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(11) **EP 0 772 941 B9**

(12) **CORRECTED EUROPEAN PATENT SPECIFICATION**

Note: Bibliography reflects the latest situation

- (15) Correction information:  
**Corrected version no 1 (W1 B1)**  
**Corrections, see page(s) 2, 3, 12**
- (48) Corrigendum issued on:  
**03.09.2003 Bulletin 2003/36**
- (45) Date of publication and mention  
of the grant of the patent:  
**05.02.2003 Bulletin 2003/06**
- (21) Application number: **95924457.5**
- (22) Date of filing: **12.07.1995**
- (51) Int Cl.7: **H04Q 3/00, H04Q 3/62**
- (86) International application number:  
**PCT/GB95/01639**
- (87) International publication number:  
**WO 96/004754 (15.02.1996 Gazette 1996/08)**

(54) **COMMUNICATION APPARATUS AND METHOD**

EINRICHTUNG UND VERFAHREN ZUR KOMMUNIKATION  
APPAREIL ET PROCEDE DE COMMUNICATION

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| <p>(84) Designated Contracting States:<br/><b>BE CH DE DK ES FR GB IT LI NL PT SE</b></p> <p>(30) Priority: <b>29.07.1994 EP 94305662</b></p> <p>(43) Date of publication of application:<br/><b>14.05.1997 Bulletin 1997/20</b></p> <p>(73) Proprietor: <b>BRITISH TELECOMMUNICATIONS<br/>public limited company<br/>London EC1A 7AJ (GB)</b></p> <p>(72) Inventors:<br/>• <b>SLATER, Martin<br/>Martlesham Heath Ipswich Suffolk IP5 7UH (GB)</b></p> | <p>• <b>CROOK, Gary<br/>Mistley Manningtree Essex CO11 1LZ (GB)</b></p> <p>(74) Representative: <b>Nash, Roger William et al<br/>BT Group Legal Services,<br/>Intellectual Property Department,<br/>Holborn Centre, 8th Floor,<br/>120 Holborn<br/>London EC1N 2TE (GB)</b></p> <p>(56) References cited:<br/><b>EP-A- 0 398 183                      WO-A-93/15583</b><br/><b>FR-A- 2 695 782</b></p> |
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**EP 0 772 941 B9**

## Description

**[0001]** This invention relates to communication apparatus and to a method of operating such apparatus. It is particularly applicable to the provision of call services over communication networks.

### Background of the Invention

**[0002]** In today's commerce, companies and organisations often have departments at widely separated geographical locations. Each geographical location is usually provided with a private branch exchange, PBX. The PBX connects telephones at that site to a number of outgoing lines connected to a public network or private circuit routes. The private circuit routes allow employees of the company to communicate with employees at other sites and to use call services as desired.

It has been found desirable for personnel in the different departments to have available to them a range of call services on their telephone networks. These services may include "call-back-when-free", "call-back-when-next-used", "divert-on-busy" and "centralised-operator".

**[0003]** The call service "call-back-when-free" is a service which caters for the situation where a first telephone user wished to contact a second telephone user but is unable to do so because the second telephone user is engaged on another call. The first telephone user dials a code number for the "call-back-when-free" call service and replaces his handset. This causes his telephone to ring when the second telephone user finishes his present call and replaces his handset. By lifting his handset, the first telephone user can then cause the second user's telephone to ring and the call can then be made.

**[0004]** The call service "call-back-when-next-used" is a call service which caters for the situation where the first telephone user attempts to contact the second user but although a ringing tone is heard the second user does not answer the telephone.

**[0005]** The first user then enters a code for this service and replaces his handset. This causes a "registration" of the request for call-back-when-next-used at the PBX serving the second user's telephone. The PBX monitors the second user's telephone for activity. When a call is made by the second user and then cleared from his telephone, the PBX notifies the PBX serving the first user's telephone. The PBX serving the first user's telephone then sets up a "no-ring" call which establishes a speech path between the two telephones. Only the first person's telephone is made to ring. When the first user answers his telephone, the second user's telephone is made to ring and the call is established.

**[0006]** The call service "divert-on-busy" caters for the situation where the first telephone user wishes to contact the second telephone user but that user is engaged. The second telephone user may have programmed his

telephone system to divert calls to a colleague's extension when he is engaged on a call.

**[0007]** The call service "centralised-operator" allows one telephone extension of a local telephone network to act as the operator on behalf of other extensions of the entire private telephone network.

**[0008]** Figure 1 shows a conventional communications network topology in which the network comprises four private branch exchanges 1 to 4, a public switched telephony network 5 and communication paths 6 to 12.

**[0009]** The private branch exchanges (PBX) 1 to 4 serve local telephone networks at various sites of the same company. It will be readily appreciated from the figure that there are a number of possible routes for calls routed from one local telephone network to another along communication paths 6 to 12.

**[0010]** For example, suppose a call originating from a local telephone network served by PBX2 is to be routed to a local telephone network served by PBX3. It may be routed via communication path 8, the public switched network 5 and communication path 10 to arrive at PBX3. Alternatively, the call may be routed via communication path 9 to arrive at PBX3. This route is called a private circuit because it does not involve the call being carried over the public switched network 5.

**[0011]** In a similar manner, calls may be routed from PBX4 to PBX2 by means of communication path 11, the public switched network 5, and communication path 8. Alternatively, a private circuit may be used, comprising communication path 12, PBX3 and communication path 9, to arrive at PBX2.

**[0012]** Current PBX designs accept calls from an associated network of telephones at that site governed by a first communication protocol and pass that call to the public network by means of a second protocol. An example of the first protocol is digital, private network signalling system (DPNSS) and an example of the second is digital access signalling system No2 (DASS2). DPNSS is a protocol which has been designed to support call services but the DASS 2 protocol does not support call services.

**[0013]** Private circuit routes allow the PBX's to communicate using the first protocol DPNSS and hence allow supplementary services. For geographically distant sites, it is usual for the organisation to rent a dedicated communication path from a telephone service provider. In this case the dedicated communication path is path 9. However, generally speaking, these paths are often underutilised and this is especially the case for primary rate 2.048 Mbit/s paths. This results in the company or organisation having to pay for dedicated communication paths which can carry a greater volume of call traffic than the company generates.

