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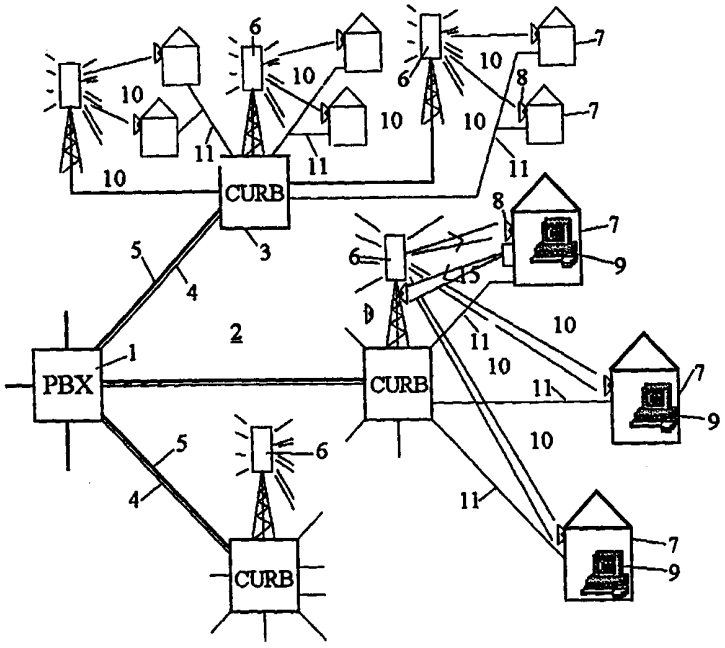
(54) Title: TELECOMMUNICATION NETWORK



(57) Abstract

A telecommunication network, comprising an exchange (1), an intermediary network (2) between the exchange and the curbs (3), and per curb a local network (10) between the curb and subscriber connections. For the transmission of wide–band signals, the local network comprises, at the side of the curb, an optical transmitter (6) and, at the side of the subscribers (7), optical receivers (8) which cooperate with said transmitter. For narrow–band services such as conventional telephony, a conventional copper cable (11) can be used locally if desired.

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Telecommunication network.

A. Background of the invention

The invention is related to a telecommunication network, comprising an exchange, an intermediary network between the exchange and local distribution/collection stations, hereinafter called curbs, and per curb a local network between the curb and subscriber connections. In a local telecommunication network there are two technical possibilities for transmitting wide-band signals, namely FTTH (Fibre To The Home) and ADSL (Asymmetric Digital Subscriber Line). Both techniques have advantages and disadvantages.

The most important disadvantage of FTTH is that it is (still) expensive and that it is still unknown terrain for operators. Besides that, it must also be mentioned as a disadvantage that FTTH must be installed at one time in a whole area in order to be able to supply wide-band. This is therefore only possible in new construction areas. As an advantage, it can be mentioned that FTTH has an unlimited bandwidth and that it is therefore "future proof".

ADSL - via (existing) twisted pair wires - has a limited bit-rate as a disadvantage. However, in combination with FTTC (Fibre To The Curb) - ADSL then only needs to bridge the distance between the curb and the subscriber - this disadvantage can be largely compensated. As an advantage, it can be mentioned that it does not need to be installed as a whole. Each client who desires wide-band can obtain an ADSL connection.

B. Summary of the invention

The object of the invention is to combine both advantages of FTTH and ADSL. According to the invention, besides the (already existing) twisted pair or not, a "fibre to the curb" (FTTC) is installed for the - often downstream oriented - wide-band services. For new construction, this fibre can be installed up to the curb together with the twisted pair. At the curb, the wide-band signal is transmitted to the subscribers via an infrared transmitter. Subscribers who do not desire wide-band services have only their normal telephone line via the twisted pair connection. Clients who do desire a wide-band service, get an optical receiver which can receive the transmitter's signal; therewith, a distance of several hundreds of metres can be bridged.

An advantage which can mentioned is that the bandwidth is much

higher than that of ADSL. An estimate is several hundred MHz. The limitation of the bandwidth is formed by reflections causing multiple-path transmission, with the therewith associated pulse broadening as a result. This problem can be largely prevented by making the receiver directionally sensitive with the aid of a reflector or lens.

Another advantage is that only costs need to be incurred for the clients who require a wide-band service. A pre-investment in the form of a fibre to the curb and a transmission tower with infrared transmitter is, of course, necessary.

An advantage of infrared with respect to radio is that it is much cheaper and does not require transmission licences. As a disadvantage, it can mentioned that the operational reliability is somewhat less than the normal twisted pair of FTTH. Among other things, the connection can become worse in the event of heavy mist and rain. Since only wide-band services are involved here and the normal telephone (narrow-band) is transported via the twisted pair, this objection can be considered to be acceptable.

