



Product Overview Guide

Release 14.0

Document Version 4

BroadWorks® Guide

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1 Introduction

From its inception, BroadSoft has focused on developing and delivering software-based voice applications. The company's flagship product, BroadWorks, is a VoIP applications platform that enables service providers to deliver basic and enhanced voice services for business and residential end users. As the leading Application Server for IP-Multimedia Subsystem (IMS) environments, BroadWorks services are network agnostic, offering carriers expanded service reach, fixed-mobile convergence (FMC), streamlined application integration, and operational cost savings.

With an extensive range of features, BroadWorks enables carriers to offer a differentiated set of communication services that range from media-oriented services such as voice messaging, conferencing, and auto attendant, to personal calling functions such as selective call forwarding, simultaneous ring, and dial-by-name. Applying these features across multiple delivery networks and end devices opens carriers to an added dimension of innovation.

In addition to offering a converged service environment, BroadWorks addresses an additional set of problems inherent in traditional networks. Using the web, BroadWorks provides a high servicing component between the service provider and the customer. User control and configuration is provided via a standard web portal that augments basic phone functionality to make existing services (for example, conference calling and call forwarding) easier to use, and new services easier to deploy. For example, a BroadWorks user can selectively forward calls from an office phone to a cell phone with a few clicks on a web page or wireless PDA. Previously, with Centrex-like services, such a service would require a highly complex and time-consuming procedure for both the user and the provider.

The BroadWorks platform operates on a standards-based, modular architecture that uses common protocols (such as SIP), open interfaces, and scalable, industry-standard hardware. BroadWorks open environment enables providers, as well as third-party service developers, to rapidly introduce new services and launch new applications.

BroadWorks provides user services, administrative features, and media-based functionality from a standards-based service delivery platform shown in the following figure.

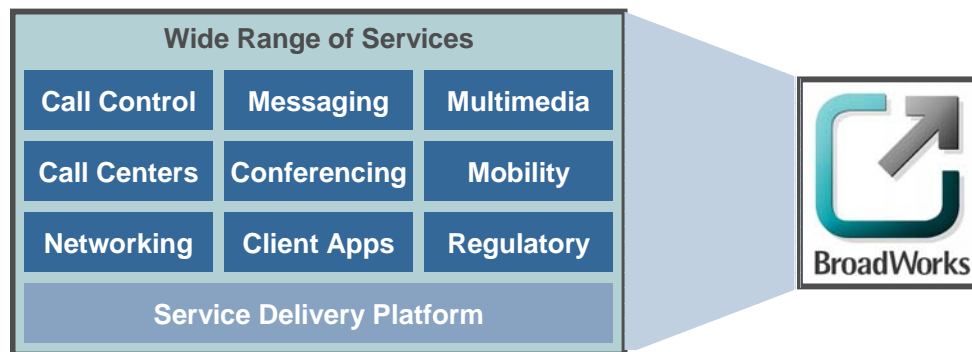


Figure 1 BroadWorks Service Delivery Platform

BroadWorks system functionality is distributed across multiple servers for optimized performance and to meet IMS specifications. The system provides a complete communications solution via its three primary server components: the BroadWorks Application Server, which provides call processing, personal and group services, and

service management; the BroadWorks Element Management System, which provides alarm proxy and software management, and the Media Resource Function (MRF), which provides audio transcoding, media mixing, and media broadcast.

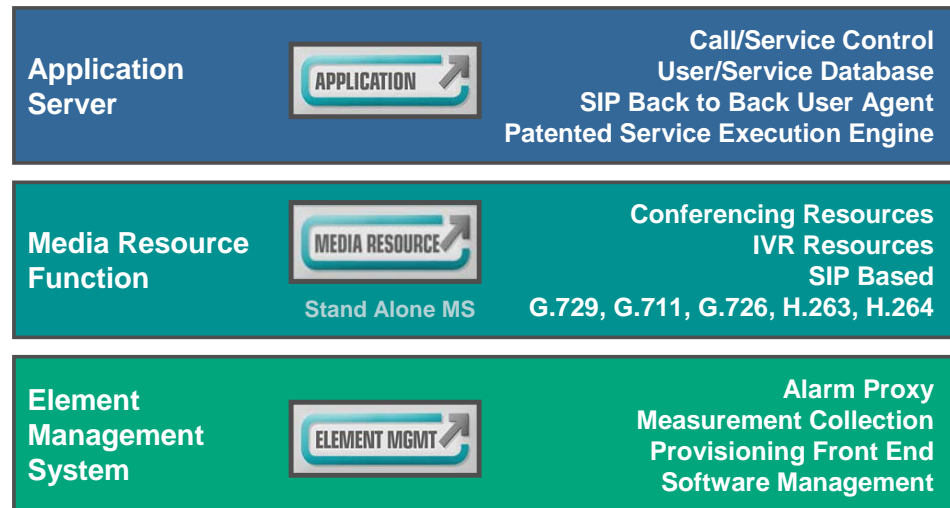


Figure 2 BroadWorks Core IMS Components

In addition to the three servers (Application Server, MRF, and EMS) that make up the BroadWorks core IMS components shown above, additional BroadWorks server types are available. The BroadWorks Conferencing Server, Web Server, Call Detail Server, and Network Server are described in greater detail in section [3 Network Architecture](#) and are combined with the Application Server to make up the Application Server Complex.

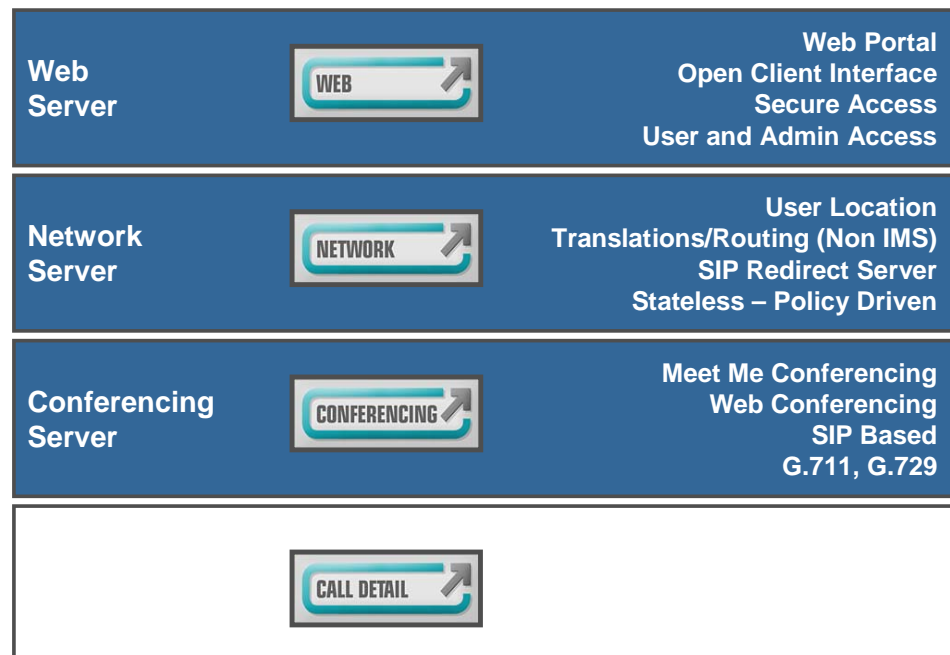


Figure 3 BroadWorks Servers

BroadWorks provides flexibility in managing service configurations using web portals. The portals provide multiple tiers of secure, easy-to-use web interfaces that simplify configuration and management of services for the end-user, group/enterprise administrator, and service provider. Specific layers in the administrative hierarchy are described as follows:

- **System Provider Web Portal** allows access to all levels and pages in the system. These web pages permit offsetting responsibilities to service providers or customer service representatives (provisioning administrator).
- **Provisioning Administrator Web Portal** permits access to all adds, modifies, and deletes of groups and group members, but does not permit access to system-level services, interfaces, or functions.
- **Service Provider Web Portal** allows service providers access to system-level set-up and monitoring functions, as well as group and personal management. The service provider web portal differs from the system provider access in that only tasks related to a service provider or reseller are accessible, rather than functions for monitoring and maintaining BroadWorks. The service provider web portal also allows system resellers to customize and brand the interface of BroadWorks for their customers.
- **Enterprise Web Portal** enables enterprise administrators to access, configure, and manage their voice VPN (that is, private dialing plan). Depending on the size of a company, this administrator can be the same person as the group administrator mentioned below.
- **Group Web Portal** for business group administrators distributes some of the service provider responsibilities and management to the group administrator, empowering the business customer to provision services to users and to manage group-related activities. The group administrator is a company employee such as an office manager or technology representative. Group administrators have the option of establishing an additional department layer of administration (for example, Sales or Engineering). This capability is especially useful for larger enterprises that want to distribute responsibilities for day-to-day administration to department administrators.
- **Personal Web Portal** grants easy access to service configuration and management to individual users. Activating and customizing services such as Call Forwarding and Call Notification is simple and intuitive. One service included with the CommPilot Personal web portal is the CommPilot Call Manager, described below.
- **CommPilot Call Manager** allows users to control calls (using functions such as hold, transfer, and conference), via a familiar web page. The CommPilot Manager also shows detailed call logs and has contact and dialing integration with Microsoft Outlook.

BroadWorks portals and CommPilot Call Manager are delivered from the BroadWorks Web Server. The Web Server interfaces with the Application Server and the Network Server. A command line interface (CLI) also exists for quick execution of configuration functions on the Application, Media, and Network Servers. Moves, adds, and changes for users and groups on the Application Server are automatically propagated to the Network Server via a synchronous API tool. The CLI provides common commands in an easy-to-understand syntax for administration of the routing and translations functions.

In addition to web-based portal and call control agents, BroadWorks offers a range of client applications. These products are integrated with BroadWorks server-based features and offer enhanced functionality for users.

- **Assistant** – PC-based Microsoft Internet Explorer toolbar that provides desktop access to BroadWorks features, including service configuration and call control.

- **Assistant - Enterprise** – All the features of Assistant, plus click-to-dial from Microsoft Outlook contacts.
- **Communicator** – Multi-line, PC-based softphone that is pre-provisioned and pre-configured for BroadWorks-based service.
- **Communicator - Multimedia** – All the features of Communicator plus high quality video service.
- **Receptionist** – PC-based attendant console application that provides group member call status and click-to-transfer functionality.
- **Call Center** – PC-based console for Call Center attendants to answer calls waiting in the Call Center queue, to make and control their active calls, and to manage their availability.

With clients, web portal access, and network agnostic service, BroadWorks surpasses legacy solutions and current competitors in three key areas:

- **Superior features and functionality** – BroadWorks leverages web-functionality, open network interfaces, and a superior service creation environment to provide capabilities that far exceed existing network-based solutions and meet or even exceed functionality of PBX and IP PBX equipment.
- **Application integration** – Within the IMS architecture, carriers can integrate BroadWorks call control with third-party applications such as “presence” and IPTV that enable them to offer novel value-added services, and triple/quadruple-play service offerings. BroadWorks is the dominant IMS Application Server platform and makes available a full suite of voice functionality for third-party access. BroadWorks also offers superior third-party application integration in stand-alone deployments, including deployment with solutions such as Microsoft’s LCS.
- **Economics** – BroadWorks, within an IMS architecture or stand-alone deployment, offers a superior value proposition for carriers by combining operating savings with accelerated innovation and service launch. BroadWorks offers lower operating costs as it is deployed on modular, industry standard hardware, and functions in a next-generation environment VoIP environment. BroadWorks also offers a more robust environment for service launch and revenue growth, enabling carriers to offer new, more powerful services in less time for a better return on investment (ROI).

1.1 Release 14 Overview

For Release 14, BroadSoft focuses on system-level innovations for increasing reliability, streamlining management and maintenance tasks, and easing integration with other third-party software and hardware vendors. However, this release does introduce some new user features, such as integrated Fax Messaging, and a new service that allows users to set up impromptu conference calls with any number of participants.

Release 14 improves the external authentication features previously introduced to BroadWorks, adding external authentication support on the Open Client Server (OCS). This provides the ability to use trusted authentication sources for any login request coming through the OCS, such as from third-party clients or provisioning applications.

Release 14 offers system providers a number of new options for call control, licensing, and call throttling, including the ability to direct and limit traffic based on the media type of the messages. It also enhances BroadWorks for use in IMS deployments, with the addition of a Location Server, new identity profile, and low-level enhancements to the SIP interface.

Release 14 improves the centralization of system administration, monitoring, and maintenance tasks within the Element Management System (EMS). Administrators can reliably monitor more types of information and statistics, including the system logs recorded on Solaris and Linux platforms, and can perform maintenance tasks on remote servers directly from the EMS interface.

Release 14 offers a number of other back-end enhancements designed to improve performance and scalability, such as support for external file servers. Support is introduced for Solaris 10, and the internal database used by BroadWorks servers is upgraded to the latest release. For more information about new feature functionality, see the *BroadWorks Release 14 Bulletin*.

2 BroadWorks-Based Applications and Solutions

2.1 Key Applications

As noted, BroadWorks provides an exceptionally large set of features, clients, and value-added partnerships. By combining these components into **Applications**, carriers can build extremely powerful service offerings.

BroadWorks can be used to support four key applications or service offerings:

- The **Hosted PBX** application allows carriers to provide business communications services to large enterprises or small/medium businesses. BroadWorks provides the enhanced feature-functionality of PBX and IP PBXs, without the capital cost and limitations of premise-based systems.
- The **Mobile PBX** application allows mobile operators to provide business services to all-mobile enterprises, or mobile-fixed converged enterprises. The Mobile PBX application delivers PBX features and enhanced enterprise services to 2G or 2.5G mobile phones on existing mobile networks.
- The **Business Trunking** application allows carriers to provide “IP Trunking” connectivity to enterprise PBXs and IP PBXs – it allows carriers to offer next-generation trunking and overlay services to enterprises’ existing premise-based systems.
- The **Residential** application allows carriers to deliver a next-generation consumer VoIP offering that serves both POTS and “enhanced” Residential, and includes next-generation residential services such as Family Services, Personal Clients, and Mobility integration.

