Title: METHOD AND DEVICE FOR CONNECTING EQUIPMENT INTO A TELEPHONE LINE

Abstract: The present invention discloses a method and device for connecting new equipment into a telephone exchange without resulting in interruption of existing service in the telephone exchange, and without requiring rewiring of cross-connect wires between the plints. In accordance with the invention, a connection board comprises an interruption and bypass connection mechanism. The connection board is adapted to be inserted into the plints thus making connection to the line side and the station side, and comprises the necessary components for the equipment. The invention also enables the equipment to be installed or connected without having to input. The present invention discloses a method and device for connecting new equipment into a telephone exchange without resulting in interruption of existing service in the telephone exchange, and without requiring rewiring of cross-connect wires between the plints. In accordance with the invention, a connection board comprises an interruption and bypass connection mechanism. The connection board is adapted to be inserted into the plints thus making connection to the line side and the station side, and comprises the necessary components for the equipment. The invention also enables the equipment to be installed or connected without having to input current cross-connect data from a database and without interrupting existing subscriber services.
Method and device for connecting equipment into a telephone line

Technical Field

The present invention relates to a method and a device for connecting equipment into a telephone line. More specifically, to a method and a device for being able to connect new equipment into a telephone exchange without resulting in interruption of existing service in the telephone exchange, and without the need for any rewiring of cross-connect wires between the plints.

Background

Connecting equipment into an existing telephone line requires manual reconnection in the existing so-called cross-connect of the telephone exchange. Furthermore, there is need for installing cable for the new equipment to the cross-connect, and also the cross-connect itself has to be extended with new cross-connect plints also referred to as termination blocks. Carrying out these measures will normally disturb the existing service installed on the telephone line. The problem can be highlighted in a relatively simple way by considering the connection of ADSL (Asymmetric Digital Subscriber Line) into an existing subscriber line. It should be noted that the invention is, however, not limited only to ADSL but is also applicable to other digital subscriber line technologies (DSL). The issue of automating these connections has arisen, on one hand, to the increasing number of digital subscriber line technologies (DSL). On the other hand due to so-called unbundling, which essentially means that the owner of the pairs of copper wire in the networks are forced through legislation to sublet them to a number of different suppliers of access equipment, i.e. service interfaces.

There are different methods for remotely automating cross-connects using equipment installed onto telephone lines, by means of so-called Metallic Cross Connects (MXCs). These methods, however, require a lot of rewiring of cable in the cross-connect and extending the number of cross-connect plints. Existing automatic cross-connects have to be loaded with existing cross-connect data before connection
can be made. This is another problem since the data that are present in the databases in many do not correspond to the cross-connects that have been actually installed.

There are also disturbances of existing services. Other methods introduce split filters and/or modems directly into the plints of the cross-connect. In this case a number of filters or modems will be needed that is larger than the number that are actually activated. Another method is to provide each telephone line with a processor capacity that enable different types of services that can be programmed into these circuits, this however requires making changes to the entire telephone station and can be very expensive. As previously mentioned, these MXCs must also be loaded with already existing cross-connect information.

**Brief description of the invention**

The object of the invention is to solve the problem with manual connection of new services into the cross-connect of a telephone exchange, without interrupting an already existing service on the telephone line. Another problem that is solved by the invention is to minimize the need for rewiring or installing new cables between plints in the cross-connect, and to minimize the need for new plints in the cross-connect.

Furthermore, the invention enables that the telephone line to be remotely controlled in that it can be reconnected to different services and that the existing service is reconnected to another telephone line.

The invention also enables connection of the equipment without having to input cross-connect data from a database. Instead the device must only take care of the changes that are made after the connection. This can also be performed to minimize the size of the selector stages comprised in the automatic cross-connect.
Brief description of the drawings

Fig 1 shows the principle for connecting a telephone line in a cross-connect.

Fig 2 shows the principle for connecting printed circuit boards in the cross-connect plints.

Fig 3 shows the principle for manual connection in the cross-connect dependent on different needs.

Fig 4 shows the principle for cross-connecting in the case of hired connections.

