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(54) **Hybrid conference system**

Hybride Konferenzanlage

Système hybride de conférence

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Description

Field of the invention

[0001] The present invention relates to a conference system comprising a central unit and at least one delegate unit connectable to the central unit.

State of the art

[0002] A conference system includes a central unit in connection with several delegate units for the participating delegates. The central unit serves to combine audio channels from various delegate units and for distributing the received audio and data channel and combinations of these channels. In the prior art solutions these delegate units are connected to the central unit either by using a fully wired or a fully wireless infrastructure. It is not possible to use a mixture of both. This substantially reduces the flexibility of the digital conference system.

[0003] Patent application US 2005/175188 discloses a microphone device comprising a host transmission unit adapted to establish signal transmission between a control circuit and an external host terminal. The host transmission unit can be a wired transmission unit or a wireless transmission unit.

Patent application DE 10 2004 037856 discloses a conference system comprising a base conference block, which is arranged such that either an end device, or an additional base conference block for realising an extended conference system can be coupled thereto. Two conference blocks can be coupled through a wired transmission or a wireless transmission.

[0004] A fixed wired conference system requires a lot of preparation when a temporarily extension of the conference room is necessary. Cables need to be placed between the additional delegate units and the central unit. This is especially difficult when cables are mounted in the furniture or the central unit is placed in a separate control room.

[0005] A wireless system requires additional managing. For instance the wireless link quality and the remaining battery capacity need to be monitored. Special interventions, like replacing the battery or changing the transmit frequency or power, are necessary when a monitor signal reaches a certain threshold. It is most likely that a conference system is placed in a dedicated room where it is possible to provide a fixed cabling. Utilising a wireless system in these circumstances requires unnecessary additional managing for the fixed wireless units.

[0006] In conference systems with simultaneous interpretation the speaker's channel is translated in a number of languages. This translation is performed by interpreters preferably in acoustically isolated rooms. For this reason it is not possible to use a wireless conference system due to a high RF attenuation.

[0007] Therefore there is a need for a conference system that overcomes these drawbacks and that allows the

use of a mixed wired/wireless infrastructure.

[0008] Patent application WO2005/117409 relates to a conference system comprising a central unit and speaker units connectable to the central unit. The central unit is provided with an adaptive filter for suppressing feedback. Each speaker unit comprises an adaptive filter coupled between a microphone and a loudspeaker. When the speaker unit is not activated, the adaptive filter serves as an echo canceller, while serving as a feedback suppressor when the speaker unit is activated.

Aims of the invention

[0009] The present invention aims to provide a conference system that does not suffer from the drawbacks related to the use of either wireless or wired systems known in the state of the art.

[0010] The present invention relates to a delegate unit for use in a conference system according to claim 1.

[0011] In a preferred embodiment said motherboard of the delegate unit comprises detection means for detecting which module is connected. The detection means preferably comprises a reading means for reading an identifier on the connected module. The reading means is advantageously a processor or a field programmable gate array (FPGA).

[0012] In an advantageous embodiment at least one of said modules is provided with an EEPROM.

[0013] In a further embodiment the motherboard is arranged for modifying the protocol used for connecting the physical interface with either the first or the second module.

[0014] Typically the second module comprises a RF section comprising an antenna and a transceiver.

[0015] In a specific embodiment at least one of the modules is arranged for operating according to at least two different protocols. Alternatively, the delegate unit may comprise a plurality of modules, whereby each module is arranged for operating the delegate unit either in wired mode or in wireless mode according to a different protocol.

[0016] In a second aspect the invention relates to a central unit for use in a conference system according to claim 10. for connecting said delegate unit when the delegate unit is arranged for use in wireless mode.

[0017] In a preferred embodiment the first and second connection means each are in a separate module. In an alternative embodiment the first and second connection means are placed in an integrated module.

[0018] Preferably the second connection means comprises an output connector for connecting an external antenna.

[0019] In another aspect the invention relates to a conference system comprising a central unit as previously described and at least one delegate unit as described.

[0020] Advantageously the conference system further comprises at least one interpreter unit. The central unit preferably is arranged for receiving an interpreter chan-

nel signal from the at least one interpreter unit.

