Process for handling a conference call

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Applicant(s)
ALCATEL

Inventor(s)
Hans Jurgen Matt; Gerhard Schneider

Agent/Attorney
FREEHILLS CARTER SMITH and BEADLE, MLC Centre, Martin Place, SYDNEY NSW 2000
Abstract

The invention concerns a process for handling a conference call (1) that arrives at an input channel of an incoming line (9) of a telecommunications (TC) facility (8) having at least one PBX line group (10). In order to be able to handle those conference calls (1) that occupy several input channels of a TC facility (8) for the connection, the invention proposes a process including the following steps:

(a). determination (2) by the TC facility (8) whether the incoming conference call (1) is part of a multichannel telecommunications (TC) connection;

(b). if (a) is true, determination by the TC facility (8) whether another conference call from the same caller is already switched to an output channel of the TC facility (8);

(c). if (a) is true and (b) is false, switching (5) of the conference call (1) to one of several associated free output channels of the TC facility (8) and reserving (6) the remaining associated output channels by the TC facility (8); and

(d). if (b) is true, switching (4) of the incoming conference call (1) to one of the reserved output channels by the TC facility (8).

(Figure 2)
Invention Title: ‘Process for handling a conference call’

The following statement is a full description of this invention, including the best method of performing it known to us:
Process for handling a conference call

Field of the invention

The invention concerns a process for handling a conference call that arrives on an input channel of a telecommunications facility having at least one PBX line group. The invention also concerns a telecommunications facility having at least one PBX line group for handling a conference call that arrives on an input channel of the telecommunications facility.

Background of the invention

Such a process and such a telecommunications (TC) facility are known from the prior art. TC facilities which are able to handle conference calls operate for example as telephone private branch exchanges conforming to the Integrated Services Digital Network (ISDN) standard. An ISDN line of the TC facility operates with three transmission channels, of which two channels (B-channels) are used for the transmission of data and speech, each at a data transfer rate of 64 kbps. The third channel (D-channel), with a data transfer rate of 16 kbps is used to control the communication paths and connection nodes with the aid of signalling data.

The PBX line group of the known TC facility is accessible via a large number of incoming lines, for example a trunk group, under a single so-called collective (or group) number. Such collective numbers are preferably employed for certain recorded announcement services or for emergency call central control units to which large numbers of changing subscribers wish to have access from the public telecommunications (TC) network. Moreover, the known TC facility has, among other things, one or more PBX line groups with a large number of outgoing lines to which a telecommunications (TC) terminal is connected in each case. Each of these TC terminals carries out a task, either automatically (for example train information) or via an operator (for example customer telephone), that is basically the same but in individual cases is different as regards content.

In order to handle conference calls, a call arriving on a B-channel of an incoming line or on an incoming trunk group is connected by the known TC facility to the first free B-channel of an outgoing line of the PBX line group. A telecommunications (TC) connection is made in this manner between the TC terminal of the calling party and the TC
terminal of the called party that is connected to the first free B-channel of the outgoing line. This known process for handling conference calls operates without problems for TC connections that occupy merely one channel for the TC connection, for example for conventional speech or fax TC connections.

However, there are also TC connections (for example in the case of ISDN) that occupy two input channels (2 B-channels) of an incoming line of the TC facility and switch through on two associated output channels of a line. The two input channels are combined in the called party's terminal into a TC connection with double the data signalling rate. Such TC connections are for example video TC connections. The setting-up of a video TC connection between two terminals is described in US 5,539,811. In order to set up the video TC connection, two calls are usually switched in quick succession from the calling party's terminal to two B-channels. A single call on one of the B-channels is merely a part of the video TC connection. The called party's terminal detects whether and how the B-channels are assigned to each other and that a video TC connection is to be set up via two mutually assigned B-channels. These two B-channels are then combined into one video TC connection with double the data signalling rate. However, the process disclosed in US 5,539,811 is not suitable for the handling of conference calls.

