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ABSTRACT

Facility for Tying a Door Intercommunication System with a Video Camera to an Integrated Services Digital Network

A telephone system with video camera is connected to an integrated services digital network (ISDN) via a facility (EIN). For this purpose, the facility (EIN) comprises, for example, an audio unit (AUD1) for coupling the audio signals of the door intercommunication system to the digital network (ISDN), a video unit (VID1) for coupling the video signals of the video camera to the digital network (ISDN), a control unit (CTRL) for transmitting a request signal for the establishment of a switched connection for transmitting the video and audio signals over the digital network (ISDN) in the event of an operation of the door intercommunication system as well as for receiving control signals and for transmitting the control signals to at least one remotely controllable unit (UNIT) and an ISDN video telephone with programmable call diversion without breaking the switched connection. The occupant of an apartment can identify a visitor to the apartment by means of a video image appearing on his ISDN video telephone and, by means of control signals, operate the door opener without breaking the switched connection and switch over to a second video camera and a second hands-free unit inside the apartment, and in this way monitor the visitor after entering his apartment, or communicate with him via the ISDN video telephone.

(Figure 1)
Invention Title:

"FACILITY FOR INTERFACING VIDEO INTERCOMMUNICATION SYSTEM WITH AN INTEGRATED SERVICES DIGITAL NETWORK"

The following statement is a full description of this invention, including the best method of performing it known to us:-
This invention relates to a facility for tying a door intercommunication system with a video camera to an integrated services digital network.

A method for the automatic establishment of a telephone connection from a door intercommunication system via a telephone set or a telephone system is known from DE 4127316. For this purpose, an activating switch is connected with a name key on the telephone set and with the door bell contact of the door intercommunication system. When a visitor operates the door bell contact a telephone connection is automatically established to the number preprogrammed on the name key of a telephone set connected to the door intercommunication system, for example, to the number of the office in which the occupant of the apartment works during the day. After release of the telephone connection, the door opener is operated by transmitting an audio-frequency signal from the dialled number. Because of the telephone link, communication between the visitor and the occupant of the apartment is limited to oral statements and identification. After the door opener has been operated, the occupant of the apartment has no further means of checking, e.g. whether the door closed after terminating an order or an order was carried out correctly; for example, if the visitor is a postman who has to deliver a parcel to the apartment.

It is therefore an object of the present invention to provide the occupant of an apartment with a technically improved method of telemetric identification of a visitor to his apartment.

According to the invention there is provided a facility for tying a door intercommunication system with a video camera to an integrated services digital network, said facility comprising

- an audio unit for coupling the audio signals of the door intercommunication system to the digital network,
- a video unit for coupling the video signals of the video camera to the digital network, and
- a control unit for transmitting a request signal for the establishment of a switched connection for transmitting the video and audio signals over the digital network in the event of an operation of the door intercommunication system as well as for receiving control signals and for transmitting the control signals to at least one
remotely controllable unit without breaking the switched connection.

A particular advantage of the invention is the generation of a new performance characteristic for video telephones, which promotes the functionality and use of video telephones, as well as their sales.

A further advantage of the invention is that only small changes need to be made to existing equipment, for example to the door intercom system or the video telephone, to implement tying the door intercommunication system with a video camera to an integrated services digital network.

In the following, the invention is described by means of a practical example and the help of Figures 1 and 2. The Figs. show the following:

- Figure 1: a schematic display of the use of a facility for tying a door intercommunication system with a video camera to an integrated services digital network in an apartment according to the invention and
- Figure 2: a schematic display of the set-up of the facility from Figure 1 according to the invention.

The practical example is initially described with the help of Figure 1. Figure 1 shows a facility EIN according to the invention, which is connected to a door intercommunication system with a video camera and an integrated services digital network, the so-called ISDN.

The door intercommunication system comprises a unit 1, which is arranged inside the apartment, a unit 2, which is arranged outside of the apartment and an internal Bus BUS to connect units 1 and 2.

Unit 1 comprises a monitor and a telephone receiver, as well as a control unit and a door bell. The unit 2 comprises a video camera, an intercommunication system as well as a door bell contact and a control unit.

When the visitor operates the door bell contact, a signal is transmitted to the door bell via the internal bus BUS. When the receiver is picked up, the monitor, video camera and intercommunication system are activated via the control units so that the recorded video image of the visitor appears on the monitor inside the apartment and the person holding the receiver can communicate with the visitor.