Fig 5 shows the principle for connecting new services into the cross-connect in accordance with prior art.

Fig 6 shows an alternative connection similar to that of fig 5.

Fig 7a and 7b shows the principle for connecting new services in accordance with the invention.

Fig 8 shows an alternative design of the connection board in accordance with the invention.

Fig 9 shows the connection board in accordance with fig 8 connected to further selector stages.

Fig 10 shows an alternative design of the connector card.

Fig 11 shows the principle for how the connector card according to the invention can be used in new installations.

Detailed Description

The invention will now be described by means of preferred embodiments and with reference to the enclosed drawings. For the sake of simplicity, the drawings show only one telephone wire of a pair of wires that make up a telephone line, wherein a
cross-connect plint normally comprises 8 or 10 pairs i.e. a total 16 or 20 wires. In
the following description one wire will represent such a pair.

In the description a normal telephone service, PSTN och ADSL, is used as an
eexample. The invention is however not limited to these services and other DSL
technologies can also be applicable, i.e. be connected by means of the invention.

The principle for connecting a telephone line in the cross-connect is shown in Fig 1.
The cross-connect 1 comprises two cross-connect plints, one plint 10 on the station
side or exchange side and one plint 20 on the line side. From the exchange a wire 11
leads to the plint 10 and from the plint 20 an outgoing wire 21 leads to the
subscriber. Between the plints 10 and 20 there is a cross-connect wire 30 or so-
called jumper wire, that connects the station side with the line side. These jumpers
are installed manually to make the cross-connect and are installed or removed as
required for connecting or disconnecting the service.

In Fig. 1 there is shown an interruption mechanism in the cross-connect plints on
the line side as well as on the station side. There are variations such that the
interrupt functionality is present only at the station side in some cases and only at
the line side in other cases. This does not affect the invention and its principles can
be used in all these cases.

When connecting the device in accordance with the invention these interruption
mechanisms are utilized. The cross-connect plints are designed such that e.g. a
printed circuit board (PCB) can be inserted into them to make contact with the line
side as well as with the station side. The invention utilizes this possibility and
connects line side and station side by means of, for example, a printed circuit board
40 in accordance with Fig 2.

The cross-connect wires are installed for connecting service as required by the
operator or service provider in accordance with Fig 3. In this figure, as an example,
a first operator offers two different services via the connection plints 10a and 10b, respectively, while a second operator offers another service via the connect plint 10c. The subscriber that is connected to the plint 20 is dependent on the circumstances connected to any of the offered services via the connect wire 30a, 30b or 30c.

The wire pairs on the line side can also be subleased as a so-called hired connection wherein cross-connection is carried out in accordance with Fig 4. Approximately 10 to 20 % of the wire pairs are handled in this way. In these cases, it is possible that a large number of reconnections per unit of time may occur.

Since equipment such as ADSL requires connecting a filter into the subscriber line, in accordance with Fig. 5, a reconnection must be made in the cross-connect, which increases the number of cross-connect plints. From Fig. 5 it is shown where the new wires must be connected to the new equipment. The original connection wire 30a, between the connect plint 10a of the station side and the corresponding plint 20a of the line side, must be removed and new connection wires 30b and 30c are connected to a new plint 10b on the station side and to new plint 20b on the line side, respectively. From the new connect plints 10b and 20b new wires have to be connected to a filter 50, which in turn is coupled to a modem 60.

Fig. 6 shows reconnection to a new type of service and connection of the vacant position in the cross-connect to a new line. Furthermore, new connect wires 30b and 30c must be connected to new plints 10b for the new service and to 20b to the new line, respectively, while the original connection wire 30a was removed. In addition, a new wire 11a has to be connected to the equipment for providing the new DSL service, for example a modem 60.

