



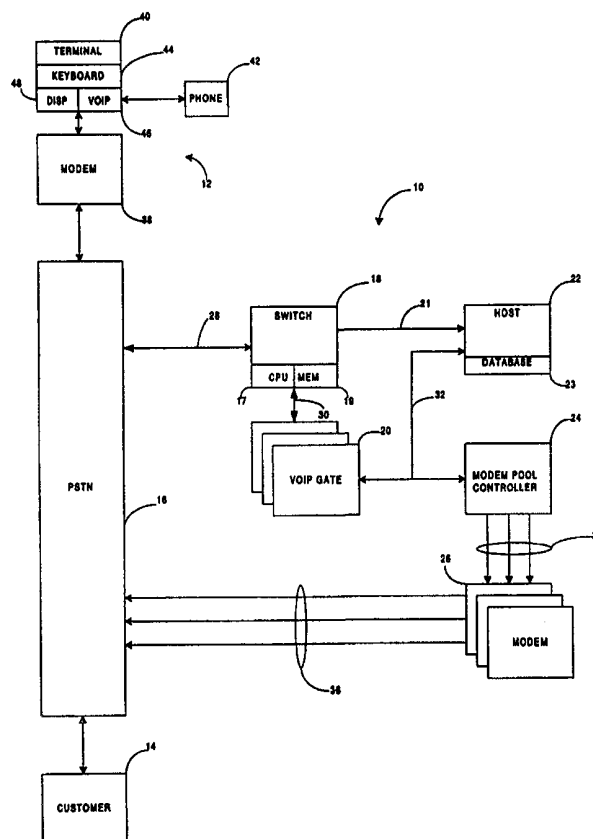
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>H04L 12/66</b>	<b>A1</b>	(11) International Publication Number: <b>WO 99/45679</b> (43) International Publication Date: 10 September 1999 (10.09.99)
<p>(21) International Application Number: PCT/US99/03346</p> <p>(22) International Filing Date: 17 February 1999 (17.02.99)</p> <p>(30) Priority Data: 09/034,604 3 March 1998 (03.03.98) US</p> <p>(71) Applicant: ROCKWELL ELECTRONIC COMMERCE CORPORATION [US/US]; 300 Bauman Court, Wood Dale, IL 60191 (US).</p> <p>(72) Inventors: HOLLATZ, Michael, C.; 10415 Fairlane, Huntley, IL 60142 (US). WERVE, Timothy, P.; 2257 Bookway Drive, Geneva, IL 60134 (US). WILLIAMS, Laird, C.; 6N486 West Ridgewood Drive, St. Charles, IL 60175 (US).</p> <p>(74) Agents: SHEKLETON, Gerald, T. et al.; Welsh &amp; Katz, Ltd., 22nd floor, 120 S. Riverside Plaza, Chicago, IL 60606 (US).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report.</i></p>

(54) Title: ACD WITH PACKET DATA BASED AGENT INTERCONNECT

## (57) Abstract

A method and apparatus for providing a voice path between a customer call connection (14) received from a public switched telephone network (16) at a switch (18) of an automatic call distributor (10) and an agent (12) of the automatic call distributor (10) at a remote location from the automatic call distributor (10) and also a data connection between a terminal (40) of the agent and a host (22) of the automatic call distributor. The method includes the steps of setting up a dedicated telephone connection through the public switched telephone network (16) between the automatic call distributor (10) and agent at the remote location and establishing a voice internet protocol communication link between the automatic call exchange of voice information between the customer (14) and agent (12). The method further includes the step of establishing a data link between a database application (23) of the host (22) and a database application of the terminal of the agent through the dedicated connection.



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## ACD WITH PACKET DATA BASED AGENT INTERCONNECT

Field of the Invention

The field of the invention relates to automatic call distributors and more particularly to automatic call distributors using internet protocols for voice and data exchange.

Background of the Invention

Automatic call distribution systems are known. Such systems are typically used in an organizational context as a means of distributing telephone calls among a group of agents of the organization.

Often the organization disseminates a single telephone number to its customers and to the public in general as a means of contacting the organization. As calls are directed to the organization from the public switch telephone network (PSTN), the automatic call distribution system directs the calls to its agents based upon some algorithm, typically based upon availability. For example, where all agents are considered equal, the ACD may distribute the calls based upon which agent position (telephone) has been idle the longest.

In order to distribute incoming calls from the PSTN to the available agents, the interaction of a controlling computer with a switching fabric of the ACD becomes essential.