BroadWorks provides a best-in-class set of integrated features and end-user clients that anchor each of these applications. Carriers design their service offering by implementing one of more of the base BroadSoft applications. BroadSoft provides tools and consulting services to assist carriers to design their marketing offering and deploy and launch their solution.

2.2 Converged Applications

Service providers are certainly not limited to the four applications listed above. In fact, BroadSoft believes there is a remarkable amount of innovation possible for service providers that blend these applications into “converged applications”. Carriers now have the opportunity to define and build a large enterprise FMC offering today that is technically and economically superior to solutions offered by premises-based equipment vendors.

Historically, carriers have struggled to satisfy the requirements of large enterprises, and this market segment has been largely ceded to PBX vendors. Centrex offerings have had limited success, and carriers have been restricted to selling access and perhaps reselling PBXs. However, with functionality provided by BroadSoft, this is no longer the case.

The BroadWorks product suite provides the functionality required for next-generation enterprise offerings; further, BroadSoft provides the sales, marketing, and deployment expertise and services to help carriers define, build, and introduce their market offering.

The key advantage of converged large enterprise solution with BroadSoft is this: all enterprise communications, regardless of location or premise equipment, are managed by a network-hosted system. This means that all enterprise users benefit from a common set

of features, a common directory, common enterprise dialing plans, and most importantly, a common end-user experience, no matter what their equipment or geographic location.

Consider the following real-world example – a large enterprise may have:

- A large PBX serving corporate headquarters
- Other PBXs or IP PBXs serving regional or country headquarters
- Branch offices or new sites using IP phones
- Sales or mobile workers with only a mobile phone as their corporate handset
- Sales, mobile, or executive workers with both a mobile and a fixed handset (and administrative assistants who share their lines)
- Home or contract workers who work from a home office over a residential line

The following figure shows an example of how a heterogeneous enterprise is served by a service provider's network-hosted FMC solution.

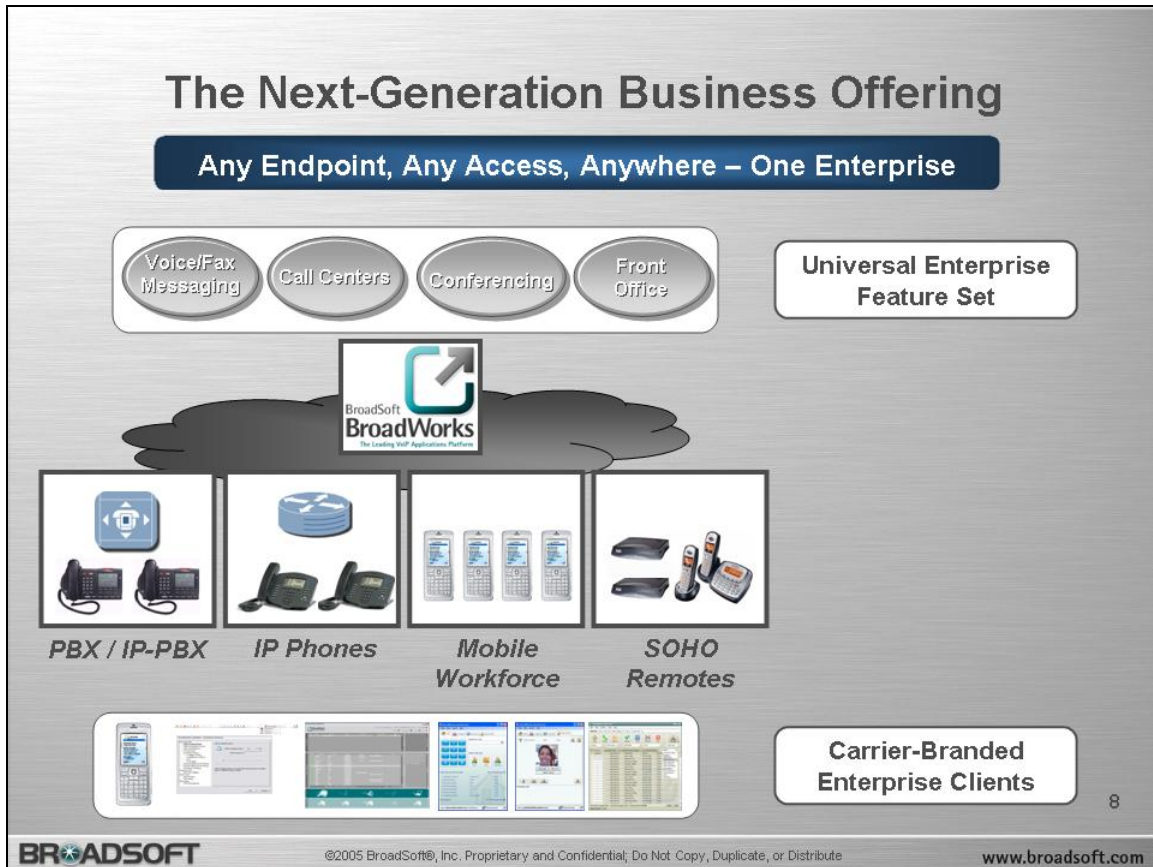


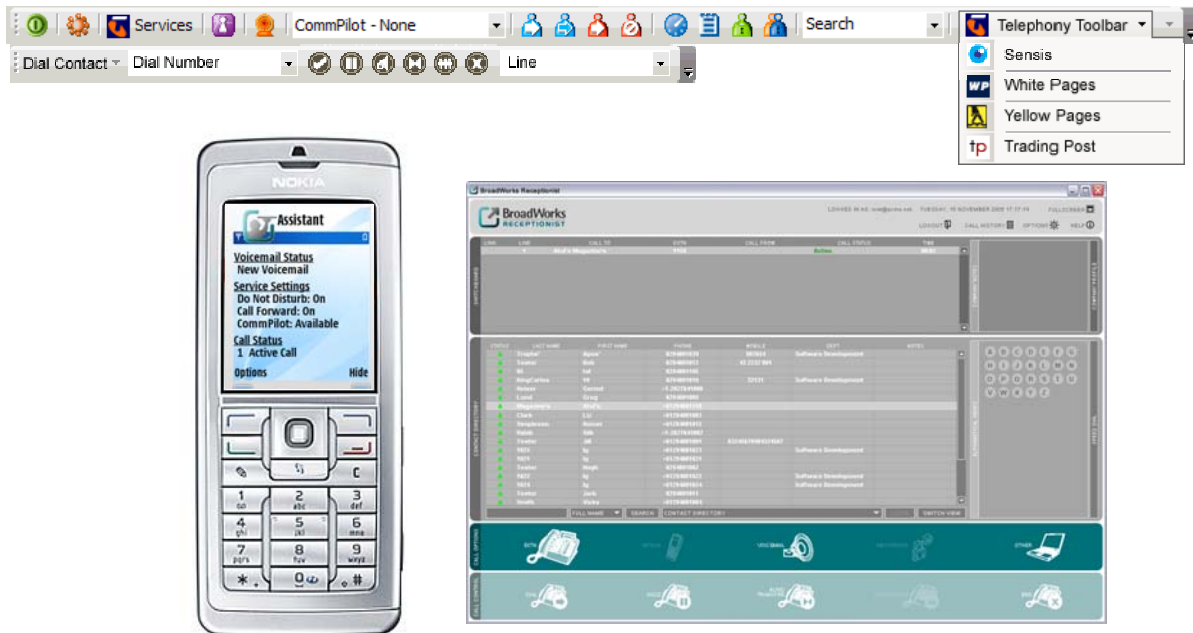
Figure 4 Next-Generation Business Offering

2.2.1 Key Selling Points and Competitive Advantages

BroadWorks-based Converged or FMC applications are superior to PBX-based systems and other network vendors' solutions in the following ways:

- **Any access, anywhere** – BroadWorks allows service providers to support worldwide large enterprises, with any size sites, in any number of locations or countries.
- **Common Features across any site** – Enterprise features are hosted in the service provider's network, and operate the same regardless of whether the employee is on an IP phone, a soft client, a PBX, an IP PBX, or a POTS line. BroadWorks supports all standard Enterprise PBX features, and also supports integrated network-based Conferencing, Voice Mail, Video Mail, Call Centers, Attendants, Mobile integration, and many more. All of these services work across all sites; for example, an enterprise's technical support line can be designed as a multi-country, multi-site, multi-language Call Center application, even if some agents are on PBXs, some are on IP phones, and some are on mobiles.
- **Common Look and Feel to Employee Clients** – the BroadWorks Assistant family allows enterprises to manage their business and increase their productivity regardless of their location or site. BroadWorks supports Assistant clients for Microsoft Outlook, Internet Explorer, and Mobile handsets. The BroadWorks Receptionist and Call Center Agent/Supervisor can be used by wireline or wireless employees. All clients can be fully branded or localized, so that the user experience can be customized as needed.

BroadWorks Assistant Plug-in for Microsoft Outlook/Internet Explorer



- **BroadWorks Mobile Assistant** **BroadWorks Receptionist**

Figure 5 BroadWorks Assistant Plug-in for Microsoft Outlook/Internet Explorer

- **Branding Opportunity** – By customizing the appearance of the BroadWorks clients, customers can place their brand in front of every enterprise user, regardless of the vendor of the employee's desk or mobile phone. This is an extremely valuable branding opportunity for customers; by using clients as the injection point into an enterprise's communications systems, customers can begin to use the "stickiness" of the client applications to pull enterprises into acceptance and embrace additional network-based services.

2.2.2 Key Functionality

This section highlights some of the key functionality provided by converged enterprise solutions, as powered by BroadWorks. This list is not exhaustive, but is meant to introduce a few key real-world cases that can be used to help carriers define and build their service offering.

- Abbreviated dialing between PBX sites, IP phone sites, and 2G, 2.5G, and 3G mobile users (both intra-country and inter-country).
- Abbreviated dialing within the enterprise from mobile stations.
- Click-to-Call dialing (with a common look and feel) from PBX stations, IP phones, home offices, or mobile phones.
- Call Centers that span sites, or span countries (for example, a technical support line with a 24-hour "follow-the-sun" strategy can have support calls go to Western Europe, North America, or Asia, based on the specific time blocks within the day. Supervisors can monitor the Call Center from anywhere in the world.).
- Mobile/Landline Call Park and Pickup – executives can take a call on their mobile, "park" the call, and then re-establish it from a wireline phone in their office or in a conference room.
- Network-based voice and video mail
- Simultaneous Ringing and single number – calls to an employee rings on their enterprise landline and mobile handset.
- Multiple phone numbers – executives with a worldwide presence can have multiple phone numbers, for example, a Frankfurt number, a New York City number, a Tokyo number, and so on.
- The all-mobile branch office – a small enterprise or a small branch office can choose to only use mobile stations as their enterprise phones. All business features are supported on 2G, 2.5G, and 3G handsets, including enhanced business services like Mobile Receptionist.

2.3 BroadWorks Solution Sets

Regardless of whether a service provider deploys Converged Applications, or if they choose to deploy a "single" application, like Hosted PBX or Business Trunking, there is large collection of solution sets that service providers can use to customize, enhance, and most of all, capitalize on their offering.

These solution sets are valuable add-ons that can be deployed with any of the BroadWorks applications or converged applications. The following figure shows an example:

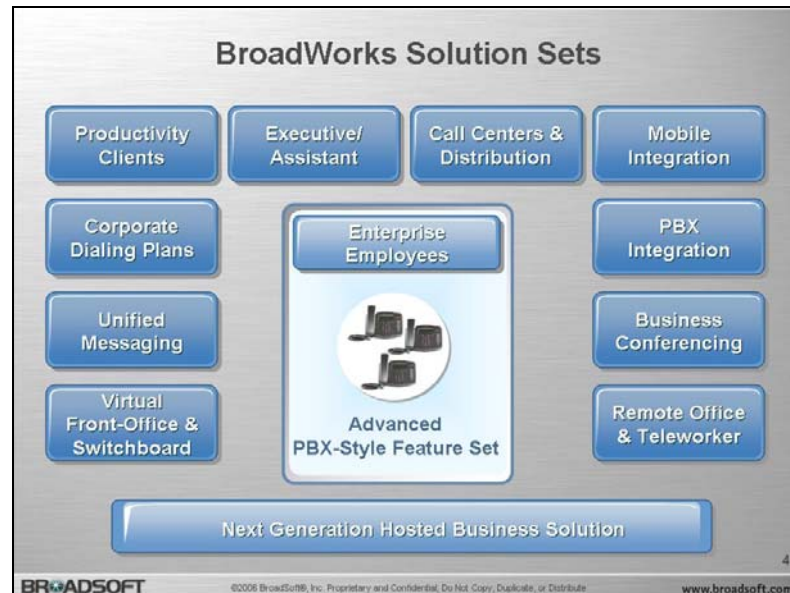


Figure 6 BroadWorks Solution Sets

BroadWorks provides each of the following solution sets. Note that all of these solution sets are fully integrated within BroadWorks – they share a common web portal, have fully integrated management capability, are fully integrated in BroadWorks accounting and CDRs, and so on.

