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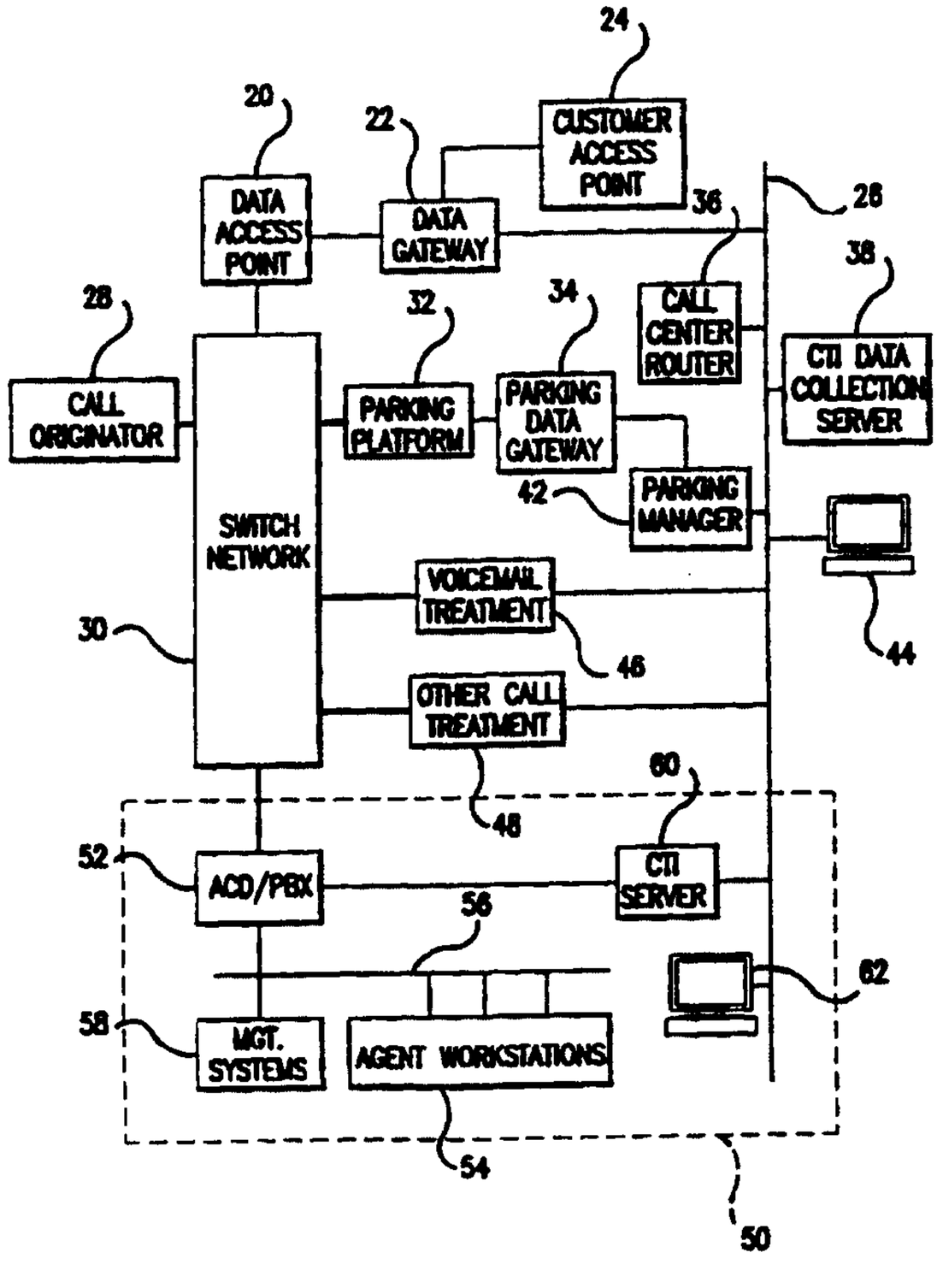
(54) **SYSTEME ET PROCEDE DE MISE EN GARDE PAR INDICATIF ET DE TRANSFERT D'APPELS DANS UN RESEAU DE TELECOMMUNICATIONS**

(54) **SYSTEM AND METHOD FOR CALL PARK AND TRANSFER IN A TELECOMMUNICATIONS NETWORK**



(57) Système et procédé de mise en garde par indicatif dans un réseau de télécommunications combinant les fonctions de mise en garde et d'acheminement intelligent d'appels. Ce système et ce procédé permettent de gérer des ressources de mise en garde et de commander la

(57) A system and method provide management of parking resources and complete control of the call throughout the entire duration of the call. The system comprises: a switch network (30) receives a call from call originator (28). A call center (50) includes: ACD

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totalité de l'appel pendant la durée entière de ce dernier. Ils constituent également une plate-forme centralisée basée sur le réseau de mise en garde d'appels par indicatif, de sorte qu'une plate-forme unique ou des plates-formes multiples d'utilisation commune, peuvent être mises en service afin de mettre en garde des appels destinés à tout centre d'appels ou autre destination, ce qui améliore l'efficacité des ressources de mise en garde par indicatif. Ce système et ce procédé créent une concentration de ressources de mise en garde disponibles pour tous les clients, ce qui améliore la disponibilité des ressources de mise en garde et de file d'attente au niveau de distributeurs d'appels automatiques (ACD) de centres d'appels ou d'autres équipements client. De plus, une fois qu'un appel est mis en garde sur une plate-forme de mise en garde, il peut être libéré et transféré à une autre destination.

(52) connects to management system (58) and agent workstations (54) through local area network (56). A service workstation (62) and CTI server (60) connect to CTI data collection server (38) over wire area network (26). Call center router (36) receives a call routing query from data access point (20) via data gateway (22). The parking manager (42) determines which parking platform (32) is available to park the call through parking data gateway (34). The parking manager (42) may also initiate a timer, the expiration of which triggers the release of the call to voicemail treatment (46) or other call treatment (48).