Often a connection of the ACD to a local PSTN is in the form of a number of trunk connections. Each of the trunk connections is monitored by the controller for incoming calls.

Where a call is detected, the controller searches for and selects an idle agent. Upon selecting an agent, the

controller instructs the switch to form a connection between the incoming trunk and selected agent.

In more complicated systems, the organization may use a number of telephone numbers to identify different individuals and functions within the organization. Each telephone number may be assigned to a particular incoming trunk or group of incoming trunk lines. As such, the controller may be required to recognize a call target based upon an identity of an incoming trunk line and route the call accordingly.

In other systems, the ACD of an organization may receive calls directed to different call targets over the same trunk lines. In such a case, the call target may be identified to the ACD by a pulse code modulated (PCM) signal transferred from the PSTN to the controller of the ACD by a dialed number identification service (DNIS) operating from within the PSTN.

In systems associated with service organizations, where many calls are received and handled by many agents, it may be important for an agent to have ready access to customer files.

In such a situation, a database is maintained of existing customers. Customer records may be displayed on agent terminals as the agents converse with specific customers. In some cases, the customer may be identified to the database for display of records on the terminal by the agent entering a customer identifier into a keyboard associated with the terminal. Alternatively, the controller of the ACD may transfer an identifier of the customer to the database based upon an automatic number identification (ANI) facility, operating from within the PSTN.

Where ANI is used, the controller of the ACD receives the ANI digits (identifying the caller via the caller's telephone number) at the same time the call arrives from the PSTN. Upon

selecting an agent, the controller may transfer a call to a queue for the selected agent or directly to the selected agent. At the same time that the call is delivered to the agent, the controller sends an identifier of the selected agent and ANI number of the customer to a controller of the database (the host). The host, in turn, displays the customer records via a computer monitor of the selected agent at the same time the call is delivered.

As a further feature, calls may be transferred among agents. Where a first agent finds that he or she cannot help a particular customer, the agent may activate a key on a keyboard of the agent and may enter an identity of another agent or agent group that may be better able to help the customer. The controller of the ACD may immediately connect the call to the newly identified agent, or may place the call in a queue until the identified agent becomes available.

In either case, the controller transfers a message to the host identifying the previous and newly identified agent. Since the host knows the identity of the customer displayed at the terminal of the previous agent, the host may now display those same customer records at the terminal of the newly selected agent.

Where a call is placed in a queue, the ACD controller may monitor a total time that the call has been in the queue. Where the time exceeds a threshold value, the controller may transfer (overflow) the call to a newly selected agent at another less heavily loaded ACD (overflow ACD) within the same organization. The controller of the transferring ACD transfers DNIS and ANI information as well as a call sequence number assigned by the transferring ACD to the overflow ACD. The overflow ACD, upon receiving the call, transfers the

information to the host including an indication that the call is an overflow call. The host in turn then polls each ACD to identify the transferring ACD and any newly created call records created by the transferring ACD.

5        While the existing method of ACD operation is relatively satisfactory, it is dependent upon a relatively close proximity of agents to the ACD and ready access to voice and data interconnections. Where an agent is not located proximate the ACD, two voice channels may be required for the agent to converse with the customer and also receive data from the host. The first voice channel may be dedicated to the exchange of voice information. A second voice channel may be used by a modem to exchange data with the host. The use of two voice channels is expensive and inefficient. Accordingly, 10 a need exists for an improved method of providing voice and data connections between ACDs and remotely located agents. 15

#### Summary

A method and apparatus for providing a voice path between a customer call connection received from a public switched telephone network at a switch of an automatic call distributor and an agent of the automatic call distributor at a remote location from the automatic call distributor and also a data connection between a terminal of the agent and a host of the automatic call distributor. The method includes the steps of setting up a dedicated telephone connection through the public switched telephone network between the automatic call distributor and agent at the remote location and establishing a voice internet protocol communication link between the automatic call distributor and agent through the dedicated connection for exchange of voice information between the 20 25 30

customer and agent. The method further includes the step of establishing a data link between a database application of the host and a database application of the terminal of the agent through the dedicated connection.

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#### Brief Description of the Drawings

FIG. 1 is a block diagram of one exemplary embodiment of an automatic call distribution system using voice internet protocols and a dedicated agent connection in accordance with an embodiment of the invention.

