Exhibit 3

DOCKET ALARM
Find authenticated court documents without watermarks at docketalarm.com.

US008199792B2

(12) **United States Patent**
Nakao et al.

(10) **Patent No.: US 8,199,792 B2**
(45) **Date of Patent: Jun. 12, 2012**

(54) **RADIO COMMUNICATION APPARATUS AND RESPONSE SIGNAL SPREADING METHOD**

(75) Inventors: **Seigo Nakao**, Kanagawa (JP); **Daichi Imamura**, Kanagawa (JP); **Akihiko Nishio**, Kanagawa (JP); **Masayuki Hoshino**, Kanagawa (JP)

(73) Assignee: **Panasonic Corporation**, Osaka (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/280,190**

(22) Filed: **Oct. 24, 2011**

(65) **Prior Publication Data**

US 2012/0039258 A1 Feb. 16, 2012

Related U.S. Application Data

(63) Continuation of application No. 13/165,538, filed on Jun. 21, 2011, which is a continuation of application No. 12/593,904, filed as application No. PCT/JP2008/001526 on Jun. 13, 2008, now Pat. No. 8,009,721.

(30) **Foreign Application Priority Data**

Jun. 15, 2007 (JP) 2007-159580
Jun. 19, 2007 (JP) 2007-161966

(51) **Int. Cl.**
H04B 1/00 (2006.01)

(52) **U.S. Cl.** **375/146**

(58) **Field of Classification Search** 375/130, 375/146, 260, 295; 370/208–210
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,377,539	B1	4/2002	Kang et al.	
7,376,117	B2	5/2008	Erlich et al.	
7,539,463	B2	5/2009	Himayat et al.	
7,852,959	B2 *	12/2010	Kwak et al.	375/260
7,929,415	B2	4/2011	Kwak et al.	
7,957,263	B2 *	6/2011	Gaal	370/209
8,036,166	B2 *	10/2011	Tiirola et al.	370/329
2007/0171995	A1 *	7/2007	Muharemovic et al.	375/260
2007/0230600	A1	10/2007	Bertrand et al.	

(Continued)

FOREIGN PATENT DOCUMENTS

JP 2004297593 A 10/2004

(Continued)

OTHER PUBLICATIONS

3GPP™, 3GPP TSG RAN WG1 #46bis, R1-062841, Seoul, Korea, Oct. 9-13, 2006, 7 pages.

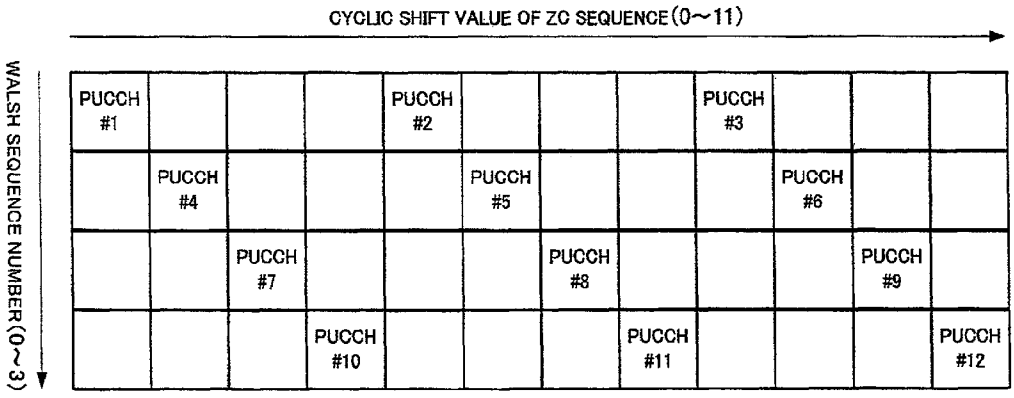
(Continued)

Primary Examiner — Khanh C Tran
(74) *Attorney, Agent, or Firm* — Seed IP Law Group PLLC

(57) **ABSTRACT**

A wireless communication apparatus capable of minimizing the degradation in separation characteristic of a code multiplexed response signal. In this apparatus, a control part (**209**) controls both a AC sequence to be used in a primary spreading in a spreading part (**214**) and a Walsh sequence to be used in a secondary spreading in a spreading part (**217**) so as to allow a very small circular shift interval of the ZC sequence to absorb the interference components remaining in the response signal; the spreading part (**214**) uses the ZC sequence set by the control part (**209**) to primary spread the response signal; and the spreading part (**217**) uses the Walsh sequence set by the control part (**209**) to secondary spread the response signal to which PC has been added.

24 Claims, 15 Drawing Sheets



DOCKET ALARM
Find authenticated court documents without watermarks at docketalarm.com.

