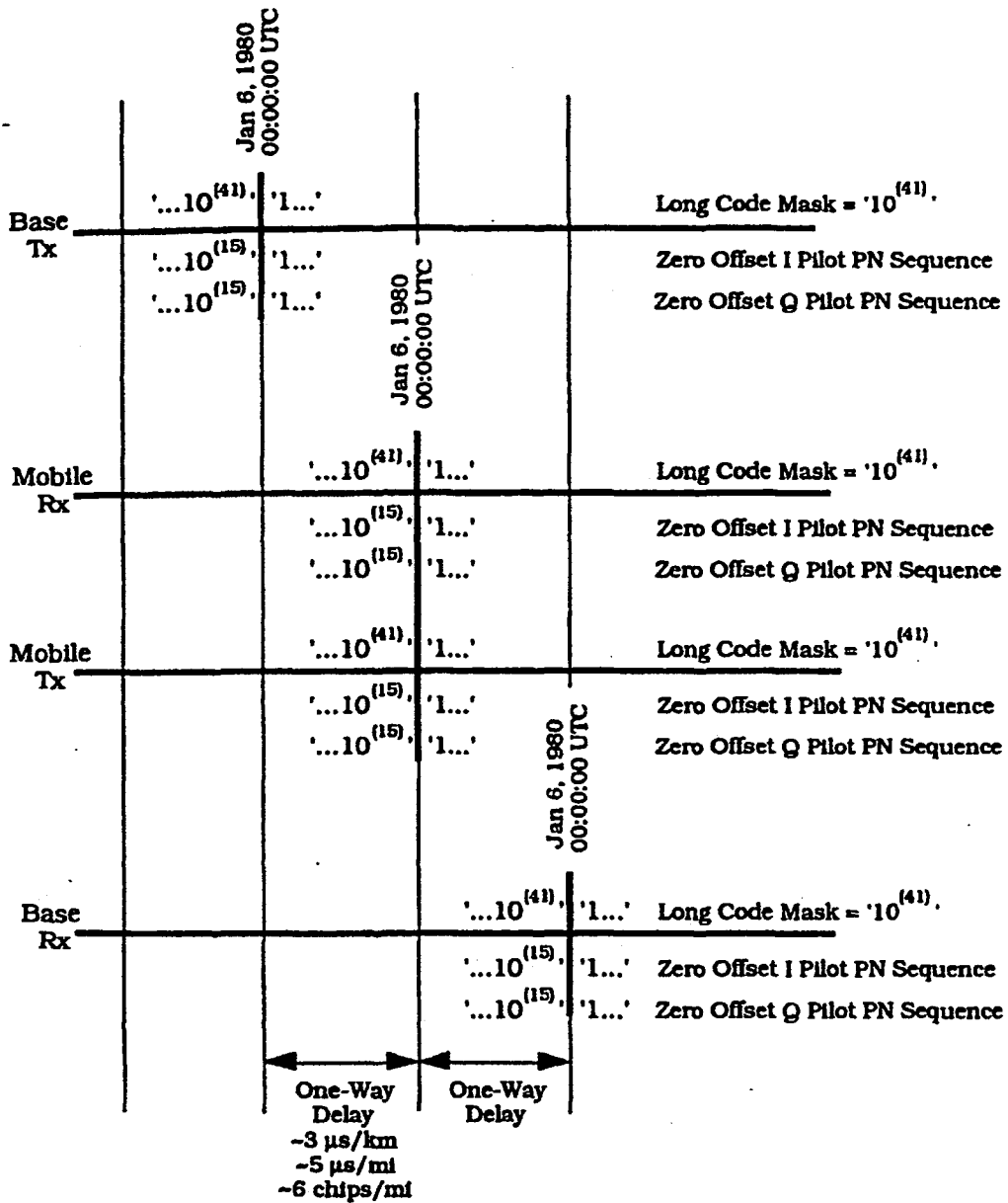
24 From Figure 1.2-1, note that the System Time at various points in the transmission and the
25 reception processes is the absolute time referenced at the base station antenna offset by the
26 one-way or round-trip delay of the transmission, as appropriate. Time measurements are
27 referenced to the transmit and receive antennas of the base station and the RF connector of
28 the mobile station. The precise zero instant of System Time is the midpoint between the
29 last '0' of the 41 consecutive '0' outputs and the succeeding '1' of the long code using the
30 binary mask consisting of '1' in the MSB followed by 41 '0's.

31 Wherever this document refers to CDMA System time in frames, it is taken to mean an
32 integer value t such that:

$$33 \quad t = \lfloor s/0.02 \rfloor$$

34 where s represents System Time in seconds.

35



Note: Time measurements are made at the antennas of base stations and the RF connectors of the mobile stations.

$0^{(n)}$ denotes a sequence of n consecutive zeroes.

Figure 1.2-1. System Time Line

1 **1.3 Tolerances**

2 **1.3.1 Analog System Tolerances**

3 Unless otherwise specified, all call-processing timers and call-processing timing values have
4 a tolerance of $\pm 10\%$. Tolerances of other parameters are provided for guidance only. Refer
5 to IS-98 "Recommended Minimum Performance Standards for Dual-Mode Wideband Spread
6 Spectrum Cellular Mobile Stations" and IS-97 "Recommended Minimum Performance
7 Standards for Base Stations Supporting Dual-Mode Wideband Spread Spectrum Cellular
8 Mobile Stations," for minimum standards, definitions, tolerances, and measurement
9 methods.

10 **1.3.2 CDMA Tolerances**

11 Unless otherwise specified, all values indicated in Sections 6, 7, and the referenced
12 appendices are exact unless an explicit tolerance is stated. Also refer to IS-98
13 "Recommended Minimum Performance Standards for Dual-Mode Wideband Spread
14 Spectrum Cellular Mobile Stations" and IS-97 "Recommended Minimum Performance
15 Standards for Base Stations Supporting Dual-Mode Wideband Spread Spectrum Cellular
16 Mobile Stations."

17

1

2

3 No text.

4

1 **2 REQUIREMENTS FOR MOBILE STATION ANALOG OPERATION**

2 (See also Section 4 for Mobile Station Options.)

3 **2.1 Transmitter**

4 **2.1.1 Frequency Parameters**

5 **2.1.1.1 Channel Spacing and Designation**

6 Channel spacing shall be 30 kHz and the dual-mode mobile station transmit channel at
7 825.030 MHz (and the corresponding base station transmit channel at 870.030 MHz) shall
8 be termed channel number 1. The 20 MHz range of channels 1 through 666 as shown in
9 Table 2.1.1.1-1 for System A and System B is basic. The additional 5 MHz of channels 667
10 through 799 and (wrap-around) 991 through 1023 for extending System A (A', A'') and B (B')
11 is mandatory. The station class mark (SCM, see 2.3.3) shall be set appropriately.

12

Table 2.1.1.1-1. Channel Numbers and Frequencies

System	Bandwidth (MHz)	Number of Channels	Boundary Channel Number	Transmitter Center Frequency (MHz)	
				Mobile	Base
(Not used)		1	(990)	(824.010)	(869.010)
A'	1	33	991	824.040	869.040
			1023	825.000	870.000
A	10	333	1	825.030	870.030
			333	834.990	879.990
B	10	333	334	835.020	880.020
			666	844.980	889.980
A'	1.5	50	667	845.010	890.010
			716	846.480	891.480
B'	2.5	83	717	846.510	891.510
			799	848.970	893.970

In the above, the center frequency in MHz corresponding to the channel number (expressed as N) is calculated as follows.

Transmitter	Channel Number	Center Frequency (MHz)
Mobile	$1 \leq N \leq 799$	$0.030 N + 825.000$
	$990 \leq N \leq 1023$	$0.030 (N - 1023) + 825.000$
Base	$1 \leq N \leq 799$	$0.030 N + 870.000$
	$990 \leq N \leq 1023$	$0.030 (N - 1023) + 870.000$

2.1.1.2 Frequency Tolerance

The mobile station carrier frequency must be maintained within ± 2.5 parts per million (ppm) of any assigned channel frequency, except during channel switching (see 2.1.2.1). This tolerance must be maintained over the ambient temperature range of -30°C to $+60^{\circ}\text{C}$, and over the supply voltage range of ± 15 percent from the nominal value.

1 **2.1.2 Power Output Characteristics**

2 **2.1.2.1 Carrier On/Off Conditions**

3 The carrier-off condition is defined as a power output at the transmitting antenna
4 connector not exceeding -60 dBm. When commanded to the carrier-on condition on a
5 reverse control channel, a mobile station transmitter must come to within 3 dB of the
6 specified output power (see 2.1.2.2) and to within the required stability (see 2.1.1.2) within
7 2 ms. Conversely, when commanded to the carrier-off condition, the transmit power must
8 fall to a level not exceeding -60 dBm within 2 ms. Whenever a transmitter is more than 1
9 kHz from its initial or final value during channel switching, the transmitter carrier must be
10 inhibited to a power output level not greater than -60 dBm.

11 **2.1.2.2 Power Output and Power Control**

12 The maximum effective radiated power (ERP) with respect to a half wave dipole for any class
13 mobile station transmitter is 8 dBW (6.3 Watts). An inoperative antenna assembly must
14 not degrade the spurious emission levels as defined in 2.1.4.2. The nominal ERP for each
15 class of mobile station transmitter is: Class I 6 dBW (4.0 Watts), Class II 2 dBW (1.6
16 Watts), Class III -2 dBW (0.6 Watts).

17 A mobile station transmitter must be capable of reducing or increasing power on command
18 from a base station specifying the power level 0 to 7. The nominal levels are given in Table
19 2.1.2.2-1. Each power level must be maintained within the range of +2 dB/-4 dB of its
20 nominal level over the ambient temperature range of -30°C to +60°C, and over the supply
21 voltage range of ±10 percent from the nominal value, accumulative. A power change
22 command will raise or lower power in increments of 4 dB.

23 All classes of mobile stations will respond to a CMAC or a VMAC command by setting their
24 transmit power to the appropriate Mobile Station Power Level, regardless of prior Mobile
25 Station Power Level.

26
27 **Table 2.1.2.2-1. Mobile Station Nominal Power Levels**

Mobile Station Power Level (PL)	Mobile Attenuation Code (MAC)	Nominal ERP (dBW) for Mobile Station Power Class		
		I	II	III
0	000	6	-2	-2
1	001	2	2	-2
2	010	-2	-2	-2
3	011	-6	-6	-6
4	100	-10	-10	-10
5	101	-14	-14	-14
6	110	-18	-18	-18
7	111	-22	-22	-22

2.1.3 Modulation Characteristics**2.1.3.1 Voice Signals**

The modulator is preceded by the following five voice-processing stages (in the order listed):

- Transmit Audio Level Adjustment
- Compressor
- Pre-Emphasis
- Deviation Limiter
- Post Deviation-Limiter Filter

Pending the generation of a complete speech transmission plan for dual-mode cellular systems, the following requirements shall be met to ensure compatibility with the transmission plan for fixed digital speech networks.

2.1.3.1.1 Compressor

This stage is the compressor portion of a 2:1 syllabic compandor. For every 2 dB change in input level to a 2:1 compressor within its operating range, the change in output level is a nominal 1 dB. The compressor must have a nominal attack time of 3 ms and a nominal recovery time of 13.5 ms as defined by the CCITT (Reference: Recommendation G162, CCITT Plenary Assembly, Geneva, May-June 1964, Blue Book, Vol. 111, P. 52). The nominal reference input level to the compressor is that corresponding to a 1000 Hz acoustic tone at the expected nominal speech volume level. This level must produce a nominal ± 2.9 kHz peak frequency deviation of the transmitted carrier.

2.1.3.1.2 Pre-Emphasis

The pre-emphasis characteristic must have a nominal +6 dB/octave response between 300 and 3000 Hz.

2.1.3.1.3 Deviation Limiter

For audio (voice) inputs applied to the transmitter voice-signal processing stages, a dual-mode mobile station operating in analog mode must limit the instantaneous frequency deviation to ± 12 kHz. This requirement excludes supervision signals (see 2.4) and wideband data signals (see 2.1.3.2).

1 **2.1.3.1.4 Post Deviation-Limiter Filter**

2 The deviation limiter must be followed by a low-pass filter whose characteristics are:

3

Frequency Band	Attenuation Relative to 1000 Hz
3000 - 5900 Hz	$\geq 40 \log (f/3000)$ dB
5900 - 6100 Hz	≥ 35 dB
6100 - 15000 Hz	$\geq 40 \log (f/3000)$ dB
above 15000 Hz	≥ 28 dB

4 **2.1.3.1.5 Transmit Level Adjustment**

5 The mobile station shall have a transmit objective loudness rating (TOLR) equal to -46 dB,
6 when transmitting to a reference base station (see 3.2.2.1). The loudness ratings are
7 described in IEEE Standard 661-1979. Measurement techniques are described in IS-98
8 "Recommended Minimum Performance Standards for Dual-Mode Wideband Spread
9 Spectrum Cellular Mobile Stations."

10 **2.1.3.2 Wideband Data Signals**

11 **2.1.3.2.1 Encoding**

12 The reverse control channel (RECC) and reverse voice channel (RVC) wideband data
13 streams (see 2.7) must be further encoded such that each nonreturn-to-zero binary one is
14 transformed to a zero-to-one transition, and each nonreturn-to-zero binary zero is
15 transformed to a one-to-zero transition.

16 **2.1.3.2.2 Modulation and Polarity**

17 The filtered wideband data stream must then be used to modulate the transmitter carrier
18 using direct binary frequency shift keying. A one (i.e., high state) into the modulator must
19 correspond to a nominal peak frequency deviation 8 kHz above the carrier frequency, and a
20 zero into the modulator must correspond to a nominal peak frequency deviation 8 kHz
21 below the carrier frequency.

2.1.4 Limitations on Emissions**2.1.4.1 Bandwidth Occupied**

Modulation products outside the region ± 20 kHz from the carrier shall not exceed a level of 26 dB below the unmodulated carrier. Modulation products outside the region of ± 45 kHz from the carrier shall not exceed a level of 45 dB below the unmodulated carrier. Modulation products outside the region of ± 90 kHz from the carrier shall not exceed a level of (a) 60 dB below the unmodulated carrier, or (b) 43 plus $10 \log_{10}$ (mean output power in Watts) dB below the unmodulated carrier, whichever is the higher level of power. Measurement techniques are defined in the current IS-98 "Recommended Minimum Performance Standards for Dual-Mode Wideband Spread Spectrum Cellular Mobile Stations."

2.1.4.2 Conducted Spurious Emissions

Refer to IS-98 "Recommended Minimum Performance Standards for Dual-Mode Wideband Spread Spectrum Cellular Mobile Stations."

2.1.4.3 Radiated Spurious Emissions

Refer to IS-98 "Recommended Minimum Performance Standards for Dual-Mode Wideband Spread Spectrum Cellular Mobile Stations."

2.2 Receiver**2.2.1 Frequency Parameters****2.2.1.1 Channel Spacing and Designation**

Channel spacing shall be 30 kHz and the dual-mode mobile station receive channel at 870.030 MHz (and the corresponding base station receive channel at 825.030 MHz) shall be termed channel number 1. The 20 MHz range of channels 1 through 666 as shown in Table 2.1.1.1-1 for System A and System B is basic. The additional 5 MHz of channels 667 through 799 and (wrap-around) 991 through 1023 for extending Systems A and B is mandatory. In either case, the station class mark (SCM, see 2.3.3) shall be set appropriately.

2.2.2 Demodulation Characteristics**2.2.2.1 Voice Signals**

The demodulator is followed by the following three voice-signal processing stages:

- De-emphasis
- Expander
- Receive Audio Level Adjustment

1 Pending the generation of a complete speech transmission plan for dual-mode cellular
2 systems, the following requirements shall be met to ensure compatibility with the
3 transmission plan for fixed digital speech networks.

4 2.2.2.1.1 De-Emphasis

5 The de-emphasis characteristic must have a nominal -6 dB per octave response between
6 300 and 3000 Hz.

7 2.2.2.1.2 Expander

8 This stage is the expander portion of a 2:1 syllabic compandor. For every 1 dB change in
9 input level to a 1:2 expander, the change in output level is a nominal 2 dB. The signal
10 expansion must follow all other demodulation signal processing (including the 6 dB/octave
11 de-emphasis and filtering). The expander must have a nominal attack time of 3 ms and a
12 nominal recovery time of 13.5 ms as defined by the CCITT (Reference: Recommendation
13 G162, CCITT Plenary Assembly, Geneva, May-June 1964, Blue Book, Vol. 111, P. 52). The
14 nominal reference input level to the expander is that corresponding to a 1000 Hz tone from
15 a carrier with a ± 2.9 kHz peak frequency deviation.

16 2.2.2.1.3 Audio Level Adjustment

17 The mobile station shall have a nominal receive objective loudness rating (ROLR) equal to
18 51 dB when receiving from a reference base station (see 3.1.3.1). The loudness ratings are
19 described in IEEE Standard 661-1979. Measurement techniques are described in IS-98
20 "Recommended Minimum Performance Standards for Dual-Mode Wideband Spread
21 Spectrum Cellular Mobile Stations."

22 2.2.3 Limitations on Emissions

23 2.2.3.1 Conducted Spurious Emissions

24 2.2.3.1.1 Suppression Inside Cellular Band

25 Any RF signals emitted in the mobile station's receive band must not exceed -80 dBm, as
26 measured at the antenna connector. Additionally, signals in the mobile station's transmit
27 band must not exceed -60 dBm, as measured at the antenna connector.

28 2.2.3.1.2 Suppression Outside Cellular Band

29 Refer to IS-98 "Recommended Minimum Performance Standards for Dual-Mode Wideband
30 Spread Spectrum Cellular Mobile Stations."

31 2.2.3.2 Radiated Spurious Emissions

32 Refer to IS-98 "Recommended Minimum Performance Standards for Dual-Mode Wideband
33 Spread Spectrum Cellular Mobile Stations."

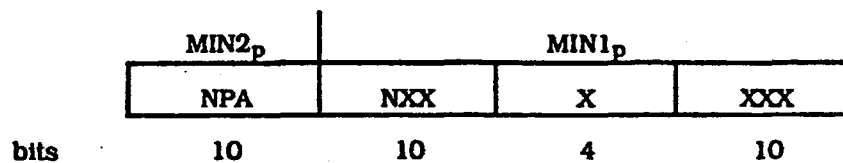
1 **2.2.4 Other Receiver Parameters**

2 System performance is predicated upon receivers meeting IS-98 "Recommended Minimum
3 Performance Standards for Dual-Mode Wideband Spread Spectrum Cellular Mobile
4 Stations."

5 **2.3 Security and Identification**

6 **2.3.1 Mobile Identification Number**

7 The mobile identification number (MIN) is a 34-bit binary number which is derived from a
8 10-digit directory telephone number by the following procedure.



10

11 (1) The first three digits are mapped into 10 bits (corresponding to {MIN2_p}) by the
12 following coding algorithm:

13 (a) Represent the 3-digit field as D₁ D₂ D₃ with the digit 0 having the value 10.

14 (b) Compute $100D_1 + 10D_2 + D_3 - 111$.

15 (c) Convert the result in step (b) to binary by a standard decimal-to-binary
16 conversion (see table below).

17 (2) The second three digits are mapped into the 10 most significant bits of MIN1_p by the
18 coding algorithm described in (1).

19 (3) The last four digits are mapped into the 14 least-significant bits of MIN1_p as follows:

20 (a) The thousands digit should be mapped into four bits by a Binary-Coded-Decimal
21 (BCD) conversion, as specified in the table below.

22 (b) The last three digits are mapped into 10 bits by the coding algorithm described
23 in (1).

24

DECIMAL-TO-BINARY CONVERSION		THOUSANDS-DIGIT BCD MAPPING PROCEDURE	
Decimal Number	Binary Number	Thousands Digit	Binary Sequence
1	000000001	1	0001
2	000000010	2	0010
3	000000011	3	0011
4	000000100	4	0100
		5	0101
		6	0110
		7	0111
998	1111100110	8	1000
999	1111100111	9	1001
		0	1010

1

2 In the following example the 10-digit directory telephone number 321-456-7890 is encoded
3 into MIN2 and MIN1 using the procedure described above:

- 4 • MIN2. The 10-bit MIN2 is derived from the first three digits of the telephone number
5 (i.e., 321):

6 (a) $D_1 = 3; D_2 = 2; D_3 = 1.$

7 (b) $100 D_1 + 10 D_2 + D_3 - 111 = 100(3) + 10(2) + (1) - 111 = 210.$

8 (c) 210 in binary is '00 1101 0010'.

9 Therefore MIN2 is '00 1101 0010'.

- 10 • MIN1. The 10 most significant bits of MIN1 are derived from the second three digits
11 of the telephone number (i.e., 456):

12 (a) $D_1 = 4; D_2 = 5; D_3 = 6$

13 (b) $100 D_1 + 10 D_2 + D_3 - 111 = 100(4) + 10(5) + (6) - 111 = 345.$

14 (c) 345 in binary is '0101 0110 01'.

15 The next four most significant bits of MIN1 are derived from the thousands digit of the
16 telephone number (i.e., 7) by BCD conversion:

17 7 in BCD is '0111'.

18 The 10 least significant bits of MIN1 are derived from the last three digits of the telephone
19 number (i.e., 890):

20 (a) $D_1 = 8; D_2 = 9; D_3 = 10.$

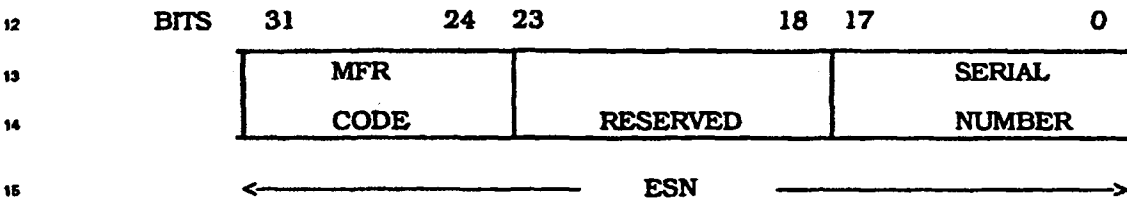
21 (b) $100 D_1 + 10 D_2 + D_3 - 111 = 100(8) + 10(9) + (10) - 111 = 789.$

1 (c) 789 in binary is '11 0001 0101'.
 2 Therefore MIN1 is '0101 0110 0101 1111 0001 0101'.

3 **2.3.2 Electronic Serial Number (ESN)**

4 The ESN is a 32-bit binary number that uniquely identifies the mobile station to any
 5 cellular system. It must be factory-set and not readily alterable in the field. Modification of
 6 the ESN will require a special facility not normally available to subscribers. The circuitry
 7 that provides the ESN must be isolated from fraudulent contact and tampering. Electronic
 8 storage devices mounted in sockets or connected with a cable are deemed not to comply
 9 with this requirement. Attempts to change the ESN circuitry must render the mobile
 10 station inoperative.

11 The bit allocation of the ESN shall be as follows:



16 At the time of issuance of initial type acceptance, the manufacturer shall be assigned a
 17 Manufacturer's (MFR) Code within the eight most-significant bits (bit 31 through bit 24) of
 18 the 32-bit serial number. Bits 23 through 18 shall be reserved (initially all zero), and bits
 19 17 through 0 shall be uniquely assigned by each manufacturer. When a manufacturer has
 20 used substantially all possible combinations of serial numbers within bits 17 through 0,
 21 the manufacturer may submit notification to the FCC. The FCC will allocate the next
 22 sequential binary number within the reserve block (bits 23 through 18).

23 **2.3.3 Station Class Mark**

24 Class-of-station information referred to as the station class mark (SCM_p) must be stored in
 25 a mobile station. The digital representation of this class mark is specified in Table 2.3.3-1.

26

Table 2.3.3-1. Station Class Mark

Function	Bit(s)	Setting	
Reserved	7	Always 0	0XXXXXXXX
Dual Mode	6	CDMA Only Dual Mode	X0XXXXXXXX X1XXXXXXXX
Slotted Class	5	Non-Slotted Slotted	XX0XXXXXX XX1XXXXXX
IS-54 Power Class	4	Always 0	XXXXXXXXX
25 MHz Bandwidth	3	Always 1	XXXX1XXX
Transmission	2	Continuous Discontinuous	XXXXX0XX XXXXX1XX
Power Class	1 - 0	Class I Class II Class III Reserved	XXXXXX00 XXXXXX01 XXXXXX10 XXXXXX11

2

3 The least significant 5 bits of the dual-mode SCM are used when operating in the analog
4 mode (see 2.7.1.1); all bits are used when operating in the CDMA mode.

5 2.3.4 Registration Memory

6 (See 6.3.4 for registration memory when operating in the CDMA mode.)

7 2.3.4.1 Autonomous Registration Memory

8 A single 21-bit (20 data bits plus an overflow bit) next registration indicator (NXTREG_{s-p})
9 and corresponding 15-bit system identification indicator (SID_{s-p}) pair must be retained
10 when the mobile station power is turned off. The data retention time under power-off
11 condition must be longer than 48 hours. If the integrity of the stored data can not be
12 guaranteed after the mobile station is disconnected from the vehicle battery, then the
13 memory must be set to zero when power is re-applied to the mobile station.

14 2.3.4.2 Location Area Memory

15 A 12-bit location area identifier (LOCAID_{s-p}) must be stored in the mobile station and used
16 to identify changes in location area (see 2.6.2.1). The LOCAID_{s-p} value must be retained
17 when the mobile station power is turned off. The data retention time under power-off
18 condition must be longer than 48 hours. If the integrity of the stored data cannot be
19 guaranteed after the mobile station is disconnected from the vehicle battery, then the
20 memory must be set to zero when power is re-applied to the mobile station.

1 A 1-bit power-up registration identifier ($PUREG_{s-p}$) must be stored in the mobile station
 2 and used to identify changes in the power-up registration flag (see 2.6.2.1). The $PUREG_{s-p}$
 3 value must be retained when the mobile station power is turned off. The data retention
 4 time-under power-off condition must be longer than 48 hours. If the integrity of the stored
 5 data cannot be guaranteed after the mobile station is disconnected from the vehicle battery,
 6 then the memory must be set to zero when power is re-applied to the mobile station.

7 **2.3.5 Access Overload Class**

8 A 4-bit overload class indicator ($ACCOLC_p$) is used to identify which overload class controls
 9 access attempts by the mobile station (see 2.6.3.4 and 6.6.3.1).

10 The mobile station shall store a 4-bit access overload class ($ACCOLC_p$). Mobile stations
 11 that are not for test or emergency use should be assigned to overload classes $ACCOLC$ 0
 12 through $ACCOLC$ 9 according to a uniform distribution. Mobile stations designated for test
 13 use should be assigned to $ACCOLC$ 10, while mobile stations designated for emergency use
 14 should be assigned to $ACCOLC$ 11. $ACCOLC$ 12 through $ACCOLC$ 15 are reserved.¹

15 **2.3.6 Extended Address Method**

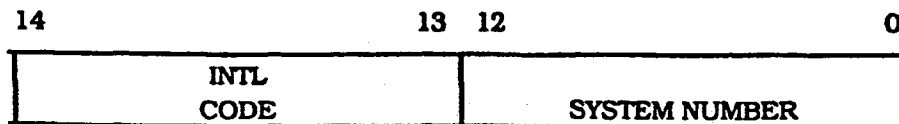
16 A 1-bit access method indicator (EX_p) must be stored in the mobile station and used to
 17 determine if the extended address word must be included in all access attempts (see
 18 2.6.3.7).

19 **2.3.7 First Paging Channel**

20 An 11-bit first paging channel ($FIRSTCHP_p$) must be stored in the mobile station and used
 21 to identify the channel number of the first paging channel when the mobile station is
 22 "home" (see 2.6.1.1.2).

23 **2.3.8 Home System Identification**

24 A 15-bit system identification indicator ($HOME_SID_p$) must be stored in the mobile station
 25 and used to identify the mobile station's home system (see 2.6.1.1.2). The bit allocation of
 26 the system identification indicator shall be as follows:



¹For more information, refer to EIA Telecommunications Systems Bulletin No. 16 (March 1985), "Assignment of Access Overload Classes in the Cellular Telecommunications Services."

1 The international (INTL) codes (bits 14 and 13) shall be allocated as follows:

2

BIT 14	BIT 13	
0	0	United States
0	1	Other countries
1	0	Canada
1	1	Mexico

3

4 Bits 12 through 0 will be assigned to each U.S. system by the FCC. See EIA/TIA
5 Telecommunications Services Bulletin TSB29 (International Implementation of Cellular
6 Radiotelephone Systems Compliant with ANSI/EIA/TIA-533) for international SID coding
7 requirements.

8 **2.3.9 Local Control Option**

9 A means must be provided within the mobile station to enable or disable the local control
10 option.

11 **2.3.10 Preferred Operation Selection**

12 **2.3.10.1 Preferred System**

13 A means shall be provided within the mobile station to identify the preferred system as
14 either System A or System B. In addition, the mobile station may provide a means for
15 allowing operation only with System A or System B.

16 **2.3.10.2 Preferred CDMA or Analog**

17 A means may be provided within the mobile station to identify the preferred operation type
18 as either CDMA mode or analog mode. In addition, the mobile station may provide a means
19 for allowing operation only with the analog or CDMA mode.

20 **2.3.11 Discontinuous Transmission**

21 Discontinuous transmission refers to the ability of certain mobile stations to switch
22 autonomously between two transmitter power-level states ("DTX-high" and "DTX-low") while
23 the mobile station is in the conversation state on an analog voice channel. Discontinuous
24 transmission is not permitted in any state other than the conversation state.

25 In the DTX-high state, the transmitter radiates at the power level indicated by the most
26 recent power-controlling order (initial-voice-channel-designation, handoff, or power-change
27 order) received by the mobile station. In this state the mobile station must transpond SAT
28 at all times, except for the normal suspensions of SAT covered in 2.4.1.

1 In the DTX-low state, the transmitter radiates at a power level determined by the DTX-high-
2 state power level ("DTX-high level") and the DTX_s indicator that is copied from the DTX field
3 in Word 2 of the System Parameter Overhead Message (see 3.7.1.2.1). If the DTX_s indicator
4 is set to '10', the DTX-low level must equal or exceed a level that is 8 dB below the DTX-
5 high level. If the DTX_s indicator is set to '11', no minimum applies to the DTX-low level;
6 that is, the transmitter may be turned off or it may be turned on at any level up to the DTX-
7 high level. In the DTX-low state, the mobile station must not transpond SAT. If the DTX_s
8 indicator is set to '00', only the DTX-high state (that is "continuous transmission") is
9 permitted. The DTX_s indicator setting of '01' is reserved.

10 When a mobile station switches from the DTX-high state to the DTX-low state, it must pass
11 through a transition state in which the transmitted power is at the DTX-high level but SAT
12 is not transponded. The sequence must be as follows: starting in the DTX-high state, enter
13 the transition state; remain in the transition state 300 ms; enter the DTX-low state.

14 When a mobile station switches from the DTX-low state to the DTX-high state, it must
15 begin transponding SAT immediately after changing the power level, except for the normal
16 suspensions of SAT covered in 2.4.1. Each time that the mobile station enters the DTX-
17 high state, it must remain in that state for at least 1.5 seconds, unless it enters the DTX-
18 high state in response to an audit order in which case it must remain in that state for at
19 least 5 seconds. (Note that any requirement for the mobile station to remain in the DTX-
20 high state for a certain minimum time interval does not prohibit the mobile station from
21 leaving the conversation state before the interval ends.)

22 2.3.12 Authentication, Encryption of Signaling Information/User Data

23 Note: Messages received during the authentication procedures that are unrelated to the
24 authentication process shall also be processed.

25 2.3.12.1 Authentication

26 Authentication is the process by which information is exchanged between a mobile station
27 and base station for the purpose of confirming the identity of the mobile station. A
28 successful outcome of the authentication process occurs only when it can be demonstrated
29 that the mobile station and base station possess identical sets of shared secret data.

30 The authentication algorithms are described in "Common Cryptographic Algorithms." The
31 interface (input and output parameters) for the algorithms are described in "Interface
32 Specification for Common Cryptographic Algorithms." Table 2.3.12.1-1 summarizes the
33 setting of the input parameters of the Auth_Signature procedure for each of its uses in this
34 standard.

Table 2.3.12.1-1. Auth_Signature Input Parameters

Procedure	RAND_CHALLENGE	ESN	AUTH_- DATA	SSD_- AUTH	SAVE_- REGISTERS
Registration (2.3.12.1.4)	RAND _s	ESN _p	MIN1	SSD_A	FALSE
Unique Challenge (2.3.12.1.5)	256 × RANDU + (8 LSBs of MIN2)	ESN _p	MIN1	SSD_A	FALSE
Originations (2.3.12.1.6)	RAND _s	ESN _p	Digits	SSD_A	TRUE
Terminations (2.3.12.1.7)	RAND _s	ESN _p	MIN1	SSD_A	TRUE
Base Station Challenge (2.3.12.1.8)	RANDBS	ESN _p	MIN1	SSD_A_- NEW	FALSE

2.3.12.1.1 Shared Secret Data (SSD)

SSD is a 128-bit pattern stored in the mobile station (in semi-permanent memory) and readily available to the base station. As depicted in Figure 2.3.12.1.1-1, SSD is partitioned into two distinct subsets. Each subset is used to support a different process.

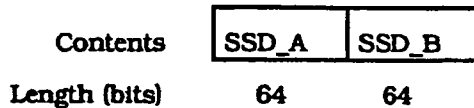


Figure 2.3.12.1.1-1. Partitioning of SSD

Specifically,

SSD_A is used to support the authentication procedures; and

SSD_B is used to support CDMA voice privacy (see 6.3.12.3), and message confidentiality for CDMA and analog.

SSD is generated according to the procedures specified in 2.3.12.1.8 or 6.3.12.1.9.

2.3.12.1.2 Random Challenge Memory (RAND)

A 32-bit value held in the mobile station. When received on the forward analog control channel, it is the concatenation of the last RAND1_A and RAND1_B values received in Random Challenge A and Random Challenge B Global Action Messages appended to the overhead message train. Both RAND1_A and RAND1_B must be received on the same control channel and in the same Overhead Message Train in order for a valid RAND to exist.

1 When received on the CDMA Paging Channel, it is equal to the RAND value received in the
2 last *Access Parameters Message* (see 7.7.2.3.2.2).

3 RAND_s is used in conjunction with SSD_A and other parameters, as appropriate, to
4 authenticate mobile station originations, terminations and registrations.

5 2.3.12.1.3 Call History Parameter (COUNT_{s-p})

6 A modulo-64 count held in the mobile station. COUNT_{s-p} is updated at the mobile upon
7 receipt of a Parameter Update Order (see Table 3.7.1.1-1) on the FVC. COUNT_{s-p} is also
8 updated by the mobile station when a *Parameter Update Order* is received on the CDMA
9 Forward Traffic Channel (see 7.7.4).

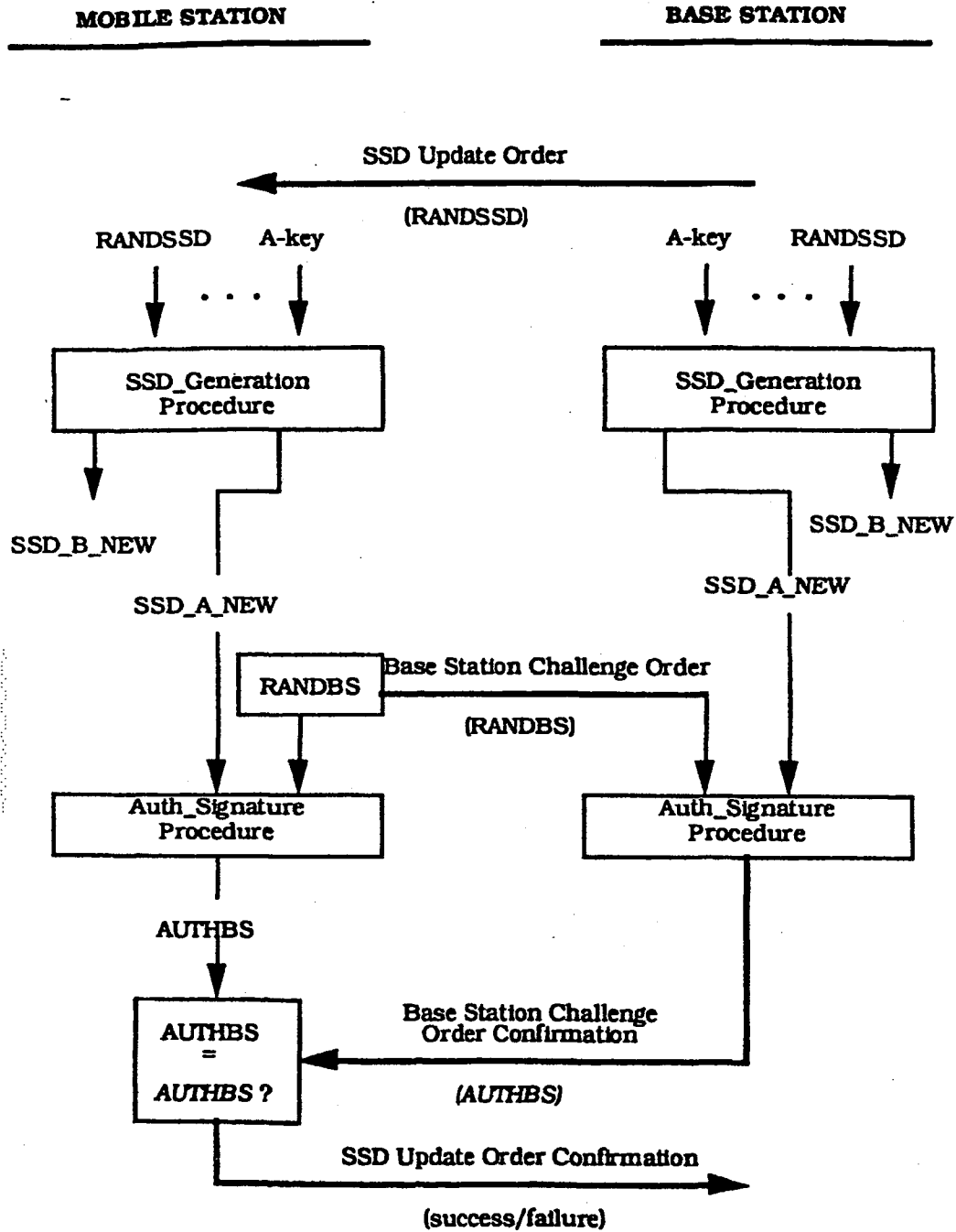
10 2.3.12.1.4 Authentication of Mobile Station Registrations

11 When the information element AUTH in the System Parameter Overhead Message is set to
12 1, and the mobile station attempts to register, the following authentication-related
13 procedures shall be performed:

- 14 • In the mobile station,
 - 15 • set the input parameters of the Auth_Signature procedure (see "Interface
16 Specification for Common Cryptographic Algorithms," section 2.3) as
17 illustrated in Figure 2.3.12.1.4-1;
 - 18 • set the SAVE_REGISTERS input parameter to FALSE;
 - 19 • execute the Auth_Signature procedure;
 - 20 • set AUTHR equal to the 18-bit output AUTH_SIGNATURE;
 - 21 • send AUTHR together with RANDC (eight most significant bits of RAND)
22 and COUNT_{s-p} to the base station (Authentication Word C of RECC
23 Autonomous Registration Order Message).
- 24 • At the base station,
 - 25 • compare the received values for RANDC, and optionally COUNT, with the
26 internally stored values associated with the received MIN/ESN;
 - 27 • compute AUTHR as described above, except use the internally stored
28 value of SSD_A; and
 - 29 • compare the value for AUTHR computed internally with the value of
30 AUTHR received from the mobile station.

31 If any of the comparisons by the base station fail, the base station may deem the
32 registration attempt unsuccessful, initiate the Unique Challenge-Response Procedure (see
33 2.3.12.1.5), or commence the process of updating the SSD (see 2.3.12.1.8).

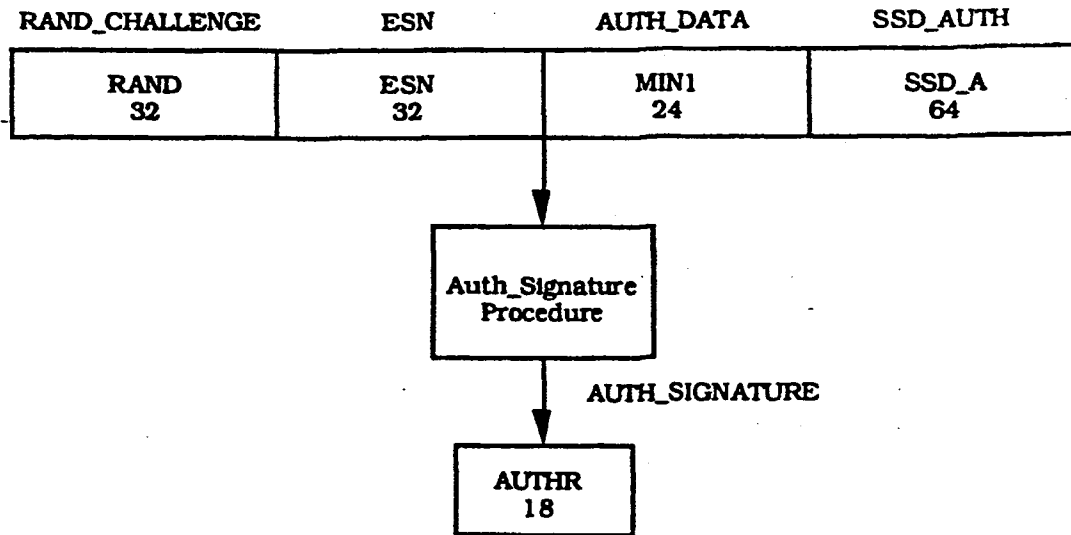
- 1 • RVC in Words 1 and 2 of a Base Station Challenge Order message if the
- 2 mobile station is tuned to an analog voice channel (see 2.6.4 and
- 3 2.7.2.1).
- 4 • set the input parameters of the Auth_Signature procedure (see "Interface
- 5 Specification for Common Cryptographic Algorithms," section 2.3) as
- 6 illustrated in Figure 2.3.12.1.8-3;
- 7 • set the SAVE_REGISTERS input parameter to FALSE;
- 8 • execute the Auth_Signature procedure;
- 9 • set AUTHBS equal to the 18-bit output AUTH_SIGNATURE.



1

2

Figure 2.3.12.1.8-1. SSD Update Message Flow



1
2 **Figure 2.3.12.1.4-1. Computation of AUTHR for Authentication of Mobile Station**
3 **Registrations**
4

5 **2.3.12.1.5 Unique Challenge-Response Procedure**

6 The Unique Challenge-Response Procedure is initiated by the base station and can be
7 carried out over the control and/or analog voice channels.

8 More specifically:

- 9
- 10 • At the base station,
 - 11 • a 24-bit, random pattern referred to as RANDU is generated and sent to the
12 mobile station via:
 - 13 • the FOCC in Word 3-Unique Challenge Order Word of a mobile station
14 control message if the procedure is to be initiated on a forward control
15 channel (see 3.6.2.3 and 3.7.1.1); or
 - 16 • the FVC in Word 2-Unique Challenge Order Word of a mobile station
17 control message if the mobile station has been assigned to a voice
18 channel (see 3.6.4 and 3.7.2.1).
 - 19 • set the input parameters of the Auth_Signature procedure (see "Interface
20 Specification for Common Cryptographic Algorithms," section 2.3) as
21 illustrated in Figure 2.3.12.1.5-1. The 24 most significant bits of the
22 RAND_CHALLENGE input parameter shall be filled with RANDU, and the 8
23 least significant bits of RAND_CHALLENGE shall be filled with the 8 least
24 significant bits of MIN2;
 - 25 • set the SAVE_REGISTERS input parameter to FALSE;
 - execute the Auth_Signature procedure;

- set AUTHU equal to the 18-bit output AUTH_SIGNATURE.
- At the mobile station,
 - compute AUTHU as described above using the received RANDU and its internally stored values for the remaining input parameters;
 - send AUTHU to the base station via:
 - the RECC in WORD C-Unique Challenge Order Confirmation Word of an order confirmation message if the mobile station is not tuned to a voice channel (see 2.6.2.3 and 2.7.1.1); or
 - the RVC in a Unique Challenge Order Confirmation message if the mobile station is tuned to an analog voice channel (see 2.6.4 and 2.7.2.1).

Upon receipt of the Unique Challenge Order Confirmation from the mobile station, the base station compares the received value for AUTHU to that generated/stored internally. If the comparison fails, the base station may deny further access attempts by the mobile station, drop the call in progress, or initiate the process of updating the SSD (see 2.3.12.1.8).

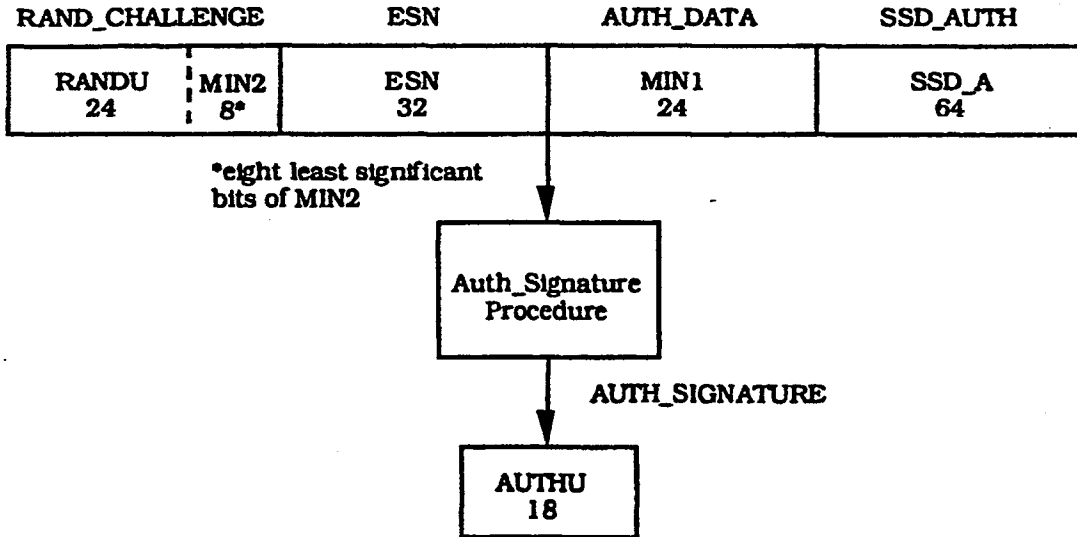


Figure 2.3.12.1.5-1. Computation of AUTHU for Unique Challenge-Response Procedure

1 **2.3.12.1.6 Authentication of Mobile Station Originations**

2 When the information element AUTH in the System Parameter Overhead Message is set to
3 I, and the mobile station attempts to originate a call, the following authentication-related
4 procedures shall be performed:

- 5 • In the mobile station,
- 6 • set the input parameters of the Auth_Signature procedure (see "Interface
7 Specification for Common Cryptographic Algorithms," section 2.3) as
8 illustrated in Figure 2.3.12.1.6-1. The AUTH_DATA input parameter shall
9 contain the last six digits transmitted by the mobile station.

10 The exact procedure is that MIN1 is used to initially fill the AUTH_DATA
11 input parameter and then the last dialed digits entered by the subscriber are
12 used to replace all or part of this initial value. If a full 6 digits are dialed, the
13 first digit of the 6 that was dialed is used as the most significant 4 bits of
14 AUTH_DATA, the second digit is the next less-significant 4 bits of
15 AUTH_DATA, and so forth. If less than 6 digits are dialed, then the least
16 significant 4 bits of AUTH_DATA are the last dialed digit, the second-last
17 dialed digit becomes the next more-significant 4 bits of AUTH_DATA, and so
18 on up to the first of the dialed digits;

- 19 • set the SAVE_REGISTERS input parameter to TRUE;
- 20 • execute the Auth_Signature procedure;
- 21 • set AUTHR equal to the 18-bit output AUTH_SIGNATURE;
- 22 • send AUTHR together with RANDC (eight most significant bits of RAND) and
23 COUNT_{s-p} to the base station (Authentication Word C of the RECC
24 Origination Message).

- 25 • At the base station,
- 26 • compare the received values for RANDC, and optionally COUNT, with the
27 internally stored values associated with the received MIN/ESN;
- 28 • compute AUTHR as described above, except use the internally stored value of
29 SSD_A; and
- 30 • compare the value for AUTHR computed internally with the value of AUTHR
31 received from the mobile station.

32 If the comparisons at the base station are successful, the appropriate channel assignment
33 procedures are commenced. Once assigned to an analog voice channel, the base station
34 may, at the discretion of the system operator, issue a Parameter Update Order (see Table
35 3.7.1.1-1) to the mobile station on the FVC. Mobile stations confirm the receipt of
36 Parameter Update Orders by sending Parameter Update Confirmations on the RVC.

37 If any of the comparisons by the base station fail, the base station may deny service, initiate
38 the Unique Challenge-Response procedure (see 2.3.12.1.5), or commence the process of
39 updating the SSD (see 2.3.12.1.8).

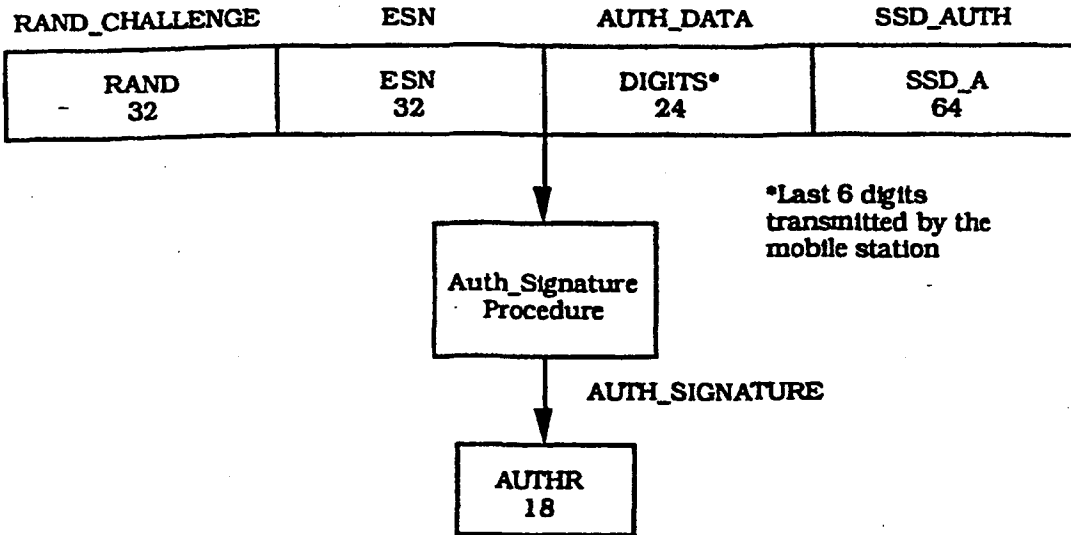


Figure 2.3.12.1.6-1. Computation of AUTHR for Authentication of Mobile Station Originations

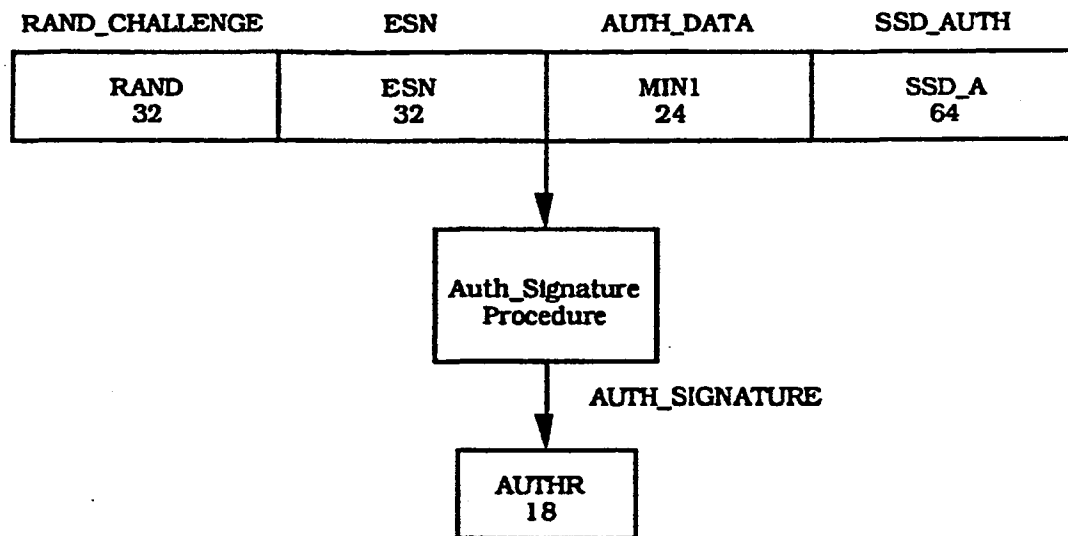
2.3.12.1.7 Authentication of Mobile Station Terminations

When the information element AUTH in the System Parameter Overhead Message is set to 1, and a "Page Match" occurs, the following authentication-related procedures shall be performed:

- In the mobile station,
 - set the input parameters of the Auth_Signature procedure (see "Interface Specification for Common Cryptographic Algorithms," section 2.3) as illustrated in Figure 2.3.12.1.7-1;
 - set the SAVE_REGISTERS input parameter to TRUE;
 - execute the Auth_Signature procedure;
 - set AUTHR equal to the 18-bit output AUTH_SIGNATURE;
 - send AUTHR together with RANDC (eight most significant bits of RAND) and COUNT_{s-p} to the base station (Authentication Word C of the RECC Page Response Message).
- At the base station,
 - compare the received values for RANDC, and optionally COUNT, with the internally stored values associated with the received MIN/ESN;
 - compute AUTHR as described above, except use the internally stored value of SSD_A; and
 - compare the value for AUTHR computed internally with the value of AUTHR received from the mobile station.

1 If the comparisons at the base station are successful, the appropriate channel assignment
 2 procedures are commenced. Once assigned to an analog voice channel, the base station
 3 may, at the discretion of the system operator, issue a Parameter Update Order (see Table
 4 3.7.1.1-1) to the mobile station on the FVC. Mobile stations confirm the receipt of
 5 Parameter Update Orders by sending Parameter Update Confirmations on the RVC.

6



7

8 **Figure 2.3.12.1.7-1. Computation of AUTHR for Authentication of Mobile Station**
 9 **Terminations**

10

11 If any of the comparisons by the base station fail, the base station may deny service, initiate
 12 the Unique Challenge procedure (see 2.3.12.1.5), or commence the process of updating the
 13 SSD (see 2.3.12.1.8).

14 2.3.12.1.8 Updating the Shared Secret Data (SSD)

15 Updating the SSD involves the SSD_Generation procedure (see "Interface Specification for
 16 Common Cryptographic Algorithms," section 2.2.1), initialized with mobile station specific
 17 information, random data and the mobile station's A-key.

18 The A-key is:

- 19 • 64 bits long;
- 20 • assigned to the mobile station;
- 21 • stored in the mobile station's permanent security and identification memory; and
- 22 • is known only to the mobile station and its associated Home Location
 23 Register/Authentication Center (HLR/AC).

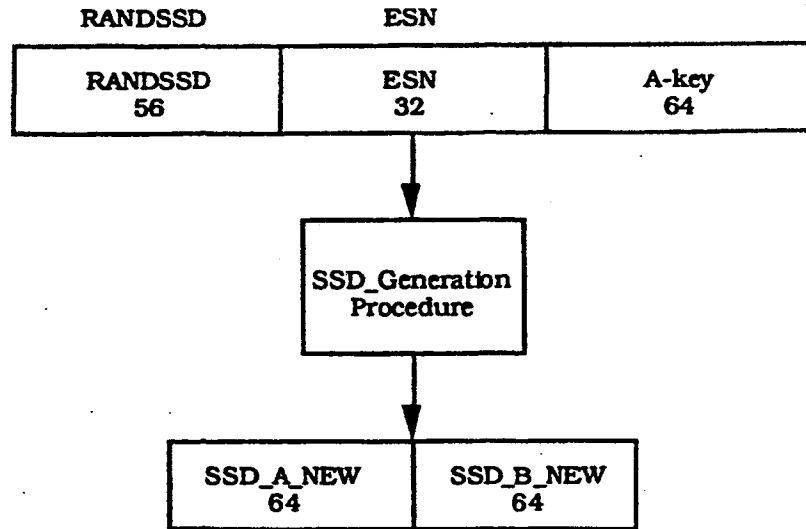
Notes

1. The last item in the above list is intended to enhance the security of the mobile station's secret data by eliminating the need to pass the A-key itself from system to system as the subscriber roams. As a consequence, SSD updates are carried out only in the mobile station and its associated HLR/AC, not in the serving system. The serving system obtains a copy of the SSD computed by the HLR/AC via intersystem communication (see EIA/TIA IS-41) with the mobile station's HLR/AC.
2. Since the SSD Update procedure involves multiple transactions and can be started on one channel and completed on another channel, call processing and signaling text above and beyond that normally included in this portion of the document has been included here for the sake of added clarity.

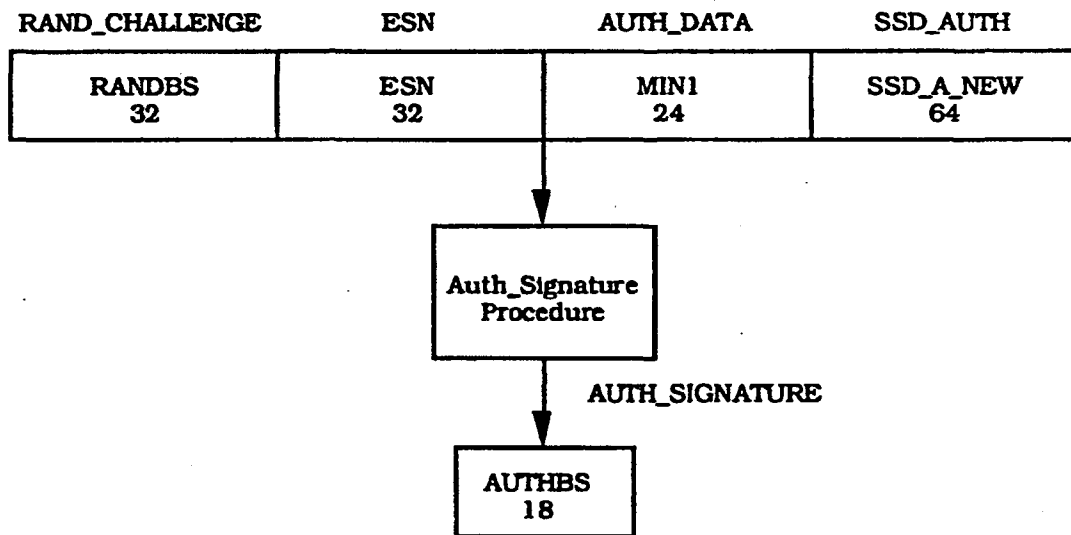
An A-key must be entered into the mobile station. See "User Interface for Authentication Key Entry," TSB 50, for details.

More specifically, updating the SSD in the mobile station proceeds as follows (see Figure 2.3.12.1.8-1):

- At the base station,
 - send an SSD Update Order, with the RANDSSD field set to the same 56-bit random number used in the HLR/AC computations, to the mobile station on the:
 - FOCC in Word 3-First SSD Update Order Word, Word 4-Second SSD Update Order Word and Word 5-Third SSD Update Order Word of a mobile station control message if the mobile station has not been assigned to an analog voice channel (see 3.6.2.3 and 3.7.1.1); or
 - FVC in Word 2-First SSD Update Order Word, Word 3-Second SSD Update Order Word and Word 4-Third SSD Update Order Word of a mobile station control message if the mobile station has been assigned to an analog voice channel (see 3.6.4 and 3.7.2.1).
- In the mobile station,
 - upon receipt of the SSD Update Order, set the input parameters of the SSD_Generation procedure (see "Interface Specification for Common Cryptographic Algorithms," section 2.2.1) as illustrated in Figure 2.3.12.1.8-2;
 - execute the SSD_Generation procedure;
 - set SSD_A_NEW and SSD_B_NEW to the outputs of the SSD_Generation procedure;
 - select a 32-bit random number, RANDBS, and send it to the base station in a Base Station Challenge Order on the:
 - RECC in Word C-Base Station Challenge Word if the mobile station is not tuned to an analog voice channel (see 2.6.2.3 and 2.7.1.1); or



1
2
3
Figure 2.3.12.1.8-2. Computation of Shared Secret Data (SSD)



4
5
6
Figure 2.3.12.1.8-3. Computation of AUTHBS

- 7
- In the base station,
 - upon receipt of the Base Station Challenge Order, set the input parameters of the Auth_Signature procedure (see "Interface Specification for Common Cryptographic Algorithms," section 2.3) as illustrated in Figure 2.3.12.1.8-3, where RANDBS is set to the value received in the Base Station Challenge Order;
 - set the SAVE_REGISTERS input parameter to FALSE;
- 8
9
10
11
12

- 1 • execute the Auth_Signature procedure;
- 2 • set AUTHBS equal to the 18-bit output AUTH_SIGNATURE;
- 3 • acknowledge receipt of the Base Station Challenge Order by including
- 4 AUTHBS in the Base Station Challenge Order Confirmation message,
- 5 which is sent on the:
 - 6 • FOCC in Word 3-Base Station Challenge Order Confirmation Word of
 - 7 a mobile station control message if the mobile station has not yet
 - 8 been assigned to an analog voice channel (see 3.6.2.3, 3.6.3.3 and
 - 9 3.7.1.1); or
 - 10 • FVC in Word 2-Base Station Challenge Order Confirmation of a
 - 11 mobile station control message if the mobile station has been
 - 12 assigned to an analog voice channel (see 3.6.4 and 3.7.2.1).
- 13 • In the mobile station,
 - 14 • upon receipt of the Base Station Challenge Order Confirmation, compare the
 - 15 AUTHBS received to that generated internally;
 - 16 • acknowledge receipt of the SSD Update Order as follows:
 - 17 • if the comparison at the mobile station is successful, execute the
 - 18 SSD_Update procedure (see "Interface Specification for Common
 - 19 Cryptographic Algorithms," section 2.2.2) to set SSD_A and SSD_B to
 - 20 SSD_A_NEW and SSD_B_NEW, respectively, and:
 - 21 • if the mobile station is not tuned to an analog voice channel
 - 22 • send an order confirmation message to the base station on the RECC
 - 23 with:
 - 24 • the "T" field in Word A-Abbreviated Address Word set to '0' to
 - 25 identify the message as an Order Confirmation;
 - 26 • the "ORDER" field in Word B-Extended Address Word set to
 - 27 '10101' to signify confirmation of the SSD Update Order;
 - 28 • the "ORDQ" field in Word B-Extended Address Word set to '001'
 - 29 to denote the successful completion of the SSD Update process;
 - 30 and
 - 31 • all other fields set as described in 2.7.1.1 and in the references
 - 32 cited therein.
 - 33 • if the mobile station is tuned to an analog voice channel,
 - 34 • send an Order Confirmation message to the base station on the RVC
 - 35 with:
 - 36 • the "T" field set to '1' to identify the message as an order
 - 37 confirmation;

- 1 • the "ORDER" field set to '10101' to signify confirmation of the
2 SSD Update order;
- 3 • the "ORDQ" field set to '001' to denote the successful completion
4 of the SSD Update process; and
- 5 • all other fields set as described in 2.7.2.1 and in the references
6 cited therein.
- 7 • if the comparison at the mobile station fails, discard SSD_A_NEW and
8 SSD-B_NEW, and:
 - 9 • if the mobile station is not tuned to an analog voice channel,
 - 10 • send an order confirmation message to the base station on the RECC
11 with:
 - 12 • the "T" field in Word A-Abbreviated Address Word set to '0' to
13 identify the message as an Order Confirmation;
 - 14 • the "ORDER" field in Word B-Extended Address Word set to
15 '10101' to signify confirmation of the SSD Update Order;
 - 16 • the "ORDQ" field in Word B-Extended Address Word set to '000'
17 to denote the unsuccessful completion of the SSD Update
18 process; and
 - 19 • all other fields set as described in 2.7.1.1 and in the references
20 cited therein.
 - 21 • if the mobile station is tuned to an analog voice channel,
 - 22 • send an Order Confirmation message to the base station on the RVC
23 with:
 - 24 • the "T" field set to '1' to identify the message as an order
25 confirmation;
 - 26 • the "ORDER" field set to '10101' to signify confirmation of the
27 SSD Update order;
 - 28 • the "ORDQ" field set to '000' to denote the unsuccessful
29 completion of the SSD Update process; and
 - 30 • all other fields set as described in 2.7.2.1 and in the references
31 cited therein.

32 In the base station, if the SSD Update Confirmation received from the mobile station
33 indicates a success, set SSD_A and SSD_B to the values received from the HLR/AC (see
34 EIA/TIA IS-41).

2.3.12.1.9 Authentication Procedures

The availability of authentication algorithm information is governed under the U.S. International Traffic and Arms Regulation (ITAR) and the Export Administration Regulations. TIA will act as the focal point and facilitator for making such information available. Procedures for distribution of this information will be contained in the Technology Transfer Control Plan which applies to "Common Cryptographic Algorithms." The Technology Transfer Control Plan will be available from TIA.

2.3.12.2 Signaling Message Encryption

In an effort to enhance the authentication process, and to protect sensitive subscriber information (e.g., PINs), provisions have been made to allow for the encryption of a select subset of FVC and RVC signaling messages. See Appendix A for the list of messages and fields to be encrypted.

Consult "Interface Specification for Common Cryptographic Algorithms," section 2.5 for a description of how the algorithm is initialized and applied.

2.3.12.2.1 Signaling Message Encryption Control

Signaling message encryption is controlled on a per-call basis. The default value is "off." To activate signaling message encryption for a mobile station assigned to an analog voice channel, the base station must send a Message Encryption Mode Order with the Order Qualifier field set to '001'. Signaling message encryption can also be activated during CDMA to analog handoff by the base station sending an *Analog Handoff Direction Message* with the MEM field set equal to '1'.

The data used to initialize the algorithm is computed based on parameters in effect at the time the AUTHR appended to the origination/page response message was computed (see 2.3.12.1.6 and 2.3.12.1.7). For a call initiated via the CDMA Access Channel, the data used to initialize the algorithm is computed based on parameters in effect at the time the AUTHR appended to the *Origination Message* or *Page Response Message* was computed (see 6.3.12.1.6 and 6.3.12.1.7).

Once activated, signaling message encryption can be deactivated by the base station by sending a Message Encryption Mode Order with the Order Qualifier field set to '000'.

In all cases both the base station and mobile station shall continue to operate in their present mode until the message sent to the mobile station has been properly acknowledged.

2.4 Supervision

2.4.1 Supervisory Audio Tone

The supervisory audio tone (SAT) will be one of three frequencies: 5970, 6000, or 6030 Hz. The SAT is added to the voice transmission by a base station (see 3.4.1). A mobile station must detect, filter, and modulate the transmitted voice channel carrier with this tone. Transmission of the SAT by a mobile station must be suspended during transmission of wideband data on the reverse voice channel (see 2.7.2), but must not be suspended when signaling tone is sent (see 2.4.2).

- 1 While a valid SAT is detected and the measured SAT determination does not agree with the
 2 SAT color code (SCC_P) received in the Mobile Station Control Message (see 3.7.1.1 and
 3 3.7.2), the receiver audio must be muted.

4 2.4.1.1 SAT Detection

- 5 A mobile station must make the following decisions to determine which SAT, if any, is
 6 present:

Measured Frequency of Incoming Signal	Measured SAT Determination	Where
$f \leq f_1$	No valid SAT	$f_1 = 5955 \pm 5\text{Hz}$
$f_1 \leq f < f_2$	SAT = 5970	$f_2 = 5985 \pm 5\text{Hz}$
$f_2 \leq f < f_3$	SAT = 6000	$f_3 = 6015 \pm 5\text{Hz}$
$f_3 \leq f < f_4$	SAT = 6030	$f_4 = 6045 \pm 5\text{ Hz}$
$f_4 \leq f$	No valid SAT	
No SAT Received	No valid SAT	

- 8
 9 The determination of SAT is not required to be made continuously but should be performed
 10 at least every 250 ms.

11 2.4.1.2 SAT Transmission

- 12 The transmission requirements for the SAT signal, including time delays in the transmitter,
 13 receiver, and any equalization circuits, are summarized as follows:

Condition	Requirement
Steady-state phase difference between received and transmitted SAT at 5970, 6000, and 6030 Hz	May have any average phase but must remain within a $\pm 10^\circ$ band
Phase Step Response	Settle to within 10° of final steady state phase difference in ≤ 250 ms
Tone Modulation Index	$1/3$ radian $\pm 10\%$ ($\Delta f = \pm 2$ kHz)

15 2.4.1.3 Fade Timing Status

- 16 When an SAT determination is made a mobile station must perform the following:

- 17 • If no valid SAT is detected or the measured SAT determination does not agree with
 18 the SAT color code (SCC_P) received in the mobile station control message (see 3.7.1.1
 19 and 3.7.2), the fade timing status must be enabled (see 2.6.4.1).
 20 • Otherwise, the fade timing status must be disabled (see 2.6.4.1).

1 **2.4.2 Signaling Tone**

2 Signaling tone must be 10 kHz \pm 1 Hz and produce a nominal frequency deviation of \pm 8 kHz.

3 **2.5 Malfunction Detection**

4 **2.5.1 Malfunction Timer**

5 A timer separate from and independent of all other functions must be running continuously
6 whenever power is applied to the transmitter of a mobile station. If the mobile station is
7 software-controlled, sufficient reset commands must be interspersed throughout the mobile
8 station logic program to ensure that the timer never expires as long as the proper sequence
9 of operations is taking place; similar means must be provided, as appropriate, in hardware-
10 controlled designs. If the timer expires, a malfunction must be assumed and the mobile
11 station must be inhibited from transmitting. The maximum time allowed for expiration of
12 the timer is 60 seconds.

13 This supersedes the requirement for a transmitter carrier-on indicator.

14 **2.5.2 False Transmission**

15 A protection circuit must be provided to minimize the possibility of false transmitter
16 operation caused by component failure within the mobile station.

1 **2.6 Call Processing**

2 The following sections describe mobile station operation as controlled by a base station.
 3 Frequent references are made to the corresponding sections in the base station section and
 4 to the messages that flow between a base station and a mobile station. It is helpful to read
 5 2.6 and 3.6 in parallel and examine the message formats in 2.7 and 3.7 at the same time.

6 When power is applied to a mobile station, it shall enter the *System Determination Substate*
 7 of the *Mobile Station Initialization State* with a power-up indication (see 6.6.1.1).

8 **2.6.1 Initialization**

9 **2.6.1.1 Retrieve System Parameters**

10 If the First-Idle ID status is enabled (see 6.6.1.1), the mobile station must:

- 11 • Set the Location-Registration ID status to enabled.
- 12 • Set the first-registration ID status to enabled.
- 13 • Set the first-location-area ID status to enabled.
- 14 • Set $PUREG_S = 0$, $PDREG_S = 0$, $LREG_S = 0$, $LRCC_S = 0$, $SID_S = 0$ and $SID_T = 0$.

15 The mobile station must then set the serving-system status according to the following
 16 algorithm:

- 17 • If $SERVSYS_S = SYS_A$, set the serving-system status to enabled.
- 18 • If $SERVSYS_S = SYS_B$, set the serving-system status to disabled.

19 The mobile station must then enter the Scan Dedicated Control Channels Task (see
 20 2.6.1.1.1).

21 **2.6.1.1.1 Scan Dedicated Control Channels**

22 If SID_T is not equal to SID_S , the mobile station shall set registration increment ($REGINCR_S$)
 23 to its default value of 450, set the first-registration ID status to enabled, set the first-
 24 location-area ID status to enabled, set $LRCC_S = 0$ and set $RAND_S = 0$.

25 If the serving-system status is enabled, a mobile station must:

- 26 • Set $FIRSTCHD_S$ to the first dedicated control channel for System A
 27 (834.990 MHz/879.990 MHz).
- 28 • Set $LASTCHD_S = FIRSTCHD_S - 21 + 1$.

29 If the serving-system status is disabled, a mobile station must:

- 30 • Set $FIRSTCHD_S$ to the first dedicated control channel for System B
 31 (835.020 MHz/880.020 MHz).
- 32 • Set $LASTCHD_S = FIRSTCHD_S + 21 - 1$.

33 The mobile station examines the signal strength on each of the channels $FIRSTCHD_S$ TO
 34 $LASTCHD_S$.

1 The mobile station must then enter the Update Overhead Information Task (see 2.6.1.1.2).

2 2.6.1.1.2 Update Overhead Information

3 Overhead messages are sent in a group called an overhead message train (see 3.7.1.2). The
4 mobile station must use the value given in the NAWC (number of additional words coming)
5 field of the System Parameter Overhead Message in the train to determine that all messages
6 of the train have been received. The END field must be used as a cross-check. For NAWC
7 counting purposes, inserted control filler messages (see 3.7.1) must not be counted as part
8 of the overhead message train.

9 If the mobile station receives a BCH-code-correct but unrecognizable System Parameter
10 Overhead Message, the mobile station must count that message as part of the train for
11 NAWC counting purposes, but must not attempt to execute the message.

12 The mobile station must tune to the strongest dedicated control channel and, within 3
13 seconds, receive a System Parameter Overhead Message (see 3.7.1.2) and update the
14 following numeric information:

- 15 • System identification (SID_S). Set the 14 most significant bits of SID_S to the value of
16 the SID 1 field. Set the least significant bit of SID_S to '1' if the serving-system status
17 is enabled; otherwise, set the bit to '0'.
- 18 • Number of paging channels (N_S). Set N_S to 1 plus the value of the N - 1 field.
- 19 • First paging channel ($FIRSTCHP_S$). Set $FIRSTCHP_S$ according to the following
20 algorithm:
 - 21 - If $SID_S = HOME_SID_P$, $FIRSTCHP_S = FIRSTCHP_P$
 - 22 - If $SID_S \neq HOME_SID_P$, $FIRSTCHP_S = FIRSTCHD_S$
- 23 • Last paging channel ($LASTCHP_S$). Set $LASTCHP_S$ according to the following
24 algorithm:
 - 25 - If the serving-system status is enabled, $LASTCHP_S = FIRSTCHP_S - N_S + 1$.
 - 26 - If the serving-system status is disabled, $LASTCHP_S = FIRSTCHP_S + N_S - 1$.

27 If SID_T is not equal to SID_S , the mobile station shall set registration increment ($REGINCR_S$)
28 to its default value of 450, set the first-registration ID status to enabled, set the first-
29 location-area ID status to enabled, set $LRCC_S = 0$ and set $RAND_S = 0$.

30 The mobile station must then enter the Paging Channel Selection Task (see 2.6.1.2).

31 If the mobile station cannot complete this task on the strongest dedicated control channel,
32 it shall tune to the second strongest dedicated control channel and attempt to complete this
33 task within a second 3-second interval. If it cannot complete this task on either of the two
34 strongest control channels, the mobile station must enter the the *System Determination*
35 *Substate of the Mobile Station Initialization State* (see 6.6.1.1).

1 **2.6.1.2 Paging Channel Selection**

2 **2.6.1.2.1 Scan Paging Channels**

3 The mobile station must examine the signal strength on each of channels FIRSTCHP_s to
4 LASTCHP_s (see 2.6.1.1.2).

5 The mobile station must then enter the Verify Overhead Information Task (see 2.6.1.2.2).

6 **2.6.1.2.2 Verify Overhead Information**

7 The mobile station must set the Wait-for-Overhead-Message bit (WFOM_s) to '0'; the mobile
8 station must then tune to the strongest paging channel and, within 3 seconds, receive an
9 overhead message train (see 3.7.1.2) and update the following:

- 10 • *System identification:* Set the 14 most significant bits of SID_r to the value of the
11 SID₁ field. Set the least significant bit of SID_r to '1' if the serving-system status is
12 enabled; otherwise, set the bit to '0'.
- 13 • *ROAM status:* The mobile station must compare the received system identification
14 (SID_r) with the stored system identification (SID_s). If SID_r = SID_s, the mobile station
15 must compare SID_s with HOME_SID_p. If HOME_SID_p = SID_s, the mobile station
16 must set the ROAM status to disabled. If HOME_SID_p ≠ SID_s, the mobile station
17 must set the ROAM status to enabled. If SID_r ≠ SID_s, the mobile station must enter
18 the *System Determination Substate* of the *Mobile Station Initialization State* (see
19 6.6.1.1).
- 20 • *Local control status:* If the local control option is enabled within the mobile station
21 (see 2.3.9) and the bits of the home system identification (HOME_SID_p) that
22 comprise the group identification match the corresponding bits of SID_s, then the
23 local control status must be enabled. Otherwise, the local control status must be
24 disabled.

25 If the Initialization Task was entered with an origination or page response indication, the
26 mobile station must also update the following numeric values:

- 27 • *Serial number bit (S_s):* Set S_s to the value in the S field.
- 28 • *Registration bit (R_s):* If the roam status is disabled, set R_s to the value of the REGH
29 field; if the roam status is enabled, set R_s to the value of the REGR field.
- 30 • *Extended address bit (E_s):* Set E_s to the value in the E field.
- 31 • *Authentication bit (AUTH_s):* Set AUTH_s to the value in the AUTH field.
- 32 • *Discontinuous transmission bit (DTX_s):* Set DTX_s to the value of the DTX field.
- 33 • *Number of paging channels (N_s):* Set N_s to 1 plus the value of the N-1 field.
- 34 • *Read-control-filler bit (RCF_s):* Set RCF_s to the value of the RCF field.
- 35 • *Combined paging/access bit (CPA_s):* Set CPA_s to the value of the CPA field.
- 36 • *Number of access channels (CMAX_s):* Set CMAX_s to 1 plus the value of the CMAX-1
37 field.

- 1 • Determine control channel boundaries for accessing the system (FIRSTCHA_s and
2 LASTCHA_s) by using the following algorithm:

- 3 - If the serving-system status is enabled,
 - 4 + If CPA_s = 1, set FIRSTCHA_s to FIRSTCHP_s for System A.
 - 5 + If CPA_s = 0, set FIRSTCHA_s to FIRSTCHP_s for System A minus N_s.
 - 6 + LASTCHA_s = FIRSTCHA_s - CMAX_s + 1.
- 7 - If the serving-system status is disabled,
 - 8 + If CPA_s = 1, set FIRSTCHA_s to FIRSTCHP_s for System B.
 - 9 + If CPA_s = 0, set FIRSTCHA_s to FIRSTCHP_s for System B plus N_s.
 - 10 + LASTCHA_s = FIRSTCHA_s + CMAX_s - 1.

11 If the Initialization Task was entered with an origination indication, the mobile station must
12 enter the System Access Task with an "origination" indication (see 2.6.3).

13 If the Initialization Task was entered with a page response indication, the mobile station
14 must enter the System Access Task with a "page response" indication (see 2.6.3).

15 If the Initialization Task was entered with a wait for page indication, the mobile station
16 must enter the Idle Task with a "wait for page" indication.

17 Otherwise, the mobile station must enter Idle at the Response to Overhead Information
18 Task (see 2.6.2.1).

19 If the mobile station cannot complete this task on the strongest paging channel, it may tune
20 to the second strongest paging channel and attempt to complete this task within a second
21 3-second interval. If it cannot complete this task on either of the two strongest control
22 channels, the mobile station must enter the the *System Determination Substate* of the
23 *Mobile Station Initialization State* (see 6.6.1.1).

24 2.6.2 Idle

25 During the Idle Task, a mobile station must execute each of the following four (sub)tasks
26 (see 2.6.2.1, 2.6.2.2, 2.6.2.3, and 2.6.2.4) at least every 46.3 ms, the periodicity of word
27 blocks on the forward control channel. If the Idle Task was entered with a wait for page
28 indication, the mobile station must not enter the *System Determination Substate* of the
29 *Mobile Station Initialization State* (see 6.6.1.1) for at least 6 seconds after entering the Idle
30 Task. Otherwise, if the mobile station is not listening to a control channel of the preferred
31 system, it may exit this task and enter the *System Determination Substate* of the *Mobile*
32 *Station Initialization State*.

33 2.6.2.1 Response to Overhead Information

34 Whenever a mobile station receives an overhead message train (see 3.7.1.2), the mobile
35 station must update SID_r (see 2.6.1.5) and then compare SID_s with SID_r. If SID_s ≠ SID_r, the
36 mobile station must exit the Idle Task and enter the *System Determination Substate* of the
37 *Mobile Station Initialization State* (see 6.6.1.1).

- 1 If $SID_s = SID_r$, the mobile station shall update the following numeric values using
 2 information contained in the System Parameter Overhead Message:
- 3 • *Serial number bit* (S_s): Set S_s to the value in the S field.
 - 4 • *Registration bit* (R_s): If the roam status is disabled, set R_s to the value of the REGH
 5 field; if the roam status is enabled, set R_s to the value of the REGR field.
 - 6 • *Extended address bit* (E_s): Set E_s to the value in the E field.
 - 7 • *Authentication bit* ($AUTH_s$): Set $AUTH_s$ to the value in the AUTH field.
 - 8 • *Discontinuous transmission bit* (DTX_s): Set DTX_s to the value of the DTX field.
 - 9 • *Number of paging channels* (N_s): Set N_s to 1 plus the value of the N - 1 field.
 - 10 • *Read-control-filler bit* (RCF_s): Set RCF_s to the value of the RCF field.
 - 11 • *Combined paging/access bit* (CPA_s): Set CPA_s to the value of the CPA field.
 - 12 • *Number of access channels* ($CMAx_s$): Set $CMAx_s$ to 1 plus the value of the CMAX - 1
 13 field.
 - 14 • Determine control channel boundaries for accessing the system ($FIRSTCHA_s$ and
 15 $LASTCHA_s$) by using the following algorithm:
 - 16 - If the serving-system status is enabled,
 - 17 + If $CPA_s = 1$, set $FIRSTCHA_s$ to $FIRSTCHP_s$ for System A.
 - 18 + If $CPA_s = 0$, set $FIRSTCHA_s$ to $FIRSTCHP_s$ for System A minus N_s .
 - 19 + $LASTCHA_s = FIRSTCHA_s - CMAx_s + 1$.
 - 20 - If the serving-system status is disabled,
 - 21 + If $CPA_s = 1$, set $FIRSTCHA_s$ to $FIRSTCHP_s$ for System B.
 - 22 + If $CPA_s = 0$, set $FIRSTCHA_s$ to $FIRSTCHP_s$ for System B plus N_s .
 - 23 + $LASTCHA_s = FIRSTCHA_s + CMAx_s - 1$.
- 24 If $SID_s = SID_{s-p}$, $PUREG_{s-p} = 1$ and the First-Idle ID status is enabled the mobile station
 25 shall initiate an autonomous registration by entering the System Access Task (see 2.6.3)
 26 with a "registration" indication.
- 27 The mobile station must then respond as indicated to each of the following messages, if
 28 received in the overhead message train. The order in which the mobile station must
 29 respond to the messages, if two or more are received, is given by their order in the following
 30 list:
- 31 1. *Local Control Messages*: If the local control status is enabled (see 2.6.1.2.2) the
 32 mobile station must respond to the Local Control Messages.
 - 33 2. *New Access Channel Set Message*:
 - 34 • The mobile station must set $FIRSTCHA_s$ to the value of the NEWACC field of the
 35 message.

- 1 • The mobile station must set LASTCHA_s according to the following algorithm:
- 2 - If the serving-system status is enabled, LASTCHA_s = NEWACC_T - CMAX_s +
- 3 1.
- 4 - If the serving-system status is disabled, LASTCHA_s = NEWACC_T + CMAX_s -
- 5 1.
- 6 3. *Registration Increment Message:* The mobile station must set REGINCR_s to the
- 7 value of the REGINCR field in the message.
- 8 4. *Location Area Message:* The mobile station must set PUREG_s, PDREG_s, LREG_s and
- 9 LOCAID_s to the values contained in the corresponding fields of the received message
- 10 and then set PUREG_{s-p} equal to PUREG_s.
- 11 • If this message is received while first-idle ID status is disabled, location-
- 12 registration ID status is disabled, first-registration ID status is enabled, first-
- 13 location-area ID status is enabled, and the mobile station is tuned to a control
- 14 channel different from LRCC_s, then the mobile station shall set first-location-
- 15 area ID status to disabled.
- 16 • If PUREG_s = 1 and the location-registration ID status is enabled the mobile
- 17 station must set the first-registration ID status to enabled (see 2.6.1.1.2) and set
- 18 first-location-area ID status to disabled (see 2.6.1.1.2). The mobile station must
- 19 then initiate an autonomous registration by entering the System Access Task
- 20 (see 2.6.3) with a "registration" indication.
- 21 • If LOCAID_{s-p} ≠ LOCAID_s and LREG_s = 1 the mobile station must do the
- 22 following:
- 23 - if the first-location-area ID status is disabled the mobile station must set the
- 24 first-registration ID status to enabled (see 2.6.1.1.2) and then initiate an
- 25 autonomous registration by entering the System Access Task (2.6.3) with a
- 26 "registration" indication.
- 27 - if the first-location-area ID status is enabled and PUREG_{s-p} = 1, the mobile
- 28 station must set the first-location-area ID status to disabled (see 2.6.1.1.2)
- 29 and then enter the Autonomous Registration Update Task (see 2.6.3.11),
- 30 supplying a "success" indication.
- 31 - if the first-location-area ID status is enabled and PUREG_{s-p} = 0, the mobile
- 32 station must set the first-location-area ID status to disabled (see 2.6.1.1.2)
- 33 and then initiate an autonomous registration by entering the System Access
- 34 Task (see 2.6.3) with a "registration" indication.
- 35 Otherwise, the mobile station shall set the first-location-area ID status to
- 36 disabled (see 2.6.1.1.2).
- 37 • The mobile station shall continue to process messages in the overhead message
- 38 train.

- 1 5. *Random Challenge A Message:* The mobile station must set the corresponding
2 portion of its internal $RAND1_S$ to the value of the $RAND1_A$ field in the Global Action
3 Message (see 2.3.12.1.2 for updating of $RAND$).
- 4 6. *Random Challenge B Message:* The mobile station shall set the corresponding
5 portion of its internal $RAND1_S$ to the value of the $RAND1_B$ field in the Global Action
6 Message (see 2.3.12.1.2 for updating of $RAND$).
- 7 7. *Registration ID Message:* The mobile station must perform the following:
- 8 • If this message is received while first-idle ID status is disabled, location-
9 registration ID status is disabled, first-registration ID status is enabled, first-
10 location-area ID status is enabled, and the mobile station is tuned to a control
11 channel different from $LRCC_S$, then the mobile station shall set first-registration
12 ID status to disabled.
- 13 • The mobile station must set $REGID_S$ to the value of the $REGID$ field of the
14 received message. If the first-registration ID status is enabled, the location-
15 registration ID status is disabled, and $SID_S = SID_{S-P}$, the mobile station must do
16 the following:
- 17 – set the first-registration ID status to disabled (see 2.6.1.1.2).
- 18 – if autonomous registration is enabled, the mobile station must enter the
19 Autonomous Registration Update Task (see 2.6.3.11), supplying a "success"
20 indication.
- 21 – the mobile station shall continue to process information in the overhead
22 message stream.
- 23 Otherwise, the mobile station shall set the first-registration ID status to disabled
24 (see 2.6.1.1.2) and proceed as follows
- 25 • If SID_S equals the SID_{S-P} value stored in the registration memory, the mobile
26 station must perform the following:
- 27 – The mobile station must use the following (or an equivalent) algorithm to
28 review the $NXTREG_{S-P}$ associated with the SID_{S-P} to determine if $REGID_S$
29 has cycled through zero:
- 30 + If $NXTREG_{S-P}$ is greater than or equal to $REGID_S + REGINCR_S + 5$, then
31 $NXTREG_{S-P}$ must be replaced by the greater of 0 or $NXTREG_{S-P} - 2^{20}$.
- 32 + Otherwise do not change $NXTREG_{S-P}$.
- 33 – The mobile station must then compare $REGID_S$ with the $NXTREG_{S-P}$
34 associated with the SID_{S-P} .
- 35 + If $REGID_S$ is greater than or equal to $NXTREG_{S-P}$ and autonomous
36 registration is enabled, the mobile station must set the first-registration
37 ID status to disabled (see 2.6.1.1.2) and then enter the System Access
38 Task with a "registration" indication (see 2.6.3).
- 39 + If $REGID_S$ is greater than or equal to $NXTREG_{S-P}$ and autonomous
40 registration is not enabled, then set $NXTREG_{S-P}$ equal to $REGID_S$.

- 1 + Otherwise, the mobile station must ignore the message and continue to
2 process messages in the overhead message train.
- 3 • If SID_p is not equal to the SID_{s-p} value stored in the registration memory, the
4 mobile station must perform the following:
- 5 - If autonomous registration is enabled, the mobile station shall set the first-
6 registration ID status to disabled (see 2.6.1.1.2). The mobile station shall
7 then enter the System Access Task with a "registration" indication supplied
8 (see 2.6.3).
- 9 - Otherwise, the mobile station must ignore the message and continue to
10 process messages in the overhead message train.
- 11 8. *CDMA Capability Message*: If $CDMA_AVAIL$ equals '1' and the preferred mode of
12 operation is CDMA, the mobile station may exit this task and enter the *System*
13 *Determination Substate* of the *Mobile Station Initialization State* (see 6.6.1.1).
- 14 9. *Rescan Message*: The mobile station must immediately exit this task and enter the
15 *System Determination Substate* of the *Mobile Station Initialization State* (see 6.6.1.1).
- 16 10. *Any Other Message*: Ignore message.

17 2.6.2.2 Page Match

18 The mobile station must monitor mobile station control messages for page messages (see
19 3.7.1.1).

- 20 • If the ROAM status is disabled, the mobile station must attempt to match $MIN1_p$ to
21 $MIN1_r$ for one-word messages and both $MIN1_p$ and $MIN2_p$ to $MIN1_r$ and $MIN2_r$,
22 respectively, for two-word messages. All decoded MIN bits must match to cause the
23 mobile station to respond to the message.
- 24 • If the ROAM Status is enabled, the mobile station must attempt to match both
25 $MIN1_p$ and $MIN2_p$ to $MIN1_r$ and $MIN2_r$, respectively. All decoded MIN bits must
26 match to cause the mobile station to respond to the order.

27 When a match occurs, the mobile station must enter the System Access Task with a "page
28 response" indication (see 2.6.3).

29 2.6.2.3 Order

30 The mobile station must monitor mobile station control messages for orders and must
31 attempt to match both $MIN1_p$ and $MIN2_p$ to $MIN1_r$ and $MIN2_r$, respectively. All decoded
32 MIN bits must match to cause the mobile station to respond to the order. The responses to
33 the following orders are:

- 34 • *Abbreviated Alert*: The mobile station must enter the System Access Task (see 2.6.3)
35 with an "order confirmation" indication.
- 36 • *Audit order*: The mobile station must enter the System Access Task (see 2.6.3) with
37 an "order confirmation" indication.
- 38 • *Local control order*: The action to be taken depends on the local control field.

- 1 • **SSD update order:** The mobile station computes SSD-A_NEW and SSD-B_NEW and
2 selects a RANDBS as described in 2.3.12.1.8. The mobile station must then enter
3 the System Access Task (see 2.6.3) with a "base station challenge" indication.
- 4 • **Unique challenge order:** The mobile station executes the Unique Challenge
5 procedure as in 2.3.12.1.5. The mobile station must then enter the System Access
6 Task (see 2.6.3) with an "order confirmation" indication.
- 7 • **Message waiting order:** If the mobile station is capable of performing Message
8 Waiting Notification, the mobile station shall indicate the presence of messages
9 waiting based on the information contained in the message type field of the Message
10 Waiting order (i.e., 0 for clear or no messages, other non-zero values indicate the
11 number of messages waiting). The mobile station then enters the System Access
12 Task (see 2.6.3) with an "order confirmation" indication.
- 13 • **Any other order:** Ignore order.

14 2.6.2.4 Call Initiation

15 When the user initiates a call, the System Access Task (see 2.6.3) must be entered with an
16 "origination" indication.

17 2.6.2.5 Reserved

18 2.6.2.6 Power Down

19 If the mobile station is intentionally removed from the air interface while in the Idle Task
20 and PDREG_s = 1 the mobile station must initiate an autonomous registration by entering
21 the System Access Task (see 2.6.3) with a "power down registration" indication.

22 2.6.3 System Access

23 2.6.3.1 Set Access Parameters

24 If a mobile station power down occurs during a system access and PDREG_s = 1 the mobile
25 station must terminate its access procedures and initiate an autonomous registration by
26 entering the System Access Task (see 2.6.3) with a "power down registration" indication.

27 When the System Access Task is started, a timer, called the access timer, must be set as
28 follows:

- 29 • If this is an origination, to a maximum of 12 seconds.
- 30 • If this is a page response, to a maximum of 6 seconds.
- 31 • If this is an order response, to a maximum of 6 seconds.
- 32 • If this is a registration other than power down registration, to a maximum of 6
33 seconds.
- 34 • If this is a power down registration, to a maximum of 3 seconds.
- 35 • If this is a Base Station Challenge, to a maximum of 6 seconds.

1 The mobile station must set the last-try code (LT_s) to '0' and then enter the Scan Access
2 Channels Task (see 2.6.3.2).

3 2.6.3.2 Scan Access Channels

4 The mobile station must examine the signal strength on each of the channels $FIRSTCHA_s$ to
5 $LASTCHA_s$ and choose up to two channels with the strongest signals. See 2.6.2.1 Response
6 to Overhead Information Task for access channel set determination.

7 The mobile station must then tune to the strongest access channel and enter the Retrieve
8 Access Attempts Parameters Task (see 2.6.3.3).

9 2.6.3.3 Retrieve Access Attempt Parameters

10 The mobile station must set the maximum-number-of-seizure-attempts allowed
11 ($MAXSZTR_s$) to a maximum of 10, and the maximum-number-of-busy-occurrences
12 ($MAXBUSY_s$) to a maximum of 10.

13 The mobile station must then initialize the following to zero:

- 14 • Number of busy occurrences ($NBUSY_{sv}$)
- 15 • Number of unsuccessful seizure attempts ($NSZTR_{sv}$)

16 The mobile station must then examine the read control-filler bit (RCF_s).

- 17 • If $RCF_s = 0$, the mobile station must then within 400 ms (+100 ms, -0 ms) set DCC_s
18 to the value in the DCC field of a received message, set $SDCC1_s$ and $SDCC2_s$ to 0,
19 and set the power level (PL_s) to 0.
- 20 • If $RCF_s = 1$, the mobile station must then within 1000 ms (+100 ms, -0 ms) read a
21 Control-Filler Message, set DCC_s , $WFOM_s$, $SDCC1_s$ and $SDCC2_s$ to the values in
22 the DCC, WFOM, SDCC1 and SDCC2 fields of the message, respectively, and set PL_s
23 to the power level given by Table 2.1.2.2-1 for the value of the CMAC field of the
24 message and the mobile station power class (see 2.1.2.2, 2.3.3, and 3.7.1.2.4).

25 If the DCC field or the Control-Filler Message is not received within the time allowed, then
26 the mobile station must examine the access timer. If the access timer has expired, the
27 mobile station must enter the Serving-System Determination Task (see 2.6.3.12). If the
28 access timer has not expired, the mobile station must enter the Alternate Access Channel
29 Task (see 2.6.3.13).

30 The mobile station must then set BIS_s to '1' and examine the $WFOM_s$ bit.

- 31 • If $WFOM_s = 1$, the mobile station must enter the Update Overhead Information Task
32 (see 2.6.3.4).
- 33 • If $WFOM_s = 0$, the mobile station must wait a random delay. Each time it waits a
34 random delay, a random delay must be generated with the time uniformly
35 distributed in the interval 0 to 92 ± 1 ms and, if quantized, with granularity no more
36 than 1 ms. The mobile station must then enter the Seize Reverse Control Channel
37 Task (see 2.6.3.5).

1 **2.6.3.4 Update Overhead Information**

2 If this task is not completed within 1.5 seconds, the mobile station must exit this task and
 3 enter the Serving-System Determination Task (see 2.6.3.12). If the Update Overhead
 4 Information Task is completed, the mobile station must enter the Seize Reverse Control
 5 Channel Task (see 2.6.3.5).

6 The mobile station must receive an overhead message train (see 3.7.1.2).

7 If the access is a registration, an origination, or a page response, the mobile station shall
 8 perform the following:

- 9 • Update System Identification (SID_T). Set the 14 most significant bits of SID_T to the
 10 value of the $SID1$ field. Set the least significant bit of SID_T to '1' if the serving-system
 11 status is enabled; otherwise, set the bit to '0'.
- 12 • If the access is a registration, the mobile station must compare SID_T with SID_S . If
 13 SID_T is not equal to SID_S , the mobile station must exit the Update Overhead
 14 Information Task and enter the Serving System Determination Task (see 2.6.3.12).
 15 Otherwise, the mobile station shall continue to process this task.
- 16 • If this access is an origination or a page response, the mobile station must compare
 17 SID_T with SID_{S-p} . If SID_T does not equal SID_{S-p} , the mobile station must set $RAND_S$
 18 equal to zero.

19 The mobile station must act as indicated below in response to the following global action
 20 messages, if received in the message train:

- 21 • *Overload Control Message.*
 - 22 – If this access is an origination, the mobile station must examine the value of the
 23 overload class field (OLC) identified by $ACCOLC_p$. If the identified OLC field is
 24 set to '0', the mobile station must exit this task and enter the Serving-System
 25 Determination Task (see 2.6.3.12); if the identified OLC field is set to '1', the
 26 mobile station must continue to respond to messages in the overhead message
 27 train.
 - 28 – Otherwise, the mobile station must continue to respond to messages in the
 29 overhead message train.
- 30 • *Access Type Parameters Message:* The busy-idle status bit (BIS_S) must be set to the
 31 value of the BIS field of the received message.
- 32 • *Random Challenge A Message:* The mobile station must set the corresponding
 33 portion of its internal $RAND1_S$ to the value of the $RAND1_A$ field in the Global Action
 34 Message (see 2.3.12.1.2 for updating of $RAND$).
- 35 • *Random Challenge B Message:* The mobile station must set the corresponding
 36 portion of its internal $RAND1_S$ to the value of the $RAND1_B$ field in the Global Action
 37 Message (see 2.3.12.1.2 for updating of $RAND$).
- 38 • *Access Attempt Parameters Message:* The mobile station must update the following
 39 parameters:
 - 40 – If this access is a page response,

- 1 + Maximum number of seizure tries allowed ($MAXSZTR_{s1}$) must be set to the
- 2 value of the $MAXSZTR-PGR$ field of the received message.
- 3 + Maximum number of busy occurrences allowed ($MAXBUSY_{s1}$) must be set to
- 4 the value of the $MAXBUSY-PGR$ field of the received message.
- 5 - Otherwise,
- 6 + Maximum number of seizure tries allowed ($MAXSZTR_{s1}$) must be set to the
- 7 value of the $MAXSZTR-OTHER$ field of the received message.
- 8 + Maximum number of busy occurrences allowed ($MAXBUSY_{s1}$) must be set to
- 9 the value of the $MAXBUSY-OTHER$ field of the received message.

10 If the access is a registration access, the mobile station must respond as indicated to the
11 registration identification message, if received in the overhead message train:

- 12 • The mobile station must set $REGID_s$ to the value of the $REGID$ field in the message.

13 After the overhead message train is received and processed as required above, the mobile
14 station must wait a random time. Each time this task is executed, a different random delay
15 must be generated, distributed uniformly in the interval 0 to 750 ms, and if quantized, with
16 granularity no greater than 1 ms. At the end of the delay, the mobile station must enter the
17 Seize Reverse Control Channel Task (see 2.6.3.5).

18 2.6.3.5 Seize Reverse Control Channel

19 The mobile station must read the busy-idle bits of the channel (see 3.7.1).

- 20 • If the channel is busy, the mobile station must increment $NBUSY_{sv}$ by 1.
- 21 - If $NBUSY_{sv}$ exceeds $MAXBUSY_{s1}$, then the mobile station must exit this task and
- 22 enter the Serving-System Determination Task (see 2.6.3.12).
- 23 - If $NBUSY_{sv}$ does not exceed $MAXBUSY_{s1}$, then the mobile station must exit this
- 24 task and the Delay After Failure Task must be executed (see 2.6.3.6).
- 25 • If the channel is idle, then the mobile station must set $NBUSY_{sv}$ to zero, turn on the
- 26 transmitter at the power level indicated by PL_s (see 2.6.3.3 and 2.1.2.2), wait the
- 27 proper delay (see 2.1.2.1) until the transmitter is within 3 dB of the required power
- 28 level, and then start to send the message to the base station (see 2.7.1).

29 If $BIS_s = 0$, then the mobile station must enter the Service Request Task (see 2.6.3.7); if
30 $BIS_s = 1$, then upon starting to send the message, the mobile station must continuously
31 monitor the busy-idle bits of the channel.

- 32 • If the channel becomes busy before the first 56 bits of the message are sent, the
- 33 mobile station must immediately stop sending the message and turn off the
- 34 transmitter.
- 35 • If the channel fails to change to busy by the time the mobile station has sent 104
- 36 bits, then the mobile station must immediately stop sending the message and turn
- 37 off the transmitter.

1 In either of these cases, the mobile station must then increment the count of seizure
 2 failures ($NSZTR_{gv}$) by 1 and compare the result with the maximum number of seizure
 3 attempts allowed ($MAXSZTR_{gl}$).

- 4 - If $NSZTR_{gv}$ exceeds $MAXSZTR_{gl}$, the mobile station must exit this task and enter
 5 the Serving-System Determination Task (see 2.6.3.12).
- 6 - If $NSZTR_{gv}$ does not exceed $MAXSZTR_{gl}$, the mobile station must exit this task
 7 and enter the Delay After Failure Task (see 2.6.3.6).
- 8 • If the busy-idle status changes to busy after 56 bits and before 104 bits are sent,
 9 then the mobile station must enter the Service Request Task (see 2.6.3.7).

10 2.6.3.6 Delay After Failure

11 The mobile station must examine the access timer. If the access timer has expired, the
 12 mobile station must enter the Serving-System Determination Task (see 2.6.3.12). If the
 13 access timer has not expired, the mobile station must wait a random time. Each time it
 14 enters this task, it must generate a random time, uniformly distributed in the interval 0 to
 15 200 ms, and if quantized, with granularity no greater than 1 ms. The mobile station must
 16 then enter the Seize Reverse Control Channel Task (see 2.6.3.5).

17 2.6.3.7 Service Request

18 The mobile station must continue to send its message to the base station. The information
 19 that must be sent is as follows (with the formats given in 2.7.1):

- 20 • Word A must always be sent.
- 21 • If:
 - 22 - $E_s = 1$, or
 - 23 - $LT_s = 1$, or
 - 24 - $AUTH_s = 1$, or
 - 25 - the ROAM status is enabled, or
 - 26 - the ROAM status is disabled and $EX_p = 1$, or
 - 27 - the access is an "order confirmation," or
 - 28 - the access is a "registration," or
 - 29 - the access is a "base station challenge," or
 - 30 - the mobile station was paged with a two-word Mobile Station Control Message,
 31 or
 - 32 - $RCF = 1$,
- 33 Word B must be sent.

- Word C must be sent as per the following table:

S _s Bit	Type of System Access			
	Registration, Origination or Page Response where AUTH _s = 0	Registration, Origination or Page Response where AUTH _s = 1	Unique Challenge Order Confirmation	Base Station Challenge
0	Send no Word C	Send Authentication Word C	Send Unique Challenge Order Confirmation Word C	Send Base Station Challenge Word C
1	Send Serial Number Word C	Send Serial Number Word C and Authentication Word C	Send Serial Number Word C and Unique Challenge Order Confirmation Word C	Send Serial Number Word C and Base Station Challenge Word C

- If the access is an "origination," word D must be sent.
- If the access is an "origination" and 9 to 16 digits were dialed, word E must be sent.

When the mobile station has sent its complete message, it must continue to send unmodulated carrier for a nominal duration of 25 ms and then turn off the transmitter.

The next task to be entered depends on the type of access by the mobile station:

- If the access is an order confirmation, the mobile station must enter the Serving-System Determination Task (see 2.6.3.12).
- If the access is an origination, the mobile station must enter the Await Message Task (see 2.6.3.8).
- If the access is a page response, the mobile station must enter the Await Message Task (see 2.6.3.8).
- If the access is a registration request other than a power down registration the mobile station must enter the Await Registration Confirmation Task (see 2.6.3.9). If the registration is a power down registration the mobile station shall power down.
- If the access is a base station challenge, the mobile station must enter the Await Message Task (see 2.6.3.8).

2.6.3.8 Await Message

If this task is not completed within 5 seconds, the mobile station must exit this task and enter the Serving System Determination Task (see 2.6.3.12).

- 1 The mobile station must monitor mobile station control messages (see 3.7.1.1). If the
 2 mobile station sent Word B as part of the Service Request (see 2.6.3.7), then the mobile
 3 station must attempt to match $MIN1_p$ and $MIN2_p$ to $MIN1_r$ and $MIN2_r$, respectively;
 4 otherwise, the mobile station must attempt to match only $MIN1_p$ to $MIN1_r$.
- 5 The mobile station must respond as indicated to any of the following messages if all
 6 decoded MIN bits match.
- 7 If the access is an origination or page response:
- 8 • *Initial Voice Channel Designation Message* (see 3.7.1.1): The mobile station must
 9 update the parameters as set in the message and delete all entries from $SID_NID_LIST_s$. If $R_s = 1$ the mobile station must enter the Autonomous Registration Update
 10 Task (see 2.6.3.11), supplying a "success" indication. Then enter the Confirm Initial
 11 Voice Channel Task (see 2.6.4.2).
 12
 - 13 • *Directed-Retry Message* (see 3.7.1.1): If the mobile station is equipped for directed
 14 retry, it must respond to the Directed-Retry Message as follows:
 15 If the mobile station encounters the start of a new message before it receives all four
 16 words of the Directed-Retry Message, it must exit this task and enter the Serving-
 17 System Determination Task (see 2.6.3.12).
 18 The mobile station must set the last-try code (LT_s) according to the $ORDQ$ field of
 19 the message:
 20 - If $ORDQ = '000'$, set LT_s to '0'.
 21 - If $ORDQ = '001'$, set LT_s to '1'.
 22 The mobile station must then clear $CCLIST_s$ and examine each $CHANPOS$ field in
 23 Words 3 and 4 of the message. For each nonzero $CHANPOS$ field, the mobile station
 24 must calculate a corresponding channel number according to the following
 25 algorithm:
 26 • If $LOCAL/MSG_TYPE = '00000'$ and the serving-system status is enabled, subtract
 27 $CHANPOS$ from $FIRSTCHA_s + 1$.
 28 • If $LOCAL/MSG_TYPE = '00000'$ and the serving-system status is disabled, add
 29 $CHANPOS$ to $FIRSTCHA_s - 1$.
 30 • If $LOCAL/MSG_TYPE = '00001'$ and the serving-system status is enabled, set
 31 $FIRSTCHA_s$ to the first dedicated control channel for System A (834.990
 32 MHz/879.990 MHz) and subtract $CHANPOS$ from $FIRSTCHA_s + 1$. The mobile must
 33 also set $AUTH_s$ to '0'.
 34 • If $LOCAL/MSG_TYPE = '00001'$ and the serving-system status is disabled, set
 35 $FIRSTCHA_s$ to the first dedicated control channel for System B (835.020
 36 MHz/880.020 MHz) and add $CHANPOS$ to $FIRSTCHA_s - 1$. The mobile must also set
 37 $AUTH_s$ to '0'.

- 1 • If LOCAL/MSG_TYPE = '00010' and the serving-system status is enabled, set
2 FIRSTCHA_s to the first dedicated control channel for System A (834.990
3 MHz/879.990 MHz) and subtract CHANPOS from FIRSTCHA_s + 1. The mobile must
4 - also set AUTH_s to '1'.
- 5 • If LOCAL/MSG_TYPE = '00010' and the serving-system status is disabled, set
6 FIRSTCHA_s to the first dedicated control channel for System B (835.020
7 MHz/880.020 MHz) and add CHANPOS to FIRSTCHA_s - 1. The mobile must also set
8 AUTH_s to '1'.

9 The mobile station must then determine whether each channel number is within the
10 set allocated to cellular systems, and if so, list the channel number in CCLIST_s.

11 After completing its response to the Directed-Retry Message, the mobile station
12 must examine the access timer. If the access timer has expired, the mobile station
13 must enter the Serving-System Determination Task (see 2.6.3.12). If the access
14 timer has not expired, the mobile station must enter the Directed-Retry Task (see
15 2.6.3.14).

16 If the access is an origination:

- 17 • *Intercept*: The mobile station must enter the Serving-System Determination Task
18 (see 2.6.3.12).
- 19 • *Reorder*: The mobile station must enter the Serving-System Determination Task (see
20 2.6.3.12).

21 If the access is a page response:

- 22 • *Release*: The mobile station must enter the Serving-System Determination Task (see
23 2.6.3.12).

24 If the access is a Base Station Challenge:

- 25 • *Base Station Challenge Order Confirmation*: The mobile station compares the
26 AUTHBS received in the Base Station Challenge Order Confirmation message to that
27 computed internally. The mobile station must then acknowledge receipt of the SSD
28 Update Order with a success or failure indication as described in 2.3.12.1.8 by
29 entering the System Access Task (see 2.6.3) with an "order response" indication (see
30 2.6.3.1). If the mobile station fails to receive the Base Station Challenge Order
31 Confirmation within 5 seconds of when the Base Station Challenge Order was
32 transmitted, terminate the SSD update process.

33 If the access is an origination and the user terminates a call during this task, the
34 termination status must be enabled so that the call can be released on a voice channel (see
35 2.6.4.4) instead of on a control channel.

36 2.6.3.9 Await Registration Confirmation

37 If this task is not completed within 5 seconds, the mobile station must exit this task and
38 enter the Action on Registration Failure Task (see 2.6.3.10).

1 The mobile station must monitor mobile station control messages (see 3.7.1.1). If the
 2 mobile station sent Word B as part of the Service Request (see 2.6.3.7), then the mobile
 3 station must attempt to match $MIN1_p$ and $MIN2_p$ to $MIN1_r$ and $MIN2_r$, respectively;
 4 otherwise, the mobile station must attempt to match only $MIN1_p$ to $MIN1_r$.

5 The mobile station must respond as indicated to any of the following messages if all
 6 decoded MIN bits match:

- 7 • *Release Order* (see 3.7.1.1): The mobile station must exit this task and enter the
 8 Action on Registration Failure Task (see 2.6.3.10).
- 9 • *Order Confirmation* (see 3.7.1.1): The mobile station must delete all entries from
 10 $SID_NID_LIST_s$. If autonomous registration is enabled or $PUREG_{s-p} = 1$, or $LREG_s =$
 11 1, the mobile station must enter the Autonomous Registration Update Task (see
 12 2.6.3.11), supplying a "success" indication; the mobile station must then enter the
 13 Serving-System Determination Task (see 2.6.3.12). Otherwise, the mobile station
 14 must enter the Serving-System Determination Task (see 2.6.3.12).

15 2.6.3.10 Action on Registration Failure

16 If autonomous registration is enabled or $PUREG_{s-p} = 1$ or $LREG_s = 1$, the mobile station
 17 must enter the Autonomous Registration Update Task (see 2.6.3.11), supplying a "failure"
 18 indication; the mobile station must then enter the Serving-System Determination Task (see
 19 2.6.3.12). Otherwise, the mobile station must enter the Serving-System Determination
 20 Task (see 2.6.3.12).

21 2.6.3.11 Autonomous Registration Update

22 If the first-location area ID status is enabled, the first-registration ID status is enabled, the
 23 first-idle ID status is enabled and if a "success" indication was supplied to this task, the
 24 mobile station must set the location-registration ID status to disabled.

25 If the first-location-area ID status is disabled and a "success" indication was supplied to
 26 this task, the mobile station must set $LOCAID_{s-p}$ equal to $LOCAID_s$ and must set location-
 27 registration ID status to disabled.

28 If the first-registration ID status is disabled and a "success" indication was supplied to this
 29 task, the mobile station must set SID_{s-p} equal to SID_s , set $NXTREG_{s-p}$ equal to $REGID_s +$
 30 $REGINCR_s$ and set location-registration ID status to disabled.

31 If the first-registration ID status is disabled and a "failure" indication was supplied to this
 32 task, the mobile station must do the following:

- 33 • generate a random number ($NRANDOM_{sv}$). Each time this step is executed, a
 34 random number must be generated, uniformly distributed in the interval 0 to 10,
 35 and with granularity no more than 1.
- 36 • set $NXTREG_{s-p}$ equal to $REGID_s + NRANDOM_{sv}$.

37 If a "success" indication was supplied to this task, the mobile station must set $LRCC_s$ equal
 38 to the current control channel.

1 The mobile station must set the first-idle ID status to disabled and then return to the
2 invoking task.

3 2.6.3.12 Serving-System Determination

4 If this task is entered as a result of a power down registration attempt the mobile station
5 must immediately power down. Otherwise, the mobile station shall proceed as follows:

- 6 • If the preferred mode of operation is CDMA or the serving-system status does not
7 correspond to the preferred system, the mobile station may enter the *System*
8 *Determination Substate* of the *Mobile Station Initialization State* (see 6.6.1.1);
9 otherwise, it must enter the Paging Channel Selection Task (see 2.6.1.2).

10 2.6.3.13 Alternate Access Channel

11 If the mobile station is tuned to the strongest access channel, it may tune to the second
12 strongest channel and then enter the Retrieve Access Attempt Parameters Task (see
13 2.6.3.3). Otherwise, it must enter the Serving-System Determination Task (see 2.6.3.12).

14 2.6.3.14 Directed Retry

15 The mobile station must examine the signal strength on each of the channels listed in
16 CCLIST_s and choose up to two channels with the strongest signals. The mobile station
17 must then tune to the strongest access channel and enter the Retrieve Access Attempts
18 Parameters Task (see 2.6.3.3).

19 2.6.4 Mobile Station Control on the Analog Voice Channel

20 2.6.4.1 Loss of Radio-Link Continuity

21 While the mobile station is tuned to a voice channel, it must monitor the fade timing status
22 (see 2.4.1.3). If the fade timing status is enabled, a fade timer must be started; each time
23 the fade timing status is disabled, the timer must be reset. If the timer counts to 5
24 seconds, the mobile station must turn off its transmitter and enter the Serving-System
25 Determination Task (see 2.6.3.12).

26 2.6.4.2 Confirm Initial Voice Channel

27 Within 100 ms of the receipt of the Initial Voice Channel Designation Message (see 3.7.1.1),
28 the mobile station must determine whether the channel number is within the set allocated
29 to cellular systems, and do the following:

- 30 • If it is within the allocated set, the mobile station must tune to the designated voice
31 channel, turn on the transmitter at the power level indicated by the VMAC field of
32 the Initial Voice Channel Designation Message (see 2.1.2.2 and 3.7.1.1), turn on the
33 SAT transponder (see 2.4.1), and set the stored SAT Color Code (SCC_s) to the value
34 of the SCC field of the Initial Voice Channel Designation Message (see 3.7.1.1).
35 Discontinuous transmission (see 2.3.11) is prohibited while the mobile station is in
36 this task. That is, a mobile station capable of discontinuous-transmission operation
37 must remain in the DTX-high state.

- 1 - If this is an origination access, the mobile station then must enter the
- 2 Conversation Task (see 2.6.4.4).
- 3 - If this is a page response access, the mobile station then must enter the Waiting
- 4 for Order Task (see 2.6.4.3.1).
- 5 • Otherwise, the mobile station must enter the Serving-System Determination Task
- 6 (see 2.6.3.12).

7 2.6.4.3 Alerting

8 2.6.4.3.1 Waiting for Order

9 Discontinuous transmission (see 2.3.11) is prohibited while the mobile station is in this
10 task. That is, a mobile station capable of discontinuous-transmission operation must
11 remain in the DTX-high state. When this task is entered, an order timer must be set to 5
12 seconds. The following may occur:

- 13 • If this task is entered as a result of receiving an *Analog Handoff Direction Message*
14 (see 6.6.6.2.9), the mobile station must use the VMAC, ANALOG_CHAN, and SCC
15 values obtained from the *Analog Handoff Direction Message* to perform the following
16 operations: adjust power level, tune to new channel, adjust to new SAT, and set
17 SCC_s to the value of the SCC field of the message (see 2.4.1). The mobile station
18 must then turn on the transmitter, and reset the fade timer. The mobile station
19 must set the message encryption mode to that indicated by the MEM value obtained
20 from the *Analog Handoff Direction Message*. The mobile station may compare the
21 SID value obtained from the *Analog Handoff Direction Message* with HOME_SID_p. If
22 SID_r = HOME_SID_p, the mobile station may set the ROAM status to disabled. If
23 SID_r ≠ HOME_SID_p, the mobile station may set the ROAM status to enabled. The
24 mobile station must remain in the Waiting for Order Task.
- 25 • If the order timer expires the mobile station must turn off the transmitter; then the
26 mobile station must enter the Serving-System Determination Task (see 2.6.3.12).
- 27 • The mobile station may receive a Base Station Challenge Order Confirmation as part
28 of the SSD Update process (see 2.3.12.1.8). The mobile station must compare the
29 AUTHBS received in the Base Station Challenge Order Confirmation message with
30 that computed internally. The mobile station must then acknowledge receipt of the
31 SSD Update Order with a success or failure indication as described in 2.3.12.1.8. If
32 the mobile station fails to receive the Base Station Challenge Order Confirmation
33 within 5 seconds of when the Base Station Challenge Order was transmitted,
34 terminate the SSD update process. Reset the order timer to 5 seconds and remain
35 in the Waiting for Order Task.
- 36 • Within 100 ms of the receipt of any of the orders listed below (see 3.7.2), the mobile
37 station must compare SCC_s to the present SAT color code (PSCC) field in the
38 received message. If SCC_s ≠ PSCC, the order must be ignored. If SCC_s = PSCC, the
39 action to be taken for each order is as follows:

- 1 - *Handoff (to Analog Voice Channel):* Turn on signaling tone for 50 ms, turn off
2 signaling tone, turn off transmitter, adjust power level, tune to new channel,
3 adjust to new SAT, set SCC_s to the value of the SCC field of the message (see
4 2.4.1), turn on transmitter, reset fade timer, remain in the Waiting for Order
5 Task, and reset the order timer to 5 seconds.
- 6 - *Handoff (to Digital Traffic Channel):* Requires further study.
- 7 - *Alert and Alert With Info:* Turn on signaling tone, wait 500 ms, and enter the
8 Waiting for Answer Task (see 2.6.4.3.2).
- 9 - *Release:* Enter Release Task (see 2.6.4.5).
- 10 - *Audit:* Send order confirmation message to base station (see 2.7.2), remain in
11 the Waiting for Order Task, and reset the order timer to 5 seconds.
- 12 - *Message Waiting Order:* If the mobile station is capable of performing Message
13 Waiting Notification, the mobile station shall indicate the presence of messages
14 waiting based on the information contained in the message type field of the
15 Message Waiting order (i.e., 0 for clear or no messages, other non-zero values
16 indicate the number of messages waiting). The mobile station must send an
17 order confirmation to the base station (see 2.7.2), reset the order timer to 5
18 seconds and remain in the Waiting for Order Task.
- 19 - *Maintenance:* Turn on signaling tone, wait 500 ms, and enter the Waiting for
20 Answer Task (see 2.6.4.3.2).
- 21 - *Change Power:* Adjust the transmitter to the power level indicated by the order
22 qualification code (see 3.7.1.1 and 2.1.2.2) and send order confirmation message
23 to base station (see 2.7.2). Remain in the Waiting for Order Task, and reset the
24 order timer to 5 seconds.
- 25 - *Local Control:* If the local control status is enabled (see 2.6.1.2.2) and a local
26 control order is received, the local control field must be examined to determine
27 the action and confirmation to take.
- 28 - *Page:* Reply with Page Response. The mobile station must remain in the
29 Waiting for Order Task and reset the order timer to 5 seconds.
- 30 - *Serial Number Request:* Reply with Serial Number Response Message. The
31 mobile station must remain in the Waiting for Order Task, and reset the order
32 timer to 5 seconds.
- 33 - *SSD Update Order:* The mobile station computes SSD_A_{NEW} and SSD_B_{NEW}
34 and selects a RANDBS as described in 2.3.12.1.8. Within 5 seconds, the mobile
35 station must reply with a Base Station Challenge Order. Remain in the Waiting
36 for Order Task and reset the order timer to 5 seconds.
- 37 - *Unique Challenge Order:* The mobile station executes the Unique Challenge
38 procedure as in 2.3.12.1.5. Within 5 seconds, the mobile station must send an
39 order confirmation message to the base station (see 2.7.2). Remain in the
40 current task and reset the order timer to 5 seconds.