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#### Detailed Description of an Embodiment

FIG. 1 is a block diagram of an exemplary embodiment of an automatic call distribution ACD system 10 in accordance with the invention. Under the embodiment, the ACD 10 may receive a call from a customer 14 through the PSTN 16 and route the customer call to an agent at a remote agent location 12 using an internet protocol and a dedicated telephone connection between the ACD 10 and agent location 12. The use of the internet protocol over the dedicated connection allows data and voice packets to share the same telephone connection in a non-interfering manner with a much higher bandwidth utilization of the telephone connection.

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Under one illustrated embodiment, the ACD 10 includes a switch 18, a host computer 22, a number of voice internet protocol (VOIP) gates 20, a modem pool controller 24 and a number of modems 26. The switch 18 may be interconnected to the PSTN 16 through one or more T1 lines 28. Similarly, the VOIP gates 20 may be interconnected to the switch through one or more T1 lines 30.

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In operation, the channels of T1 lines 28 connecting the switch 18 and PSTN 16 may be associated with particular ports of the switch 18. Similarly, the VOIP gates 20 may also be associated with particular ports of the switch 18. A memory 5 18 is provided within the switch 18 for purposes of providing a reference as to which port of the switch 18 is connected to a particular VOIP gate 20 or incoming trunk line 28 from the PSTN 16.

The host 22, VOIP gates 20 and modem pool controller 24 10 may be interconnected as a local area network (LAN). As such, communication may occur between the host 22, VOIP gates 20 and modem pool controller 24 over the LAN connection 32 using a TCP/IP format. The switch 18 may be interconnected with the host 22 through an appropriate data link 21 (e.g., leased 15 lines, virtual private lines, microwave link, the Internet, digital packet switching, etc.).

The modem pool controller 24 may control and provide an interface with one or more modems 26. A parallel interconnect 34 may be provided between the modem pool controller 24 and 20 each of the modems 26.

The network side of each modem 26 may be individually connected by outgoing telephone lines 36 to the PSTN 16 as shown in FIG. 1. Alternatively, the output of each modem 26 may be routed to individual ports of the switch 18, to further 25 reduce the need for external telephone connections and telephone charges.

The PSTN 16 may offer standard telephone service on the trunk lines 28 in association with services such as ANI and DNIS. Call control, call maintenance, and call set-up may be 30 accomplished by in-band signalling over the trunk line itself or over an associated control channel.



DNIS information from the PSTN 16 may be useful to the ACD 10 where inbound calls are be directed to any of a large block of telephone numbers assigned to individual departments of the organization using the ACD 10. This may be especially  
5 useful where the block of numbers to the switch 18 is connected through the trunk lines 28 in rotary fashion, so that when the calling party from the PSTN appears, for example, on a first trunk, it can be determined whether the calling party was, in fact, calling the telephone number  
10 corresponding to the first trunk or was, in fact, calling the telephone number corresponding to a second trunk and was rotated down to the next available trunk.

With regard to the agent station 12, the agent may be provided with an audio interface (e.g., telephone handset 42)  
15 for conversing with customers 14 through a terminal 40 and ACD 10. A modem 38 may be provided as an interface of the terminal 40 with the ACD 10 through the PSTN 16. A keyboard 44 and display 48 is provided on the terminal 40 for exchange of data with a database 23 of the ACD 10 through the terminal  
20 40.

Present within the terminal 40 is a voice internet protocol (VOIP) application 46 allowing for concurrent voice and data traffic through the terminal 40. The VOIP application 46 provides a voice plug within the terminal 40  
25 which may be addressed by VOIP applications at other locations (e.g., a VOIP application operating from within a VOIP gateway 20). The VOIP applications within the VOIP gateway 20 and terminal 40 may be any of a number of available internet products (e.g., WebPhone by NetSpeak, WebTalk by Quarterdeck,  
30 Intercom by Telescape, NetPhone by Electric Magic, Global Phone by Internet, etc.).

With regard to inbound calls, the switch 18 functions to selectively interconnect calls from external customer units 14 of the external PSTN 16 to agents associated with the ACD 10. While each agent (e.g., 12) may be shown in terms of a single agent, it may be assumed that the agent position 12 of FIG. 1 may be one of many agents (each situated at a different remote location) and associated with the ACD 10 through the PSTN 16.

Further, under one illustrated embodiment of the invention, it may be assumed that an agent (e.g., 12) may be associated with any port of its associated switch (e.g., 18).

How the agent 12 becomes initially connected to a port of that switch will be explained later.