**[0014]** International Patent Application WO93/15583 discloses a communications network arrangement comprising a first communications network ("public network") which operates in accordance with a first signalling protocol, and a plurality of further communications

networks ("PABXs") which are connected to the first communications network and which belong to the same virtual private network. The further communications networks operate in accordance with a second signalling protocol (which may be different for different ones of the further communications networks) which supports a call service which is not supported by the first protocol. Each PABX is provided with an "interworking unit" which sits alongside the PABX providing the virtual network to the PABX. All private network calls route through the interworking unit which uses a database to translate the incoming private network number to a public network number and establishes an outgoing call to that public network address across another private interface. This is routed back through the PABX so that the public network interfaces that are required on the PABX can be used. The address provided on the secondary call identifies the call, but need not route the call to the final extension across the public network. The signalling necessary to establish the final part of the call on the other side of the network is sent through an overlay network, for example an X.25 network. Calls are established within the X.25 network as required to support the private network. Thus dedicated private circuit functionality is provided using separate signalling and transmission network bearers. **[deletion(s)]**

Summary of the Invention

**[0015]** According to a first aspect of the invention there is provided communication apparatus for transmitting calls generated by a first communication network over a second communication network to a third communication network, the first communication network operating in accordance with a first communication protocol which enables call services, the third communication network operating in accordance with a communication protocol which enables at least one of the call services enabled by the first communication protocol and the second communication network operating according to a second communication protocol different to the first, which apparatus comprises:

means to produce a call compatible with the second communication protocol;

means to transmit the call over the second communication network to the third communication network;

said apparatus being characterised by:

means to produce a data message compatible with the second communication protocol, said data message being indicative of the required service; and

means to transmit the data message over the

second communication network to the third communication network.

**[0016]** The invention thus enables the establishment of call services across a communication network that need not itself operate according to a communication protocol that provides call services. All that is required is that the protocol allows the transmission of data representing the service required which can then be read by an element of the destination network. Thus, it is not necessary for a dedicated communications network to be provided between two geographically remote sites of the same organisation. A public switched network, for example, can be used to carry call service information in a transparent way. This is less expensive to the user than using private circuits. In accordance with the invention only one protocol is required to carry the call and information required to set up a call service.

**[0017]** Preferably, the apparatus further comprises means to receive data messages from the second communication network and means to read the data messages to determine the required data service and to transmit a message to the first communication network according to the first protocol that enables the required service to be established.

**[0018]** The communication protocols may include DPNSS for the network protocol enabling call services and DASS2 for the protocol operating on the second network.

**[0019]** According to a second aspect of the present invention there is provided a communications network comprising:

two or more local networks operating in accordance with the same or different protocols enabling call services;

a third network connected between said two or more local networks to allow routing of calls between said two or more local networks, and operating in accordance with a second protocol different to said protocol(s) enabling call services;

means to route associated with each local network for routing calls originating on its associated local network over the third network to a means to route associated with another one of said local networks;

said communication network being characterised by:

each means to route including:

means to transmit over the third network a data message compatible with the second protocol and containing data indicative of the required service; and

means to read such data messages to determine the required call service and to produce a data message on the associated local network according to the first protocol to establish the required call service.

**[0020]** Preferably, the first protocol is DPNSS and the second DASS1 or DASS2 with the message being transmitted over the network as a user-to-user message enabled by DASS1 or DASS2.

**[0021]** According to a third aspect of the invention there is provided a method of operating communication apparatus in a communications network, said communications network comprising a first communication network operating in accordance with a first communication protocol which enables call services and a second communication network operating according to a second communication protocol different to the first, said method comprising the steps of:

receiving a call configured according to said first communications protocol, which call requires a call service;

generating a call compatible with said second communications protocol;

transmitting said generated call over said second communications network;

said method being characterised by:

configuring one or more data messages including data representative of the call service, said data messages being compatible with said second communications protocol; and

transmitting the or each data message over said second communications network.

#### Description of the Drawings

**[0022]** A specific embodiment of the invention will now be described, by way of example only, with reference to the drawings in which,

Figure 1 shows in schematic form a prior art communications network of a number of private branch exchanges interlinked by dedicated lines and a public switched network;

Figure 2 shows in schematic form a communications network in accordance with the invention;

Figure 3 shows a Virtual Private Network Server which is included in the network of Fig. 2;

Figure 4 shows a memory structure stored in a

memory of the VPN server shown in figure 3;

Figure 5 shows a User to User Data Message (UUD) compatible with a protocol used in the communications network shown in figure 2; and

Figure 6 and 7 are explanatory diagrams.

#### Detailed Description

**[0023]** With reference to figure 2, a communication network 21 in accordance with the invention comprises a public switched telephony network 22, four PBXs 23, 24, 25 and 26 each PBX serving an associated local network (not shown) and three virtual private network servers VPN server 27, VPN server 28 and VPN server 29.

**[0024]** The communication network 21 also includes a number of communication paths. Communication path 30 links PBX25 to the VPN server 27 whilst communication path 31 links the VPN server 27 to the PSTN 22. Similarly, communication path 32 links PBX26 to VPN server 28 and communication path 33 links VPN server 28 to the PSTN 22. It will be seen from figure 2 that VPN server 29 is linked to two PBXs. Communication path 34 links the VPN server 29 to PBX 23 whilst communication path 35 links the VPN server 29 to PBX 24. A further communication path 36 links VPN server 29 to PSTN 22.

**[0025]** Each of the local networks includes equipment of a well known type such as telephones, facsimile machines, computers and computer modems and these will not be described in greater detail.

**[0026]** The communication paths comprise optical fibre but may comprise other communication cable.

**[0027]** The PBXs are Meridian 1 private branch exchanges, made by Northern Telecom, and available from British Telecommunications plc of 81 Newgate Street, London.

**[0028]** Each VPN server 27, 28, 29 is an intelligent switching unit capable of signalling protocol conversion and signalling protocol manipulation in a way which will be later described. The VPN servers 27 and 28 are nominally identical, the structure is as shown schematically in figure 3 and it comprises four major components, a processor 40, a call transceiver 41, a memory 42, and a processor instruction means 45.

**[0029]** For VPN server 28, the call transceiver 41 receives calls on communication path 32 originating from PBX 26 and on path 33 calls arriving by way of the PSTN 22. Calls are also redirected by the call transceiver 41 onto these paths under the control of the processor 40. Similarly, for VPN server 27 calls are received by its transceiver 41 on paths 30, 31 and calls can also be redirected onto these paths.

