

(22) Date de dépôt/Filing Date: 1999/03/03

(41) Mise à la disp. pub./Open to Public Insp.: 1999/09/04

(45) Date de délivrance/Issue Date: 2002/11/26

(30) **Priorité/Priority:** 1998/03/04 (09/034,765) US

(51) Cl.Int.⁶/Int.Cl.⁶ H04M 3/38, H04Q 3/00

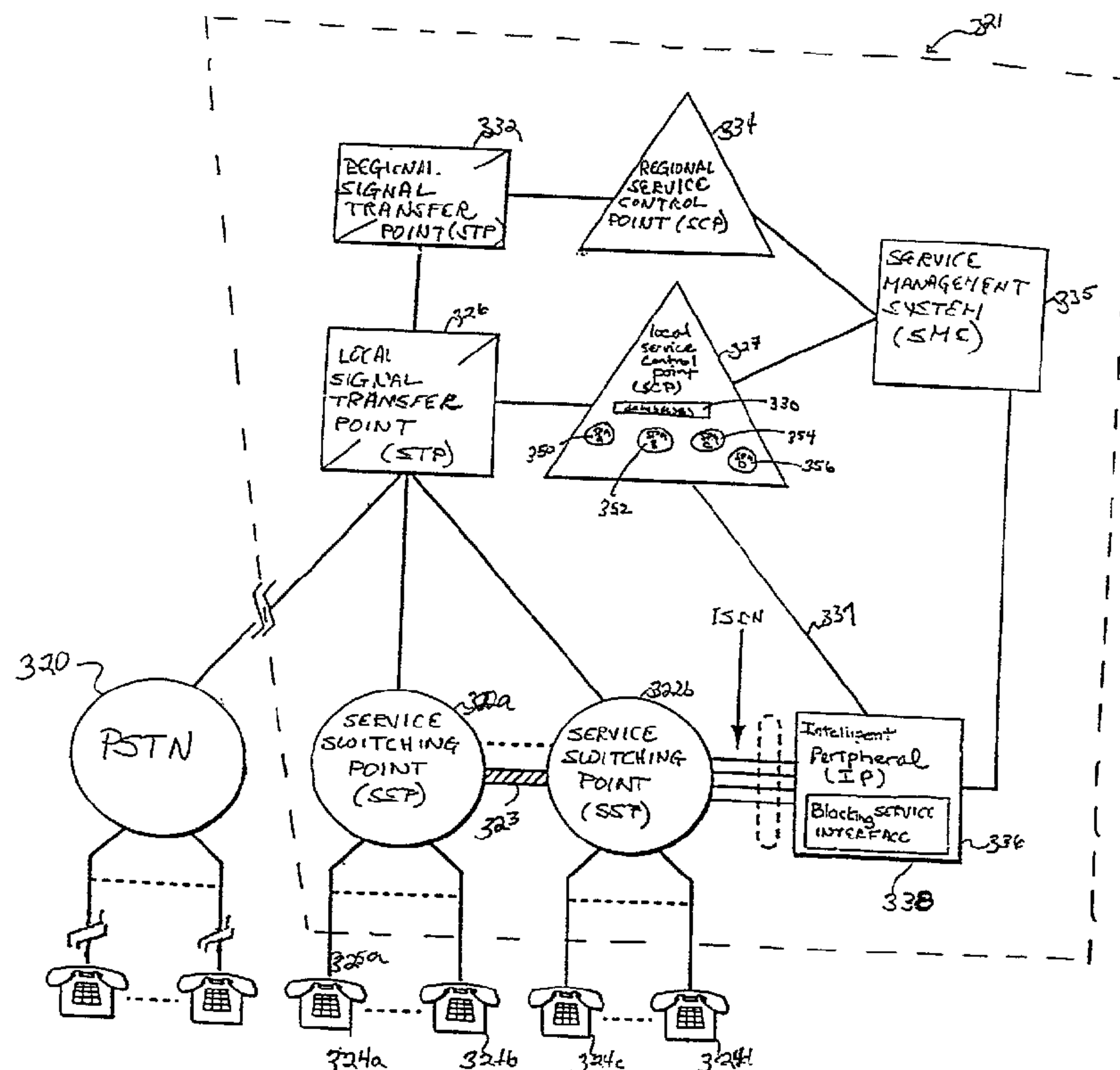
(72) Inventeur/Inventor:
MALIK, DALE W., US

(73) Propriétaire/Owner:
BELLSOUTH INTELLECTUAL PROPERTY
CORPORATION, US

(74) **Agent:** FINLAYSON & SINGLEHURST

(54) Titre : SYSTEME ET METHODE DE GESTION DE BLOCAGE DES SERVICES DE RESEAUX INTELLIGENTS EVOLUES

(54) Title: SYSTEM AND METHOD FOR MANAGING CUSTOMER BLOCKING OF ADVANCED INTELLIGENT NETWORK SERVICES



(57) Abrégé/Abstract:

A system and method for managing information relating to the blocking of an advanced service associated with respect to a communication from a calling line number. A communication directed to a feature code is received from a calling line associated with the calling line number. Also, an indication to block a selected advanced service is received so that the selected advanced

(57) Abrégé(suite)/Abstract(continued):

service is not to be applied to communications from the calling line number. In turn, a blocking record is created with respect to the calling line number. The blocking record includes the calling line number, an originating point code associated with the calling line number, and the indication to block the selected advanced service. The blocking record in association with other blocking records respectively corresponding to other calling line numbers is stored so that the blocking record is accessible for review by a network element in its determination whether to apply the selected advanced service to the communication from the calling line number. Generally, the blocking record is stored in a database separate from any service package application (SPA) used to apply advanced services to communications from the calling line number. Also, a personal identification number may be established for accessing the blocking record and may be included in the blocking record. Indications that an additional advanced service is either blocked or unblocked may also be provided in the blocking record.

ABSTRACT

SYSTEM AND METHOD FOR MANAGING CUSTOMER
BLOCKING OF ADVANCED
INTELLIGENT NETWORK SERVICES

A system and method for managing information relating to the blocking of an advanced service associated with respect to a communication from a calling line number. A communication directed to a feature code is received from a calling line associated with the calling line number. Also, an indication to block a selected advanced service is received so that the selected advanced service is not to be applied to communications from the calling line number. In turn, a blocking record is created with respect to the calling line number. The blocking record includes the calling line number, an originating point code associated with the calling line number, and the indication to block the selected advanced service. The blocking record in association with other blocking records respectively corresponding to other calling line numbers is stored so that the blocking record is accessible for review by a network element in its determination whether to apply the selected advanced service to the communication from the calling line number. Generally, the blocking record is stored in a database separate from any service package application (SPA) used to apply advanced services to communications from the calling line number. Also, a personal identification number may be established for accessing the blocking record and may be included in the blocking record. Indications that an additional advanced service is either blocked or unblocked may also be provided in the blocking record.

5

10

1

15

SYSTEM AND METHOD FOR MANAGING CUSTOMER
BLOCKING OF ADVANCED
INTELLIGENT NETWORK SERVICES

FIELD OF THE INVENTION

20

This invention generally relates to the field of telecommunications. This invention particularly relates to the field of managing advanced services in an Advanced Intelligent Network (AIN), and even more particularly, this invention relates to the field of caller-activated blocking of advanced services in an AIN.

BACKGROUND OF THE INVENTION

25

30

In the competitive market of telecommunication services, a customer may desire to augment his or her conventional telecommunication service with advanced services. Generally, an advanced service is a service that provides features or functions that are not usually provided within a local switching system (e.g., #5ESS, manufactured by Lucent Technologies), that are relatively complex, that require coordination of multiple systems, and that are implemented typically through the use of data communications between or among network elements. Examples of advanced services include call return, flexible call forwarding, three-way calling, etc.

35

Presently, some advanced services are usage-sensitive services that can be used simply by entering a feature code associated with that advanced service. A usage-sensitive service is an advanced

service that is provided on a per use basis in response to an action by the customer. The usage-sensitive service usually is also charged on a per use basis. For example, if a customer wanted to use the call return service, the customer would enter a feature code, for example “*69”, to have the service applied to the calling line. The feature code for the advanced service is typically entered on the telephone keypad for each use of the advanced service. The customer then is charged each time the advanced service is used. Access to the advanced services is not restricted or prevented. In other words, anyone aware of the feature code for an advanced service can use the advanced service without any limitation. Consequently, a customer may receive charges on the customer’s bill that the customer is unaware of, specifically due to use of a usage-sensitive service. Therefore, it would be beneficial to a customer to be able to restrict or prevent access to these type of advanced services.