On the other hand, no video conference calls can be handled with the known process of the type stated at the beginning. The two video calls which arrive one after the other on two B-channels of an incoming line, are connected in each case by the known TC facility to the first free B-channel of a first free outgoing line. This can mean that two B-channels of a video call are connected to two different output channels of the TC facility, in particular are connected to the PBX line group of the TC facility, and the video call is thus routed to two different TC terminals of the called party. A proper video TC connection cannot therefore be achieved via a PBX line group of the TC facility.

Summary of the invention

An object of this invention is to create and develop a process of the type stated at the beginning, to the effect that even those conference calls that occupy several input channels of one or more incoming lines of a TC facility for one TC connection, can be handled.
According to a first aspect of the present invention there is provided a process for handling a conference call that arrives at an input channel of an incoming line of a telecommunications (TC) facility having at least one PBX line group, comprising the following steps:

(a). determination by the TC facility whether the incoming conference call is part of a telecommunications (TC) connection that occupies several input channels of the TC facility;

(b). if (a) is true, determination by the TC facility whether another conference call from the same caller is already switched to an output channel of the TC facility;

(c). if (a) is true and (b) is false, switching by the TC facility of the conference call to one of several associated free output channels of the TC facility and reserving the remaining associated output channels; and

(d). if (b) is true, switching by the TC facility of the incoming conference call to one of the reserved output channels.

In an embodiment of the invention the TC facility has one or more incoming lines, each having one or more input channels. Incoming lines configured as so-called S2M lines have a data transfer rate of 2048 Mbps, for example, and have 15 ISDN trunk lines with a total of 30 input channels per line. At the outgoing side the TC facility has one or more PBX line groups. Each of the PBX line groups has one or more outgoing lines, each having one or more output channels. Outgoing lines configured as so-called S0 lines have, for example, two output channels (two B-channels of an ISDN connection) per line. Outgoing lines of the PBX line groups are conceivable where in each case several S0 lines are combined into group lines, each having several S0 lines. The TC facility can also have one or more conventional individual lines for one telephone channel in each case.

With the process according to this embodiment of the invention, the TC facility recognises whether an incoming call is a conference call or an individual call. Depending on the type of incoming call, the TC facility forwards a conference call to one of the PBX line groups for group channels or forwards an individual call to one of the individual lines.

The TC facility first checks each incoming conference call to see whether the conference call is part of a TC connection which occupies several input channels of one or more incoming lines of the TC facility. If this is not the case, that is to say if the conference call occupies only
one input channel, this is therefore a conventional speech or fax conference call and the incoming call requires no special handling. Such a conference call can be handled in the conventional manner, as is known from the prior art.

If, however, the incoming conference call is part of a multichannel TC connection, that is to say it involves a video conference call, for example, before the incoming conference call is switched to a free output channel of a free outgoing line, a check is made to see whether a conference call from the same caller is switched to another output channel of an outgoing line of the TC facility.

If no other conference call from the same caller is switched to another output channel of the TC facility, the incoming conference call is switched to one of several associated free output channels. The associated output channels can be part of one or more outgoing lines. The associated output channels of several outgoing lines are preferably combined into one group line for \( n \times 2\)B-channels. Thus, with six associated B-channels of an ISDN TC facility, for example, three SO lines form one group line with multichannel capability.

The remainder of the associated output channels are reserved for further incoming conference calls of the multichannel TC facility, which are expected later. If all conference calls of the multichannel TC facility are switched to one of the associated output channels, the individual conference calls can be combined into one TC connection having a data transfer rate that is many times higher than single-channel TC connections.

The reserved output channels are identified so that the corresponding further conference calls of the multichannel TC connection, which arrive on further input channels of the TC facility, can be assigned to this output channel and switched to the latter. This ensures that several associated conference calls which together form a multichannel TC connection, for example a video TC connection, are also switched to several associated output channels at the PBX line group, so they can then be combined into a multichannel TC connection with the desired higher data transfer rate.

