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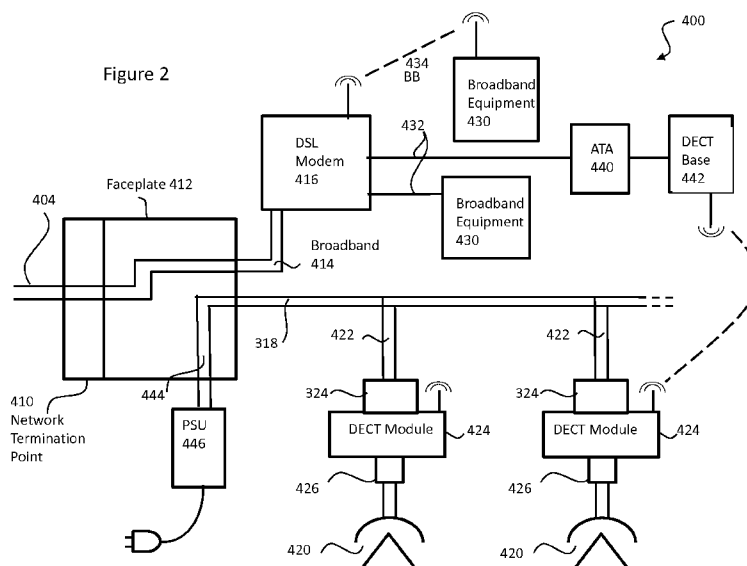
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MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
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(54) Title: PREMISES TELEPHONY WIRING

(57) **Abstract:** A premises telephony network, comprising within a premises: a signalling path for communicating telephony signalling between an external digital telephony network and an analogue telephony apparatus; a power supply for powering the analogue telephony apparatus; premises telephony wiring suitable for carrying power supply current and analogue telephony signalling for the analogue telephony apparatus; in which the power supply is connected electrically to a path across the premises telephony wiring for powering the analogue telephony apparatus; in which the path across the customer-premises telephony wiring is distinct from the signalling path. Power is provided for analogue telephony apparatus located at the premises by disconnecting electrically the premises telephony wiring from an external telephony network and by connecting electrically a power supply located at the premises to a path across the premises telephony wiring for powering the analogue telephony apparatus.

Premises Telephony Wiring

Field of the Invention

The present invention relates to premises telephony wiring for the connection of analogue telephony apparatus such as analogue telephones, fax machines, computer modems etc. to a telecommunications network. In particular, the present invention relates to arrangements for the provision of power to analogue telephony apparatus over premises telephony wiring.

A network termination point (NTP) comprises apparatus for connecting a customer's data and telephone equipment and associated wiring at the customer premises to a communications provider's telecommunications network via an access line. By "customer" is indicated a customer, end-user or subscriber taking services provided over a telecommunications network by a communications provider such as a local exchange carrier. A telecommunications network access line is commonly used to carry both voice telephony and broadband data signals between a communications provider's telecommunications network and the customer-premises. The network termination point generally provides the physical point of termination of an incoming (generally two-wire) line from a telecommunications network into a customer's premises, and usually also provides the legal demarcation point between the external (communications provider's) telecommunications network and the customer's internal, premises network. The network termination point may comprise a telephony master socket.

The telecommunications network access line was traditionally dedicated to carrying voice telephony traffic as a voice-band analogue voltage signal over copper pair. This has steadily changed so that many telecommunications network access lines now carry a broadband data signal, i.e. digital subscriber line (DSL), in addition to an analogue voice telephony signal over a single copper twisted pair and this is illustrated in Figure 1.