[0021] In a preferred embodiment the conference system further comprises a wireless access point in connection with the central unit. Advantageously the second connection means of the central unit is disabled when the conference system is in operation. Typically the wireless access point is connected to the central unit by a wired network.

Short description of the drawings

[0022] Fig. 1 represents a delegate unit with a motherboard and an add-on module for operation in wired mode.

[0023] Fig. 2 represents a delegate unit with a motherboard and an add-on module for operation in wireless mode.

[0024] Fig. 3 represents a general view of the conference system according to the present invention.

[0025] Fig. 4 represents a hybrid conference system with wired and wireless delegate units in connection with the central unit.

[0026] Fig. 5 represents a conference system according to the invention, provided with a wireless access point.

Detailed description of the invention

[0027] The conference system according to the present invention allows connecting a delegate unit either by cables or by a wireless connection. The central point in the system remains the central unit, which is given additional functionality such that it is capable of dealing with an infrastructure comprising both wired and wireless delegate units.

[0028] In prior art conference systems the mechanical design is fixed and cannot be adapted easily in order to allow for other functions. In the approach according to the present invention an advantageous design for the delegate units is employed. A delegate unit (1) according to the invention comprises a motherboard (5), a first add-on module (10) for operation as a wired unit and a second add-on module (20) for operation in wireless mode. The mechanical design of the delegate units provides an open place where the two add-on modules can easily be placed and replaced, e.g. by a click system.

[0029] The add-on module (10) (see Fig.1) for operation in wired mode comprises the specific components required for making the delegate unit (1) operable as a wired unit :

- network drivers (12) for transmitting and receiving data on a wired network,
- connectors (14) to connect the unit to the network,
- DC/DC conversion means (16) for converting the incoming voltage to a working voltage,
- interface (30) to the motherboard (5).

[0030] The add-on module (20) (see Fig.2) for opera-

tion in wireless mode comprises the specific components required for making the delegate unit (1) operable as a wireless unit :

- 5 • a RF section comprising
 - o front end (22) comprising a power amplifier, switch, filters, ...
 - o base band CPU (24) for modulation, encoding/decoding, ...
 - o transceiver (26) for transmitting and receiving a RF signal,
 - o antennas (28)
- 10
- 15 • battery management comprising a DC/DC converter, an external DC connector to connect an external wall adapter, an external DC contacts to charge the battery,
- a battery pack,
- 20 • interface (30) to the motherboard (5).

[0031] So, the network/module specific components are placed or connected on one board. This way, two different modules (10,20) are obtained which make it possible to use the delegate unit (1) as a wired or wireless unit. The modules are so designed that the same physical interface (30) can be used for connecting to the motherboard (5). The interface communication protocol used between the motherboard and the add-on module depends on the components placed on the module. Different protocols may be used for different modules. Some possible protocols that can be provided on an add-on module include Ethernet, Cobranet, WLAN, ... depending on whether the module is intended for a wired or wireless module. Optionally there are more than two add-on modules, each operable either in wired mode or in wireless mode and each arranged for operating according to a different (wired or wireless) protocol. Alternatively, an add-on module may comprise specific components for operation in one protocol as well as other specific components for operation according to a second protocol (whereby both protocols are either for wired mode or for wireless mode).

[0032] The motherboard (5) comprises a processing unit for filtering the desired channels from the network stream (i.e. the collection of various audio channels (microphone channels in the uplink), the floor channel in the downlink - Fig.3) or signals received from the central unit, such that the desired audio channels can be listened to via headphone or loudspeaker. The processing unit is also arranged for modifying the uplink network stream or for preparing the uplink antenna signal if the microphone from the delegate unit is activated. The motherboard is capable of detecting which module is attached and can adjust the interface protocol between the motherboard and the add-on module to allow bidirectional communication. In a fully bidirectional bit synchronised wired network for example, the data (audio, control, ...) is placed