- 1 - **Message Encryption Mode Order:** The base station is activating/deactivating
 2 signaling message encryption. If the order qualifier field in the received message
 3 is set to '001', activate signaling message encryption. If the order qualifier field
 4 - in the received message is set to '000', deactivate signaling message encryption.
 5 In either case, send an order confirmation message to the base station (see
 6 2.7.2), remain in the Waiting for Order Task and reset the order timer to 5
 7 seconds.
- 8 - **Parameter Update Order:** Increment COUNT_{s-p} (see 2.3.12.1.3), send an order
 9 confirmation message to the base station (see 2.7.2) and reset the order timer to
 10 5 seconds. Remain in the Waiting for Order Task.
- 11 - **Any other order:** Ignore order.

12 2.6.4.3.2 Waiting for Answer

13 Discontinuous transmission (see 2.3.11) is prohibited while the mobile station is in this
 14 task. That is, a mobile station capable of discontinuous-transmission operation must
 15 remain in the DTX-high state. When this task is entered, an alert timer must be set to 65
 16 seconds (-0, +20%). The following may occur:

- 17 • If this task is entered as a result of receiving an *Analog Handoff Direction Message*
 18 (see 6.6.6.2.9), the mobile station must use the VMAC, ANALOG_CHAN, and SCC
 19 values obtained from the *Analog Handoff Direction Message* to perform the following
 20 operations: adjust power level, tune to new channel, adjust to new SAT, and set
 21 SCC_s to the value of the SCC field of the message (see 2.4.1). The mobile station
 22 must then turn on the transmitter, reset the fade timer, and turn on the signaling
 23 tone. The mobile station must set the message encryption mode to that indicated
 24 by the MEM value obtained from the *Analog Handoff Direction Message*. The mobile
 25 station may compare the SID value obtained from the *Analog Handoff Direction*
 26 *Message* with HOME_SID_p. If SID_r = HOME_SID_p, the mobile station may set the
 27 ROAM status to disabled. If SID_r ≠ HOME_SID_p, the mobile station may set the
 28 ROAM status to enabled. The mobile station must remain in the Waiting for Answer
 29 Task.
- 30 • If the alert timer expires the mobile station must turn off the transmitter; then the
 31 mobile station must enter the Serving-System Determination Task (see 2.6.3.12).
- 32 • If the user answers, signaling tone must be turned off and the Conversation Task
 33 (see 2.6.4.4) must be entered.
- 34 • The mobile station may receive a Base Station Challenge Order Confirmation as part
 35 of the SSD Update process (see 2.3.12.1.8). The mobile station must compare the
 36 AUTHBS received in the Base Station Challenge Order Confirmation Message with
 37 that computed internally. The mobile station must then acknowledge receipt of the
 38 SSD Update Order with a success or failure indication as described in 2.3.12.1.8. If
 39 the mobile station fails to receive the Base Station Challenge Order Confirmation
 40 within 5 seconds of when the Base Station Challenge Order was transmitted,
 41 terminate the SSD update process. Remain in the Waiting for Answer Task.

- 1 • Within 100 ms of the receipt of any of the orders listed below, the mobile station
2 must compare SCC_s to the PSCC field in the received message. If $SCC_s \neq PSCC$, the
3 order must be ignored. If $SCC_s = PSCC$, the action to be taken for each order is as
4 follows:
- 5 - *Handoff (to Analog Voice Channel)*: Turn off signaling tone for 500 ms, turn on
6 signaling tone for 50 ms, turn off signaling tone, turn off transmitter, adjust
7 power level, tune to new channel, adjust to new SAT, set SCC_s to the value of
8 the SCC field of the message (see 2.4.1), turn on transmitter, reset fade timer,
9 and turn on signaling tone. Then remain in the Waiting for Answer Task.
 - 10 - *Handoff (to Digital Traffic Channel)*: Requires further study.
 - 11 - *Alert and Alert With Info*: Remain in the Waiting for Answer Task, and reset the
12 alert timer to 65 seconds.
 - 13 - *Stop Alert*: Turn off signaling tone, and enter the Waiting for Order Task (see
14 2.6.4.3.1).
 - 15 - *Release*: Turn off signaling tone, wait 500 ms, and then enter the Release Task
16 (see 2.6.4.5).
 - 17 - *Audit*: Send order confirmation message to base station (see 2.7.2) and remain
18 in the Waiting for Answer Task.
 - 19 - *Message Waiting*: If the mobile station is capable of performing Message Waiting
20 Notification, the mobile station shall indicate the presence of messages waiting
21 based on the information contained in the message type field of the Message
22 Waiting order (i.e., 0 for clear or no messages, other non-zero values indicate the
23 number of messages waiting). The mobile station must send an order
24 confirmation to the base station (see 2.7.2) and remain in the Waiting for Answer
25 Task.
 - 26 - *Maintenance*: Remain in the Waiting for Answer Task, and reset the alert timer
27 to 65 seconds.
 - 28 - *Change Power*: Adjust the transmitter to the power level indicated by the order
29 qualification code (see 3.7.1.1 and 2.1.2.2) and send order confirmation message
30 to base station (see 2.7.2). Remain in the Waiting for Answer Task.
 - 31 - *Local Control*: If the local control status is enabled (see 2.6.1.2.2) and a local
32 control order is received, the local control field must be examined to determine
33 the action and confirmation to take.
 - 34 - *Page*: Reply with Page Response. The mobile station must remain in the
35 Waiting for Answer Task.
 - 36 - *Serial Number Request*: Reply with Serial Number Response Message. The
37 mobile station must remain in the Waiting for Answer Task.

- 1 - **SSD Update Order:** The mobile station computes SSD-A_NEW and SSD-B_NEW
2 and selects a RANDBS as described in 2.3.12.1.8. Within 5 seconds, the mobile
3 station must then reply with a Base Station Challenge Order. Remain in the
4 Waiting for Answer Task.
- 5 - **Unique Challenge Order:** The mobile station executes the Unique Challenge
6 procedure as in 2.3.12.1.5. Within 5 seconds, the mobile station must send an
7 order confirmation message to the base station (see 2.7.2). Remain in the
8 current task.
- 9 - **Message Encryption Mode Order:** The base station is activating/deactivating
10 signaling message encryption. If the order qualifier field in the received message
11 is set to '001', activate signaling message encryption. If the order qualifier field
12 in the received message is set to '000', deactivate signaling message encryption.
13 In either case, send an order confirmation message to the base station (see
14 2.7.2) and remain in the Waiting for Answer Task.
- 15 - **Parameter Update Order:** Increment COUNT_{s-p} (see 2.3.12.1.3) and send an
16 order confirmation message to the base station (see 2.7.2). Remain in the
17 Waiting for Answer Task.
- 18 - **Any other order:** Ignore order.

19 2.6.4.4 Conversation

20 When this task is entered, a release-delay timer must be set to 500 ms. If the termination
21 status is enabled (see 2.6.3.8), the mobile station must set the termination status to
22 disabled, wait 500 ms and then enter the Release Task (see 2.6.4.5).

23 Discontinuous transmission (see 2.3.11) must be inhibited for 1.5 seconds after the mobile
24 station enters this task. That is, for at least 1.5 seconds after entering this task, a mobile
25 station capable of discontinuous-transmission operation must remain in the DTX-high
26 state.

27 In the conversation state, the following may occur:

- 28 • If this task is entered as a result of receiving an *Analog Handoff Direction Message*
29 (see 6.6.6.2.9), the mobile station must use the VMAC, ANALOG_CHAN, and SCC
30 values obtained from the *Analog Handoff Direction Message* to perform the following
31 operations: adjust power level, tune to new channel, adjust to new SAT, and set
32 SCC_s to the value of the SCC field of the message (see 2.4.1). The mobile station
33 must then turn on the transmitter, and reset the fade timer. The mobile station
34 must set the message encryption mode to that indicated by the MEM value obtained
35 from the *Analog Handoff Direction Message*. The mobile station may compare the
36 SID value obtained from the *Analog Handoff Direction Message* with HOME_SID_p. If
37 SID_r = HOME_SID_p, the mobile station may set the ROAM status to disabled. If
38 SID_r ≠ HOME_SID_p, the mobile station may set the ROAM status to enabled. The
39 mobile station must remain in the Conversation Task.

- 1 • If the user terminates the call, the release-delay timer must be examined. If the
2 timer has expired, the Release Task must be entered (see 2.6.4.5). If the timer has
3 not expired, the mobile station must wait until the timer expires and then enter the
4 Release Task.

- 5 • If the user requests a flash, the mobile station must take the following steps. Mobile
6 stations capable of discontinuous-transmission operation (see 2.3.11) must inhibit
7 discontinuous transmission for 1.5 seconds; that is, for at least 1.5 seconds the
8 mobile station must remain in the DTX-high state. Immediately following the flash,
9 a mobile station not capable of discontinuous transmission or a mobile station
10 capable of discontinuous transmission but in the DTX-high state must turn on
11 signaling tone for 400 ms.

12 If the mobile station is capable of discontinuous transmission and is in the DTX-low
13 state or the transition state when the flash occurs, the mobile station must enter
14 the DTX-high state and wait 200 ms. Then it must turn on signaling tone for 400
15 ms. If a valid order (one that is not ignored) is received while processing a flash, the
16 flash must be terminated immediately and the order must be processed. Flashes so
17 terminated are not considered valid.

- 18 • The mobile station may receive a Base Station Challenge Order Confirmation as part
19 of the SSD Update process (see 2.3.12.1.8). The mobile station must compare the
20 AUTHBS received in the Base Station Challenge Order Confirmation Message with
21 that computed internally. The mobile station must then acknowledge receipt of the
22 SSD Update Order with a success or failure indication as described in 2.3.12.1.8. If
23 the mobile station fails to receive the Base Station Challenge Order Confirmation
24 within 5 seconds of when the Base Station Challenge Order was transmitted,
25 terminate the SSD update process. Remain in the Conversation Task.
- 26 • Within 100 ms of the receipt of any of the orders listed below, the mobile station
27 must compare SCC_B to the PSCC field in the received message. If $SCC_B \neq PSCC$, the
28 order must be ignored. If $SCC_B = PSCC$, the mobile station must take the following
29 steps. Except for the audit order, mobile stations capable of discontinuous-
30 transmission operation (see 2.3.11) must inhibit discontinuous transmission for 1.5
31 seconds; that is, for at least 1.5 seconds the mobile station must remain in the DTX-
32 high state. Upon receipt of the audit order, mobile stations capable of
33 discontinuous transmission must inhibit discontinuous transmission for at least 5
34 seconds. Immediately after determining that $SCC_B = PSCC$ a mobile station not
35 capable of discontinuous transmission or a mobile station capable of discontinuous
36 transmission but in the DTX-high state must take the actions specified below for
37 each order.

- 1 If the mobile station is capable of discontinuous transmission and is in the DTX-low
2 state or the transition state when the order arrives, the mobile station must enter
3 the DTX-high state and wait 200 ms. Then it must take the actions specified below
4 for each order.
- 5 - *Handoff (to Analog Voice Channel)*: Turn on signaling tone for 50 ms, turn off
6 signaling tone, turn off transmitter, adjust power level, tune to new channel,
7 adjust to new SAT, set SCC_s to the value of the SCC field of the message (see
8 2.4.1), turn on transmitter, reset fade timer, and remain in the Conversation
9 Task.
 - 10 - *Handoff (to Digital Traffic Channel)*: Requires further study.
 - 11 - *Send Called-Address*:
 - 12 + If received within 10 seconds of the completion of the last valid flash, send
13 the called-address to the base station (see 2.7.2) and remain in the
14 Conversation Task.
 - 15 + Otherwise, ignore the order and remain in the Conversation Task.
 - 16 - *Disable DTMF Order*: Send an order confirmation message to the base station
17 (see 2.7.2). The mobile station must then disable its DTMF tone generator until
18 the Called Address message sent to the base station in response to the next
19 Send Called-Address message received by the mobile station has been
20 completely transmitted. The mobile station must remain in the Conversation
21 Task.
 - 22 - *Alert and Alert With Info*: Turn on signaling tone, wait 500 ms, and then enter
23 the Waiting for Answer Task (see 2.6.4.3.2).
 - 24 - *Release*: Examine the release-delay timer. If the timer has expired, the mobile
25 station must enter the Release Task (see 2.6.4.5). If the timer has not expired,
26 the mobile station must wait until the timer expires and then enter the Release
27 Task.
 - 28 - *Audit*: Send order confirmation message to base station (see 2.7.2) and remain
29 in the Conversation Task.
 - 30 - *Flash With Info*: Send order confirmation message to the base station (see 2.7.2)
31 and remain in the Conversation Task.
 - 32 - *Message Waiting*: If the mobile station is capable of performing Message Waiting
33 Notification, the mobile station shall indicate the presence of messages waiting
34 based on the information contained in the message type field of the Message
35 Waiting order (i.e., 0 for clear or no messages, other non-zero values indicate the
36 number of messages waiting). The mobile station must send an order
37 confirmation to the base station (see 2.7.2) and remain in the Conversation
38 Task.
 - 39 - *Maintenance*: Turn on signaling tone, wait 500 ms, and then enter the Waiting
40 for Answer Task (see 2.6.4.3.2).

- 1 - **Change Power:** Adjust the transmitter to the power level indicated by the order
2 qualification code (see 3.7.1.1 and 2.1.2.2) and send order confirmation message
3 to base station (see 2.7.2). Remain in the Conversation Task. If the mobile
4 station is capable of discontinuous transmission and is in the DTX-low state or
5 the transition state when this order arrives, the mobile station must immediately
6 enter the DTX-high state at the power level indicated in the order.
- 7 - **Local Control:** If the local control status is enabled (see 2.6.1.2.2) and a local
8 control order is received, the local control field must be examined to determine
9 the action and confirmation to take.
- 10 - **Page:** Reply with Page Response. The mobile station must remain in the
11 Conversation Task.
- 12 - **Serial Number Request:** Reply with Serial Number Response Message. The
13 mobile station must remain in the Conversation Task.
- 14 - **SSD Update Order:** The mobile station computes SSD-A_NEW and SSD-B_NEW
15 and selects a RANDBS as described in 2.3.12.1.8. Within 5 seconds, the mobile
16 station must then reply with a Base Station Challenge Order. Remain in the
17 Conversation Task.
- 18 - **Unique Challenge Order:** The mobile station executes the Unique Challenge
19 procedure as in 2.3.12.1.5. Within 5 seconds, the mobile station must send an
20 order confirmation message to the base station (see 2.7.2). Remain in the
21 Conversation Task.
- 22 - **Message Encryption Mode Order:** The base station is activating/deactivating
23 signaling message encryption. If the order qualifier field in the received message
24 is set to '001', activate signaling message encryption. If the order qualifier field
25 in the received message is set to '000', deactivate signaling message encryption.
26 In either case, send an order confirmation message to the base station (see
27 2.7.2) and remain in the Conversation Task.
- 28 - **Parameter Update Order:** Increment COUNT_{s-p} (see 2.3.12.1.3) and send an
29 order confirmation message to the base station (see 2.7.2). Remain in the
30 Conversation Task.
- 31 - **Any other order:** Ignore order.

22 2.6.4.5 Release

33 Discontinuous transmission (see 2.3.11) is prohibited while the mobile station is in this
34 task. That is, a mobile station capable of discontinuous-transmission operation must
35 remain in the DTX-high state. Any mobile station in the DTX-low state must immediately
36 enter the DTX-high state, wait 200 ms. While in the DTX-high state, the mobile station
37 shall do the following:

- 38 • Send signaling tone for 1.8 seconds. If a flash (see 2.6.4.4) was being sent when this
39 task was entered, signaling tone must continue to be sent for no more than 1.8
40 seconds.

- 1 • Stop sending signaling tone.
- 2 • Turn off the transmitter.
- 3 **The mobile station must then enter the Serving-System Determination Task (see 2.6.3.12).**

4 **2.6.4.6 Power Down**

5 **If the mobile station is intentionally removed from the air interface while it is tuned to an**
6 **analog voice channel the mobile station must immediately prohibit discontinuous**
7 **transmission (see 2.3.11). That is, a mobile station capable of discontinuous-transmission**
8 **operation must remain in the DTX-high state. Any mobile station in the DTX-low state**
9 **must immediately enter the DTX-high state, wait 200 ms. While in the DTX-high state, the**
10 **mobile station shall do the following:**

- 11 • **If PDREG_s = 1 the mobile station must send an autonomous registration message**
12 **with a power down indication on the reverse voice channel.**
- 13 • **Send signaling tone for 1.8 seconds. If a flash (2.6.4.4) was being sent when this**
14 **task was entered, signaling tone must continue to be sent for no more than 1.8**
15 **seconds.**
- 16 • **Stop sending signaling tone, turn off the transmitter and then power down.**

2.7 Signaling Formats

In the message formats used between the mobile stations and base stations, some bits are marked as reserved (RSVD). Some or all of these reserved bits may be used in the future for additional messages. Therefore, all mobile stations and base stations must set all bits that they are programmed to treat as reserved bits to '0' (zero) in all messages that they transmit. All mobile stations and base stations must ignore the state of all bits that they are programmed to treat as reserved bits in all messages that they receive.

2.7.1 Reverse Analog Control Channel (RECC)

The reverse analog control channel (RECC) is a wideband data stream sent from the mobile station to the base station. This data stream must be generated at a 10 kbps \pm 1 bit/second rate. Figure 2.7.1-1 depicts the format of the RECC data stream.

Information element	Length (bits)	
DOTTING = 1010...010	30	↑ Seizure Precursor ↓
WORD SYNC = 11100010010	11	
CODED DCC [Coded per Table 2.7.1-1]	7	
1st Word Repeated 5 times	240	
2nd Word Repeated 5 times	240	
3rd Word Repeated 5 times	240	
...		

Figure 2.7.1-1. Reverse Analog Control Channel Message Stream (Mobile-to-Base)

All messages begin with the RECC seizure precursor that is composed of a 30-bit dotting sequence (1010...010), an 11-bit word sync sequence (11100010010), and the coded digital color code (DCC). The 7-bit coded DCC is obtained by translating the received DCC according to Table 2.7.1-1.

Table 2.7.1-1. Coded Digital Color Code

Received DCC	7-Bit Coded DCC
00	0000000
01	0011111
10	1100011
11	1111100

Each word contains 48 bits, including parity, and is repeated five times; it is then referred to as a word block. A word is formed by encoding 36 content bits into a (48, 36) BCH code that has a distance of 5, (48, 36; 5). The left-most bit (i.e., earliest in time) shall be designated the most-significant bit. The 36 most-significant bits of the 48-bit field shall be the content bits. The generator polynomial for the code is the same as for the (40, 28; 5) code used on the forward control channel (see 3.7.1).

2.7.1.1 Reverse Analog Control Channel (RECC) Messages

Each RECC message can consist of one to six words. The types of messages to be transmitted over the reverse control channel are:

- Page Response Message
- Origination Message
- Order Confirmation Message
- Order Message

These messages are made up of combinations of the following five words. Note: If included, Words are to be transmitted in the order shown.

Word A - Abbreviated Address Word

Information element	Length (bits)
F	1
NAWC	3
T	1
S	1
E	1
ER	1
SCM (3-0)	4
MIN1	24
P	12

1 Word B - Extended Address Word

Information element	Length (bits)
F = 0	1
NAWC	3
LOCAL/MSG_TYPE	5
ORDQ	3
ORDER	5
LT	1
EP	1
SCM(4)	1
MPCI	2
SDCC1	2
SDCC2	2
MIN2 ₃₃₋₂₄	10
P	12

2

3 Word C - Serial Number Word

Information element	Length (bits)
F = 0	1
NAWC	3
ESN	32
P	12

4

5 Word C - Authentication Word

Information element	Length (bits)
F = 0	1
NAWC	3
COUNT	6
RANDC	8
AUTHR	18
P	12

6

1 Word C - Unique Challenge Order Confirmation Word

Information element	Length (bits)
F = 0	1
NAWC	3
RSVD = 000...000	14
AUTHU	18
P	12

2

3 Word C - Base Station Challenge Word

Information element	Length (bits)
F = 0	1
NAWC	3
RANDBS	32
P	12

4

5 Word D - First Word of the Called-Address

Information element	Length (bits)
F = 0	1
NAWC	3
1st DIGIT	4
2nd DIGIT	4
3rd DIGIT	4
4th DIGIT	4
5th DIGIT	4
6th DIGIT	4
7th DIGIT	4
8th DIGIT	4
P	12

6

Word E - Second Word of the Called-Address

Information element	Length (bits)
F = 0	1
NAWC = 0	3
9th DIGIT	4
10th DIGIT	4
11th DIGIT	4
12th DIGIT	4
13th DIGIT	4
14th DIGIT	4
15th DIGIT	4
16th DIGIT	4
P	12

The interpretation of the data fields is as follows:

- F - First word indication field. Set to '1' in first word and '0' in subsequent words.
- NAWC - Number of additional words coming field.
- T - T field. Set to '1' to identify the message as an origination or an order; set to '0' to identify the message as an order response or page response.
- S - Send serial number field. If the serial number word is sent, set to '1'; if the serial number word is not sent, set to '0'.
- E - Extended address field. If the extended address word is sent, set to '1'; if the extended address word is not sent, set to '0'.
- EP - The Extended Protocol (EP) bit is used to indicate to the system that the mobile station is capable of using the Extended Protocol.
- ER - The Extended Protocol Reverse Channel (ER) bit is used to indicate that the current message is in the Extended Protocol. If the ER bit is a "zero" (0), the message format of 2.7.1.1 above, is being used. If the ER bit is a "one" (1), the Extended Protocol message format is being used.
- COUNT - A modulo-64 count maintained by the mobile station and used for authentication and anti-fraud purposes.
- RANDC - An 8-bit number used to confirm the last RAND received by the mobile station.

1	SCM(4-0)	-	The station class mark field (see 2.3.3).
2	MPCI	-	'00' indicates EIA-553 or IS-54-A mobile station.
3		-	'01' Reserved. (used to indicate EIA/TIA IS-54-B dual-mode mobile
4		-	station).
5		-	'10' indicates CDMA-capable dual-mode mobile station.
6		-	'11' reserved.
7	SDCC1	-	Supplementary Digital Color Codes
8	SDCC2	-	Supplementary Digital Color Codes
9	ORDER	-	Order field. Identifies the order type (see Table 3.7.1.1-1).
10	ORDQ	-	Order qualifier field. Qualifies the order confirmation to a specific
11		-	action (see Table 3.7.1.1-1).
12	LOCAL	-	Local control field. This field is specific to each system. The ORDER
13		-	field must be set to local control (see Table 3.7.1.1-1) for this field to
14		-	be interpreted.
15	MESSAGE	-	Message type field. Qualifies the order to a specific action (see Table
16	TYPE	-	3.7.1.1-1)
17	LT	-	Last-try code field (see 2.6.3.8).
18	MIN1	-	First part of the mobile identification number field (see 2.3.1).
19	MIN2	-	Second part of the mobile identification number field (see 2.3.1).
20	ESN	-	Electronic Serial Number field. Identifies the electronic serial number
21		-	of the mobile station (see 2.3.2).
22	DIGIT	-	Digit field (see Table 2.7.1.1-1).
23	AUTHR	-	Output response of the authentication algorithm.
24	AUTHU	-	Output of the authentication algorithm when responding to a Unique
25		-	Challenge order (see 2.3.12.1.5).
26	RANDBS	-	Random number used in the SSD update procedure (see 2.3.12.1.8).
27	RSVD	-	Reserved for future use; all bits must be set as indicated.
28	P	-	Parity field.
29			

Table 2.7.1.1-1. Digit Code

Digit	Code	Digit	Code
1	0001	7	0111
2	0010	8	1000
3	0011	9	1001
4	0100	0	1010
5	0101	.	1011
6	0110	#	1100
		Null	0000

Notes:

1. The digit 0 is encoded as binary "ten"; not binary "zero."
2. The code 0000 is the null code, indicating no digit present.
3. All other four-bit sequences are reserved, and must not be transmitted.

2

3 Examples of encoding called-address information into the called-address words are given
4 below:

5 1. If the number 2# is entered, the word is:

Information element	Value	Length (bits)
F = 0	NOTE	1
NAWC	NOTE	3
1st DIGIT	0010	4
2nd DIGIT	1100	4
3rd DIGIT	0000	4
4th DIGIT	0000	4
5th DIGIT	0000	4
6th DIGIT	0000	4
7th DIGIT	0000	4
8th DIGIT	0000	4
P		12

6

- 1 II. If the number 13792640 is entered, the word is:

Information element	Value	Length (bits)
F = 0	NOTE	1
NAWC	NOTE	3
1st DIGIT	0001	4
2nd DIGIT	0011	4
3rd DIGIT	0111	4
4th DIGIT	1001	4
5th DIGIT	0010	4
6th DIGIT	0110	4
7th DIGIT	0100	4
8th DIGIT	1010	4
P		12

2

- 3 III. If the number *24273258 is entered, the words are:

- 4 Word D - First Word of the Called-Address

Information element	Value	Length (bits)
F = 0	NOTE	1
NAWC	NOTE	3
1st DIGIT	1011	4
2nd DIGIT	0010	4
3rd DIGIT	0100	4
4th DIGIT	0010	4
5th DIGIT	0111	4
6th DIGIT	0011	4
7th DIGIT	0010	4
8th DIGIT	0101	4
P		12

5

1 Word E - Second Word of the Called-Address

Information element	Value	Length (bits)
F = 0	NOTE	1
NAWC = 0	NOTE	3
9th DIGIT	1000	4
10th DIGIT	0000	4
11th DIGIT	0000	4
12th DIGIT	0000	4
13th DIGIT	0000	4
14th DIGIT	0000	4
15th DIGIT	0000	4
16th DIGIT	0000	4
P		12

2

3 **NOTE:** These four bits depend on the type of message.4 **2.7.2 Reverse Analog Voice Channel (RVC)**

5 The reverse voice channel (RVC) is a wideband data stream sent from the mobile station to
 6 the base station. This data stream must be generated at a 10 kbps \pm 1 bps rate. Figure
 7 2.7.2-1 depicts the format of the RVC data stream.

8

Information element	Length (bits)
DOTTING	101
W.S.	11
Repeat 1 of WORD1	48
dotting	37
W.S.	11
Repeat 2 of WORD 1	48
dotting	37
W.S.	11
...	...
Repeat 5 of WORD 1	48
dotting	37
W.S.	11
Repeat 1 of WORD 2	48
dotting	37
W.S.	11
...	...
Repeat 5 of WORD 2	48

1 DOTTING = 1010....101

2 W.S. (WORD SYNC) = 11100010010

3 **Figure 2.7.2-1. RVC Message Stream (Mobile-to-Base)**

4

5 A 37-bit dotting sequence (1010....101) and an 11-bit word sync sequence (11100010010)

6 are sent to permit base stations to achieve synchronization with the incoming data, except

7 at the first repeat of word 1 of the message where a 101-bit dotting sequence is used. Each

8 word contains 48 bits, including parity, and is repeated five times together with the 37-bit

9 dotting and 11-bit word sync sequences; it is then referred to as a word block. For a multi-

10 word message, the second word block is formed the same as the first word block including

11 the 37-bit dotting and 11-bit word sync sequences. A word is formed by encoding the 36

12 content bits into a (48, 36) BCH code that has a distance of 5, (48, 36; 5). The left-most bit

13 (i.e., earliest in time) shall be designated the most-significant bit. The 36 most-significant

14 bits of the 48-bit field shall be the content bits. The generator polynomial for the code is

15 the same as for the (40, 28; 5) code used on the forward control channel (see 3.7.1).

2.7.2.1 Reverse Analog Voice Channel (RVC) Messages

Each RVC message can consist of one or two words. Formats are shown for the following RVC message types:

- Order Confirmation Message
- Called-Address Message
- Serial Number Response Message
- Page Response
- Unique Challenge Order Confirmation
- Base Station Challenge Order Message

Order Confirmation Message

Information element	Length (bits)
F = 1	1
NAWC = 00	2
T = 1	1
LOCAL/MSG_TYPE	5
ORDQ	3
ORDER	5
RSVD = 000 ... 000	19
P	12

1 Called-Address Message:

2 Word 1 - First Word of the Called-Address

Information element	Length (bits)
F = 1	1
NAWC	2
T = 0	1
1st DIGIT	4
2nd DIGIT	4
3rd DIGIT	4
4th DIGIT	4
5th DIGIT	4
6th DIGIT	4
7th DIGIT	4
8th DIGIT	4
P	12

3

4 Word 2 - Second Word of the Called-Address

Information element	Length (bits)
F = 0	1
NAWC = 00	2
T = 0	1
9th DIGIT	4
10th DIGIT	4
11th DIGIT	4
12th DIGIT	4
13th DIGIT	4
14th DIGIT	4
15th DIGIT	4
16th DIGIT	4
P	12

5

1 Serial Number Response Message:

2 Word 1 of Serial Number Response Message

Information element	Length (bits)
F = 1	1
NAWC = 01	2
T = 1	1
LOCAL/MSG_TYPE = 00000	5
ORDQ	3
ORDER	5
RSVD = 000 ... 000	19
P	12

3

4 Word 2 of Serial Number Response Message

Information element	Length (bits)
F = 0	1
NAWC = 00	2
T = 1	1
ESN	32
P	12

5

6 Page Response

Information element	Length (bits)
F = 1	1
NAWC = 00	2
T = 1	1
MSG_TYPE = 00000	5
ORDQ = 000	3
ORDER = 00000	5
RSVD = 000 ... 000	19
P	12

7

1 Unique Challenge Order Confirmation Message

Information element	Length (bits)
F = 1	1
NAWC = 00	2
T = 1	1
LOCAL/MSG_TYPE = 0...0	5
ORDQ	3
ORDER	5
AUTHU	18
RSVD = 0	1
P	12

2

3 Base Station Challenge Order Message

4 Word 1 of Base Station Challenge Order Message

Information element	Length (bits)
F = 1	1
NAWC = 01	2
T = 1	1
LOCAL/MSG_TYPE = 0...0	5
ORDQ	3
ORDER	5
RSVD = 000 ... 000	19
P	12

5

6 Word 2 of Base Station Challenge Order Message

Information element	Length (bits)
F = 0	1
NAWC = 00	2
T = 1	1
RANDBS	32
P	12

7

1 The interpretation of the data fields is as follows:

- 2 F - First word field. Set to '1' in first word and '0' in second word.
- 3 - NAWC - Number of additional words coming field.
- 4 T - T field. Set to '1' to identify the message as an order or order
- 5 confirmation. Set to '0' to identify the message as a called-address.
- 6 DIGIT - Digit field (see Table 2.7.1.1-1).
- 7 ORDER - Order field. Identifies the order type (see Table 3.7.1.1-1).
- 8 ORDQ - Order qualifier field. Qualifies the order confirmation to a specific
- 9 action (see Table 3.7.1.1-1).
- 10 LOCAL - Local Control field. This field is specific to each system. The ORDER
- 11 field must be set to local control (see Table 3.7.1.1-1) for this field to
- 12 be interpreted.
- 13 MSG_TYPE - Message Type field. Qualifies the order (see Table 3.7.1.1-1).
- 14 RSVD - Reserved for future use; all bits must be set as indicated.
- 15 AUTHU - Output of the authentication algorithm when responding to a Unique
- 16 Challenge order (see 2.3.12.1.5).
- 17 RANDBS - Random number used in the SSD update procedure (see 2.3.12.1.8).
- 18 ESN - Electronic Serial Number field. Identifies the electronic serial number
- 19 of the mobile station (see 2.3.2).
- 20 P - Parity field.
- 21

1 6 REQUIREMENTS FOR MOBILE STATION CDMA OPERATION

2 This section defines requirements that are specific to CDMA mobile station equipment and
3 operation. See Section 2 and Section 4 for analog mobile station requirements.

4 6.1 Transmitter**5 6.1.1 Frequency Parameters****6 6.1.1.1 Channel Spacing and Designation**

7 Channel spacing and designation for the dual-mode mobile station transmissions shall be
8 as specified in 2.1.1.1. The mobile station shall support CDMA operations on channel
9 numbers 1013 through 1023, 1 through 311, 356 through 644, 689 through 694, and 739
10 through 777 inclusive, as shown in Table 6.1.1.1-1.

11 The CDMA frequency assignment in MHz corresponding to the CDMA Channel number
12 shown in Table 6.1.1.1-1 (expressed as N) is calculated as shown in Table 6.1.1.1-2.

13 Channel numbers for the Primary CDMA Channel and the Secondary CDMA Channel are
14 given in 7.1.1.1.

15 6.1.1.2 Frequency Tolerance

16 When operating in the CDMA transmission mode, the mobile station transmit carrier
17 frequency shall be 45.0 MHz \pm 300 Hz lower than the frequency of the base station transmit
18 signal as measured at the mobile station receiver.

19 6.1.2 Power Output Characteristics

20 All power levels are referenced to the mobile station antenna connector unless otherwise
21 specified.

22 6.1.2.1 Maximum Output Power

23 The absolute maximum effective radiated power (ERP) with respect to a half-wave dipole for
24 any class mobile station transmitter shall be 8 dBW (6.3 Watts). ERP measured during a
25 transmitted power control group (see 6.1.3.1.7.1) for each mobile station class when
26 commanded to maximum output power shall be within the limits given in Table 6.1.2.1-1.
27 Transmission at maximum power shall not degrade the spurious emission levels as
28 specified in 6.1.4.2. An inoperative antenna assembly shall not degrade spurious emission
29 levels as specified in 6.1.4.2. These ERP requirements shall be met over the ambient
30 temperature range of -30° C to +60° C. For a Class III mobile station, the ERP at maximum
31 output power may drop by 2 dB at 60° C.

32

Table 6.1.1.1-1. CDMA Channel Numbers and Corresponding Frequencies

System	Valid CDMA Frequency Assignments	Analog Channel Count	CDMA Channel Number	Transmitter Frequency Assignment (MHz)		
				Mobile	Base	
A" (1 MHz)	///////	22	991	824.040	869.040	
	CDMA		1012	824.670	869.670	
A (10 MHz)	CDMA	11	1013	824.700	869.700	
	CDMA		1023	825.000	870.000	
	CDMA		1	825.030	870.030	
	CDMA		311	311	834.330	879.330
B (10 MHz)	///////	22	312	834.360	879.360	
	CDMA		333	834.990	879.990	
	CDMA	22	334	835.020	880.020	
	CDMA		355	835.650	880.650	
	CDMA	289	356	835.680	880.680	
	CDMA		644	844.320	889.320	
	CDMA	22	645	844.350	889.350	
	CDMA		666	844.980	889.980	
	A' (1.5 MHz)	///////	22	667	845.010	890.010
		CDMA		688	845.640	890.640
CDMA		6	689	845.670	890.670	
CDMA			694	845.820	890.820	
CDMA		22	695	845.850	890.850	
CDMA			716	846.480	891.480	
B' (2.5 MHz)	///////	22	717	846.510	891.510	
	CDMA		738	847.140	892.140	
	CDMA	39	739	847.170	892.170	
	CDMA		777	848.310	893.310	
	CDMA	22	778	848.340	893.340	
	CDMA		799	848.970	893.970	

Frequencies in shaded (///////) regions are not valid for CDMA frequency assignments.

Table 6.1.1.1-2. CDMA Channel Number to CDMA Frequency Assignment Correspondence

Transmitter	CDMA Channel Number	CDMA Frequency Assignment, MHz
Mobile Station	$1 \leq N \leq 777$	$0.030 N + 825.000$
	$1013 \leq N \leq 1023$	$0.030 (N-1023) + 825.000$
Base Station	$1 \leq N \leq 777$	$0.030 N + 870.000$
	$1013 \leq N \leq 1023$	$0.030 (N-1023) + 870.000$

Table 6.1.2.1-1. Effective Radiated Power at Maximum Output Power

Mobile Station Class	ERP at Maximum Output Shall Exceed	ERP at Maximum Output Shall not Exceed
I	1 dBW (1.25 watts)	8 dBW (6.3 watts)
II	-3 dBW (0.5 watts)	4 dBW (2.5 watts)
III	-7 dBW (0.2 watts)	0 dBW (1.0 watts)

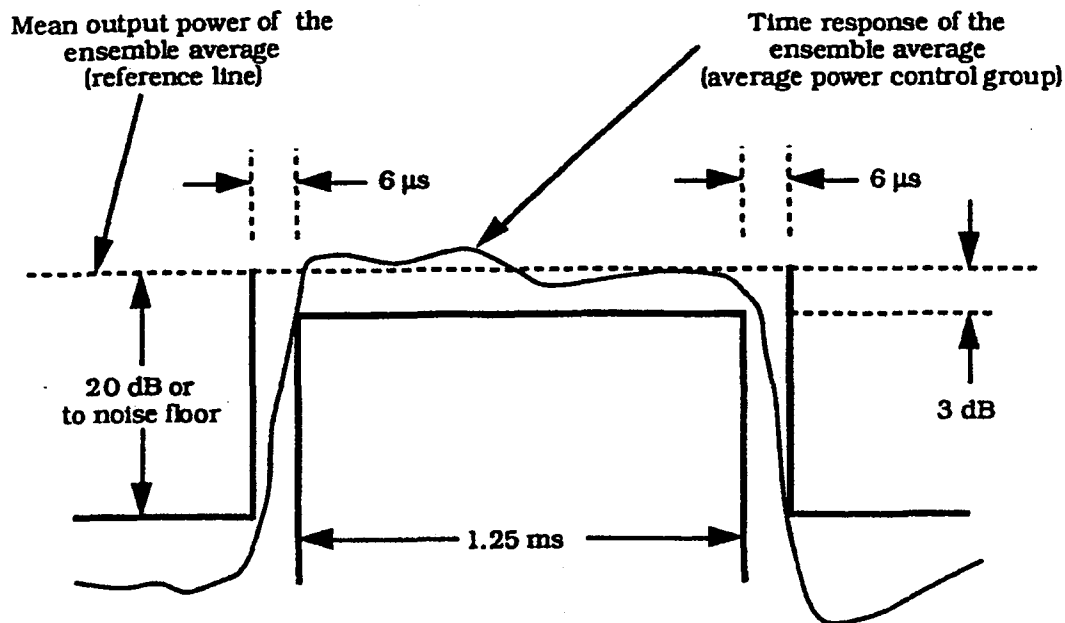
6.1.2.2 Output Power Limits

6.1.2.2.1 Minimum Controlled Output Power

With both closed loop and open loop power control functions set to minimum (see 6.1.2.3), the mean output power of the mobile station shall be less than -50 dBm/1.23 MHz (-111 dBm/Hz) for all frequencies within ± 615 kHz of the center frequency.

6.1.2.2.2 Gated Output Power

When operating in variable data rate transmission mode, the mobile station transmits at nominal controlled power levels only during gated-on periods, each defined as a power control group (see 6.1.3.1.7.1). Given an ensemble of power control groups, all with the same mean output power, the time response of the ensemble average shall be within the limits shown in Figure 6.1.2.2.2-1. During gated-off periods, between the transmissions of power control groups, the mobile station shall reduce its mean output power either by at least 20 dB with respect to the mean output power of the most recent power control group, or to the transmitter noise floor, whichever is the greater power. The transmitter noise floor should be less than -60 dBm/1.23 MHz and shall be less than -54 dBm/1.23 MHz.



1
2 **Figure 6.1.2.2.2-1. Transmission Envelope Mask (Average Gated-on Power Control**
3 **Group)**
4

5 **6.1.2.2.3 Standby Output Power**

6 The mobile station shall disable its transmitter except when transmitting an access probe
7 when in the *System Access State* or when in the *Mobile Station Control on the Traffic*
8 *Channel State* (see 6.6.3 and 6.6.4). When the transmitter is disabled, the output noise
9 density of the mobile station shall be less than -60 dBm/1.23 MHz for all frequencies
10 within the mobile station's transmit band between 824 and 849 MHz.

11 **6.1.2.3 Controlled Output Power**

12 When operating in the CDMA transmission mode, the mobile station shall provide two
13 independent means for output power adjustment: open loop estimation, solely a mobile
14 station operation, and closed loop correction, involving both the mobile station and the base
15 station.

16 Accuracy requirements on the controlled range of mean output power (see 6.1.2.4) need not
17 apply for the following three cases: mean output power levels exceeding the minimum ERP
18 at the maximum output power for the corresponding mobile station class (see Table
19 6.1.2.1-1); mean output power levels less than the minimum controlled output power (see
20 6.1.2.2.1); or mean input power levels exceeding -25 dBm within the 1.23 MHz CDMA
21 bandwidth.

22 **6.1.2.3.1 Estimated Open Loop Output Power**

23 In the following equations, mean power is referenced to the nominal CDMA Channel
24 bandwidth of 1.23 MHz.

1 For open loop probing on the Access Channel (with closed loop correction inactive) the
2 mobile station shall transmit the first probe at a mean output power level defined by¹

$$\begin{aligned} 3 \quad \text{mean output power (dBm)} &= - \text{mean input power (dBm)} \\ 4 &\quad - 73 \\ 5 &\quad + \text{NOM_PWR (dB)} \\ 6 &\quad + \text{INIT_PWR (dB)}. \end{aligned}$$

7 Subsequent probes in an access probe sequence are sent at increased power levels (each
8 probe is incremented by a value equal to PWR_STEP) until a response is obtained or the
9 sequence ends (see 6.6.3.1).

10 The initial transmission on the Reverse Traffic Channel shall be at a mean output power
11 defined by

$$\begin{aligned} 12 \quad \text{mean output power (dBm)} &= - \text{mean input power (dBm)} \\ 13 &\quad - 73 \\ 14 &\quad + \text{NOM_PWR (dB)} \\ 15 &\quad + \text{INIT_PWR (dB)} \\ 16 &\quad + \text{the sum of all access probe corrections (dB)}. \end{aligned}$$

17 Once the first power control bit has been received after initializing Reverse Traffic Channel
18 transmissions, the mean output power shall be defined by

$$\begin{aligned} 19 \quad \text{mean output power (dBm)} &= - \text{mean input power (dBm)} \\ 20 &\quad - 73 \\ 21 &\quad + \text{NOM_PWR (dB)} \\ 22 &\quad + \text{INIT_PWR (dB)} \\ 23 &\quad + \text{the sum of all access probe corrections (dB)} \\ 24 &\quad + \text{the sum of all closed loop power control corrections (dB)}. \end{aligned}$$

25 The values for NOM_PWR, INIT_PWR, and the step size of a single access probe correction
26 PWR_STEP are system parameters, specified in the *Access Parameters Message* (see
27 7.7.2.3.2.2) and are obtained by the mobile station prior to transmitting. The range of the
28 NOM_PWR parameter is -8 to 7 dB, with a nominal value of 0 dB. The range of the
29 INIT_PWR parameter is -16 to 15 dB, with a nominal value of 0 dB. The range of the
30 PWR_STEP parameter is 0 to 7 dB. The accuracy of the adjustment to the mean output
31 power due to NOM_PWR, INIT_PWR, or a single access probe correction of PWR_STEP shall
32 be ± 0.5 dB or 20%, whichever is greater.

¹The purpose of having two parameters is to distinguish between their use. If INIT_PWR were 0, then NOM_PWR is the correction that should provide the correct received power at the base station. INIT_PWR is the adjustment that is made to the first Access Channel probe so that it should be received at somewhat less than the required signal power. This conservatism partially compensates for occasional, partially decorrelated path losses between the Forward CDMA Channel and the Reverse CDMA Channel. The constant -73 is equal to $10 \times \log_{10} (10^{-7.3} \text{ mw}^2)$. For simplicity, the constant is expressed as -73 with no units.

1 The mobile station shall support a total combined range of initial offset parameters and
 2 closed loop corrections as determined by NOM_PWR, INIT_PWR, access probe corrections,
 3 and closed loop power control corrections of at least ± 32 dB.

4 Prior to application of access probe corrections, closed loop power control corrections, and
 5 with INIT_PWR set to zero, the mobile station's estimated open loop mean output power
 6 should be within ± 6 dB and shall be within ± 9 dB of the value determined by the following
 7 relationship:

$$\begin{aligned} \text{mean output power (dBm)} = & - \text{mean input power (dBm)} \\ & - 73 \\ & + \text{NOM_PWR (dB)}. \end{aligned}$$

11 This requirement shall be met over the full range of NOM_PWR (from -8 to +7 dB).

12 6.1.2.3.2 Closed Loop Output Power

13 For closed loop correction on the Reverse Traffic Channel (with respect to the open loop
 14 estimate), the mobile station shall adjust its mean output power level in response to each
 15 valid power control bit (see 7.1.3.1.7) received on the Forward Traffic Channel. A power
 16 control bit shall be considered valid if it is received in a 1.25 ms time slot (see 6.1.3.1.7.1)
 17 that is the second time slot following a time slot in which the mobile station transmitted.
 18 The change in mean output power level per single power control bit shall be 1 dB nominal.
 19 The total changed closed loop mean output power shall be the accumulation of the level
 20 changes. The mobile station shall lock the accumulation of valid level changes and shall
 21 ignore received power control bits related to gated-off periods when the transmitter is
 22 disabled.

23 The change in mean output power per single power control bit shall be within ± 0.5 dB of
 24 the nominal change, and the change in mean output power level per 10 valid power control
 25 bits of the same sign shall be within $\pm 20\%$ of 10 times the nominal change. A '0' power
 26 control bit implies an increase in transmit power; a '1' power control bit implies a decrease
 27 in transmit power.

28 The mobile station shall provide a closed loop adjustment range greater than ± 24 dB
 29 around its open loop estimate.

30 See 6.6.6.2.7.2 for combining power control bits received from different multipath
 31 components or from different base stations during handoff.

32 6.1.2.4 Power Transition Characteristics

33 6.1.2.4.1 Open Loop Estimation

34 Following a step change in mean input power, ΔP_{in} , the mean output power of the mobile
 35 station shall transition to its final value in a direction opposite in sign to ΔP_{in} , with
 36 magnitude contained between mask limits defined by:

37 (a) upper limit:

38 for $0 < t < 24$ ms: $\max [1.2 \times |\Delta P_{in}| \times (t/24), |\Delta P_{in}| \times (t/24) + 0.5 \text{ dB}]$,

39 for $t \geq 24$ ms: $\max [1.2 \times |\Delta P_{in}|, |\Delta P_{in}| + 0.5 \text{ dB}]$;

(b) lower limit:

$$\text{for } t > 0: \max [0.8 \times |\Delta P_{\text{IN}}| \times [1 - e^{-(1.25 - t)/36}] - 0.5 \text{ dB}, 0];$$

where t is expressed in units of milliseconds, ΔP_{IN} is expressed in units of dB, and $\max [x, y]$ is the maximum of x and y . These limits shall apply for a step change ΔP_{IN} of ± 20 dB or less. The change in the magnitude of mean output power shall be a monotonically increasing function of time. If the change in mean output power consists of discrete increments, no single increment shall exceed 0.75 dB. See 6.1.2.3 for the valid range of the mobile station's mean output power.

6.1.2.4.2 Closed Loop Correction

Following the reception of a valid closed loop power control bit, the mean output power of the mobile station shall be within 0.3 dB of the final value in less than 500 μs .

6.1.3 Modulation Characteristics

6.1.3.1 Reverse CDMA Channel Signals

The Reverse CDMA Channel is composed of Access Channels and Reverse Traffic Channels. These channels shall share the same CDMA frequency assignment using direct-sequence CDMA techniques. Figure 6.1.3.1-1 shows an example of all of the signals received by a base station on the Reverse CDMA Channel. Each Traffic Channel is identified by a distinct user long code sequence; each Access Channel is identified by a distinct Access Channel long code sequence. Multiple Reverse CDMA Channels may be used by a base station in a frequency division multiplexed manner.

The Reverse CDMA Channel has the overall structure shown in Figure 6.1.3.1-2. Data transmitted on the Reverse CDMA Channel is grouped into 20 ms frames. All data transmitted on the Reverse CDMA Channel is convolutionally encoded, block interleaved, modulated by the 64-ary orthogonal modulation, and direct-sequence spread prior to transmission.

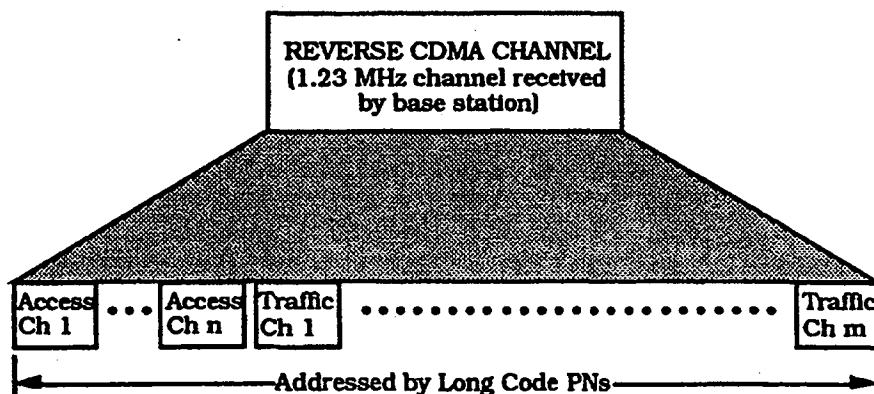
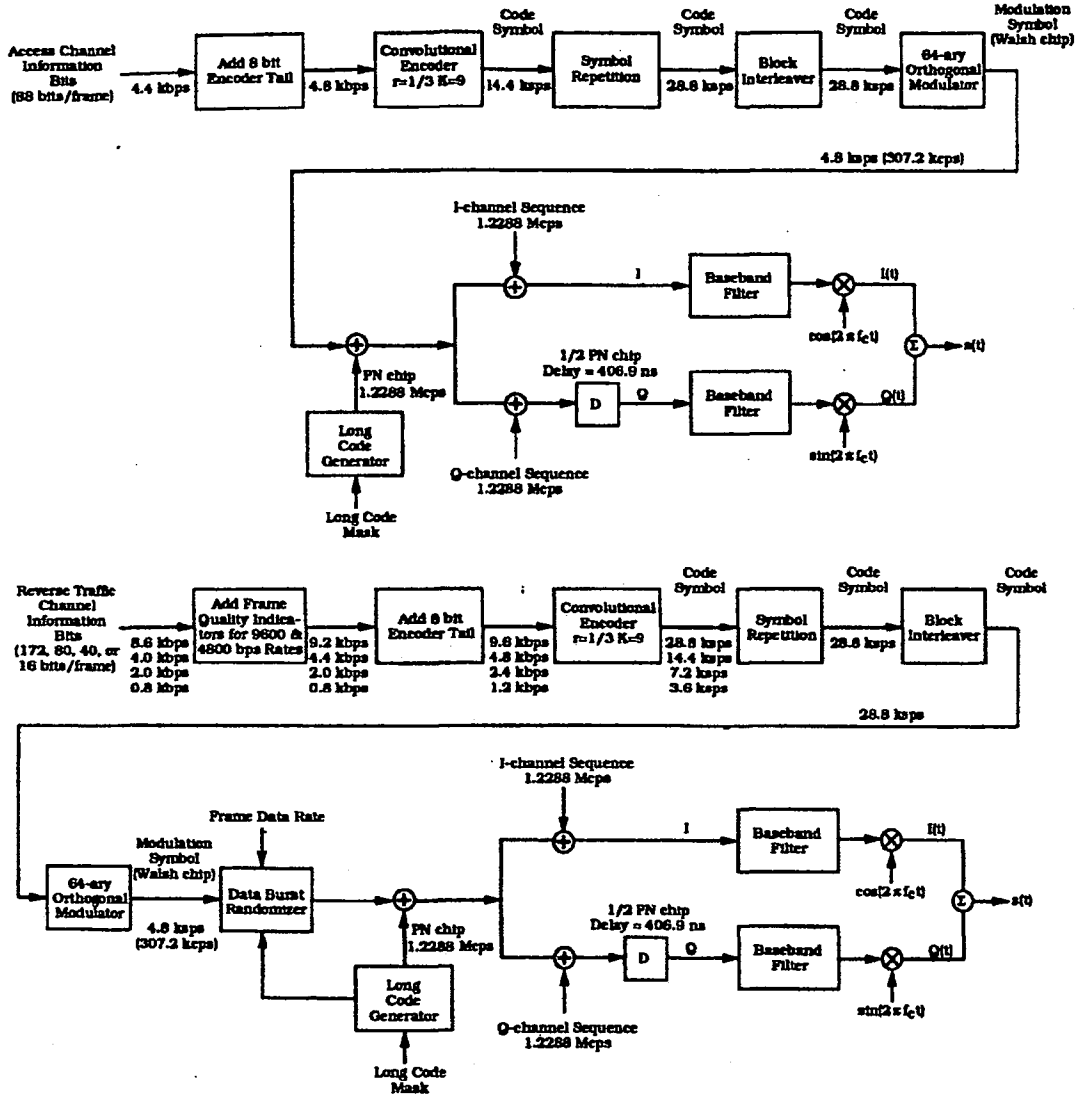


Figure 6.1.3.1-1. Example of Logical Reverse CDMA Channels Received at a Base Station

1
2
3



4
5
6

Figure 8.1.3.1-2. Reverse CDMA Channel Structure

1 After adding frame quality indicators for both the 9600 bps and 4800 bps rates (see
2 6.1.3.3.2.1) and adding eight Encoder Tail Bits (see 6.1.3.3.2.2), data frames may be
3 transmitted on the Reverse Traffic Channel at data rates of 9600, 4800, 2400, and 1200
4 bps. The Reverse Traffic Channel may use any of these data rates for transmission. The
5 transmission duty cycle on the Reverse Traffic Channel varies with the transmission data
6 rate. Specifically, the transmission duty cycle for 9600 bps frames is 100 percent, the
7 transmission duty cycle for 4800 bps frames is 50 percent, the transmission duty cycle for
8 2400 bps frames is 25 percent, and the transmission duty cycle for 1200 bps frames is 12.5
9 percent as shown in Table 6.1.3.1.1-1. As the duty cycle for transmission varies
10 proportionately with the data rate, the actual burst transmission rate is fixed at 28,800
11 code symbols per second. Since six code symbols are modulated as one of 64 modulation
12 symbols for transmission, the modulation symbol transmission rate is fixed at 4800
13 modulation symbols per second. This results in a fixed Walsh chip rate of 307.2 kcps. The
14 rate of the spreading PN sequence is fixed at 1.2288 Mcps, so that each Walsh chip is
15 spread by four PN chips. Table 6.1.3.1.1-1 defines the signal rates and their relationship
16 for the various transmission rates on the Reverse Traffic Channel.

17 The numerology is identical for the Access Channel except that the transmission rate is
18 fixed at 4800 bps after adding eight Encoder Tail Bits (see 6.1.3.2.2). Each code symbol is
19 repeated once, and the transmission duty cycle is 100 percent. Table 6.1.3.1.1-2 defines
20 the signal rates and their relationship on the Access Channel.

21 6.1.3.1.1 Modulation Parameters

22 The modulation parameters for the Reverse Traffic Channel and the Access Channel are
23 shown in Table 6.1.3.1.1-1 and Table 6.1.3.1.1-2, respectively.

24

Table 6.1.3.1.1-1. Reverse Traffic Channel Modulation Parameters

Parameter	Data Rate (bps)				Units
	9600	4800	2400	1200	
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/3	1/3	1/3	1/3	bits/code sym
Transmit Duty Cycle	100.0	50.0	25.0	12.5	%
Code Symbol Rate	28,800	28,800	28,800	28,800	sps
Modulation	6	6	6	6	code sym/mod symbol
Modulation Symbol Rate	4800	4800	4800	4800	sps
Walsh Chip Rate	307.20	307.20	307.20	307.20	kcps
Mod Symbol Duration	208.33	208.33	208.33	208.33	μs
PN Chips/Code Symbol	42.67	42.67	42.67	42.67	PN chip/code symbol
PN Chips/Mod symbol	256	256	256	256	PN chip/mod symbol
PN Chips/Walsh Chip	4	4	4	4	PN chips/Walsh chip

Table 6.1.3.1.1-2. Access Channel Modulation Parameters

Parameter	Data Rate (bps)	
	4800	Units
PN Chip Rate	1.2288	Mcps
Code Rate	1/3	bits/code sym
Code Symbol Repetition	2	symbols/code sym
Transmit Duty Cycle	100.0	%
Code Symbol Rate	28,800	sps
Modulation	6	code sym/mod symbol
Modulation Symbol Rate	4800	sps
Walsh Chip Rate	307.20	kcps
Mod Symbol Duration	208.33	μs
PN Chips/Code Symbol	42.67	PN chip/code sym
PN Chips/Mod symbol	256	PN chip/mod symbol
PN Chips/Walsh Chip	4	PN chips/Walsh chip

1 **6.1.3.1.2 Data Rates**

2 The Access Channel shall support fixed data rate operation at 4800 bps.

3 The Reverse Traffic Channel shall support variable data rate operation at 9600, 4800, 2400,
4 and 1200 bps.

5 **6.1.3.1.3 Convolutional Encoding**

6 The mobile station shall convolutionally encode the data transmitted on the Reverse Traffic
7 Channel and the Access Channel prior to interleaving. The convolutional code shall be rate
8 1/3 and has a constraint length of 9. The generator functions for this code shall be g_0
9 equals 557 (octal), g_1 equals 663 (octal), and g_2 equals 711 (octal). This is a rate 1/3 code
10 generating three code symbols for each data bit input to the encoder. These code symbols
11 shall be output so that the code symbol (c_0) encoded with generator function g_0 shall be
12 output first, the code symbol (c_1) encoded with generator function g_1 shall be output
13 second, and the code symbol (c_2) encoded with generator function g_2 shall be output last.
14 The state of the convolutional encoder, upon initialization, shall be the all-zero state. The
15 first code symbol output after initialization shall be a code symbol encoded with generator
16 function g_0 .

17 Convolutional encoding involves the modulo-2 addition of selected taps of a serially time-
18 delayed data sequence. The length of the data sequence delay is equal to $K-1$, where K is
19 the constraint length of the code. Figure 6.1.3.1.3-1 illustrates the encoder for the code
20 specified in this section.

21 **6.1.3.1.4 Code Symbol Repetition**

22 Code symbols output from the convolutional encoder are repeated before being interleaved
23 when the data rate is lower than 9600 bps.

24 Code symbol repetition on the Reverse Traffic Channel is only used as an expedient method
25 for describing the operation of the block interleaver specified in 6.1.3.1.5 and the data burst
26 randomizer specified in 6.1.3.1.7.2. Implementations other than code symbol repetition
27 that achieve the same result are allowed.

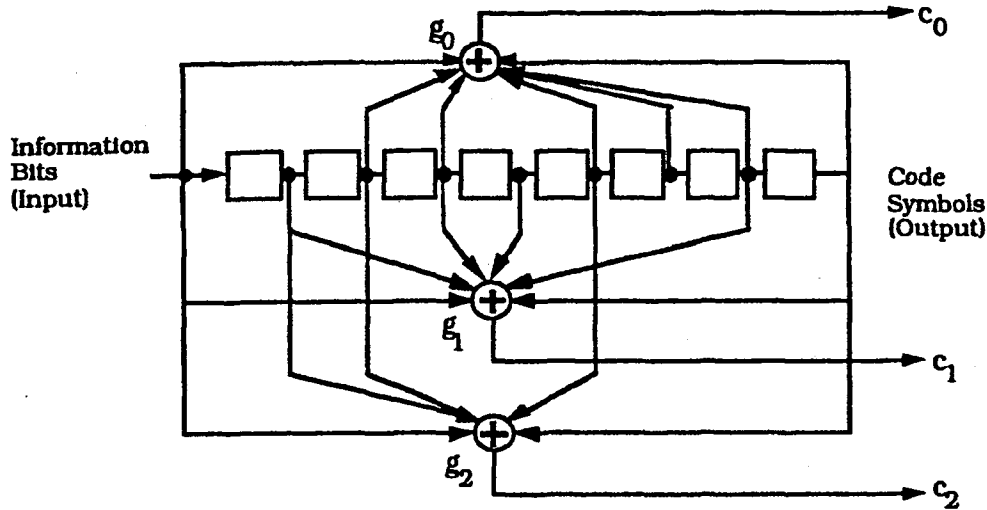


Figure 6.1.3.1.3-1. $K = 9$, Rate 1/3 Convolutional Encoder

The code symbol repetition rate on the Reverse Traffic Channel varies with data rate. Code symbols shall not be repeated for the 9600 bps data rate. Each code symbol at the 4800 bps data rate shall be repeated 1 time (each symbol occurs 2 consecutive times). Each code symbol at the 2400 bps data rate shall be repeated 3 times (each symbol occurs 4 consecutive times). Each code symbol at the 1200 bps data rate shall be repeated 7 times (each symbol occurs 8 consecutive times). For all of the data rates (9600, 4800, 2400, and 1200 bps), this results in a constant code symbol rate of 28800 code symbols per second. On the Reverse Traffic Channel these repeated code symbols shall not be transmitted multiple times. Rather, the repeated code symbols shall be input to the block interleaver function, and all but one of the code symbol repetitions shall be deleted prior to actual transmission due to the variable transmission duty cycle.

Each code symbol on the Access Channel, which has a fixed data rate of 4800 bps, shall be repeated 1 time (each symbol occurs 2 consecutive times). On the Access Channel both repeated code symbols shall be transmitted.

6.1.3.1.5 Block Interleaving

The mobile station shall interleave all code symbols on the Reverse Traffic Channel and the Access Channel prior to modulation and transmission. A block interleaver spanning 20 ms shall be used. The interleaver shall be an array with 32 rows and 18 columns (i.e., 576 cells). Code symbols (repeated code symbols when at data rates lower than 9600 bps) shall be written into the interleaver by columns filling the complete 32×18 matrix. Tables 6.1.3.1.5-1 through 6.1.3.1.5-4 illustrate the ordering of write operations of code symbols (or repeated code symbols) into the interleaver array for transmission data rates of 9600, 4800, 2400, and 1200 bps, respectively.

1 Reverse Traffic Channel code symbols shall be output from the interleaver by rows. The
2 interleaver rows shall be output in the following order:

3 At 9600 bps:

4 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

5 At 4800 bps:

6 1 3 2 4 5 7 6 8 9 11 10 12 13 15 14 16 17 19 18 20 21 23 22 24 25 27 26 28 29 31 30 32

7 At 2400 bps:

8 1 5 2 6 3 7 4 8 9 13 10 14 11 15 12 16 17 21 18 22 19 23 20 24 25 29 26 30 27 31 28 32

9 At 1200 bps:

10 1 9 2 10 3 11 4 12 5 13 6 14 7 15 8 16 17 25 18 26 19 27 20 28 21 29 22 30 23 31 24 32

11

12 Access Channel code symbols shall be output from the interleaver by rows. The interleaver
13 rows shall be output in the following order:²

14 1 17 9 25 5 21 13 29 3 19 11 27 7 23 15 31 2 18 10 26 6 22 14 30 4 20 12 28 8 24 16 32

²This is a bit-reversed readout of the row addresses. If there is a binary counter $c_4c_3c_2c_1c_0$, counting from 0 through 31, and n is a 5-bit binary number, $n = a_4a_3a_2a_1a_0$, where $a_4=c_0$, $a_3=c_1$, $a_2=c_2$, $a_1=c_3$, $a_0=c_4$, then the row address is given by $n+1$.

**Table 6.1.3.1.5-1. Reverse Traffic Channel Interleaver Memory (Write Operation)
(9600 bps)**

1	33	65	97	129	161	193	225	257	289	321	353	385	417	449	481	513	545
2	34	66	98	130	162	194	226	258	290	322	354	386	418	450	482	514	546
3	35	67	99	131	163	195	227	259	291	323	355	387	419	451	483	515	547
4	36	68	100	132	164	196	228	260	292	324	356	388	420	452	484	516	548
5	37	69	101	133	165	197	229	261	293	325	357	389	421	453	485	517	549
6	38	70	102	134	166	198	230	262	294	326	358	390	422	454	486	518	550
7	39	71	103	135	167	199	231	263	295	327	359	391	423	455	487	519	551
8	40	72	104	136	168	200	232	264	296	328	360	392	424	456	488	520	552
9	41	73	105	137	169	201	233	265	297	329	361	393	425	457	489	521	553
10	42	74	106	138	170	202	234	266	298	330	362	394	426	458	490	522	554
11	43	75	107	139	171	203	235	267	299	331	363	395	427	459	491	523	555
12	44	76	108	140	172	204	236	268	300	332	364	396	428	460	492	524	556
13	45	77	109	141	173	205	237	269	301	333	365	397	429	461	493	525	557
14	46	78	110	142	174	206	238	270	302	334	366	398	430	462	494	526	558
15	47	79	111	143	175	207	239	271	303	335	367	399	431	463	495	527	559
16	48	80	112	144	176	208	240	272	304	336	368	400	432	464	496	528	560
17	49	81	113	145	177	209	241	273	305	337	369	401	433	465	497	529	561
18	50	82	114	146	178	210	242	274	306	338	370	402	434	466	498	530	562
19	51	83	115	147	179	211	243	275	307	339	371	403	435	467	499	531	563
20	52	84	116	148	180	212	244	276	308	340	372	404	436	468	500	532	564
21	53	85	117	149	181	213	245	277	309	341	373	405	437	469	501	533	565
22	54	86	118	150	182	214	246	278	310	342	374	406	438	470	502	534	566
23	55	87	119	151	183	215	247	279	311	343	375	407	439	471	503	535	567
24	56	88	120	152	184	216	248	280	312	344	376	408	440	472	504	536	568
25	57	89	121	153	185	217	249	281	313	345	377	409	441	473	505	537	569
26	58	90	122	154	186	218	250	282	314	346	378	410	442	474	506	538	570
27	59	91	123	155	187	219	251	283	315	347	379	411	443	475	507	539	571
28	60	92	124	156	188	220	252	284	316	348	380	412	444	476	508	540	572
29	61	93	125	157	189	221	253	285	317	349	381	413	445	477	509	541	573
30	62	94	126	158	190	222	254	286	318	350	382	414	446	478	510	542	574
31	63	95	127	159	191	223	255	287	319	351	383	415	447	479	511	543	575
32	64	96	128	160	192	224	256	288	320	352	384	416	448	480	512	544	576

1 **Table 6.1.3.1.5-2. Reverse Traffic Channel or Access Channel Interleaver Memory**
 2 **(Write Operation) (4800 bps)**

1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241	257	273
1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241	257	273
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242	258	274
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242	258	274
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243	259	275
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243	259	275
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244	260	276
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244	260	276
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245	261	277
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245	261	277
6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246	262	278
6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246	262	278
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247	263	279
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247	263	279
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248	264	280
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248	264	280
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249	265	281
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249	265	281
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250	266	282
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250	266	282
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251	267	283
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251	267	283
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252	268	284
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252	268	284
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253	269	285
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253	269	285
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254	270	286
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254	270	286
15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255	271	287
15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255	271	287
16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288
16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288

**Table 6.1.3.1.5-3. Reverse Traffic Channel Interleaver Memory (Write Operation)
(2400 bps)**

1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137
1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137
1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137
1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137
2	10	18	26	34	42	50	58	66	74	82	90	98	106	114	122	130	138
2	10	18	26	34	42	50	58	66	74	82	90	98	106	114	122	130	138
2	10	18	26	34	42	50	58	66	74	82	90	98	106	114	122	130	138
2	10	18	26	34	42	50	58	66	74	82	90	98	106	114	122	130	138
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139
4	12	20	28	36	44	52	60	68	76	84	92	100	108	116	124	132	140
4	12	20	28	36	44	52	60	68	76	84	92	100	108	116	124	132	140
4	12	20	28	36	44	52	60	68	76	84	92	100	108	116	124	132	140
4	12	20	28	36	44	52	60	68	76	84	92	100	108	116	124	132	140
5	13	21	29	37	45	53	61	69	77	85	93	101	109	117	125	133	141
5	13	21	29	37	45	53	61	69	77	85	93	101	109	117	125	133	141
5	13	21	29	37	45	53	61	69	77	85	93	101	109	117	125	133	141
5	13	21	29	37	45	53	61	69	77	85	93	101	109	117	125	133	141
6	14	22	30	38	46	54	62	70	78	86	94	102	110	118	126	134	142
6	14	22	30	38	46	54	62	70	78	86	94	102	110	118	126	134	142
6	14	22	30	38	46	54	62	70	78	86	94	102	110	118	126	134	142
6	14	22	30	38	46	54	62	70	78	86	94	102	110	118	126	134	142
7	15	23	31	39	47	55	63	71	79	87	95	103	111	119	127	135	143
7	15	23	31	39	47	55	63	71	79	87	95	103	111	119	127	135	143
7	15	23	31	39	47	55	63	71	79	87	95	103	111	119	127	135	143
7	15	23	31	39	47	55	63	71	79	87	95	103	111	119	127	135	143
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144

1 **Table 6.1.3.1.5-4. Reverse Traffic Channel Interleaver Memory (Write Operation)**
 2 **(1200 bps)**

1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72

1 **6.1.3.1.6 Orthogonal Modulation**

2 Modulation for the Reverse CDMA Channel shall be 64-ary orthogonal modulation. One of
 3 64 possible modulation symbols is transmitted for each six code symbols. The modulation
 4 symbol shall be one of 64 mutually orthogonal waveforms generated using Walsh functions.
 5 These modulation symbols are given in Table 6.1.3.1.6-1 and are numbered 0 through 63.
 6 The modulation symbols shall be selected according to the following formula:

7
$$\text{Modulation symbol index} = c_0 + 2c_1 + 4c_2 + 8c_3 + 16c_4 + 32c_5,$$

8 where c_5 shall represent the last (or most recent) and c_0 the first (or oldest) binary valued
 9 ('0' and '1') code symbol of each group of six code symbols that form a modulation symbol
 10 index.

11 The 64 by 64 matrix shown in Table 6.1.3.1.6-1 can be generated by means of the following
 12 recursive procedure:

13
$$\mathbf{H}_1 = 0, \quad \mathbf{H}_2 = \begin{matrix} 0 & 0 \\ 0 & 1 \end{matrix}.$$

14

15
$$\mathbf{H}_4 = \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{matrix}, \quad \mathbf{H}_{2N} = \begin{matrix} \mathbf{H}_N & \mathbf{H}_N \\ \mathbf{H}_N & \overline{\mathbf{H}_N} \end{matrix}.$$

16 where N is a power of 2 and $\overline{\mathbf{H}_N}$ denotes the binary complement of \mathbf{H}_N .

17 The period of time required to transmit a single modulation symbol shall be equal to
 18 $1/4800$ second (= 208.333... μs). The period of time associated with one-sixty-fourth of the
 19 modulation symbol is referred to as a Walsh chip and shall be equal to $1/307200$ second (=
 20 3.255... μs).

21 Within a modulation symbol, Walsh chips shall be transmitted in the order of 0, 1, 2, ...,
 22 63.

6.1.3.1.7 Variable Data Rate Transmission

6.1.3.1.7.1 Rates and Gating

Prior to transmission, the Reverse Traffic Channel interleaver output stream is gated with a time filter that allows transmission of certain interleaver output symbols and deletion of others. This process is illustrated in Figure 6.1.3.1.7.1-1. As shown in the figure, the duty cycle of the transmission gate varies with the transmit data rate. When the transmit data rate is 9600 bps, the transmission gate allows all interleaver output symbols to be transmitted. When the transmit data rate is 4800 bps, the transmission gate allows one-half of the interleaver output symbols to be transmitted, and so forth. The gating process operates by dividing the 20 ms frame into 16 equal length (i.e., 1.25 ms) periods, called power control groups. Certain power control groups are gated-on (i.e., transmitted), while other groups are gated-off (i.e., not transmitted).

The assignment of gated-on and gated-off groups, referred to as the data burst randomizing function, is specified in 6.1.3.1.7.2. The gated-on power control groups are pseudorandomized in their positions within the frame. The data burst randomizer ensures that every code symbol input to the repetition process is transmitted exactly once. During the gated-off periods, the mobile station shall comply with the requirement in 6.1.2.2.2, thus reducing the interference to other mobile stations operating on the same Reverse CDMA Channel.

When transmitting on the Access Channel, the code symbols are repeated once (each symbol occurs twice) prior to transmission. The data burst randomizer is not used when the mobile station transmits on the Access Channel. Therefore, both copies of the repeated code symbols are transmitted as shown in Figure 6.1.3.1.7.1-2.

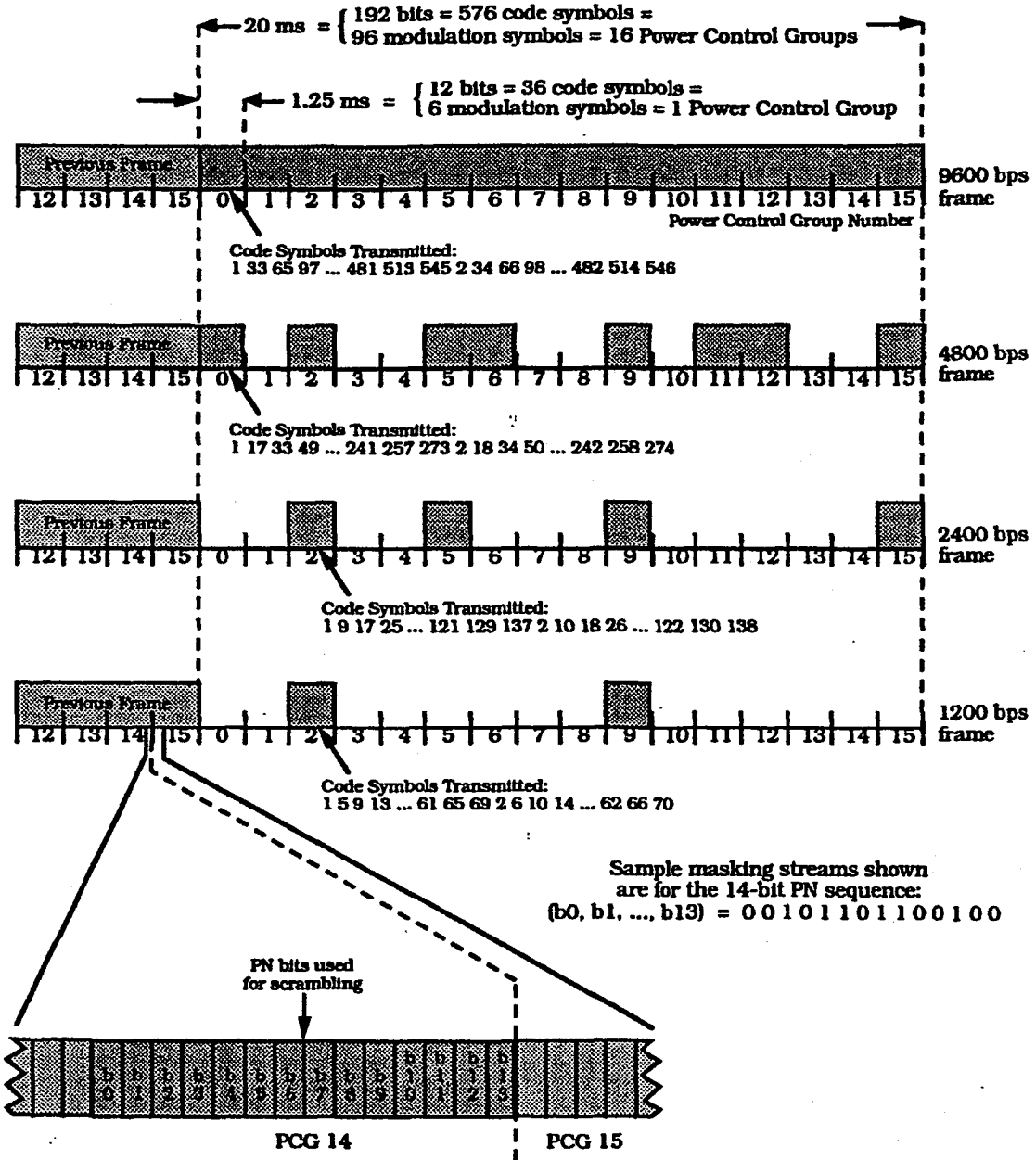
6.1.3.1.7.2 Data Burst Randomizing Algorithm

The data burst randomizer generates a masking pattern of '0's and '1's that randomly masks out the redundant data generated by the code repetition. The masking pattern is determined by the data rate of the frame and by a block of 14 bits taken from the long code. These 14 bits shall be the last 14 bits of the long code used for spreading in the previous to the last power control group of the previous frame (see Figure 6.1.3.1.7.1-1). In other words, these are the 14 bits which occur exactly one power control group (1.25 ms) before each Reverse Traffic Channel frame boundary. These 14 bits are denoted as

$$b_0 \ b_1 \ b_2 \ b_3 \ b_4 \ b_5 \ b_6 \ b_7 \ b_8 \ b_9 \ b_{10} \ b_{11} \ b_{12} \ b_{13}.$$

where b_0 represents the oldest bit, and b_{13} represents the latest bit.³

³In order to randomize the position of the data bursts, only 8 bits are strictly necessary. The algorithm described here uses 14 bits to assure that the slots used for data transmission at the quarter rate are a subset of the slots used at the half rate and that the slots used at the one-eighth rate are a subset of the slots used at the quarter rate.



1
2
3

Figure 6.1.3.1.7.1-1. Reverse CDMA Channel Variable Data Rate Transmission Example

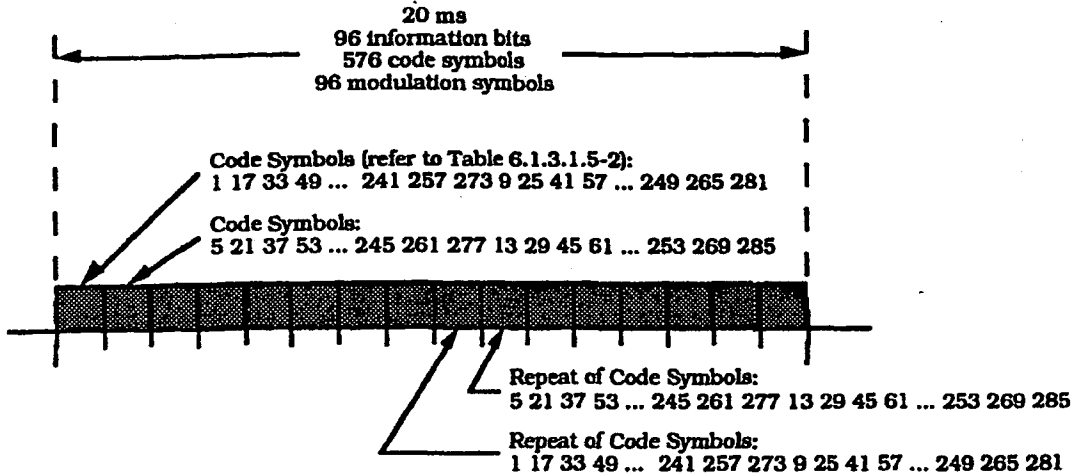


Figure 6.1.3.1.7.1-2. Access Channel Transmission Structure

Each 20 ms Reverse Traffic Channel frame shall be divided into 16 equal length (i.e., 1.25 ms) power control groups numbered from 0 to 15 as shown in Figure 6.1.3.1.7.1-1. The data burst randomizer algorithm shall be as follows:

Data Rate Selected: 9600 bps

Transmission shall occur on power control groups numbered:

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15.

Data Rate Selected: 4800 bps

Transmission shall occur on power control groups numbered:

$b_0, 2 + b_1, 4 + b_2, 6 + b_3, 8 + b_4, 10 + b_5, 12 + b_6, 14 + b_7.$

Data Rate Selected: 2400 bps

Transmission shall occur on power control groups numbered:

b_0 if $b_8 = 0$, or $2 + b_1$ if $b_8 = 1$;
 $4 + b_2$ if $b_9 = 0$, or $6 + b_3$ if $b_9 = 1$;
 $8 + b_4$ if $b_{10} = 0$, or $10 + b_5$ if $b_{10} = 1$;
 $12 + b_6$ if $b_{11} = 0$, or $14 + b_7$ if $b_{11} = 1$.

1 Data Rate Selected: 1200 bps

2 Transmission shall occur on power control groups numbered:

3 b_0 if ($b_8 = 0$ and $b_{12} = 0$), or $2 + b_1$ if ($b_8 = 1$ and $b_{12} = 0$),
 4 or $4 + b_2$ if ($b_9 = 0$ and $b_{12} = 1$), or $6 + b_3$ if ($b_9 = 1$ and $b_{12} = 1$);
 5 $8 + b_4$ if ($b_{10} = 0$ and $b_{13} = 0$), or $10 + b_5$ if ($b_{10} = 1$ and $b_{13} = 0$),
 6 or $12 + b_6$ if ($b_{11} = 0$ and $b_{13} = 1$), or $14 + b_7$ if ($b_{11} = 1$ and $b_{13} = 1$).

7 6.1.3.1.8 Direct Sequence Spreading

8 Prior to transmission, the Reverse Traffic Channel and the Access Channel shall be direct
 9 sequence spread by the long code. For the Reverse Traffic Channel, this spreading
 10 operation involves modulo-2 addition of the data burst randomizer output stream and the
 11 long code. For the Access Channel, this spreading operation involves modulo-2 addition of
 12 the 64-ary orthogonal modulator output stream and the long code.

13 This long code shall be periodic with period $2^{42}-1$ chips and shall satisfy the linear
 14 recursion specified by the following characteristic polynomial:

$$15 \quad p(x) = x^{42} + x^{35} + x^{33} + x^{31} + x^{27} + x^{26} + x^{25} + x^{22} + x^{21} + x^{19} + \\ 16 \quad x^{18} + x^{17} + x^{16} + x^{10} + x^7 + x^6 + x^5 + x^3 + x^2 + x^1 + 1.$$

17 Each PN chip of the long code shall be generated by the modulo-2 inner product of a 42-bit
 18 mask and the 42-bit state vector of the sequence generator as shown in Figure 6.1.3.1.8-1.

19 The time alignment of the long code generator shall be as shown in Figure 1.2-1.

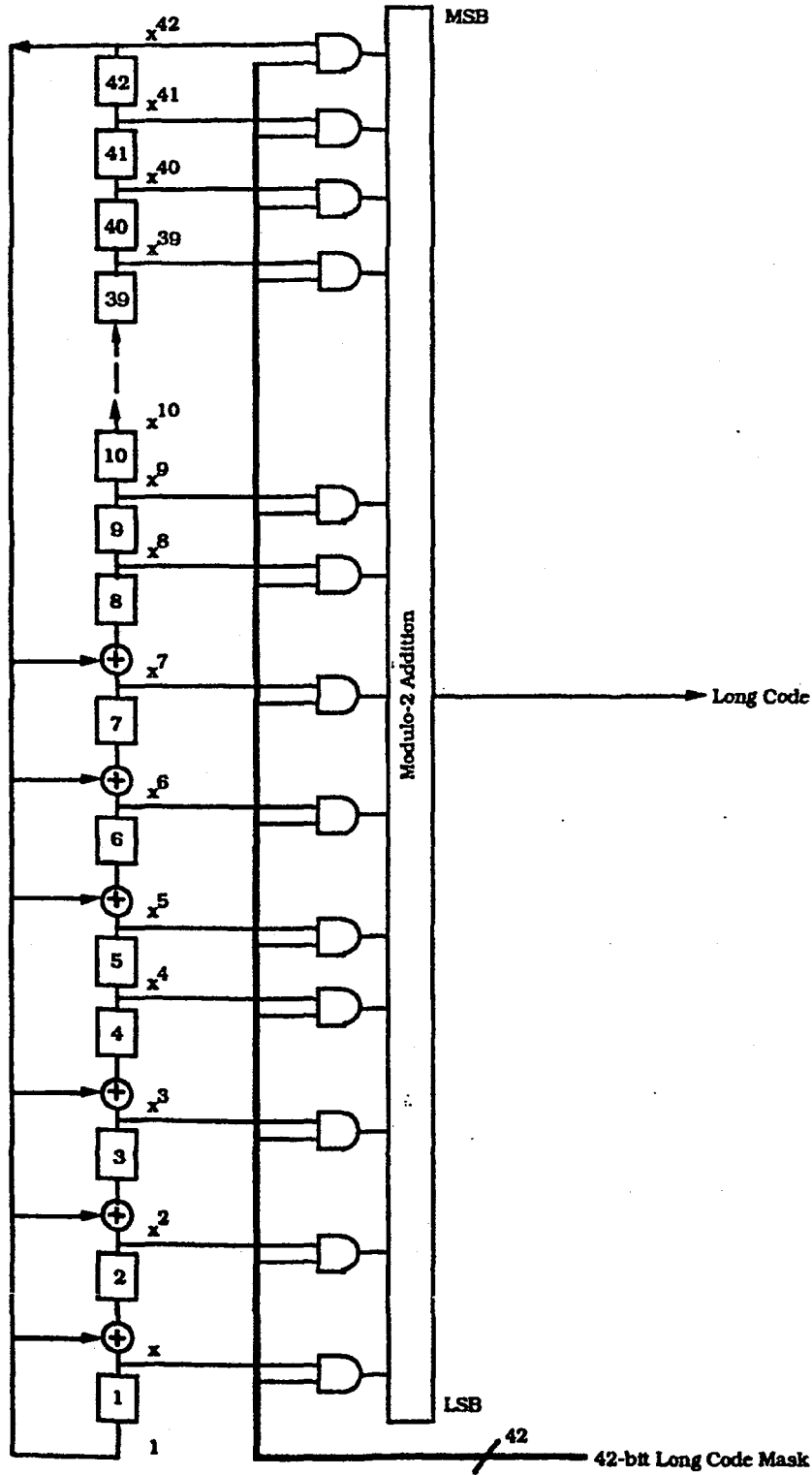
20 The mask used for the long code varies depending on the channel type on which the mobile
 21 station is transmitting. See Figure 6.1.3.1.8-2. Specifically, when transmitting on the
 22 Access Channel, the mask shall be as follows: M_{41} through M_{33} shall be set to
 23 '110001111'; M_{32} through M_{28} shall be set to the Access Channel number chosen (see
 24 6.6.3.1.1.2); M_{27} through M_{25} shall be set to the code channel number for the associated
 25 Paging Channel (the range is 1 through 7), M_{24} through M_9 shall be set to the BASE_ID
 26 value (see 7.7.2.3.2.1) for the current base station; and M_8 through M_0 shall be set to the
 27 PILOT_PN value for the current CDMA Channel (see 7.7.1.3).

28 When transmitting on the Reverse Traffic Channel, the mobile station shall use one of two
 29 long code masks unique to that mobile station: a public long code mask unique to the
 30 mobile station's ESN or a private long code mask. The public long code mask shall be as
 31 follows: M_{41} through M_{32} shall be set to '1100011000', and M_{31} through M_0 shall be set
 32 to a permutation of the mobile station's ESN bits. This permutation is specified as follows:

$$33 \quad \text{ESN} = (E_{31}, E_{30}, E_{29}, E_{28}, E_{27}, E_{26}, E_{25}, \dots, E_2, E_1, E_0) \\ 34 \quad \text{Permuted ESN} = (E_0, E_{31}, E_{22}, E_{13}, E_4, E_{26}, E_{17}, E_8, E_{30}, E_{21}, E_{12}, E_3, E_{25}, E_{16}, \\ 35 \quad E_7, E_{29}, E_{20}, E_{11}, E_2, E_{24}, E_{15}, E_6, E_{28}, E_{19}, E_{10}, E_1, E_{23}, E_{14}, \\ 36 \quad E_5, E_{27}, E_{18}, E_9).^4$$

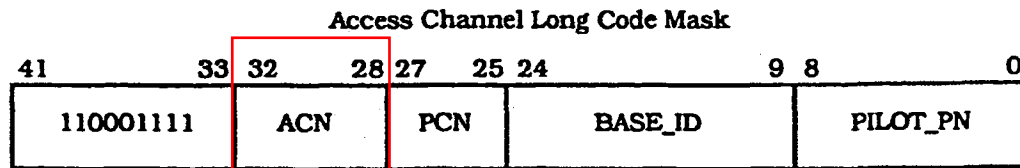
37 The private long code mask shall be as specified in Appendix A.

⁴This permutation prevents high correlation between long codes corresponding to consecutive ESNs.



1
2

Figure 6.1.3.1.8-1. Long Code Generator



ACN - Access Channel Number
 PCN - Paging Channel Number
 BASE_ID - Base station identification
 PILOT_PN - PN offset for the Forward CDMA Channel

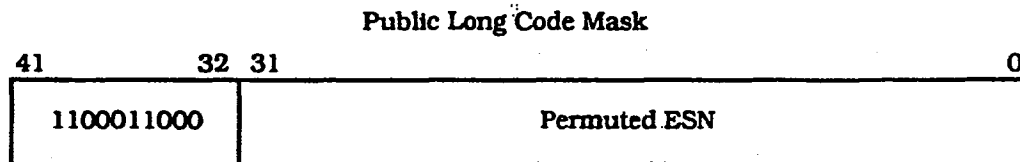


Figure 6.1.3.1.8-2. Long Code Mask Format

6.1.3.1.9 Quadrature Spreading

Following the direct sequence spreading, the Reverse Traffic Channel and Access Channel are spread in quadrature as shown in Figure 6.1.3.1-2. The sequences used for this spreading shall be the zero-offset I and Q pilot PN sequences used on the Forward CDMA Channel (see 7.1.3.2.1). These sequences are periodic with period 2^{15} chips and shall be based on the following characteristic polynomials, respectively:

$$P_I(x) = x^{15} + x^{13} + x^9 + x^8 + x^7 + x^5 + 1$$

(for the in-phase (I) sequence)

and

$$P_Q(x) = x^{15} + x^{12} + x^{11} + x^{10} + x^6 + x^5 + x^4 + x^3 + 1$$

(for the quadrature-phase (Q) sequence).

The maximum length linear feedback shift register sequences, $\{i(n)\}$ and $\{q(n)\}$, based on the above polynomials are of period $2^{15}-1$ and can be generated by using the following linear recursions:

$$i(n) = i(n-15) \oplus i(n-10) \oplus i(n-8) \oplus i(n-7) \oplus i(n-6) \oplus i(n-2)$$

(based on $P_I(x)$ as the characteristic polynomial)

and

$$q(n) = q(n-15) \oplus q(n-12) \oplus q(n-11) \oplus q(n-10) \oplus q(n-9) \oplus q(n-5) \oplus q(n-4) \oplus q(n-3)$$

(based on $P_Q(x)$ as the characteristic polynomial).

- 1 where $i(n)$ and $q(n)$ are binary-valued ('0' and '1') and the additions are modulo-2. In order
- 2 to obtain the I and Q pilot PN sequences (of period 2^{15}), a '0' is inserted in $\{i(n)\}$ and $\{q(n)\}$
- 3 after 14 consecutive '0' outputs (this occurs only once in each period). Therefore, the pilot
- 4 PN sequences have one run of 15 consecutive '0' outputs instead of 14.
- 5 The mobile station shall align the I and Q pilot PN sequences such that the first chip on
- 6 every even second mark as referenced to the transmit time reference (see 6.1.5.1) is the '1'
- 7 after the 15 consecutive '0's (see Figure 1.2-1).
- 8 The pilot PN sequences repeat every 26.666... ms ($= 2^{15}/1228800$ seconds). There are
- 9 exactly 75 repetitions in every 2 seconds.
- 0 The data spread by the Q pilot PN sequence shall be delayed by half a PN chip time
- 1 (406.901 ns) with respect to the data spread by the I pilot PN sequence.
- 2 After baseband filtering (see 6.1.3.1.10), the binary data ('0's and '1's), I and Q shown in
- 3 Figure 6.1.3.1-2, shall be mapped into phase according to Table 6.1.3.1.9-1.

4

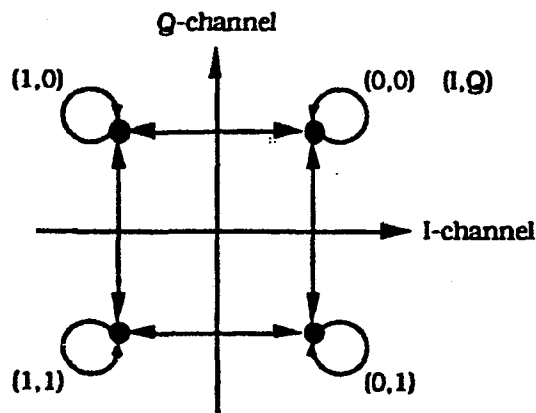
5 **Table 6.1.3.1.9-1. Reverse CDMA Channel I and Q Mapping**

I	Q	Phase
0	0	$\pi/4$
1	0	$3\pi/4$
1	1	$-3\pi/4$
0	1	$-\pi/4$

6

7 The resulting signal constellation and phase transition are shown in Figure 6.1.3.1.9-1.

8



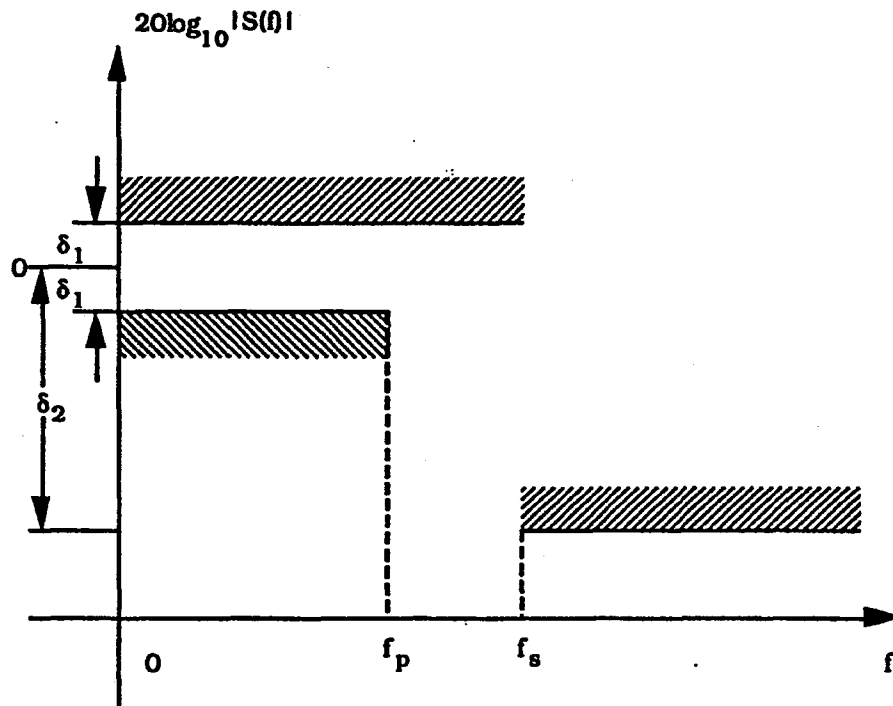
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0 **Figure 6.1.3.1.9-1. Reverse CDMA Channel Signal Constellation and Phase Transition**

1

1 **6.1.3.1.10 Baseband Filtering**

2 Following the spreading operation, the I and Q impulses are applied to the inputs of the I
 3 and Q baseband filters as shown in Figure 6.1.3.1-2. The baseband filters shall have a
 4 frequency response $S(f)$ that satisfies the limits given in Figure 6.1.3.1.10-1. Specifically,
 5 the normalized frequency response of the filter shall be contained within $\pm\delta_1$ in the
 6 passband $0 \leq f \leq f_p$ and shall be less than or equal to $-\delta_2$ in the stopband $f \geq f_s$. The
 7 numerical values for the parameters are $\delta_1 = 1.5$ dB, $\delta_2 = 40$ dB, $f_p = 590$ kHz, and $f_s = 740$
 8 kHz.



9
 10 **Figure 6.1.3.1.10-1. Baseband Filters Frequency Response Limits**

11
 12 Let $s(t)$ be the impulse response of the baseband filter. Then $s(t)$ shall satisfy the following
 13 equation:

14
$$\text{Mean Squared Error} = \sum_{k=0}^{\infty} [\alpha s(kT_s - \tau) - h(k)]^2 \leq 0.03.$$

15 where the constants α and τ are used to minimize the mean squared error. The constant T_s
 16 is equal to 203.451... ns, which equals one quarter of a PN chip. The values of the
 17 coefficients $h(k)$, for $k < 48$, are given in Table 6.1.3.1.10-1; $h(k) = 0$ for $k \geq 48$. Note that
 18 $h(k)$ equals $h(47 - k)$.

Table 6.1.3.1.10-1. Coefficients $h(k)$

k	$h(k)$
0, 47	-0.025288315
1, 46	-0.034167931
2, 45	-0.035752323
3, 44	-0.016733702
4, 43	0.021602514
5, 42	0.064938487
6, 41	0.091002137
7, 40	0.081894974
8, 39	0.037071157
9, 38	-0.021998074
10, 37	-0.060716277
11, 36	-0.051178658
12, 35	0.007874526
13, 34	0.084368728
14, 33	0.126869306
15, 32	0.094528345
16, 31	-0.012839661
17, 30	-0.143477028
18, 29	-0.211829088
19, 28	-0.140513128
20, 27	0.094601918
21, 26	0.441387140
22, 25	0.785875640
23, 24	1.0

1 **6.1.3.2 Access Channel**

2 The Access Channel is used by the mobile station to initiate communication with the base
 3 station and to respond to Paging Channel messages. An Access Channel transmission is a
 4 coded, interleaved, and modulated spread-spectrum signal. The Access Channel uses a
 5 random-access protocol (see 6.6.3.1.1). Access Channels are uniquely identified by their
 6 long codes (see 6.1.3.1.8).

7 **6.1.3.2.1 Access Channel Time Alignment and Modulation Rate**

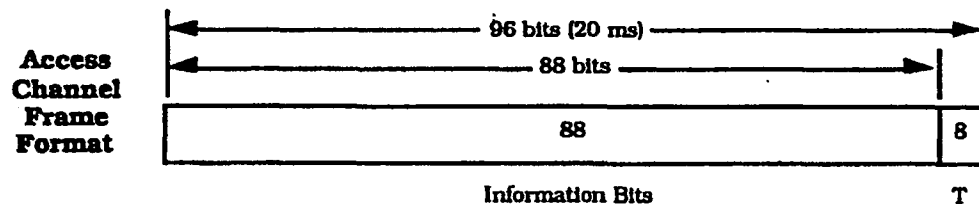
8 The mobile station shall transmit information on the Access Channel at a fixed data rate of
 9 4800 bps. An Access Channel frame shall be 20 ms in duration. An Access Channel frame
 10 shall begin only when System Time is an integral multiple of 20 ms (see Figure 1.2-1).

11 The synchronization, timing, and structure of the Access Channel are specified in 6.6.3.1.1
 12 and 6.7.1.1.

13 The Reverse CDMA Channel may contain up to 32 Access Channels numbered 0 through
 14 31 per supported Paging Channel. At least one Access Channel exists on the Reverse
 15 CDMA Channel for each Paging Channel on the corresponding Forward CDMA Channel.
 16 Each Access Channel is associated with a single Paging Channel.

17 **6.1.3.2.2 Access Channel Frame Structure**

18 Each Access Channel frame contains 96 bits (20 ms frame at 4800 bps). Each Access
 19 Channel frame shall consist of 88 information bits and eight Encoder Tail Bits (see Figure
 20 6.1.3.2.2-1).



22 T - Encoder Tail Bits

23 **Figure 6.1.3.2.2-1. Access Channel Frame Structure**

24

25 **6.1.3.2.2.1 Access Channel Preamble**

26 The Access Channel preamble shall consist of frames of 96 zeros that are transmitted at the
 27 4800 bps rate. The Access Channel preamble is transmitted to aid the base station in
 28 acquiring an Access Channel transmission (see 6.7.1.1).

29 **6.1.3.2.3 Access Channel Convolutional Encoding**

30 The Access Channel data shall be convolutionally encoded prior to transmission as
 31 specified in 6.1.3.1.3.

1 When generating Access Channel data, the encoder shall be initialized to the all zero state
2 at the end of each 20 ms frame.

3 6.1.3.2.4 Access Channel Code Symbol Repetition

4 Each code symbol output from the convolutional encoder on the Access Channel shall be
5 repeated once (each code symbol occurs two consecutive times) as specified in 6.1.3.1.4.

6 6.1.3.2.5 Access Channel Interleaving

7 The repeated code symbols on the Access Channel shall be interleaved as specified in
8 6.1.3.1.5.

9 6.1.3.2.6 Access Channel Modulation

10 The Access Channel data shall be modulated as specified in 6.1.3.1.6.

11 6.1.3.2.7 Access Channel Gating

12 The mobile station shall not gate off any power control group while transmitting on the
13 Access Channel as specified in 6.1.3.1.7.1.

14 6.1.3.2.8 Access Channel Direct Sequence Spreading

15 The Access Channel shall be spread by the long code as specified in 6.1.3.1.8.

16 6.1.3.2.9 Access Channel Quadrature Spreading

17 The Access Channel shall be quadrature spread by the pilot PN sequences as specified in
18 6.1.3.1.9.

19 6.1.3.2.10 Access Channel Baseband Filtering

20 The Access Channel shall be filtered as specified in 6.1.3.1.10.

21 6.1.3.3 Reverse Traffic Channel

22 The Reverse Traffic Channel is used for the transmission of user and signaling information
23 to the base station during a call.

24 6.1.3.3.1 Reverse Traffic Channel Time Alignment and Modulation Rates

25 The mobile station shall transmit information on the Reverse Traffic Channel at variable
26 data rates of 9600, 4800, 2400, and 1200 bps. The Reverse Traffic Channel frame shall be
27 20 ms in duration. The data rate shall be selected on a frame-by-frame (i.e., 20 ms) basis.

28 A mobile station shall support staggered Traffic Channel frames. The time offset is
29 specified by the FRAME_OFFSET parameter (see the *Channel Assignment Message* in
30 7.7.2.3.2.8).⁵ A zero-offset Reverse Traffic Channel frame shall begin only when System
31 Time is an integral multiple of 20 ms (see Figure 1.2-1). A staggered frame shall begin

⁵The Reverse Traffic Channel time offset is the same as the Forward Traffic Channel time offset.

1 1.25 × FRAME_OFFSET ms later than the zero-offset Traffic Channel frame. The Reverse
2 Traffic Channel interleaver block shall be aligned with the Reverse Traffic Channel frame.

3 6.1.3.3.2 Reverse Traffic Channel Frame Structure

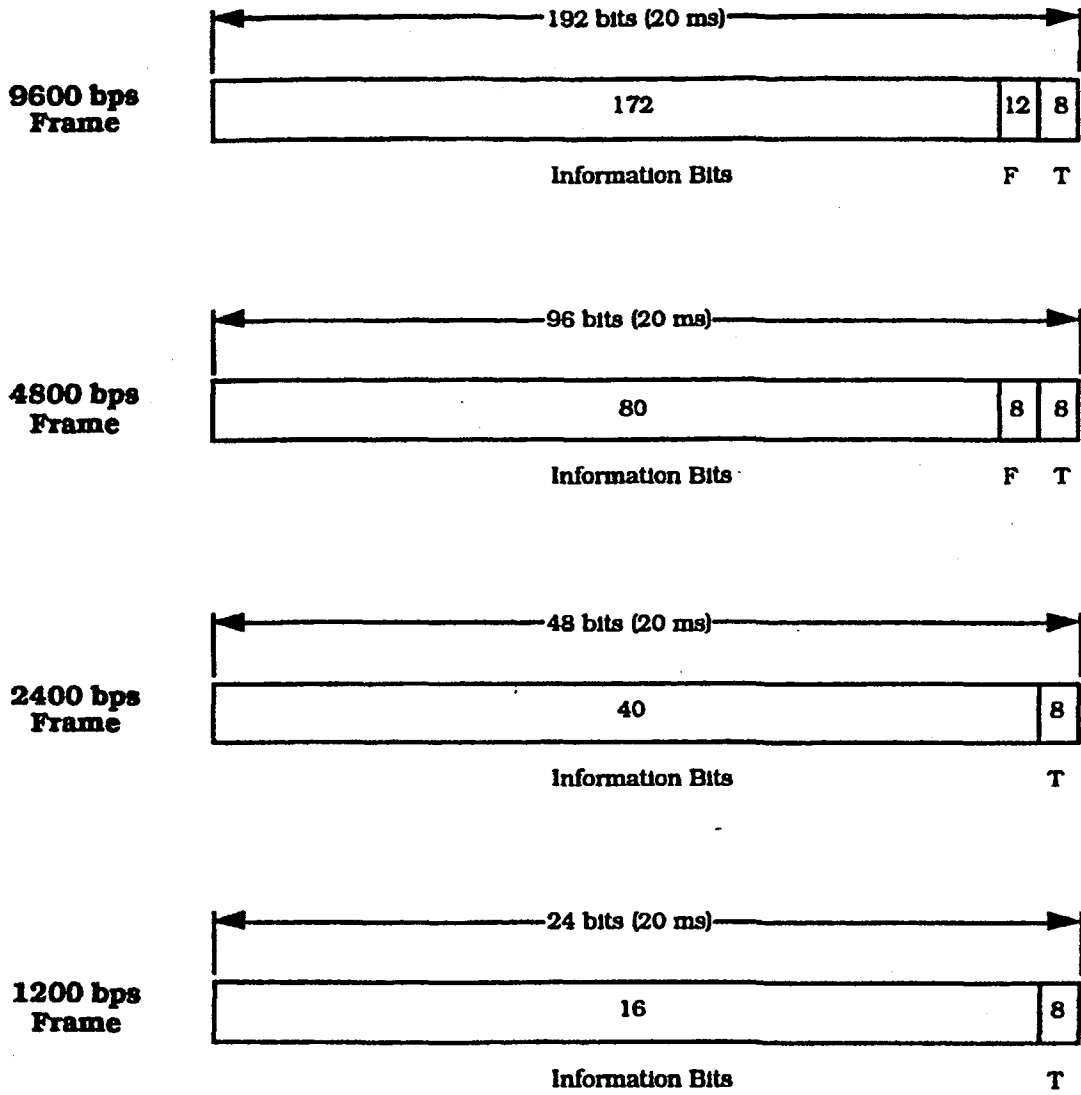
4 Reverse Traffic Channel frames sent at the 9600 bps transmission rate shall consist of 192
5 bits. These 192 bits shall be composed of 172 information bits followed by 12 frame quality
6 indicator (CRC) bits and eight Encoder Tail Bits as shown in Figure 6.1.3.3.2-1.

7 Reverse Traffic Channel frames sent at the 4800 bps transmission rate shall consist of 96
8 bits. These 96 bits shall be composed of 80 information bits followed by eight frame quality
9 indicator (CRC) bits and eight Encoder Tail Bits as shown in Figure 6.1.3.3.2-1.

10 Reverse Traffic Channel frames sent at the 2400 bps transmission rate shall consist of 48
11 bits. These 48 bits shall be composed of 40 information bits followed by eight Encoder Tail
12 Bits as shown in Figure 6.1.3.3.2-1.

13 Reverse Traffic Channel frames sent at the 1200 bps transmission rate shall consist of 24
14 bits. These 24 bits shall be composed of 16 information bits followed by eight Encoder Tail
15 Bits as shown in Figure 6.1.3.3.2-1.

16



Notation

- F - Frame Quality Indicator (CRC)
- T - Encoder Tail Bits

1
2

Figure 6.1.3.3.2-1. Reverse Traffic Channel Frame Structure

1 **6.1.3.3.2.1 Reverse Traffic Channel Frame Quality Indicator**

2 Each 9600 bps and 4800 bps frame shall include a frame quality indicator. This frame
3 quality indicator is a CRC.⁶ No frame quality indicator is used for the 2400 bps and 1200
4 bps transmission rates.

5 For both the 9600 bps and 4800 bps rates, the frame quality indicator (CRC) shall be
6 calculated on all bits within the frame, except the frame quality indicator itself and the
7 Encoder Tail Bits. The 9600 bps transmission rate shall use a 12-bit frame quality
8 indicator. The generator polynomial for this frame quality indicator shall be as follows:

9
$$g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1.$$

10 The 4800 bps transmission rate shall use an 8-bit frame quality indicator. The generator
11 polynomial for this frame quality indicator shall be as follows:

12
$$g(x) = x^8 + x^7 + x^4 + x^3 + x + 1.$$

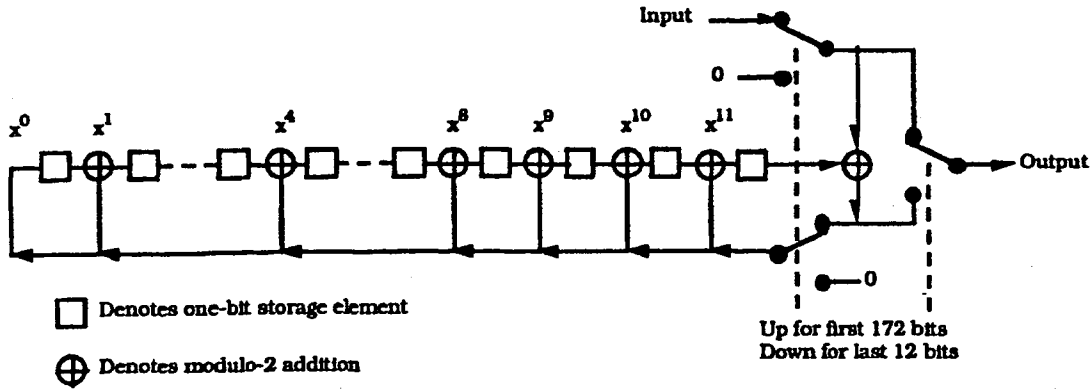
13 The frame quality indicators shall be computed according to the following procedure using
14 the logic shown in Figures 6.1.3.3.2.1-1 and 6.1.3.3.2.1-2:

- 15
- 16 • Initially, all shift register elements shall be set to logical one and the switches shall
17 be set in the up position.
 - 18 • The register shall be clocked 172 times (for 192-bit frame) or 80 times (for 96-bit
19 frame) with the information bits as input.
 - 20 • The switches shall be set in the down position, and the register shall be clocked an
21 additional 12 times (for 192-bit frame) or 8 times (for 96-bit frame). The 12 or 8
22 additional output bits shall be the frame quality indicator bits.
 - The bits shall be transmitted in the order calculated.

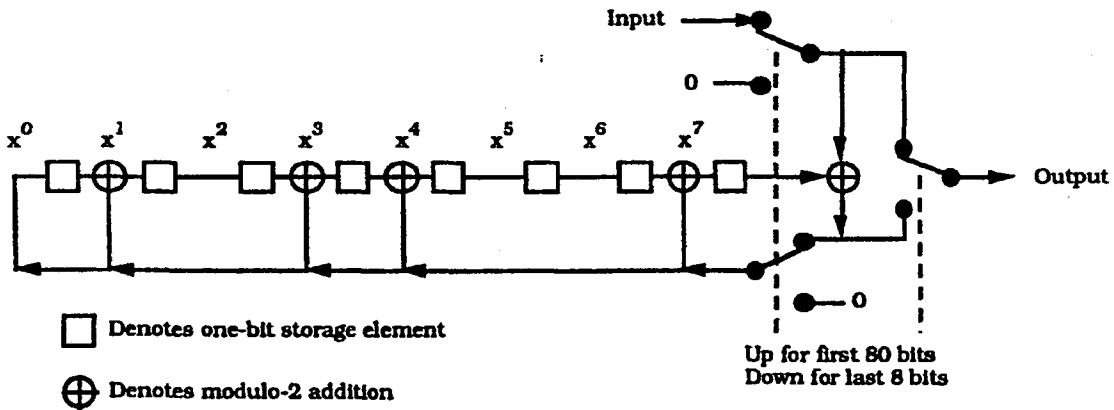
23 **6.1.3.3.2.2 Reverse Traffic Channel Encoder Tail Bits**

24 The last eight bits of each Reverse Traffic Channel frame are called the Encoder Tail Bits.
25 These eight bits shall be set to '0'.

⁶The frame quality indicator supports two functions at the receiver. The first function is to determine whether the frame is in error. The second function is to assist in the determination of the data rate of the received frame. Other parameters may be needed for rate determination in addition to the frame quality indicator, such as symbol error rate evaluated at the four data rates.



1
2 **Figure 6.1.3.3.2.1-1. Reverse Traffic Channel Frame Quality Indicator Calculation at**
3 **the 9600 bps Rate**



7
8 **Figure 6.1.3.3.2.1-2. Reverse Traffic Channel Frame Quality Indicator Calculation at**
9 **the 4800 bps Rate**

1 **6.1.3.3.2.3 Traffic Channel Preamble**

2 The Traffic Channel preamble shall consist of frames of 192 zeros that are transmitted at
3 the 9600 bps rate. The Traffic Channel preamble shall not include the frame quality
4 indicator.

5 The Traffic Channel preamble is transmitted to aid the base station in performing initial
6 acquisition of the Reverse Traffic Channel. The Traffic Channel preamble transmission
7 occurs after the mobile station's transmitter has been enabled during the *Traffic Channel*
8 *Initialization Substate* of the *Mobile Station Control on the Traffic Channel State* and before
9 receipt of the first valid message on the Forward Traffic Channel (see 6.6.4.2).

10 **6.1.3.3.2.4 Null Traffic Channel Data**

11 Null Traffic Channel data shall consist of frames of 16 ones followed by 8 zeros (the
12 Encoder Tail Bits) sent at the 1200 bps rate.

13 The mobile station transmits null Traffic Channel data when no service option is active.
14 Null Traffic Channel data serves as a "keep-alive" operation so that the base station can
15 maintain connectivity with the mobile station.

16 **6.1.3.3.3 Reverse Traffic Channel Convolutional Encoding**

17 The Reverse Traffic Channel data shall be convolutionally encoded prior to transmission as
18 specified in 6.1.3.1.3.

19 When generating Reverse Traffic Channel data, the encoder shall be initialized to the all
20 zero state at the end of each 20 ms frame.

21 **6.1.3.3.4 Reverse Traffic Channel Code Symbol Repetition**

22 Reverse Traffic Channel code symbol repetition shall be as specified in 6.1.3.1.4.

23 **6.1.3.3.5 Reverse Traffic Channel Interleaving**

24 The code symbols (or repeated code symbols when a data rate lower than 9600 bps is used)
25 on the Reverse Traffic Channel shall be interleaved as specified in 6.1.3.1.5.

26 **6.1.3.3.6 Reverse Traffic Channel Modulation**

27 The Reverse Traffic Channel data shall be modulated as specified in 6.1.3.1.6.

28 **6.1.3.3.7 Reverse Traffic Channel Gating**

29 The mobile station shall perform the data burst randomizing function as specified in
30 6.1.3.1.7 while transmitting on the Reverse Traffic Channel.

31 **6.1.3.3.8 Reverse Traffic Channel Direct Sequence Spreading**

32 The Reverse Traffic Channel shall be spread by the long code as specified in 6.1.3.1.8.

1 **6.1.3.3.9 Reverse Traffic Channel Quadrature Spreading**

2 The Reverse Traffic Channel shall be quadrature spread by the pilot PN sequences as
3 specified in 6.1.3.1.9.

4 **6.1.3.3.10 Reverse Traffic Channel Baseband Filtering**

5 The Reverse Traffic Channel shall be filtered as specified in 6.1.3.1.10.

6 **6.1.3.3.11 Multiplex Option Information**

7 Multiplex Option 1 is also referred to as the default multiplex option.⁷ It provides for the
8 transmission of primary traffic and signaling or secondary traffic. Signaling traffic may be
9 transmitted via blank-and-burst with the signaling traffic using all of the frame or via dim-
10 and-burst with the primary traffic and signaling traffic sharing the frame. Multiplex Option
11 1 also supports the transmission of secondary traffic. When primary traffic is active,
12 secondary traffic is transmitted via dim-and-burst with the primary traffic and secondary
13 traffic sharing the frame. When primary traffic is not active, secondary traffic is
14 transmitted via blank-and-burst with the secondary traffic using all of the frame. The
15 information bit structures for primary and signaling traffic are specified in 6.1.3.3.11.1; the
16 information bit structures for secondary traffic are specified in 6.1.3.3.11.2. Table
17 6.1.3.3.11-1 shows the information bit structures supported by Multiplex Option 1.

18 The mobile station shall support Multiplex Option 1. The mobile station shall support the
19 transmission of primary traffic and signaling traffic using the information bit structures
20 specified in 6.1.3.3.11.1. The mobile station may support secondary traffic, and if so, the
21 mobile station shall also use the information bit structures specified in 6.1.3.3.11.2.
22 Procedures for support of secondary traffic data are for further study.

23 Other multiplex options are for further study.

24 ⁷The multiplex option is the same on both the Forward Traffic Channel and the Reverse Traffic Channel.

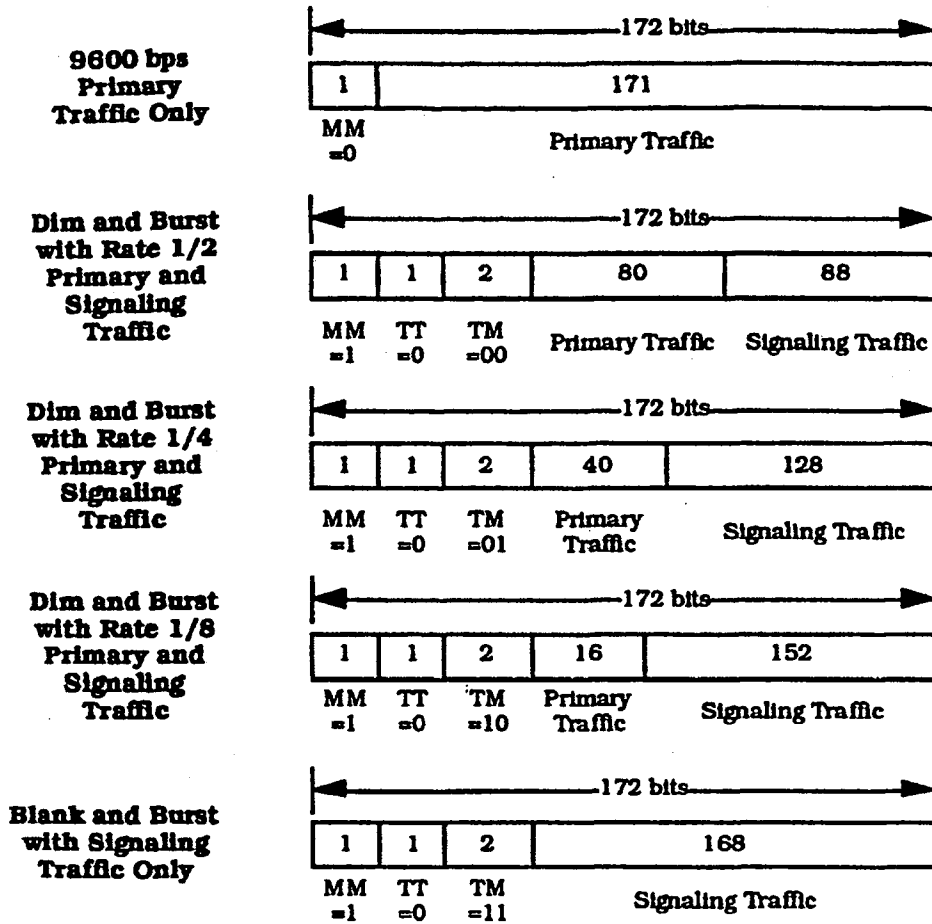
1 **Table 6.1.3.3.11-1. Reverse Traffic Channel Information Bits for Multiplex Option 1**

Transmit Rate (bits/sec)	Format Bits			Primary Traffic	Signaling Traffic	Secondary Traffic	
	Mixed Mode (MM)	Traffic Type (TT)	Traffic Mode (TM)	bits/ frame	bits/ frame	bits/ frame	
9600	'0'	-	-	171	0	0	
	'1'	'0'	'00'	80	88	0	
	'1'	'0'	'01'	40	128	0	
	'1'	'0'	'10'	16	152	0	
	'1'	'0'	'11'	0	168	0	
	*	'1'	'1'	'00'	80	0	88
	*	'1'	'1'	'01'	40	0	128
	*	'1'	'1'	'10'	16	0	152
*	'1'	'1'	'11'	0	0	168	
4800	-	-	-	80	0	0	
2400	-	-	-	40	0	0	
1200	-	-	-	16	0	0	

Note: Secondary traffic structures, marked with *, are optional.

2 **6.1.3.3.11.1 Primary and Signaling Traffic with Multiplex Option 1**

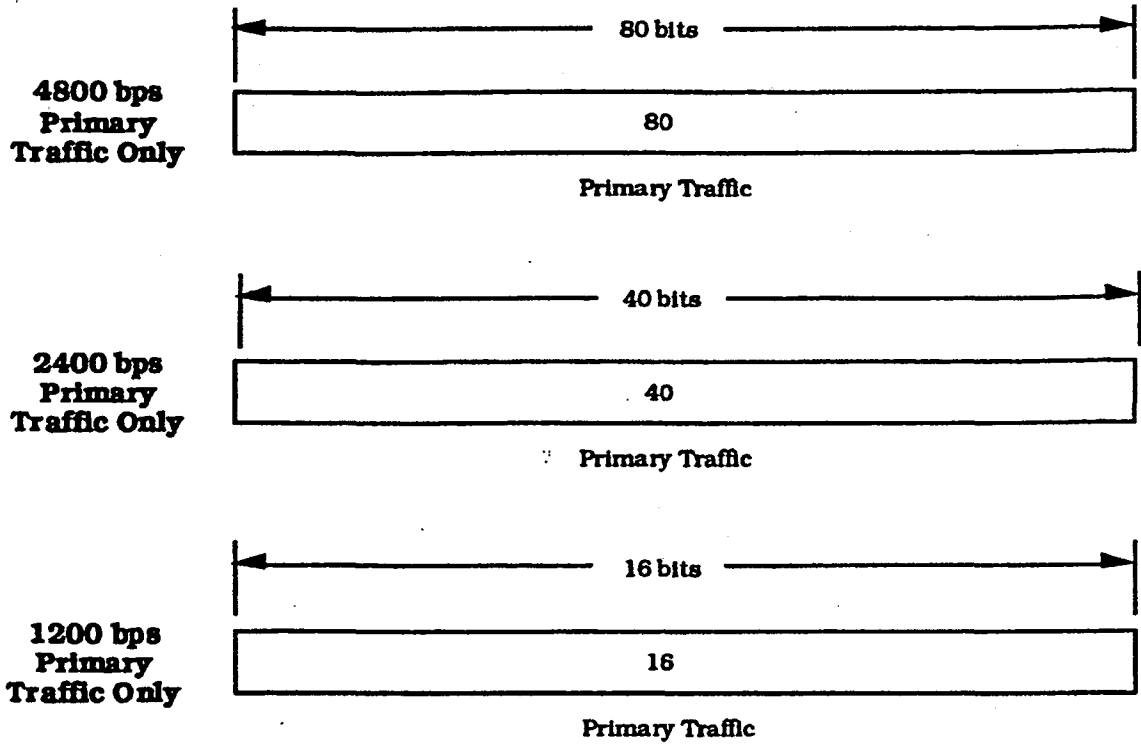
- 3 The mobile station shall support the information bit structures described in Table
4 6.1.3.3.11-1 and Figure 6.1.3.3.11.1-1.