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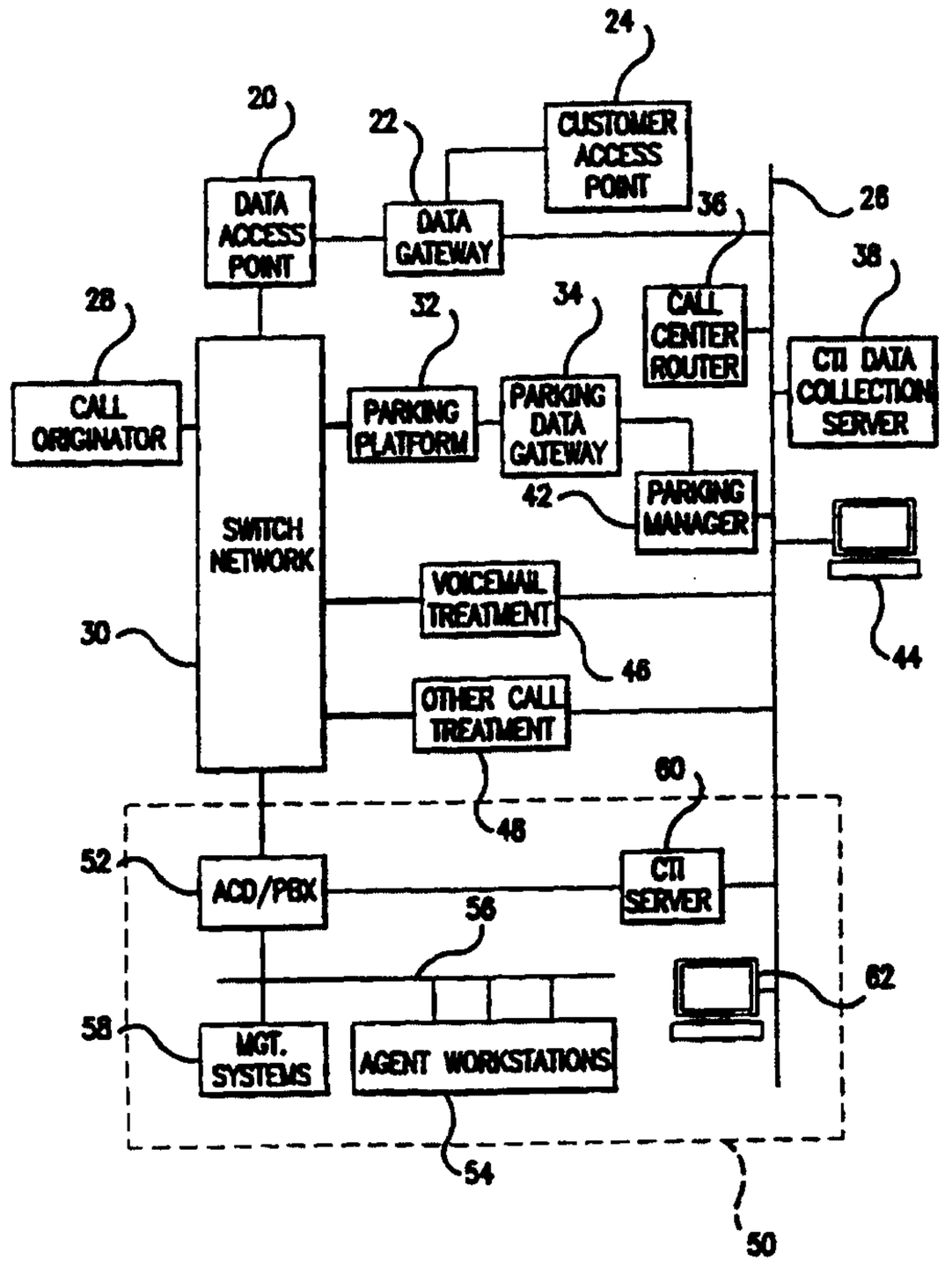
(57) Abstract

A system and method provide management of parking resources and complete control of the call throughout the entire duration of the call. The system comprises: a switch network (30) receives a call from call originator (28). A call center (50) includes: ACD (52) connects to management system (58) and agent workstations (54) through local area network (56). A service workstation (62) and CTI server (60) connect to CTI data collection server (38) over wire area network (26). Call center router (36) receives a call routing query from data access point (20) via data gateway (22). The parking manager (42) determines which parking platform (32) is available to park the call through parking data gateway (34). The parking manager (42) may also initiate a timer, the expiration of which triggers the release of the call to voicemail treatment (46) or other call treatment (48).



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System and Method for Call Park and Transfer in a Telecommunications Network

Background of the Invention

Field of the Invention

The present invention relates generally to computer telephony, and more particularly to holding a call on a telephone network.

Related Art

The proliferation of call centers within many different industries has introduced new requirements into the functionality of a telecommunications network. A call center is typically a platform and location used by a business for customer services, operator services, telemarketing, or other such purposes. At a typical call center, individuals known as "agents" interact with callers to accomplish these purposes. Callers commonly access a call center by dialing a 1-800 number, though any type of telephone number may be used.

Many call centers utilize automatic call distributors (ACD) to queue calls for agents, thus enabling the call center to support a number of simultaneous calls that greatly exceeds the number of call center agents. Even so, it is common for an ACD at a call center to become overburdened with calls. Such is the case when the trunks to an ACD from a telecommunications network become overutilized due to high volumes of calls. Additionally, many call center managers (hereinafter referred to as "customers") do not wish to buy an ACD for their call center, yet desire call queuing functionality so that callers do not encounter busy signals. From a business perspective, it is not acceptable for callers to encounter a busy signal and so find themselves unable to reach a call center.

Thus, telecommunications network carriers (hereinafter referred to as "carriers") have recognized the need for a capability to hold a call on a carrier network if the intended destination is unavailable. The process of holding a call

on a network is generally referred to as "call parking." In addition, many customers operate multiple call centers, at different physical locations, that serve a single telephone number (for example, a 1-800 number). Thus, there is a need to determine the most available and cost-efficient destination among multiple destinations to which to route a call.

Intelligent routing applications can be used to route a call to one of multiple such destinations based on a number of criteria. In addition to call center availability, other criteria include the time of day, day of week, location of call origination, proximity of call origination to call destination, and caller-entered input (for example, digits entered on a telephone set keypad). Customers may also wish for callers to be routed to applications that provide call treatments, such as recordings or voicemail.

System requirements are imposed not only by customers, but also by carriers. One such requirement is minimizing the network-based cost of routing a call. Intelligent call routing applications are available to minimize such costs on a call-by-call basis.

While such intelligent routing applications are currently available, combining them with call parking remains a challenge. Conventional approaches do not provide for centralized, network-based call parking that can service multiple call centers. Conventional approaches also do not provide an adequate means for managing the network resources for parking a call. In particular, a mechanism does not exist for determining the availability of resources to park a call prior to routing the call to a call center or other termination.

Conventional approaches also do not provide for controlling the disposition of a call throughout the entire duration of the call, including the time when a call is parked. Further, it is desirable to provide a selection of call treatments to apply to a call after it has been parked.

Conventional approaches also do not determine the actual availability of call center resources, such as call center agents. Conventional approaches measure call center agent availability only indirectly. One such approach measures

the availability of the traffic trunks serving a call center ACD. Calls are then routed to available trunks. However, because trunk availability is an imperfect indicator of agent availability, calls may be routed to a trunk where actual agent availability is much lower than trunk availability. This results in unnecessarily loading the ACD queue.

What is needed is a network call parking and routing system that measures call center availability by directly measuring the availability of call center agents.