If another conference call from the same caller is switched to another output channel of the TC facility, the incoming conference call is switched to one of the reserved output channels belonging to this other output channel. As explained above, the reserved output channels were
suitably identified so that the incoming conference call can be easily assigned to the reserved output channels and switched to the latter.

With the process according to an embodiment of the invention, conference calls that occupy several input channels of the TC facility, which can then be combined into one TC connection having a higher data transfer rate, can now also be properly handled for the first time. As a result, in the context of conference calls, multichannel TC connections can also be established for the first time. This is of particular significance, especially for new video-based communications services such as video information and video emergency call services; but also for other data services that have a requirement for a higher data rate n x 2B.

The process according to the invention also then functions without problems if the setting-up of multichannel TC connections of various callers overlaps. If, for example, the setting-up of two-channel TC connections of two callers overlaps, the first conference call of the first caller is switched to one of two associated output channels of a first outgoing line. The following first conference call of the second caller is switched to one of two associated output channels of a second outgoing line. The following second conference call of the first caller is switched to the other reserved output channel of the first line. The following second conference call of the second caller is finally switched to the other reserved output channel of the second line. Two-channel video TC connections can be set up in this way, on the one hand between the terminal of the first caller and a first terminal of the called party, that is connected to the first line, and on the other hand between the terminal of the second caller and a second terminal of the called party, that is connected to the second line.

TC facilities are also conceivable, where in each case several conference calls are combined into PBX line groups. Each PBX line group has a certain number of channels. A special directory number is assigned to each PBX line group. In order to establish a TC connection via a specific number of channels, the caller dials the directory number of the appropriate PBX line group. With this embodiment, the determination by the TC facility as to whether the incoming conference call is part of a TC connection which occupies several input channels of the TC facility, is thus limited to the recognition of the dialled number.

According to an advantageous development of the invention, it is proposed that in step (c) the directory number of the call be assigned to the reserved output channels and that in step (b) it is determined whether the directory number of the caller is identical to the directory
number that is assigned to the reserved output channels. The TC facility receives the directory number of the caller during a call, preferably automatically via a corresponding control channel, for example the D-channel in the case of ISDN. Via the directory number of the caller, that is assigned to the reserved output channel, a subsequent conference call can then be assigned to one of the reserved output channels and switched to the latter.

A further object of this invention is to create and develop a TC facility of the type stated at the beginning so that it can handle those conference calls that occupy several input channels of one or more incoming lines of the TC facility for one TC connection.

According to a second aspect of the present invention there is provided a telecommunications (TC) facility having at least one PBX line group for handling a conference call, that arrives at an input channel of an incoming line of the TC facility, wherein the TC facility has:

(a). Means for determining whether the incoming conference call is part of a telecommunications (TC) connection that occupies several input channels of the TC facility;

(b). Means for determining whether another conference call from the same caller is switched to an output channel of the TC facility if (a). is true;

(c). Means for switching the conference call to one of several associated free output channels of the TC facility and reserving the remaining associated output channels if (a). is true and (b) is false;

(d). Means for switching the incoming conference call to one of the reserved output channels if (b). is true.

In order to assign several associated output channels of one or more outgoing lines of the TC facility to several conference calls arriving in succession in the TC facility, which together produce a multichannel TC connection, the output channels reserved by the TC facility have to be suitably identified. To do this, according to a preferred embodiment, the TC facility has means for assigning the directory number of the caller to the reserved output channels and means for determining whether the directory number of the caller is the same as a directory number that is assigned to one of the reserved output channels.
According to an advantageous development of this invention it is proposed that the TC facility operates in accordance with the Integrated Services Digital Network (ISDN) standard. An incoming conference call of a two-channel TC connection arrives, for example, on one of 30 B-channels of an incoming S2M line of the TC facility. The conference call is then switched to one of two associated B-channels of an outgoing S0 line. An incoming conference call of a six-channel TC connection arrives, for example, on one of 30 B-channels of an incoming S2M line of the TC facility. The conference call is then switched to one of six associated B-channels of an outgoing group line comprised of three S0 lines.