- **Virtual Front Office Attendants and Switchboards** – BroadWorks supports fully-virtual software-based attendant console functionality, Automated Attendant functionality, hardware attendants, and allows carriers and enterprises to design the look, feel, and operations of their front office.
- **Unified Messaging** – BroadWorks supports fully integrated voice, video, and fax messaging.
- **Corporate Dial Plans** – BroadWorks allows enterprises to design their own unique dial plan. BroadWorks is fully configurable and supports abbreviated dialing, intra- and inter-site dialing, on-net/off-net routing, least cost routing, international routing, and so on.
- **Productivity Clients** – BroadWorks supports a variety of PC, mobile, and web clients that provide personal productivity enhancement, and also supports specialized clients for applications like Call Centers and Receptionists.
- **Executive/Assistant Support** – BroadWorks supports a variety of executive/assistant solution sets, including dedicated assistants, assistant pools, and multiple executives-multiple assistant administrators “sharing”.
- **Call Centers and Call Distribution** – BroadWorks allows service providers to offer Call Center and virtual Call Center functionality, and also supports a wide variety of Hunting and automatic call distribution (ACD) services.

- **Mobile Integration** – employees can “extend” their office phones with mobile handsets; this allows for one-number and one-mailbox functionality, and also allows for employees who have a mobile as their only device.
- **PBX Integration** – Service providers can “meld” employees on PBXs with employees on IP phones or mobiles. PBX-based employees can receive overlay services, disaster recovery and business continuity services, and unified dial plan functionality from BroadWorks.
- **Business Conferencing** – BroadWorks supports a variety of business conferencing services, including meet-me conferencing, reservationless conferencing, automated dial-out conferencing, collaboration tools, and more.
- **Remote Office and Teleworkers** – BroadWorks allows carriers to offer full “virtual user” functionality. Employees can carry their enterprise services with them wherever they go. BroadWorks supports a variety of personal mobility services, including remote office, hoteling, soft clients, PC and web clients, and mobile clients.

3 Network Architecture

At its core, BroadWorks is a VoIP application platform that delivers enhanced services and directs calls within and outside of a provider's IMS telephony network. BroadWorks also supports services through stand-alone architectures that integrate smoothly with softswitches, class 4 or class 5 switching systems, and 2G and 2.5G wireless networks.

3.1 IMS Architectures

BroadWorks functions as the application or feature server as defined in the IP Multimedia Subsystem (IMS) architecture and provides a full range of network-agnostic, SIP-based call control, video, and media-based features that serve fixed-line, cable, and wireless end points.

Carriers are deploying IMS with the promise of superior feature-functionality, streamlined application integration, and meaningful operating savings. IMS offers these benefits in large part by supporting an environment where user profile information and service logic are extracted from core infrastructure. As these elements are typically integrated within a vendor's proprietary product architecture, carriers are typically locked into the applications provided by their infrastructure vendor. Through industry standards, IMS separates the application layer from the session control layer and data layer.

With IMS, companies such as BroadSoft, focused on VoIP application software, can partner with infrastructure vendors to provide best-of-breed solutions. Practically speaking, IMS offers the standards and operating model where the BroadWorks Application Server and adjunct servers function with session layer components such as the S-CSCF. BroadWorks offers configurations with numerous leading infrastructure vendors that provide session layer equipment. These configurations have been validated and deployed with leading incumbent carriers. The following figure shows an example of BroadWorks deployed in an IMS architecture that extends services to multiple transport networks.

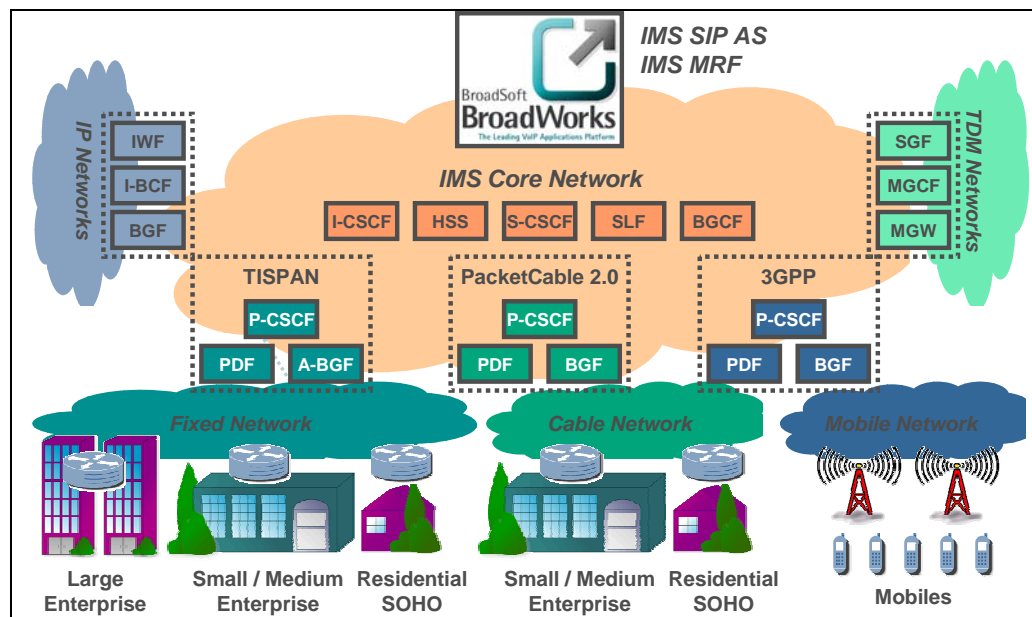
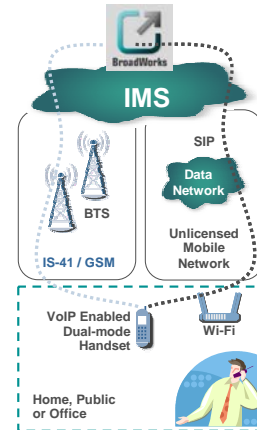


Figure 7 BroadWorks Deployed in IMS Architecture

For carriers with IMS on the roadmap but immediate plans to roll out enhanced services using existing infrastructure, BroadWorks offers a variety of configurations to support any specific set of requirements. For example, carriers can launch BroadWorks-based enhanced features for mobile devices using today's 2G and 2.5G networks. Features are available without changes to an operator's mobile switch, wireless handsets, or radio networks. Such a combination of enhanced group and user features is capable of supporting the "Mobile PBX" application.

In addition to providing enhanced services for mobile devices, BroadWorks can bridge different end devices in fixed-mobile convergence offerings. Providers can offer a single service set for multiple devices where service preferences and call treatments are applied across mobile and fixed devices.

BroadWorks supports additional definitions of fixed-mobile convergence such as cases where mobile devices are supported through both 2G mobile network connections and mobile LAN connections such as 802.11. In this case, BroadWorks provides service in both network connections and for any network handoffs between, providing continuous service and an integrated set of service preferences.



3.1.1 IMS Architecture and Third-Party Applications

Converged architecture offers the environment for integrating multiple applications. These applications can complement and augment the array of voice, video, and media feature-functionality available from BroadWorks. The following figure shows how the IMS environment provides the platform for such application integration.

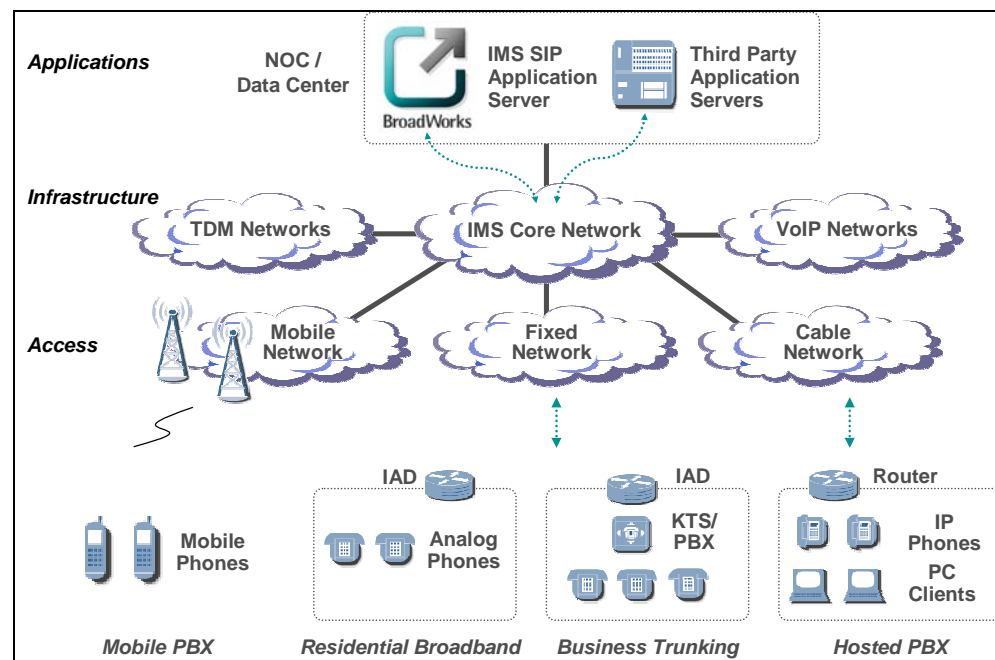


Figure 8 IMS Architecture and Third-Party Applications

An example of potent high-value application is “presence”. The integration of presence offers powerful service possibilities. For example, as a user roams from wireless networks onto the corporate wireless network, the presence server signals BroadWorks to change a user’s call status from “out of office” to “in office”. The user’s incoming calls, previously directed to an automated attendant, are now routed to the user’s personal assistant or directly to the user’s phone.

Other high-value applications include Call Center and content delivery. The content delivery application could offer presence or call-related triggers for the delivery of audio and video content. For example, as a user leaves the office network, the presence server checks call status and, if “off hook,” signals the content server to provide travel information or weather updates. Perhaps, the user specifies voice commands that prompt the content server for audio clips such as news briefs or video clips such as sports footage.

Integrated high-value applications offer service variants for both the business user and the residential user. And just as the delivery of custom ring tones has emerged as a surprising and significant source of revenue for carriers, high-value applications offer a source of highly profitable and differentiating new services.

3.2 Stand-alone Architecture

BroadWorks provides voice service for users on packet networks and connects calls to the PSTN through either a softswitch/media gateway using inter-machine trunks or through a network gateway using PRIs. Providers might initially interconnect to the PSTN through network gateways as it requires the least investment, eventually deploying a softswitch as subscriber traffic increases.

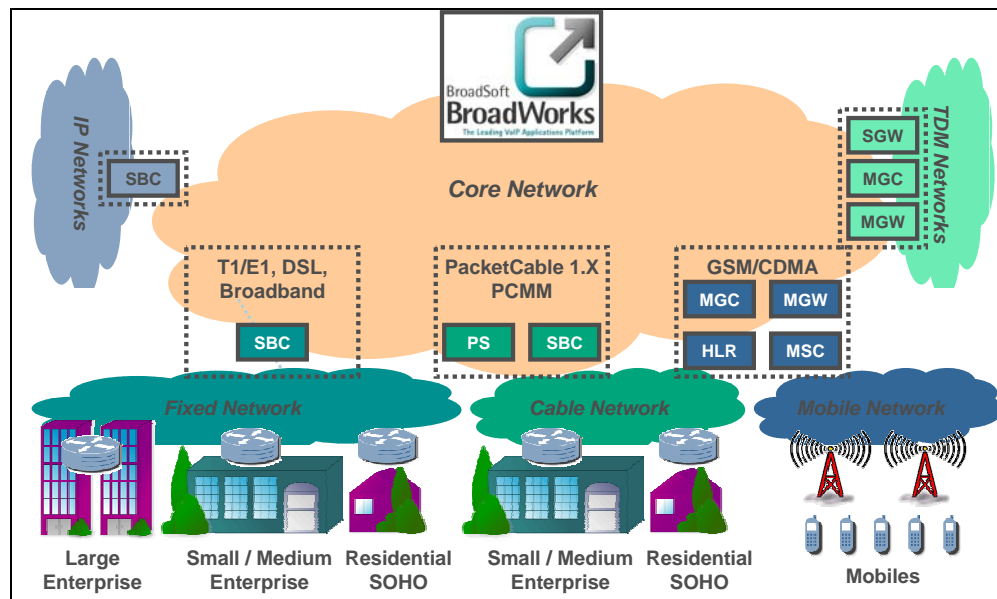


Figure 9 Stand-alone Architecture

End-user telephony devices are located at the customer premises. These devices include access gateways, integrated access devices (IADs), IP phones, and soft clients. The end-user device packetizes media from a user (voice, fax, and data) and transports the information into the service provider’s network. The end-user device signals the BroadWorks Application Server, allowing for service logic execution and call routing.

The transport between the customer premises and the provider's network is IP-based. IP can be transported over a variety of transport mediums, including Ethernet, fiber, wireless, cable, xDSL, and T1/E1. Because it is transport-independent, BroadWorks is easily integrated with existing access networks.

The BroadWorks Application Server executes services and routes calls based on the signaling messages received from Application Servers and network gateways. For calls within the provider's network, BroadWorks routes calls to the appropriate user. For calls outside of the provider's network, BroadWorks routes calls to either a softswitch or a network gateway, via the BroadWorks Network Server, which is responsible for network-wide routing. A softswitch provides all network and trunking functions and acts as a trunking tandem switch, hosting SS7 and network services such as 800, local number portability, 911, and operator services. A network gateway can be used to connect with an existing class 4 or 5 switching system, using PRI or SS7 ISUP trunking.

BroadWorks provides the ability to generate call detail records for both duration-based and service usage-based billing. BroadWorks also provides a subscriber and service provisioning interface for connectivity with operations support systems.

BroadWorks also supports the mobile PBX architecture in the stand-alone architecture. Shown in the following figure, BroadWorks integrates with 2G networks through a softswitch, registering the network interconnect to the mobile network as an SIP end point. Such a solution provides many enhanced group features for mobile devices that are typically only found on PBX or IP PBX equipment, enabling carriers to compete more effectively with CPE-based solutions.

