

BRANCH CALLING AND CALLER ID BASED  
CALL ROUTING TELEPHONE FEATURES

Samuel F. Wood

Jerry A. Klein

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CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. Application Serial No. 09/565,565,  
10 filed May 4, 2000, entitled "Telephone Call Control System for the Public Switched  
Telephone Network."

FIELD OF THE INVENTION

This invention relates to telephone services and, in particular, to a system for allowing  
a subscriber to select features of the subscriber's telephone service and to various novel  
15 features that can be selected.

BACKGROUND

People have used various means for limiting interruptions due to the telephone. In the  
past, people used switchboards and secretaries to screen incoming, or inbound, calls. Voice  
mail systems took over some of this role both in the home and in the central office. Today,  
20 there are web-based companies managing 3rd-party call control, via the toll-switch network,  
which allow users to enter call control information through a web portal. There are also edge  
devices in each of the public telephone company's central offices which provide local control,  
but offer an extremely limited number of features and do not provide true 3rd-party call  
control.

25 The web-based toll systems provide good user interaction but they are not economical  
and cannot take advantage of local number portability because they do not provide local  
control and connectivity.

The Public Switched Telephone Network (PSTN) consists of a plurality of edge  
switches connected to telephones on one side and to a network of tandem switches on the  
30 other. The tandem switch network allows connectivity between all of the edge switches, and a

signalling system is used by the PSTN to allow calling and to transmit both calling and called party identity.

Until now, optional features were provided by the local service telephone company (telco) through the edge switch at the central office (CO). It was not possible to provide  
5 optional features through any other means. Control of these features was done through the first party (calling party) or the second party (called party), or worse yet, manually by calling the business office.

In the past, numerous devices have been built that allow the connection of two lines together at an edge switch. These devices can be used to add features to a telephone network  
10 by receiving a call on one line and then dialing out on another line. The problem with these devices is that, because they are connected through an edge switch, transmission losses and impairments occur, degrading the overall connection. In addition, signalling limitations prevent full control, by the subscriber or the system, over the call.

A preferred embodiment of the inventive system described herein connects at the  
15 tandem, thereby eliminating these problems.

In the edge devices residing in the PSTN central offices, the 1st party (the calling party) has numerous features available (dialing options). The 2nd party (called party) also has options available such as call forwarding, but these features typically require access from the first or second party's device and are extremely awkward to program. The user interaction is  
20 not only awkward, it is limited and requires interaction with the telephone company to provision them. In other words, past systems for provisioning, meaning addition, modification, or control of telephone features, required a subscriber to make the feature selection through the telephone business office. Central office workers would then implement the provisioning under request of the business office.

25 Call Forwarding is one popular provision. There is signification transmission degradation for Call Forwarding to take place. The calling party pays for a call to the edge device, and the edge subscriber, the called party, pays for the call to the forwarding number. For enhanced inbound call control to occur, a direct 3rd-party call control means is needed.

A variety of services have arisen to address the problems mentioned above. Many of  
30 these systems allow the called party to make changes to his/her call forwarding attributes which do not allow direct 3rd-party call control. These services provide good user interaction, some via the internet, but they rely upon the toll network through the use of "800" numbers.

This requires the subscriber to pay by the minute and does not allow the subscriber to take advantage of number portability in order to obtain 3rd-party call control. There are other toll network mechanisms for remote call forwarding. For example, MCI offers a service where the customer can remotely change the forwarding target number for "800" numbers.

- 5 Contacting the ultimate end-user before terminating the first incoming call is similar to the manner in which "800" credit calls and collect calls are processed, but these are not done at the local subscriber level.

In addition to these toll services, there are edge devices that perform some of the same services. Edge devices such as phones and PBXs that include voice mail, inter-active voice  
10 response, call forwarding, speed calling, etc., have been used to provide additional call control. These devices allow the phone user direct control over incoming and outgoing calls. The disadvantage of edge devices is that they add cost, degrade voice and transmission quality, can be difficult to program, are not easily programmed remotely, can require the user to pay for two lines, provide lower quality of service, and cannot provide the same level of  
15 functionality as a system that controls the PSTN directly. There are Voice Over Internet Protocol (VoIP) products emerging that provide better user interfaces and control but they do not take advantage and voice quality of the PSTN.