**[0030]** VPN server 29 differs from VPN servers 27,28 only in the connection of a further communication path, that is to say, communication paths 34, 35 and 36 are connected to its call transceiver 41.

**[0031]** The call transceiver 41 is connected to a processor 40 by a control and data bus 44. The processor 40 is able to interpret call information received by the call transceiver 41 and to instruct the call transceiver 41 to retransmit the call onto an appropriate one of the paths. The call information is passed by the call transceiver 41 along the control and databus 44 to the processor 40. The same control and databus 44 carries the instructions from the processor 40 to call transceiver 41.

**[0032]** The memory 42 stores a database of routing data and corresponding dialled digit strings arranged as a set of look-up tables. The processor 40 can access the data stored in the look-up table by means of databus 43 in a way that will be later described. The processor instruction means 45 is a data storage area which stores the instructions which the processor 40 follows to perform the required operations. It takes the form of a ROM (read only memory), but it could take the form of a floppy disk, hard disk or other data storage device.

**[0033]** Figure 4 shows a table 46 which is held in the memory 42 of each VPN server 27, 28 and 29. The table 46 comprises a first field 46a within which is stored lead digits of digit strings that may be dialled by a telephone user. The lead digits include "9", "22", "33", "34" and "44".

**[0034]** A second field 46b contains full bearer call numbers to be associated with the dialled lead digits. Lead digit "9" is associated with null bearer call number. Lead digits "22" are associated with bearer call number "0642-224694". Lead digits "33" are associated with a bearer call number "0798-332040". Lead digits "34" are associated with a bearer call "0798-332041". Lead digits "44" are associated with a bearer call "0402-440103".

**[0035]** Table 46 is configured as a look-up table such that inputting a lead digit or digits returns a bearer call number. Thus, if the lead digits "33" are input into the table 46 the bearer call number "0798-332040" is returned.

**[0036]** As can be seen from figure 2, numbers are allocated to parts of the communications network 21 as follows.

**[0037]** VPN server 27 is allocated the number "0642 224694" and PBX25 is allocated the number "224" the extensions supported by the PBX 25 being represented by "XXX" in the figure.

**[0038]** VPN server 28 is allocated the number "0402 440103" with the PBX it serves PBX 26 being allocated "440". Again, extensions being supported by the PBX are indicated as allocated to the number range "XXX".

**[0039]** VPN server 29 is allocated the numbers "0798 332040" and "0798 342041". The PBX 23 is allocated the number "332" with its extensions being allocated numbers in a range represented by "XXX" in the figure. The PBX 24 is allocated the number "342" with the extensions it supports being allocated numbers in a range represented in the figure by "XXX".

**[0040]** The local networks operate in accordance with a communications protocol called DPNSS-1 (digital, pri-

vate network signalling system). This protocol is well known to those skilled in the art of telecommunications and it enables a number of call services such as "call-back-when-free", "call-back-when-next-used", "divert-on-busy" and "centralised-operator".

**[0041]** The PSTN 22 operates in accordance with a communications protocol called DASS 2 (Digital Access Signalling System No.2). Again, this protocol is well known to those skilled in the art of telecommunications, but it is important to note that it does not support call services. It does, however, allow signalling between two PBX nodes in the form of user to user data messages.

**[0042]** The user to user data message has a format as shown in figure 5. It comprises a thirty two byte structure 50. A first one byte 51 is the MESSAGE TYPE field of the message. It signifies whether the data message is complete or incomplete. This caters for the situation where a number of data messages are required to carry a particular set of data. A first to a penultimate data message will have a first byte 51 signifying the data message is incomplete and the last data message will have a first byte 51 signifying that the data message is complete. A second byte 52

signifies the length of the data carried in a data field 53. The data field 53 is allocated thirty bytes of the message.

**[0043]** The communications network 21 operates in a manner as shown in figure 6 when a call is to be established between extensions served by different PBX's. In the figure a prefix P1 means that the message is configured according to the first protocol, DPNSS, and a prefix P2 means that the message is configured according to the second protocol DASS2.

**[0044]** Let us suppose that a first user is on an extension served by PBX 24 and wishes to call a second user on an extension served by PBX25. The first user dials a "9" for an outside line followed by "0642 224XXX" the PSTN number for a direct connection to the extension (direct in the sense that it does not go via a switchboard operator).

**[0045]** The dialling of a "9-0642 224XXX" results in a message P1\_CALL (9-0642 224XXX) being sent to VPN server 29 from PBX 24. The VPN server 29 receives this along communication path 35. The call transceiver 41 passes the message to the processor 40. The processor 40 inputs the leading digit 9 into the look-up table 46 held in memory 42. The look-up table returns the bearer call number, which in this case is null. The processor 40 thus instructs the call transceiver 41 to suppress the leading digit "9" and a call message according to the DASS2 protocol, P2\_CALL (0642 224XXX) is sent over the PSTN22, to VPN server 27. VPN server 27 converts this message to its equivalent in DPNSS P1\_CALL (0642 224XXX).

**[0046]** PBX25 then sends an acknowledgement message P1\_ACK to the VPN server 27. VPN server 27 transmits an acknowledge message P2\_ACK over the PSTN22 to VPN server 29. VPN server 29 then sends a P1\_ACK to PBX24.

[0047] PBX25 then sends a P1\_ANSWER message which results in VPN server 27 sending a P2\_ANSWER over PSTN22 to VPN server 29. VPN server 29 sends a P1\_ANSWER message to PBX24.

[0048] Speech communication between the two extensions can then be initiated.

[0049] Figure 7 shows the messaging sequence that occurs when a call service is to be utilised over the PSTN22 between extensions served by different PBXs. Suppose a call is to be made from a first extension served by PBX25 to second extension served by PBX23, and then is to utilise a call service. Again in this figure the prefix P1 is attached to a message which conforms to the protocol DPNSS and the prefix P2 is attached to a message which conform to the protocol DASS2.

[0050] To set up the call, the PBX25 receives a dialled digit string including a code for a call service from the first extension. PBX25 then sends a message to VPN server 27, P1\_CALL (SERVICE + 332XXX). 332XXX being the second extension served by PBX23. SERVICE being a code for the particular call service required.

[0051] VPN server 27 receives the message and inputs the first two digits "33" of the extension number into its look-up table 46. This returns the bearer call number 0798-332040. The processor 40 transmits from the call receiver 41 a message P2\_CALL (UUD + 0798-332040). The message is transmitted across the PSTN22 to VPN server 29. VPN server 29 sends an P2\_ACK acknowledgement message across the PSTN22 to VPN server 27. This is followed by a P2\_ANSWER message.