Summary of the Invention

The present invention is a system and method for providing call parking functionality combined with intelligent call routing functionality in a telecommunications network. The present invention provides management of parking resources and complete control of the call throughout the entire duration of the call. The present invention also provides a centralized, network-based platform for call parking, such that one or more platforms can be used to park calls that are intended for any call center or other destination, thus improving the efficiency of call parking resources. The present invention makes a common pool of parking resources available to all customers, which maximizes the availability of call parking and queuing resources at call center ACDs and other customer premise equipment. In addition, once a call is parked on a parking platform, it can be released and transferred to a destination other than the originally-intended destination.

The present invention, referred to hereinafter as a Network Park and Transfer System (NPTS), provides a mechanism for controlling a call throughout the call duration. If a destination is unavailable, NPTS parks the call and performs a customer-specified application (also known as a "call treatment"), such as playing music or a voice recording. When the destination becomes available, NPTS routes the call to the intended destination. Alternatively, NPTS can route

the call to an alternate destination, keep the call parked for another application, route the call to a voicemail system, or apply other call treatments.

One advantage of the present invention is that it collects and uses data on actual call center agent availability, rather than deriving availability measurements by collecting data on ACD queue status or trunk utilization.

Another advantage of the present invention is that it uses a generic format for specifying routing terminations that it has determined. This allows for an open architecture that is capable of using numerous different types of network hardware components and vendors.

Yet another advantage of the present invention is that it employs a distributed architecture to provide the aforementioned functionality. Whereas conventional approaches use a single central component for controlling the routing of a call, NPTS, in order to combine intelligent call routing with call parking, uses a distributed parking platform in conjunction with call control and routing components.

Another advantage of the present invention is that it allows customers to customize their call centers to accommodate varying levels of resources by providing a mechanism for parking calls on a network prior to distributing them to any one of multiple call center destinations.

Further features and advantages of the present invention as well as the structure and operation of various embodiments of the present invention are described in detail below with reference to the accompanying drawings.

Brief Description of the Figures

The present invention will be described with reference to the accompanying drawings, wherein:

FIG. 1 is a block diagram illustrating the system architecture of the preferred embodiment of the present invention;

FIG. 2 is a flow diagram illustrating a process performed by the present invention; and

FIG. 3 is another flow diagram illustrating a process performed by the present invention.

Detailed Description of the Preferred Embodiments

The present invention, referred to herein as a Network Park and Transfer System (NPTS), provides a system and method for parking a call on a network. A subscriber to the services offered by a telecommunications network carrier (hereinafter referred to as a "carrier") may use the functionality of this invention, provided the carrier makes the invention available to that customer. NPTS is ideally suited for call center destinations. For the remainder of this description, the call center example is described only as an example and not by way of limitation.

While various embodiments of NPTS are presented below, they are intended to be illustrative rather than limiting. As will be apparent to one skilled in the relevant arts, substantial variations of these embodiments are well within the spirit and scope of NPTS.

FIG. 1 is a block diagram illustrating an example system architecture for a preferred embodiment of NPTS. In FIG. 1, the interconnections between elements are depicted as either thick or thin lines. Thick lines depict trunks bearing call traffic, while thin lines depict data links used to implement NPTS control functions.

NPTS uses a telecommunications switch network 30 to receive calls from a call originator 28 and deliver them to a customer's call center 50. A call originator 28 represents the point of entry of a telephone call to the switch network 30. Call originator 28 may be a local exchange carrier (LEC), a caller's dedicated access line (DAL) to the switch network 30, another switch network of another carrier, or any other means for originating a call on switch network 30.

Call center 50 is typically a platform and location used by a business for customer services, operator services, telemarketing, or other such purposes. It is commonly reached with a 1-800 number, though any type of telephone number may be used. It is also common for a business to employ multiple call centers 50 for a single 1-800 number. In addition to receiving calls from the switch network 30, it may also be capable of placing outbound calls to the switch network 30 via traffic trunks.

An example of a call center 50 is illustrated in FIG. 1. This illustration is only an example of a call center architecture; NPTS is not limited to use with this example architecture. An automated call distributor (ACD) 52 receives calls and distributes them to a plurality of agent workstations 54. In a typical call center, one agent is assigned to each agent workstation 54, although other variations are possible. The ACD 52 also queues calls when there are no available agents. The ACD 52 and agent workstations 54 may be connected via local area network (LAN) 56 or dedicated links. Also used, and typically connected to the same LAN 56, are one or more management systems 58, which are generally computer applications that manage call center resources, track usage, collect statistics, manage the workload of agents, and perform other miscellaneous functions.

In place of an ACD 52, a call center may employ a private branch exchange (PBX) or other switching device, as is well known in the industry. Also as an alternative embodiment, the functionality of the ACD/PBX 52 may be provided by the switch network 30, with the agent workstations 54 of the call center 50 being served directly from the switch network 30.

Computer/telephony interface (CTI) Server 60 is a computer that collects data from the ACD 52 and forwards it to CTI data collection server 38. This data indicates usage parameters of the ACD 52, including trunk utilization, incoming calls, queued calls, calls distributed to agent workstations 54, etc. CTI Server 60 can also pass control information to ACD 52. The CTI Server 60 is also connected to a wide area network (WAN) 26 that is used by NPTS, as described below.

A service workstation 62 is used specifically by NPTS for management of NPTS services at a customer premise 50. service workstation 62 is similar to service workstation 44, as described below.

NPTS is designed to serve a plurality of such call centers 50. NPTS can be used to serve a plurality of any call destinations, including call centers, single subscriber lines, virtual private network (VPN) stations, other switch networks, and combinations thereof, as would be apparent to one skilled in the relevant art.

Because multiple call centers are often available through a single telephone number, enhanced call routing is employed to enable the switch network 30 to route calls to any call center 50. Switch network 30 determines to which call center 50 a call should be routed. This determination can be made based on a number of factors, including time of day, day of week, point of call origination, network routing costs, and numerous other criteria. In addition, it is usually desirable to route the call to the call center with the highest current availability. The ability to route calls based on any and all of these factors, as well as the ability to park calls in the network if the intended call center is not available, is provided by NPTS.

Most telecommunications networks employ a data access point 20 to perform common call routing functions. The call routing capability of NPTS may be embodied in a data access point 20. However, in a preferred embodiment, the NPTS call routing capability is implemented as a separate component, call center router 36, to facilitate the integration of NPTS within an existing network.

When a call originator 28 sends a call to the switch network 30, a switch in the switch network 30 issues a call routing query to the data access point 20. This query is a request for a network destination to which to route the call. The data access point 20 selects a particular call routing plan for the call based on the dialed number of the call. According to standard telecommunications network technology, the data access point 20 processes the call routing query in accordance with the call routing plan, and returns to the switch network 30 a call

routing translation. The translation specifies a network destination to which to route the call.