One way prior systems have solved the problem of preventing access to an advanced service is to provide blocking of the advanced service. Blocking an advanced service prevents the advanced service from being applied to the calling line. Generally, a customer who wants to block an advanced service has to call a service provider representative and make a request to block the advanced service. The service provider representative then may obtain administrative information and service-related information regarding the customer and then may download the information provided by the customer into a database or an appropriate advanced intelligent network (AIN) element. Finally, an order is sent to a switch serving the calling line to block the advanced service. This process is at best time-consuming, inefficient, and complex. The present system does not provide an efficient way of performing these operations. Moreover, the present system does not provide a way of circumventing the representative/customer interaction for each request made by a customer to block an advanced service.

Prior systems usually are designed so that each service package application (SPA) maintains its own database. Service-related information, such as blocking of an advanced service, is stored in the database for the advanced service. Hence, when a customer makes a request to the service provider representative to block an advanced service, the service provider representative generally has the

cumbersome task of downloading information regarding blocking an advanced service within each applicable SPA for the customer. Consequently, after the customer makes a request to block an advanced service, implementing blocking of the advanced service may not occur immediately. In addition, the service provider has to expend more resources to manage blocking of advanced services due to use of separate databases.

Accordingly, there is a need for a system and method that provides blocking and unblocking of an advanced service in an Advanced Intelligent Network (AIN).

There is also a need for a system and method that provides blocking and unblocking of an advanced service without the need for representative/customer interaction.

There is an additional need for a system and method that provides a central archive for maintaining and managing information relating to blocking of advanced services.

There is a further need for a system and method that provides a centralized AIN element for implementing the above-described needs efficiently, easily, and inexpensively.

SUMMARY OF THE INVENTION

The present invention satisfies the above-described needs by providing a caller-activated rental system and method in the Advanced Intelligent Network (AIN) for advanced services. The present invention uses a blocking record database for maintaining a central archive of blocking records that can be directly accessed by the customer. Advantageously, the blocking record is used to centralize blocking information among advanced services so that a customer can directly control and manage the blocking and unblocking of advanced services. The customer then is able to block and unblock an advanced service using the blocking record without intervention from a service provider representative. The present invention conveniently and efficiently manages blocking and unblocking of an advanced service in an SCP or IP.

Generally described, the present invention provides a method for centralizing information relating to the blocking of an advanced service associated with respect to a communication from a

calling line number. Specifically, a communication directed to a feature code is received from a calling line associated with the calling line number. Also, an indication to block a selected advanced service is received so that the selected advanced service is not to be applied to communications from the calling line number. In turn, a blocking record is created with respect to the calling line number. The blocking record includes the calling line number, an originating point code associated with the calling line number, and the indication to block the selected advanced service. The blocking record in association with other blocking records respectively corresponding to other calling line numbers is stored so that the blocking record is accessible for review by a network element in its determination whether to apply the selected advanced service to the communication from the calling line number.

Generally, the blocking record is stored in association with the other blocking records in a database separate from any service package application (SPA) used to apply advanced services to communications from the calling line number. Also, a personal identification number may be established for accessing the blocking record. This personal identification number may be included in the blocking record. Confirmation may be provided to the communication that the advanced service is blocked. Indications that an additional advanced service is either blocked or unblocked also may be provided in the blocking record.

In another aspect, the present invention provides a method for implementing blocking of an advanced service with respect to a communication from a calling line number. In this aspect of the present invention, a communication directed to a feature code is received from a calling line associated with the calling line number. On the basis of the communication being directed to the feature code, a blocking record associated with the calling line number is checked for an indication that the selected advanced service is not to be applied to the communication. Based on the indication, the communication is processed without applying the selected advanced service to the communication.

In another aspect, the present invention provides a method for allowing a change in the status of an advanced service with respect to communications from a calling line number. In this aspect of the present invention, a communication directed to a feature code is received from a

calling line associated with the calling line number. An indication is received from the communication to unblock a selected advanced service to communications that are from the calling line number. A blocking record with respect to the calling line number is retrieved. The blocking
5 record includes an indication that the selected advanced service is currently blocked. In response to receipt of the indication to unblock the selected advanced service, the blocking record is changed by changing the indication that the selected advanced service is blocked to the indication that the selected advanced service is unblocked. The blocking
10 record is then stored in association with other blocking records respectively corresponding to other calling numbers. Finally, the selected advanced service is applied to the calling line associated with the calling line number.

In another aspect, the present invention provides a caller-
15 activated blocking system for advanced services. The system comprises an advanced intelligent network (AIN) element operative to make a recognition of a communication as a request for blocking of an advanced service with respect to a calling line on the basis of use of a feature code to which the communication is directed. The AIN element is also
20 operative to direct collection of blocking information regarding the advanced service for the calling line and to receive the blocking information. In addition, on the basis of the blocking information, the AIN element is operative to direct blocking of the advanced service for the calling line number so that the advanced service is not applied to the
25 calling line.

With respect to the system, the advanced service typically is maintained independent of the AIN element operative to receive the blocking information. Usually, the AIN element is further operative to direct creation of a blocking record regarding the advanced service for
30 the calling line number with the blocking record being based on the blocking information and to receive the blocking record instead of the blocking information. Further, on the basis of the blocking record, instead of the blocking information, the AIN element may be operative to direct blocking of the advanced service for the calling line number so
35 that the advanced service is not applied to the calling line.

In another aspect, the present invention provides a blocking record for storing blocking information for advanced services. The

blocking record comprises a calling line number field, an originating point code (OPC) field, and at least one advanced service field. The calling line number field hosts a calling line number associated with a calling line. The originating point code (OPC) field hosts an OPC of a switch serving the calling line number. The advanced service field represents an advanced service and indicates a status of the advanced service.

Typically, the status of the advanced service is either unblocked or blocked. The blocking record can also include a personal identification (PIN) field for hosting a PIN. The PIN preferably restricts access to the blocking record and changes the status of an advanced service either from blocked to unblocked or from unblocked to blocked within the blocking record. In addition, the advanced service field is generally value-sensitive such that a value of "1" indicates that the advanced service is blocked and a value of "0" indicates that the advanced service is unblocked.

In summary, the present invention provides a system and method for blocking and unblocking of an advanced service in an Advanced Intelligent Network (AIN). The present invention also provides a system and method for blocking and unblocking of an advanced service without the need for representative/customer interaction. In addition, the present invention provides a system and method for maintaining and managing information relating to blocking of advanced services in a central archive. The present invention also provides a system and method for centralizing an AIN element for implementing the above-described features efficiently, easily, and inexpensively.

These and other objects, features, and advantages of the present invention may be more clearly understood and appreciated from a review of the following detailed description of the disclosed embodiments and by reference to the appended drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates a blocking record with fields for advanced services in accordance with an exemplary embodiment of the present invention.

Figs. 2a and 2b are flow diagrams illustrating an exemplary method of operation of the present invention.

Fig. 3 is a diagram of an exemplary embodiment and exemplary environment for operation of the present invention.

5

DETAILED DESCRIPTION

The present invention includes, *inter alia*, a caller-activated blocking system in the Advanced Intelligent Network (AIN) for advanced services. A customer can obtain direct access to advanced services without having to rely on a service provider representative of a telecommunication service provider. Specifically, the customer is able to place a call to create a personal profile record, namely a blocking record, that is customer controlled and managed. The blocking record is a collection of information that generally includes blocking information for advanced services. The blocking record is used to centralize blocking information among advanced services so that a customer can control and manage the blocking and unblocking of advanced services. Once the blocking record is established, the customer is able to directly access the blocking record by merely placing a call to any advanced service. Consequently, the customer can block and unblock any advanced service in the blocking record without the intervention of a service provider representative. The particular embodiments described herein are intended in all respects to be illustrative rather than restrictive. Alternative embodiments will become apparent to those skilled in the art to which the present invention pertains without departing from its spirit and scope.

25

30

This detailed description first provides an overview of an exemplary embodiment of the present invention by reference to the illustration of a blocking record with fields for advanced services Fig. 1 and to the flow diagrams of Fig. 2a and 2b.