Notation

- | | |
|--|--|
| <p>MM - Mixed Mode Bit
 0 - Primary Traffic Only
 1 - Primary Traffic and/or Signaling Traffic or Secondary Traffic</p> <p>TT - Traffic Type Bit
 0 - Signaling Traffic
 1 - Secondary Traffic</p> | <p>TM - Traffic Mode Bits
 00 - 80 Primary Traffic Bits and either 88 Signaling Traffic or 68 Secondary Traffic Bits
 01 - 40 Primary Traffic Bits and either 128 Signaling Traffic Bits or 128 Secondary Traffic Bits
 10 - 16 Primary Traffic Bits and either 152 Signaling Traffic Bits or 152 Secondary Traffic Bits
 11 - 168 Signaling Traffic Bits or 168 Secondary Traffic Bits</p> |
|--|--|

1
2
3
Figure 6.1.3.3.11.1-1. Information Bits for Primary Traffic and Signaling Traffic (Part 1 of 2)

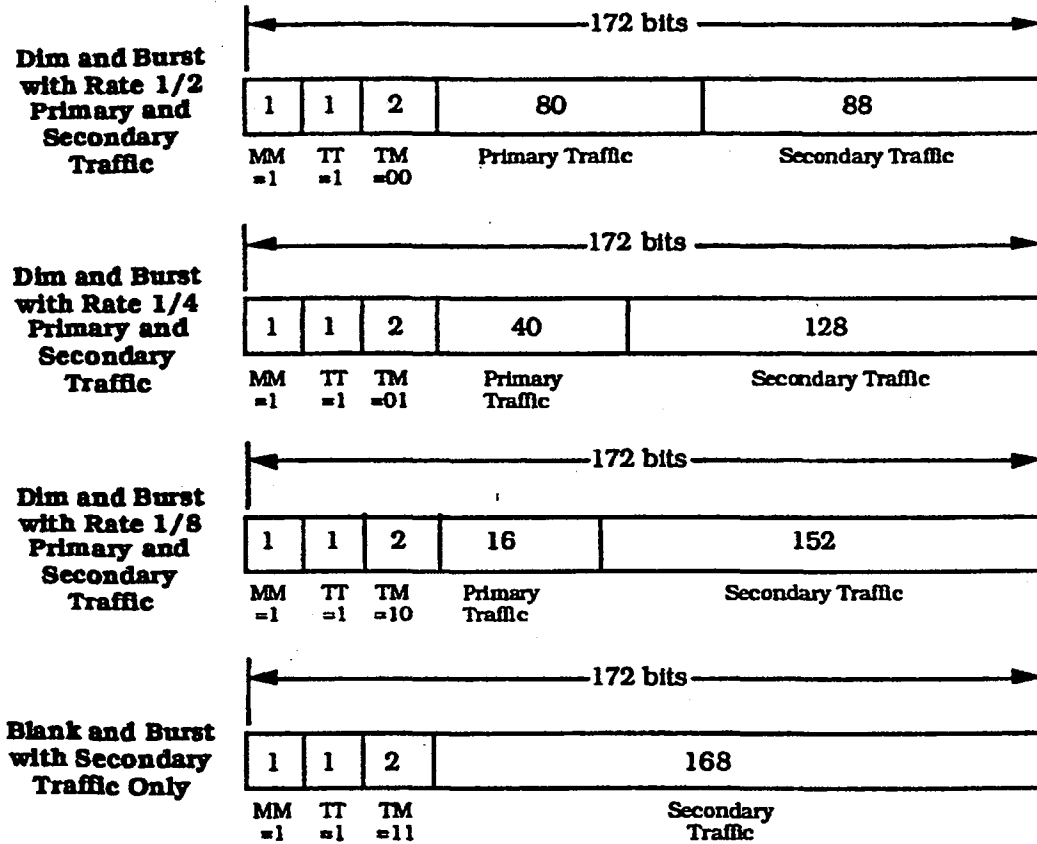


1
2
3
4

Figure 6.1.3.3.11.1-1. Information Bits for Primary Traffic and Signaling Traffic (Part 2 of 2)

6.1.3.3.11.2 Secondary Traffic with Multiplex Option 1

If the mobile station supports secondary traffic, the mobile station shall use the information bit structures described in Table 6.1.3.3.11-1 and Figure 6.1.3.3.11.2-1.



Notation

- MM - Mixed Mode Bit
 - 0 - Primary Traffic Only
 - 1 - Primary Traffic and/or Signaling Traffic or Secondary Traffic
- TT - Traffic Type Bit
 - 0 - Signaling Traffic
 - 1 - Secondary Traffic
- TM - Traffic Mode Bits
 - 00 - 80 Primary Traffic Bits and either 88 Signaling Traffic or 88 Secondary Traffic Bits
 - 01 - 40 Primary Traffic Bits and either 128 Signaling Traffic Bits or 128 Secondary Traffic Bits
 - 10 - 16 Primary Traffic Bits and either 152 Signaling Traffic Bits or 152 Secondary Traffic Bits
 - 11 - 168 Signaling Traffic Bits or 168 Secondary Traffic Bits

Figure 6.1.3.3.11.2-1. Information Bits for Secondary Traffic

6.1.3.3.11.3 Use of Various Information Bit Formats for Multiplex Option 1

When neither a primary traffic service option nor a secondary traffic service option is active, the mobile station shall transmit signaling traffic using only blank-and-burst frames. When not transmitting signaling traffic, the mobile station shall transmit only null Traffic Channel data frames.

When a primary traffic service option is active and a secondary traffic service option is not active, the mobile station shall use the information formats specified in 6.1.3.3.11.1. The mobile station shall not transmit null Traffic Channel data. The mobile station should use the dim-and-burst information formats specified in 6.1.3.3.11.1 for signaling traffic.

When a primary traffic service option is not active and a secondary traffic service option is active, the mobile station shall use the information formats specified in 6.1.3.3.11.2 to transmit secondary traffic. The mobile station shall use the blank-and-burst format specified in 6.1.3.3.11.1 for signaling traffic. The mobile station shall transmit null Traffic Channel data when neither secondary traffic nor signaling traffic is to be sent.

When both a primary traffic service option and a secondary traffic service option are active, the mobile station shall use the information formats specified in 6.1.3.3.11.1 and 6.1.3.3.11.2. The mobile station shall not transmit null Traffic Channel data. The mobile station should use the dim-and-burst information formats specified in 6.1.3.3.11.1 for signaling traffic.

6.1.3.3.11.4 Control of Service Options for Multiplex Option 1

Multiplex Option 1 controls the number of bits that the service option supplies for a frame (see IS-96 "Speech Service Option Standard for Wideband Spread Spectrum Digital Cellular System").

The mobile station shall use the following rules when a primary traffic service option is active: If signaling traffic is to be transmitted in a frame, Multiplex Option 1 shall either restrict the primary traffic service option to generate zero bits (for a blank-and-burst frame) or to generate less than 171 bits (for a dim-and-burst frame). If secondary traffic is to be transmitted in a frame, Multiplex Option 1 may restrict the primary traffic service option to generate less than 171 bits but shall allow the primary traffic service option to generate at least 16 bits. In all other cases, Multiplex Option 1 shall allow the primary traffic service option to generate either 16, 40, 80, or 171 bits for a frame.

6.1.4 Limitations on Emissions**6.1.4.1 Bandwidth Occupied**

Modulation products in a bandwidth of 30 kHz centered ± 900 kHz from the channel center frequency should be at least 45 dB and shall be at least 42 dB below the mean output power level.

6.1.4.2 Conducted Spurious Emissions

6.1.4.2.1 Suppression Inside Cellular Band

When transmitting on any CDMA Channel, spurious emission levels in the mobile station transmit band between 824 and 849 MHz shall be less than the limits specified in Table 6.1.4.2.1-1.

In addition, spurious emissions in each 1.23 MHz band located anywhere in the mobile station receive band between 869 and 894 MHz shall be less than -80 dBm. These requirements shall apply to measurements made at the mobile station antenna connector.

Table 6.1.4.2.1-1. Spurious Emission Limits When Transmitting

For Frequency Offset Δf , with $ \Delta f $	Greater than 885.0 kHz	Greater than 1.98 MHz
Spurious emission levels shall not exceed (a), or both (b) and (c), whichever is the greater power.	(a) -42 dBc/30 kHz	(a) -54 dBc/30 kHz
	(b) -60 dBm/30 kHz	(b) -60 dBm/30 kHz
	(c) -54 dBm/1.23 MHz	(c) -54 dBm/1.23 MHz
Spurious emission levels should not exceed (a), or both (b) and (c), whichever is the greater power.	(a) -45 dBc/30 kHz	(a) -60 dBc/30 kHz
	(b) -66 dBm/30 kHz	(b) -66 dBm/30 kHz
	(c) -60 dBm/1.23 MHz	(c) -60 dBm/1.23 MHz

Note: All frequencies in the measurement bandwidth shall satisfy the restrictions on $|\Delta f|$ where Δf = center frequency - measurement frequency

6.1.4.2.2 Suppression Outside Cellular Band

Current FCC rules shall apply.

6.1.4.3 Radiated Spurious Emissions

Radiated spurious emissions (from sources other than the antenna connector) shall meet levels corresponding to the conducted spurious requirements listed in 6.1.4.2.

6.1.5 Synchronization and Timing

6.1.5.1 Time Reference

Figure 1.2-1 illustrates the nominal relationship between the mobile station and base station transmit and receive time references. The mobile station shall establish a time reference which is used to derive timing for the transmit chip, symbol, frame slot, and system timing. The mobile station time reference shall be, in steady state conditions, within $\pm 1 \mu s$ of the time of occurrence, as measured at the mobile station antenna connector, of the earliest arriving multipath component being used for demodulation. If another multipath component (belonging to the same Pilot Channel or to a different Pilot Channel) becomes the earliest arriving multipath component to be used, the mobile station

1 time reference shall track to the new component. If the difference between the mobile
2 station time reference and the time of occurrence of the earliest arriving multipath
3 component being used for demodulation, as measured at the mobile station antenna
4 connector, is less than $\pm 1 \mu\text{s}$, the mobile station may track its time reference to the earliest
5 arriving multipath component being used for demodulation.

6 If a mobile station time reference correction is needed, it shall be corrected no faster than
7 $1/4$ chip (203.451 ns) in any 200 ms period and no slower than $3/8$ PN chip (305.18 ns)
8 per second.

9 When receiving the Forward Traffic Channel, the mobile station time reference shall be used
10 as the transmit time of the Reverse Traffic Channel. When receiving the Paging Channel,
11 the mobile station time reference shall be used as the transmit time of the Access Channel.

12 6.1.6 Transmitter Performance Requirements

13 System performance is predicated on transmitters meeting the requirements set forth in
14 IS-98 "Recommended Minimum Performance Standards for Dual-Mode Wideband Spread
15 Spectrum Cellular Mobile Stations."

16 6.2 Receiver

17 6.2.1 Frequency Parameters

18 6.2.1.1 Channel Spacing and Designation

19 Channel spacing and designation for the mobile station reception shall be as specified in
20 2.1.1.1. Valid channels for CDMA operations shall be as specified in 6.1.1.1.

21 6.2.2 Demodulation Characteristics

22 6.2.2.1 Processing

23 The mobile station demodulation process shall perform complementary operations to the
24 base station modulation process on the Forward CDMA Channel (see 7.1.3).

25 The mobile station shall provide a minimum of four processing elements that can be
26 directed independently from each other. At least three elements shall be capable of
27 tracking and demodulating multipath components of the Forward CDMA Channel. At least
28 one element shall be a "searcher" element capable of scanning and estimating the signal
29 strength at each pilot PN sequence offset.

30 6.2.2.2 Forward Traffic Channel Frame Categorization for Multiplex Option 1

31 For multiplex option 1, the mobile station shall classify received Forward Traffic Channel
32 frames into the following 14 categories (see 7.1.3.5.11):

- 33 1. 9600 bps frame, primary traffic only
- 34 2. 9600 bps frame, dim-and-burst with Rate $1/2$ primary and signaling traffic
- 35 3. 9600 bps frame, dim-and-burst with Rate $1/4$ primary and signaling traffic

- 1 4. 9600 bps frame, dim-and-burst with Rate 1/8 primary and signaling traffic
- 2 5. 9600 bps frame, blank-and-burst with signaling traffic only
- 3 6. 4800 bps frame, primary traffic only
- 4 7. 2400 bps frame, primary traffic only
- 5 8. 1200 bps frame, primary traffic or null data only
- 6 9. 9600 bps frame, primary traffic only, with bit errors⁸
- 7 10. Frame with insufficient frame quality⁹
- 8 11. 9600 bps frame, dim-and-burst with Rate 1/2 primary and secondary traffic
- 9 12. 9600 bps frame, dim-and-burst with Rate 1/4 primary and secondary traffic
- 10 13. 9600 bps frame, dim-and-burst with Rate 1/8 primary and secondary traffic
- 11 14. 9600 bps frame, blank-and-burst with secondary traffic only

12 Frames in categories 9 and 10 are bad frames; all frames otherwise categorized are
13 considered good frames.

14 If primary traffic is active and secondary traffic is not active, then the mobile station shall
15 categorize the received frames into one of categories 1 through 10. If primary traffic is not
16 active and secondary traffic is active, then the mobile station shall categorize the received
17 frames into one of categories 5, 8, 10 and 14. If neither primary traffic nor secondary traffic
18 is active, then the mobile station shall categorize the received frames into one of categories
19 5, 8, and 10. Mobile stations that do not implement secondary traffic services are not
20 required to implement categories 11 through 14.

21 6.2.2.3 Forward Traffic Channel Time Alignment

22 The Forward Traffic Channel frame time alignment is specified in 7.1.3.5.1. A mobile
23 station shall support staggered Forward Traffic Channel frames.

24 6.2.3 Limitations on Emissions

25 6.2.3.1 Conducted Spurious Emissions

⁸Certain service options, which can be connected to the multiplex sublayer, can satisfactorily handle some bit errors. This category is used when the frame quality indicator (CRC) fails but other parameters indicate a 9600 bps frame has been received.

⁹This category is used when the mobile station is unable to decide upon the data rate of the received frame or when the mobile station detects a frame in error which does not belong to category 9.

1 **6.2.3.1.1 Suppression Inside Cellular Band**

2 Total spurious emissions in each 1.23 MHz band located anywhere in the mobile station
3 receive band between 869 and 894 MHz shall be less than -80 dBm. Total spurious
4 emissions in each 1.23 MHz band located anywhere in the mobile station's transmit band
5 between 824 and 849 MHz shall not exceed -60 dBm. These requirements shall apply to
6 measurements made at the mobile station antenna connector, with the transmitter
7 disabled.

8 **6.2.3.1.2 Suppression Outside Cellular Band**

9 Current FCC rules shall apply.

10 **6.2.3.2 Radiated Spurious Emissions**

11 Current FCC rules shall apply.

12 **6.2.4 Receiver Performance Requirements**

13 System performance is predicated on receivers meeting the requirements set forth in IS-98
14 "Recommended Minimum Performance Standards for Dual-Mode Wideband Spread
15 Spectrum Cellular Mobile Stations."

16 **6.3 Security and Identification**

17 **6.3.1 Mobile Station Identification Number**

18 See 2.3.1.

19 For CDMA operation, the same MIN may be entered into multiple mobile stations.
20 Individual systems may or may not allow these capabilities. The management of these
21 capabilities is a function of the base station and system operator.

22 **6.3.2 Electronic Serial Number**

23 See 2.3.2.

24 **6.3.3 Station Class Mark**

25 See 2.3.3.

26 **6.3.4 Registration Memory**

27 See 2.3.4 for registration memory when operating in the analog mode.

28 The mobile station shall have memory to store one element in the zone-based registration
29 list `ZONE_LISTs-p` (see 6.6.5.1.5). This stored element shall include both `REG_ZONE` and
30 the corresponding (SID, NID) pair. The data retention time under power-off conditions shall
31 be at least 48 hours. If, after 48 hours, the data integrity cannot be guaranteed, then the
32 entry in `ZONE_LISTs-p` shall be deleted upon power-on.

33 The mobile station shall have memory to store one element in the system/network
34 registration list `SID_NID_LISTs-p` (see 6.6.5.1.5). The data retention time under power-off

1 conditions shall be at least 48 hours. If, after 48 hours, the data integrity cannot be
2 guaranteed, then the entry in $SID_NID_LIST_{s-p}$ shall be deleted upon power-on.

3 The mobile station shall have memory to store the distance-based registration variables
4 $BASE_LAT_REG_{s-p}$, $BASE_LONG_REG_{s-p}$ and $REG_DIST_REG_{s-p}$ (see 6.6.5.1.4). The data
5 retention time under power-off conditions shall be at least 48 hours. If, after 48 hours, the
6 data integrity cannot be guaranteed, then $REG_DIST_REG_{s-p}$ shall be set to zero upon
7 power-on.

8 6.3.5 Access Overload Class

9 See 2.3.5.

10 6.3.6 Reserved

11 6.3.7 Reserved

12 6.3.8 Home System and Network Identification

13 In addition to the $HOME_SID_p$ parameter that the mobile station stores for the MIN that is
14 associated with the mobile station (see 2.3.8), the mobile station shall provide memory to
15 store at least one home (SID_p , NID_p) pair. The mobile station shall also provide memory to
16 store the 1-bit parameters $MOB_TERM_HOME_p$, $MOB_TERM_FOR_SID_p$, and $MOB_TERM_FOR_NID_p$
17 (see 6.6.5.3).

18 6.3.9 Local Control Option

19 See 2.3.9.

20 6.3.10 Preferred Operation Selection

21 6.3.10.1 Preferred System

22 See 2.3.10.1.

23 6.3.10.2 Preferred CDMA or Analog

24 See 2.3.10.2.

25 6.3.11 Discontinuous Reception

26 The mobile station shall provide memory to store the preferred slot cycle index,
27 $SLOT_CYCLE_INDEX_p$ (see 6.6.2.1.1.3).

28 6.3.12 Authentication, Encryption of Signaling Information/User Data and Voice Privacy

29 6.3.12.1 Authentication

30 Authentication is the process by which information is exchanged between a mobile station
31 and base station for the purpose of confirming the identity of the mobile station. A
32 successful outcome of the authentication process occurs only when it can be demonstrated
33 that the mobile station and base station possess identical sets of shared secret data.

1 The authentication algorithms are described in "Common Cryptographic Algorithms." The
 2 interface (input and output parameters) for the algorithms are described in "Interface
 3 Specification for Common Cryptographic Algorithms." Table 6.3.12.1-1 summarizes the
 4 setting of the input parameters of the Auth_Signature procedure for each of its uses in this
 5 standard.

6
 7 **Table 6.3.12.1-1. Auth_Signature Input Parameters**

Procedure	RAND_CHALLENGE	ESN	AUTH_- DATA	SSD_- AUTH	SAVE_- REGISTERS
Registration (6.3.12.1.4)	RAND _S	ESN _P	MIN1	SSD_A	FALSE
Unique Challenge (6.3.12.1.5)	256 × RANDU + (8 LSBs of MIN2)	ESN _P	MIN1	SSD_A	FALSE
Originations (6.3.12.1.6)	RAND _S	ESN _P	Digits	SSD_A	TRUE
Terminations (6.3.12.1.7)	RAND _S	ESN _P	MIN1	SSD_A	TRUE
Base Station Challenge (6.3.12.1.9)	RANDBS	ESN _P	MIN1	SSD_A_- NEW	FALSE

8

9 **6.3.12.1.1 Shared Secret Data (SSD)**

10 SSD is a 128-bit quantity that is stored in semi-permanent memory in the mobile station,
 11 as specified in 2.3.12.1.1.

12 SSD_A is used to support the authentication procedures and SSD_B is used to support
 13 voice privacy and message encryption. SSD is generated according to the procedure
 14 specified in 2.3.12.1.8 or 6.3.12.1.9.

15 **6.3.12.1.2 Random Challenge Memory (RAND)**

16 See 2.3.12.1.2.

17 **6.3.12.1.3 Call History Parameter (COUNT_{S-P})**

18 See 2.3.12.1.3.

19 **6.3.12.1.4 Authentication of Mobile Station Registrations**

20 The following authentication procedures shall be performed when the AUTH field of the
 21 *Access Parameters Message* is set to '01' (standard authentication mode), and the mobile
 22 station attempts to register (by sending a *Registration Message* on the Access Channel).

1 The mobile station shall set the input parameters of the Auth_Signature procedure (see
 2 "Interface Specification for Common Cryptographic Algorithms," section 2.3) as illustrated
 3 in Figure 6.3.12.1.4-1.

4 The mobile station shall set the SAVE_REGISTERS input parameter to FALSE.

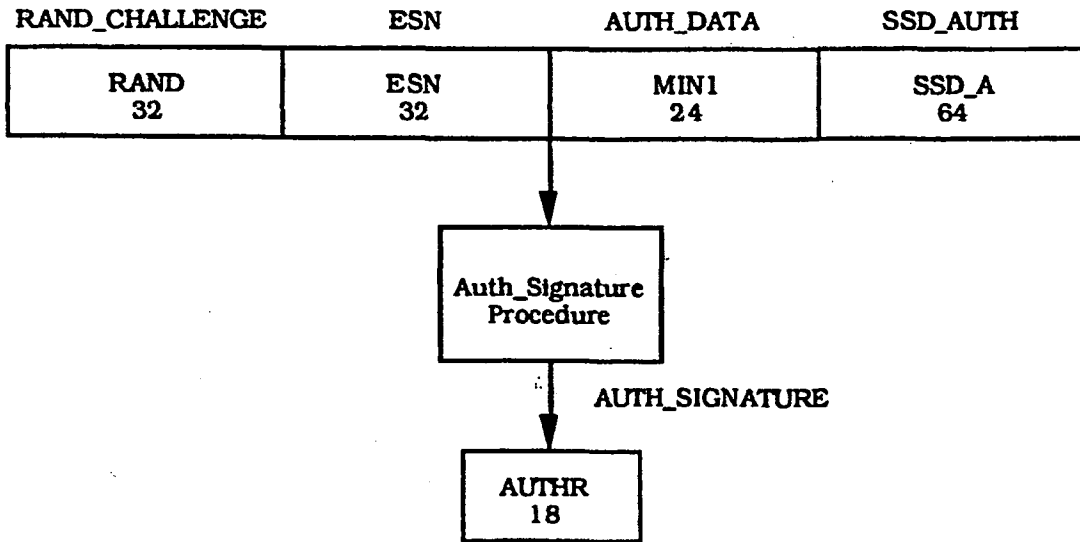
5 The mobile station shall then execute the Auth_Signature procedure. The 18-bit output
 6 AUTH_SIGNATURE shall be used to fill the AUTHR field of the *Registration Message*. The
 7 RANDC (eight most significant bits of RAND) and COUNT fields of the message shall be
 8 filled with the current values stored in the mobile station.

9 The base station compares the received value of RANDC to the most significant eight bits of
 10 its internally stored value of RAND.

11 The base station may also compare the received value of COUNT with its internally stored
 12 value associated with the received MIN/ESN.

13 The base station computes the value of AUTHR in the same manner as the mobile station,
 14 but using its internally stored value of SSD_A. The base station compares its computed
 15 value of AUTHR to the value received from the mobile station.

16 If any of the comparisons fail, the base station may deem the registration attempt
 17 unsuccessful, initiate the Unique Challenge-Response Procedure (see 6.3.12.1.5) or
 18 commence the process of updating SSD (see 6.3.12.1.9).



20
 21 **Figure 6.3.12.1.4-1. Computation of AUTHR for Authentication of Mobile Station**
 22 **Registrations**
 23

1 6.3.12.1.5 Unique Challenge-Response Procedure

2 The Unique Challenge-Response Procedure is initiated by the base station and can be
 3 carried out either on the Paging and Access Channels, or on the Forward and Reverse
 4 Traffic Channels. The procedure is as follows:

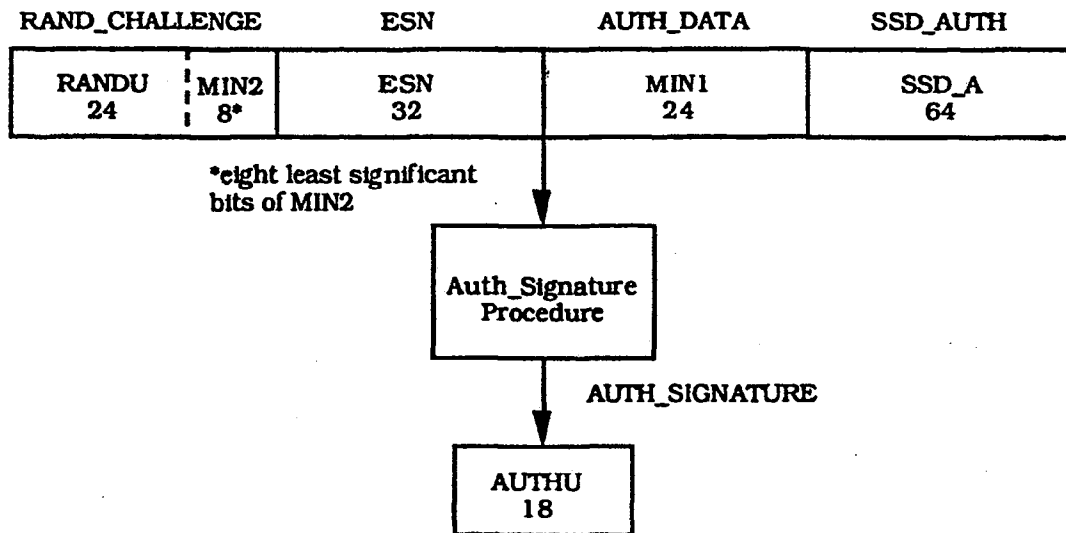
5 The base station generates the 24-bit quantity RANDU and sends it to the mobile station in
 6 the *Authentication Challenge Message* on either the Paging Channel or the Forward Traffic
 7 Channel. Upon receipt of the *Authentication Challenge Message*, the mobile station shall
 8 set the input parameters of the Auth_Signature procedure (see "Interface Specification for
 9 Common Cryptographic Algorithms," section 2.3) as illustrated in Figure 6.3.12.1.5-1. The
 10 24 most significant bits of the RAND_CHALLENGE input parameter shall be filled with
 11 RANDU, and the 8 least significant bits of RAND_CHALLENGE shall be filled with the 8
 12 least significant bits of MIN2.

13 The mobile station shall set the SAVE_REGISTERS input parameter to FALSE.

14 The mobile station shall then execute the Auth_Signature procedure. The 18-bit output
 15 AUTH_SIGNATURE shall be used to fill the AUTHU field of the *Authentication Challenge*
 16 *Response Message*, which shall be sent to the base station.

17 The base station computes the value of AUTHU in the same manner as the mobile station,
 18 but using its internally stored value of SSD_A. The base station compares its computed
 19 value of AUTHU to the value received from the mobile station. If the comparison fails, the
 20 base station may deny further access attempts by the mobile station, drop the call in
 21 progress, or initiate the process of updating SSD (see 6.3.12.1.9).

22



23

24 **Figure 6.3.12.1.5-1. Computation of AUTHU for the Unique Challenge-Response**
 25 **Procedure**

26

26

1 6.3.12.1.6 Authentication of Mobile Station Originations

2 When the AUTH field of the *Access Parameters Message* sent on the Paging Channel is set
3 to '01' (standard authentication mode), and the mobile station attempts to originate a call
4 (by sending an *Origination Message* on the Access Channel), the following authentication
5 procedures shall be performed:

6 The mobile station shall set the input parameters of the Auth_Signature procedure (see
7 "Interface Specification for Common Cryptographic Algorithms," section 2.3) as illustrated
8 in Figure 6.3.12.1.6-1. The AUTH_DATA input parameter shall contain the last six digits
9 contained in the CHAR1 fields of the *Origination Message*, encoded according to Table
10 6.7.1.3.2.4-4.

11 If fewer than six digits are included in the *Origination Message*, the most significant bits of
12 MIN1 shall be used to replace the missing digits. The exact procedure is that MIN1 is used
13 to initially fill the AUTH_DATA input parameter and then the last dialed digits entered by
14 the subscriber are used to replace all or part of this initial value. If a full 6 digits are dialed,
15 the first digit of the 6 that was dialed is used as the most significant 4 bits of AUTH_DATA,
16 the second digit is the next less-significant 4 bits of AUTH_DATA, and so forth. If less than
17 6 digits are dialed, then the least significant 4 bits of AUTH_DATA are the last dialed digit,
18 the second-last dialed digit becomes the next more-significant 4 bits of AUTH_DATA, and so
19 on up to the first of the dialed digits.

20 The mobile station shall set the SAVE_REGISTERS input parameter to TRUE.

21 The mobile station shall then execute the Auth_Signature Procedure. The 18-bit output
22 AUTH_SIGNATURE shall be used to fill the AUTHR field of the *Origination Message*. The
23 RANDC (eight most significant bits of RAND) and COUNT fields of the message shall be
24 filled with the current values stored in the mobile station.

25 The base station compares the received value of RANDC to the most significant eight bits of
26 its internally stored value of RAND.

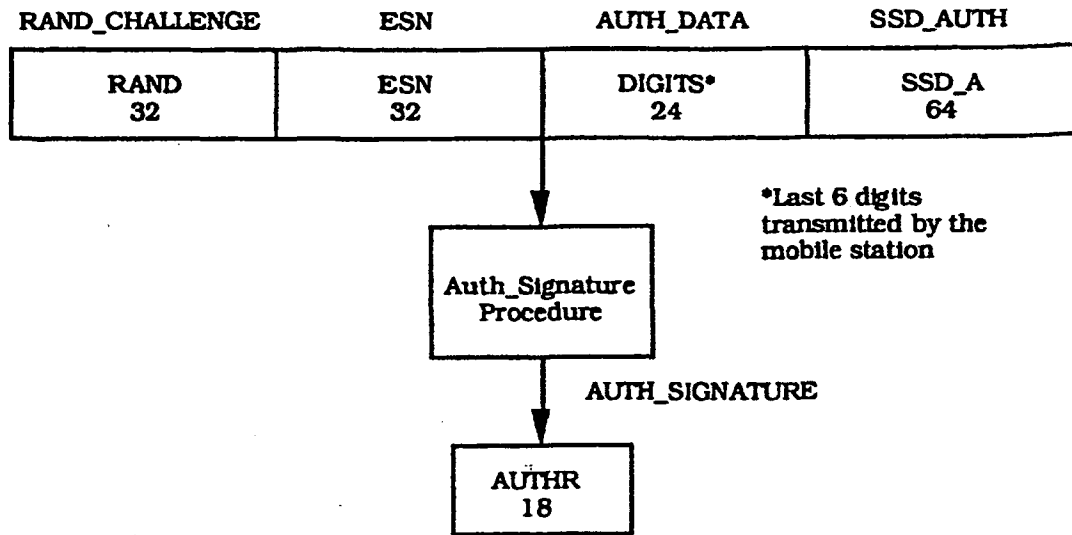
27 The base station may also compare the received value of COUNT with its internally stored
28 value associated with the received MIN/ESN.

29 The base station computes the value of AUTHR in the same manner as the mobile station,
30 but using its internally stored value of SSD_A. The base station compares its computed
31 value of AUTHR to the value received from the mobile station.

32 If the comparisons executed at the base station are successful, the base station may initiate
33 the appropriate channel assignment procedures. After channel assignment, the base
34 station may issue a *Parameter Update Order* on the Forward Traffic Channel, updating the
35 value of COUNT_{s-p} in the mobile station.

36 If any of the comparisons fail, the base station may deny service, initiate the Unique
37 Challenge-Response Procedure (see 6.3.12.1.5) or commence the process of updating SSD
38 (see 6.3.12.1.9).

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Figure 6.3.12.1.6-1. Computation of AUTHR for Authentication of Mobile Station Originations

6.3.12.1.7 Authentication of Mobile Station Terminations

When the AUTH field of the *Access Parameters Message* sent on the Paging Channel is set to '01' (standard authentication mode), and the mobile station responds to a page (by sending a *Page Response Message* on the Access Channel), the following authentication procedures shall be performed:

The mobile station shall set the input parameters of the Auth_Signature procedure (see "Interface Specification for Common Cryptographic Algorithms," section 2.3) as illustrated in Figure 6.3.12.1.7-1.

The mobile station shall set the SAVE_REGISTERS input parameter to TRUE.

The mobile station shall then execute the Auth_Signature procedure. The 18-bit output AUTH_SIGNATURE shall be used to fill the AUTHR field of the *Page Response Message*. The RANDC (eight most significant bits of RAND) and COUNT fields of the message shall be filled with the current values stored in the mobile station.

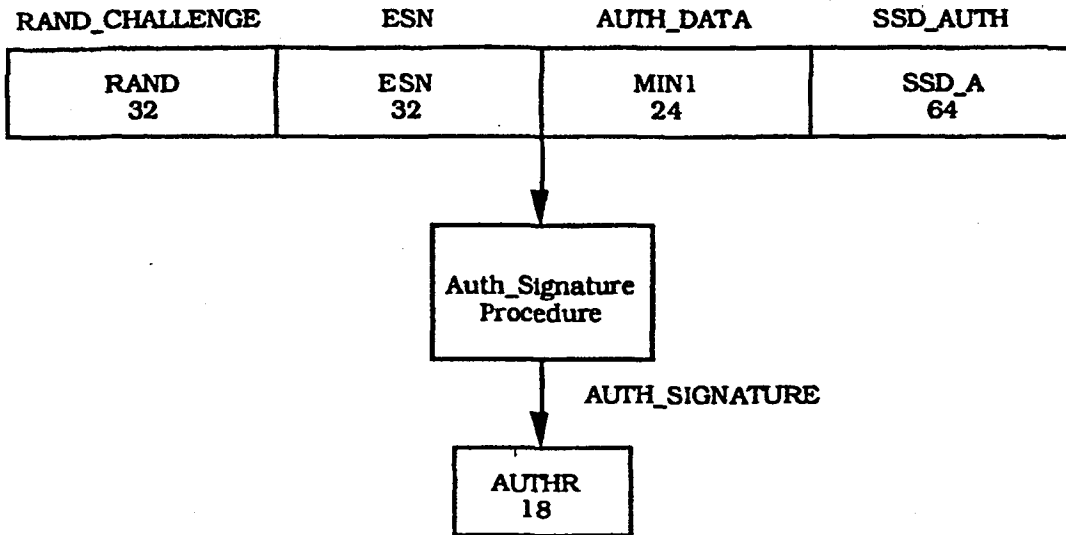
The base station compares the received value of RANDC to the eight most significant bits of its internally stored value of RAND.

The base station may also compare the received value of COUNT with its internally stored value associated with the received MIN/ESN.

The base station computes the value of AUTHR in the same manner as the mobile station, but using its internally stored value of SSD_A. The base station compares its computed value of AUTHR to the value received from the mobile station.

If the comparisons executed at the base station are successful, the base station may initiate the appropriate channel assignment procedures. After channel assignment, the base

1 station may issue a *Parameter Update Order* on the Forward Traffic Channel, updating the
 2 value of COUNT_{S-P} in the mobile station.
 3 If any of the comparisons fail, the base station may deny service, initiate the Unique
 4 Challenge Response Procedure (see 6.3.12.1.5) or commence the process of updating SSD
 6 (see 6.3.12.1.9).



7
 8 **Figure 6.3.12.1.7-1. Computation of AUTHR for Authentication of Mobile Station**
 9 **Terminations**

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 11 **6.3.12.1.8 Authentication of Mobile Station Data Bursts**

12 Reserved.

13 **6.3.12.1.9 Updating the Shared Secret Data (SSD)**

14 SSD is updated using the SSD_Generation procedure (see "Interface Specification for
 15 Common Cryptographic Algorithms," section 2.2.1), initialized with mobile station specific
 16 information, random data and the mobile station's A-key. The A-key is 64 bits long. It is
 17 assigned to the mobile station and is stored in the mobile station's permanent security and
 18 identification memory. The A-key is known only to the mobile station and to its associated
 19 Home Location Register/Authentication Center (HLR/AC) (see EIA/TIA/IS-41). See TSB 50
 20 "User Interface for Authentication Key Entry," for details of A-key entry into the mobile
 21 station.

22 The SSD update procedure is performed as follows (see Figure 6.3.12.1.9-1):

23 The base station sends an *SSD Update Message* on either the Paging Channel or the
 24 Forward Traffic Channel. The RANDSSD field of the *SSD Update Message* contains the
 25 same value used for the HLR/AC computation of SSD.

1 Upon receipt of the *SSD Update Message* the mobile station shall set the input parameters
2 of the *SSD_Generation* procedure (see "Interface Specification for Common Cryptographic
3 Algorithms," section 2.2.1) as illustrated in Figure 6.3.12.1.9-2. The mobile station shall
4 then execute the *SSD_Generation* procedure. The mobile station shall set *SSD_A_NEW* and
5 *SSD_B_NEW* to the outputs of the *SSD_Generation* procedure.

6 The mobile station shall then select a 32-bit random number, *RANDBS*, and shall send it to
7 the base station in a *Base Station Challenge Order* on the Access Channel or Reverse Traffic
8 Channel.

9 Both the mobile station and the base station shall then set the input parameters of the
10 *Auth_Signature* procedure (see "Interface Specification for Common Cryptographic
11 Algorithms," section 2.3) as illustrated in Figure 6.3.12.1.9-3 and shall execute the
12 *Auth_Signature* procedure.

13 The mobile station and base station shall set the *SAVE_REGISTERS* input parameter to
14 *FALSE*.

15 The mobile station and base station shall execute the *Auth_Signature* procedure. *AUTHBS*
16 is set to the 18-bit result *AUTH_SIGNATURE*. The base station sends its computed value of
17 *AUTHBS* to the mobile station in a *Base Station Challenge Confirmation Order* on the Paging
18 Channel or the Forward Traffic Channel.

19 Upon receipt of the *Base Station Challenge Confirmation Order* the mobile station shall
20 compare the received value of *AUTHBS* to its internally computed value. (If the mobile
21 station receives a *Base Station Challenge Confirmation Order* without having previously
22 received an *SSD Update Message*, the mobile station shall respond with an *SSD Update*
23 *Rejection Order*.)

24 If the comparison is successful, the mobile station shall execute the *SSD_Update* procedure
25 (see "Interface Specification for Common Cryptographic Algorithms," section 2.2.2) to set
26 *SSD_A* and *SSD_B* to *SSD_A_NEW* and *SSD_B_NEW*, respectively. The mobile station shall
27 then send an *SSD Update Confirmation Order* to the base station, indicating successful
28 completion of the *SSD* update.

29 If the comparison is not successful, the mobile station shall discard *SSD_A_NEW* and
30 *SSD_B_NEW*. The mobile station shall then send an *SSD Update Rejection Order* to the
31 base station, indicating unsuccessful completion of the *SSD* update.

32 Upon receipt of the *SSD Update Confirmation Order*, the base station sets *SSD_A* and
33 *SSD_B* to the values received from the HLR/AC (see EIA/TIA/IS-41).

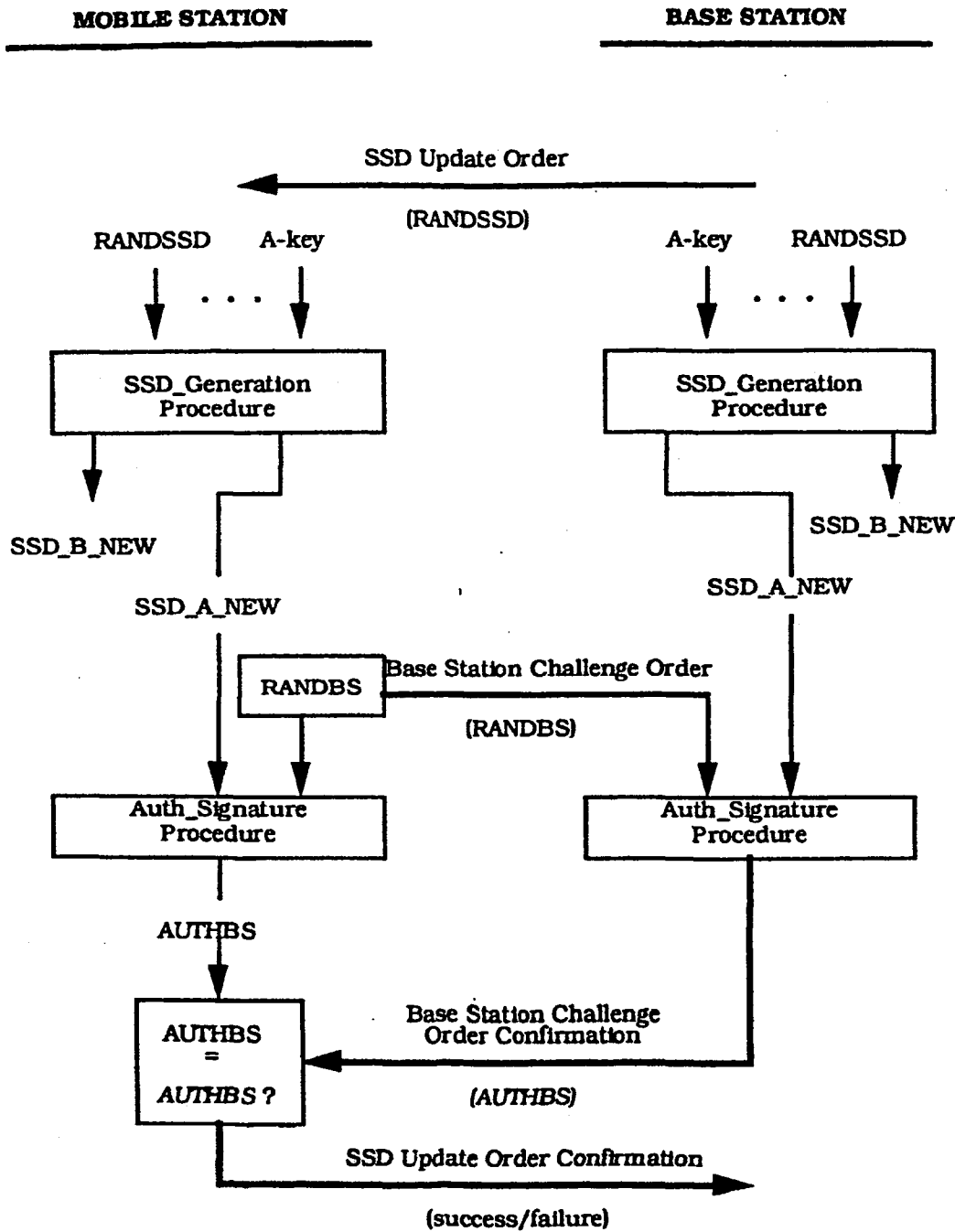


Figure 6.3.12.1.9-1. SSD Update Message Flow

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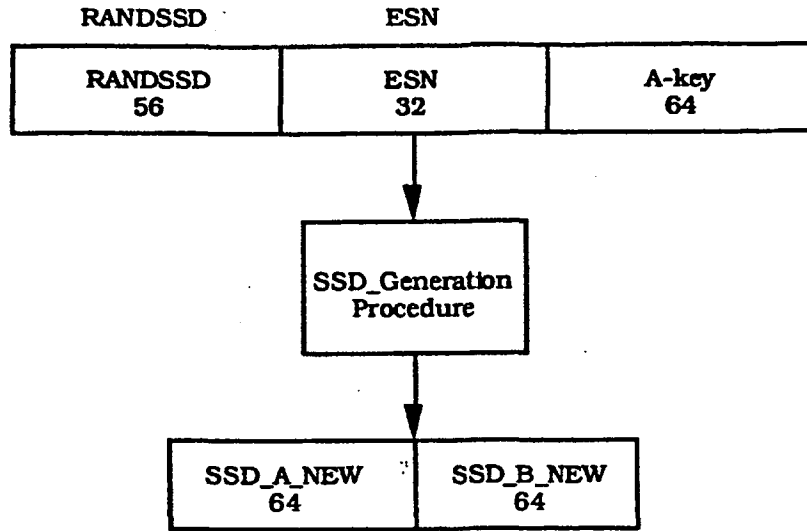


Figure 6.3.12.1.9-2. Computation of Shared Secret Data (SSD)

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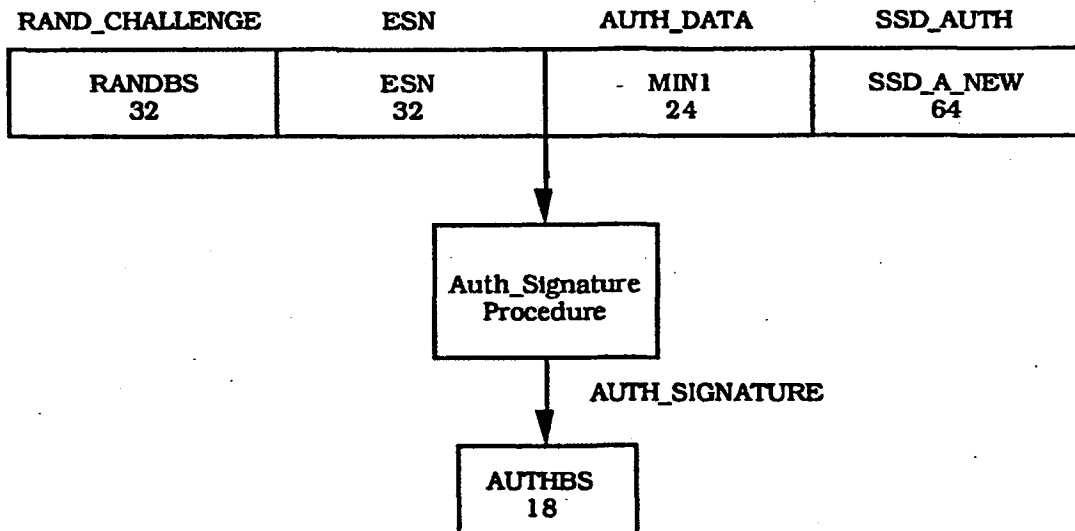


Figure 6.3.12.1.9-3. Computation of AUTHBS

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6.3.12.2 Signaling Message Encryption

In an effort to enhance the authentication process and to protect sensitive subscriber information (such as PINs), a method is provided to encrypt certain fields of selected Traffic Channel signaling messages. See Appendix A for the list of messages and fields to be encrypted.

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1 The message encryption algorithm is described in "Common Cryptographic Algorithms."
2 The availability of encryption algorithm information is governed under the U. S.
3 International Traffic and Arms Regulation (ITAR) and the Export Administration
4 Regulations. TIA acts as the focal point and facilitator for making such information
5 available.

6 Messages shall not be encrypted if authentication is not performed (AUTH field equal to '00'
7 in the *Access Parameters Message*). See "Interface Specification for Common Cryptographic
8 Algorithms" for details of the initialization and use of the encryption procedure.

9 Signaling message encryption is controlled for each call individually. The initial encryption
10 mode for the call is established by the value of the ENCRYPT_MODE field in the *Channel*
11 *Assignment Message*. If ENCRYPT_MODE is set to '00', message encryption is off. To turn
12 encryption on after channel assignment, the base station sends one of the following
13 Forward Traffic channel messages to the mobile station:

- 14 • *Handoff Direction Message* with the ENCRYPT_MODE field set to '01'
- 15 • *Analog Handoff Direction Message* with the MEM field set to '1'
- 16 • *Message Encryption Mode Order* with the ENCRYPT_MODE field set to '01'

17 To turn signaling message encryption off, the base station sends one of the following
18 Forward Traffic Channel messages to the mobile station

- 19 • *Handoff Direction Message* with the ENCRYPT_MODE field set to '00'.
- 20 • *Analog Handoff Direction Message* with the MEM field set to '0'.
- 21 • *Message Encryption Mode Order* with the ENCRYPT_MODE field set to '00'.

22 Every Reverse Traffic Channel message contains an ENCRYPTION field which identifies the
23 message encryption mode active at the time the message was created (see 6.7.2.3.1.2).

24 6.3.12.3 Voice Privacy

25 Voice privacy is provided in the CDMA system by means of the private long code mask used
26 for PN spreading (see 6.1.3.1.8).

27 The generation and application of the private long code mask is specified in Appendix A.

28 Voice privacy is provided on the Traffic Channels only. All calls are initiated using the
29 public long code mask for PN spreading (see 6.1.3.1.8). The mobile station user may
30 request voice privacy during call setup using the *Origination Message* or *Page Response*
31 *Message*, and during Traffic Channel operation using the *Long Code Transition Request*
32 *Order*.

33 The transition to private long code mask shall not be performed if authentication is not
34 performed (AUTH field set to '00' in the *Access Parameters Message* or mobile station
35 unable to perform authentication).

36 To initiate a transition to the private or public long code mask, either the base station or
37 the mobile station sends a *Long Code Transition Request Order* on the Traffic Channel. The
38 mobile station actions in response to receipt of this order are specified in 6.6.4, and the
39 base station actions in response to receipt of this order are specified in 7.6.4.

1 The base station can also cause a transition to the private or public long code mask by
2 sending the *Handoff Direction Message* with the PRIVATE_LCM bit set appropriately.

3 6.3.13 Lock and Maintenance Required Orders

4 The mobile station shall have memory to store the lock reason code (LCKRSN_{S-p}) received
5 in the *Lock Until Power-Cycled Order*. The data retention time under power-off conditions
6 shall be at least 48 hours.

7 The mobile station shall have memory to store the maintenance reason code (MAINTRSN_{S-p})
8 received in the *Maintenance Required Order*. The data retention time under power-off
9 conditions shall be at least 48 hours.

10 There are no requirements on the use of the lock and maintenance reason codes, and
11 interpretation and use are implementation dependent.

12 6.3.14 Mobile Station Revision Identification

13 The mobile station shall provide memory to store the following parameters sent in the
14 *Status Message (Terminal Information information record)*:

- 15 • Protocol revision number (MOB_P_REV_p)
- 16 • Manufacturer's model number (MOB_MODEL_p)
- 17 • Firmware revision number (MOB_FIRM_REV_p)

18 6.4 Supervision

19 This section details the supervision mechanisms in CDMA. The time and numerical
20 constant values (e.g., T_{30m} and N_{2m}) are given in Appendix D.

21 6.4.1 Pilot Channel

22 The mobile station shall monitor the Pilot Channel at all times except when not receiving in
23 the slotted mode. The mobile station shall measure the strength of the Pilot Channel as
24 specified in 6.6.6.2.2.

25 6.4.2 Sync Channel

26 The mobile station shall check the CRC of all received Sync Channel messages (see
27 7.7.1.2.2). The mobile station shall consider any message with a CRC that checks to be
28 valid. The mobile station shall ignore any message which is not valid.

29 6.4.3 Paging Channel

30 The mobile station shall check the CRC of all received Paging Channel messages (see
31 7.7.2.2.2). The mobile station shall consider any message with a CRC that checks to be
32 valid. The mobile station shall ignore any message which is not valid.

33 If the mobile station is operating in the non-slotted mode in the *Mobile Station Idle State*, it
34 shall monitor the Paging Channel at all times. The mobile station shall reset a timer for
35 T_{30m} seconds whenever a valid message is received on the Paging Channel, whether

1 addressed to the mobile station or not. If the timer expires, the mobile station shall declare
2 a loss of the Paging Channel.

3 If the mobile station is operating in the slotted mode in the *Mobile Station Idle State*, the
4 mobile station shall set a timer for T_{30m} seconds at the start of each of its assigned slots. If
5 the timer expires before the mobile station receives a valid message, whether addressed to
6 the mobile station or not, the mobile station shall declare a loss of the Paging Channel.

7 When in the *System Access State*, the mobile station shall monitor the Paging Channel at
8 all times. The mobile station shall reset a timer for T_{40m} seconds whenever a valid
9 message is received on the Paging Channel, whether addressed to the mobile station or not.
10 If the timer expires, the mobile station shall declare a loss of the Paging Channel.

11 6.4.4 Forward Traffic Channel

12 The mobile station shall check the CRC of all received Forward Traffic messages (see
13 7.7.3.2.2). The mobile station shall consider any message with a CRC that checks to be
14 valid. The mobile station shall ignore any message which is not valid.

15 When in the *Mobile Station Control on the Traffic Channel State*, the mobile station shall
16 monitor the Forward Traffic Channel at all times. If the mobile station receives N_{2m}
17 consecutive bad frames on the Forward Traffic Channel (see 6.2.2.2), it shall disable its
18 transmitter. Thereafter, if the mobile station receives N_{3m} consecutive good frames, the
19 mobile station should re-enable its transmitter.

20 The mobile station shall establish a Forward Traffic Channel fade timer. The timer shall be
21 enabled when the mobile station first enables its transmitter when in the *Traffic Channel*
22 *Initialization Substate* of the *Mobile Station Control on the Traffic Channel State*. The fade
23 timer shall be reset for T_{5m} seconds whenever N_{3m} consecutive good frames are received on
24 the Forward Traffic Channel. If the timer expires, the mobile station shall disable its
25 transmitter and declare a loss of the Forward Traffic Channel. The mobile station also
26 resets this timer when it re-enables its transmitter when performing a CDMA to CDMA hard
27 handoff (see 6.6.6.2.8).

28 6.4.5 Accumulated Statistics

29 6.4.5.1 Accumulated Access Channel Statistics

30 The mobile station shall maintain the counters shown in Table 6.4.5.1-1. Each counter
31 shall be 16 bits long. The mobile station shall initialize each counter described herein to
32 zero upon power-on; the mobile station shall not re-initialize any counter described herein
33 at any other time except upon command from the base station. Each counter shall be
34 maintained modulo 2^{16} .

35 The mobile station shall increment the ACC_1 counter for each Access Channel request
36 message it generates. The mobile station shall increment the ACC_2 counter for each
37 Access Channel response messages it generates. The mobile station shall increment the
38 ACC_1 counter during the i minus one transmission of an access probe in the access
39 attempt, for i equals three to seven. The mobile station shall increment ACC_8 if the access

- 1 attempt is unsuccessful due to the transmission of MAX_REQ_SEQ or MAX_RSP_SEQ
 2 probe sequences.

3 **Table 6.4.5.1-1. Accumulated Access Channel Statistics**

Counter Identifier	Length (bits)	Description
ACC_1	16	Number of Access Channel request messages generated by layer 3
ACC_2	16	Number of Access Channel response messages generated by layer 3
ACC_3	16	Number of times that an access probe was transmitted at least twice
ACC_4	16	Number of times that an access probe was transmitted at least three times
ACC_5	16	Number of times that an access probe was transmitted at least four times
ACC_6	16	Number of times that an access probe was transmitted at least five times
ACC_7	16	Number of times that an access probe was transmitted at least six times
ACC_8	16	Number of unsuccessful access attempts

4

5 **6.4.5.2 Accumulated Reverse Traffic Channel Statistics**

6 The mobile station shall maintain the counters shown in Table 6.4.5.2-1 when supporting
 7 Multiplex Option 1. Each used counter shall be 24 bits long. The mobile station shall
 8 initialize each used counter described herein to zero upon power-on; the mobile station
 9 shall not re-initialize any counter described herein at any other time except upon command
 10 from the base station. Each used counter shall be maintained modulo 2^{24} .

11 Each time a Multiplex Option 1 Reverse Traffic Channel frame is transmitted, the mobile
 12 station shall increment the counter corresponding to the type of frame.

Table 6.4.5.2-1. Accumulated Reverse Traffic Channel Statistics

Counter Identifier	Length (bits)	Type of Frame
MUX1_REV_1	24	9600 bps frame, primary traffic only
MUX1_REV_2	24	9600 bps frame, dtm-and-burst with Rate 1/2 primary and signaling traffic
MUX1_REV_3	24	9600 bps frame, dtm-and-burst with Rate 1/4 primary and signaling traffic
MUX1_REV_4	24	9600 bps frame, dtm-and-burst with Rate 1/8 primary and signaling traffic
MUX1_REV_5	24	9600 bps frame, blank-and-burst with signaling traffic only
MUX1_REV_6	24	4800 bps frame, primary traffic only
MUX1_REV_7	24	2400 bps frame, primary traffic only
MUX1_REV_8	24	1200 bps frame, primary traffic or null Traffic Channel data only
MUX1_REV_9	0	Reserved
MUX1_REV_10	0	Reserved
MUX1_REV_11	24	9600 bps frame, dtm-and-burst with Rate 1/2 primary and secondary traffic
MUX1_REV_12	24	9600 bps frame, dtm-and-burst with Rate 1/4 primary and secondary traffic
MUX1_REV_13	24	9600 bps frame, dtm-and-burst with Rate 1/8 primary and secondary traffic
MUX1_REV_14	24	9600 bps frame, blank-and-burst with secondary traffic only

6.4.5.3 Accumulated Paging Channel Statistics

The mobile station shall maintain the counters shown in Table 6.4.5.3-1. The counters shall have the length as specified in Table 6.4.5.3-1. The mobile station shall initialize each counter described herein to zero upon power-on; the mobile station shall not re-initialize any counter described herein at any other time except upon command from the base station. Each counter shall be maintained modulo 2^{Length} , where Length is specified in Table 6.4.5.3-1.

The mobile station shall increment the counter PAG_1 for each Paging Channel message CRC that it tests. The mobile station shall increment the counter PAG_2 for each invalid Paging Channel message. The mobile station shall increment the counter PAG_3 for each record or message that it receives addressed to the mobile station. The PAG_3 counter

1 shall not be incremented for messages detected as duplicates or for acknowledgements.¹⁰
 2 The mobile station shall increment the counter PAG_4 for each Paging Channel half frame
 3 (see 7.7.2.1.2) that it receives. The mobile station shall increment the counter PAG_5 for
 4 each Paging Channel half frame that contains any part of a valid message. The mobile
 5 station shall increment the counter PAG_6 each time that it declares a loss of the Paging
 6 Channel (see 6.4.3). The mobile station shall increment the counter PAG_7 for each idle
 7 handoff it performs.

8
 9 **Table 6.4.5.3-1. Accumulated Paging Channel Statistics**

Counter Identifier	Length (bits)	Description
PAG_1	24	Number of Paging Channel messages the mobile station attempted to receive
PAG_2	24	Number of Paging Channel messages the mobile station received that CRC does not check
PAG_3	16	Number of Paging Channel messages or records the mobile station received that were addressed to it
PAG_4	24	Number of Paging Channel half frames received by the mobile station
PAG_5	24	Number of Paging Channel half frames that contain any part of a message with a CRC that checks
PAG_6	16	Number of times that the mobile station declared a loss of the Paging Channel
PAG_7	16	Number of mobile station idle handoffs

10

11 **6.4.5.4 Accumulated Forward Traffic Channel Statistics**

12 The mobile station shall maintain the counters shown in Table 6.4.5.4-1 when supporting
 13 Multiplex Option 1. Each counter shall be 24 bits long. The mobile station shall initialize
 14 each counter described herein to zero upon power-on; the mobile station shall not re-
 15 initialize any counter described herein at any other time except upon command from the
 16 base station. Each counter shall be maintained modulo 2^{24} .

17 Each time a mobile station categorizes a received Multiplex Option 1 Forward Traffic
 18 Channel frame (see 6.2.2.2), the mobile station shall increment the counter corresponding
 19 to the type of frame. The accumulation shall start when the mobile station enables its
 20 transmitter while in the *Traffic Channel Initialization Substate* of the *Mobile Station Control*

¹⁰PAG_3 counts those messages processed by layer 3.

1 on the Traffic Channel State (see 6.6.4.2). The accumulation shall stop when the mobile
 2 station exits the Mobile Station Control on the Traffic Channel State.

3
 4

Table 6.4.5.4-1. Accumulated Forward Traffic Channel Statistics

Counter Identifier	Length (bits)	Type of Frame
MUX1_FOR_1	24	9600 bps frame, primary traffic only
MUX1_FOR_2	24	9600 bps frame, dim-and-burst with Rate 1/2 primary and signaling traffic
MUX1_FOR_3	24	9600 bps frame, dim-and-burst with Rate 1/4 primary and signaling traffic
MUX1_FOR_4	24	9600 bps frame, dim-and-burst with Rate 1/8 primary and signaling traffic
MUX1_FOR_5	24	9600 bps frame, blank-and-burst with signaling traffic only
MUX1_FOR_6	24	4800 bps frame, primary traffic only
MUX1_FOR_7	24	2400 bps frame, primary traffic only
MUX1_FOR_8	24	1200 bps frame, primary traffic or null Traffic Channel data only
MUX1_FOR_9	24	9600 bps frame with bit errors
MUX1_FOR_10	24	Frame quality insufficient to decide upon rate
MUX1_FOR_11	24	9600 bps frame, dim-and-burst with Rate 1/2 primary and secondary traffic
MUX1_FOR_12	24	9600 bps frame, dim-and-burst with Rate 1/4 primary and secondary traffic
MUX1_FOR_13	24	9600 bps frame, dim-and-burst with Rate 1/8 primary and secondary traffic
MUX1_FOR_14	24	9600 bps frame, blank-and-burst with secondary traffic only

1 **6.4.5.5 Accumulated Layer Two Statistics**

2 The mobile station shall maintain the counters shown in Table 6.4.5.5-1. Each counter
3 shall be 16 bits long. The mobile station shall initialize each counter described herein to
4 zero upon power-on; the mobile station shall not re-initialize any counter described herein
5 at any other time except upon command from the base station. Each counter shall be
6 maintained modulo 2^{16} .

7 When the mobile station transmits a Reverse Traffic Channel message requiring an
8 acknowledgement for the i th time, for i equals one to three it shall increment the counter
9 LAYER2_RTC i .

10 The mobile station shall increment the counter LAYER2_RTC4 each time it aborts using the
11 Traffic Channel because the timeout expired after the N_{1m} transmission of a message
12 requiring an acknowledgement.

13 The mobile station shall increment the counter LAYER2_RTC5 for each transmission of a
14 message not requiring an acknowledgement on the Reverse Traffic Channel. This count
15 shall include all transmissions, including those that were repeated multiple times or those
16 carrying an identical layer 3 content.

17

18

Table 6.4.5.5-1. Accumulated Layer 2 Statistics

Counter Identifier	Length (bits)	Description
LAYER2_RTC1	16	Number of messages requiring acknowledgement that were transmitted at least once on the Reverse Traffic Channel
LAYER2_RTC2	16	Number of messages requiring acknowledgement that were transmitted at least twice on the Reverse Traffic Channel
LAYER2_RTC3	16	Number of messages requiring acknowledgement that were transmitted at least three times on the Reverse Traffic Channel
LAYER2_RTC4	16	Number of times that the mobile station aborted a call as a result of the timeout expiring after the N_{1m} transmission of a message requiring acknowledgement
LAYER2_RTC5	16	Number of times a message not requiring an acknowledgement was sent on the Reverse Traffic Channel

1 **6.4.5.6 Other Monitored Quantities and Statistics**

2 The mobile station shall store the value described in Table 6.4.5.6-1.

3
4 **Table 6.4.5.6-1. Other Monitored Quantities and Statistics**

Quantity Identifier	Length (bits)	Description
OTHER_SYS_TIME	36	The SYS_TIME field from the most recently received <i>Sync Channel Message</i>

5
6 **6.5 Malfunction Detection**

7 To ensure that a mobile station transmits a spread spectrum signal which does not
8 adversely affect system capacity, the mobile station shall respond to the *Lock Until Power-*
9 *Cycled Order* and *Maintenance Required Order* from the base station as specified in 6.6.2.4,
10 6.6.3.2 through 6.6.3.7, and 6.6.4.3 through 6.6.4.5. It is the responsibility of the base
11 station to detect a mobile station transmission malfunction and to send the appropriate
12 message.

13 **6.5.1 Malfunction Timer**

14 The mobile station shall have a malfunction timer which meets the requirements of 2.5.1.

1 6.6 Call Processing

2 This section describes mobile station call processing. It contains frequent references to the
3 messages that flow between the mobile station and base station. While reading this
4 section, it may be helpful to refer to the message formats (see 6.7 and 7.7), and to the
5 message flow examples (see Appendix B).

6 The mobile station may ignore fields at the end of messages which do not exist in the
7 protocol revision supported by the mobile station.

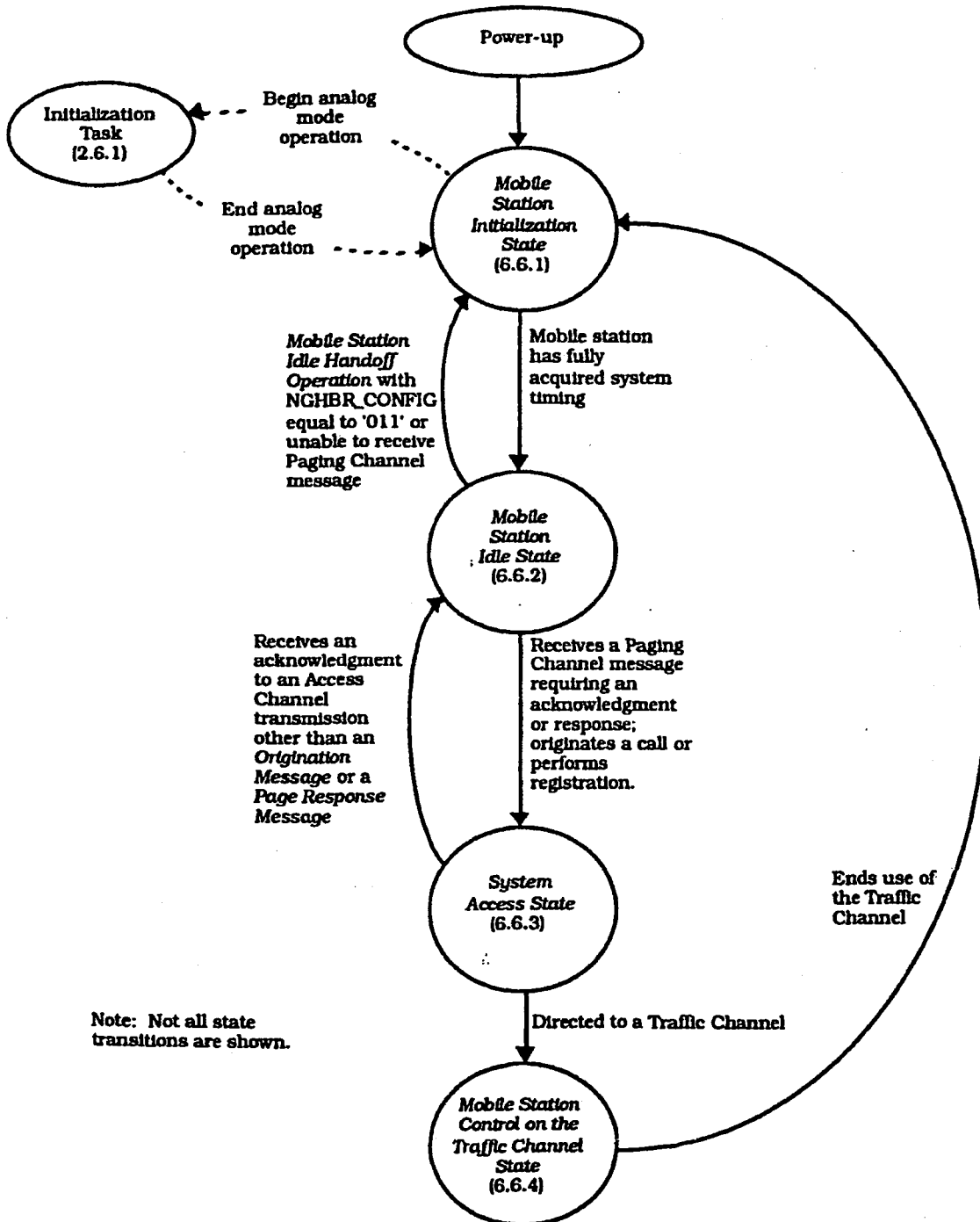
8 The values for the time and numerical constants used in this section (e.g., T_{20m} , N_{4m}) are
9 specified in Appendix D.

10 As illustrated in Figure 6.6-1, mobile station call processing consists of the following states:

- 11 • *Mobile Station Initialization State* - In this state, the mobile station selects and
12 acquires a system.
- 13 • *Mobile Station Idle State* - In this state, the mobile station monitors messages on the
14 Paging Channel.
- 15 • *System Access State* - In this state, the mobile station sends messages to the base
16 station on the Access Channel.
- 17 • *Mobile Station Control on the Traffic Channel State* - In this state, the mobile station
18 communicates with the base station using the Forward and Reverse Traffic Channels.

19 After power is applied to the mobile station, it shall enter the *System Determination*
20 *Substate of the Mobile Station Initialization State* with a power-up indication.

21



Note: Not all state transitions are shown.

Figure 6.6-1. Mobile Station Call Processing States

2

3

1 **6.6.1 Mobile Station Initialization State**

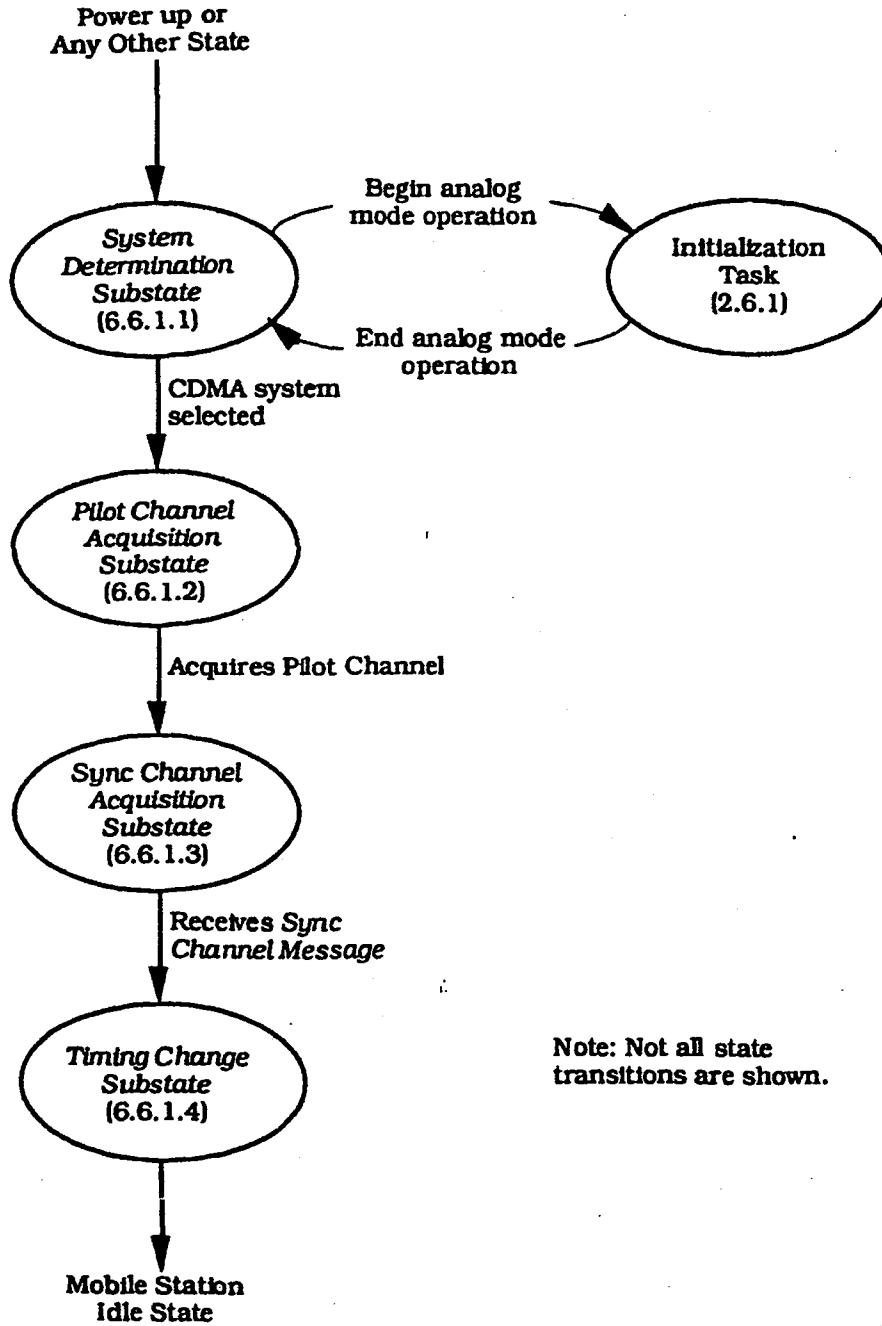
2 In this state, the mobile station first selects a system to use. If the selected system is a
3 CDMA system, the mobile station proceeds to acquire and then synchronize to the CDMA
4 system. If the selected system is an analog system, the mobile station begins analog mode
5 operation (see 2.6.1).

6 As illustrated in Figure 6.6.1-1, the *Mobile Station Initialization State* consists of the
7 following substates:

- 8 • *System Determination Substate* - In this substate, the mobile station selects which
9 system to use.
- 10 • *Pilot Channel Acquisition Substate* - In this substate, the mobile station acquires the
11 Pilot Channel of a CDMA system.
- 12 • *Sync Channel Acquisition Substate* - In this substate, the mobile station obtains
13 system configuration and timing information for a CDMA system.
- 14 • *Timing Change Substate* - In this substate, the mobile station synchronizes its timing
15 to that of a CDMA system.

16 While in the *Mobile Station Initialization State*, the mobile station shall update all active
17 registration timers as specified in 6.6.5.5.1.2.

1
2
3



Note: Not all state transitions are shown.

4
5

Figure 6.6.1-1. Mobile Station Initialization State

1 **6.6.1.1 System Determination Substate**

2 In this substate, the mobile station selects the system to use. The precise process for
3 system selection is left to the mobile station manufacturer. It is typically influenced by a
4 set of expressed user preferences, such as the following:

- 5 • System A (or B) only
- 6 • System A (or B) preferred
- 7 • CDMA (or analog) system only
- 8 • CDMA (or analog) system preferred

9 Upon entering the *System Determination Substate*, the mobile station shall initialize
10 registration parameters as specified in 6.6.5.5.1.1. If the mobile station enters the *System*
11 *Determination Substate* with a power-up indication, the mobile station shall set the First-
12 Idle ID status to enabled (see 2.6.3.11), and the RAND_s variable to 0 (see 2.3.12.1.2).

13 In the *System Determination Substate*, the mobile station shall perform the following:

- 14 • The mobile station shall determine which system to use.
- 15 • If the mobile station is to use System A, it shall set SERVSYS_s to SYS_A. If the
16 mobile station is to use System B, it shall set SERVSYS_s to SYS_B.
- 17 • If the mobile station is to use an analog system, it shall enter the Initialization Task
18 (see 2.6.1).
- 19 • If the mobile station is to use a CDMA system, it shall set CDMACH_s either to the
20 Primary or Secondary CDMA Channel number (see 7.1.1.1) for the selected serving
21 system (SERVSYS_s). The mobile station shall enter the *Pilot Channel Acquisition*
22 *Substate*.
- 23 • If the mobile station fails to acquire a CDMA system on the first CDMA Channel it
24 tries, the mobile station should attempt to acquire on the alternate CDMA Channel
25 (Primary or Secondary) before performing the system selection process again.

26 **6.6.1.2 Pilot Channel Acquisition Substate**

27 In this substate, the mobile station acquires the Pilot Channel of the selected CDMA
28 system.

29 Upon entering the *Pilot Channel Acquisition Substate*, the mobile station shall tune to the
30 CDMA Channel number equal to CDMACH_s, shall set its code channel for the Pilot Channel
31 (see 7.1.3.1.8), and shall search for the Pilot Channel. If the mobile station acquires the
32 Pilot Channel within T_{20m} seconds, the mobile station shall enter the *Sync Channel*
33 *Acquisition Substate*.

34 If the mobile station does not acquire the Pilot Channel within T_{20m} seconds, the mobile
35 station shall enter the *System Determination Substate*.

6.6.1.3 Sync Channel Acquisition Substate

In this substate, the mobile station receives and processes the *Sync Channel Message* to obtain system configuration and timing information.

Upon entering the *Sync Channel Acquisition Substate*, the mobile station shall set its code channel for the Sync Channel (see 7.1.3.1.8).

If the mobile station does not receive a valid *Sync Channel Message* (see 6.4.2) within T_{21m} seconds, the mobile station shall enter the *System Determination Substate*.

If the mobile station receives a valid *Sync Channel Message* within T_{21m} seconds but the protocol revision level supported by mobile station ($MOB_P_REV_p$) is less than the minimum protocol revision level supported by the base station ($MIN_P_REV_r$), the mobile station shall enter the *System Determination Substate*.

If the mobile station receives a valid *Sync Channel Message* within T_{21m} seconds and the protocol revision level supported by the mobile station ($MOB_P_REV_p$) is greater than or equal to the minimum protocol revision level supported by the base station ($MIN_P_REV_r$), the mobile station shall store the following information from the message:

- Protocol revision level ($P_REV_s = P_REV_r$)
- Minimum protocol revision level ($MIN_P_REV_s = MIN_P_REV_r$)
- System identification ($SID_s = SID_r$)
- Network identification ($NID_s = NID_r$)
- Pilot PN sequence offset ($PILOT_PN_s = PILOT_PN_r$)
- Long code state ($LC_STATE_s = LC_STATE_r$)
- System Time ($SYS_TIME_s = SYS_TIME_r$)
- Paging Channel data rate ($PRAT_s = PRAT_r$)

The mobile station may store the following information from the message:

- Number of leap seconds that have occurred since the start of System Time ($LP_SEC_s = LP_SEC_r$)
- Offset of local time from System Time ($LTM_OFF_s = LTM_OFF_r$)
- Daylight savings time indicator ($DAYLT_s = DAYLT_r$)

The mobile station shall enter the *Timing Change Substate*.

6.6.1.4 Timing Change Substate

Figure 6.6.1.4-1 illustrates the mobile station timing changes that occur in this substate. The mobile station synchronizes its long code timing and system timing to those of the CDMA system, using the $PILOT_PN_s$, LC_STATE_s , and SYS_TIME_s values obtained from the received *Sync Channel Message*. SYS_TIME_s is equal to the System Time (see 1.2) corresponding to 320 ms past the end of the last 80 ms superframe (see Figure 7.1.3.2.1-1) of the received *Sync Channel Message* minus the pilot PN sequence offset. LC_STATE_s is equal to the system long code state (see 6.1.3.1.8) corresponding to SYS_TIME_s .

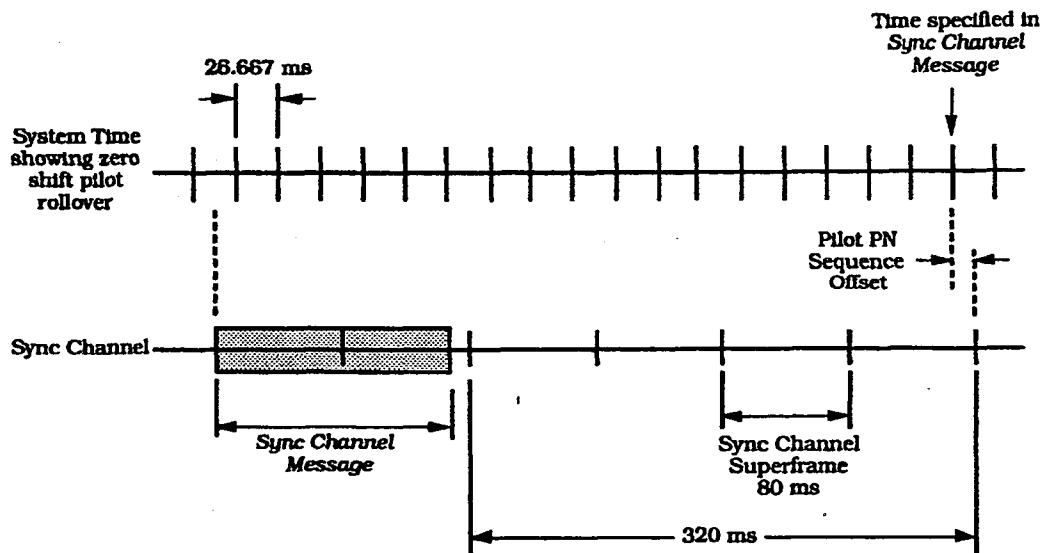
1 In the *Timing Change Substate*, the mobile station shall synchronize its long code timing to
 2 the CDMA system long code timing derived from LC_STATE_S , and synchronize its system
 3 timing to the CDMA system timing derived from SYS_TIME_S .

4 The mobile station shall:

- 5 • Set $PAGECH_S$ to the Primary Paging Channel (see 7.1.3.4);
- 6 • Set $PAGE_CHAN_S$ to '1';
- 7 • Set the stored message sequence numbers $CONFIG_MSG_SEQ_S$,
 8 $SYS_PAR_MSG_SEQ_S$, $ACC_MSG_SEQ_S$, $NGHBR_LST_MSG_SEQ_S$, and
 9 $CHAN_LST_MSG_SEQ_S$ variables to NULL (see 6.6.2.2); and
- 10 • Perform registration initialization as specified in 6.6.5.5.1.3.

11 The mobile station shall enter the Mobile Station Idle State.

12



13

14 **Figure 6.6.1.4-1. Mobile Station Internal Timing**

15

16 6.6.2 Mobile Station Idle State

17 In this state, the mobile station monitors the Paging Channel. The mobile station can
 18 receive messages, receive an incoming call (mobile station terminated call), initiate a call
 19 (mobile station originated call), initiate a registration, or initiate a message transmission.

20 Upon entering the *Mobile Station Idle State*, the mobile station shall set its code channel to
 21 $PAGECH_S$, set the Paging Channel data rate as determined by $PRAT_S$ and shall perform
 22 Paging Channel supervision as specified in 6.4.3.

23 At any time, the mobile station may exit the *Mobile Station Idle State* and enter the *System*
 24 *Determination Substate* of the *Mobile Station Initialization State*.

1 While in the *Mobile Station Idle State*, the mobile station shall perform the following
2 procedures:

- 3 • The mobile station shall perform Paging Channel monitoring procedures as specified
4 in 6.6.2.1.1.
- 5 • The mobile station shall perform message acknowledgement procedures as specified
6 in 6.6.2.1.2.
- 7 • The mobile station shall perform registration procedures as specified in 6.6.2.1.3.
- 8 • The mobile station shall perform idle handoff procedures as specified in 6.6.2.1.4.
- 9 • The mobile station shall perform the *Response to Overhead Information Operation* as
10 specified in 6.6.2.2 whenever the mobile station receives a system overhead message
11 (*System Parameters Message, CDMA Channel List Message, Neighbor List Message, or*
12 *Access Parameters Message*).
- 13 • The mobile station shall perform the *Mobile Station Page Match Operation* as specified
14 in 6.6.2.3 whenever it receives a *Page Message* or *Slotted Page Message*.
- 15 • The mobile station shall perform the *Mobile Station Order and Message Processing*
16 *Operation* as specified in 6.6.2.4 whenever a message or order directed to the mobile
17 station is received other than a *Page Message* or *Slotted Page Message*.
- 18 • The mobile station shall perform the *Mobile Station Origination Operation* as specified
19 in 6.6.2.5 if directed by the user to initiate a call.
- 20 • If the mobile station supports message transmission, it shall perform the *Mobile*
21 *Station Message Transmission Operation* as specified in 6.6.2.6 if directed by the user
22 to transmit a message.
- 23 • The mobile station shall perform the *Mobile Station Power-Down Operation* as
24 specified in 6.6.2.7 if directed by the user to power down.

25 6.6.2.1 Idle Procedures

26 6.6.2.1.1 Paging Channel Monitoring Procedures

27 6.6.2.1.1.1 General Overview

28 The Paging Channel is divided into 80 ms slots called Paging Channel slots. Paging and
29 control messages for a mobile station operating in the non-slotted mode can be received in
30 any of the Paging Channel slots. Therefore, the non-slotted mode of operation requires the
31 mobile station to monitor all slots.

32 The Paging Channel protocol also provides for scheduling the transmission of messages for
33 a specific mobile station in certain assigned slots. Support of this feature is optional and
34 may be enabled by each mobile station. A mobile station that monitors the Paging Channel
35 only during certain assigned slots is referred to as operating in the slotted mode. During
36 the slots in which the Paging Channel is not being monitored, the mobile station can stop
37 or reduce its processing for power conservation. A mobile station may not operate in the
38 slotted mode in any state except the *Mobile Station Idle State*.

1 A mobile station operating in the slotted mode generally monitors the Paging Channel for
 2 one or two slots per slot cycle. The mobile station can specify its preferred slot cycle using
 3 the SLOT_CYCLE_INDEX field in the *Registration Message*, *Origination Message*, or *Page*
 4 *Response Message*. The mobile station can also specify its preferred slot cycle using the
 5 SLOT_CYCLE_INDEX field of the *Terminal Information* record of the *Status Message* when in
 6 the *Mobile Station Control on the Traffic Channel State*. The length of the slot cycle, T, in
 7 units of 1.28 seconds,¹¹ is given by

$$T = 2^i,$$

8
 9 where i is the selected slot cycle index (see 6.6.2.1.1.3).

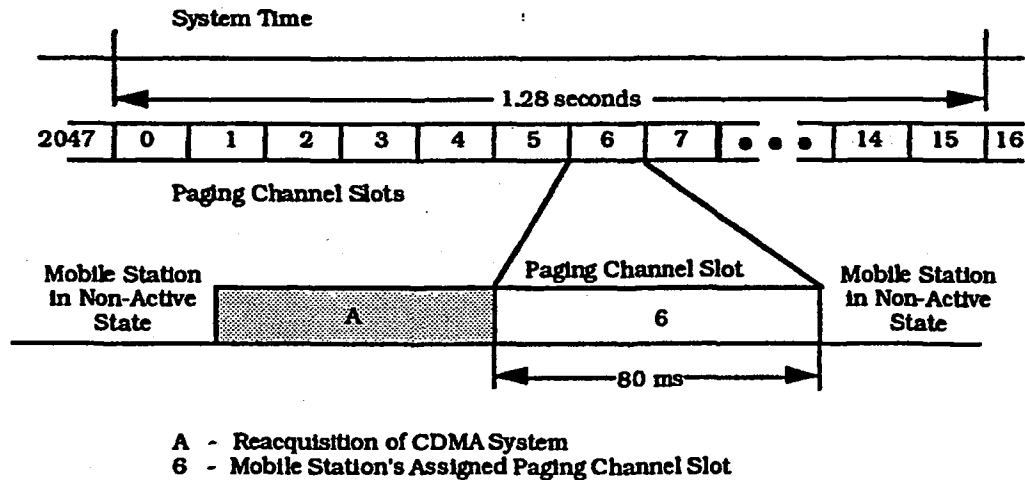
10 There are $16 \times T$ slots in a slot cycle.

11 SLOT_NUM is the Paging Channel slot number, modulo the maximum length slot cycle
 12 (2048 slots). That is, the value of SLOT_NUM is

$$\text{SLOT_NUM} = [t/4] \bmod 2048,$$

13
 14 where t is the System Time in frames. For each mobile station, the starting times of its slot
 15 cycles are offset from the slot in which SLOT_NUM equals zero by a fixed, randomly selected
 16 number of slots as specified in 6.6.2.1.1.3.

17 Figure 6.6.2.1.1.1-1 shows an example for a slot cycle length of 1.28 seconds, in which the
 18 computed value of PGSLOT (see 6.6.2.1.1.3) is equal to 6, so that one of the mobile station's
 19 slot cycles begins when SLOT_NUM equals 6. The mobile station begins monitoring the
 20 Paging Channel at the start of the slot in which SLOT_NUM equals 6. The next slot in
 21 which the mobile station must begin monitoring the Paging Channel is 16 slots later, i.e.,
 22 the slot in which SLOT_NUM is 22.



24
 25 **Figure 6.6.2.1.1.1-1. Mobile Station Idle Slotted Mode Structure Example (see text)**

26
¹¹The minimum length slot cycle consists of 16 slots of 80 ms each, hence 1.28 seconds.

1 *Slotted Page Messages* contain a field called MORE_PAGES which, when set to '0' during a
 2 mobile station's assigned slot, indicates that the remainder of the slot will contain no more
 3 messages addressed to that mobile station. This allows a mobile station operating in the
 4 slotted mode to stop monitoring the Paging Channel as soon as possible.

5 If no *Slotted Page Message* containing the MORE_PAGES field equal to '0' is received in the
 6 assigned slot, the mobile station continues to monitor the Paging Channel for one
 7 additional slot. This allows the base station to carry over a message begun in the assigned
 8 slot into the following slot if necessary.

9 6.6.2.1.1.2 Non-Slotted Mode Requirements

10 A mobile station operating in the non-slotted mode shall monitor the Paging Channel at all
 11 times. If the mobile station declares loss of the Paging Channel (see 6.4.3), the mobile
 12 station shall enter the *System Determination Substate of the Mobile Station Initialization*
 13 *State*.

14 When a mobile station monitors the Paging Channel in any state other than the *Mobile*
 15 *Station Idle State*, it shall operate in the non-slotted mode.

16 6.6.2.1.1.3 Slotted Mode Requirements

17 The mobile station shall not operate in the slotted mode unless bit 5 of the station class
 18 mark is set to '0' (see 2.3.3).

19 During operation in the slotted mode, the mobile station shall ensure that its stored
 20 configuration parameter values are current (see 6.6.2.2). The mobile station shall not
 21 operate in the slotted mode if its configuration parameters are not current.

22 If the mobile station declares a loss of the Paging Channel (see 6.4.3), the mobile station
 23 shall enter the *System Determination Substate of the Mobile Station Initialization State*.

24 6.6.2.1.1.3.1 Monitoring Assigned Slots

25 For each of its assigned slots, the mobile station shall begin monitoring the Paging Channel
 26 in time to receive the first bit of the assigned slot. The mobile station shall continue to
 27 monitor the Paging Channel until one of the following conditions is satisfied:

- 28 • The mobile station receives a *Slotted Page Message* with the MORE_PAGES field set
 29 to '0'; or
- 30 • The mobile station monitors the assigned slot and the slot following the assigned slot,
 31 and the mobile station receives at least one valid message (see 6.4.3).

32 To determine its assigned slots, the mobile station shall use the hash function specified in
 33 6.6.7.1 to select a number, PGSLOT, in the range 0 to 2047 (spanning the maximum slot
 34 cycle length, which is 163.84 seconds). The mobile station's assigned slots shall be those
 35 slots in which

$$36 \quad \lfloor t/4 \rfloor - \text{PGSLOT} \bmod (16 \times T) = 0,$$

37 where t is the System Time in frames and T is the slot cycle length in units of 1.28 seconds
 38 given by

$$T = 2^i,$$

where i is the slot cycle index.

6.6.2.1.1.3.2 Determination of the Slot Cycle Index

If the SID and NID of the current base station (SID_B and NID_B , as stored from the *System Parameters Message*) do not match any entry of $SID_NID_LIST_B$, the mobile station shall use a slot cycle index no greater than the smaller of $MAX_SLOT_CYCLE_INDEX_B$ and 1; otherwise, the mobile station shall use a slot cycle index no greater than $SLOT_CYCLE_INDEX_B$ (see 6.6.2.2.1.6).

If the mobile station is directed by the user to modify the preferred slot cycle index ($SLOT_CYCLE_INDEX_P$), the mobile station shall perform parameter-change registration (see 6.6.5.1.6).

6.6.2.1.2 Acknowledgement Procedures

Acknowledgement procedures facilitate the reliable exchange of messages between the base station and the mobile station. The mobile station uses the fields ACK_TYPE (acknowledgement address type), ACK_SEQ (acknowledgement sequence number), MSG_SEQ (message sequence number), ACK_REQ (acknowledgement required), and $VALID_ACK$ (valid acknowledgement) to support this mechanism. These fields are referred to as layer 2 fields, and the acknowledgement procedures are referred to as layer 2 procedures. All other message fields and the processing thereof are referred to as pertaining to layer 3. (See Appendix C for further discussion of layering.)

Acknowledgements of messages received on the Paging Channel shall be sent on the Access Channel (see 6.6.3).

When sending a message that includes an acknowledgement, the mobile station shall set the $VALID_ACK$ field to '1' and shall set the ACK_TYPE and ACK_SEQ fields equal to the $ADDR_TYPE$ and MSG_SEQ fields, respectively, of the message being acknowledged. For acknowledgement of a *Page Message* or *Slotted Page Message*, the mobile station shall set the ACK_SEQ field equal to the MSG_SEQ field of the record containing the mobile station's MIN, and shall set the ACK_TYPE field to '000'.

When sending a message that does not include an acknowledgement, the mobile station shall set the $VALID_ACK$ field to '0' and shall set the ACK_TYPE and ACK_SEQ fields equal to the $ADDR_TYPE$ and MSG_SEQ fields, respectively, of the last message received that required acknowledgement. If no such message has been received, the mobile station shall set the ACK_TYPE field to '000' and shall set the ACK_SEQ field to '111'.

Unless otherwise specified in the requirements for processing a specific message, the mobile station shall transmit an acknowledgement in response to any message received that is addressed to the mobile station and that has the ACK_REQ field set to '1'. The mobile station shall transmit a *Page Response Message* including an acknowledgement in response to each record of a *Page Message* or *Slotted Page Message* addressed to the mobile station's

1 MIN.¹² If a specific message is required in response to any other message requiring
2 acknowledgement, the acknowledgement shall be included with the response. If no specific
3 message is required to be transmitted in response to a received message requiring
4 acknowledgement, the mobile station shall include the acknowledgement in a *Mobile Station*
5 *Acknowledgement Order* (see 6.7.3).

6 If no message requiring acknowledgement has been received, the mobile station shall not
7 include an acknowledgement in any transmitted message until a message is received that
8 requires acknowledgement. After a message including an acknowledgement has been sent,
9 the mobile station shall not include an acknowledgement in any subsequent transmitted
10 message until another message is received that requires acknowledgement.

11 The mobile station shall detect duplicate received messages by the following rules.

12 The mobile station shall consider two messages (or order records) containing the mobile
13 station's address in the ADDRESS field (all directed messages except *Page Messages* and
14 *Slotted Page Messages*) to be duplicates if all of the following are true:

- 15 • The messages (records) were received on the same Paging Channel; and
- 16 • The messages (records) contain the same values in both the MSG_SEQ and
17 ACK_REQ fields;¹³ and
- 18 • The messages (records) were received within T_{4m} seconds (see Appendix D) of each
19 other (see Figure 6.6.2.1.2-1); and
- 20 • The messages (records) contain identical ADDR_TYPE and ADDRESS fields.

21 The mobile station shall consider two page records (as contained in *Page Messages* and
22 *Slotted Page Messages*) to be duplicates if all of the following are true:

- 23 • The records were received on the same Paging Channel; and
- 24 • The records contain the same values in the MSG_SEQ field; and
- 25 • The records were received in messages received within T_{4m} seconds of each other
26 (see Figure 6.6.2.1.2-1), or in the same message; and
- 27 • Both records are addressed to the same MIN.

28 The mobile station shall discard, without further processing, any message or page record
29 that is a duplicate of one previously received.

30 Paging Channels shall be considered different if any of the following is true:

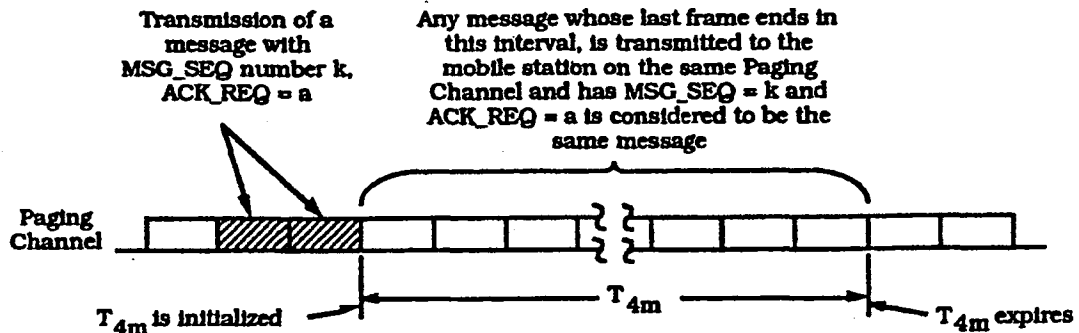
- 31 • The Paging Channels are transmitted by different base stations, or
- 32 • The Paging Channels are transmitted on different code channels (see 7.1.3.1.8), or
- 33 • The Paging Channels are transmitted on different CDMA Channels (see 7.1.1.1).

¹²These messages do not have an ACK_REQ field.

¹³Separate sequence numbers are used for messages requiring acknowledgement and messages not requiring acknowledgement on the Paging Channel.

1 The mobile station shall consider messages to be different if they are not duplicates
 2 according to the rules given above. The mobile station shall process all messages that are
 3 considered to be different.

4



5

6 **Figure 6.6.2.1.2-1. Time Interval for Duplicate Message Detection**

7 **6.6.2.1.3 Registration**

8 While in the *Mobile Station Idle State*, the mobile station shall maintain all active
 9 registration timers (see 6.6.5.4), and shall perform the registration procedures specified in
 10 6.6.5.5.2.1.

11 **6.6.2.1.4 Idle Handoff**

12 **6.6.2.1.4.1 Pilot Search**

13 An idle handoff occurs when a mobile station has moved from the coverage area of one base
 14 station into the coverage area of another base station during the *Mobile Station Idle State*.
 15 The mobile station determines that an idle handoff should occur when it detects a
 16 sufficiently strong Pilot Channel signal other than that of the current base station's Pilot
 17 Channel signal.

18 Pilot Channels are identified by their offsets relative to the zero offset pilot PN sequence (see
 19 7.1.3.2.1). Pilot offsets are grouped into sets describing their status with regard to pilot
 20 searching.

21 The following sets of pilot offsets are defined for a mobile station in the *Mobile Station Idle*
 22 *State*. Each pilot offset is a member of only one set.

- 23 • **Active Set:** The pilot offset of the Forward CDMA Channel whose Paging Channel is
 24 being monitored.
- 25 • **Neighbor Set:** The offsets of the Pilot Channels that are likely candidates for idle
 26 handoff. The members of the Neighbor Set are specified in the *Neighbor List*
 27 *Message*.
- 28 • **Remaining Set:** The set of all possible pilot offsets in the current system (integer
 29 multiples of $PILOT_INC_p$) on the current CDMA frequency assignment, excluding the
 30 pilots in the Neighbor Set and the Active Set.

1 The mobile station shall support a Neighbor Set size of at least N_{gm} pilots (see Appendix D).

2 In the *Mobile Station Idle State*, the mobile station shall continuously search for the
3 strongest Pilot Channel signal on the current CDMA frequency assignment ($CDMACH_B$)
4 whenever it monitors the Paging Channel. Search performance criteria are defined in IS-98
5 "Recommended Minimum Performance Standards for Dual-Mode Wideband Spread
6 Spectrum Cellular Mobile Stations."

7 This search should be governed by the following:

- 8 • **Active Set:** The search window size for the pilot in the Active Set should be the
9 number of PN chips specified in Table 6.6.6.2.1-1 corresponding to $SRCH_WIN_A_B$.
10 The mobile station should center the search window for the pilot of the Active Set
11 around the earliest arriving usable multipath component of the pilot. If the mobile
12 station receives a value greater than or equal to 13 for $SRCH_WIN_A_T$, it may store
13 and use the value 13 in $SRCH_WIN_A_B$.
- 14 • **Neighbor Set:** The search window size for each pilot in the Neighbor Set should be
15 the number of PN chips specified in Table 6.6.6.2.1-1 corresponding to
16 $SRCH_WIN_N_B$. The mobile station should center the search window for each pilot in
17 the Neighbor Set around the pilot's PN sequence offset using timing defined by the
18 mobile station's time reference (see 6.1.5.1).
- 19 • **Remaining Set:** The search window size for each pilot in the Remaining Set should
20 be the number of PN chips specified in Table 6.6.6.2.1-1 corresponding to
21 $SRCH_WIN_R_B$. The mobile station should center the search window for each pilot in
22 the Remaining Set around the pilot's PN sequence offset using timing defined by the
23 mobile station's time reference (see 6.1.5.1). The mobile station should only search
24 for Remaining Set pilots whose pilot PN sequence offset indices are equal to integer
25 multiples of $PILOT_INC_B$.

26 If the mobile station determines that one of the Neighbor Set or Remaining Set Pilot
27 Channel signals is sufficiently stronger than the Pilot Channel of the Active Set, the mobile
28 station should perform an idle handoff as specified in 6.6.2.1.4.2.

29 6.6.2.1.4.2 Idle Handoff Procedures

30 While performing an idle handoff, the mobile station shall operate in the non-slotted mode
31 until the mobile station has received at least one valid message on the new Paging Channel.
32 Following the reception of this message the mobile station may resume slotted mode
33 operation in accordance with 6.6.2.1.1.3. After performing an idle handoff, the mobile
34 station shall discard all unprocessed messages received on the old Paging Channel.

35 If the new base station is listed in the *Neighbor List Message* from the old base station (see
36 6.6.2.2.3), the mobile station shall use the 3-bit $NGHBR_CONFIG$ field to determine the
37 actions required to transition to the new base station. If the new base station is not listed
38 in the *Neighbor List Message*, the mobile station shall perform the handoff operation using
39 the same procedure as for a pilot in the list with the $NGHBR_CONFIG$ field set to '011'.

40 If the $NGHBR_CONFIG$ field is '000', the mobile station shall set $ACC_MSG_SEQ_B$ to NULL
41 (see 6.6.2.2) and shall set $PILOT_PN_B$ to the pilot offset index of the base station

1 transmitting the new Paging Channel. If the mobile station has not stored configuration
 2 parameters for the new Paging Channel, or if the stored information is not current (see
 3 6.6.2.2), the mobile station shall set CONFIG_MSG_SEQ_s, SYS_PAR_MSG_SEQ_s,
 4 NGHBR_LST_MSG_SEQ_s, and CHAN_LST_MSG_SEQ_s to NULL. The mobile station shall
 5 begin monitoring the Paging Channel of the new base station, using the same Code
 6 Channel and CDMA Channel.

7 If the NGHBR_CONFIG field is '001', the mobile station shall set ACC_MSG_SEQ_s to NULL
 8 and shall set PILOT_PN_s to the pilot offset index of the base station transmitting the new
 9 Paging Channel. If the mobile station has not stored configuration parameters for the
 10 Primary Paging Channel of the new base station, or if the stored information is not current
 11 (see 6.6.2.2), the mobile station shall set CONFIG_MSG_SEQ_s, SYS_PAR_MSG_SEQ_s,
 12 NGHBR_LST_MSG_SEQ_s, and CHAN_LST_MSG_SEQ_s to NULL. Set PAGE_CHAN_s to '1'.
 13 The mobile station shall begin monitoring the Primary Paging Channel of the new base
 14 station, using the same CDMA Channel.

15 If the NGHBR_CONFIG field is '010', the mobile station shall set ACC_MSG_SEQ_s to NULL
 16 and shall set PILOT_PN_s to the pilot offset index of the base station transmitting the new
 17 Paging Channel. If the mobile station has not stored configuration parameters for the
 18 Primary Paging Channel of the new base station, or if the stored information is not current
 19 (see 6.6.2.2), the mobile station shall set CONFIG_MSG_SEQ_s, SYS_PAR_MSG_SEQ_s,
 20 NGHBR_LST_MSG_SEQ_s and CHAN_LST_MSG_SEQ_s to NULL. Set PAGE_CHAN_s to '1'.
 21 The mobile station shall tune to the first CDMA Channel given in the *CDMA Channel List*
 22 *Message* for the old base station and begin monitoring the Primary Paging Channel of the
 23 new base station.

24 If the NGHBR_CONFIG field is '011', the mobile station shall enter the *System*
 25 *Determination Substate* of the *Mobile Station Initialization State*.

26 6.6.2.2 Response to Overhead Information Operation

27 The overhead messages on the Paging Channel are:

- 28 • *System Parameters Message*
- 29 • *Access Parameters Message*
- 30 • *Neighbor List Message*
- 31 • *CDMA Channel List Message*

32 The *Response to Overhead Information Operation* is performed whenever the mobile station
 33 receives an overhead message. The mobile station updates internally stored information
 34 from the received message's data fields.

35 Configuration parameters and access parameters are received in the configuration
 36 messages and the *Access Parameters Message*. The configuration messages are:

- 37 • *System Parameters Message*
- 38 • *Neighbor List Message*
- 39 • *CDMA Channel List Message*

1 Associated with the set of configuration messages sent on each Paging Channel is a
2 configuration message sequence number (CONFIG_MSG_SEQ). When the contents of one
3 or more of the configuration messages change, the configuration message sequence number
4 is incremented. For each of the configuration messages received, the mobile station stores
5 the configuration message sequence number contained in the configuration message
6 (SYS_PAR_MSG_SEQ_s, NGHBR_LIST_MSG_SEQ_s, CHAN_LIST_MSG_SEQ_s). The mobile
7 station also stores the most recently received configuration message sequence number
8 (CONFIG_MSG_SEQ_s) contained in any message (see 6.6.2.2.1, 6.6.2.2.3, 6.6.2.2.4 and
9 6.6.2.3). The mobile station examines the stored values of the configuration message
10 sequence numbers to determine whether the configuration parameters stored by the mobile
11 station are current.

12 The configuration message sequence number is also included in the *Page Message* and the
13 *Slotted Page Message*. This allows the mobile station to determine whether the stored
14 configuration parameters are current without waiting for a configuration message.

15 *Access Parameters Messages* are independently sequence-numbered by the ACC_MSG_SEQ
16 field. The mobile station stores the most recently received *Access Parameters Message*
17 sequence number (ACC_MSG_SEQ_s).

18 Paging Channels shall be considered different if they are transmitted by different base
19 stations, if they are transmitted on different code channels, or if they are transmitted on
20 different CDMA Channels. Configuration and access parameters from one Paging Channel
21 shall not be used while monitoring a different Paging Channel. The mobile station shall
22 ignore any overhead message whose PILOT_PN_r field is not equal to the pilot offset index
23 (PILOT_PN_s) of the base station whose Paging Channel is being monitored.

24 The mobile station may store the configuration parameters from Paging Channels it has
25 recently monitored. When a mobile station starts monitoring a Paging Channel that it has
26 recently monitored, the mobile station can determine whether the stored parameters are
27 current by examining the CONFIG_MSG_SEQ_s in a configuration message, a *Slotted Page*
28 *Message*, or a *Page Message*.

29 The mobile station shall define a special value, NULL, to be stored in place of sequence
30 numbers for messages that have not been received or are marked as not current. The
31 special value NULL shall be unequal to any valid message sequence number.

32 The mobile station shall consider the stored configuration parameters to be current only if
33 all the following conditions are true:

- 34 • All three stored configuration message sequence numbers (SYS_PAR_MSG_SEQ_s,
35 NGHBR_LIST_MSG_SEQ_s, CHAN_LIST_MSG_SEQ_s) are equal to CONFIG_MSG-
36 _SEQ_s; and
- 37 • CONFIG_MSG_SEQ_s is not equal to NULL; and
- 38 • No more than T_{31m} seconds (see Appendix D) have elapsed since the mobile station
39 last received a valid message on the Paging Channel for which the parameters were
40 stored.

41 If the stored parameters are current, the mobile station shall process the parameters as
42 described in 6.6.2.2.1, 6.6.2.2.3, and 6.6.2.2.4.

1 **6.6.2.2.1 System Parameters Message**

2 Whenever a *System Parameters Message* is received on the Paging Channel, the
 3 configuration message sequence number, $CONFIG_MSG_SEQ_r$, shall be compared to that
 4 stored in $SYS_PAR_MSG_SEQ_s$. If the comparison results in a match, the mobile station
 5 may ignore the message. If the comparison results in a mismatch, then the mobile station
 6 shall process the remaining fields in the message as described in 6.6.2.2.1.1, 6.6.2.2.1.2,
 7 6.6.2.2.1.3, 6.6.2.2.1.4, 6.6.2.2.1.5, and 6.6.2.2.1.6.

8 **6.6.2.2.1.1 Stored Parameters**

9 The mobile station shall store the following parameters:

- 10 • Configuration message sequence number
 11 $(CONFIG_MSG_SEQ_s = CONFIG_MSG_SEQ_r,$
 12 $SYS_PAR_MSG_SEQ_s = CONFIG_MSG_SEQ_r)$
- 13 • System identification ($SID_s = SID_r$)
- 14 • Network identification ($NID_s = NID_r$)
- 15 • Registration zone ($REG_ZONE_s = REG_ZONE_r$)
- 16 • Number of registration zones to be retained ($TOTAL_ZONES_s = TOTAL_ZONES_r$)
- 17 • Zone timer length ($ZONE_TIMER_s = ZONE_TIMER_r$)
- 18 • Multiple SID storage indicator ($MULT_SIDS_s = MULT_SIDS_r$)
- 19 • Multiple NID storage indicator ($MULT_NIDS_s = MULT_NIDS_r$)
- 20 • Base station identification ($BASE_ID_s = BASE_ID_r$)
- 21 • Base station class ($BASE_CLASS_s = BASE_CLASS_r$)
- 22 • Maximum slot cycle index
 23 $(MAX_SLOT_CYCLE_INDEX_s = MAX_SLOT_CYCLE_INDEX_r)$
- 24 • Home registration indicator ($HOME_REG_s = HOME_REG_r$)
- 25 • SID roamer registration indicator ($FOR_SID_REG_s = FOR_SID_REG_r$)
- 26 • NID roamer registration indicator ($FOR_NID_REG_s = FOR_NID_REG_r$)
- 27 • Power-up registration indicator ($POWER_UP_REG_s = POWER_UP_REG_r$)
- 28 • Power-down registration indicator ($POWER_DOWN_REG_s = POWER_DOWN_REG_r$)
- 29 • Parameter-change registration indicator ($PARAMETER_REG_s = PARAMETER_REG_r$)
- 30 • Registration period ($REG_PRD_s = REG_PRD_r$)
- 31 • Base station latitude ($BASE_LAT_s = BASE_LAT_r$)
- 32 • Base station longitude ($BASE_LONG_s = BASE_LONG_r$)
- 33 • Registration distance ($REG_DIST_s = REG_DIST_r$)
- 34 • Search window size for the Active Set and Candidate Set
 35 $(SRCH_WIN_A_s = SRCH_WIN_A_r)$
- 36 • Search window size for the Neighbor Set ($SRCH_WIN_N_s = SRCH_WIN_N_r$)

- 1 • Search window size for the Remaining Set ($SRCH_WIN_R_s = SRCH_WIN_R_r$)
- 2 • Maximum age for retention of Neighbor Set members
- 3 ($NGHBR_MAX_AGE_s = NGHBR_MAX_AGE_r$)
- 4 • Power control reporting threshold ($PWR_REP_THRESH_s = PWR_REP_THRESH_r$)
- 5 • Power control reporting frame count ($PWR_REP_FRAMES_s = PWR_REP_FRAMES_r$)
- 6 • Power report mode indicator ($PWR_REP_MODE_s = PWR_REP_MODE_r$)
- 7 • Power report delay ($PWR_REP_DELAY_s = PWR_REP_DELAY_r$)
- 8 • Pilot detection threshold ($T_ADD_s = T_ADD_r$)
- 9 • Pilot drop threshold ($T_DROP_s = T_DROP_r$)
- 10 • Active Set versus Candidate Set comparison threshold ($T_COMP_s = T_COMP_r$)
- 11 • Drop timer value ($T_TDROP_s = T_TDROP_r$)

12 6.6.2.2.1.2 Paging Channel Assignment Change

13 If the number of Paging Channels specified in the *System Parameters Message*
 14 ($PAGE_CHAN_r$) is different from $PAGE_CHAN_s$, the mobile station shall use the hash
 15 algorithm specified in 6.6.7.1 to select a new Paging Channel number in the range 1 to
 16 $PAGE_CHAN_r$. The mobile station shall store the new Paging Channel number as
 17 $PAGECH_s$. The mobile station shall then set $PAGE_CHAN_s$ to $PAGE_CHAN_r$. The mobile
 18 station shall set $ACC_MSG_SEQ_s$ to NULL. If the mobile station has not stored
 19 configuration parameters for the new Paging Channel, or if the stored parameters are not
 20 current (see 6.6.2.2), the mobile station shall set $CONFIG_MSG_SEQ_s$, $SYS_PAR_MSG_SEQ_s$,
 21 $NGHBR_LST_MSG_SEQ_s$, and $CHAN_LST_MSG_SEQ_s$ to NULL. The mobile
 22 station shall then begin monitoring the new Paging Channel as specified in 6.6.2.1.1.

23 6.6.2.2.1.3 RESCAN Parameter

24 If the $RESCAN_r$ field in the *System Parameters Message* equals '1', the mobile station shall
 25 enter the *System Determination Substate* of the *Mobile Station Initialization State*.

26 6.6.2.2.1.4 Roaming Status

27 The mobile station shall determine the roaming status for the mobile station (see 6.6.5.3).

28 The mobile station should indicate to the user whether the mobile station is roaming.

29 6.6.2.2.1.5 Registration

30 The mobile station shall update stored variables and perform other registration procedures
 31 as specified in 6.6.5.5.2.2.

32 6.6.2.2.1.6 Slot Cycle Index

33 The mobile station shall set $SLOT_CYCLE_INDEX_s$ to the smaller of: the preferred slot cycle
 34 index $SLOT_CYCLE_INDEX_p$ and the maximum slot cycle index
 35 $MAX_SLOT_CYCLE_INDEX_s$. If the mobile station is operating in the slotted mode, it shall
 36 set its slot cycle length as described in 6.6.2.1.1.3.

1 **6.6.2.2.2 Access Parameters Message**

2 Whenever an *Access Parameters Message* is received on the Paging Channel, the sequence
3 number, $ACC_MSG_SEQ_r$, shall be compared to $ACC_MSG_SEQ_s$. If the comparison
4 results in a match, the mobile station may ignore the message. If the comparison results in
5 a mismatch, then the mobile station shall process the remaining fields in the message as
6 follows.

7 The mobile station shall store the following parameters:

- 8 • *Access Parameters Message* sequence number ($ACC_MSG_SEQ_s = ACC_MSG_SEQ_r$)
- 9 • Number of Access Channels ($ACC_CHAN_s = ACC_CHAN_r$)
- 10 • Nominal transmit power offset ($NOM_PWR_s = NOM_PWR_r$)
- 11 • Initial power offset for access ($INIT_PWR_s = INIT_PWR_r$)
- 12 • Power increment ($PWR_STEP_s = PWR_STEP_r$)
- 13 • Number of access probes ($NUM_STEP_s = NUM_STEP_r$)
- 14 • Maximum Access Channel message capsule size ($MAX_CAP_SZ_s = MAX_CAP_SZ_r$)
- 15 • Access Channel preamble length ($PAM_SZ_s = PAM_SZ_r$)
- 16 • Persistence modifier for Access Channel attempts for registrations which are not
17 responses to the *Registration Request Order* ($REG_PSIST_s = REG_PSIST_r$)
- 18 • Persistence modifier for Access Channel attempts for message transmissions
19 ($MSG_PSIST_s = MSG_PSIST_r$)
- 20 • Time randomization for Access Channel probes ($PROBE_PN_RAN_s = PROBE_PN_RAN_r$)
- 21 • Acknowledgement timeout ($ACC_TMO_s = ACC_TMO_r$)
- 22 • Access Channel probe backoff range ($PROBE_BKOFF_s = PROBE_BKOFF_r$)
- 23 • Access Channel probe sequence backoff range ($BKOFF_s = BKOFF_r$)
- 24 • Maximum number of probe sequences for an Access Channel request
25 ($MAX_REQ_SEQ_s = MAX_REQ_SEQ_r$)
- 26 • Maximum number of probe sequences for an Access Channel response
27 ($MAX_RSP_SEQ_s = MAX_RSP_SEQ_r$)
- 28 • Authentication mode ($AUTH_s = AUTH_r$)
- 29 • Random challenge value ($RAND_s = RAND_r$)

30 The mobile station shall record the persistence parameter number that corresponds to the
31 mobile station's overload class as follows:

- 32 • Persistence value for access overload class ($PSIST_s = PSIST_r$)

6.6.2.2.3 Neighbor List Message

Whenever a valid *Neighbor List Message* is received on the current Paging Channel (PAGECH_s), the configuration message sequence number, CONFIG_MSG_SEQ_r, shall be compared to that stored in NGHBR_LST_MSG_SEQ_s. If the comparison results in a match, the mobile station may ignore the message. If the comparison results in a mismatch, then the mobile station shall process the remaining fields in the message as follows.

The mobile station shall store the following parameters:

- Configuration message sequence number
(CONFIG_MSG_SEQ_s = CONFIG_MSG_SEQ_r,
NGHBR_LST_MSG_SEQ_s = CONFIG_MSG_SEQ_r)
- Pilot PN sequence offset increment (PILOT_INC_s = PILOT_INC_r)

For each of the neighboring base stations contained in the *Neighbor List Message*, the mobile station shall store the following:

- Neighbor configuration (NGHBR_CONFIG_s = NGHBR_CONFIG_r)
- Neighbor pilot PN sequence offset (NGHBR_PN_s = NGHBR_PN_r)

The mobile station shall update the idle handoff Neighbor Set (see 6.6.2.1.4) so that it consists only of pilot offsets listed in the *Neighbor List Message*. If the *Neighbor List Message* contains more pilot offsets than the mobile station can store, the mobile station shall store the pilot offsets beginning at the start of the *Neighbor List Message*, up to the limits of the mobile station's Neighbor Set storage capacity.

6.6.2.2.4 CDMA Channel List Message

Whenever a *CDMA Channel List Message* is received on the Paging Channel, the configuration message sequence number, CONFIG_MSG_SEQ_r, shall be compared to that stored in CHAN_LST_MSG_SEQ_s. If the comparison results in a match, the mobile station may ignore the message. If the comparison results in a mismatch, then the mobile station shall process the remaining fields in the message as follows.

The mobile station shall store the following parameters:

- Configuration message sequence number
(CONFIG_MSG_SEQ_s = CONFIG_MSG_SEQ_r,
CHAN_LST_MSG_SEQ_s = CONFIG_MSG_SEQ_r)

The mobile station shall use the hash algorithm specified in 6.6.7.1 and the number of channels listed in the *CDMA Channel List Message* to determine the CDMA Channel (frequency assignment) for its Paging Channel. If the CDMA frequency assignment has changed (the computed CDMA Channel is different from CDMACH_s), the mobile station shall perform the following actions:

- Set CDMACH_s to the new CDMA Channel.
- Set PAGECH_s to the Primary Paging Channel.

- 1 • Set CONFIG_MSG_SEQ_s, SYS_PAR_MSG_SEQ_s, NGHBR_LST_MSG_SEQ_s,
2 CHAN_LST_MSG_SEQ_s, and ACC_MSG_SEQ_s to NULL.
- 3 • Tune to the new CDMA Channel.

4 6.6.2.3 Mobile Station Page Match Operation

5 The page messages on the Paging Channel are:

- 6 • *Page Message*
- 7 • *Slotted Page Message*

8 The *Mobile Station Page Match Operation* is performed whenever the mobile station receives
9 a page message. The mobile station searches each message to determine whether it
10 contains the mobile station's MIN. If so, the mobile station transmits a *Page Response*
11 *Message* to the page message on the Access Channel.

12 The mobile station shall compare the configuration message sequence number, CONFIG-
13 _MSG_SEQ_r, to CONFIG_MSG_SEQ_s. If the comparison results in a mismatch, then the
14 mobile station shall set CONFIG_MSG_SEQ_s to CONFIG_MSG_SEQ_r. The mobile station
15 shall also compare the *Access Parameters Message* sequence number, ACC_MSG_SEQ_r,
16 with that stored in ACC_MSG_SEQ_s. If the comparison results in a mismatch, then the
17 mobile station shall set ACC_MSG_SEQ_s to NULL (see 6.6.2.2).

18 The mobile station shall compare its MIN with the MIN in each record of the page message
19 (see 7.7.2.3.2.5 and 7.7.2.3.2.6). If both MIN1 and MIN2 are present in a record and both
20 MIN1 and MIN2 match MIN1 and MIN2 for the mobile station, then a page match shall be
21 declared. If MIN1 but not MIN2 is present in a record, MIN1 matches MIN1 for the mobile
22 station, and a home (non-roaming) (SID, NID) pair matches the SID and NID of the base
23 station, then a page match shall be declared (see 6.6.5.3). Any other combination shall be
24 considered a mismatch.