In order to connect new services into the cross-connect of the telephone exchange without causing interruptions in existing service on the telephone wire together with
minimizing the installation or reinstallation new wires and the number new plints, a connection card 70 in accordance with the invention is used. The connection card 70 comprises a unique non-interrupt mechanism or a bypass connection mechanism 80 in accordance with Fig. 7a and 7b. Fig. 7b shows the connection into both subscriber and station sides of the cross-connect. The other figures show the connection of the connection card 70 only into one side, but Fig. 7b is applicable also on the other figures. The non-interrupt mechanism permits connection of the device without any interruption in existing services. The non-interrupt mechanism can be made externally, in which case will require additional wiring on the jumper side of the cross-connect plints.

The connection card 70 is normally connected to the plints of the station side as well as to the plints of the line side in accordance with Fig 7b. There is however nothing that prevents a connection to be made, for example, to the station side. In the latter case access is only achieved to preexisting connected lines and new lines must be manually connected. This also means that the possibility to connect measurement equipment on unused pairs is wasted, depriving us of the ability to sublease the lines. The possibility to connect measurement equipment is important in order to maintain the quality of the subscriber lines when introducing new DSL technology.

The connect card 70 comprises, in addition to the previously mentioned interrupt mechanism and bypass connection mechanism 80, one or a number of selector mechanisms associated with the jumper side and/or the contacts of the station side and/or the line side in the cross-connect plint 10 in accordance with Fig 8. These selector mechanisms can of course be shared between the cross-connect plints of the station side and the line side, respectively.

The outputs 90 from the connection card 70 can be utilized in different way according to the current need. If full cross-connect capacity is required, the selector
stages are connected to further connector stages 100 in accordance with Fig 9. The outputs can also be connected to outputs 90 of other connect cards to either a pool of filters or modems or linked them to further selector stages in accordance with Fig. 10. These filters and modems are preferably distributed over the connection cards whereby no external wiring is needed. The device in accordance with the description achieves that when the expected number of reconnections in a certain group are wired out to more centrally positioned selector stages. The inclusion of the filter pool in the device in accordance with Fig. 10 minimizes the need for wiring. Furthermore, cross-connections can be carried out between a large number of wires and/or pieces of service equipment due to the fact that certain of the outputs of the selectors can be connected to other groups via more central selector stage. The device can be dimensioned such that only the predicted number of reconnected lines must be wired out from these grouped selector modules.

If and when these outputs have been consumed or are getting close to being consumed, it is possible to free these outputs by means of reconnection in the cross-connect in a further visit to the installation. The connection cards are designed such that reconnection is possible when the cards are installed.

The filters and/or the modems can be placed either on the access cards or in the center stage of the automated cross-connect equipment.

When making a new installation, the line side and the station side can be connected to the same block in accordance with Fig. 11, thereby using half the number of cross-connect plinths and thus corresponding floor space.
CLAIMS

1. A method for automating a cross-connect in a telephone station at which a wire (11,21) is connected to a connection plint (10,20) comprising a first connection side and a second connection side with an intermediate interruption mechanism by which a member with contacts is connectable to electric equipment between said first and second connect side, characterized in that
   a connection board (70) comprising an interruption and bypass connection mechanism (80) is connected to the connection plint;
   wherein the interruption and bypass connection, respectively, between the first and second connection sides is carried out by means of said interruption and bypass connection mechanism (80) of the connection card.

2. The method of claim 1, wherein selection of cross-connection to a connection side of the connection plint is carried out by means of a selector mechanism comprised in the connection card.

3. The method of claim 2, wherein an increase in cross-connection capacity is provided by means of connecting additional selector stages (100) via outputs (90) of the connection card (70).

4. The method of claim 2, wherein outputs (90) of a first connect card (70) is connected to outputs of a second connection card.

5. The method of claim 2, wherein outputs (90) of a first connection card (70) is connected to links to additional selector stages.

6. The method of claim 1, wherein said connection card (70) comprises a filter.

7. The method of claim 6, wherein outputs (90) of a first connection card (70) is connected to outputs (90) of a second connection card (70) thereby concentrating said outputs to a pool of filters.
8. The method of claim 1, wherein said connection card (70) comprises a modem.

9. The method of claim 8, wherein outputs (90) of a first connection card (70) is connected to outputs (90) of a second connection card (70) thereby connecting said outputs to a pool of filters.

