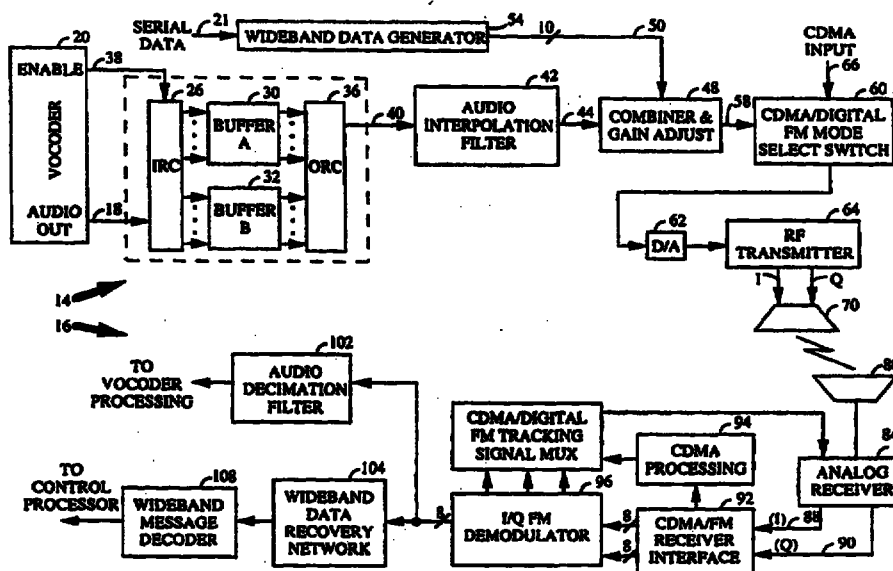




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04B 1/40, H04J 15/00, H04L 25/49 27/14, H03D 7/16	A3	(11) International Publication Number: WO 96/20540 (43) International Publication Date: 4 July 1996 (04.07.96)
(21) International Application Number: PCT/US95/16363 (22) International Filing Date: 19 December 1995 (19.12.95) (30) Priority Data: 373,122 23 December 1994 (23.12.94) US (71) Applicant: QUALCOMM INCORPORATED [US/US]; 6455 Lusk Boulevard, San Diego, CA 92121 (US). (72) Inventors: BLACK, Peter, J.; Apartment 13, 11 Austral Street, St. Lucia, QLD 4067 (AU). WILSON, Nathaniel, B.; 11346-8 Portobelo, San Diego, CA 92124 (US). (74) Agent: MILLER, Russell, B.; Qualcomm Incorporated, 6455 Lusk Boulevard, San Diego, CA 92121 (US).		(81) Designated States: AL, AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 6 September 1996 (06.09.96)

(54) Title: DUAL-MODE FM/CDMA COMMUNICATION SYSTEM**(57) Abstract**

A dual-mode digital communication system for communicating an information signal during operation in frequency-modulated (FM) and multiple-access modes is disclosed herein. The digital communication system includes a dual-mode transmitter (14) for transmitting the information signal using an FM communication signal during FM mode operation, and for transmitting the information signal using a multiple-access communication signal during multiple-access mode operation. The communication system further includes a dual-mode receiver (16) for receiving the FM communication signal during FM mode operation, and for receiving the multiple-access communication signal during multiple-access mode operation. Incorporated within the dual-mode receiver (16) is a digital demodulator (96) for recovering the information signal from the received FM signal during operation in the FM mode, and for recovering the information signal from the received multiple-access signal during multiple-access mode operation.

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INTERNATIONAL SEARCH REPORT

International Application No
PC, /US 95/16363

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H04B1/40 H04J15/00 H04L25/49 H04L27/14 H03D7/16

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)

IPC 6 H04L H04Q H04B H03D

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO,A,92 21195 (OMNIPPOINT) 26 November 1992 see page 2, line 14 - line 16 see page 2, line 20 - line 30	1,2, 9-11,18
Y		3,4,12, 13
X	WO,A,92 10028 (QUALCOMM) 11 June 1992 see page 2, line 4 - line 7 see page 2, line 14 - line 20 see page 2, line 31 - page 3, line 2 see page 3, line 31 - page 4, line 1	1,8-10, 17,18
Y		4,13

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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- "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

17 July 1996

Date of mailing of the international search report

24.07.96

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Scriven, P

INTERNATIONAL SEARCH REPORT

International Application No

PC1/US 95/16363

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PATENT ABSTRACTS OF JAPAN vol. 006, no. 081 (E-107), 19 May 1982 & JP,A,57 018145 (TOSHIBA), 29 January 1982, see abstract	3,12
X	--- US,A,4 944 025 (GEHRING ET AL.) 24 July 1990 see abstract; figure 1 see column 1, line 14 - line 26 see column 1, line 35 - line 39 see column 1, line 64 - line 67 see column 3, line 27 - line 35	19-26
Y	---	4,13
A	EP,A, 568 291 (BRITISH AEROSPACE SPACE) 3 November 1993 see abstract	1,2,10, 11
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A	--- US,A,4 680 749 (ENGLUND ET AL.) 14 July 1987 see abstract; figures 1,2	3,12
A	--- EP,A,0 508 401 (NEC) 14 October 1992 see abstract; figure 1	4,13, 19-26
A	--- WO,A,91 03871 (MOTOROLA) 21 March 1991 see abstract; figures 1,2,4	5-7, 14-16, 19-26
A	--- WO,A,94 26024 (ERICSSON) 10 November 1994 see figures 4A-4D	5,14, 19-26
A	--- EP,A,0 507 401 (PHILIPS) 7 October 1992 see column 3, line 3945 --- -/--	5,14, 19-26

INTERNATIONAL SEARCH REPORT

International Application No

PC/US 95/16363

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	WO,A,95 30275 (QUALCOMM) 9 November 1995 see abstract; figure 3 see page 2, line 13 - line 16 see page 3, line 35 - page 4, line 20 see page 5, line 5 - line 11 see page 9, line 22 - line 27; figure 3	1-4, 9-13, 18-26
A	---	5-7, 14-16
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X,P	--- US,A,5 422 931 (AUSTIN-LAZARUS ET AL.) 6 June 1995 see column 1, line 53 - column 2, line 2 -----	1,2, 9-11,18

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 95/ 16363

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1-3, 10-12 see annex sheet
2. Claims 4-7, 13-16 "
3. Claims 8, 17 "
4. Claims 9, 18 "
5. Claims 19-26 "

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/

1. Claims 1-3, 10-12: Dual mode FM/multiple access communication,
and transmitter therefor
2. Claims 4-7, 13-16: FM demodulation method for dual mode FM/multiple
access communication
3. Claims 8,17: Automatic gain control for FM receiver used as a dual
mode FM/multiple access system
4. Claims 9,18: Dual mode FM/CDMA communication
5. Claims 19-26: FM demodulator

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PC1/US 95/16363

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PLI/US 95/16363

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US-A-5422931	06-06-95	NONE	