25 If a page match is declared, and the mobile station is configured to receive mobile station
26 terminated calls in its present roaming status (see 6.6.5.3), the mobile station shall enter
27 the *Update Overhead Information Substate* of the *System Access State* (see 6.6.3.2) with a
28 page response indication within T_{33m} seconds after the page message is received.

29 If the mobile station is not configured to receive mobile station terminated calls in its
30 present roaming status, the mobile station may ignore the record.

31 6.6.2.4 Mobile Station Order and Message Processing Operation

32 During the *Mobile Station Order and Message Processing Operation*, the mobile station
33 processes all messages except overhead messages (see 6.6.2.2) and page messages (see
34 6.6.2.3).

35 The mobile station shall compare the ADDRESS field of the message to the corresponding
36 mobile station identification data (e.g., MIN or ESN). If the identification data matches the
37 ADDRESS field, the mobile station shall process the message; otherwise the mobile station
38 shall ignore the message.

The following cases occur for messages received on the Paging Channel whose ADDRESS field matches the mobile station's identification data:

- If the message requires acknowledgement, and is not the *Lock Until Power-Cycled Order* or the *Unlock Order*, the mobile station shall acknowledge the message as specified in 6.6.2.1.2. The mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* with an order/message response indication within T_{33m} seconds, unless otherwise specified for a particular message.
- If the message does not require acknowledgement, the mobile station shall transmit a response only if it is required by the message or order. If a response is required, the mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* with an order/message response indication within T_{33m} seconds, unless otherwise specified for a particular message.
- If the message is a message that cannot be processed by the mobile station, the mobile station shall respond with a *Mobile Station Reject Order* with the ORDQ field set to indicate the reason for rejection. The mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* with an order/message response indication within T_{33m} seconds, unless otherwise specified for a particular message.

The following directed messages and orders can be received. If any field value of the message is outside its permissible range, the mobile station shall send a *Mobile Station Reject Order* with ORDQ equal to '00000100' (message field not in valid range) or '00000010' (message not accepted in this state), as appropriate.

1. *Abbreviated Alert Order*: The mobile station may alert the user.
2. *Audit Order*
3. *Authentication Challenge Message*: The mobile station shall process the message and shall respond with an *Authentication Challenge Response Message* as specified in 6.3.12.1.5. The mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* with an order/message response indication within T_{32m} seconds
4. *Base Station Acknowledgement Order*
5. *Base Station Challenge Confirmation Order*: The mobile station shall process the message and shall respond with an *SSD Update Confirmation Order* or *SSD Update Rejection Order* as specified in 6.3.12.1.9. The mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* with an order/message response indication within T_{32m} seconds.
6. *Channel Assignment Message*: If the message specifies a Paging Channel assignment (ASSIGN_MODE equal to '001'), the mobile station shall perform the following actions: If a CDMA channel (CDMA_FREQ) is specified in the assignment, the mobile station shall set $CDMACH_s = CDMA_FREQ_r$ and shall tune to the new frequency assignment. The mobile station shall set ACC_MSG_SEQ_s to NULL (see 6.6.2.2) and shall set PILOT_PN_s to the pilot PN sequence offset of the strongest pilot in the list (PILOT_PN_r). If the mobile station has not stored configuration

1 parameters for the Primary Paging Channel of the new base station, or if the stored
 2 information is not current (see 6.6.2.2), the mobile station shall set CONFIG-
 3 _MSG_SEQ_s, SYS_PAR_MSG_SEQ_s, NGHBR_LST_MSG_SEQ_s, and CHAN_LST-
 4 _MSG_SEQ_s to NULL. The mobile station shall then begin monitoring the Primary
 5 Paging Channel of the selected base station.

6 If the ASSIGN_MODE field is any value other than '001', the mobile station shall
 7 respond with a *Mobile Station Reject Order* with ORDQ equal to '00000010'
 8 (message not accepted in this state).

9 7. Data Burst Message

10 8. Feature Notification Message

11 9. Local Control Order

12 10. Lock Until Power-Cycled Order: The mobile station shall record the reason for the
 13 *Lock Until Power-Cycled Order* in the mobile station's semi-permanent memory
 14 (LCKRSN_P_{s-p} equals the least-significant four bits of ORDQ_r). After a mobile station
 15 receives this order, it shall not enter the *System Access State* (see 6.6.3) until it has
 16 received an *Unlock Order* or until after power-cycling the mobile station (i.e., after the
 17 next mobile station power-up). This requirement shall take precedence over any
 18 other mobile station requirement specifying entry to the *System Access State*. The
 19 mobile station should notify the user of the locked condition. The mobile station may
 20 exit the *Mobile Station Idle State* and enter the *System Determination Substate* of the
 21 *Mobile Station Initialization State*. This allows the mobile station to operate in the
 22 analog mode while locked.

23 11. Maintenance Required Order: The mobile station shall record the reason for the
 24 *Maintenance Required Order* in the mobile station's semi-permanent memory
 25 (MAINTRSN_{s-p} equals the least-significant four bits of ORDQ_r). If the mobile
 26 station has previously received a *Lock Until Power-Cycled Order*, it shall remain in
 27 the locked condition; otherwise the mobile station shall remain in the unlocked
 28 condition. The mobile station should notify the user of the maintenance required
 29 condition.

30 12. Registration Accepted Order

31 13. Registration Rejected Order

32 14. Registration Request Order: The mobile station shall process the message and
 33 perform registration procedures as specified in 6.6.5.5.2.3.

34 15. SSD Update Message: The mobile station shall process the message and shall
 35 respond with a *Base Station Challenge Order* as specified in 6.3.12.1.9. The mobile
 36 station shall enter the *Update Overhead Information Substate* of the *System Access*
 37 *State* with an order/message response indication within T_{32m} seconds.

38 16. Unlock Order: After receiving this order, the mobile station is no longer locked. The
 39 mobile station should notify the user that the locked condition has been removed.
 40 The mobile station shall enter the *System Determination Substate* of the *Mobile*
 41 *Station Initialization State*.

1 If any message or order directed to the mobile station is received that is not listed above,
2 the mobile station shall respond with a *Mobile Station Reject Order* with *ORDQ* equal to
3 '00000010' (message not accepted in this state).

4 6.6.2.5 Mobile Station Origination Operation

5 The *Mobile Station Origination Operation* is performed when the mobile station is directed by
6 the user to initiate a call.

7 The mobile station shall enter the *Update Overhead Information Substate* of the *System*
8 *Access State* (see 6.6.3) with a call origination indication within T_{33m} seconds.

9 6.6.2.6 Mobile Station Message Transmission Operation

10 Support of this operation is optional. If the mobile station supports the *Mobile Station*
11 *Message Transmission Operation*, the operation is performed when the user directs the
12 mobile station to transmit a message.

13 If the mobile station supports this operation, the mobile station shall enter the *Update*
14 *Overhead Information Substate* of the *System Access State* (see 6.6.3.2) with a message
15 transmission indication within T_{33m} seconds.

16 6.6.2.7 Mobile Station Power-Down Operation

17 The *Mobile Station Power-Down Operation* is performed when the user directs the mobile
18 station to power down.

19 The mobile station shall update stored parameters and perform other registration
20 procedures as specified in 6.6.5.5.2.4.

21 If no power-down registration is performed (see 6.6.5.5.2.4), the mobile station may power
22 down.

23 6.6.3 System Access State

24 In this state, the mobile station sends messages to the base station on the *Access*
25 *Channel(s)* and receives messages from the base station on the *Paging Channel*.

26 As illustrated in Figure 6.6.3-1, the *System Access State* consists of the following substates:

- 27 • *Update Overhead Information Substate* - In this substate, the mobile station monitors
28 the *Paging Channel* until it has received a current set of configuration messages.
- 29 • *Mobile Station Origination Attempt Substate* - In this substate, the mobile station
30 sends an *Origination Message* to the base station.
- 31 • *Page Response Substate* - In this substate, the mobile station sends a *Page Response*
32 *Message* to the base station.
- 33 • *Mobile Station Order/Message Response Substate* - In this substate, the mobile
34 station sends a response to a message received from the base station.
- 35 • *Registration Access Substate* - In this substate, the mobile station sends a
36 *Registration Message* to the base station.

- **Mobile Station Message Transmission Substate** - In this substate, the mobile station sends a *Data Burst Message* to the base station.

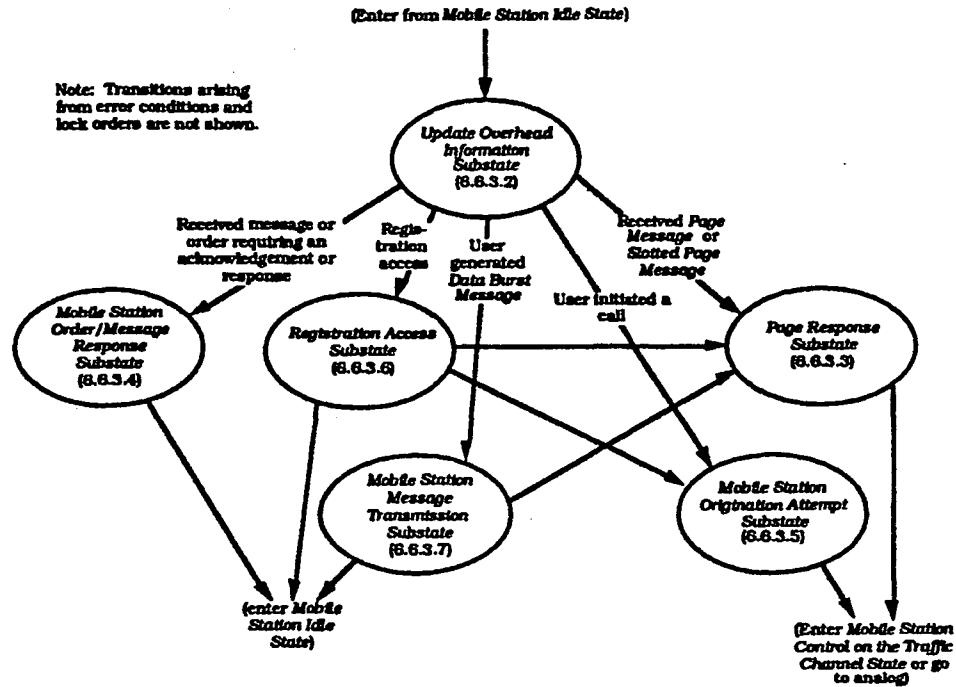


Figure 6.6.3-1. System Access State

6.6.3.1 Access Procedures

6.6.3.1.1 Access Attempts

6.6.3.1.1.1 Overview

The mobile station transmits on the Access Channel using a random access procedure. Many parameters of the random access procedure are supplied by the base station in the *Access Parameters Message*.

The entire process of sending one message and receiving (or failing to receive) an acknowledgement for that message is called an access attempt (see Figures 6.6.3.1.1.1-1 and 6.6.3.1.1.1-2). Each transmission in the access attempt is called an access probe. The mobile station transmits the same message in each access probe in an access attempt. Each access probe consists of an Access Channel preamble and an Access Channel message capsule (see Figure 6.6.3.1.1.1-1B).

Within an access attempt, access probes are grouped into access probe sequences. Each access probe sequence consists of up to 1 + NUM_STEP access probes, all transmitted on the same Access Channel. The Access Channel used for each access probe sequence is chosen pseudorandomly from among all the Access Channels associated with the current Paging Channel. The first access probe of each access probe sequence is transmitted at a

1 specified power level relative to the nominal open loop power level. Each subsequent access
2 probe is transmitted at a power level a specified amount higher than the previous access
3 probe (see 6.1.2.3.1).

4 The timing of access probes and access probe sequences is expressed in terms of Access
5 Channel slots (see 6.7.1.1). The transmission of an access probe begins at the start of an
6 Access Channel Slot.

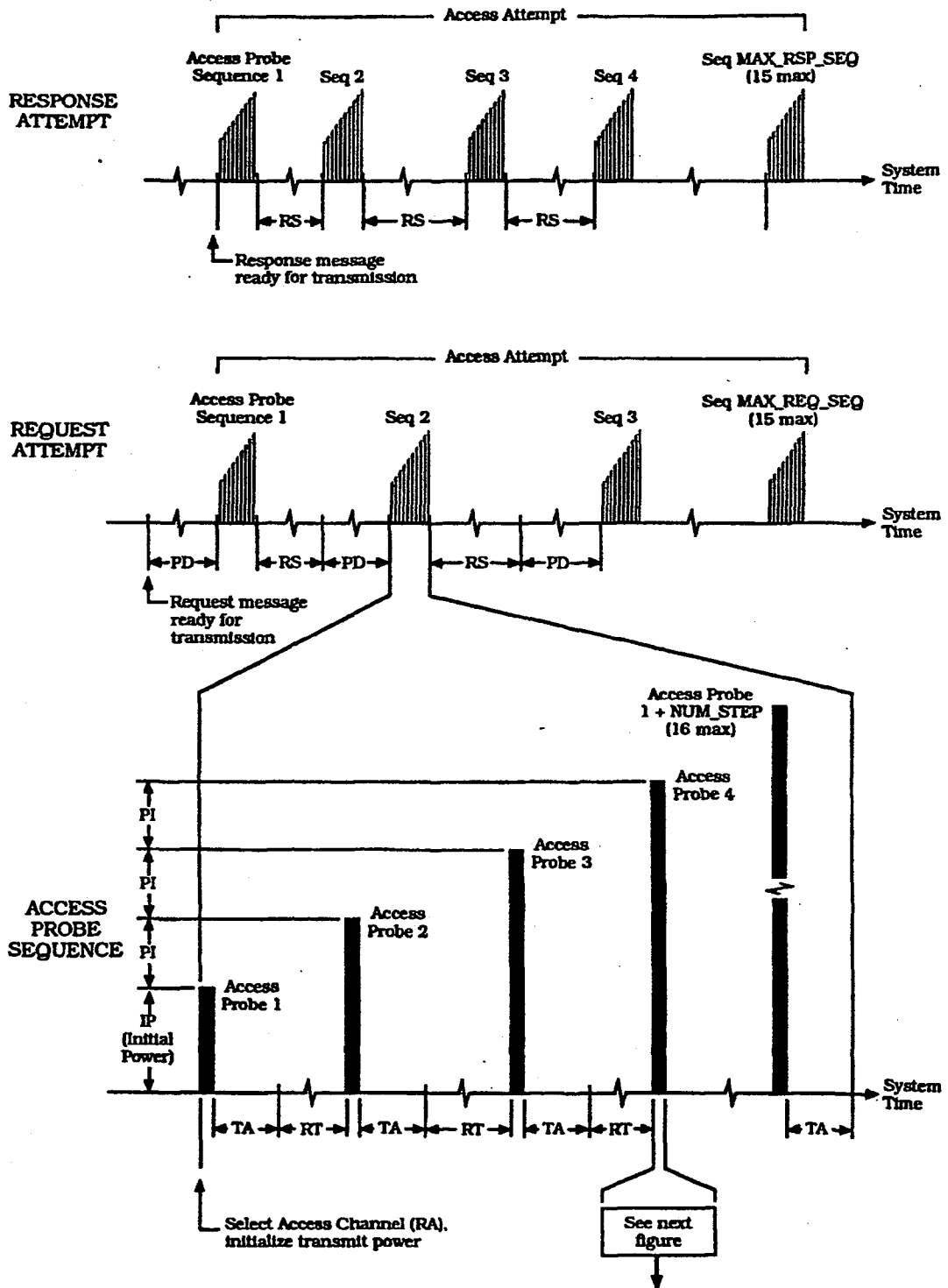
7 There are two types of messages sent on the Access Channel: a response message (one that
8 is a response to a base station message) or a request message (one that is sent
9 autonomously by the mobile station). Different procedures are used for sending a response
10 message and for sending a request message. The timing of the start of each access probe
11 sequence is determined pseudorandomly. For every access probe sequence, a backoff
12 delay, RS , from 0 to $1 + BKOFF$ slots is generated pseudorandomly. For request access
13 probe sequences only, an additional delay is imposed by the use of a persistence test.¹⁴
14 For each slot after the backoff delay, RS , the mobile station performs a pseudorandom test,
15 with parameters that depend on the reason for the access attempt and the access overload
16 class, $ACCOLC_p$, of the mobile station. If the test passes, the first access probe of the
17 sequence begins in that slot. If the test fails, the access probe sequence is deferred until at
18 least the next slot.

19 Timing between access probes of an access probe sequence is also generated
20 pseudorandomly. After transmitting each access probe, the mobile station waits a specified
21 period, $TA = (2 + ACC_TMO) \times 80$ ms, from the end of the slot to receive an
22 acknowledgement from the base station. If an acknowledgement is received, the access
23 attempt ends. If no acknowledgement is received, the next access probe is transmitted after
24 an additional backoff delay, RT , from 0 to $1 + PROBE_BKOFF$ slots.

25 The precise timing of the Access Channel transmissions in an access attempt is determined
26 by a procedure called PN randomization. For each access attempt, the mobile station
27 computes a delay, RN , from 0 to $2^{PROBE_PN_RAN} - 1$ PN chips using a (non-random) hash
28 function that depends on its ESN. The mobile station delays its transmit timing by RN
29 PN chips. This transmit timing adjustment includes delay of the direct sequence spreading
30 long code and of the quadrature spreading I and Q pilot PN sequences, so it effectively
31 increases the apparent range from the mobile station to the base station.¹⁵

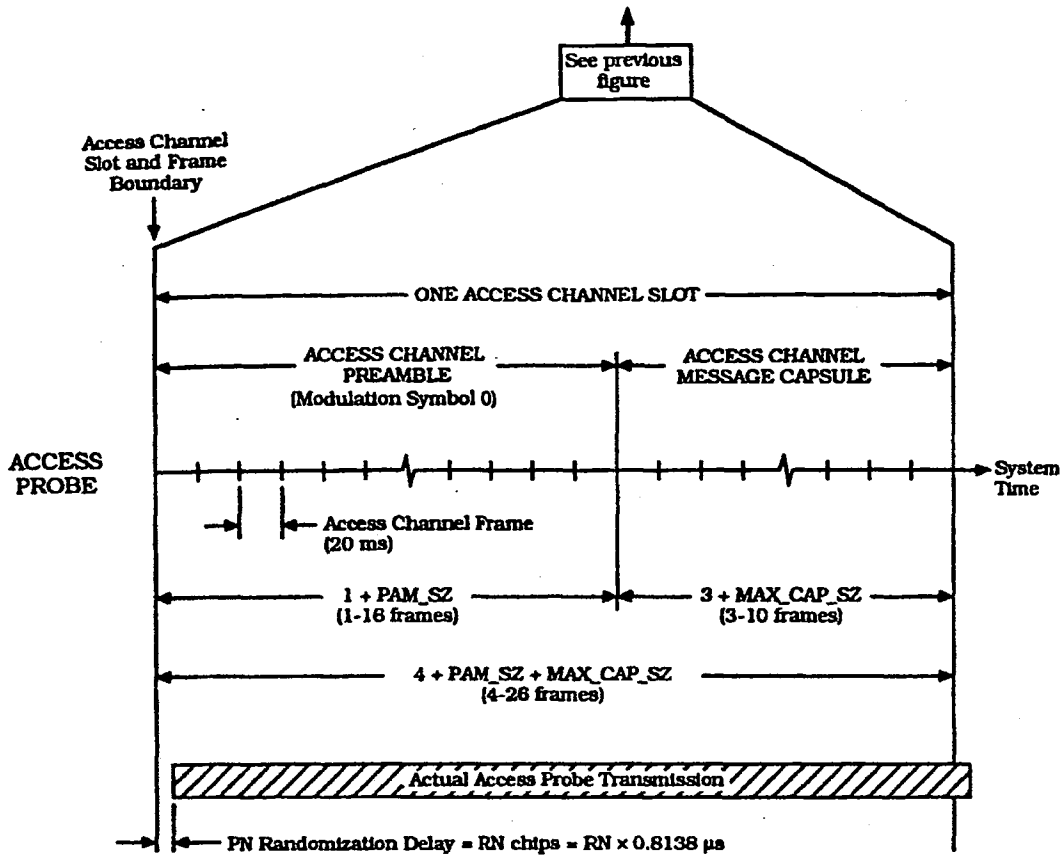
¹⁴A persistence test is not needed for response access attempts, because the base station controls the arrival rate of response messages directly by controlling the rate at which it transmits messages requiring responses.

¹⁵This increases the probability that the base station will be able to separately demodulate transmissions from multiple mobile stations in the same Access Channel slot, especially when many mobile stations are at a similar range from the base station. Use of a non-random algorithm for PN randomization permits the base station to separate the PN randomization from the actual propagation delay from the mobile station, so it can accurately estimate the timing of Reverse Traffic Channel transmissions from the mobile station.



1
2

Figure 6.6.3.1.1.1-1A. Access Channel Request and Response Attempts

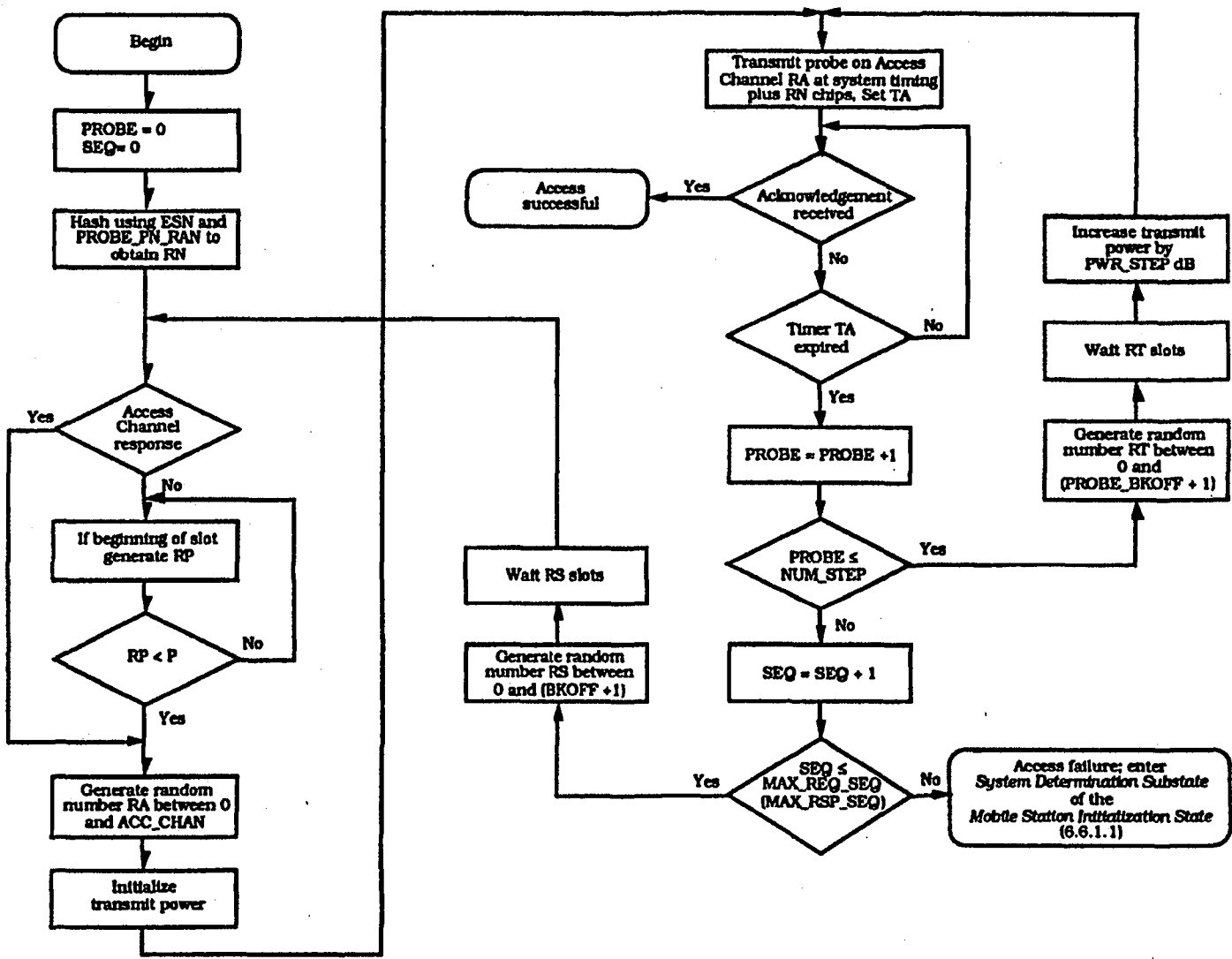


2 **Calculated, Random, and Hashed Variables**

Variable	Name	Generation	Range	Units
IP	Initial Open-Loop Power	$IP = -73 - \text{Mean Input Power (dBm)} + \text{NOM_PWR} + \text{INIT_PWR}$	See 6.1.2.1 6.1.2.2.1	dBm
PD	Persistence Delay	Delay continues slot-by-slot until persistence test (run every slot) passes.	—	slots
PI	Power Increment	$PI = \text{PWR_STEP}$	0 to 7	dB
RA	Access Channel Number	Random between 0 and ACC_CHAN; generated before every sequence.	0 to 31	—
RN	PN Randomization Delay	Hash using ESN between 0 and $2^{\text{PROBE_PN_RAN}} - 1$; generated once at beginning of attempt.	0 to 511	chips
RS	Sequence Backoff	Random between 0 and 1 + BKOFF; generated before every sequence (except the first sequence).	0 to 16	slots
RT	Probe Backoff	Random between 0 and 1 + PROBE_BKOFF; generated before subsequent probes.	0 to 16	slots
TA	Ack Response Timeout	$TA = 80 \times (2 + \text{ACC_TMO})$; timeout from end of slot	160 to 1360	ms

3 **Figure 6.6.3.1.1.1-1B. Access Channel Request and Response Attempts**

2
1
Figure 6.6.3.1.1.1-2. Access Procedure



1 **6.6.3.1.1.2 Requirements**

2 Each time the mobile station performs an access attempt, it shall compute a number, RN,
3 from 0 to $2^{\text{PROBE_PN_RAN}} - 1$, using the hashing technique described in 6.6.7.1. For the
4 duration of this access attempt, the mobile station shall delay its transmit timing (see
5 6.1.3.2.1), including long code direct sequence spreading (see 6.1.3.2.8) and I and Q pilot
6 PN sequence quadrature spreading (see 6.1.3.2.9), by RN PN chips.

7 When the mobile station performs an access attempt, it shall transmit one or more access
8 probe sequences. If the access attempt is an Access Channel request, the mobile station
9 shall transmit no more than MAX_REQ_SEQ_B access probe sequences; if the access
10 attempt is an Access Channel response, the mobile station shall transmit no more than
11 MAX_RSP_SEQ_B access probe sequences.

12 Before transmitting each access probe sequence, the mobile station shall generate a
13 random number, RA, from 0 to ACC_CHAN_B using the procedure described in 6.6.7.2. The
14 mobile station shall use this random number, RA, as the Access Channel number for all
15 access probes in that access probe sequence (see 6.1.3.1.8).

16 Before transmitting each access probe sequence other than the first access probe sequence,
17 the mobile station shall generate a random number, RS, from 0 to $(\text{BKOFF}_B + 1)$, using the
18 procedure described in 6.6.7.2. The mobile station shall delay the transmission of the
19 access probe sequence for RS slots.

20 If the access attempt is an Access Channel request, then before transmitting the first
21 access probe in each access probe sequence, and after the delay of RS if applicable, the
22 mobile station shall perform a persistence test for each Access Channel slot. The mobile
23 station shall transmit the first access probe of a probe sequence in a slot only if the test
24 passes for that slot. To perform the persistence test, the mobile station shall generate a
25 random number RP, $0 < \text{RP} < 1$, using the technique described in 6.6.7.2. The persistence
26 test is said to pass when RP is less than the current value of P for the type of this access
27 attempt. If P equals 0, the access attempt fails, and the mobile station shall end the access
28 attempt, update its registration variables as specified in 6.6.5.6.3.2, and enter the *System*
29 *Determination Substate* of the *Mobile Station Initialization State*.

30 If the Access Channel request is a registration, P shall be computed by

$$31 \quad P = \begin{cases} 2^{-\text{PSIST}(n)/4} \times 2^{-\text{REG_PSIST}} & \text{if } \text{PSIST}(n) \neq 63 \\ 0 & \text{otherwise} \end{cases} \quad n = 0, 1, \dots, 9$$

$$32 \quad P = \begin{cases} 2^{-\text{PSIST}(n)} \times 2^{-\text{REG_PSIST}} & \text{if } \text{PSIST}(n) \neq 7 \\ 0 & \text{otherwise} \end{cases} \quad n = 10, 11, \dots, 15$$

34 where n is the overload class (ACCOLC_p) assigned to the mobile station.

35 If the Access Channel request is a message transmission, P shall be computed by

$$1 \quad P = \begin{cases} 2^{-\text{PSIST}(n)/4} \times 2^{-\text{MSG_PSIST}} & \text{if PSIST}(n) \neq 63 \\ 0 & \text{otherwise} \end{cases} \quad n = 0, 1, \dots, 9$$

$$2 \quad P = \begin{cases} 2^{-\text{PSIST}(n)} \times 2^{-\text{MSG_PSIST}} & \text{if PSIST}(n) \neq 7 \\ 0 & \text{otherwise} \end{cases} \quad n = 10, 11, \dots, 15$$

4 where n is the overload class assigned to the mobile station.

5 If the Access Channel request is other than a registration or a message transmission, P
6 shall be computed by

$$7 \quad P = \begin{cases} 2^{-\text{PSIST}(n)/4} & \text{if PSIST}(n) \neq 63 \\ 0 & \text{otherwise} \end{cases} \quad n = 0, 1, \dots, 9$$

$$8 \quad P = \begin{cases} 2^{-\text{PSIST}(n)} & \text{if PSIST}(n) \neq 7 \\ 0 & \text{otherwise} \end{cases} \quad n = 10, 11, \dots, 15$$

10 where n is the overload class assigned to the mobile station.

11 The mobile station shall transmit the first probe in each access probe sequence at the
12 power level specified in 6.1.2.3.1. The mobile station shall transmit each subsequent probe
13 in the access probe sequence at a power level PWR_STEP_s dB greater than that of the
14 previous probe. Between access probes, the mobile station shall disable its transmitter.

15 After transmitting each probe, the mobile station shall wait $\text{TA} = (2 + \text{ACC_TMO}_s) \times 80$ ms
16 from the end of the Access Channel slot. If no acknowledgement is received within TA
17 seconds, the mobile station shall perform the following:

- 18 • If NUM_STEP_s or fewer access probes have been transmitted in this access probe
19 sequence, the mobile station shall generate a random number, RT , from 0 to $1 +$
20 PROBE_BKOFF , using the procedure described in 6.6.7.2. The mobile station shall
21 delay RT additional Access Channel slots, and then transmit the next access probe.
- 22 • Otherwise, if fewer than MAX_REQ_SEQ (for a request access) or MAX_RSP_SEQ (for
23 a response access) access probe sequences have been transmitted in this access
24 attempt, the mobile station shall begin the randomization procedures for another
25 access probe sequence.
- 26 • Otherwise, the mobile station shall update its registration variables as specified in
27 6.6.5.5.3.2 and enter the *System Determination Substate of the Mobile Station*
28 *Initialization State*.

29 6.6.3.1.2 Acknowledgement Procedures

30 The acknowledgement procedures facilitate the reliable exchange of messages between the
31 base station and the mobile station. The mobile station uses the fields ACK_TYPE
32 (acknowledgement address type), ACK_SEQ (acknowledgement sequence number),
33 MSG_SEQ (message sequence number), ACK_REQ (acknowledgement required), and

1 VALID_ACK (valid acknowledgement) to support this mechanism. These fields are referred
2 to as layer 2 fields, and the acknowledgement procedures are referred to as layer 2
3 procedures. All other message fields and the processing thereof are referred to as
4 pertaining to layer 3. (See Appendix C for further discussion of layering.)

5 The mobile station shall set the ACK_TYPE, ACK_SEQ and VALID_ACK fields of all
6 messages sent on the Access Channel as specified in 6.6.2.1.2.

7 The mobile station shall generate a single set of MSG_SEQ numbers for messages sent on
8 the Access Channel. The mobile station shall set the MSG_SEQ field of the first message
9 sent on the Access Channel after powering on to '000'. The mobile station shall increment
10 MSG_SEQ, modulo 8, for each new access attempt, even if the contents of the new message
11 are identical to those of the previous message.

12 The mobile station shall monitor the Paging Channel while in the *System Access State*.
13 When the mobile station receives a message with the VALID_ACK field set to '1' and the
14 ACK_SEQ field set to the MSG_SEQ number of the message currently being sent, the
15 mobile station shall consider the current message to have been acknowledged and shall end
16 the access attempt.

17 The mobile station shall not begin a new access attempt until the previous access attempt
18 has ended.

19 6.6.3.1.3 Handoffs

20 While in the *System Access State*, the mobile station should continue its pilot search
21 (see 6.6.2.1.4.1), but shall not perform idle handoffs.

22 6.6.3.1.4 System Access State Exit Procedures

23 Upon exiting the *System Access State*, the mobile station shall abort any access attempt in
24 progress and discard the associated message.

25 6.6.3.2 Update Overhead Information Substate

26 In this substate, the mobile station monitors the Paging Channel until it has received the
27 current configuration messages. The mobile station compares sequence numbers to
28 determine whether all the configuration messages are up to date. To make sure it has the
29 latest access parameters, the mobile station receives at least one message containing the
30 ACC_MSG_SEQ field (except in case of a page response, since the initiating *Page Message*
31 or *Slotted Page Message* contains ACC_MSG_SEQ), and waits, if necessary, for an *Access*
32 *Parameters Message*.

33 Upon entering the *Update Overhead Information Substate*, the mobile station shall set the
34 *System Access State* timer to a value of T_{41m} seconds. The mobile station shall set PAGED
35 to NO. If the *Update Overhead Information Substate* was entered with a page response
36 indication, the mobile station shall set CURR_ACC_MSG_SEQ to ACC_MSG_SEQ_s;
37 otherwise, it shall set CURR_ACC_MSG_SEQ to NULL.

38 If the state timer expires while in this substate, the mobile station shall enter the *System*
39 *Determination Substate* of the *Mobile Station Initialization State*.

1 While in the *Update Overhead Information Substate*, the mobile station shall monitor the
2 Paging Channel. If the mobile station declares a loss of the Paging Channel (see 6.4.3), it
3 shall enter the *Mobile Station Idle State*. If the mobile station receives any of the following
4 messages or orders containing an ADDRESS field matching the corresponding mobile
5 station identification data, the mobile station shall process the message as follows:

- 6 1. **Local Control Order**
- 7 2. **Lock Until Power-Cycled Order**: The mobile station shall record the reason for the
8 *Lock Until Power-Cycled Order* in the mobile station's semi-permanent memory
9 (LCKRSN_{P-s-p} equals the least-significant four bits of ORDQ_r). The mobile station
10 should notify the user of the locked condition. The mobile station shall enter the
11 *System Determination Substate* of the *Mobile Station Initialization State*, and shall
12 not enter the *System Access State* again until after the next mobile station power-
13 up or until it has received an *Unlock Order*. This requirement shall take precedence
14 over any other mobile station requirement specifying entry to the *System Access*
15 *State*.
- 16 3. **Maintenance Required Order**: The mobile station shall record the reason for the
17 *Maintenance Required Order* in the mobile station's semi-permanent memory
18 (MAINTRSN_{s-p} equals the least-significant four bits of ORDQ_r). The mobile station
19 shall remain in the unlocked condition. The mobile station should notify the user
20 of the maintenance required condition.

21 If the mobile station receives any of the following messages, it shall process the message as
22 follows:

- 23 1. **System Parameters Message**: The mobile station shall process the parameters from
24 the message (see 6.6.2.2.1).
- 25 2. **Access Parameters Message**: The mobile station shall process the parameters from
26 the message (see 6.6.2.2.2).
- 27 3. **Neighbor List Message**: The mobile station shall process the parameters from the
28 message (see 6.6.2.2.3).
- 29 4. **CDMA Channel List Message**: The mobile station shall process the parameters from
30 the message (see 6.6.2.2.4).
- 31 5. **Slotted Page Message**: The mobile station shall set CURR_ACC_MSG_SEQ to
32 ACC_MSG_SEQ_r. If this substate was not entered with an origination or page
33 response indication, the mobile station shall compare its MIN with the MIN in each
34 record of the message. If a match is declared (see 6.6.2.3), the mobile station shall
35 set PAGED to YES.
- 36 6. **Page Message**: The mobile station shall set CURR_ACC_MSG_SEQ to
37 ACC_MSG_SEQ_r. If this substate was not entered with an origination or page
38 response indication, the mobile station shall compare its MIN with the MIN in each
39 record of the message. If a match is declared (see 6.6.2.3), the mobile station shall
40 set PAGED to YES.

1 7. ***Any other message:*** If the mobile station receives any other message with a
2 MSG_TYPE specified in Table 7.7.2.3-1, it shall process all layer 2 fields of the
3 message and may ignore all other fields. The mobile station may ignore all other
4 messages.

5 When the stored configuration parameters are current (see 6.6.2.2) and
6 CURR_ACC_MSG_SEQ and ACC_MSG_SEQ_s are equal and are not NULL, the mobile
7 station shall disable the *System Access State* timer and do one of the following:

- 8 • If PAGED is equal to YES or if this substate was entered with a page response
9 indication, the mobile station shall determine whether the message resulting in the
10 page match was received on the current Paging Channel. If the message was received
11 on the current Paging Channel, the mobile station shall enter the *Page Response*
12 *Substate*; otherwise the mobile station shall enter the *Mobile Station Idle State*.
- 13 • If this substate was entered with a page response retransmission indication, the
14 mobile station shall enter the *Page Response Substate*.
- 15 • If this substate was entered with an origination indication, the mobile station shall
16 enter the *Mobile Station Origination Attempt Substate*.
- 17 • If this substate was entered with an order/message response indication, the mobile
18 station shall determine whether the message resulting in the response was received
19 on the current Paging Channel. If the message was received on the current Paging
20 Channel, the mobile station shall enter the *Mobile Station Order/Message Response*
21 *Substate*; otherwise the mobile station shall discard the response and enter the
22 *Mobile Station Idle State*.
- 23 • If this substate was entered with a registration indication, the mobile station shall
24 enter the *Registration Access Substate*.
- 25 • If this substate was entered with a message transmission indication, the mobile
26 station shall enter the *Mobile Station Message Transmission Substate*.

27 6.6.3.3 Page Response Substate

28 In this substate, the mobile station sends a *Page Response Message* in response to a *Page*
29 *Message* or *Slotted Page Message* from the base station. If the base station responds to the
30 *Page Response Message* with an authentication request, the mobile station responds in this
31 substate.

32 Upon entering the *Page Response Substate*, the mobile station shall send a *Page Response*
33 *Message*, using the access procedures specified in 6.6.3.1.1.2. If message authentication is
34 enabled (see 6.3.12.1), the mobile station shall calculate the values of the AUTHR and
35 RANDC fields using the current value of RAND_s.

36 While in this substate, the mobile station shall monitor the Paging Channel. If the mobile
37 station declares a loss of the Paging Channel (see 6.4.3), it shall disable its transmitter and
38 enter the *Mobile Station Idle State*. If the mobile station receives an acknowledgement to
39 any message sent by the mobile station in this substate, the mobile station shall end the
40 access attempt. If the acknowledgement was not included in a *Channel Assignment*

- 1 **Message, Authentication Challenge Message, Base Station Challenge Confirmation Order, or**
 2 **SSD Update Message, the mobile station shall set the System Access State timer to T_{42m} .**
- 3 **If the access attempt for the Page Response Message ends by the receipt of an**
 4 **acknowledgement from the base station, the mobile station shall update its registration**
 5 **variables as specified in 6.6.5.5.3.1.**
- 6 **If the System Access State timer expires while in this substate, the mobile station shall**
 7 **enter the Mobile Station Idle State.**
- 8 **If the mobile station receives any of the following messages addressed to the mobile station,**
 9 **then the mobile station shall process the message as described.**
- 10 1. **Authentication Challenge Message:** **If the mobile station receives this message while**
 11 **an access attempt is in progress, the mobile station shall ignore the message. If**
 12 **the mobile station receives this message after the acknowledgement to any message**
 13 **sent by the mobile station in this substate, or if the acknowledgement is included in**
 14 **this message, the mobile station shall disable the System Access State timer and**
 15 **respond to the message as specified in 6.3.12.1.5, using the access procedures**
 16 **specified in 6.6.3.1.1.2.**
- 17 2. **Base Station Challenge Confirmation Order:** **If the mobile station receives this**
 18 **message while an access attempt is in progress, the mobile station shall ignore the**
 19 **message. If the mobile station receives this message after the acknowledgement to**
 20 **any message sent by the mobile station in this substate, or if the acknowledgement**
 21 **is included in this message, the mobile station shall disable the System Access**
 22 **State timer and respond to the message as specified in 6.3.12.1.9, using the access**
 23 **procedures specified in 6.6.3.1.1.2.**
- 24 3. **Channel Assignment Message:** **The mobile station shall terminate any access**
 25 **attempt in progress. It shall then process the message as follows:**
- 26 **If ASSIGN_MODE_T equals '000', the mobile station shall store the Forward Traffic**
 27 **Channel code channel (CODE_CHAN_S = CODE_CHAN_T), the frame offset**
 28 **(FRAME_OFFSET_S = FRAME_OFFSET_T), the message encryption mode indicator**
 29 **(ENCRYPT_MODE_S = ENCRYPT_MODE_T), and, if FREQ_INCL_T equals '1', the**
 30 **frequency assignment (CDMACH_S = CDMA_FREQ_T), and then enter the Traffic**
 31 **Channel Initialization Substate of the Mobile Station Control on the Traffic Channel**
 32 **State.**
- 33 **If ASSIGN_MODE_T equals '001', the mobile station shall perform the following**
 34 **actions: If a CDMA channel (CDMA_FREQ) is listed in the assignment, the mobile**
 35 **station shall set CDMACH_S = CDMA_FREQ_T and shall tune to the new frequency**
 36 **assignment. The mobile station shall set ACC_MSG_SEQ_S to NULL (see 6.6.2.2)**
 37 **and shall set PILOT_PN_S to the pilot PN sequence offset of the strongest pilot in the**
 38 **list (PILOT_PN_T). If the mobile station has not stored configuration parameters for**
 39 **the Primary Paging Channel of the new base station, or if the stored information is**
 40 **not current (see 6.6.2.2), the mobile station shall set CONFIG_MSG_SEQ_S,**
 41 **SYS_PAR_MSG_SEQ_S, NGHBR_LST_MSG_SEQ_S, and CHAN_LST_MSG_SEQ_S to**
 42 **NULL. The mobile station shall then begin monitoring the Primary Paging Channel**
 43 **of the selected base station. If RESPOND_T is equal to '1', the mobile station shall**

1 enter the *Update Overhead Information Substate* with a page response
 2 retransmission indication. If RESPOND_T is equal to '0', the mobile station shall
 3 enter the *Mobile Station Idle State*.

4 If ASSIGN_MODE_T equals '010' and RESPOND_T equals '1', the mobile station shall
 5 enter the Initialization Task with a page response indication (see 2.6.1).

6 If ASSIGN_MODE_T equals '010' and RESPOND_T equals '0', the mobile station shall
 7 enter the Initialization Task (see 2.6.1) with a wait for page indication.

8 If ASSIGN_MODE_T equals '011', the mobile station shall store the system
 9 identification ($\text{SID}_B = \text{SID}_T$), voice mobile station attenuation code ($\text{VMAC}_B =$
 10 VMAC_T), voice channel number ($\text{ANALOG_CHAN}_B = \text{ANALOG_CHAN}_T$), SAT color
 11 code ($\text{SCC}_B = \text{SCC}_T$), and message encryption mode indicator ($\text{MEM}_B = \text{MEM}_T$) and
 12 enter the Confirm Initial Voice Channel Task (see 2.6.4.2) with a page response
 13 indication.

14 4. Feature Notification Message

15 5. Local Control Order

16 6. Lock Until Power-Cycled Order: The mobile station shall disable its transmitter and
 17 record the reason for the *Lock Until Power-Cycled Order* in the mobile station's
 18 semi-permanent memory (LCKRSN_{B-p} equals the least-significant four bits of
 19 ORDQ_T). The mobile station should notify the user of the locked condition. The
 20 mobile station shall enter the *System Determination Substate* of the *Mobile Station*
 21 *Initialization State*, and shall not enter the *System Access State* again until after the
 22 next mobile station power-up or until it has received an *Unlock Order*. This
 23 requirement shall take precedence over any other mobile station requirement
 24 specifying entry to the *System Access State*.

25 7. Maintenance Required Order: The mobile station shall record the reason for the
 26 *Maintenance Required Order* in the mobile station's semi-permanent memory
 27 (MAINTRSN_{B-p} equals the least-significant four bits of ORDQ_T). The mobile station
 28 shall remain in the unlocked condition. The mobile station should notify the user
 29 of the maintenance required condition.

30 8. Release Order: The mobile station shall enter the *Mobile Station Idle State* or the
 31 *System Determination Substate* of the *Mobile Station Initialization State*.

32 9. SSD Update Message: If the mobile station receives this message while an access
 33 attempt is in progress, the mobile station shall ignore the message. If the mobile
 34 station receives this message after the acknowledgement to any message sent by
 35 the mobile station in this substate, or if the acknowledgement is included in this
 36 message, the mobile station shall disable the *System Access State* timer and
 37 respond to the message as specified in 6.3.12.1.9, using the access procedures
 38 specified in 6.6.3.1.1.2.

39 10. Any other message: If the mobile station receives any other message with a
 40 MSG_TYPE specified in Table 7.7.2.3-1, it shall process all layer 2 fields of the
 41 message and may ignore all other fields. The mobile station may ignore all other
 42 messages.

1 **6.6.3.4 Mobile Station Order/Message Response Substate**

2 In this substate, the mobile station sends a message that is a response to a message
3 received from the base station. If the base station responds to the mobile station's message
4 with an authentication request, the mobile station responds in this substate.

5 Upon entering the *Mobile Station Order/Message Response Substate*, the mobile station
6 shall send the response message using the access procedures specified in 6.6.3.1.1.2.

7 While in this substate, the mobile station shall monitor the Paging Channel. If the mobile
8 station declares a loss of the Paging Channel (see 6.4.3), it shall disable its transmitter and
9 enter the *Mobile Station Idle State*. If the mobile station receives an acknowledgement to
10 any message sent by the mobile station in this substate, it shall end the access attempt. If
11 the acknowledgement was not included in an *Authentication Challenge Message*, *Base
12 Station Challenge Confirmation Order*, or *SSD Update Message*, the mobile station shall
13 enter the *Mobile Station Idle State*.

14 If the mobile station receives any of the following messages addressed to the mobile station,
15 then the mobile station shall process the message as follows:

- 16 1. *Authentication Challenge Message*: If the mobile station receives this message while
17 an access attempt is in progress, the mobile station shall ignore the message. If
18 the mobile station receives this message after the acknowledgement to any message
19 sent by the mobile station in this substate, or if the acknowledgment is included in
20 this message, the mobile station shall respond to the message as specified in
21 6.3.12.1.5, using the access procedures specified in 6.6.3.1.1.2.
- 22 2. *Base Station Challenge Confirmation Order*: If the mobile station receives this
23 message while an access attempt is in progress, the mobile station shall ignore the
24 message. If the mobile station receives this message after the acknowledgement to
25 any message sent by the mobile station in this substate, or if the acknowledgment
26 is included in this message, the mobile station shall respond to the message as
27 specified in 6.3.12.1.9, using the access procedures specified in 6.6.3.1.1.2.
- 28 3. *Feature Notification Message*
- 29 4. *Local Control Order*
- 30 5. *Lock Until Power-Cycled Order*: The mobile station shall disable its transmitter and
31 record the reason for the *Lock Until Power-Cycled Order* in the mobile station's
32 semi-permanent memory ($LCKRSN_{S-p}$ equals the least-significant four bits of
33 $ORDQ_r$). The mobile station should notify the user of the locked condition. The
34 mobile station shall enter the *System Determination Substate* of the *Mobile Station
35 Initialization State*, and shall not enter the *System Access State* again until after the
36 next mobile station power-up or until it has received an *Unlock Order*. This
37 requirement shall take precedence over any other mobile station requirement
38 specifying entry to the *System Access State*.
- 39 6. *Maintenance Required Order*: The mobile station shall record the reason for the
40 *Maintenance Required Order* in the mobile station's semi-permanent memory
41 ($MAINTRSN_{S-p}$ equals the least-significant four bits of $ORDQ_r$). The mobile station

1 shall remain in the unlocked condition. The mobile station should notify the user
2 of the maintenance required condition.

3 7. SSD Update Message: If the mobile station receives this message while an access
4 attempt is in progress, the mobile station shall ignore the message. If the mobile
5 station receives this message after the acknowledgement to any message sent by
6 the mobile station in this substate, or if the acknowledgement is included in this
7 message, the mobile station shall respond to the message as specified in 6.3.12.1.9,
8 using the access procedures specified in 6.6.3.1.1.2.

9 8. Any other message: If the mobile station receives any other message with a
10 MSG_TYPE specified in Table 7.7.2.3-1, it shall process all layer 2 fields of the
11 message and may ignore all other fields. The mobile station may ignore all other
12 messages.

13 6.6.3.5 Mobile Station Origination Attempt Substate

14 In this substate, the mobile station sends an *Origination Message*. If the base station
15 responds to the *Origination Message* with an authentication request, the mobile station
16 responds in this substate.

17 Upon entering the *Mobile Station Origination Attempt Substate*, the mobile station shall send
18 the *Origination Message* using the access procedures specified in 6.6.3.1.1.2. The mobile
19 station shall include in the *Origination Message* as many of the dialed digits as possible
20 without exceeding the message capsule size. If message authentication is enabled (see
21 6.3.12.1), the mobile station shall calculate the values of the AUTHR and RANDC fields
22 using the current value of RAND_s.

23 While in this substate, the mobile station shall monitor the Paging Channel. If the mobile
24 station declares a loss of the Paging Channel (see 6.4.3), it shall disable its transmitter and
25 enter the *Mobile Station Idle State*. If the mobile station receives an acknowledgement to
26 any message sent by the mobile station in this substate, it shall end the access attempt. If
27 the acknowledgement was not included in a *Channel Assignment Message*, *Authentication*
28 *Challenge Message*, *Base Station Challenge Confirmation Order*, or *SSD Update Message*, the
29 mobile station shall set the *System Access State* timer to T_{42m}.

30 If the access attempt for the *Origination Message* ends by the receipt of an
31 acknowledgement from the base station, the mobile station shall update its registration
32 variables as specified in 6.6.5.5.3.1.

33 If the *System Access State* timer expires while in this substate, the mobile station shall
34 enter the *Mobile Station Idle State*.

35 If the mobile station is directed by the user to disconnect the call, the mobile station shall
36 abort any access attempt in progress and enter the *System Determination Substate* of the
37 *Mobile Station Initialization State*.

38 If the mobile station receives any of the following messages addressed to the mobile station,
39 then the mobile station shall process the message as follows

40 1. Authentication Challenge Message: If the mobile station receives this message while
41 an access attempt is in progress, the mobile station shall ignore the message. If

1 the mobile station receives this message after the acknowledgement to any message
 2 sent by the mobile station in this substate, or if the acknowledgement is included
 3 in this message, the mobile station shall disable the *System Access State* timer and
 4 respond to the message as specified in 6.3.12.1.5, using the access procedures
 5 specified in 6.6.3.1.1.2.

6 2. **Base Station Challenge Confirmation Order:** If the mobile station receives this
 7 message while an access attempt is in progress, the mobile station shall ignore the
 8 message. If the mobile station receives this message after the acknowledgement to
 9 any message sent by the mobile station in this substate, or if the acknowledgement
 10 is included in this message, the mobile station shall disable the *System Access*
 11 *State* timer and respond to the message as specified in 6.3.12.1.9, using the access
 12 procedures specified in 6.6.3.1.1.2.

13 3. **Channel Assignment Message:** The mobile station shall terminate any access
 14 attempt in progress. It shall then process the message as follows:

15 If ASSIGN_MODE_T equals '000', the mobile station shall store the Forward Traffic
 16 Channel code channel (CODE_CHAN_S = CODE_CHAN_T), the frame offset
 17 (FRAME_OFFSET_S = FRAME_OFFSET_T), the message encryption mode indicator
 18 (ENCRYPT_MODE_S = ENCRYPT_MODE_T), and, if FREQ_INCL_T equals '1', the
 19 frequency assignment (CDMACH_S = CDMA_FREQ_T), and then enter the *Traffic*
 20 *Channel Initialization Substate* of the *Mobile Station Control on the Traffic Channel*
 21 *State*.

22 If ASSIGN_MODE_T equals '001', the mobile station shall perform the following
 23 actions: If a CDMA channel (CDMA_FREQ) is specified in the assignment, the
 24 mobile station shall set CDMACH_S = CDMA_FREQ_T and shall tune to the new
 25 frequency assignment. The mobile station shall set ACC_MSG_SEQ_S to NULL (see
 26 6.6.2.2) and shall set PILOT_PN_S to the pilot PN sequence offset of the strongest
 27 pilot in the list (PILOT_PN_T). If the mobile station has not stored configuration
 28 parameters for the Primary Paging Channel of the new base station, or if the stored
 29 information is not current (see 6.6.2.2), the mobile station shall set CONFIG-
 30 _MSG_SEQ_S, SYS_PAR_MSG_SEQ_S, NGHBR_LST_MSG_SEQ_S, and CHAN_LST-
 31 _MSG_SEQ_S to NULL. The mobile station shall then begin monitoring the Primary
 32 Paging Channel of the selected base station. If RESPOND_T is equal to '1', the
 33 mobile station shall enter the *Update Overhead Information Substate* with an
 34 origination indication.

35 If ASSIGN_MODE_T equals '010' and RESPOND_T equals '1', the mobile station shall
 36 enter the *Initialization Task* with an origination indication (see 2.6.1).

37 If ASSIGN_MODE_T equals '011', the mobile station shall store the system
 38 identification (SID_S = SID_T), voice mobile station attenuation code (VMAC_S =
 39 VMAC_T), voice channel number (ANALOG_CHAN_S = ANALOG_CHAN_T), SAT color
 40 code (SCC_S = SCC_T), and message encryption mode indicator (MEM_S = MEM_T) and
 41 enter the *Confirm Initial Voice Channel Task* (see 2.6.4.2) with an origination
 42 indication.

- 1 4. **Feature Notification Message:** If $RELEASE_T$ is equal to '1', the mobile station shall
2 terminate any access attempt in progress and enter the *Mobile Station Idle State* or
3 the *System Determination Substate* of the *Mobile Station Initialization State*. If
4 $RELEASE_T$ is equal to '0', the mobile station shall reset the System Access State
5 timer to T_{42m} .
- 6 5. **Intercept Order:** The mobile station shall terminate any access attempt in progress
7 and enter the *Mobile Station Idle State*.
- 8 6. **Local Control Order**
- 9 7. **Lock Until Power-Cycled Order:** The mobile station shall disable its transmitter and
10 record the reason for the *Lock Until Power-Cycled Order* in the mobile station's
11 semi-permanent memory ($LCKRSN_{B-p}$ equals the least-significant four bits of
12 $ORDQ_T$). The mobile station should notify the user of the locked condition. The
13 mobile station shall enter the *System Determination Substate* of the *Mobile Station*
14 *Initialization State*, and shall not enter the *System Access State* again until after the
15 next mobile station power-up or until it has received an *Unlock Order*. This
16 requirement shall take precedence over any other mobile station requirement
17 specifying entry to the *System Access State*.
- 18 8. **Maintenance Required Order:** The mobile station shall record the reason for the
19 *Maintenance Required Order* in the mobile station's semi-permanent memory
20 ($MAINTRSN_{B-p}$ equals the least-significant four bits of $ORDQ_T$). The mobile station
21 shall remain in the unlocked condition. The mobile station should notify the user
22 of the maintenance required condition.
- 23 9. **Release Order:** The mobile station shall enter the *Mobile Station Idle State* or the
24 *System Determination Substate* of the *Mobile Station Initialization State*.
- 25 10. **Reorder Order:** The mobile station shall terminate any access attempt in progress
26 and enter the *Mobile Station Idle State*.
- 27 11. **SSD Update Message:** If the mobile station receives this message while an access
28 attempt is in progress, the mobile station shall ignore the message. If the mobile
29 station receives this message after the acknowledgement to any message sent by
30 the mobile station in this substate, or if the acknowledgement is included in this
31 message, the mobile station shall disable the *System Access State* timer and
32 respond to the message as specified in 6.3.12.1.9, using the access procedures
33 specified in 6.6.3.1.1.2.
- 34 12. **Any other message:** If the mobile station receives any other message with a
35 MSG_TYPE specified in Table 7.7.2.3-1, it shall process all layer 2 fields of the
36 message and may ignore all other fields. The mobile station may ignore all other
37 messages.

38 6.6.3.6 Registration Access Substate

39 In this substate, the mobile station sends a *Registration Message*. If the base station
40 responds with an authentication request, the mobile station responds in this substate.

1 Upon entering the *Registration Access Substate*, the mobile station shall send the
2 *Registration Message*, using the access procedures specified in 6.6.3.1.1.2. If message
3 authentication is enabled (see 6.3.12.1), the mobile station shall calculate the values of the
4 *AUTHR* and *RANDC* fields using the current value of *RANDg*.

5 While in this substate, the mobile station shall monitor the *Paging Channel*. If the mobile
6 station declares a loss of the *Paging Channel* (see 6.4.3), it shall disable its transmitter and
7 enter the *Mobile Station Idle State*. If the mobile station receives an acknowledgement to
8 any message sent by the mobile station in this substate, it shall end the access attempt. If
9 the acknowledgement was not included in an *Authentication Challenge Message*, *Base*
10 *Station Challenge Confirmation Order*, *SSD Update Message*, or *Release Order*, or if the
11 registration access was initiated due to a user direction to power down, the mobile station
12 shall do one of the following:

- 13 • If the registration access was initiated due to a user direction to power down, the
14 mobile station shall update registration variables as specified in 6.6.5.5.3.3 and may
15 power down.
- 16 • Otherwise, the mobile station shall enter the *Mobile Station Idle State*.

17 If the access attempt for a *Registration Message* ends by the receipt of an acknowledgement
18 from the base station, the mobile station shall update its registration variables as specified
19 in 6.6.5.5.3.1.

20 If the mobile station is directed by the user to originate a call, the mobile station may abort
21 any access attempt in progress and enter the *Mobile Station Origination Attempt Substate*.

22 If the mobile station receives a *Page Message* or a *Slotted Page Message*, the mobile station
23 may compare its *MIN* with the *MIN* in each record of the message. If a match is declared
24 (see 6.6.2.3), the mobile station shall abort any access attempt in progress and enter the
25 *Page Response Substate*.

26 If the mobile station receives any of the following messages addressed to the mobile station,
27 then the mobile station shall process the message as described.

28 1. *Authentication Challenge Message*: If the mobile station receives this message while
29 an access attempt is in progress, or if the registration access was initiated due to a
30 user direction to power down, the mobile station shall ignore the message. If the
31 mobile station receives this message after the acknowledgement to any message
32 sent by the mobile station in this substate, or if the acknowledgement is included
33 in this message, the mobile station shall respond to the message as specified in
34 6.3.12.1.5, using the access procedures specified in 6.6.3.1.1.2.

35 2. *Base Station Challenge Confirmation Order*: If the mobile station receives this
36 message while an access attempt is in progress, or if the registration access was
37 initiated due to a user direction to power down, the mobile station shall ignore the
38 message. If the mobile station receives this message after the acknowledgement to
39 any message sent by the mobile station in this substate, or if the acknowledgement
40 is included in this message, the mobile station shall respond to the message as
41 specified in 6.3.12.1.9, using the access procedures specified in 6.6.3.1.1.2.

42 3. *Feature Notification Message*

- 1 4. Local Control Order
- 2 5. Lock Until Power-Cycled Order: The mobile station shall disable its transmitter and
3 record the reason for the *Lock Until Power-Cycled Order* in the mobile station's
4 semi-permanent memory (LCKRSN_P-p equals the least-significant four bits of
5 ORDQ_r). The mobile station should notify the user of the locked condition. The
6 mobile station shall enter the *System Determination Substate* of the *Mobile Station*
7 *Initialization State*, and shall not enter the *System Access State* again until after the
8 next mobile station power-up or until it has received an *Unlock Order*. This
9 requirement shall take precedence over any other mobile station requirement
10 specifying entry to the *System Access State*.
- 11 6. Maintenance Required Order: The mobile station shall record the reason for the
12 *Maintenance Required Order* in the mobile station's semi-permanent memory
13 (MAINTRSN_P-p equals the least-significant four bits of ORDQ_r). The mobile station
14 shall remain in the unlocked condition. The mobile station should notify the user
15 of the maintenance required condition.
- 16 7. Registration Accepted Order
- 17 8. Registration Rejected Order
- 18 9. Release Order: The mobile station shall enter the *Mobile Station Idle State* or the
19 *System Determination Substate* of the *Mobile Station Initialization State*.
- 20 10. SSD Update Message: If the mobile station receives this message while an access
21 attempt is in progress, or if the registration access was initiated due to a user
22 direction to power down, the mobile station shall ignore the message. If the mobile
23 station receives this message after the acknowledgement to any message sent by
24 the mobile station in this substate, or if the acknowledgement is included in this
25 message, the mobile station shall respond to the message as specified in 6.3.12.1.9,
26 using the access procedures specified in 6.6.3.1.1.2.
- 27 11. Any other message: If the mobile station receives any other message with a
28 MSG_TYPE specified in Table 7.7.2.3-1, it shall process all layer 2 fields of the
29 message and may ignore all other fields. The mobile station may ignore all other
30 messages.

31 6.6.3.7 Mobile Station Message Transmission Substate

32 In this substate, the mobile station sends a *Data Burst Message*. If the base station
33 responds with an authentication request, the mobile station responds in this substate.

34 Support of this substate is optional.

35 Upon entering the *Mobile Station Message Transmission Substate*, the mobile station shall
36 transmit the *Data Burst Message* using the access procedures specified in 6.6.3.1.1.2.

37 While in this substate, the mobile station shall monitor the *Paging Channel*. If the mobile
38 station declares a loss of the *Paging Channel* (see 6.4.3), it shall disable its transmitter and
39 enter the *Mobile Station Idle State*. If the mobile station receives an acknowledgement to
40 any message sent by the mobile station in this substate, it shall end the access attempt. If

- 1 the acknowledgement was not included in an *Authentication Challenge Message*, *Base*
2 *Station Challenge Confirmation Order*, or *SSD Update Message*, the mobile station shall
3 enter the *Mobile Station Idle State*.
- 4 If the mobile station receives a *Page Message* or a *Slotted Page Message*, the mobile station
5 may compare its MIN with the MIN in each record of the message. If a match is declared
6 (see 6.6.2.3), the mobile station shall abort any access attempt in progress and enter the
7 *Page Response Substate*. The mobile station may store the message for later transmission.
- 8 If the mobile station receives any of the following messages addressed to the mobile station,
9 then the mobile station shall process the message as described.
- 10 1. *Authentication Challenge Message*: If the mobile station receives this message while
11 an access attempt is in progress, the mobile station shall ignore the message. If
12 the mobile station receives this message after the acknowledgement to any message
13 sent by the mobile station in this substate, or if the acknowledgement is included
14 in this message, the mobile station shall respond to the message as specified in
15 6.3.12.1.5, using the access procedures specified in 6.6.3.1.1.2.
 - 16 2. *Base Station Challenge Confirmation Order*: If the mobile station receives this
17 message while an access attempt is in progress, the mobile station shall ignore the
18 message. If the mobile station receives this message after the acknowledgement to
19 any message sent by the mobile station in this substate, or if the acknowledgement
20 is included in this message, the mobile station shall respond to the message as
21 specified in 6.3.12.1.9, using the access procedures specified in 6.6.3.1.1.2.
 - 22 3. *Data Burst Message*
 - 23 4. *Local Control Order*
 - 24 5. *Lock Until Power-Cycled Order*: The mobile station shall disable its transmitter and
25 record the reason for the *Lock Until Power-Cycled Order* in the mobile station's
26 semi-permanent memory ($LCKRSN_{8-p}$ equals the least-significant four bits of $ORDQ_7$). The mobile station should notify the user of the locked condition. The
27 mobile station shall enter the *System Determination Substate* of the *Mobile Station*
28 *Initialization State*, and shall not enter the *System Access State* again until after the
29 next mobile station power-up or until it has received an *Unlock Order*. This
30 requirement shall take precedence over any other mobile station requirement
31 specifying entry to the *System Access State*.
 - 32 6. *Maintenance Required Order*: The mobile station shall record the reason for the
33 *Maintenance Required Order* in the mobile station's semi-permanent memory
34 ($MAINTRSN_{8-p}$ equals the least-significant four bits of $ORDQ_7$). The mobile station
35 shall remain in the unlocked condition. The mobile station should notify the user
36 of the maintenance required condition.
 - 37 7. *SSD Update Message*: If the mobile station receives this message while an access
38 attempt is in progress, the mobile station shall ignore the message. If the mobile
39 station receives this message after the acknowledgement to any message sent by
40 the mobile station in this substate, or if the acknowledgement is included in this
41

1 message, the mobile station shall respond to the message as specified in 6.3.12.1.9,
2 using the access procedures specified in 6.6.3.1.1.2.

- 3 8. Any other message: If the mobile station receives any other message with a
4 MSG_TYPE specified in Table 7.7.2.3-1, it shall process all layer 2 fields of the
5 message and may ignore all other fields. The mobile station may ignore all other
6 messages.

7 6.6.4 Mobile Station Control on the Traffic Channel State

8 In this state, the mobile station communicates with the base station using the Forward and
9 Reverse Traffic Channels.

10 As illustrated in Figure 6.6.4-1, the *Mobile Station Control on the Traffic Channel State*
11 consists of the following substates:

- 12 • *Traffic Channel Initialization Substate* - In this substate, the mobile station verifies
13 that it can receive the Forward Traffic Channel and begins transmitting on the
14 Reverse Traffic Channel.
- 15 • *Waiting for Order Substate* - In this substate, the mobile station waits for an *Alert*
16 *With Information Message*.
- 17 • *Waiting for Mobile Station Answer Substate* - In this substate, the mobile station waits
18 for the user to answer the call.
- 19 • *Conversation Substate* - In this substate, the mobile station's primary service option
20 application exchanges primary traffic packets with the base station.
- 21 • *Release Substate* - In this substate, the mobile station disconnects the call.

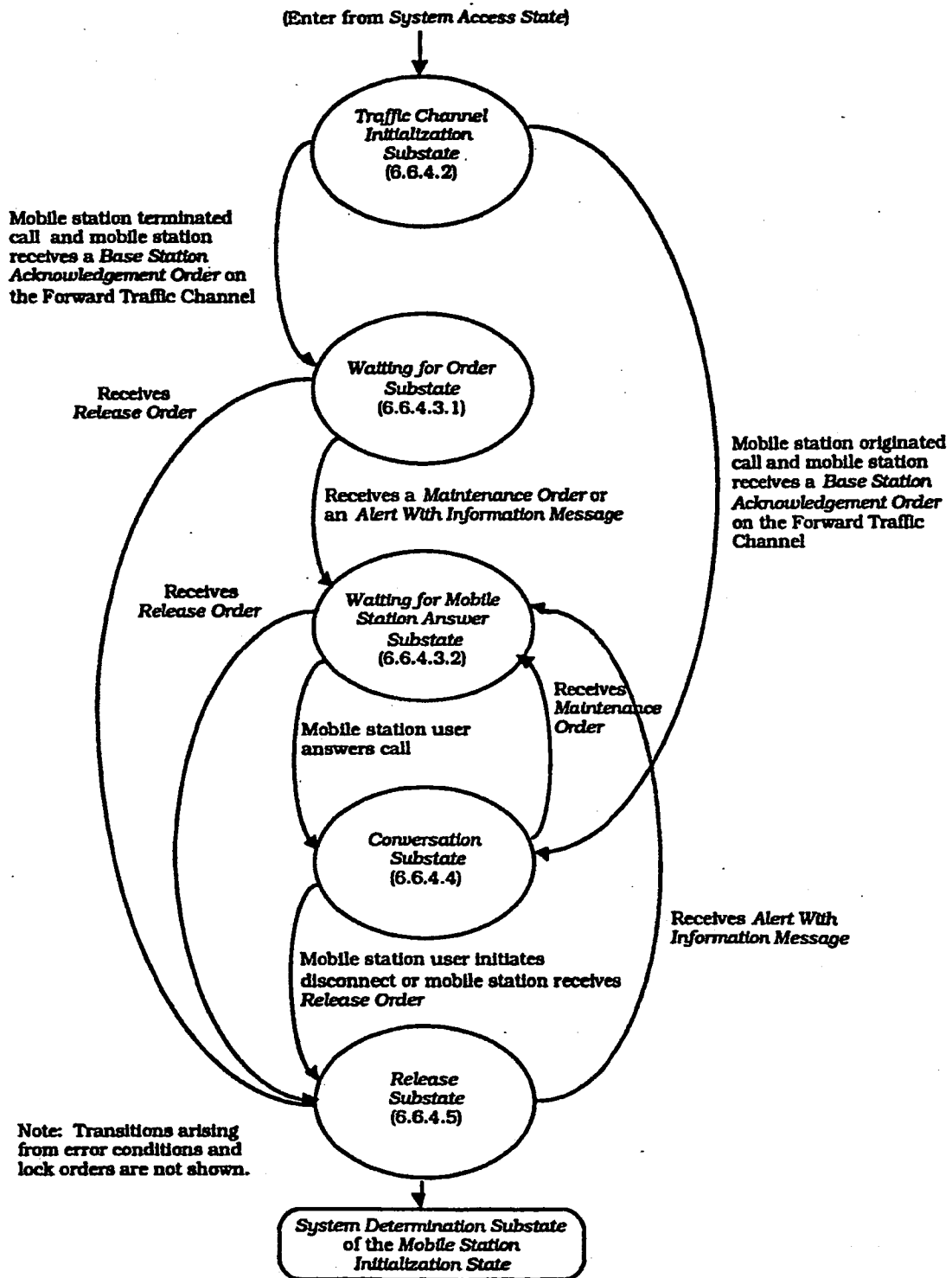


Figure 6.6.4-1. Mobile Station Control on the Traffic Channel State

6.6.4.1 Special Functions and Actions

The mobile station performs the following special functions and actions in one or more of the substates of the *Mobile Station Control on the Traffic Channel State*.

6.6.4.1.1 Forward Traffic Channel Power Control

To support Forward Traffic Channel power control, the mobile station reports frame error rate statistics to the base station. If the base station enables periodic reporting, the mobile station reports frame error rate statistics at specified intervals. If the base station enables threshold reporting, the mobile station reports frame error rate statistics when the frame error rate reaches a specified threshold.¹⁶

The mobile station shall maintain a counter (TOT_FRAMES_s) for the total number of received frames and a counter (BAD_FRAMES_s) for the number of received bad frames, where bad frames are defined as frame categories 9 and 10 (see 6.2.2.2).

The mobile station shall perform the following for each received frame:

- The mobile station shall increment TOT_FRAMES_s by 1.
- If the received frame is bad, the mobile station shall increment BAD_FRAMES_s by 1.
- If either
 - PWR_THRESH_ENABLE_s is equal to '1' and BAD_FRAMES_s is equal to PWR_REP_THRESH_s or
 - PWR_PERIOD_ENABLE_s is equal to '1' and TOT_FRAMES_s is equal to $\lfloor (2(\text{PWR_REP_FRAMES}_s/2) \times 5) \rfloor$,

the mobile station shall send a *Power Measurement Report Message* to the base station.

- If TOT_FRAMES_s is equal to $\lfloor (2(\text{PWR_REP_FRAMES}_s/2) \times 5) \rfloor$, the mobile station shall set TOT_FRAMES_s and BAD_FRAMES_s to zero.

After sending a *Power Measurement Report Message*, the mobile station shall set TOT_FRAMES_s and BAD_FRAMES_s to zero and shall not increment either counter for a period of PWR_REP_DELAY_s × 4 frames following the first transmission of the message.

6.6.4.1.1.1 Forward Traffic Channel Power Control Initialization

To initialize Forward Traffic Channel power control, the mobile station shall set TOT_FRAMES_s and BAD_FRAMES_s to zero.

6.6.4.1.1.2 Processing the Power Control Parameters Message

The mobile station shall store the following parameters from the *Power Control Parameters Message*:

¹⁶Both periodic and threshold reporting may be enabled simultaneously, either one of them may be enabled, or both forms of reporting may be disabled at any given time.

- 1 • Power control reporting threshold ($PWR_REP_THRESH_s = PWR_REP_THRESH_r$)
- 2 • Power control reporting frame count ($PWR_REP_FRAMES_s = PWR_REP_FRAMES_r$)
- 3 • Threshold report mode indicator
- 4 ($PWR_THRESH_ENABLE_s = PWR_THRESH_ENABLE_r$)
- 5 • Periodic report mode indicator
- 6 ($PWR_PERIOD_ENABLE_s = PWR_PERIOD_ENABLE_r$)
- 7 • Power report delay ($PWR_REP_DELAY_s = PWR_REP_DELAY_r$)

8 The mobile station shall set TOT_FRAMES_s and BAD_FRAMES_s to zero.

9 6.6.4.1.2 Service Options

10 6.6.4.1.2.1 Overview

11 During Traffic Channel operation, the mobile station and base station may support primary
12 traffic services. Each such service, referred to as a service option, has a set of requirements
13 that govern the way in which the primary traffic bits (see 7.1.3.5.11 and 6.1.3.3.11) from
14 forward and reverse Traffic Channel frames are processed by the mobile station and base
15 station.

16 Either the mobile station or base station can request a service option. The mobile station
17 can request a particular service option at the time of call origination, when responding to a
18 page, or during Traffic Channel operation. If the service option request is acceptable to the
19 base station, the mobile station and base station begin using the new service option. If the
20 mobile station requests a service option that is not acceptable to the base station, the base
21 station can reject the requested service option or request an alternative service option. If
22 the base station requests an alternative service option, the mobile station can accept or
23 reject the base station's alternative service option, or request another service option. This
24 process, called service option negotiation, ends when the mobile station and base station
25 find a mutually acceptable service option, or when the mobile station rejects a service
26 option request from the base station or the base station rejects a service option request
27 from the mobile station.

28 The mobile station and base station use the *Service Option Request Order* either to request a
29 service option or suggest an alternative service option, and the *Service Option Response*
30 *Order* to accept or reject a service option request. In addition, the mobile station can
31 request a service option in the *Origination Message* or the *Page Response Message*, and the
32 base station can request a service option in the *Page Message* or the *Slotted Page Message*.
33 The mobile station and base station use the *Service Option Control Order* to invoke service
34 option specific functions.

35 The mobile station uses a variable (SO_REQ_s) to record the number of the service option for
36 which the mobile station has sent an outstanding request, either in an *Origination Message*,
37 a *Page Response Message*, or a *Service Option Request Order*. SO_REQ_s is set to a special
38 value, NULL, when the mobile station does not have an outstanding service option request.
39 The mobile station uses another variable (SO_CUR_s) to record the number of the service

1 option which is currently active. SO_CUR_s is set to NULL when there is no active service
2 option.

3 6.6.4.1.2.2 Requirements

4 6.6.4.1.2.2.1 Processing the *Service Option Request Order*

5 When the mobile station receives a *Service Option Request Order*, it shall perform the
6 following:

- 7 • If the mobile station accepts the requested service option, the mobile station shall set
8 SO_REQ_s to NULL and shall send a *Service Option Response Order* accepting the
9 requested service option within T_{58m} seconds. The mobile station shall interpret the
10 message action time of the *Service Option Request Order* in accordance with the
11 requirements for the requested service option and shall begin using the requested
12 service option in accordance with those requirements. The mobile station shall set
13 SO_CUR_s to the requested service option number when the service option becomes
14 active.
- 15 • If the mobile station does not accept the requested service option and has an
16 alternative service option to request, the mobile station shall set SO_REQ_s to the
17 alternative service option number and shall send a *Service Option Request Order*
18 requesting the alternative service option within T_{58m} seconds.
- 19 • If the mobile station does not accept the requested service option and does not have
20 an alternative service option to request, the mobile station shall set SO_REQ_s to
21 NULL and shall send a *Service Option Response Order* to reject the request within
22 T_{58m} seconds. The mobile station shall continue to process primary traffic as it did
23 prior to receiving the *Service Option Request Order* and shall remain in the current
24 state.

25 6.6.4.1.2.2.2 Processing the *Service Option Response Order*

26 When the mobile station receives a *Service Option Response Order*, it shall perform the
27 following:

- 28 • If the service option number specified in the order is equal to SO_REQ_s, the mobile
29 station shall set SO_REQ_s to NULL. The mobile station shall interpret the message
30 action time of the *Service Option Response Order* in accordance with the require-
31 ments for the specified service option, and shall begin using the specified service
32 option in accordance with those requirements. The mobile station shall set SO_CUR_s
33 to the specified service option number when the service option becomes active.
- 34 • If the order indicates a service option rejection, the mobile station shall set SO_REQ_s
35 to NULL. The mobile station shall continue to process primary traffic as it did prior
36 to receiving the *Service Option Response Order* and shall remain in the current state.
- 37 • If the order does not indicate a service option rejection and the service option
38 specified in the order is not equal to SO_REQ_s, the mobile station shall set SO_REQ_s
39 to NULL and shall send a *Mobile Station Reject Order* (ORDQ = '00000100') within
40 T_{58m} seconds. The mobile station shall continue to process primary traffic as it did

1 prior to receiving the *Service Option Response Order* and shall remain in the current
2 state.

3 6.6.4.1.2.2.3 Processing the Received *Service Option Control Order*

4 If there is an active service option (SO_CUR_s is not equal to NULL), the mobile station shall
5 interpret the message action time of the *Service Option Control Order* in accordance with the
6 requirements for the active service option and shall process the *Service Option Control Order*
7 in accordance with those requirements; otherwise, the mobile station shall send a *Mobile*
8 *Station Reject Order* ($ORDQ = '00000001'$) within T_{56m} seconds.

9 6.6.4.1.2.2.4 Service Option Request Initialization

10 To perform service option request initialization, the mobile station shall set SO_REQ_s to the
11 specified service option number.

12 6.6.4.1.3 Acknowledgement Procedures

13 The acknowledgement procedures facilitate the reliable exchange of messages between the
14 base station and the mobile station. The mobile station uses the fields ACK_SEQ
15 (acknowledgement sequence number), MSG_SEQ (message sequence number) and
16 ACK_REQ (acknowledgement required indicator) to detect duplicate messages and provide a
17 reference for acknowledgements. These message fields are referred to as layer 2 fields, and
18 the acknowledgement procedures are referred to as layer 2 procedures. All other message
19 fields are referred to as layer 3 fields, and the processing of layer 3 fields is referred to as
20 layer 3 processing. (See Appendix C for further discussion of layering.)

21 On both the Forward Traffic Channel and the Reverse Traffic Channel, the procedure for
22 messages requiring acknowledgement is a selective repeat scheme in which a message is
23 retransmitted only if an acknowledgement for it is not received.

24 6.6.4.1.3.1 Messages Requiring Acknowledgement

25 A Traffic Channel message requires acknowledgement when the ACK_REQ field is set to '1'.

26 6.6.4.1.3.1.1 Transmitting Messages and Receiving Acknowledgements

27 The Layer 2 protocol does not guarantee delivery of messages in any order. If the mobile
28 station requires that the base station receive a set of messages in a certain order, the
29 mobile station must wait for an acknowledgement to each message before transmitting the
30 next message in the set. For messages requiring acknowledgement whose relative ordering
31 is not important, the mobile station may transmit up to four such messages before
32 receiving an acknowledgement for the first message.

33 The mobile station shall store a message sequence number for messages requiring
34 acknowledgement ($MSG_SEQ_ACK_s$). The mobile station shall store an acknowledgement
35 status indicator ($ACK_WAITING_s[n]$, where n is 0 through 7) for each possible value of the
36 Reverse Traffic Channel message MSG_SEQ field. The mobile station shall not send a new
37 message requiring acknowledgement when $ACK_WAITING_s[(MSG_SEQ_ACK_s + 4) \bmod 8]$ is
38 equal to YES.

The mobile station shall perform the following procedures:

- When the mobile station receives any message on the Forward Traffic Channel, it shall set $ACK_WAITING_s[ACK_SEQ_r]$ to NO.
- When the mobile station sends a new message requiring acknowledgement on the Reverse Traffic Channel, it shall set $ACK_WAITING_s[MSG_SEQ_ACK_s]$ to YES and shall set the MSG_SEQ field of the message to $MSG_SEQ_ACK_s$. The mobile station shall then increment $MSG_SEQ_ACK_s$, modulo 8.

The mobile station shall not retransmit a message for which it has received an acknowledgement.

If the mobile station has not received an acknowledgement within T_{1m} seconds after transmitting the message, the mobile station shall retransmit the message (see Figure 6.6.4.1.3.1.1-1). If the mobile station retransmits a message, the mobile station shall use the same MSG_SEQ number for the retransmission. The mobile station shall not retransmit a message sooner than T_{1m} seconds after the previous transmission of the same message.

The mobile station shall store a retransmission counter ($RETRY_COUNT_s$) for each transmitted message requiring acknowledgement. The mobile station shall set $RETRY_COUNT_s$ to zero prior to the first transmission of the message. After each transmission of the message, the mobile station shall increment $RETRY_COUNT_s$ if no acknowledgement is received. When $RETRY_COUNT_s$ is equal to N_{1m} , the mobile station shall declare an acknowledgement failure.

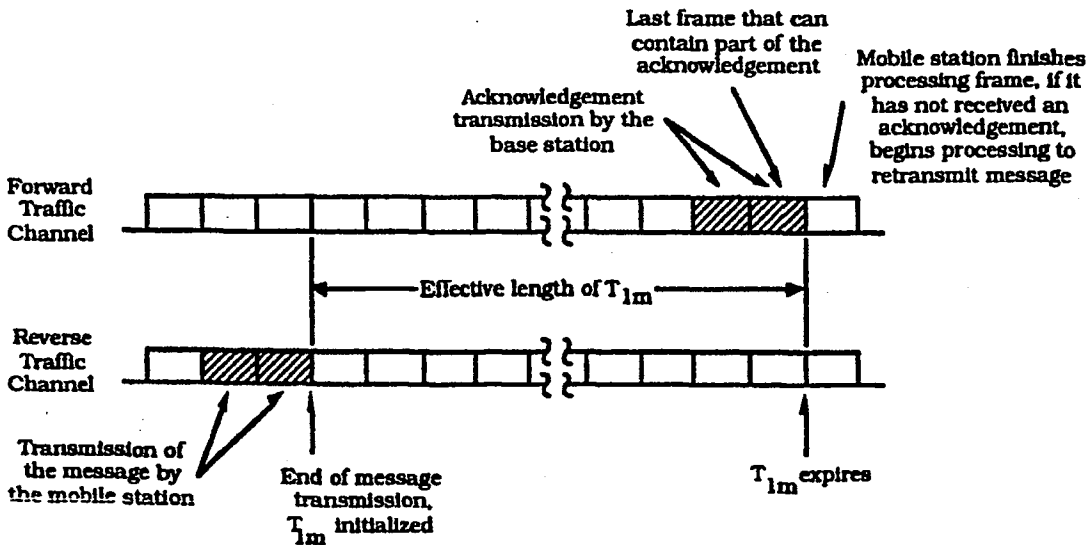


Figure 6.6.4.1.3.1.1-1. Time Limit for Acknowledgement of Reverse Traffic Channel Messages

1 6.6.4.1.3.1.2 Receiving Messages and Returning Acknowledgements

2 Messages received on the Forward Traffic Channel contain MSG_SEQ fields that are
 3 incremented by the same rules as messages transmitted on the Reverse Traffic Channel.
 4 Separate sequence numbers are maintained for Forward Traffic Channel Messages that
 5 require acknowledgement and for messages that do not require acknowledgement.

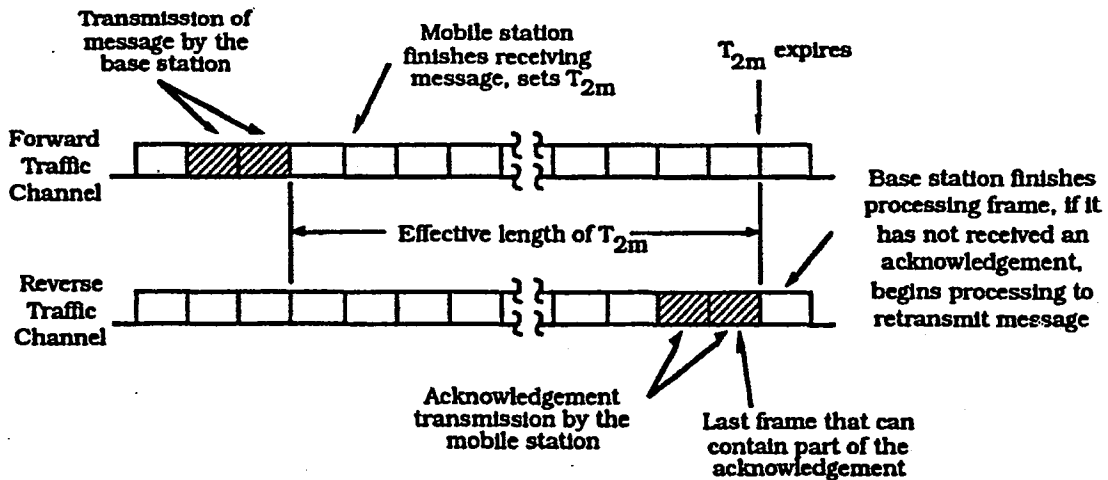
6 The mobile station acknowledges a received message by transmitting a message with the
 7 ACK_SEQ field set equal to the MSG_SEQ field of the received message. A message
 8 transmitted with the ACK_SEQ field set in this manner is referred to as including an
 9 acknowledgement of the received message.

10 Whenever a message requiring acknowledgement is received, the mobile station shall set
 11 the ACK_SEQ field of subsequent Reverse Traffic Channel messages to MSG_SEQ_r. If no
 12 message has been received, the mobile station shall set this field to '111'.

13 After receiving a message requiring acknowledgement, the mobile station shall transmit a
 14 message including an acknowledgement within T_{2m} seconds as shown in Figure
 15 6.6.4.1.3.1.2-1.

16 When a received message requires acknowledgement and no message is available within
 17 T_{2m} seconds after the message is received, the mobile station shall transmit a *Mobile
 18 Station Acknowledgement Order* including the acknowledgement. The *Mobile Station
 19 Acknowledgement Order* shall be sent as a message not requiring acknowledgement.

20



21

22 **Figure 6.6.4.1.3.1.2-1. Time Limit for Acknowledgement of Forward Traffic Channel**
 23 **Messages**

24

25 For duplicate message detection, the mobile station shall store a received status indicator
 26 for each possible value of the Forward Traffic Channel message MSG_SEQ field
 27 (MSG_SEQ_RCVD_s[n], where n is 0 through 7). The mobile station shall perform the
 28 following procedures:

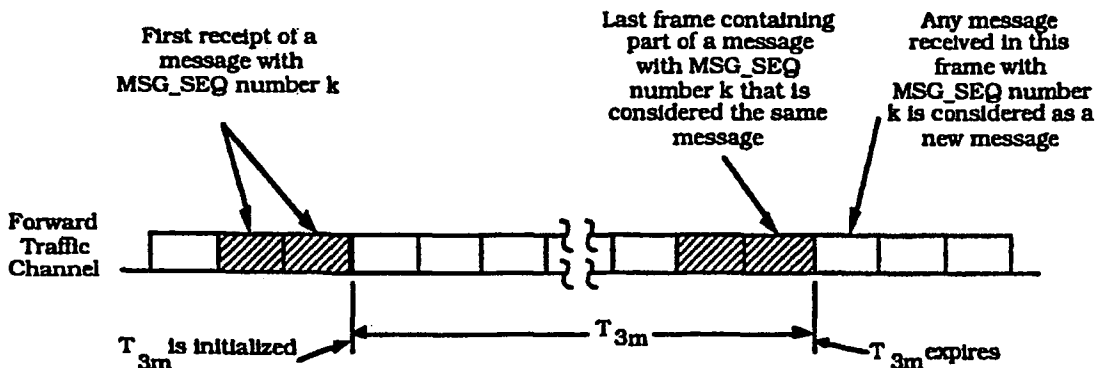
- 1 • When a message requiring acknowledgement is received with message sequence
2 number MSG_SEQ_r , and $MSG_SEQ_RCVD_s[MSG_SEQ_r]$ is equal to NO, the mobile
3 station shall process the message as a new message. The mobile station shall then
4 set $MSG_SEQ_RCVD_s[MSG_SEQ_r]$ to YES, and shall set
5 $MSG_SEQ_RCVD_s[(4 + MSG_SEQ_r) \bmod 8]$ to NO.
- 6 • When a message requiring acknowledgement is received with message sequence
7 number MSG_SEQ_r , and $MSG_SEQ_RCVD_s[MSG_SEQ_r]$ is equal to YES, the mobile
8 station shall acknowledge the message but shall not perform any further processing
9 of the message.

10 **6.6.4.1.3.2 Messages Not Requiring Acknowledgement**

11 A Traffic Channel message does not require acknowledgement when the ACK_REQ field is
12 set to '0'.

13 The mobile station shall store a message sequence number for messages not requiring
14 acknowledgement ($MSG_SEQ_NOACK_s$). For each new message sent that does not require
15 acknowledgement, the mobile station shall set the MSG_SEQ field of the message to
16 $MSG_SEQ_NOACK_s$ and shall then increment $MSG_SEQ_NOACK_s$, modulo 8.

17 The mobile station shall consider all messages received within T_{3m} seconds that do not
18 require acknowledgement and have the same MSG_SEQ number to be duplicates, as shown
19 in Figure 6.6.4.1.3.2-1. If the mobile station receives multiple copies of a message as
20 determined by the MSG_SEQ number, it shall discard the duplicate copies.



22
23 **Figure 6.6.4.1.3.2-1. Time Window for Detecting Duplicate Messages not Requiring**
24 **Acknowledgement**

25
26 **6.6.4.1.3.3 Acknowledgement Procedures Reset**

27 The mobile station shall reset the acknowledgement procedures as follows:

- 28 • Message sequence number reset.
- 29 • If $ACK_WAITING_s[n]$ is equal to YES for any n , the mobile station should save the
30 corresponding messages and retransmit them after completing the reset of the

- 1 acknowledgement procedures. For each such message the mobile station shall
2 set the retransmission counter (RETRY_COUNT_s) to zero.
- 3 • The mobile station shall set MSG_SEQ_ACK_s to 0, MSG_SEQ_NOACK_s to 0, and
4 shall set ACK_WAITING_s[n] to NO for all values of n from 0 to 7.
 - 5 • Acknowledgement sequence number reset. The mobile station shall set the
6 ACK_SEQ field of all Reverse Traffic Channel messages to '111' until the first
7 message requiring acknowledgement is received.
 - 8 • Duplicate detection reset. The mobile station shall set MSG_SEQ_RCVD_s[n] to NO
9 for all values of n from 0 to 7.

10 6.6.4.1.4 Processing the *In-Traffic System Parameters Message*

11 The mobile station shall store the following parameters from the *In-Traffic System*
12 *Parameters Message*:

- 13 • System identification (SID_s = SID_r)
- 14 • Network identification (NID_s = NID_r)
- 15 • Search window size for the Active Set and the Candidate Set
16 (SRCH_WIN_A_s = SRCH_WIN_A_r)
- 17 • Search window size for the Neighbor Set (SRCH_WIN_N_s = SRCH_WIN_N_r)
- 18 • Search window size for the Remaining Set (SRCH_WIN_R_s = SRCH_WIN_R_r)
- 19 • Pilot detection threshold (T_ADD_s = T_ADD_r)
- 20 • Pilot drop threshold T_DROP_s = T_DROP_r)
- 21 • Active Set versus Candidate Set comparison threshold (T_COMP_s = T_COMP_r)
- 22 • Drop timer value (T_TDROP_s = T_TDROP_r)
- 23 • Maximum age for retention of Neighbor Set members
24 (NGHBR_MAX_AGE_s = NGHBR_MAX_AGE_r)

25 The mobile station shall determine its roaming status (see 6.6.5.3). The mobile station
26 should indicate to the user whether the mobile station is roaming.

27 6.6.4.1.5 Message Action Times

28 A message without a USE_TIME field or with a USE_TIME field set to '0' has an implicit
29 action time. A message whose USE_TIME field is set to '1' has an explicit action time which
30 is specified in the ACTION_TIME field of the message. A message with a future action time
31 is called a pending message.

32 Unless otherwise specified, a message having an implicit action time shall take effect no
33 later than the first 80 ms boundary (relative to System Time) occurring at least 80 ms after
34 the end of the frame containing the last bit of the message. A message with an explicit
35 action time shall take effect when System Time (in 80 ms units) modulo 64 becomes equal
36 to the message's ACTION_TIME field. The difference in time between ACTION_TIME and the
37 end of the frame containing the last bit of the message shall be at least 80 ms.

1 The mobile station shall support one pending message at any given time, not including
2 pending *Service Option Control Orders*. The number of pending *Service Option Control*
3 *Orders* that the mobile station is required to support is specific to the service option (see the
4 relevant service option description).

5 6.6.4.1.6 Long Code Transition Request Processing

6 The mobile station performs these procedures upon receiving a *Long Code Transition*
7 *Request Order*.

8 If the *Long Code Transition Request Order* requests a transition to the private long code, and
9 the mobile station is able to generate the private long code (see 6.3.12.3), and the mobile
10 station accepts the request, the mobile station shall send a *Long Code Transition Response*
11 *Order* (ORDQ = '00000011') within T_{56m} seconds. The mobile station shall use the private
12 long code on both the Forward Traffic Channel and the Reverse Traffic Channel. If
13 USE_TIME equals '0', the mobile station shall begin using the private long code at the first
14 80 ms boundary (relative to the start of System Time) after N_{4m} frames from the end of the
15 response transmission. The mobile station should indicate to the user that the voice
16 privacy mode is active. If the *Long Code Transition Request Order* requests a private long
17 code transition, and the mobile station is not able to generate the private long code or the
18 mobile station does not accept the request, the mobile station shall send a *Long Code*
19 *Transition Response Order* (ORDQ = '00000010') within T_{56m} seconds.

20 If the *Long Code Transition Request Order* requests a transition to the public long code and
21 the mobile station accepts the request, the mobile station shall send a *Long Code Transition*
22 *Response Order* (ORDQ = '00000010') within T_{56m} seconds. The mobile station should
23 indicate to the user that the voice privacy mode is inactive. If the *Long Code Transition*
24 *Request Order* requests a public long code transition, and the mobile station does not
25 accept the request, the mobile station shall send a *Long Code Transition Response Order*
26 (ORDQ = '00000011') within T_{56m} seconds.

27 6.6.4.2 Traffic Channel Initialization Substate

28 In this substate, the mobile station verifies that it can receive the Forward Traffic Channel
29 and begins transmitting on the Reverse Traffic Channel.

30 Upon entering the *Traffic Channel Initialization Substate*, the mobile station shall perform
31 the following:

- 32 • The mobile station shall perform registration initialization as specified in 6.6.5.5.4.1.
- 33 • The mobile station shall reset the acknowledgement procedures as specified in
34 6.6.4.1.3.3.
- 35 • The mobile station shall initialize Forward Traffic Channel power control as specified
36 in 6.6.4.1.1.1.
- 37 • The mobile station shall set SO_CUR_s to NULL to indicate that there is no active
38 service option.

- 1 • If the call is mobile station originated and the *Origination Message* requests a special
2 service option, the mobile station shall perform service option request initialization
3 (see 6.6.4.1.2.2.4) specifying the special service option number.
- 4 • If the call is mobile station originated and the *Origination Message* does not request a
5 special service option, the mobile station shall perform service option request
6 initialization (see 6.6.4.1.2.2.4) specifying 1 (the default service option number).
- 7 • If the call is mobile station terminated, the mobile station shall perform service
8 option request initialization (see 6.6.4.1.2.2.4) specifying the service option number
9 requested in the *Page Response Message*.

10 While in the *Traffic Channel Initialization Substate*, the mobile station shall perform the
11 following:

- 12 • The mobile station shall perform pilot strength measurements as specified in
13 6.6.6.2.2, but shall not send *Pilot Strength Measurement Messages*.
- 14 • The mobile station shall perform registration timer maintenance as specified in
15 6.6.5.5.4.2.

16 If the mobile station does not support the assigned CDMA Channel (see 6.2.1.1) or the
17 assigned Forward Traffic code channel (see 7.1.3.1.8), the mobile station shall enter the
18 *System Determination Substate* of the *Mobile Station Initialization State*.

19 If the mobile station supports the assigned CDMA Channel and the assigned Forward
20 Traffic code channel, the mobile station shall perform the following:

- 21 • The mobile station shall tune to the assigned CDMA Channel.
- 22 • The mobile station shall set its code channel for the assigned Forward Traffic code
23 channel.
- 24 • The mobile station shall set its Forward and Reverse Traffic Channel frame offsets to
25 the assigned frame offset as determined by $FRAME_OFFSET_s$.
- 26 • The mobile station shall set its Forward and Reverse Traffic Channel long code masks
27 to the public long code mask (see 6.1.3.1.8).

28 If the mobile station does not receive N_{5m} consecutive good frames within T_{50m} seconds
29 after entering this substate, the mobile station shall enter the *System Determination*
30 *Substate* of the *Mobile Station Initialization State*.

31 If the mobile station receives N_{5m} consecutive good frames within T_{50m} seconds after
32 entering this substate, the mobile station shall perform the following additional functions
33 while it remains in the *Traffic Channel Initialization Substate*:

- 34 • The mobile station shall perform Forward Traffic Channel supervision as specified in
35 6.4.4. If a loss of the Forward Traffic Channel is declared, the mobile station shall
36 enter the *System Determination Substate* of the *Mobile Station Initialization State*.
- 37 • The mobile station shall adjust its transmit power as specified in 6.1.2.3.
- 38 • The mobile station shall transmit the Traffic Channel preamble as specified in
39 6.1.3.3.2.3.

- 1 • The mobile station shall perform the acknowledgement procedures as specified in
2 6.6.4.1.3. If an acknowledgement failure is declared, the mobile station shall disable
3 its transmitter and enter the *System Determination Substate of the Mobile Station*
4 *Initialization State*.

5 If the mobile station does not receive a *Base Station Acknowledgement Order* within T_{51m}
6 seconds after entering this substate, the mobile station shall disable its transmitter and
7 enter the *System Determination Substate of the Mobile Station Initialization State*.

8 If the mobile station receives a *Base Station Acknowledgement Order* within T_{51m} seconds
9 after entering this substate, the mobile station shall perform the following:

- 10 • If the call is mobile station terminated, the mobile station shall enter the *Waiting for*
11 *Order Substate*.
- 12 • If the call is mobile station originated, the mobile station shall enter the *Conversation*
13 *Substate*.

14 6.6.4.3 Alerting

15 6.6.4.3.1 Waiting for Order Substate

16 In this substate, the mobile station waits for an *Alert With Information Message*.

17 Upon entering the *Waiting for Order Substate*, the mobile station shall set the substate
18 timer for T_{52m} seconds.

19 While in the *Waiting for Order Substate*, the mobile station shall perform the following:

- 20 • If the substate timer expires, the mobile station shall disable its transmitter and
21 enter the *System Determination Substate of the Mobile Station Initialization State*.
- 22 • The mobile station shall perform Forward Traffic Channel supervision as specified in
23 6.4.4. If a loss of the Forward Traffic Channel is declared, the mobile station shall
24 enter the *System Determination Substate of the Mobile Station Initialization State*.
- 25 • The mobile station shall adjust its transmit power as specified in 6.1.2.3.
- 26 • The mobile station shall perform Forward Traffic Channel power control as specified
27 in 6.6.4.1.1.
- 28 • The mobile station shall perform handoff processing as specified in 6.6.6.
- 29 • If there is an active service option (SO_CUR_9 is not equal to NULL), the mobile station
30 shall process the received primary traffic bits in accordance with the requirements for
31 the active service option; otherwise, the mobile station shall discard the received
32 primary traffic bits.
- 33 • If there is an active service option (SO_CUR_9 is not equal to NULL), the mobile station
34 shall transmit primary traffic bits in accordance with the requirements for the active
35 service option; otherwise, the mobile station shall transmit null Traffic Channel data.
- 36 • The mobile station shall perform registration timer maintenance as specified in
37 6.6.5.5.4.2.

- 1 • If the mobile station is directed by the user to transmit a message, the mobile station
2 shall send a *Data Burst Message*.
- 3 • If the mobile station is directed by the user to request a service option, the mobile
4 station shall perform service option request initialization (see 6.6.4.1.2.2.4) specifying
5 the requested service option number, and shall send a *Service Option Request Order*
6 (**ORDQ** = requested service option number).
- 7 • If there is an active service option (**SO_CUR_g** is not equal to **NULL**), the mobile station
8 may send a *Service Option Control Order* (**ORDQ** = function code) to invoke a service
9 option specific function in accordance with the requirements for the active service
10 option.
- 11 • If the mobile station is directed by the user to request a private long code transition
12 and has the long code mask (see 6.3.12.3), the mobile station shall send a *Long Code*
13 *Transition Request Order* (**ORDQ** = '00000001') as a message requiring
14 acknowledgement.
- 15 • If the mobile station is directed by the user to request a public long code transition,
16 the mobile station shall send a *Long Code Transition Request Order* (**ORDQ** =
17 '00000000') as a message requiring acknowledgement.
- 18 • If the mobile station is directed by the user to operate in analog mode, the mobile
19 station shall send the *Request Analog Service Order* as a message requiring
20 acknowledgement.
- 21 • If the mobile station is directed by the user to power down, the mobile station shall
22 enter the *Release Substate* with a power-down indication (see 6.6.4.5).
- 23 • The mobile station shall perform the acknowledgement procedures as specified in
24 6.6.4.1.3. If an acknowledgement failure is declared, the mobile station shall disable
25 its transmitter and enter the *System Determination Substate of the Mobile Station*
26 *Initialization State*.
- 27 • If the mobile station receives a message which is included in the following list and
28 every message field value is within its permissible range, the mobile station shall
29 process the message as described below and in accordance with the message's action
30 time (see 6.6.4.1.5).
 - 31 1. ***Alert With Information Message:*** If the message contains a Signal information
32 record, the mobile station should alert the user in accordance with the Signal
33 information record; otherwise, the mobile station should use Standard Alert as
34 defined in 7.7.5.5. The mobile station shall enter the *Waiting for Mobile Station*
35 *Answer Substate* (see 6.6.4.3.2).
 - 36 2. ***Analog Handoff Direction Message:*** The mobile station shall process the message
37 as specified in 6.6.6.2.9, and enter the *Waiting For Order Task* (see 2.6.4.3.1)
38 with a handoff from CDMA indication.
 - 39 3. ***Audit Order***

- 1 4. **Authentication Challenge Message:** The mobile station shall reset the substate
2 timer for T_{52m} seconds. The mobile station shall then process the message and
3 respond as specified in 6.3.12.1.5 within T_{32m} seconds.
- 4 5. **Base Station Acknowledgement Order**
- 5 6. **Base Station Challenge Confirmation Order:** The mobile station shall reset the
6 substate timer for T_{52m} seconds. The mobile station shall then process the
7 message and respond with an *SSD Update Confirmation Order* or *SSD Update*
8 *Rejection Order* as specified in 6.3.12.1.9 within T_{32m} seconds.
- 9 7. **Data Burst Message**
- 10 8. **Handoff Direction Message:** The mobile station shall process the message as
11 specified in 6.6.6.2.5.1. The mobile station shall reset the substate timer for
12 T_{52m} seconds.
- 13 9. **In-Traffic System Parameters Message:** The mobile station shall process the
14 message as specified in 6.6.4.1.4.
- 15 10. **Local Control Order**
- 16 11. **Lock Until Power-Cycled Order:** The mobile station shall disable its transmitter
17 and record the reason for the *Lock Until Power-Cycled Order* in the mobile
18 station's semi-permanent memory ($LCKRSN_{S-p}$ equals the least-significant
19 four bits of $ORDQ_r$). The mobile station should notify the user of the locked
20 condition. The mobile station shall enter the *System Determination Substate* of
21 the *Mobile Station Initialization State*, and shall not enter the *System Access*
22 *State* again until after the next mobile station power-up or until it has received
23 an *Unlock Order*. This requirement shall take precedence over any other mobile
24 station requirement specifying entry to the *System Access State*.
- 25 12. **Long Code Transition Request Order:** The mobile station shall process the
26 message as specified in 6.6.4.1.6.
- 27 13. **Maintenance Order:** The mobile station shall enter the *Waiting for Mobile Station*
28 *Answer Substate*.
- 29 14. **Maintenance Required Order:** The mobile station shall record the reason for the
30 *Maintenance Required Order* in the mobile station's semi-permanent memory
31 ($MAINTRSN_{S-p}$ equals the least-significant four bits of $ORDQ_r$). The mobile
32 station shall remain in the unlocked condition. The mobile station should notify
33 the user of the maintenance required condition.
- 34 15. **Message Encryption Mode Order:** The mobile station shall process the message
35 as specified in 6.3.12.2.
- 36 16. **Mobile Station Registered Message:** The mobile station shall process the
37 message as specified in 6.6.5.5.4.3.
- 38 17. **Neighbor List Update Message:** The mobile station shall process the message as
39 specified in 6.6.6.2.6.3.

- 1 **18. Parameter Update Order:** The mobile station shall reset the substate timer for
2 **T_{52m}** seconds. The mobile station shall increment COUNT_{s-p} (see 2.3.12.1.3).
3 The mobile station shall send a *Parameter Update Confirmation Order* within
4 **T_{56m}** seconds. The mobile station shall set the ORDQ field of the *Parameter*
5 ***Update Confirmation Order*** to the same value as the ORDQ field of the
6 ***Parameter Update Order***.
- 7 **19. Pilot Measurement Request Order:** The mobile station shall process the order as
8 specified in 6.6.6.2.5.1.
- 9 **20. Power Control Parameters Message:** The mobile station shall process the
10 message as specified in 6.6.4.1.1.2.
- 11 **21. Release Order:** The mobile station shall enter the *Release Substate* with a base
12 station release indication (see 6.6.4.5).
- 13 **22. Retrieve Parameters Message:** The mobile station shall send, within T_{56m}
14 seconds, a *Parameters Response Message*.
- 15 **23. Service Option Control Order:** The mobile station shall process the message as
16 specified in 6.6.4.1.2.2.3.
- 17 **24. Service Option Request Order:** The mobile station shall process the message as
18 specified in 6.6.4.1.2.2.1.
- 19 **25. Service Option Response Order:** The mobile station shall process the message as
20 specified in 6.6.4.1.2.2.2.
- 21 **26. Set Parameters Message:** If the mobile station can set all of the parameters
22 specified by the PARAMETER_ID fields in the message, the mobile station shall
23 set them; otherwise, the mobile station shall send, within T_{56m} seconds, a
24 ***Mobile Station Reject Order***.
- 25 **27. SSD Update Message:** The mobile station shall reset the substate timer for T_{52m}
26 seconds. The mobile station shall then process the message and respond with a
27 ***Base Station Challenge Order*** as specified in 6.3.12.1.9 within T_{32m} seconds.
- 28 **28. Status Request Order:** The mobile station shall send, within T_{56m} seconds, a
29 ***Status Message***.
- 30 • If the mobile station receives any other message with a MSG_TYPE specified in Table
31 7.7.3.3-1, it shall process all layer 2 fields of the message. If the mobile station
32 receives a message that is not included in the above list or cannot be processed, the
33 mobile station shall discard the message and send a *Mobile Station Reject Order*
34 (ORDQ set to the applicable reason code as determined from Table 6.7.3-1) within
35 T_{56m} seconds.

36 6.6.4.3.2 Waiting for Mobile Station Answer Substate

37 In this substate, the mobile station waits for the user to answer the mobile station
38 terminated call.

39 Upon entering the *Waiting for Mobile Station Answer Substate*, the mobile station shall set
40 the substate timer for T_{53m} seconds.

1 While in the *Waiting for Mobile Station Answer Substate*, the mobile station shall perform
2 the following:

- 3 • If the substate timer expires, the mobile station shall disable its transmitter and
4 enter the *System Determination Substate* of the *Mobile Station Initialization State*.
- 5 • The mobile station shall perform Forward Traffic Channel supervision as specified in
6 6.4.4. If a loss of the Forward Traffic Channel is declared, the mobile station shall
7 enter the *System Determination Substate* of the *Mobile Station Initialization State*.
- 8 • The mobile station shall adjust its transmit power as specified in 6.1.2.3.
- 9 • The mobile station shall perform Forward Traffic Channel power control as specified
10 in 6.6.4.1.1.
- 11 • The mobile station shall perform handoff processing as specified in 6.6.6.
- 12 • If there is an active service option (SO_CUR_s is not equal to NULL), the mobile station
13 shall process the received primary traffic bits in accordance with the requirements for
14 the active service option; otherwise, the mobile station shall discard the received
15 primary traffic bits.
- 16 • If there is an active service option (SO_CUR_s is not equal to NULL), the mobile station
17 shall transmit primary traffic bits in accordance with the requirements for the active
18 service option; otherwise, the mobile station shall transmit null Traffic Channel data.
- 19 • The mobile station shall perform registration timer maintenance as specified in
20 6.6.5.5.4.2.
- 21 • If the mobile station is directed by the user to answer the call, the mobile station
22 shall send a *Connect Order* to the base station as a message requiring
23 acknowledgement. The mobile station shall enter the *Conversation Substate*.
- 24 • If the mobile station is directed by the user to transmit a message, the mobile station
25 shall send a *Data Burst Message*.
- 26 • If the mobile station is directed by the user to request a service option, the mobile
27 station shall perform service option request initialization (see 6.6.4.1.2.2.4) specifying
28 the requested service option number, and shall send a *Service Option Request Order*
29 (ORDQ = requested service option number).
- 30 • If there is an active service option (SO_CUR_s is not equal to NULL), the mobile station
31 may send a *Service Option Control Order* (ORDQ = function code) to invoke a service
32 option specific function in accordance with the requirements for the active service
33 option.
- 34 • If the mobile station is directed by the user to request a private long code transition
35 and has the long code mask (see 6.3.12.3), the mobile station shall send a *Long Code*
36 *Transition Request Order* (ORDQ = '00000001') as a message requiring
37 acknowledgement.
- 38 • If the mobile station is directed by the user to request a public long code transition,
39 the mobile station shall send a *Long Code Transition Request Order* (ORDQ =
40 '00000000') as a message requiring acknowledgement.

- 1 • If the mobile station is directed by the user to operate in analog mode, the mobile
2 station shall send the *Request Analog Service Order* as a message requiring
3 acknowledgement.
- 4 • If the mobile station is directed by the user to power down, the mobile station shall
5 enter the *Release Substate* with a power-down indication (see 6.6.4.5).
- 6 • The mobile station shall perform the acknowledgement procedures as specified in
7 6.6.4.1.3. If an acknowledgement failure is declared, the mobile station shall disable
8 its transmitter and enter the *System Determination Substate* of the *Mobile Station*
9 *Initialization State*.
- 10 • If the mobile station receives a message which is included in the following list and
11 every message field value is within its permissible range, the mobile station shall
12 process the message as described below and in accordance with the message's action
13 time (see 6.6.4.1.5).
- 14 1. *Alert With Information Message*: The mobile station shall reset the substate
15 timer for T_{59m} seconds. If the *Alert With Information Message* does not contain a
16 Signal information record, the mobile station should use Standard Alert as
17 defined in 7.7.5.5.
- 18 2. *Analog Handoff Direction Message*: The mobile station shall process the message
19 as specified in 6.6.6.2.9 and enter the Waiting For Answer Task (see 2.6.4.3.2).
- 20 3. *Audit Order*
- 21 4. *Authentication Challenge Message*: The mobile station shall process the message
22 and respond as specified in 6.3.12.1.5 within T_{32m} seconds.
- 23 5. *Base Station Acknowledgement Order*
- 24 6. *Base Station Challenge Confirmation Order*: The mobile station shall process the
25 message and respond with an *SSD Update Confirmation Order* or *SSD Update*
26 *Rejection Order* as specified in 6.3.12.1.9 within T_{32m} seconds.
- 27 7. *Data Burst Message*
- 28 8. *Handoff Direction Message*: The mobile station shall process the message as
29 specified in 6.6.6.2.5.1.
- 30 9. *In-Traffic System Parameters Message*: The mobile station shall process the
31 message as specified in 6.6.4.1.4.
- 32 10. *Local Control Order*
- 33 11. *Lock Until Power-Cycled Order*: The mobile station shall disable its transmitter
34 and record the reason for the *Lock Until Power-Cycled Order* in the mobile
35 station's semi-permanent memory (LCKRSN_P_{s-p} equals the least-significant
36 four bits of ORDQ_r). The mobile station should notify the user of the locked
37 condition. The mobile station shall enter the *System Determination Substate* of
38 the *Mobile Station Initialization State*, and shall not enter the *System Access*
39 *State* again until after the next mobile station power-up or until it has received
40

- 1 an *Unlock Order*. This requirement shall take precedence over any other mobile
2 station requirement specifying entry to the *System Access State*.
- 3 12. *Long Code Transition Request Order*: The mobile station shall process the
4 message as specified in 6.6.4.1.6.
- 5 13. *Maintenance Order*: The mobile station shall reset the substate timer for T_{53m}
6 seconds.
- 7 14. *Maintenance Required Order*: The mobile station shall record the reason for the
8 *Maintenance Required Order* in the mobile station's semi-permanent memory
9 (MAINTRSN_{s-p} equals the least-significant four bits of ORDQ_r). The mobile
10 station shall remain in the unlocked condition. The mobile station should notify
11 the user of the maintenance required condition.
- 12 15. *Message Encryption Mode Order*: The mobile station shall process the message
13 as specified in 6.3.12.2.
- 14 16. *Mobile Station Registered Message*: The mobile station shall process the
15 message as specified in 6.6.5.5.4.3.
- 16 17. *Neighbor List Update Message*: The mobile station shall process the message as
17 specified in 6.6.6.2.6.3.
- 18 18. *Parameter Update Order*: The mobile station shall increment COUNT_{s-p} (see
19 2.3.12.1.3). The mobile station shall send a *Parameter Update Confirmation*
20 *Order* within T_{56m} seconds. The mobile station shall set the ORDQ field of the
21 *Parameter Update Confirmation Order* to the same value as the ORDQ field of
22 the *Parameter Update Order*.
- 23 19. *Pilot Measurement Request Order*: The mobile station shall process the order as
24 specified in 6.6.6.2.5.1.
- 25 20. *Power Control Parameters Message*: The mobile station shall process the
26 message as specified in 6.6.4.1.1.2.
- 27 21. *Release Order*: The mobile station shall enter the *Release Substate* with a base
28 station release indication (see 6.6.4.5).
- 29 22. *Retrieve Parameters Message*: The mobile station shall send, within T_{56m}
30 seconds, a *Parameters Response Message*.
- 31 23. *Service Option Control Order*: The mobile station shall process the message as
32 specified in 6.6.4.1.2.2.3.
- 33 24. *Service Option Request Order*: The mobile station shall process the message as
34 specified in 6.6.4.1.2.2.1.
- 35 25. *Service Option Response Order*: The mobile station shall process the message as
36 specified in 6.6.4.1.2.2.2.
- 37 26. *Set Parameters Message*: If the mobile station can set all of the parameters
38 specified by the PARAMETER_ID fields in the message, the mobile station shall
39 set them; otherwise, the mobile station shall send, within T_{56m} seconds, a
40 *Mobile Station Reject Order*.

- 1 **27. SSD Update Message:** The mobile station shall process the message and
 2 respond with a *Base Station Challenge Order* as specified in 6.3.12.1.9 within
 3 T_{32m} seconds.
- 4 **28. Status Request Order:** The mobile station shall send, within T_{56m} seconds, a
 5 *Status Message*.
- 6 • If the mobile station receives any other message with a MSG_TYPE specified in Table
 7 7.7.3.3-1, it shall process all layer 2 fields of the message. If the mobile station
 8 receives a message that is not included in the above list or cannot be processed, the
 9 mobile station shall discard the message and send a *Mobile Station Reject Order*
 10 (ORDQ set to the applicable reason code as determined from Table 6.7.3-1) within
 11 T_{56m} seconds.

12 6.6.4.4 Conversation Substate

13 In this substate, the mobile station's primary traffic service option application exchanges
 14 primary traffic bits with the base station.

15 While in the *Conversation Substate*, the mobile station shall perform the following:

- 16 • The mobile station shall perform Forward Traffic Channel supervision as specified in
 17 6.4.4. If a loss of the Forward Traffic Channel is declared, the mobile station shall
 18 enter the *System Determination Substate of the Mobile Station Initialization State*.
- 19 • The mobile station shall adjust its transmit power as specified in 6.1.2.3.
- 20 • The mobile station shall perform Forward Traffic Channel power control as specified
 21 in 6.6.4.1.1.
- 22 • The mobile station shall perform handoff processing as specified in 6.6.6.
- 23 • If there is an active service option (SO_CUR_g is not equal to NULL), the mobile station
 24 shall process the received primary traffic bits in accordance with the requirements for
 25 the active service option; otherwise, the mobile station shall discard the received
 26 primary traffic bits.
- 27 • If there is an active service option (SO_CUR_g is not equal to NULL), the mobile station
 28 shall transmit primary traffic bits in accordance with the requirements for the active
 29 service option; otherwise, the mobile station shall transmit null Traffic Channel data.
- 30 • The mobile station shall perform registration timer maintenance as specified in
 31 6.6.5.5.4.2.
- 32 • If the mobile station originated the call and did not send all the dialed digits in the
 33 *Origination Message*, the mobile station shall send the remaining dialed digits to the
 34 base station in the *Origination Continuation Message*. The mobile station shall send
 35 the *Origination Continuation Message* as a message requiring acknowledgement
 36 within T_{54m} seconds after entering the *Conversation Substate*.
- 37 • If the mobile station is directed by the user to transmit a message, the mobile station
 38 shall send a *Data Burst Message*.

- 1 • If the mobile station is directed by the user to request a service option, the mobile
2 station shall perform service option request initialization (see 6.6.4.1.2.2.4) specifying
3 the requested service option number, and shall send a *Service Option Request Order*
4 (*ORDQ* = requested service option number).
- 5 • If there is an active service option (*SO_CUR_s* is not equal to NULL), the mobile station
6 may send a *Service Option Control Order* (*ORDQ* = function code) to invoke a service
7 option specific function in accordance with the requirements for the active service
8 option.
- 9 • If the mobile station is directed by the user to request a private long code transition
10 and has the long code mask (see 6.3.12.3), the mobile station shall send a *Long Code*
11 *Transition Request Order* (*ORDQ* = '00000001') as a message requiring
12 acknowledgement.
- 13 • If the mobile station is directed by the user to request a public long code transition,
14 the mobile station shall send a *Long Code Transition Request Order* (*ORDQ* =
15 '00000000') as a message requiring acknowledgement.
- 16 • If the mobile station is directed by the user to issue a flash, the mobile station shall
17 build a *Flash With Information Message* with the collected digits contained in a
18 *Keypad Facility* information record and send the message to the base station as a
19 message requiring acknowledgement.
- 20 • If the mobile station is directed by the user to send burst DTMF digits, the mobile
21 station shall build the *Send Burst DTMF Message* with the dialed digits and send the
22 message as a message requiring acknowledgement.
- 23 • If the mobile station is directed by the user to send a continuous DTMF digit, the
24 mobile station shall build the *Continuous DTMF Tone Order* with the dialed digit and
25 send the order as a message requiring acknowledgement. When the mobile station is
26 directed by the user to cease sending the continuous DTMF digit, the mobile station
27 shall send the *Continuous DTMF Tone Order* (*ORDQ* = '11111111') as a message
28 requiring acknowledgement.
- 29 • If the mobile station is directed by the user to operate in analog mode, the mobile
30 station shall send the *Request Analog Service Order* as a message requiring
31 acknowledgement.
- 32 • If the mobile station is directed by the user to disconnect the call, the mobile station
33 shall enter the *Release Substate* with a mobile station release indication (see 6.6.4.5).
- 34 • If the mobile station is directed by the user to power down, the mobile station shall
35 enter the *Release Substate* with a power-down indication (see 6.6.4.5).
- 36 • The mobile station shall perform the acknowledgement procedures as specified in
37 6.6.4.1.3. If an acknowledgement failure is declared, the mobile station shall disable
38 its transmitter and enter the *System Determination Substate* of the *Mobile Station*
39 *Initialization State*.
- 40 • If the mobile station receives a message which is included in the following list and
41 every message field value is within its permissible range, the mobile station shall

1 process the message as described below and in accordance with the message's action
2 time (see 6.6.4.1.5).