[0052] The VPN server 27 then sends the original call message P1\_CALL (SERVICE + 332XXX) in a UUD in the DASS2 protocol. This is shown in figure 7 as the message P2\_UUD (P1\_CALL(SERVICE + 332XXX)). This travels across the PSTN22 to the VPN server 29 in a "transparent" way that is to say no number translation or protocol conversion is carried out but rather the original message is carried within the DASS2 compatible UUD.

[0053] The processor 40 of VPN server 29 then removes from the UUD, the DPNSS message P1\_CALL (SERVICE - 332XXX). It then transmits the message to PBX23. Thus it will now be seen that to PBX23 it appears that it has received the message directly from PBX25 that is to say it is a DPNSS call.

[0054] PBX23 then returns an acknowledgement message P1\_ACK followed by P1\_ANSWER. These are loaded by the VPN server 29 into UUDs to from P2\_UUD (P1\_ACK) and P2\_UUD (P1\_ANSWER) and they are sent over the PSTN22 to VPN server 27. VPN server 27 then removes the DPNSS messages and sends them to PBX25. Speech can then be initiated.

## Claims

1. Communication apparatus (27,28,29) for transmitting calls generated by a first communication network (23,24,25,26) over a second communication network (22) to a third communication network (23,24,25,26), the first communication network (23,24,25,26) operating in accordance with a first communication protocol which enables call services, the third communication network (23,24,25,26) operating in accordance with a communication protocol which enables at least one of the call services enabled by the first communication protocol and the second communication network (22) operating according to a second communication protocol different to the first, which apparatus (27,28,29) comprises:

means (40,44,45) to produce a call compatible with the second communication protocol;

means (41) to transmit the call over the second communication network to the third communication network;

said apparatus being **characterised by:**

means (40,44,45) to produce a data message (50) compatible with the second communication protocol, said data message (50) being indicative of the required service; and

means (41) to transmit the data message (50) over the second communication network (22) to the third communication network (23,24,25,26).

2. Apparatus according to claim 1 further comprising:

means to receive (41) data messages (50) from the second communication network (22);

means (40,44,45) to read the data messages (50) to determine the required data service; and means (41) to transmit a message to the first communication network (23,24,25,26) according to the first protocol that enables the required service to be established.

3. Apparatus as claimed in claim 1 or 2 wherein said data message (50) comprises a dialled digit string, indicative of an element of the third communication network (23,24,25,26) with which it is desired to establish a connection.

4. Apparatus as claimed in any preceding claim further comprising a look-up table (46) containing data (46b) for enabling connection to elements of the

third communication network (23,24,25,26) and corresponding dialled digit strings (46a), said look-up table (46) being arranged such that inputting a dialled digit string (46a) to the look-up table (46) results in the return from the look-up table (46) of data (46b) enabling connection to the element.

5. A communications network (21) comprising:

two or more local networks (23,24,25,26) operating in accordance with the same or different protocols enabling call services;

a third network (22) connected between said two or more local networks (23,24,25,26) to allow routing of calls between said two or more local networks (23,24,25,26), and operating in accordance with a second protocol different to said protocol(s) enabling call services;

means to route (27,28,29) associated with each local network (23,24,25,26) for routing calls originating on its associated local network (23,24,25,26) over the third network (22) to a means to route associated with another one of said local networks (23,24,25,26);

said communication network (21) being **characterised by:**

each means to route (27,28,29) including:

means to transmit (41) over the third network (22) a data message (50) compatible with the second protocol and containing data (53) indicative of the required service; and

means to read (40,41,44,45) such data messages to determine the required call service and to produce a data message on the associated local network (23,24,25,26) according to the first protocol to establish the required call service.

6. A method of operating communication apparatus (27,28,29) in a communications network (21), said communications network (21) comprising a first communication network (23,24,25,26) operating in accordance with a first communication protocol which enables call services and a second communication network (22) operating according to a second communication protocol different to the first, said method comprising the steps of:

receiving a call configured according to said first communications protocol, which call re-

quires a call service;

generating a call compatible with said second communications protocol;

transmitting said generated call over said second communications network (22);

said method being **characterised by:**

configuring one or more data messages (50) including data representative of the call service, said data messages (50) being compatible with said second communications protocol; and transmitting the or each data message (50) over said second communications network (22).

7. A method of operating a communications network (21), said communications network (21) comprising:

a first communication network (23,24,25,26) operating in accordance with a first communication protocol which enables call services;

a second communication network (22) operating according to a second communication protocol different to the first; and

a third communication network (23,24,25,26) operating in accordance with a communication protocol which enables at least one of said call services;

first communication apparatus (27,28,29); and

second communication apparatus (27,28,29);

said method comprising the steps of:

operating said first apparatus (27,28,29) in accordance with the method of claim 6; and

operating said second apparatus (27,28,29) to:

receive the or each data message (50) after transmission over said second communications network (22); and

transmit an indication of the required call service represented by the or each data message (50) to said third communications network (23,24,25,26).

8. A method as claimed in claim 7 wherein:

said call configured in accordance with said first communication protocol includes a dialled digit string;

said data message configuration step involves loading the dialled digit string into one or more data messages (50) compatible with the second protocol; and

said call service establishment step involves transmitting the dialled digit string to said third communications network (23,24,25,26).

9. Processor instruction means for instructing a processor (40) to carry out each of the steps of the method as claimed in claim 6.

### Patentansprüche

1. Kommunikationsvorrichtung (27, 28, 29) zum Übertragen von Anrufen, die von einem ersten Kommunikationsnetz (23, 24, 25, 26) erzeugt werden, über ein zweites Kommunikationsnetz (22) an ein drittes Kommunikationsnetz (23, 24, 25, 26), wobei das erste Kommunikationsnetz (23, 24, 25, 26) in Übereinstimmung mit einem ersten Kommunikationsprotokoll arbeitet, das Anrufdienste ermöglicht, das dritte Kommunikationsnetz (23, 24, 25, 26) in Übereinstimmung mit einem Kommunikationsprotokoll arbeitet, das wenigstens einen der Anrufdienste ermöglicht, die vom ersten Kommunikationsprotokoll ermöglicht werden, und das zweite Kommunikationsnetz (22) in Übereinstimmung mit einem zweiten Kommunikationsprotokoll arbeitet, das vom ersten verschieden ist, wobei die Vorrichtung (27, 28, 29) umfaßt:

Mittel (40, 44, 45), die einen mit dem zweiten Kommunikationsprotokoll kompatiblen Anruf erzeugen;

Mittel (41), die den Anruf über das zweite Kommunikationsnetz an das dritte Kommunikationsnetz übertragen;

wobei die Vorrichtung **gekennzeichnet ist durch:**

Mittel (40, 44, 45), die eine mit dem zweiten Kommunikationsprotokoll kompatible Datennachricht (50) erzeugen, die den angeforderten Dienst angibt; und

Mittel (41), die die Datennachricht (50) über das zweite Kommunikationsnetz (22) an das dritte Kommunikationsnetz (23, 24, 25, 26) übertragen.