10. The method of claim 2, wherein outputs of a first group of selector mechanisms are connected to a second group of selector mechanisms via a central selector stage.

11. The method of claim 10, wherein the arrangement with a first and a second group of selector functions and a central selector stage is dimensioned dependent on a predicted number of reconnected lines.

12. The method of claim 10, wherein the center stage comprises a filter.

13. The method of claim 10, wherein the center stage comprises a modem.

14. The method of claim 1, wherein a wire (11) from the station side and a wire (21) from the line side are connected to a first connection side and a second connection side, respectively, in the same connection plint (10).

15. The method of claim 2, wherein reconnection of the telephone line is remote controlled.

16. The method of claim 1, wherein the connection card is connected on the station side and/or on the line side.

17. An apparatus for automating a cross-connect in a telephone station at which a wire (11,21) is connected to a connection plint (10,20) comprising a first connection side and a second connection side with an intermediate interruption mechanism by which a member with contacts is connectable to electric equipment between said first and second connect side,

characterized in that a connection board (70) adapted to be inserted into the connection plint and
comprising an interruption and bypass connection mechanism (80);
wherein interruption and bypass connection, respectively, between the first and second connection sides is carried out by means of said interruption and bypass connection mechanism (80) of the connection card.

18. The apparatus of claim 17, wherein the connection card further comprises a selector mechanism adapted for performing a selection of a cross-connection to a connection side of the connection plint.

19. The apparatus of claim 18, wherein the connection card (70) further comprises outputs (90) adapted for extending the cross-connect capacity by means of additional selector stages (100) via said outputs (90).

20. The apparatus of claim 18, wherein outputs (90) of a first connection card (70) are connected to outputs of a second connection card.

21. The apparatus of claim 18, wherein outputs (90) of a first connection card (70) are connected to links to additional selector stages.

22. The apparatus of claim 17, wherein said connection card (70) comprises a filter.

23. The apparatus of claim 22, wherein outputs (90) of a first connection card (70) are connected to outputs (90) of a second connection card (70) thereby connecting said outputs to a pool of filters.

24. The apparatus of claim 17, wherein said connection card (70) comprises a modem.

25. The apparatus of claim 24, wherein outputs (90) of a first connection card (70) are connected to outputs (90) of a second connection card (70) thereby connecting said outputs to a pool of modems.
26. The apparatus of claim 18, wherein outputs of a first group of selector mechanisms are connected to a second group of selector functions via a central selector stage.

27. The apparatus of claim 26, wherein the arrangement with a first and a second group of selector functions and a central selector stage is dimensioned dependent on the predicted number of reconnected lines.

28. The apparatus of claim 26, wherein the center stage comprises a filter.

29. The apparatus of claim 26, wherein the center stage comprises a modem.

30. The apparatus of claim 17, wherein a wire (11) from the station side and a wire (21) from the line side are connected to a first connection side and a second connection side, respectively, in the same connection plint (10).

31. The apparatus of claim 18, wherein reconnection of the telephone line is performed by remote control.

32. The apparatus of claim 17, wherein the connection card is connected on the station side and/or on the line side.

33. The apparatus of claim 17, wherein the connection card comprises a number of selector mechanisms associated with a cross-connection wire side and/or a station side and/or a line side.
### INTERNATIONAL SEARCH REPORT

**A. CLASSIFICATION OF SUBJECT MATTER**

**IPC7:** H04Q 1/14, H04M 11/06  
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)

**IPC7:** H04L, H04M, H04Q  
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**EPO-INTERNAL, WPI, PAJ**

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Relevant to claim No.</th>
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<td>US 2002057732 A1 (STURE ROOS), 16 May 2002 (16.05.2002), page 2, column 1, line 1 - page 4, column 1, line 20, figures 1-4, abstract</td>
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Further documents are listed in the continuation of Box C.  

- 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  
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**Date of the actual completion of the international search:**  
13 May 2004

**Date of mailing of the international search report:**  
18-05-2004

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