In a preferred embodiment of NPTS, call center router 36 is invoked during call routing plan execution by one or more triggers in the call routing plan. A trigger is a conditional or enforced branch in call processing, as is well known in the telecommunications art. A conditional trigger can be conditioned on the call center region, time of day, day of week, and the like. The trigger is typically placed in the call routing plan during order entry based on customer instructions.

When processing of the call routing query in the data access point 20 reaches this trigger, the call routing query is transferred to the call center router 36. The call center router 36 then processes the query and returns a call routing translation to the data access point 20. The data access point 20 in turn passes the call routing translation to the switch network 30.

A data gateway 22 serves as an interface between the data access point 20 and numerous other call routing components, including the call center router 36. The data gateway 22 provides distribution of call routing queries to various components, as well as data translation and protocol conversion, as is well known in the art.

In addition to one or more call center routers 36, the data gateway 22 may interface the data access point 20 with a customer access point 24. This arrangement allows a customer to own and maintain call routing and control components. A customer may have components, similar in functionality to the data access point 20 or call center router 36, on the customer's premises. When the data access point 20 receives a call routing query (from the switch network 30) for a designated call, it can pass the query through the data gateway 22 to the customer access point 24. The customer may then perform call routing and control processing and return a call routing translation to the data access point 20 via the data gateway 22.

The call center router 36 is a computer that provides call routing and control functions for NPTS. It receives data on call center availability from the

call centers 50 and determines, based on availability and other customer-selected criteria, to which call center 50 to route the call. It may also determine, if an intended destination is not currently available, to park the call on the switch network 30.

To determine availability of intended call center destinations, the call center router 36 uses data from a CTI data collection server 38. The CTI data collection server 38 collects data from each call center 50 via a CTI Server 60 located at each call center. The CTI Server 60 receives data from the ACD 52 that indicate such metrics as incoming calls, calls queued, calls sent to agent workstations 54, utilization of trunks serving the ACD 52, and utilization of agent workstations 54. The CTI data collection server 38 continuously receives this data from the CTI server 60 at each call center 50. Data receipt is via WAN 26.

The call center router 36 can then retrieve this data from the CTI data collection server 38 via WAN 26. Using this data, the call center router 36 can determine if the intended destination call center 50 has sufficient current availability to accept the call. Availability can be determined by total number of agent workstations, agents currently handling calls, current number of calls in queue (usually an ACD 52 queue), and rate of incoming calls.

In a preferred embodiment of the invention, a CTI data collection server 38 and CTI server 60 collect data that directly reflects agent availability. In contrast, conventional approaches measure call center 50 availability by the utilization of trunks serving the ACD 52, and the queue of the ACD 52. Thus conventional approaches do not always reflect the actual availability of agents.

NPTS uses CTI data collection components that are capable of collecting data that represent the number of active agent workstations 54 (and thus the number of agents) currently available, as well as calls in queue and trunk availability. By taking all of these data into account, the call center router 36 can determine the availability of the call center 50 more accurately than conventional approaches. Availability can also be determined using thresholds set by a customer. For example, a customer can specify that calls should be routed to a

certain call center if that call center has an agent utilization rate of less than 120% (taking into account calls in queue).

If the call center router 36 determines that the intended destination call center 50 does not have sufficient current availability to accept the call, the call center router 36 can decide to park the call on the switch network 30 until the call center 50 does have sufficient availability. That is, the call is held by the switch network 30. Parking a call on the network provides the advantage of freeing the call center 50 queuing resources (i.e., ACD 52) from this particular call. This better utilizes the limited resources of call center 50. It also allows the call center 50 to serve the call later, without the caller encountering a busy signal.

NPTS also provides the advantage of centralized, network-based call parking that can be used by, and is common to, any number of call centers of different customers. The carrier that offers NPTS can use a common pool of parking resources, thus maximizing efficiency, for all of their NPTS customers. Also, a call that is parked on NPTS can be released and routed to a destination other than the one for which it was originally intended. For example, suppose a call is originally intended for call center A, but is parked because call center A was deemed unavailable. The customer that operates call center A has previously specified in the call routing plans that are used by the call center router 36 that call center B should take the call if call center A remains unavailable for more than one minute. After one minute expires, the call center router 36 specifies to a parking platform to release the call and route it to call center B. Other criteria can be employed in call rerouting decisions, as would be apparent to one skilled in the relevant art.

To park a call, the call center router 36 answers the call routing query with instructions for the switch network 30 to route the call to one of one or more parking platforms 32. A parking platform 32 is a common collection of one or more components, each of which can receive a telephone call and perform a specified application on the call. The parking platform 32 is responsible for holding the call until it can be rerouted elsewhere. NPTS can utilize many types

of parking platforms. One type of component that can be used to implement parking platform 32 is generally referred to as an audio response unit (ARU), and is also known as an interactive voice response (IVR) unit. An ARU is typically a microprocessor or midrange computer that is equipped with telephony ports. An ARU is used for such applications as caller interactive menu routing services.

An parking platform can include one or more ARUs. Many telecommunication carriers today have IVR platforms and can adapt them to NPTS. ARUs can accept a call, hold it, play a voice menu for the caller, accept DTMF signals representing the caller's input, apply another treatment based on the caller's input, and ultimately release the call to the switch network 30, re-routing it to another destination.

The parking platform 32 uses a parking data gateway 34 to interface with the parking manager 42. The parking data gateway 34 provides an application programming interface (API) that performs data translation between the parking platform 32 and the parking manager 42. In this embodiment, a scalable multi-processor midrange computer, such as a DEC Alpha 1000, is used to implement parking data gateway 34.

In one embodiment, release link trunk signaling (RLTS) is used to connect parking platform 32 to switch network 30. RLTS allows a call that is parked on a parking platform to be released to the switch network 30 without the need for a second trunk. The trunk that is used by a call to reach a parking platform is released when the call is rerouted on the switch network 30, thus freeing the trunk for another call. In an alternative embodiment, the call is simply extended from the parking platform.

A parking manager 42 is responsible for managing the resources of one or more parking platforms. Parking manager 42 is a computer that interfaces with each parking platform via data links, and with the call center router 36 via WAN 26. When the call center router 36 receives a call routing query and determines that the intended call center 50 is not available, it sends a request for parking to the parking manager 42. The parking manager 42 keeps track of parking

resources (ports, trunks, etc.) on each parking platform. The parking manager 42 returns to the call center router 36 a parking platform destination to which to route the call.

The call center router 36 then sends instructions back to the data access point 20 and on to the switch network 30 to route the call to the parking platform that was indicated by the parking manager 42. When the call reaches the parking platform, the parking platform sends a message to the parking manager 42 indicating that the call has been parked. The parking manager 42 then sends a similar message to call center router 36.

