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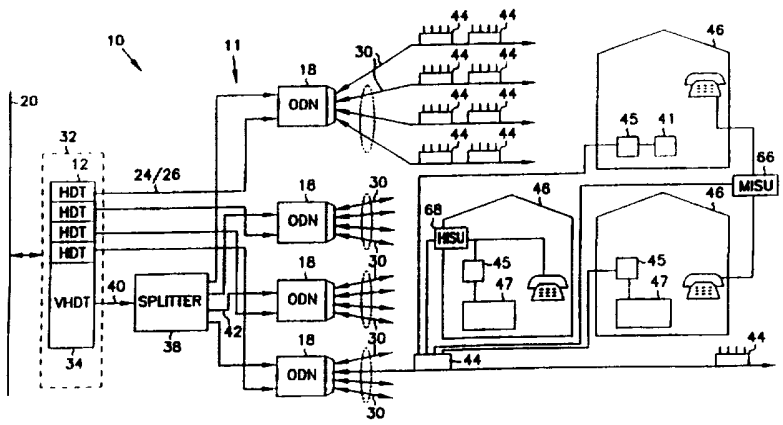

(57) Abstract

The communication system includes a hybrid fiber/coax distribution network. A head end provides for downstream transmission of telephony and control data in a first frequency bandwidth over the hybrid fiber/coax distribution network and reception of upstream telephony and control data in a second frequency bandwidth over the hybrid fiber/coax distribution network. The head end includes a head end multicarrier modem for modulating downstream telephony information on a plurality of orthogonal carriers in the first frequency bandwidth and demodulating upstream telephony information modulated on a plurality of orthogonal carriers in the second frequency bandwidth. The system includes service units, operatively connected to the hybrid fiber/coax distribution network for upstream transmission of telephony and control data and for receipt of the downstream control data and telephony. Also provided is a method and apparatus for performing a Fast Fourier Transform (FFT).

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INTERNATIONAL SEARCH REPORT

Intern· al Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G06F17/14 H04L1/00 H04L1/24 H04L5/02 H04L5/14
H04L12/10 H04L12/12 H04L12/26 H04L12/28 H04L12/44
H04L27/26 H04L27/34

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G06F H04L H04M

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

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[X] Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
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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	Vaskimo, K

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INTERNATIONAL SEARCH REPORT

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Y		28, 31-33, 46,49-53
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Y		19,37, 139,146
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X	US 5 371 548 A (WILLIAMS THOMAS H) 6 December 1994 see column 2, line 5 - column 4, line 14 see column 6, line 35 - column 8, line 59 see figure 2	68,111, 116
A	--- US 4 707 832 A (GLENN RAYMOND R ET AL) 17 November 1987 see column 1, line 6 - line 10 see column 1, line 52 - column 2, line 58 see column 4, line 19 - line 68 see column 7, line 29 - column 8, line 17	69,117
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A	US 5 365 525 A (NEWBERG DONALD G ET AL) 15 November 1994 see the whole document	143,144
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Y	M.E.WOODWARD, H.JARMOUKLY: "Time-spread decoding: A method for the implementation of error-control algorithms in fast digital transmission channels using slow microprocessors" DIGITAL PROCESSING OF SIGNALS IN COMMUNICATIONS, 22 - 26 April 1985, LOUGHBOROUGH UNIVERSITY, pages 119-124, XP002050185 see the whole document	146
A		147-149

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 97/01444

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:

SEE ADDITIONAL SHEETS

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/ 210

1. Claims 1-17: Apparatus and method for providing a Fast Fourier Transform and/or an inverse Fast Fourier Transform. The system includes input/output memory, a conversion RAM, LUT storing the twiddle factors, and array of multipliers and an array of add/sub units to perform the butterfly operation.

2. Claims 18-53: System and method of computer data transmission over a telecommunication network having a head and end connected to a plurality of remotes subscribers.

3. Claims 54-58: Method for transmitting data over a telecommunication system that uses a multicarrier transmission scheme from a head and to a service unit.

4. Claims 59-60: Method for allocating payload channels for a service that uses multiple payloads channels in a telecommunication system with a multicarrier transmission scheme to communicate with a service unit.

5. Claims 61-63: Method for communicating errors to a head end of a telecommunication system.

6. Claims 64-67: Method for controlling power usage at a service unit of a telecommunication system with a multicarrier transmission scheme.

7. Claim 68: Method of transmitting digital data in a communication system.

8. Claims 69-76, 117-124: Method of adjusting upstream power levels in a bidirectional multipoint-to-point multichannel communication system having a single central head end and a plurality of service units located remotely from the head end and from each other.
9. Claims 77-79, 111-116, 125-127: Multicarrier transmission modem for a communication system and method of transmitting digital data in a communication system.

10. Claims 80-110: A bidirectional multipoint-to-point communication system for sending payload information over a distribution network.

11. Claims 128-132: Communication system for transferring digital data over a distribution network.

12. Claims 133-138: In a biderectional multipoint-to-point multichannel communication system having a single central head end and a plurality of service units located remotely from the head end and from each other, a method performed by both said one remote unit and said central head end for acquiring one of said service units into said systems.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

13. Claims 139-141,149: In a bidirectional multipoint-to-point multichannel communication system having a single central head end and a plurality of service units located remotely from the head end and from each other, said system communicating by means of multiple coherent carriers wherein at least one of said remote units receives and transmits less than all of said carriers, a method performed by both said one remote unit and said central head end for tracking one of said service units into said system.

14. Claim 142: In a bidirectional multipoint-to-point multichannel communication system having a single central head end and a plurality of service units located from the head end and from each other, said system communicating by means of multiple coherent carriers wherein at least one of said remote units receives and transmits less than all of said carriers, a method for transmitting messages having different smounts of error - correction capability.

15. Claims 143-145: In a communication system for transmitting payload messages having a predetermined number of data bits between a central head end and a plurality of remote units within a sequence of frames, a method for including a plurality of different amounts of error correction into said frames while maintaining a constant transmission time for all of said messages.

16. Claims 146-148: In a communication system for transmitting payload messages between a central head end and a plurality of remote units over a plurality of coherent carriers within messages each having a sequence of frames, a method for decreasing peak decoding load at said head end.

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