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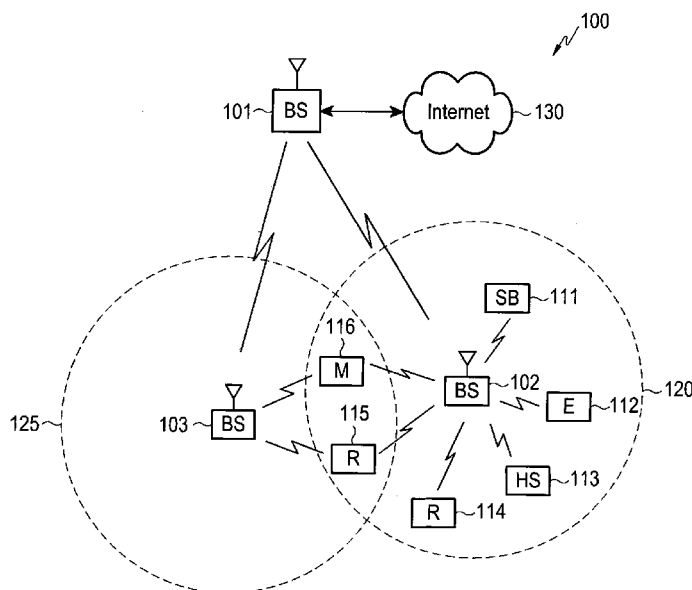
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(54) **Title:** APPARATUS AND METHOD FOR CHANNEL-STATE-INFORMATION PILOT DESIGN FOR AN ADVANCED WIRELESS NETWORK



(57) **Abstract:** A base station and mobile station communicate using a multiple input multiple output (MIMO) communication. The base station includes a two dimensional (2D) antenna array comprising a number N of antenna elements configured in a 2D grid. The 2D antenna array is configured to communicate with at least one subscriber station. The base station also includes a controller configured to transmit N channel-state-information reference-signal (CSI-RS) antenna ports (APs) associated with each of the N antenna elements. The subscriber station includes an antenna array configured to communicate with at least one base station. The subscriber station also includes processing circuitry configured receives physical downlink shared channels (PDSCHs) from a 2D active antenna array at the at least one base station. The 2D active antenna array includes a number N antenna elements. The processing circuitry further configured to estimate a full CSI associated with the N antenna elements.



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A. CLASSIFICATION OF SUBJECT MATTER**H04B 7/04(2006.01)i, H04B 7/26(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)

H04B 7/04; H04W 72/12; H04L 1/06; H04J 11/00; H04W 72/04; H04B 7/26

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: MIMO (Multiple Input Multiple Output), CSI-RS

(Channel State Information Reference Signal) antenna port, antenna array, H-CSI (Horizontal-CSI), V-CSI (Vertical-CSI), multiplexing, H-CQI (Horizontal-CQI), H-PMI (Horizontal-PMI), V-CQI (Vertical-CQI), V-PMI (Vertical-PMI).

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2010-0138261 A (PANTECH CO., LTD.) 31 December 2010 See paragraphs 17, 23, 33-35, 50-60; and figures 3a-3b.	1-15
A	KR 10-2012-0029338 A (LG ELECTRONICS INC.) 26 March 2012 See claim 28; paragraphs 8-10, 609; and figures 10, 16.	1-15
A	KR 10-2012-0015977 A (PANTECH CO., LTD.) 22 February 2012 See claim 1; paragraphs 10-16, 251-254; and figure 17.	1-15
A	TRAN, THIEN-TOAN et al., 'Overview of enabling technologies for 3GPP LTE-advanced', EURASIP Journal on Wireless Communications and Networking 2012, 20 February 2012, pp. 1-12 (http://jwcn.eurasipjournals.com/content/2012/1/54) See page 5, right col., line 43 - page 6, right col., line 6.	1-15
A	KR 10-2011-0091839 A (LG ELECTRONICS INC.) 16 August 2011 See paragraphs 8-9; and figure 5.	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2013/002688

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