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(54) **METHOD OF TRANSMITTING UPLINK CONTROL SIGNALS IN WIRELESS COMMUNICATION SYSTEM**

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(51) **Int. Cl.**
H04B 7/26 (2006.01)

(52) **U.S. Cl.** **370/522**
(58) **Field of Classification Search** 370/522
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2007/0133458 A1 6/2007 Chandra et al.

(Continued)

FOREIGN PATENT DOCUMENTS

KR 10-2007-0074431 A 7/2007

(Continued)

OTHER PUBLICATIONS

Source: LG Electronics Inc., 3GPP TSG RAN WGI #51; "Scheduling Request (SR) interaction with PUCCH"; Agenda Item: 6.2.4; Document for: Discussion and Decision; Jeju, Korea; Nov. 5-9, 2007; R1-074739.

(Continued)

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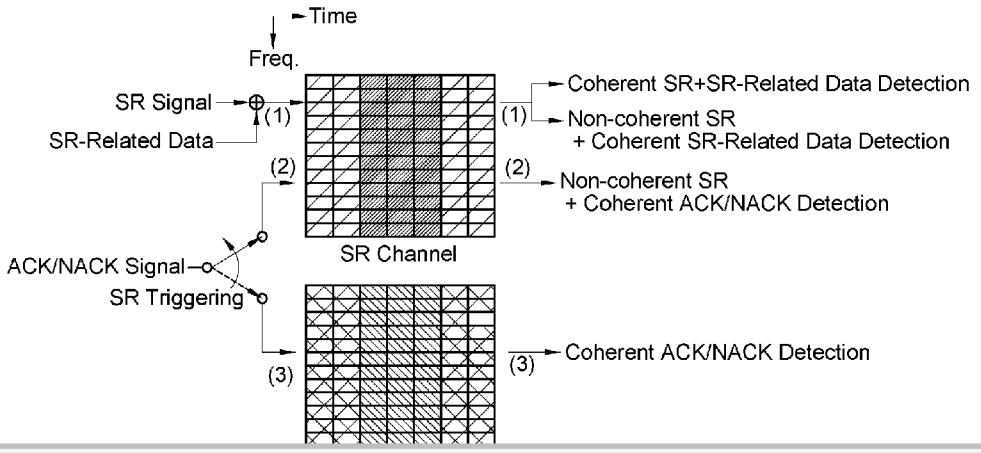
(57) **ABSTRACT**

A method of transmitting uplink control signals in a wireless communication system includes preparing a ACK/NACK resource for transmitting the ACK/NACK signal for HARQ of downlink data on an uplink control channel, preparing a scheduling request resource for transmitting a scheduling request and the ACK/NACK signal on the uplink control channel in one subframe, and transmitting the ACK/NACK signal on the uplink control channel configured by the scheduling request resource for the positive transmission of the scheduling request and transmitting the ACK/NACK signal on the uplink control channel configured by the ACK/NACK resource for negative transmission of the scheduling request.

14 Claims, 11 Drawing Sheets



U.S. PATENT DOCUMENTS

2007/0171849	A1	7/2007	Zhang et al.	
2007/0201397	A1*	8/2007	Zhang	370/329
2009/0109917	A1*	4/2009	Pajukoski et al.	370/329
2010/0195629	A1*	8/2010	Chen et al.	370/336

FOREIGN PATENT DOCUMENTS

KR	10-2008-0073616	A	8/2008
WO	WO-2009/008677	A2	1/2009
WO	WO-2007/078171	A2	7/2009

OTHER PUBLICATIONS

R1-070777, "E-UTRA Multiplexing of UL Control Signaling with Data," Motorola, RAN1#48, St. Louis, USA, Feb. 2007.

R1-070162, "EUTRA UL L1/L2 Control Channel Mapping," Motorola, RAN1#47bis, Sorrento, Italy, Jan. 2007.