The switch 18 is controlled by a central processing unit, or CPU 17, in conjunction with a peripheral memory device 18. Control of the switch 18 and communications with the host 22 and PSTN 16 may be accomplished generally as described in U.S. Patent No. 5,268,903, and U.S. Patent No. 5,140,611, both to Jones, and both incorporated herein by reference. Routing and overflow of calls may be accomplished generally as described in: U.S. Patent No. 5,335,269 to Steinlicht et al.; U.S. Patent No. 5,365,581 to Baker et al.; and U.S. Patent No. 5,384,841 to Adams et al., all incorporated herein by reference.

During operation, the CPU 17 monitors each port of the switch 18 for changes in status. A change in status may be an agent unit 12 hanging up after a call, or it may be a call alerting tone detected on a trunk 28 alerting the CPU 17 to the presence of an incoming call.

Where the status change is an agent 12 hanging up, the CPU 17 acts to tear-down the call connection within the switch 18 between the agent at a first port of the switch and a

second party to the conversation, communicating through a second port of the switch 18. Upon tear down of the connection, the CPU 17 also sends a message to the host, notifying the host of termination of the call connection. The  
5 message to the host 22 would include at least the identity of the agent 12.

Where the status change is a call alert signal on an incoming trunk line (or control channel associated with the incoming trunk line), then the CPU 17 may send an acknowledge  
10 message to the PSTN 16 accepting the call. The PSTN 16 may respond with the forwarding of DNIS and ANI messages, identifying the called and calling party.

Upon accepting the call, the CPU 17 first stores the DNIS and ANI numbers in a termination table of the memory 18. More  
15 specifically, the CPU 17 maintains a table of call information for each port of the switch 18. Where a call is accepted on an incoming trunk line, the CPU 17 enters the DNIS and ANI number into the table for the incoming trunk line upon which the call is received.

20 In addition to updating the termination table within memory 18, the CPU 17 also generates a call identifier (also sometimes referred to as a call ID or sequence number) for the call, unique to the switch 18. The call identifier along with the ANI and DNIS numbers may then be sent to the host 22 as  
25 part of a call arrival message. Delivery of the ANI and DNIS numbers and call identifier allows the host 22 to create a unique call record for the call in memory 23, in a call record area of memory 23 reserved for the switch 18. The call record may be used to retrieve customer records for delivery to an  
30 appropriate display terminal 40 once the call has been assigned to an agent 12.

The CPU 17 then, by reference to the DNIS number, determines the identity of agent 12 to which the call is to be directed. For example, the DNIS number may be used to differentiate between calls directed to a first telephone  
5 number arriving on a first incoming trunk group directed to a sales group of the organization from calls directed to a service group of the organization. Since agents servicing sales calls would, in most cases, not handle calls directed to service, the DNIS number provides a convenient means of  
10 differentiating between two or more types of calls.

In preparation for completing the call connection, the CPU 17 may transfer an identifier of the agent and call ID to the host 22. In response, the host 22 may take steps to set up a dedicated call connection between the ACD 10 and agent  
15 12.

In preparation for setting up the dedicated call connection, the host 22 transfers a telephone number of the agent 12 to the modem pool controller 24 along with a LAN address to be assigned by the modem controller 24 to the call  
20 (i.e., to a selected modem). The host 22 also selects a VOIP gate 20 and transfers a voice plug address of the selected VOIP gate 20 to the modem pool controller 24 for use with the call. The host 22 also transfers the assigned LAN address of the modem to the selected VOIP gate 20.

25 The modem pool controller 24 maintains an addressing table for each modem 26, based upon its use. The addressing table may be used by the modem pool controller 24 in routing packets of data both to and from selected modems of the modem pool.

30 After selecting a modem for the call, the modem pool controller 24 stores the assigned LAN address in the

addressing table of the selected modem 26. The modem pool controller 24 also stores the voice plug address of the selected VOIP gate 20 in the addressing table of the selected modem 26.

5        Upon receipt of the telephone number of the agent 12, the modem pool controller 24 transfers the telephone number of the agent 12 to the selected modem 26. The controller then causes the selected modem 26 to go off-hook and transfer the  
10        telephone number of the agent 12 from the selected modem 26 to the PSTN 16.

      Upon receipt of the telephone number of the agent 12, the PSTN 16 sends a call alert to the agent 12. Upon detecting the call alert signal, the modem 38 of the agent terminal 40 goes off-hook to answer the call.

15        To complete the call connection, the host 22 transfers an identifier (e.g., a port address) of the selected VOIP gate 20 to the switch 18 along with instructions to connect the call from customer 14 to the port of the selected VOIP gate 20. The switch 18, in turn, forms an internal connection between  
20        the incoming call from the customer 14 and the selected VOIP gate 20.

