

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
15 October 2009 (15.10.2009)

PCT

(10) International Publication Number  
**WO 2009/126902 A3**

- (51) International Patent Classification:  
*H04L 1/16* (2006.01)      *H04L 1/18* (2006.01)
- (21) International Application Number:  
PCT/US2009/040235
- (22) International Filing Date:  
10 April 2009 (10.04.2009)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
61/044,111      11 April 2008 (11.04.2008)      US  
61/052,725      13 May 2008 (13.05.2008)      US  
61/081,444      17 July 2008 (17.07.2008)      US  
61/083,789      25 July 2008 (25.07.2008)      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, BR, BW, BY, BZ, CA, CH, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(71) Applicant (for all designated States except US): **INTER-DIGITAL PATENT HOLDINGS, INC.** [US/US]; 3411 Silverside Road, Concord Plaza, Suite 105, Hagley Building, Wilmington, DE 19810 (US).

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (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, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **ZHANG, Guodong** [CN/US]; 14 Walnut Drive, Syosset, NY 11791 (US). **WANG, Jin** [CN/US]; 34 Fairlawn Drive, Central Islip, NY 11722 (US). **PAN, Kyle, Jung-Lin** [US/US]; 43 Avalon Circle, Smithtown, NY 11787 (US). **GAUVREAU, Jean-louis** [CA/CA]; 115 Paradis, La Prairie, J5R 6G7 (CA). **TERRY, Stephen, E.** [US/US]; 15 Summit Avenue, Northport, NY 11768 (US).
- (74) Agent: **MCMICHAEL, Wesley, T.**; Volpe And Koenig, P.C., 30 South 17th Street United Plaza, Suite 1600, Philadelphia, PA 19103 (US).

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:  
3 December 2009

(54) Title: METHODS FOR TRANSMISSION TIME INTERVAL BUNDLING IN THE UPLINK

F L A G	RB ALLOCATION	MCS	DMRS	TPC, RSN etc	
	0000...000	# OF BUNDLED TTIs, RESTRICTED MCS, RB ALLOCATION			

**FIG. 5b**

(57) Abstract: A method and apparatus for supporting uplink Transmission Time Interval (TTI) bundling in Long Term Evolution (LTE) is provided. Described are related method and apparatus for signaling, activation/deactivation and wireless transmit/receive unit (WTRU) behavior.

WO 2009/126902 A3

INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2009/040235

A. CLASSIFICATION OF SUBJECT MATTER  
INV. H04L1/16 H04L1/18

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)  
H04L H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ERICSSON: "Text Proposal for TTI bundling" 3GPP DRAFT; R2-081466 TTI-BUNDLING_MAC TEXT PROPOSAL, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG2, no. Shenzhen, China; 20080325, 25 March 2008 (2008-03-25), XP050139210 [retrieved on 2008-03-25] chapters 2, 5, 7  ----- -/--	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 document 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

16 September 2009

Date of mailing of the international search report

06/10/2009

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040,  
Fax: (+31-70) 340-3016

Authorized officer

Ferrari, Jeannot

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2009/040235

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>ERICSSON: "Evaluation of TTI-Bundling Alternatives" 3GPP DRAFT; R2-081465 EVALUATION OF TTI-BUNDLING ALTERNATIVES, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG2, no. Shenzhen, China; 20080325, 25 March 2008 (2008-03-25), XP050139209 [retrieved on 2008-03-25] chapter 2</p>	1-25
X	<p>ALCATEL-LUCENT: "RAN2 aspects of the solutions for Subframe Bundling" 3GPP DRAFT; R2-081446 SUBFRAME BUNDLING RAN2 ISSUES, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG2, no. Shenzhen, China; 20080325, 25 March 2008 (2008-03-25), XP050139195 [retrieved on 2008-03-25] chapters 2-4</p>	1-25
X,P	<p>CATT: "TTI bundling Configuration" 3GPP DRAFT; R2-082317 TTI BUNDLING CONFIGURATION, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG2, no. Kansas City, USA; 20080429, 29 April 2008 (2008-04-29), XP050140061 [retrieved on 2008-04-29] the whole document</p>	1-25
X,P	<p>ERICSSON: "TTI-Bundling Considerations for TDD" 3GPP DRAFT; R2-082148 TTI-BUNDLING CONSIDERATIONS FOR TDD, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG2, no. Kansas City, USA; 20080428, 28 April 2008 (2008-04-28), XP050139927 [retrieved on 2008-04-28] the whole document</p>	1-25

-/--

## INTERNATIONAL SEARCH REPORT

International application No

PCT/US2009/040235

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	<p>ERICSSON: "Text Proposal for TTI bundling"            3GPP DRAFT; R2-082149 TTI-BUNDLING_MAC            TEXT PROPOSAL, 3RD GENERATION PARTNERSHIP            PROJECT (3GPP), MOBILE COMPETENCE CENTRE ;            650, ROUTE DES LUCIOLES ; F-06921            SOPHIA-ANTIPOLIS CEDEX ; FRANCE,            vol. RAN WG2, no. Kansas City, USA;            20080429, 29 April 2008 (2008-04-29),            XP050139928 [retrieved on 2008-04-29]            chapters 2, 5</p>	1-25
X,P	<p>ZTE: "TTI bundling impact on DRX            Inactivity Timer"            3GPP DRAFT; R2-082253, 3RD GENERATION            PARTNERSHIP PROJECT (3GPP), MOBILE            COMPETENCE CENTRE ; 650, ROUTE DES            LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX            ; FRANCE,            vol. RAN WG2, no. Kansas City, USA;            20080429, 29 April 2008 (2008-04-29),            XP050140016 [retrieved on 2008-04-29]            the whole document</p>	1-25