35

The overview is followed by a description of exemplary provisioning of the present invention in the exemplary environment. In other words, the exemplary provisioning description provides an explanation of the set-up of an exemplary embodiment through the preferred provisioning of a service switching point (SSP) with public office feature code (POFC) triggers.

After this exemplary provisioning description, a description of an exemplary operation of an exemplary embodiment of the present invention in connection with the exemplary environment is illustrated in Fig. 3. This description of exemplary operation includes examples illustrating a customer creating and updating a blocking system for an advanced service and implementation of the present invention after the creation and updating process. Throughout the drawings, like numerals indicate like elements.

10 Overview of an Exemplary Embodiment

Generally, the present invention includes, *inter alia*, a caller-activated blocking system in an Advanced Intelligent Network (AIN) for advanced telecommunication services. An "advanced telecommunication service" is also referred to as an advanced service herein.

15 Fig. 1 illustrates a typical blocking record with fields for advanced services in accordance with an exemplary embodiment of the present invention. The blocking record 5 is a collection of information that includes blocking information for advanced services and, generally includes, identification information for identifying the source of a call. 20 Such identification information may include a calling line number and an originating point code. The blocking record 5 is created pursuant to a selected format or protocol. The blocking record 5 can generally include a calling line number field 20, an originating point code (OPC) field 25, a personal identification number (PIN) field 30, and advanced service fields 40.

25 The calling line number field 20 hosts the calling line number of the customer. The OPC field 25 hosts the OPC of the switch serving the calling line number. The OPC identifies the switch serving the calling line number so that advanced services can be blocked and unblocked. 30

The PIN field 30 hosts a personal identification number (PIN) designated by the customer or provided by the service provider. Preferably, the PIN is established during the creation of the blocking record and is designed to restrict access to the blocking record 5. The 35 PIN is also used for changing the status of an advanced service from blocked to unblocked and vice-versa within the blocking record 5. Once

the PIN is set up, it remains the same for the existence of the blocking record.

The advanced service fields 40 include specific advanced services 40a – 40d that are provided by a service provider. These advanced service fields 40 are set up by the service provider for designating an advanced service as unblocked or blocked. As used herein, the terms "unblock", "unblocked" and "unblocking" are indicative of an advanced service being provided in connection with the associated calling line number. Also, as used herein, the terms "block", "blocked" and "blocking" are indicative of an advanced service not being provided in connection with the associated calling line number. In an exemplary embodiment, these advanced service fields 40 are value-sensitive, where, in an advanced service field, a value of "1" indicates that the advanced service is blocked and a value of "0" indicates that the advanced service is unblocked.

In Fig. 1, the advanced service fields 40 may include a long distance service 40a, a flexible call forwarding service 40b, a three-way calling service 40c and a call return service 40d. These advanced services preferably are usage-sensitive services.

A usage-sensitive service is an advanced service that is provided on a per use basis in response to a positive action by the customer. Such positive action includes dialing a feature code or special access code to access the advanced service. Usually, a service provider bills the customer for the usage-sensitive service on a per use basis. For example, a long distance service is a usage-sensitive service, where the long distance service typically is provided when a customer dials "1", an area code and a calling line number. The customer is then charged by the service provider for using the long distance service. Examples of other usage-sensitive services include repeat dialing service, caller identification tracking service and rental services. For further information regarding rental services and aspects thereof, the interested reader is referred to the commonly assigned Canadian Patent Application File No. 2,244,461, filed on July 31, 1998, entitled "System and Method for Automatic Provision and Customer Selection and Deactivation of Temporary Advanced Intelligent Network Services", which may be referred to for further details.

As used herein, the phrase "advanced services" refers to features or enhancements that are provided by a service provider to a customer in addition to conventional telephone service through the PSTN. As previously mentioned, examples of advanced services preferably include usage-sensitive services, such as flexible call forwarding service, rental services, three-way calling service, call return service, and long distance service. However, it will be appreciated by one skilled in the art that the present invention is not limited to usage-sensitive services. Specifically, the present invention may also include other advanced services such as voice mail service, caller identification service, and so forth. It will also be appreciated that the present invention is not limited to the referenced advanced services, but may include various other advanced services. Further, it will be appreciated that the blocking record can accommodate an unlimited number of advanced service fields for advanced services, but in all practicality, the number of advanced service fields may be restricted for manageability of the blocking system.

Generally, to create a blocking record, a customer first dials a feature code for an advanced service. If the advanced service can be blocked, an announcement for the advanced service is played indicating that the advanced service can be blocked. If the customer desires to block the advanced service, a blocking record is created containing the advanced service fields previously mentioned. An indication is provided, for example a value of "1", in the advanced service field to block the associated advanced service. The remaining advanced service fields preferably contain a value of "0" to indicate that the remaining advanced services are unblocked. This process is described in greater detail in connection with Figs. 2a and 2b.

In a case where all advanced services are unblocked by the customer, the blocking record is deleted from the blocking record database. In doing so, space in the database is not unnecessarily occupied. When the customer later desires to block an advanced service, a new blocking record is created and saved in the database, and the advanced service fields are reestablished.

Figs. 2a and 2b are flow diagrams illustrating an exemplary method of operation of the present invention. In Fig. 2a, the process begins at the Start step 200, and in step 205, a feature code and

identification information associated with a calling line are received in connection with a communication. This identification information typically includes an originating point code (OPC) and a calling line number associated with a calling line. Generally, the communication is directed to the feature code and is placed on a calling line associated with the calling line number. By direction of the communication to the feature code, the caller has provided an indication of a request for an advanced service.

This advanced service may include a temporary advanced telecommunication service or a usage-sensitive service with respect to the calling line or calling line number associated with the communication. As used herein, the term "calling line" is used synonymously with the term "calling line number" unless a distinction is noted. For example, a customer, who is interested in blocking a flexible call forwarding service, places a call to a feature code for that advanced service by using the telephone associated with the calling line number to which the advanced service is to be applied. The caller can then block the flexible call forwarding service so that the advanced service is not provided on that calling line.

Based on the calling line number, in step 210, a database is consulted in an SCP for a blocking record. The database, which may also be referred to herein as a blocking record database, contains blocking records associated with various calling line numbers. Next, in step 215, a determination is made as to whether the calling line number has an existing blocking record. If so, the "YES" branch is followed to step 265 (Fig. 2b), in which case, the blocking record associated with the calling line number of the communication is retrieved from the blocking record database; otherwise, the "NO" branch is followed to step 220. The situation where the existing blocking record is retrieved from the database is described in greater detail below in connection with Fig. 2b.

Referring to Fig. 2a, in the case where a blocking record does not exist, an announcement is played, in step 220, indicating that blocking is available for the advanced service. Next, in step 225, a determination is made as to whether blocking of the advanced service is desired. Preferably, an announcement is played prompting the customer to provide an indication of the desirability to block the advanced service. If blocking the advanced service is desired, the "YES" branch is followed

to step 230; otherwise, the "NO" branch is followed to step 260. In step 260, the advanced service is provided in a conventional manner on the calling line. The process terminates at the END step 295.

5 If blocking the advanced service is desired, a PIN is set up for the blocking record, in step 230. The PIN can be designated by the customer, or it can be assigned by the service provider. Next, in step 235, the blocking record is created having advanced service fields, as previously described in connection with Fig. 1. The fields in the blocking record are populated with identification information including
10 the calling line number and the OPC associated with the calling line number. In addition, the PIN preferably is included in the blocking record. The calling line number, the OPC, and the PIN preferably are populated in the calling line number field, the OPC field, and the PIN field, respectively.

15 As discussed in connection with Fig. 1, the PIN is used for changing the status of an advanced service from blocked to unblocked and vice-versa within the blocking record. Specifically, by entering the PIN on a telephone keypad, an advanced service that is blocked becomes unblocked, and an advanced service that is unblocked becomes blocked.
20 In the case where a blocking record is created, all advanced service fields initially are unblocked. However, the act of setting up a PIN indicates that the advanced service associated with the feature code that was received in step 205 is to be blocked. Therefore, in step 245, the advanced service is blocked by placing a value of "1" in the appropriate
25 advanced service field. The remaining advanced service fields contain a value of "0", which indicates that the associated advanced services remain unblocked.