One advantage of NPTS is that transparent interfaces are used to permit the integration of proprietary equipment within the architecture. A generic specification of a call routing destination, called a destination label, is used to encapsulate proprietary physical parameters, such as proprietary routing addresses. The use of destination labels keeps the interfaces transparent between the call center router 36 and the data access point 20, and between the call center router 36 and the parking manager 42. When the call center router 36 answers a call routing query with a call center 50 to which to route the call, it returns a destination label to the data access point 20. This destination label indicates, in a common format and specification, the call center 50 destination. The data access point 20 then translates the destination label into a destination recognizable and useable by the switch network 30. Generally, this translation states a switch and trunk group on which to terminate the call to the call center 50, as well as digits to outpulse to the call center 50.

Also, when the call center router 36 requests a parking platform from the parking manager 42, the parking manager 42 returns a destination label to the call center router 36. This destination label indicates a specific parking platform to which to route the call. The destination label may specify a switch and trunk group through which the switch network 30 can terminate the call to the appropriate parking platform. The destination label may also specify digits to outpulse with the call to the parking platform. In one embodiment, the outpulsed

digits specify one or more applications to be applied to the call by the parking platform. The call center router 36 returns this destination label to the data access point 20, which performs the routing translation.

By using destination labels, NPTS allows for the integration of different vendors' equipment into the architecture. Different vendors' components may be used for the call center router 36 and parking manager 42 by designing them to provide a generic interface that utilizes Destination Labels.

In a preferred embodiment, the parking manager 42 includes a state engine. When a destination label is returned to the call center router 36 to route the call to a specific parking platform, a parking slot on that parking platform is placed in a "reserved" state. When the call reaches the parking platform, the parking platform notifies the parking manager 42. The parking manager 42 then places a slot on that parking platform in a "occupied" state, and notifies the call center router 36.

While the call is parked, the call center router 36 monitors the availability of the intended destination call center 50. If the call center 50 becomes available, then the call center router 36 sends a request to the parking manager 42 to unpark the call. This request also contains the destination label needed to route the call to the call center 50.

When the parking manager 42 receives a request from the call center router 36 to unpark a call, it performs a routing translation on the destination label to specify a network address. It then instructs the parking platform to release the call, providing the parking platform with the network routing address. The parking platform releases the call to the switch network 30 with the address to which to route the call. The parking manager 42 then places the slot on the parking platform in an "available" state.

Thus, even while the call is parked, NPTS continues to control the disposition of the call. The call center router 36 monitors availability at the originally intended call center 50. NPTS is also capable of releasing the call to another destination, or to a call treatment application. In one embodiment, when

the parking manager 42 receives from a parking platform an indication that a call has been parked, it initiates a timer. Use of this timer, as well as its duration, can be specified by the customer. When the timer expires, if the call center router 36 has not responded to the parking manager 42 with a request to unpark the call, the parking manager 42 instructs the parking platform to release the call and route it to a voicemail treatment 46. The voicemail treatment 46 plays a message to the caller. The caller can then leave a voicemail message for the customer. Alternatively, other call treatment applications 48 may be used. The parking manager 42 simply sends the appropriate network routing address to the parking platform. The parking platform then releases the call to the switch network 30, and the switch network 30 routes the call to voicemail treatment 46 or other call treatment 48.

The voicemail treatment 46 and other call treatments 48 are also connected to WAN 26. Thus, when they receive a call, they send a notification to the parking manager 42 to confirm the call has been received and properly treated.

A service workstation 44 is used for integrated order entry and provisioning of the NPTS system. Specifications of certain parameters may be entered using service workstation 44. These parameters can include IVR routing algorithms (time of day, day of week, etc.), call routing destinations (call centers, other stations), availability measurement thresholds, call treatment applications, parking manager timer use and duration, and numerous other parameters. In addition, a service workstation 62 can be placed at a customer's premises, allowing a customer to order and manage their own services in a similar fashion.

In a preferred embodiment of NPTS, a WAN 26 provides connectivity among the various components that control the disposition and routing of a call. These components include the data gateway 22, call center router 36, parking manager 42, CTI data collection server 38, voicemail treatment 46 and other call treatments 48, service workstation 44, customer premise service workstation 62, and call centers 50. This arrangement allows for easy incorporation of additional

components into the NPTS architecture, and provides the connectivity needed for data communications among the various components.

FIG. 2 is a flow diagram illustrating a process performed by a preferred embodiment of NPTS. Shown is the architecture of FIG. 1, along with call and data flows among the various components. The process shown is that of NPTS receiving a call for one 50b of multiple call centers 50a - 50n, determining the intended call center 50b is unavailable, parking the call on the parking platform 32, later determining the intended call center 50b has become available, releasing the call from parking platform 32, and routing the call to the intended call center 50b.

1. The switch network 30 receives a call from a call originator 28 over a traffic trunk. The dialed number of the call is one designated for a call center 50 that subscribes to NPTS.

2. A switch from the switch network 30 issues a call routing query to the data access point 20 over a data link.

3. The data access point 20 invokes the appropriate call routing plan, based on the dialed number of the call. During the processing of this plan, a trigger is reached that causes the data access point 20 to transfer the call routing query to a call center router 36 via data gateway 22.

4. The data gateway 22 routes the call routing query to the appropriate call center router 36, based on the dialed number translation.

5. The call center router 36 calls invokes the appropriate call routing plan, based on the dialed number, ANI, and any other customer-specified parameters that may be used in intelligent call routing algorithms. The call center router 36 determines that the call should be routed to call center 50b. The call center router 36 then determines that the intended call center 50b is currently not available. Therefore, the call center router 36 sends a parking request to the parking manager 42.

6. In response to the parking request, the parking manager 42 determines which parking platform 32 is available to park the call. In this case, parking manager 42 selects parking platform 32 is available, and returns

to the call center router 36 a destination label that indicates the selected parking platform 32. The parking manager 42 then reserves a parking slot on the selected parking platform 32.

7. The call center router 36 sends the destination label to the data gateway 22.

8. The data gateway 22 sends the destination label to the data access point 20.

9. The data access point 20 translates the destination label to a physical network routing address. The data access point 20 sends this address in a response message to the switch in the switch network 30 that issued the original call routing query in step 2.

10. The switch network 30 routes the call to the parking platform 32. The switch network 30 uses a RLT to reach the selected parking platform 32. It outpulses digits along with the call to the selected parking platform 32, which uses these digits to perform one or more applications on the call.

11. The selected parking platform 32 sends a message to the parking data gateway 34 to notify parking manager 42 that the call has been received.

12. The parking data gateway 34 forwards the message to parking manager 42.

13. The parking manager 42 places the slot on the selected parking platform 32 that received the call in a "occupied" status, so that the slot will not be considered for use in parking another call until it is made available. The parking manager 42 then sends a message to the call center router 36 to announce that the call has been parked. The parking manager 42 may also initiate a timer, the expiration of which triggers the release of the call to voicemail treatment 46 or other call treatment 48.