In Figure 1, network termination point 310, provides connectivity between telecommunications network access line 304 and customer-premises telephony network 300. Customer-premises telephony network 300 connects telecommunications network access line 304 through to internal broadband connection 314. Internal broadband connection 314 runs from network termination point 310 to customer-premises DSL modem 316. Customer-premises telephony network 300 also connects telecommunications network access line 304, via faceplate 312 and low-pass filter 311, through to internal analogue voice telephony wiring 318. Internal analogue voice telephony wiring 318 runs from network termination point 310 to customer-premises

analogue telephony apparatus 320. Access line 304, broadband connection 314 and analogue voice telephony wiring 318 are typically twisted copper pairs. Analogue voice telephony wiring 318 may include one or more forks or branches 322, with each fork or branch supplying one or more telephone sockets 324. Each analogue telephony apparatus 320 may connect into the analogue voice telephony wiring 318 via a cord and connector 326, which mates with a telephone socket 324. In addition to analogue voice telephony signalling, communications provider's access line 304, network termination point 310, faceplate 312, low-pass filter 311 and analogue voice telephony wiring 318 provide an electrical path for power supply current to flow from the telecommunications network (not shown) to the analogue telephony apparatus 320. DSL modem 316 is connected to one or more customer-premises broadband components 330 – either by wired (e.g. Ethernet) connection 332 or wireless (e.g. Wi-Fi) connection 334.

More recently, some communications providers have changed their access lines to become all-digital, with the analogue voice telephony signal being replaced with broadband digital voice telephony signalling. The all-digital access line may be provided using DSL modulation over copper pair with voice encoded into packets (e.g. VoIP) or may use other digital technologies. Alternatively, the all-digital access line may be provided over fibre. In either case, the power supply from the network relied on by analogue telephony apparatus will no longer be guaranteed.

The invention addresses interworking with communications provider's telephone networks where exchange of voice traffic with customer-premises is based on digital voice telephony signalling, rather than analogue signalling. The change to an all-digital access line poses a problem for customers who want to continue to use their conventional analogue telephony apparatus distributed around the customers' premises. Analogue telephone adapters (ATA) that convert from VoIP digital voice signalling to PSTN analogue voice signalling may be used to enable conventional analogue telephones to communicate via an all-digital access line. Conveniently, the ATA may be connected wirelessly to communicate analogue voice signalling within the customer's premises. Suitable short-range wireless technologies include Digital Enhanced Cordless Telecommunications (DECT) based on standard EN 300 175. DECT adapters include the HT702 from Grandstream Networks of Boston, MA 02215, USA or the SPA232D Multi-Line access DECT ATA from Cisco Systems, Inc. of San Jose, CA 95134, USA. Other short-range wireless technologies may be used, including a femtocell or small cell using WCDMA, WiMAX, LTE or similar. For clarity, the term "DECT" is used, below, to include all suitable wireless technologies.

However, analogue telephones and other analogue telephony apparatus cannot function without receiving a suitable power supply. Analogue telephone adapters (ATA) may allow

conventional analogue telephones to communicate via a digital connection, however, the average user may not want to relocate their analogue telephony apparatus to work with a DECT adapter and may wish to avoid the cost and inconvenience of providing a separate power supply at each analogue telephony apparatus installed around their premises.

Summary of the Invention

The present invention accordingly provides, in a first aspect, a method of providing power for an analogue telephony apparatus located at a premises; in which the premises comprises premises telephony wiring, in which the analogue telephony apparatus is connectable electrically to the premises telephony wiring; in which the method comprises: disconnecting electrically the premises telephony wiring from an external telephony network; connecting electrically a power supply located at the premises to a path across the premises telephony wiring for powering the analogue telephony apparatus.

According to an embodiment of the invention, the method comprises connecting the analogue telephony apparatus to the path across the customer-premises telephony wiring and to the signalling path.

According to an embodiment of the invention, the method comprises connecting to the premises telephony wiring a module for deriving power from the path across the customer-premises telephony wiring and for deriving telephony signalling from the signalling path and for providing the derived power and signalling to the analogue telephony apparatus.

According to an embodiment of the invention, the premises telephony wiring is suitable for carrying power supply current from the power supply to the analogue telephony apparatus and analogue telephony signalling.

According to an embodiment of the invention, disconnecting electrically the premises telephony wiring from the external telephony network, comprises disconnecting, at a network termination point, the premises telephony wiring from the external telephony network.

According to an embodiment of the invention, the method comprises connecting electrically the power supply to the premises telephony wiring at the network termination point.