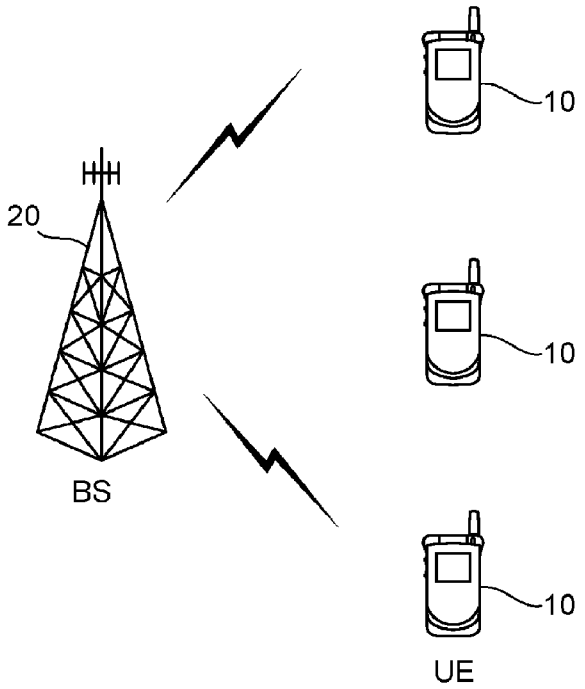
Alcatel-Lucent: "Multiplexing the Scheduling Request in the Uplink" ; 5.13.2 UL Control Signaling; 3GPP TSG-RAN WG1 #49bis; R1-073066; Orlando U.S., Jun. 25-29, 2007; XP050106721.

Nokia Siemens Networks, Nokia; Multiplexing of Scheduling Request and ACK/NACK and/or CQI; 3GPP TSG RAN WG1 #49bis; R1-073001; 5.13.2; Orlando, U.S.A., Jun. 25-29, 2007; XP050106675.

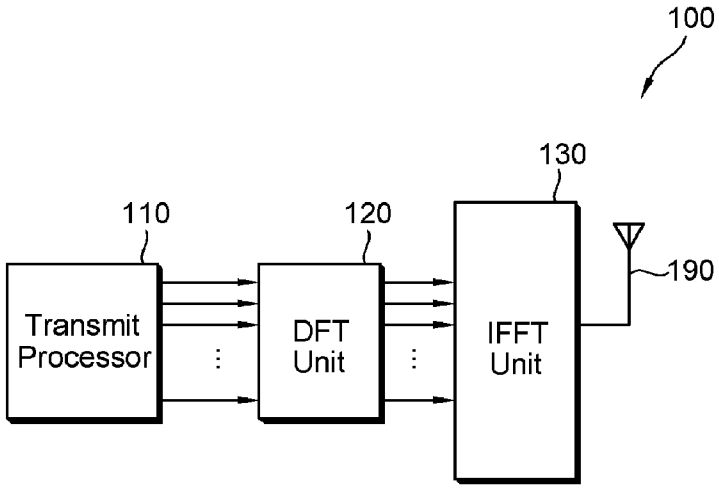
Ericsson: 'Detail of ACK/NAK bundling for TDD'; TSG-RAN WG1 #53; R1-082002; 7.1.2; Kansas City, MO, U.S.A., May 5-9, 2008; XP050110349.

* cited by examiner

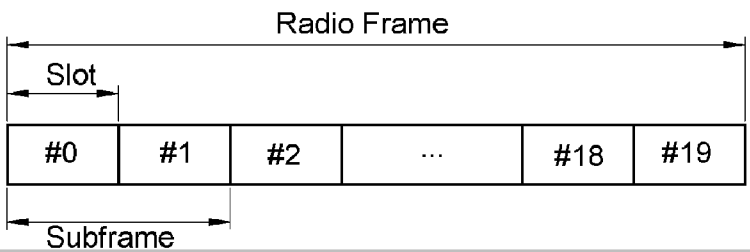
[Fig. 1]