- 3 1. Alert With Information Message: If the message contains a Signal information
4 record with the SIGNAL_TYPE field set to '01' or '10', or if the message does not
5 contain a Signal information record, the mobile station shall enter the *Waiting*
6 *For Mobile Station Answer Substate*. If the *Alert With Information Message* does
7 not contain a Signal information record, the mobile station should use Standard
8 Alert as defined in 7.7.5.5.
- 9 2. Analog Handoff Direction Message: The mobile station shall process the message
10 as specified in 6.6.6.2.9 and enter the Conversation Task (see 2.6.4.4) with a
11 handoff from CDMA indication.
- 12 3. Audit Order
- 13 4. Authentication Challenge Message: The mobile station shall process the message
14 and respond as specified in 6.3.12.1.5 within T_{32m} seconds.
- 15 5. Base Station Acknowledgement Order
- 16 6. Base Station Challenge Confirmation Order: The mobile station shall process the
17 message and respond with an *SSD Update Confirmation Order* or *SSD Update*
18 *Rejection Order* as specified in 6.3.12.1.9 within T_{32m} seconds.
- 19 7. Continuous DTMF Tone Order: Support of this order by the mobile station is
20 optional.
- 21 8. Data Burst Message
- 22 9. Flash with Information Message
- 23 10. Handoff Direction Message: The mobile station shall process the message as
24 specified in 6.6.6.2.5.1.
- 25 11. In-Traffic System Parameters Message: The mobile station shall process the
26 message as specified in 6.6.4.1.4.
- 27 12. Local Control Order
- 28 13. Lock Until Power-Cycled Order: The mobile station shall disable its transmitter
29 and record the reason for the *Lock Until Power-Cycled Order* in the mobile
30 station's semi-permanent memory (LCKRSN_P_{s-p} equals the least-significant
31 four bits of ORDQ_r). The mobile station should notify the user of the locked
32 condition. The mobile station shall enter the *System Determination Substate* of
33 the *Mobile Station Initialization State*, and shall not enter the *System Access*
34 *State* again until after the next mobile station power-up or until it has received
35 an *Unlock Order*. This requirement shall take precedence over any other mobile
36 station requirement specifying entry to the *System Access State*.
- 37 14. Long Code Transition Request Order: The mobile station shall process the
38 message as specified in 6.6.4.1.6.
- 39 15. Maintenance Order: The mobile station shall enter the *Waiting for Mobile Station*
40 *Answer Substate*.

- 1 16. **Maintenance Required Order**: The mobile station shall record the reason for the
2 **Maintenance Required Order** in the mobile station's semi-permanent memory
3 (MAINTRSN_{s-p} equals the least-significant four bits of ORDQ_r). The mobile
4 station shall remain in the unlocked condition. The mobile station should notify
5 the user of the maintenance required condition.
- 6 17. **Message Encryption Mode Order**: The mobile station shall process the message
7 as specified in 6.3.12.2.
- 8 18. **Mobile Station Registered Message**: The mobile station shall process the
9 message as specified in 6.6.5.5.4.3.
- 10 19. **Neighbor List Update Message**: The mobile station shall process the message as
11 specified in 6.6.6.2.6.3.
- 12 20. **Parameter Update Order**: The mobile station shall increment COUNT_{s-p} (see
13 2.3.12.1.3). The mobile station shall send a **Parameter Update Confirmation**
14 **Order** within T_{56m} seconds. The mobile station shall set the ORDQ field of the
15 **Parameter Update Confirmation Order** to the same value as the ORDQ field of
16 the **Parameter Update Order**.
- 17 21. **Pilot Measurement Request Order**: The mobile station shall process the order as
18 specified in 6.6.6.2.5.1.
- 19 22. **Power Control Parameters Message**: The mobile station shall process the
20 message as specified in 6.6.4.1.1.2.
- 21 23. **Release Order**: The mobile station shall enter the **Release Substate** with a base
22 station release indication (see 6.6.4.5).
- 23 24. **Retrieve Parameters Message**: The mobile station shall send, within T_{56m}
24 seconds, a **Parameters Response Message**.
- 25 25. **Send Burst DTMF Message**: Support of this order by the mobile station is
26 optional.
- 27 26. **Service Option Control Order**: The mobile station shall process the message as
28 specified in 6.6.4.1.2.2.3.
- 29 27. **Service Option Request Order**: The mobile station shall process the message as
30 specified in 6.6.4.1.2.2.1.
- 31 28. **Service Option Response Order**: The mobile station shall process the message as
32 specified in 6.6.4.1.2.2.2.
- 33 29. **Set Parameters Message**: If the mobile station can set all of the parameters
34 specified by the PARAMETER_ID fields in the message, the mobile station shall
35 set them; otherwise, the mobile station shall send, within T_{56m} seconds, a
36 **Mobile Station Reject Order**.
- 37 30. **SSD Update Message**: The mobile station shall process the message and
38 respond with a **Base Station Challenge Order** as specified in 6.3.12.1.9 within
39 T_{32m} seconds.

1 **31. Status Request Order:** The mobile station shall send, within T_{56m} seconds, a
2 **Status Message.**

- 3 • If the mobile station receives any other message with a **MSG_TYPE** specified in Table
4 **7.7.3.3-1**, it shall process all layer 2 fields of the message. If the mobile station
5 receives a message that is not included in the above list or cannot be processed, the
6 mobile station shall discard the message and send a *Mobile Station Reject Order*
7 (ORDQ set to the applicable reason code as determined from Table 6.7.3-1) within
8 T_{56m} seconds.

9 **6.6.4.5 Release Substate**

10 In this substate, the mobile station confirms the call disconnect.

11 Upon entering the *Release Substate*, the mobile station shall perform the following:

- 12 • The mobile station shall set the substate timer for T_{55m} seconds.
- 13 • If the mobile station enters the *Release Substate* with a power-down indication, the
14 mobile station shall send a *Release Order* (ORDQ = '00000001'), and perform power-
15 down registration procedures (see 6.6.5.5.4.4).
- 16 • If the mobile station enters the *Release Substate* with a mobile station release
17 indication, the mobile station shall send a *Release Order* (ORDQ = '00000000').
- 18 • If the mobile station enters the *Release Substate* with a base station release
19 indication, the mobile station shall send a *Release Order* (ORDQ = '00000000'). The
20 mobile station shall disable its transmitter and enter the *System Determination*
21 *Substate of the Mobile Station Initialization State*.

22 While in the *Release Substate*, the mobile station shall perform the following:

- 23 • If the substate timer expires, the mobile station shall disable its transmitter and
24 enter the *System Determination Substate of the Mobile Station Initialization State*.
- 25 • The mobile station shall perform Forward Traffic Channel supervision as specified in
26 6.4.4. If a loss of the Forward Traffic Channel is declared, the mobile station shall
27 enter the *System Determination Substate of the Mobile Station Initialization State*.
- 28 • The mobile station shall adjust its transmit power as specified in 6.1.2.3.
- 29 • The mobile station shall perform Forward Traffic Channel power control as specified
30 in 6.6.4.1.1.
- 31 • The mobile station shall perform handoff processing as specified in 6.6.6.
- 32 • The mobile station shall transmit null Traffic Channel data on the Reverse Traffic
33 Channel (see 6.1.3.3.2.4).
- 34 • The mobile station shall perform registration timer maintenance as specified in
35 6.6.5.5.4.2.
- 36 • The mobile station shall perform the acknowledgement procedures as specified in
37 6.6.4.1.3. If an acknowledgement failure is declared, the mobile station shall disable

1 its transmitter and enter the *System Determination Substate* of the *Mobile Station*
2 *Initialization State*.

- 3 • If the mobile station receives a message which is included in the following list and
4 every message field value is within its permissible range, the mobile station shall
5 process the message as described below and in accordance with the message's action
6 time (see 6.6.4.1.5).

- 7 1. *Alert With Information Message*: The mobile station shall enter the *Waiting for*
8 *Mobile Station Answer Substate*. If the *Alert With Information Message* does not
9 contain a Signal information record, the mobile station should use Standard
10 Alert as defined in 7.7.5.5.
- 11 2. *Base Station Acknowledgement Order*
- 12 3. *Data Burst Message*
- 13 4. *Handoff Direction Message*: The mobile station shall process the message as
14 specified in 6.6.6.2.5.1.
- 15 5. *In-Traffic System Parameters Message*: The mobile station shall process the
16 message as specified in 6.6.4.1.4.
- 17 6. *Local Control Order*
- 18 7. *Lock Until Power-Cycled Order*: The mobile station shall disable its transmitter
19 and record the reason for the *Lock Until Power-Cycled Order* in the mobile
20 station's semi-permanent memory ($LCKRSN_{s-p}$ equals the least-significant
21 four bits of $ORDQ_r$). The mobile station should notify the user of the locked
22 condition. The mobile station shall enter the *System Determination Substate* of
23 the *Mobile Station Initialization State*, and shall not enter the *System Access*
24 *State* again until after the next mobile station power-up or until it has received
25 an *Unlock Order*. This requirement shall take precedence over any other mobile
26 station requirement specifying entry to the *System Access State*.
- 27 8. *Maintenance Required Order*: The mobile station shall record the reason for the
28 *Maintenance Required Order* in the mobile station's semi-permanent memory
29 ($MAINTRSN_{s-p}$ equals the least-significant four bits of $ORDQ_r$). The mobile
30 station shall remain in the unlocked condition. The mobile station should notify
31 the user of the maintenance required condition.
- 32 9. *Mobile Station Registered Message*: The mobile station shall process the
33 message as specified in 6.6.5.5.4.3.
- 34 10. *Neighbor List Update Message*: The mobile station shall process the message as
35 specified in 6.6.6.2.6.3.
- 36 11. *Power Control Parameters Message*: The mobile station shall process the
37 message as specified in 6.6.4.1.1.2.
- 38 12. *Release Order*: The mobile station shall disable its transmitter. If the mobile
39 station enters the *Release Substate* with a power-down indication, the mobile

- 1 station may power down; otherwise, the mobile station shall enter the *System*
 2 *Determination Substate* of the *Mobile Station Initialization State*.
- 3 13. Retrieve Parameters Message: The mobile station shall send, within T_{56m}
 4 seconds, a *Parameters Response Message*.
- 5 14. Service Option Control Order: The mobile station shall process the message as
 6 specified in 6.6.4.1.2.2.3.
- 7 15. Status Request Order: The mobile station shall send, within T_{56m} seconds, a
 8 *Status Message*.
- 9 • If the mobile station receives any other message with a MSG_TYPE specified in Table
 10 7.7.3.3-1, it shall process all layer 2 fields of the message. If the mobile station
 11 receives a message that is not included in the above list or cannot be processed, the
 12 mobile station shall discard the message and send a *Mobile Station Reject Order*
 13 (ORDQ set to the applicable reason code as determined from Table 6.7.3-1) within
 14 T_{56m} seconds.

15 6.6.5 Registration

16 6.6.5.1 Forms of Registration

17 Registration is the process by which the mobile station notifies the base station of its
 18 location, status, identification, slot cycle, and other characteristics. The mobile station
 19 informs the base station of its location and status so that the base station can efficiently
 20 page the mobile station when establishing a mobile terminated call. For operation in the
 21 slotted mode, the mobile station supplies the SLOT_CYCLE_INDEX parameter so that the
 22 base station can determine which slots the mobile station is monitoring. The mobile station
 23 supplies the station class mark and protocol revision number so that the base station
 24 knows the capabilities of the mobile station.

25 The CDMA system supports nine different forms of registration:

- 26 1. Power-up registration. The mobile station registers when it powers on, switches
 27 from using the alternate serving system, or switches from using the analog system.
- 28 2. Power-down registration. The mobile station registers when it powers off if
 29 previously registered in the current serving system.
- 30 3. Timer-based registration. The mobile station registers when a timer expires.
- 31 4. Distance-based registration. The mobile station registers when the distance
 32 between the current base station and the base station in which it last registered
 33 exceeds a threshold.
- 34 5. Zone-based registration. The mobile station registers when it enters a new zone.
- 35 6. Parameter-change registration. The mobile station registers when certain of its
 36 stored parameters change.
- 37 7. Ordered registration. The mobile station registers when the base station requests
 38 it.

1 8. **Implicit registration.** When a mobile station successfully sends an *Origination*
2 *Message* or *Page Response Message*, the base station can infer the mobile station's
3 location. This is considered an implicit registration.

4 9. **Traffic Channel registration.** Whenever the base station has registration
5 information for a mobile station that has been assigned to a Traffic Channel, the
6 base station can notify the mobile station that it is registered.

7 The first five forms of registration, as a group, are called autonomous registration and are
8 enabled by roaming status (see 6.6.5.3). Parameter-change registration is independent of
9 roaming status. Ordered registration is initiated by the base station through an *Order*
10 *Message*. Implicit registration does not involve the exchange of any registration messages
11 between the base station and the mobile station. While a mobile station is assigned a
12 Traffic Channel, the base station can obtain registration information by using the *Status*
13 *Request Order* to obtain *Status Messages* from the mobile station. The mobile station can
14 be notified that it is registered through the *Mobile Station Registered Message*.

15 Any of the various forms of autonomous registration and parameter-change registration can
16 be enabled or disabled. The forms of registration that are enabled and the corresponding
17 registration parameters are communicated in the *System Parameters Message*.

18 In addition, the mobile station may enable or disable autonomous registration for each type
19 of roaming described in 6.6.5.3.

20 6.6.5.1.1 Power-Up Registration

21 Power-up registration is performed when the mobile station is turned on. To prevent
22 multiple registrations when power is quickly turned on and off, the mobile station delays
23 T_{57m} seconds before registering after entering the *Mobile Station Idle State*.

24 The mobile station shall maintain a power-up/initialization timer. While the power-
25 up/initialization timer is active, the mobile station shall not make registration access
26 attempts.

27 6.6.5.1.2 Power-Down Registration

28 Power-down registration is performed when the user directs the mobile station to power off.
29 If power-down registration is performed, the mobile station does not power down until after
30 completing the registration attempt.

31 The mobile station does not perform power down registration if it has not previously
32 registered in the system that corresponds to the current SID_s and NID_s (see 6.6.5.5.2.4).

33 6.6.5.1.3 Timer-Based Registration

34 Timer-based registration causes the mobile station to register at regular intervals. Its use
35 also allows the system to automatically deregister mobile stations that did not perform a
36 successful power-down registration. Timer-based registration uses a Paging Channel slot
37 counter (equivalent to a timer with time increments of 80 ms). Timer-based registration is
38 performed when the counter reaches a maximum value ($REG_COUNT_MAX_p$) that is
39 controlled by the base station via the REG_PRD field of the *System Parameters Message*.
40 The base station disables timer-based registration by setting REG_PRD to zero.

1 The counter is reset on power-up and when switching from analog or alternate serving
2 systems. The counter is also reset after each successful or implicit registration.

3 The mobile station shall maintain a timer-based registration counter (REG_COUNT_s). The
4 mobile station shall compute and store the timer expiration count (REG_COUNT_MAX_s) as

$$5 \quad \text{REG_COUNT_MAX}_s = \lfloor 2^{\text{REG_PRD}/4} \rfloor.$$

6 The mobile station shall maintain an indicator of timer-based registration timer enable
7 status (COUNTER_ENABLED_s).

8 Whenever the mobile station changes COUNTER_ENABLED_s from NO to YES, it shall set
9 REG_COUNT_s to a pseudorandom value between 0 and REG_COUNT_MAX_s - 1, using the
10 pseudorandom number generator specified in 6.6.7.2.

11 If the mobile station is operating in the non-slotted mode, it shall increment the timer-
12 based registration counter once per 80 ms whenever COUNTER_ENABLED_s equals YES. If
13 the mobile station is operating in slotted mode, it may increment the timer-based
14 registration counter when it begins to monitor the Paging Channel (see 6.6.2.1.1.3). A
15 mobile station operating in the slotted mode shall increment the counter by the same
16 amount that the counter would have been incremented if the mobile station had been
17 operating in the non-slotted mode.¹⁷

18 6.6.5.1.4 Distance-Based Registration

19 Distance-based registration causes a mobile station to register when the distance between
20 the current base station and the base station in which it last registered exceeds a
21 threshold. The mobile station determines that it has moved a certain distance by
22 computing a distance measure based on the difference in latitude and longitude between
23 the current base station and the base station where the mobile station last registered. If
24 this distance measure exceeds the threshold value, the mobile station registers.

25 The mobile station stores the base station latitude (BASE_LAT_REG_{s-p}), the base station
26 longitude (BASE_LONG_REG_{s-p}) and the registration distance (REG_DIST_REG_{s-p}), of the
27 base station whose Access Channel was used for the mobile station's last registration (see
28 6.3.4). The mobile station shall compute the current base station's distance from the last
29 registration point (DISTANCE) as:

$$30 \quad \text{DISTANCE} = \lfloor \frac{\sqrt{(\Delta\text{lat})^2 + (\Delta\text{long})^2}}{16} \rfloor,$$

31 where

$$32 \quad \Delta\text{lat} = \text{BASE_LAT}_s - \text{BASE_LAT_REG}_{s-p}$$

$$33 \quad \Delta\text{long} = (\text{BASE_LONG}_s - \text{BASE_LONG_REG}_{s-p}) \times \cos(\pi/180 \times \text{BASE_LAT_REG}_{s-p}/14400).$$

¹⁷For example, if the mobile station uses a 2.56 second slot cycle, then it may increment the counter by 32 every time it becomes active.

1 The mobile station shall compute DISTANCE with an error of no more than $\pm 5\%$ of its true
 2 value when $|BASE_LAT_REG_{s-p}/14400|$ is less than 60 and with an error of no more than
 3 $\pm 7\%$ of its true value when $|BASE_LAT_REG_{s-p}/14400|$ is between 60 and 70.¹⁸

4 6.6.5.1.5 Zone-Based Registration

5 Zones are groups of base stations within a given system and network. A base station's zone
 6 assignment is identified by the REG_ZONE field of the *System Parameters Message*.

7 Zone-based registration causes a mobile station to register whenever it moves into a new
 8 zone not on its internally stored list of visited registration zones. A zone is added to the list
 9 whenever a registration (including implicit registration) occurs, and is deleted upon
 10 expiration of a timer. After a system access, timers are enabled for every zone except one
 11 that was successfully registered by the access. Timers are also enabled at the start of a
 12 call.

13 A mobile station can be registered in more than one zone. Zones are uniquely identified by
 14 a zone number (REG_ZONE) plus the SID and NID of the zone.

15 The mobile station shall store a list of the zones in which the mobile station has registered
 16 (ZONE_LIST_s). Each entry in ZONE_LIST_s shall include the zone number (REG_ZONE) and
 17 the (SID, NID) pair for the zone. The mobile station shall be capable of storing at least N_{ZM}
 18 entries in ZONE_LIST_s. A base station shall be considered to be in ZONE_LIST_s only if the
 19 base station's REG_ZONE, SID and NID are found in an entry in ZONE_LIST_s. The mobile
 20 station provides storage for one entry of ZONE_LIST_s in semi-permanent memory,
 21 ZONE_LIST_{s-p} (see 6.3.4).

22 The mobile station shall maintain a zone list entry timer for each entry in ZONE_LIST_s.
 23 When an entry in ZONE_LIST_s is removed from the list, the corresponding zone list entry
 24 timer shall be disabled. The timer duration shall be as determined from the stored value of
 25 ZONE_TIMER_s using Table 7.7.2.3.2.1-1. The mobile station shall provide a means to
 26 examine each timer's value while the timer is active, so that the age of list entries can be
 27 compared.

28 The base station controls the maximum number of zones in which a mobile station may be
 29 considered registered, by means of the TOTAL_ZONES field of the *System Parameters*
 30 *Message*. When an entry is added to the zone list, or if TOTAL_ZONES is decreased, the
 31 mobile station removes entries from the zone list if there are more entries than allowed by
 32 the setting of TOTAL_ZONES.

33 Whenever ZONE_LIST_s contains more than TOTAL_ZONES_s entries, the mobile station shall
 34 delete the excess entries according to the following rules:

- 35 • If TOTAL_ZONES_s is equal to zero, the mobile station shall delete all entries.
- 36 • If TOTAL_ZONES_s is not equal to zero, the mobile station shall delete those entries
 37 having active zone list entry timers (excluding any such entry selected to be retained).

¹⁸BASE_LAT and BASE_LONG are given in units of 1/4 seconds. BASE_LAT/14400 and
 BASE_LONG/14400 are in units of degrees.

1 starting with the oldest entry, as determined by the timer values, and continuing in
2 order of decreasing age until no more than TOTAL_ZONES_s entries remain.

3 The mobile station shall store a list of the systems/networks in which the mobile station
4 has registered (SID_NID_LIST_s). Each entry in SID_NID_LIST_s shall include the (SID, NID)
5 pair for the system/network. The mobile station shall be capable of storing N_{10m} entries in
6 SID_NID_LIST_s. A base station shall be considered to be in the SID_NID_LIST_s only if the
7 base station's SID and NID are found in an entry in SID_NID_LIST_s. The mobile station
8 shall provide storage for one entry of SID_NID_LIST_s in semi-permanent memory
9 (SID_NID_LIST_{s-p}).

10 The mobile station shall maintain a SID/NID list entry timer for each entry in
11 SID_NID_LIST_s. When an entry in SID_NID_LIST_s is removed from the list, the
12 corresponding SID/NID list entry timer shall be disabled. The timer duration shall be as
13 determined from the stored value of ZONE_TIMER_s using Table 7.7.2.3.2.1-1. The mobile
14 station shall provide a means to examine each timer's value while the timer is active, so
15 that the age of list entries can be compared.

16 Whenever SID_NID_LIST_s contains more than N_{10m} entries, the mobile station shall delete
17 the excess entries according to the following rule:

- 18 • The mobile station shall delete those entries having active SID/NID list entry timers,
19 starting with the oldest entry, as determined by the timer values, and continuing in
20 order of decreasing age.

21 Whenever MULT_SIDS_s is equal to '0' and SID_NID_LIST contains entries with different
22 SIDs, the mobile station shall delete the excess entries according to the following rules:

- 23 • If the SID/NID entry timer for any entry is disabled, the mobile station shall delete all
24 entries not having the same SID as the entry whose timer is disabled;
- 25 • Otherwise, the mobile station shall delete all entries not having the same SID as the
26 newest entry in SID_NID_LIST, as determined by the timer values.

27 Whenever MULT_NIDS_s is equal to '0' and SID_NID_LIST contains more than one entry for
28 any SID, the mobile station shall delete the excess entries for each SID according to the
29 following rules:

- 30 • If the SID/NID entry timer for any entry is disabled, the mobile station shall delete all
31 entries for that SID except the entry whose timer is disabled;
- 32 • For all other SIDs, the mobile station shall delete all entries for each SID except the
33 newest entry, as determined by the timer values.

34 6.6.5.1.6 Parameter-Change Registration

35 Parameter-change registration is performed when a mobile station modifies any of the
36 following stored parameters:

- 37 • The preferred slot cycle index (SLOT_CYCLE_INDEX_p)
- 38 • The station class mark (SCM_p)
- 39 • The call termination enabled indicator (MOB_TERM_s)

1 Parameter-change registration is independent of the roaming status of the mobile station.¹⁹
2 Whenever a parameter changes, the mobile station shall delete all entries from
3 SID_NID_LIST_B.

4 6.6.5.1.7 Ordered Registration

5 The base station can command the mobile station to register by sending a *Registration*
6 *Request Order*. Ordered registration is performed in the *Mobile Station Order and Message*
7 *Processing Operation* (6.6.2.4). Requirements are specified in 6.6.5.5.2.3.

8 6.6.5.1.8 Implicit Registration

9 Whenever an *Origination Message* or *Page Response Message* is sent, the base station can
10 infer the location of the mobile station. This is considered an implicit registration.
11 Requirements are specified in 6.6.5.5.3.

12 6.6.5.1.9 Traffic Channel Registration

13 While a mobile station is assigned a Traffic Channel, the mobile station is notified that it is
14 registered through the *Mobile Station Registered Message*. Requirements are specified in
15 6.6.5.5.4.3.

16 6.6.5.2 Systems and Networks

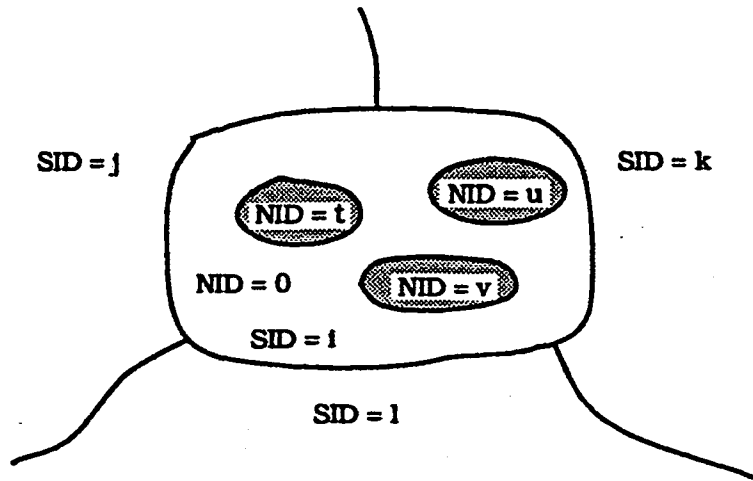
17 A base station is a member of a cellular system and a network. A network is a subset of a
18 system.

19 Systems are labeled with an identification called the system identification or SID; networks
20 within a system are given a network identification or NID. A network is uniquely identified
21 by the pair (SID, NID). The NID number 0 is a reserved value indicating all base stations
22 that are not included in a specific network. The NID number 65535 ($2^{16}-1$) is a reserved
23 value the mobile station may use for roaming status determination (see 6.6.5.3) to indicate
24 that the mobile station considers the entire SID (regardless of NID) as home (non-roaming).

25 Figure 6.6.5.2-1 shows an example of systems and networks. SID 1 contains three
26 networks labeled t, u, and v. A base station in system 1 that is not in one of these three
27 networks is in NID 0.

28

¹⁹The indicator REG_ENABLED does not govern parameter-change registration.



1
2 **Figure 6.6.5.2-1. Systems and Networks Example**
3

4 **6.6.5.3 Roaming**

5 The mobile station has a list of one or more home (non-roaming) (SID, NID) pairs. A mobile
6 station is roaming if the stored (SID_s, NID_s) pair (received in the *System Parameters*
7 *Message*) does not match one of the mobile station's non-roaming (SID, NID) pairs. Two
8 types of roaming are defined: A mobile station is a foreign NID roamer if the mobile station
9 is roaming and there is some (SID, NID) pair in the mobile station's (SID, NID) list for which
10 SID is equal to SID_s. A mobile station is a foreign SID roamer if there is no (SID, NID) pair
11 in the mobile station's (SID, NID) list for which SID is equal to SID_s.²⁰ The mobile station
12 may use the special NID value 65535 to indicate that the mobile station considers all NIDs
13 within a SID to be non-roaming (i.e., that the mobile station is not roaming when operating
14 with any base station in that system).

15 The mobile station shall store three 1-bit parameters in its permanent memory (see 6.3.8).
16 These parameters are MOB_TERM_HOME_p, MOB_TERM_FOR_SID_p, and MOB_TERM-
17 _FOR_NID_p. The mobile station shall set MOB_TERM_HOME_p to '1' if the mobile station is
18 configured to receive mobile station terminated calls when using a home (SID, NID) pair;
19 otherwise MOB_TERM_HOME_p shall be set to '0'. The mobile station shall set MOB_TERM-
20 _FOR_SID_p to '1' if the mobile station is configured to receive mobile station terminated
21 calls when it is a foreign SID roamer; otherwise MOB_TERM_FOR_SID_p shall be set to '0'.
22 The mobile station shall set MOB_TERM_FOR_NID_p to '1' if the mobile station is configured

²⁰For example, suppose a mobile station has the following SID, NID list (2, 3) (2, 0) (3, 1). If the base station (SID, NID) pair is (2, 3) then the mobile station is not roaming because the (SID, NID) pair is in the list. If the base station (SID, NID) pair is (2, 7) then the mobile station is a foreign NID roamer because the SID 2 is in the list, but the (SID, NID) pair (2, 7) is not in the list. If the base station (SID, NID) pair is (4, 0) then the mobile station is a foreign SID roamer because SID 4 is not in the list.

1 to receive mobile station terminated calls when it is a foreign NID roamer; otherwise
2 MOB_TERM_FOR_NID_p shall be set to '0'.

3 The mobile station determines the registration status using these parameters and the
4 HOME_REG, FOR_NID_REG, and FOR_SID_REG fields of the *System Parameters Message*.

5 The mobile station shall store a mobile station call termination enabled indicator,
6 MOB_TERM_s. The mobile station shall set MOB_TERM_s to YES if any of the following
7 conditions is met; otherwise MOB_TERM_s shall be set to NO:

- 8 • The mobile station is not roaming, and MOB_TERM_HOME_p is equal to '1'; or
- 9 • The mobile station is a foreign NID roamer and MOB_TERM_FOR_NID_p is equal to '1';
10 or
- 11 • The mobile station is a foreign SID roamer and MOB_TERM_FOR_SID_p is equal to '1'.

12 The mobile station shall store a registration status indicator, REG_ENABLED_s. The
13 indicator REG_ENABLED_s shall be set to YES if any of the following conditions is met for
14 the mobile station; otherwise REG_ENABLED_s shall be set to NO:

- 15 • The mobile station is not roaming, and both HOME_REG_s and MOB_TERM_HOME_p
16 are equal to '1'; or
- 17 • The mobile station is a foreign NID roamer and both FOR_NID_REG_s and
18 MOB_TERM_FOR_NID_p are equal to '1'; or
- 19 • The mobile station is a foreign SID roamer and both FOR_SID_REG_s and
20 MOB_TERM_FOR_SID_p are equal to '1'.

21 The mobile station performs autonomous registrations if REG_ENABLED_s is YES.

22 6.6.5.4 Registration Timers and Indicators

23 The mobile station shall provide the following registration timers:

- 24 • Power-up/initialization timer (see 6.6.5.1.1).
- 25 • Timer-based registration timer (see 6.6.5.1.3).
- 26 • Zone list entry timers (see 6.6.5.1.5).
- 27 • SID/NID list entry timers (see 6.6.5.1.5).

28 The mobile station shall provide a means of enabling and disabling each timer. When a
29 timer is disabled, it shall not be considered expired. A timer that has been enabled is
30 referred to as active.

31 6.6.5.5 Registration Procedures

32 6.6.5.5.1 Actions in the *Mobile Station Initialization State*

33 6.6.5.5.1.1 Power-up or Serving System Change

34 Upon power-up, the mobile station shall perform the following actions:

- 35 • Delete all entries of ZONE_LIST_s.

- 1 • If ZONE_LIST_{s-p} contains an entry, copy the entry to ZONE_LIST_s and disable the
- 2 corresponding entry timer.
- 3 • Delete all entries of SID_NID_LIST_s.
- 4 • If SID_NID_LIST_{s-p} contains an entry, copy the entry to SID_NID_LIST_s and disable
- 5 the corresponding entry timer.

6 Upon power-up or after switching from analog or the alternate CDMA serving system, the
7 mobile station shall perform the following actions:

- 8 • Set timer-based registration enable status (COUNTER_ENABLED_s) to NO.
- 9 • Set autonomous registration enable status (REG_ENABLED_s) to NO.
- 10 • Disable all registration timers (see 6.6.5.4).

11 6.6.5.5.1.2 Timer Maintenance

12 While in the *Mobile Station Initialization State*, the mobile station shall update all active
13 registration timers (see 6.6.5.4). If any timer expires while in this state, the mobile station
14 shall preserve the expiration status so that further action can be taken in the *Mobile Station*
15 *Idle State*.

16 6.6.5.5.1.3 Entering the *Mobile Station Idle State*

17 Before entering the *Mobile Station Idle State*, the mobile station shall perform the following
18 action:

- 19 • If SID_NID_LIST_s is empty, enable the power-up/initialization timer with an
20 expiration time of T_{57m} seconds (see 6.6.5.1.1).

21 6.6.5.5.2 Actions in the *Mobile Station Idle State*

22 Requirements in this section and its subsections apply only when the mobile station is in
23 the *Mobile Station Idle State*.

24 6.6.5.5.2.1 Idle Registration Procedures

25 These procedures are performed whenever the mobile station is in the *Mobile Station Idle*
26 *State* (see 6.6.2.1.3).

27 While in the *Mobile Station Idle State*, the mobile station shall update all active registration
28 timers (see 6.6.5.4).

29 If the power-up/initialization timer has expired or is disabled, the mobile station shall
30 perform the following actions in the order given; except that if any action causes a
31 registration to be performed, the remaining actions, if any, shall not be performed and the
32 mobile station shall enter the *Update Overhead Information Substate* of the *System Access*
33 *State* (see 6.6.3) with a registration indication.

- 34 1. The timer-based registration timer shall be enabled (COUNTER_ENABLED_s = YES)
35 and the timer count (REG_COUNT_s) shall be set to a pseudorandom number as
36 specified in 6.6.5.1.3, if the following conditions are met:

- 1 a. COUNTER_ENABLED_s is equal to NO; and
- 2 b. The stored configuration parameters are current (see 6.6.2.2); and
- 3 c. REG_ENABLED_s is equal to YES; and
- 4 d. REG_PRD_s is not equal to zero.
- 5 2. If any zone list entry timer (see 6.6.5.1.5) has expired, the mobile station shall
- 6 delete the corresponding entry from ZONE_LIST_s.
- 7 3. If any SID/NID list entry timer (see 6.6.5.1.5) has expired, the mobile station shall
- 8 delete the corresponding entry from SID_NID_LIST_s.
- 9 4. The mobile station shall perform power-up registration, as specified in 6.6.5.1.1, if
- 10 all the following conditions are met:
 - 11 a. POWER_UP_REG_s is equal to '1'; and
 - 12 b. The stored configuration parameters are current (see 6.6.2.2); and
 - 13 c. SID_NID_LIST_s is empty; and
 - 14 d. REG_ENABLED_s is equal to YES.
- 15 5. The mobile station shall perform parameter-change registration (see 6.6.5.1.6) if all
- 16 the following conditions are met:
 - 17 a. PARAMETER_REG_s is equal to '1'; and
 - 18 b. The stored configuration parameters are current (see 6.6.2.2); and
 - 19 c. There is no entry of SID_NID_LIST_s whose SID and NID fields match the stored
 - 20 SID_s and NID_s.
- 21 6. The mobile station shall perform timer-based registration (see 6.6.5.1.3) if all the
- 22 following conditions are met:
 - 23 a. COUNTER_ENABLED_s is equal to YES; and
 - 24 b. The stored configuration parameters are current (see 6.6.2.2); and
 - 25 c. REG_ENABLED_s is equal to YES; and
 - 26 d. REG_COUNT_s is greater than or equal to REG_COUNT_MAX_s.
- 27 7. The mobile station shall perform distance-based registration (see 6.6.5.1.4) if all the
- 28 following conditions are met:
 - 29 a. REG_DIST_s is not equal to zero; and
 - 30 b. The stored configuration parameters are current (see 6.6.2.2); and
 - 31 c. REG_ENABLED_s is equal to YES; and
 - 32 d. The current base station's distance from the base station in which the mobile
 - 33 station last registered (see 6.6.5.1.4) is greater than or equal to
 - 34 REG_DIST_REG_{s-p}.

- 1 8. The mobile station shall perform zone-based registration (see 6.6.5.1.5) if all the
2 following conditions are met:
- 3 a. TOTAL_ZONES_s is not equal to zero; and
- 4 b. The stored configuration parameters are current (see 6.6.2.2); and
- 5 c. REG_ENABLED_s is equal to YES; and
- 6 d. There is no entry of ZONE_LIST_s whose SID, NID and REG_ZONE fields match
7 the stored SID_s, NID_s and REG_ZONE_s.

8 6.6.5.5.2.2 Processing the Registration Fields of the *System Parameters Message*

9 When the mobile station processes the *System Parameters Message*, it shall perform the
10 following actions:

- 11 1. If REG_PRD_s is equal to zero, the mobile station shall set COUNTER_ENABLED_s to
12 NO.
- 13 2. If REG_PRD_s is not equal to zero, the mobile station shall set REG_COUNT_MAX_s
14 as specified in 6.6.5.1.3.
- 15 3. The mobile station shall update its roaming status and set REG_ENABLED_s as
16 specified in 6.6.5.3.
- 17 4. If ZONE_LIST_s contains more than TOTAL_ZONES_s entries, the mobile station shall
18 delete the excess entries according to the rules specified in 6.6.5.1.5.
- 19 5. If SID_NID_LIST_s contains more than N_{10m} entries, the mobile station shall delete
20 the excess entries according to the rules specified in 6.6.5.1.5.
- 21 6. If MULT_SIDS_s is equal to '0' and SID_NID_LIST contains entries with different
22 SIDs, delete the excess entries according to the rules specified in 6.6.5.1.5.
- 23 7. If MULT_NIDS_s is equal to '0' and SID_NID_LIST contains more than one entry for
24 any SID, delete the excess entries according to the rules specified in 6.6.5.1.5.

25 6.6.5.5.2.3 Ordered Registration

26 Ordered registration is performed after receiving a *Registration Request Order* while in the
27 *Mobile Station Order and Message Processing Operation* (see 6.6.2.4).

28 The mobile station shall enter the *Update Overhead Information Substate* of the *System*
29 *Access State* with a registration indication within T_{33m} seconds after the *Registration*
30 *Request Order* is received.

31 6.6.5.5.2.4 Power Down

32 These procedures are performed when the mobile station is directed by the user to power
33 down.

34 If POWER_UP_REG_s is equal to '0', the mobile station shall perform the following actions:

- 35 • If an entry of ZONE_LIST_s does not have an active timer, copy that entry to
36 ZONE_LIST_{s-p}; otherwise, delete any entry in ZONE_LIST_{s-p}.

- 1 • If an entry of $SID_NID_LIST_s$ does not have an active timer, copy that entry to
- 2 $SID_NID_LIST_{s-p}$; otherwise, delete any entry in $SID_NID_LIST_{s-p}$.

3 If $POWER_UP_REG_s$ is equal to '1', the mobile station shall delete all entries from

4 $ZONE_LIST_{s-p}$ and $SID_NID_LIST_{s-p}$.

5 The mobile station shall perform power-down registration, as specified in 6.6.5.1.2, if all the

6 following conditions are met:

- 7 • $REG_ENABLED_s$ equals YES; and
- 8 • $POWER_DOWN_REG_s$ equals '1'; and
- 9 • There is an entry of $SID_NID_LIST_s$ for which the SID and NID fields are equal to
- 10 SID_s and NID_s ; and
- 11 • The power-up/initialization timer (see 6.6.5.1.1) is disabled or has expired.

12 6.6.5.5.3 Actions in the *System Access State*

13 Requirements in this section and its subsections apply only when the mobile station is in

14 the *System Access State*.

15 6.6.5.5.3.1 Successful Registration or Implicit Registration

16 These procedures are performed after the mobile station receives an acknowledgement for a

17 *Registration Message*, *Origination Message*, or *Page Response Message* sent on the Access

18 Channel (see 6.6.3.1.2).

19 The mobile station shall perform the following actions:

- 20 • Disable the power-up/initialization timer (see 6.6.5.1.1).
- 21 • Set the First-Idle ID status to enabled (see 2.6.1.1).
- 22 • Set REG_COUNT_s to zero.
- 23 • Add REG_ZONE_s , SID_s , and NID_s to $ZONE_LIST_s$ if not already in the list.
- 24 • Disable the zone list entry timer for the entry of $ZONE_LIST_s$ containing REG_ZONE_s ,
- 25 SID_s , and NID_s . For any other entry of $ZONE_LIST_s$ whose entry timer is not active,
- 26 enable the entry timer with the duration specified by $ZONE_TIMER_s$ (see 6.6.5.1.5).
- 27 • If $ZONE_LIST_s$ contains more than $TOTAL_ZONES_s$ entries, delete the excess entries
- 28 according to the rules specified in 6.6.5.1.5.
- 29 • Add SID_s and NID_s to $SID_NID_LIST_s$ if not already in the list.
- 30 • Disable the SID/NID list entry timer for the entry of $SID_NID_LIST_s$ containing SID_s ,
- 31 and NID_s . For any other entry of $SID_NID_LIST_s$ whose entry timer is not active,
- 32 enable the entry timer with the duration specified in 6.6.5.1.5.
- 33 • If $SID_NID_LIST_s$ contains more than N_{10m} entries, delete the excess entries
- 34 according to the rules specified in 6.6.5.1.5.
- 35 • If $MULT_SIDS_s$ is equal to '0' and SID_NID_LIST contains entries with different SIDs,
- 36 delete the excess entries according to the rules specified in 6.6.5.1.5.

- 1 • If MULT_NIDS_s is equal to '0' and SID_NID_LIST contains more than one entry for
- 2 any SID, delete the excess entries according to the rules specified in 6.6.5.1.5.
- 3 • Set the stored location of last registration (BASE_LAT_REG_{s-p} and BASE_LONG-
- 4 _REG_{s-p}) to the current base station's location (BASE_LAT_s and BASE_LONG_s). Set
- 5 the stored registration distance (REG_DIST_REG_{s-p}) to the current base station's
- 6 registration distance (REG_DIST_s).
- 7 • Update its roaming status and set REG_ENABLED_s and MOB_TERM_s as specified in
- 8 6.6.5.3.

9 6.6.5.5.3.2 Unsuccessful Access

10 These procedures are performed when an access attempt fails.

11 The mobile station shall perform the following actions:

- 12 • If there is an entry of ZONE_LIST_s whose entry timer is not active, enable the entry
- 13 timer with the duration specified by ZONE_TIMER_s (see 6.6.5.1.5).
- 14 • If there is an entry of SID_NID_LIST_s whose entry timer is not active, enable the entry
- 15 timer with the duration specified in 6.6.5.1.5.

16 6.6.5.5.3.3 Power Down

17 These procedures are performed when the mobile station is directed by the user to power

18 down.

19 If POWER_UP_REG_s is equal to '0', the mobile station shall perform the following actions:

- 20 • If an entry of ZONE_LIST_s does not have an active timer, copy that entry to
- 21 ZONE_LIST_{s-p}; otherwise, delete any entry in ZONE_LIST_{s-p}.
- 22 • If an entry of SID_NID_LIST_s does not have an active timer, copy that entry to
- 23 SID_NID_LIST_{s-p}; otherwise, delete any entry in SID_NID_LIST_{s-p}.

24 If POWER_UP_REG_s is equal to '1', the mobile station shall delete all entries from

25 ZONE_LIST_{s-p} and SID_NID_LIST_{s-p}.

26 6.6.5.5.4 Actions in the Mobile Station Control on the Traffic Channel State

27 Requirements in this section and its subsections apply only when the mobile station is in

28 the *Mobile Station Control on the Traffic Channel State*.

29 6.6.5.5.4.1 Traffic Channel Initialization

30 Upon entering the *Traffic Channel Initialization Substate* of the *Mobile Station Control on the*

31 *Traffic Channel State*, the mobile station shall set COUNTER_ENABLED_s to NO.

32 6.6.5.5.4.2 Timer Maintenance

33 While in the *Mobile Station Control on the Traffic Channel State*, the mobile station shall

34 update all active registration timers.

1 If a zone list entry timer expires, the mobile station shall delete the corresponding entry
 2 from $ZONE_LIST_s$. If a SID/NID list entry timer expires, the mobile station shall delete the
 3 corresponding entry from $SID_NID_LIST_s$.

4 6.6.5.5.4.3 Processing the *Mobile Station Registered Message*

5 The mobile station receives the *Mobile Station Registered Message* on the Forward Traffic
 6 Channel when the mobile station is considered registered for the base station whose
 7 location and other parameters are included in the message.

8 The mobile station shall store the following parameters:

- 9 • System identification ($SID_s = SID_r$)
- 10 • Network identification ($NID_s = NID_r$)
- 11 • Registration zone ($REG_ZONE_s = REG_ZONE_r$)
- 12 • Number of registration zones to be retained ($TOTAL_ZONES_s = TOTAL_ZONES_r$)
- 13 • Zone timer length ($ZONE_TIMER_s = ZONE_TIMER_r$)
- 14 • Multiple SID storage indicator ($MULT_SIDS_s = MULT_SIDS_r$)
- 15 • Multiple NID storage indicator ($MULT_NIDS_s = MULT_NIDS_r$)
- 16 • Base station latitude ($BASE_LAT_s = BASE_LAT_r$)
- 17 • Base station longitude ($BASE_LONG_s = BASE_LONG_r$)
- 18 • Registration distance ($REG_DIST_s = REG_DIST_r$)

19 The mobile station shall perform the following actions:

- 20 • Set the First-Idle ID status to enabled (see 2.6.2.1).
- 21 • Add REG_ZONE_s , SID_s , and NID_s to $ZONE_LIST_s$ if not already in the list.
- 22 • Disable the zone list entry timer for the entry of $ZONE_LIST_s$ containing REG_ZONE_s ,
 23 SID_s , and NID_s . For any other entry of $ZONE_LIST_s$ whose entry timer is not active,
 24 enable the entry timer with the duration specified by $ZONE_TIMER_s$ (see 6.6.5.1.5).
- 25 • If $ZONE_LIST_s$ contains more than $TOTAL_ZONES_s$ entries, delete the excess entries
 26 according to the rules specified in 6.6.5.1.5.
- 27 • Add SID_s and NID_s to $SID_NID_LIST_s$ if not already in the list.
- 28 • Disable the SID/NID list entry timer for the entry of $SID_NID_LIST_s$ containing SID_s ,
 29 and NID_s . For any other entry of $SID_NID_LIST_s$ whose entry timer is not active,
 30 enable the entry timer with the duration specified in 6.6.5.1.5.
- 31 • If $SID_NID_LIST_s$ contains more than N_{10m} entries, delete the excess entries
 32 according to the rules specified in 6.6.5.1.5.
- 33 • If $MULT_SIDS_s$ is equal to '0' and SID_NID_LIST contains entries with different SIDs,
 34 delete the excess entries according to the rules specified in 6.6.5.1.5.
- 35 • If $MULT_NIDS_s$ is equal to '0' and SID_NID_LIST contains more than one entry for
 36 any SID, delete the excess entries according to the rules specified in 6.6.5.1.5.

- 1 • Set the stored location of last registration ($BASE_LAT_REG_{s-p}$ and $BASE_LONG_REG_{s-p}$) to the base station's location ($BASE_LAT_s$ and $BASE_LONG_s$). Set the
- 2 stored registration distance ($REG_DIST_REG_{s-p}$) to the base station's registration
- 3 distance (REG_DIST_s).
- 4
- 5 • Update its roaming status and set MOB_TERM_s as specified in 6.6.5.3. The mobile
- 6 station should indicate to the user whether the mobile station is roaming.

7 6.6.5.5.4.4 Power Down

8 These procedures are performed when the mobile station is directed by the user to power
9 down.

10 If $POWER_UP_REG_s$ is equal to '0', the mobile station shall perform the following actions:

- 11 • If an entry of $ZONE_LIST_s$ does not have an active timer, copy that entry to
- 12 $ZONE_LIST_{s-p}$; otherwise, delete any entry in $ZONE_LIST_{s-p}$.
- 13 • If an entry of $SID_NID_LIST_s$ does not have an active timer, copy that entry to
- 14 $SID_NID_LIST_{s-p}$; otherwise, delete any entry in $SID_NID_LIST_{s-p}$.

15 If $POWER_UP_REG_s$ is equal to '1', the mobile station shall delete all entries from
16 $ZONE_LIST_{s-p}$ and $SID_NID_LIST_{s-p}$.

17 6.6.6 Handoff Procedures

18 This section presents an overview and mobile station requirements for handoffs occurring
19 while the mobile station is in the *Mobile Station Control on the Traffic Channel State* (see
20 6.6.4). Mobile station requirements for handoffs occurring while the mobile station is in the
21 *Mobile Station Idle State* are specified in 6.6.2.1.4.

22 6.6.6.1 Overview

23 6.6.6.1.1 Types of Handoff

24 The mobile station supports the following three handoff procedures while in the *Mobile*
25 *Station Control on the Traffic Channel State*:

- 26 • **Soft Handoff:** A handoff in which the mobile station commences communications
27 with a new base station without interrupting communications with the old base
28 station. Soft handoff can only be used between CDMA Channels having identical
29 frequency assignments. Soft handoff provides diversity of Forward Traffic Channels
30 and Reverse Traffic Channel paths on the boundaries between base stations.
- 31 • **CDMA to CDMA Hard Handoff:** A handoff in which the mobile station is transitioned
32 between disjoint sets of base stations, different frequency assignments, or different
33 frame offsets.
- 34 • **CDMA to Analog Handoff:** A handoff in which the mobile station is directed from a
35 Forward Traffic Channel to an analog voice channel.

6.6.6.1.2 Pilot Sets

In the following, the term pilot refers to a Pilot Channel identified by a pilot sequence offset (see 7.1.3.2.1) and a frequency assignment (see 7.1.1.1). A pilot is associated with the Forward Traffic Channels in the same Forward CDMA Channel. All pilots in a pilot set have the same CDMA frequency assignment.

Soft handoffs and CDMA to CDMA hard handoffs using the same frequency assignment are typically initiated by the mobile station. The mobile station searches for pilots to detect the presence of CDMA Channels and to measure their strengths. When the mobile station detects a pilot of sufficient strength that is not associated with any of the Forward Traffic Channels assigned to it, it sends a *Pilot Strength Measurement Message* to the base station. The base station can then assign a Forward Traffic Channel associated with that pilot to the mobile station and direct the mobile station to perform a handoff.

The pilot search parameters and the rules for *Pilot Strength Measurement Message* transmission are expressed in terms of the following sets of pilots:

- **Active Set:** The pilots associated with the Forward Traffic Channels assigned to the mobile station.
- **Candidate Set:** The pilots that are not currently in the Active Set but have been received by the mobile station with sufficient strength to indicate that the associated Forward Traffic Channels could be successfully demodulated.
- **Neighbor Set:** The pilots that are not currently in the Active Set or the Candidate Set and are likely candidates for handoff.
- **Remaining Set:** The set of all possible pilots in the current system (integer multiples of $PILOT_INC_s$) on the current CDMA frequency assignment, excluding the pilots in the Neighbor Set, the Candidate Set, and the Active Set.

6.6.6.2 Requirements

6.6.6.2.1 Pilot Search

The base station specifies for each of the above pilot sets the search window (range of PN offsets) in which the mobile station is to search for usable multipath components (i.e., multipath components that the mobile station can use for demodulation of the associated Forward Traffic Channel) of the pilots in the set.

Search performance criteria are defined in IS-98 "Recommended Minimum Performance Standards for Dual-Mode Wideband Spread Spectrum Cellular Mobile Stations."

1 This search shall be governed by the following:

- 2 • **Active Set and Candidate Set:** The search procedures for pilots in the Active Set and
3 Candidate Set shall be identical. The search window size²¹ for each pilot in the
4 Active Set and Candidate Set shall be the number of PN chips specified in Table
5 6.6.6.2.1-1 corresponding to SRCH_WIN_A_s. The mobile station should center the
6 search window for each pilot of the Active Set and Candidate Set around the earliest
7 arriving usable multipath component of the pilot. If the mobile station receives a
8 value greater than or equal to 13 for SRCH_WIN_A_r, it may store and use the value
9 13 in SRCH_WIN_A_s.

10
11 **Table 6.6.6.2.1-1. Searcher Window Sizes**

SRCH_WIN_A SRCH_WIN_N SRCH_WIN_R	Window Size (PN chips)	SRCH_WIN_A SRCH_WIN_N SRCH_WIN_R	Window Size (PN chips)
0	4	8	60
1	6	9	80
2	8	10	100
3	10	11	130
4	14	12	160
5	20	13	226
6	28	14	320
7	40	15	452

- 12
13 • **Neighbor Set:** The search window size for each pilot in the Neighbor Set shall be the
14 number of PN chips specified in Table 6.6.6.2.1-1 corresponding to SRCH_WIN_N_s.
15 The mobile station should center the search window for each pilot in the Neighbor
16 Set around the pilot's PN sequence offset using timing defined by the mobile station's
17 time reference (see 6.1.5.1).
- 18 • **Remaining Set:** The search window size for each pilot in the Remaining Set shall be
19 the number of PN chips specified in Table 6.6.6.2.1-1 corresponding to
20 SRCH_WIN_R_s. The mobile station should center the search window for each pilot in
21 the Remaining Set around the pilot's PN sequence offset using timing defined by the
22 mobile station's time reference (see 6.1.5.1). The mobile station should only search
23 for Remaining Set pilots whose pilot PN sequence offset indices are equal to integer
24 multiples of PILOT_INC_s.

²¹The table defines the entire search range. For example, SRCH_WIN_A_s = 6 corresponds to a 28 PN chip search window or ±14 PN chips around the search window center.

6.6.6.2.2 Pilot Strength Measurements

The mobile station assists the base station in the handoff process by measuring and reporting the strengths of received pilots.

The mobile station should use the searcher element (see 6.2.2.1) to compute the strength of a pilot by adding the ratios of received pilot energy per chip, E_c , to total received spectral density (noise and signals), I_0 , of at most k usable multipath components, where k is the number of demodulating elements (see 6.2.2.1) supported by the mobile station.

6.6.6.2.3 Handoff Drop Timer

The mobile station shall maintain a handoff drop timer for each pilot in the Active Set and Candidate Set. The mobile station shall start the timer whenever the strength of the corresponding pilot becomes less than T_DROP_s . For the Active Set, the mobile station shall start the timer even if the timer has previously expired. The mobile station shall reset and disable the timer if the strength of the corresponding pilot exceeds T_DROP_s . If T_TDROP_s equals zero, the mobile station shall consider the timer expired within 100 ms of enabling it. Otherwise, the mobile station shall consider the timer expired within 10% of the timer expiration value shown in Table 6.6.6.2.3.-1 corresponding to T_TDROP_s . If T_TDROP_s changes, the mobile station shall begin using the new value within 100 ms.

Table 6.6.6.2.3-1. Handoff Drop Timer Expiration Values

T_TDROP	Timer Expiration (seconds)	T_TDROP	Timer Expiration (seconds)
0	≤ 0.1	8	27
1	1	9	39
2	2	10	55
3	4	11	79
4	6	12	112
5	9	13	159
6	13	14	225
7	19	15	319

The mobile station shall indicate the status of the handoff drop timer for all pilots in the Active Set and Candidate Set when transmitting a *Pilot Strength Measurement Message*.

6.6.6.2.4 Pilot PN Phase

The mobile station shall measure the arrival time, $PILOT_ARRIVAL$, for each pilot reported to the base station. The pilot arrival time shall be the time of occurrence, as measured at the mobile station antenna connector, of the earliest arriving usable multipath component

1 of the pilot. The arrival time shall be measured relative to the mobile station's time
 2 reference (see 6.1.5.1) in units of PN chips. The mobile station shall compute the reported
 3 pilot PN phase, $PILOT_PN_PHASE$, as

$$4 \quad PILOT_PN_PHASE = (PILOT_ARRIVAL + (64 \times PILOT_PN)) \bmod 2^{15},$$

5 where $PILOT_PN$ is the PN sequence offset index of the pilot (see 7.1.3.2.1).

6 6.6.6.2.5 Handoff Messages

7 6.6.6.2.5.1 Processing of Forward Traffic Channel Handoff Messages

8 If the mobile station receives any of the following messages, then the mobile station shall
 9 process the message as described.

- 10 1. Pilot Measurement Request Order: The mobile station shall send, within T_{56m}
 11 seconds, a *Pilot Strength Measurement Message*.
- 12 2. Handoff Direction Message: The message shall take effect at the following time:
 - 13 • If $FRAME_OFFSET_T$ is not equal to $FRAME_OFFSET_S$ and USE_TIME_T equals '0',
 14 then the message shall take effect on the first 80 ms boundary (relative to
 15 System Time) occurring at least 80 ms after the end of the frame containing the
 16 last bit of the message.
 - 17 • Otherwise, the message shall take effect at the action time of the message as
 18 specified in 6.6.4.1.5.

19 When the message takes effect, the mobile station shall perform the following:

- 20 • Update the Active Set, Candidate Set, and Neighbor Set in accordance with the
 21 *Handoff Direction Message* (see 6.6.6.2.6.1, 6.6.6.2.6.2, and 6.6.6.2.6.3).
- 22 • Discontinue use of all Forward Traffic Channels associated with pilots not listed
 23 in the *Handoff Direction Message*.
- 24 • If $FRAME_OFFSET_T$ is not equal to $FRAME_OFFSET_S$, change the frame offset on
 25 both the Forward Traffic Channel and the Reverse Traffic Channel.
- 26 • If the $RESET_L2_T$ is equal to '1', reset the acknowledgement procedures as
 27 specified in 6.6.4.1.3.3, and reset the Forward Traffic Channel power control
 28 counters as specified in 6.6.4.1.1.1.
- 29 • Use the long code mask specified by the $PRIVATE_LCM_T$ (see 6.3.12.3) and
 30 indicate to the user the voice privacy mode status.
- 31 • Process the $ENCRYPT_MODE$ field as specified in 6.3.12.2.
- 32 • If $CDMA_FREQ_T \neq CDMACH_S$, $FRAME_OFFSET_T \neq FRAME_OFFSET_S$, or the set
 33 of pilots specified by the message is disjoint from the Active Set prior to the
 34 action time of the message, the mobile station shall perform actions as indicated
 35 in 6.6.6.2.8. If the message specifies more than one pilot, the mobile station
 36 shall perform actions as specified in 6.6.6.2.7.
- 37 • Store the following parameters from the *Handoff Direction Message*:

- 1 • *Handoff Direction Message* sequence number ($HDM_SEQ_S = HDM_SEQ_T$)
- 2 • Search window size for the Active Set and Candidate Set
- 3 ($SRCH_WIN_A_S = SRCH_WIN_A_T$)
- 4 • Pilot detection threshold ($T_ADD_S = T_ADD_T$)
- 5 • Pilot drop threshold ($T_DROP_S = T_DROP_T$)
- 6 • Active Set versus Candidate Set comparison threshold ($T_COMP_S = T_COMP_T$)
- 7 • Drop timer value ($T_TDROP_S = T_TDROP_T$)
- 8 • Frame offset ($FRAME_OFFSET_S = FRAME_OFFSET_T$)
- 9 • Frequency assignment, if specified
- 10 (if $FREQ_INCL_T = '1'$, $CDMACH_S = CDMA_FREQ_T$)
- 11 3. *Analog Handoff Direction Message*: The mobile station shall process the message as
- 12 specified in 6.6.6.2.9.
- 13 4. *Neighbor List Update Message*: The mobile station shall process the message as
- 14 specified in 6.6.6.2.6.3.

15 6.6.6.2.5.2 Processing of Reverse Traffic Channel Handoff Messages

16 The mobile station sends the following messages on the Reverse Traffic Channel in support
 17 of handoff when its transmitter is enabled and following the receipt of the first *Base Station*
 18 *Acknowledgement Order* on the Forward Traffic Channel:

- 19 1. *Pilot Strength Measurement Message*: The mobile station shall send an autonomous
- 20 *Pilot Strength Measurement Message* whenever any of the following events occur:
 - 21 • The strength of a Neighbor Set or Remaining Set pilot is found to be above
 - 22 T_ADD_S .
 - 23 • The strength of a Candidate Set pilot exceeds the strength of an Active Set pilot
 - 24 by $T_COMP_S \times 0.5$ dB and a *Pilot Strength Measurement Message* carrying this
 - 25 information has not been sent since the last *Handoff Direction Message* was
 - 26 received.
 - 27 • The handoff drop timer of an Active Set pilot has expired and a *Pilot Strength*
 - 28 *Measurement Message* carrying this information has not been sent since the last
 - 29 *Handoff Direction Message* was received.
- 30 2. *Handoff Completion Message*: The mobile station shall send the *Handoff*
- 31 *Completion Message* as a message requiring acknowledgment within T_{56m} seconds
- 32 after the action time of a received *Handoff Direction Message*.

33 6.6.6.2.6 Set Maintenance

34 6.6.6.2.6.1 Maintenance of the Active Set

35 The mobile station shall support a maximum Active Set size of N_{6m} pilots. The mobile
 36 station shall track the pilot strengths of all pilots in the Active Set.

1 When the mobile station is first assigned a Forward Traffic Channel, the mobile station
2 shall initialize the Active Set to contain only the pilot associated with the assigned Forward
3 Traffic Channel. When the mobile station processes a *Handoff Direction Message* it shall
4 replace the Active Set with the pilots listed in the message.

5 6.6.6.2.6.2 Maintenance of the Candidate Set

6 The mobile station shall support a maximum Candidate Set size of N_{7m} pilots.

7 When the mobile station is first assigned a Forward Traffic Channel, the mobile station
8 shall initialize the Candidate Set to contain no pilots. The mobile station shall adjust the
9 Candidate Set whenever any of the following events occur:

- 10 • If the mobile station detects that the strength of a Neighbor Set pilot or a Remaining
11 Set pilot exceeds T_ADD_s , the mobile station shall add the pilot to the Candidate Set.
- 12 • If the mobile station processes a *Handoff Direction Message* which does not list a pilot
13 in the current Active Set, and the handoff drop timer corresponding to that pilot has
14 not expired, the mobile station shall add the pilot to the Candidate Set.
- 15 • If the mobile station processes a *Handoff Direction Message* which lists a pilot in the
16 current Candidate Set, the mobile station shall delete the pilot from the Candidate
17 Set.
- 18 • If the handoff drop timer corresponding to a Candidate Set pilot expires, the mobile
19 station shall delete the pilot from the Candidate Set.
- 20 • If the mobile station adds a pilot to the Candidate Set and the resulting Candidate
21 Set size exceeds N_{7m} , the mobile station shall delete from the Candidate Set the pilot
22 whose handoff drop timer is closest to expiration. If more than one such pilot exists,
23 the mobile station shall delete one such pilot that has the lowest strength. If no pilot
24 in the Candidate Set has an enabled handoff drop timer, the mobile station shall
25 delete from the Candidate Set one of the pilots that has the lowest strength.

26 6.6.6.2.6.3 Maintenance of the Neighbor Set

27 The mobile station shall support a Neighbor Set size of at least N_{8m} pilots.

28 When the mobile station is first assigned a Forward Traffic Channel, the mobile station
29 shall initialize the Neighbor Set to contain the pilots specified in the most recently received
30 *Neighbor List Message*.

31 The mobile station shall maintain a counter, AGE_s , for each pilot in the Neighbor Set. The
32 mobile station shall initialize this counter to zero when it moves the pilot from the Active
33 Set or the Candidate Set to the Neighbor Set. The mobile station shall initialize this
34 counter to $NGHBR_MAX_AGE_s$ when it moves the pilot from the Remaining Set to the
35 Neighbor Set. The mobile station shall increment AGE_s for each pilot in the Neighbor Set
36 upon receipt of a *Neighbor List Update Message*.

1 The mobile station shall adjust the Neighbor Set whenever any of the following events
2 occur:

- 3 • If the mobile station receives a *Neighbor List Update Message*, it shall perform the
4 following:
 - 5 • Increment AGE_B for each pilot in the Neighbor Set.
 - 6 • Delete from the Neighbor Set all pilots whose AGE_B exceeds $NGHBR_MAX_AGE_B$.
 - 7 • Add to the Neighbor Set each pilot named in the message, if it is not already a
8 pilot of the Candidate Set or Neighbor Set. If the mobile station can store in the
9 Neighbor Set only k additional pilots and more than k new pilots were sent in
10 the *Neighbor List Update Message*, the mobile station shall store the first k new
11 pilots listed in the message.
- 12 • If the handoff drop timer of a pilot in the Candidate Set expires, the mobile station
13 shall add the pilot to the Neighbor Set.
- 14 • If the mobile station processes a *Handoff Direction Message* in which a pilot in the
15 Active Set is not listed and the handoff drop timer corresponding to the pilot has
16 expired, the mobile station shall add the pilot to the Neighbor Set.
- 17 • If the mobile station adds a pilot to the Candidate Set and the resulting Candidate
18 Set size exceeds the size supported by the mobile station, the mobile station shall
19 add the deleted Candidate Set pilot to the Neighbor Set (see 6.6.6.2.6.2).
- 20 • If the mobile station detects that the strength of a Neighbor Set pilot exceeds
21 T_ADD_B , the mobile station shall delete the pilot from the Neighbor Set.
- 22 • If the mobile station processes a *Handoff Direction Message* which lists a pilot in the
23 current Neighbor Set, the mobile station shall delete the pilot from the Neighbor Set.
- 24 • If the mobile station adds a pilot to the Neighbor Set and the resulting Neighbor Set
25 size exceeds the size supported by the mobile station, the mobile station shall delete
26 from the Neighbor Set the pilot whose AGE_B is largest. If more than one such pilot
27 exists, the mobile station shall delete one such pilot that has the lowest strength.

28 6.6.6.2.7 Soft Handoff

29 6.6.6.2.7.1 Forward Traffic Channel Processing

30 All Forward Traffic Channels associated with pilots in the Active Set of the mobile station
31 carry identical modulation symbols with the exception of the power control subchannel (see
32 7.1.3.1.7 and 7.6.6.2.4.2).

33 When the Active Set contains more than one pilot, the mobile station should provide
34 diversity combining of the associated Forward Traffic Channels. The mobile station shall
35 provide for differential propagation delays from zero to at least 150 μ s.

1 6.6.6.2.7.2 Reverse Traffic Channel Power Control During Soft Handoff

2 The *Handoff Direction Message* identifies sets of Forward Traffic Channels that carry
3 identical closed loop power control subchannels. A set consists of one or more Forward
4 Traffic Channel transmissions with identical power control information.

5 In each power control group containing valid power control bits (see 6.1.2.3.2), the mobile
6 station should provide diversity combining of the identical closed loop power control
7 subchannels and shall obtain at most one power control bit from each set of identical
8 closed loop power control subchannels. If the power control bits obtained from all sets are
9 equal to '0', the mobile station shall increase its power as specified in 6.1.2.3.2. If the
10 power control bit obtained from any set is equal to '1', the mobile station shall decrease its
11 power as specified in 6.1.2.3.2.

12 6.6.6.2.8 CDMA to CDMA Hard Handoff

13 The base station directs the mobile station to perform a CDMA to CDMA hard handoff by
14 sending a *Handoff Direction Message* in which the mobile station is transitioned between
15 disjoint sets of base stations, different frequency assignments, or different frame offsets.

16 At the action time specified in the *Handoff Direction Message*, the mobile station shall
17 disable its transmitter, reset the fade timer specified in 6.4.4, suspend incrementing
18 TOT_FRAMES_s and BAD_FRAMES_s as specified in 6.6.4.1.1, and tune to the assigned
19 Forward Traffic Channel. The mobile station shall perform acquisition of the pilots in the
20 new Active Set. The mobile station shall not enable its transmitter until it receives at least
21 N_{3m} consecutive good frames on the assigned Forward Traffic Channel. Upon receiving
22 N_{3m} consecutive good frames, the mobile station shall resume incrementing TOT_FRAMES_s
23 and BAD_FRAMES_s as specified in 6.6.4.1.1.

24 If the *Handoff Direction Message* specifies a CDMA frequency assignment different from the
25 current CDMA frequency assignment and an Active Set containing pilots with pilot PN
26 sequence offsets identical to those of the pilots in the current Active Set, the mobile station
27 shall begin monitoring the assigned Forward Traffic Channel within T_{60m} seconds after the
28 action time.

29 If the *Handoff Direction Message* specifies a CDMA frequency assignment different from the
30 current CDMA frequency assignment and an Active Set containing a pilot with pilot PN
31 sequence offset not equal to that of any pilot in the current Active Set, the mobile station
32 shall begin monitoring the assigned Forward Traffic Channel within T_{61m} seconds after the
33 action time.

34 If the *Handoff Direction Message* specifies a CDMA to CDMA hard handoff using the current
35 CDMA frequency assignment, the mobile station shall begin monitoring the assigned
36 Forward Traffic Channel within T_{62m} seconds after the action time.

37 6.6.6.2.9 CDMA to Analog Handoff

38 The base station directs the mobile station to perform a CDMA to Analog handoff by
39 sending an *Analog Handoff Direction Message*.

40 The mobile station shall store the following parameters from the *Analog Handoff Direction*
41 *Message*:

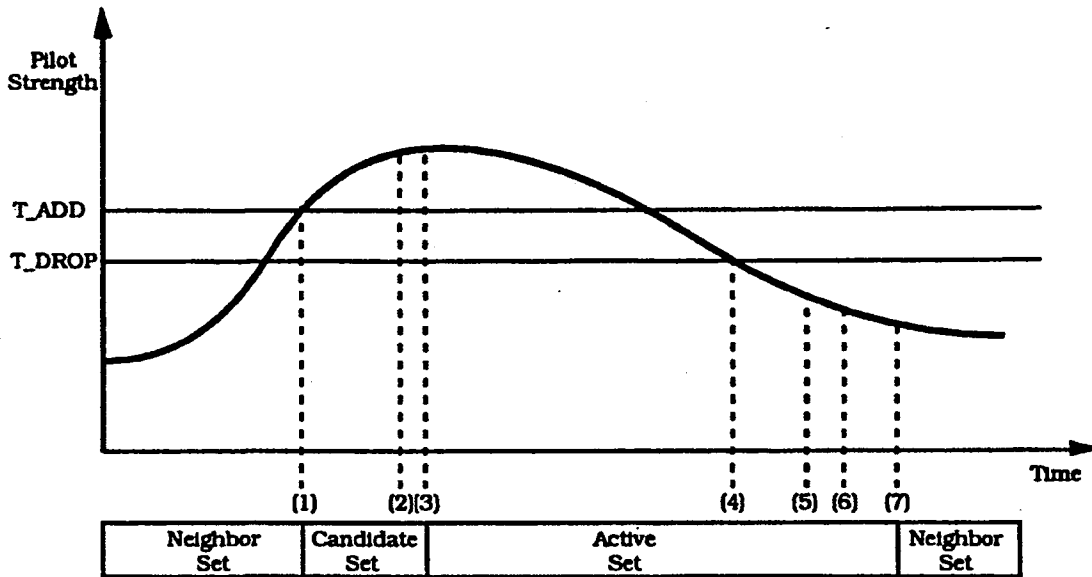
- 1 • System identification ($SID_s = SID_r$)
- 2 • Voice mobile station attenuation code ($VMAC_s = VMAC_r$)
- 3 • Analog voice channel number ($ANALOG_CHAN_s = ANALOG_CHAN_r$)
- 4 • SAT color code ($SCC_s = SCC_r$)
- 5 • Message encryption mode indicator ($MEM_s = MEM_r$)
- 6
- 7 **At the action time specified by the *Analog Handoff Direction Message* (see 6.6.4.1.5), the**
- 8 **mobile station shall disable its transmitter. The mobile station shall enable its transmitter**
on the analog voice channel within T_{63m} seconds after the action time.

1 **6.6.6.3 Examples**

2 The following examples illustrate typical message exchanges between the mobile station
 3 and the base station during handoff. Refer to Appendix B for examples of call processing
 4 during handoff.

5 Figure 6.6.6.3-1 shows an example of the messages exchanged between the mobile station
 6 and the base station during a typical handoff process.

7



8

9

(1) Pilot strength exceeds T_ADD . Mobile station sends a *Pilot Strength Measurement Message* and transfers pilot to the Candidate Set.

10

(2) Base station sends a *Handoff Direction Message*.

11

(3) Mobile station transfers pilot to the Active Set and sends a *Handoff Completion Message*.

12

13

(4) Pilot strength drops below T_DROP . Mobile station starts the handoff drop timer.

14

15

(5) Handoff drop timer expires. Mobile station sends a *Pilot Strength Measurement Message*.

16

17

(6) Base station sends a *Handoff Direction Message*.

18

(7) Mobile station moves pilot from the Active Set to the Neighbor Set and sends a *Handoff Completion Message*.

19

20

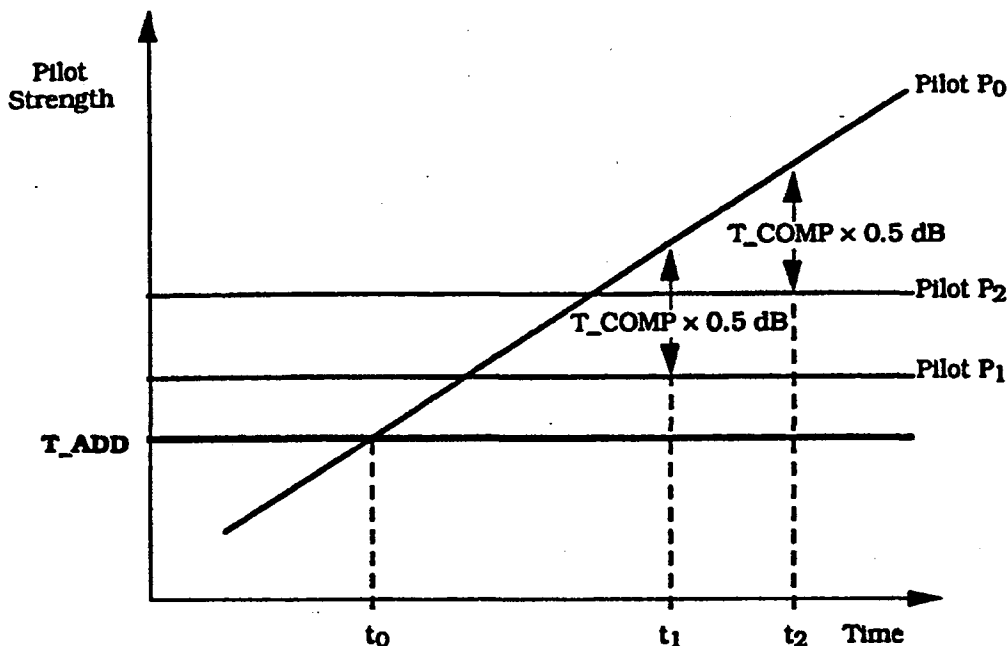
21

Figure 6.6.6.3-1. Handoff Threshold Example

22

- 1 Figure 6.6.6.3-2 illustrates the messaging triggered by a pilot of the Candidate Set as its
 2 strength gradually rises above the strength of each pilot of the Active Set. Note that the
 3 mobile station reports that a Candidate Set pilot is stronger than an Active Set pilot only if
 4 the difference between their respective strengths is at least $T_COMP_s \times 0.5$ dB.

5



6

7 Candidate Set: Pilot P₀

7

8 Active Set: Pilots P₁, P₂

8

9 t₀ — Pilot Strength Measurement Message sent, P₀ > T_ADD

9

10 t₁ — Pilot Strength Measurement Message sent, P₀ > P₁ + T_COMP × 0.5 dB

10

11 t₂ — Pilot Strength Measurement Message sent, P₀ > P₂ + T_COMP × 0.5 dB

11

12 **Figure 6.6.6.3-2. Pilot Strength Measurements Triggered by a Candidate Pilot**

12

13

14 **6.6.7 Hash Functions and Randomization**

14

15 **6.6.7.1 Hash Function**

15

- 16 Certain procedures require a uniform distribution of mobile stations among N resources.
 17 The following function returns an integer, using as arguments the mobile station's MIN or
 18 ESN, the number of resources N, and a modifier DECORR. The modifier serves to
 19 decorrelate the values obtained for the various applications from the same mobile station.

19

1 If the hashing function is to be used for determining the Access Channel PN
 2 Randomization, HASH_KEY shall be equal to the mobile station ESN. Otherwise,
 3 HASH_KEY shall be equal to the 32 least significant bits of $(MIN1 + 2^{24} \times MIN2)$.

4 Define:

- 5 • Word L to be bits 0-15 of HASH_KEY
- 6 • Word H to be bits 16-31 of HASH_KEY

7 where bit 0 is the least significant bit of HASH_KEY. The hash value is computed as
 8 follows:²²

$$R = \lfloor N \times ((40503 \times (L \oplus H \oplus DECORR)) \bmod 2^{16}) / 2^{16} \rfloor$$

10 The mobile station shall choose the range N and the 16-bit modifier DECORR according to
 11 the application as shown in Table 6.6.7.1-1. In the table, HASH_KEY [0...11] denotes the
 12 12 least significant bits of HASH_KEY.

14 **Table 6.6.7.1-1. Hash Function Modifier**

Application	N	DECORR	Return Value
CDMA Channel Number	Number of channels in last CDMA Channel List Message (up to 10)	0	R + 1
Paging Channel Number	PAGE_CHAN _g from System Parameters Message (up to 7)	2 × HASH_KEY [0...11]	R + 1
Paging Slot Number	2048	6 × HASH_KEY[0...11]	R
Access Channel PN Randomization	2 ^{PROBE_PN_RAN_g} where PROBE_PN_RAN is from Access Parameters Message (up to 512)	14 × HASH_KEY[0...11]	R

15

16 **6.6.7.2 Pseudorandom Number Generator**

17 Where pseudorandom numbers are needed in the CDMA cellular protocols, a linear
 18 congruential generator shall be used. The mobile station shall implement the linear
 19 congruential generator defined by:

$$z_n = a \times z_{n-1} \bmod m$$

21 where $a = 7^5 = 16807$ and $m = 2^{31} - 1 = 2147483647$. z_n is the output of the generator.²³

²²This formula is adapted from Knuth, D. N., *Sorting and Searching*, vol. 3 of *The Art of Computer Programming*, 3 vols., (Reading, MA: Addison-Wesley, 1973), pp. 508-513.

²³This generator has full period, ranging over all integers from 1 to m-1; the values 0 and m are never produced. Several suitable implementations can be found in Park, Stephen K. and Miller, Keith W.,

- 1 During the *Mobile Station Initialization State*, the mobile station shall seed its generator with
- 2
$$z_0 = (\text{ESN} \oplus \text{RANDOM_TIME}) \bmod m$$
- 3 where *RANDOM_TIME* shall be the least-significant 32-bits of *SYS_TIME*, stored from the
- 4 *Sync Channel Message*. If the initial value so produced is found to be zero, it shall be
- 5 replaced with one. The mobile station shall compute a new z_n for each subsequent use.
- 6 The mobile station shall use the value $u_n = z_n / m$ for those applications that require a
- 7 binary fraction u_n , $0 < u_n < 1$.
- 8 The mobile station shall use the value $k_n = \lfloor N \times z_n / m \rfloor$ for those applications that require
- 9 a small integer k_n , $0 \leq k_n \leq N-1$.

"Random Number Generators: Good Ones are Hard to Find," *Communications of the ACM*, vol. 31, no. 10, October 1988, pp. 1192-1201.

6.7 Signaling Formats

This section describes the messages sent by the mobile station.

Some bits in the following message formats are marked as RESERVED. These bits allow for extensions to the basic message for future features and capabilities. The mobile station sets all reserved bits to '0'.

All messages have a set of acknowledgement fields. These fields are ACK_SEQ, MSG_SEQ, ACK_REQ, and VALID_ACK for Access Channel messages and ACK_SEQ, MSG_SEQ, and ACK_REQ for Reverse Traffic Channel messages.

In any multi-bit field of a signaling message, the most significant bit shall be transmitted first.

6.7.1 Access Channel

This section describes the messages sent by the mobile station on the Access Channel (see 6.1.3.2).

6.7.1.1 Access Channel Structure

An Access Channel slot is $(3 + \text{MAX_CAP_SZ}) + (1 + \text{PAM_SZ})$ Access Channel frames in length. An Access Channel slot begins and ends on an Access Channel frame boundary. Access Channel slots begin at Access Channel frames in which

$$t \bmod (4 + \text{MAX_CAP_SZ} + \text{PAM_SZ}) = 0,$$

where t is the System Time in frames. Note that all Access Channels associated with a particular Paging Channel have the same slot size and that all of the slots begin at the same time. Figure 6.7.1.1-1 shows an example of Access Channel slots. Figure 6.7.1.1-2 shows the Access Channel structure.

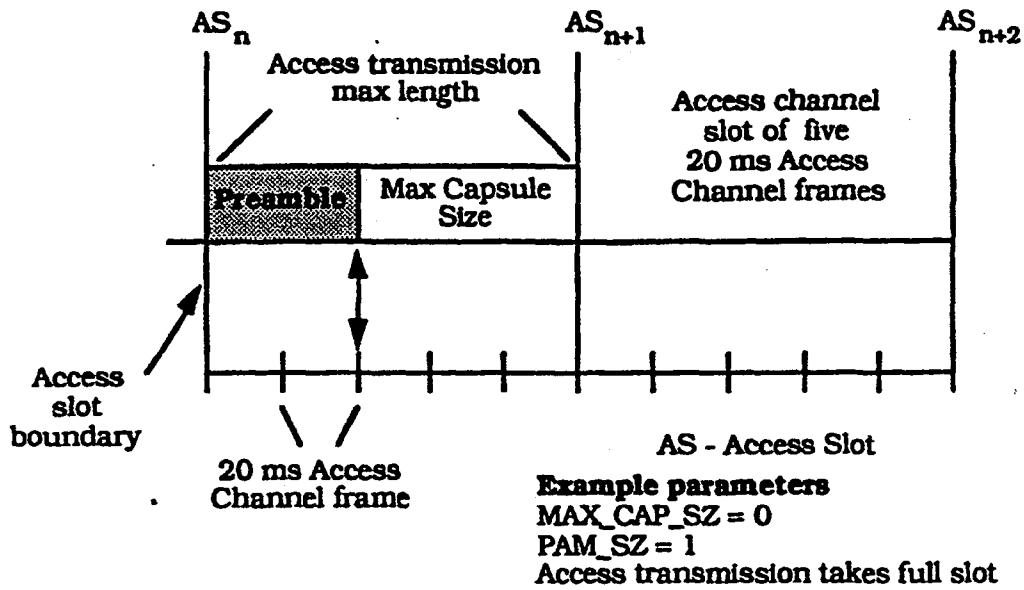
The Access Channel slot length may differ from base station to base station. A mobile station shall determine the beginning and length of the Access Channel slot prior to transmission.

An Access Channel transmission consists of the Access Channel preamble and the Access Channel message capsule. An Access Channel transmission shall be an integer number of Access Channel frames in length and shall not exceed $4 + \text{MAX_CAP_SZ} + \text{PAM_SZ}$ Access Channel frames in length.

On each Access Channel transmission, the mobile station shall transmit a preamble consisting of 96 zeros (see 6.1.3.2.2.1) starting at the beginning of the slot (plus PN randomization as specified in 6.6.3.1.1.2) and $1 + \text{PAM_SZ}$ Access Channel frames in length. The mobile station shall transmit an Access Channel message capsule immediately following the preamble.

1

2

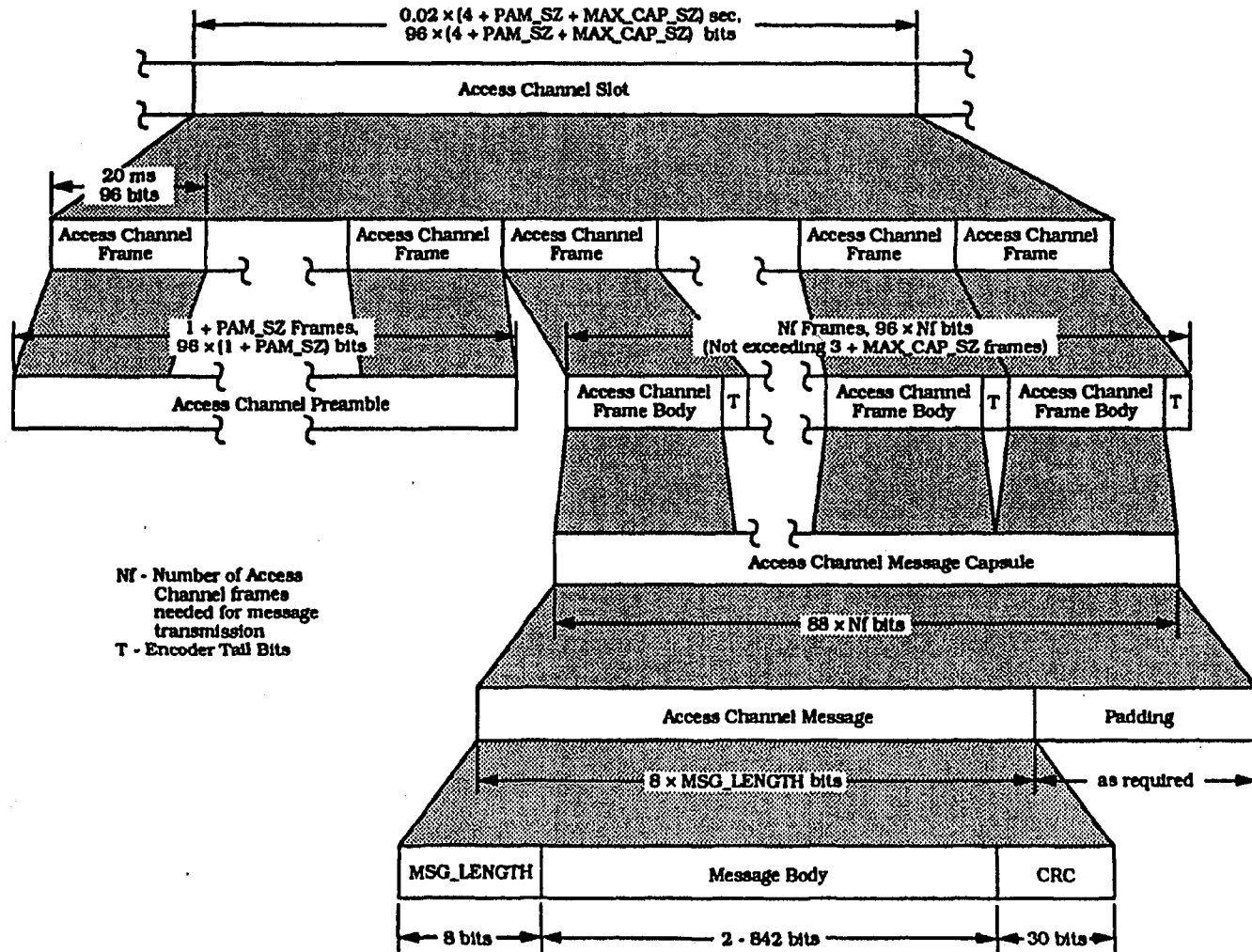


3

4

Figure 6.7.1.1-1. Example of Access Channel Slot Structure

2
 Figure 6.7.1.1-2. Access Channel Structure



6.7.1.2 Access Channel Message Structure

An Access Channel message capsule consists of an Access Channel message and padding, as shown in Figure 6.7.1.2-1. The length of the Access Channel message capsule shall be an integer number of Access Channel frames given by

$$CAP_SZ = \left\lceil \frac{8 + \text{Message Body Length} + 30}{88} \right\rceil$$

Each Access Channel message shall consist of a length field (MSG_LENGTH), a message body, and a CRC, in that order. The message body size shall be selected so that CAP_SZ does not exceed 3 + MAX_CAP_SZ. The mobile station shall transmit the Access Channel message immediately following the preamble.

The mobile station shall transmit padding consisting of zero or more '0' bits immediately following the Access Channel message. The length of the padding shall be such that

$$8 + \text{Message Body Length} + 30 + \text{Padding Length} = 88 \times CAP_SZ$$

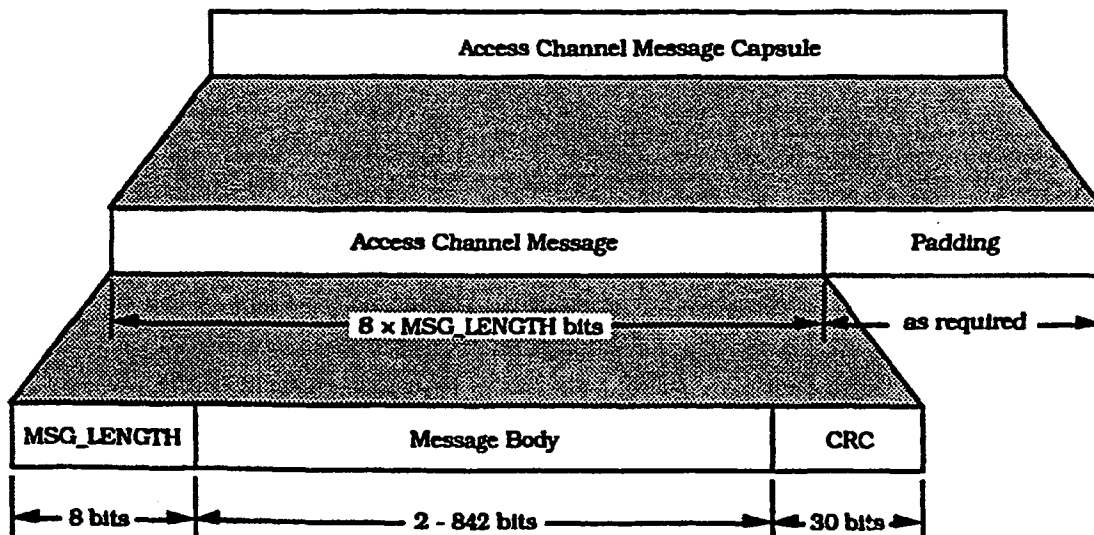


Figure 6.7.1.2-1. Access Channel Message Structure

6.7.1.2.1 Access Channel MSG_LENGTH Field

The mobile station shall set the MSG_LENGTH field of each Access Channel signaling message to the length of the message in octets, including the MSG_LENGTH field, the message body, and the CRC, but not including the preamble or the padding. The MSG_LENGTH field shall be 8 bits in length. Consistent with a maximum MAX_CAP_SZ value of 7, the mobile station shall limit the maximum Access Channel message length to 110 octets, or 880 bits. That is, the value of the MSG_LENGTH field shall not exceed 110.

1 6.7.1.2.2 Access Channel Message CRC

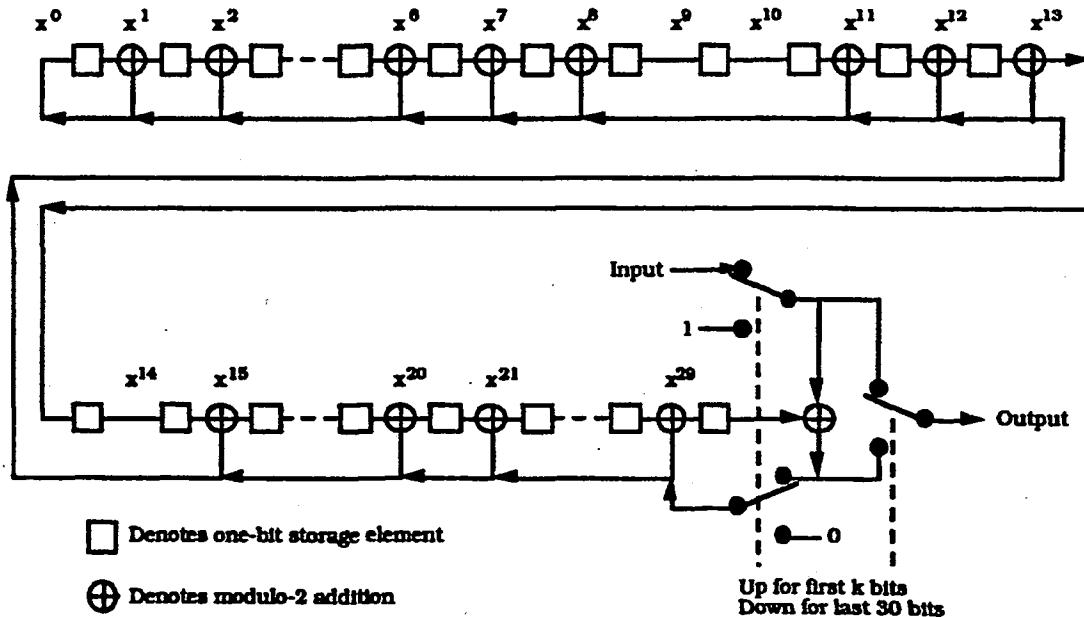
2 A 30-bit CRC shall be computed for each Access Channel signaling message. The CRC
 3 shall include the MSG_LENGTH field and the message body. The generator polynomial for
 4 the CRC shall be as follows:

5
$$g(x) = x^{30} + x^{29} + x^{21} + x^{20} + x^{15} + x^{13} + x^{12} + x^{11} + x^8 + x^7 + x^6 + x^2 + x + 1.$$

6 The CRC shall be the value computed by the following procedure and the logic shown in
 7 Figure 6.7.1.2.2-1:

- 8 • All shift register elements shall be initialized to logical one.²⁴
- 9 • The switches shall be set in the up position.
- 10 • The information bit count k shall be defined as 8 + message body length in bits.
- 11 • The register shall be clocked k times, with the length and message body of the
 12 message as the k input bits.
- 13 • The switches shall be set in the down position.
- 14 • The register shall be clocked an additional 30 times.
- 15 • The 30 additional output bits shall be the CRC field.
- 16 • The bits shall be transmitted in the order in which they appear at the output of the
 17 CRC encoder.

18



19

20

Figure 6.7.1.2.2-1. Access Channel CRC Calculation

²⁴Initialization of the register to ones causes the CRC for all-zero data to be non-zero.

6.7.1.3 Access Channel Message Body Format

The messages sent on the Access Channel are summarized in Table 6.7.1.3-1.

Table 6.7.1.3-1. Access Channel Messages

Message Name	Message Type (binary)
<i>Registration Message</i>	00000001
<i>Order Message</i>	00000010
<i>Data Burst Message</i>	00000011
<i>Origination Message</i>	00000100
<i>Page Response Message</i>	00000101
<i>Authentication Challenge Response Message</i>	00000110

6.7.1.3.1 Common Fields

6.7.1.3.1.1 Common Layer 2 and Identification Fields

All Access Channel messages share the following eight fields:

ACK_SEQ - Acknowledgement sequence number.

The mobile station shall set this field to the value of the MSG_SEQ field from the most recently received Paging Channel message requiring acknowledgement. If no such message has been received, the mobile station shall set this field to '111'. See 6.6.2.1.2.

MSG_SEQ - Message sequence number.

The mobile station shall set this field to the message sequence number for this message. See 6.6.3.1.2.

ACK_REQ - Acknowledgement required indicator. This field indicates whether this message requires an acknowledgement. The mobile station shall set the ACK_REQ field of all messages sent on the Access Channel to '1'.

VALID_ACK - Valid acknowledgement indicator.

To acknowledge a Paging Channel message, the mobile station shall set this field to '1'. Otherwise, the mobile station shall set this field to '0'. See 6.6.2.1.2.

- 1 **ACK_TYPE** - Acknowledgement address type.
 2 The mobile station shall set this field to the value of the
 3 **ADDR_TYPE** field, if present, from the most recently received
 4 Paging Channel message requiring acknowledgement. If the
 5 Paging Channel message contained no **ADDR_TYPE** field, or if
 6 no such message has been received, the mobile station shall
 7 set this field to '000'.
- 8 **MSID_TYPE** - Mobile station identifier field type.
 9 The mobile station shall set this field to the value shown in
 10 Table 6.7.1.3.1.1-1 corresponding to the identifier type
 11 contained in the **MSID** field.

12
13 **Table 6.7.1.3.1.1-1. Address Types**

Description	MSID_TYPE (binary)	MSID_LEN (octets)
MIN and ESN	000	9
All other MSID_TYPE values are reserved		

- 14
- 15 **MSID_LEN** - Mobile station identifier field length.
 16 The mobile station shall set this field to the number of octets
 17 in the **MSID** field.
- 18 **MSID** - Mobile station identifier.
 19 The mobile station shall set this field to the mobile station
 20 identifier, using the identifier type specified in the **MSID_TYPE**
 21 field.

22

23

24 If **MSID_TYPE** is equal to '000', the **MSID** field shall consist of
 25 the following subfields:

Subfield	Length (bits)
MIN1	24
MIN2	10
ESN	32
RESERVED	6

- 27 **MIN1** - First part of the mobile identification number (MIN).
 28 The mobile station shall set this field to **MIN1** (see 2.3.1).
- 29 **MIN2** - Second part of the mobile identification number (MIN).

- 1 The mobile station shall set this field to MIN2 (see 2.3.1).
- 2 **ESN** - Mobile station's electronic serial number.
- 3 The mobile station shall set this field to its electronic serial
- 4 number. See 2.3.2.
- 5 **RESERVED** - Reserved bits.
- 6 The mobile station shall set this field to '000000'.

7 6.7.1.3.1.2 Common Authentication Fields

8 Most Access Channel messages share the same four fields related to authentication:

- 9 **AUTH_MODE** - Authentication mode.
- 10 If authentication information is not available, or if the base
- 11 station has indicated that authentication is not required (by
- 12 setting the AUTH field in the *Access Parameters Message* to
- 13 '00'), the mobile station shall set this field to '00'. If
- 14 authentication is required by the base station and
- 15 authentication information is available, the mobile station
- 16 shall set this field to '01'. All other values are reserved.
- 17 **AUTHR** - Authentication data.
- 18 If the AUTH_MODE field is set to '01', the mobile station shall
- 19 set this field as specified in 6.3.12.1. If the AUTH_MODE field
- 20 is set to any other value, the mobile station shall omit this
- 21 field.
- 22 **RANDC** - Random challenge value.
- 23 If the AUTH_MODE field is set to '01', the mobile station shall
- 24 set this field as specified in 6.3.12.1. If the AUTH_MODE field
- 25 is set to any other value, the mobile station shall omit this
- 26 field.
- 27 **COUNT** - Call history parameter.
- 28 If the AUTH_MODE field is set to '01', the mobile station shall
- 29 set this field to the current value of the COUNT_{s-p} parameter.
- 30 If the AUTH_MODE field is set to any other value, the mobile
- 31 station shall omit this field.

32 6.7.1.3.2 Message Body Contents

33 The following sections specify the contents of the message body for each message that may

34 be sent on the Access Channel.

1 **6.7.1.3.2.1 Registration Message**

2 When the mobile station sends a *Registration Message*, it shall use the following variable-
 3 length message format:

4

Field	Length (bits)
MSG_TYPE ('00000001')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
VALID_ACK	1
ACK_TYPE	3
MSID_TYPE	3
MSID_LEN	4
MSID	8 × MSID_LEN
AUTH_MODE	2
AUTHR	0 or 18
RANDC	0 or 8
COUNT	0 or 6
REG_TYPE	4
SLOT_CYCLE_INDEX	3
MOB_P_REV	8
SCM	8
MOB_TERM	1
RESERVED	6

5

- 6 **MSG_TYPE** - Message type.
 7 The mobile station shall set this field to '00000001'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
 9 See 6.7.1.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
 11 See 6.7.1.3.1.1.
- 12 **ACK_REQ** - Acknowledgement required indicator.
 13 See 6.7.1.3.1.1.

1	VALID_ACK	- Valid acknowledgement indicator. See 6.7.1.3.1.1.
2		
3	ACK_TYPE	- Acknowledgement address type. See 6.7.1.3.1.1.
4		
5	MSID_TYPE	- Mobile station identifier field type. See 6.7.1.3.1.1.
6		
7	MSID_LEN	- Mobile station identifier field length. See 6.7.1.3.1.1.
8		
9	MSID	- Mobile station identifier. See 6.7.1.3.1.1.
10		
11	AUTH_MODE	- Authentication mode. See 6.7.1.3.1.2.
12		
13	AUTHR	- Authentication data. See 6.7.1.3.1.2.
14		
15	RANDC	- Random challenge value. See 6.7.1.3.1.2.
16		
17	COUNT	- Call history parameter. See 6.7.1.3.1.2.
18		
19	REG_TYPE	- Registration type. This field indicates which type of event generated the registration attempt. The mobile station shall set this field to the REG_TYPE value shown in Table 6.7.1.3.2.1-1 corresponding to the event that caused this registration to occur (see 6.6.5.1).
20		
21		
22		
23		
24		
25		

Table 6.7.1.3.2.1-1. Registration Type (REG_TYPE) Codes

REG_TYPE (binary)	Type of Registration
0000	Timer-based (see 6.6.5.1.3)
0001	Power-up (see 6.6.5.1.1)
0010	Zone-based (see 6.6.5.1.5)
0011	Power-down (see 6.6.5.1.2)
0100	Parameter-change (see 6.6.5.1.6)
0101	Ordered (see 6.6.5.1.7)
0110	Distance-based (see 6.6.5.1.4)
All other REG_TYPE values are reserved.	

- 2
- 3 **SLOT_CYCLE_INDEX** - Slot cycle index.
- 4 If the mobile station is configured for slotted mode operation,
- 5 the mobile station shall set this field to the preferred slot cycle
- 6 index, **SLOT_CYCLE_INDEX_p** (see 6.6.2.1.1). Otherwise, the
- 7 mobile station shall set this field to '000'.
- 8 **MOB_P_REV** - Protocol revision of the mobile station.
- 9 The mobile station shall set this field to '00000001'.
- 10 **SCM** - Station class mark.
- 11 The mobile station shall set this field to its station class mark.
- 12 See 2.3.3.
- 13
- 14 **MOB_TERM** - Mobile terminated calls accepted indicator.
- 15 If the mobile station is configured to accept mobile terminated
- 16 calls while operating with the current roaming status (see
- 17 6.6.5.3), the mobile station shall set this bit to '1'. Otherwise,
- 18 the mobile station shall set this bit to '0'.
- 19 **RESERVED** - Reserved bits
- 20 The mobile station shall set this field to '000000'.

1 **6.7.1.3.2.2 Order Message**

2 When the mobile station sends an *Order Message* on the Access Channel, it shall use the
3 following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000010')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
VALID_ACK	1
ACK_TYPE	3
MSID_TYPE	3
MSID_LEN	4
MSID	8 × MSID_LEN
RESERVED	2
ORDER	6
ADD_RECORD_LEN	3
order-specific fields (if used)	8 × ADD_RECORD_LEN
RESERVED	5

- 5
- 6 **MSG_TYPE** - Message type.
7 The mobile station shall set this field to '00000010'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
9 See 6.7.1.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
11 See 6.7.1.3.1.1.
- 12 **ACK_REQ** - Acknowledgement required indicator.
13 See 6.7.1.3.1.1.
- 14 **VALID_ACK** - Valid acknowledgement indicator.
15 See 6.7.1.3.1.1.
- 16 **ACK_TYPE** - Acknowledgement address type.
17 See 6.7.1.3.1.1.
- 18 **MSID_TYPE** - Mobile station identifier field type.
19 See 6.7.1.3.1.1.
- 20

- 1 **MSID_LEN** - Mobile station identifier field length.
2 See 6.7.1.3.1.1.
- 3 **MSID** - Mobile station identifier.
4 See 6.7.1.3.1.1.
- 5 **RESERVED** - Reserved bits.
6 These bits take the place of the AUTH_MODE field.
7 The mobile station shall set this field to '00'.
- 8 **ORDER** - Order code.
9 The mobile station shall set this field to the ORDER code
10 (see 6.7.3) for this type of *Order Message*.
- 11 **ADD_RECORD_LEN** - Additional record length.
12 The mobile station shall set this field to the number of octets
13 in the order-specific fields included in this message.
- 14 **order-specific fields** - Order-specific fields.
15 The mobile station shall include order-specific fields as
16 specified in 6.7.3.
- 17 **RESERVED** - Reserved bits.
18 The mobile station shall set this field to '00000'.

1 **6.7.1.3.2.3 Data Burst Message**

2 When the mobile station sends a *Data Burst Message* on the Access Channel, it shall use
 3 the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000011')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
VALID_ACK	1
ACK_TYPE	3
MSID_TYPE	3
MSID_LEN	4
MSID	8 × MSID_LEN
RESERVED	2
MSG_NUMBER	8
BURST_TYPE	6
NUM_MSGS	8
NUM_FIELDS	8

NUM_FIELDS occurrences of the following field:

CHAR1	8
-------	---

- 5
- 6 **MSG_TYPE** - Message type.
 7 The mobile station shall set this field to '00000011'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
 9 See 6.7.1.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
 11 See 6.7.1.3.1.1.
- 12 **ACK_REQ** - Acknowledgement required indicator.
 13 See 6.7.1.3.1.1.
- 14 **VALID_ACK** - Valid acknowledgement indicator.
 15 See 6.7.1.3.1.1.
- 16 **ACK_TYPE** - Acknowledgement address type.
 17 See 6.7.1.3.1.1.

- 1 **MSID_TYPE** - Mobile station identifier field type.
2 See 6.7.1.3.1.1.
- 3 **MSID_LEN** - Mobile station identifier field length.
4 See 6.7.1.3.1.1.
- 5 **MSID** - Mobile station identifier.
6 See 6.7.1.3.1.1.
- 7 **RESERVED** - Reserved bits.
8 These bits take the place of the AUTH_MODE field.
9 The mobile station shall set this field to '00'.
- 10 **MSG_NUMBER** - Message number within the data burst stream.
11 The mobile station shall set this field to the number of this
12 message within the data burst stream.
- 13
- 14 **BURST_TYPE** - Data burst type.
15 The mobile station shall set this field to the value shown in
16 Table 6.7.1.3.2.3-1 for the type of this data burst.
- 17

Table 6.7.1.3.2.3-1. Burst Data Types

Value (binary)	Burst Data Type
000000	Unknown burst data type
All other burst data type codes are reserved.	

- 18
- 19
- 20 **NUM_MSG** - Number of messages in the data burst stream.
21 The mobile station shall set this field to the number of
22 messages within this data burst stream.
- 23 **NUM_FIELDS** - Number of characters in this message.
24 The mobile station shall set this field to the number of CHARI
25 fields included in this message.
- 26 **CHARI** - Character.
27 The mobile station shall include NUM_FIELDS occurrences of
28 this field. The mobile station shall set these fields to the
29 corresponding octet of the data burst stream.
- 30

1 6.7.1.3.2.4 Origination Message

2 When the mobile station sends an *Origination Message*, it shall use the following variable-
 3 length message format:

4

Field	Length (bits)
MSG_TYPE ('00000100')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
VALID_ACK	1
ACK_TYPE	3
MSID_TYPE	3
MSID_LEN	4
MSID	8 × MSID_LEN
AUTH_MODE	2
AUTHR	0 or 18
RANDC	0 or 8
COUNT	0 or 6
MOB_TERM	1
SLOT_CYCLE_INDEX	3
MOB_P_REV	8
SCM	8
REQUEST_MODE	3
SPECIAL_SERVICE	1
SERVICE_OPTION	0 or 16
PM	1
DIGIT_MODE	1
NUMBER_TYPE	0 or 3
NUMBER_PLAN	0 or 4

(continues on next page)

Field	Length (bits)
MORE_FIELDS	1
NUM_FIELDS	8
NUM_FIELDS occurrences of the following field:	
CHAR1	4 or 8
RESERVED	0 - 7 (as needed)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
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- MSG_TYPE** - Message type.
The mobile station shall set this field to '00000100'.
- ACK_SEQ** - Acknowledgement sequence number.
See 6.7.1.3.1.1.
- MSG_SEQ** - Message sequence number.
See 6.7.1.3.1.1.
- ACK_REQ** - Acknowledgement required indicator.
See 6.7.1.3.1.1.
- VALID_ACK** - Valid acknowledgement indicator.
See 6.7.1.3.1.1.
- ACK_TYPE** - Acknowledgement address type.
See 6.7.1.3.1.1.
- MSID_TYPE** - Mobile station identifier field type.
See 6.7.1.3.1.1.
- MSID_LEN** - Mobile station identifier field length.
See 6.7.1.3.1.1.
- MSID** - Mobile station identifier.
See 6.7.1.3.1.1.
- AUTH_MODE** - Authentication mode:
See 6.7.1.3.1.2.
- AUTHR** - Authentication data.
See 6.7.1.3.1.2.
- RANDC** - Random challenge value.
See 6.7.1.3.1.2.
- COUNT** - Call history parameter.
See 6.7.1.3.1.2.

- 1 **MOB_TERM** - Mobile terminated calls accepted indicator.
 If the mobile station is configured to accept mobile terminated
 calls while operating with the current roaming status (see
 6.6.5.3), the mobile station shall set this bit to '1'. Otherwise,
 the mobile station shall set this bit to '0'.
- 6 **SLOT_CYCLE_INDEX** - Slot cycle index.
 If the mobile station is configured for slotted mode operation,
 the mobile station shall set this field to the preferred slot cycle
 index, **SLOT_CYCLE_INDEX_p** (see 6.6.2.1.1). Otherwise, the
 mobile station shall set this field to '000'.
- 11 **MOB_P_REV** - Protocol revision of the mobile station.
 The mobile station shall set this field to '00000001'.
- 13 **SCM** - Station class mark.
 The mobile station shall set this field to the station class mark
 of the mobile station. See 2.3.3.
- 16 **REQUEST_MODE** - Requested mode code. The mobile station shall set this field
 to the value shown in Table 6.7.1.3.2.4-1 corresponding to its
 current configuration.

Table 6.7.1.3.2.4-1. REQUEST_MODE Codes

Value (binary)	Requested Mode
001	CDMA only
010	Analog only
011	Either CDMA or analog
All other REQUEST_MODE codes are reserved.	

- 21
- 22 **SPECIAL_SERVICE** - Special service option indicator.
 To request a special service option, the mobile station shall set
 this field to '1'. To request the default service option (Service
 Option 1), the mobile station shall set this field to '0'.
- 28 **SERVICE_OPTION** - Requested service option for this origination.
 If the **SPECIAL_SERVICE** field is set to '1', the mobile station
 shall set this field to the value shown in TSB58 "Service
 Option Number Assignments for Wideband Spread Spectrum
 Digital Cellular System" corresponding to the requested
 service option. If the **SPECIAL_SERVICE** field is set to '0', the
 mobile station shall omit this field.
- 33 **PM** - Privacy mode indicator.
 To request voice privacy, the mobile station shall set this field
 to '1'. Otherwise, the mobile station shall set this field to '0'.
- 36 **DIGIT_MODE** - Digit mode indicator.

1 This field indicates whether the dialed digits are 4-bit DTMF
 2 codes using the Unknown numbering plan, or 8-bit ASCII
 3 codes using a specified numbering plan.

4 To originate the call using the binary representation of DTMF
 5 digits, the mobile station shall set this field to '0'. To originate
 6 the call using ASCII characters, the mobile station shall set
 7 this field to '1'.

8 **NUMBER_TYPE** - Type of number.

9 If the DIGIT_MODE field is set to '1', the mobile station shall
 10 set this field to the NUMBER_TYPE value shown in Table
 11 6.7.1.3.2.4-2 corresponding to the type of the number as
 12 defined in ANSI T1.607 §4.5.9. If the DIGIT_MODE field is set
 13 to '0', the mobile station shall omit this field.

14
 15 **Table 6.7.1.3.2.4-2. Number Types**

Description	NUMBER_TYPE (binary)
Unknown	000
International number	001
National number	010
Network-specific number	011
Subscriber number	100
Reserved	101
Abbreviated number	110
Reserved for extension	111

16
 17 **NUMBER_PLAN** - Numbering plan.

18 If the DIGIT_MODE field is set to '1', the mobile station shall
 19 set this field to the NUMBER_PLAN value shown in Table
 20 6.7.1.3.2.4-3 corresponding to the requested numbering plan.
 21 If the DIGIT_MODE field is set to '0', the mobile station shall
 22 omit this field.
 23

**Table 6.7.1.3.2.4-9. Numbering Plan Identification
(DIGIT_MODE = '1') (See ANSI T1.607 §4.5.9)**

Description	NUMBER_PLAN (binary)
Unknown	0000
ISDN/Telephony numbering plan (CCITT E.164 and CCITT E.163)	0001
Data numbering plan (CCITT X.121)	0011
Telex numbering plan (CCITT F.69)	0100
Private numbering plan	1001
Reserved for extension	1111
All other NUMBER_PLAN codes are reserved.	

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- MORE_FIELDS** - More dialed digits indicator.
 This field indicates whether additional dialed digits will be sent in a later *Origination Continuation Message*.
 If all dialed digits will fit in this message, the mobile station shall set this field to '0'. If not, the mobile station shall set this field to '1'.
- NUM_FIELDS** - Number of dialed digits in this message.
 The mobile station shall set this field to the number of dialed digits included in this message.
- CHARI** - A dialed digit or character.
 The mobile station shall include NUM_FIELDS occurrences of this field. If the DIGIT_MODE field is set to '0', the mobile station shall set each occurrence of this field to the code value shown in Table 6.7.1.3.2.4-4 corresponding to the dialed digit. If the DIGIT_MODE field is set to '1', the mobile station shall set each occurrence of this field to the ASCII representation corresponding to the dialed digit, as specified in ANSI X3.4, with the most significant bit set to '0'.

Table 6.7.1.3.2.4-4. Representation of DTMF Digits

Digit	Code (binary)	Digit	Code (binary)
1	0001	7	0111
2	0010	8	1000
3	0011	9	1001
4	0100	0	1010
5	0101	*	1011
6	0110	#	1100
All other codes are reserved.			

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7**RESERVED** - Reserved bits.

The mobile station shall add reserved bits as needed in order to make the length of the entire message equal to an integer number of octets. The mobile station shall set these bits to '0'.

1 **6.7.1.3.2.5 Page Response Message**

2 When the mobile station sends a *Page Response Message*, it shall use the following
 3 variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000101')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
VALID_ACK	1
ACK_TYPE	3
MSID_TYPE	3
MSID_LEN	4
MSID	8 × MSID_LEN
AUTH_MODE	2
AUTHR	0 or 18
RANDC	0 or 8
COUNT	0 or 6
MOB_TERM	1
SLOT_CYCLE_INDEX	3
MOB_P_REV	8
SCM	8
REQUEST_MODE	3
SERVICE_OPTION	16
PM	1
RESERVED	6

- 5
- 6 **MSG_TYPE** - Message type.
 7 The mobile station shall set this field to '00000101'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
 9 See 6.7.1.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
 11 See 6.7.1.3.1.1.

1	ACK_REQ	- Acknowledgement required indicator.
2		See 6.7.1.3.1.1.
3	VALID_ACK	- Valid acknowledgement indicator.
4		See 6.7.1.3.1.1.
5	ACK_TYPE	- Acknowledgement address type.
6		See 6.7.1.3.1.1.
7	MSID_TYPE	- Mobile station identifier field type.
8		See 6.7.1.3.1.1.
9	MSID_LEN	- Mobile station identifier field length.
10		See 6.7.1.3.1.1.
11	MSID	- Mobile station identifier.
12		See 6.7.1.3.1.1.
13	AUTH_MODE	- Authentication mode.
14		See 6.7.1.3.1.2.
15	AUTHR	- Authentication data.
16		See 6.7.1.3.1.2.
17	RANDC	- Random challenge value.
18		See 6.7.1.3.1.2.
19	COUNT	- Call history parameter.
20		See 6.7.1.3.1.2.
21	MOB_TERM	- Mobile terminated calls accepted indicator.
22		If the mobile station is configured to accept mobile terminated
23		calls while operating with the current roaming status (see
24		6.6.5.3), the mobile station shall set this bit to '1'. Otherwise,
25		the mobile station shall set this bit to '0'.
26	SLOT_CYCLE_INDEX	- Slot cycle index.
27		If the mobile station is configured for slotted mode operation,
28		the mobile station shall set this field to the preferred slot cycle
29		index, SLOT_CYCLE_INDEX_p (see 6.6.2.1.1). Otherwise, the
30		mobile station shall set this field to '000'.
31	MOB_P_REV	- Protocol revision of the mobile station.
32		The mobile station shall set this field to '00000001'.
33	SCM	- Station class mark.
34		The mobile station shall set this field to the station class mark
35		of the mobile station. See 2.3.3.
36	REQUEST_MODE	- Requested mode code. The mobile station shall set this field
37		to the value shown in Table 6.7.1.3.2.4-1 corresponding to its
38		current configuration.

- 1 **SERVICE_OPTION** - **Service option.**
- 2 **If the mobile station accepts the service option specified in the**
- 3 **Page Message or Slotted Page Message, it shall set this field to**
- 4 **the service option number specified in that message if that**
- 5 **message contained an explicit service option field, or to**
- 6 **'0000000000000001' (the default service option number) if the**
- 7 **Page Message or Slotted Page Message did not contain a**
- 8 **service option field.**
- 9
- 10 **If the mobile station does not accept the service option**
- 11 **specified in the Page Message or Slotted Page Message and**
- 12 **has an alternative service option to request, it shall set this**
- 13 **field to the service option code shown in TSB58 "Service**
- 14 **Option Number Assignments for Wideband Spread Spectrum**
- 15 **Digital Cellular System" corresponding to the alternative**
- 16 **service option.**
- 17
- 18 **If the mobile station does not accept the service option**
- 19 **specified in the Page Message or Slotted Page Message and**
- 20 **does not have an alternative service option to request, the**
- 21 **mobile station shall set this field to '0000000000000000' to**
- 22 **reject the service option specified by the Page Message or**
- 23 **Slotted Page Message.**
- 24 **PM** - **Privacy mode indicator.**
- 25 **To request voice privacy, the mobile station shall set this field**
- 26 **to '1'. Otherwise, the mobile station shall set this field to '0'.**
- 27 **RESERVED** - **Reserved bits.**
- 28 **The mobile station shall set this field to '000000'.**

1 **6.7.1.3.2.6 Authentication Challenge Response Message**

2 When the mobile station sends an *Authentication Challenge Response Message* on the
 3 Access Channel, it shall use the following fixed-length message format:

Field	Length (bits)
MSG_TYPE ('00000110')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
VALID_ACK	1
ACK_TYPE	3
MSID_TYPE	3
MSID_LEN	4
MSID	8 × MSID_LEN
RESERVED	2
AUTHU	18
RESERVED	4

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- MSG_TYPE - Message type.
The mobile station shall set this field to '00000110'.
- ACK_SEQ - Acknowledgement sequence number.
See 6.7.1.3.1.1.
- MSG_SEQ - Message sequence number.
See 6.7.1.3.1.1.
- ACK_REQ - Acknowledgement required indicator.
See 6.7.1.3.1.1.
- VALID_ACK - Valid acknowledgement indicator.
See 6.7.1.3.1.1.
- ACK_TYPE - Acknowledgement address type.
See 6.7.1.3.1.1.
- MSID_TYPE - Mobile station identifier field type.
See 6.7.1.3.1.1.

1	MSID_LEN	-	Mobile station identifier field length.
2			See 6.7.1.3.1.1.
3	MSID	-	Mobile station identifier.
4			See 6.7.1.3.1.1.
5	RESERVED	-	Reserved bits.
6			These bits take the place of the AUTH_MODE field.
7			The mobile station shall set this field to '00'.
8	AUTHU	-	Authentication challenge response.
9			The mobile station shall set this field as specified in
10			6.3.12.1.5.
11	RESERVED	-	Reserved bits.
12			The mobile station shall set this field to '0000'.

6.7.2 Reverse Traffic Channel

During Traffic Channel operation, the mobile station sends signaling messages to the base station using the Reverse Traffic Channel.

6.7.2.1 Reverse Traffic Channel Structure

When sending a Reverse Traffic Channel message, the mobile station shall send it as signaling traffic using the signaling traffic formats specified in 6.1.3.3.11. The mobile station may use one or more Reverse Traffic Channel frames to send the message.

The first signaling traffic bit in a Reverse Traffic Channel frame shall be a Start of Message (SOM) Bit. The mobile station shall set this bit to '1' if a Reverse Traffic Channel message begins in the frame, or to '0' if the frame contains bits of a Reverse Traffic Channel message that began in a previous frame. The mobile station shall use the remaining signaling traffic bits of the frame to send Reverse Traffic Channel message bits. If the frame used to send the last bits of a message contains any unused signaling traffic bits, the mobile station shall set each of these bits, referred to as padding bits, to '0'.

6.7.2.2 Reverse Traffic Channel Message Structure

A Reverse Traffic Channel message shall consist of a length field (MSG_LENGTH), a message body, and a CRC field, in that order (see Figure 6.7.2.2-1).

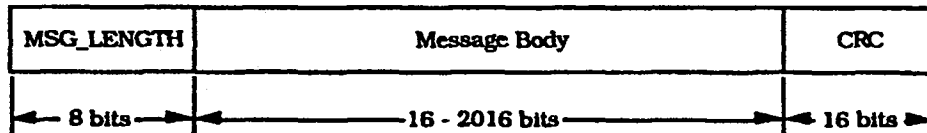


Figure 6.7.2.2-1. Reverse Traffic Channel Message Structure

6.7.2.2.1 Reverse Traffic Channel Message MSG_LENGTH Field

The mobile station shall set the MSG_LENGTH field of a Reverse Traffic Channel message to the length, in octets, of the message, including the MSG_LENGTH field, the message body and the CRC field. The MSG_LENGTH field shall be 8 bits in length. The minimum value of the MSG_LENGTH field shall be 5.²⁵

6.7.2.2.2 Reverse Traffic Channel Message CRC Field

The mobile station shall set the CRC field of a Reverse Traffic Channel message to the CRC computed for the message. The CRC computation shall include the MSG_LENGTH field and the message body. The CRC field shall be 16 bits in length.

²⁵To accommodate the MSG_LENGTH field, the layer 2 fields present in the Message Body and the CRC field.

The generator polynomial for the CRC shall be the standard CRC-CCITT polynomial:

$$g(x) = x^{16} + x^{12} + x^5 + 1.$$

The CRC shall be equal to the value computed by the following procedure and the logic shown in Figure 6.7.2.2.2-1:

- All shift register elements shall be initialized to logical one.²⁶
- The switches shall be set in the up position.
- The information bit count k shall be defined as 8 + message body length in bits.
- The register shall be clocked k times, with the length and message body of the message as the k input bits.
- The switches shall be set in the down position.
- The register shall be clocked an additional 16 times.
- The 16 additional output bits shall be the CRC field.
- The bits shall be transmitted in the order in which they appear at the output of the CRC encoder.