It may happen that neighbouring areas cause cross-talk and thus interference. In cases where this is a problem, this can be avoided by using different light polarity in neighbouring areas. A second possibility to avoid cross-talk is by modulating a carrier wave with the wide-band signal before it is supplied to the infrared transmitter. By allocating different carrier waves to neighbouring areas (different wavelength, frequency or polarisation), cross-talk is avoided.

Since use is made of consumer components (LEDs and infrared receivers such as also used in remote control units), it is plausible that the concept according to the present invention will be economically attractive.

C. Examples of embodiment

Fig. 1 shows an example of an embodiment of a telecommunication network according to the invention. Shown is an exchange (PBX) 1, which is connected by an intermediary network 2 to local distribution/collection stations 3, called curbs. The curbs are connected to the exchange by both a conventional, narrow-band twisted pair cable 4 and an optical fibre 5, with which wide-band signals can be transmitted. If desired, the copper cable 4 can be omitted. At or

near each curb 3, one or - see the uppermost curb in the figure - several IR (omnidirectional) transmitters 6 are set up, which are supplied by the wide-band signal transmitted by the optical fibre 5. The IR transmitters are situated at locations where there is direct sight to the houses 7 of the subscribers. On the outside of the houses, an IR receiver 8 is installed which receives the IR signal of the transmitter and supplies it to subscriber equipment such as a PC or NC (Network Computer) 9 via an interface which is not shown.

Fig. 2 shows in greater detail an IR receiver 8. This is formed by an O/E converter 12, for example a photodiode, in the focal point of a reflector 12. For concentrating incoming light, use can also be made of a lens 14; in the figures, both are used. The optical signal of the co-operating transmitter 6, bundled via the lens 14 and reflector 12, is converted into an electrical signal by the photodiode.

Finally, although it can be foreseen that for wide-band downstream traffic the upstream traffic also will usually be narrow-banded, it observed that, in cases where in the local network 10 there is nevertheless a need for an upstream wide-band connection, subscriber locations 7 can thereto be provided with IR transmitters (such as the transmitters 6), while at the curb an IR receiver (such as the IR receivers 8) can be set up. In the intermediary network 2, the upstream wide-band traffic can be transmitted via the fibres 5. Such a wide-banded upstream connection in the local network 10, formed by an IR transmitter at the side of a subscriber 7 and an IR receiver at the side of the curb, is diagrammatically shown in Fig. 1 at 15.

D. Claims

1. A telecommunication network, comprising an exchange (1), an intermediary network (2) between the exchange and local distribution/collection stations, hereinafter called curbs (3), and per curb a local network (10) between the curb and subscriber connections, **characterised in that** the local network, for the transmission of wide-band signals, comprises, at the side of the curb, an optical transmitter (6) and, at the side of the subscribers (7), optical receivers (8) which co-operate with said transmitter.

2. Telecommunication network according to Claim 1, characterised in that the intermediary network comprises optical fibres (5) for the transmission of wide-band signals.

3. Telecommunication network according to Claim 2, characterised in that the intermediary network comprises twisted pair cables (4) for the transmission of narrow-band signals.

4. Telecommunication network according to Claim 1, characterised in that the local network comprises twisted pair cables for the transmission of narrow-band signals.

5. Telecommunication network according to Claim 1, characterised in that the optical receiver is directionally sensitive by means of a reflector (13) or a lens (14).

6. Telecommunication network according to Claim 1, characterised in that [in] neighbouring local networks of the optical transmitters have mutually differing light polarity.

7. Telecommunication network according to Claim 1, characterised by modulation means for modulating, on a carrier wave, the wide-band signals which are transmitted from the curb to the subscriber stations, where the wavelength, the frequency or the polarity of the various modulated carrier waves or of the various modulating signals in neighbouring local networks are mutually different.