Advantageously, the outgoing lines of the PBX line group of TC facility are configured as S0 lines, each of which has two associated output channels. Several S0 lines can be combined into one outgoing group line.

Advantageously, the incoming conference call that is part of the TC connection which occupies several input channels of the TC facility is in the form of a video conference call; but it can also be a data service with a higher data transfer rate of n x 2B.

**Brief description of the drawings**

A preferred exemplary embodiment of this invention is explained below with the aid of the drawings, of which:

Fig. 1 shows a telecommunications (TC) facility according to the invention as in a preferred embodiment; and

Fig. 2 shows a flowchart of the process according to the invention as in a preferred embodiment.

**Detailed description of the embodiments**

In Fig. 1 a telecommunications (TC) facility according to the invention is identified as a whole by the reference number 8. The TC facility 8 operates in accordance with the Integrated Services Digital Network (ISDN) standard. It has several incoming lines 9, each with several input channels. The incoming lines 9 are configured as S2M lines which have a data transfer rate of 2048 Mbps and 15 ISDN trunk lines with a total of 30 input channels per line 9. At the outgoing side the TC facility 8 has at least one PBX line group 10. The PBX line group 10 has several outgoing lines 11, each with several output channels. The outgoing lines 11 are configured as so-called S0 lines which have two output channels (two B-channels of an ISDN
A process according to the invention as in a preferred embodiment is illustrated in Fig. 2. The process is employed to handle a conference call that arrives at the TC facility 8. Conference calls that are part of a multichannel TC connection can be handled for the first time with the aid of the process according to the invention. The TC facility 8 recognises whether an incoming call is a conference call or an individual call if both types are carried in one PBX line group. Depending on the type of the incoming call, the TC facility 8 forwards a conference call to the PBX line group 10 and forwards an individual call to one of the single lines 12. The process according to the invention is explained with the aid of Fig. 2 as an example of the handling of conference calls which are part of a TC connection, which occupy two input channels (for example a video TC connection).

The process therefore starts at step 1 where the conference call arrives on one input channel of an incoming line 9 of the TC facility 8 and is routed to the PBX line group 10.

In a following step 2 it is determined whether the incoming conference call 1 is part of a telecommunications (TC) connection that occupies two input channels of the TC facility 8. For a two-channel TC connection via the ISDN, two calls are set up in quick succession and then combined into the two-channel TC connection. If a conference call arrives on one input channel of the TC facility 8, the TC facility 8 recognises whether or not this is one of two conference calls 1 of a two-channel TC connection.

If the incoming conference call 1 is not a conference call 1 of the two-channel TC connection, that is to say it is a conventional speech TC connection or fax TC connection, for example, the incoming conference call 1 is handled in the conventional manner, as known from the prior art. The process then returns to step 1 and is ready to handle a new conference call 1.

If, on the other hand, the incoming conference call 1 is part of the two-channel TC connection, the process branches to a following step 3. Here, in general terms, it is determined whether another conference call from the same caller is already switched to an output channel of an outgoing line 11 of the PBX line group 10 of the TC facility 8. More specifically, it is
determined in step 3 whether the directory number of the caller is identical to the directory number that was assigned to a reserved output channel (see step 7). One of two associated output channels that has been reserved in step 6 in a preceding process run is designated as a reserved output channel. In the case of the ISDN, two associated B-channels each form an outgoing line 11.