14. The call center router 36 continuously monitors availability of the intended call center 50b. When the call center 50b becomes available, the call center router 36 sends an unpark request, along with the destination label of the call center 50b, to the parking manager 42.

15. The parking manager 42 translates the destination label to a physical network routing address. The parking manager 42 sends a message to parking data gateway 34 to instruct the selected parking platform 32 to release the call and route it to the call center 50b. The parking manager 42 also places the parking slot on the selected parking platform 32 in an "available" state.

16. The parking data gateway 34 forwards the message to the selected parking platform 32.

17. The selected parking platform 32 releases the call to the switch network 30. The RLT that was used by the call to reach the selected parking platform 32 from the switch network 30 is now available for another call.

18. The switch network 30 routes the call to the call center 50b.

FIG. 3 is another flow diagram illustrating a process performed by a preferred embodiment of NPTS. The process shown is that of NPTS receiving a call for one 50b of multiple call centers 50a - 50n, determining that the intended call center 50b is unavailable, and parking the call on a parking platform 32. However, before the intended call center 50b becomes available, a timer on the parking manager 42 expires. This triggers the release of the call to a voicemail call treatment 46.

1. The switch network 30 receives a call from a call originator 28 over a traffic trunk. The dialed number of the call is one designated for a call center 50 that subscribes to NPTS.

2. A switch from the switch network 30 issues a call routing query to the data access point 20 over a data link.

3. The data access point 20 calls on the appropriate call routing plan, based on the dialed number of the call. During the processing of the call routing plan, a trigger is reached that causes the data access point 20 to transfer the query to a call center router 36 via data gateway 22.

4. The data gateway 22 routes the query to the appropriate call center router 36 based on the dialed number translation.

5. The call center router 36 invokes the appropriate call routing plan, based on the dialed number, ANI, and any other customer-specified parameters that may be used in intelligent call routing algorithms. The call center router 36 determines that the call should be routed to call center 50b. The call center router 36 then determines that the intended call center 50b is currently not available. Therefore, the call center router 36 sends a parking request to the parking manager 42.

6. In response to the parking request, the parking manager 42 determines which parking platform 32 is available to park the call. In this case, parking manager 42 selects parking platform 32 is available, and returns to the call center router 36 a destination label that indicates the selected parking platform 32. The parking manager 42 then reserves a parking slot on the selected parking platform 32.

7. The call center router 36 sends the destination label to the data gateway 22.

8. The data gateway 22 sends the destination label to the data access point 20.

9. The data access point 20 translates the destination label to a physical network routing address. The data access point 20 sends this address in a response message to the switch in the switch network 30 that issued the original call routing query in step 2.

10. The switch network 30 routes the call to the selected parking platform 32. The switch network 30 uses a RLT to reach the selected parking platform 32. It outpulses digits along with the call to the parking platform 32, which uses these digits to perform one or more applications on the call.

11. The selected parking platform 32 sends a message to the parking data gateway 34 to notify the parking manager 42 that the call has been received.

12. The parking data gateway 34 forwards the message to the parking manager 42.

13. The parking manager 42 places the slot on the selected parking platform 32 that received the call in a "occupied" status, so that the slot will not be considered for use in parking another call until it is made available. The parking manager 42 then sends a message to the call center router 36 to announce that the call has been parked. The parking manager 42 also initiates a timer, the expiration of which triggers the release of the call to voicemail treatment 46.

14. The call center router 36 continuously monitors availability of the intended call center 50b. However, prior to receiving an unpark request from the call center router 36, the timer that was set by the parking manager 42 when the call was parked expires. The parking manager 42 sends instructions to the parking data gateway 34 to instruct the selected parking platform 32 to release the call. Along with these instructions, the parking manager 42 sends the physical network routing address of the voicemail treatment 46.

15. The parking data gateway 34 forwards the message to selected parking platform 32.

16. The selected parking platform 32 releases the call to the switch network 30. The RLT that was used by the call to reach the selected parking platform 32 from the switch network 30 is now available for another call.

17. The switch network 30 routes the call to voicemail treatment 46. The caller may then leave a voicemail message for the customer.

The processes illustrated in FIGS. 2 and 3 are examples of the use of NPTS. NPTS can perform other processes, as would be apparent to one skilled in the relevant art. For example, the parking request can originate at the IVR. For another example, other call treatment applications 48 may be used rather than voicemail treatment 46. In one embodiment, call treatments can be applied to the call by a parking platform while the call is parked.

Of course, NPTS can route calls directly to call centers 50, or other destinations, without parking the calls, if availability is sufficient at the intended

destination. NPTS can also park a call, and then releasing it to be routed to a call center 50 other than the originally intended call center 50.

While various embodiments of the present invention have been described above, it should be understood that they have been presented by way of example, and not limitation. It will be apparent to persons skilled in the relevant art that various changes in form and detail can be made therein without departing from the spirit and scope of the invention. Thus the present invention should not be limited by any of the above-described example embodiments, but should be defined only in accordance with the following claims and their equivalents.

What Is Claimed Is:

1. A system for parking a telephone call made to a call destination on a telecommunications switch network, comprising:

means for parking a call when a destination of said call is unavailable;

means for monitoring the availability of said destination of said parked call based on the availability of agents at said destination; and

means for routing said parked call to said destination when said destination becomes available.

2. The system of claim 1, wherein said destination is a call center.

3. The system of claim 1, wherein said availability of said agents is based on the number of agents currently handling calls.

4. The system of claim 1, wherein said availability of said agents is based on the current number of calls in a queue.

5. The system of claim 1, wherein said availability of said agents is based on the rate of incoming calls.

6. The system of claim 1, further comprising:

means for applying a call treatment to said parked call.

7. The system of claim 6, wherein said call treatment is selected based on caller input.

8. The system of claim 6, further comprising:

means for applying a further call treatment to said parked call when said parked call has been parked for a predetermined interval.

9. The system of claim 1, further comprising:

means for routing said parked call to an alternative destination.

10. A method for parking a telephone call made to a call destination on a telecommunications switch network, comprising the steps of:

parking a call when a destination of said call is unavailable;

monitoring the availability of said destination of said parked call based on the availability of agents at said destination; and

routing said parked call to said destination when said destination becomes available.

11. The method of claim 10, wherein said monitoring step comprises:

measuring the number of agents currently handling calls.

12. The method of claim 10, wherein said monitoring step comprises:

measuring the current number of calls in a queue.

13. The method of claim 10, wherein said monitoring step comprises:

measuring the rate of incoming calls.

14. The method of claim 10, further comprising the step of:

applying a call treatment to said parked call.