The present invention provides, in a second aspect, a premises telephony network, comprising within a premises:

a signalling path for communicating telephony signalling between an external digital telephony network and an analogue telephony apparatus;

a power supply for powering the analogue telephony apparatus;

premises telephony wiring suitable for carrying power supply current and analogue telephony signalling for the analogue telephony apparatus;

in which the power supply is connected electrically to a path across the premises telephony wiring for powering the analogue telephony apparatus; in which the path across the customer-premises telephony wiring is distinct from the signalling path.

According to an embodiment of the invention, the path across the customer-premises telephony wiring is distinct from a signalling path within the premises for communicating telephony signalling between the external telephony network and the analogue telephony apparatus.

According to an embodiment of the invention, the signalling path comprises a wireless section and a wired section, in which the analogue telephony apparatus is connectable electrically to the wired section.

According to an embodiment of the invention, the premises telephony network comprises a module for deriving power from the path across the customer-premises telephony wiring and for deriving telephony signalling from the signalling path and for providing the derived power and telephony signalling to the analogue telephony apparatus.

According to an embodiment of the invention, the path across the customer-premises telephony wiring comprises a first connector for connection of an analogue telephony apparatus to the premises telephony wiring; in which the module comprises a second connector for connection to the first connector and a third connector for connection to an analogue telephony apparatus.

According to an embodiment of the invention, the signalling path comprises a first part for digital telephony signalling and a second part for analogue telephony signalling; in which the first part is connected to the second part via a converter for converting between digital telephony signalling for communication with the communications provider network and analogue telephony signalling for communication with the analogue telephony apparatus.

According to an embodiment of the invention, the power supply is direct current.

Brief Description of the Drawings

Embodiments of the present invention will now be described, by way of example, with reference to the appended drawings, in which:

Figure 1 shows a schematic representation of standard customer-premises telephony network;

Figure 2 shows a schematic representation of customer-premises telephony network according to embodiments of the present invention;

Detailed Description of the Preferred Embodiments

On changing to an all-digital access line, the average user may choose to use an ATA to allow their conventional analogue telephones and other analogue telephony apparatus to continue to communicate with their communications provider's telecommunications network. They may not, however, want to relocate their analogue telephony apparatus to work with DECT adapters and may wish to avoid the cost and inconvenience of providing a separate power supply at each analogue telephony apparatus installed around their premises. The invention provides power via the existing customer-premises wiring, so allowing conventional analogue telephones and other analogue telephony apparatus to be located at and obtain power via the existing customer-premises telephony network. This avoids relocating analogue telephony apparatus from their habitual sites around the home or office.

Figure 2 shows a schematic representation of customer-premises telephony network according to embodiments of the present invention. The invention differs from known systems in reconfiguring the customer-premises telephony wiring 318 to provide power centrally from a customer-premises power supply 446 to customer-premises analogue telephony apparatus 420. Referring to Figure 2, according to an embodiment, DECT adapters (i.e. DECT base 442 and DECT modules 424) wirelessly exchange analogue voice telephony signalling. DECT modules 424 plug into customer-premises telephony sockets 324 and. DECT modules 424 connect power from customer-premises telephony wiring 318 to analogue telephony apparatus 420. At the same time, DECT modules 424 may derive their own power from customer-premises telephony wiring 318 through customer-premises telephony sockets 324. According to a further embodiment, the DECT modules 424 present a compatible telephony connector to the analogue telephony apparatus 420 for provision of power and signalling. In this way a single customer-premises power supply can power multiple analogue telephones and other forms of analogue telephony apparatus. According to an embodiment, a single, customer-premises power supply can, in addition, power multiple DECT modules 424, so avoiding the need for an individual power supply and a mains power outlet for each DECT module.

The reconfiguration of the customer-premises telephony wiring 318 can be achieved, for example, by fitting an interstitial plate to the network termination point (NTP) 410 (e.g. a master socket) to reconfigure the NTP so as to isolate the premises telephony wiring from

the access network and to provide a connection for a suitable, premises-located power supply to the isolated premises telephony wiring. This reconfiguration of the existing wiring for a local power supply reduces the number of power adapters required in the customer-premises and removes the need for a separate mains power outlet at each phone socket – which otherwise may pose a problem where telephone socket and mains socket are not co-located.