2. Vorrichtung nach Anspruch 1, die ferner umfaßt;

Mittel, die Datennachrichten (50) vom zweiten Kommunikationsnetz (22) empfangen (41); Mittel (40, 44, 45), die die Datennachrichten (50) lesen, um den angeforderten Datendienst zu bestimmen; und

Mittel (41), die eine Nachricht an das erste Kommunikationsnetz (23, 24, 25, 26) in Übereinstimmung mit dem ersten Protokoll, das den Aufbau des angeforderten Dienstes ermöglicht, übertragen.

3. Vorrichtung nach Anspruch 1 oder 2, bei der die Datennachricht (50) eine gewählte Ziffernfolge umfaßt, die ein Element des dritten Kommunikationsnetzes (23, 24, 25, 26) angibt, mit dem eine Verbindung hergestellt werden soll.

4. Vorrichtung nach einem vorhergehenden Anspruch, die ferner eine Nachschlagtabelle (46) umfaßt, die Daten (46b), die die Verbindung mit Elementen des dritten Kommunikationsnetzes (23, 24, 25, 26) ermöglichen, sowie entsprechende gewählte Ziffernfolgen (46a) enthält und so beschaffen ist, daß die Eingabe einer gewählten Ziffernfolge (46a) in die Nachschlagtabelle (46) die Rückgabe von eine Verbindung mit dem Element ermöglichenden Daten (46b) aus der Nachschlagtabelle (46) zur Folge hat.

5. Kommunikationsnetz (21), das umfaßt:

zwei oder mehr lokale Netze (23, 24, 25, 26), die in Übereinstimmung mit demselben oder mit verschiedenen Protokollen arbeiten, die Anrufdienste ermöglichen;

ein drittes Netz (22), das zwischen die zwei oder mehr lokalen Netze (23, 24, 25, 26) geschaltet ist und die Lenkung von Anrufen zwischen den zwei oder mehr lokalen Netzen (23, 24, 25, 26) ermöglicht und in Übereinstimmung mit einem zweiten Protokoll arbeitet, das von dem oder den Protokollen, die Anrufdienste ermöglichen, verschieden ist;

Lenkungsmittel (27, 28, 29), die jedem lokalen Netz (23, 24, 25, 26) zugeordnet sind und Anrufe, die von ihrem zugeordneten lokalen Netz (23, 24, 25, 26) ausgehen, über das dritte Netz (22) zu Lenkungsmitteln lenken, die einem weiteren der lokalen Netze (23, 24, 25, 26) zugeordnet sind;

wobei das Kommunikationsnetz (21) **dadurch gekennzeichnet ist, daß:**

jedes Lenkungsmittel (27, 28, 29) umfaßt:

Mittel (41), die eine mit dem zweiten Protokoll kompatible Datennachricht (50), die

- den angeforderten Dienst angegebene Daten (43) enthält, über das dritte Netz (22) übertragen; und  
Mittel (40, 41, 44, 45), die Datennachrichten lesen, um den angeforderten Anrufdienst zu bestimmen und um eine Daten-  
nachricht in dem zugeordneten lokalen Netz (23, 24, 25, 26) in Übereinstimmung mit dem ersten Protokoll zu erzeugen, um den angeforderten Anrufdienst aufzubauen.
6. Verfahren zum Betreiben einer Kommunikationsvorrichtung (27, 28, 29) in einem Kommunikationsnetz (21), wobei das Kommunikationsnetz (21) ein erstes Kommunikationsnetz (23, 24, 25, 26), das in Übereinstimmung mit einem ersten Kommunikationsprotokoll arbeitet, das Anrufdienste ermöglicht, und ein zweites Kommunikationsnetz (22), das in Übereinstimmung mit einem zweiten Kommunikationsprotokoll arbeitet, das vom ersten verschieden ist, umfaßt, wobei das Verfahren die folgenden Schritte umfaßt:
- Empfangen eines Anrufs, der in Übereinstimmung mit dem ersten Kommunikationsprotokoll konfiguriert ist und einen Anrufdienst anfordert;  
Erzeugen eines Anrufs, der mit dem zweiten Kommunikationsprotokoll kompatibel ist;  
Übertragen des erzeugten Anrufs über das zweite Kommunikationsnetz (22);
- wobei das Verfahren **gekennzeichnet ist durch:**
- Konfigurieren einer oder mehrerer Datennachrichten (50), die Daten enthalten, die den Anrufdienst repräsentieren, wobei die Datennachrichten (50) mit dem zweiten Kommunikationsprotokoll kompatibel sind; und  
Übertragen der oder jeder Datennachricht (50) über das zweite Kommunikationsnetz (22).
7. Verfahren zum Betreiben eines Kommunikationsnetzes (21), wobei das Kommunikationsnetz (21) umfaßt:
- ein erstes Kommunikationsnetz (23, 24, 25, 26), das in Übereinstimmung mit einem ersten Kommunikationsprotokoll arbeitet, das Anrufdienste ermöglicht;  
ein zweites Kommunikationsnetz (22), das in Übereinstimmung mit einem zweiten Kommunikationsprotokoll arbeitet, das vom ersten Kommunikationsprotokoll verschieden ist; und  
ein drittes Kommunikationsnetz (23, 24, 25, 26), das in Übereinstimmung mit einem Kommunikationsprotokoll arbeitet, das wenigstens
- einen der Anrufdienste ermöglicht;  
eine erste Kommunikationsvorrichtung (27, 28, 29); und  
eine zweite Kommunikationsvorrichtung (27, 28, 29);
- wobei das Verfahren die folgenden Schritte umfaßt:
- Betreiben der ersten Vorrichtung (27, 28, 29) in Übereinstimmung mit dem Verfahren nach Anspruch 6; und  
Betreiben der zweiten Vorrichtung (27, 28, 29), um;
- die oder jede Datennachricht (50) nach der Übertragung über das zweite Kommunikationsnetz (22) zu empfangen; und  
eine Angabe des angeforderten Anrufdiensts, die durch die oder jede Datennachricht (50) repräsentiert wird, an das dritte Kommunikationsnetz (23, 24, 25, 26) zu übertragen.
8. Verfahren nach Anspruch 7, bei dem:
- der Anruf, der in Übereinstimmung mit dem ersten Kommunikationsprotokoll konfiguriert ist, gewählte Ziffernfolgen enthält;  
der Datennachricht-Konfigurationsschritt das Laden der gewählten Ziffernfolge in eine oder mehrere Datennachrichten (50), die mit dem zweiten Protokoll kompatibel sind, umfaßt; und  
der Anrufdienst-Aufbausschritt das Übertragen der gewählten Ziffernfolge an das dritte Kommunikationsnetz (23, 24, 25, 26) umfaßt.
9. Prozessorbefehlsmittel, die einem Prozessor (40) befehlen, jeden der Schritte des Verfahrens nach Anspruch 6 auszuführen.