In addition, the internal bus BUS is connected to the facility EIN for tying the
door intercommunication system with a video camera to the integrated services digital network. When the telephone receiver is not picked up when the door bell contact is operated, e.g. after a period of time preprogrammed in facility EIN, a switched connection, for example, is established via the integrated services digital network, which is activated by a signal generated in the control unit of unit 1 and is transmitted to facility EIN via the internal bus BUS, as well as by means of a directory number previously programmed into facility EIN.

For this purpose, facility EIN is connected with the ISDN via an S₀-Bus S₀ and a network termination NT. An ISDN telephone TEL and a fax FAX are, for example, connected to the S₀-Bus S₀. The network termination NT is suitable, for example, for transmitting two user information channels and one signalling channel. The user information channels are the so called B-channels with 64 kBit/s transmission capacity each. The signalling channel is the so called D-channel with 16 kBit/s transmission capacity. The network termination NT configuration therefore corresponds with the basic connection configuration in the ISDN.

The facility EIN is furthermore connected with a video camera CAM and a control S for a remotely controllable unit UNIT. The remotely controllable unit UNIT is, for example, a door opener, a shutter, a garage door or a video camera.

When the door bell contact of the door intercommunication system has been operated and the telephone receiver is not picked up, the facility EIN establishes a switched connection to a video telephone, whose number has been preprogrammed by the occupant of the apartment; for example to the video telephone in the office in which the occupant of the apartment works during the day. When the receiver of the video telephone is picked up, the control unit of unit 2 activates the video camera and the door intercom. The recorded video image of the visitor is then shown on the monitor of the video telephone in the office of the occupant of the apartment and the person on the video telephone, which is usually the owner of the apartment, can communicate with the visitor. The occupant of the apartment, having identified the visitor by means of the video image, can then operate the door opener via a control signal transmitted in the signalling channel of the ISDN without breaking the switched connection, so that the visitor can enter the apartment if this is so desired. The visitor can be, for example, a child of the occupant of the apartment which does not yet have
its own key and is returning from school while the occupant is still at the office. Or the visitor is a postman delivering a parcel and he has to deposit the parcel in the apartment.

The switched connection remains established to monitor whether the remotely controllable unit UNIT has been activated as desired. For example, the video camera of the door intercommunication system can be remotely controlled, so that the occupant of the apartment can centre the visitor on the video images during the video communication. Furthermore, one can switch from the video camera of the door intercom to the video camera CAM by means of a further control signal transmitted in the signalling channel by facility EIN without breaking the switched connection. The video camera CAM is situated in the apartment, which allows the occupant of the apartment, who is on the video phone in his office, to observe the visitor after he has entered the apartment; for example the postman, to see if he closes the apartment door after depositing the parcel and does not remove any items. The switched connection is terminated when the receiver of the video telephone is put down.

The practical example is now explained further with the help of Figure 2. Fig 2 shows the design of the facility EIN according to the invention from Figure 1, in a schematic display. The facility EIN comprises an audio unit AUD 1 for coupling the audio signals of the door intercommunication system to the ISDN, a video unit VID 1 for coupling the video signals of the video camera of the door intercommunication system to the ISDN and a control unit CTRL for transmitting a request signal for the establishment of a switched connection for transmitting the video and audio signals over the ISDN in the event of an operation of the door intercommunication system. The control unit CTRL also receives control signals and transmits the control signals to at least one remotely controllable unit UNIT without breaking the switched connection.

A coupling of the audio and video signals to the ISDN and the coupling of the audio signals from the ISDN to the internal bus BUS is not possible with a direct connection because of the different protocols and potentials. The audio unit AUD 1 therefore comprises two transformers to separate potential and a converter to convert the protocols. The video unit VID 1 comprises an optocoupler to separate the potential and a converter to convert the protocols. The optocoupler is suitable for transmitting high bit rates and is therefore particularly suitable for transmitting video.
signals, which have a higher bit rate than the audio signals.