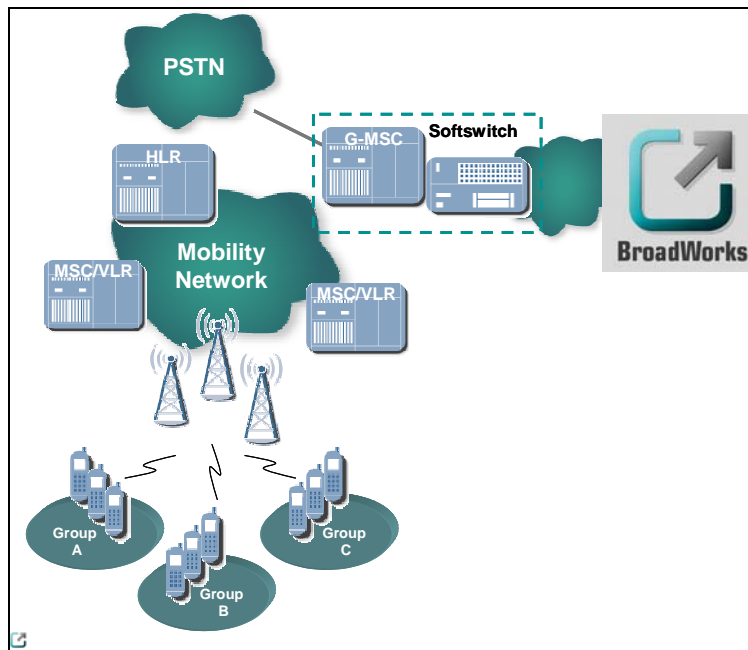


Figure 10 BroadWorks Integrated in 2G Network

4 BroadWorks Server Components

The BroadWorks system is typically comprised of Application Servers, Media Resource Function (MRF) pools, and Element Management Systems for an IMS deployment. Adjunct servers provide additional functionality to complement the Application Server to form the Application Server Complex that includes the Network Servers, Web Servers, Conferencing Server, and Call Detail Servers. Each server within the product architecture is deployed in a redundant manner. The following figure offers a basic representation of how the product architecture is broken into the application layer, session control layer, and media layer within a typical IMS network design.

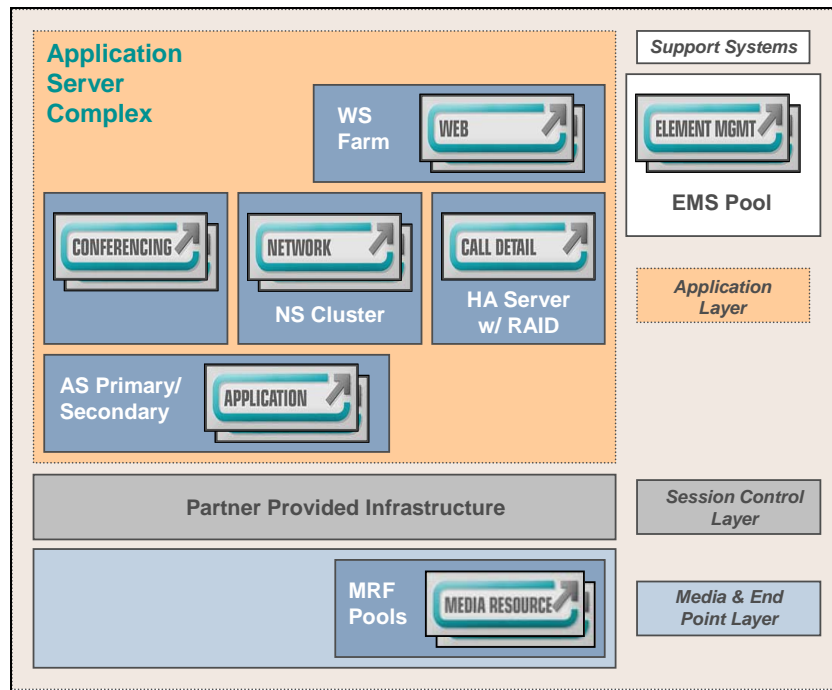


Figure 11 BroadWorks Server Components

These components and the same code base also function in a stand-alone architecture. The most notable difference is that the BroadWorks Media Server is deployed instead of the MRF. Otherwise, the modularity and flexibility of BroadWorks technology makes it difficult to describe all the various stand-alone environments within which BroadWorks components can function. The following sections describe BroadWorks server components in both IMS environments and typical stand-alone deployments.

4.1 BroadWorks Application Server

The BroadWorks Application Server is a service delivery platform responsible for the execution and management of enhanced personal and group services. Application Server functions include management of network traffic, handling of signaling interfaces, and logical execution and management of services. The BroadWorks Application Server comprises a database, the ServiceOS™ abstraction layer, and protocol stacks.

There are multiple layers of service configuration for services delivered from the Application Server. Secure web access is provided by the BroadWorks Web Server,

described in section [4.5 BroadWorks Web Server](#), which enables management, administration, provisioning, and configuration. The associated web portals can be customized for different customer groups, based on the subscribed-to services of those groups.

With various levels of security and accessibility (system provider, service provider, enterprise/group administrators, and end user), secure access is granted not only to the system, but also to the correct level of privileges. Different users are directed to the applicable web pages with proper security and real-time information. Information is retrieved from the database and displayed in real time.

Portals supported by the Application Server are as follows:

- **CommPilot System Provider** allows administrators access to all system, service, enterprise, group, and user functions.
- **CommPilot Service Provider** allows a system reseller to access all service, group, and user functions for the specific groups owned by this provider.
- **CommPilot Enterprise** allows administrators of multi-location enterprises to configure and manage services across business groups.
- **CommPilot Group** allows business group administrators to provision users and their respective services, as well as to manage group-related services. Group administrators also have the option of creating department administrators to manage the day-to-day administration of their respective departments (for example, Sales or Engineering).
- **CommPilot Personal** allows end users to configure and manage their services.

By providing customers with the ability to manage their own features via the portals, service provider responsibilities and customer management are reduced.

The BroadWorks database maintains user and group profiles, as well as service and subscription data. Updates and access are performed in real time.

The ServiceOS is patent-pending technology developed by BroadSoft. The ServiceOS manages the sessions, which are the network connections associated with a user. One session equals one subscriber's connection with BroadWorks.

The Application Server is shown in the following figure functioning in both an IMS architecture and stand-alone architecture with highlighted interfaces.

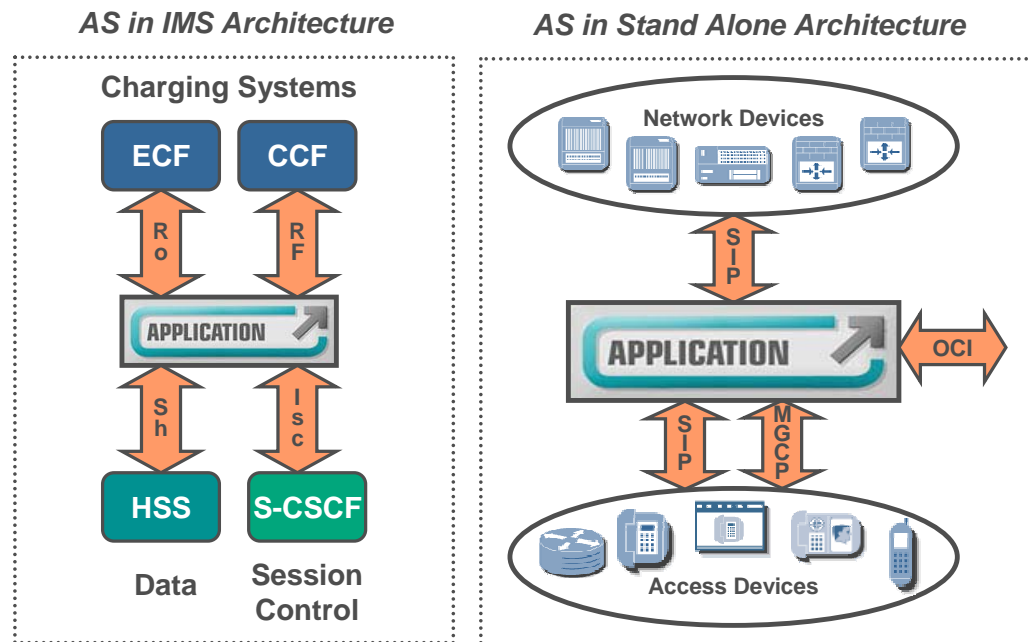


Figure 12 Application Server in IMS Architecture and Stand-alone Architecture

4.2 BroadWorks Media Resource Function (Media Server in Stand-alone)

The MRF functions together with an IMS/SIP Application Server (AS) and enables enhanced services, such as Auto Attendants, Video Auto Attendants, Meet-Me, Conferencing, Multimedia Messaging, video advertisements in Call Center queues, play tones and treatments to callers. The MRF supports these services for wireline, wireless, and/or converged networks, offering carriers new revenue sources and competitive differentiation in the market.

The MRF functions using standard IMS interfaces with interconnections to the Application Server, S-CSCF, and end devices as shown in the following figure:

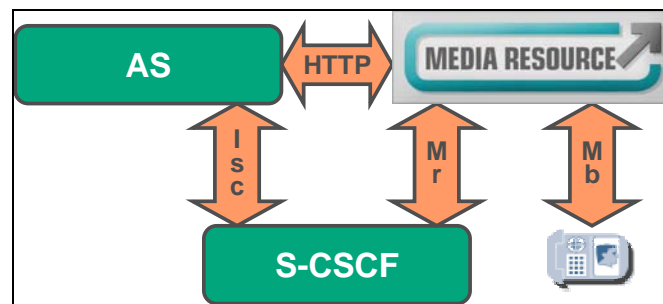


Figure 13 BroadWorks Media Resource Function

When a media service is required, the Application Server sends a media request message to the MRF using the ISC interface. Once the MRF has allocated the required resources, the Application Server directs the end point(s) in the call to the appropriate MRF ports. The MRF uses the Mb interface protocol to send and receive audio/video, with RTP. The HTTP interface is used to pull media files from a storage area.

The BroadWorks Media Server provides similar media functionality to the MRF but does so in a stand-alone architecture. Media Servers can be geographically distributed, which can minimize call latency and bandwidth utilization.

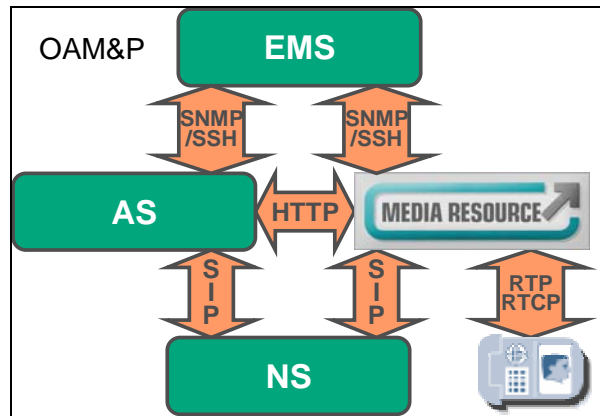


Figure 14 Media Resource Function Protocols

In a stand-alone architecture, SIP and HTTP are used as standard protocols for communication between the Application Server, Network Server, and the Media Servers. The Application Server requests resources from Media Servers and controls the behavior of those resources. Third-party media servers can also be deployed and controlled via a standard SIP interface.

Service providers can choose from multiple codecs that are supported on the BroadWorks Media Servers and MRF. Configurable classes of multimedia service can also be assigned to service providers, enterprises, groups, and individual users, restricting callers to the codecs in their assigned set. Service providers can opt for lower bit-rate codecs to increase the number of simultaneous calls that can be provided on an access link to end users. G.729 is one of the available codecs supported.

In addition, the BroadWorks system can be configured to route calls differently depending on the codecs they use, eliminating network elements that do not support included media, or prioritizing network elements that offer better support for included media.

4.3 BroadWorks Network Server

In a stand-alone architecture, the BroadWorks Network Server enables system providers to centrally manage network-related applications within their network. This includes public translations and routing capabilities such as least-cost routing, as well as enterprise-focused network applications such as voice virtual private networks (VPNs).

The Network Server allows construction of massive next-generation voice networks by assisting with the scaling of IP telephony networks and offloading subscriber-specific routing functions, allowing softswitches to focus on core call state management for trunking media gateways. The Network Server also acts as a platform for network-based enterprise applications such as private dial plans, and supports passing of non-numerical characters like * and # to the network so they can be used to trigger functionality in other networks.

The Network Server optimizes network resource utilization by providing the capability to selectively route calls to geographically dispersed resources, thus maximizing network bandwidth utilization. For example, the Network Server can manage Media Servers as a single network-wide pool of resources and, at the same time, select an appropriate Media Server for the location of the requesting subscriber. The Network Server also performs a central role in supporting BroadWorks redundancy capabilities (for more information, see section [4.11 System Redundancy and Reliability](#)).

Provisioning new subscribers can occur via synchronization of the group and user data between Application Servers and Network Servers. The Network Server functions with the Application Server as shown in the following figure:

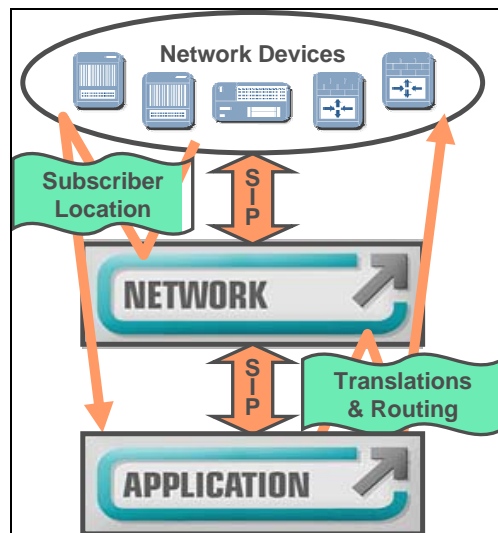


Figure 15 BroadWorks Network Server and Application Server

The policy database provides public and private (that is, enterprise) policies, to manage a system provider's network services. It also maintains subscriber location information to track where subscribers are hosted within the network. The policy database contains translation processing and a routing engine that is driven by a flexible policy approach. Dialing plans, call typing, route selection, and network services configuration are policy-driven and can be updated "on-the-fly", including the introduction of new policies within the network. Operators can configure the precedence of their routing policies to match requirements.