Once the advanced service has been blocked, in step 250, the status of the advanced service is confirmed. For example, an
30 announcement may be played indicating that the advanced is blocked. After this confirmation, in step 255, the blocking record is stored in the database. The exemplary method ends in step 295.

Now turning to Fig. 2b, if a determination is made that the blocking record for the calling line exists, in step 265, the blocking
35 record is retrieved from the blocking record database. Next, in step 267, a determination is made as to whether the advanced service is blocked. This determination is made by checking the advanced service

field for the advanced service. The advanced service field can either have a value of "1" meaning blocked or a value of "0" meaning unblocked, as previously mentioned in connection with Fig. 1. If the advanced service is blocked, the "YES" branch is followed to step 268; otherwise, the "NO" branch is followed to step 269a. If the advanced service is blocked, in step 268, an announcement is played indicating that the advanced service is blocked.

It will be appreciated by those skilled in the art that an announcement is played in accordance with methods known in the art of telecommunications. It will be further appreciated that the present invention is not limited to playing an announcement as an indication that an advanced service is blocked or unblocked, but the present invention instead may provide some other indication as to the status of the advanced service.

Once the announcement is played indicating that the advanced service is blocked, in step 269b, a determination is made as to whether the status of the advanced service is to be changed from blocked to unblocked. After the announcement is played indicating that the advanced service is blocked, preferably, another announcement can be played prompting the customer to provide an indication to change the status of the advanced service. If a determination is made to change the status of the advanced service, the "YES" branch is followed to step 270b; otherwise, the "NO" branch is followed to the END step 295.

In step 270b, the PIN is received in an intelligent peripheral, such as a service circuit node, from the customer. The PIN is the same one established when the blocking record was created. In response to receiving the PIN, the status of the advanced service changes from blocked to unblocked, in step 272b. Preferably, the value in the advanced service field changes from "1" to "0". Next, in step 274b, the status of the advanced service is confirmed. For example, an announcement can be played indicating that the advanced service is unblocked. After the change is made and confirmed, the blocking record is stored in the database, in step 276b. In step 278, the advanced service then is provided in a conventional manner on the calling line. The process terminates at the END step 295.

Referring back to step 267 in Fig. 2b, in the event that the advanced service is unblocked, the "NO" branch is followed to step 269a.

In step 269a, a determination is made as to whether the status of the advanced service is to be changed from unblocked to blocked. This determination can be made by playing an announcement indicating that blocking is available for the advanced service and prompting the customer to provide an indication to change the status of the advanced service. If a determination is made to change the status of the advanced service, the "YES" branch is followed to step 270a; otherwise, the "NO" branch is followed to step 280. In step 280, the advanced service is provided in a conventional manner on the calling line. The process terminates at the END step 295.

In step 270a, the PIN is received in an intelligent peripheral, such as a service node, from the customer. In response to receiving the PIN, the status of the advanced service changes from unblocked to blocked, in step 272a. Preferably, the value in the advanced service field changes from "0" to "1". Next, in step 274a, the status of the advanced service is confirmed. For example, an announcement can be played indicating that the advanced service is now blocked. After the change is made and confirmed, the blocking record is stored in the database, in step 276a. The process terminates at the END step 295.

Advantageously, the exemplary method allows a customer to control and manage a selected advanced service without the need for a service provider representative. Further, the exemplary method allows the customer to block and unblock the advanced service with a minimum of time and effort and minimum interaction with a telecommunication service provider. Additional advantages of the present invention are discussed below.

Exemplary Operation of an Exemplary Embodiment in an Exemplary Environment

Overview of AIN elements

Fig. 3 is a diagram of an exemplary embodiment and exemplary environment for operation of the present invention. Connected to the public switched telecommunication network (PSTN) 320, an exemplary environment is an Advanced Intelligent Network (AIN) 321. For brevity, only a basic explanation of the AIN 321 is provided herein. Where the AIN 321 operates or is composed differently in an important aspect from that which would be understood

by those skilled in the art, additional details are provided herein. For further information regarding the referenced AIN 321 and aspects thereof, the interested reader is referred to the commonly assigned patent to Weisser, U.S. Patent No. 5,430,719, which may be referred to for further details.

5 The AIN 321 includes a variety of interconnected network elements. A group of such network elements includes the plurality of central offices which are indicated as service switching points (SSPs) 322a, 322b in Fig. 3. An SSP typically includes switch functionality, but also includes other functionality so as to communicate with other AIN elements as those skilled in the art understand. As further illustrated in Fig. 4, the SSPs 322a, 322b have a
10 plurality of subscriber lines connected thereto. A subscriber line may also be referred to as a calling line. Each SSP serves a designated group of calling lines and thus, the SSP that serves a particular calling line may be referred to as its serving SSP. Each calling line is connected typically to a piece of terminating equipment including a plurality of telephones commonly
15 referenced as 324 and individually referenced as 324a, 324b, 324c and 324d. Although telephones are illustrated as the pieces of terminating equipment in Fig. 3, those skilled in the art will understand that such pieces include other telecommunication devices such as facsimile machines, computers, modems, etc.

 Pursuant to the preferred embodiment, each active calling line in an AIN is assigned a ten digit calling line number. In the description of the present invention, the term
20 "calling line number" is used in its generally understood meaning to be the number which is dialed or input by a caller or source and used by the network to route the communication so as to reach a piece of terminating equipment on a calling line associated with the dialed calling line number. A calling line number is commonly referred to as a telephone number or a calling line number.

25 Referring again to Fig. 3, SSPs 322a, 322b are interconnected by a plurality of trunk circuits 323. These are the voice path trunks that interconnect the SSPs to connect communications. The term "communication" or "call" is used herein to include all messages that may be exchanged between caller and called party in the network illustrated in Fig. 3.

Each of the SSPs 322a, 322b is connected to another type of AIN element referred to as a local signal transfer point (STP) 326 via respective data links. Currently, these are data links employing a signaling protocol referred to as Signaling System 7 (SS7), which is well known to those skilled in the art. Much of the intelligence of the AIN resides in yet another type of AIN element referred to as a local service control point (SCP) 327 that is connected to STP 326 over a SS7 data link. Among the functions performed by the SCP 327 is the maintenance of network databases and subscriber databases as represented collectively by databases 330. These databases may be used in providing advanced services to a customer. One such database is preferably a blocking record database 330 for maintaining blocking records. Typically, the SCP 327 is also the repository of service package applications (SPAs) that are used in connection with or as part of the databases 330 in the application of advanced services or enhanced features to calling lines. These SPAs may include SPA A 350, SPA B 352, SPA C 354, and SPA D 356, each of which represent an advanced service, such as a long distance service, a flexible call forwarding service, a three-way calling service, and so forth. Preferably, the blocking record database 330 is independent of the advanced services so as to serve as a central archive for maintaining blocking information for the advanced services. Consequently, each SPA can access the blocking record database 330 to obtain blocking information in connection with the associated advanced service. Advantageously, the present invention provides a blocking record database for conveniently accessing blocking records and for efficiently managing blocking and unblocking of an advanced service.

Referring again to Fig. 3, the local STP 326 may be connected to other network elements through a regional STP 332, which in turn, may be connected to a regional SCP 334. Both regional SCP 334 and local SCP 327 are connected via respective data links to a service management system (SMS) 335. The SMS 335 interfaces to business offices of the local exchange carrier and interexchange carriers.

In order to keep the processing of data and calls as simple as possible, a relatively small set of triggers is defined at the SSPs for each call. A trigger in the AIN is an event associated with a particular calling line that generates a packet to be sent to an SCP. The trigger causes the SCP to query its databases or service package applications for processing

instructions with respect to the particular call. The results are sent back to the SSP in a response from the SCP 327 through STP 326. The return packet includes instructions to the SSP as to how to process the call. The instructions may be to take some special action as a result of a customized calling service or enhanced feature. In response, the SSP moves through its call states, collects the called digits, and generates further packets that are used to set up and route the call. Similar devices for routing calls among various local exchange carriers are provided by regional STP 332 and regional SCP 334.