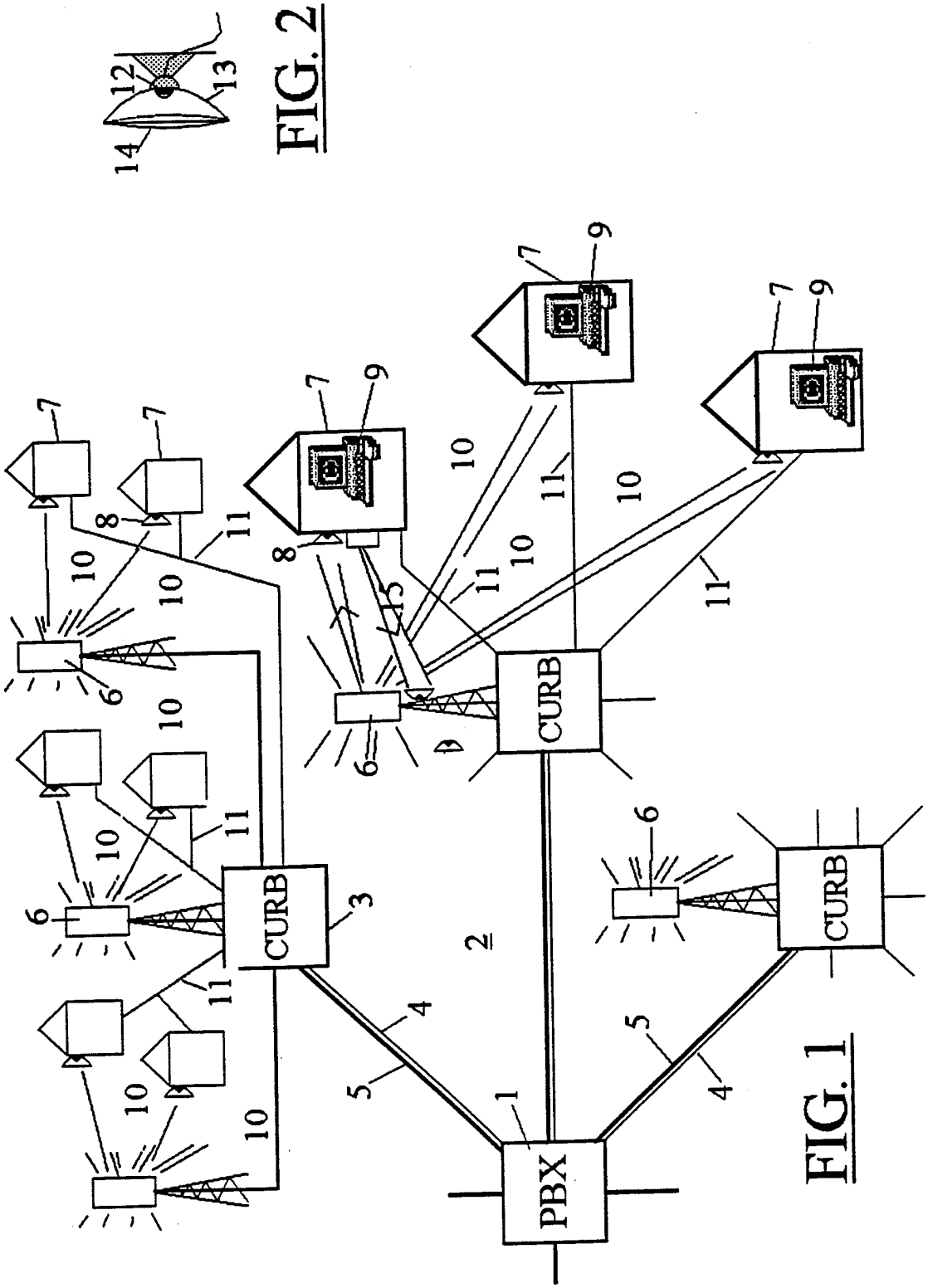

FIG. 1

FIG. 2

INTERNATIONAL SEARCH REPORT

Inter onal Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04B10/207 H04B10/10

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 H04B

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.
Y	US 5 729 370 A (COY BRENT E ET AL) 17 March 1998 (1998-03-17) abstract; figures 2,3,5 column 5, line 27 -column 6, line 35	1-5
Y	WO 97 37445 A (DOMINION COMMUNICATIONS L L C) 9 October 1997 (1997-10-09) abstract; figures 1,3,4,6-10	1-5
A	US 5 677 909 A (HEIDE CAROLYN) 14 October 1997 (1997-10-14) abstract; figures 1,9,10 column 1, line 14 - line 50 column 5, line 6 - line 30	1

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

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14 September 1999	23/09/1999

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	KWONG W C ET AL: "COHERENT-DETECTION OF NARROW-LINEWIDTH MILLIMETER-WAVE AND MICROWAVE SUBCARRIER SIGNALS FOR FUTURE MOBILE/PERSONAL COMMUNICAIONS" PROCEEDINGS OF THE MILITARY COMMUNICATIONS CONFERENCE (MILCOM), LONG BRANCH, NJ., OCT. 2 - 5, 1994, vol. 3, 2 October 1994 (1994-10-02), pages 940-944, XP000505999 INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS page 1, left-hand column, paragraph 2 -right-hand column, paragraph 1 -----	1

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INTERNATIONAL SEARCH REPORT

..ormation on patent family members

Inter ..nal Application No
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