      Upon completion of voice connection from the customer 14 to the selected VOIP gate 20, the VOIP gate 20 may begin sending voice packets over the dedicated connection to the  
25        VOIP application 46 within the terminal 40. The VOIP gate 20 is able to route voice packets to the selected modem 26 based upon the LAN address of the modem assigned by the host 22 and transferred to the VOIP gate 20 from the host 22 during call setup. Voice packets received from the agent 12 through the  
30        modem 26 are routed to the selected VOIP gate 20 based upon

the voice plug address stored in the addressing table of the selected modem 26.

At the agent terminal 40, voice packets received over the dedicated connection from the ACD 10 are converted into audible sound and routed to the handset 42 by the VOIP application 46. Similarly, voice information from the handset 42 is converted into voice packets and transferred through the dedicated connection to the selected modem 26, where they are routed based upon the voice plug address of the selected VOIP gate 20 stored in the addressing table of the selected modem 26.

Concurrent with the setup of the voice connection between the customer 14 and agent 12 through the dedicated connection, the host 22 also delivers customer information to the display 48 of the agent terminal 40. The host 22 identifies the customer information based upon the call ID received from the switch 18 and call record previously stored in the database 23. Upon identifying the customer records, the host 22 transfers the customer records over the dedicated connection to the agent terminal 40.

To route the customer records to the terminal 40, the host sends an information packet over the LAN connection 32 to the selected modem 26 using the LAN address previously assigned by the host 22. The modem pool controller 24 routes the packet through the selected modem 26 and dedicated connection to the terminal 40.

Upon receiving the information packet of customer records, the terminal displays the records upon the display 48 at the same time as call arrival through the VOIP application 46. The agent may modify the customer records through the keyboard 44 or request additional records through the database

23 of the host 22. The terminal 40 may address data packets to the host 22 based upon a source address of the host 22 contained in a header of the delivered customer records.

In another embodiment of the invention, the host 22  
5 performs a predictive analysis of agent loading and functions to begin setup of the dedicated connection between the ACD 10 and agents 12 before an actual need exists. Such analysis may be based upon maintaining a reserve of idle agents 12 for a short period of time before assignment of a call from a  
10 customer 14 to an agent 12. As part of the predictive analysis effort, the host 22 maintains a table of agents in the database 23, with agents assigned to calls based upon how long the agent has been idle. Where the idle period falls below a threshold, the host 22 acts to add more agents to the  
15 table.

To add an agent, the host goes to a reserve agent table within the database 23 and recovers a telephone number of the agent 12. Upon recovering the telephone number of the agent from the reserve table, the host 22 transfers the number to  
20 the modem pool controller 24 along with a LAN identifier of the agent. Once the dedicated connection is set up, the agent is added to the table of agents and assigned the next call, as described above.

In another embodiment of the invention, the idle period  
25 threshold value may be reduced by reducing the time for creating the dedicated connection. Reducing the time for setup of the dedicated connection may allow call setup between the ACD 10 and a remote agent 12 to occur in real time without the requirement that the host 22 maintain a reserve of idle  
30 agents.

Reducing the time of call setup may be accomplished under one embodiment by fixing a speed of modem operation. Under the embodiment, the modems 26, 38 are programmed to operate at a speed of 33.8 kHz.

5        Specific embodiments of methods and apparatus of providing a telecommutable platform according to the present invention has been described for the purpose of illustrating the manner in which the invention is made and used. It should be understood that the implementation of other variations and  
10        modifications of the invention and its various aspects will be apparent to one skilled in the art, and that the invention is not limited by the specific embodiments described. Therefore, it is contemplated to cover the present invention any and all modifications, variations, or equivalents that fall within the  
15        true spirit and scope of the basic underlying principles disclosed and claimed herein.