As illustrated in Fig. 3, the AIN 321 also includes an intelligent peripheral 336 (IP), such as a service circuit node (SCN). IP 336 includes voice and dual tone multi-frequency (DTMF) signal recognition devices and voice synthesis devices. In addition, IP 336 may include a blocking service interface 338 for use in connection with the present invention as is further explained below. IP 336 is connected to the local SCP 327 via data link 339 using an X.25 protocol and to the SMS 335 via a data link. In addition, IP 336 typically is connected to one or more (but usually only a few) SSPs via Integrated Service Digital Network (ISDN) links as shown by the connection to SSP 322b.

Exemplary Operation

Blocking of an Advanced Service

Referring to Fig. 3, an exemplary method and system of operation are described in the context of a customer making use of the blocking system to unblock and block an advanced service. It will be appreciated by those skilled in the art that the blocking system can be overridden at any time by a service provider, if necessary.

As explained above, a customer initiates a request for an advanced service by placing a call from a device associated with the calling line number to which the advanced service is to be applied. Specifically, the customer places the call to a feature code to indicate the request for the advanced service. Each of the calling lines that may be used to request an advanced service at a particular SSP are provisioned with a feature code trigger. Preferably, this trigger is a public office feature code trigger (POFC) that responds to a feature code comprising an asterisk followed by two digits, to-wit: *XX. Thus, a customer dials the feature code (*XX) which triggers the SSP based on the recognition

of the feature code as a POFC trigger to initiate a query/response exchange with the SCP.

It will be appreciated by those skilled in the art that to use the blocking system for blocking an advanced service, the present invention is not limited to placing a call from the device associated with the calling line number to which the advanced service is to be applied. Instead, the present invention may include placing a call from a device other than the one associated with the calling line number to which the advanced service is to be applied. Specifically, a call may be placed from any device to block an advanced service for a calling line number that is selected by the customer. For example, a customer can place a call from a device at his or her office to access the blocking system and can block an advanced service associated with the customer's calling line number at the customer's home.

Assume the customer ("Dale") is using his telephone 324a which is connected by calling line 325a to SSP 322a. In other words, SSP 322a serves Dale's calling line 325a. The SSP 322a is provisioned such that it initiates a query/response exchange with SCP 327 on receipt of a feature code based on a public office feature code (POFC) trigger.

Also assume that Dale is interested in blocking an advanced service with respect to the calling line number associated with his telephone 324a and calling line 325a. As a first step in blocking the advanced service, Dale places a call from his telephone 324a and calling line 325a by using a feature code such as *XX. "XX" may be any set of numbers that may be dialed from a telecommunication device. As noted, an exemplary embodiment provides for the use of *XX based on the provisioning of the appropriate SSPs with a POFC trigger. The feature code is associated with the advanced service that Dale desires to block.

Referring to Fig. 3, the feature code is received with the communication in the SSP 322a serving Dale's calling line 325, and is recognized by the SSP 322a as an indicator of the special status of the communication. The communication typically is carried over voice links rather than data links. The feature code triggers the SSP 322a to pause in the processing of the call and to obtain further instructions from other network elements. Referring to the example, Dale's call to the feature code is received in SSP 322a, which pauses in the processing of the communication to request instructions from SCP 327. This request

preferably takes the form of a query from SSP 322a to SCP 327. The medium usually is a data link rather than a voice link, and the information exchange is a data exchange.

5 As part of the SSP's query to the SCP 327 for processing instructions, the SSP 322a provides the SCP 327 with information relating to the communication. This information may be provided in a TCAP message pursuant to the SS7 protocol. In particular, the SSP 322a provides the SCP 327 with communication information including the feature code and identification information. This identification
10 information includes the calling line number and an originating point code (OPC) or other identifier as appropriate. The OPC is indicative of the switch serving the calling line number. The OPC identifies the appropriate switch for blocking and unblocking an advanced service.

15 In response to receiving the communication information and the identification information from the SSP 322a, the SCP 327 carries out certain functions. The SCP 327 looks up the meaning of the feature code and this may be accomplished by looking up the feature code through use of a service package application (SPA). Upon look up, the SCP 327 determines that the customer desires to access an advanced
20 service.

As noted, the SCP 327 recognizes the feature code as indicative that the communication is a request for an advanced service. On the basis of this recognition, the SCP 327 retains an association between the calling line or calling line number of the communication and
25 the SSP 322a which originated the query to the SCP 327. The SCP 327 may retain this association in database 330 or some other appropriate storage medium. Preferably, the SCP retains the originating point code (OPC) associated with this communication in a database 330. This may be a database that is shared by service package applications (SPAs) that
30 are associated with SCP 327. The retention of this OPC may be accomplished through the use of an SPA that is referred to herein as "SPA A". Advantageously, the present invention preferably provides that the SCP 327 retain the association between the calling line number and the SSP 322a at this point in the processing of the communication.
35 Retaining this association at this point in the call processing is advantageous because the SCP 327 otherwise does not have any

information with respect to the relationship between an SSP and the calling lines or calling line numbers that the SSP serves.

Before providing the advanced service, an SPA for the advanced service consults a blocking record database 330 in the SCP 327 to determine whether a blocking record exists for the calling line 325. If a blocking record does not exist, an announcement is played indicating that blocking is available for the advanced service and prompting the customer to provide an indication as to whether the customer desires to block the advanced service. It will be appreciated that the announcement is played in a conventional manner known in the art. It will be also appreciated that a prompt to provide an indication as to whether the customer desires to block the advanced service is also provided according to conventional standards known in the art. If the customer provides an indication that he or she does not desire to block the advanced service, the advanced service is applied in a conventional manner to the calling line. For example, Dale may be asked to enter "1" on the telephone keypad to indicate that he does not desire to block the advanced service. When Dale enters "1", the advanced service is applied to the calling line.

However, if the customer provides an indication that he or she desires to block the advanced service, the SCP 327 determines that the communication is to be routed to the intelligent peripheral (IP) 336. Thus, the SCP 327 provides a response with instructions to the SSP 322a to route the communication to the IP 336. In this example, Dale may be asked to enter "2" on the telephone keypad to indicate that he desires to block the advanced service. When Dale enters "2", the SCP 327 determines that the communication is to be routed to the intelligent peripheral (IP) 336 so that a blocking record can be created for the customer.

Referring to Fig. 3, upon receipt of the processing instructions from the SCP 327, the SSP 322a routes the communication over voice links in a conventional manner to the IP 336. Upon receipt of the communication from the SSP 322a, the IP 336 recognizes that the communication is a request for special service such as access to the blocking system for blocking or unblocking of an advanced service. The IP 336 may make this recognition by checking an appropriate table or database or through the use of a service package application (SPA) that is referred to herein as "SPA B". Thus, the IP 336 pauses in the processing

of the communication to query the SCP 327. The IP 336 provides the SCP 327 with communication information including the feature code. In addition, this query may include a request to the SCP 327 to locate a blocking record to determine, based on the calling line number, whether the customer has an existing blocking record. If the customer has an existing blocking record, then a blocking record is retrieved with respect to this customer, calling line or calling line number.

The SCP 327, in response to the query, makes a recognition of the communication as a request for a special service such as a request for blocking of an advanced service. This recognition may be accomplished through the use of other tables or databases as those skilled in the art will understand. This recognition also may be accomplished through the use of an SPA that is referred to herein as "SPA C". As part of this recognition, the SCP 27 may use SPA C to check whether a blocking record exists with respect to this customer, calling line or calling line number.

If a blocking record does not already exist in the case of an initial request for blocking an advanced service, the IP 336 creates a new blocking record with respect to this customer, calling line or calling line number. The fields within the blocking record are populated with information such as the OPC, the calling line number, and a PIN, as previously described with respect to Figs. 1, 2a, and 2b. As previously mentioned, the PIN can be designated by the customer, or it can be assigned by the service provider. The blocking record also contains advanced service fields, as previously described in connection with Fig. 1.

The act of setting up a PIN indicates that the advanced service associated with the feature code is to be blocked. Therefore, the advanced service is blocked by placing a value of "1" in the appropriate advanced service field. The remaining advanced service fields contain a value of "0", which indicates that the associated advanced services remain unblocked.

The blocking record preferably is compiled pursuant to a selected format or protocol, including information such as the type of advanced services that are to be provided, as well as whether the advanced service is unblocked or blocked, as previously described in

connection with Figs. 1, 2a, and 2b. This information may be formatted into a selected protocol or arrangement.