The ServiceOS manages the sessions, which are the network connections associated with a user or network element.

In the IMS architecture, functionality at the session control layer is not required. However, the Network Server still provides critical scaling and redundancy functionality within the Application Server Complex described in the following figure:

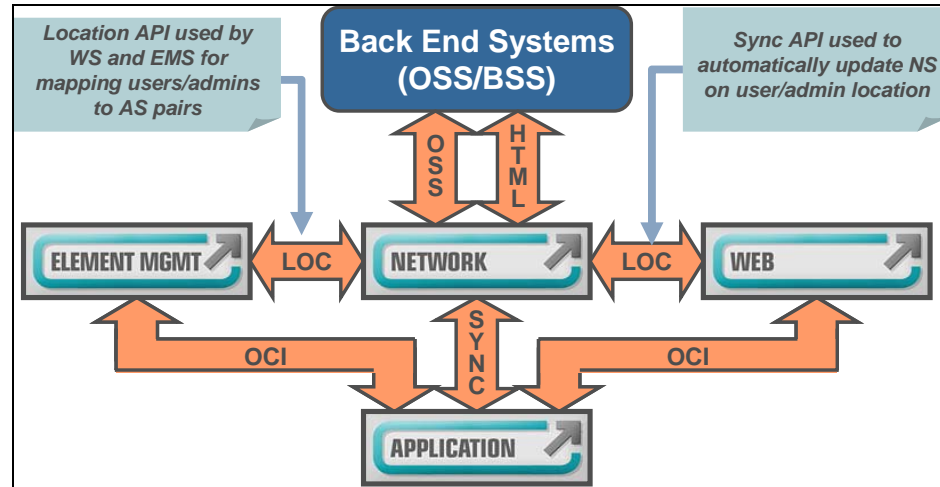


Figure 16 BroadWorks Network Server and Application Server Complex

The Network Server in this configuration, offering location services without call processing capabilities, is referred to as the Location Server. The conversion of the Network Server to a Location Server is seamless; both servers use the same code base, but have different licenses that control access to the call processing functionality.

4.4 BroadWorks Conferencing Server

The BroadWorks Conferencing Server is a specialized media resource that provides a complete set of enhanced business conferencing features, including web-based presentation and collaboration. In a stand-alone architecture, the Conferencing Server functions as shown in the following figure:

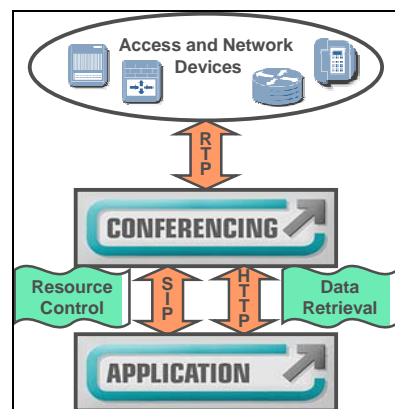


Figure 17 BroadWorks Conferencing Server

For a list of conferencing features, see section [7.2.34 Web Conferencing](#).

Conferencing offers service providers a rich revenue stream that can deliver a rapid return on investment. The Conferencing Server is fully integrated with the BroadWorks back office and operates on standard hardware, thereby allowing for cost-effective scaling with the rest of the platform.

4.5 BroadWorks Web Server

System providers deploy Web Server farms to support BroadWorks system web interfaces and additional external interfaces. The Web Server supports the CommPilot Interface using HTTP, and the BroadWorks Open Client Interface. System providers can choose to use either of these interfaces or both concurrently. The following figure shows this in both IMS and stand-alone architectures:

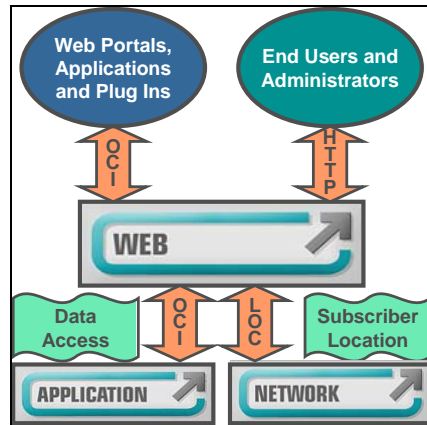


Figure 18 BroadWorks Web Server

4.5.1 CommPilot Interface (HTTP)

The BroadWorks CommPilot Interface supports use of the various CommPilot web portals, CommPilot, and the BroadWorks Attendant Console. Using the BroadWorks Web Server improves security and scalability, since end users and administrators are not accessing the Application Server directly to manage their services.

4.5.2 Open Client Interface

The Open Client Interface (OCI) is an open interface that enables third-party applications to leverage BroadWorks call control and provisioning functionality. This interface operates using both XML and HTTP/SOAP. Thus, BroadWorks makes it easy for developers to create new applications to augment existing BroadWorks functionality. For example, the OCI queries the Network Server to find the Application Server with the requested data such as a user's mobile number or department.

The Open Client Interface provides call details, such as redirection number, country code, and name. A message waiting indicator (MWI) can also be provided for third-party clients. The interface does support the uploading of custom media files to the system.

4.6 BroadWorks Mobility Manager

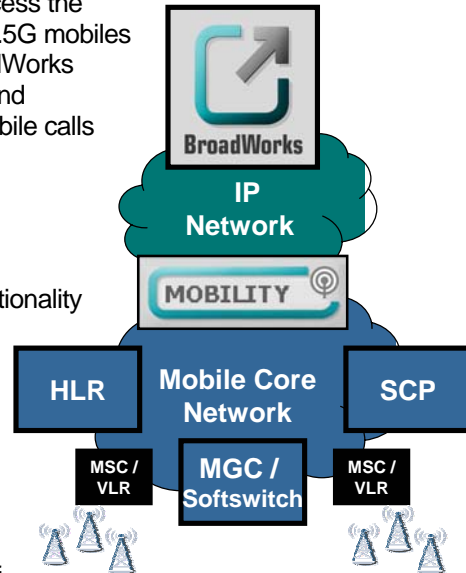
Introduction

The BroadWorks Mobility Manager provides call routing, continuity, and seamless handover between IP domains and circuit switch domains. In simple terms, the Mobility Manager extends “Centrex” and “Hosted PBX” solutions to any mobile terminal using existing intelligent networking (IN) methods to access the BroadWorks VoIP domain. This allows 2G and 2.5G mobiles to access a SIP-based network, so that the BroadWorks Application Server suite can provide call control and enhanced services for incoming and outgoing mobile calls

4.6.1 Benefits

Mobility Manager's benefits include:

- Highly differentiated services – Provides functionality that customer premises equipment such as IP PBXs cannot replicate.
- Converged services – Solves discontinuity in today's offering (that is, single voice mailbox) while enabling services that are not available with IN/SCP solutions.
- Converged access – Increases first call completion rate using simultaneous ringing of devices (that is, mobile, soft phone, PSTN phone) and extends service to WiFi with dual-mode handsets.
- Pre-integrated – Hooks BroadWorks into existing mobile call control with easy user configuration via an IN (CAMEL/WIN) service key while allowing existing IN services (that is, prepaid) to be maintained.
- Supports preferred architectures – Mobility Manager is deployable in non-IMS and IMS architectures and works with any GSM or CDMA 2G/2.5G mobile network/handset.
- Standards based – Supports 3GPP VCC standard for dual-mode fixed-mobile convergence.



4.6.2 Functional Overview

The Mobility Manager provides the following core functionality:

- PLMN-IP interconnect – Supports both SS7 and SIP interconnects for linking the mobile network and IP networks.
- SCP functionality and IN trigger support – Supports ITU MAP v2/3 and ANSI IS-41D and supports CS1, CS1+, CAMEL, INAP, and WIN protocols.
- Dual-mode phone support – Provides network domain selection, dual registration support, and mobile-WiFi handover.
- Routing optimization – Supports HLR interrogation for terminating calls to any mobile device within the CS network.
- SMS – Provides “bridging” between IP and circuit-switched networks.
- IMS compliant – Supports 3GPP Release 6 ISC interface.

4.6.3 Network Architecture and Deployment

BroadWorks applications are completely independent of the underlying architecture. BroadSoft Mobile PBX, Hosted PBX, and Business Trunking are supported both in IMS architectures and “pre-IMS” architectures.

In non-IMS architectures, the BroadWorks Application Servers are located in the VoIP network providing enhanced business and residential applications. The BroadWorks Mobility Manager is a signaling interconnect between the VoIP SIP network, the mobile CS network, and the SS7 network, providing fixed-mobile convergence functionality. A media gateway provides the media interconnect between the mobile network and the IP network. This is illustrated in the following figure.

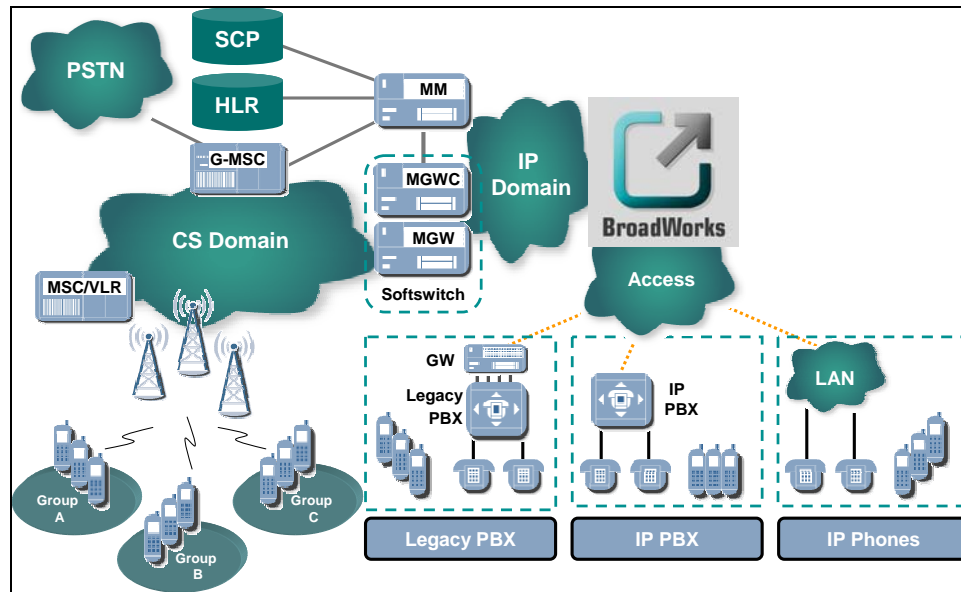


Figure 19 Integrated with Mobile and Fixed Services

The Mobility Manager offers a seamless migration to IMS enabling operators to launch enhanced wireless services, accelerate revenue generation, and take the first step in IMS migration. In IMS architectures, BroadWorks acts as an IMS Application Server and an IMS Media Resource Function (MRF). BroadWorks is 3GPP Release 6 compliant and has completed interoperability testing with most IMS core network equipment vendors. In IMS deployments, the BroadWorks Mobility Manager performs as the Call Continuity Control Function (CCCF) providing IMS Voice Call Continuity (VCC) user service as shown in the following figure:

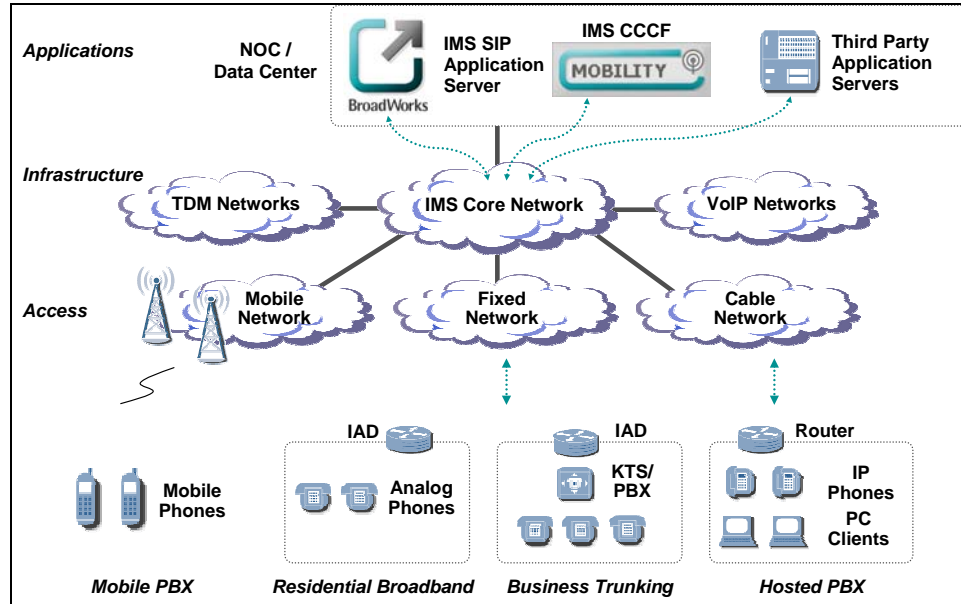


Figure 20 Mobility Manager Deployed in IMS Architecture

4.6.4 Architecture Overview

The BroadWorks Mobility Manager runs on off-the-shelf, carrier-grade hardware from IBM. The Mobility Manager is supported on x336 platform and on IBM's Blade-T blade platform.

The Mobility Manager is a fully redundant platform; internal modules run either in active-standby or load-sharing mode, depending on their role.

The Mobility Manager supports linear scalability. As the network grows, carriers simply need to add more x336s or blades to their solution. Subscriber management is stored in the BroadWorks Application Server for simple and seamless provisioning workflow for adding new subscribers.