U.S. PATENT DOCUMENTS

2008/0212464	A1	9/2008	Kim et al.
2008/0232449	A1	9/2008	Khan et al.
2008/0268860	A1	10/2008	Lunttila et al.
2008/0293424	A1	11/2008	Cho et al.
2008/0298433	A1	12/2008	Tiirola et al.
2008/0298488	A1	12/2008	Shen et al.
2008/0310540	A1	12/2008	Tiirola et al.
2008/0311942	A1	12/2008	Kim et al.
2009/0022135	A1	1/2009	Papasakellariou et al.
2009/0028065	A1	1/2009	Iwai et al.
2009/0046646	A1	2/2009	Cho et al.
2010/0046480	A1	2/2010	Kawamura et al.
2010/0135273	A1	6/2010	Kim

FOREIGN PATENT DOCUMENTS

JP	2005333344	A	12/2005
WO	2008053930	A1	5/2008

OTHER PUBLICATIONS

3GPP™, 3GPP TSG RAN WG1 Meeting #47bis, R1-070394, Sorrento, Italy, Jan. 15-19, 2007, 5 pages.

3GPP™, 3GPP TSG RAN WG1 Meeting #48bis, R1-071650, St. Julians, Malta, Mar. 26-30, 2007, 3 pages.

"3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation (Release 8)," Technical Specification 3GPP TS 36.211 (V8.3.0), 3rd Generation Partnership Project (3GPP™), Valbonne, France, May 2008.

"Coherent Uplink ACK/NAK Transmission With high Speed UEs," Report R1-072857, 3GPP TSG RAN WG1 Meeting #49, Orlando, Fla, Jun. 25-29, 2007, 6 pages.

"Coherent Uplink ACK/NAK Transmission With high Speed UEs," Report R1-073429, 3GPP TSG RAN WG1 Meeting #50, Athens, Aug. 20-24, 2007, 4 pages.

"Multiplexing Capability of CQIs and ACK/NACKs Form Different UEs," 3rd Generation Partnership Project (3GPP™) TSG RAN WG1 Meeting #49, Kobe, Japan, May 7-11, 2007, 4 pages.

"Selection of Orthogonal Cover and Syclic Shift for High Speed UL ACK," Report R1-073564, 3GPP TSG RAN WG1 Meeting #50, Athens, Aug. 20-24, 2007, 5 pages.

"Usage of Cyclic Shifts and Block-Wise Spreading Codes for Uplink ACK/NACK," Report R1-073618, 3GPP TSG RAN WG1 Meeting #50, Athens, Aug. 20-24, 2007, 5 pages.

Burstrom et al., "Uplink Control Channel in E-UTRA, Radio Link and Radio Network Evaluation," IEEE Wireless Communications and Networking Conference (WCN 2008), Las Vegas, Nev., Mar. 31-Apr. 3, 2008, pp. 835-839.

Extended European Search Report, for European Application No. 08764121.3, dated Jul. 19, 2011, 7 pages.

International Search Report, mailed Jul. 8, 2008, issued in corresponding International Application No. PCT/JP2008/001526, filed Jun. 13, 2008.

Kawamura et al., "Layer 1/Layer 2 Control Channel Structure in Single-Carrier FDMA Based Evolved UTRA Uplink," IEEE, 5 pages, 2007.

Kwak et al., "Degisn of CQI Channel Structure for Different/Large-Sized Control Signals," U.S. Appl. No. 60/944,074, filed Jun. 14, 2007, 14 pages.

Motorola, "EUTRA-SC-FDMA Uplink Pilot/References Signal Design," R1-063057, 3GPP RAN WG1 #47, Agenda Item 6.4.2, Riga, Latvia, Nov. 6-10, 2006, 5 pages.

Nokia, "Multiplexing of L1/L2 Control Signaling when UE has no data to transmit," R1-063380, 3GPP TSG RAN WG1 #47, Agenda Item 6.12.1, Riga, Latvia, Nov. 6-10, 2006, 6 pages.

Nokia Siemens Network, Nokia, "Randomization for ACK/NACK signals transmitted on PUCCH," R1-073005, 3GPP TSG RAN WG1 Meeting #49bis, Orlando, Fla, Jun. 25-29, 2007, 4 pages.

Notice of Reason for Rejection mailed Jan. 19, 2010, in corresponding Japanese Patent Application 2009-519168.

Panasonic, "Signaling parameters for UL ACK/NACK resources," R1-073616, 3GPP TSG RAN WG1 Meeting #50, Athens, Aug. 20-24, 2007, pp. 1-3.

* cited by examiner

DOCKET ALARM
Find authenticated court documents without watermarks at docketalarm.com.