5 After the advanced service is blocked, in an exemplary embodiment, the caller is provided with confirmation as to the blocking of the advanced services. In particular, the IP 336 provides confirmation to the customer of the blocking of the advanced service for the calling line number. With this confirmation step, the caller may rest assured that the advanced service or the change to the advanced service is applied to his or her calling line number. The IP 336, preferably
10 through use of the blocking service interface 338, may provide Dale with an announcement that confirms that the advanced service is blocked pursuant to the information in the blocking record.

After the status of the advanced service is confirmed, the blocking record is provided by the IP 336 to the SCP 327, and
15 preferably to SPA C. As appropriate, the blocking service interface 338 may be used to convert the blocking record from the format that is used to interact with the caller to the format that is most appropriate for transmission to the SCP 327 such as the X.25 protocol.

Upon receipt of the blocking record from the IP 336, the
20 SCP 327 stores blocking record in the database 330, where each advanced service in the blocking record is marked either blocked or unblocked.

Now that a blocking record for the calling line exists, the blocking record database is consulted by the applicable SPA whenever
25 the customer dials a feature code for an advanced service. The SPA searches the applicable advanced service field within the blocking record to determine whether the advanced service is blocked or unblocked. If the advanced service is blocked, the SCP 327 plays an announcement indicating that the advanced service is blocked and prompting the
30 customer to provide an indication as to whether the customer desires to change the status of the advanced service. If the customer provides an indication to change the status of the advanced service, the SCP 327 determines that the communication is to be routed to the intelligent peripheral (IP) 336. Thus, the SCP 327 provides a response with
35 instructions to the SSP 322a to route the communication to the IP 336.

Referring to Fig. 3, upon receipt of the processing instructions from the SCP 327, the SSP 322a routes the communication

over voice links in a conventional manner to the IP 336. Upon receipt of the communication from the SSP 322a, the IP 336 recognizes that the communication is a request for special service such as access to the blocking system for blocking or unblocking of an advanced service. The IP 336 may make this recognition by checking an appropriate table or database or through the use of a service package application (SPA) that is referred to herein as "SPA B". Thus, the IP 336 pauses in the processing of the communication to query the SCP 327. The IP 336 provides the SCP 327 with communication information including the feature code. In addition, this query may include a request to the SCP 327 to locate a blocking record to determine, based on the calling line number, whether the customer has an existing blocking record. If the customer has an existing blocking record, then a blocking record is retrieved with respect to this customer, calling line or calling line number.

The SCP 327, in response to the query, makes a recognition of the communication as a request for a special service such as a request for blocking of an advanced service. This recognition may be accomplished through the use of other tables or databases as those skilled in the art will understand. This recognition also may be accomplished through the use of an SPA that is referred to herein as "SPA C". As part of this recognition, the SCP 327 may use SPA C to check whether a blocking record exists with respect to this customer, calling line or calling line number.

In this case, the blocking record exists with respect to this customer, calling line or calling line number. Consequently, the SCP 327 routes the blocking record to the IP 336. The IP 336 preferably plays another announcement prompting the customer to enter the correct PIN using the telephone keypad. The customer then enters the PIN using the telephone keypad. The PIN is received in the IP 336. The PIN is verified by the IP 336. In response to receiving the correct PIN, the status of the advanced service changes from blocked to unblocked. Preferably, the value in the advanced service field changes from "1" to "0". The IP 336 confirms the status of the advanced service, for example, by playing an announcement indicating that the advanced service is unblocked.

After the status of the advanced service is confirmed, the blocking record is provided by the IP 336 to the SCP 327, and

preferably to SPA C. Upon receipt of the blocking record from the IP 336, the SCP 327 stores blocking record in the database 330. The advanced service then is applied in a conventional manner to the calling line based on the OPC and calling line number in the blocking record.

5 Referring to Fig. 3, in the event that the advanced service is already unblocked when the SPA checks the blocking record in the blocking record database 330, the SCP 327 may play an announcement indicating that blocking is available for the advanced service and prompting the customer to provide an indication as to whether the
10 customer desires to change the status of the advanced service. Changing the status of the advanced service from unblocked to blocked follows the same procedure as discussed above in connection with changing the status of the advanced service from blocked to unblocked. One exception is the value in the advanced service field changes from "0" to "1" when the PIN
15 is received in the IP 336 from the customer.

Advantageously, the blocking record database maintains a central archive of blocking records that can be directly accessed by the customer. The customer then is able to change the status of an advanced service without intervention of a service provider representative.
20 Moreover, the present invention provides the benefit of conveniently and efficiently managing blocking and unblocking of an advanced service in an SCP or IP. Implementation of the present invention is far less time-consuming and cumbersome than setting up a blocking switch on the calling line as required by some prior art systems.

25

Operation of the Blocking System

Operation of the blocking system is described below by way of a representative example. Turning back to Fig. 1, assume Dale has blocked the long distance service in accordance with the method
30 described in connection with Figs. 2a, 2b, and 3. As shown in Fig. 1, the flexible call forwarding service, the three-way calling service, and the call return service are unblocked. Also, assume Dale desires to forward a call to a forwarding number that requires long distance routing.

Dale dials a feature code for flexible call forwarding. The
35 flexible call forwarding SPA is triggered for providing call forwarding service. To provide the advanced service, the flexible call forwarding SPA consults the blocking record database and determines that according

to the blocking record 5, the flexible call forwarding service is unblocked. An announcement is played by the SCP indicating that blocking is available and prompting Dale to provide an indication as to whether he desires to block flexible call forwarding. Dale does not
5 desire to block flexible call forwarding. So, Dale provides an indication that he does not want to block the advanced service. In turn, the call forwarding SPA proceeds as normal in prompting Dale to enter the number to which he desires calls to be forwarded. Dale enters a forwarding number that requires long distance routing. The flexible call
10 forwarding SPA checks the blocking record and determines that according to the blocking record 5, the long distance service is blocked. The SCP plays an announcement indicating that the long distance service is blocked and prompting Dale to provide an indication as to whether he desires to unblock the long distance service. If Dale decides to leave the
15 long distance service blocked, Dale can only enter a forwarding number that does not require long distance routing.

The above-described examples illustrate the present invention, which includes a caller-activated blocking system for advanced services. By this invention, a customer can obtain direct access to a
20 blocking record for advanced services without having to rely on the service provider representative of a telecommunication service provider. The customer then can unblock or block an advanced service without intervention from the service provider. Rather, the customer may place a call to the advanced service whenever the customer desires to unblock
25 or block the advanced service.

From the foregoing description of the exemplary embodiments of the present invention and operation thereof, other embodiments will suggest themselves to those skilled in the art. Therefore, the scope of the present invention is to be limited only by the
30 claims below and equivalents thereof.

CLAIMS

What is claimed is:

5

1. In an advanced intelligent network, a method to centralize information relating to the blocking of an advanced service associated with respect to a communication from a calling line number, comprising the steps of:

10

A. receiving a communication directed to a feature code from a calling line associated with the calling line number;

B. receiving an indication to block a selected advanced service so that the selected advanced service is not to be applied to communications from the calling line number;

15

C. creating a blocking record with respect to the calling line number, the blocking record including the calling line number, an originating point code associated with the calling line number, and the indication to block the selected advanced service; and

20

D. storing the blocking record in association with other blocking records respectively corresponding to other calling line numbers so that the blocking record is accessible for review by a network element in its determination whether to apply the selected advanced service to the communication from the calling line number.

25

2. The method of Claim 1, wherein step D comprises the step of storing the blocking record in association with the other blocking records in a database separate from any service package application (SPA) used to apply advanced services to communications from the calling line number.

30

3. The method of Claim 1, further comprising the step of establishing a personal identification number for accessing the blocking record.

35

4. The method of Claim 3, further comprising the step of including the personal identification number in the blocking record.

5. The method of Claim 1, further comprising the step of providing confirmation to the communication that the advanced service is blocked.

5 6. The method of Claim 1, wherein step C comprises the step of including indications to either 1) block or 2) unblock an additional advanced service.

7. In an advanced intelligent network, a method to implement blocking of an advanced service with respect to a communication from a calling line number, comprising the steps of:

5 A. receiving a communication directed to a feature code from a calling line associated with the calling line number;

10 B. on the basis of the communication being directed to the feature code, checking a blocking record associated with the calling line number, the blocking record including the calling line number, an originating point code associated with the calling line number, and an indication corresponding to a selected advanced service, the indication indicating that the selected advanced service is not to be applied to the communication; and

15 C. based on the indication, processing the communication without applying the selected advanced service to the communication.