Claims

- 1 1. A method of providing a voice path between a customer  
2 call connection received from a public switched telephone  
3 network at a switch of an automatic call distributor and an  
4 agent of the automatic call distributor at a remote location  
5 from the automatic call distributor and also a data path  
6 between a terminal of the agent and a host of the automatic  
7 call distributor, such method comprising the steps of:  
8       setting up a dedicated telephone connection through the  
9 public switched telephone network between the automatic call  
10 distributor and agent at the remote location;  
11       establishing a voice internet protocol communication link  
12 between the automatic call distributor and agent through the  
13 dedicated connection for exchange of voice information between  
14 the customer and agent; and  
15       establishing a data link between a database application  
16 of the host and a database application of the terminal of the  
17 agent through the dedicated connection.
- 1 2. The method of providing a voice and data path as in claim  
2 1 further comprising providing a voice application within the  
3 automatic call distributor which operates between the customer  
4 call and the dedicated connection and which converts between  
5 voice information of the customer call at the switch and voice  
6 internet protocol of the dedicated connection.
- 1 3. The method of providing a voice and data path as in claim  
2 1 further comprising providing a voice application within the  
3 terminal of the agent which operates between the dedicated  
4 connection and an audio speaker and microphone of the agent

5 and which converts between voice internet protocol of the  
6 dedicated connection and audible information of the agent.

1 4. The method of providing a voice and data path as in claim  
2 3 further comprising establishing a call connection between  
3 the voice application of the automatic call distributor and  
4 the customer through a call switch of the automatic call  
5 distributor.

1 5. The method of providing a voice and data path as in claim  
2 4 further comprising receiving a call from the customer at a  
3 first port of a switch of the automatic call distributor along  
4 with an ANI and DNIS number of the call from the public  
5 switched telephone network.

1 6. The method of providing a voice and data path as in claim  
2 5 further comprising determining which agent should handle the  
3 call based upon the ANI and DNIS numbers.

1 7. The method of providing a voice and data path as in claim  
2 6 further comprising retrieving a telephone number of the  
3 agent from a lookup table.

1 8. The method of providing a voice and data path as in claim  
2 6 further comprising transferring the telephone number of the  
3 agent to a modem of the automatic call distributor.

1 9. The method of providing a voice and data path as in claim  
2 8 further comprising transferring the telephone number of the  
3 agent from the modem of the automatic call distributor to the  
4 public switched telephone network for setup of the dedicated

5 call connection between the modem of the automatic call  
6 distributor and modem of the terminal of the agent.

1 10. The method of providing a voice and data path as in claim  
2 9 wherein the step of establishing a voice internet protocol  
3 communication connection between a voice application of the  
4 automatic call distributor and a voice application of a  
5 terminal of the agent further comprises transferring a local  
6 area identifier of the voice application of the automatic call  
7 distributor to a controller of the modem of the automatic call  
8 distributor and an identifier of the modem of the automatic  
9 call distributor to the voice application of the automatic  
10 call distributor.

1 11. The method of providing a voice and data path as in claim  
2 10 wherein the step of establishing a voice internet protocol  
3 communication connection between a voice application of the  
4 automatic call distributor and a voice application of a  
5 terminal of the agent further comprises instructing the switch  
6 of the automatic call distributor to form a call connection  
7 between the call from the customer at the first port of the  
8 switch and a second port of the switch providing a connection  
9 to the voice application of the automatic call distributor.

1 12. The method of providing a voice and data path as in claim  
2 1 wherein the step of establishing the data link between a  
3 database application of the automatic call distributor and a  
4 database application of the terminal of the agent further  
5 comprises transferring an identifier of the host and call to a  
6 controller of the dedicated connection and an identifier of

7 the call and a modem of the automatic call distributor  
8 supporting the dedicated connection to the host.

1 13. Apparatus for providing an voice path between a customer  
2 call received from a public switched telephone network at a  
3 switch of an automatic call distributor and an agent of the  
4 automatic call distributor at a remote location from the  
5 automatic call distributor and also a data path between a  
6 terminal of the agent and a host of the automatic call  
7 distributor, such apparatus comprising:

8 means for setting up a dedicated telephone connection  
9 between the automatic call distributor and agent;

10 means for establishing a voice internet protocol  
11 communication link between the automatic call distributor and  
12 agent through the dedicated connection for exchange of voice  
13 information between the customer and agent; and

14 means for establishing a data link between a database  
15 application of the automatic call distributor and a database  
16 application of the terminal of the agent through the dedicated  
17 connection.

1 14. The apparatus for providing a voice and data path as in  
2 claim 13 further comprising means for providing voice internet  
3 protocol processing which operates between the switch and  
4 dedicated connection and which converts between voice  
5 information of the customer call and voice internet protocol  
6 of the agent through the dedicated connection.

1 15. The apparatus for providing a voice and data path as in  
2 claim 14 further comprising means for providing voice internet  
3 protocol processing within the terminal which operates between

4 the dedicated connection and the agent and which converts  
5 voice information of the agent to voice internet protocol  
6 information of the dedicated connection.