#### Revendications

1. Appareil de communication (27, 28, 29) pour émettre des appels, lancés par un premier réseau de communication (23, 24, 25, 26) dans un deuxième réseau de communication (22), à un troisième réseau de communication (23, 24, 25, 26), le premier réseau de communication (23, 24, 25, 26) fonctionnant selon un premier protocole de communication permettant les services d'appel, le troisième réseau de communication (23, 24, 25, 26) fonctionnant selon un protocole de communication permettant au moins l'un des services d'appel autorisés par le premier protocole de communication, et le deuxième réseau de communication (22) fonctionnant selon un deuxième protocole de communication différent

du premier, l'appareil (27, 28, 29) comprenant :

des moyens (40, 44, 45) de production d'un appel compatible avec le deuxième protocole de communication,

des moyens (41) d'émission de l'appel dans le deuxième réseau de communication vers le troisième réseau de communication,

l'appareil étant **caractérisé par** :

des moyens (40, 44, 45) de production d'un message de données (50) compatible avec le deuxième protocole de communication, le message de données (50) indiquant le service requis, et

des moyens (41) d'émission du message de données (50) dans le deuxième réseau de communication (22), vers le troisième réseau de communication (23, 24, 25, 26).

2. Appareil selon la revendication 1, comprenant en outre :

des moyens (41) de réception des messages de données (50) depuis le deuxième réseau de communication (22),

des moyens (40, 44, 45) de lecture des messages de données (50) pour déterminer le service de données requis, et

des moyens (41) d'émission d'un message vers le premier réseau de communication (23, 24, 25, 26) selon le premier protocole, permettant d'établir le service requis.

3. Appareil selon l'une des revendications 1 et 2, dans lequel le message de données (50) comprend une série de chiffres émis en numérotation, spécifiant un élément du troisième réseau de communication (23, 24, 25, 26) avec lequel on souhaite établir une liaison.

4. Appareil selon l'une quelconque des revendications précédentes, comprenant en outre une table de consultation (46) contenant des données (46b) pour permettre une liaison avec des éléments du troisième réseau de communication (23, 24, 25, 26) et des séries correspondantes de chiffres de numérotation (46a), la table de consultation (46) étant agencée pour que l'entrée, dans la table de consultation (46), d'une série de chiffres de numérotation (46a) provoque la fourniture, en retour de la table de consultation (46), de données (46b) permettant l'établissement de la liaison avec l'élément.

5. Réseau de communication (21) comprenant :

deux réseaux locaux ou plus (23, 24, 25, 26) fonctionnant selon un même protocole, ou des

protocoles différents, permettant des services d'appel,

un troisième réseau (22) implanté entre les deux, ou plus, réseaux locaux (23, 24, 25, 26) pour permettre l'acheminement d'appels entre les deux ou plus réseaux locaux (23, 24, 25, 26), et fonctionnant selon un deuxième protocole différent du ou des protocoles permettant les services d'appel,

des moyens d'acheminement (27, 28, 29) associés à chaque réseau local (23, 24, 25, 26) pour acheminer des appels, provenant de son réseau local associé (23, 24, 25, 26), dans le troisième réseau (22) jusqu'à des moyens de d'acheminement associé à un autre des réseaux locaux (23, 24, 25, 26),

le réseau de communication (21) étant **caractérisé par le fait que** chacun des moyens d'acheminement (27, 28, 29) comprend :

des moyens (41), d'émission dans le troisième réseau (22), d'un message de données (50) compatible avec le deuxième protocole et contenant des données (53) indiquant le service requis, et

des moyens (40, 41, 44, 45) de lecture de tels messages pour déterminer le service d'appel requis et produire un message de données dans le réseau local associé (23, 24, 25, 26) selon le premier protocole, pour établir le service d'appel requis.

6. Procédé de commande d'un appareil de communication (27, 28, 29) dans un réseau de communication (21), le réseau de communication (21) comprenant un premier réseau de communication (23, 24, 25, 26) fonctionnant selon un premier protocole de communication permettant les services d'appel et un deuxième réseau de communication (22) fonctionnant selon un deuxième protocole de communication différent du premier, le procédé comprenant les étapes suivantes :

recevoir un appel configuré selon le premier protocole de communication, l'appel requérant un service d'appel,

engendrer un appel compatible avec le deuxième protocole de communication,

émettre l'appel engendré dans le deuxième réseau de communication (22),

le procédé étant **caractérisé par le fait que** :

on configure un ou plusieurs messages de données (50) comprenant des données représentant le service d'appel, les messages de données (50) étant compatibles avec le deuxième protocole de communication, et

on émet le ou les messages de données (50) sur le deuxième réseau de communication (22).

des étapes du procédé de la revendication 6.

7. Procédé de commande d'un réseau de communication (21), le réseau de communication (21) comprenant :

un premier réseau de communication (23, 24, 25, 26) fonctionnant selon un premier protocole de communication permettant des services s'appel,

un deuxième réseau de communication (22) fonctionnant selon un deuxième protocole de communication différent du premier, et

un troisième réseau de communication (23, 24, 25, 26) fonctionnant selon protocole de communication permettant au moins l'un des services d'appel,

un premier appareil de communication (27, 28, 29), et

un deuxième appareil de communication (27, 28, 29), le procédé comprenant les étapes suivantes :

commander le premier appareil (27, 28, 29) selon le procédé de la revendication 6, et

commander le deuxième appareil (27, 28, 29) pour :

recevoir le ou les messages de données (50) après transmission dans le deuxième réseau de communication (22), et

émettre une indication du service d'appel requis, représenté par le ou les messages de données (50), vers le troisième réseau de communication (23, 24, 25, 26).