The BroadWorks Mobility Manager provides SNMP v2 support for fault and alarm management.

4.6.5 Pre-integrated with BroadWorks

The BroadWorks Mobility Manager is pre-integrated with BroadWorks. This allows BroadWorks to be a complete "plug-in" solution that works in tandem with an operator's existing IN deployment. Although the BroadWorks Mobility Manager is pre-integrated and is BroadSoft's recommended solution, BroadWorks can interwork with leading third-party mobility managers that comply with industry standards. The interconnect protocols such as SIP, IMS ISC, and SS7 are common for all vendors.

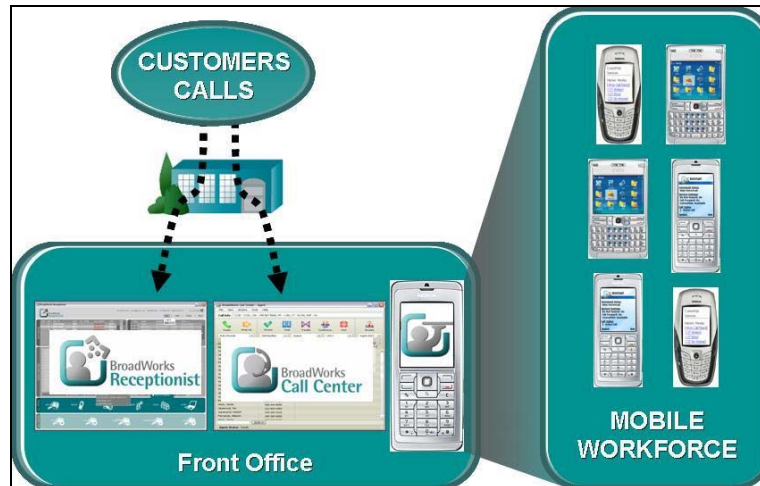


Figure 21 Solution for Mobile-Enabled Business

Mobile PBX mobilizes proven office communications tools for businesses. Operators can offer services such as a mobile switchboard to manage calls for their entire workforce through a single company number. Power users can enhance their productivity any time, anywhere via mobile applications that offer corporate directories and enhanced calling features. Mobile business hunting and queuing services boost sales and support productivity via mobile call queuing and reachability applications.

In addition to enhancing wireless services, BroadWorks bridges user services across different devices. Operators can offer “One-Number” service where service preferences and call treatments are applied across multiple devices such as a user’s mobile handset, PC soft phone, and/or wireline business phone.

4.6.6 How it Works

The Mobility Manager provides several functions. First, it acts as an IN SCP proxy – IN call triggers from the MSC point to the Mobility Manager, which routes the call to BroadWorks. It also interfaces with the HLR to assist with call termination (that is, where to route the call, and to determine if the mobile is available). As an FMC solution, the Mobility Manager also offers call handoff between cellular and WLAN as a dual-mode FMC solution.

A Mobility Manager can be deployed for simplified integration into existing mobile IN call control. To use a Mobility Manager, the IN triggers within the user’s HLR profile point to the Mobility Manager for service control. The Mobility Manager then provides services on each of the following connections:

- IN integration for the MSC (via INAP/CAP) – Provides call routing to BroadWorks via IN origination/termination triggers for both CAMEL and WIN. It can also act as proxy SCP/SSF to manage call control between both BroadWorks and IN SCPs.
- IN-controlled call routing via the MGW (softswitch) – Receives signaling from SS7 (ISUP) and IP (SIP) domains.
- Subscriber location via the HLR – Provides optimized routing of mobile call terminations.

Within the IMS domain, such services are grouped into a Call Continuity Control Function (CCCF) where the CCCF provides Voice Call Continuity (VCC) for dual-mode handsets that roam between cellular and WiFi networks.

4.7 BroadWorks Element Management System

The BroadWorks Element Management System (EMS) is an optional server that provides a single point of entry into BroadWorks for the system provider's OAM systems. System providers still have the option of using BroadWorks existing OAM interfaces directly. The EMS can function in a variety of network architectures broadly represented as shown in the following figure:

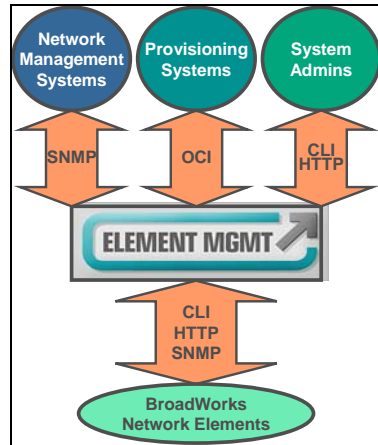


Figure 22 BroadWorks Element Management System

The EMS provides visibility to all BroadWorks servers for provisioning, network management, and maintenance. The following functionality is supported:

- Auto-discovery of BroadWorks servers and network elements
- Administrator and password management
- Web cut-through to network elements
- Performance management reporting
- Alarm consolidation and reporting
- Alarm auto-clearing and correlation
- Command line interface (CLI) cut-through to network elements
- Remote execution of server maintenance tasks
- Solaris and Linux *syslog* integration

The EMS can be deployed in a geographically redundant fashion.

4.8 BroadWorks Call Detail Server

The BroadWorks Call Detail Server extracts the management of call logs from the Application Server. With the Call Detail Server, providers can collect of a broader array of call data and distribute those records to other systems in real time.

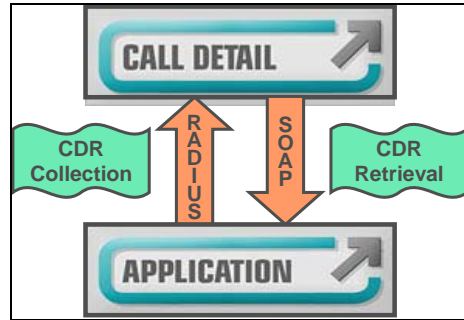


Figure 23 BroadWorks Call Detail Server

More extensive call data from the Call Detail Server can be used to offer new feature-functionality to users such as BroadWorks Enhanced Call Logs. Also, the separation of call log management from the Application Server enables carriers to further optimize system performance and hardware utilization.

The Call Detail Server enables service providers to offer Enhanced Call Logs. With this feature, users can view call logs beyond the 20 records of dialed, received, and missed calls that are available with BroadWorks Web Call Logs feature.

Once data are collected and stored by the Call Detail Server, they are available for third-party applications using the SOAP interface.

Third-party applications supported by the Call Detail Server include station message detail reporting (SMDR) and customer care.

4.9 BroadWorks Client Management System

4.9.1 Operating Environment

The Client Management System (CMS) is a client services delivery platform designed around subsystems that incorporate user interface mechanisms, machine-to-machine communications using secure protocols, and back-end processing components. It is designed to be integrated with the BroadWorks platform. The following figure provides an overall system view of the CMS elements in relation to the BroadWorks servers and other third-party subsystems.

NOTE: Interconnections are CMS-centric and do not show all possibilities.

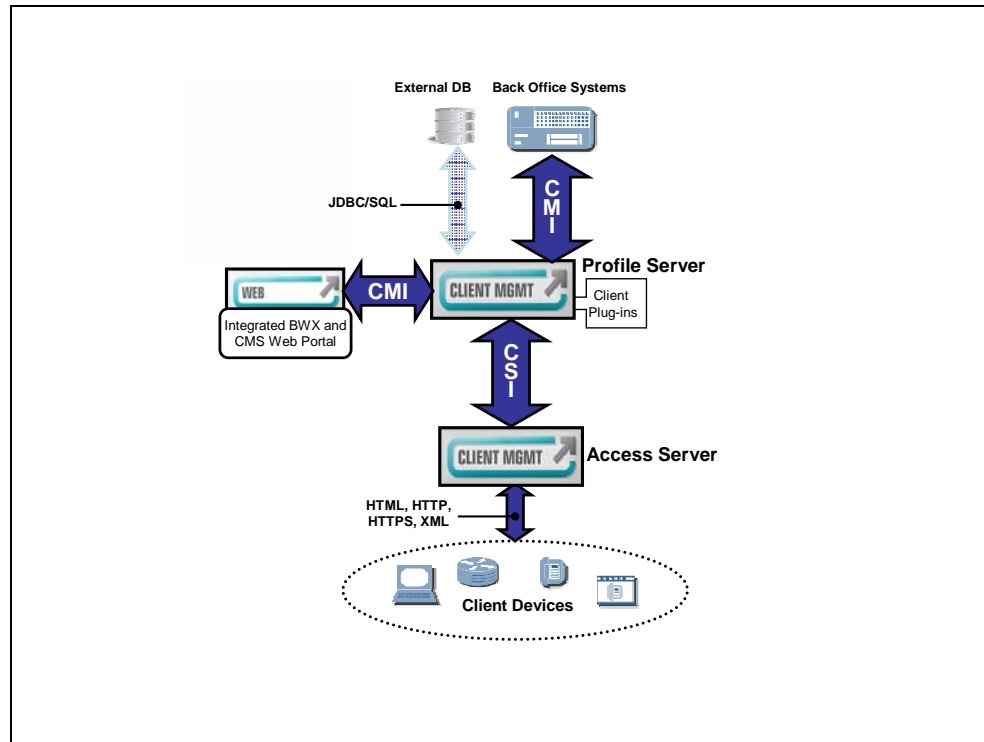


Figure 24 CMS Components

The CMS platform is composed of the Profile Server, Web Server enabled for CMS, and Access Server. The primary function of each entity is as follows:

- **CMS Web Server (Web portal)** – This subsystem is installed on the BroadWorks Web Server. When it is activated, it is fully integrated with the Web Server and provides the end user with a seamless GUI spanning the functions of the BroadWorks Application Server and CMS. Through the GUI, the administrator at one of the BroadWorks levels (system, service provider, enterprise, or group) can apply commands that are available to that level. The commands in the CMS context provide the administrator at that level with the ability to establish or modify information in a user profile, in templates that are used in the CMS, and in the client profile for the end point. For the end user, the web-based commands follow the standard set. The web portal offers full web authentication capabilities to ensure secure and authorized access to the portal functions. The Web Server communicates through the OCI port for BroadWorks Application Server operations, and through the Client Management Interface (CMI) port for CMS operations executed by the Profile Server.
- **CMS Profile Server** – This subsystem provides the business logic that controls the actions or the relations that are being set up on client profiles via the web-based interface or via an automation channel called the CMI port. Moreover, the CMS Profile Server provides the central point to control the functions associated with the configuration, deployment, and activation of client profiles in the field. These functions act upon objects stored in CMS. Some are synchronized versions of the objects on the BroadWorks Application Server, for instance service providers, groups, and users while others are strictly for CMS, such as plug-in, templates, and client profiles. Actions that relate to interactions with the end points are communicated over the CSI port to the Access Server. Essentially, the Profile Server provides two platforms: a management platform (via the Client Management Interface) and a service delivery platform (via the Client Service Interface) through well-defined addresses and ports.

- *CMS Access Server* – This subsystem provides the communication with the end points using the protocols shown. As such, it is the first line of contact. The Access Server can provide secure communication with the end points by requiring authentication. Furthermore, the Access Server decouples the Profile Server of many repetitive functions that need to be done with the end points, for instance to start and monitor file downloads on groups, on specific clients, or to perform end point monitoring through periodic contact. Devices communicate with the Access Server over the communications channel using device-specific flows and it is the Access Server that converts these flows into a standardized, single protocol (CSI) to communicate with the Profile Server.
- *Back-office systems* – These systems represent elements such as OSS/BSS and can interface to CMS using the CMI interface mechanism.
- *Other application platforms* – These platforms represent applications that can be developed to work with CMS using the CMI interfacing mechanism.

4.9.2 Key Components

The following basic components are used in CMS:

- *Plug-in* – A plug-in defines all the possible parameters that can be programmed on a terminal model made by a manufacturer. Multiple models can be stored in a plug-in. Moreover, the plug-in contains versioned firmware that allows CMS to properly manage firmware deployment to the end points. A CMS plug-in is developed based on APIs and guidelines provided by the CMS platform, which provide device-specific behavior, data, and resources to the CMS platform.
- *Client template* – A template provides the means for the system provider, service provider, enterprise, or group administrator to define certain parameters based on the operational context of the end point, for example, a manager or an employee terminal. This helps to select a terminal model quickly as opposed to choosing a model and then configuring it for that function. The template provides a convenient way to harmonize key parameters in a unified view as well as also handle device-specific parameters. Furthermore, the template allows the administrator to specify default values in fields, lock fields so that they cannot be modified, or hide fields from view.
- *Client profiles* – A client profile is created by using a template that also specifies a particular terminal model. This allows the administrator to properly configure the end point according to certain choices within the allowed limits imposed by the template. In particular, the client profile links to user information to provide configuration of line keys and services allowed on the phone.

4.10 Connectivity

The protocols of the BroadWorks servers manage the customer's online activities as they relate to requests of BroadWorks and communication with external devices. The Application Server contains the functionality of a SIP user agent, SIP registrar, and MGCP line-side call agent, and the Network Server as a SIP redirect server.