If the directory number of the caller is not the same as a directory number that is assigned to a reserved output channel, that is to say if the incoming call is the first of the two conference calls 1 of the two-channel TC connection, the process branches to steps 5 to 7. In step 5 the incoming conference call 1 is switched to one of two associated free output channels of the TC facility 8. In step 6 the other of the two associated output channels is reserved for a second incoming conference call that is expected later. In step 7 the directory number of the caller is assigned to the reserved output channel. The second conference call 1 arriving later can be assigned without problems to the reserved output channel via the assigned directory number.

If, on the other hand, the incoming conference call 1 is the second conference call 1 of the two-channel TC connection, the directory number of the caller of the incoming conference call 1 is the same as the directory number that is assigned to a reserved output channel. If this is the case, in step 4 the incoming conference call 1 is switched to the output channel reserved in step 6, to which the directory number of the call is assigned. This ensures that the two conference calls 1 of the two-channel TC connection are switched to two associated output channels of an outgoing line 11 of the PBX line group 10.

With the process according to the invention, video conference calls and other conference calls that occupy several input channels of the TC facility 8, which can then be combined into one TC connection having a higher data transfer rate, can now also be properly handled for the first time. As a result, multichannel TC connections can now also be established for the first time between the terminal of a calling party and a terminal connected to an outgoing line 11 of a PBX line group 10 of a TC facility 8.

It will be understood that the invention disclosed and defined herein extends to all alternative combinations of two or more of the individual features mentioned or evident from the text or drawings. All of these different combinations constitute various alternative aspects of the invention.
The foregoing describes embodiments of the present invention and modifications, obvious to those skilled in the art can be made thereto, without departing from the scope of the present invention.
Claims

1. Process for handling a conference call that arrives at an input channel of an incoming line of a telecommunications (TC) facility having at least one PBX line group, comprising the following steps:

(a) determination by the TC facility whether the incoming conference call is part of a telecommunications (TC) connection that occupies several input channels of the TC facility;

(b) if (a) is true, determination by the TC facility whether another conference call from the same caller is already switched to an output channel of the TC facility;

(c) if (a) is true and (b) is false, switching by the TC facility of the conference call to one of several associated free output channels of the TC facility and reserving the remaining associated output channels; and

(d) if (b) is true, switching by the TC facility of the incoming conference call to one of the reserved output channels.

2. Process according to Claim 1, wherein in step (c) the directory number of the caller is assigned to the reserved output channels, and that it is determined in step (b) whether the directory number of the caller is the same as the directory number that is assigned to one of the reserved output channels.

3. Telecommunications (TC) facility having at least one PBX line group for handling a conference call, that arrives at an input channel of an incoming line of the TC facility, wherein the TC facility has:

(a) Means for determining whether the incoming conference call is part of a telecommunications (TC) connection that occupies several input channels of the TC facility;

(b) Means for determining whether another conference call from the same caller is switched to an output channel of the TC facility if (a) is true;

(c) Means for switching the conference call to one of several associated free output channels of the TC facility and reserving the remaining associated output channels if (a) is true and (b) is false;

(d) Means for switching the incoming conference call to one of the reserved output channels if (b) is true.
4. TC facility according to Claim 3, wherein the TC facility has means for assigning
the directory number of the caller to the reserved output channels and means for determining
whether the directory number of the caller is the same as the directory number that is assigned
to one of the reserved output channels.

5. TC facility according to Claim 3 or 4, wherein the TC facility operates according to
the Integrated Services Digital Network (ISDN) standard.

6. TC facility according to Claim 5, wherein the outgoing lines of the PBX line group
of the TC facility are configured as SO lines, each having two associated output channels.

7. TC facility according to one any one of Claims 3 to 6, wherein the incoming
conference call, which is part of a telecommunications (TC) connection that occupies several
input channels of the TC facility, is configured as a video conference call.

8. A process for handling a conference call substantially as hereinbefore described with
reference to the accompanying drawings.

9. A telecommunications facility substantially as hereinbefore described with reference
to the accompanying drawings.

Dated this 16th day of February 2000

ALCATEL
by its attorneys

Freehills Patent Attorneys
Fig. 2