As shown in Figure 2, customer-premises telephony network 400, which has a connection to an all-digital access line 404, is reconfigured to provide power to analogue telephony apparatus 420. An electrical power supply (PSU) 446 for powering the analogue telephony apparatus 420 via the premises telephony wiring 418 is located at the premises. In order to avoid degradation of the output of PSU 446, NTP 410 is adapted, e.g. by re-wiring NTP 410, to disconnect the customer-premises telephony wiring 418 from the all-digital access line 404. For example, if connected to the customer-premises telephony wiring 418, the all-digital access line 404 may constitute a short circuit or apply an adverse voltage across the terminals of PSU 446, so causing PSU 446 to malfunction.

As indicated, above, the premises receives at NTP 410, a broadband signal 414 but no analogue telephony signal. The received broadband signal is routed from NTP 410 to DSL modem 416 through customer-premises telephony network 400. DSL modem 416 acts in conventional manner to extract a digitised voice telephony signal and one or more data signals from the received broadband. The (or each) data signal is routed to broadband equipment 430, such digital television or home computing equipment e.g. via Ethernet cable or Wi-Fi wireless links 432, 434. The customer-premises telephony network 400 comprises an analogue telephony converter (ATA) 440 that converts between digital voice telephony signalling carried on all-digital access line 404 and analogue voice telephony signalling used by analogue telephony apparatus 420. The digitised voice telephony signal is routed, e.g. via Ethernet cable or Wi-Fi wireless link, to ATA 440 which converts, as indicated, above, between digitised and analogue voice signals. According to an embodiment, the customer-premises telephony network 400 comprises a wireless transceiver (such as a DECT base station 442) to exchange telephone signals received via ATA 440 from the communications provider's telecommunications network with wireless (e.g. DECT) modules 424 distributed around the customer-premises. The DECT modules 424 also transmit to the DECT base station 442, telephony signals received from analogue phones 420. The DECT base station is in communication with the communications provider's network access line 404 via ATA 440 and interface equipment (such as a DSL modem 416) that together convert between the analogue telephony signals used within the customer-premises and signals suitable for transmission over a digital access line.

According to an embodiment, each DECT module 424 provides a standard analogue (i.e. POTS) telephone connection for an analogue telephony apparatus 420. In order to supply power to the analogue telephony apparatus, a suitable power supply voltage is provided by PSU 446 to each DECT module 424 via the internal telephony wiring 418 and, via the DECT modules 424, to the analogue telephony apparatus 420. Conventionally the power supply required by analogue telephones is -48 volt direct current supply, although the arrangement described here is capable of supplying power at other voltages and also as alternating current, if required.

Power supply 446 may be located within NTP 410 or located separately with a connection to the NTP for supply of power to customer-premises telephony network 400. Power supply 446 may draw power from the electricity supply grid, from batteries or from a local source, such as a generator or solar energy converter.

According to an embodiment, once the necessary changes have been made to the NTP 410 and any associated wiring, all the user has to do is unplug their analogue phone from the customer-premises telephony network connector 324, plug a suitable DECT module 424 in its place and then plug the phone 420 into the telephone connector 426 provided with the DECT module.

According to the embodiments, described above, customer-premises telephony network 400 is reconfigured to overcome problems arising from upgrading communications provider's telecommunications networks to all-digital by allowing customers to continue to use conventional analogue telephony apparatus connected to existing customer-premises telephony network sockets distributed around the customers' premises.

The customer-premises telephony wiring 318 is any wiring suitable for connecting and supplying analogue telephony signalling and power to voice-band telephony equipment such as analogue telephones, fax machines, computer modems etc. It is commonly implemented as twisted copper pair.

It will be understood by those skilled in the art that, although the present invention has been described in relation to the above described example embodiments, the invention is not limited thereto and that there are many possible variations and modifications which fall within the scope of the invention.

The scope of the present invention includes any novel features or combination of features disclosed herein. The applicant hereby gives notice that new claims may be formulated to such features or combination of features during prosecution of this application or of any such further applications derived therefrom. In particular, with reference to the appended claims, features from dependent claims may be combined with those of the independent

claims and features from respective independent claims may be combined in any appropriate manner and not merely in the specific combinations enumerated in the claims.