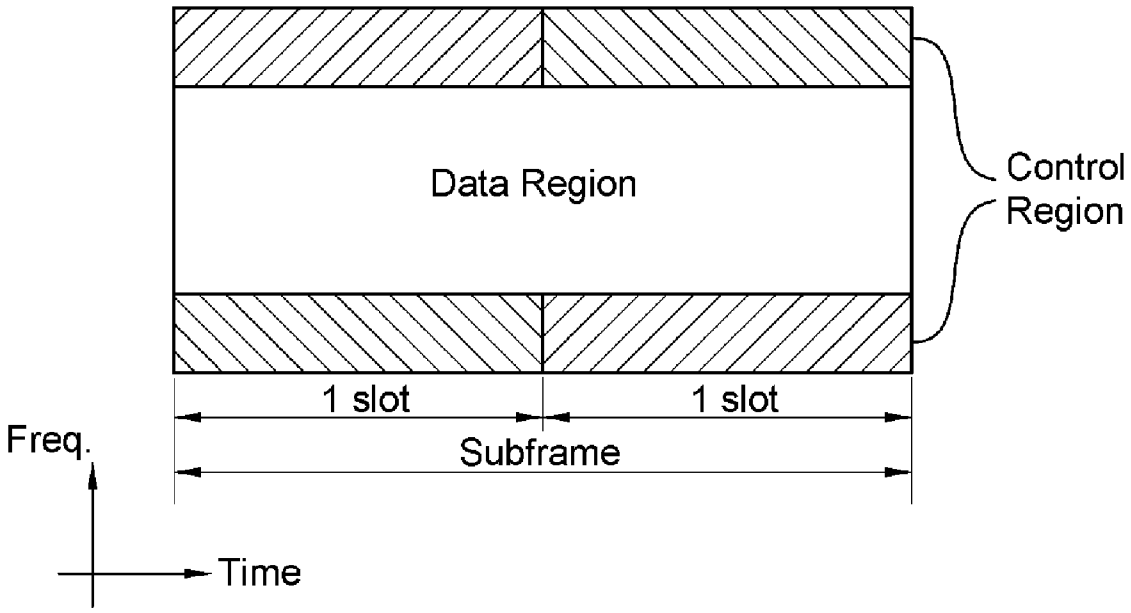
[Fig. 2]



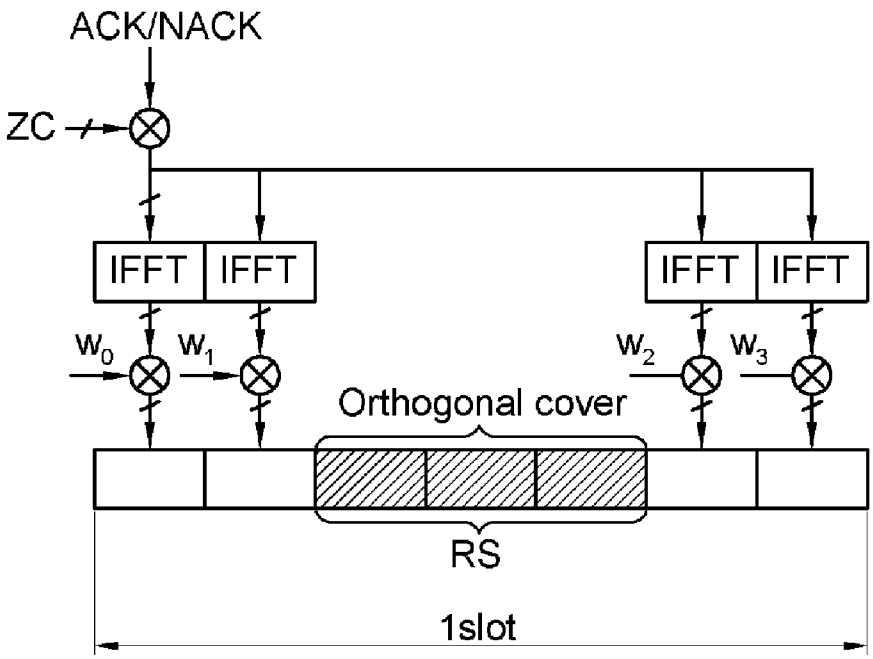
[Fig. 3]