in downlink and uplink frames. Each audio channel (floor channel, interpreted channels) has a fixed position in the frame. These frames are transmitted on the wired network with a LVDS link. Therefore on the add-on module an LVDS network driver and receiver is necessary. In addition, the interface between motherboard and add-on module is modified in a way that data communication is possible between the processing unit on the motherboard and network drivers. In this example this can be LVDS (low voltage differential signalling) or TTL logic depending on the network drivers and receivers used. Placing the delegate units in daisy chain makes it possible for each delegate unit to receive the transmitted data from the central unit and, if needed, to add data in the uplink stream. At system start-up the motherboard learns which module has been connected by reading the identifier on the module. This identifier can be implemented in many ways. One possible way consists in simply adding an N-bit digital ID on the module that is read by a processor or FPGA on the motherboard. Another way to implement the identifier is to assign a serial number range to each kind of module, such that a module's serial number falling within a given range identifies the kind of module. A serial number is programmed in the add-on module to allow unique identification of the module. Together with this identifier the motherboard knows the module's hardware and software version. The identifier can be used to select the interface communication protocol.

[0033] In an embodiment of the present invention the identification and interface protocol selection is combined. An FPGA on the motherboard is used together with an EEPROM (Electrically Erasable Programmable Read Only Memory) that programs the FPGA during start-up. If this EEPROM is placed on the add-on module, the identification can be realised by the code inside the EEPROM. The FPGA takes care of the interface protocol and as the FPGA code is loaded from the used add-on module during start-up, the interface protocol is matched to the components used on the add-on module. This technique can be further extended for different network types by placing the network specific components on the module and programming the FPGA with the EEPROM in a way such that at start-up the correct interface protocol is used between motherboard and add-on module.

[0034] The central point in the conference system according to the invention is the central unit (2), which is comprises a processing unit, interconnection means and RF input/output means. Fig.3 illustrates in general a conference system according to the present invention.

[0035] The processing unit in the central unit (2) has the task to mix all incoming microphone channels on a general floor channel. Although the transmitted audio channel from a wireless delegate unit is intercepted by other wireless units, they must ignore this signal. This is done by dividing the transmitted packets from delegate and central unit into several classes. Only the classes intended for the delegate units are further processed. The packet classification is performed by a header identifier in front of the data in each packet.

Next to the mixing, the central unit is also used to receive the interpreter channels from the interpreter units. Furthermore, the processing unit prepares the network stream and RF signal that is put on the wired and wireless network. This network stream contains the general broadcast channel and also the interpreter channels.

[0036] In order to connect the wired delegate units to the central unit, the central unit is equipped with connectors. Through these connectors the units and access points (cfr. infra) can be powered and have access to the network data.

[0037] A RF output connector on the central unit is used to connect an external antenna arranged for broadcasting the general floor channel and interpreter channels. A RF input connector is used to connect an external antenna to intercept the transmitted signals from the delegate units. The RF module for the central unit and the connectors for the wired network can be placed in separated modules or integrated in one module. Separated modules are interconnected by means of the wired network.

[0038] Optionally the conference system further comprises a wireless access point (50) for use as an interface between the wired and wireless network. Fig. 5 shows a configuration of a conference system with a wireless access point (50). If this element is used, the RF input and output connectors on the central unit are disabled. The advantage of using an access point is that the RX and TX antennas can be placed in an optimal position. The central unit can also be placed in another room, e.g. a control room. It suffices to have one cable between the central unit and the wireless access point. Several access points may be used in very large conference rooms. The access point (50) is connected to the central unit by using the wired network. A suitable network connector is provided. The access point further comprises a processing unit for transforming the wired network into the wireless network and vice versa. No other manipulations on the network stream are performed. The media access control is implemented in the processing unit. The front-end of the access point (50) comprises a baseband processor and transceiver+antennas for signal transmission and reception. RF input/output connection means are provided for connecting an external antenna for intercepting transmitted signals from the delegate units and for broadcasting the general floor channel and interpreter channels.

[0039] In a preferred embodiment the conference system comprises a central unit (2) and a plurality of delegate units (1) (e.g. up to 100 or even more). Facilities for simultaneous interpreting are provided. A specified number of channels can be simultaneously mixed on a general floor channel. The mixing is done by the central unit. Each delegate unit has a loudspeaker that can play back the floor channel. The floor channel can also be distributed to external equipment. The microphone channels are further subdivided in president channels and del-

egate channels. These channels share the same physical characteristics, but are treated differently on the application layer. A delegate unit can be assigned to a certain audio channel by the central unit. A delegate unit has the possibility to request access to an audio channel. Therefore a control channel is used. The central unit responds and assigns the delegate a free audio channel.