1 16. The apparatus for providing a voice and data path as in  
2 claim 15 further comprising means for establishing a call  
3 connection between the means for providing voice internet  
4 protocol processing of the automatic call distributor and the  
5 customer through a call switch of the automatic call  
6 distributor.

1 17. The apparatus for providing a voice and data path as in  
2 claim 16 further comprising means for receiving a call from  
3 the customer at a first port of a switch of the automatic call  
4 distributor along with an ANI and DNIS number of the call from  
5 the public switched telephone network.

1 18. The apparatus for providing a voice and data path as in  
2 claim 17 further comprising means for determining which agent  
3 should handle the call based upon the ANI and DNIS numbers.

1 19. The apparatus for providing a voice and data path as in  
2 claim 18 further comprising means for retrieving a telephone  
3 number of the agent from a lookup table.

1 20. The apparatus for providing a voice and data path as in  
2 claim 19 further comprising means for transferring the  
3 telephone number of the agent to a modem of the automatic call  
4 distributor.

1 21. The apparatus for providing a voice and data path as in  
2 claim 20 further comprising means for transferring the

3 telephone number of the agent from the modem of the automatic  
4 call distributor to the public switched telephone network for  
5 setup of the dedicated call connection between the modem of  
6 the automatic call distributor and modem of the terminal of  
7 the agent.

1 22. The apparatus for providing a voice and data path as in  
2 claim 21 wherein the means for establishing a voice internet  
3 protocol communication connection between a voice application  
4 of the automatic call distributor and a voice application of a  
5 terminal of the agent further comprises means for transferring  
6 a local area identifier of the voice application of the  
7 automatic call distributor to a controller of the modem of the  
8 automatic call distributor and an identifier of the modem of  
9 the automatic call distributor to the voice application of the  
10 automatic call distributor.

1 23. The apparatus for providing a voice and data path as in  
2 claim 22 wherein the means for establishing a voice internet  
3 protocol communication connection between a voice application  
4 of the automatic call distributor and a voice application of a  
5 terminal of the agent further comprises means for instructing  
6 the switch of the automatic call distributor to form a call  
7 connection between the call from the customer at the first  
8 port of the switch and a second port of the switch providing a  
9 connection to the voice application of the automatic call  
10 distributor.

1 24. The apparatus for providing a voice and data path as in  
2 claim 13 wherein the means for establishing the data link  
3 between a database application of the automatic call

4 distributor and a database application of the terminal of the  
5 agent further comprises means for transferring an identifier  
6 of the host and call to a controller of the automatic call  
7 distributor and an identifier of the call and a modem of the  
8 automatic call distributor supporting the dedicated connection  
9 to the host.

1 25. Apparatus for providing an end-to-end voice path between  
2 an agent at a first remote location and a customer at a second  
3 remote location through an automatic call distributor and a  
4 public switched telephone network and also a data path between  
5 a terminal of the agent and a host of the automatic call  
6 distributor also through the public switched telephone  
7 network, such apparatus comprising:

8 means for providing a dedicated call connection between  
9 the automatic call distributor and agent;

10 first means for converting between a voice signal and a  
11 voice internet protocol located within the automatic call  
12 distributor and coupled between the call connection with the  
13 customer and the dedicated call connection with the agent;

14 second means for converting between a voice signal and a  
15 voice internet protocol located within the terminal of the  
16 agent and coupled between the dedicated call connection and a  
17 speaker of the agent; and

18 means for providing a shared data link over the dedicated  
19 call connection with a first portion of the shared data link  
20 exchanging data between the first and second means for  
21 converting and a second portion of the shared data link  
22 exchanging data between the host of the automatic call  
23 distributor and a database application of the terminal of the  
24 agent.

1 26. Apparatus for providing a voice and data path between an  
2 agent at a remote location and an automatic call distributor,  
3 the voice path being used to service a call from a customer  
4 received from the public switched telephone network by the  
5 automatic call distributor and the data path being used to  
6 provide the agent with records of the customer from a database  
7 of the automatic call distributor, such apparatus comprising:  
8 means for setting up a dedicated telephone connection  
9 between the automatic call distributor and agent at the remote  
10 location;  
11 means for establishing a voice internet protocol  
12 communication link between the automatic call distributor and  
13 agent through the dedicated connection for exchange of voice  
14 information between the customer and agent; and  
15 means for establishing a data link between a database  
16 application of the automatic call distributor and a database  
17 application of the terminal of the agent through the dedicated  
18 connection.