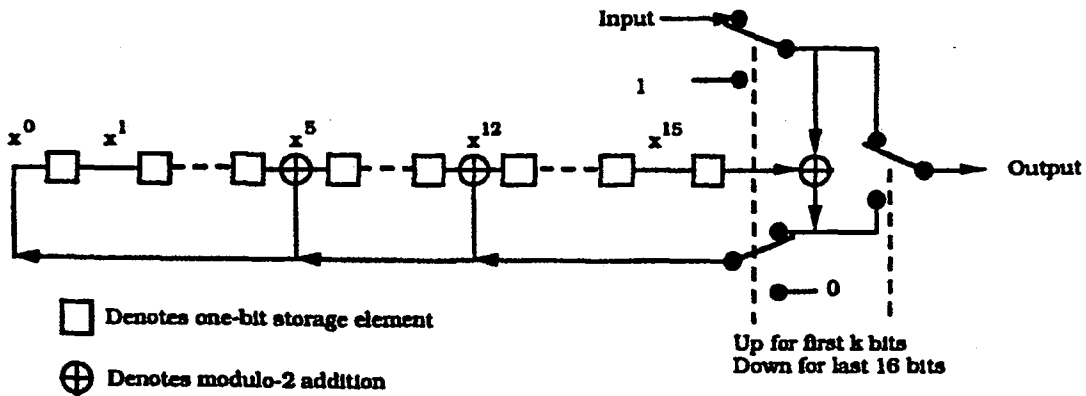


Figure 6.7.2.2.2-1. Reverse Traffic Channel Message CRC Calculation

²⁶Initialization of the register to ones causes the CRC for all-zero data to be non-zero.

1 **6.7.2.3 Reverse Traffic Channel Message Body Format**

2 The Reverse Traffic Channel messages are summarized in Table 6.7.2.3-1.

3
4 **Table 6.7.2.3-1. Reverse Traffic Channel Messages**

Message Name	Message Type (binary)
<i>Order Message</i>	00000001
<i>Authentication Challenge Response Message</i>	00000010
<i>Flash With Information Message</i>	00000011
<i>Data Burst Message</i>	00000100
<i>Pilot Strength Measurement Message</i>	00000101
<i>Power Measurement Report Message</i>	00000110
<i>Send Burst DTMF Message</i>	00000111
<i>Status Message</i>	00001000
<i>Origination Continuation Message</i>	00001001
<i>Handoff Completion Message</i>	00001010
<i>Parameters Response Message</i>	00001011

5
6 **6.7.2.3.1 Common Fields**

7 **6.7.2.3.1.1 Common Acknowledgement Fields**

8 All Reverse Traffic Channel messages share the same three acknowledgement fields:

9 **ACK_SEQ** - Acknowledgement sequence number.

10 The mobile station shall set this field to the value of the
11 **MSG_SEQ** field from the most recently received Forward
12 Traffic Channel message requiring acknowledgement. If no
13 such message has been received, the mobile station shall set
14 this field to '111'. See 6.6.4.1.3.

15 **MSG_SEQ** - Message sequence number.

16 The mobile station shall set this field to the message sequence
17 number for this message. See 6.6.4.1.3.

18 **ACK_REQ** - Acknowledgement required indicator.

19 This field indicates whether this message requires an
20 acknowledgement.

21 To indicate that this message requires acknowledgement, the
22 mobile station shall set this field to '1'. To indicate that this
23 message does not require acknowledgement, the mobile
24 station shall set this field to '0'.

1 **6.7.2.3.1.2 Common Encryption Field**

2 All Reverse Traffic Channel messages contain the following field:

3 **ENCRYPTION** - Message encryption indicator.

4 The mobile station shall set this field to the current message
5 encryption mode, equal to the ENCRYPT_MODE field of the
6 last received *Channel Assignment Message*, *Handoff Direction*
7 *Message* or *Message Encryption Mode Order*. The value of this
8 field and the encryption state of a message shall not change if
9 the same message is retransmitted.

10 **6.7.2.3.2 Message Body Contents**

11 The following sections specify the contents of the message body for each message that may
12 be sent on the Reverse Traffic Channel.

1 **6.7.2.3.2.1 Order Message**

2 When the mobile station sends an *Order Message* on the Reverse Traffic Channel, it shall
3 use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000001')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
ORDER	6
ADD_RECORD_LEN	3
Order-specific fields (if used)	8 × ADD_RECORD_LEN
RESERVED	6

4

5

6

MSG_TYPE - Message type.

7

The mobile station shall set this field to '00000001'.

8

ACK_SEQ - Acknowledgement sequence number.

9

See 6.7.2.3.1.1.

10

MSG_SEQ - Message sequence number.

11

See 6.7.2.3.1.1.

12

ACK_REQ - Acknowledgement required indicator.

13

See 6.7.2.3.1.1.

14

ENCRYPTION - Message encryption indicator.

15

See 6.7.2.3.1.2.

16

ORDER - Order code.

17

The mobile station shall set this field to the ORDER code.
See 6.7.3.

18

19

ADD_RECORD_LEN - Additional record length.

20

The mobile station shall set this field to the number of octets
in the order-specific fields included in this message.

21

22

Order-specific fields - Order-specific fields.

23

The mobile station shall include order-specific fields as
specified in 6.7.3.

24

- 1 **RESERVED** - **Reserved bits.**
- 2 **The mobile station shall set this field to '000000'.**

1 **6.7.2.3.2.2 Authentication Challenge Response Message**

2 When the mobile station sends an *Authentication Challenge Response Message* on the
3 Reverse Traffic Channel, it shall use the following fixed-length message format:

4

Field	Length (bits)
MSG_TYPE ('00000010')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
AUTHU	18
RESERVED	5

- 5
- 6 **MSG_TYPE** - Message type.
7 The mobile station shall set this field to '00000010'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
9 See 6.7.2.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
11 See 6.7.2.3.1.1.
- 12 **ACK_REQ** - Acknowledgement required indicator.
13 See 6.7.2.3.1.1.
- 14 **ENCRYPTION** - Message encryption indicator.
15 See 6.7.2.3.1.2.
- 16 **AUTHU** - Authentication challenge response.
17 The mobile station shall set this field as specified in
18 6.3.12.1.5.
- 19 **RESERVED** - Reserved bits.
20 The mobile station shall set this field to '00000'.

1 **6.7.2.3.2.3 Flash With Information Message**

2 When the mobile station sends a *Flash With Information Message*, it shall use the following
3 variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000011')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2

4 Zero or more occurrences of the following record:

RECORD_TYPE	8
RECORD_LEN	8
Type-specific fields	8 × RECORD_LEN

RESERVED	7
----------	---

5
6 **MSG_TYPE** - Message type.

7 The mobile station shall set this field to '00000011'.

8 **ACK_SEQ** - Acknowledgement sequence number.

9 See 6.7.2.3.1.1.

10 **MSG_SEQ** - Message sequence number.

11 See 6.7.2.3.1.1.

12 **ACK_REQ** - Acknowledgement required indicator.

13 See 6.7.2.3.1.1.

14 **ENCRYPTION** - Message encryption indicator.

15 See 6.7.2.3.1.2.

16
17 The mobile station shall include one occurrence of the following record for each information
18 record to be included:

19 **RECORD_TYPE** - Information record type.

20 The mobile station shall set this field to the record type code
21 shown in Table 6.7.4-1 corresponding to the type of this
22 information record.

- 1 **RECORD_LEN** - Information record length.
2 The mobile station shall set this field to the number of octets
3 in the type-specific fields of this record.
4 **Type-specific fields** - Type-specific fields.
5 The mobile station shall set these fields as specified in 6.7.4
6 for this type of information record.
7 **RESERVED** - Reserved bits.
8 The mobile station shall set this field to '0000000'.

1 **6.7.2.3.2.4 Data Burst Message**

2 When the mobile station sends a *Data Burst Message* on the Reverse Traffic Channel, it
 3 shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000100')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
MSG_NUMBER	8
BURST_TYPE	6
NUM_MSGS	8
NUM_FIELDS	8

NUM_FIELDS occurrences of the following field:

CHAR1	8
-------	---

RESERVED	1
----------	---

5
 6 **MSG_TYPE** - Message type.

The mobile station shall set this field to '00000100'.

7
 8 **ACK_SEQ** - Acknowledgement sequence number.

See 6.7.2.3.1.1.

9
 10 **MSG_SEQ** - Message sequence number.

See 6.7.2.3.1.1.

11
 12 **ACK_REQ** - Acknowledgement required indicator.

See 6.7.2.3.1.1.

13
 14 **ENCRYPTION** - Message encryption indicator.

See 6.7.2.3.1.2.

15
 16 **MSG_NUMBER** - Message number within the data burst stream.

The mobile station shall set this field to the number of this message within the data burst stream.

17
 18
 19 **BURST_TYPE** - Data burst type.

The mobile station shall set this field to the value shown in Table 6.7.1.3.2.3-1 for the type of this data burst.

- 1 **NUM_MSGS** - Number of messages in the data burst stream.
2 The mobile station shall set this field to the number of
3 messages within this data burst stream.
- 4 **NUM_FIELDS** - Number of characters in this message.
5 The mobile station shall set this field to the number of **CHARI**
6 fields included in this message.
- 7 **CHARI** - Character.
8 The mobile station shall include **NUM_FIELDS** occurrences of
9 this field. The mobile station shall set these fields to the
10 corresponding octet of the data burst stream.
- 11 **RESERVED** - Reserved bits.
12 The mobile station shall set this field to '0'.

1 **6.7.2.3.2.5 Pilot Strength Measurement Message**

2 When the mobile station sends a *Pilot Strength Measurement Message*, it shall use the
 3 following variable-length message format:

4

Field	Length (bits)
MSG_TYPE ('00000101')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
REF_PN	9
PILOT_STRENGTH	6
KEEP	1

Zero or more occurrences of the following record:

PILOT_PN_PHASE	15
PILOT_STRENGTH	6
KEEP	1

RESERVED	0 - 7 (as needed)
----------	-------------------

- 5
- 6 **MSG_TYPE** - Message type.
 7 The mobile station shall set this field to '00000101'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
 9 See 6.7.2.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
 11 See 6.7.2.3.1.1.
- 12 **ACK_REQ** - Acknowledgement required indicator.
 13 See 6.7.2.3.1.1.
- 14 **ENCRYPTION** - Message encryption indicator.
 15 See 6.7.2.3.1.2.
- 16 **REF_PN** - Time reference PN sequence offset.
 17 The mobile station shall set this field to the PN sequence offset
 18 of the pilot used by the mobile station to derive its time
 19 reference, relative to the zero offset pilot PN sequence in units
 20 of 64 PN chips.

- 1 **PILOT_STRENGTH** - Pilot strength.
 2 The mobile station shall set this field to
 3 $\lfloor -2 \times 10 \times \log_{10} PS \rfloor$
 4 where PS is the strength of the pilot used by the mobile
 5 station to derive its time reference (see 6.1.5.1), measured as
 6 specified in 6.6.6.2.2. If this value is less than 0, the mobile
 7 station shall set this field to '000000'. If this value is greater
 8 than '111111', the mobile station shall set this field to
 9 '111111'.
 10 **KEEP** - Keep pilot indicator.
 11 If the handoff drop timer (see 6.6.6.2.3) corresponding to the
 12 pilot used by the mobile station to derive its time reference
 13 (see 6.1.5.1) has expired, the mobile station shall set this field
 14 to '0'. Otherwise, the mobile station shall set this field to '1'.
 15
 16 The mobile station shall include one occurrence of the following three-field record for each
 17 pilot in the Active Set and for each pilot in the Candidate Set, other than the pilot identified
 18 by the REF_PN field.
 19 **PILOT_PN_PHASE** - Pilot measured phase.
 20 The mobile station shall set this field to the phase of the pilot
 21 PN sequence relative to the zero offset pilot PN sequence of
 22 this pilot, in units of one PN chip, as specified in 6.6.6.2.4.
 23 **PILOT_STRENGTH** - Pilot strength.
 24 The mobile station shall set this field to
 25 $\lfloor -2 \times 10 \times \log_{10} PS \rfloor$
 26 where PS is the strength of this pilot, measured as specified in
 27 6.6.6.2.2. If this value is less than 0, the mobile station shall
 28 set this field to '000000'. If this value is greater than
 29 '111111', the mobile station shall set this field to '111111'.
 30 **KEEP** - Keep pilot indicator.
 31 If the handoff drop timer (see 6.6.6.2.3) corresponding to this
 32 pilot has expired, the mobile station shall set this field to '0'.
 33 Otherwise, the mobile station shall set this field to '1'.
 34
 35 **RESERVED** - Reserved bits.
 36 The mobile station shall add reserved bits as needed in order
 37 to make the length of the entire message equal to an integer
 38 number of octets. The mobile station shall set these bits
 39 to '0'.

6.7.2.3.2.6 Power Measurement Report Message

When the mobile station sends a *Power Measurement Report Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000110')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
ERRORS_DETECTED	5
PWR_MEAS_FRAMES	10
LAST_HDM_SEQ	2
NUM_PILOTS	4
NUM_PILOTS occurrences of the following field:	
PILOT_STRENGTH	6
RESERVED	0 - 7 (as needed)

- 5
- 6 MSG_TYPE - Message type.
- 7 The mobile station shall set this field to '00000110'.
- 8 ACK_SEQ - Acknowledgement sequence number.
- 9 See 6.7.2.3.1.1.
- 10 MSG_SEQ - Message sequence number.
- 11 See 6.7.2.3.1.1.
- 12 ACK_REQ - Acknowledgement required indicator.
- 13 See 6.7.2.3.1.1.
- 14 ENCRYPTION - Message encryption indicator.
- 15 See 6.7.2.3.1.2.
- 16 ERRORS_DETECTED - Number of frame errors detected.
- 17 If the number of bad frames (see 6.2.2.2) received in the
- 18 measurement period is less than or equal to 31, the mobile
- 19 station shall set this field to that number (BAD_FRAMES_s, see
- 20 6.6.4.1.1). If that number exceeds 31, the mobile station shall
- 21 set this field to '11111'.

- 1 **PWR_MEAS_FRAMES** - Number of Forward Traffic Channel frames in the measurement
2 period.
- 3 The mobile station shall set this field to the number of
4 Forward Traffic Channel frames in the measurement period
5 (**TOTAL_FRAMES_s**, see 6.6.4.1.1).
- 6 **LAST_HDM_SEQ** - *Handoff Direction Message* sequence number.
- 7 If a *Handoff Direction Message* has been received during this
8 call, the mobile station shall set this field to the value of the
9 **HDM_SEQ** field from the *Handoff Direction Message* that
10 determined the current Active Set. If no *Handoff Direction*
11 *Message* has been received during this call, the mobile station
12 shall set this field to '11'.
- 13 **NUM_PILOTS** - Number of pilots reported.
- 14 The mobile station shall set this field to the number of pilots
15 in the current Active Set.
- 16 **PILOT_STRENGTH** - Pilot strength.
- 17 The mobile station shall include one occurrence of this field
18 for each pilot in the Active Set. If the Active Set contains more
19 than one pilot, the mobile station shall include the pilot
20 strengths in the same order as in the *Handoff Direction*
21 *Message* that determined the current Active Set.
- 22 The mobile station shall set each occurrence of this field to
23
$$\lfloor -2 \times 10 \times \log_{10} PS \rfloor$$
- 24 where PS is the strength of the pilot, measured as specified in
25 6.6.6.2.2. If this value is less than 0, the mobile station shall
26 set this field to '000000'. If this value is greater than
27 '111111', the mobile station shall set this field to '111111'.
- 28 **RESERVED** - Reserved bits.
- 29 The mobile station shall add reserved bits as needed in order
30 to make the length of the entire message equal to an integer
31 number of octets. The mobile station shall set these bits
32 to '0'.

1 **6.7.2.3.2.7 Send Burst DTMF Message**

2 When the mobile station sends a *Send Burst DTMF Message*, it shall use the following
3 variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000111')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
NUM_DIGITS	8
DTMF_ON_LENGTH	3
DTMF_OFF_LENGTH	3

NUM_DIGITS occurrences of the following field:

DIGIT <i>n</i>	4
----------------	---

RESERVED	0 - 7 (as needed)
----------	-------------------

5
6 MSG_TYPE - Message type.

7 The mobile station shall set this field to '00000111'.

8 ACK_SEQ - Acknowledgement sequence number.

9 See 6.7.2.3.1.1.

10 MSG_SEQ - Message sequence number.

11 See 6.7.2.3.1.1.

12 ACK_REQ - Acknowledgement required indicator.

13 See 6.7.2.3.1.1.

14 ENCRYPTION - Message encryption indicator.

15 See 6.7.2.3.1.2.

16 NUM_DIGITS - Number of DTMF digits.

17 The mobile station shall set this field to the number of DTMF
18 digits included in this message.

19 DTMF_ON_LENGTH - DTMF pulse width code.

20 The mobile station shall set this field to the DTMF_
21 ON_LENGTH value shown in Table 6.7.2.3.2.7-1
22 corresponding to the requested width of DTMF pulses to be
23 generated by the base station.

Table 6.7.2.3.2.7-1. Recommended DTMF Pulse Width

DTMF_ON_LENGTH Field (binary)	Recommended Pulse Width
000	95 ms
001	150 ms
010	200 ms
011	250 ms
100	300 ms
101	350 ms
All other DTMF_ON_LENGTH codes are reserved.	

DTMF_OFF_LENGTH - DTMF interdigit interval code.

The mobile station shall set this field to the DTMF_OFF_LENGTH value shown in Table 6.7.2.3.2.7-2 corresponding to the requested minimum interval between DTMF pulses to be generated by the base station.

Table 6.7.2.3.2.7-2. Recommended Minimum Interdigit Interval

DTMF_OFF_LENGTH Field (binary)	Recommended Minimum Interdigit Interval
000	60 ms
001	100 ms
010	150 ms
011	200 ms
All other DTMF_OFF_LENGTH codes are reserved.	

DIGIT - DTMF digit.

The mobile station shall include one occurrence of this field for each DTMF digit to be generated by the base station. The mobile station shall set each occurrence of this field to the code value shown in Table 6.7.1.3.2.4-4 corresponding to the dialed digit.

RESERVED - Reserved bits.

The mobile station shall add reserved bits as needed in order to make the length of the entire message equal to an integer number of octets. The mobile station shall set these bits to '0'.

1 **6.7.2.3.2.8 Status Message**

2 When the mobile station sends a *Status Message*, it shall use the following variable-length
3 message format:

Field	Length (bits)
MSG_TYPE ('00001000')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
RECORD_TYPE	8
RECORD_LEN	8
Type-specific fields	8 × RECORD_LEN
RESERVED	7

- 5
- 6 **MSG_TYPE** - Message type.
7 The mobile station shall set this field to '00001000'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
9 See 6.7.2.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
11 See 6.7.2.3.1.1.
- 12 **ACK_REQ** - Acknowledgement required indicator.
13 See 6.7.2.3.1.1.
- 14 **ENCRYPTION** - Message encryption indicator.
15 See 6.7.2.3.1.2.
- 16 **RECORD_TYPE** - Information record type.
17 The mobile station shall set this field to the record type value
18 shown in Table 6.7.4-1 corresponding to the type of this
19 information record.
- 20 **RECORD_LEN** - Information record length.
21 The mobile station shall set this field to the number of octets
22 included in the type-specific fields of this information record.
- 23 **Type-specific fields** - Type-specific fields.
24 The mobile station shall set these fields as specified in 6.7.4
25 for this type of record.

- 1 **RESERVED** - **Reserved bits.**
- 2 **The mobile station shall set this field to '0000000'.**

1 **6.7.2.3.2.9 Origination Continuation Message**

2 When the mobile station sends an *Origination Continuation Message*, it shall use the
3 following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001001')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
DIGIT_MODE	1
NUM_FIELDS	8

NUM_FIELDS occurrences of the following field:

CHARi	4 or 8
-------	--------

RESERVED	0 - 7 (as needed)
----------	-------------------

5
6 **MSG_TYPE** - Message type.

7 The mobile station shall set this field to '00001001'.

8 **ACK_SEQ** - Acknowledgement sequence number.

9 See 6.7.2.3.1.1.

10 **MSG_SEQ** - Message sequence number.

11 See 6.7.2.3.1.1.

12 **ACK_REQ** - Acknowledgement required indicator.

13 See 6.7.2.3.1.1.

14 **ENCRYPTION** - Message encryption indicator.

15 See 6.7.2.3.1.2.

16 **DIGIT_MODE** - Digit mode indicator.

17 The mobile station shall set this field to the **DIGIT_MODE**
18 value from the *Access Channel Origination Message* for which
19 this message is a continuation.

20 **NUM_FIELDS** - Number of dialed digits in this message.

21 The mobile station shall set this field to the number of dialed
22 digits included in this message.

- 1 **CHARI** - A dialed digit or character.
- 2 The mobile station shall include **NUM_FIELDS** occurrences of
3 this field. The mobile station shall include occurrences of this
4 field for all dialed digits after those sent in the Access Channel
5 *Origination Message* of which this message is a continuation.
6 If the **DIGIT_MODE** field is set to '0', the mobile station shall
7 set each occurrence of this field to the code value shown in
8 Table 6.7.1.3.2.4-4 corresponding to the dialed digit. If the
9 **DIGIT_MODE** field is set to '1', the mobile station shall set
10 each occurrence of this field to the ASCII representation
11 corresponding to the dialed digit, as specified in ANSI X3.4,
12 with the most significant bit set to '0'.
- 13 **RESERVED** - Reserved bits.
- 14 The mobile station shall add reserved bits as needed in order
15 to make the length of the entire message equal to an integer
16 number of octets. The mobile station shall set these bits
17 to '0'.

1 **6.7.2.3.2.10 Handoff Completion Message**

2 When the mobile station sends a *Handoff Completion Message*, it shall use the following
3 variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001010')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
LAST_HDM_SEQ	2

One or more occurrences of the following field:

PILOT_PN	9
----------	---

RESERVED	0 - 7 (as needed)
----------	-------------------

- 5
- 6 **MSG_TYPE** - Message type.
7 The mobile station shall set this field to '00001010'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
9 See 6.7.2.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
11 See 6.7.2.3.1.1.
- 12 **ACK_REQ** - Acknowledgement required indicator.
13 See 6.7.2.3.1.1.
- 14 **ENCRYPTION** - Message encryption indicator.
15 See 6.7.2.3.1.2.
- 16 **LAST_HDM_SEQ** - *Handoff Direction Message* sequence number.
17 The mobile station shall set this field to the value of the
18 **HDM_SEQ** field from the *Handoff Direction Message* that
19 determined the current Active Set.
20

- 1 **PILOT_PN** - Pilot PN sequence offset.
- 2 The mobile station shall include one occurrence of this field
3 for each pilot in the current Active Set. The mobile station
4 shall set this field to the pilot PN sequence offset, relative to
5 the zero offset pilot PN sequence in units of 64 PN chips, for
6 this pilot. If the Active Set contains more than one pilot, the
7 mobile station shall include the pilot offsets in the same order
8 as in the Handoff Direction Message that determined the
9 current Active Set.
- 10 **RESERVED** - Reserved bits.
- 11 The mobile station shall add reserved bits as needed in order
12 to make the length of the entire message equal to an integer
13 number of octets. The mobile station shall set these bits
14 to '0'.

1 **6.7.2.3.2.11 Parameters Response Message**

2 When the mobile station sends a *Parameters Response Message*, it shall use the following
3 variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001011')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2

One or more occurrences of the following record:

PARAMETER_ID	16
PARAMETER_LEN	10
PARAMETER	PARAMETER_LEN

RESERVED	0 - 7 (as needed)
----------	-------------------

- 5
- 6 **MSG_TYPE** - Message type.
7 The mobile station shall set this field to '00001011'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
9 See 6.7.2.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
11 See 6.7.2.3.1.1.
- 12 **ACK_REQ** - Acknowledgement required indicator.
13 See 6.7.2.3.1.1.
- 14 **ENCRYPTION** - Message encryption indicator.
15 See 6.7.2.3.1.2.
- 16

17 The mobile station shall include one occurrence of the following three-field record for each
18 occurrence of the **PARAMETER_ID** field in the *Forward Traffic Channel Retrieve Parameters*
19 *Message* to which this message is a response. See Appendix E.

- 20 **PARAMETER_ID** - Parameter identification.
21 The mobile station shall set this field to the value of the
22 **PARAMETER_ID** field for this parameter from the *Retrieve*
23 *Parameters Message* to which this message is a response.

- 1 **PARAMETER_LEN** - Parameter length.
 2 The mobile station shall set this field to the length shown in
 3 Table E-1 corresponding to this **PARAMETER_ID**.
 4 If the mobile station is unable to return the value of this
 5 parameter, or if the parameter identification is unknown, the
 6 mobile station shall set this field to '0000000000'.
 7 **PARAMETER** - Parameter value.
 8 The mobile station shall set this field equal to the value of the
 9 parameter identified by **PARAMETER** in Appendix E.
 10 If the mobile station is unable to return the value of this
 11 parameter, or if the parameter identification is unknown, the
 12 mobile station shall omit this field.
 13
 14 **RESERVED** - Reserved bits.
 15 The mobile station shall add reserved bits as needed in order
 16 to make the length of the entire message equal to an integer
 17 number of octets. The mobile station shall set these bits
 18 to '0'.

1 **6.7.3 Orders**

2 *Order Messages* are sent by the mobile station on the Access Channel and on the Reverse
3 Traffic Channel. The general format used on the Access Channel is defined in 6.7.1.3.2.2,
4 and the general format used on the Reverse Traffic Channel is defined in 6.7.2.3.2.1. There
5 are many specific types of *Order Messages*, as shown in Table 6.7.3-1.

6 The mobile station may send on the Access Channel any type of order shown in
7 Table 6.7.3-1 with a 'Y' in the first column, but shall not send on the Access Channel any
8 type of order with an 'N' in the first column. The mobile station may send on the Reverse
9 Traffic Channel any type of order shown in Table 6.7.3-1 with a 'Y' in the second column,
10 but shall not send on the Reverse Traffic Channel any type of order with an 'N' in the
11 second column. The mobile station shall be capable of sending all types of orders shown in
12 Table 6.7.3-1 with a 'Y' in the sixth column.

13 An order consists of a 6-bit order code and zero or more order-specific fields. The mobile
14 station shall set the ORDER field in the *Order Message* to the order code shown in Table
15 6.7.3-1 corresponding to the type of order being sent.

16 If the order qualification code in the fourth column of Table 6.7.3-1 is '00000000' and there
17 are no other additional fields as shown by an 'N' in the fifth column, the mobile station
18 shall include no order qualification code or other order-specific fields in the *Order Message*.
19 The order qualification code of such a message is implicitly '00000000'.

20 If the order qualification code is not '00000000' and there are no other additional fields as
21 shown in Table 6.7.3-1 by an 'N' in the fifth column, the mobile station shall include the
22 order qualification code as the only order-specific field in the *Order Message*.

23 If there are other additional fields as shown in Table 6.7.3-1 by a 'Y' in the fifth column, the
24 mobile station shall include order-specific fields as specified in the corresponding
25 subsection of this section.

1 **Table 6.7.3-1. Order and Order Qualification Codes Used on the Reverse Traffic**
 2 **Channel and the Access Channel (Part 1 of 3)**

Access Channel Order	Reverse Traffic Channel Order	Order Code, ORDER (binary)	Order Qualification Code, ORDQ (binary)	More Fields other than ORDQ	Support Req'd	Name/Function
Y	Y	000010	00000000	Y	Y	Base Station Challenge Order (see 6.7.3.1)
Y	Y	000011	00000000	N	Y	SSD Update Confirmation Order
Y	Y	000011	00000001	N	Y	SSD Update Rejection Order
N	Y	000101	0000nnnn	N	Y	Parameter Update Confirmation Order (where 'nnnn' is the Request Number)
N	Y	001011	00000000	N	N	Request Analog Service Order
Y	Y	010000	00000000	N	Y	Mobile Station Acknowledgement Order
N	Y	010011	00000000	Y	N	Service Option Request Order (see 6.7.3.2)
N	Y	010100	00000000	Y	Y	Service Option Response Order (see 6.7.3.3)
N	Y	010101	00000000	N	Y	Release Order (normal release)
N	Y	010101	00000001	N	Y	Release Order (with power-down indication)
N	Y	010111	00000000	N	N	Long Code Transition Request Order (request public)
N	Y	010111	00000001	N	N	Long Code Transition Request Order (request private)
N	Y	010111	00000010	N	Y	Long Code Transition Response Order (use public)
N	Y	010111	00000011	N	N	Long Code Transition Response Order (use private)
N	Y	011000	00000000	N	Y	Connect Order
N	Y	011001	0000nnnn	N	Y	Continuous DTMF Tone Order (where 'nnnn' is the tone per Table 6.7.1.3.2.4-4).

1 **Table 6.7.3-1. Order and Order Qualification Codes Used on the Reverse Traffic**
 2 **Channel and the Access Channel (Part 2 of 3)**

Access Channel Order	Reverse Traffic Channel Order	Order Code, ORDER (binary)	Order Qualification Code, ORDg (binary)	More Fields other than ORDg	Support Req'd	Name/Function
N	Y	011001	11111111	N	Y	<i>Continuous DTMF Tone Order</i> (Stop continuous DTMF tone)
N	Y	011101	nnnnnnnn	N	Y	<i>Service Option Control Order</i> (the specific control is designated by 'nnnnnnnn' as determined by each service option)
Y	Y	011110	nnnnnnnn	N	N	<i>Local Control Response Order</i> (specific response as designated by 'nnnnnnnn' as determined by each system)
Y	Y	011111	00000001	Y	Y	<i>Mobile Station Reject Order</i> (unspecified reason; see 6.7.3.4)
Y	Y	011111	00000010	Y	Y	<i>Mobile Station Reject Order</i> (message not accepted in this state; see 6.7.3.4)
Y	Y	011111	00000011	Y	Y	<i>Mobile Station Reject Order</i> (message structure not acceptable; see 6.7.3.4)
Y	Y	011111	00000100	Y	Y	<i>Mobile Station Reject Order</i> (message field not in valid range; see 6.7.3.4)
Y	Y	011111	00000101	Y	Y	<i>Mobile Station Reject Order</i> (message type or order code not understood; see 6.7.3.4)
Y	Y	011111	00000110	Y	Y	<i>Mobile Station Reject Order</i> (message requires a capability that is not supported by the mobile station; see 6.7.3.4)

1 **Table 6.7.3-1. Order and Order Qualification Codes Used on the Reverse Traffic**
 2 **Channel and the Access Channel (Part 3 of 3)**

Access Channel Order	Reverse Traffic Channel Order	Order Code, ORDER (binary)	Order Qualification Code, ORDQ (binary)	More Fields other than ORDQ	Support Req'd	Name/Function
Y	Y	011111	00000111	Y	Y	<i>Mobile Station Reject Order (message cannot be handled by the current mobile station configuration; see 6.7.3.4)</i>
All other codes are reserved.						

3

6.7.3.1 Base Station Challenge Order

When the mobile station sends a *Base Station Challenge Order*, it shall use the following fixed-length format for the order-specific fields:

Order-Specific Field	Length (bits)
ORDQ	8
RANDBS	32

ORDQ - Order qualification code.

The mobile station shall set this field to '00000000'.

RANDBS - Random challenge data.

The mobile station shall set this field as specified in 6.3.12.1.9.

1 **6.7.3.2 Service Option Request Order**

2 When the mobile station sends a *Service Option Request Order*, it shall use the following
3 fixed-length format for the order-specific fields:

4

Order-Specific Field	Length (bits)
ORDQ	8
SERVICE_OPTION	16

5

6 **ORDQ** - Order qualification code.

7 The mobile station shall set this field to '00000000'.

8 **SERVICE_OPTION** - Service option.

9 The mobile station shall set this field to the service option
10 code shown in TSB58 "Service Option Number Assignments
11 for Wideband Spread Spectrum Digital Cellular System"
12 corresponding to the requested or alternative service option.

1 **6.7.3.3 Service Option Response Order**

2 When the mobile station sends a *Service Option Response Order*, it shall use the following
3 fixed-length format for the order-specific fields:

Order-Specific Field	Length (bits)
ORDQ	8
SERVICE_OPTION	16

5
6 **ORDQ** - Order qualification code.

7 The mobile station shall set this field to '00000000'.

8 **SERVICE_OPTION** - Service option.

9 The mobile station shall set this field to the service option
10 code shown in TSB58 "Service Option Number Assignments
11 for Wideband Spread Spectrum Digital Cellular System"
12 corresponding to the accepted service option, or to
13 '0000000000000000' to reject the proposed service option.
14 See 6.6.4.1.2.2.1.

1 **6.7.3.4 Mobile Station Reject Order**

2 **The *Mobile Station Reject Order* can be sent on either the Access Channel or the Reverse**
 3 **Traffic Channel. The mobile station shall use the following variable-length format for the**
 4 **order-specific fields:**

Order-Specific Field	Length (bits)
ORDQ	8
REJECTED_TYPE	8

If the order is sent on the Access Channel and
 REJECTED_TYPE is '0000111'
 or if the order is sent on the Reverse Traffic Channel and
 REJECTED_TYPE is '0000001'
 the order-specific fields also include the following two fields:

REJECTED_ORDER	8
REJECTED_ORDQ	8

If the order is sent on the Reverse Traffic Channel and
 REJECTED_TYPE is '00001011' or
 REJECTED_TYPE is '00001100'
 the order-specific fields also include the following field:

REJECTED_PARAM_ID	16
-------------------	----

If the order is sent on the Access Channel and
 REJECTED_TYPE is '00001100'
 or if the order is sent on the Reverse Traffic Channel and
 REJECTED_TYPE is '00000011' or
 REJECTED_TYPE is '00001110'
 the order-specific fields also include the following field:

REJECTED_RECORD	8
-----------------	---

6
7
8
9
10
11
12
13

ORDQ - Order qualification code.

The mobile station shall set this field to the ORDQ value shown in Table 6.7.3-1 corresponding to the reason for rejecting the message.

REJECTED_TYPE - Message type of rejected message.

The mobile station shall set this field to the value of the MSG_TYPE field of the message being rejected.

- 1 **REJECTED_ORDER** - Order type of rejected message.
2
3 If the rejected message was an *Order Message*, the mobile
4 station shall set this field to the value of the **ORDER** field in
5 the rejected message; otherwise the mobile station shall omit
6 this field.
- 6 **REJECTED_ORDQ** - Order qualification code of rejected message.
7
8 If the rejected message was an *Order Message* including an
9 **ORDQ** field, the mobile station shall set this field to the value
10 of the **ORDQ** field in the rejected message. If the rejected
11 message was an *Order Message* not including an **ORDQ** field,
12 the mobile station shall set this field to '00000000'; otherwise
13 the mobile station shall omit this field.
- 13 **REJECTED_PARAM_ID** - Parameter identification of the rejected parameter.
14
15 If the rejected message was a *Retrieve Parameters Message* or
16 a *Set Parameters Message*, the mobile station shall set this
17 field to the **PARAMETER_ID** of the first parameter for which
18 the requested operation could not be completed; otherwise the
19 mobile station shall omit this field.
- 19 **REJECTED_RECORD** - Record type of the rejected information record.
20
21 If the rejected message was a *Feature Notification Message*, an
22 *Alert With Information Message* or a *Flash With Information*
23 *Message*, the mobile station shall set this field to the
24 **RECORD_TYPE** field of the first information record that could
25 not be accepted; otherwise the mobile station shall omit this
 field.

1 **6.7.4 Reverse Traffic Channel Information Records**

2 On the Reverse Traffic Channel, information records may be included in the *Flash with*
 3 *Information Message* or the *Status Message*. Table 6.7.4-1 lists the information record type
 4 values that may be used with each message type. The following sections describe the
 5 contents of each of the record types in detail.

6
 7 **Table 6.7.4-1. Information Record Types**

Message Type	Information Record	Record Type (binary)
None	Reserved	00000001
Flash	Feature Indicator	00000010
Flash	Keypad Facility	00000011
Flash	Called Party Number	00000100
Flash	Calling Party Number	00000101
Status	Identification	00000110
Status	Call Mode	00000111
Status	Terminal Information	00001000
Status	MIN Information	00001001
Status	Security Status	00001010
Flash	Connected Number	00001011
All other record type values are reserved.		

1 **6.7.4.1 Feature Indicator**

2 This information record allows the user to invoke supplementary services and features. The
 3 mobile station shall use the following fixed-length format for the type-specific fields:

4

Type-Specific Field	Length (bits)
FEATURE	4
RESERVED	4

5

6

FEATURE - Feature identifier.

7

This field identifies the supplementary service or feature to be invoked. Field values are for further study.

8

9

The mobile station shall set this field to the feature identifier.

10

RESERVED - Reserved bits.

11

The mobile station shall set this field to '0000'.

1 **6.7.4.2 Keypad Facility**

2 This information record allows the user to send characters entered via a keyboard or other
 3 such terminal. The mobile station shall use the following variable-length format for the
 4 type-specific fields:

Type-Specific Field	Length (bits)
One or more occurrences of the following field:	
CHARI	8

5

6

7

8

9

10

11

12

13

14

CHARI - Character.

The mobile station shall include one occurrence of this field for each character entered. The mobile station shall set each occurrence of this field to the ASCII representation corresponding to the character entered, as specified in ANSI X3.4, with the most significant bit set to '0'.

1 **6.7.4.3 Called Party Number**

2 This information record identifies the called party's number. The mobile station shall use
3 the following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
NUMBER_TYPE	3
NUMBER_PLAN	4

Zero or more occurrences of the following field:

CHARI	8
-------	---

RESERVED	1
----------	---

5
6 **NUMBER_TYPE** - Type of number.

7 The mobile station shall set this field to the **NUMBER_TYPE**
8 value shown in Table 6.7.1.3.2.4-2 corresponding to the type
9 of the called number, as defined in ANSI T1.607 §4.5.9.

10 **NUMBER_PLAN** - Numbering plan.

11 The mobile station shall set this field to the **NUMBER_PLAN**
12 value shown in Table 6.7.1.3.2.4-3 corresponding to the
13 numbering plan used for the called number, as defined in
14 ANSI T1.607 §4.5.9.

15 **CHARI** - Character.

16 The mobile stations shall include one occurrence of this field
17 for each character in the called number. The mobile station
18 shall set each occurrence of this field to the ASCII
19 representation corresponding to the character, as specified in
20 ANSI X3.4, with the most significant bit set to '0'.

21 **RESERVED** - Reserved bits.

22 The mobile station shall set this field to '0'.

1 6.7.4.4 Calling Party Number

2 This information record identifies the calling party's number. The mobile station shall use
 3 the following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
NUMBER_TYPE	3
NUMBER_PLAN	4
PI	2
SI	2

Zero or more occurrences of the following field:

CHARI	8
-------	---

RESERVED	5
----------	---

5

6

NUMBER_TYPE - Type of number.

7

The mobile station shall set this field to the NUMBER_TYPE value shown in Table 6.7.1.3.2.4-2 corresponding to the type of the calling number as defined in ANSI T1.607 §4.5.9.

8

9

10

NUMBER_PLAN - Numbering plan.

11

The mobile station shall set this field to the NUMBER_PLAN value shown in Table 6.7.1.3.2.4-3 corresponding to the numbering plan used for the calling number, as defined in ANSI T1.607 §4.5.9.

12

13

14

15

PI - Presentation indicator.

16

This field indicates whether or not the calling number should be displayed.

17

18

The mobile station shall set this field to the PI value shown in Table 6.7.4.4-1 corresponding to the presentation indicator as defined in ANSI T1.607 §4.5.9.

19

20

21

Table 6.7.4.4-1. Presentation Indicators

Description	PI (binary)
Presentation allowed	00
Presentation restricted	01
Number not available	10
Reserved	11

SI - Screening indicator.

This field indicates how the calling number was screened.

The mobile station shall set this field to the SI value shown in Table 6.7.4.4-2 corresponding to the screening indicator value as defined in ANSI T1.607 §4.5.9.

Table 6.7.4.4-2. Screening Indicators

Description	SI (binary)
User-provided, not screened	00
User-provided, verified and passed	01
User-provided, verified and failed	10
Network-provided	11

CHAR - Character.

The mobile stations shall include one occurrence of this field for each character in the calling number. The mobile station shall set each occurrence of this field to the ASCII representation corresponding to the character, as specified in ANSI X3.4, with the most significant bit set to '0'.

RESERVED - Reserved bits.

The mobile station shall set this field to '00000'.

1 **6.7.4.5 Identification**

2 This information record can be included in a *Status Message* to return the mobile station's
 3 ESN and MIN. The mobile station shall use the following fixed-length format for the type-
 4 specific fields:

Type-Specific Field	Length (bits)
MIN1	24
MIN2	10
ESN	32
MOB_TERM	1
RESERVED	5

- 5
- 6
- 7 **MIN1** - First part of the mobile station identification number (MIN).
 8 The mobile station shall set this field to MIN1 (see 2.3.1).
- 9 **MIN2** - Second part of the mobile station identification number (MIN).
 10 The mobile station shall set this field to MIN2 (see 2.3.1).
- 11 **ESN** - Mobile station's electronic serial number.
 12 The mobile station shall set this field to its electronic serial
 13 number. See 2.3.2.
- 14 **MOB_TERM** - Mobile terminated calls accepted indicator.
 15 If the mobile station is configured to accept mobile terminated
 16 calls while operating with the roaming status (see 6.6.5.3) as
 17 determined by the base station SID, NID pair specified in the
 18 *Status Request Order* (see 7.7.4.4), the mobile station shall set
 19 this bit to '1'. Otherwise, the mobile station shall set this bit
 20 to '0'.
- 21 **RESERVED** - Reserved bits.
 22 The mobile station shall set this field to '00000'.

1 6.7.4.6 Call Mode

2 This information record can be included in a *Status Message* to return the mobile station's
 3 preferred call mode and call-related information. The mobile station shall use the following
 4 fixed-length format for the type-specific fields:

Type-Specific Field	Length (bits)
ORIG_MODE	1
PRI_SERVICE	16
SEC_SERVICE	16
RESERVED	7

6

7

ORIG_MODE - Origination mode indicator.

8

If the current call is a mobile-originated call, the mobile station shall set this field to '0'. If the current call is a mobile-terminated call, the mobile station shall set this field to '1'.

9

10

11

PRI_SERVICE - Primary service option.

12

The mobile station shall set this field to the value shown in TSB58 "Service Option Number Assignments for Wideband Spread Spectrum Digital Cellular System" corresponding to the current primary service option. If no primary service option is active, the mobile station shall set this field to '0000000000000000'.

13

14

15

16

17

18

SEC_SERVICE - Secondary service option.

19

The mobile station shall set this field to the value shown in TSB58 "Service Option Number Assignments for Wideband Spread Spectrum Digital Cellular System" corresponding to the current secondary service option. If no secondary service option is active, the mobile station shall set this field to '0000000000000000'.

20

21

22

23

24

25

RESERVED - Reserved bits.

26

The mobile station shall set this field to '0000000'.

28

1 **6.7.4.7 Terminal Information**

2 This information record can be included in a *Status Message* to return configuration
 3 information about the mobile station. The mobile station shall use the following variable-
 4 length format for the type-specific fields:

Type-Specific Field	Length (bits)
MOB_P_REV	8
MOB_MFG_CODE	8
MOB_MODEL	8
MOB_FIRM_REV	16
SCM	8
LOCAL_CTRL	1
SLOT_CYCLE_INDEX	3

One or more occurrences of the following field:

SERVICE_OPTION	16
----------------	----

RESERVED	4
----------	---

- 6
- 7 **MOB_P_REV** - Protocol revision of the mobile station.
 8 The mobile station shall set this field to '00000001'.
- 9 **MOB_MFG_CODE** - Manufacturer code.
 10 This field identifies the manufacturer of the mobile station.
 11 The mobile station shall set this field to the manufacturer
 12 code assigned to its manufacturer.
- 13 **MOB_MODEL** - Model number.
 14 This number is assigned by the manufacturer for a particular
 15 model.
 16 The mobile station shall set this field to the model number
 17 assigned by the manufacturer for this mobile station.
- 18 **MOB_FIRM_REV** - Firmware revision number.
 19 This number is assigned by the manufacturer for a particular
 20 firmware version.
 21 The mobile station shall set this field to the revision number
 22 assigned by the manufacturer for the firmware version
 23 running in this mobile station.

- 1 **SCM** - **Station class mark.**
2 **The mobile station shall set this field to its station class mark.**
3 **See 2.3.3.**
- 4 **LOCAL_CTRL** - **Local control indicator.**
5 **If local control is enabled, the mobile station shall set this**
6 **field to '1'. If local control is disabled, the mobile station shall**
7 **set this field to '0'. See 2.6.1.2.2.**
- 8 **SLOT_CYCLE_INDEX** - **Slot cycle index.**
9 **If the mobile station is configured for slotted mode operation,**
10 **the mobile station shall set this field to the preferred slot cycle**
11 **index, $SLOT_CYCLE_INDEX_p$ (see 6.6.2.1.1). Otherwise, the**
12 **mobile station shall set this field to '000'.**
- 13 **SERVICE_OPTION** - **Supported service option.**
14 **The mobile station shall include one occurrence of this field**
15 **for each service option supported by the mobile station.**
- 16 **RESERVED** - **Reserved bits.**
17 **The mobile station shall set this field to '0000'.**

1 **6.7.4.8 MIN Information**

2 This information record can be included in a *Status Message* to return MIN-related
 3 configuration information about the mobile station. The mobile station shall use the
 4 following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
ACCOLC	4
MOB_TERM_HOME	1
MOB_TERM_FOR_SID	1
MOB_TERM_FOR_NID	1

Zero or more occurrences of the following record:

SID	15
NID	16

RESERVED	0-7 (as needed)
----------	-----------------

6

7

ACCOLC - Overload class.

8

The mobile station shall set this field to the access overload class assigned to the mobile station.

9

10

MOB_TERM_HOME - Home (non-roaming) registration enable indicator.

11

If the mobile station is configured to receive mobile station terminated calls when not roaming, the mobile station shall set this field to '1'. Otherwise, the mobile station shall set this field to '0'. See 6.6.5.3.

12

13

14

15

MOB_TERM_FOR_SID - Foreign SID roaming registration enable indicator.

16

If the mobile station is configured to receive mobile station terminated calls when it is a foreign SID roamer, the mobile station shall set this field to '1'. Otherwise, the mobile station shall set this field to '0'. See 6.6.5.3.

17

18

19

20

MOB_TERM_FOR_NID - Foreign NID roaming registration enable indicator.

21

If the mobile station is configured to receive mobile station terminated calls when it is a foreign NID roamer, the mobile station shall set this field to '1'. Otherwise, the mobile station shall set this field to '0'. See 6.6.5.3.

22

23

24

25

1 The mobile station shall include one occurrence of the following two-field record for each
2 home (non-roaming) (SID, NID) pair:

3 **SID** - System identification.

4 The mobile station shall set this field to the SID value for this
5 (SID, NID) pair.

6 **NID** - Network identification.

7 The mobile station shall set this field to the NID value for this
8 (SID, NID) pair.

9

10 **RESERVED** - Reserved bits.

11 The mobile station shall add reserved bits as needed in order
12 to make the length of the entire information record equal to an
13 integer number of octets. The mobile station shall set these
14 bits to '0'.

1 **6.7.4.9 Security Status**

2 This information record can be included in a *Status Message* to return the authentication,
 3 encryption, and voice privacy modes of the mobile station. The mobile station shall use the
 4 following fixed-length format for the type-specific fields:

5

Type-Specific Field	Length (bits)
AUTH_MODE	2
ENCRYPT_MODE	2
PRIVATE_LCM	1
RESERVED	3

6

7 **AUTH_MODE** - Authentication mode.

8 If the mobile station provided standard authentication
 9 information at the initiation of this call, the mobile station
 10 shall set this field to '01'. Otherwise, the mobile station shall
 11 set this field to '00'. All other values are reserved.

12 **ENCRYPT_MODE** - Message encryption mode.

13 The mobile station shall set this field to the value shown in
 14 Table 7.7.2.3.2.8-2 corresponding to the message encryption
 15 mode currently in use for this call.

16 **PRIVATE_LCM** - Private long code mask indicator.

17 If the mobile station is using the private long code mask for
 18 this call, the mobile station shall set this field to '1'. If the
 19 mobile station is using the public long code mask for this call,
 20 the mobile station shall set this field to '0'.

21 **RESERVED** - Reserved bits.

22 The mobile station shall set this field to '000'.

6.7.4.10 Connected Number

This information record identifies the responding party to a call. The mobile station shall use the following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
NUMBER_TYPE	3
NUMBER_PLAN	4
PI	2
SI	2

Zero or more occurrences of the following field:

CHARi	8
-------	---

RESERVED	5
----------	---

- NUMBER_TYPE** - Type of number.

The mobile station shall set this field to the NUMBER_TYPE value shown in Table 6.7.1.3.2.4-2 corresponding to the type of the connected number as defined in ANSI T1.607 §4.5.9.
- NUMBER_PLAN** - Numbering plan.

The mobile station shall set this field to the NUMBER_PLAN value shown in Table 6.7.1.3.2.4-3 corresponding to the numbering plan used for the connected number, as defined in ANSI T1.607 §4.5.9.
- PI** - Presentation indicator.

This field indicates whether or not the connected number should be displayed. The mobile station shall set this field to the PI value shown in Table 6.7.4.4-1 corresponding to the presentation indicator as defined in ANSI T1.607 §4.5.9.
- SI** - Screening indicator.

This field indicates how the connected number was screened. The mobile station shall set this field to the SI value shown in Table 6.7.4.4-2 corresponding to the screening indicator value as defined in ANSI T1.607 §4.5.9.
- CHARi** - Character.

The mobile station shall include one occurrence of this field for each character in the connected number. The mobile station shall set each occurrence of this field to the ASCII representation corresponding to the character, as specified in ANSI X3.4, with the most significant bit set to '0'.

- 1 **RESERVED** - Reserved bits.
- 2 **The mobile station shall set this field to '00000'.**

- 1
- 2
- 3 No text.
- 4

1 7 REQUIREMENTS FOR BASE STATION CDMA OPERATION

2 This section defines requirements that are specific to CDMA base station equipment and
3 operation. See Section 3 and Section 5 for analog base station requirements.

4 7.1 Transmitter**6 7.1.1 Frequency Parameters****8 7.1.1.1 Channel Spacing and Designation**

7 Channel spacing and designation for the base station transmissions shall be as specified in
8 7.1.1.1. The base station shall support CDMA operations on CDMA channel numbers as
9 shown in Table 6.1.1.1-1.

10 The CDMA frequency assignment in MHz corresponding to the CDMA Channel number
11 shown in Table 6.1.1.1-1 (expressed as N) is calculated as shown in Table 6.1.1.1-2.

12 The Primary CDMA Channel shall be channel number 283 for System A and channel
13 number 384 for System B.

14 The Secondary CDMA Channel shall be channel number 691 for System A and channel
15 number 777 for System B.

16 7.1.1.2 Frequency Tolerance

17 The base station transmit carrier frequency shall be maintained within $\pm 5 \times 10^{-8}$ of the
18 CDMA frequency assignment.

19 7.1.2 Power Output Characteristics

20 Maximum effective radiated power (ERP) and antenna height above average terrain (HAAT)
21 shall be coordinated locally on an ongoing basis.

22 7.1.3 Modulation Characteristics**23 7.1.3.1 Forward CDMA Channel Signals**

24 The Forward CDMA Channel has the overall structure shown in Figure 7.1.3.1-1. The
25 Forward CDMA Channel consists of the following code channels: the Pilot Channel, up to
26 one Sync Channel, up to seven Paging Channels, and a number of Forward Traffic
27 Channels. Each of these code channels is orthogonally spread by the appropriate Walsh
28 function and is then spread by a quadrature pair of PN sequences at a fixed chip rate of
29 1.2288 Mcps (million chips/sec). Multiple Forward CDMA Channels may be used within a
30 base station in a frequency division multiplexed manner.

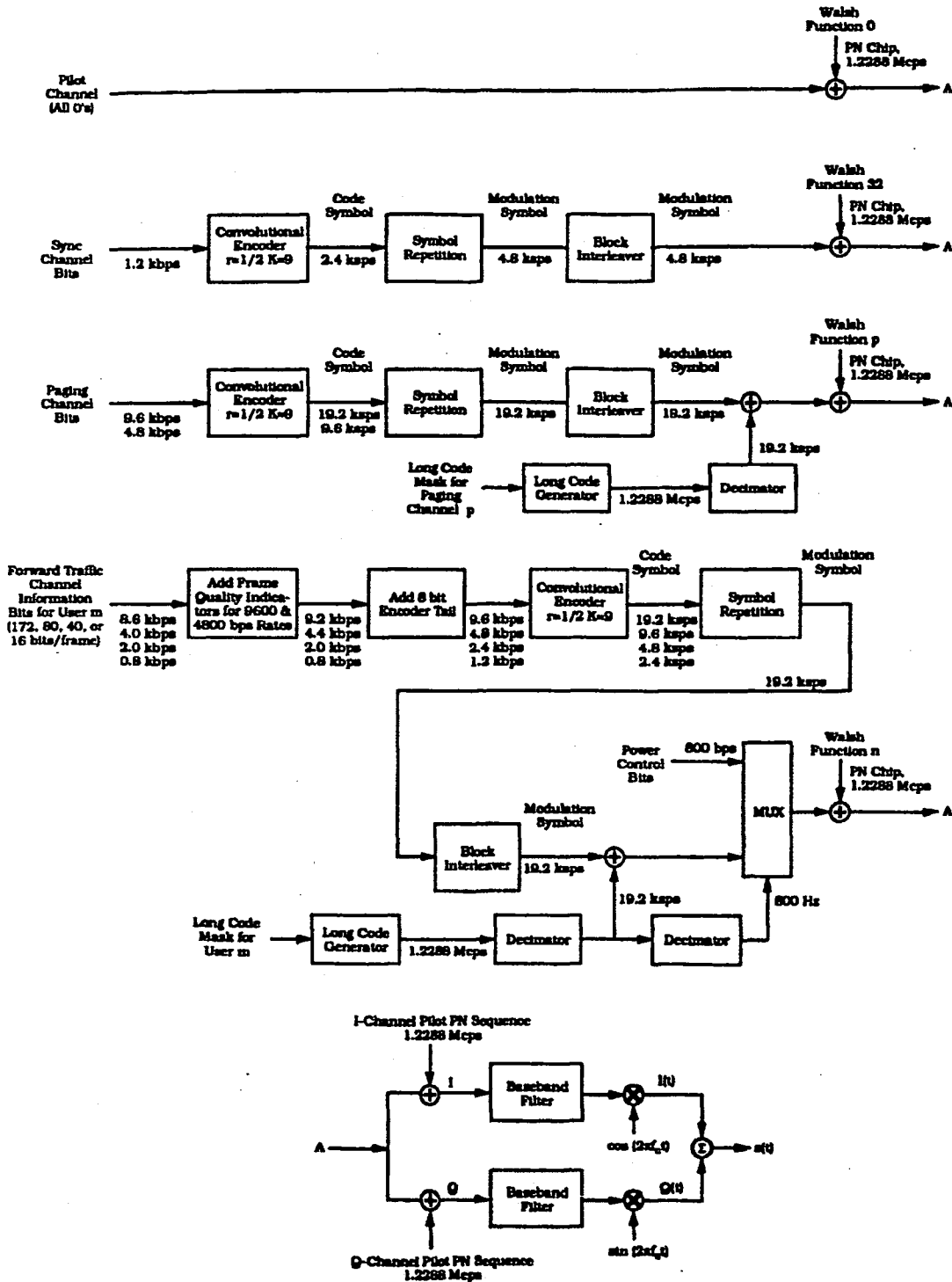
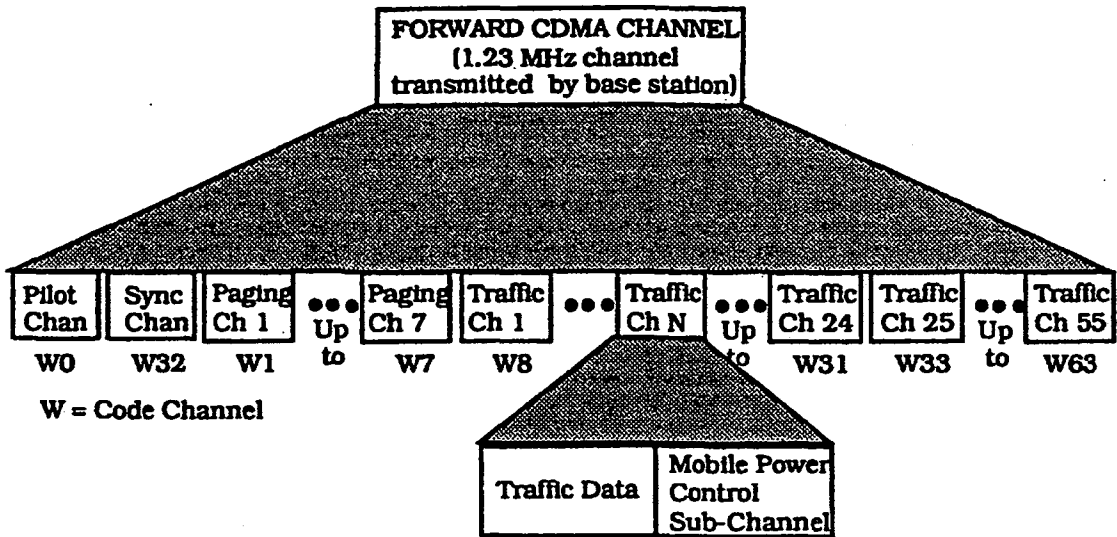


Figure 7.1.3.1-1. Forward CDMA Channel Structure

1 An example assignment of the code channels transmitted by a base station is shown in
 2 Figure 7.1.3.1-2. Out of the 64 code channels available for use, the example depicts the
 3 Pilot Channel (always required), one Sync Channel, seven Paging Channels (the maximum
 4 number allowed), and 55 Traffic Channels. Another possible configuration could replace all
 5 the Paging Channels and the Sync Channel one for one with Traffic Channels, for a
 6 maximum of one Pilot Channel, zero Paging Channels, zero Sync Channels, and 63 Traffic
 7 Channels.

8



9

10 **Figure 7.1.3.1-2. Example of a Forward CDMA Channel Transmitted by a Base Station**

11

12 **7.1.3.1.1 Modulation Parameters**

13 The modulation parameters for the Forward CDMA Channel are as shown in Tables
 14 7.1.3.1.1-1, 7.1.3.1.1-2, and 7.1.3.1.1-3.

15

Table 7.1.3.1.1-1. Sync Channel Modulation Parameters

Parameter	Data Rate (bps)		Units
	1200		
PN Chip Rate	1.2288		Mcps
Code Rate	1/2		bits/code symbol
Code Repetition	2		mod sym/code sym*
Modulation Symbol Rate	4,800		sps
PN Chips/Modulation Symbol	256		PN chips/mod sym
PN Chips/Bit	1024		PN chips/bit

*Each repetition of a code symbol is a modulation symbol.

Table 7.1.3.1.1-2. Paging Channel Modulation Parameters

Parameter	Data Rate (bps)		Units
	9600	4800	
PN Chip Rate	1.2288	1.2288	Mcps
Code Rate	1/2	1/2	bits/code symbol
Code Repetition	1	2	mod sym/code sym*
Modulation Symbol Rate	19,200	19,200	sps
PN Chips/Modulation Symbol	64	64	PN chips/mod sym
PN Chips/Bit	128	256	PN chips/bit

*Each repetition of a code symbol is a modulation symbol.

Table 7.1.3.1.1-3. Forward Traffic Channel Modulation Parameters

Parameter	Data Rate (bps)				Units
	9600	4800	2400	1200	
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/2	1/2	1/2	1/2	bits/code symbol
Code Repetition	1	2	4	8	mod sym/code sym*
Modulation Symbol Rate	19,200	19,200	19,200	19,200	sps
PN Chips/Modulation Symbol	64	64	64	64	PN chips/mod sym
PN Chips/Bit	128	256	512	1024	PN chips/bit

*Each repetition of a code symbol is a modulation symbol.

7.1.3.1.2 Data Rates

The Sync Channel shall operate at a fixed rate of 1200 bps. The Paging Channel shall support fixed data rate operation at 9600 or 4800 bps. The Forward Traffic Channel shall support variable data rate operation at 9600, 4800, 2400, and 1200 bps.

7.1.3.1.3 Convolutional Encoding

The Sync Channel, Paging Channel, and Forward Traffic Channel shall be convolutionally encoded prior to transmission. The convolutional code shall be rate 1/2, with a constraint length of 9. The generator functions of the code shall be g_0 equals 753 (octal) and g_1 equals 561 (octal). This is a rate 1/2 code generating two code symbols for each data bit input to the encoder. These code symbols shall be output so that the code symbol (c_0) encoded with generator function g_0 is output first, and the code symbol (c_1) encoded with generator function g_1 is output last. The state of the convolutional encoder, upon initialization, shall be the all-zero state. The first code symbol output after initialization shall be a code symbol encoded with generator function g_0 .

Convolutional encoding involves the modulo-2 addition of selected taps of a serially time-delayed data sequence. The length of the data sequence delay is equal to $K-1$, where K is the constraint length of the code. Figure 7.1.3.1.3-1 illustrates the specific K equals 9, rate 1/2 convolutional encoder that is used for these channels.

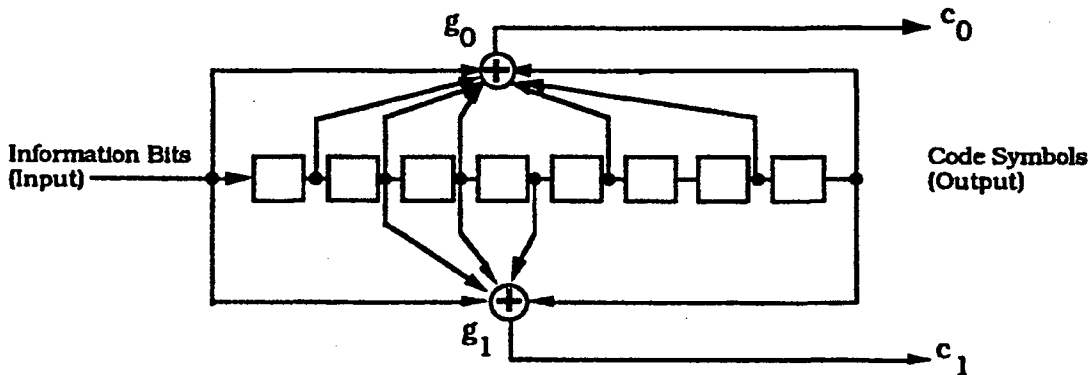


Figure 7.1.3.1.3-1. $K = 9$, Rate 1/2 Convolutional Encoder

7.1.3.1.4 Code Symbol Repetition

For the Sync Channel, each convolutionally encoded symbol shall be repeated 1 time (each symbol occurs 2 consecutive times) prior to block interleaving.

For the Paging and Forward Traffic Channels, each convolutionally encoded symbol shall be repeated prior to block interleaving whenever the information rate is lower than 9600 bps. Each code symbol at the 4800 bps rate shall be repeated 1 time (each symbol occurs 2 consecutive times). Each code symbol at the 2400 bps data rate shall be repeated 3 times (each symbol occurs 4 consecutive times). Each code symbol at the 1200 bps data rate

1 shall be repeated 7 times (each symbol occurs 8 consecutive times). For all the data rates
2 (9600, 4800, 2400, and 1200 bps) this results in a constant modulation symbol rate of
3 19200 modulation symbols per second.

4 7.1.3.1.5 Block Interleaving

5 All symbols after repetition on the Sync Channel, Paging Channel, and Forward Traffic
6 Channel are block interleaved.

7 The Sync Channel shall use a block interleaver spanning 26.666... ms which is equivalent
8 to 128 modulation symbols at the symbol rate of 4800 sps.¹

9 The input (array write) symbol sequence to the Sync Channel interleaver is given in Table
10 7.1.3.1.5-1. The table is read down by columns from the left to the right. That is, the first
11 input symbol (1) is at the top left, the second input symbol (1) is just below the first input
12 symbol, and the 17th input symbol (9) is just to the right of the first input symbol. The
13 output (array read) symbol sequence shall be as given in Table 7.1.3.1.5-2. The table is
14 read the same way as Table 7.1.3.1.5-1. That is, the first output symbol (1) is at the top
15 left, the second output symbol (33) is just below the first output symbol, and the 17th
16 output symbol (3) is just to the right of the first output symbol.

17 The Forward Traffic and Paging Channels shall use the identical block interleaver spanning
18 20 ms equivalent to 384 modulation symbols at the modulation symbol rate of 19200 sps.

19 The input (array write) and output (array read) symbol sequence for the four data rates
20 shall be as given in Tables 7.1.3.1.5-3 through 7.1.3.1.5-10. These tables are read down by
21 columns from the left to the right as with the Sync Channel interleaver. In these tables,
22 symbols with the same number denote repeated code symbols.

¹The Sync Channel symbols are interleaved by a technique that is best described as a bit reversal method.

Table 7.1.3.1.5-1. Sync Channel Interleaver Input (Array Write Operation)

1	9	17	25	33	41	49	57
1	9	17	25	33	41	49	57
2	10	18	26	34	42	50	58
2	10	18	26	34	42	50	58
3	11	19	27	35	43	51	59
3	11	19	27	35	43	51	59
4	12	20	28	36	44	52	60
4	12	20	28	36	44	52	60
5	13	21	29	37	45	53	61
5	13	21	29	37	45	53	61
6	14	22	30	38	46	54	62
6	14	22	30	38	46	54	62
7	15	23	31	39	47	55	63
7	15	23	31	39	47	55	63
8	16	24	32	40	48	56	64
8	16	24	32	40	48	56	64

Table 7.1.3.1.5-2. Sync Channel Interleaver Output (Array Read Operation)

1	3	2	4	1	3	2	4
33	35	34	36	33	35	34	36
17	19	18	20	17	19	18	20
49	51	50	52	49	51	50	52
9	11	10	12	9	11	10	12
41	43	42	44	41	43	42	44
25	27	26	28	25	27	26	28
57	59	58	60	57	59	58	60
5	7	6	8	5	7	6	8
37	39	38	40	37	39	38	40
21	23	22	24	21	23	22	24
53	55	54	56	53	55	54	56
13	15	14	16	13	15	14	16
45	47	46	48	45	47	46	48
29	31	30	32	29	31	30	32
61	63	62	64	61	63	62	64

Table 7.1.3.1.5-3. Forward Traffic and Paging Channel Interleaver Input (Array Write Operation at 9600 bps)

1	25	49	73	97	121	145	169	193	217	241	265	289	313	337	361
2	26	50	74	98	122	146	170	194	218	242	266	290	314	338	362
3	27	51	75	99	123	147	171	195	219	243	267	291	315	339	363
4	28	52	76	100	124	148	172	196	220	244	268	292	316	340	364
5	29	53	77	101	125	149	173	197	221	245	269	293	317	341	365
6	30	54	78	102	126	150	174	198	222	246	270	294	318	342	366
7	31	55	79	103	127	151	175	199	223	247	271	295	319	343	367
8	32	56	80	104	128	152	176	200	224	248	272	296	320	344	368
9	33	57	81	105	129	153	177	201	225	249	273	297	321	345	369
10	34	58	82	106	130	154	178	202	226	250	274	298	322	346	370
11	35	59	83	107	131	155	179	203	227	251	275	299	323	347	371
12	36	60	84	108	132	156	180	204	228	252	276	300	324	348	372
13	37	61	85	109	133	157	181	205	229	253	277	301	325	349	373
14	38	62	86	110	134	158	182	206	230	254	278	302	326	350	374
15	39	63	87	111	135	159	183	207	231	255	279	303	327	351	375
16	40	64	88	112	136	160	184	208	232	256	280	304	328	352	376
17	41	65	89	113	137	161	185	209	233	257	281	305	329	353	377
18	42	66	90	114	138	162	186	210	234	258	282	306	330	354	378
19	43	67	91	115	139	163	187	211	235	259	283	307	331	355	379
20	44	68	92	116	140	164	188	212	236	260	284	308	332	356	380
21	45	69	93	117	141	165	189	213	237	261	285	309	333	357	381
22	46	70	94	118	142	166	190	214	238	262	286	310	334	358	382
23	47	71	95	119	143	167	191	215	239	263	287	311	335	359	383
24	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384

Table 7.1.3.1.5-4. Forward Traffic and Paging Channel Interleaver Output (Array Read Operation at 9600 bps)

1	9	5	13	3	11	7	15	2	10	6	14	4	12	8	16
65	73	69	77	67	75	71	79	66	74	70	78	68	76	72	80
129	137	133	141	131	139	135	143	130	138	134	142	132	140	136	144
193	201	197	205	195	203	199	207	194	202	198	206	196	204	200	208
257	265	261	269	259	267	263	271	258	266	262	270	260	268	264	272
321	329	325	333	323	331	327	335	322	330	326	334	324	332	328	336
33	41	37	45	35	43	39	47	34	42	38	46	36	44	40	48
97	105	101	109	99	107	103	111	98	106	102	110	100	108	104	112
161	169	165	173	163	171	167	175	162	170	166	174	164	172	168	176
225	233	229	237	227	235	231	239	226	234	230	238	228	236	232	240
289	297	293	301	291	299	295	303	290	298	294	302	292	300	296	304
353	361	357	365	355	363	359	367	354	362	358	366	356	364	360	368
17	25	21	29	19	27	23	31	18	26	22	30	20	28	24	32
81	89	85	93	83	91	87	95	82	90	86	94	84	92	88	96
145	153	149	157	147	155	151	159	146	154	150	158	148	156	152	160
209	217	213	221	211	219	215	223	210	218	214	222	212	220	216	224
273	281	277	285	275	283	279	287	274	282	278	286	276	284	280	288
337	345	341	349	339	347	343	351	338	346	342	350	340	348	344	352
49	57	53	61	51	59	55	63	50	58	54	62	52	60	56	64
113	121	117	125	115	123	119	127	114	122	118	126	116	124	120	128
177	185	181	189	179	187	183	191	178	186	182	190	180	188	184	192
241	249	245	253	243	251	247	255	242	250	246	254	244	252	248	256
305	313	309	317	307	315	311	319	306	314	310	318	308	316	312	320
369	377	373	381	371	379	375	383	370	378	374	382	372	380	376	384

Table 7.1.3.1.5-5. Forward Traffic and Paging Channel Interleaver Input (Array Write Operation at 4800 bps)

1	13	25	37	49	61	73	85	97	109	121	133	145	157	169	181
1	13	25	37	49	61	73	85	97	109	121	133	145	157	169	181
2	14	26	38	50	62	74	86	98	110	122	134	146	158	170	182
2	14	26	38	50	62	74	86	98	110	122	134	146	158	170	182
3	15	27	39	51	63	75	87	99	111	123	135	147	159	171	183
3	15	27	39	51	63	75	87	99	111	123	135	147	159	171	183
4	16	28	40	52	64	76	88	100	112	124	136	148	160	172	184
4	16	28	40	52	64	76	88	100	112	124	136	148	160	172	184
5	17	29	41	53	65	77	89	101	113	125	137	149	161	173	185
5	17	29	41	53	65	77	89	101	113	125	137	149	161	173	185
6	18	30	42	54	66	78	90	102	114	126	138	150	162	174	186
6	18	30	42	54	66	78	90	102	114	126	138	150	162	174	186
7	19	31	43	55	67	79	91	103	115	127	139	151	163	175	187
7	19	31	43	55	67	79	91	103	115	127	139	151	163	175	187
8	20	32	44	56	68	80	92	104	116	128	140	152	164	176	188
8	20	32	44	56	68	80	92	104	116	128	140	152	164	176	188
9	21	33	45	57	69	81	93	105	117	129	141	153	165	177	189
9	21	33	45	57	69	81	93	105	117	129	141	153	165	177	189
10	22	34	46	58	70	82	94	106	118	130	142	154	166	178	190
10	22	34	46	58	70	82	94	106	118	130	142	154	166	178	190
11	23	35	47	59	71	83	95	107	119	131	143	155	167	179	191
11	23	35	47	59	71	83	95	107	119	131	143	155	167	179	191
12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192

Table 7.1.3.1.5-6. Forward Traffic and Paging Channel Interleaver Output (Array Read Operation at 4800 bps)

1	5	3	7	2	6	4	8	1	5	3	7	2	6	4	8
33	37	35	39	34	38	36	40	33	37	35	39	34	38	36	40
65	69	67	71	66	70	68	72	65	69	67	71	66	70	68	72
97	101	99	103	98	102	100	104	97	101	99	103	98	102	100	104
129	133	131	135	130	134	132	136	129	133	131	135	130	134	132	136
161	165	163	167	162	166	164	168	161	165	163	167	162	166	164	168
17	21	19	23	18	22	20	24	17	21	19	23	18	22	20	24
49	53	51	55	50	54	52	56	49	53	51	55	50	54	52	56
81	85	83	87	82	86	84	88	81	85	83	87	82	86	84	88
113	117	115	119	114	118	116	120	113	117	115	119	114	118	116	120
145	149	147	151	146	150	148	152	145	149	147	151	146	150	148	152
177	181	179	183	178	182	180	184	177	181	179	183	178	182	180	184
9	13	11	15	10	14	12	16	9	13	11	15	10	14	12	16
41	45	43	47	42	46	44	48	41	45	43	47	42	46	44	48
73	77	75	79	74	78	76	80	73	77	75	79	74	78	76	80
105	109	107	111	106	110	108	112	105	109	107	111	106	110	108	112
137	141	139	143	138	142	140	144	137	141	139	143	138	142	140	144
169	173	171	175	170	174	172	176	169	173	171	175	170	174	172	176
25	29	27	31	26	30	28	32	25	29	27	31	26	30	28	32
57	61	59	63	58	62	60	64	57	61	59	63	58	62	60	64
89	93	91	95	90	94	92	96	89	93	91	95	90	94	92	96
121	125	123	127	122	126	124	128	121	125	123	127	122	126	124	128
153	157	155	159	154	158	156	160	153	157	155	159	154	158	156	160
185	189	187	191	186	190	188	192	185	189	187	191	186	190	188	192

Table 7.1.3.1.5-7. Forward Traffic Channel Interleaver Input (Array Write Operation at 2400 bps)

1	7	13	19	25	31	37	43	49	55	61	67	73	79	85	91
1	7	13	19	25	31	37	43	49	55	61	67	73	79	85	91
1	7	13	19	25	31	37	43	49	55	61	67	73	79	85	91
1	7	13	19	25	31	37	43	49	55	61	67	73	79	85	91
2	8	14	20	26	32	38	44	50	56	62	68	74	80	86	92
2	8	14	20	26	32	38	44	50	56	62	68	74	80	86	92
2	8	14	20	26	32	38	44	50	56	62	68	74	80	86	92
2	8	14	20	26	32	38	44	50	56	62	68	74	80	86	92
3	9	15	21	27	33	39	45	51	57	63	69	75	81	87	93
3	9	15	21	27	33	39	45	51	57	63	69	75	81	87	93
3	9	15	21	27	33	39	45	51	57	63	69	75	81	87	93
3	9	15	21	27	33	39	45	51	57	63	69	75	81	87	93
4	10	16	22	28	34	40	46	52	58	64	70	76	82	88	94
4	10	16	22	28	34	40	46	52	58	64	70	76	82	88	94
4	10	16	22	28	34	40	46	52	58	64	70	76	82	88	94
4	10	16	22	28	34	40	46	52	58	64	70	76	82	88	94
5	11	17	23	29	35	41	47	53	59	65	71	77	83	89	95
5	11	17	23	29	35	41	47	53	59	65	71	77	83	89	95
5	11	17	23	29	35	41	47	53	59	65	71	77	83	89	95
5	11	17	23	29	35	41	47	53	59	65	71	77	83	89	95
6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96

Table 7.1.3.1.5-8. Forward Traffic Channel Interleaver Output (Array Read Operation at 2400 bps)

1	3	2	4	1	3	2	4	1	3	2	4	1	3	2	4
17	19	18	20	17	19	18	20	17	19	18	20	17	19	18	20
33	35	34	36	33	35	34	36	33	35	34	36	33	35	34	36
49	51	50	52	49	51	50	52	49	51	50	52	49	51	50	52
65	67	66	68	65	67	66	68	65	67	66	68	65	67	66	68
81	83	82	84	81	83	82	84	81	83	82	84	81	83	82	84
9	11	10	12	9	11	10	12	9	11	10	12	9	11	10	12
25	27	26	28	25	27	26	28	25	27	26	28	25	27	26	28
41	43	42	44	41	43	42	44	41	43	42	44	41	43	42	44
57	59	58	60	57	59	58	60	57	59	58	60	57	59	58	60
73	75	74	76	73	75	74	76	73	75	74	76	73	75	74	76
89	91	90	92	89	91	90	92	89	91	90	92	89	91	90	92
5	7	6	8	5	7	6	8	5	7	6	8	5	7	6	8
21	23	22	24	21	23	22	24	21	23	22	24	21	23	22	24
37	39	38	40	37	39	38	40	37	39	38	40	37	39	38	40
53	55	54	56	53	55	54	56	53	55	54	56	53	55	54	56
69	71	70	72	69	71	70	72	69	71	70	72	69	71	70	72
85	87	86	88	85	87	86	88	85	87	86	88	85	87	86	88
13	15	14	16	13	15	14	16	13	15	14	16	13	15	14	16
29	31	30	32	29	31	30	32	29	31	30	32	29	31	30	32
45	47	46	48	45	47	46	48	45	47	46	48	45	47	46	48
61	63	62	64	61	63	62	64	61	63	62	64	61	63	62	64
77	79	78	80	77	79	78	80	77	79	78	80	77	79	78	80
93	95	94	96	93	95	94	96	93	95	94	96	93	95	94	96

1 **Table 7.1.3.1.5-9. Forward Traffic Channel Interleaver Input (Array Write Operation**
 2 **at 1200 bps)**

1	4	7	10	13	16	19	22	25	28	31	34	37	40	43	46
1	4	7	10	13	16	19	22	25	28	31	34	37	40	43	46
1	4	7	10	13	16	19	22	25	28	31	34	37	40	43	46
1	4	7	10	13	16	19	22	25	28	31	34	37	40	43	46
1	4	7	10	13	16	19	22	25	28	31	34	37	40	43	46
1	4	7	10	13	16	19	22	25	28	31	34	37	40	43	46
1	4	7	10	13	16	19	22	25	28	31	34	37	40	43	46
1	4	7	10	13	16	19	22	25	28	31	34	37	40	43	46
2	5	8	11	14	17	20	23	26	29	32	35	38	41	44	47
2	5	8	11	14	17	20	23	26	29	32	35	38	41	44	47
2	5	8	11	14	17	20	23	26	29	32	35	38	41	44	47
2	5	8	11	14	17	20	23	26	29	32	35	38	41	44	47
2	5	8	11	14	17	20	23	26	29	32	35	38	41	44	47
2	5	8	11	14	17	20	23	26	29	32	35	38	41	44	47
2	5	8	11	14	17	20	23	26	29	32	35	38	41	44	47
2	5	8	11	14	17	20	23	26	29	32	35	38	41	44	47
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48

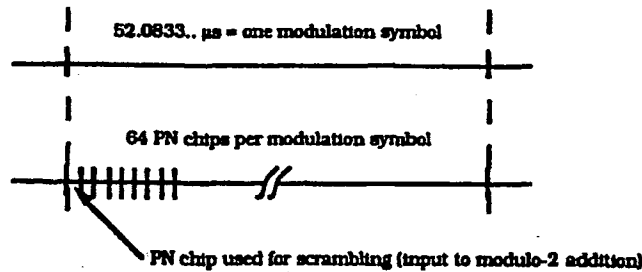
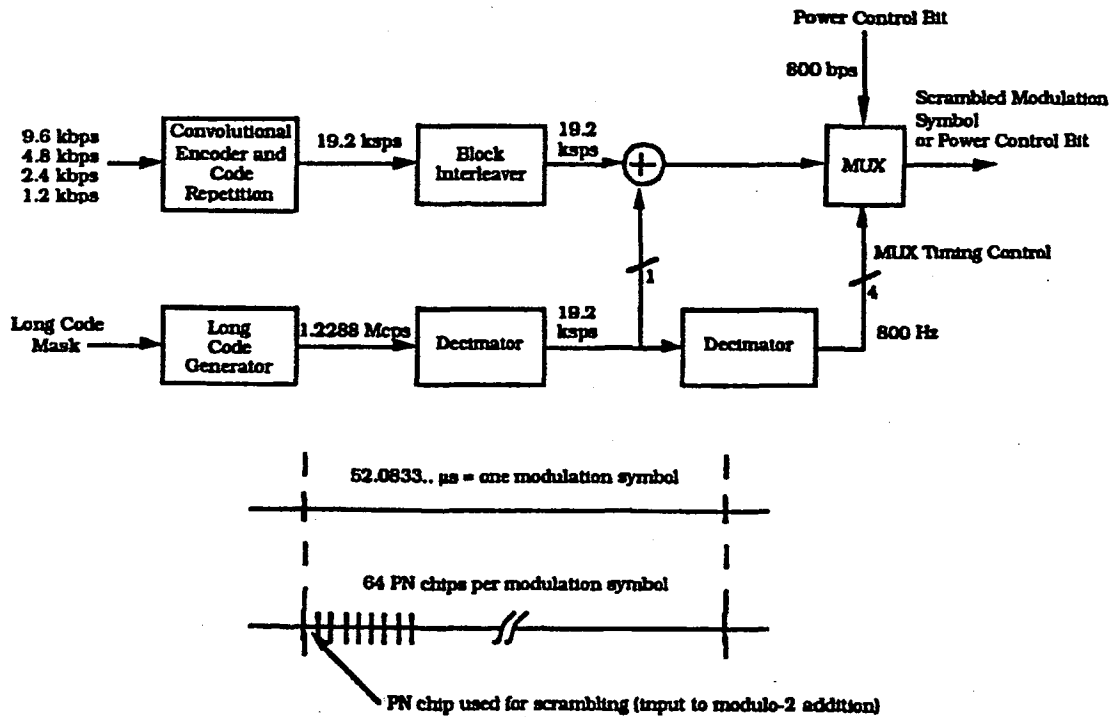
3
4
5 **Table 7.1.3.1.5-10. Forward Traffic Channel Interleaver Output (Array Read**
 6 **Operation at 1200 bps)**

1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
9	10	9	10	9	10	9	10	9	10	9	10	9	10	9	10
17	18	17	18	17	18	17	18	17	18	17	18	17	18	17	18
25	26	25	26	25	26	25	26	25	26	25	26	25	26	25	26
33	34	33	34	33	34	33	34	33	34	33	34	33	34	33	34
41	42	41	42	41	42	41	42	41	42	41	42	41	42	41	42
5	6	5	6	5	6	5	6	5	6	5	6	5	6	5	6
13	14	13	14	13	14	13	14	13	14	13	14	13	14	13	14
21	22	21	22	21	22	21	22	21	22	21	22	21	22	21	22
29	30	29	30	29	30	29	30	29	30	29	30	29	30	29	30
37	38	37	38	37	38	37	38	37	38	37	38	37	38	37	38
45	46	45	46	45	46	45	46	45	46	45	46	45	46	45	46
3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4
11	12	11	12	11	12	11	12	11	12	11	12	11	12	11	12
19	20	19	20	19	20	19	20	19	20	19	20	19	20	19	20
27	28	27	28	27	28	27	28	27	28	27	28	27	28	27	28
35	36	35	36	35	36	35	36	35	36	35	36	35	36	35	36
43	44	43	44	43	44	43	44	43	44	43	44	43	44	43	44
7	8	7	8	7	8	7	8	7	8	7	8	7	8	7	8
15	16	15	16	15	16	15	16	15	16	15	16	15	16	15	16
23	24	23	24	23	24	23	24	23	24	23	24	23	24	23	24
31	32	31	32	31	32	31	32	31	32	31	32	31	32	31	32
39	40	39	40	39	40	39	40	39	40	39	40	39	40	39	40
47	48	47	48	47	48	47	48	47	48	47	48	47	48	47	48

7.1.3.1.6 Data Scrambling

Data scrambling applies to the Paging and Forward Traffic Channels. Data scrambling is performed on the modulation symbols output from the block interleaver at the 19,200 sps rate.

The data scrambling shall be accomplished by performing the modulo-2 addition of the interleaver output symbol with the binary value of the long code PN chip that is valid at the start of the transmission period for that symbol as shown in Figure 7.1.3.1.6-1. This PN sequence shall be the equivalent of the long code operating at 1.2288 MHz clock rate where only the first output of every 64 is used for the data scrambling (i.e., at a 19200 sps rate). The long code may be generated as described in 6.1.3.1.8. The long code masks to be used for the Paging and Forward Traffic Channels are specified in 7.1.3.4.6 and 7.1.3.5.6, respectively.



⊕ Modulo-2 addition

Figure 7.1.3.1.6-1. Data Scrambler Function and Timing

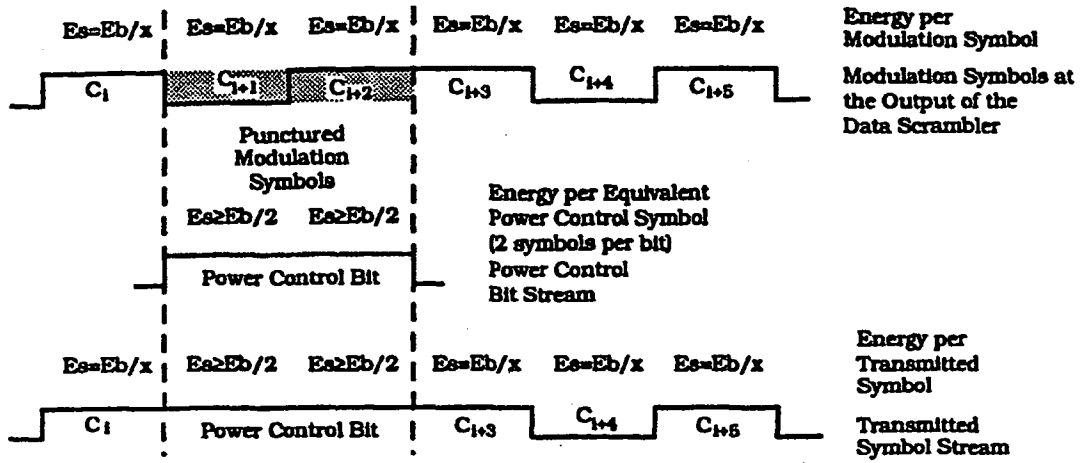
7.1.3.1.7 Power Control Subchannel

A power control subchannel is continuously transmitted on the Forward Traffic Channel. The sub-channel shall transmit at a rate of one bit ('0' or '1') every 1.25 ms (i.e., 800 bps). A '0' bit shall indicate to the mobile station to increase the mean output power level and a '1' bit shall indicate to the mobile station to decrease the mean output power level. The

- 1 amount that the mobile station increases and decreases its power for every power control
2 bit is specified in 6.1.2.3.2.
- 3 The base station Reverse Traffic Channel receiver shall estimate the received signal strength
4 of the particular mobile station it is assigned to over a 1.25 ms period, equivalent to 6
5 modulation symbols. The base station receiver shall use the estimate to determine the
6 value of the power control bit ('0' or '1'). The base station shall transmit the power control
7 bit on the corresponding Forward Traffic Channel using the puncturing technique
8 described below. The transmission of the power control bit shall occur on the Forward
9 Traffic Channel in the second power control group following the corresponding Reverse
10 Traffic Channel power control group in which the signal strength was estimated.²
- 11 The length of one power control bit shall correspond exactly to two modulation symbols of
12 the Forward Traffic Channel (i.e., 104.166... μ s). Each power control bit shall replace two
13 consecutive Forward Traffic Channel modulation symbols³ and shall be transmitted with
14 energy not less than E_b , namely the energy per information bit of the Forward Traffic
15 Channel, as shown in Figure 7.1.3.1.7-1.
- 16 The power control bits shall be inserted into the Forward Traffic Channel data stream after
17 the data scrambling.
- 18 There are 16 possible starting positions for the power control bit as shown in Figure
19 7.1.3.1.7-2. Each position corresponds to one of the first 16 modulation symbols
20 (numbered 0 through 15) of a 1.25 ms period. In each 1.25 ms period, a total of 24 bits
21 from the long code are used for scrambling. These bits are numbered 0 through 23, where
22 bit 0 is the first to be used and bit 23 the last in each 1.25 ms period.
- 23 The 4-bit binary number with values 0 through 15 formed by scrambling bits 23, 22, 21,
24 and 20 shall be used to determine the position of the power control bit as shown in Figure
25 7.1.3.1.7-2. Bit 20 shall be the least significant bit, and bit 23 shall be the most significant
26 bit. In the example of Figure 7.1.3.1.7-2, the values of bits 23, 22, 21, and 20 are '1011'
27 (11 decimal), and the power control bit starting position is the eleventh. Figure 7.1.3.1.6-1
28 shows the relationship between the scrambled modulation symbols (at 19200 sps) and the
29 punctured power control subchannel (at 800 bps).

²For instance, as shown in Figure 7.1.3.1.7-2, the signal is received on the Reverse Traffic Channel in power control group number 5, and the corresponding power control bit is transmitted on the Forward Traffic Channel during power control group number $5 + 2 = 7$.

³This technique is commonly known as symbol puncturing. In this case, the punctured modulation symbols are replaced by the power control bits.



Where x is Given by:

Transmit Rate	Value of x
9600 bps	2
4800 bps	4
2400 bps	8
1200 bps	16

All unpunctured modulation symbols in a frame are transmitted at the same power level. Modulation symbols in adjacent frames may be sent at different power levels.

1
2

Figure 7.1.3.1.7-1. Power Control Sub-Channel Structure and Puncturing

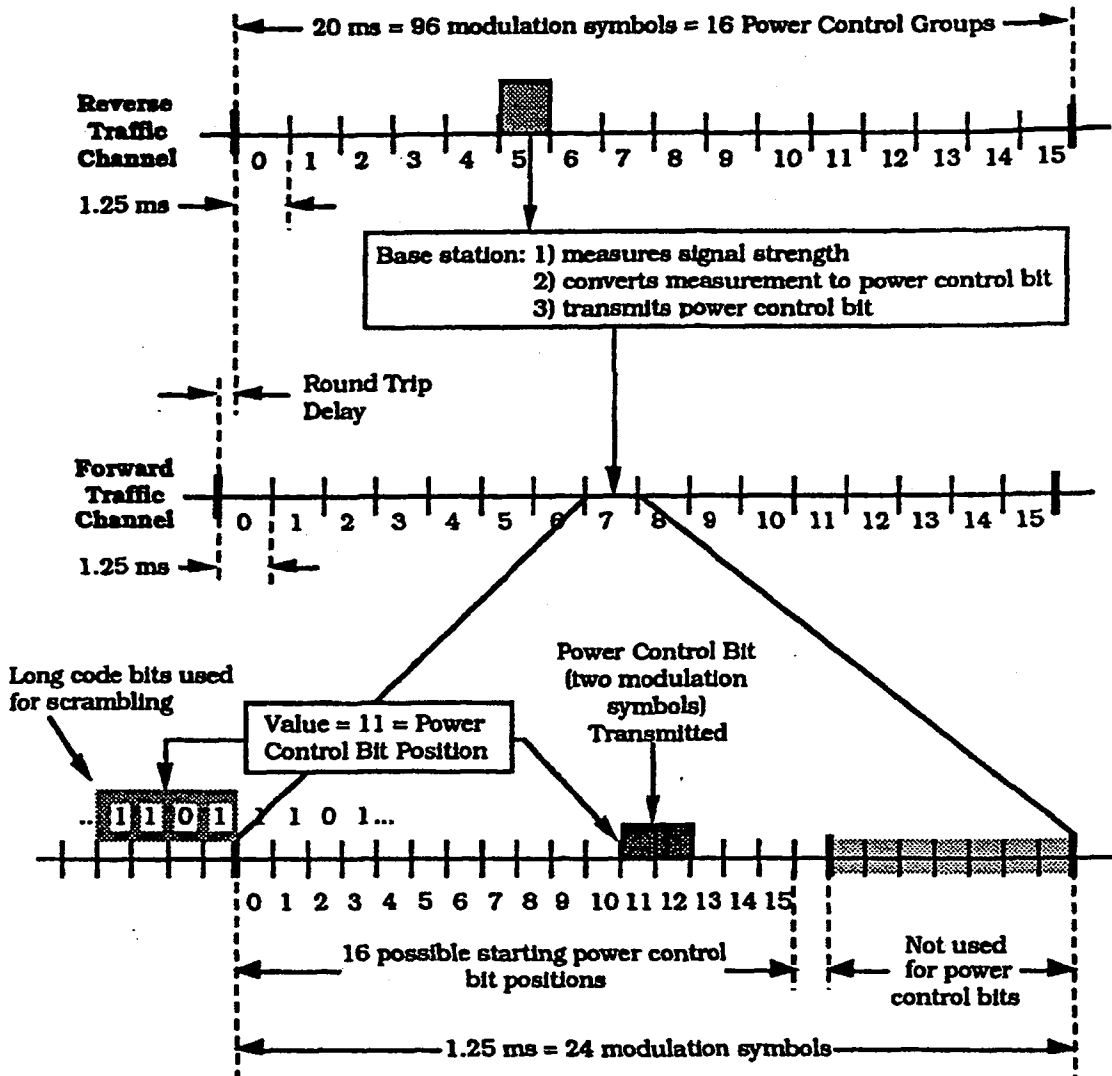


Figure 7.1.3.1.7-2. Randomization of Power Control Bit Positions

1
2
3

7.1.3.1.8 Orthogonal Spreading

Each code channel transmitted on the Forward CDMA Channel shall be spread with a Walsh function at a fixed chip rate of 1.2288 Mcps to provide orthogonal channelization among all code channels on a given Forward CDMA Channel. One of sixty-four time-orthogonal Walsh functions, as defined in Table 7.1.3.1.8-1, shall be used. A code channel that is spread using Walsh function n shall be assigned to code channel number n ($n = 0$ to 63). Walsh function time alignment shall be such that the first Walsh chip, designated by 0 in the column headings of Table 7.1.3.1.8-1, begins at the even second time marks referenced to base station transmission time (see 7.1.5). The Walsh function spreading

12

- 1 sequence shall repeat with a period of $52.083... \mu\text{s}$ ($= 64/1.2288 \text{ Mcps}$) which is equal to
- 2 the duration of one Forward Traffic Channel modulation symbol.
- 3 Code channel number zero shall always be assigned to the Pilot Channel. If the Sync
- 4 Channel is present, it shall be assigned code channel number 32. If Paging Channels are
- 5 present, they shall be assigned to code channel numbers one through seven (inclusive) in
- 6 sequence. The remaining code channels are available for assignment to the Forward Traffic
- 7 Channels.

Table 7.1.3.1.8-1. 64-ary Walsh Functions

Walsh Chip with a Walsh Function

	012345678901	1111111111	2222222222	3333333333	4444444444	5555555555	6666666666
	0	00000000	00000000	00000000	00000000	00000000	00000000
	1	01010101	01010101	01010101	01010101	01010101	01010101
	2	00110011	00110011	00110011	00110011	00110011	00110011
	3	01100110	01100110	01100110	01100110	01100110	01100110
	4	00001111	00001111	00001111	00001111	00001111	00001111
	5	01011010	01011010	01011010	01011010	01011010	01011010
	6	00111100	00111100	00111100	00111100	00111100	00111100
	7	01101001	01101001	01101001	01101001	01101001	01101001
	8	00000000	11111111	00000000	11111111	00000000	11111111
	9	01010101	01010101	01010101	01010101	01010101	01010101
	10	00110011	11001100	00110011	11001100	00110011	11001100
	11	01100110	10011001	01100110	10011001	01100110	10011001
	12	00001111	11110000	00001111	11110000	00001111	11110000
	13	01011010	01011010	01011010	01011010	01011010	01011010
	14	00111100	00111100	00111100	00111100	00111100	00111100
	15	01101001	01101001	01101001	01101001	01101001	01101001
W	16	00000000	00000000	11111111	11111111	00000000	00000000
a	17	01010101	01010101	01010101	01010101	01010101	01010101
i	18	00110011	00110011	11001100	11001100	00110011	00110011
s	19	01100110	01100110	10011001	10011001	01100110	01100110
h	20	00001111	00001111	11110000	11110000	00001111	00001111
F	21	01011010	01011010	01011010	01011010	01011010	01011010
u	22	00111100	00111100	00111100	00111100	00111100	00111100
n	23	01101001	01101001	01101001	01101001	01101001	01101001
ct	24	00000000	11111111	00000000	11111111	00000000	11111111
i	25	01010101	01010101	01010101	01010101	01010101	01010101
o	26	00110011	11001100	00110011	11001100	00110011	11001100
n	27	01100110	10011001	01100110	10011001	01100110	10011001
d	28	00001111	11110000	00001111	11110000	00001111	11110000
e	29	01011010	01011010	01011010	01011010	01011010	01011010
s	30	00111100	00111100	00111100	00111100	00111100	00111100
e	31	01101001	01101001	01101001	01101001	01101001	01101001
x	32	00000000	00000000	00000000	00000000	11111111	11111111
	33	01010101	01010101	01010101	01010101	01010101	01010101
	34	00110011	00110011	00110011	00110011	11001100	11001100
	35	01100110	01100110	01100110	01100110	10011001	10011001
	36	00001111	00001111	00001111	00001111	00001111	00001111
	37	01011010	01011010	01011010	01011010	01011010	01011010
	38	00111100	00111100	00111100	00111100	00111100	00111100
	39	01101001	01101001	01101001	01101001	01101001	01101001
	40	00000000	11111111	00000000	11111111	00000000	11111111
	41	01010101	01010101	01010101	01010101	01010101	01010101
	42	00110011	11001100	00110011	11001100	00110011	11001100
	43	01100110	10011001	01100110	10011001	01100110	10011001
	44	00001111	11110000	00001111	11110000	00001111	11110000
	45	01011010	01011010	01011010	01011010	01011010	01011010
	46	00111100	00111100	00111100	00111100	00111100	00111100
	47	01101001	01101001	01101001	01101001	01101001	01101001
	48	00000000	00000000	11111111	11111111	00000000	00000000
	49	01010101	01010101	01010101	01010101	01010101	01010101
	50	00110011	11001100	00110011	11001100	00110011	11001100
	51	01100110	10011001	01100110	10011001	01100110	10011001
	52	00001111	00001111	11110000	11110000	00001111	00001111
	53	01011010	01011010	01011010	01011010	01011010	01011010
	54	00111100	00111100	00111100	00111100	00111100	00111100
	55	01101001	01101001	01101001	01101001	01101001	01101001
	56	00000000	11111111	00000000	11111111	00000000	11111111
	57	01010101	01010101	01010101	01010101	01010101	01010101
	58	00110011	11001100	00110011	11001100	00110011	11001100
	59	01100110	10011001	01100110	10011001	01100110	10011001
	60	00001111	11110000	00001111	11110000	00001111	11110000
	61	01011010	01011010	01011010	01011010	01011010	01011010
	62	00111100	00111100	00111100	00111100	00111100	00111100
	63	01101001	01101001	01101001	01101001	01101001	01101001

1 **7.1.3.1.9 Quadrature Spreading**

2 Following the orthogonal spreading, each code channel is spread in quadrature as shown in
 3 Figure 7.1.3.1-1. The spreading sequence shall be a quadrature sequence of length 2^{15}
 4 (i.e., 32768 PN chips in length). This sequence is called the pilot PN sequence and shall be
 5 based on the following characteristic polynomials:

6
$$P_I(x) = x^{15} + x^{13} + x^9 + x^8 + x^7 + x^5 + 1$$

7 (for the in-phase (I) sequence)

8 and

9
$$P_Q(x) = x^{15} + x^{12} + x^{11} + x^{10} + x^6 + x^5 + x^4 + x^3 + 1$$

10 (for the quadrature (Q) phase sequence).

11 The maximum length linear feedback shift register sequence $\{i(n)\}$ and $\{q(n)\}$ based on the
 12 above polynomials are of length $2^{15} - 1$ and can be generated by the following linear
 13 recursions:

14
$$i(n) = i(n-15) \oplus i(n-10) \oplus i(n-8) \oplus i(n-7) \oplus i(n-6) \oplus i(n-2)$$

15 (based on $P_I(x)$ as the characteristic polynomial)

16 and

17
$$q(n) = q(n-15) \oplus q(n-12) \oplus q(n-11) \oplus q(n-10) \oplus q(n-9) \oplus q(n-5) \oplus q(n-4) \oplus q(n-3)$$

18 (based on $P_Q(x)$ as the characteristic polynomial).

19 where $i(n)$ and $q(n)$ are binary-valued ('0' and '1') and the additions are modulo-2. In order
 20 to obtain the I and Q pilot PN sequences (of period 2^{15}), a '0' is inserted in $\{i(n)\}$ and $\{q(n)\}$
 21 after 14 consecutive '0' outputs (this occurs only once in each period). Therefore, the pilot
 22 PN sequences have one run of 15 consecutive '0' outputs instead of 14.

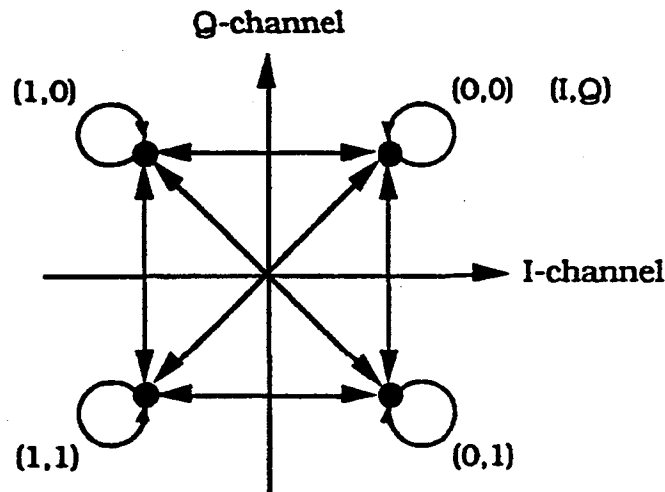
23 The chip rate for the pilot PN sequence shall be 1.2288 Mcps. The pilot PN sequence period
 24 is $32768/1228800 = 26.666\dots$ ms, and exactly 75 pilot PN sequence repetitions occur every
 25 2 seconds. The pilot PN sequence offset shall be as specified in 7.1.3.2.1.

26 After baseband filtering, the binary ('0's and '1's) I and Q at the output of the quadrature
 27 spreading (shown in Figure 7.1.3.1-1) shall be mapped into phase according to Table
 28 7.1.3.1.9-1.

1 **Table 7.1.3.1.9-1. Forward CDMA Channel I and Q Mapping**

I	Q	Phase
0	0	$\pi/4$
1	0	$3\pi/4$
1	1	$-3\pi/4$
0	1	$-\pi/4$

2
3 The resulting signal constellation and phase transitions are shown in Figure 7.1.3.1.9-1.
4



5
6 **Figure 7.1.3.1.9-1. Forward CDMA Channel Signal Constellation and Phase Transition**
7

8 **7.1.3.1.10 Filtering**

9 **7.1.3.1.10.1 Baseband Filtering**

10 Following the spreading operation, the I and Q impulses are applied to the inputs of the I
11 and Q baseband filters as shown in Figure 7.1.3.1-1. The baseband filters shall have a
12 frequency response $S(f)$ that satisfies the limits given in Figure 7.1.3.1.10.1-1. Specifically,
13 the normalized frequency response of the filter shall be contained within $\pm\delta_1$ in the
14 passband $0 \leq f \leq f_p$ and shall be less than or equal to $-\delta_2$ in the stopband $f \geq f_s$. The
15 numerical values for the parameters are $\delta_1 = 1.5$ dB, $\delta_2 = 40$ dB, $f_p = 590$ kHz, and $f_s = 740$
16 kHz.

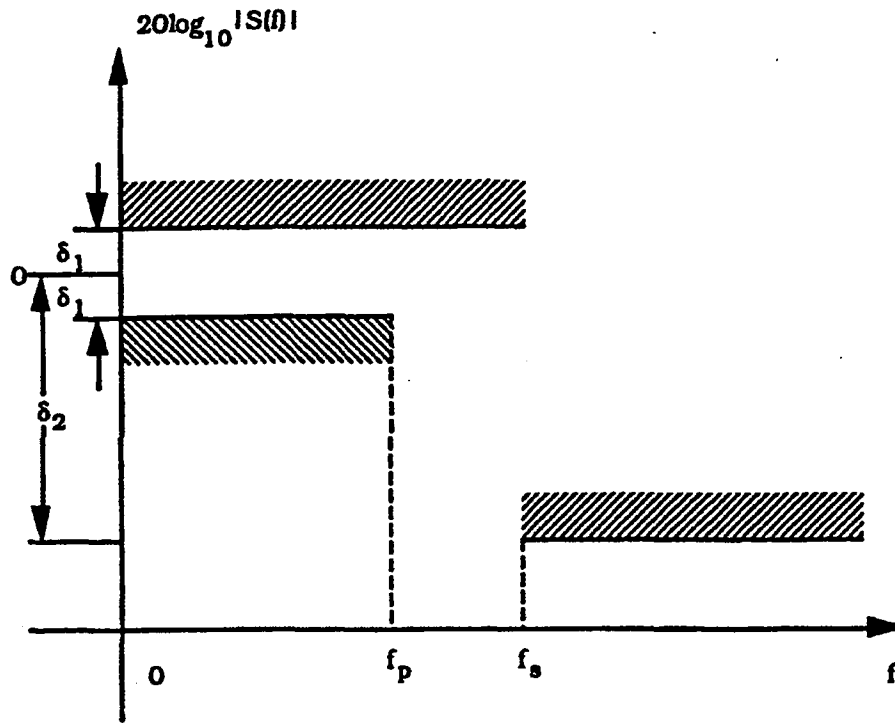


Figure 7.1.3.1.10.1-1. Baseband Filters Frequency Response Limits

Let $s(t)$ be the impulse response of the baseband filter. Then $s(t)$ shall satisfy the following equation:

$$\text{Mean Squared Error} = \sum_{k=0}^{\infty} [\alpha s(kT_s - \tau) - h(k)]^2 \leq 0.03,$$

where the constants α and τ are used to minimize the mean squared error. The constant T_s is equal to 203.451... ns, which equals one quarter of a PN chip. The values of the coefficients $h(k)$, for $k < 48$, are given in Table 7.1.3.1.10.1-1; $h(k) = 0$ for $k \geq 48$. Note that $h(k)$ equals $h(47 - k)$.

Table 7.1.3.1.10.1-1. Coefficients $h(k)$

k	h(k)
0, 47	-0.025288315
1, 46	-0.034167931
2, 45	-0.035752323
3, 44	-0.016733702
4, 43	0.021602514
5, 42	0.064938487
6, 41	0.091002137
7, 40	0.081894974
8, 39	0.037071157
9, 38	-0.021998074
10, 37	-0.060716277
11, 36	-0.051178658
12, 35	0.007874526
13, 34	0.084368728
14, 33	0.126869306
15, 32	0.094528345
16, 31	-0.012839661
17, 30	-0.143477028
18, 29	-0.211829088
19, 28	-0.140513128
20, 27	0.094601918
21, 26	0.441387140
22, 25	0.785875640
23, 24	1.0

2

7.1.3.1.10.2 Phase Characteristics

The base station shall provide phase equalization for the transmit signal path.⁴ The equalizing filter shall be designed to provide the equivalent baseband transfer function

$$H(\omega) = K \frac{\omega^2 + j\alpha\omega\omega_0 - \omega_0^2}{\omega^2 - j\alpha\omega\omega_0 - \omega_0^2}$$

where K is an arbitrary gain, j equals $\sqrt{-1}$, α equals 1.36, and ω_0 equals $2\pi \times 3.15 \times 10^5$. The equalizing filter implementation shall be equivalent to applying baseband filters with this transfer function individually to the baseband I and Q waveforms.

The overall base station transmitter analog filter response (including the equalizing filter) shall be such that, for a cascaded filter consisting of the overall base station filter and a filter with a transfer function that is the inverse of the equalization filter specified above, the mean squared phase error from the best fit linear phase response, integrated over the frequency range $1 \text{ kHz} \leq |f - f_c| \leq 630 \text{ kHz}$, shall be no greater than 0.01 squared radians. For purposes of this requirement, "overall" shall mean from the I and Q baseband filter inputs (see 7.1.3.1.10.1) to the RF output of the transmitter.

7.1.3.2 Pilot Channel

A Pilot Channel is transmitted at all times by the base station on each active Forward CDMA Channel. The Pilot Channel is an unmodulated spread spectrum signal that is used for synchronization by a mobile station operating within the coverage area of the base station.

7.1.3.2.1 Pilot PN Sequence Offset

Each base station shall use a time offset of the pilot PN sequence to identify a Forward CDMA Channel. Time offsets may be reused within a CDMA cellular system.

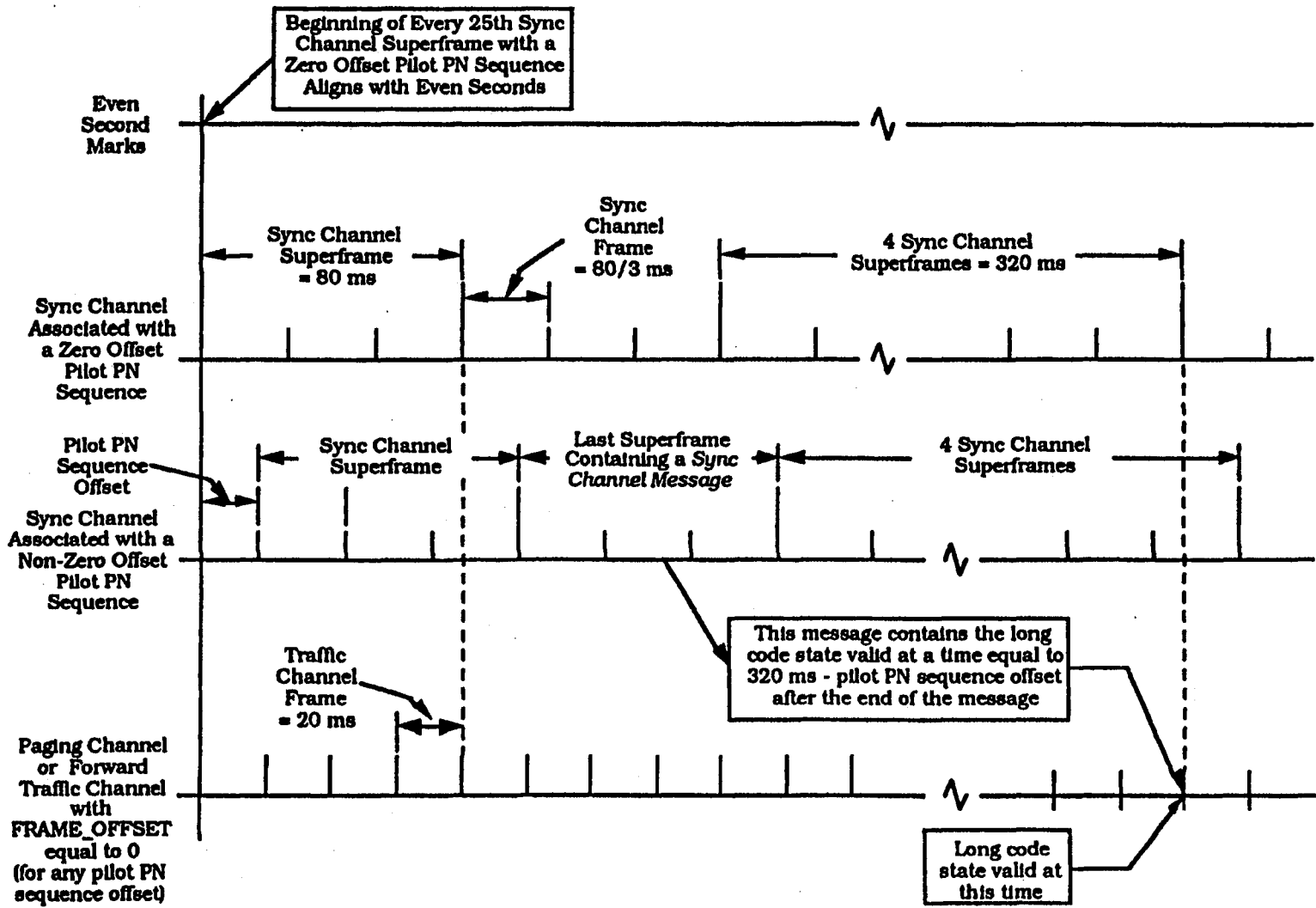
Distinct Pilot Channels shall be identified by an offset index (0 through 511 inclusive). This offset index specifies the offset value from the zero offset pilot PN sequence. The zero offset pilot PN sequence shall be such that the start of the sequence shall be output at the beginning of every even second in time, referenced to base station transmission time (see 7.1.5). The start of the zero offset pilot PN sequence for either the I or Q sequence shall be defined as the state of the sequence for which the previous 15 outputs were '0' (see Figure 1.2-1).

Five hundred twelve unique values are possible for the pilot PN sequence offset. The offset (in chips) for a given pilot PN sequence from the zero shift pilot PN sequence equals the index value multiplied by 64. For example, if the pilot PN sequence offset index is 15, the pilot PN sequence offset will be $15 \times 64 = 960$ PN chips. In this case the pilot PN sequence will start 781.25 μs after the start of every even second of time, referenced to base station transmission time. The pilot PN sequence offset is illustrated in Figure 7.1.3.2.1-1. The same pilot PN sequence offset shall be used on all CDMA frequency assignments for a given base station.

⁴ This equalization simplifies the design of the mobile station receive filters.

2
1

Figure 7.1.3.2.1-1. Forward CDMA Channel Pilot PN Sequence Offset



1 7.1.3.2.2 Pilot Channel Orthogonal Spreading

2 Prior to transmission, the pilot channel shall be spread with Walsh function zero as
3 specified in 7.1.3.1.8.

4 7.1.3.2.3 Pilot Channel Quadrature Spreading

5 The Pilot Channel shall be PN spread as specified in 7.1.3.1.9.

6 7.1.3.2.4 Pilot Channel Filtering

7 Filtering for the Pilot Channel shall be as specified in 7.1.3.1.10.

8 7.1.3.3 Sync Channel

9 The Sync Channel is an encoded, interleaved, spread, and modulated spread spectrum
10 signal that is used by mobile stations operating within the coverage area of the base station
11 to acquire initial time synchronization.

12 7.1.3.3.1 Sync Channel Time Alignment and Modulation Rates

13 The bit rate for the Sync Channel is 1200 bps. A Sync Channel frame is 26.666... ms in
14 duration. The I and Q channel pilot PN sequences for the Sync Channel use the same pilot
15 PN sequence offset as the Pilot Channel for a given base station.

16 Once the mobile station achieves pilot PN sequence synchronization by acquiring the Pilot
17 Channel, the synchronization for the Sync Channel is immediately known. This is because
18 the Sync Channel (and all other channels) are spread with the same pilot PN sequence, and
19 because the frame and interleaver timing on the Sync Channel are aligned with the pilot PN
20 sequence.

21 The start of the interleaver block and frame of the Sync Channel shall align with the start of
22 the pilot PN sequence being used to spread the Forward CDMA Channel (see Figure
23 7.1.3.2.1-1). See Table 7.1.3.1.1-1 for a summary of Sync Channel modulation parameters.

24 7.1.3.3.2 Sync Channel Structure

25 A Sync Channel superframe is formed by three Sync Channel frames (i.e., 80 ms) as shown
26 in Figure 7.1.3.2.1-1. Messages transmitted on the Sync Channel begin only at the start of
27 a Sync Channel superframe.

28 When using the zero-offset Pilot PN sequence, Sync Channel superframes begin at the even-
29 second time mark referenced to base station transmission time (see 7.1.5) or at the start of
30 any third Sync Channel frame after that. When using a Pilot PN sequence other than the
31 zero-offset sequence, the Sync Channel superframe shall begin at the even second time
32 mark plus the pilot PN offset value in time.

33 7.1.3.3.3 Sync Channel Convolutional Encoding

34 The Sync Channel data shall be convolutionally encoded prior to transmission as specified
35 in 7.1.3.1.3. The state of the Sync Channel convolutional encoder shall not be reset
36 between Sync Channel frames.

1 **7.1.3.3.4 Sync Channel Code Symbol Repetition**

2 The Sync Channel code symbols shall be repeated as specified in 7.1.3.1.4.

3 **7.1.3.3.5 Sync Channel Interleaving**

4 The modulation symbols on the Sync Channel shall be interleaved as specified in 7.1.3.1.5
5 with the following exception: since the Sync Channel is not convolutionally encoded by
6 blocks (the state of the encoder is not reset after initialization), the last eight bits of a Sync
7 Channel frame influence symbols in the successive interleaver block.

8 The interleaver block shall align with the Sync Channel frame, such that the first bit of the
9 frame influences the first 36 (numbered 1 1 2 2 . . . 18 18) modulation symbols input into
10 the interleaver block.

11 **7.1.3.3.6 Sync Channel Data Scrambling**

12 The Sync Channel data shall not be scrambled.

13 **7.1.3.3.7 Sync Channel Power Control Subchannel**

14 The base station shall not insert a power control subchannel on the Sync Channel.

15 **7.1.3.3.8 Sync Channel Orthogonal Spreading**

16 Prior to transmission, the Sync Channel shall be spread with Walsh function 32 as
17 specified in 7.1.3.1.8.

18 **7.1.3.3.9 Sync Channel Quadrature Spreading**

19 The Sync Channel shall be PN spread as specified in 7.1.3.1.9.

20 **7.1.3.3.10 Sync Channel Filtering**

21 Filtering for the Sync Channel shall be as specified in 7.1.3.1.10.

22 **7.1.3.4 Paging Channel**

23 The Paging Channel is an encoded, interleaved, spread, and modulated spread spectrum
24 signal that is used by mobile stations operating within the coverage area of the base
25 station. The base station uses Paging Channel to transmit system overhead information
26 and mobile station specific messages.

27 The Primary Paging Channel shall be Paging Channel number 1.

28 **7.1.3.4.1 Paging Channel Time Alignment and Modulation Rates**

29 The Paging Channel shall transmit information at a fixed data rate of 9600 or 4800 bps.
30 The 2400 and 1200 bps data rates are not supported on the Paging Channel. All Paging
31 Channels in a given system (i.e., with the same SID) should transmit information at the
32 same data rate. The Paging Channel frame is 20 ms in duration.

33 The I and Q channel pilot PN sequences for the Paging Channel use the same pilot PN
34 sequence offset as the Pilot Channel for a given base station.

1 The start of the interleaver block and frame of the Paging Channel shall align with the start
 2 of the zero-offset pilot PN sequence at every even second time mark (see Figure 7.1.3.2.1-1).
 3 The first Paging Channel frame shall occur at the start of base station transmission time
 4 (see 7.1.5). See Table 7.1.3.1.1-2 for a summary of Paging Channel modulation
 5 parameters.

6 **7.1.3.4.2 Paging Channel Structure**

7 The Paging Channel shall be divided into Paging Channel slots that are each 80 ms in
 8 duration as shown in the example in Figure 6.6.2.1.1.1-1.

9 **7.1.3.4.3 Paging Channel Convolutional Encoding**

10 The Paging Channel data shall be convolutionally encoded prior to transmission as
 11 specified in 7.1.3.1.3. The state of the Paging Channel convolutional encoder shall not be
 12 reset between Paging Channel frames.

13 **7.1.3.4.4 Paging Channel Code Symbol Repetition**

14 The Paging Channel code symbols shall be repeated as specified in 7.1.3.1.4.

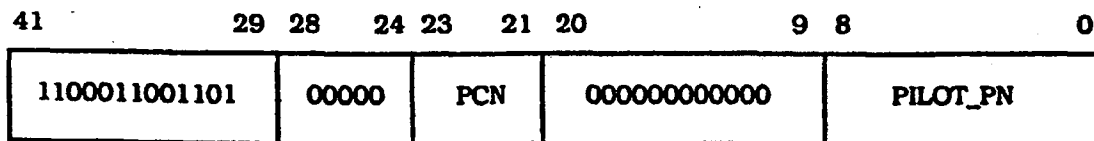
15 **7.1.3.4.5 Paging Channel Interleaving**

16 The modulation symbols on the Paging Channel shall be interleaved as specified in
 17 7.1.3.1.5. The interleaver block shall align with the Paging Channel frame. The alignment
 18 shall be such that the first bit of the frame influences the first 18 (for 9600 bps) or 36 (for
 19 4800 bps) modulation symbols input into the interleaver.

20 Since the Paging Channel is not convolutionally encoded by blocks, the last 8 bits of a
 21 Paging Channel frame influence symbols in the successive interleaver block.

22 **7.1.3.4.6 Paging Channel Data Scrambling**

23 The Paging Channel data shall be scrambled as specified in 7.1.3.1.6 utilizing the Paging
 24 Channel long code mask as shown in Figure 7.1.3.4.6-1.



26 PCN - Paging Channel Number

27 PILOT_PN - Pilot PN sequence offset index for the Forward CDMA Channel

28 **Figure 7.1.3.4.6-1. Paging Channel Long Code Mask**

29 **7.1.3.4.7 Paging Channel Power Control Subchannel**

30 The base station shall not insert a power control subchannel on the Paging Channel.

1 **7.1.3.4.8 Paging Channel Orthogonal Spreading**

2 Prior to transmission, the Paging Channel shall be spread by a Walsh function, with index
3 equal to the Paging Channel number, as specified in 7.1.3.1.8.