[0040] The floor channel can be simultaneously interpreted into different languages by interpreter units (80) that are connected to the central unit (2) by wires. Each delegate unit can choose an interpreter channel for his headphone. This means that each delegate unit is able to receive all interpreter channels and to choose the selected channel. Changing the interpreter channel should be possible without interaction with the central unit. Next to the audio channels there are data channels in the uplink and downlink. These data channels must have at least the same data rate as the audio channels. If a delegate wants to send data on the data channel he must request permission from the central unit using the control channel.

[0041] As the system uses a centralised approach, all channel assignments and other settings are controlled by the central unit.

[0042] Although the present description presents the invention as a conference system in a conference room or hall, it is immediately apparent to those skilled in the art that the same conference system can also be applied e.g. in an airplane, a boat, a bus, ...

Claims

1. Delegate unit (1) for use in a conference system, said delegate unit comprising a first module (10) arranged for operating said delegate unit in a wired mode, **characterised in that** the delegate unit comprises a second module (20) arranged for operating said delegate unit in a wireless mode and **in that** it comprises a motherboard (5) provided with a physical interface (30) for connecting with either said first or said second module.
2. Delegate unit as in claim 1, wherein said motherboard (5) comprises detection means for detecting which module is connected.
3. Delegate unit as in claim 2, wherein said detection means comprises a reading means for reading an identifier on said connected module.
4. Delegate unit as in claim 3, wherein said reading means is a processor or a field programmable gate array (FPGA).
5. Delegate unit as in any of the claims 1 to 4, wherein at least one of said modules is provided with an EEPROM.
6. Delegate unit as in any of claims 1 to 5, wherein said motherboard (5) is arranged for modifying the protocol used for connecting said physical interface (30) with either said first or said second module.
7. Delegate unit as in any of the previous claims, wherein said second module (20) comprises a RF section comprising an antenna and a transceiver.
8. Delegate unit as in any of the previous claims, at least one of said modules (10,20) is arranged for operating according to at least two different protocols.
9. Delegate unit as in any of claims 1 to 7, comprising a plurality of modules (10,20), whereby each module is arranged for operating said delegate unit (1) either in said wired mode or in said wireless mode according to a different protocol.
10. Central unit (2) for use in a conference system, said central unit comprising first connection means for establishing a connection with a delegate unit, said delegate unit arranged for use in wired mode, **characterised in that** the central unit comprises second connection means for connecting said delegate unit when said delegate unit is arranged for use in a wireless mode.
11. Central unit (2) as in claim 10, wherein said first and second connection means each are in a separate module.
12. Central unit (2) as in claim 10, wherein said first and second connection means are placed in an integrated module.
13. Central unit (2) as in any of claims 10 to 12, wherein said second connection means comprises an output connector for connecting an external antenna.
14. A conference system (100) comprising a central unit (2) as in any of claims 10 to 13 and at least one delegate unit (1) as in any of claims 1 to 9.
15. Conference system (100) as in claim 14, further comprising at least one interpreter unit (80).
16. Conference system (100) as in claim 15, wherein said central unit (2) is arranged for receiving an interpreter channel signal from said at least one interpreter unit.
17. Conference system as in any of claims 14 to 16, further comprising a wireless access point (50) in connection with said central unit (2).
18. Conference system as in claim 17, whereby, in op-

eration, said second connection means of said central unit (2) is disabled.

19. Conference system as in claim 17 or 18, wherein said wireless access point (50) is connected to said central unit by a wired network.

