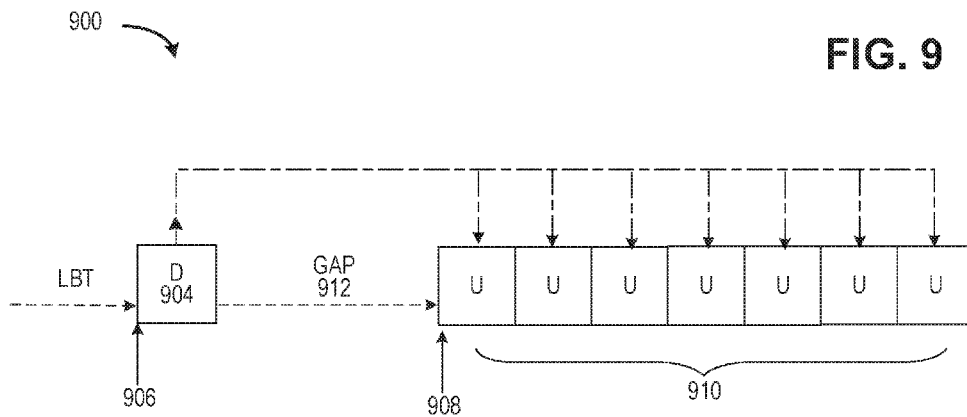




- (51) International Patent Classification:
H04W 72/04 (2009.01) H04L 5/00 (2006.01)
- (21) International Application Number:
PCT/US2017/065102
- (22) International Filing Date:
07 December 2017 (07.12.2017)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
62/431,296 07 December 2016 (07.12.2016) US
- (71) Applicant: INTEL IP CORPORATION [US/US]; 2200 Mission College Boulevard, Santa Clara, California 95054 (US).
- (72) Inventors: CHANG, Wenting; 8F, Raycom Infotech Park A, No. 2, Kexueyuan South Road, Beijing 100190 (CN). NIU, Huaning; 1308 Knollview Drive, Milpitas, California 95035 (US). YE, Qiaoyang; 4536 Piper St, Fremont, California 94538 (US). JEON, Jeongho; 310 Crescent Village Cir, Apt 2304, San Jose, California 95134 (US).

- (74) Agent: PERDOK, Monique, M. et al.; Schwegman Lundberg & Woessner, P.A., P.O. Box 2938, Minneapolis, Minnesota 55402 (US).
- (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, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, KM, ML, MR, NE, SN, TD, TG).

(54) Title: MULTIFIRE USER EQUIPMENT FOR GRANTLESS UPLINK TRANSMISSION



(57) Abstract: Embodiments of autonomous uplink transmissions, such as grantless uplink (GUL) transmissions, are described. In some embodiments, a user equipment (UE) may be configured as a Multifire (MF UE) and includes processing circuitry configured to configure the MF UE for GUL transmissions on a MF cell, such as grantless uplink control information (GUL-UCI). The MF UE may be configured to receive downlink control information (DCI) in a physical downlink control channel (PDCCH) on the MF cell, the DCI including uplink grant information, wherein the DCI is to configure the MF UE for a GUL transmission. In some embodiments, the MF UE may transmit the GUL transmission (GUL-UCI) in a physical uplink shared channel (PUSCH), a short physical uplink control channel (sPUCCH), and/or an extended PUCCH (ePUCCH). In some embodiments, the MF UE may be configured to transmit a GUL transmission during a gap duration between downlink signaling and uplink signaling.



Published:

- *with international search report (Art. 21(3))*
- *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:

06 December 2018 (06.12.2018)

A. CLASSIFICATION OF SUBJECT MATTER**H04W 72/04(2009.01)i, H04L 5/00(2006.01)i**

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

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
H04W 72/04; H04W 4/00; H04L 5/00Documentation 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 modelsElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & keywords: multfire, gap, GUL(grantless uplink), duration, offset**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WILUS INC., 'Correction on handling UL LBT procedure under UE power limited case', R1-1610460, 3GPP TSG RAN WG1 Meeting #86bis, 18 October 2016 See section 15.2.1.	25
A		1-24
A	ZTE, 'Discussion on grant-free transmission based on sensing', R1-1609801, 3GPP TSG RAN WG1 Meeting #86bis, 30 September 2016 See sections 2-4.	1-25
A	ZTE et al., 'Discusssion on NR operation in unlicensed spectrum', R1-1612160, 3GPP TSG RAN WG1 Meeting #87, 04 November 2016 See sections 2-5.	1-25
A	US 2011-0243066 A1 (SHAHROKH NAYEB NAZAR et al.) 06 October 2011 See paragraphs [0166]-[0238]; and figure 18.	1-25
A	WO 2013-017154 A1 (FUJITSU LIMITED) 07 February 2013 See page 20, line 19 - page 26, line 24; and figure 6.	1-25

 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 another 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

12 November 2018 (12.11.2018)

Date of mailing of the international search report

12 November 2018 (12.11.2018)

Name and mailing address of the ISA/KR

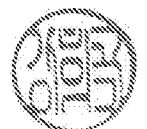
International Application Division
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea

Facsimile No. +82-42-481-8578

Authorized officer

KANG, Hee Gok

Telephone No. +82-42-481-8264



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2017/065102

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011-0243066 A1	06/10/2011	CN 102577209 A	11/07/2012
		CN 102577209 B	05/04/2017
		CN 107104780 A	29/08/2017
		EP 2484039 A1	08/08/2012
		EP 2484039 B1	15/08/2018
		EP 3267610 A1	10/01/2018
		JP 2013-507067 A	28/02/2013
		JP 2017-022726 A	26/01/2017
		JP 5993740 B2	14/09/2016
		JP 6310019 B2	11/04/2018
		KR 10-1838284 B1	13/03/2018
		KR 10-2012-0093912 A	23/08/2012
		KR 10-2013-0023338 A	07/03/2013
		KR 10-2018-0028555 A	16/03/2018
		RU 2012117218 A	10/11/2013
		RU 2557164 C2	20/07/2015
		TW 201138358 A	01/11/2011
		TW 201642614 A	01/12/2016
		TW I545912 B	11/08/2016
		US 10039087 B2	31/07/2018
		US 2017-0013612 A1	12/01/2017
		US 2017-0245262 A1	24/08/2017
		US 9485060 B2	01/11/2016
		US 9967866 B2	08/05/2018
		WO 2011-041623 A1	07/04/2011
		WO 2013-017154 A1	07/02/2013
CN 103733711 B	02/01/2018		
KR 10-1587999 B1	25/01/2016		
KR 10-1704364 B1	22/02/2017		
KR 10-1749479 B1	20/06/2017		
KR 10-2014-0032476 A	14/03/2014		
KR 10-2016-0014768 A	11/02/2016		
KR 10-2017-0016516 A	13/02/2017		
US 10009919 B2	26/06/2018		
US 2014-0105164 A1	17/04/2014		
US 2016-0262176 A1	08/09/2016		
US 9357541 B2	31/05/2016		
WO 2013-017178 A1	07/02/2013		