Claims

1. A premises telephony network, comprising within a premises:
 - a signalling path for communicating telephony signalling between an external digital telephony network and an analogue telephony apparatus;
 - a power supply for powering the analogue telephony apparatus;
 - premises telephony wiring suitable for carrying power supply current and analogue telephony signalling for the analogue telephony apparatus;
 - in which the power supply is connected electrically to a path across the premises telephony wiring for powering the analogue telephony apparatus.
2. The premises telephony network as claimed in claim 1, in which the path across the customer-premises telephony wiring is distinct from the signalling path.
3. The premises telephony network as claimed in any of claims 1 to 2 in which the signalling path comprises a wireless section and a wired section, in which the analogue telephony apparatus is connectable electrically to the wired section.
4. The premises telephony network as claimed in any of claims 1 to 3, comprising a module for deriving power from the path across the customer-premises telephony wiring and for deriving telephony signalling from the signalling path and for providing the derived power and telephony signalling to the analogue telephony apparatus.
5. The premises telephony network as claimed in claim 4, in which the path across the customer-premises telephony wiring comprises a first connector for connection of an analogue telephony apparatus to the premises telephony wiring; in which the module comprises a second connector for connection to the first connector and a third connector for connection to an analogue telephony apparatus.
6. The premises telephony network as claimed in claim 5, in which the signalling path comprises a first part for digital telephony signalling and a second part for analogue telephony signalling; in which the first part is connected to the second part via a converter for converting between digital telephony signalling for communication with the communications provider network and analogue telephony signalling for communication with the analogue telephony apparatus.
7. The premises telephony network as claimed in any of claims 1 to 6, in which the power supply is direct current.

8. A method of providing power for an analogue telephony apparatus located at a premises; in which the premises comprises premises telephony wiring, in which the analogue telephony apparatus is connectable electrically to the premises telephony wiring; in which the method comprises:

disconnecting electrically the premises telephony wiring from an external telephony network;

connecting electrically a power supply located at the premises to a path across the premises telephony wiring for powering the analogue telephony apparatus.
9. The method as claimed claim 8, in which the path across the customer-premises telephony wiring is distinct from a signalling path within the premises for communicating telephony signalling between the external telephony network and the analogue telephony apparatus.
10. The method as claimed in claim 9, comprising connecting the analogue telephony apparatus to the path across the customer-premises telephony wiring and to the signalling path.
11. The method as claimed in any of claims 9 and 10, comprising connecting to the premises telephony wiring a module for deriving power from the path across the customer-premises telephony wiring and for deriving telephony signalling from the signalling path and for providing the derived power and signalling to the analogue telephony apparatus.
12. The method as claimed in claim 11, in which the signalling path comprises a wireless section and a wired section in which the module connects the wireless section with the wired section.
13. The method as claimed in any of claims 8 to 12, in which the premises telephony wiring is suitable for carrying power supply current from the power supply to the analogue telephony apparatus and analogue telephony signalling.
14. The method as claimed in any of claims 8 to 13, in which disconnecting electrically the premises telephony wiring from the external telephony network, comprises disconnecting, at a network termination point, the premises telephony wiring from the external telephony network.
15. The method as claimed in claim 14, comprising connecting electrically the power supply to the premises telephony wiring at the network termination point.