Patentansprüche

1. Delegierteneinheit (1) zur Verwendung in einem Konferenzsystem, wobei die Delegierteneinheit ein erstes Modul (10) umfasst, welches für den Betrieb der Delegierteneinheit in einem Kabelmodus eingerichtet ist, **dadurch gekennzeichnet, dass** die Delegierteneinheit ein zweites Modul (20) umfasst, welches für den Betrieb der Delegierteneinheit in einem drahtlosen Modus eingerichtet ist, und dass sie eine Hauptplatine (5) umfasst, die mit einer physischen Schnittstelle (30) zum Verbinden mit entweder dem ersten oder dem zweiten Modul ausgestattet ist.
2. Delegierteneinheit nach Anspruch 1, wobei die Hauptplatine (5) Erfassungsmittel umfasst, um zu erfassen, welches Modul verbunden ist.
3. Delegierteneinheit nach Anspruch 2, wobei das Erfassungsmittel ein Lesemittel umfasst, um eine Kennung auf dem verbundenen Modul zu lesen.
4. Delegierteneinheit nach Anspruch 3, wobei es sich bei dem Lesemittel um einen Prozessor oder ein feldprogrammierbares Gate-Array (FPGA) handelt.
5. Delegierteneinheit nach einem der Ansprüche 1 bis 4, wobei mindestens eines der Module mit einem EEPROM ausgestattet ist.
6. Delegierteneinheit nach einem der Ansprüche 1 bis 5, wobei die Hauptplatine (5) dafür eingerichtet ist, das Protokoll zu modifizieren, das verwendet wird, um die physische Schnittstelle (30) entweder mit dem ersten oder mit dem zweiten Modul zu verbinden.
7. Delegierteneinheit nach einem der vorhergehenden Ansprüche, wobei das zweite Modul (20) einen RF-Abschnitt umfasst, welcher eine Antenne und eine Sende-/Empfangseinheit umfasst.
8. Delegierteneinheit nach einem der vorhergehenden Ansprüche, wobei mindestens eines der Module (10, 20) für ein Betreiben nach mindestens zwei verschiedenen Protokollen eingerichtet ist.
9. Delegierteneinheit nach einem der Ansprüche 1 bis 7, welche mehrere Module (10, 20) umfasst, wobei jedes Modul dafür eingerichtet ist, die Delegierten-

einheit (1) gemäß einem unterschiedlichen Protokoll entweder in dem Kabelmodus oder dem drahtlosen Modus zu betreiben.

10. Zentraleinheit (2) zur Verwendung in einem Konferenzsystem, wobei die Zentraleinheit ein erstes Verbindungsmittel zum Aufbau einer Verbindung mit einer Delegierteneinheit umfasst, wobei die Delegierteneinheit für eine Verwendung in einem Kabelmodus eingerichtet ist, **dadurch gekennzeichnet, dass** die Zentraleinheit ein zweites Verbindungsmittel zum Verbinden der Delegierteneinheit, wenn die Delegierteneinheit für eine Verwendung in einem drahtlosen Modus eingerichtet ist, umfasst.
11. Zentraleinheit (2) nach Anspruch 10, wobei sich das erste und zweite Verbindungsmittel jeweils in einem separaten Modul befinden.
12. Zentraleinheit (2) nach Anspruch 10, wobei die ersten und zweiten Verbindungsmittel in einem integrierten Modul angeordnet sind.
13. Zentraleinheit (2) nach einem der Ansprüche 10 bis 12, wobei das zweite Verbindungsmittel einen Ausgangsanschluss zum Verbinden einer externen Antenne umfasst.
14. Konferenzsystem (100), welches eine Zentraleinheit (2) nach einem der Ansprüche 10 bis 13 und mindestens eine Delegierteneinheit (1) nach einem der Ansprüche 1 bis 9 umfasst.
15. Konferenzsystem (100) nach Anspruch 14, welches ferner mindestens eine Dolmetschereinheit (80) umfasst.
16. Konferenzsystem (100) nach Anspruch 15, wobei die Zentraleinheit (2) dafür eingerichtet ist, ein Dolmetscherkanalsignal aus der mindestens einen Dolmetschereinheit zu empfangen.
17. Konferenzsystem nach einem der Ansprüche 14 bis 16, welches ferner einen drahtlosen Zugangspunkt (50) umfasst, der mit der Zentraleinheit (2) in Verbindung steht.
18. Konferenzsystem nach Anspruch 17, wobei im Betrieb das zweite Verbindungsmittel der Zentraleinheit (2) abgeschaltet ist.
19. Konferenzsystem nach Anspruch 17 oder 18, wobei der drahtlose Zugangspunkt (50) über ein Kabelnetz mit der Zentraleinheit verbunden ist.