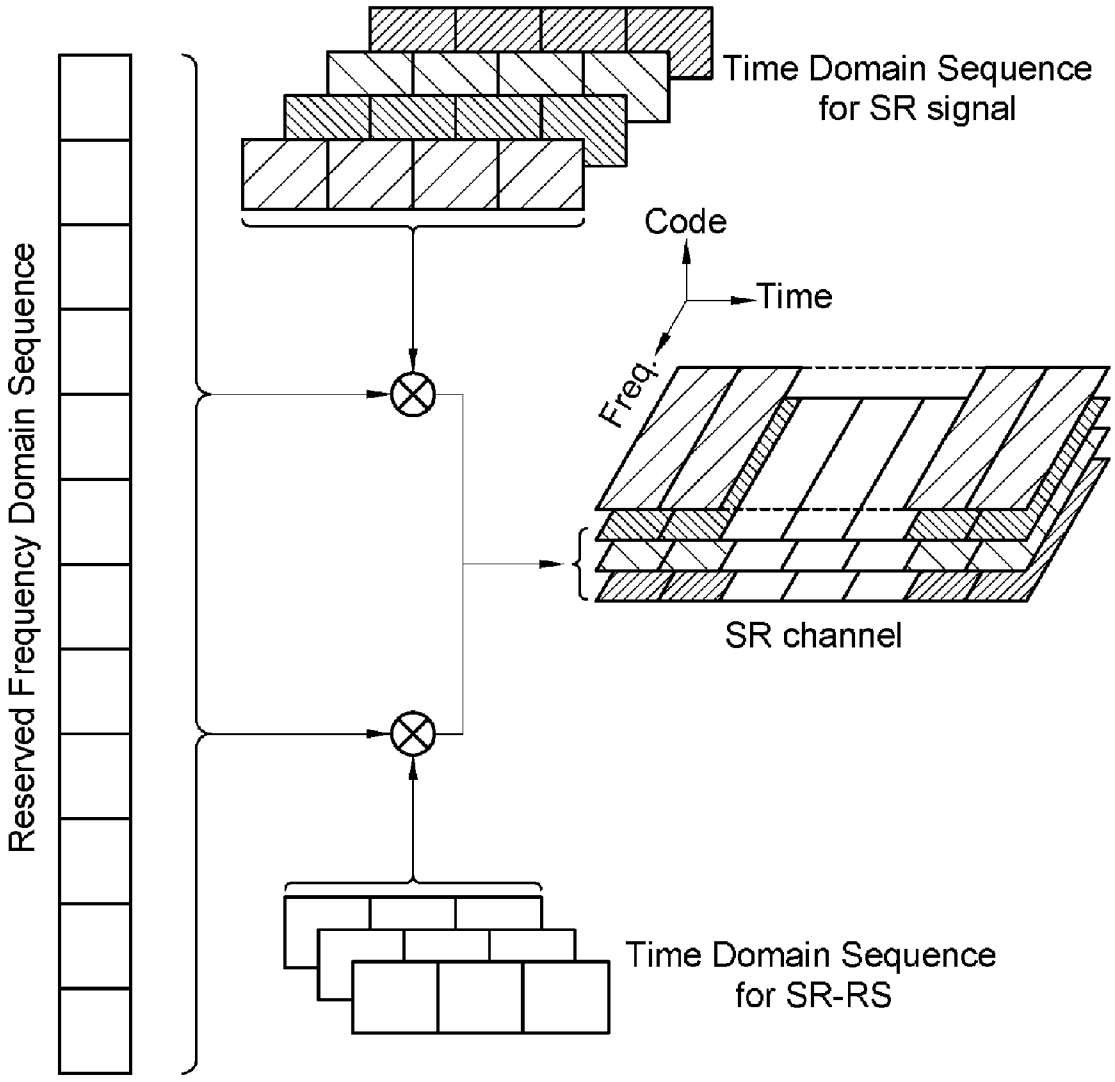
[Fig. 4]



[Fig. 5]



[Fig. 6]



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