The control unit CTRL comprises a memory to store video images and a comparator to compare the stored video images with the video signals of the video camera, as well as an ISDN video telephone or a computer with ISDN-PC adaptor card. For example, video images of persons known to the occupant of the apartment can be stored in the memory. This can be done, for example, when the person concerned operates the door intercom during a programming phase and the video image recorded by the video camera is stored in the memory. The programming phase can be set on the control unit CTRL. For this purpose, the control unit CTRL comprises a microprocessor or a digital signal processor and a keypad, where a programming code can be entered. In this manner, the video images of the occupant’s child, one or more neighbours, or the postman can be stored. If a visitor then operates the door intercom, the current video image of the visitor is compared with the stored video images before a switched connection is established. Depending on the programming conducted by the occupant of the apartment, a request signal to establish a switched connection is only transmitted to the ISDN video telephone or the computer, when, e.g. there is a match between the current video image of the visitor and the stored video image. The ISDN telephone or the computer establish a switched connection to a preprogrammed directory number only when, e.g. the child of the occupant or a neighbour operate the door intercom; a switched connection is not established when a person unknown to the occupant of the apartment operates the door intercom, e.g. a sales person.

Instead of, or in addition to comparing the video image of the visitor with the stored video images, audio signals can be stored and compared. The control unit CTRL comprises a memory for storing audio signals and a comparator for comparing the stored audio signals with the audio signals from the door intercom. A request signal to establish a switched connection is only transmitted to the ISDN telephone or the computer depending on the result of the comparison. If, for example, the child of the occupant operates the door intercom, the child can initiate a switched connection by saying its name, when the name has previously been stored in the memory during a programming phase.

The facility EIN furthermore comprises a second video unit VID2 to be
connected with a second video camera CAM. The second video camera CAM is inside the apartment of the occupant and is used to monitor the internal area of the apartment, in particular the entrance door. The second video camera CAM is activated by the control unit CTRL and via video unit VID2, and is also remotely controllable. If the occupant of the apartment has operated the door opener by a control signal transmitted through the signalling channel, he can switch to the second video camera CAM by a further control signal from the video camera of the door intercom, to check, e.g. if the entrance door has been opened. For this purpose the control unit CTRL comprises a switch to switch from the transmission of the video signals from the first video camera of the door intercom, to the transmission of the video signals of the second video camera CAM without breaking the switched connection. The switch reacts to the second control signal. The switch can also be designed so that it switches back to the first video camera if the second control signal is repeated, so that one can switch repeatedly between the two video cameras. The video unit VID2, like video unit VID1, also comprises an optocoupler and a protocol converter.

The facility EIN further comprises a second audio unit AUD2 for a connection with a second hands-free unit not shown and a switch to switch from the transmission of the audio signals from the hands-free unit of the door intercom to the transmission of the audio signals from the second hands-free unit without breaking the switched connection. The design of the second audio unit AUD2 is comparable with the design of the audio unit AUD1, the design of the switch comparable with the switch for the video cameras. Instead of monitoring the internal area of the apartment by means of the second video camera, or in addition to this monitoring, the occupant, by means of a control signal in the signalling channel which activates the switch, can continue the conversation with the visitor via the second hands-free unit in the apartment. The audio and video signals of the door intercom can also be diverted to the ISDN video telephone by means of control signals from the occupant, so that the visitor, e.g. the child, can communicate with the occupant via the ISDN video telephone after entering the apartment. The control signals must be preprogrammed and stored in the microprocessor or in the digital signal processor. Possible control signals can be the numbers of the ISDN video telephone keypad. A sample allocation can be: No 1
signifies: operate door opener, No. 2 switch over from video camera 1 to 2 and vice versa, No.3 switch from hands-free unit 1 to 2 and vice versa, No. 4 switch from door intercom to the ISDN video telephone.

The control unit CTRL also comprises a programmable memory for the programmed storage of at least one directory number which can be automatically dialled in the event of an operation of the door intercommunication system. The directory number can be entered in the ISDN video telephone as a call diversion. The directory number can be entered at the ISDN video telephone itself or telemetrically via a switched connection and control signals in the signalling channel; for example, No. 5 of the keypad of the used telephone can be used to change over to programming the directory number, which is then entered via the keypad. Programming can then be ended, e.g. by entering the No. sequence 000. To program the directory number of the call diversion, the ISDN video telephone can only be called from telephones with predetermined directory numbers. The desired directory numbers are preprogrammed into a number filter contained in the control unit CTRL for this purpose. By means of switched connections which are established from the preprogrammed directory numbers, the number filter allows video and/or audio signals to be retrieved, control signal to be transmitted to the at least one remotely controllable unit UNIT and/or the directory number of the call diversion to be programmed. The occupant of the apartment can therefore, e.g. for monitoring purposes, without a visitor operating the door intercom, call his own ISDN video telephone and, via the facility EIN, retrieve the video signals from the door intercom or the second video camera and/or the audio signals of the door intercom or the second hands-free unit. He can furthermore operate the remotely controllable units, e.g. the shutter, to simulate his presence while he is absent on holiday.