8. Procédé selon la -revendication 7, dans lequel :

le dit appel configuré selon le premier protocole de communication comprend une série de chiffres de numérotation,

l'étape de configuration de message de données comprend le chargement de la série de chiffres de numérotation dans un ou plusieurs messages de données (50) compatibles avec le deuxième protocole, et

l'étape d'établissement de service d'appel comprend l'émission de la série de chiffres de numérotation vers le troisième réseau de communication (23, 24, 25, 26).

9. Moyens de commande d'un processeur pour commander à un processeur (40) d'exécuter chacune

Fig.1.

(PRIOR ART)

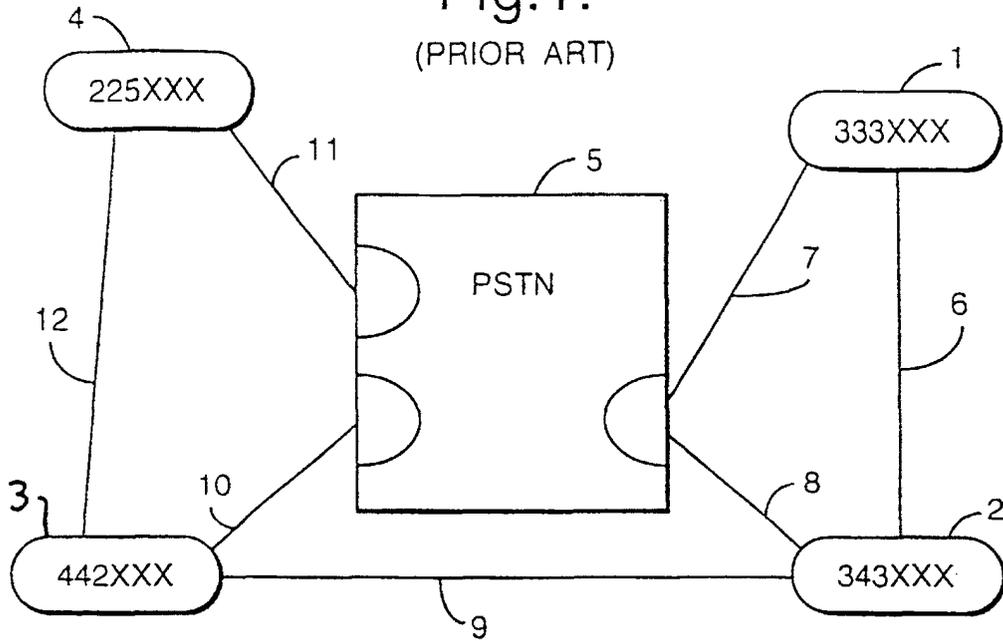


Fig.4.

LEAD DIGITS	BEARER CALL NUMBER
9X	NULL
22X	0642-224694
33X	0798-332040
34X	0798-342041
44X	0402-440103

Fig.2.

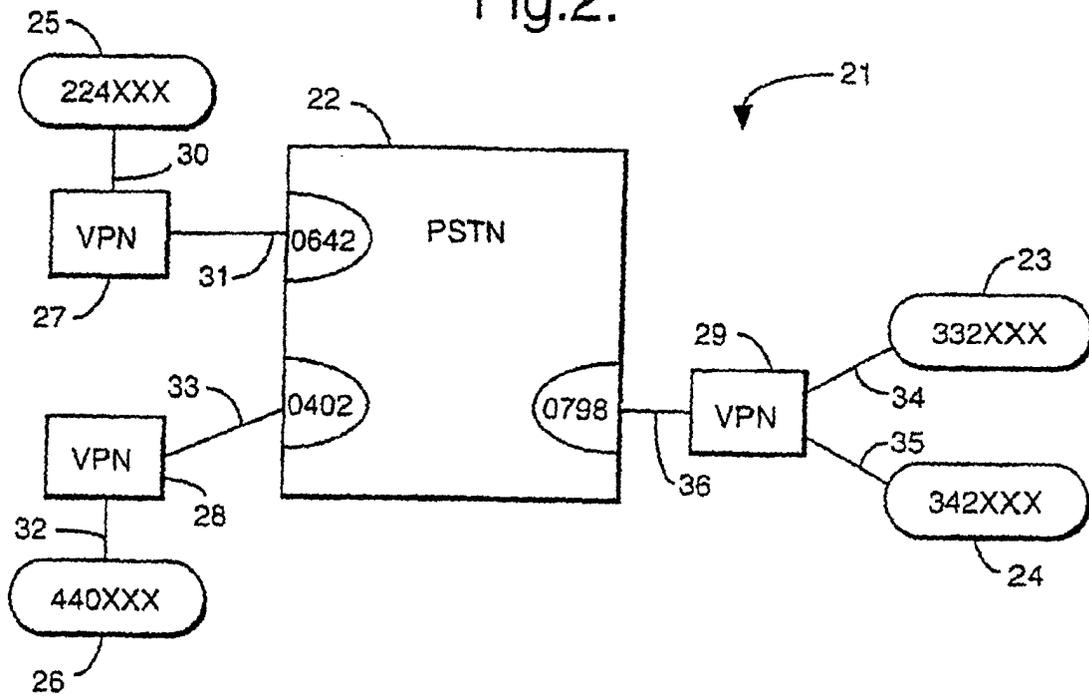


Fig.3.