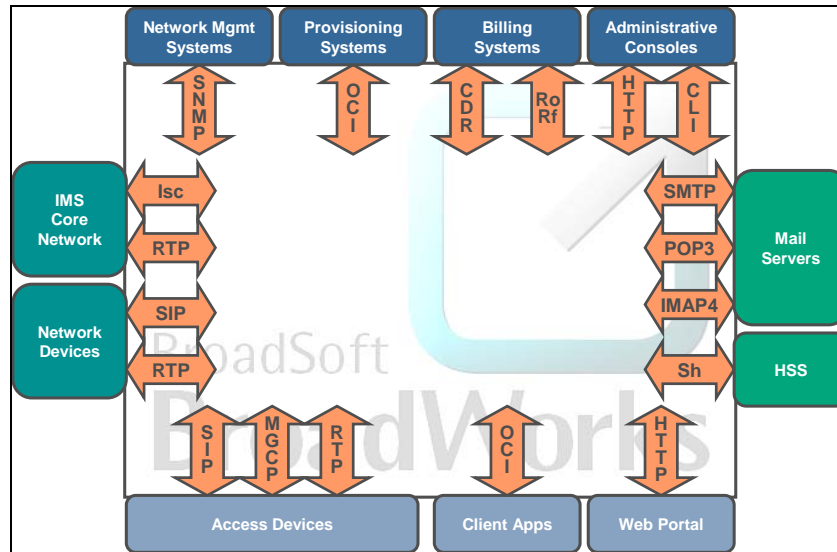


Figure 25 Connectivity

End-user telephony devices are located at the customer premises. These devices include integrated access devices (IADs), IP phones, and access gateways. The end-user device signals the BroadWorks Application Server using SIP (IADs, IP phones, and gateways) or MGCP (IADs and line gateways), allowing for call routing and service logic execution.

The Application Server signals the Network Server for routing and translations, the Network Server returns the relevant information, and the Application Server continues call processing by sending the requests to the identified softswitch, network gateway, or another Application Server.

SIP is used for communication between the Application Server and softswitch/network gateways, between the Application Server and Network Server, and between the Network Server and softswitch/network gateway. The BroadWorks Application Server and BroadWorks Media Server communicate via MGCP and SIP.

The end-user device packetizes media from a user (voice, fax, and data) and transports the information into the system provider's network, using RTP. RTP is also used to transport media between gateways, IP phones, IADs, and BroadWorks Media Servers.

4.10.1 Business Trunking

BroadWorks Business Trunking provides SIP-based network services to interconnect customer premises equipment (CPE) such as PBX, IP PBX, or key telephone systems (KTS). Each business trunk represents a concurrent call or voice channel for premises equipment. Businesses require a certain number of trunks based on call traffic and the rate of oversubscription for their CPE.

BroadWorks Business Trunking is transport neutral and can be delivered through multiple types of access, including T1/E1, DSL, and Ethernet. A single integrated access device (IAD) is used to connect the access line to both customer voice equipment and an Ethernet switch.

BroadWorks Business Trunking provides a platform for personal and group enhanced services that can overlay the feature-functionality of a customer's premises equipment. These services differentiate BroadWorks-based offerings from TDM or other VoIP trunks. BroadWorks enhanced services may include Unified Messaging, Find-Me/Follow-Me (Mobility), Virtual Call Center, Interoffice Auto Attendant, Web Conferencing, and Voice VPN.

Users can access and configure these services in real time through the CommPilot Personal Portal. For multi-site businesses, overlay services can offer a consistent set of feature-functionality to all employees. These services can help to integrate multi-site operations and increase staff contact hours and mobility.

The range of applications offered by BroadWorks enables providers to offer an attractive migration plan to Hosted PBX. In addition to Business Trunking, the provider can overlay their IP PBX, PBX, or KTS with enhanced feature-functionality and inter-office Voice VPN. As CPE capacity is met or phones break down, individual hosted PBX seats are added. When the CPE is scheduled for its end-of-life time, the entire enterprise can be converted to a Hosted PBX service. All users, regardless of application and throughout the transition, are managed in the same group with a common dial plan, feature set, and management interface.

In addition, the hosted model offers the flexibility to better meet the changing needs of business customers, whether it is the desire to rapidly grow or eliminate seats, move locations, or roll out new services. Thus, providers can increase customer satisfaction while increasing their share of the enterprise's communications spending.

4.11 System Redundancy and Reliability

System reliability is the result of more than just hardware compliance. True system reliability is achieved through a combination of software engineering, server redundancy, and networking capabilities. Recognizing this, BroadSoft has gone to great lengths to address issues at every layer in the system architecture to achieve the highest levels of reliability, redundancy, and performance.

BroadWorks provides a total system solution for redundancy that addresses potential points of failure in *both* the BroadWorks servers *and* the service provider's IP network. This architecture, as described in the following section, is designed to ensure that service is maintained in the event of a network and/or server failure.

4.11.1 Hardware Redundancy

A fully redundant BroadWorks system incorporating all components delivers over 99.999% availability. The redundancy model used for each type of server is in the following section.

4.11.1.1 Primary/Secondary Application Servers

Application Servers are deployed in primary/secondary redundant pairs. Under normal operation, the primary Application Server terminates all calls for its user base. User modifications, additions and deletions are replicated across the database of both the primary and secondary Application Servers, making all service and user profiles available on both servers. Database replication is done in real time, as additions and modifications are made.

In the event that the primary server fails, or is simply inaccessible from one or more end points in the network, then those end points are able to route their calls through the secondary server. The fail-over time required for an end point to retry the secondary server after a non-response from the primary server is typically engineered to be less than one second. This type of redundancy can be geographically distributed (for more information, see section [4.11.4 Geographic Redundancy](#)), thereby protecting against server failures as well as against IP networking failures (for example, router and circuit failures).

4.11.1.2 N+1 Media Server Pools

Media Servers are deployed in pools of N+1 units. Application Servers use a Media Server Selection policy on the Network Servers to get a list of available Media Servers from which media resources can be requested. The Application Server requests a media resource from the first Media Server in the list. If the selected Media Server does not respond, then the next available Media Server is attempted until success. The fail-over time is engineered to be less than one second. Also, Media Servers can be added and removed from the network without affecting overall service.

4.11.1.3 Network Server Clusters

The Network Servers employ a highly scalable clustering model that can also be geographically distributed. A cluster can have up to seven Network Servers and 35 Application Servers (five Application Servers per Network Server). Database transactions are replicated across all Network Servers in the cluster. Any Network Server can handle any incoming SIP transaction from any provisioned network element. Network Servers can be added and removed as necessary without affecting overall service.

Network devices, including Application Servers, use a DNS list to traverse through a cluster of Network Servers. If the first server in the list does not respond, then the next server in the list is attempted, until a server responds. The fail-over time required for a client network device to retry a secondary server in the list is typically engineered to be less than one second.

4.11.1.4 Other BroadWorks Server Elements Redundancy

The BroadWorks Web Server, Element Management System, and Call Detail Server are deployed in fully redundant N+ 1 configurations.

4.11.2 Network Redundancy

BroadWorks offers network level redundancy, which is a capability not possible with circuit-switched equipment. Using various schemes, BroadWorks can offer continued service in the event of floods, massive electrical outages, or any other disasters that affect a particular data center, central office, or geographic region. This enhanced service availability is achieved through common signaling interface redundancy, separate access and network interface redundancy, and redundant path topology.

BroadWorks makes a clear distinction between signaling events from “network devices” (for example, softswitches, network gateways, proxy servers, management systems) and signaling events from “access devices” that interface with the system from the customer premises (for example, IADs, access gateways, IP phones, web browsers). Service providers can choose to deploy both access and network elements on the same physical interface plane, or they can choose to separate them, for security purposes, onto separate physical interfaces.

In either configuration, service providers can also choose the redundant addressing scheme that best fits the topology of their network. BroadWorks supports two IP addressing topologies: *redundant paths*, whereby each redundant network interface cards pair is configured on the same IP subnet; or *redundant routes*, whereby each network interface card is configured with unique routable IP addresses on separate IP subnets.

4.11.3 Software Reliability

A system controller manages each BroadWorks server by monitoring the health of the server and keeping its processes up and running. Alarms are generated in the event of a software failure. Internally, each process contains a “watch-dog” thread to keep all subsystems alive and functioning and to minimize service interruptions. This means a software failure results in a maximum of one lost call. Call processing session audits are performed by the Application Server to tear down any hung sessions caused by malfunctioning end points in the network.

4.11.4 Geographic Redundancy

It is not enough to simply deploy redundant network elements. Service providers must assemble these elements, often from a variety of vendors, into a cohesive highly available service offering. BroadWorks offers the necessary flexibility for integrating with the various redundant configurations of all the leading network equipment vendors.

One problem that arises when hosting end-user services is the management of persistent profile data, and run-time session states. Conventional redundancy solutions usually solve this problem with proprietary hardware, which make the solutions expensive and do not offer any level of geographic redundancy.

The solution for these problems in a BroadWorks system begins with database replication technology that keeps data in sync across servers in the network. Secondly, through a proven BroadSoft technology called “Dynamic User Hosting”, a user’s end point binds to any appropriate Application Server in the network. Once the end point has connected to BroadWorks, the rest of the network discovers which Application Server is hosting the associated user’s services through the Network Server. This forces all subsequent user transactions to be sent to the hosting Application Server. This solution is ideal for deploying geographic network solutions.

5 BroadWorks Clients

BroadWorks clients offer enhanced feature functionality for end users. Clients are especially popular among end users, offering an always-on service available directly from the desktop.

5.1 BroadWorks Communicator Family

The BroadWorks Communicator family enables end users to convert their desktop computer into a fully functional phone. The BroadWorks client offers advantages over other client softphones as a result of the integration with the BroadWorks system platform and tailored features-functionality to BroadWorks applications.



5.1.1 BroadWorks Communicator (Release 13.0)

The BroadWorks Communicator client is an audio-only client that provides a feature-rich desktop interface to make and receive calls as well as execute enhanced features. The Communicator has access to BroadWorks' many advanced VoIP features including screening and messaging/voice mail integration.

As an integrated device with the BroadWorks platform, service providers are able to auto provision the client, provide automatic updates, and maintain version control seamlessly through the BroadWorks Application Server. The Communicator is capable of supporting G.729a protocol. The BroadWorks Communicator allows residential users and businesses to use the client as a primary or secondary phone device. BroadWorks supports this via server features that enable both devices to register to the same user account and directory number (DN)/direct-inward dialing (DID) number.

The BroadWorks Communicator is available in English, Spanish, and Simplified Chinese, in addition to having multilanguage support through the BroadWorks platform.

5.1.2 BroadWorks Communicator - Multimedia (Release 13.0)

The BroadWorks Communicator - Multimedia provides all the capabilities of the audio-only Communicator and adds high quality multimedia transmission. With the Communicator - Multimedia, a user's desktop computer can function as a full-feature multimedia communications device.



Figure 26 BroadWorks Communicator - Multimedia

While BroadWorks integration offers considerable value for the audio-only client, the benefits are even further expanded with the addition of video. First, the video codec negotiation is somewhat more complicated than audio-only codec negotiation. BroadWorks pre-integration limits the issues associated with video codec negotiation, simplifying deployment and reducing support calls and customer issues. Second, pre-integration with the video client enables separate routing of voice streams over traditional handsets while the video signal is connected to the video client. Thus, users can enjoy features of their desk handsets such as a high-fidelity speakers and microphone, along with the multimedia experience available from the desktop client.

5.2 BroadWorks Assistant Family

The BroadWorks Assistant family is a suite of products that helps, or “assists”, end users to manage, control, and configure their phone. In a compact and extremely useful user interface, BroadWorks Assistant provides users with an easy way to answer, transfer, and dial calls, search enterprise, personal, or Outlook contacts directories, and quickly enable/disable call settings such as Call Forwarding, Do Not Disturb, and Simultaneous Ringing with a click of a mouse.



5.2.1 BroadWorks Assistant (Release 14.0)

The BroadWorks Assistant is an integrated toolbar that enables users to make and accept telephone calls, and change telephone settings, from within Internet Explorer. The BroadWorks Assistant is a carrier class, lightweight desktop communications product for everyday users of Internet Explorer.

The BroadWorks Assistant is a feature-rich desktop toolbar, with user controls to access voice services efficiently, that is fully integrated with the BroadWorks platform. The toolbar delivers the following features and benefits to users:

- User help functions available during any operation with an HTML user guide built into the application
- Right-click to dial on highlighted phone numbers within web pages
- Call notifications with caller ID from BroadWorks
- Basic call control (answer or perform a soft-pickup for a call, end a call, transfer to voice mail)
- See who is calling based on a contact list in various BroadWorks directories
- Easily change telephony service settings such as Simultaneous Ringing, Call Forwarding All, Call Forwarding No Answer, Call Forwarding Busy, Do Not Disturb, Remote Office, VM User, Logged-in Status
- View call history

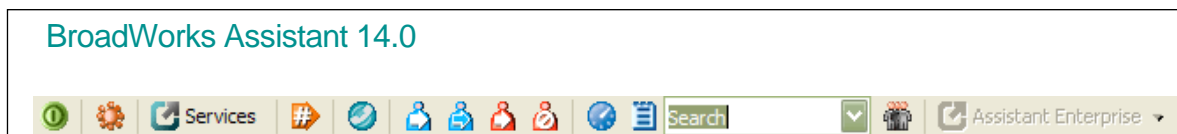


Figure 27 BroadWorks Assistant Toolbar

5.2.2 BroadWorks Assistant - Enterprise (Release 14.0)

The BroadWorks Assistant - Enterprise is an integrated toolbar with all the functionality of the BroadWorks Assistant and the added benefits of integration with Microsoft Outlook. The BroadWorks Assistant - Enterprise offers the following significant benefits:

- Complete call control capabilities, including making, receiving, transferring and holding calls
- Add Microsoft Outlook contact vCards for new incoming calls
- Outbound click-to-dial from Outlook contacts