4 **7.1.3.4.9 Paging Channel Quadrature Spreading**

5 The Paging Channel shall be PN spread as specified in 7.1.3.1.9.

6 **7.1.3.4.10 Paging Channel Filtering**

7 Filtering for the Paging Channel shall be as specified in 7.1.3.1.10.

8 **7.1.3.5 Forward Traffic Channel**

9 The Forward Traffic Channel is used for the transmission of user and signaling information
10 to a specific mobile station during a call. The maximum number of Forward Traffic
11 Channels that can be simultaneously supported by a given Forward CDMA Channel is
12 equal to 63 minus the number of Paging Channels and Sync Channels operating on the
13 same Forward CDMA Channel.

14 **7.1.3.5.1 Forward Traffic Channel Time Alignment and Modulation Rates**

15 The base station shall transmit information on the Forward Traffic Channel at variable data
16 rates of 9600, 4800, 2400, and 1200 bps. The Forward Traffic Channel frame shall be 20
17 ms in duration. The data rate shall be selected on a frame-by-frame (i.e., 20 ms) basis.
18 Although the data rate may vary on a frame-by-frame basis, the modulation symbol rate is
19 kept constant by code repetition at 19,200 symbols per second (sps).

20 The I and Q channel pilot PN sequences for the Forward Traffic Channel use the same pilot
21 PN sequence offset as the Pilot Channel for a given base station.

22 The modulation symbols that are transmitted at the lower data rates shall be transmitted
23 using lower energy. Specifically, the energy per modulation symbol (E_s) for the supported
24 data rates should be as in Table 7.1.3.5.1-1 where E_b is the energy per information bit.
25 Note that all symbols in an interleaver block are from the same frame. Thus they are all
26 transmitted at the same energy. The transmit power of the power control bits shall be as
27 specified in 7.1.3.1.7.

28

29 **Table 7.1.3.5.1-1. Transmitted Symbol Energy Versus Data Rate**

Data Rate (bps)	Energy per Modulation Symbol
9600	$E_s = E_b/2$
4800	$E_s = E_b/4$
2400	$E_s = E_b/8$
1200	$E_s = E_b/16$

30

1 A base station may implement staggered Forward Traffic Channel frames. The time offset is
2 specified by the `FRAME_OFFSET` parameter (see the *Channel Assignment Message* in
3 7.7.2.3.2.8).⁵ A zero-offset Forward Traffic Channel frame shall be such that every 100th
4 frame shall align with the even-second time mark referenced to base station transmission
5 time (see 7.1.5). A staggered frame shall begin $1.25 \times \text{FRAME_OFFSET}$ ms later than the
6 zero-offset Traffic Channel frame. The Forward Traffic Channel block interleaver shall
7 always be aligned with the Forward Traffic Channel frame.

8 7.1.3.5.2 Forward Traffic Channel Frame Structure

9 Forward Traffic Channel frames sent at the 9600 bps transmission rate shall consist of 192
10 bits. These 192 bits shall be composed of 172 information bits followed by 12 frame quality
11 indicator (CRC) bits and eight Encoder Tail Bits as shown in Figure 7.1.3.5.2-1.

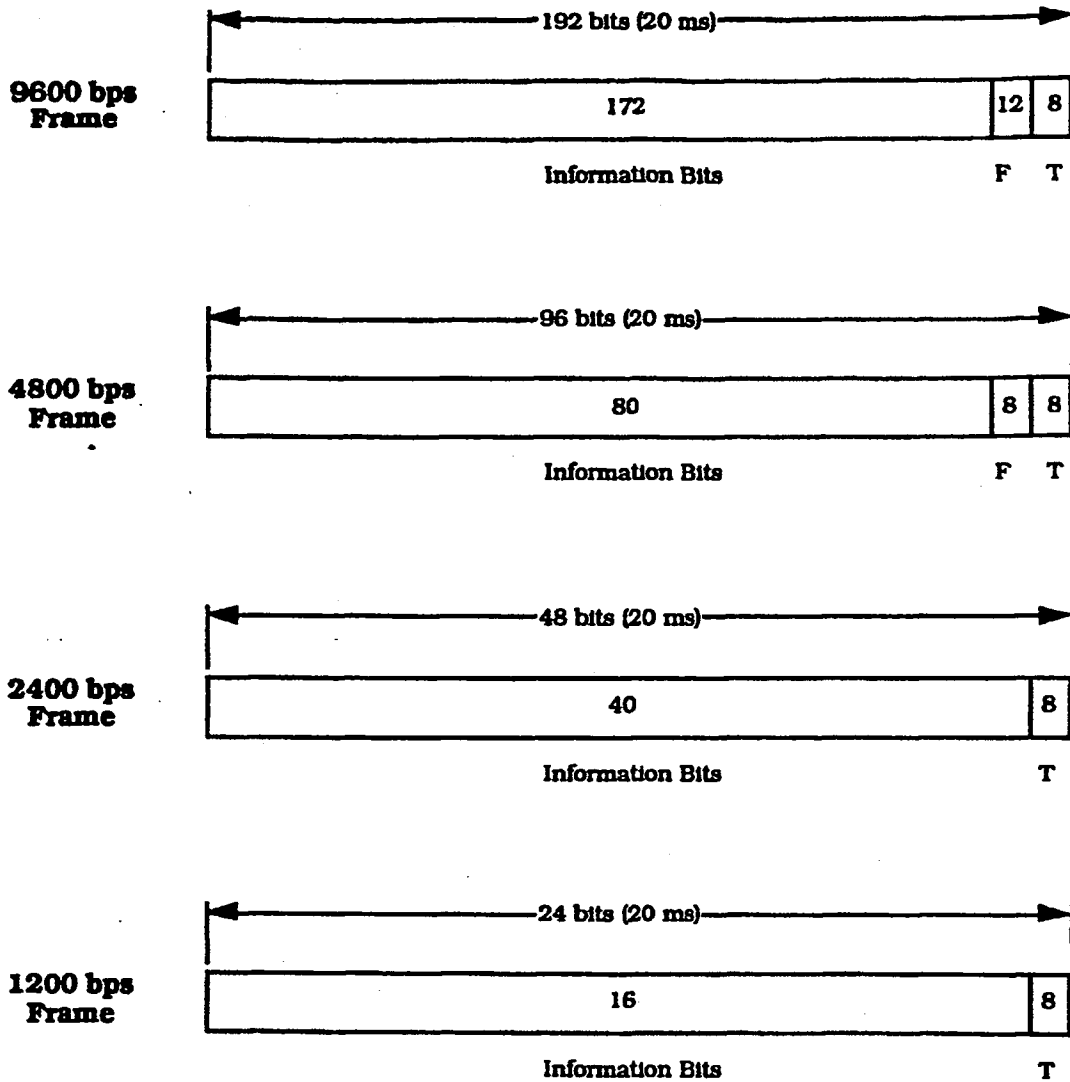
12 Forward Traffic Channel frames sent at the 4800 bps transmission rate shall consist of 96
13 bits. These 96 bits shall be composed of 80 information bits followed by eight frame quality
14 indicator (CRC) bits and eight Encoder Tail Bits as shown in Figure 7.1.3.5.2-1.

15 Forward Traffic Channel frames sent at the 2400 bps transmission rate shall consist of 48
16 bits. These 48 bits shall be composed of 40 information bits followed by eight Encoder Tail
17 Bits as shown in Figure 7.1.3.5.2-1.

18 Forward Traffic Channel frames sent at the 1200 bps transmission rate shall consist of 24
19 bits. These 24 bits shall be composed of 16 information bits followed by eight Encoder Tail
20 Bits as shown in Figure 7.1.3.5.2-1.

21

⁵The Forward Traffic Channel time offset is the same as the Reverse Traffic Channel time offset.



Notation

- F - Frame Quality Indicator (CRC)
- T - Encoder Tail Bits

1
2

Figure 7.1.3.5.2-1. Forward Traffic Channel Frame Structure

1 **7.1.3.5.2.1 Forward Traffic Channel Frame Quality Indicator**

2 Each 9600 bps and 4800 bps frame shall include a frame quality indicator. This frame
3 quality indicator is a CRC.⁶ No frame quality indicator is used for the 2400 bps and 1200
4 bps transmission rates.

5 For both the 9600 bps and 4800 bps rates, the frame quality indicator (CRC) shall be
6 calculated on all bits within the frame, except the frame quality indicator itself and the
7 Encoder Tail Bits. The 9600 bps transmission rate shall use a 12-bit frame quality
8 indicator. The generator polynomial for this frame quality indicator shall be as follows:

$$9 \quad g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1.$$

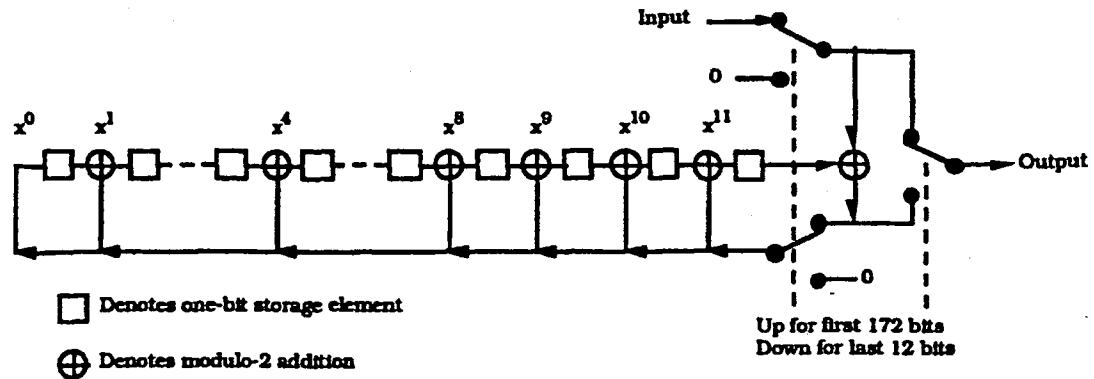
0 The 4800 bps transmission rate shall use an 8-bit frame quality indicator. The generator
11 polynomial for this frame quality indicator shall be as follows:

$$2 \quad g(x) = x^8 + x^7 + x^4 + x^3 + x + 1.$$

3 The frame quality indicators shall be computed according to the following procedure using
4 the logic shown in Figures 7.1.3.5.2.1-1 and 7.1.3.5.2.1-2:

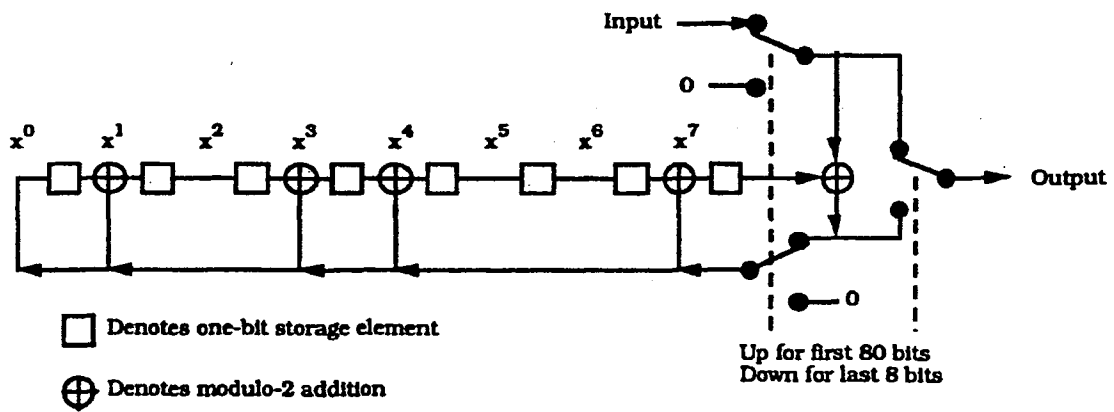
- 5 • Initially, all shift register elements shall be set to logical one and the switches shall
6 be set in the up position.
- 7 • The register shall be clocked 172 times (for 192-bit frame) or 80 times (for 96-bit
8 frame) with the information bits as input.
- 9 • The switches shall be set in the down position, and the register shall be clocked an
10 additional 12 times (for 192-bit frame) or 8 times (for 96-bit frame). The 12 or 8
11 additional output bits shall be the frame quality indicator bits.
- 12 • The bits shall be transmitted in the order calculated.

⁶The frame quality indicator supports two functions at the receiver. The first function is to determine whether the frame is in error. The second function is to assist in the determination of the data rate of the received frame. Other parameters may be needed for rate determination in addition to the frame quality indicator, such as symbol error rate evaluated at the four data rates.



1
2
3
4
5

Figure 7.1.3.5.2.1-1. Forward Traffic Channel Frame Quality Indicator Calculation at the 9600 bps Rate



6
7
8

Figure 7.1.3.5.2.1-2. Forward Traffic Channel Frame Quality Indicator Calculation at the 4800 bps Rate

1 **7.1.3.5.2.2 Forward Traffic Channel Encoder Tail Bits**

2 The last eight bits of each Forward Traffic Channel frame are called the Encoder Tail Bits.
3 These eight bits shall be set to '0'.

4 **7.1.3.5.2.3 Reserved**

5 **7.1.3.5.2.4 Null Traffic Channel Data**

6 Null Traffic Channel data shall consist of frames of 16 ones followed by 8 zeros (the
7 Encoder Tail Bits) sent at the 1200 bps rate.

8 The base station transmits null Traffic Channel data when no service option is active. Null
9 Traffic Channel data serves as a "keep-alive" operation so that the mobile station can
10 maintain connectivity with the base station.

11 **7.1.3.5.3 Forward Traffic Channel Convolutional Encoding**

12 The Forward Traffic Channel data shall be convolutionally encoded prior to transmission as
13 specified in 7.1.3.1.3.

14 When generating Forward Traffic Channel data, the encoder shall be initialized to the all
15 zero state at the end of each 20 ms frame.

16 **7.1.3.5.4 Forward Traffic Channel Code Symbol Repetition**

17 The Forward Traffic Channel code symbols shall be repeated as specified in 7.1.3.1.4.

18 **7.1.3.5.5 Forward Traffic Channel Interleaving**

19 The modulation symbols on the Forward Traffic Channel shall be interleaved as specified in
20 7.1.3.1.5. The interleaver block shall align with the Traffic Channel frame. The alignment
21 shall be such that the first bit of the frame influences the first 18 (for 9600 bps), 36 (for
22 4800 bps), 72 (for 2400 bps) or 144 (for 1200 bps) modulation symbols input into the
23 interleaver.⁷

24 **7.1.3.5.6 Forward Traffic Channel Data Scrambling**

25 The Forward Traffic Channel data shall be scrambled as specified in 7.1.3.1.6. The public
26 long code mask shall be as shown in Figure 7.1.3.5.6-1. The permutation of the ESN bits
27 in the public long code mask shall be as specified in 6.1.3.1.8. The generation of the
28 private long code mask shall be as specified in Appendix A.

29 ⁷Since the Forward Traffic Channel is convolutionally encoded by blocks (the state of the encoder is reset at the end of each frame), all bits of one Forward Traffic Channel frame influence symbols in only one interleaver block.



Figure 7.1.3.5.6-1. Forward Traffic Channel Public Long Code Mask

7.1.3.5.7 Forward Traffic Channel Power Control Subchannel

The base station shall insert on every Forward Traffic Channel a power control subchannel as specified in 7.1.3.1.7.

7.1.3.5.8 Forward Traffic Channel Orthogonal Spreading

Prior to transmission, the Forward Traffic Channel shall be spread with a Walsh function as specified in 7.1.3.1.8.

7.1.3.5.9 Forward Traffic Channel Quadrature Spreading

The Forward Traffic Channel shall be PN spread as specified in 7.1.3.1.9.

7.1.3.5.10 Forward Traffic Channel Filtering

Filtering for the Forward Traffic Channel shall be as specified in 7.1.3.1.10.

7.1.3.5.11 Multiplex Option Information

Multiplex Option 1 is also referred to as the default multiplex option.⁸ It provides for the transmission of primary traffic and signaling or secondary traffic. Signaling traffic may be transmitted via blank-and-burst with the signaling traffic using all of the frame or via dim-and-burst with the primary traffic and signaling traffic sharing the frame. Multiplex Option 1 also supports the transmission of secondary traffic. When primary traffic is active, secondary traffic is transmitted via dim-and-burst with the primary traffic and secondary traffic sharing the frame. When primary traffic is not active, secondary traffic is transmitted via blank-and-burst with the secondary traffic using all of the frame. The information bit structures for primary and signaling traffic are specified in 7.1.3.5.11.1. The information bit structures for secondary traffic are specified in 7.1.3.5.11.2. Table 7.1.3.5.11-1 shows the information bit structures supported by Multiplex Option 1.

The base station shall support Multiplex Option 1. The base station shall support the transmission of primary traffic and signaling traffic using the information bit structures specified in 7.1.3.5.11.1. The base station may support secondary traffic, and if so, the base station shall also use the information bit structures specified in 7.1.3.5.11.2. Procedures for support of secondary traffic data are for further study.

Other multiplex options are for further study.

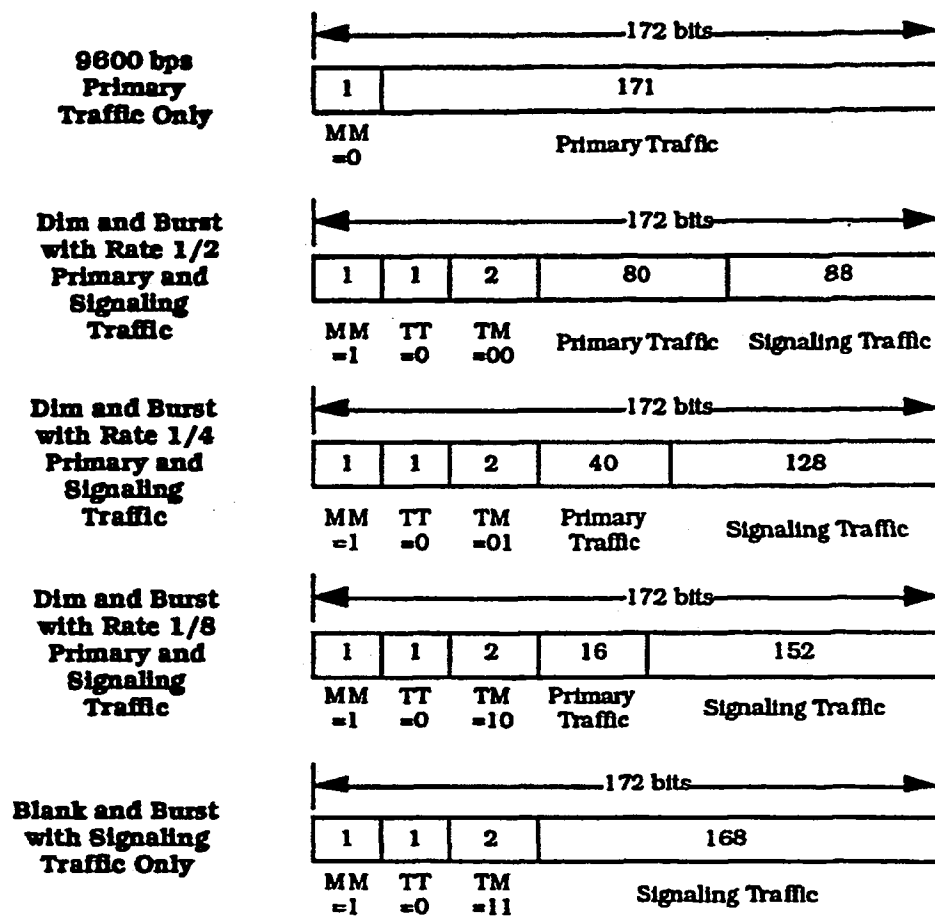
⁸The multiplex option is the same on both the Forward Traffic Channel and the Reverse Traffic Channel.

Table 7.1.3.5.11-1. Forward Traffic Channel Information Bits for Multiplex Option 1

Transmit Rate (bits/sec)	Format Bits			Primary Traffic	Signaling Traffic	Secondary Traffic
	Mixed Mode (MM)	Traffic Type (TT)	Traffic Mode (TM)	bits/frame	bits/frame	bits/frame
9600	'0'	-	-	171	0	0
	'1'	'0'	'00'	80	88	0
	'1'	'0'	'01'	40	128	0
	'1'	'0'	'10'	16	152	0
	'1'	'0'	'11'	0	168	0
	'1'	'1'	'00'	80	0	88
	'1'	'1'	'01'	40	0	128
	'1'	'1'	'10'	16	0	152
	'1'	'1'	'11'	0	0	168
4800	-	-	-	80	0	0
2400	-	-	-	40	0	0
1200	-	-	-	16	0	0

Note: Secondary traffic structures, marked with *, are optional.

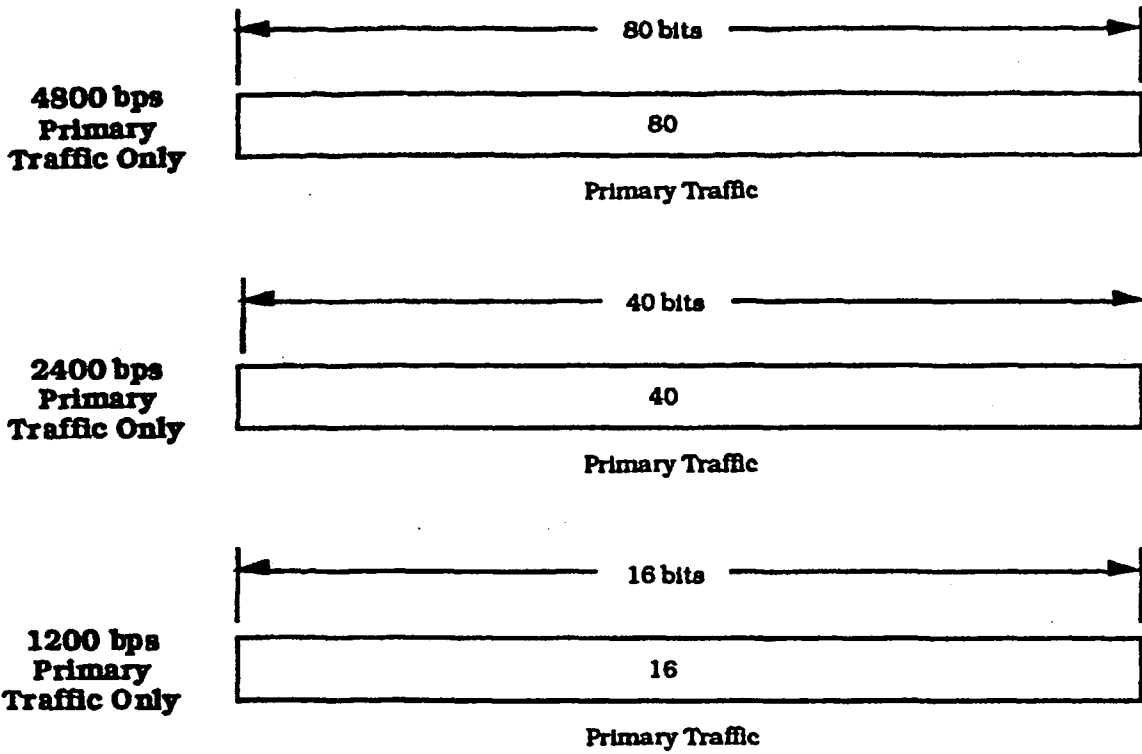
- 3 7.1.3.5.11.1 Primary and Signaling Traffic with Multiplex Option 1
- 4 The base station shall support the information bit structures described in Table
- 5 7.1.3.5.11-1 and Figure 7.1.3.5.11.1-1.



Notation

- | | |
|--|--|
| <p>MM - Mixed Mode Bit
 0 - Primary Traffic Only
 1 - Primary Traffic and/or Signaling Traffic or Secondary Traffic</p> <p>TT - Traffic Type Bit
 0 - Signaling Traffic
 1 - Secondary Traffic</p> | <p>TM - Traffic Mode Bits
 00 - 80 Primary Traffic Bits and either 88 Signaling Traffic or 88 Secondary Traffic Bits
 01 - 40 Primary Traffic Bits and either 128 Signaling Traffic Bits or 128 Secondary Traffic Bits
 10 - 16 Primary Traffic Bits and either 152 Signaling Traffic Bits or 152 Secondary Traffic Bits
 11 - 168 Signaling Traffic Bits or 168 Secondary Traffic Bits</p> |
|--|--|

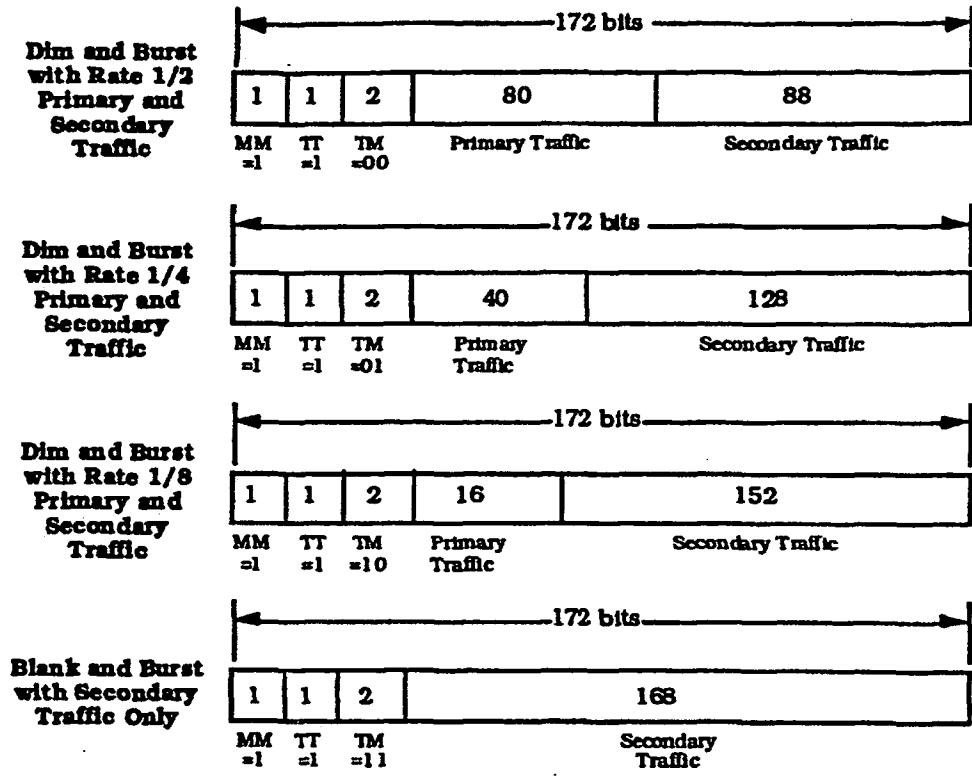
Figure 7.1.3.5.11.1-1. Information Bits for Primary Traffic and Signaling Traffic (Part 1 of 2)



1
2
3
4

Figure 7.1.3.5.11.1-1. Information Bits for Primary Traffic and Signaling Traffic (Part 2 of 2)

- 1 7.1.3.5.11.2 Secondary Traffic with Multiplex Option 1
- 2 If the base station supports secondary traffic, the base station shall use the information bit
- 3 structures described in Table 7.1.3.5.11-1 and Figure 7.1.3.5.11.2-1.
- 4



Notation

- | | |
|--|--|
| <p>MM - Mixed Mode Bit
 0 - Primary Traffic Only
 1 - Primary Traffic and/or Signaling Traffic or Secondary Traffic</p> <p>TT - Traffic Type Bit
 0 - Signaling Traffic
 1 - Secondary Traffic</p> | <p>TM - Traffic Mode Bits
 00 - 80 Primary Traffic Bits and either 88 Signaling Traffic or 88 Secondary Traffic Bits
 01 - 40 Primary Traffic Bits and either 128 Signaling Traffic Bits or 128 Secondary Traffic Bits
 10 - 16 Primary Traffic Bits and either 152 Signaling Traffic Bits or 152 Secondary Traffic Bits
 11 - 168 Signaling Traffic Bits or 168 Secondary Traffic Bits</p> |
|--|--|

5
6

Figure 7.1.3.5.11.2-1. Information Bits for Secondary Traffic

7.1.3.5.11.3 Use of Various Information Bit Formats for Multiplex Option 1

When neither a primary traffic service option nor a secondary traffic service option is active, the base station shall transmit signaling traffic using only blank-and-burst frames. When not transmitting signaling traffic, the base station shall transmit only null Traffic Channel data frames.

When a primary traffic service option is active and a secondary traffic service option is not active, the base station shall use the information formats specified in 7.1.3.5.11.1. The base station shall not transmit null Traffic Channel data. The base station should use the dim-and-burst information formats specified in 7.1.3.5.11.1 for signaling traffic.

When a primary traffic service option is not active and a secondary traffic service option is active, the base station shall use the information formats specified in 7.1.3.5.11.2 to transmit secondary traffic. The base station shall use the blank-and-burst format specified in 7.1.3.5.11.1 for signaling traffic. The base station shall transmit null Traffic Channel data when neither secondary traffic nor signaling traffic is to be sent.

When both a primary traffic service option and a secondary traffic service option are active, the base station shall use the information formats specified in 7.1.3.5.11.1 and 7.1.3.5.11.2. The base station shall not transmit null Traffic Channel data. The base station should use the dim-and-burst information formats specified in 7.1.3.5.11.1 for signaling traffic.

7.1.3.5.11.4 Control of Service Options for Multiplex Option 1

Multiplex Option 1 controls the number of bits that the service option supplies for a frame (see IS-96 "Speech Service Option Standard for Wideband Spread Spectrum Digital Cellular System").

The base station shall use the following rules when a primary traffic service option is active: If signaling traffic is to be transmitted in a frame, Multiplex Option 1 shall either restrict the primary traffic service option to generate zero bits (for a blank-and-burst frame) or to generate less than 171 bits (for a dim-and-burst frame). If secondary traffic is to be transmitted in a frame, Multiplex Option 1 may restrict the primary traffic service option to generate less than 171 bits but shall allow the primary traffic service option to generate at least 16 bits. In all other cases, Multiplex Option 1 should allow the primary traffic service option to generate either 16, 40, 80, or 171 bits for a frame.

7.1.4 Limitations on Emissions**7.1.4.1 Bandwidth Occupied**

Modulation products in a bandwidth of 30 kHz centered ± 750 kHz from the CDMA Channel center frequency shall be at least 45 dB below the mean output power level.

1 **7.1.4.2 Conducted Spurious Emissions**

2 **7.1.4.2.1 Suppression Inside Cellular Band**

3 For all frequencies within the cellular base station's transmit band between 869 and 894
4 MHz which are also within the specific bands allocated to the operator's system (see Table
5 6.1.1.1-1), the total spurious emissions in any 30 kHz band shall be attenuated below the
6 mean output power level in accordance with the following schedule:

7 (a) for offset frequencies greater than 750 kHz from the CDMA Channel center
8 frequency, at least 45 dB.

9 (b) for offset frequencies greater than 1.98 MHz from the CDMA Channel center
10 frequency, at least 60 dB.

11 For all frequencies not within the specific bands allocated to the operator's system (see
12 Table 6.1.1.1-1), the total spurious emissions in any 30 kHz band shall not exceed a level of
13 60 dB below the mean output power level or -13 dBm, whichever is smaller.

14 **7.1.4.2.2 Suppression Outside Cellular Band**

15 Current FCC rules shall apply.

16 **7.1.4.3 Radiated Spurious Emissions**

17 Radiated spurious emissions (from sources other than the antenna connector) shall meet
18 the levels corresponding to the conducted spurious requirements listed in 7.1.4.2.

19 **7.1.4.4 Intermodulation**

20 Radiated products from co-located transmitters shall not exceed FCC spurious and
21 harmonic level requirements that would apply to any of the transmitters operated
22 separately.

23 **7.1.5 Synchronization, Timing, and Phase**

24 **7.1.5.1 Timing Reference Source**

25 Each base station shall use a time base reference from which all time critical CDMA
26 transmissions, including pilot PN sequences, frames, and Walsh functions, shall be derived.
27 The time base reference shall be time-aligned to CDMA System Time, as described in 1.2.
28 Reliable external means should be provided at each base station to synchronize each base
29 station's time base reference to CDMA System Time. Each base station should use a
30 frequency reference of sufficient accuracy to maintain time alignment to CDMA System
31 Time. In the event that the external source of System Time is lost,⁹ the system shall

⁹These guidelines on time keeping requirements reflect the fact that the amount of time error between base stations that can be tolerated in a CDMA network is not a hard limit. Each mobile station can search an ever increasing time window as directed by the base stations. However, increasing this window gradually degrades performance since wider windows require a longer time for the mobile stations to search out and locate the various arrivals from all base stations that may be in view. An

maintain the base station transmit time within the tolerance specified in 7.1.5.2 for a period of time within the tolerance specified in IS-97 "Recommended Minimum Performance Standards for Base Stations Supporting Dual-Mode Wideband Spread Spectrum Cellular Mobile Stations."

7.1.5.2 Base Station Transmission Time

All base stations should radiate the pilot PN sequence within $\pm 3 \mu\text{s}$ of CDMA System Time and shall radiate the pilot PN sequence within $\pm 10 \mu\text{s}$ of CDMA System Time. All CDMA Channels radiated by a base station shall be within $\pm 1 \mu\text{s}$ of each other.

Time measurements are made at the base station antenna connector.

The rate of change for timing corrections shall not exceed $1/8$ PN chip (101.725 ns) per 200 ms.

7.1.5.3 Pilot to Walsh Cover Time Tolerance

The time error between the pilot PN sequence and all Walsh cover sequences sharing a common Forward CDMA Channel shall be less than ± 50 ns.

7.1.5.4 Pilot to Walsh Cover Phase Tolerance

The phase difference between the RF carrier of the Pilot Channel and the RF carrier of any other code channels on the same forward CDMA Channel emitted by the base station shall not exceed 0.05 radian.

7.1.6 Transmitter Performance Requirements

System performance is predicated on transmitters meeting the requirements set forth in IS-97 "Recommended Minimum Performance Standards for Base Stations Supporting Dual-Mode Wideband Spread Spectrum Cellular Mobile Stations."

7.2 Receiver

7.2.1 Frequency Parameters

7.2.1.1 Channel Spacing and Designation

Channel spacing and designations for the base station reception shall be as specified in 2.1.1.1.

eventual limit on time errors occurs since pilot addresses are derived as 64 chip time shifts of a length 32768 chip sequence. In a very extreme case where the maximum number of 512 sequences were assigned to base stations, these address sequences would be 64 chips apart. In this situation it is possible that large time errors between base station transmissions would be confused with path-delayed arrivals from a given base station.

1 **7.2.2 Demodulation Characteristics**

2 The base station demodulation process shall perform complementary operations to the
3 mobile station modulation process on the Reverse CDMA Channel (see 6.1.3).

4 The base station receiver shall support the closed loop power control sub-channel as
5 specified in section 7.1.3.1.7.

6 The Reverse Traffic Channel frame is described in 6.1.3.3.2. A base station may implement
7 staggered Reverse Traffic Channel frames as described in 6.1.3.3.1.

8 **7.2.3 Limitations on Emissions**

9 Current FCC rules shall apply.

10 **7.2.4 Receiver Performance Requirements**

11 System performance is predicated on receivers meeting the requirements set forth in IS-97
12 "Recommended Minimum Performance Standards for Base Stations Supporting Wideband
13 Spread Spectrum Cellular Mobile Stations."

14 **7.3 Security and Identification**

15 **7.3.1 Authentication**

16 The base station may be equipped with a database that includes unique mobile station
17 authentication keys and/or shared secret data for each registered mobile station in the
18 system. This database is used for authentication of mobile stations that are equipped for
19 authentication operation.

20 If the base station supports mobile station authentication, it shall provide the following
21 capabilities: The base station shall send and receive authentication messages and perform
22 the authentication calculations described in 6.3.12.1. The base station shall set the RAND
23 parameter of the *Access Parameters Message* to the same value transmitted on the forward
24 analog control channel (see 2.3.12.1.2).

25 **7.3.2 Encryption**

26 If the base station supports mobile station authentication (see 7.3.1), it may also support
27 message encryption by providing the capability to send encryption control messages and to
28 perform the operations of encryption and decryption as specified in 6.3.12.2.

29 **7.3.3 Voice Privacy**

30 If the base station supports mobile station authentication (see 7.3.1), it may also support
31 voice privacy using the private long code mask, as specified in 6.3.12.3.

32 **7.4 Supervision**

33 **7.4.1 Access Channel**

34 The base station shall continually monitor each active Access Channel. The base station
35 should provide control in cases of overload by using the *Access Parameters Message*.

1 The base station shall check the CRC of all received Access Channel messages (see
2 6.7.1.2.2). The base station shall consider any message with a CRC that checks to be valid.
3 The base station shall ignore any message which is not valid.

4 7.4.2 Reverse Traffic Channel

5 The base station shall continually monitor each active Reverse Traffic Channel to determine
6 if the call is active. If the base station detects that the call is no longer active, the base
7 station shall declare loss of Reverse Traffic Channel continuity (see 7.6.4).

8 The base station shall check the CRC of all received Reverse Traffic Channel messages (see
9 6.7.2.2.2). The base station shall consider any message with a CRC that checks to be valid.
10 The base station shall ignore any message which is not valid.

11 7.5 Malfunction Detection

12 Reserved.

1 **7.6 Call Processing**

2 This section describes base station call processing. It contains frequent references to the
3 messages that flow between the base station and the mobile station. While reading this
4 section, it may be helpful to refer to the message formats (see 6.7 and 7.7), and to the call
5 flow examples (see Appendix B).

6 The values for the time and numeric constants used in this section (e.g., T_{1b} and N_{4m}) are
7 specified in Appendix D.

8 Base station call processing consists of the following types of processing:

- 9 • *Pilot and Sync Channel Processing* - During *Pilot and Sync Channel Processing*, the
10 base station transmits the Pilot Channel and Sync Channel which the mobile station
11 uses to acquire and synchronize to the CDMA system while the mobile station is in
12 the *Mobile Station Initialization State*.
- 13 • *Paging Channel Processing* - During *Paging Channel Processing*, the base station
14 transmits the Paging Channel which the mobile station monitors to receive messages
15 while the mobile station is in the *Mobile Station Idle State* and the *System Access*
16 *State*.
- 17 • *Access Channel Processing* - During *Access Channel Processing*, the base station
18 monitors the Access Channel to receive messages which the mobile station sends
19 while the mobile station is in the *System Access State*.
- 20 • *Traffic Channel Processing* - During *Traffic Channel Processing*, the base station uses
21 the Forward and Reverse Traffic Channels to communicate with the mobile station
22 while the mobile station is in the *Mobile Station Control on the Traffic Channel State*.

23 **7.6.1 Pilot and Sync Channel Processing**

24 During *Pilot and Sync Channel Processing*, the base station transmits the Pilot and Sync
25 Channels which the mobile station uses to acquire and synchronize to the CDMA system
26 while the mobile station is in the *Mobile Station Initialization State*.

27 **7.6.1.1 Primary and Secondary CDMA Channels**

28 The Primary and Secondary CDMA Channels are the CDMA Channels on which the mobile
29 station attempts to acquire the CDMA system (see 7.1.1.1).

30 The base station shall support the Primary CDMA Channel, or the Secondary CDMA
31 Channel, or both. The base station may support additional CDMA Channels.

32 **7.6.1.2 Pilot Channel Operation**

33 The Pilot Channel (see 7.1.3.2) is a reference channel which the mobile station uses for
34 acquisition, timing, and as a phase reference for coherent demodulation.

35 The base station shall continually transmit a Pilot Channel for every CDMA Channel
36 supported by the base station.

1 7.6.1.3 Sync Channel Operation

2 The Sync Channel (see 7.1.3.3) provides the mobile station with system configuration and
3 timing information.

4 The base station shall transmit at most one Sync Channel for each supported CDMA
5 Channel. If the base station supports the Primary CDMA Channel, the base station shall
6 transmit a Sync Channel on the Primary CDMA Channel. If the base station does not
7 support the Primary CDMA Channel, the base station shall transmit a Sync Channel on the
8 Secondary CDMA Channel.

9 The base station shall continually send the *Sync Channel Message* on each Sync Channel
10 that the base station transmits.

11 7.6.2 Paging Channel Processing

12 During *Paging Channel Processing*, the base station transmits the Paging Channel (see
13 7.1.3.4) which the mobile station monitors to receive messages while the mobile station is
14 in the *Mobile Station Idle State* and the *System Access State*.

15 The base station may transmit up to seven Paging Channels on each supported CDMA
16 Channel. For each supported CDMA Channel for which the base station transmits a Sync
17 Channel, the base station shall transmit at least one Paging Channel.

18 For each Paging Channel that the base station transmits, the base station shall continually
19 send valid Paging Channel messages (see 7.7.2), which may include the *Null Message*.

20 The base station shall not send any message which ends in a Paging Channel slot other
21 than the Paging Channel slot in which the message begins, or the Paging Channel slot
22 following the Paging Channel slot in which the message begins.

23 7.6.2.1 Paging Channel Procedures

24 7.6.2.1.1 CDMA Channel Determination

25 To determine the mobile station's assigned CDMA Channel, the base station shall use the
26 hash function specified in 6.6.7.1 with the following inputs:

- 27 • Mobile station's MIN.
- 28 • Number of CDMA Channels on which the base station transmits Paging Channels.

29 7.6.2.1.2 Paging Channel Determination

30 To determine the mobile station's assigned Paging Channel, the base station shall use the
31 hash function specified in 6.6.7.1 with the following inputs:

- 32 • Mobile station's MIN.
- 33 • Number of Paging Channels which the base station transmits on the mobile
34 station's assigned CDMA Channel.

1 **7.6.2.1.3 Paging Slot Determination**

2 To determine the assigned Paging Channel slots for a mobile station with a given slot cycle
3 index, the base station shall select a number PGSLOT using the hash function specified in
4 6.6.7.1 with the following inputs:

- 5 • Mobile station's MIN.
- 6 • Maximum number of Paging Channel slots (2048).

7 The assigned Paging Channel slots for the mobile station are those slots for which

$$8 \quad \lfloor t/4 \rfloor - \text{PGSLOT} \bmod (16 \times T) = 0,$$

9 where t is the System Time in frames, and T is the slot cycle length in units of 1.28 seconds
10 given by

$$11 \quad T = 2^i,$$

12 where i is the slot cycle index.

13 **7.6.2.1.4 Message Transmission and Acknowledgement Procedures**

14 The Paging Channel acknowledgement procedures facilitate the reliable exchange of
15 messages between the base station and the mobile station on the Paging Channel and
16 Access Channel (see 7.6.3.1.1). The base station uses the fields ACK_TYPE
17 (acknowledgement address type), ACK_SEQ (acknowledgement sequence number),
18 MSG_SEQ (message sequence number), ACK_REQ (acknowledgement required), and
19 VALID_ACK (valid acknowledgement) to support this mechanism. These fields are referred
20 to as layer 2 fields, and the acknowledgement procedures are referred to as layer 2
21 procedures. All other message fields and the processing thereof are referred to as
22 pertaining to layer 3. (See Appendix C for further discussion of layering.)

23 Paging Channel messages can be directed (addressed) either to a specific mobile station, by
24 means of the ADDRESS field, or to a specific MIN (*Page Message* and *Slotted Page Message*
25 only). Since MINs can be active in more than one mobile station, separate
26 acknowledgement and message sequence numbering procedures are used for each type of
27 message address.¹⁰

28 The base station shall set the ACK_SEQ and VALID_ACK fields of all Paging Channel
29 messages as specified in 7.6.3.1.1.

30 The base station shall maintain independent message numbering sequences (MSG_SEQ) on
31 the Paging Channel for each message address type (i.e., for each allowed value of the
32 ADDR_TYPE field) and for each address. The records of the *Page Message* and *Slotted Page*
33 *Message* shall be considered to be addressed by MIN (as if ADDR_TYPE were equal to '000').

34 For each message address type, separate message numbering sequences shall be
35 maintained for messages requiring acknowledgement and for messages not requiring
36 acknowledgment. Each base station may maintain the sequence numbers independently of

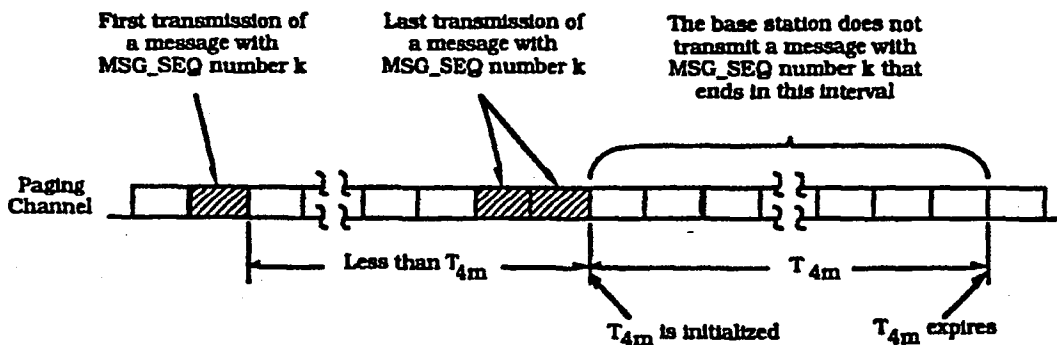
¹⁰Individual systems may or may not allow these capabilities. The management of these capabilities is a function of the base station and system operator.

1 other base stations. For each new message sent to a message address, the base station
2 shall increment the appropriate MSG_SEQ value, modulo 8.

3 The base station shall wait at least T_{4m} seconds after transmitting a MSG_SEQ number in
4 a message sent to a message address before using the same MSG_SEQ number in a
5 different message (see Figure 7.6.2.1.4-1).

6 The base station may send a message several times to increase the probability of message
7 reception. The base station shall complete all retransmissions of the same message within
8 T_{4m} seconds after the first transmission, as shown in Figure 7.6.2.1.4-1. If the base station
9 sends a message with the same contents more than T_{4m} seconds after the first
10 transmission, it shall use a different message sequence number.

11 A message received on the Access Channel contains an acknowledgement if the VALID_ACK
12 field is '1'. When the base station receives a message with VALID_ACK set to '1', it shall use
13 the received ACK_TYPE, ACK_SEQ and mobile station identification fields to determine the
14 message that is being acknowledged. The base station should not retransmit a message
15 requiring acknowledgement after it has received an acknowledgement of the message.



17
18 **Figure 7.6.2.1.4-1. MSG_SEQ Reuse**

19 7.6.2.2 Overhead Information

20 The base station sends overhead messages to provide the mobile station with the
21 information it needs to operate with the base station.

22 The base station shall maintain a configuration sequence number (CONFIG_SEQ), and shall
23 increment CONFIG_SEQ modulo 64 whenever the base station modifies the *System*
24 *Parameters Message*, the *Neighbor List Message*, or the *CDMA Channel List Message*.

25 The base station shall maintain an access configuration sequence number
26 (ACC_CONFIG_SEQ), and shall increment ACC_CONFIG_SEQ modulo 64 whenever the
27 base station modifies the *Access Parameters Message*.

28 On each of the Paging Channels the base station transmits, the base station shall send
29 each of the following system overhead messages at least once per T_{1b} seconds:

- 30 1. Access Parameters Message
31 2. CDMA Channel List Message

1 3. Neighbor List Message2 4. System Parameters Message

3 7.6.2.3 Mobile Station Directed Messages

4 The base station shall use the following rules for selecting the Paging Channel slot in which
5 to send a message to a mobile station:

- 6 • If the base station is able to determine that the mobile station is operating in the
7 non-slotted mode, the base station may send the message to the mobile station in
8 any Paging Channel slot.
- 9 • If the base station is able to determine that the mobile station is operating in the
10 slotted mode and is able to determine the mobile station's slot cycle index (see
11 6.6.2.1.1.3), the base station shall send the message, at least once, as follows:
 - 12 1. The base shall send the message in an assigned Paging Channel slot for the
13 mobile station (see 7.6.2.1.3); and
 - 14 2. The base station shall not send the message after the last *Slotted Page Message*
15 sent in that Paging Channel slot.
- 16 • If the base station is not able to determine whether the mobile station is operating in
17 the non-slotted mode, or the base station is not able to determine the mobile station's
18 slot cycle index, the base station shall assume that the mobile station is operating in
19 the slotted mode with a slot cycle index which is the smaller of
20 MAX_SLOT_CYCLE_INDEX and 1. The base station shall send the message, at least
21 once, as follows:
 - 22 1. The base shall send the message in an assigned Paging Channel slot for the
23 mobile station (see 7.6.2.1.3); and
 - 24 2. The base station shall not send the message after the last *Slotted Page Message*
25 (the *Slotted Page Message* having the MORE_PAGES bit set equal to '0') sent in
26 that Paging Channel slot.

27 The base station shall send at least one *Slotted Page Message* in each Paging Channel slot
28 (see 7.7.2.1.1). The base station should send messages directed to mobile stations
29 operating in the slotted mode as the first messages in the slot.

30 The base station may send the following messages directed to a mobile station on the
31 Paging Channel. If the base station sends a message, the base station shall comply with
32 the specified requirements for sending the message, if any.

- 33 1. Abbreviated Alert Order
- 34 2. Audit Order
- 35 3. Authentication Challenge Message
- 36 4. Base Station Acknowledgement Order
- 37 5. Base Station Challenge Confirmation Order
- 38 6. Channel Assignment Message

- 1 7. Data Burst Message
- 2 8. Feature Notification Message
- 3 9. Intercept Order
- 4 10. Local Control Order
- 5 11. Lock Until Power-Cycled Order
- 6 12. Maintenance Required Order
- 7 13. Page Message: The base station shall include both MIN1 and MIN2 fields in the
8 message when paging either a foreign SID roamer or a foreign NID roamer (see
9 6.6.5.3).
- 10 14. Registration Accepted Order
- 11 15. Registration Rejected Order
- 12 16. Registration Request Order
- 13 17. Release Order
- 14 18. Reorder Order
- 15 19. Slotted Page Message: The base station shall include both MIN1 and MIN2 fields in
16 the message when paging either a foreign SID roamer or a foreign NID roamer (see
17 6.6.5.3).
- 18 20. SSD Update Message
- 19 21. Unlock Order

20 7.6.3 Access Channel Processing

21 During *Access Channel Processing*, the base station monitors the Access Channel to receive
22 messages which the mobile station sends while the mobile station is in the *System Access*
23 *State*.

24 Each Access Channel is associated with a Paging Channel. Up to 32 Access Channels can
25 be associated with a Paging Channel. The number of Access Channels associated with a
26 particular Paging Channel is specified in the *Access Parameters Message* sent on that
27 Paging Channel.

28 The base station shall continually monitor all Access Channels associated with each Paging
29 Channel that the base station transmits.

30 7.6.3.1 Access Channel Procedures

31 7.6.3.1.1 Message Reception and Acknowledgement Procedures

32 The Access Channel acknowledgement procedures facilitate the reliable exchange of
33 messages between the base station and the mobile station on the Paging Channel (see
34 7.6.2.1.4) and Access Channel. The base station uses the fields ACK_TYPE
35 (acknowledgement address type), ACK_SEQ (acknowledgement sequence number),
36 MSG_SEQ (message sequence number), ACK_REQ (acknowledgement required), and

1 VALID_ACK (valid acknowledgement) to support this mechanism. These fields are referred
2 to as layer 2 fields, and the acknowledgement procedures are referred to as layer 2
3 procedures. All other message fields and the processing thereof are referred to as
4 pertaining to layer 3. (See Appendix C for further discussion of layering.)

5 A message received on the Access Channel requires acknowledgement if the ACK_REQ field
6 is set to '1'. In this specification, all messages sent on the Access Channel require
7 acknowledgement. All messages sent on the Access Channel contain identification data for
8 the mobile station sending the message, and are acknowledged by Paging Channel
9 messages.

10 The base station acknowledges a received message by transmitting a message on the Paging
11 Channel with the ACK_SEQ field set equal to the MSG_SEQ field of the received message,
12 and with the VALID_ACK field set to '1'. A message transmitted with the ACK_SEQ and
13 VALID_ACK fields set in this manner is referred to as including an acknowledgement of the
14 received message.

15 After receiving a message requiring acknowledgement from a mobile station on the Access
16 Channel, the base station shall transmit a message directed to that mobile station,
17 including acknowledgement, on the corresponding Paging Channel. The acknowledgement
18 shall be transmitted within $ACC_TMO \times 80$ ms after receiving the message, where
19 ACC_TMO is the value sent in the *Access Parameters Message* on the mobile station's
20 assigned Paging Channel.

21 When a received message requires acknowledgement and no message directed to the mobile
22 station is available within $ACC_TMO \times 80$ ms after the message is received, the base station
23 shall transmit a *Base Station Acknowledgement Order* directed to the mobile station,
24 including the acknowledgement.

25 Whenever a message requiring acknowledgement is received from a mobile station, the base
26 station shall set the ACK_SEQ field in subsequent Paging Channel messages directed to
27 that mobile station, to the MSG_SEQ specified in the received message. The VALID_ACK
28 field shall be set to '1' for the first message with this value of ACK_SEQ sent to the mobile
29 station on the Paging Channel. For all Paging Channel messages after the first, directed to
30 the same mobile station and containing the same ACK_SEQ field value:

- 31 • The base station may set VALID_ACK to '1' if the message is sent within T_{4m} seconds
32 after the first message (see Figure 7.6.2.1.4-1).
- 33 • The base station shall set VALID_ACK field to '0' if the message is sent more than
34 T_{4m} seconds after the first message.

35 If the base station performs duplicate message detection using Access Channel message
36 sequence numbers, it should use the following procedures. The base station should store,
37 for each mobile station that is active on the Access Channel, a received status indicator for
38 each possible value of the Access Channel message MSG_SEQ field (MSG_SEQ_RCVD[n],
39 where n is 0 through 7).

40 The base station should consider a mobile station active on the Access Channel when it
41 receives an Access Channel message from the mobile station. The base station should
42 consider the mobile station inactive on the Access Channel if:

- 1 • It has received no message from the mobile station within a time period to be selected
2 by the base station manufacturer; or
- 3 • The mobile station has been assigned to a Traffic Channel; or
- 4 • The mobile station has been assigned to the analog system; or
- 5 • The base station has received a power-down registration from the mobile station.

6 When the base station receives an Access Channel message from an inactive mobile station,
7 it should set MSG_SEQ_RCVD[n] to NO for all values of n from 0 to 7. The base station
8 should then consider the mobile station active on the Access Channel.

9 For each active mobile station, the base station should perform the following procedures:

- 10 • When a message requiring acknowledgement is received (including a message
11 received while the mobile station was inactive), with message sequence number
12 MSG_SEQ, and MSG_SEQ_RCVD[MSG_SEQ] is equal to NO, the base station should
13 process the message as a new message. The base station should set
14 MSG_SEQ_RCVD[MSG_SEQ] to YES, and should set MSG_SEQ_RCVD[(MSG_SEQ +
15 2) modulo 8] to NO.
- 16 • When a message requiring acknowledgement is received, with message sequence
17 number MSG_SEQ, and MSG_SEQ_RCVD[MSG_SEQ] is equal to YES, the base
18 station shall acknowledge the message as specified earlier in this section but should
19 not perform any further processing of the message.

20 7.6.3.2 Reserved

21 7.6.3.3 Response to Page Response Message

22 If the base station receives a Page Response Message, the base station should send a
23 Channel Assignment Message or a Release Order. The base station may also start
24 authentication procedures (see 6.3.12).

25 If the base station sends a Channel Assignment Message, the base station shall perform the
26 following:

- 27 • If the Channel Assignment Message directs the mobile station to a Traffic Channel,
28 the base station shall begin Traffic Channel Processing (see 7.6.4) for the mobile
29 station.
- 30 • If the Channel Assignment Message directs the mobile station to an analog voice
31 channel, the base station shall follow the procedure described in 3.6.4.

32 7.6.3.4 Response to Orders

33 No requirements.

34 7.6.3.5 Response to Origination Message

35 If the base station receives an Origination Message, the base station should send a Channel
36 Assignment Message, an Intercept Order, a Reorder Order, or a Release Order. The base
37 station may also commence authentication procedures (see 6.3.12).

1 If the base station sends a *Channel Assignment Message*, the base station shall perform the
2 following:

- 3 • If the *Channel Assignment Message* directs the mobile station to a Traffic Channel,
4 the base station shall begin *Traffic Channel Processing* (see 7.6.4) for the mobile
5 station.
- 6 • If the *Channel Assignment Message* directs the mobile station to an analog voice
7 channel, the base station shall follow the procedure described in 3.6.4.

8 The base station shall not set $RESPOND_r$ equal to '0' when $ASSIGN_MODE = '001'$ or
9 $ASSIGN_MODE = '010'$.

10 7.6.3.6 Response to Registration Message

11 If the base station receives a *Registration Message*, the base station may send a *Registration*
12 *Accepted Order* or a *Registration Rejected Order*. The base station may also start
13 authentication procedures (see 6.3.12).

14 7.6.3.7 Response to Data Burst Message

15 No requirements.

16 7.6.4 Traffic Channel Processing

17 During *Traffic Channel Processing*, the base station uses the Forward and Reverse Traffic
18 Channels to communicate with the mobile station while the mobile station is in the *Mobile*
19 *Station Control on the Traffic Channel State*.

20 Traffic Channel processing consists of the following substates:

- 21 • *Traffic Channel Initialization Substate* - In this substate, the base station begins
22 transmitting on the Forward Traffic Channel and receiving on the Reverse Traffic
23 Channel.
- 24 • *Waiting for Order Substate* - In this substate, the base station sends the *Alert With*
25 *Information Message* to the mobile station.
- 26 • *Waiting for Answer Substate* - In this substate, the base station waits for the *Connect*
27 *Order* from the mobile station.
- 28 • *Conversation Substate* - In this substate, the base station exchanges primary traffic
29 bits with the mobile station's primary service option application.
- 30 • *Release Substate* - In this substate, the base station disconnects the call.

31 7.6.4.1 Special Functions and Actions

32 The base station performs the following special functions and actions in one or more of the
33 Traffic Channel processing substates.

1 7.6.4.1.1 Forward Traffic Channel Power Control

2 When the base station enables Forward Traffic Channel power control, the mobile station
3 reports frame error rate statistics to the base station using the *Power Measurement Report*
4 *Message*.

5 The base station may enable Forward Traffic Channel power control using the *System*
6 *Parameters Message* sent on the Paging Channel and the *Power Control Parameters*
7 *Message* sent on the Forward Traffic Channel. The base station may enable periodic
8 reporting which causes the mobile station to report frame error rate statistics at specified
9 intervals. The base station may also enable threshold reporting which causes the mobile
10 station to report frame error rate statistics when the frame error rate reaches a specified
11 threshold.¹¹

12 The base station may use the reported frame error rate statistics to adjust the transmit
13 power of the Forward Traffic Channel.

14 7.6.4.1.2 Service Options

15 7.6.4.1.2.1 Overview

16 During Traffic Channel operation, the base station and mobile station may support primary
17 traffic services. Each such service, referred to as a service option, has a set of requirements
18 that govern the way in which the primary traffic bits (see 7.1.3.5.11 and 6.1.3.3.11) from
19 forward and reverse Traffic Channel frames are processed by the base station and mobile
20 station. Service Option 1, for example, defines the requirements for a 2-way, variable rate
21 speech service.

22 Either the base station or mobile station can request a service option. The base station can
23 request a particular service option when paging the mobile station or during Traffic
24 Channel operation. If the requested service option is acceptable to the mobile station, the
25 base station and mobile station begin using the new service option. If the base station
26 requests a service option that is not acceptable to the mobile station, the mobile station can
27 reject the requested service option or request an alternative service option. If the mobile
28 station requests an alternative service option, the base station can accept or reject the
29 mobile station's alternative service option, or request another service option. This process,
30 called service option negotiation, ends when the base station and mobile station find a
31 mutually acceptable service option, or when the base station rejects a service option
32 request from the mobile station or the mobile station rejects a service option request from
33 the base station.

34 The base station and mobile station use the *Service Option Request Order* either to request a
35 service option or suggest an alternative service option, and the *Service Option Response*
36 *Order* to accept or reject a service option request. In addition, the base station can request
37 a service option in the *Page Message* or the *Slotted Page Message*, and the mobile station
38 can request a service option in the *Origination Message* or the *Page Response Message*. The

¹¹Both periodic and threshold reporting may be enabled simultaneously, either one of them may be enabled, or both forms of reporting may be disabled at any given time.

1 base station and mobile station use the *Service Option Control Order* to invoke service
2 option specific functions.

3 The base station uses a variable (SO_REQ) to record the number of the service option for
4 which the base station has sent an outstanding request in a *Service Option Request Order*.
5 SO_REQ is set to a special value, NULL, when the base station does not have an
6 outstanding service option request. The base station uses another variable (SO_CUR) to
7 record the number of the service option which is currently active. SO_CUR is set to NULL
8 when there is no active service option.

9 7.6.4.1.2.2 Requirements

10 7.6.4.1.2.2.1 Processing Service Option Requests

11 When processing a service option request in an *Origination Message*, a *Page Response*
12 *Message*, or a *Service Option Request Order*, the base station shall perform the following:

- 13 • If the base station accepts the requested service option, the base station shall set
14 SO_REQ to NULL and shall send a *Service Option Response Order* accepting the
15 requested service option within T_{4b} seconds. The base station shall begin using the
16 requested service option in accordance with the requirements for the requested
17 service option. The base station shall set SO_CUR to the requested service option
18 number when the service option becomes active.
- 19 • If the base station does not accept the requested service option and has an
20 alternative service option to request, the base station shall set SO_REQ to the
21 alternative service option number and shall send a *Service Option Request Order*
22 requesting the alternative service option within T_{4b} seconds.
- 23 • If the base station does not accept the requested service option and does not have an
24 alternative service option to request, the base station shall set SO_REQ to NULL and
25 shall send a *Service Option Response Order* to reject the request within T_{4b} seconds.
26 The base station shall continue to process primary traffic as it did prior to receiving
27 the *Service Option Request Order* and shall remain in the current state.

28 7.6.4.1.2.2.2 Processing the *Service Option Response Order*

29 When the base station receives a *Service Option Response Order*, it shall perform the
30 following:

- 31 • If the service option number specified in the order is equal to SO_REQ, the base
32 station shall set SO_REQ to NULL and shall begin using the specified service option
33 in accordance with the requirements for the service option. The base station shall set
34 SO_CUR to the specified service option number when the service option becomes
35 active.
- 36 • If the order indicates a service option rejection, the base station shall set SO_REQ to
37 NULL. The base station shall continue to process primary traffic as it did prior to
38 receiving the *Service Option Response Order* and shall remain in the current state.
- 39 • If the order does not indicate a service option rejection and the service option
40 specified in the order is not equal to SO_REQ, the base station shall set SO_REQ to

1 NULL, should send a *Release Order* (ORDQ = '00000010'), and should enter the
2 *Release Substate*.

3 7.6.4.1.2.2.3 Processing the Received *Service Option Control Order*

4 If there is an active service option (SO_CUR is not equal to NULL), the base station shall
5 process the received *Service Option Control Order* in accordance with the requirements for
6 the active service option.

7 7.6.4.1.2.2.4 Service Option Request Initialization

8 To perform service option request initialization, the base station shall set SO_REQ to the
9 specified service option number.

10 7.6.4.1.3 Acknowledgement Procedures

11 The acknowledgement procedures facilitate the reliable exchange of messages between the
12 mobile station and the base station. The base station uses the fields ACK_SEQ
13 (acknowledgement sequence number), MSG_SEQ (message sequence number) and
14 ACK_REQ (acknowledgement required) to detect duplicate messages and provide a reference
15 for acknowledgements. These message fields are referred to as layer 2 fields, and the
16 acknowledgement procedures are referred to as layer 2 procedures. All other message fields
17 are referred to as layer 3 fields, and the processing of layer 3 fields is referred to as layer 3
18 processing. (See Appendix C for further discussion of layering.)

19 On both the Reverse Traffic Channel and the Forward Traffic Channel, the procedure for
20 messages requiring acknowledgement is a selective repeat scheme in which a message is
21 retransmitted only if an acknowledgement for it is not received.

22 7.6.4.1.3.1 Messages Requiring Acknowledgement

23 A Traffic Channel message requires acknowledgement when the ACK_REQ field is set to '1'.

24 7.6.4.1.3.1.1 Transmitting Messages and Receiving Acknowledgements

25 The Layer 2 protocol does not guarantee delivery of messages in any order. If the base
26 station requires that the mobile station receive a set of messages in a certain order, the
27 base station must wait for an acknowledgement to each message before transmitting the
28 next message in the set. For messages requiring acknowledgement whose relative ordering
29 is not important, the base station may transmit up to four such messages before receiving
30 an acknowledgement for the first message.

31 The base station shall store a message sequence number for messages requiring
32 acknowledgement (MSG_SEQ_ACK). The base station shall store an acknowledgement
33 status indicator for each possible value of the Forward Traffic Channel message MSG_SEQ
34 field (ACK_WAITING[n], where n is 0 through 7). The base station shall not send a new
35 message requiring acknowledgement when ACK_WAITING[(MSG_SEQ_ACK + 4) modulo 8]
36 is equal to YES.

1 The base station shall perform the following procedures:

- 2 • When the base station receives a message on the Reverse Traffic Channel, with
3 acknowledgement sequence number ACK_SEQ, it shall set ACK_WAITING[ACK_SEQ]
4 to NO.
- 5 • When the base station sends a new message requiring acknowledgement on the
6 Forward Traffic Channel, it shall set ACK_WAITING[MSG_SEQ_ACK] to YES and shall
7 set the MSG_SEQ field of the message to MSG_SEQ_ACK. The base station shall
8 then increment MSG_SEQ_ACK, modulo 8.

9 The base station shall not retransmit a message for which it has received an
10 acknowledgement.

11 If the base station does not receive an acknowledgement after transmitting the message, the
12 base station shall retransmit the message. If the base station retransmits a message, the
13 base station shall use the same MSG_SEQ number for the retransmission.

14 The base station shall store a retransmission counter (RETRY_COUNT) for each transmitted
15 message requiring acknowledgement. The base station shall set RETRY_COUNT to zero
16 prior to the first transmission of the message. After each transmission of the message, the
17 base station shall increment RETRY_COUNT if no acknowledgement is received. The base
18 station shall not exceed a maximum number of retransmissions, to be selected by the base
19 station manufacturer. When RETRY_COUNT is equal to the maximum number of
20 retransmissions, the base station shall declare an acknowledgement failure.

21 7.6.4.1.3.1.2 Receiving Messages and Returning Acknowledgements

22 Messages received on the Reverse Traffic Channel contain MSG_SEQ fields that are
23 incremented by the same rules as messages transmitted on the Forward Traffic Channel.
24 Separate sequence numbers are maintained for Reverse Traffic Channel Messages that
25 require acknowledgement and for messages that do not require acknowledgement.

26 The base station acknowledges a received message by transmitting a message with the
27 ACK_SEQ field set equal to the MSG_SEQ field of the received message. A message
28 transmitted with the ACK_SEQ field set in this manner is referred to as including an
29 acknowledgement of the received message.

30 Whenever a message requiring acknowledgement is received, the base station shall set the
31 ACK_SEQ field of subsequent Forward Traffic Channel messages to the MSG_SEQ field of
32 the received message. If no message has been received, the base station shall set this field
33 to '111'.

34 After receiving a message requiring acknowledgement, the base station shall transmit a
35 message including an acknowledgement within T_{1m} seconds as shown in Figure
36 6.6.4.1.3.1.1-1.

37 When a received message requires acknowledgement and no message is available within
38 T_{1m} seconds after the message is received, the base station shall transmit a *Base Station*
39 *Acknowledgement Order* including the acknowledgement.

1 For duplicate message detection, the base station shall store a received status indicator for
2 each possible value of the Reverse Traffic Channel message MSG_SEQ field
3 (MSG_SEQ_RCVD[n], where n is 0 through 7). The base station shall perform the following
4 procedures:

- 5 • When a message requiring acknowledgement is received with message sequence
6 number MSG_SEQ, and MSG_SEQ_RCVD[MSG_SEQ] is equal to NO, the base
7 station shall process the message as a new message. The base station shall then set
8 MSG_SEQ_RCVD[MSG_SEQ] to YES, and shall set MSG_SEQ_RCVD[(MSG_SEQ +
9 4) modulo 8] to NO.
- 10 • When a message requiring acknowledgement is received with message sequence
11 number MSG_SEQ, and MSG_SEQ_RCVD[MSG_SEQ] is equal to YES, the base
12 station shall acknowledge the message but shall not perform any further processing
13 of the message.

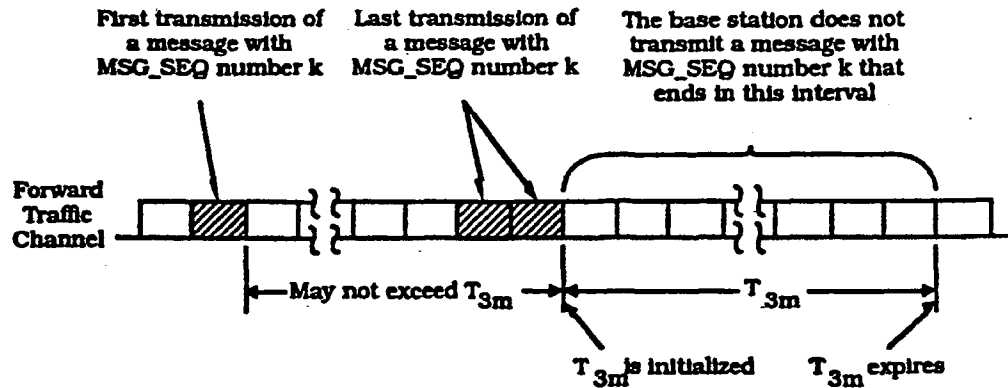
14 7.6.4.1.3.2 Messages not Requiring Acknowledgement

15 A Traffic Channel message does not require acknowledgement when the ACK_REQ field is
16 set to '0'.

17 The base station shall store a message sequence number for messages not requiring
18 acknowledgement (MSG_SEQ_NOACK). For each new message sent that does not require
19 acknowledgement, the base station shall set the MSG_SEQ field of the message to
20 MSG_SEQ_NOACK and shall then increment MSG_SEQ_NOACK, modulo 8.

21 If the base station transmits the same message not requiring acknowledgement more than
22 once, it shall use the same MSG_SEQ number for all transmissions. The base station shall
23 complete all retransmissions of the same message within T_{3m} seconds after the first
24 transmission, as shown in Figure 7.6.4.1.3.2-1. The base station shall wait at least T_{3m}
25 seconds after the last transmission of a message not requiring acknowledgement before
26 transmitting another message not requiring acknowledgement that has the same MSG_SEQ
27 number, as shown in Figure 7.6.4.1.3.2-1.¹²

¹²This is necessary because it is possible that the mobile station receives only the last transmission.



1
2 **Figure 7.6.4.1.3.2-1. Time Requirement for the Base Station Not to Reuse a**
3 **MSG_SEQ Number**
4

5 **7.6.4.1.3.3 Acknowledgement Procedures Reset**

6 The base station shall reset the acknowledgement procedures as follows:

- 7
- 8 • Message sequence number reset.
 - 9 • If ACK_WAITING[n] is equal to YES for any n, the base station should save the
 - 10 corresponding messages and retransmit them after completing the reset of the
 - 11 acknowledgement procedures. For each such message, the base station shall set
 - 12 the retransmission counter (RETRY_COUNT) to zero.
 - 13 • The base station shall set MSG_SEQ_ACK to 0, MSG_SEQ_NOACK to 0, and shall
 - 14 set ACK_WAITING[n] to NO for all values of n from 0 to 7.
 - 15 • Acknowledgement sequence number reset. The base station shall set the ACK_SEQ
 - 16 field of all Forward Traffic Channel messages to '111' until the first message requiring
 - 17 acknowledgement is received.
 - 18 • Duplicate detection reset. The base station shall set MSG_SEQ_RCVD[n] to NO for
 - 19 all values of n from 0 to 7.

7.6.4.1.4 Message Action Times

A Forward Traffic Channel message without a USE_TIME field or with a USE_TIME field set to '0' has an implicit action time. A message with its USE_TIME field set to '1' has an explicit action time which is specified in the ACTION_TIME field of the message. A message with a future action time is called a pending message.

Unless otherwise specified, a message having an implicit action time shall take effect no later than the first 80 ms boundary (relative to System Time) occurring at least 80 ms after the end of the frame containing the last bit of the message. A message with an explicit action time shall take effect when System Time (in 80 ms units) modulo 64 becomes equal to the message's ACTION_TIME field. The difference in time between ACTION_TIME and the end of the frame containing the last bit of the message shall be at least 80 ms.

The base station shall support one pending message at any given time, not including pending *Service Option Control Orders*. The number of pending *Service Option Control Orders* that the base station is required to support is specific to the service option (see the relevant service option descriptions).

7.6.4.1.5 Long Code Transition Request Processing

If a request for voice privacy is specified in the *Origination Message* or *Page Response Message*, the base station may send a *Long Code Transition Request Order* (ORDQ = '00000001') requesting a transition to the private long code.

The base station shall process the *Long Code Transition Request Order* as follows:

- If the *Long Code Transition Request Order* requests a transition to the private long code and the base station accepts the request, the base station shall send a *Long Code Transition Request Order* (ORDQ = '00000001'). If the base station does not accept the private long code transition request, the base station shall send a *Long Code Transition Request Order* (ORDQ = '00000000').
- If the *Long Code Transition Request Order* requests a transition to the public long code and the base station accepts the request, the base station shall send a *Long Code Transition Request Order* (ORDQ = '00000000'). If the base station does not accept the public long code transition request, the base station shall send a *Long Code Transition Request Order* (ORDQ = '00000001').

The base station shall process the *Long Code Transition Response Order* as follows:

- If the *Long Code Transition Response Order* indicates that the mobile station accepts the long code transition requested in the *Long Code Transition Request Order* sent by the base station, the base station shall use the requested long code mask on both the Forward Traffic Channel and the Reverse Traffic Channel. If the base station did not specify an explicit action time in the *Long Code Transition Request Order*, the base station should begin using the requested long code mask at the first 80 ms boundary (relative to the start of System Time) after N_{4m} frames after the last frame in which any portion of the *Long Code Transition Response Order* was received.

1 **7.6.4.2 Traffic Channel Initialization Substate**

2 In this substate, the base station begins transmitting on the Forward Traffic Channel and
3 acquires the Reverse Traffic Channel.

4 Upon entering the *Traffic Channel Initialization Substate*, the base station shall perform the
5 following:

- 6 • The base station shall reset the message acknowledgement procedures as specified in
7 7.6.4.1.3.3.
- 8 • The base station shall set SO_CUR to NULL to indicate that there is no active service
9 option.
- 10 • The base station shall perform service option request initialization (see 7.6.4.1.2.2.4)
11 specifying NULL as the service option number.
- 12 • The base station shall set its Forward and Reverse Traffic Channel long code masks
13 to the public long code mask (see 7.1.3.5.6).
- 14 • The base station shall set its Forward and Reverse Traffic Channel frame offsets (see
15 7.1.3.5.1) to the frame offset assigned to the mobile station.

16 While in the *Traffic Channel Initialization Substate*, the base station shall perform the
17 following:

- 18 • The base station shall transmit null Traffic Channel data.
- 19 • The base station shall perform the message acknowledgement procedures as
20 specified in 7.6.4.1.3.
- 21 • If the base station acquires the Reverse Traffic Channel, the base station shall send a
22 *Base Station Acknowledgement Order*. The base station should send the *Base Station*
23 *Acknowledgement Order* as a message requiring acknowledgement. If the call is a
24 mobile station terminated call, the base station shall enter the *Waiting for Order*
25 *Substate* (see 7.6.4.3.1). If the call is a mobile station originated call, the base station
26 shall enter the *Conversation Substate* (see 7.6.4.4).
- 27 • If the base station fails to acquire the Reverse Traffic Channel, the base station shall
28 either retransmit the *Channel Assignment Message* on the Paging Channel and
29 remain in the *Traffic Channel Initialization Substate*, or the base station should
30 disable transmission on the Forward Traffic Channel and discontinue the *Traffic*
31 *Channel Processing* for the mobile station.

1 7.6.4.3 Alerting

2 7.6.4.3.1 Waiting for Order Substate

3 In this substate, the base station sends an *Alert With Information Message* to the mobile
4 station.

5 Upon entering the *Waiting for Order Substate*, the base station shall perform the following:

- 6 • The base station shall process the service option request specified in the *Page*
7 *Response Message* as specified in 7.6.4.1.2.2.1.

8 While in the *Waiting for Order Substate*, the base station shall perform the following:

- 9 • The base station shall transmit the power control subchannel as specified in
10 7.1.3.1.7.
- 11 • If there is an active service option (SO_CUR is not equal to NULL), the base station
12 shall process the received primary traffic bits in accordance with the requirements for
13 the active service option; otherwise, the base station shall discard the received
14 primary traffic bits.
- 15 • If there is an active service option (SO_CUR is not equal to NULL), the base station
16 shall transmit primary traffic bits in accordance with the requirements for the active
17 service option; otherwise, the base station shall transmit null Traffic Channel data.
- 18 • The base station shall perform the message acknowledgement procedures as
19 specified in 7.6.4.1.3.
- 20 • If the base station declares a loss of Reverse Traffic Channel continuity (see 7.4.2),
21 the base station should send a *Release Order* to the mobile station. If the base
22 station sends a *Release Order*, the base station shall enter the *Release Substate*.
- 23 • The base station may perform Forward Traffic Channel power control as specified in
24 7.6.4.1.1.
- 25 • The base station may request a service option as specified in 7.6.4.1.2. To do so, the
26 base station shall perform service option request initialization (see 7.6.4.1.2.2.4)
27 specifying the requested service option number, and shall send a *Service Option*
28 *Request Order* (ORDQ = requested service option number).
- 29 • If there is an active service option (SO_CUR is not equal to NULL), the base station
30 may send a *Service Option Control Order* (ORDQ = function code) to invoke a service
31 option specific function in accordance with the requirements for the active service
32 option.
- 33 • The base station may request a long code transition, as specified in 7.6.4.1.5, either
34 autonomously or in response to a request for voice privacy specified in the *Origination*
35 *Message* or *Page Response Message*.
- 36 • The base station may perform authentication procedures as specified in 7.3.1.

- 1 • The base station may send the following messages. If the base station sends a
2 message, the base station shall comply with the specified requirements for sending
3 the message, if any.
- 4 1. Alert With Information Message: The base station shall enter the *Waiting for*
5 *Answer Substate*.
- 6 2. Analog Handoff Direction Message: The base station shall enter the *Waiting for*
7 *Order Task* (see 3.6.4.3.1).
- 8 3. Audit Order
- 9 4. Authentication Challenge Message
- 10 5. Base Station Acknowledgement Order
- 11 6. Base Station Challenge Confirmation Order
- 12 7. Data Burst Message
- 13 8. Handoff Direction Message
- 14 9. In-Traffic System Parameters Message
- 15 10. Local Control Order
- 16 11. Lock Until Power-Cycled Order
- 17 12. Long Code Transition Request Order
- 18 13. Maintenance Order: The base station shall enter the *Waiting for Answer*
19 *Substate*.
- 20 14. Maintenance Required Order
- 21 15. Message Encryption Mode Order
- 22 16. Mobile Station Registered Message
- 23 17. Neighbor List Update Message
- 24 18. Parameter Update Order: see 2.3.12.1.3.
- 25 19. Pilot Measurement Request Order
- 26 20. Power Control Parameters Message
- 27 21. Release Order: The base station shall enter the *Release Substate*.
- 28 22. Retrieve Parameters Message
- 29 23. Service Option Control Order
- 30 24. Service Option Request Order
- 31 25. Service Option Response Order
- 32 26. Set Parameters Message
- 33 27. SSD Update Message
- 34 28. Status Request Order

- 1 • If the base station receives one of the following autonomous messages from the
2 mobile station, the base station shall process the message according to the specified
3 requirements, if any:
 - 4 1. Data Burst Message
 - 5 2. Handoff Completion Message: The base station shall process the message as
6 described in 7.6.6.2.2.3.
 - 7 3. Long Code Transition Request Order: The base station shall process the message
8 as described in 7.6.4.1.5.
 - 9 4. Parameter Update Confirmation Order
 - 10 5. Pilot Strength Measurement Message: The base station shall process the
11 message as described in 7.6.6.2.2.1.
 - 12 6. Power Measurement Report Message: The base station may process the message
13 as described in 7.6.4.1.1.
 - 14 7. Release Order: The base station shall send the mobile station a *Release Order*,
15 within T_{2b} seconds, and enter the *Release Substate*, or the base station shall
16 send an *Alert with Information Message*, within T_{2b} seconds, and enter the
17 *Waiting for Answer Substate*.
 - 18 8. Request Analog Service Order: The base station may respond with an *Analog*
19 *Handoff Direction Message*.
 - 20 9. Service Option Control Order: The base station shall process the message as
21 described in 7.6.4.1.2.2.3.
 - 22 10. Service Option Request Order: The base station shall process the message as
23 described in 7.6.4.1.2.2.1.
 - 24 11. Service Option Response Order: The base station shall process the message as
25 described in 7.6.4.1.2.2.2.

26 7.6.4.3.2 Waiting for Answer Substate

27 In this substate, the base station waits for a *Connect Order* from the mobile station.

28 While in the *Waiting for Answer Substate*, the base station shall perform the following:

- 29 • The base station shall transmit the power control subchannel as specified in
30 7.1.3.1.7.
- 31 • If there is an active service option (SO_CUR is not equal to NULL), the base station
32 shall process the received primary traffic bits in accordance with the requirements for
33 the active service option; otherwise, the base station shall discard the received
34 primary traffic bits.
- 35 • If there is an active service option (SO_CUR is not equal to NULL), the base station
36 shall transmit primary traffic bits in accordance with the requirements for the active
37 service option; otherwise, the base station shall transmit null Traffic Channel data.

- 1 • The base station shall perform the message acknowledgement procedures as
2 specified in 7.6.4.1.3.
- 3 • If the base station declares a loss of Reverse Traffic Channel continuity (see 7.4.2),
4 the base station should send a *Release Order* to the mobile station. If the base
5 station sends a *Release Order*, the base station shall enter the *Release Substate*
- 6 • The base station may perform Forward Traffic Channel power control as specified in
7 7.6.4.1.1.
- 8 • The base station may request a service option as specified in 7.6.4.1.2. To do so, the
9 base station shall perform service option request initialization (see 7.6.4.1.2.2.4)
10 specifying the requested service option number, and shall send a *Service Option*
11 *Request Order* (ORDQ = requested service option number).
- 12 • If there is an active service option (SO_CUR is not equal to NULL), the base station
13 may send a *Service Option Control Order* (ORDQ = function code) to invoke a service
14 option specific function in accordance with the requirements for the active service
15 option.
- 16 • The base station may request a long code transition, as specified in 7.6.4.1.5, either
17 autonomously or in response to a request for voice privacy specified in the *Origination*
18 *Message* or *Page Response Message*.
- 19 • The base station may perform authentication procedures as specified in 7.3.1.
- 20 • The base station may send the following messages. If the base station sends a
21 message, the base station shall comply with the specified requirements for sending
22 the message, if any.
 - 23 1. *Alert With Information Message*
 - 24 2. *Analog Handoff Direction Message*: The base station shall enter the Waiting for
25 Answer Task (see 3.6.4.3.2).
 - 26 3. *Audit Order*
 - 27 4. *Authentication Challenge Message*
 - 28 5. *Base Station Acknowledgement Order*
 - 29 6. *Base Station Challenge Confirmation Order*
 - 30 7. *Data Burst Message*
 - 31 8. *Handoff Direction Message*
 - 32 9. *In-Traffic System Parameters Message*
 - 33 10. *Local Control Order*
 - 34 11. *Lock Until Power-Cycled Order*
 - 35 12. *Long Code Transition Request Order*
 - 36 13. *Maintenance Order*
 - 37 14. *Maintenance Required Order*

- 1 15. Message Encryption Mode Order
- 2 16. Mobile Station Registered Message
- 3 17. Neighbor List Update Message
- 4 18. Parameter Update Order: see 2.3.12.1.3.
- 5 19. Pilot Measurement Request Order
- 6 20. Power Control Parameters Message
- 7 21. Release Order: The base station shall enter the *Release Substate*.
- 8 22. Retrieve Parameters Message
- 9 23. Service Option Control Order
- 10 24. Service Option Request Order
- 11 25. Service Option Response Order
- 12 26. Set Parameters Message
- 13 27. SSD Update Message
- 14 28. Status Request Order

- 15 • If the base station receives one of the following autonomous messages from the
16 mobile station, the base station shall process the message according to the specified
17 requirements, if any:

- 18 1. Connect Order: The base station shall enter the *Conversation Substate*.
- 19 2. Data Burst Message
- 20 3. Handoff Completion Message: The base station shall process the message as
21 described in 7.6.6.2.2.3.
- 22 4. Long Code Transition Request Order: The base station shall process the message
23 as described in 7.6.4.1.5.
- 24 5. Parameter Update Confirmation Order
- 25 6. Pilot Strength Measurement Message: The base station shall process the
26 message as described in 7.6.6.2.2.1.
- 27 7. Power Measurement Report Message: The base station may process the message
28 as described in 7.6.4.1.1.
- 29 8. Release Order: The base station shall send the mobile station a *Release Order*,
30 within T_{2b} seconds, and enter the *Release Substate*, or the base station shall
31 send an *Alert with Information Message*, within T_{2b} seconds, and enter the
32 *Waiting for Answer Substate*.
- 33 9. Request Analog Service Order: The base station may respond with an *Analog*
34 *Handoff Direction Message*.
- 35 10. Service Option Control Order: The base station shall process the message as
36 described in 7.6.4.1.2.2.3.

1 11. Service Option Request Order: The base station shall process the message as
2 described in 7.6.4.1.2.2.1.

3 12. Service Option Response Order: The base station shall process the message as
4 described in 7.6.4.1.2.2.2.

5 7.6.4.4 Conversation Substate

6 In this substate, the base station exchanges primary traffic bits with the mobile station's
7 primary traffic service option application.

8 Upon entering the *Conversation Substate*, the base station shall perform the following:

- 9 • If the call is mobile station originated, the base station shall process the service
10 option request specified in the *Origination Message* as specified in 7.6.4.1.2.2.1.

11 While in the *Conversation Substate*, the base station shall perform the following:

- 12 • The base station shall transmit the power control subchannel as specified in
13 7.1.3.1.7.
- 14 • If there is an active service option (SO_CUR is not equal to NULL), the base station
15 shall process the received primary traffic bits in accordance with the requirements for
16 the active service option; otherwise, the base station shall discard the received
17 primary traffic bits.
- 18 • If there is an active service option (SO_CUR is not equal to NULL), the base station
19 shall transmit primary traffic bits in accordance with the requirements for the active
20 service option; otherwise, the base station shall transmit null Traffic Channel data.
- 21 • The base station shall perform the message acknowledgement procedures as
22 specified in 7.6.4.1.3.
- 23 • If the base station declares a loss of Reverse Traffic Channel continuity (see 7.4.2),
24 the base station should send a *Release Order* to the mobile station. If the base
25 station sends a *Release Order*, the base station shall enter the *Release Substate*.
- 26 • The base station may perform Forward Traffic Channel power control as specified in
27 7.6.4.1.1.
- 28 • The base station may request a service option as specified in 7.6.4.1.2. To do so, the
29 base station shall perform service option request initialization (see 7.6.4.1.2.2.4)
30 specifying the requested service option number, and shall send a *Service Option*
31 *Request Order* (ORDQ = requested service option number).
- 32 • If there is an active service option (SO_CUR is not equal to NULL), the base station
33 may send a *Service Option Control Order* (ORDQ = function code) to invoke a service
34 option specific function in accordance with the requirements for the active service
35 option.
- 36 • The base station may request a long code transition, as specified in 7.6.4.1.5, either
37 autonomously or in response to a request for voice privacy specified in the *Origination*
38 *Message* or *Page Response Message*.
- 39 • The base station may perform authentication procedures as specified in 7.3.1.

- 1 • The base station may send the following messages. If the base station sends a
2 message, the base station shall comply with the specified requirements for sending
3 the message, if any.
- 4 1. Alert With Information Message: If the message contains a signal information
5 record with the SIGNAL_TYPE field set to '01' or '10', or if the message does not
6 contain a signal information record, the base station shall enter the *Waiting for*
7 *Answer Substate*.
- 8 2. Analog Handoff Direction Message: The base station shall enter the
9 Conversation Task (see 3.6.4.4).
- 10 3. Audit Order
- 11 4. Authentication Challenge Message
- 12 5. Base Station Acknowledgement Order
- 13 6. Base Station Challenge Confirmation Order
- 14 7. Continuous DTMF Tone Order
- 15 8. Data Burst Message
- 16 9. Flash With Information Message
- 17 10. Handoff Direction Message
- 18 11. In-Traffic System Parameters Message
- 19 12. Local Control Order
- 20 13. Lock Until Power-Cycled Order
- 21 14. Long Code Transition Request Order
- 22 15. Maintenance Order: The base station shall enter the *Waiting for Answer*
23 *Substate*.
- 24 16. Maintenance Required Order
- 25 17. Message Encryption Mode Order
- 26 18. Mobile Station Registered Message
- 27 19. Neighbor List Update Message
- 28 20. Parameter Update Order: see 2.3.12.1.3.
- 29 21. Pilot Measurement Request Order
- 30 22. Power Control Parameters Message
- 31 23. Release Order: The base station shall enter the *Release Substate*.
- 32 24. Retrieve Parameters Message
- 33 25. Send Burst DTMF Message
- 34 26. Service Option Control Order

- 1 27. Service Option Request Order
- 2 28. Service Option Response Order
- 3 29. Set Parameters Message
- 4 30. SSD Update Message
- 5 31. Status Request Order
- 6 • If the base station receives one of the following autonomous messages from the
- 7 mobile station, the base station shall process the message according to the specified
- 8 requirements, if any:
 - 9 1. Continuous DTMF Tone Order
 - 10 2. Data Burst Message
 - 11 3. Flash With Information Message
 - 12 4. Handoff Completion Message: The base station shall process the message as
 - 13 described in 7.6.6.2.2.3.
 - 14 5. Long Code Transition Request Order: The base station shall process the message
 - 15 as described in 7.6.4.1.5.
 - 16 6. Origination Continuation Message
 - 17 7. Parameter Update Confirmation Order
 - 18 8. Pilot Strength Measurement Message: The base station shall process the
 - 19 message as described in 7.6.6.2.2.1.
 - 20 9. Power Measurement Report Message: The base station may process the message
 - 21 as described in 7.6.4.1.1.
 - 22 10. Release Order: The base station shall send the mobile station a *Release Order*,
 - 23 within T_{2b} seconds, and enter the *Release Substate*, or the base station shall
 - 24 send an *Alert with Information Message*, within T_{2b} seconds, and enter the
 - 25 *Waiting for Answer Substate*.
 - 26 11. Request Analog Service Order: The base station may respond with an *Analog*
 - 27 *Handoff Direction Message*.
 - 28 12. Send Burst DTMF Message
 - 29 13. Service Option Control Order: The base station shall process the message as
 - 30 described in 7.6.4.1.2.2.3.
 - 31 14. Service Option Request Order: The base station shall process the message as
 - 32 described in 7.6.4.1.2.2.1.
 - 33 15. Service Option Response Order: The base station shall process the message as
 - 34 described in 7.6.4.1.2.2.2.

35 7.6.4.5 Release Substate

36 In this substate, the base station disconnects the call.

1 While in the *Release Substate*, the base station shall perform the following:

- 2 • The base station shall transmit the power control subchannel as specified in
3 7.1.3.1.7.
- 4 • The base station shall transmit null Traffic Channel data for at least T_{3b} seconds.
5 After this interval, the base station should stop transmitting on the Forward Traffic
6 Channel.
- 7 • The base station shall perform the message acknowledgement procedures as
8 specified in 7.6.4.1.3.
- 9 • The base station may perform Forward Traffic Channel power control as specified in
10 7.6.4.1.1.
- 11 • The base station may send the following messages. If the base station sends a
12 message, the base station shall comply with the specified requirements for sending
13 the message, if any.
 - 14 1. Alert With Information Message: If the message contains a signal information
15 record with the SIGNAL_TYPE field set to '01' or '10', or if the message does not
16 contain a signal information record, the base station shall enter the *Waiting for*
17 *Answer Substate*.
 - 18 2. Audit Order
 - 19 3. Base Station Acknowledgement Order
 - 20 4. Data Burst Message
 - 21 5. Handoff Direction Message
 - 22 6. In-Traffic System Parameters Message
 - 23 7. Local Control Order
 - 24 8. Lock Until Power-Cycled Order
 - 25 9. Maintenance Order: The base station shall enter the *Waiting for Answer*
26 *Substate*.
 - 27 10. Maintenance Required Order
 - 28 11. Mobile Station Registered Message
 - 29 12. Neighbor List Update Message
 - 30 13. Parameter Update Order
 - 31 14. Power Control Parameters Message
 - 32 15. Release Order
 - 33 16. Retrieve Parameters Message
 - 34 17. Service Option Control Order
 - 35 18. Status Request Order

- 1 • If the base station receives one of the following autonomous messages from the
2 mobile station, the base station shall process the message according to the specified
3 requirements, if any:
 - 4 1. Connect Order
 - 5 2. Continuous DTMF Tone Order
 - 6 3. Data Burst Message
 - 7 4. Flash With Information Message
 - 8 5. Handoff Completion Message: The base station shall process the message as
9 described in 7.6.6.2.2.3.
 - 10 6. Pilot Strength Measurement Message
 - 11 7. Power Measurement Report Message
 - 12 8. Long Code Transition Request Order
 - 13 9. Origination Continuation Message
 - 14 10. Release Order
 - 15 11. Request Analog Service Order
 - 16 12. Send Burst DTMF Message
 - 17 13. Service Option Control Order
 - 18 14. Service Option Request Order
 - 19 15. Service Option Response Order

20 7.6.5 Registration

21 Registration is the process by which a mobile station notifies the base station of its location,
22 status, identification, slot cycle, and other characteristics. The base station can make use
23 of location information to efficiently page the mobile station when establishing a mobile-
24 terminated call. Registration also provides the mobile station's SLOT_CYCLE_INDEX
25 parameter so that the base station can determine which Paging Channel slots a mobile
26 station operating in the slotted mode is monitoring. Registration also provides the station
27 class mark and protocol revision number so that the base station knows the capabilities of
28 the mobile station.

29 The CDMA system supports nine different forms of registration:

- 30 1. Power-up registration. The mobile station registers when it powers on, switches
31 from using the alternate serving system, or switches from using the analog system.
- 32 2. Power-down registration. The mobile station registers when it powers off if
33 previously registered in the current serving system.
- 34 3. Timer-based registration. The mobile station registers when a timer expires.

- 1 4. Distance-based registration. The mobile station registers when the distance
2 between the current base station and the base station in which it last registered
3 exceeds a threshold.
- 4 5. Zone-based registration. The mobile station registers when it enters a new zone.
- 5 6. Parameter-change registration. The mobile station registers when certain of its
6 stored parameters change.
- 7 7. Ordered registration. The mobile station registers when the base station requests
8 it.
- 9 8. Implicit registration. When a mobile station successfully sends an *Origination*
10 *Message* or *Page Response Message*, the base station can infer the mobile station's
11 location. This is considered an implicit registration.
- 12 9. Traffic Channel registration. Whenever the base station has registration
13 information for a mobile station that has been assigned to a Traffic Channel, the
14 base station can notify the mobile station that it is registered.

15 The first five forms of registration, as a group, are called autonomous registration and are
16 conditioned, in part, by roaming status and by indicators contained in the *System*
17 *Parameters Message* (see 6.6.5.3). The base station may initiate ordered registration
18 through an *Order Message*.

19 While a mobile station is assigned a Traffic Channel, the base station may obtain
20 registration information by using the *Status Request Order* to obtain *Status Messages* from
21 the mobile station. The base station may notify the mobile station that it is registered
22 through the *Mobile Station Registered Message*.

23 7.6.5.1 Registration on the Paging and Access Channels

24 The base station shall specify the forms of registration that are enabled, the corresponding
25 registration parameters, and the roaming status conditions for which registration is
26 enabled in the *System Parameters Message*. If any of the autonomous registration forms
27 are enabled, the base station should also enable parameter-based registration.

28 The base station should process an *Origination Message* or *Page Response Message* sent on
29 the Access Channel as an implicit registration of the mobile station sending the message.
30 The base station can obtain complete registration information about the mobile station at
31 any time by sending a *Registration Request Order* to the mobile station.

32 7.6.5.2 Registration on the Traffic Channels

33 The base station can obtain registration information from a mobile station on the traffic
34 channel by means of the *Status Request Order*. When the base station has registration data
35 for a mobile station, the base station may send a *Mobile Station Registered Message* to the
36 mobile station, specifying the base station's registration system, zone and location
37 information.

1 **7.6.6 Handoff Procedures**

2 **7.6.6.1 Overview**

3 **7.6.6.1.1 Types of Handoff**

4 **The base station supports the following three handoff procedures:**

- 5 • ***Soft Handoff:*** A handoff in which a new base station commences communications
6 with the mobile station without interrupting the communications with the old base
7 station. The base station¹³ can direct the mobile station to perform a soft handoff
8 only when all Forward Traffic Channels assigned to the mobile station have identical
9 frequency assignments. Soft handoff provides diversity of Forward Traffic Channels
10 and Reverse Traffic Channel paths on the boundaries between base stations.
- 11 • ***CDMA to CDMA Hard Handoff:*** A handoff in which the base station directs the
12 mobile station to transition between disjoint sets of base stations, different frequency
13 assignments, or different frame offsets.
- 14 • ***CDMA to Analog Handoff:*** A handoff in which the base station directs the mobile
15 station from a Forward Traffic Channel to an analog voice channel.

16 **Section 6.6.6 describes the mobile station requirements during handoff.**

17 **7.6.6.1.2 The Active Set**

18 **The Active Set contains the pilots (see 6.6.6.1.2) associated with the Forward Traffic**
19 **Channels assigned to the mobile station. The base station informs the mobile station of the**
20 **contents of the Active Set using the *Channel Assignment Message* and the *Handoff Direction***
21 ***Message*.**

22 **7.6.6.2 Requirements**

23 **7.6.6.2.1 Overhead Information**

24 **The base station sends the following messages governing the pilot search procedures**
25 **performed by the mobile station:**

- 26 • ***System Parameters Message***
- 27 • ***In-Traffic System Parameters Message***
- 28 • ***Neighbor List Message***
- 29 • ***Neighbor List Update Message***
- 30 • ***Handoff Direction Message***

¹³In this section the term base station may imply multiple cells or sectors.

1 7.6.6.2.1.1 System Parameters

2 The base station sends handoff related parameters on the Paging Channel in the *System*
3 *Parameters Message*.

4 The base station may revise handoff related parameters for a mobile station operating on
5 the Traffic Channel by sending the *In-Traffic System Parameters Message*.

6 The base station may also modify the values of the parameters SRCH_WIN_A, T_ADD,
7 T_DROP, T_COMP, and T_TDROP through the *Handoff Direction Message*.

8 7.6.6.2.1.2 Neighbor List

9 The base station sends a Neighbor List on the Paging Channel, in the *Neighbor List*
10 *Message*.

11 The base station may revise the Neighbor List for a mobile station operating on the Traffic
12 Channel by sending a *Neighbor List Update Message*.

13 The base station shall not include a pilot that is a member of the mobile station's Active Set
14 in a *Neighbor List Update Message*. The base station shall not specify more than N_{8m} pilots
15 in the *Neighbor List Message* or in the *Neighbor List Update Message*. The base station
16 should list the pilots in the *Neighbor List Update Message* in descending priority order (see
17 6.6.6.2.6.3).

18 7.6.6.2.2 Call Processing During Handoff**19 7.6.6.2.2.1 Processing the *Pilot Strength Measurement Message***

20 The base station should use the pilot strength measurements in the *Pilot Strength*
21 *Measurement Message* to determine a new Active Set.

22 The base station may also use the PN phase measurements in the *Pilot Strength*
23 *Measurement Message* to estimate the propagation delay to the mobile station. This
24 estimate can be used to reduce Reverse Traffic Channel acquisition time.

25 The base station may respond to a *Pilot Strength Measurement Message* received from the
26 mobile station by sending the *Handoff Direction Message*.

27 7.6.6.2.2.2 Processing the *Handoff Direction Message*

28 The base station shall maintain a *Handoff Direction Message* sequence number. The
29 sequence number shall be initialized to zero prior to the transmission of the first *Handoff*
30 *Direction Message* to the mobile station. The base station shall increment the sequence
31 number modulo 4 each time the base station modifies the pilot list (including the order in
32 which pilots are specified within the list) sent to the mobile station in a *Handoff Direction*
33 *Message*.

34 Following a hard handoff, the base station should set the *Handoff Direction Message*
35 sequence number to the value of the LAST_HDM_SEQ field of the *Handoff Completion*
36 *Message* and should use the pilot order contained in the *Handoff Completion Message* to
37 interpret the contents of subsequent *Power Measurement Report Messages*.

1 The base station shall set the contents of a *Handoff Direction Message* according to the
2 following rules:

- 3 • A *Handoff Direction Message* shall list no more than N_{6m} pilots in the new Active Set.
- 4 • A *Handoff Direction Message* shall identify the identical power control subchannels
5 (i.e., those carrying identical power control symbols).
- 6 • When the CDMA frequency assignment is not changed, the *Handoff Direction*
7 *Message* shall not change the code channel associated with an Active Set pilot that
8 remains in the new Active Set.
- 9 • The base station specifies the long code mask to be used on the new Forward Traffic
10 Channel by using the PRIVATE_LCM field of the *Handoff Direction Message*. The
11 base station may change the contents of this field only for CDMA to CDMA hard
12 handoffs. If a change of long code mask is specified and the base station does not
13 specify an explicit action time in the *Handoff Direction Message*, the base station
14 shall begin using the new long code mask on the first 80 ms boundary (relative to
15 System Time) occurring at least 80 ms after the end of the frame containing the last
16 bit of the message.
- 17 • For CDMA to CDMA hard handoffs, the base station may require the mobile station
18 to perform a reset of the acknowledgement procedures by using the RESET_L2 field
19 of the *Handoff Direction Message*. If the base station requires the mobile station to
20 reset the acknowledgement procedures, the base station shall also reset the
21 acknowledgement procedures, as specified in 7.6.4.1.3.3.
- 22 • For CDMA to CDMA hard handoffs, the base station may alter the frame offset by
23 setting the FRAME_OFFSET field to a new value. If the base station specifies a new
24 frame offset and does not specify an explicit action time, the base station shall
25 change its Forward and Reverse Traffic Channel frame offsets at the second 80 ms
26 boundary (relative to System Time) after the end of transmission of the *Handoff*
27 *Direction Message*, unless the end of transmission of the message coincides with an
28 80 ms boundary, in which case the change in frame offsets shall occur 80 ms after
29 the end of transmission.

30 7.6.6.2.2.3 Transmitting During Handoff

31 The base station shall continue transmission to the mobile station on a Forward Traffic
32 Channel removed from the Active Set until it receives the *Handoff Completion Message* from
33 the mobile station or determines that the call has been released.

34 The base station shall discontinue transmission to the mobile station on a Forward Traffic
35 Channel removed from the Active Set after it receives the *Handoff Completion Message*.

36 7.6.6.2.2.4 Ordering Pilot Measurements From the Mobile Station

37 The base station may direct the mobile station to send a *Pilot Strength Measurement*
38 *Message* by sending a *Pilot Measurement Request Order*.

7.6.6.2.3 Active Set Maintenance

The base station shall maintain an Active Set for each mobile station under its control as follows:

- When the base station sends the *Channel Assignment Message* it shall initialize the Active Set to contain only the pilot associated with the assigned Forward Traffic Channel.
- When the base station sends a *Handoff Direction Message* it shall add to the Active Set, before the action time of the message, all pilots named in the message, if they are not already in the Active Set.
- The base station shall delete the pilots that were not named in the most recent *Handoff Direction Message* from the Active Set upon receipt of the *Handoff Completion Message*.

7.6.6.2.4 Soft Handoff

The base station should use soft handoff when directing a mobile station from one Forward Traffic Channel to another Forward Traffic Channel having the same frequency assignment.

7.6.6.2.4.1 Receiving During Soft Handoff

Each base station in the Active Set shall demodulate the Reverse Traffic Channel. The base station should provide diversity combining of the demodulated signals obtained by each base station in the Active Set.

7.6.6.2.4.2 Transmitting During Soft Handoff

The base station shall begin transmitting identical modulation symbols on all Forward Traffic Channels specified in a *Handoff Direction Message* (with the possible exception of the power control subchannel) by the action time of the message.

The base station shall transmit identical power control symbols on all identical power control subchannels that were identified as such in the last *Handoff Direction Message*.

The base station shall use the same long code mask on the Reverse Traffic Channel and on all Forward Traffic Channels whose associated pilots are in the Active Set.

7.6.6.2.5 CDMA to Analog Hard Handoff

The base station may direct the mobile station to perform a handoff from the CDMA system to the analog system by sending an *Analog Handoff Direction Message*.

1 **7.7 Signaling Formats**

2 The following sections specify the requirements on the signaling message formats
3 transmitted on the Sync Channel, the Paging Channel, and the Traffic Channel.

4 In any multi-bit field in the following messages, the most significant bit (MSB) shall be
5 transmitted first.

6 **7.7.1 Sync Channel**

7 The sync channel is used to provide time and frame synchronization to the mobile station.
8 Only one message, the *Sync Channel Message*, is sent on the Sync Channel.

9 **7.7.1.1 Sync Channel Structure**

10 The Sync Channel is divided into 80 ms superframes (see 7.1.3.3.2). Each superframe is
11 divided into three 26.666... ms frames. The first bit of each frame is a SOM Bit, and the
12 remaining bits in the frame comprise the Sync Channel frame body.

13 A Sync Channel message capsule is composed of a Sync Channel message and padding. A
14 Sync Channel message consists of a length field, a message body, and a CRC field. Padding
15 consists of zero or more bits.

16 Sync Channel message capsules shall begin with the first bit of the first Sync Channel
17 frame body of a Sync Channel superframe. The base station shall set the SOM Bit
18 immediately preceding the beginning of a Sync Channel message capsule to '1', and shall
19 set all other SOM Bits to '0'. The base station shall transmit the Sync Channel message in
20 consecutive Sync Channel frame bodies. The base station shall include sufficient padding
21 bits in each Sync Channel message capsule to extend it through the bit preceding the SOM
22 Bit at the beginning of the next Sync Channel superframe. The base station shall begin a
23 new Sync Channel message capsule in the first Sync Channel frame of that superframe.

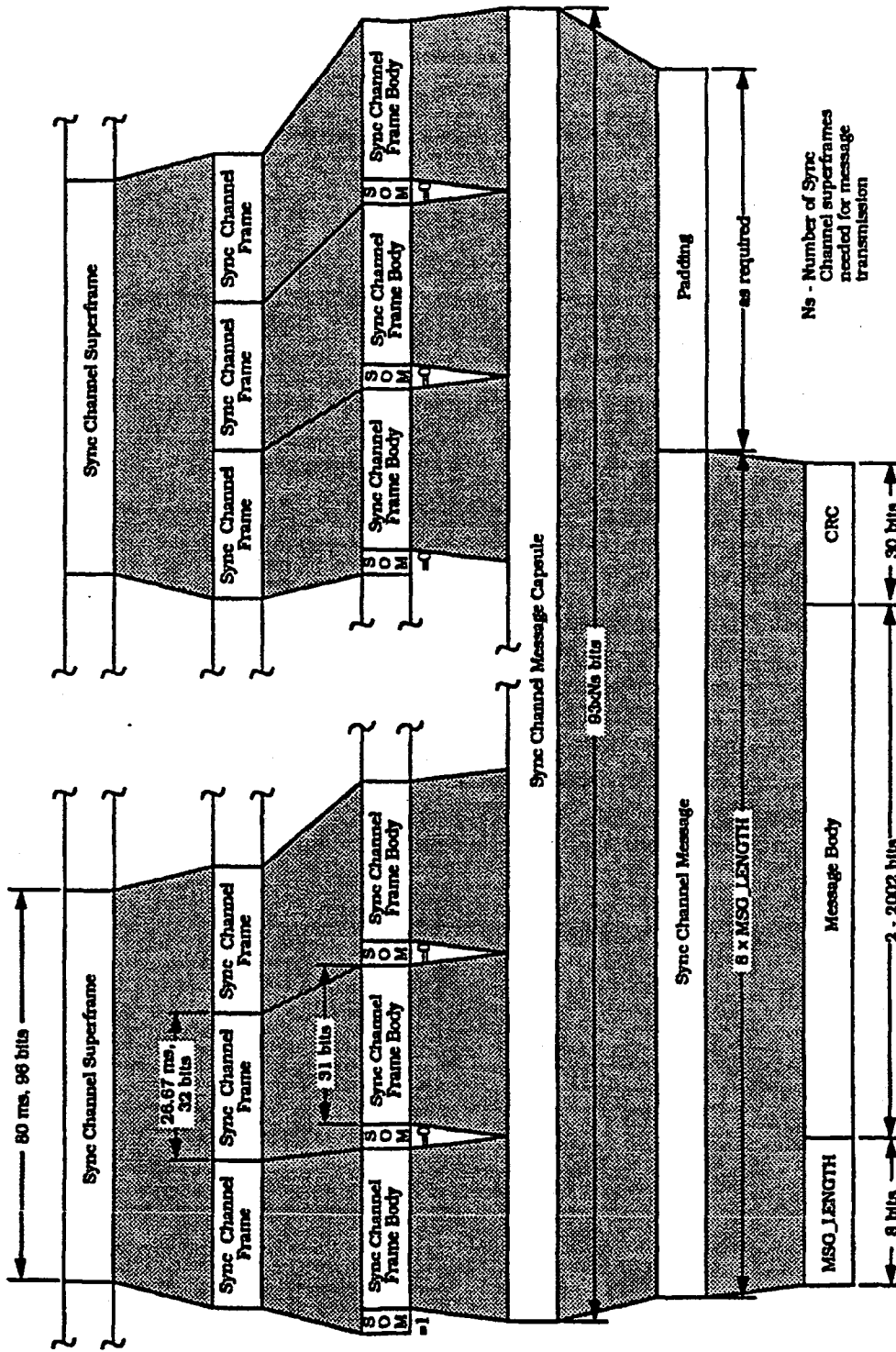


Figure 7.7.1.1-1. Sync Channel Structure (1200 bps) Example

1 **7.7.1.2 Sync Channel Message Structure**

2 The *Sync Channel Message* shall consist of an 8-bit MSG_LENGTH field, a *Sync Channel*
 3 *Message* body field, and a CRC field. Padding bits shall be appended to the end of the *Sync*
 4 *Channel Message* so that the total of the *Sync Channel Message* length added to the length
 5 of the padding bits shall be equal to an integer multiple of 93 bits. Padding bits shall be set
 6 to '0'.

7 **7.7.1.2.1 Sync Channel MSG_LENGTH Field**

8 The base station shall set the MSG_LENGTH field of the *Sync Channel Message* to the
 9 length of the *Sync Channel Message* in octets, including the MSG_LENGTH field, the *Sync*
 10 *Channel Message* body, and the CRC. The MSG_LENGTH field shall be 8 bits in length.
 11 The base station shall limit the maximum *Sync Channel Message* length to 148 octets, or
 12 1184 bits. That is, the value of the MSG_LENGTH field shall not exceed 148.

13 **7.7.1.2.2 Sync Channel Signaling Message CRC**

14 A 30-bit CRC shall be computed for each *Sync Channel Message*. The CRC includes the
 15 MSG_LENGTH field and the message body field. The generator polynomial for the CRC
 16 shall be as follows:

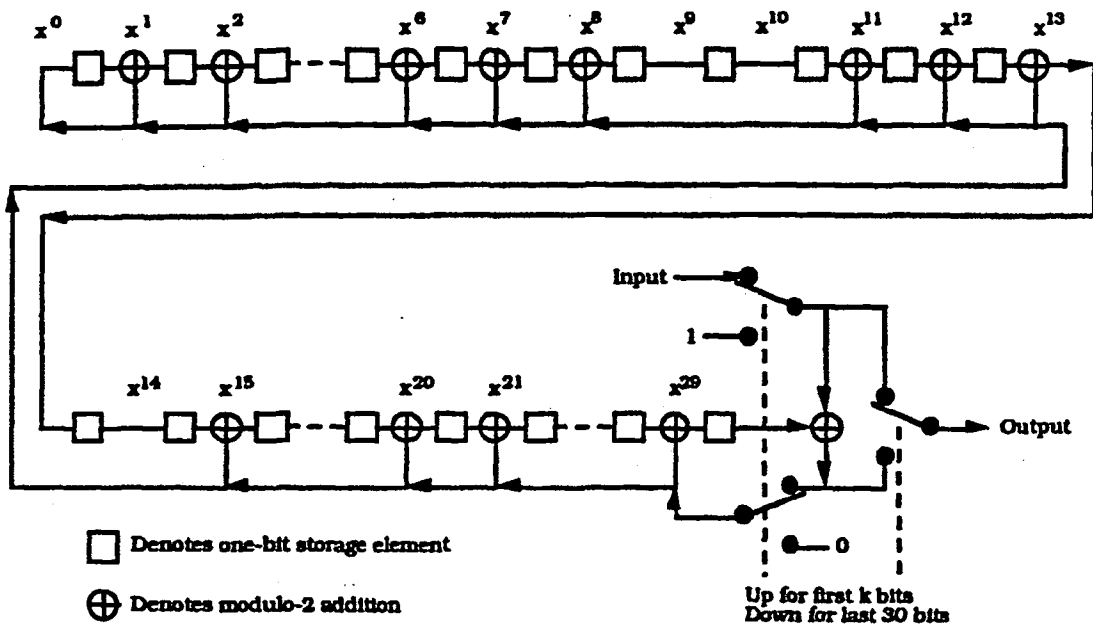
17
$$g(x) = x^{30} + x^{29} + x^{21} + x^{20} + x^{15} + x^{13} + x^{12} + x^{11} + x^8 + x^7 + x^6 + x^2 + x + 1.$$

18 The following procedure and the logic shown in Figure 7.7.1.2.2-1 (or equivalent) shall be
 19 used to compute the CRC:

- 20 • All shift register elements shall be initialized to logical one.¹⁴
- 21 • The switches shall be set in the up position.
- 22 • The information bit count k shall be defined as 8 + message body length in bits.
- 23 • The register shall be clocked k times, with the length and message body fields of the
 24 message as the k input bits.
- 25 • The switches shall be set in the down position.
- 26 • The register shall be clocked an additional 30 times.
- 27 • The 30 additional output bits shall be the CRC field.
- 28 • The bits shall be transmitted in the order in which they appear at the output of the
 29 CRC encoder.

¹⁴Initialization of the register to ones causes the CRC for all-zero data to be non-zero.

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Figure 7.7.1.2.2-1. Sync Channel CRC Calculation

1 **7.7.1.3 Sync Channel Message Body Format**

2 When the base station sends a *Sync Channel Message*, it shall use the following fixed-
 3 length message format:

Field	Length (bits)
MSG_TYPE ('00000001')	8
P_REV	8
MIN_P_REV	8
SID	15
NID	16
PILOT_PN	9
LC_STATE	42
SYS_TIME	36
LP_SEC	8
LTM_OFF	6
DAYLT	1
PRAT	2
RESERVED	3

- 5
- 6 **MSG_TYPE** - Message type.
 7 The base station shall set this field to '00000001'.
- 8 **P_REV** - Protocol revision level.
 9 The base station shall set this field to '00000001'.
- 10 **MIN_P_REV** - Minimum protocol revision level.
 11 Only mobile stations that support revision numbers greater
 12 than or equal to this field access the system.
 13 The base station shall set this field to the minimum protocol
 14 revision level that it supports.¹⁵
- 15 **SID** - System identification.
 16 The base station shall set this field to the system identification
 17 number for this cellular system.

¹⁵It is intended that all future revisions of this specification be backward compatible. However, if a future revision is not compatible, the MIN_P_REV level field allows the protocol to be upgraded, preventing incompatible mobile stations from attempting system acquisition.

- 1 **NID** - Network identification.
- 2 This field serves as a sub-identifier of a system as defined by
- 3 the owner of the SID.
- 4 The base station shall set this field to the network
- 5 identification number for this network. The NID value of
- 6 65,535 is reserved.
- 7 **PILOT_PN** - Pilot PN sequence offset index.
- 8 The base station shall set this field to the pilot PN sequence
- 9 offset for this base station, in units of 64 PN chips.
- 10 **LC_STATE** - Long code state.
- 11 The base station shall set this field to the long code state at
- 12 the time given by the **SYS_TIME** field of this message.
- 13 **SYS_TIME** - System time.
- 14 The base station shall set this field to the System Time as of
- 15 four Sync Channel superframes (320 ms) after the end of the
- 16 last superframe containing any part of this *Sync Channel*
- 17 *Message*, minus the pilot PN sequence offset, in units of 80
- 18 ms (see 1.2).
- 19 **LP_SEC** - The number of leap seconds that have occurred since the start
- 20 of System Time.
- 21 The base station shall set this field to the number of leap
- 22 seconds that have occurred since the start of System Time, as
- 23 of the time given by the **SYS_TIME** field of this message.
- 24 **LTM_OFF** - Offset of local time from System Time.
- 25 The current local time of day is equal to **SYS_TIME** - **LP_SEC** +
- 26 **LTM_OFF**.
- 27 The base station shall set this field to the two's complement
- 28 offset of local time from System Time, in units of 30 minutes.
- 29 **DAYLT** - Daylight savings time indicator.
- 30 If the daylight savings time is in effect, the base station shall
- 31 set this field to '1'. Otherwise, the base station shall set this
- 32 field to '0'.
- 33 **PRAT** - Paging Channel data rate.
- 34 The base station shall set this field to the **PRAT** field value
- 35 shown in Table 7.7.1.3-1 corresponding to the data rate used
- 36 by the Paging Channels in the system.
- 37

Table 7.7.1.3-1. Paging Channel Data Rate

PRAT Field (binary)	Paging Channel data rate
00	9600 bps
01	4800 bps
10	Reserved
11	Reserved

2

3

RESERVED - Reserved bits.

4

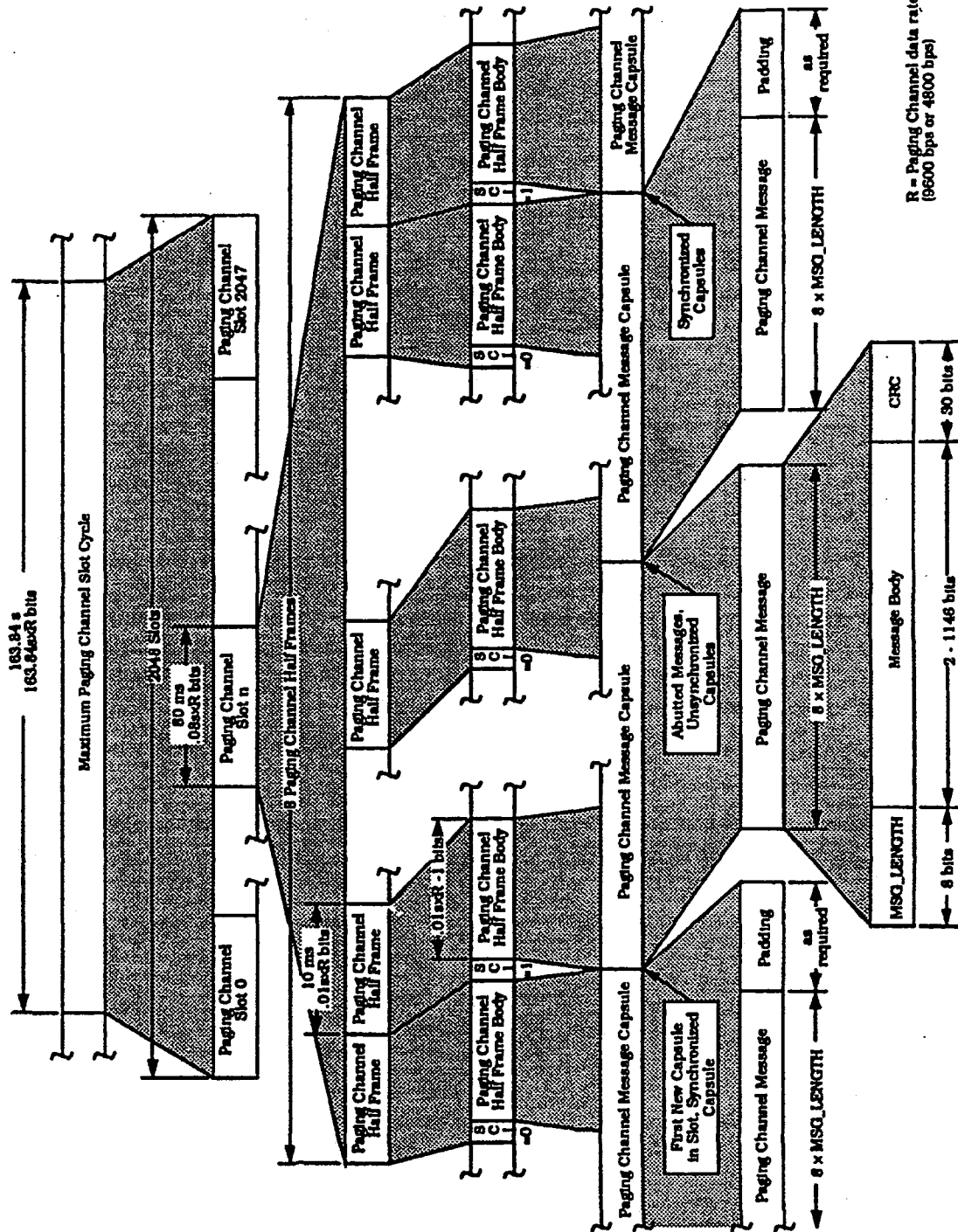
The base station shall set this field to '000'.