20 8. The method of Claim 7, wherein step B comprises checking a database for the blocking record, the database including the blocking record stored in association with other blocking records respectively corresponding to other calling line numbers and the database being stored separately from any service package application (SPA) used to apply advanced services to communications directed to the calling line number.

25 9. The method of Claim 7, further comprising the step of using a personal identification number for checking the blocking record.

30 10. The method of Claim 7, further comprising the step of providing confirmation to the communication that the selected advanced service is blocked.

11. In an advanced intelligent network, a method to allow for a change in the status of an advanced service with respect to communications from a calling line number, comprising the steps of:

- 5 A. receiving a communication directed to a feature code from a calling line associated with the calling line number;
- B. receiving from the communication an indication to unblock a selected advanced service to communications that are from the calling line number;
- 10 C. retrieving a blocking record with respect to the calling line number, the blocking record including the calling line number, and originating point code associated with the calling line number, and an indication to block the selected advanced service;
- D. in response to receipt of the indication to unblock the selected advanced service, changing the blocking record by changing the indication to block the selected advanced service to the indication to unblock the selected advanced service;
- 15 E. storing the blocking record in association with other blocking records respectively corresponding to other calling numbers so that the blocking record is accessible for review by a network element in its determination whether to apply the selected advanced service to a communication directed to the calling line number; and
- 20 F. applying the selected advanced service to the calling line associated with the calling line number.
- 25

12. The method of Claim 11, wherein step C comprises checking a database for the blocking record, the database including the blocking record stored in association with other blocking records respectively corresponding to other calling line numbers and the database being stored separately from any service package application (SPA) used to apply advanced services to communications directed to the calling line number.

30

13. The method of Claim 11, further comprising the step of using a personal identification number for retrieving the blocking record.

35

14. The method of Claim 13, further comprising the step of including the personal identification number in the blocking record.

5 15. The method of Claim 11, further comprising the step of providing confirmation to the communication that the advanced service is unblocked.

10 16. The method of Claim 11, wherein step C further comprises the step of including indications to either 1) block or 2) unblock additional advanced services.

17. A caller-activated blocking system for advanced services, comprising:

an advanced intelligent network (AIN) element operative:

a. to make a recognition of a communication as a request for blocking of an advanced service with respect to a calling line on the basis of use of a feature code to which the communication is directed;

b. to direct collection of blocking information regarding the advanced service for the calling line;

c. to receive the blocking information; and

d. on the basis of the blocking information, to direct blocking of the advanced service for the calling line number so that the advanced service is not applied to the calling line.

18. The system of 17, wherein the advanced service is maintained independent of the AIN element operative to receive the blocking information.

19. The system of Claim 17, wherein the AIN element is further operative to direct creation of a blocking record regarding the advanced service for the calling line number with the blocking record being based on the blocking information; and

wherein the AIN element is further operative to receive the blocking record instead of the blocking information, and on the basis of the blocking record, instead of the blocking information, to direct blocking of the advanced service for the calling line number so that the advanced service is not applied to the calling line.

20. The system of Claim 17, wherein the AIN element is further operative to provide confirmation to the communication of blocking of the advanced service for the calling line.

21. A blocking record for storing blocking information for advanced services, comprising:

a calling line number field for hosting a calling line number associated with a calling line;

an originating point code (OPC) field for hosting an OPC of a switch serving the calling line number; and

at least one advanced service field for representing an advanced service, where the advanced service field indicates a status of the advanced service.

22. The blocking record of Claim 21, wherein the status of the advanced service is either unblocked or blocked.

23. The blocking record of Claim 21, further comprising a personal identification (PIN) field for hosting a PIN.

24. The blocking record of Claim 23, wherein the PIN restricts access to the blocking record.

25. The blocking record of Claim 23, wherein the PIN changes the status of an advanced service from blocked to unblocked within the blocking record.

26. The blocking record of Claim 23, wherein the PIN changes the status of an advanced service from unblocked to blocked within the blocking record.

27. The blocking record of Claim 21, wherein the advanced service field is value-sensitive.

28. The blocking record of Claim 27, wherein in the advanced service field, a value of "1" indicates that the advanced service is blocked and a value of "0" indicates that the advanced service is unblocked.

5 ↓

Advanced Services 40

calling line Number	Originating Point Code (OPC)	Personal Identification Number (PIN)	Long distance	Fixed call Forwarding	Three- way calling	Call Return
<u>20</u>	<u>25</u>	<u>30</u>		⊙	⊙	⊙
			<u>40a</u>	<u>40b</u>	<u>40c</u>	<u>40d</u>