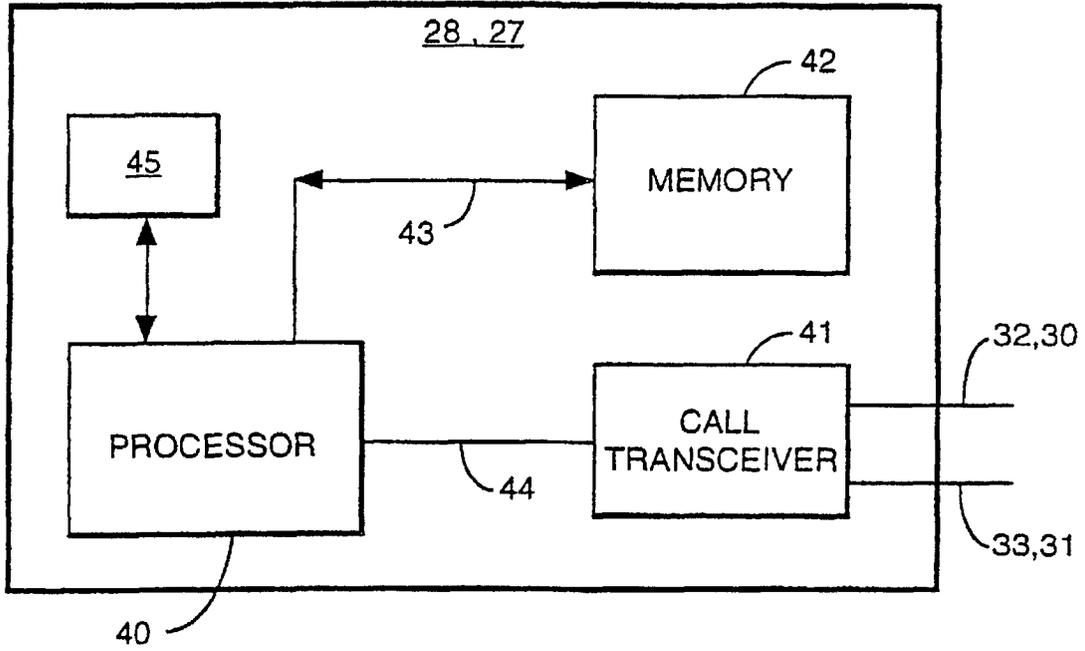


Fig.5.

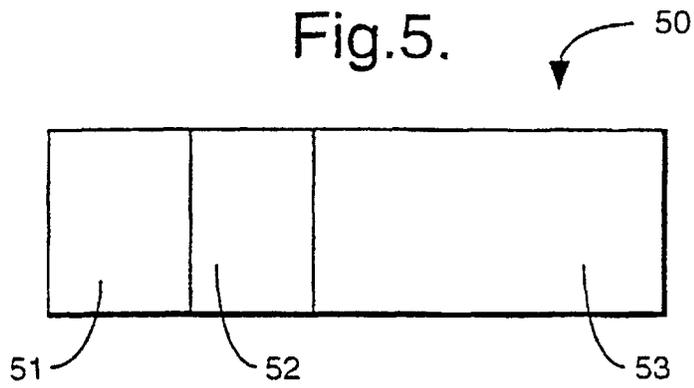


Fig.6.

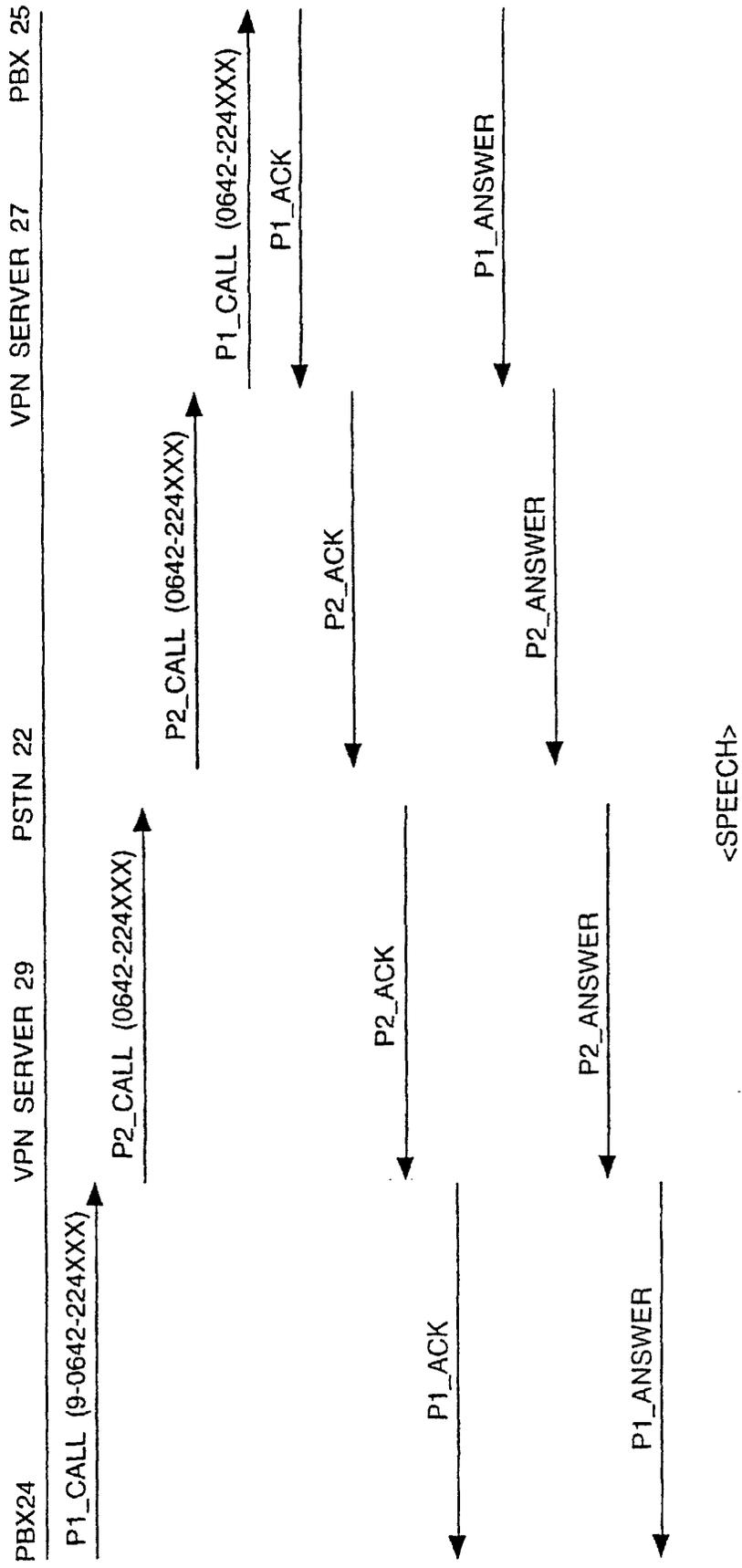


Fig.7.