1 7.7.2 Paging Channel

**2 The Paging Channel is used to send control information to mobile stations that have not
3 been assigned to a Traffic Channel.**

4 7.7.2.1 Paging Channel Structure**5 7.7.2.1.1 Paging Channel Slot Structure**

**6 The Paging Channel is divided into 80 ms slots. The slots are grouped into cycles of 2048
7 slots (163.84 seconds) referred to as maximum slot cycles. Each maximum slot cycle
8 begins at the start of the frame when System Time, in units of 80 ms, modulo 2048 is zero.
9 The slots of each maximum slot cycle are numbered from 0 to 2047, as shown in Figure
10 7.7.2.1.1-1. A mobile station operating in the slotted mode monitors the Paging Channel
11 using a slot cycle with a length that is a submultiple of the maximum slot cycle length (see
12 6.6.2.1.1.3).**



R = Paging Channel data rate (9600 bps or 4800 bps)

Figure 7.7.2.1.1-1. Paging Channel Structure Example

7.7.2.1.2 Paging Channel Message Capsule Structure

Each 80 ms slot is composed of four Paging Channel frames, each 20 ms in length. As shown in Figure 7.7.2.1.1-1, a 20 ms long Paging Channel frame is divided into 10 ms long Paging Channel half frames. The first bit in any Paging Channel half frame is an SCI (Synchronized Capsule Indicator) Bit.

A Paging Channel message capsule is composed of a Paging Channel message and padding. A Paging Channel message consists of a length field, a message body, and a CRC field. Padding consists of zero or more bits.

The base station may transmit synchronized or unsynchronized Paging Channel message capsules. A synchronized message capsule starts on the second bit of a Paging Channel half frame. An unsynchronized message capsule begins immediately after the previous message capsule.

If after the end of a Paging Channel message there remain 8 bits or more¹⁶ before the next SCI Bit, the base station may transmit an unsynchronized message capsule immediately following that message. The base station shall not include any padding bits in a Paging Channel message capsule that is followed by an unsynchronized Paging Channel message capsule.

If after the end of a Paging Channel message there remain fewer than 8 bits before the next SCI Bit, or if no unsynchronized message capsule is transmitted following a Paging Channel message capsule, the base station shall include sufficient padding bits in that message capsule to extend it through the bit preceding the next SCI Bit, and the base station shall transmit a synchronized message capsule immediately following that SCI Bit.¹⁷ The base station shall set all padding bits to '0'.

When a message capsule immediately follows an SCI Bit, the base station shall set that SCI Bit to '1'. The base station shall set all other SCI Bits to '0'.

The base station shall transmit the first message that begins in each Paging Channel slot in a synchronized message capsule.¹⁸

¹⁶This restriction permits the mobile station to determine whether an unsynchronized message is being transmitted by checking the first 8 bits after the end of the message for a non-zero MSG_LENGTH value.

¹⁷This implies that all bits transmitted on the Paging Channel are either SCI bits or are part of a message capsule.

¹⁸This permits mobile stations operating in the slotted mode to obtain synchronization immediately after becoming active.

1 **7.7.2.2 Paging Channel Message Structure**

2 **7.7.2.2.1 Paging Channel MSG_LENGTH Field**

3 The base station shall set the MSG_LENGTH field of each Paging Channel message to the
 4 length of the message in octets, including the MSG_LENGTH field, the message body, and
 5 the CRC. The MSG_LENGTH field shall be 8 bits in length. The base station shall limit the
 6 maximum Paging Channel message length to 148 octets, or 1184 bits. That is, the value of
 7 the MSG_LENGTH field shall not exceed 148.

8 **7.7.2.2.2 Paging Channel Message CRC**

9 A 30-bit CRC shall be computed for each Paging Channel signaling message. The CRC
 10 shall include the MSG_LENGTH field and the message body field. The generator polynomial
 11 for the CRC shall be as follows:

$$12 \quad g(x) = x^{30} + x^{29} + x^{21} + x^{20} + x^{15} + x^{13} + x^{12} + x^{11} + x^8 + x^7 + x^6 + x^2 + x + 1.$$

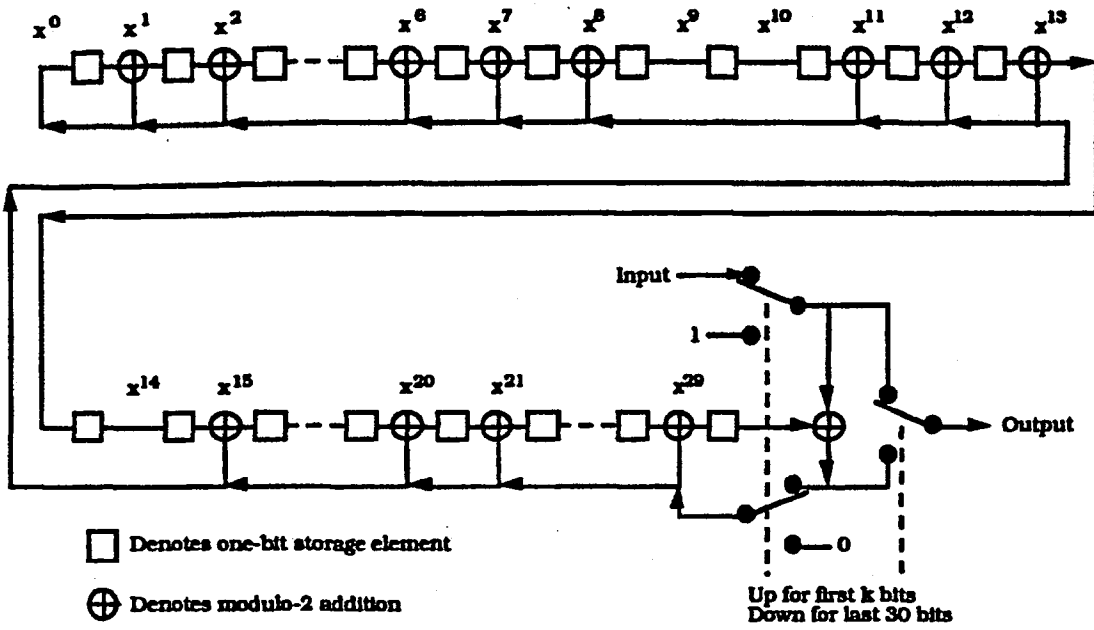
13 The CRC shall be the value computed by the following procedure and the logic shown in
 14 Figure 7.7.2.2.2-1:

- 15 • All shift register elements shall be initialized to logical one.¹⁹
- 16 • The switches shall be set in the up position.
- 17 • The information bit count k shall be defined as 8 + message body length in bits.
- 18 • The register shall be clocked k times, with the length and message body fields of the
 19 message as the k input bits.
- 20 • The switches shall be set in the down position.
- 21 • The register shall be clocked an additional 30 times.
- 22 • The 30 additional output bits shall be the CRC field.
- 23 • The bits shall be transmitted in the order in which they appear at the output of the
 24 CRC encoder.

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¹⁹Initialization of the register to ones causes the CRC for all-zero data to be non-zero.

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Figure 7.7.2.2-1. Paging Channel CRC Calculation

1 **7.7.2.3 Paging Channel Message Body Format**

- 2 The Paging Channel messages are summarized in Table 7.7.2.3-1. Paging Channel
 3 messages are grouped into the message groups shown in the table. Messages of each group
 4 are sent either periodically or on an as-needed basis.

5

6

Table 7.7.2.3-1. Paging Channel Messages

Message Name	Message Type (binary)
<i>System Parameters Message</i>	00000001
<i>Access Parameters Message</i>	00000010
<i>Neighbor List Message</i>	00000011
<i>CDMA Channel List Message</i>	00000100
<i>Slotted Page Message</i>	00000101
<i>Page Message</i>	00000110
<i>Order Message</i>	00000111
<i>Channel Assignment Message</i>	00001000
<i>Data Burst Message</i>	00001001
<i>Authentication Challenge Message</i>	00001010
<i>SSD Update Message</i>	00001011
<i>Feature Notification Message</i>	00001100
<i>Null Message</i>	--

7

1 **7.7.2.3.1 Common Fields**

2 Many Paging Channel messages include the following common fields defining the mobile
3 station to which the message is addressed.

4 **ADDR_TYPE** - Address field type.

5 The base station shall set this field to the value shown in
6 Table 7.7.2.3.1-1 corresponding to the address type contained
7 in the ADDRESS field.

8 **Table 7.7.2.3.1-1. Address Types**

Description	ADDR_TYPE (binary)	ADDR_LEN (octets)
MIN (MIN1 and MIN2)	000	5
ESN	001	4
All other ADDR_TYPE values are reserved		

10
11 **ADDR_LEN** - Address field length.

12 The base station shall set this field to the number of octets in
13 the ADDRESS field.

14 **ADDRESS** - Mobile station address.

15 The base station shall set this field to the mobile station
16 address, using the address type specified in the ADDR_TYPE
17 field.

18
19 If ADDR_TYPE is equal to '000', the ADDRESS field shall
20 consist of the following subfields:

Subfield	Length (bits)
MIN1	24
MIN2	10
RESERVED	6

21 **MIN1** - First part of the mobile identification number (MIN).

22 The base station shall set this subfield to the MIN1 value for
23 the MIN specified by this address field (see 2.3.1).

24 **MIN2** - Second part of the mobile identification number (MIN).

25 The base station shall set this subfield to the MIN2 value for
26 the MIN specified by this address field (see 2.3.1).

- 1 **RESERVED** - Reserved bits.
 2 The base station shall set this field to '000000'.
 3

- 4 If ADDR_TYPE is equal to '001', the ADDRESS field shall
 5 consist of the following subfield:

Subfield	Length (bits)
ESN	32

- 6 **ESN** - Mobile station's electronic serial number.
 7 The base station shall set this field to the electronic serial
 8 number of the mobile station to which this message is
 9 addressed.

10 **7.7.2.3.2 Message Body Contents**

- 11 The following sections specify the contents of the message body for each message that may
 12 be sent on the Paging Channel.

- 1 7.7.2.3.2.1 System Parameters Message
- 2 When the base station sends a *System Parameters Message*, it shall use the following fixed-
- 3 length message format:

Field	Length (bits)
MSG_TYPE ('00000001')	8
PILOT_PN	9
CONFIG_MSG_SEQ	6
SID	15
NID	16
REG_ZONE	12
TOTAL_ZONES	3
ZONE_TIMER	3
MULT_SIDS	1
MULT_NIDS	1
BASE_ID	16
BASE_CLASS	4
PAGE_CHAN	3
MAX_SLOT_CYCLE_INDEX	3
HOME_REG	1
FOR_SID_REG	1
FOR_NID_REG	1
POWER_UP_REG	1
POWER_DOWN_REG	1
PARAMETER_REG	1
REG_PRD	7
BASE_LAT	22
BASE_LONG	23
REG_DIST	11
SRCH_WIN_A	4

(continues on next page)

Field	Length (bits)
SRCH_WIN_N	4
SRCH_WIN_R	4
NGHBR_MAX_AGE	4
PWR_REP_THRESH	5
PWR_REP_FRAMES	4
PWR_THRESH_ENABLE	1
PWR_PERIOD_ENABLE	1
PWR_REP_DELAY	5
RESCAN	1
T_ADD	6
T_DROP	6
T_COMP	4
T_TDROP	4
RESERVED	4

- 2
- 3 **MSG_TYPE** - Message type.
- 4 The base station shall set this field to '00000001'.
- 5 **PILOT_PN** - Pilot PN sequence offset index.
- 6 The base station shall set this field to the pilot PN sequence
- 7 offset for this base station, in units of 64 PN chips.
- 8 **CONFIG_MSG_SEQ** - Configuration message sequence number.
- 9 The base station shall set this field to CONFIG_SEQ
- 10 [see 7.6.2.2).
- 11 **SID** - System identification.
- 12 The base station shall set this field to the system identification
- 13 number for this cellular system.
- 14 **NID** - Network identification.
- 15 This field serves as a sub-identifier of a system as defined by
- 16 the owner of the SID.
- 17 The base station shall set this field to the network
- 18 identification number for this network. The NID value of
- 19 65,535 is reserved.
- 20 **REG_ZONE** - Registration zone.
- 21 The base station shall set this field to its registration zone
- 22 number (see 6.6.5.1.5).

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- TOTAL_ZONES** - Number of registration zones to be retained.
The base station shall set this field to the number of registration zones the mobile station is to retain for purposes of zone-based registration (see 6.6.5.1.5).
If zone-based registration is to be disabled, the base station shall set this field to '000'.
- ZONE_TIMER** - Zone timer length.
The base station shall set this field to the ZONE_TIMER value shown in Table 7.7.2.3.2.1-1 corresponding to the length of the zone registration timer to be used by mobile stations.

Table 7.7.2.3.2.1-1. Value of Zone Timer

ZONE_TIMER Value (binary)	Timer Length (Minutes)
000	1
001	2
010	5
011	10
100	20
101	30
110	45
111	60

- MULT_SIDS** - Multiple SID storage indicator.
If mobile stations may store entries of SID_NID_LIST containing different SIDs, the base station shall set this field to '1'; otherwise the base station shall set this field to '0'.
- MULT_NIDS** - Multiple NID storage indicator.
If mobile stations may store multiple entries of SID_NID_LIST having the same SID (with different NIDs), the base station shall set this field to '1'; otherwise the base station shall set this field to '0'.
- BASE_ID** - Base station identification.
The base station shall set this field to its identification number.
- BASE_CLASS** - Base station class.
The base station shall set this field to the value shown in Table 7.7.2.3.2.1-2 corresponding to the class of service provided by this base station.

Table 7.7.2.3.2.1-2. Base Station Classes

Value (binary)	Class of Service Provided
0000	Public Macrocellular System
All other values are reserved.	

- 1
2
- 3
- 4 **PAGE_CHAN** - Number of Paging Channels.
5 The base station shall set this field to the number of Paging
6 Channels on this CDMA Channel. The base station shall not
7 set this field to '000'.
- 8 **MAX_SLOT_CYCLE-** - Maximum slot cycle index.
9 **_INDEX** The base station shall set this field to the
10 **SLOT_CYCLE_INDEX** value corresponding to the maximum
11 slot cycle length permitted (see 6.6.2.1.1).
- 12 **HOME_REG** - Home registration indicator.
13 If mobile stations that are not roaming (see 6.6.5.3) and have
14 **MOB_TERM_HOME** equal to '1' are to be enabled for
15 autonomous registrations, the base station shall set this field
16 to '1'. If such mobile stations are not to be enabled for
17 autonomous registration, the base station shall set this field
18 to '0'.
- 19 **FOR_SID_REG** - SID roamer registration indicator.
20 If mobile stations that are foreign SID roamers (see 6.6.5.3)
21 and have **MOB_TERM_FOR_SID** equal to '1' are to be enabled
22 for autonomous registration, the base station shall set this
23 field to '1'. If such mobile stations are not to be enabled for
24 autonomous registration, the base station shall set this field
25 to '0'.
- 26 **FOR_NID_REG** - NID roamer registration indicator.
27 If mobile stations that are foreign NID roamers (see 6.6.5.3)
28 and have **MOB_TERM_FOR_NID** equal to '1' are to be enabled
29 for autonomous registration, the base station shall set this
30 field to '1'. If such mobile stations are not to be enabled for
31 autonomous registration, the base station shall set this field
32 to '0'.
- 33 **POWER_UP_REG** - Power-up registration indicator.
34 If mobile stations enabled for autonomous registration are to
35 register immediately after powering on and receiving the
36 system overhead messages, the base station shall set this field
37 to '1'. Otherwise, the base station shall set this field to '0'.

- 1 **POWER_DOWN_REG** - Power-down registration indicator.
2 If mobile stations enabled for autonomous registration are to
3 register immediately before powering down, the base station
4 shall set this field to '1'. Otherwise, the base station shall set
5 this field to '0'.
- 6 **PARAMETER_REG** - Parameter-change registration indicator.
7 If mobile stations are to register on parameter change events
8 as specified in 6.6.5.1.6, the base station shall set this field to
9 '1'. If not, the base station shall set this field to '0'.
- 10 **REG_PRD** - Registration period.
11 If mobile stations are not to perform timer-based registration,
12 the base station shall set this field to '000000'. If mobile
13 stations are to perform timer-based registration, the base
14 station shall set this field to the value in the range 29 to 85
15 inclusive, such that the desired timer value is
16
17
$$[\lceil 2\text{REG_PRD}/4 \rceil] \times 0.08 \text{ seconds.}$$
- 18 **BASE_LAT** - Base station latitude.
19 The base station shall set this field to its latitude in units of
20 0.25 second, expressed as a two's complement signed number
21 with positive numbers signifying North latitudes.
- 22 **BASE_LONG** - Base station longitude.
23 The base station shall set this field to its longitude in units of
24 0.25 second, expressed as a two's complement signed number
25 with positive numbers signifying East longitude.
- 26 **REG_DIST** - Registration distance.
27 If mobile stations are to perform distance-based registration,
28 the base station shall set this field to the non-zero "distance"
29 beyond which the mobile station is to re-register (see
30 6.6.5.1.4). If mobile stations are not to perform distance-
31 based registration, the base station shall set this field to 0.
- 32 **SRCH_WIN_A** - Search window size for the Active Set and Candidate Set.
33 The base station shall set this field to the value shown in
34 Table 6.6.6.2.1-1 corresponding to the search window size to
35 be used by mobile stations for the Active Set and Candidate
36 Set.
- 37 **SRCH_WIN_N** - Search window size for the Neighbor Set.
38 The base station shall set this field to the value shown in
39 Table 6.6.6.2.1-1 corresponding to the search window size to
40 be used by mobile stations for the Neighbor Set.
- 41 **SRCH_WIN_R** - Search window size for the Remaining Set.
42 The base station shall set this field to the value shown in
43 Table 6.6.6.2.1-1 corresponding to the search window size to
44 be used by mobile stations for the Remaining Set.

- 1 **NGHBR_MAX_AGE** - Neighbor Set maximum AGE.
2
3 The base station shall set this field to the maximum AGE
4 value beyond which mobile stations are to drop members from
5 the Neighbor Set (see 6.6.6.2.6.3).
- 6 **PWR_REP_THRESH** - Power control reporting threshold.
7
8 The base station shall set this field to the number of bad
9 frames (see 6.2.2.2) to be received in a measurement period
10 before mobile stations are to generate a *Power Measurement*
11 *Report Message* (see 6.6.4.1.1). If the base station sets
12 **PWR_THRESH_ENABLE** to '1', it shall not set this field to
13 '00000'.
- 14 **PWR_REP_FRAMES** - Power control reporting frame count.
15
16 The base station shall set this field to the value such that the
17 number given by
18
$$\lfloor 2(\text{PWR_REP_FRAMES}/2) \times 5 \rfloor$$

19 frames
20 is the number of frames over which mobile stations are to
21 count frame errors.
- 22 **PWR_THRESH-** - Threshold report mode indicator.
23 **_ENABLE** If mobile stations are to generate threshold *Power*
24 *Measurement Report Messages*, the base station shall set this
25 field to '1'. If mobile stations are not to generate threshold
26 *Power Measurement Report Messages*, the base station shall
27 set this field to '0'.
- 28 **PWR_PERIOD-** - Threshold report mode indicator.
29 **_ENABLE** If mobile stations are to generate periodic *Power Measurement*
30 *Report Messages*, the base station shall set this field to '1'. If
31 mobile stations are not to generate periodic *Power*
32 *Measurement Report Messages*, the base station shall set this
33 field to '0'.
- 34 **PWR_REP_DELAY** - Power report delay.
35
36 The period that mobile stations wait following a *Power*
37 *Measurement Report Message* before restarting frame counting
38 for power control purposes.
39 The base station shall set this field to the power report delay
40 value, in units of 4 frames (see 6.6.4.1.1).
- 41 **RESCAN** - Rescan indicator.
42
43 If mobile stations are to re-initialize and re-acquire the system
44 upon receiving this message, the base station shall set this
 field to '1'. Otherwise, the base station shall set this field
 to '0'.
- 45 **T_ADD** - Pilot detection threshold.
46
47 This value is used by mobile stations to trigger the sending of
48 the *Pilot Strength Measurement Message* initiating the handoff
49 process (see 6.6.6).
50

- 1 The base station shall set this field to the pilot detection
2 threshold, expressed as an unsigned binary number equal to
3 $\lfloor -2 \times 10 \times \log_{10} E_c/I_0 \rfloor$.
- 4 **T_DROP** - Pilot drop threshold.
- 5 This value is used by mobile stations to start a handoff drop
6 timer for pilots in the Active Set and the Candidate Set (see
7 6.6.6.2.3).
- 8 The base station shall set this field to the pilot drop threshold,
9 expressed as an unsigned binary number equal to
10 $\lfloor -2 \times 10 \times \log_{10} E_c/I_0 \rfloor$.
- 11 **T_COMP** - Active Set versus Candidate Set comparison threshold.
- 12 Mobile stations transmit a *Pilot Strength Measurement*
13 *Message* when the strength of a pilot in the Candidate Set
14 exceeds that of a pilot in the Active Set by this margin (see
15 6.6.6.2.5.2).
- 16 The base station shall set this field to the threshold Candidate
17 Set pilot to Active Set pilot ratio, in units of 0.5 dB.
- 18 **T_TDROP** - Drop timer value.
- 19 Timer value after which an action is taken by mobile stations
20 for a pilot that is a member of the Active Set or Candidate Set,
21 and whose strength has not become greater than T_DROP. If
22 the pilot is a member of the Active Set, a *Pilot Strength*
23 *Measurement Message* is issued. If the pilot is a member of
24 the Candidate Set, it will be moved to the Neighbor Set.
- 25 The base station shall set this field to the T_TDROP value
26 shown in Table 6.6.6.2.3-1 corresponding to the drop timer
27 value to be used by mobile stations.
- 28 **RESERVED** - Reserved bits.
- 29 The base station shall set this field to '0000'.

1 **7.7.2.3.2.2 Access Parameters Message**

- 2 **The Access Parameters Message defines the parameters used by mobile stations when**
 3 **transmitting to the base station on an Access Channel. When the base station sends an**
 4 **Access Parameters Message, it shall use the following variable-length message format:**

Field	Length (bits)
MSG_TYPE ('00000010')	8
PILOT_PN	9
ACC_MSG_SEQ	6
ACC_CHAN	5
NOM_PWR	4
INIT_PWR	5
PWR_STEP	3
NUM_STEP	4
MAX_CAP_SZ	3
PAM_SZ	4
PSIST(0-9)	6
PSIST(10)	3
PSIST(11)	3
PSIST(12)	3
PSIST(13)	3
PSIST(14)	3
PSIST(15)	3
MSG_PSIST	3
REG_PSIST	3
PROBE_PN_RAN	4
ACC_TMO	4
PROBE_BKOFF	4
BKOFF	4

(continues on next page)

Field	Length (bits)
MAX_REQ_SEQ	4
MAX_RSP_SEQ	4
AUTH	2
RAND	0 or 32
RESERVED	7

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- MSG_TYPE** - Message type.
The base station shall set this field to '00000010'.
- PILOT_PN** - Pilot PN sequence offset index.
The base station shall set this field to the pilot PN sequence offset for this base station, in units of 64 PN chips.
- ACC_MSG_SEQ** - Access parameters message sequence number.
The base station shall set this field to ACC_CONFIG_SEQ (see 7.6.2.2).
- ACC_CHAN** - Number of Access Channels.
The base station shall set this field to one less than the number of Access Channels associated with this Paging Channel.
- NOM_PWR** - Nominal transmit power offset.
The base station shall set this field to the correction factor to be used by mobile stations in the open loop power estimate, expressed as a two's complement value in units of 1 dB (see 6.1.2.3.1).
- INIT_PWR** - Initial power offset for access.
The base station shall set this field to the correction factor to be used by mobile stations in the open loop power estimate for the initial transmission on an Access Channel, expressed as a two's complement value in units of 1 dB (see 6.1.2.3.1).
- PWR_STEP** - Power increment.
The base station shall set this field to the value by which mobile stations are to increase their transmit power between successive access probes in an access probe sequence, in units of 1 dB.
- NUM_STEP** - Number of access probes.
The base station shall set this field to one less than the maximum number of access probes mobile stations are to transmit in a single access probe sequence.

- 1 **MAX_CAP_SZ** - Maximum Access Channel message capsule size.
 2 The base station shall set this field to the value in the range
 3 0 to 7, three less than the maximum number of Access
 4 Channel frames in an Access Channel message capsule.
- 5 **PAM_SZ** - Access Channel preamble length.
 6 The base station shall set this field to one less than the
 7 number of Access Channel frames that mobile stations are to
 8 transmit in each Access Channel preamble.
- 9 **PSIST(0-9)** - Persistence value for access overload classes 0 through 9.
 10 If mobile stations in access overload classes 0 through 9 are
 11 permitted to transmit requests on the Access Channel, the
 12 base station shall set this field to the persistence value to be
 13 used. If such mobile stations are not permitted to transmit
 14 requests on the Access Channel, the base station shall set
 15 this field to '111111'.
- 16 **PSIST(10)** - Persistence value for access overload class 10 (test mobile
 17 stations).
 18 If mobile stations in access overload class 10 are permitted to
 19 transmit requests on the Access Channel, the base station
 20 shall set this field to the persistence value to be used. If such
 21 mobile stations are not permitted to transmit requests on the
 22 Access Channel, the base station shall set this field to '111'.
- 23 **PSIST(11)** - Persistence value for access overload class 11 (emergency
 24 mobile stations).
 25 If mobile stations in access overload class 11 are permitted to
 26 transmit requests on the Access Channel, the base station
 27 shall set this field to the persistence value to be used. If such
 28 mobile stations are not permitted to transmit requests on the
 29 Access Channel, the base station shall set this field to '111'.
- 30 **PSIST(12)** - Persistence value for access overload class 12.
 31 If mobile stations in access overload class 12 are permitted to
 32 transmit requests on the Access Channel, the base station
 33 shall set this field to the persistence value to be used. If such
 34 mobile stations are not permitted to transmit requests on the
 35 Access Channel, the base station shall set this field to '111'.
- 36 **PSIST(13)** - Persistence value for access overload class 13.
 37 If mobile stations in access overload class 13 are permitted to
 38 transmit requests on the Access Channel, the base station
 39 shall set this field to the persistence value to be used. If such
 40 mobile stations are not permitted to transmit requests on the
 41 Access Channel, the base station shall set this field to '111'.

- 1 **PSIST(14)** - Persistence value for access overload class 14.
2 If mobile stations in access overload class 14 are permitted to
3 transmit requests on the Access Channel, the base station
4 shall set this field to the persistence value to be used. If such
5 mobile stations are not permitted to transmit requests on the
6 Access Channel, the base station shall set this field to '111'.
7 **PSIST(15)** - Persistence value for access overload class 15.
8 If mobile stations in access overload class 15 are permitted to
9 transmit requests on the Access Channel, the base station
10 shall set this field to the persistence value to be used. If such
11 mobile stations are not permitted to transmit requests on the
12 Access Channel, the base station shall set this field to '111'.
13 **MSG_PSIST** - Persistence modifier for Access Channel attempts for message
14 transmissions.
15 A mobile station multiplies its transmission probability by
16 2^{-MSG_PSIST} for such attempts.
17 The base station shall set this field to the persistence modifier
18 for Access Channel attempts for message transmissions.
19 **REG_PSIST** - Persistence modifier for Access Channel attempts for
20 registrations which are not responses to the *Registration*
21 *Request Order*.
22 A mobile station multiplies its transmission probability by
23 2^{-REG_PSIST} for such attempts.
24 The base station shall set this field to the persistence modifier
25 for Access Channel attempts for registrations which are not
26 responses to the *Registration Request Order*.
27 **PROBE_PN_RAN** - Time randomization for Access Channel probes.
28 A mobile station delays its transmission from System Time by
29 RN PN chips, where RN is a number determined by hashing
30 between 0 and $2^{PROBE_PN_RAN} - 1$ PN chips.
31 The base station shall set this field to the value in the range 0
32 to 9 inclusive such that the time randomization range is
33 $2^{PROBE_PN_RAN} - 1$ PN chips.
34 **ACC_TMO** - Acknowledgement timeout.
35 The base station shall set this field to two less than the length
36 of time mobile stations are to wait after the end of an Access
37 Channel transmission before determining that the base
38 station did not receive the transmission, in units of 80 ms.
39 **PROBE_BKOFF** - Access Channel probe backoff range.
40 The base station shall set this field to one less than the
41 maximum number of slots mobile stations are to delay due to
42 random backoff between consecutive access probes.

- 1 **BKOFF** - **Access Channel probe sequence backoff range.**

2 **The base station shall set this field to one less than the**

3 **maximum number of slots mobile stations are to delay due to**

4 **random backoff between successive access probe sequences**

5 **and before the first access probe sequence of a response**

6 **access.**
- 7 **MAX_REQ_SEQ** - **Maximum number of access probe sequences for an Access**

8 **Channel request.**

9 **The base station shall set this field to the maximum number**

10 **of access probe sequences mobile stations are to transmit for**

11 **an Access Channel request. The base station shall set this**

12 **field to a value greater than 0.**
- 13 **MAX_RSP_SEQ** - **Maximum number of access probe sequences for an Access**

14 **Channel response.**

15 **The base station shall set this field to the maximum number**

16 **of access probe sequences mobile stations are to transmit for**

17 **an Access Channel response. The base station shall set this**

18 **field to a value greater than 0.**
- 19 **AUTH** - **Authentication mode.**

20 **If mobile stations are to include standard authentication data**

21 **in Access Channel messages, the base station shall set this**

22 **field to '01'. If mobile stations are not to include**

23 **authentication data in Access Channel messages, the base**

24 **station shall set this field to '00'. All other values are**

25 **reserved.**
- 26 **RAND** - **Random challenge value.**

27 **If the AUTH field is set to '01', the base station shall set this**

28 **field to the random challenge value to be used by mobile**

29 **stations for authentication. If the AUTH field is set to any**

30 **other value, the base station shall omit this field.**
- 31 **RESERVED** - **Reserved bits.**

32 **The base station shall set this field to '0000000'.**

7.7.2.3.2.3 Neighbor List Message

When the base station sends a *Neighbor List Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000011')	8
PILOT_PN	9
CONFIG_MSG_SEQ	6
PILOT_INC	4

Zero or more occurrences of the following record:

NGHBR_CONFIG	3
NGHBR_PN	9

RESERVED	0 - 7 (as needed)
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MSG_TYPE - Message type.

The base station shall set this field to '00000011'.

PILOT_PN - Pilot PN sequence offset index.

The base station shall set this field to the pilot PN sequence offset for this base station, in units of 64 PN chips.

CONFIG_MSG_SEQ - Configuration message sequence number.

The base station shall set this field to CONFIG_SEQ (see 7.6.2.2).

PILOT_INC - Pilot PN sequence offset index increment.

A mobile station searches for Remaining Set pilots at pilot PN sequence index values that are multiples of this value.

The base station shall set this field to the pilot PN sequence increment, in units of 64 PN chips, that mobile stations are to use for searching the Remaining Set. The base station should set this field to the largest increment such that the pilot PN sequence offsets of all its neighbor base stations are integer multiples of that increment.

1 The base station shall include one occurrence of the following two-field record for each
 2 member mobile stations are to place in their Neighbor Sets. The base station may include
 3 zero or more occurrences of the following record.

4 **NGHBR_CONFIG** - Neighbor configuration.

5 The base station shall set this field to the value shown in
 6 Table 7.7.2.3.2.3-1 corresponding to the configuration of this
 7 neighbor.

8
 9 **Table 7.7.2.3.2.3-1. Neighbor Configuration Field**

Value (bin)	Neighbor Configuration
000	The neighbor base station has the same configuration as the current base station.
001	The neighbor base station has a different configuration. It does have a Primary Paging Channel on the current CDMA frequency assignment.
010	The neighbor base station does not have a Paging Channel on the current CDMA frequency assignment. It does have a Primary Paging Channel on the first CDMA Channel listed in the <i>CDMA Channel List Message</i> transmitted by the current base station.
011	The neighbor base station configuration is unknown.
100-111	Reserved.

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NGHBR_PN - Neighbor pilot PN sequence offset index.

The base station shall set this field to the pilot PN sequence offset for this neighbor, in units of 64 PN chips.

RESERVED - Reserved bits.

The base station shall add reserved bits as needed in order to make the length of the entire message equal to an integer number of octets. The base station shall set these bits to '0'.

1 **7.7.2.3.2.4 CDMA Channel List Message**

2 When the base station sends a *CDMA Channel List Message*, it shall use the following
3 variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000100')	8
PILOT_PN	9
CONFIG_MSG_SEQ	6

One or more occurrences of the following field:

CDMA_FREQ	11
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RESERVED	0 - 7 (as needed)
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6 **MSG_TYPE** - Message type.

7 The base station shall set this field to '00000100'.

8 **PILOT_PN** - Pilot PN sequence offset index.

9 The base station shall set this field to the pilot PN sequence
10 offset for this base station, in units of 64 PN chips.

11 **CONFIG_MSG_SEQ** - Configuration message sequence number.

12 The base station shall set this field to CONFIG_SEQ
13 (see 7.6.2.2).

14 **CDMA_FREQ** - CDMA Channel frequency assignment.

15 The order in which occurrences of this field are included gives
16 the designations of the supported CDMA Channels as CDMA
17 Channel 1 through CDMA Channel N.

18 The base station shall include one occurrence of this field for
19 each CDMA Channel containing a Paging Channel that is
20 supported by this base station. If the Primary CDMA Channel
21 is supported by this base station, the base station shall
22 include its occurrence of this field first. If the Primary CDMA
23 Channel is not supported and the Secondary CDMA Channel
24 is supported, the base station shall include the occurrence of
25 this field corresponding to the Secondary CDMA Channel first.

26 The base station shall set each occurrence of this field to the
27 CDMA channel number corresponding to the CDMA frequency
28 assignment for that CDMA Channel (see 7.1.1.1).

1 **RESERVED** - Reserved bits.

2 The base station shall add reserved bits as needed in order to
3 make the length of the entire message equal to an integer
4 number of octets. The base station shall set these bits to '0'.

1 **7.7.2.3.2.5 Slotted Page Message**

2 When the base station sends a *Slotted Page Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('0000101')	8
CONFIG_MSG_SEQ	6
ACC_MSG_SEQ	6
MORE_PAGES	1

Zero or more occurrences of the following record:

MSG_SEQ	3
EXT_ADDR	1
MIN1	24
MIN2	0 or 10
SPECIAL_SERVICE	1
SERVICE_OPTION	0 or 16

RESERVED	0 - 7 (as needed)
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5
6 **MSG_TYPE** - Message type.

7 The base station shall set this field to '0000101'.

8 **CONFIG_MSG_SEQ** - Configuration message sequence number.

9 The base station shall set this field to CONFIG_SEQ
10 (see 7.6.2.2).

11 **ACC_MSG_SEQ** - Access parameters message sequence number.

12 The base station shall set this field to ACC_CONFIG_SEQ
13 (see 7.6.2.2).

14 **MORE_PAGES** - More slotted pages to follow indicator.

15 If this message is the last *Slotted Page Message* to begin in the
16 current Paging Channel slot, the base station shall set this
17 field to '0'. Otherwise, the base station shall set this field
18 to '1'.

19 The base station shall include one occurrence of the following four-field record for each
20 mobile station MIN to be specified in this message.

21 **MSG_SEQ** - Message sequence number.

7.7.2.3.2.6 Page Message

When the base station sends a Page Message, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000110')	8
CONFIG_MSG_SEQ	6
ACC_MSG_SEQ	6

Zero or more occurrences of the following record:

MSG_SEQ	3
EXT_ADDR	1
MIN1	24
MIN2	0 or 10
SPECIAL_SERVICE	1
SERVICE_OPTION	0 or 16

RESERVED	0 - 7 (as needed)
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MSG_TYPE - Message type.

The base station shall set this field to '00000110'.

CONFIG_MSG_SEQ - Configuration message sequence number.

The base station shall set this field to CONFIG_SEQ (see 7.6.2.2).

ACC_MSG_SEQ - Access parameters message sequence number.

The base station shall set this field to ACC_CONFIG_SEQ (see 7.6.2.2).

The base station shall include one occurrence of the following four-field record for each mobile station MIN to be specified in this message.

MSG_SEQ - Message sequence number.

The base station shall set this field to the message sequence number for this message (see 7.6.2.1.4).

EXT_ADDR - Extra address indicator.

If the MIN2 field is included in this record, the base station shall set this field to '1'. If the MIN2 field is not included in this record, the base station shall set this field to '0'.

- 1 **MIN1** - First part of the mobile station identification number (MIN).
2 The base station shall set this field to the MIN1 value for the
3 MIN specified by this record (see 2.3.1).
4 **MIN2** - Second part of the mobile station identification number (MIN).
5 If the EXT_ADDR field is set to '1', the base station shall set
6 this field to the MIN2 value for the MIN specified by this
7 record (see 2.3.1). If the EXT_ADDR field is set to '0', the base
8 station shall omit this field.
9 **SPECIAL_SERVICE** - Special service option indicator.
10 To request a special service option, the base station shall set
11 this field to '1'. To request the default service option (Service
12 Option 1), the base station shall set this field to '0'.
13 **SERVICE_OPTION** - Service option.
14 If the SPECIAL_SERVICE field is set to '1', the base station
15 shall set this field to the service option code shown in TSB58
16 "Service Option Number Assignments for Wideband Spread
17 Spectrum Digital Cellular System" corresponding to the
18 requested service option. If the SPECIAL_SERVICE field is set
19 to '0', the base station shall omit this field.
20 **RESERVED** - Reserved bits.
21 The base station shall add reserved bits as needed in order to
22 make the length of the entire message equal to an integer
23 number of octets. The base station shall set these bits to '0'.

1 **7.7.2.3.2.7 Order Message**

2 When the base station sends an *Order Message*, it shall use the following variable-length
3 message format:

Field	Length (bits)
MSG_TYPE ('00000111')	8

4 One or more occurrences of the following record:

ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
VALID_ACK	1
ADDR_TYPE	3
ADDR_LEN	4
ADDRESS	8 × ADDR_LEN
ORDER	6
ADD_RECORD_LEN	3
order-specific fields (if used)	8 × ADD_RECORD_LEN

RESERVED	2
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5
6 **MSG_TYPE** - Message type.

7 The base station shall set this field to '00000111'.

8
9 The base station shall include one or more occurrences of the following variable-length
10 order record:

11 **ACK_SEQ** - Acknowledgement sequence number.

12 The base station shall set this field to the **MSG_SEQ** field from
13 the most recently received Access Channel message requiring
14 an acknowledgement from the mobile station addressed by
15 this order (see 7.6.3.1.1).

16 **MSG_SEQ** - Message sequence number.

17 The base station shall set this field to the message sequence
18 number for this order (see 7.6.2.1.4).

19 **ACK_REQ** - Acknowledgement required indicator.

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- If the mobile station is to acknowledge this order, the base station shall set this field to '1'. If the mobile station is not to acknowledge this order, the base station shall set this field to '0' (see 7.6.3.1.1).
- VALID_ACK** - Valid acknowledgement indicator.
- To acknowledge the most recently received Access Channel message from the mobile station, the base station shall set this field to '1'. If this order record does not acknowledge the most recently received Access Channel message from the mobile station, the base station shall set this field to '0'.
- ADDR_TYPE** - Address type.
See 7.7.2.3.1.
- ADDR_LEN** - Address field length.
See 7.7.2.3.1.
- ADDRESS** - Mobile station address.
See 7.7.2.3.1.
- ORDER** - Order code.
The base station shall set this field to the ORDER code (see 7.7.4) for this type of order.
- ADD_RECORD_LEN** - Additional record length.
The base station shall set this field to the number of octets in the order-specific fields included in this order record.
- order-specific fields** - Order specific fields.
The base station shall include order-specific fields as specified in 7.7.4 for this type of order.
- RESERVED** - Reserved bits.
The base station shall set this field to '00'.

1 **7.7.2.3.2.8 Channel Assignment Message**

2 When the base station sends a *Channel Assignment Message*, it shall use the following
 3 variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001000')	8

4 One or more occurrences of the following record:

ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
VALID_ACK	1
ADDR_TYPE	3
ADDR_LEN	4
ADDRESS	8 × ADDR_LEN
ASSIGN_MODE	3
ADD_RECORD_LEN	3

If ASSIGN_MODE = '000', the record also includes the following fields:

FREQ_INCL	1
CODE_CHAN	8
CDMA_FREQ	0 or 11
FRAME_OFFSET	4
ENCRYPT_MODE	2
RESERVED	0 - 7 (as needed)

If ASSIGN_MODE = '001', the record also includes the following fields:

RESPOND	1
FREQ_INCL	1
CDMA_FREQ	0 or 11

One or more occurrences of the following field:

PILOT_PN	9
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RESERVED	0 - 7 (as needed)
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If ASSIGN_MODE = '010', the record also includes the following fields:

RESPOND	1
RESERVED	7

If ASSIGN_MODE = '011', the record also includes the following fields:

SID	15
VMAC	3
ANALOG_CHAN	11
SCC	2
MEM	1

RESERVED	0 - 7 (as needed)
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MSG_TYPE - Message type.

The base station shall set this field to '00001000'.

The base station shall include one or more occurrences of the following variable-length assignment record:

ACK_SEQ - Acknowledgement sequence number.

The base station shall set this field to the MSG_SEQ field from the most recently received Access Channel message requiring an acknowledgement from the mobile station addressed by this assignment (see 7.6.3.1.1).

MSG_SEQ - Message sequence number.

The base station shall set this field to the message sequence number for this assignment (see 7.6.2.1.4).

ACK_REQ - Acknowledgement required indicator.

If the mobile station is to acknowledge this message record, the base station shall set this field to '1'. If the mobile station is not to acknowledge this message record, the base station shall set this field to '0' (see 7.6.3.1.1).

- 1 **VALID_ACK** - Valid acknowledgement indicator.
 2 To acknowledge the most recently received Access Channel
 3 message from the mobile station, the base station shall set
 4 this field to '1'. If this assignment record does not
 5 acknowledge the most recently received Access Channel
 6 message from the mobile station, the base station shall set
 7 this field to '0'.
 8 **ADDR_TYPE** - Address type.
 9 See 7.7.2.3.1.
 10 **ADDR_LEN** - Address field length.
 11 See 7.7.2.3.1.
 12 **ADDRESS** - Mobile station address.
 13 See 7.7.2.3.1.
 14 **ASSIGN_MODE** - Assignment mode.
 15 The base station shall set this field to the value shown in
 16 Table 7.7.2.3.2.8-1 corresponding to the assignment mode for
 17 this assignment.
 18

Table 7.7.2.3.2.8-1. Assignment Mode

Value (binary)	Assignment Mode
000	Traffic Channel Assignment
001	Paging Channel Assignment
010	Acquire Analog System
011	Analog Voice Channel Assignment
All other values are reserved.	

- 20
- 21 **ADD_RECORD_LEN** - Additional record length.
 22 The base station shall set this field to the number of octets in
 23 the fields included after this one in this assignment record.
 24 If the **ASSIGN_MODE** field is set to '000', the base station shall include the following five
 25 fields in the assignment record:
 26 **FREQ_INCL** - Frequency included indicator.
 27 If the **CDMA_FREQ** field is included in this assignment record,
 28 the base station shall set this bit to '1'. If the **CDMA_FREQ**
 29 field is not included in this assignment record, the base
 30 station shall set this bit to '0'.
 31 **CODE_CHAN** - Code channel.

- 1 The base station shall set this field to the code channel index
- 2 (see 7.1.3.1.8) in the range 1 to 63 inclusive that the mobile
- 3 station is to use on the Forward Traffic Channel.
- 4 **CDMA_FREQ** - Frequency assignment.
- 5 If the **FREQ_INCL** bit is set to '1', the base station shall set
- 6 this field to the CDMA Channel number corresponding to the
- 7 CDMA frequency assignment for the CDMA Channel
- 8 containing the Forward Traffic Channel the mobile station is
- 9 to use. If the **FREQ_INCL** bit is set to '0', the base station shall
- 10 omit this field.
- 11 **FRAME_OFFSET** - Frame offset.
- 12 The Forward and Reverse Traffic Channel frames are delayed
- 13 **FRAME_OFFSET** × 1.25 ms relative to system timing (see
- 14 7.1.3.5.1).
- 15 The base station shall set this field to the Forward and
- 16 Reverse Traffic Channel frame offset.
- 17 **ENCRYPT_MODE** - Message encryption mode.
- 18 The base station shall set this field to the **ENCRYPT_MODE**
- 19 value shown in Table 7.7.2.3.2.8-2 corresponding to the
- 20 encrypting mode that is to be used for messages sent on the
- 21 Forward and Reverse Traffic Channels, as specified
- 22 in 6.3.12.2.

Table 7.7.2.3.2.8-2. Message Encryption Modes

ENCRYPT_MODE Field (binary)	Encryption Mode Used
00	Encryption disabled
01	Encrypt call control messages
All other ENCRYPT_MODE values are reserved.	

- 25
- 26 **RESERVED** - Reserved bits.
- 27 The base station shall add reserved bits as needed in order to
- 28 make the total length of the fields after the preceding
- 29 **ADD_RECORD_LEN** field through this **RESERVED** field equal
- 30 to an integer number of octets. The base station shall set
- 31 these bits to '0'.
- 32

1 If the ASSIGN_MODE field is set to '001', the base station shall include the following four
2 fields in the assignment record:

3 **RESPOND** - Respond on new Access Channel indicator.

4 If the mobile station is to retransmit an *Origination Message*
5 or *Page Response Message* after processing this channel
6 assignment, the base station shall set this field to '1'. The
7 base station may set this field to '0' only in response to a *Page*
8 *Response Message*.

9 **FREQ_INCL** - Frequency included indicator.

10 If the CDMA_FREQ field is included in this assignment record,
11 the base station shall set this bit to '1'. If the CDMA_FREQ
12 field is not included in this assignment record, the base
13 station shall set this bit to '0'.

14 **CDMA_FREQ** - Frequency assignment.

15 If the FREQ_INCL bit is set to '1', the base station shall set
16 this field to the CDMA Channel number corresponding to the
17 CDMA frequency assignment for the CDMA Channel
18 containing the Paging Channel the mobile station is to use. If
19 the FREQ_INCL bit is set to '0', the base station shall omit
20 this field.

21 The base station shall include one occurrence of the following field for each base station
22 whose Paging Channel may be monitored by the mobile station. The base station may
23 include one or more occurrences of this field.

24 **PILOT_PN** - Pilot PN sequence offset index.

25 The base station shall set this field to the pilot PN sequence
26 offset for a base station, in units of 64 PN chips. The base
27 station having this pilot PN sequence offset should support a
28 Primary Paging Channel with the same Paging Channel rate
29 as the current base station.

30 **RESERVED** - Reserved bits.

31 The base station shall add reserved bits as needed in order to
32 make the total length of the fields after the preceding
33 ADD_RECORD_LEN field through this RESERVED field equal
34 to an integer number of octets. The base station shall set
35 these bits to '0'.

37 If the ASSIGN_MODE field is set to '010', the base station shall include the following two
38 fields in the assignment record:

39 **RESPOND** - Respond on analog control channel indicator.

40 If the mobile station is to retransmit an *Origination Message*
41 or *Page Response Message* (see 2.7.1.1) on the analog control
42 channel after processing this channel assignment, the base
43 station shall set this field to '1'. The base station may set this
44 field to '0' only in response to a *Page Response Message*.

- 1 **RESERVED** - Reserved bits.
2 The base station shall set this field to '0000000'.
3
4 If the **ASSIGN_MODE** field is set to '011', the base station shall include the following six
5 fields in the assignment record:
6 **SID** - System identification of the analog system.
7 The base station shall set this field to the system identification
8 of the analog system supporting the assigned voice channel
9 for this assignment (see 2.3.8).
10 **VMAC** - Voice mobile station attenuation code.
11 The base station shall set this field to the mobile station
12 power level associated with the assigned voice channel for this
13 assignment (see 2.1.2).
14 **ANALOG_CHAN** - Voice channel number.
15 The base station shall set this field to the voice channel
16 number for this assignment (see 2.1.1.1).
17 **SCC** - SAT color code.
18 The base station shall set this field to the supervisory audio
19 tone associated with the assigned voice channel.
20 **MEM** - Message encryption mode indicator.
21 If analog control message encryption is to be enabled on the
22 assigned forward and reverse analog voice channels, the base
23 station shall set this bit to '1'. Otherwise, the base station
24 shall set this bit to '0'.
25
26 **RESERVED** - Reserved bits.
27 The base station shall add reserved bits as needed in order to
28 make the length of the entire message equal to an integer
29 number of octets. The base station shall set these bits to '0'.

7.7.2.3.2.9 Data Burst Message

When the base station sends a *Data Burst Message* on the Paging Channel, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001001')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
VALID_ACK	1
ADDR_TYPE	3
ADDR_LEN	4
ADDRESS	8 × ADDR_LEN
MSG_NUMBER	8
BURST_TYPE	6
NUM_MSGS	8
NUM_FIELDS	8

NUM_FIELDS occurrences of the following field:

CHAR1	8
-------	---

RESERVED	5
----------	---

- MSG_TYPE - Message type.
The base station shall set this field to '00001001'.
- ACK_SEQ - Acknowledgement sequence number.
The base station shall set this field to the MSG_SEQ field from the most recently received Access Channel message requiring an acknowledgement from the mobile station addressed by this message (see 7.6.3.1.1).
- MSG_SEQ - Message sequence number.
The base station shall set this field to the message sequence number for this message (see 7.6.2.1.4).

- 1 **ACK_REQ** - Acknowledgement required indicator.
 2 If the mobile station is to acknowledge this message, the base
 3 station shall set this field to '1'. If the mobile station is not to
 4 acknowledge this message, the base station shall set this field
 5 to '0' (see 7.6.3.1.1).
- 6 **VALID_ACK** - Valid acknowledgement indicator.
 7 To acknowledge the most recently received Access Channel
 8 message from the mobile station, the base station shall set
 9 this field to '1'. If this message does not acknowledge the
 10 most recently received Access Channel message from the
 11 mobile station, the base station shall set this field to '0'.
- 12 **ADDR_TYPE** - Address type.
 13 See 7.7.2.3.1.
- 14 **ADDR_LEN** - Address field length.
 15 See 7.7.2.3.1.
- 16 **ADDRESS** - Mobile station address.
 17 See 7.7.2.3.1.
- 18 **MSG_NUMBER** - Message number.
 19 The base station shall set this field to the number of this
 20 message within the data burst stream.
- 21 **BURST_TYPE** - Data burst type.
 22 The base station shall set this field to the value shown in
 23 Table 7.7.2.3.2.9-1 for the type of this data burst.

Table 7.7.2.3.2.9-1. Burst Data Types

Value (binary)	Burst Data Type
000000	Unknown burst data type
All other burst data type codes are reserved.	

- 26 **NUM_MSGS** - Number of messages in the data burst stream.
 27 The base station shall set this field to the number of messages
 28 in this data burst stream.
- 29 **NUM_FIELDS** - Number of characters in this message.
 30 The base station shall set this field to the number of
 31 occurrences of the CHAR_i field included in this message.
- 32 **CHAR_i** - Character.
 33 The base station shall include NUM_FIELDS occurrences of
 34 this field. The base station shall set these fields to the
 35 corresponding octet of the data burst stream.

- 1 **RESERVED** - Reserved bits.
- 2 **The base station shall set this field to '00000'.**

1 **7.7.2.3.2.10 Authentication Challenge Message**

2 When the base station sends an *Authentication Challenge Message* on the Paging Channel,
3 it shall use the following fixed-length message format:

Field	Length (bits)
MSG_TYPE ('00001010')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
VALID_ACK	1
ADDR_TYPE	3
ADDR_LEN	4
ADDRESS	8 × ADDR_LEN
RANDU	24
RESERVED	3

5

6 **MSG_TYPE** - Message type.

7 The base station shall set this field to '00001010'.

8 **ACK_SEQ** - Acknowledgement sequence number.

9 The base station shall set this field to the MSG_SEQ field from
10 the most recently received Access Channel message requiring
11 an acknowledgement from the mobile station addressed by
12 this message (see 7.6.3.1.1).

13 **MSG_SEQ** - Message sequence number.

14 The base station shall set this field to the message sequence
15 number for this message (see 7.6.2.1.4).

16 **ACK_REQ** - Acknowledgement required indicator.

17 If the mobile station is to acknowledge this message, the base
18 station shall set this field to '1'. If the mobile station is not to
19 acknowledge this message, the base station shall set this field
20 to '0' (see 7.6.3.1.1).

21 **VALID_ACK** - Valid acknowledgement indicator.

22 To acknowledge the most recently received Access Channel
23 message from the mobile station, the base station shall set
24 this field to '1'. If this message does not acknowledge the
25 most recently received Access Channel message from the
26 mobile station, the base station shall set this field to '0'.

1	ADDR_TYPE	-	Address type.
2			See 7.7.2.3.1.
3	ADDR_LEN	-	Address field length.
4			See 7.7.2.3.1.
5	ADDRESS	-	Mobile station address.
6			See 7.7.2.3.1.
7	RANDU	-	Random challenge data.
8			The base station shall set this field to the random challenge
9			data (see 6.3.12.1.5).
10	RESERVED	-	Reserved bits.
11			The base station shall set this field to '000'.

1 7.7.2.3.2.11 SSD Update Message

2 When the base station sends an *SSD Update Message* on the Paging Channel, it shall use
 3 the following fixed-length message format:

Field	Length (bits)
MSG_TYPE ('00001011')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
VALID_ACK	1
ADDR_TYPE	3
ADDR_LEN	4
ADDRESS	8 × ADDR_LEN
RANDSSD	56
RESERVED	3

4

5

6 **MSG_TYPE** - Message type.

7 The base station shall set this field to '00001011'.

8

9 **ACK_SEQ** - Acknowledgement sequence number.

10 The base station shall set this field to the **MSG_SEQ** field from
 11 the most recently received Access Channel message requiring
 12 an acknowledgement from the mobile station addressed by
 this message (see 7.6.3.1.1).

13

14 **MSG_SEQ** - Message sequence number.

15 The base station shall set this field to the acknowledgement
 sequence number for this message (see 7.6.2.1.4).

16

17 **ACK_REQ** - Acknowledgement required indicator.

18 If the mobile station is to acknowledge this message, the base
 station shall set this field to '1'. If the mobile station is not to
 19 acknowledge this message, the base station shall set this field
 20 to '0' (see 7.6.3.1.1).

21

22 **VALID_ACK** - Valid acknowledgement indicator.

23 To acknowledge the most recently received Access Channel
 message from the mobile station, the base station shall set
 24 this field to '1'. If this message does not acknowledge the
 25 most recently received Access Channel message from the
 26 mobile station, the base station shall set this field to '0'.

27

28

29

30

31

- 1 **ADDR_TYPE** - Address type.
2 **See 7.7.2.3.1.**
- 3 **ADDR_LEN** - Address field length.
4 **See 7.7.2.3.1.**
- 5 **ADDRESS** - Mobile station address.
6 **See 7.7.2.3.1.**
- 7 **RANDSSD** - Random data for the computation of SSD.
8 **The base station shall set this field as specified in 6.3.12.1.9.**
- 9
- 10 **RESERVED** - Reserved bits.
11 **The base station shall set this field to '000'.**

1 **7.7.2.3.2.12 Feature Notification Message**

2 When the base station sends a *Feature Notification Message* on the Paging Channel, it shall
 3 use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001100')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
VALID_ACK	1
ADDR_TYPE	3
ADDR_LEN	4
ADDRESS	8 × ADDR_LEN
RELEASE	1

One or more occurrences of the following record:

RECORD_TYPE	8
RECORD_LEN	8
Type-specific fields	8 × RECORD_LEN

RESERVED	2
----------	---

5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

MSG_TYPE - Message type.

The base station shall set this field to '00001100'.

ACK_SEQ - Acknowledgement sequence number.

The base station shall set this field to the MSG_SEQ field from the most recently received Access Channel message requiring an acknowledgement from the mobile station addressed by this message (see 7.6.3.1.1).

MSG_SEQ - Message sequence number.

The base station shall set this field to the acknowledgement sequence number for this message (see 7.6.2.1.4).

ACK_REQ - Acknowledgement required indicator.

If the mobile station is to acknowledge this message, the base station shall set this field to '1'. If the mobile station is not to acknowledge this message, the base station shall set this field to '0' (see 7.6.3.1.1).

- 1 **VALID_ACK** - Valid acknowledgement indicator.
 2 To acknowledge the most recently received Access Channel
 3 message from the mobile station, the base station shall set
 4 this field to '1'. If this message does not acknowledge the
 5 most recently received Access Channel message from the
 6 mobile station, the base station shall set this field to '0'.
- 7 **ADDR_TYPE** - Address type.
 8 See 7.7.2.3.1.
- 9 **ADDR_LEN** - Address field length.
 10 See 7.7.2.3.1.
- 11 **ADDRESS** - Mobile station address.
 12 See 7.7.2.3.1.
- 13 **RELEASE** - Origination completion indicator.
 14 The base station shall set this field to '1' if this message is
 15 used to complete an origination request from the mobile
 16 station. Otherwise the base station shall set this field to '0'.
- 17 The base station shall include occurrences of the following three-field record as specified in
 18 7.7.5.
- 19 **RECORD_TYPE** - Information record type.
 20 The base station shall set this field as specified in 7.7.5.
- 21 **RECORD_LEN** - Information record length.
 22 The base station shall set this field to the number of octets in
 23 the type-specific fields included in this record.
- 24 **type-specific fields** - Type-specific fields.
 25 The base station shall include type-specific fields as specified
 26 in 7.7.5.
- 27
- 28 **RESERVED** - Reserved bits.
 29 The base station shall set this field to '00'.

1 **7.7.2.3.2.13 Null Message**

2 When the base station sends a *Null Message*, it shall use the following fixed-length message
3 format:

4

Field	Length (bits)
RESERVED	2

5

6 **RESERVED** - Reserved bits.

7 The base station shall set this field to '00'.

7.7.3 Forward Traffic Channel

During Traffic Channel operation, the base station sends signaling messages to the mobile station using the Forward Traffic Channel.

7.7.3.1 Forward Traffic Channel Structure

When sending a Forward Traffic Channel message, the base station shall send it as signaling traffic using the signaling traffic formats specified in 7.1.3.5.11. The base station may use one or more Forward Traffic Channel frames to send the message.

The first signaling traffic bit in a Forward Traffic Channel frame shall be a Start of Message (SOM) Bit. The base station shall set this bit to '1' if a Forward Traffic Channel message begins in the frame, or to '0' if the frame contains bits of a Forward Traffic Channel message that began in a previous frame. The base station shall use the remaining signaling traffic bits of the frame to send Forward Traffic Channel message bits. If the frame used to send the last bits of a message contains any unused signaling traffic bits, the base station shall set each of these bits, referred to as padding bits, to '0'.

7.7.3.2 Forward Traffic Channel Message Structure

A Forward Traffic Channel message shall consist of a length field (MSG_LENGTH), a message body, and a CRC field, in that order (see Figure 7.7.3.2-1).

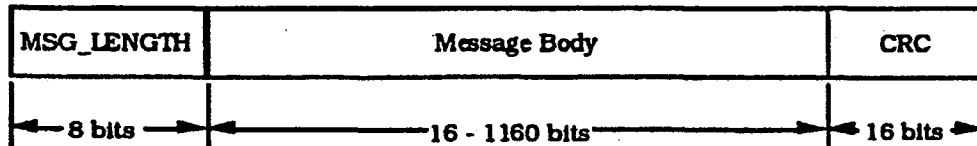


Figure 7.7.3.2-1. Forward Traffic Channel Message Structure

7.7.3.2.1 Forward Traffic Channel Message MSG_LENGTH Field

The base station shall set the MSG_LENGTH field of a Forward Traffic Channel message to the length, in octets, of the message, including the MSG_LENGTH field, the message body and the CRC field. The MSG_LENGTH field shall be 8 bits in length. The minimum value of the MSG_LENGTH field shall be 5.²⁰ The base station shall limit the maximum Forward Traffic Channel message length to 148 octets or 1184 bits. That is, the value of the MSG_LENGTH field shall not exceed 148.

²⁰To accommodate the MSG_LENGTH field, the layer 2 fields present in the Message Body and the CRC field.

1 **7.7.3.2.2 Forward Traffic Channel Message CRC Field**

2 The base station shall set the CRC field of a Forward Traffic Channel message to the CRC
3 computed for the message. The CRC computation shall include the MSG_LENGTH field and
4 the message body. The CRC field shall be 16 bits in length.

5 The generator polynomial for the CRC shall be the standard CRC-CCITT polynomial:

$$6 \quad g(x) = x^{16} + x^{12} + x^5 + 1.$$

7 The CRC shall be equal to the value computed by the following procedure and the logic
8 shown in Figure 7.7.3.2.2-1:

- 9
- 10 • All shift register elements shall be initialized to logical one.²¹
 - 11 • The switches shall be set in the up position.
 - 12 • The information bit count k shall be defined as $8 + \text{message body length}$ in bits.
 - 13 • The register shall be clocked k times, with the length and message body fields of the
14 message as the k input bits.
 - 15 • The switches shall be set in the down position.
 - 16 • The register shall be clocked an additional 16 times.
 - 17 • The 16 additional output bits shall be the CRC field.
 - 18 • The bits shall be transmitted in the order in which they appear at the output of the
19 CRC encoder.

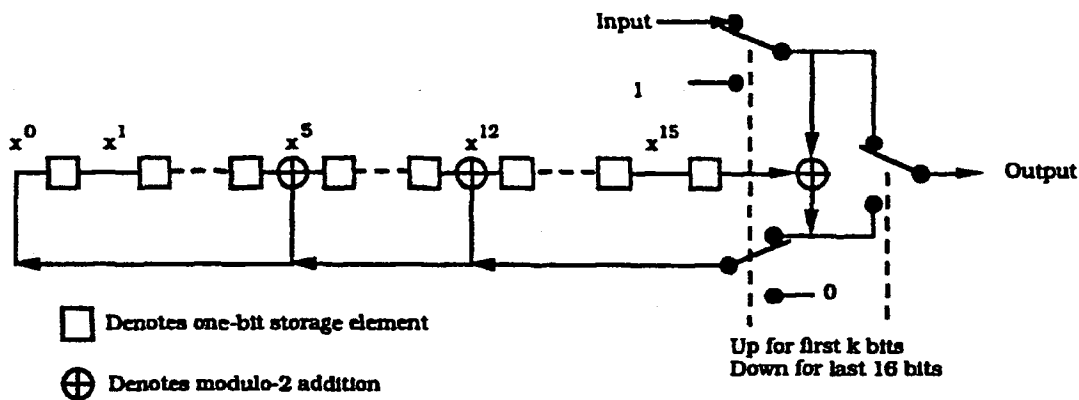


Figure 7.7.3.2.2-1. Forward Traffic Channel Signaling CRC Calculation

²¹Initialization of the register to ones causes the CRC for all-zero data to be non-zero.

7.7.3.3 Forward Traffic Channel Message Body Formats

The signaling messages sent over the Forward Traffic Channel are summarized in Table 7.7.3.3-1.

Table 7.7.3.3-1. Forward Traffic Channel Messages

Message Name	Message type (binary)
<i>Order Message</i>	00000001
<i>Authentication Challenge Message</i>	00000010
<i>Alert With Information Message</i>	00000011
<i>Data Burst Message</i>	00000100
<i>Handoff Direction Message</i>	00000101
<i>Analog Handoff Direction Message</i>	00000110
<i>In-Traffic System Parameters Message</i>	00000111
<i>Neighbor List Update Message</i>	00001000
<i>Send Burst DTMF Message</i>	00001001
<i>Power Control Parameters Message</i>	00001010
<i>Retrieve Parameters Message</i>	00001011
<i>Set Parameters Message</i>	00001100
<i>SSD Update Message</i>	00001101
<i>Flash with Information Message</i>	00001110
<i>Mobile Station Registered Message</i>	00001111

7.7.3.3.1 Common Fields

7.7.3.3.1.1 Common Acknowledgement Fields

All Forward Traffic Channel messages share the same acknowledgement fields:

ACK_SEQ - Acknowledgement sequence number.

The base station shall set this field to the value of the MSG_SEQ field from the most recently received Reverse Traffic Channel message requiring acknowledgement (see 7.6.4.1.3).

MSG_SEQ - Message sequence number.

The base station shall set this field to the message sequence number for this message (see 7.6.4.1.3).

1 **ACK_REQ** - Acknowledgement required indicator.
2 This field indicates whether this message requires an
3 acknowledgement.
4 To indicate that this message requires acknowledgement, the
5 base station shall set this field to '1'. To indicate that this
6 message does not require acknowledgement, the base station
7 shall set this field to '0'.

8 **7.7.3.3.1.2 Common Encryption Field**

9 All Forward Traffic Channel messages contain the following field:

10 **ENCRYPTION** - Message encryption indicator.
11 The base station shall set this field to the current message
12 encryption mode, equal to the **ENCRYPT_MODE** field of the
13 last transmitted *Channel Assignment Message* directed to the
14 mobile station, *Handoff Direction Message* or *Message*
15 *Encryption Mode Order*. The value of this field and the
16 encryption state of a message shall not change if the same
17 message is retransmitted.

1 **7.7.3.3.2 Message Body Contents**

2 The following sections specify the contents of the message body for each message that may
3 be sent on the Forward Traffic Channel.

4 **7.7.3.3.2.1 Order Message**

5 When the base station sends an *Order Message*, it shall use the following variable-length
6 message format:

Field	Length (bits)
MSG_TYPE ('00000001')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
USE_TIME	1
ACTION_TIME	6
ORDER	6
ADD_RECORD_LEN	3
order-specific fields (if used)	8 × ADD_RECORD_LEN
RESERVED	7

8
9 **MSG_TYPE** - Message type.

10 The base station shall set this field to '00000001'.

11 **ACK_SEQ** - Acknowledgement sequence number.

12 See 7.7.3.3.1.1.

13 **MSG_SEQ** - Message sequence number.

14 See 7.7.3.3.1.1.

15 **ACK_REQ** - Acknowledgement required indicator.

16 See 7.7.3.3.1.1.

17 **ENCRYPTION** - Message encryption indicator.

18 See 7.7.3.3.1.2.

19 **USE_TIME** - Use action time indicator.

20 This field indicates whether an **ACTION_TIME** is specified in
21 this order.

- 1
2
3
- If an ACTION_TIME can be specified for this order code, as shown in table 7.7.4-1, the base station may set this field to '1'. Otherwise, the base station shall set this field to '0'.
- 4 **ACTION_TIME** - Action time.
- 5
6
7
8
- If the USE_TIME field is set to '1', the base station shall set this field to the System Time, in units of 80 ms (modulo 64), at which the order is to take effect. If the USE_TIME field is set to '0' the base station shall set this field to '000000'.
- 9 **ORDER** - Order code.
- 10
11
- The base station shall set this field to the ORDER code for this type of *Order Message* (see 7.7.4).
- 12 **ADD_RECORD_LEN** - Additional record length.
- 13
14
- The base station shall set this field to the number of octets in the order-specific fields included in this message.
- 15 **order-specific fields** - Order specific fields.
- 16
17
18
- The base station shall include order-specific fields as specified in 7.7.4.
- 19 **RESERVED** - Reserved bits.
- 20
- The base station shall set these bits to '0000000'.

1 **7.7.3.3.2.2 Authentication Challenge Message**

2 When the base station sends an *Authentication Challenge Message* on the Forward Traffic
3 Channel, it shall use the following fixed-length message format:

Field	Length (bits)
MSG_TYPE ('00000010')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
RANDU	24
RESERVED	7

4
5
6 **MSG_TYPE** - Message type.

7 The base station shall set this field to '00000010'.

8 **ACK_SEQ** - Acknowledgement sequence number.

9 See 7.7.3.3.1.1.

10 **MSG_SEQ** - Message sequence number.

11 See 7.7.3.3.1.1.

12 **ACK_REQ** - Acknowledgement required indicator.

13 See 7.7.3.3.1.1.

14 **ENCRYPTION** - Message encryption indicator.

15 See 7.7.3.3.1.2.

16 **RANDU** - Random challenge data.

17 The base station shall set this field as specified in 6.3.12.1.5.

18 **RESERVED** - Reserved bits.

19 The base station shall set these bits to '0000000'.

1 **7.7.3.3.2.3 Alert With Information Message**

2 When the base station sends an *Alert With Information Message*, it shall use the following
 3 variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000011')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2

Zero or more occurrences of the following record:

RECORD_TYPE	8
RECORD_LEN	8
Type-specific fields	8 × RECORD_LEN

RESERVED	7
----------	---

- 5
- 6 **MSG_TYPE** - Message type.
 7 The base station shall set this field to '00000011'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
 9 See 7.7.3.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
 11 See 7.7.3.3.1.1.
- 12 **ACK_REQ** - Acknowledgement required indicator.
 13 See 7.7.3.3.1.1.
- 14 **ENCRYPTION** - Message encryption indicator.
 15 See 7.7.3.3.1.2.

16 The base station shall include occurrences of the following three-field record as specified in
 17 7.7.5.

- 18 **RECORD_TYPE** - Information record type.
 19 The base station shall set this field as specified in 7.7.5.
- 20 **RECORD_LEN** - Information record length.
 21 The base station shall set this field to the number of octets in
 22 the type-specific fields included in this record.

- 1 **type-specific fields** - **Type-specific fields.**
- 2 **The base station shall include type-specific fields as specified**
- 3 **in 7.7.5.**
- 4 **RESERVED** - **Reserved bits.**
- 5 **The base station shall set these bits to '0000000'.**

1 7.7.3.3.2.4 Data Burst Message

2 When the base station sends a *Data Burst Message* on the Forward Traffic Channel, it shall
 3 use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000100')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
MSG_NUMBER	8
BURST_TYPE	6
NUM_MSGS	8
NUM_FIELDS	8

NUM_FIELDS occurrences of the following field:

CHAR	8
------	---

RESERVED	1
----------	---

- 5
- 6 MSG_TYPE - Message type.
 7 The base station shall set this field to '00000100'.
- 8 ACK_SEQ - Acknowledgement sequence number.
 9 See 7.7.3.3.1.1.
- 10 MSG_SEQ - Message sequence number.
 11 See 7.7.3.3.1.1.
- 12 ACK_REQ - Acknowledgement required indicator.
 13 See 7.7.3.3.1.1.
- 14 ENCRYPTION - Message encryption indicator.
 15 See 7.7.3.3.1.2.
- 16 MSG_NUMBER - Message number.
 17 The base station shall set this field to the number of this
 18 message within the data burst stream.
- 19 BURST_TYPE - Data burst type.
 20 The base station shall set this field to the value shown in
 21 Table 7.7.2.3.2.9-1 for the type of this data burst.

- 1 **NUM_MSGS** - Number of messages in the data burst stream.
2 The base station shall set this field to the number of messages
3 in this data burst stream.
- 4 **NUM_FIELDS** - Number of characters in this message.
5 The base station shall set this field to the number of
6 occurrences of the **CHARi** field included in this message.
- 7 **CHARi** - Character.
8 The base station shall include **NUM_FIELDS** occurrences of
9 this field. The base station shall set these fields to the
10 corresponding octet of the data burst stream.
- 11 **RESERVED** - Reserved bits.
12 The base station shall set this field to '0'.

1 7.7.3.3.2.5 Handoff Direction Message

- 2 When the base station sends a *Handoff Direction Message*, it shall use the following
 3 variable-length message format:

4

Field	Length (bits)
MSG_TYPE('00000101')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
USE_TIME	1
ACTION_TIME	6
HDM_SEQ	2
SRCH_WIN_A	4
T_ADD	6
T_DROP	6
T_COMP	4
T_TDROP	4
FRAME_OFFSET	4
PRIVATE_LCM	1
RESET_L2	1
ENCRYPT_MODE	2
FREQ_INCL	1
CDMA_FREQ	0 or 11

One or more occurrences of the following record:

PILOT_PN	9
PWR_COMB_IND	1
CODE_CHAN	8

RESERVED	0 - 7 (as needed)
----------	-------------------

5

6

MSG_TYPE - Message type.

7

The base station shall set this field to '00000101'.

- 1 **ACK_SEQ** - Acknowledgement sequence number.
2 See 7.7.3.3.1.1.
- 3 **MSG_SEQ** - Message sequence number.
4 See 7.7.3.3.1.1.
- 5 **ACK_REQ** - Acknowledgement required indicator.
6 See 7.7.3.3.1.1.
- 7 **ENCRYPTION** - Message encryption indicator.
8 See 7.7.3.3.1.2.
- 9 **USE_TIME** - Use action time indicator.
10 This field indicates whether an **ACTION_TIME** is specified in
11 this message.
12 If an **ACTION_TIME** is specified in this message, the base
13 station shall set this field to '1'. Otherwise, the base station
14 shall set this field to '0'.
- 15 **ACTION_TIME** - Action time.
16 If the **USE_TIME** field is set to '1', the base station shall set
17 this field to the System Time, in units of 80 ms (modulo 64),
18 at which the handoff is to take effect. If the **USE_TIME** field is
19 set to '0' the base station shall set this field to '000000'.
- 20 **HDM_SEQ** - *Handoff Direction Message* sequence number.
21 This field is used by the mobile station in the *Power*
22 *Measurement Report Message* to identify the order in which
23 the reported pilot strengths are sent.
24 The base station shall set this field to the *Handoff Direction*
25 *Message* sequence number, **LAST_HDM_SEQ**, as specified in
26 7.6.6.2.2.
- 27 **SRCH_WIN_A** - Search window size for the Active Set and Candidate Set.
28 The base station shall set this field to the window size
29 parameter shown in Table 6.6.6.2.1-1 corresponding to the
30 number of PN chips that the mobile station is to search for
31 pilots in the Active Set and Candidate Set.
- 32 **T_ADD** - Pilot detection threshold.
33 This value is used by the mobile station to trigger the sending
34 of the *Pilot Strength Measurement Message* initiating the
35 handoff process (see 6.6.6).
36 The base station shall set this field to the pilot detection
37 threshold, expressed as an unsigned binary number equal to
38 $\lfloor -2 \times 10 \times \log_{10} E_c/I_0 \rfloor$.
- 39 **T_DROP** - Pilot drop threshold.
40 This value is used by the mobile station to trigger the sending
41 of the *Pilot Strength Measurement Message* terminating the
42 handoff process and to move pilots from the Candidate Set to
43 the Neighbor Set (see 6.6.6).

1		The base station shall set this field to the pilot drop threshold, expressed as an unsigned binary number equal to $\lfloor -2 \times 10 \times \log_{10} E_c/I_0 \rfloor$.
2		
3		
4	T_COMP	- Active Set versus Candidate Set comparison threshold.
5		The mobile station transmits a <i>Pilot Strength Measurement Message</i> when the strength of a pilot in the Candidate Set exceeds that of a pilot in the Active Set by this margin (see 6.6.6.2.5.2).
6		
7		
8		
9		The base station shall set this field to the threshold Candidate Set pilot to Active Set pilot ratio, in units of 0.5 dB.
10		
11	T_TDROD	- Drop timer value.
12		Timer value after which an action is taken by the mobile station for a pilot that is a member of the Active Set or Candidate Set, and whose strength has not become greater than T_DROD. If the pilot is a member of the Active Set, a <i>Pilot Strength Measurement Message</i> is issued. If the pilot is a member of the Candidate Set, it will be moved to the Neighbor Set.
13		
14		
15		
16		
17		
18		
19		The base station shall set this field to the T_TDROD value shown in Table 6.6.6.2.3-1 corresponding to the drop timer value to be used by the mobile station.
20		
21		
22	FRAME_OFFSET	- Frame offset.
23		The Forward and Reverse Traffic Channel frames are delayed FRAME_OFFSET \times 1.25 ms relative to system timing (see 7.1.3.5.1).
24		
25		
26		The base station shall set this field to the Forward and Reverse Traffic Channel frame offset.
27		
28	PRIVATE_LCM	- Private long code mask indicator.
29		This field is used to change the long code mask after a hard handoff.
30		
31		If the private long code mask is to be used after the handoff, the base station shall set this field to '1'. Otherwise the base station shall set this field to '0'.
32		
33		
34	RESET_L2	- Reset acknowledgement procedures command.
35		This field is used to reset acknowledgement processing in the mobile station.
36		
37		To direct the mobile station to reset its acknowledgement procedures, the base station shall set this field to '1'. Otherwise, the base station shall set this field to '0'.
38		
39		
40	ENCRYPT_MODE	- Message encryption mode.
41		The base station shall set this field to the ENCRYPT_MODE value shown in Table 7.7.2.3.2.8-2 corresponding to the encrypting mode that is to be used for messages sent on the Forward and Reverse Traffic Channels, as specified in 6.3.12.2.
42		
43		
44		
45		

- 1 **FREQ_INCL** - Alternate frequency assignment indicator.
 2 If the **CDMA_FREQ** field is included for this message, the base
 3 station shall set this field to '1'. Otherwise, the base station
 4 shall set this field to '0'.
 5 **CDMA_FREQ** - Frequency assignment for the CDMA Channel.
 6 If the **FREQ_INCL** field is set to '1', the base station shall set
 7 this field to the CDMA Channel number corresponding to the
 8 CDMA frequency assignment for the CDMA Channel as
 9 specified in 7.1.1.1. Otherwise, the base station shall omit
 10 this field.
- 11 The base station shall include one occurrence of the following three-field record for each
 12 member of the mobile station's new Active Set.
- 13 **PILOT_PN** - Pilot PN sequence offset index.
 14 The base station shall set this field to the pilot PN sequence
 15 offset for this pilot in units of 64 PN chips.
 16 **PWR_COMB_IND** - Power control symbol combining indicator.
 17 If the Forward Traffic Channel associated with this pilot will
 18 carry the same closed-loop power control subchannel bits as
 19 that of the previous pilot in this message, the base station
 20 shall set this field to '1'. Otherwise, the base station shall set
 21 this field to '0'. For the first occurrence of this record in the
 22 message, the base station shall set this field to '0'.
 23 **CODE_CHAN** - Code channel index.
 24 The base station shall set this field to the code channel index
 25 (see 7.1.3.1.8) in the range 1 to 63 inclusive that the mobile
 26 station is to use on the Forward Traffic Channel associated
 27 with this pilot.
 28 **RESERVED** - Reserved bits.
 29 The base station shall add reserved bits as needed in order to
 30 make the length of the entire message equal to an integer
 31 number of octets. The base station shall set these bits to '0'.

1 **7.7.3.3.2.6 Analog Handoff Direction Message**

2 When the base station sends an *Analog Handoff Direction Message*, it shall use the
 3 following fixed-length message format:

Field	Length (bits)
MSG_TYPE ('00000110')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
USE_TIME	1
ACTION_TIME	6
SID	15
VMAC	3
ANALOG_CHAN	11
SCC	2
MEM	1

- 5
- 6 **MSG_TYPE** - Message type.
 7 The base station shall set this field to '00000110'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
 9 See 7.7.3.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
 11 See 7.7.3.3.1.1.
- 12 **ACK_REQ** - Acknowledgement required indicator.
 13 See 7.7.3.3.1.1.
- 14 **ENCRYPTION** - Message encryption indicator.
 15 See 7.7.3.3.1.2.
- 16 **USE_TIME** - Use action time indicator.
 17 This field indicates whether an **ACTION_TIME** is specified in
 18 this message.
 19 If an **ACTION_TIME** is specified in this message, the base
 20 station shall set this field to '1'. Otherwise, the base station
 21 shall set this field to '0'.

- 1 **ACTION_TIME** - Action time.
2 If the **USE_TIME** field is set to '1', the base station shall set
3 this field to the System Time, in units of 80 ms (modulo 64),
4 at which the handoff is to take effect. If the **USE_TIME** field is
5 set to '0' the base station shall set this field to '000000'.
6 **SID** - System identification of the analog system.
7 The base station shall set this field to the system identification
8 number for the analog cellular system (see 2.3.8).
9 **VMAC** - Voice mobile station attenuation code.
10 This field indicates the mobile station's power level associated
11 with the designated voice channel.
12 The base shall set this field to the MAC value shown in Table
13 2.1.2.2-1 corresponding to the nominal power for this mobile
14 station.
15 **ANALOG_CHAN** - Analog voice channel number.
16 The base station shall set this field to the channel number of
17 the analog voice channel, as specified in Table 2.1.1.1-1.
18 **SCC** - SAT color code.
19 This indicates the supervisory audio tone associated with the
20 designated analog voice channel.
21 The base station shall set this field to the SAT value shown in
22 Table 3.7.1.1-2 (see 2.4.1).
23 **MEM** - Message encryption mode indicator.
24 To enable analog control message encryption on the assigned
25 forward and reverse analog voice channels, the base station
26 shall set this bit to '1'. To disable analog control message
27 encryption, the base station shall set this bit to '0'.
28

1 **7.7.3.3.2.7 In-Traffic System Parameters Message**

2 When the base station sends an *In-Traffic System Parameters Message*, it shall use the
 3 following fixed-length message format:

Field	Length (bits)
MSG_TYPE ('00000111')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
SID	15
NID	16
SRCH_WIN_A	4
SRCH_WIN_N	4
SRCH_WIN_R	4
T_ADD	6
T_DROP	6
T_COMP	4
T_TDROP	4
NGHBR_MAX_AGE	4
RESERVED	4

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- MSG_TYPE - Message type.
 The base station shall set this field to '00000111'.
- ACK_SEQ - Acknowledgement sequence number.
 See 7.7.3.3.1.1.
- MSG_SEQ - Message sequence number.
 See 7.7.3.3.1.1.
- ACK_REQ - Acknowledgement required indicator.
 See 7.7.3.3.1.1.
- ENCRYPTION - Message encryption indicator.
 See 7.7.3.3.1.2.

- 1 **SID** - **System identification.**
2 **The base station shall set this field to the system identification**
3 **number for this cellular system.**
- 4 **NID** - **Network identification.**
5 **This field serves as a sub-identifier of a system as defined by**
6 **the owner of the SID.**
7 **The base station shall set this field to the network**
8 **identification number for this network. The NID value of**
9 **65,535 is reserved.**
- 10 **SRCH_WIN_A** - **Search window size for the Active Set and Candidate Set.**
11 **The base station shall set this field to the window size**
12 **parameter shown in Table 6.6.6.2.1-1 corresponding to the**
13 **number of PN chips that the mobile station is to search for**
14 **pilots in the Active Set and Candidate Set.**
- 15 **SRCH_WIN_N** - **Search window size for the Neighbor Set.**
16 **The base station shall set this field to the window size**
17 **parameter shown in Table 6.6.6.2.1-1 corresponding to the**
18 **number of PN chips that the mobile station is to search for**
19 **pilots in the Neighbor Set.**
- 20 **SRCH_WIN_R** - **Search window size for the Remaining Set.**
21 **The base station shall set this field to the window size**
22 **parameter shown in Table 6.6.6.2.1-1 corresponding to the**
23 **number of PN chips that the mobile station is to search for**
24 **pilots in the Remaining Set.**
- 25 **T_ADD** - **Pilot detection threshold.**
26 **This value is used by the mobile station to trigger the sending**
27 **of the *Pilot Strength Measurement Message* initiating the**
28 **handoff process (see 6.6.6).**
29 **The base station shall set this field to the pilot detection**
30 **threshold, expressed as an unsigned binary number equal to**
31 **$\lfloor -2 \times 10 \times \log_{10} E_c/I_0 \rfloor$.**
- 32 **T_DROP** - **Pilot drop threshold.**
33 **This value is used by the mobile station to trigger the sending**
34 **of the *Pilot Strength Measurement Message* terminating the**
35 **handoff process and to move pilots from the Candidate Set to**
36 **the Neighbor Set (see 6.6.6).**
37 **The base station shall set this field to the pilot drop threshold,**
38 **expressed as an unsigned binary number equal to**
39 **$\lfloor -2 \times 10 \times \log_{10} E_c/I_0 \rfloor$.**

- 1 **T_COMP** - Active Set versus Candidate Set comparison threshold.
2 The mobile station transmits a *Pilot Strength Measurement*
3 *Message* when the strength of a pilot in the Candidate Set
4 exceeds that of a pilot in the Active Set by this margin (see
5 6.6.6.2.5.2).
6 The base station shall set this field to the threshold Candidate
7 Set pilot to Active Set pilot ratio, in units of 0.5 dB.
- 8 **T_TDROP** - Drop timer value.
9 Timer value after which an action is taken by the mobile
10 station for a pilot that is a member of the Active Set or
11 Candidate Set, and whose strength has not become greater
12 than T_DROP. If the pilot is a member of the Active Set, a
13 *Pilot Strength Measurement Message* is issued. If the pilot is a
14 member of the Candidate Set, it will be moved to the Neighbor
15 Set.
16 The base station shall set this field to the T_TDROP value
17 shown in Table 6.6.6.2.3-1 corresponding to the drop timer
18 value to be used by the mobile station.
- 19 **NGHBR_MAX_AGE** - Maximum age for retention of Neighbor Set members.
20 The mobile station drops neighbor set members whose AGE
21 count exceeds this field.
22 The base station shall set this field to the Neighbor Set
23 maximum age retention value (see 6.6.6.2.6.3).
- 24 **RESERVED** - Reserved bits.
25 The base station shall set this field to '0000'.

1 **7.7.3.3.2.8 Neighbor List Update Message**

2 When the base station sends a *Neighbor List Update Message*, it shall use the following
3 variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001000')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
PILOT_INC	4

One or more occurrences of the following field:

NGHBR_PN	9
----------	---

RESERVED	0 - 7 (as needed)
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5
6 **MSG_TYPE** - Message type.

7 The base station shall set this field to '00001000'.

8 **ACK_SEQ** - Acknowledgement sequence number.

9 See 7.7.3.3.1.1.

10 **MSG_SEQ** - Message sequence number.

11 See 7.7.3.3.1.1.

12 **ACK_REQ** - Acknowledgement required indicator.

13 See 7.7.3.3.1.1.

14 **ENCRYPTION** - Message encryption indicator.

15 See 7.7.3.3.1.2.

16 **PILOT_INC** - Pilot PN sequence offset index increment.

17 The mobile station searches for Remaining Set pilots at pilot
18 PN sequence offset index values that are multiples of this
19 value.

20 The base station shall set this field to the pilot PN sequence
21 increment, in units of 64 PN chips, that the mobile station is
22 to use for searching the Remaining Set. The base station
23 should set this field to the largest increment such that the
24 pilot PN sequence offsets of all its neighbor base stations are
25 integer multiples of that increment.

- 1 **NGHBR_PN** - Neighbor pilot PN sequence offset index.
- 2 The base station shall include one occurrence of this field for
- 3 each pilot in its neighbor list. The base station shall set this
- 4 field to the pilot's PN sequence offset, in units of 64 PN chips.
- 5 **RESERVED** - Reserved bits.
- 6 The base station shall add reserved bits as needed in order to
- 7 make the length of the entire message equal to an integer
- 8 number of octets. The base station shall set these bits to '0'.

1 7.7.3.3.2.9 Send Burst DTMF Message

2 When the base station sends a *Send Burst DTMF Message*, it shall use the following
 3 variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001001')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
NUM_DIGITS	8
DTMF_ON_LENGTH	3
DTMF_OFF_LENGTH	3

NUM_DIGITS occurrences of the following field:

DIGIT	4
-------	---

RESERVED	0 - 7 (as needed)
----------	-------------------

- 5
- 6 MSG_TYPE - Message type.
7 The base station shall set this field to '00001001'.
- 8 ACK_SEQ - Acknowledgement sequence number.
9 See 7.7.3.3.1.1.
- 10 MSG_SEQ - Message sequence number.
11 See 7.7.3.3.1.1.
- 12 ACK_REQ - Acknowledgement required indicator.
13 See 7.7.3.3.1.1.
- 14 ENCRYPTION - Message encryption indicator
15 See 7.7.3.3.1.2.
- 16 NUM_DIGITS - Number of DTMF digits.
17 The base station shall set this field to the number of DTMF
18 digits included in this message.
- 19 DTMF_ON_LENGTH - DTMF pulse width code.
20 The base station shall set this field to the DTMF_ON_LENGTH
21 value shown in Table 6.7.2.3.2.7-1 corresponding to the
22 requested pulse width of the DTMF pulse to be generated by
23 the mobile station.

- 1 **DTMF_OFF_LENGTH** - DTMF interdigit interval code.
2
3 The base station shall set this field to the
4 DTMF_OFF_LENGTH value shown in Table 6.7.2.3.2.7-2
5 corresponding to the requested minimum interdigit interval
6 between DTMF pulses to be generated by the mobile station.
- 6 **DIGITN** - DTMF digit.
7
8 The base station shall include one occurrence of this field for
9 each DTMF digit to be generated by the mobile station. The
10 base station shall set each occurrence of this field to the code
11 value shown in Table 6.7.1.3.2.4-4 corresponding to the
12 dialed digit.
- 12 **RESERVED** - Reserved bits.
13
14 The base station shall add reserved bits as needed in order to
15 make the length of the entire message equal to an integer
 number of octets. The base station shall set these bits to '0'.

1 7.7.3.3.2.10 Power Control Parameters Message

2 When the base station sends a *Power Control Parameters Message*, it shall use the following
3 fixed-length message format:

Field	Length (bits)
MSG_TYPE ('00001010')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
PWR_REP_THRESH	5
PWR_REP_FRAMES	4
PWR_THRESH_ENABLE	1
PWR_PERIOD_ENABLE	1
PWR_REP_DELAY	5
RESERVED	7

5
6 MSG_TYPE - Message type.

7 The base station shall set this field to '00001010'.

8 ACK_SEQ - Acknowledgement sequence number.

9 See 7.7.3.3.1.1.

10 MSG_SEQ - Message sequence number.

11 See 7.7.3.3.1.1.

12 ACK_REQ - Acknowledgement required indicator.

13 See 7.7.3.3.1.1.

14 ENCRYPTION - Message encryption indicator.

15 See 7.7.3.3.1.2.

16 PWR_REP_THRESH - Power control reporting threshold.

17 The base station shall set this field to the number of bad
18 frames (see 6.2.2.2) to be received in a measurement period
19 before mobile stations are to generate a *Power Measurement*
20 *Report Message* (see 6.6.4.1.1). If the base station sets
21 PWR_THRESH_ENABLE to '1', it shall not set this field to
22 '00000'.

- 1 **PWR_REP_FRAMES** - Power control reporting frame count.
2 The base station shall set this field to the value such that the
3 number given by
4
$$\lfloor 2^{(PWR_REP_FRAMES/2)} \times 5 \rfloor$$
 frames
5 is the number of frames over which the mobile station is to
6 count frame errors.
- 7 **PWR_THRESH-** - Threshold report mode indicator.
8 **_ENABLE** If mobile stations are to generate threshold *Power*
9 *Measurement Report Messages*, the base station shall set this
10 field to '1'. If mobile stations are not to generate threshold
11 *Power Measurement Report Messages*, the base station shall
12 set this field to '0'.
- 13 **PWR_PERIOD-** - Threshold report mode indicator.
14 **_ENABLE** If mobile stations are to generate periodic *Power Measurement*
15 *Report Messages*, the base station shall set this field to '1'. If
16 mobile stations are not to generate periodic *Power*
17 *Measurement Report Messages*, the base station shall set this
18 field to '0'.
- 19 **PWR_REP_DELAY** - Power report delay.
20 The period that the mobile station waits following a *Power*
21 *Measurement Report Message* before restarting frame counting
22 for power control purposes.
23 The base station shall set this field to the power report delay
24 value, in units of 4 frames (see 6.6.4.1.1).
- 25 **RESERVED** - Reserved bits.
26 The base station shall set this field to '0000000'.
- 27

1 **7.7.3.3.2.11 Retrieve Parameters Message**

2 When the base station sends a *Retrieve Parameters Message*, it shall use the following
3 variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001011')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2

One or more occurrences of the following field:

PARAMETER_ID	16
RESERVED	7

- 5
- 6 **MSG_TYPE** - Message type.
7 The base station shall set this field to '00001011'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
9 See 7.7.3.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
11 See 7.7.3.3.1.1.
- 12 **ACK_REQ** - Acknowledgement required indicator.
13 See 7.7.3.3.1.1.
- 14 **ENCRYPTION** - Message encryption indicator.
15 See 7.7.3.3.1.2.
- 16 **PARAMETER_ID** - Parameter identification.
17 The base station can request the mobile station to report any
18 parameter specified in Table E-1.
19 The base station shall include one occurrence of this field for
20 each parameter requested. The base station shall set this
21 field to the parameter identification number specified in
22 Table E-1 corresponding to the parameter requested.
- 23 **RESERVED** - Reserved bits.
24 The base station shall set this field to '0000000'.

1 7.7.3.3.2.12 Set Parameters Message

2 When the base station sends a *Set Parameters Message*, it shall use the following variable-
 3 length message format:

Field	Length (bits)
MSG_TYPE ('00001100')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2

One or more occurrences of the following record:

PARAMETER_ID	16
PARAMETER_LEN	10
PARAMETER	PARAMETER_LEN

RESERVED	0 - 7 (as needed)
----------	-------------------

5

6

MSG_TYPE - Message type.

7

The base station shall set this field to '00001100'.

8

ACK_SEQ - Acknowledgement sequence number.

9

See 7.7.3.3.1.1.

10

MSG_SEQ - Message sequence number.

11

See 7.7.3.3.1.1.

12

ACK_REQ - Acknowledgement required indicator.

13

See 7.7.3.3.1.1.

14

ENCRYPTION - Message encryption indicator.

15

See 7.7.3.3.1.2.

16

The base station shall include one occurrence of the following three-field record for each
 17 parameter to be set.

18

PARAMETER_ID - Parameter identification.

19

The base station shall set this field to the identification shown
 20 in Table E-1 corresponding to the settable parameter to be
 21 set.

1	PARAMETER_LEN	- Parameter length.
2		The base station shall set this field to the length shown in
3		Table E-1 corresponding to the parameter to be set.
4	PARAMETER	- Parameter value.
5		The base station shall set this field to the value of the
6		parameter specified by the PARAMETER_ID field.
7	RESERVED	- Reserved bits.
8		The base station shall add reserved bits as needed in order to
9		make the length of the entire message equal to an integer
10		number of octets. The base station shall set these bits to '0'.

1 **7.7.3.3.2.13 SSD Update Message**

2 When the base station sends an *SSD Update Message* on the Forward Traffic Channel, it
3 shall use the following fixed-length message format:

Field	Length (bits)
MSG_TYPE ('00001101')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
RANDSSD	56
RESERVED	7

- 5
- 6 **MSG_TYPE** - Message type. The base station shall set this field to
7 '00001101'.
- 8 **ACK_SEQ** - Acknowledgement sequence number.
9 See 7.7.3.3.1.1.
- 10 **MSG_SEQ** - Message sequence number.
11 See 7.7.3.3.1.1.
- 12 **ACK_REQ** - Acknowledgement required indicator.
13 See 7.7.3.3.1.1.
- 14 **ENCRYPTION** - Message encryption indicator.
15 See 7.7.3.3.1.2.
- 16 **RANDSSD** - Random data.
17 The base station shall set this field as specified in 6.3.12.1.9.
- 18 **RESERVED** - Reserved bits.
19 The base station shall set this field to '0000000'.

7.7.3.3.2.14 Flash With Information Message

When the base station sends a *Flash With Information Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001110')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2

One or more occurrences of the following record:

RECORD_TYPE	8
RECORD_LEN	8
Type-specific fields	8 × RECORD_LEN

RESERVED	7
----------	---

- MSG_TYPE - Message type.
The base station shall set this field to '00001110'.
- ACK_SEQ - Acknowledgement sequence number.
See 7.7.3.3.1.1.
- MSG_SEQ - Message sequence number.
See 7.7.3.3.1.1.
- ACK_REQ - Acknowledgement required indicator.
See 7.7.3.3.1.1.
- ENCRYPTION - Message encryption indicator.
See 7.7.3.3.1.2.

The base station shall include occurrences of the following three-field record as specified in 7.7.5.

- RECORD_TYPE - Information record type.
The base station shall set this field as specified in 7.7.5.
- RECORD_LEN - Information record length.
The base station shall set this field to the number of octets in the type-specific fields included in this record.

- 1 **type-specific fields** - **Type-specific fields.**
- 2 **The base station shall include type-specific fields as specified**
- 3 **in 7.7.5.**
- 4
- 5 **RESERVED** - **Reserved bits.**
- 6 **The base station shall set this field to '0000000'.**

1 **7.7.3.3.2.15 Mobile Station Registered Message**

2 When the base station sends a *Mobile Station Registered Message*, it shall use the following
 3 fixed-length message format:

Field	Length (bits)
MSG_TYPE ('00001111')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTION	2
SID	15
NID	16
REG_ZONE	12
TOTAL_ZONES	3
ZONE_TIMER	3
MULT_SIDS	1
MULT_NIDS	1
BASE_LAT	22
BASE_LONG	23
REG_DIST	11
RESERVED	4

4
 5 **MSG_TYPE** - Message type.

6 The base station shall set this field to '00001111'.

7 **ACK_SEQ** - Acknowledgement sequence number.

8 See 7.7.3.3.1.1.

9 **MSG_SEQ** - Message sequence number.

10 See 7.7.3.3.1.1.

11 **ACK_REQ** - Acknowledgement required indicator.

12 See 7.7.3.3.1.1.

13 **ENCRYPTION** - Message encryption indicator.

14 See 7.7.3.3.1.2.

15 **SID** - System identification.

16 The base station shall set this field to the system identification
 17 number for this cellular system.

- 1 **NID** - Network identification.
- 2 This field serves as a sub-identifier of a system as defined by
- 3 the owner of the SID.
- 4 The base station shall set this field to the network
- 5 identification number for this network. The NID value of
- 6 65,535 is reserved.
- 7 **REG_ZONE** - Registration zone.
- 8 The base station shall set this field to its registration zone
- 9 number (see 6.6.5.1.5).
- 10 **TOTAL_ZONES** - Number of registration zones to be retained.
- 11 The base station shall set this field to the number of
- 12 registration zones the mobile station is to retain for purposes
- 13 of zone-based registration (see 6.6.5.1.5).
- 14 If zone-based registration is to be disabled, the base station
- 15 shall set this field to '000'.
- 16 **ZONE_TIMER** - Zone timer length.
- 17 The base station shall set this field to the ZONE_TIMER value
- 18 shown in Table 7.7.2.3.2.1-1 corresponding to the length of
- 19 the zone registration timer to be used by mobile stations.
- 20 **MULT_SIDS** - Multiple SID storage indicator.
- 21 If mobile stations may store entries of SID_NID_LIST
- 22 containing different SIDs, the base station shall set this field
- 23 to '1'; otherwise the base station shall set this field to '0'.
- 24 **MULT_NIDS** - Multiple NID storage indicator.
- 25 If mobile stations may store multiple entries of SID_NID_LIST
- 26 having the same SID (with different NIDs), the base station
- 27 shall set this field to '1'; otherwise the base station shall set
- 28 this field to '0'.
- 29 **BASE_LAT** - Base station latitude.
- 30 The base station shall set this field to its latitude in units of
- 31 0.25 second, expressed as a two's complement signed number
- 32 with positive numbers signifying North latitudes.
- 33 **BASE_LONG** - Base station longitude.
- 34 The base station shall set this field to its longitude in units of
- 35 0.25 second, expressed as a two's complement signed number
- 36 with positive numbers signifying East longitude.
- 37 **REG_DIST** - Registration distance.
- 38 If mobile stations are to perform distance-based registration,
- 39 the base station shall set this field to the non-zero "distance"
- 40 beyond which the mobile station is to re-register (see
- 41 6.6.5.1.4). If mobile stations are not to perform distance-
- 42 based registration, the base station shall set this field to 0.

1 **RESERVED** - Reserved bits.
2 **The base station shall set this field to '0000'.**

1 **7.7.4 Orders**

2 **Order Messages** are sent by the base station on the Paging Channel and on the Forward
3 Traffic Channel. The general format used on the Paging Channel is defined in 7.7.2.3.2.7,
4 and the general format used on the Forward Traffic Channel is defined in 7.7.3.3.2.1.
5 There are many specific types of *Order Messages*, as shown in Table 7.7.4-1.

6 The base station may send on the Paging Channel any type of order shown in Table 7.7.4-1
7 with a 'Y' in the first column, but shall not send on the Paging Channel any type of order
8 with an 'N' in the first column. The base station may send on the Forward Traffic Channel
9 any type of order shown in Table 7.7.4-1 with a 'Y' in the second column, but shall not send
10 on the Forward Traffic Channel any type of order with an 'N' in the second column.

11 An order consists of a 6-bit order code and zero or more order-specific fields. The base
12 station shall set the ORDER field in the *Order Message* to the order code shown in Table
13 7.7.4-1 corresponding to the type of order being sent.

14 If the order qualification code in the fourth column of Table 7.7.4-1 is '00000000' and there
15 are no other additional fields as shown by an 'N' in the sixth column, the base station shall
16 include no order qualification code or other order-specific fields in the *Order Message*. The
17 order qualification code of such a message is implicitly '00000000'.

18 If the order qualification code is not '00000000' and there are no other additional fields as
19 shown in Table 7.7.4-1 by an 'N' in the sixth column, the base station shall include the
20 order qualification code as the only order specific field in the *Order Message*.

21 If there are other additional fields as shown in Table 7.7.4-1 by a 'Y' in the sixth column,
22 the base station shall include order-specific fields as specified in the corresponding
23 subsection of this section.

1 **Table 7.7.4-1. Order and Order Qualification Codes Used on the Paging Channel and**
 2 **the Forward Traffic Channel (Part 1 of 3)**

Paging Channel Order	Forward Traffic Channel Order	Order Code, ORDER (binary)	Order Qualification Code, ORDQ (binary)	ACTION TIME can be specified	Additional Fields other than ORDQ	Name/Function
Y	N	000001	00000000	N	N	<i>Abbreviated Alert Order</i>
Y	Y	000010	00000000	N	Y	<i>Base Station Challenge Confirmation Order (see 7.7.4.1)</i>
N	Y	000011	000000nn	Y	N	<i>Message Encryption Mode Order (where nn is the mode per Table 7.7.2.3.2.8-2)</i>
Y	N	000100	00000000	N	N	<i>Reorder Order</i>
N	Y	000101	0000nnnn	N	N	<i>Parameter Update Order (where 'nnnn' is the Request Number)</i>
Y	Y	000110	00000000	N	N	<i>Audit Order</i>
Y	N	001001	00000000	N	N	<i>Intercept Order</i>
N	Y	001010	00000000	N	N	<i>Maintenance Order</i>
Y	Y	010000	00000000	N	N	<i>Base Station Acknowledgement Order</i>
N	Y	010001	00000000	N	N	<i>Pilot Measurement Request Order</i>
Y	Y	010010	0001nnnn	N	N	<i>Lock Until Power-Cycled Order (where nnnn is the lock reason)</i>
Y	Y	010010	0010nnnn	N	N	<i>Maintenance Required Order (where nnnn is the maintenance reason)</i>
Y	N	010010	11111111	N	N	<i>Unlock Order</i>
N	Y	010011	00000000	Y	Y	<i>Service Option Request Order (see 7.7.4.2)</i>

1 **Table 7.7.4-1. Order and Order Qualification Codes Used on the Paging Channel and**
 2 **the Forward Traffic Channel (Part 2 of 3)**

Paging Channel Order	Forward Traffic Channel Order	Order Code, ORDER (binary)	Order Qualification Code, ORDQ (binary)	ACTION_TIME can be specified	Additional Fields other than ORDQ	Name/Function
N	Y	010100	00000000	Y	Y	<i>Service Option Response Order (see 7.7.4.3)</i>
Y	Y	010101	00000000	N	N	<i>Release Order (no reason given)</i>
Y	Y	010101	00000010	N	N	<i>Release Order (indicates that requested service option is rejected)</i>
N	Y	010111	00000000	Y	N	<i>Long Code Transition Request Order (request public)</i>
N	Y	010111	00000001	Y	N	<i>Long Code Transition Request Order (request private)</i>
N	Y	011001	0000nnnn	N	N	<i>Continuous DTMF Tone Order (where the tone is designated by 'nnnn' as defined in Table 6.7.1.3.2.4-4)</i>
N	Y	011001	11111111	N	N	<i>Continuous DTMF Tone Order (Stop continuous DTMF tone)</i>
N	Y	011010	nnnnnnnn	N	Y	<i>Status Request Order (see 7.7.4.4)</i>
Y	N	011011	00000000	N	N	<i>Registration Accepted Order</i>
Y	N	011011	00000001	N	N	<i>Registration Request Order</i>

1 **Table 7.7.4-1. Order and Order Qualification Codes Used on the Paging Channel and**
 2 **the Forward Traffic Channel (Part 3 of 3)**

Paging Channel Order	Forward Traffic Channel Order	Order Code, ORDER (binary)	Order Qualification Code, ORDg (binary)	ACTION_ TIME can be specified	Additional Fields other than ORDg	Name/Function
Y	N	011011	00000010	N	N	<i>Registration Rejected Order</i>
N	Y	011101	nnnnnnnn	Y	N	<i>Service Option Control Order (the specific control is designated by 'nnnnnnnn' as determined by each service option)</i>
Y	Y	011110	nnnnnnnn	N	N	<i>Local Control Order (the specific order is designated by 'nnnnnnnn' as determined by each system)</i>
All other codes are reserved.						

1 **7.7.4.1 Base Station Challenge Confirmation Order**

2 **The Base Station Challenge Confirmation Order can be sent on either the Paging Channel or**
 3 **on the Forward Traffic Channel. The base station shall use the following fixed-length**
 4 **format for the order-specific fields:**

Order Specific Field	Length (bits)
ORDQ	8
AUTHBS	18
RESERVED	6

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- ORDQ** - Order qualification code.
 The base station shall set this field to '00000000'.
- AUTHBS** - Challenge response.
 The base station shall set this field as specified in 6.3.12.1.9.
- RESERVED** - Reserved bits.
 The base station shall set this field to '000000'.

1 **7.7.4.2 Service Option Request Order**

2 The *Service Option Request Order* can be sent only on the Forward Traffic Channel. The
 3 base station shall use the following fixed-length format for the order-specific fields:

Order Specific Field	Length (bits)
ORDQ	8
SERVICE_OPTION	16

5
 6 **ORDQ** - Order qualification code.

7 The base station shall set this field to '00000000'.

8 **SERVICE_OPTION** - Service option.

9 The base station shall set this field to the service option code
 10 shown in TSB58 "Service Option Number Assignments for
 11 Wideband Spread Spectrum Digital Cellular System"
 12 corresponding to the requested or alternative service option.

1 **7.7.4.3 Service Option Response Order**

2 The *Service Option Response Order* can be sent only on the Forward Traffic Channel. The
 3 base station shall use the following fixed-length format for the order-specific fields:

4

Order Specific Field	Length (bits)
ORDQ	8
SERVICE_OPTION	16

5

6 **ORDQ** - Order qualification code.

7 The base station shall set this field to '00000000'.

8 **SERVICE_OPTION** - Service option.

9 The base station shall set this field to the service option code
 10 shown in TSB58 "Service Option Number Assignments for
 11 Wideband Spread Spectrum Digital Cellular System"
 12 corresponding to the accepted service option, or to
 13 '0000000000000000' to reject the last service option
 14 requested by the mobile station.

15

7.7.4.4 Status Request Order

The *Status Request Order* can be sent only on the Forward Traffic Channel. The ORDQ field of the *Status Request Order* specifies the information record to be returned by the mobile station in the *Status Message*. The base station shall use the following variable-length format for the order-specific fields:

Order Specific Field	Length (bits)
ORDQ	8
SID	0 or 15
NID	0 or 16
RESERVED	0 or 1 (as needed)

ORDQ Order qualification code.

The base station shall set this field to the order qualification code corresponding to the information record type to be returned by the mobile station in the *Status Message*, as shown in Table 7.7.4.4-1.

Table 7.7.4.4-1. Status Request ORDQ Values

Information Record Requested	ORDQ (binary)
Identification	00000110
Call Mode	00000111
Terminal Information	00001000
MIN Information	00001001
Security Status	00001010
All other ORDQ values are reserved.	

SID - System identification.

If the ORDQ field is set to '00000110', the base station shall set this field to the system identification number for this cellular system. Otherwise, the base station shall omit this field.

NID - Network identification.

This field serves as a sub-identifier of a system as defined by the owner of the SID.

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If the ORDQ field is set to '00000110', the base station shall set this field to the network identification number for this network. The NID value of 65,535 is reserved. Otherwise, the base station shall omit this field.

RESERVED - Reserved bits.

The base station shall add reserved bits as needed in order to make the length of the order-specific fields equal to an integer number of octets. The base station shall set these bits to '0'.

7.7.5 Information Records

On the Paging Channel, information records may be included in the *Feature Notification Message*. On the Forward Traffic Channel, information records may be included in the *Alert with Information Message* and the *Flash with Information Message*. Table 7.7.5-1 lists the information record type values that may be used with each message type. The following sections describe the contents of each of the record types in detail.

Table 7.7.5-1. Information Record Types

Feature	Alert	Flash	Information Record	Record Type (binary)
Y	Y	Y	Display	00000001
Y	Y	Y	Called Party Number	00000010
Y	Y	Y	Calling Party Number	00000011
N	N	Y	Connected Number	00000100
Y	Y	Y	Signal	00000101
Y	N	Y	Message Waiting	00000110
All other record type values are reserved.				

1 **7.7.5.1 Display**

2 This information record allows the network to supply display information that may be
 3 displayed by the mobile station. The base station shall use the following variable-length
 4 format for the type-specific fields:

5

Type-Specific Field	Length (bits)
---------------------	---------------

One or more occurrences of the following field:

CHARI	8
-------	---

6

7

CHARI - Character.

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13

The base station shall include one occurrence of this field for each character to be displayed. The base station shall set each occurrence of this field to the ASCII representation corresponding to the character entered, as specified in ANSI X3.4, with the most significant bit set to '0'.

1 **7.7.5.2 Called Party Number**

2 This information record identifies the called party's number. The base station shall use the
 3 following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
NUMBER_TYPE	3
NUMBER_PLAN	4

4 Zero or more occurrences of the following field:

CHARI	8
-------	---

RESERVED	1
----------	---

5
 6 **NUMBER_TYPE** - Type of number.

7 The base station shall set this field to the NUMBER_TYPE
 8 value shown in Table 6.7.1.3.2.4-2 corresponding to the type
 9 of the called number, as defined in ANSI T1.607 §4.5.9.

10 **NUMBER_PLAN** - Numbering plan.

11 The base station shall set this field to the NUMBER_PLAN
 12 value shown in Table 6.7.1.3.2.4-3 corresponding to the
 13 numbering plan used for the called number, as defined in
 14 ANSI T1.607 §4.5.9.

15 **CHARI** - Character.

16 The base station shall include one occurrence of this field for
 17 each character in the called number. The base station shall
 18 set each occurrence of this field to the ASCII representation
 19 corresponding to the character, as specified in ANSI X3.4,
 20 with the most significant bit set to '0'.

21 **RESERVED** - Reserved bits.

22 The base station shall set this field to '0'.

1 **7.7.5.3 Calling Party Number**

2 This information record identifies the calling party's number. The base station shall use
3 the following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
NUMBER_TYPE	3
NUMBER_PLAN	4
PI	2
SI	2

Zero or more occurrences of the following field:

CHARI	8
-------	---

RESERVED	5
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5

6

NUMBER_TYPE - Type of number.

7

The base station shall set this field to the **NUMBER_TYPE** value shown in Table 6.7.1.3.2.4-2 corresponding to the type of the calling number, as defined in ANSI T1.607 §4.5.9.

8

9

10

NUMBER_PLAN - Numbering plan.

11

The base station shall set this field to the **NUMBER_PLAN** value shown in Table 6.7.1.3.2.4-3 corresponding to the numbering plan used for the calling number, as defined in ANSI T1.607 §4.5.9.

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13

14

15

PI - Presentation indicator.

16

This field indicates whether or not the calling number should be displayed.

17

18

The base station shall set this field to the **PI** value shown in Table 6.7.4.4-1 corresponding to the presentation indicator, as defined in ANSI T1.607 §4.5.9.

19

20

21

SI - Screening indicator.

22

This field indicates how the calling number was screened.

23

The base station shall set this field to the **SI** value shown in Table 6.7.4.4-2 corresponding to the screening indicator value, as defined in ANSI T1.607 §4.5.9.

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CHARI - Character.

The base stations shall include one occurrence of this field for each character in the calling number. The base station shall set each occurrence of this field to the ASCII representation corresponding to the character, as specified in ANSI X3.4, with the most significant bit set to '0'.

RESERVED - Reserved bits.

The base station shall set this field to '00000'.

1 **7.7.5.4 Connected Number**

2 This information record identifies the responding party to a call. The base station shall use
3 the following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
NUMBER_TYPE	3
NUMBER_PLAN	4
PI	2
SI	2

Zero or more occurrences of the following field:

CHARI	8
-------	---

RESERVED	5
----------	---

5

6 **NUMBER_TYPE** - Type of number.

7 The base station shall set this field to the **NUMBER_TYPE**
8 value shown in Table 6.7.1.3.2.4-2 corresponding to the type
9 of the connected number, as defined in ANSI T1.607 §4.5.9.

10 **NUMBER_PLAN** - Numbering plan.

11 The base station shall set this field to the **NUMBER_PLAN**
12 value shown in Table 6.7.1.3.2.4-3 corresponding to the
13 numbering plan used for the connected number, as defined in
14 ANSI T1.607 §4.5.9.

15 **PI** - Presentation indicator.

16 This field indicates whether or not the connected number
17 should be displayed.

18 The base station shall set this field to the **PI** value shown in
19 Table 6.7.4.4-1 corresponding to the presentation indicator,
20 as defined in ANSI T1.607 §4.5.9.

21 **SI** - Screening indicator.

22 This field indicates how the connected number was screened.

23 The base station shall set this field to the **SI** value shown in
24 Table 6.7.4.4-2 corresponding to the screening indicator
25 value, as defined in ANSI T1.607 §4.5.9.

- 1 **CHARi** - **Character.**
- 2 **The base station shall include one occurrence of this field for**
- 3 **each character in the connected number. The base station**
- 4 **shall set each occurrence of this field to the ASCII**
- 5 **representation corresponding to the character, as specified in**
- 6 **ANSI X3.4, with the most significant bit set to '0'.**
- 7 **RESERVED** - **Reserved bits.**
- 8 **The base station shall set this field to '00000'.**

1 **7.7.5.5 Signal**

2 This information record allows the network to convey information to a user by means of
3 tones and other alerting signals.

4 The Standard Alert is defined as SIGNAL_TYPE = '10', ALERT_PITCH = '00' and SIGNAL =
5 '000001'.

6 The base station shall use the following fixed-length format for the type-specific fields:
7

Type-Specific Field	Length (bits)
SIGNAL_TYPE	2
ALERT_PITCH	2
SIGNAL	6
RESERVED	6

8
9 **SIGNAL_TYPE** - Signal type.

10 The base station shall set this field to the signal type value
11 shown in Table 7.7.5.5-1.

12
13 **Table 7.7.5.5-1. Signal Type**

Description	SIGNAL_TYPE (binary)
Tone signal	00
ISDN Alerting	01
IS-54B Alerting	10
Reserved	11

14
15 **ALERT_PITCH** - Pitch of the alerting signal.

16 This field is ignored unless SIGNAL_TYPE is '10', IS-54B
17 Alerting.

18 If SIGNAL_TYPE is '10', the base station shall set this field to
19 the alert pitch shown in Table 7.7.5.5-2. Otherwise, the base
20 station shall set this field to '00'.
21

Table 7.7.5.5-2. Alert Pitch

Description	ALERT_PITCH (binary)
Medium pitch (standard alert)	00
High pitch	01
Low pitch	10
Reserved	11

SIGNAL - Signal code.

The base station shall set this field to the specific signal desired. If SIGNAL_TYPE is '00', the base station shall set this field as described in Table 7.7.5.5-3. If SIGNAL_TYPE is '01', the base station shall set this field as described in Table 7.7.5.5-4. If SIGNAL_TYPE is '10', the base station shall set this field as described in Table 7.7.5.5-5.

Table 7.7.5.5-3. Tone Signals (SIGNAL_TYPE = '00')

Description	SIGNAL (binary)
Dial tone on: a continuous 350-Hz tone added to a 440-Hz tone.	000000
Ring back tone on: a 440-Hz tone added to a 480-Hz tone repeated in a 2s-on 4s-off pattern	000001
Intercept tone on: alternating 440-Hz and 620-Hz tones, each on for 250 ms.	000010
Abbreviated intercept: alternating 440-Hz and 620-Hz tones, each on for 250 ms, repeated for four seconds.	000011
Network congestion (reorder) tone on: a 480-Hz tone added to a 620-Hz tone repeated in a 250-ms-on, 250-ms-off cycle.	000100
Abbreviated network congestion (reorder): a 480-Hz tone added to a 620-Hz tone repeated in a 250-ms-on, 250-ms-off cycle for four seconds.	000101
Busy tone on: a 480-Hz tone added to a 620-Hz tone repeated in a 500-ms-on, 500-ms-off cycle.	000110
Confirm tone on: a 350-Hz tone added to a 440-Hz tone repeated 3 times in a 100-ms-on, 100-ms-off cycle.	000111
Answer tone on: answer tone is not presently used in North American networks	001000
Call waiting tone on: a 300 ms burst of 440-Hz tone	001001
Tones off	111111
All other SIGNAL values are reserved	

Table 7.7.5.5-4. ISDN Alerting (SIGNAL_TYPE = '01')

Description	SIGNAL (binary)
Normal Alerting: 2.0 s on, 4.0 s off, repeating	000000
Intergroup Alerting: 0.8 s on, 0.4 s off, 0.8 s on, 4.0 s off, repeating	000001
Special/Priority Alerting: 0.4 s on, 0.2 s off, 0.4 s on, 0.2 s off, 0.8 s on, 4.0 s off, repeating	000010
Reserved (ISDN Alerting pattern 3)	000011
"Ping ring": single burst of 500 ms	000100
Reserved (ISDN Alerting pattern 5)	000101
Reserved (ISDN Alerting pattern 6)	000110
Reserved (ISDN Alerting pattern 7)	000111
Alerting off	001111
All other SIGNAL values are reserved	

2

Table 7.7.5.5-5. IS-54B Alerting (SIGNAL_TYPE = '10')

Description	SIGNAL (binary)
<i>No Tone: Off</i>	000000
<i>Long: 2.0 s on, 4.0 s off, repeating (standard alert)</i>	000001
<i>Short-Short: 0.8 s on, 0.4 s off, 0.8 s on, 4.0 s off, repeating</i>	000010
<i>Short-Short-Long: 0.4 s on, 0.2 s off, 0.4 s on, 0.2 s off, 0.8 s on, 4.0 s off, repeating</i>	000011
<i>Short-Short-2: 1.0 s on, 1.0 s off, 1.0 s on, 3.0 s off, repeating.</i>	000100
<i>Short-Long-Short: 0.5 s on, 0.5 s off, 1.0 s on, 0.5 s off, 0.5 s on, 3.0 s off, repeating.</i>	000101
<i>Short-Short-Short-Short: 0.5 s on, 0.5 s off, 0.5 s on, 0.5 s off, 0.5 s on, 0.5 s off, 0.5 s, 2.5 s off, repeating.</i>	000110
<i>PBX Long: 1.0 s on, 2.0 s off, repeating.</i>	000111
<i>PBX Short-Short: 0.4 s on, 0.2 s off, 0.4 s on, 2.0 off, repeating.</i>	001000
<i>PBX Short-Short-Long: 0.4 s on, 0.2 s off, 0.4 s on, 0.2 s off, 0.8 s on, 1.0 s off, repeating.</i>	001001
<i>PBX Short-Long-Short: 0.4 s on, 0.2 s off, 0.8 s on, 0.2 s off, 0.4 s on, 1.0 s off, repeating.</i>	001010
<i>PBX Short-Short-Short-Short: 0.4 s on, 0.2 s off, 0.4 s on, 0.2 s off, 0.4 s on, 0.2 s off, 0.4 s, 0.8 s off, repeating.</i>	001011
All other SIGNAL values are reserved	

2

3

4

RESERVED - Reserved bits.

The base station shall set this field to '000000'.

1 **7.7.5.6 Message Waiting**

2 This information element conveys to the user the number of messages waiting. The base
3 station shall use the following fixed-length format for the type-specific fields:

4

Type-Specific Field	Length (bits)
MSG_COUNT	8

5

6

MSG_COUNT - Number of waiting messages.

7

8

The base station shall set this field to the number of messages waiting.

9