1 27. Apparatus for providing a voice and data path between an  
2 agent at a remote location and an automatic call distributor,  
3 the voice path being used to service a call from a customer  
4 received from the public switched telephone network by the  
5 automatic call distributor and the data path being used to  
6 provide the agent with records of the customer from a database  
7 of the automatic call distributor, such apparatus comprising:  
8 a dedicated telephone connection between the automatic  
9 call distributor and agent at the remote location;  
10 a voice internet protocol application disposed between  
11 the customer call at the switch and the dedicated connection;



12 a voice internet protocol application disposed between  
13 the agent and the dedicated connection;

14 a database application within a host of the automatic  
15 call distributor coupled to the dedicated connection; and

16 a database application within a data processor of the  
17 agent coupled to the dedicated connection.

1 28. The apparatus as in claim 27 further comprising a  
2 processor coupled between the dedicated connection and agent  
3 which processes the voice internet application and database  
4 application of the agent.

1 29. The apparatus as in claim 28 further comprising a modem  
2 coupled between the processor of the agent and the dedicated  
3 connection.

1 30. The apparatus as in claim 27 further comprising a voice  
2 internet processor coupled between the customer call at the  
3 switch and the dedicated connection which processes the voice  
4 internet application of the automatic call distributor.

1 31. The apparatus as in claim 30 further comprising a host  
2 processor coupled between the database at the switch and the  
3 dedicated connection which processes the database application  
4 of the automatic call distributor.

1 32. The apparatus as in claim 28 further comprising a modem  
2 coupled between the processor of the of the automatic call  
3 distributor and the dedicated connection.

1 33. The apparatus as in claim 32 further comprising a local  
2 area network coupling the voice internet protocol processor

3 and host processor to the modem of the automatic call  
4 distributor.

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/03346

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :H04L 12/66

US CL :Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 370/351, 352, 353, 354, 355, 356; 379/93.01, 93.14, 219, 220, 227, 258, 260, 265, 308, 309; 395/200.68, 200.72

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

APS

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,E	US 5,884,032 A (BATEMAN ET AL.) 16 March 1999, Figs. 1, 6, 10 and col. 1 line 33 to col. 4 line 22.	1-33
X,E	US 5,878,130 A (ANDREWS et al.) 02 March 1999, figs. 1-9 and col. 1 line 16 to col. 4 line 3; col. 4 line 55 to col. 5 line 20; and col. 5 line 59 to col. 7 line 14.	1-33
X,P	US 5,862,211 A (ROUSH) 19 January 1999, fig. 1; col. 1 line 40 to col. 3 line 42.	1-33
X,P	US 5,848,143 A (ANDREWS et al.) 08 December 1998, figs. 1-13, col. 1 line 16 to col. 3 line 62.	1-33
X,P	US 5,768,360 A (REYNOLDS et al.) 16 June 1998, figs. 1-2; see claims 1, 5, 9, 10	1, 13, 25-27

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*E* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 23 APRIL 1999	Date of mailing of the international search report 09 JUN 1999
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer BOB A. PHUNKULH <i>James R. Matthews</i> Telephone No. (703) 308-8251

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/03346

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,546,452 A (ANDREWS et al.) 13 August 1996, figs. 1-8, see col. 1 line 23 to col. 3 line 19.	1-33
X,P	US 5,778,060 A (OTTO) 07 July 1998, figs. 1, 6; col. see claims 1 6 20.	1, 13, 25-27
Y	US 5,530,744 A (CHARALAMBOUS et al.) 25 June 1996, see abstract, and claims 1, 15, 21	1, 13, 25-27
Y	US 5,528,678 A (KAPLAN) 18 June 1996, see abstract, and claims 1 and 15.	1, 13, 25-27
Y	US 5,452,350 A (REYNOLDS et al.) 19 September 1995, see figs. 1-2.	1, 13, 25-27
X	US 4,737,983 A (FRAUENTHAL et al.) 12 April 1988, fig. 3; col. 1 line 13 to col. 2 line 49.	1, 13, 25-27
Y	US 5,193,110 A (JONES et al.) 09 March 1993, see abstract	1-33
X	US 5,036,535 A (GECHTER et al.) 30 July 1991, see figs. 1-7B; and claims 1-63.	1-33

INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/03346

A. CLASSIFICATION OF SUBJECT MATTER:  
US CL :

370/351, 352, 353, 354, 355, 356; 379/93.01, 93.14, 219, 220, 227, 258, 260, 265, 308, 309; 395/200.68, 200.72