According to the above statements, both the video and audio signals from facility EIN can be transmitted to an ISDN telephone whose directory number was preprogrammed into facility EIN either as a call diversion and/or in the number filter and the video and audio signals can be received from the facility EIN via a switched connection. The video and audio signals are transmitted in at least one user information channel, preferably in two B-channels of the ISDN. In addition, persons can send control signals from entitled directory numbers to facility EIN in a signalling
channel. The facility EIN can also be programmed by means of the microprocessor, so that the occupant of the apartment, e.g. by pressing one of the numbers 6, 7 or 8 of the keypad of the used and entitled telephone, can store the video recording of the visitor and/or the conversation with the visitor, in a memory of facility EIN; e.g., No. 6 for video, No. 7 for audio and No. 8 for video and audio. Alternatively, or in addition, the microprocessor can be programmed so that in the event of the non-establishment of a switched connection to the programmed directory number, e.g. when the occupant does not pick up because he is not present at the premises of the programmed directory number, the facility EIN records and stores the video and audio signals of the visitor for a preset period of time, e.g. 30 seconds, to allow the occupant to check whether his door intercom was operated during his absence. The occupant can retrieve the stored signals, as he would from a telephone answering machine, e.g. on the ISDN video telephone itself after returning to his apartment, or by remote retrieval via a switched connection and, e.g. No. 9 of the keypad of the used telephone.
The claims defining the invention are as follows:

1. A facility for tying a door intercommunication system with a video camera to an integrated services digital network, said facility comprising
   - an audio unit for coupling the audio signals of the door intercommunication system to the digital network,
   - a video unit for coupling the video signals of the video camera to the digital network, and
   - a control unit for transmitting a request signal for the establishment of a switched connection for transmitting the video and audio signals over the digital network in the event of an operation of the door intercommunication system as well as for receiving control signals and for transmitting the control signals to at least one remotely controllable unit without breaking the switched connection.

2. A facility as claimed in claim 1, wherein the audio unit contains two transformers, and that the video unit contains an optocoupler.

3. A facility as claimed in claim 1, wherein the control unit comprises a memory for storing video images and a comparator for comparing the stored video images with the video signals from the video camera, and that a request signal is only transmittable depending on the result of the comparison.

4. A facility as claimed in claim 1, wherein it comprises a second video unit for connection to a second video camera and a switch for switching from transmission of the video signals from the first video camera to transmission of the video signals from the second video camera without breaking the switched connection.

5. A facility as claimed in claim 1, wherein it comprises a second audio unit for connection to a hands-free unit and a switch for switching from transmission of the audio signals from the door intercommunication system to transmission of the audio signals from the hands-free unit without breaking the switched connection.

6. A facility as claimed in claim 1, wherein the control unit comprises a programmable memory for storing at least one directory number which can be automatically dialled in the event of an operation of the door intercommunication system.

7. A facility as claimed in claim 6, wherein the control unit comprises a number filter which authorizes only predetermined directory numbers to retrieve video and/or
audio signals over a switched connection, to pass control signals on to the at least one remotely controllable unit, and/or to program a number for call forwarding.

8. A facility as claimed in claim 6, wherein over the switched connection, the video and audio signals are transmitted and received in at least one user information channel and the control signals are received in a signalling channel.

9. A facility as claimed in claim 1, wherein the control unit comprises a memory for storing audio signals and a comparator for comparing the stored audio signals with the audio signals from the door intercommunication system, and that a request signal is only transmittable depending on the result of the comparison.

10. A facility as claimed in claim 1, wherein it comprises an ISDN video telephone or a computer with an ISDN-PC adaptor card for establishing the switched connection.

11. A facility as claimed in claim 1, wherein the control unit comprises a memory for storing the video and/or audio signals from the door intercommunication system.

12. A facility substantially as herein described with reference to Figures 1 - 2 of the accompanying drawings.
Fig. 1
Fig. 2