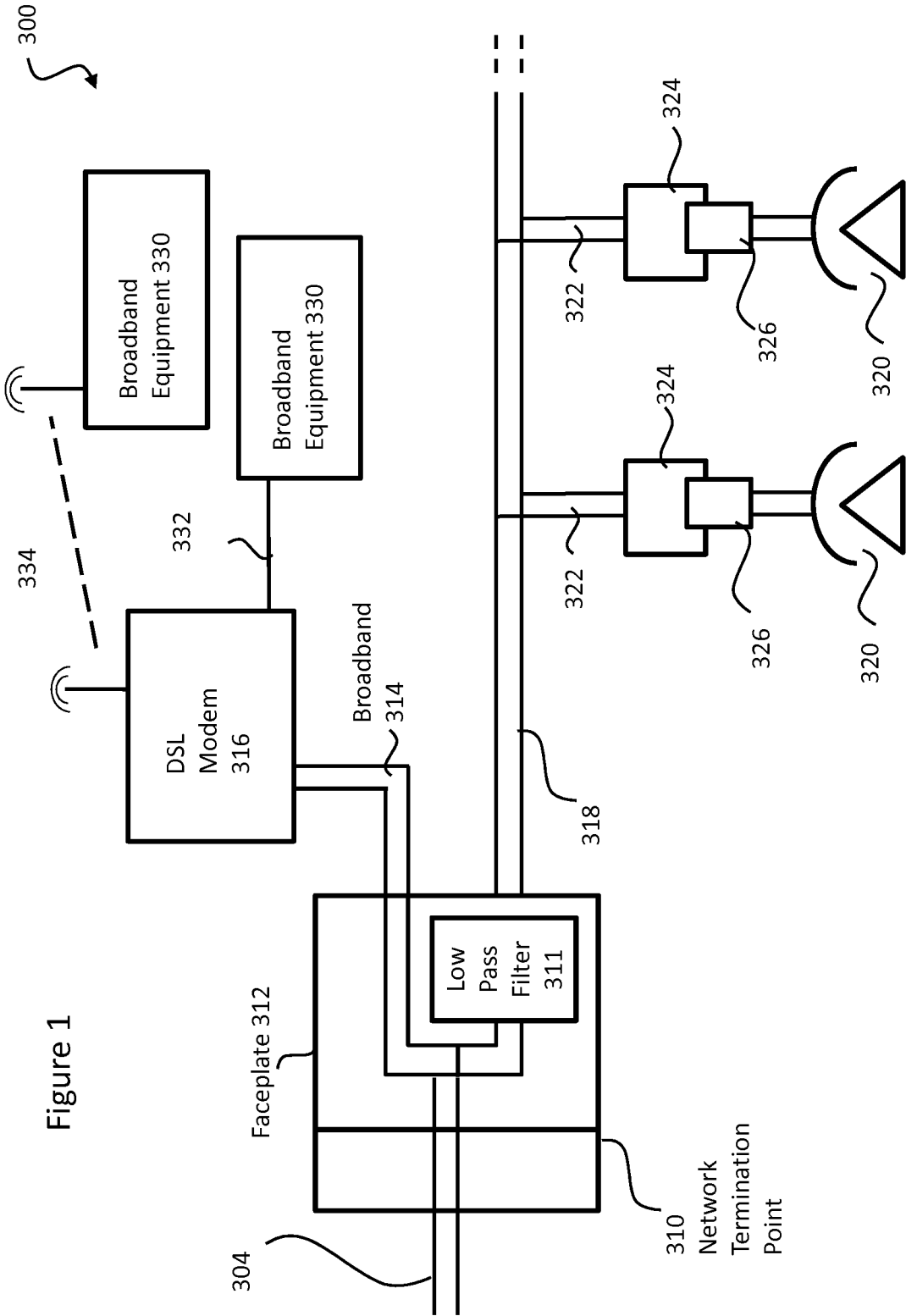
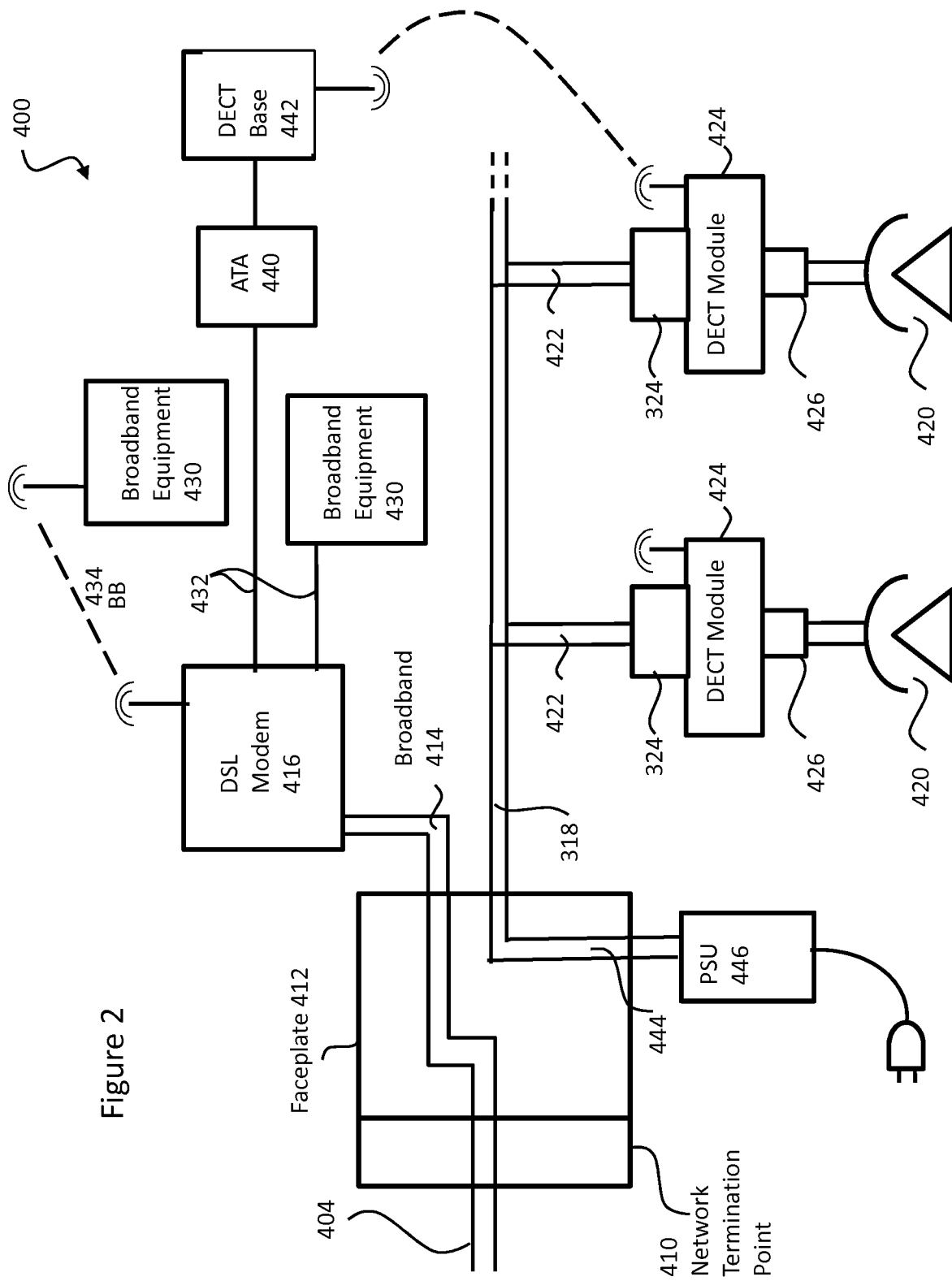


Figure 1

Figure 2



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/064126

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04M19/08
ADD.

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)
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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/077968 A1 (PITSOULAKIS GEORGE N [US] ET AL) 13 April 2006 (2006-04-13) paragraphs [0028] - [0036], [0044], [0048] - [0056], [0066] - [0071]; figures 1-6,10	1-15
X	US 2013/163490 A1 (RODRIGUEZ MARK F [US] ET AL) 27 June 2013 (2013-06-27) paragraphs [0003], [0010], [0012] - [0020], [0039] - [0044]; figures 1-8	1-15
A	EP 2 362 626 A1 (BRITISH TELECOMM [GB]) 31 August 2011 (2011-08-31) paragraphs [0017] - [0025]; figure 1	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

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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

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"&" document member of the same patent family

Date of the actual completion of the international search

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Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2016/064126

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006077968	A1	13-04-2006	NONE
US 2013163490	A1	27-06-2013	US 2013163490 A1 27-06-2013
		US 2016191713 A1	30-06-2016
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