Revendications

1. Unité délégué (1) pour une utilisation dans un système de conférence, ladite unité délégué comprenant un premier module (10) conçu pour faire fonctionner ladite unité délégué dans un mode filaire, **caractérisée en ce que** l'unité délégué comprend un deuxième module (20) conçu pour faire fonctionner ladite unité délégué dans un mode sans fil et **en ce qu'elle** comprend une carte mère (5) pourvue d'une interface physique (30) pour une connexion soit audit premier, soit audit deuxième module. 5
2. Unité délégué selon la revendication 1, dans laquelle ladite carte mère (5) comprend des moyens de détection pour détecter le module qui est connecté. 10
3. Unité délégué selon la revendication 2, dans laquelle lesdits moyens de détection comprennent des moyens de lecture pour lire un identifiant sur ledit module connecté. 15
4. Unité délégué selon la revendication 3, dans laquelle lesdits moyens de lecture sont un processeur ou un réseau de portes programmable sur site (FPGA). 20
5. Unité délégué selon l'une quelconque des revendications 1 à 4, dans laquelle au moins l'un desdits modules est pourvu d'une mémoire EEPROM. 25
6. Unité délégué selon l'une quelconque des revendications 1 à 5, dans laquelle ladite carte mère (5) est conçue pour modifier le protocole utilisé pour connecter ladite interface physique (30) soit audit premier, soit audit deuxième module. 30
7. Unité délégué selon l'une quelconque des revendications précédentes, dans laquelle ledit deuxième module (20) comprend une section RF comprenant une antenne et un émetteur-récepteur. 35
8. Unité délégué selon l'une quelconque des revendications précédentes, dans laquelle au moins l'un desdits modules (10, 20) est conçu pour fonctionner selon au moins deux protocoles différents. 40
9. Unité délégué selon l'une quelconque des revendications 1 à 7, comprenant une pluralité de modules (10, 20), dans laquelle chaque module est conçu pour faire fonctionner ladite unité délégué (1) soit dans ledit mode filaire, soit dans ledit mode sans fil selon un protocole différent. 45
10. Unité centrale (2) pour une utilisation dans un système de conférence, ladite unité centrale comprenant des premiers moyens de connexion pour établir une connexion avec une unité délégué, ladite unité délégué étant conçue pour une utilisation dans un mode filaire, **caractérisée en ce que** l'unité centrale comprend des deuxièmes moyens de connexion pour connecter ladite unité délégué lorsque ladite unité délégué est conçue pour une utilisation dans un mode sans fil. 50
11. Unité centrale (2) selon la revendication 10, dans laquelle lesdits premiers et deuxièmes moyens de connexion sont chacun dans un module séparé. 55
12. Unité centrale (2) selon la revendication 10, dans laquelle lesdits premiers et deuxièmes moyens de connexion sont placés dans un module intégré.
13. Unité centrale (2) selon l'une quelconque des revendications 10 à 12, dans laquelle lesdits deuxièmes moyens de connexion comprennent un connecteur de sortie pour connecter une antenne externe.
14. Système de conférence (100) comprenant une unité centrale (2) selon l'une quelconque des revendications 10 à 13 et au moins une unité délégué (1) selon l'une quelconque des revendications 1 à 9.
15. Système de conférence (100) selon la revendication 14, comprenant en outre au moins une unité interprète (80).
16. Système de conférence (100) selon la revendication 15, dans lequel ladite unité centrale (2) est agencée pour recevoir un signal du canal interprète de ladite au moins une unité interprète.
17. Système de conférence selon l'une quelconque des revendications 14 à 16, comprenant en outre un point d'accès sans fil (50) connecté à ladite unité centrale (2).
18. Système de conférence selon la revendication 17, dans lequel, en cours de fonctionnement, lesdits deuxièmes moyens de connexion de ladite unité centrale (2) sont désactivés.
19. Système de conférence selon la revendication 17 ou 18, dans lequel ledit point d'accès sans fil (50) est connecté à ladite unité centrale via un réseau filaire.