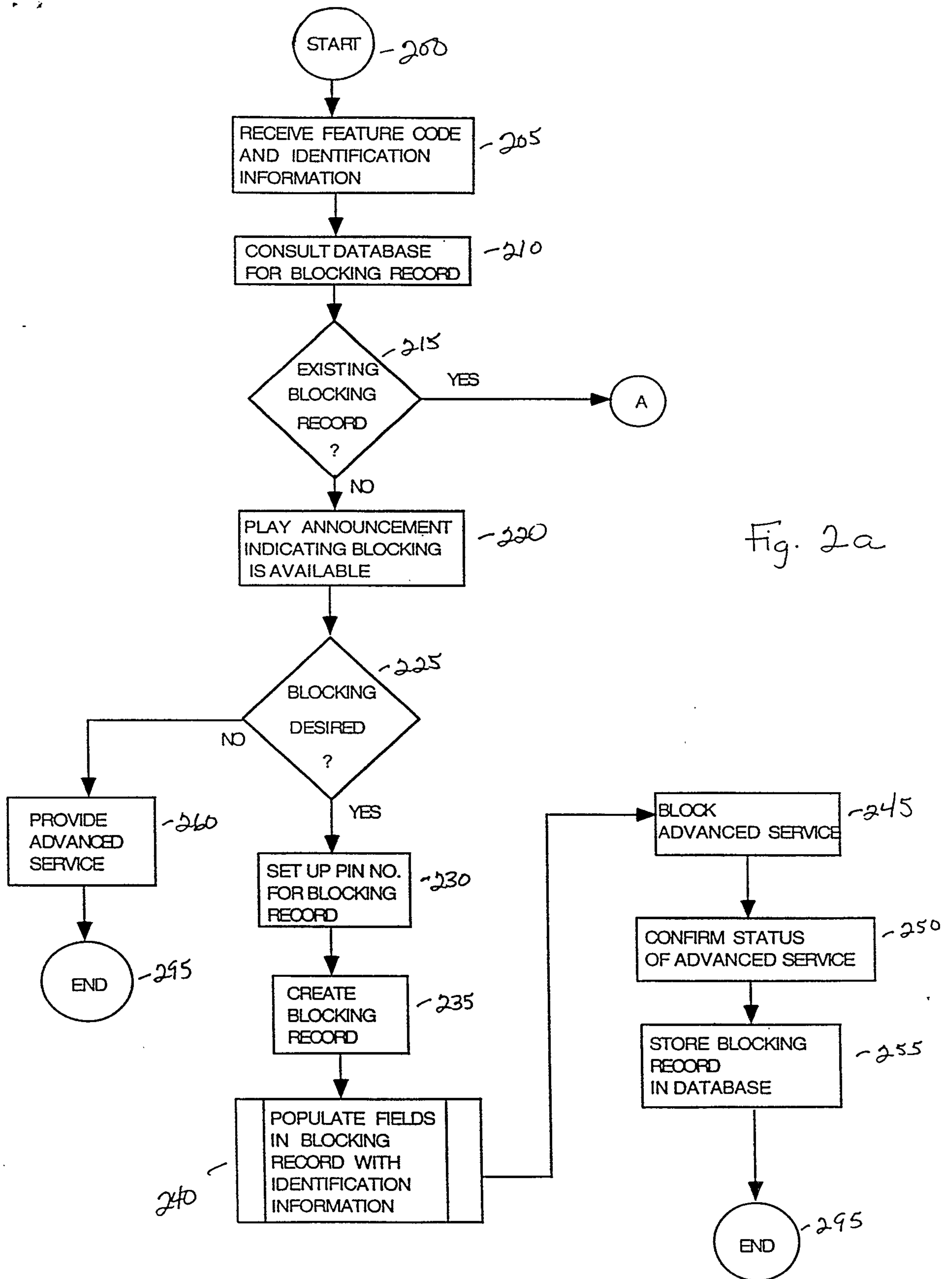
| ≡ blocked

⊙ ≡ unblocked

Fig. 1

Fenlayson & Seaglehurst

PATENT AGENTS



Fenclayson & Seaglehurst
PATENT AGENTS

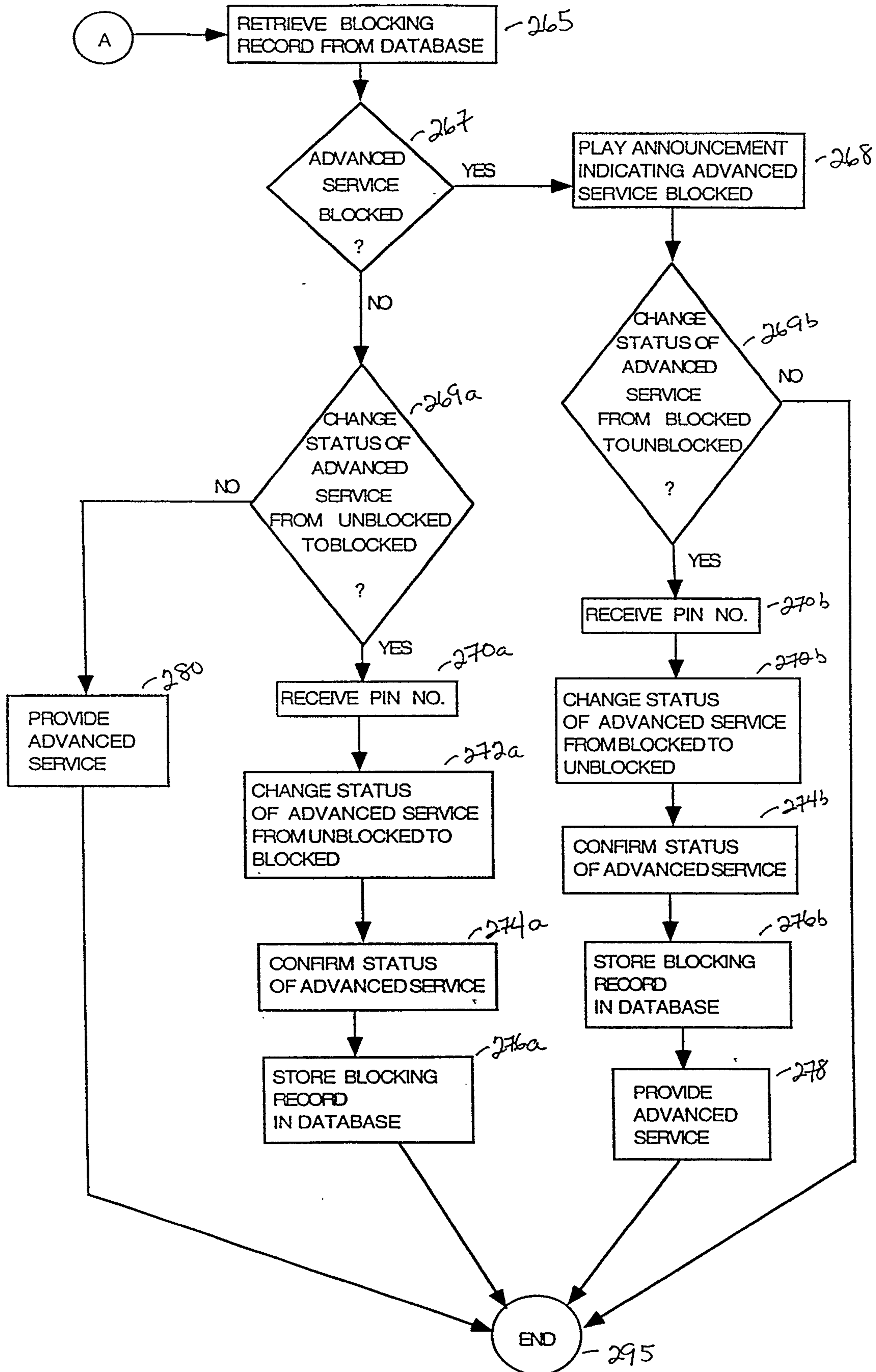


Fig. 2b

Fenlayson & Singlehurst
PATENT AGENTS

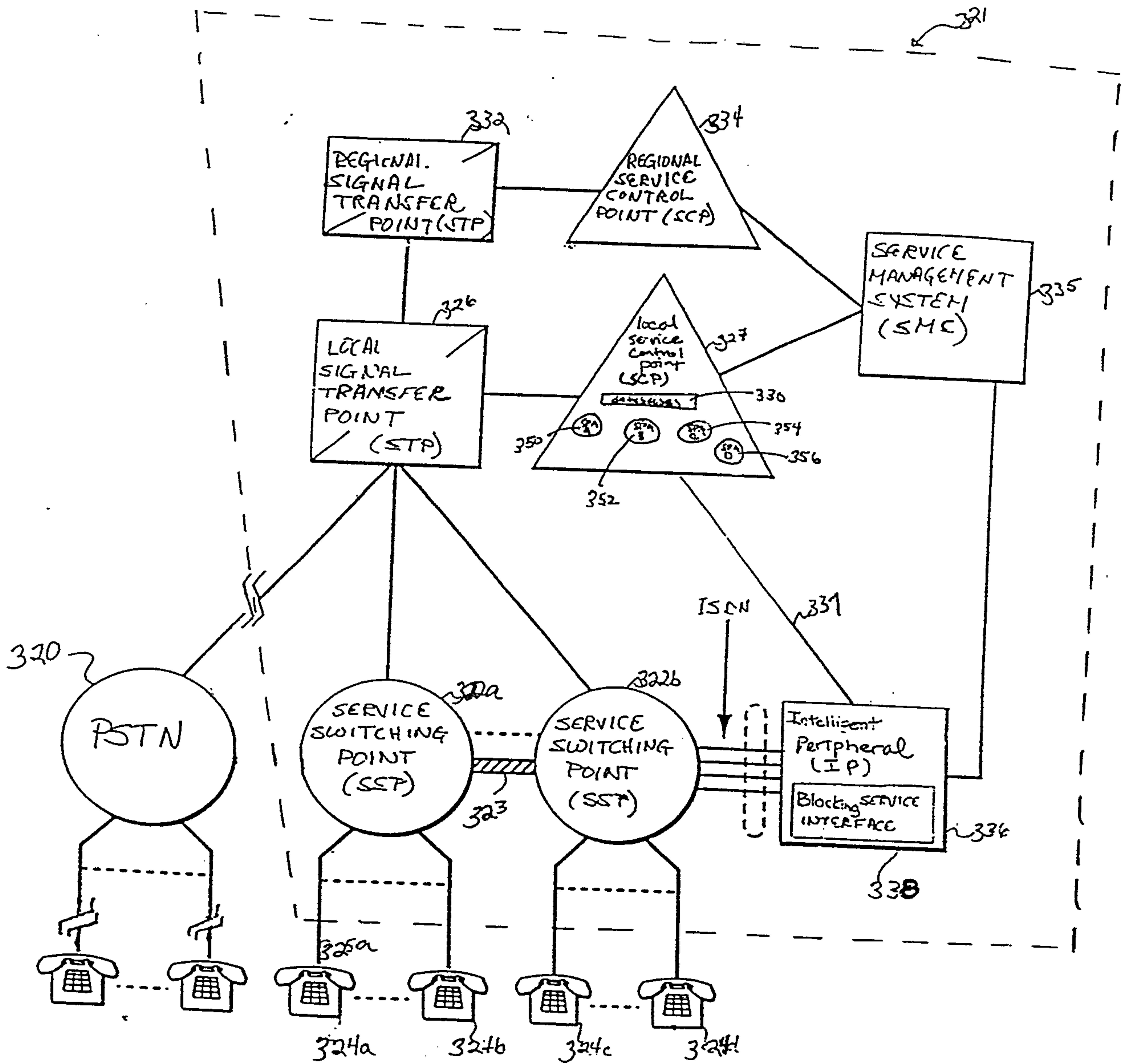


Fig. 3