15. The method of claim 14, further comprising the step of:

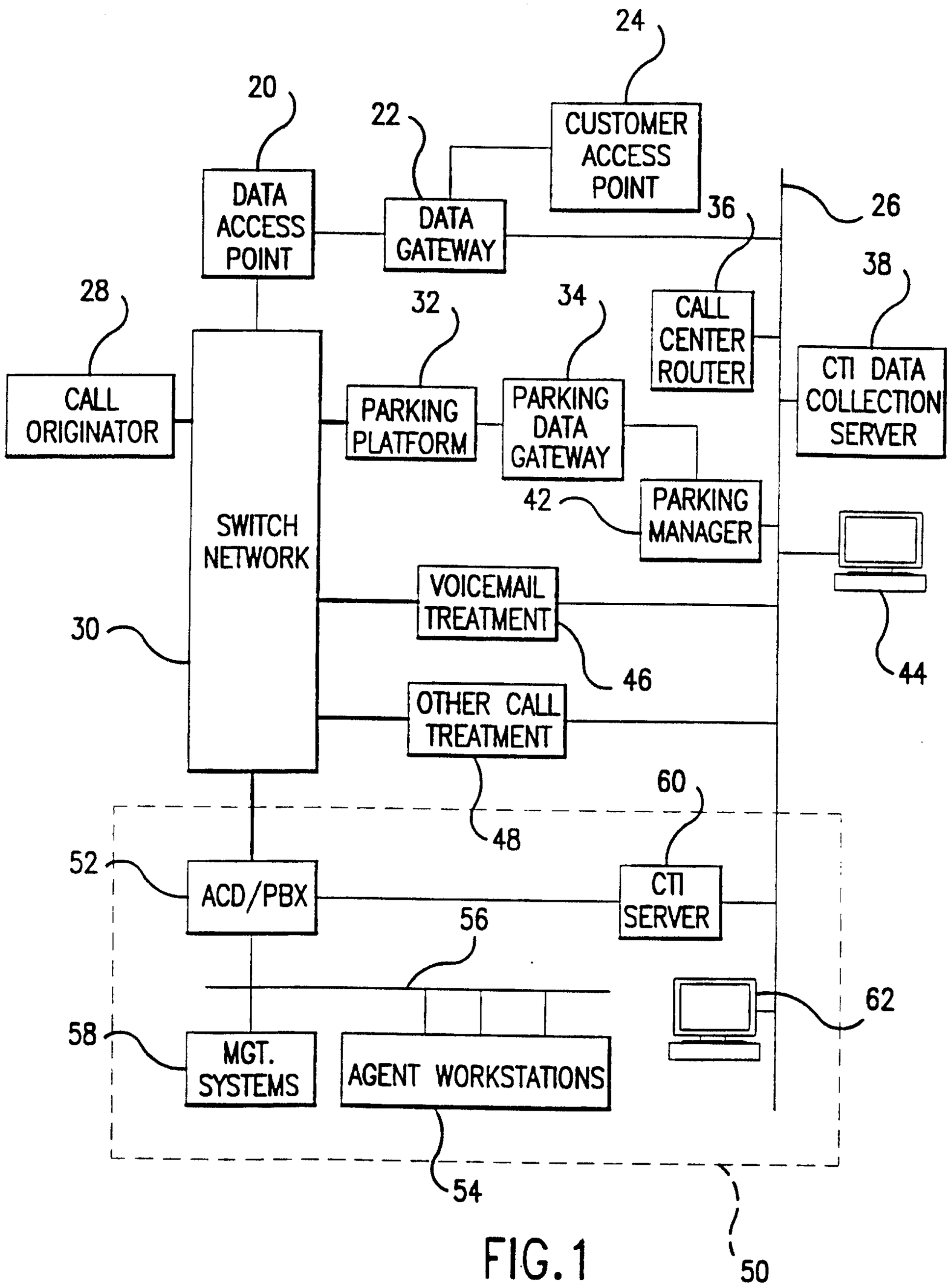
selecting said call treatment based on caller input.

16. The method of claim 14, further comprising the step of:

applying a further call treatment to said parked call when said parked call has been parked for a predetermined interval.

17. The method of claim 10, further comprising the step of:

routing said parked call to an alternative destination.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20
22
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DATA ACCESS POINT
DATA GATEWAY
36
26
38
28
32
34
CALL CENTER ROUTER
CTI DATA COLLECTION SERVER
CALL ORIGINATOR
PARKING PLATFORM
PARKING DATA GATEWAY
SWITCH NETWORK
42
PARKING MANAGER
VOICEMAIL TREATMENT
30
46
44
OTHER CALL TREATMENT
60
48
52
ACD/PBX
CTI SERVER
56
62
58
MGT. SYSTEMS
AGENT WORKSTATIONS
54
50