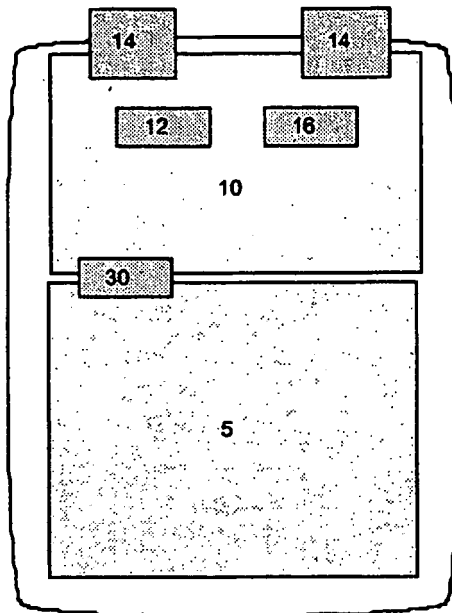


Fig. 1

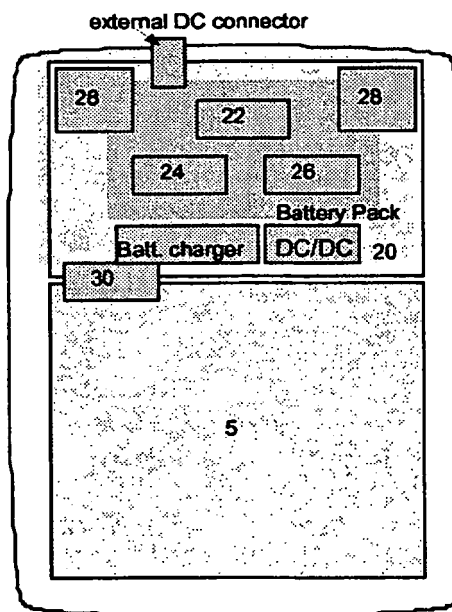


Fig. 2

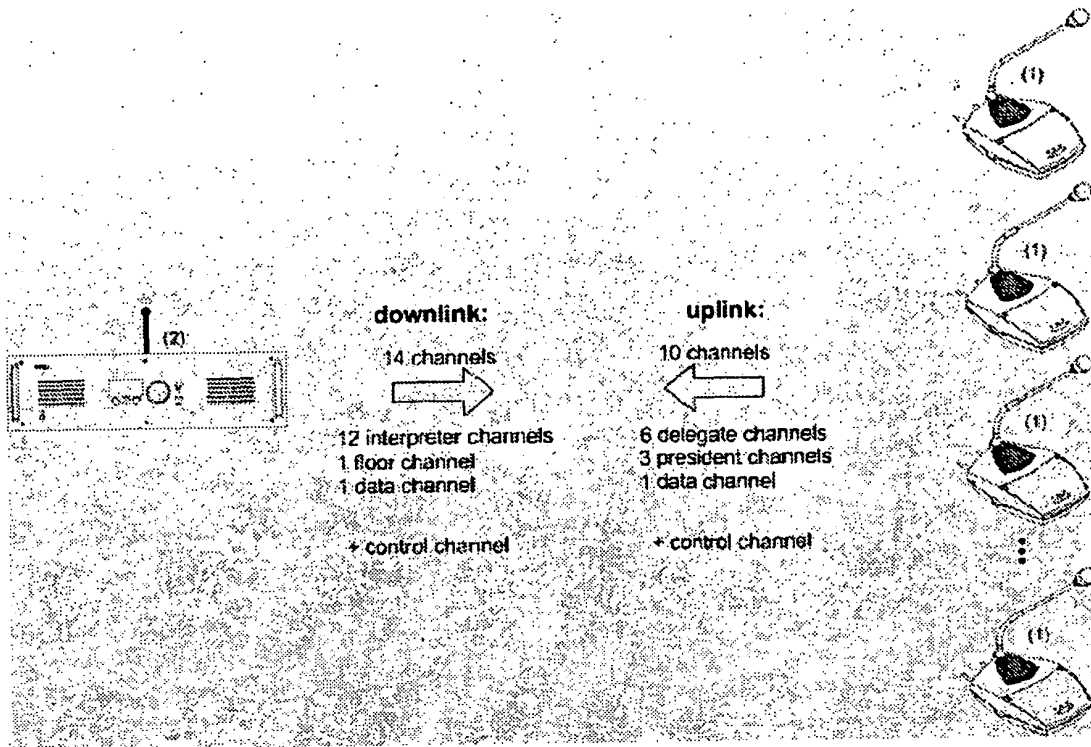


Fig. 3

