

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
15 June 2006 (15.06.2006)

PCT

(10) International Publication Number  
**WO 2006/062652 A3**

(51) International Patent Classification:  
**H04L 27/26** (2006.01) **H04J 1/08** (2006.01)

(21) International Application Number:  
PCT/US2005/040400

(22) International Filing Date:  
9 November 2005 (09.11.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
11/006,318 7 December 2004 (07.12.2004) US

(71) Applicant (for all designated States except US): **ATC TECHNOLOGIES, LLC** [US/US]; 10802 Parkridge Boulevard, Reston, Virginia 20191-5416 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **KARABINIS, Peter, D.** [US/US]; 101 Chalon Drive, Cary, North Carolina 27511 (US).

(74) Agents: **BIGEL, Mitchell, S.** et al.; Myers Bigel Sibley & Sajovec, P.A., P.O. Box 37428, Raleigh, North Carolina 27627 (US).

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

(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, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

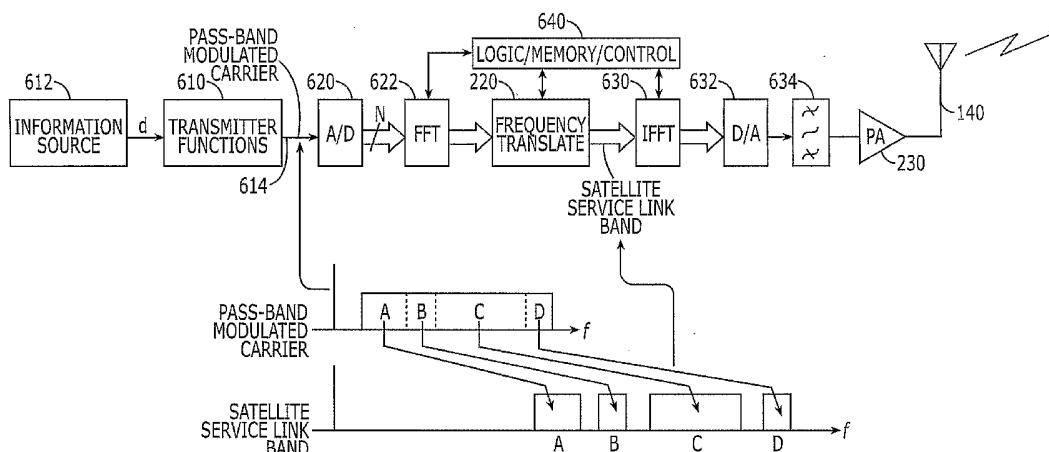
Published:

— with international search report

(88) Date of publication of the international search report:  
12 October 2006

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: BROADBAND WIRELESS COMMUNICATIONS SYSTEMS AND METHODS USING MULTIPLE NON-CONTIGUOUS FREQUENCY BANDS/SEGMENTS



(57) Abstract: Wireless communications transceivers include a transmitter that is configured to selectively frequency shift and transmit portions of broadband information over multiple non-contiguous narrowband frequency bands/segments, each of which is too narrow to carry the broadband information. A receiver also is configured to receive and selectively frequency shift portions of broadband information from multiple non-contiguous narrowband frequency bands/segments, each of which is too narrow to carry the second broadband information. Broadband information thereby may be transmitted and received in a regulated communications environment, even though a given provider may only be assigned discontinuous frequency bands/segments, none of which is wide enough to carry the entire broadband information.

WO 2006/062652 A3

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2005/040400

A. CLASSIFICATION OF SUBJECT MATTER  
INV. H04L27/26 H04J1/08

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 H04J

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, WPI Data, PAJ, INSPEC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No. ?
X	<p>ALASTI H ET AL: "A discrete multi carrier multiple access technique for wireless communications"</p> <p>VEHICULAR TECHNOLOGY CONFERENCE, 1998. VTC 98. 48TH IEEE OTTAWA, ONT., CANADA 18-21 MAY 1998, NEW YORK, NY, USA, IEEE, US, vol. 2, 18 May 1998 (1998-05-18), pages 1533-1537, XP010288028</p> <p>ISBN: 0-7803-4320-4</p> <p>page 1533, right-hand column, last line -</p> <p>page 1534, left-hand column, paragraph 3</p> <p>figure 1</p> <p style="text-align: center;">----- -/--</p>	1-52

☒ 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.

\*S\* document member of the same patent family

Date of the actual completion of the international search

4 July 2006

Date of mailing of the international search report

25/07/2006

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Farese, L

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2005/040400

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>MESTDAGH D J G ET AL: "ZIPPER VDSL: A SOLUTION FOR ROBUST DUPLEX COMMUNICATION OVER TELEPHONE LINES" IEEE COMMUNICATIONS MAGAZINE, IEEE SERVICE CENTER, NEW YORK, NY, US, vol. 38, no. 5, May 2000 (2000-05), pages 90-96, XP000949788 ISSN: 0163-6804 page 92, right-hand column, last paragraph - page 93, left-hand column, line 3 figure 6</p> <p>-----</p>	1-52