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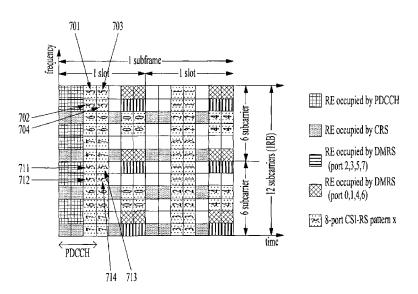
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(54) Title: METHOD AND APPARATUS FOR TRANSMITTING CHANNEL STATE INFORMATION-REFERENCE SIGNALS



(57) Abstract: A method of transmitting channel state information (CSI)-reference signals (RS) at a base station in a wireless communication system includes generating a reference signal sequence, and mapping the reference signal sequence to resource elements (REs) included in one or more patterns for 8-port CSI-RS transmission among five patterns for 8-port CSI-RS transmission located in a first region of a PRB pair and three patterns for 8-port CSI-RS transmission located in a second region of the PRB pair. A maximum of two OFDM (orthogonal frequency division multiplexing) symbols is used for a physical downlink control channel in a subframe including the PRB pair.



International application No. **PCT/KR2013/008209**

A. CLASSIFICATION OF SUBJECT MATTER

H04W 24/10(2009.01)i, H04J 11/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols) H04W 24/10; H04L 5/00; H04B 7/26; H04J 11/00; H04W 72/04; H04L 27/26

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) eKOMPASS(KIPO internal) & Keywords: CSI-RS, RE, mapping, pattern, port

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	
A	KR 10-2011-0132180 A (PANTECH CO., LTD.) 07 December 2011 See abstract; paragraphs [65]-[67], [73], [95]-[100], [125]; claim 3; and figure 5.	1–13	
A	WO 2011-153286 A1 (QUALCOMM INCORPORATED) 08 December 2011 See abstract; paragraphs [6], [7], [50], [59], [64], [65]; and figures 4, 7.	1–13	
A	WO 2012-111937 A2 (PANTECH CO., LTD.) 23 August 2012 See paragraphs [109]-[113]; and figure 5.	1-13	
A	US 2012-0188955 A1 (WENFENG ZHANG) 26 July 2012 See paragraphs [12], [47]-[51]; claims 2-7; and figures 2, 3.	1-13	
A	WO 2011-153264 A2 (ZTE (USA) INC.) 08 December 2011 See abstract; paragraphs [13], [14]; and figures 2A, 2B.	1-13	

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See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 10-2011-0132180 A	07/12/2011	CN 103069761 A EP 2577929 A2 JP 2013-535128 A US 2011-0292847 A1 WO 2011-152651 A2 WO 2011-152651 A3	24/04/2013 10/04/2013 09/09/2013 01/12/2011 08/12/2011 23/02/2012
WO 2011-153286 A1	08/12/2011	CN 102884751 A CN 102939734 A EP 2577900 A1 JP 2013-530604 A JP 2013-532427 A KR 10-2013-0016723 A KR 10-2013-0031934 A US 2012-0106374 A1 US 2012-0134273 A1 WO 2011-140264 A1	16/01/2013 20/02/2013 10/04/2013 25/07/2013 15/08/2013 18/02/2013 29/03/2013 03/05/2012 31/05/2012 10/11/2011
WO 2012-111937 A2	23/08/2012	KR 10-2012-0093026 A WO 2012-111937 A3	22/08/2012 01/11/2012
US 2012-0188955 A1	26/07/2012	CN 102684857 A EP 2479918 A1	19/09/2012 25/07/2012
WO 2011-153264 A2	08/12/2011	CN 103120006 A EP 2578036 A2 JP 2013-533674 A KR 10-2013-0113353 A US 2013-128860 A1 WO 2011-153264 A3	22/05/2013 10/04/2013 22/08/2013 15/10/2013 23/05/2013 19/04/2012