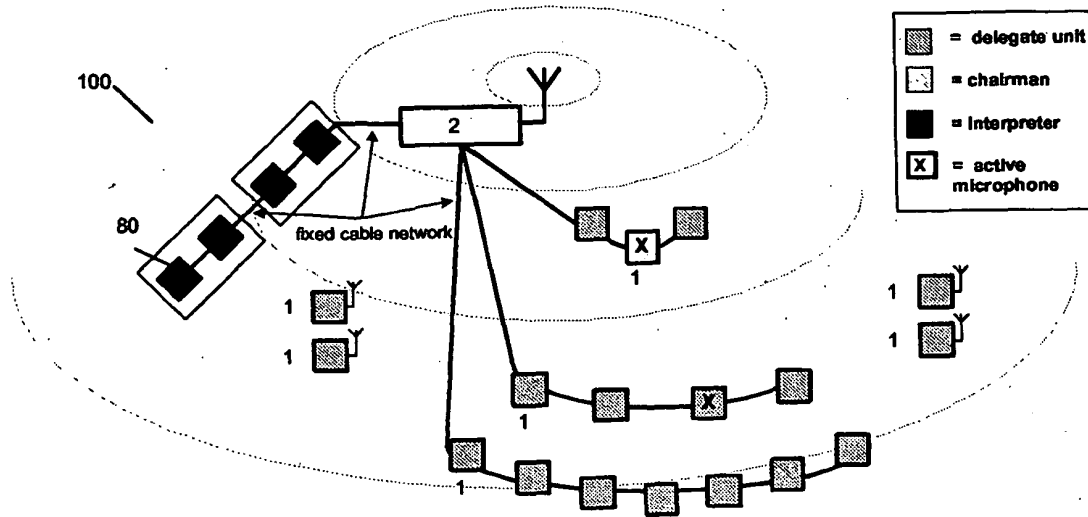
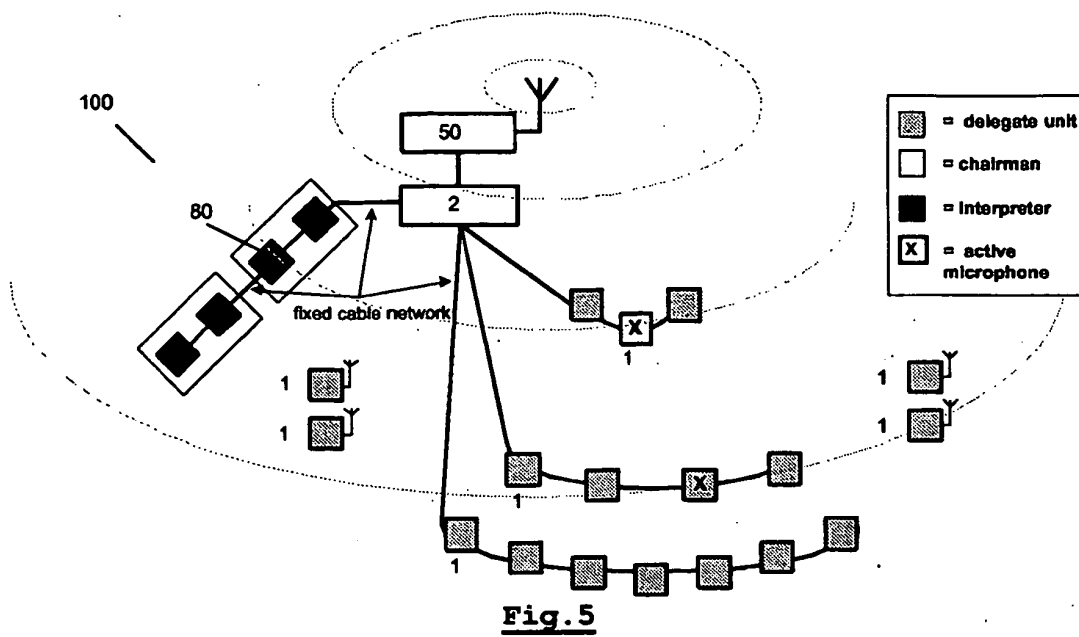


Fig. 4



REFERENCES CITED IN THE DESCRIPTION

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