

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 July 2011 (07.07.2011)

(10) International Publication Number
WO 2011/081390 A3

(51) International Patent Classification:
H04B 7/04 (2006.01)

(21) International Application Number:
PCT/KR2010/009390

(22) International Filing Date:
28 December 2010 (28.12.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/291,717 31 December 2009 (31.12.2009) US
61/360,363 30 June 2010 (30.06.2010) US
12/970,568 16 December 2010 (16.12.2010) US

(71) Applicant (for all designated States except US): **SAM-SUNG ELECTRONICS CO., LTD.** [KR/KR]; 416, Maetan-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do 443-742 (KR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **ZHANG, Jianzhong** [CN/US]; 504 Renfro Court, Irving, Dallas County, TX 75063 (US). **NAM, Young-Han** [KR/US]; 2525 Ohio Drive, No. 3908, Plano, Collin County, TX 75093 (US).

(74) Agents: **KWON, Hyuk-Rok** et al.; 2F. Seokwang Bldg., 1-96 Sinmun-ro 2ga, Jongro-ku, Seoul 110-062 (KR).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

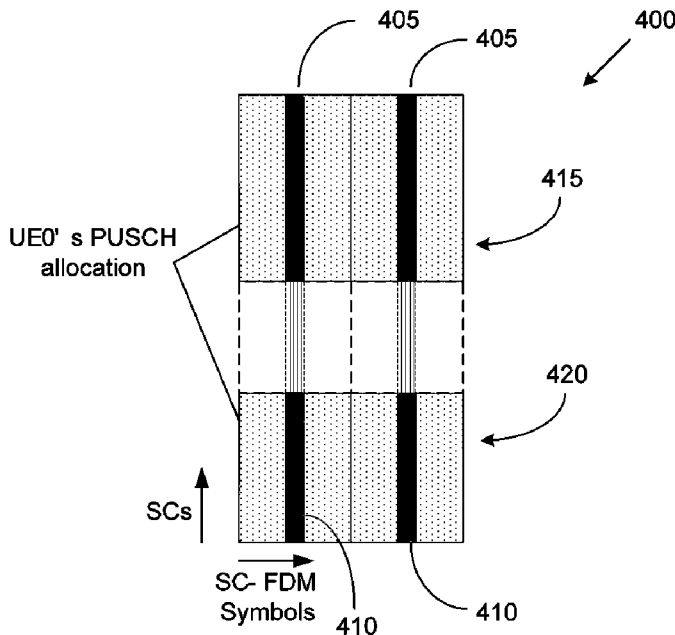
Published:

— with international search report (Art. 21(3))

[Continued on next page]

(54) Title: UPLINK DEMODULATION REFERENCE SIGNAL DESIGN FOR MIMO TRANSMISSION

[Fig. 4]



(57) Abstract: A base station capable of communicating with a plurality of subscriber stations is provided. The base station transmits control information and data to at least one of the plurality of subscriber stations in a subframe using a subset of antenna ports corresponding to a subset of antenna port numbers. The base station maps reference signals corresponding to the subset of antenna ports according to a transmission rank R. The base station indicates, via a cyclic shift indicator (CSI) field in an uplink grant, an assigned resource index corresponding to the mapped reference signal. The CSI field includes a cyclic shift and an orthogonal cover code (OCC) index. The subscriber station uses a resource mapping table to identify the assigned resource index based on the transmission rank, cyclic shift and OCC index.



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:
10 November 2011

A. CLASSIFICATION OF SUBJECT MATTER**H04B 7/04(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; H04L 5/02; H04W 72/04

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, cyclic, shift, indicator, OCC, uplink, grant, reference, signal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009-0279493 A1 (GAAL PETER et al.) 12 November 2009 See abstract; paragraph [32] - paragraph [36]; figure 1.	1-14
A	WO 2009-056464 A1 (NOKIA SIEMENS NETWORKS OY et al.) 07 May 2009 See abstract; paragraph [27] - paragraph [40]; figure 3.	1-14

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"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

Date of the actual completion of the international search

29 AUGUST 2011 (29.08.2011)

Date of mailing of the international search report

31 AUGUST 2011 (31.08.2011)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro,
Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KIM, Byoung Sung

Telephone No. 82-42-481-5652



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2010/009390

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009-0279493 A1	12.11.2009	AU 2009-228256 A1 CA 2717130 A1 CN 101978644 A EP 2258071 A2 JP 2011-519200 A KR 10-2010-0134071 A TW 200948006 A WO 2009-120843 A2 WO 2009-120843 A3	01.10.2009 01.10.2009 16.02.2011 08.12.2010 30.06.2011 22.12.2010 16.11.2009 01.10.2009 27.05.2010
WO 2009-056464 A1	07.05.2009	CN 101911580 A EP 2056515 A1 US 2010-0296465 A1	08.12.2010 06.05.2009 25.11.2010