FIG. 1

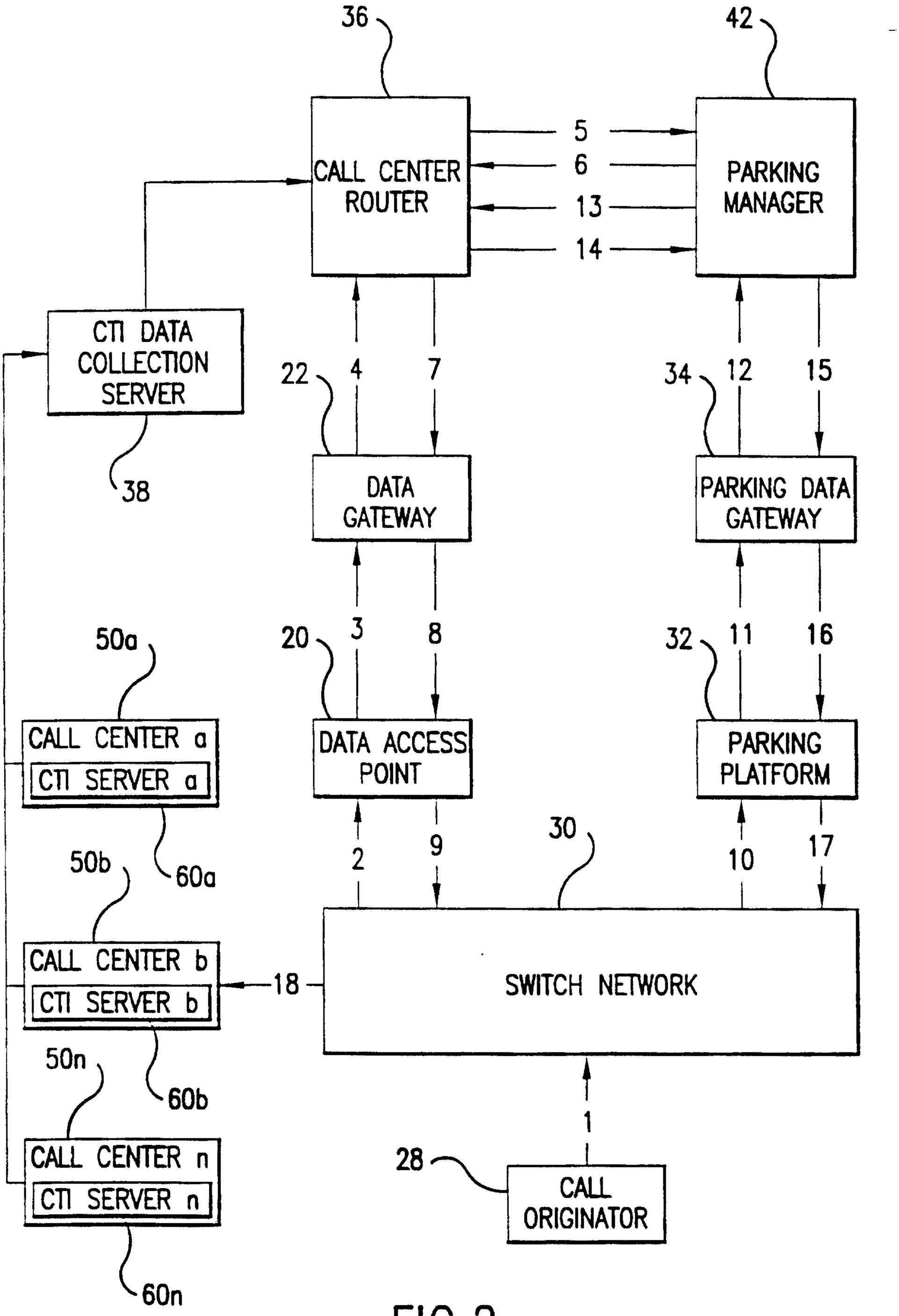
36
42
CALL CENTER ROUTER
5
6
13
14
PARKING MANAGER
CTI DATA COLLECTION SERVER
38
22
4
7
34
12
15
DATA GATEWAY
PARKING DATA GATEWAY
50a
20
3
8
32
11
16
CALL CENTER a
CTI SERVER a
DATA ACCESS POINT
PARKING PLATFORM
60a
50b
2
9
30
10
17
CALL CENTER b
CTI SERVER b
18
SWITCH NETWORK
50n
60b
1
28
CALL ORIGINATOR
CALL CENTER n
CTI SERVER n
60n

FIG.2

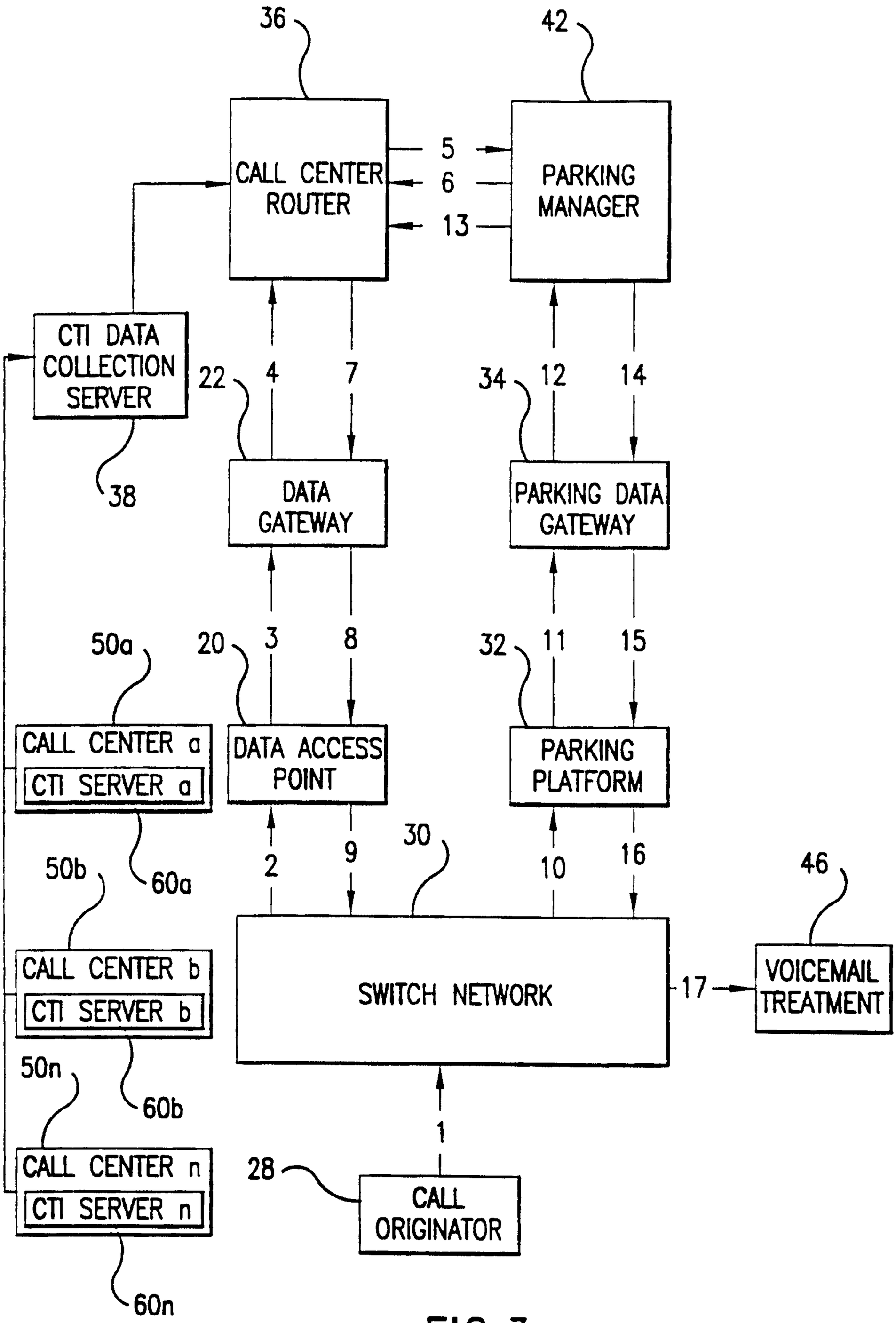
36
42
CALL CENTER ROUTER
PARKING MANAGER
5
6
13
CTI DATA COLLECTION SERVER
22
4
7
34
12
14
38
DATA GATEWAY
PARKING DATA GATEWAY
50a
20
3
8
32
11
15
CALL CENTER a
CTI SERVER a
DATA ACCESS POINT
PARKING PLATFORM
2
9
30
10
16
46
50b
60a
CALL CENTER b
CTI SERVER b
SWITCH NETWORK
17
VOICEMAIL TREATMENT
50n
60b
1
CALL CENTER n
CTI SERVER n
28
CALL ORIGINATOR
60n

FIG.3