#### SUMMARY

20 A system for allowing a subscriber to remotely control features is described herein along with various telephone features that may be programmed into the system. A subscriber may be any customer using the telephone service, in contrast to employees of the PSTN who may use special communication networks within the PSTN. Two such features are caller ID (CID) based call routing and branch calling. The system allows the subscriber to set up a  
25 feature where the CID signal is detected within the PSTN and automatically associated with stored information relating to the caller. The stored information may have been previously entered into a memory within the PSTN by the subscriber via the world wide web. The CID signal may be also used to route the call to one of more forwarding numbers or to take any other action, such as blocking the call. This feature also allows the subscriber to use the CID  
30 signal to display certain information even though the caller may have her CID blocked.

Another feature described herein is referred to as branch calling, which allows a call to be forwarded to multiple telephones simultaneously, where the first telephone answered terminates the calling of the other telephones (or any other end units).

The preferred system described herein adds direct control of third party call control features, but does not suffer from any of the disadvantages listed above, and allows the subscriber to manage his/her telephone system in a dynamic and exceptionally useful manner that is not currently available through the existing PSTN. The system allows enhanced direct third-party call control features, such as selective call routing and remote dialing, to be added to the PSTN (Public Switched Telephone Network) using local call control and providing dynamic provisioning of the system by the subscriber. Direct 3rd-party control means that the ability to provision the 3rd-party features is directly available to a subscriber, eliminating the need to go through the telephone company (telco) business office.

In one embodiment, the system includes a processor (referred to herein as a tandem access controller) connected to the PSTN which would allow anyone to directly provision, that is to say set-up and make immediate changes to, the configuration of his or her phone line. In another embodiment, a tandem access controller (TAC) subsystem is connected internally to the PSTN in a local service area. The TAC provides features, selected by the subscriber, to all edge switches connected to the PSTN tandem switch. Connecting directly to the PSTN tandem switch (or embedding the system into the tandem switch) eliminates the signal degradation problems previously described.

In one embodiment, the system allows provisioning of features via the internet under direct control of the subscriber. Recently, several products have been introduced that provide a means of controlling features via the public internet. However, all these devices fall short in that they require the subscriber to obtain an "800" number or some other number that requires the subscriber to pay a toll charge each time a call is made. The system connects locally, so no toll charges are incurred.

The offered features are implemented by software programs run by the processing system.

The web-enhanced services in one embodiment of the invention coexist with and overlay the local phone service at the local level, thereby providing good economics and user interaction, single number access to multiple subscriber devices, connectivity without transmission impairments and true, direct 3rd-party call control.

The present system relies upon use of local telephone facilities thereby eliminating all the extra charges associated with making toll calls. It also allows the user to take advantage of number portability and keep his/her existing public phone number.

5 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates the tandem access controller (TAC) in one embodiment of the present invention connected to the existing PSTN tandem switch, the TAC providing features for the subscriber's telephone as requested by the subscriber via the web.

Fig. 2 illustrates a system similar to Fig. 1 but showing multiple tandem switches and TACs and also showing how the subscriber may, in addition to using the standard telephone,  
10 make phone calls using Voice Over IP via a conventional digital telephone.

Fig. 3 is a flowchart of one method that a person may use to set up a subscriber account and to designate features the subscriber would like for his/her telephone.

Fig. 4 is a flowchart of a method that can be performed by the TAC in response to the  
15 subscriber (or other service) controlling the TAC, using the web (or other packet-based system), to change the subscriber's telephone provisioning or perform another function, such as make a VoIP call.

Fig. 5 is a flowchart of a method that can be performed by the TAC in response to an inbound call to the subscriber.

Fig. 6 is a flowchart of a method performed by the subscriber and the TAC when the  
20 subscriber desires to make an outbound call via the web or using a conventional telephone.

Fig. 7 illustrates a system, using the TAC, that allows wireless cell phones to obtain the same provisioning options as the conventional telephones.

Fig. 8 illustrates a system, using the TAC, that allows fax and modem calls to benefit  
25 from the provisioning offered by the TAC.

Fig. 9 is a flowchart of possible scenarios using the caller ID based feature.

Fig. 10 is a flowchart of possible scenarios using the branch calling feature.

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