■ Group, enterprise and LDAP directory browsing

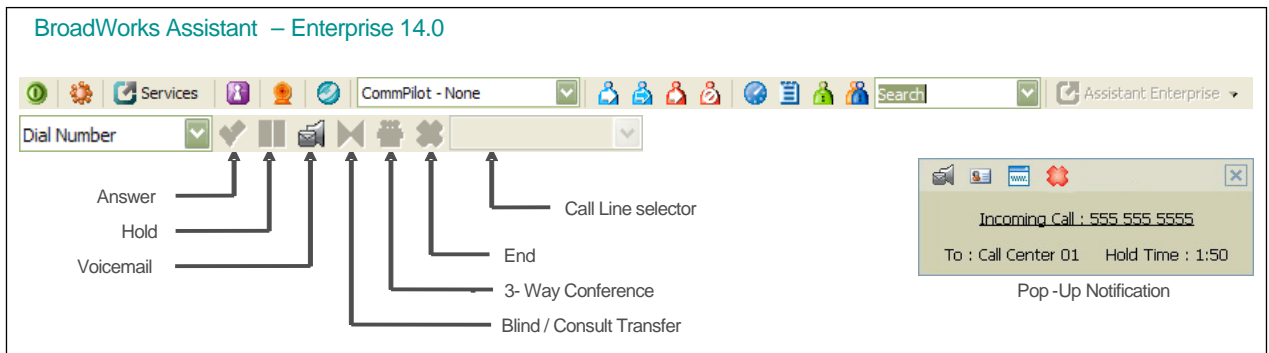
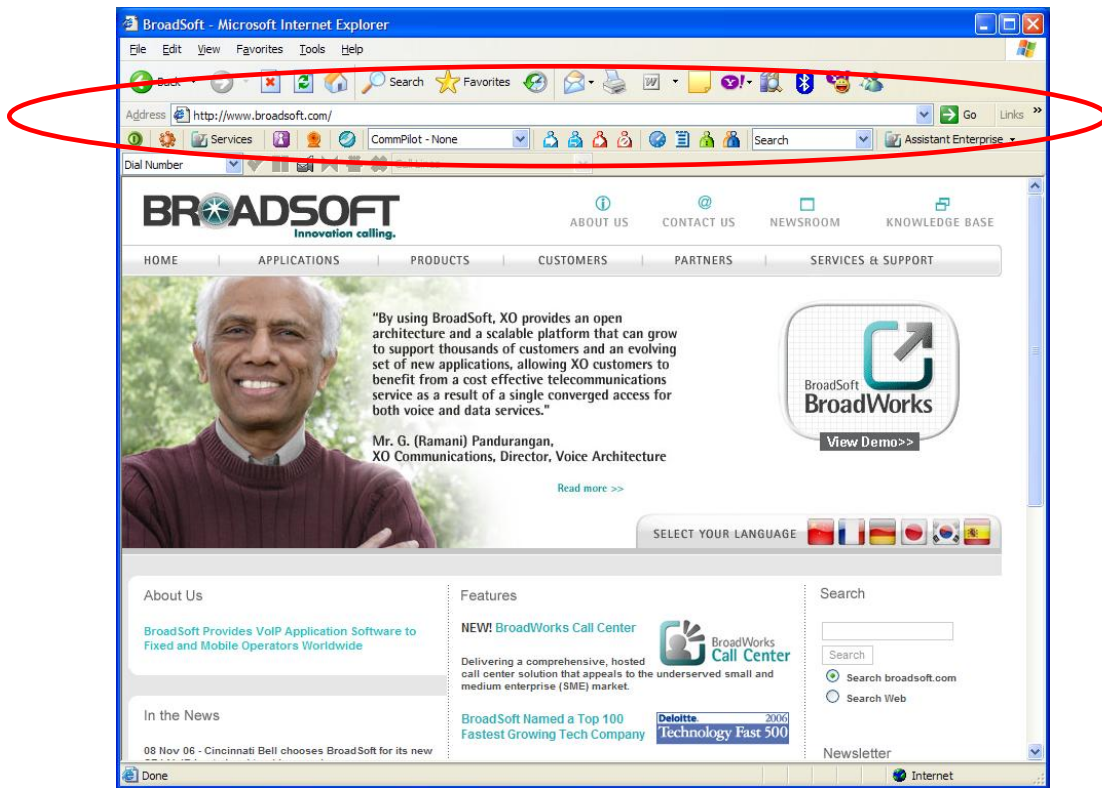


Figure 28 BroadWorks Assistant - Enterprise Toolbar

5.2.3 BroadWorks Assistant - Mobile (Release 14.0)

BroadWorks Assistant - Mobile is a feature-rich, easy-to-use mobile application that is fully integrated with the BroadWorks platform. It is an integrated Nokia E-series mobile handset application that enables users to originate BroadWorks-routed telephone calls, modify their telephone settings, view their corporate directory, and have access to their call logs. BroadWorks Assistant - Mobile is a carrier class, lightweight mobile application for everyday users that delivers the following features and benefits to users:

- Provides access to a corporate directory
- Addresses the needs of corporate, small business and small office/home office users
- Receives voice mail notifications
- Easily change telephony service settings such as Simultaneous Ringing, Call Forwarding All, Call Forwarding No Answer, Call Forwarding Busy, Do Not Disturb, and Remote Office
- View call history
- Place calls from a mobile phone but have it appear like as if the user is calling from their office line
- Manage only one phone number and voice mail account
- Create international profiles

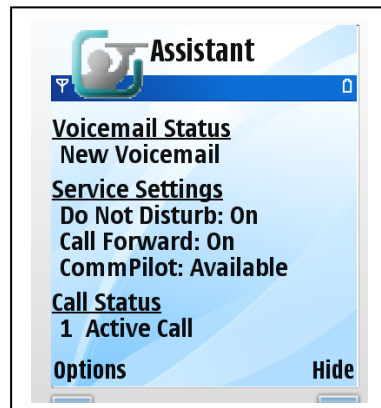


Figure 29 BroadWorks Assistant - Mobile

5.3 BroadWorks Call Center (Release 13.0)

The BroadWorks Call Center provides an intuitive, graphical interface for managing calls and queues in a Call Center. It has two modes of operation: one for Call Center agents, and one for Call Center supervisors. Both modes are provided in the same executable; the mode is determined when a user logs in, according to the license the user has been granted on the BroadWorks Application Server.



The agent mode allows users to answer calls in the queue, to transfer calls back to the queue, to make outbound calls, and to manage their availability. Agents can also escalate calls to a supervisor on duty.

Supervisors have the additional abilities to monitor the status of all agents in their Call Center, to barge in silently on active calls, and to examine statistical reports on Call Center activity and queue size.

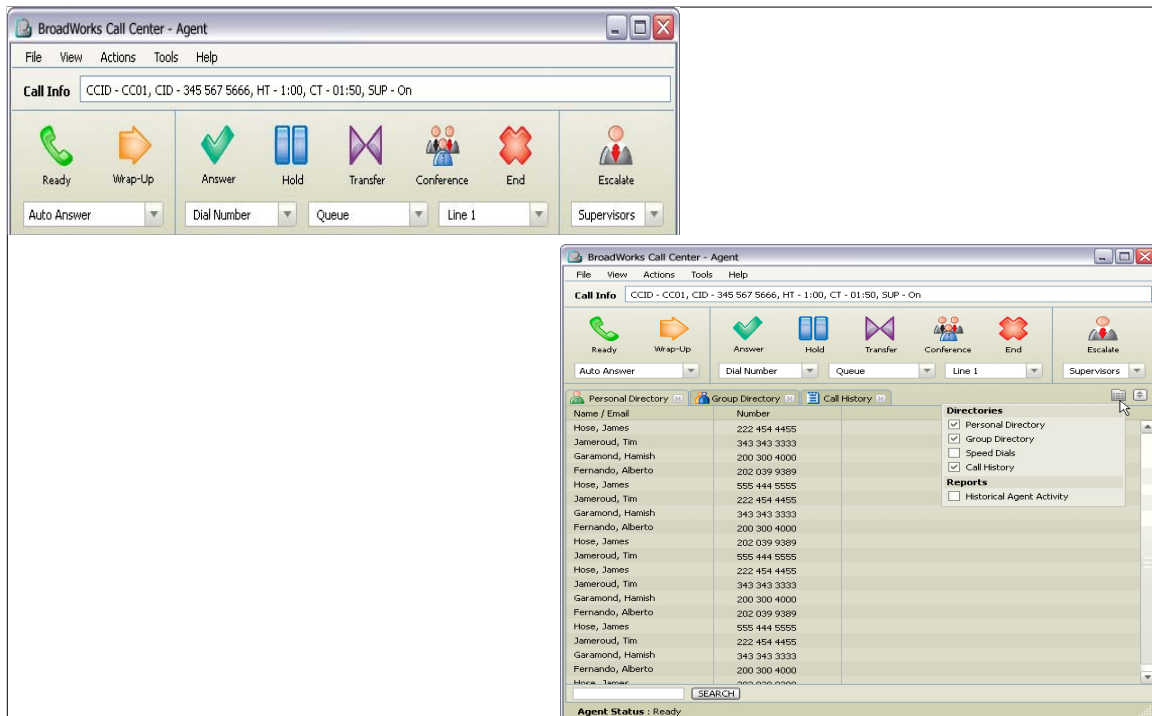


Figure 30 BroadWorks Call Center (Agent Mode)

5.4 BroadWorks Receptionist Family

5.4.1 BroadWorks Receptionist (Release 13.1)

The BroadWorks Receptionist is a carrier class IP telephony attendant console for use by receptionists, or telephone attendants, who manage and screen inbound calls for enterprises. The BroadWorks Receptionist is a feature-rich desktop application that is fully integrated with the BroadWorks platform. The application delivers the following benefits to users:



- Easy-to-use design that follows the natural work “flow” of a call from the top to the bottom of the screen.
- Intuitive business processes, as only “valid” options are presented to the attendant.
- Professional call handling as critical information is available in real time.
- Accurate delivery of messages via a one-step process when people are unavailable.

The BroadWorks Receptionist can be used under a number of different operational scenarios. These scenarios include:

- **After Hours** – Allows operators to automate switching from day to night mode.
- **Call Center Queue** – Allows operators to monitor and control calls in a Call Center queue, and to manage their availability status.
- **Hoteling** – Allows multiple part-time operators to share a single log-in sequence when they change shifts.
- **Low Traffic** – Single receptionist answering one or more dedicated main line numbers.
- **High Traffic** – More than one attendant console managing multiple dedicated main line numbers.
- **Network Attendant Console** – Geographically dispersed operators supporting each other in an enterprise configuration.
- **Multi-tenanted Offices** – One or more operator answering calls on behalf of different organizations.
- **Optional Voice Mail Transfer** – Operator has the added ability to transfer calls to voice mail for contacts in a group/enterprise that are busy or unavailable.



Figure 31 BroadWorks Receptionist Attendant Console

5.5 BroadWorks Deployment Studio

The Deployment Studio facilitates the customization, deployment, and management of BroadWorks Assistant, Assistant - Enterprise, Receptionist, and Call Center -

Agent/Supervisor desktop client software by service providers.

Providers can configure a variety of client settings, such as branding, networking, localization, and additional pre-defined settings, for BroadWorks Assistant, BroadWorks Assistant -

Enterprise, BroadWorks Receptionist, and BroadWorks Call Center. The Deployment Studio is required to deploy all BroadWorks clients.

Service providers proceed through the following steps to fully customize their client applications to suit their specific requirements:

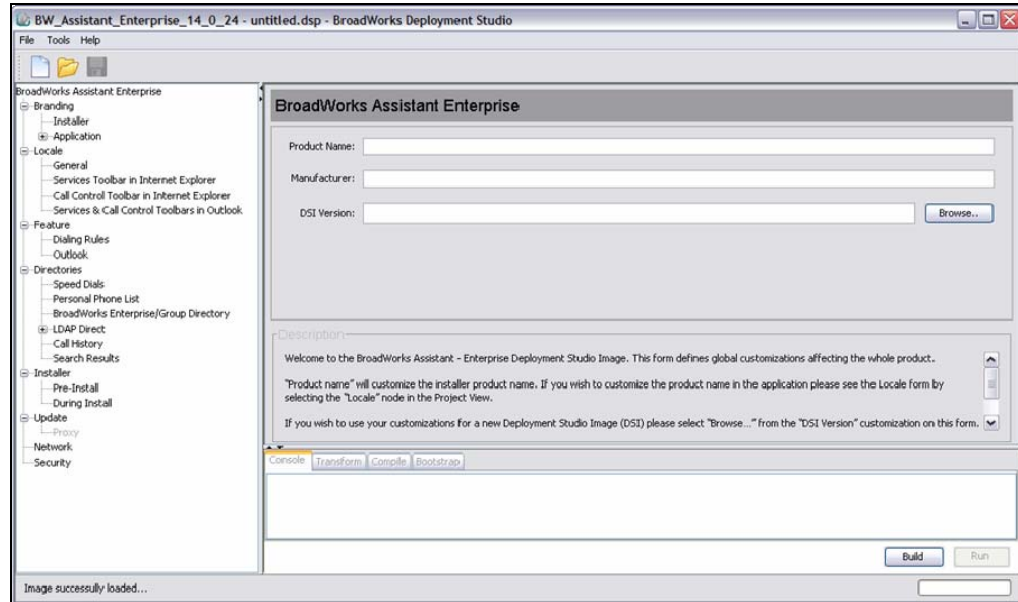


Figure 32 BroadWorks Deployment Studio

5.5.1 Customizations and Controls

	R	A	CC
Branding			
Installer product name	✓	✓	✓
Installer manufacturer	✓	✓	✓
Installer product icon	✓	✓	✓
Installer unbranded dialogs	✓	✓	✓
Installer side image	✓	✓	✓
Installer top image	✓	✓	✓
Splash screen	✓		✓
Default theme name	✓		
Login panel title bar image	✓		
Login panel color	✓		
Login panel font color	✓		
Login panel icon color	✓		
Login screen background	✓		
Login screen product image	✓		
Switchboard, contact repository, call options and call control panel color	✓		
Table font size and style	✓		
Panel header font size and style	✓		
Slide panel header font size and style	✓		
Frame icon	✓		
Internet Explorer toolbar background color		✓	
Notification toast background image		✓	
Notification toast end image/icon		✓	
Notification toast voice mail image/icon		✓	
Notification toast web pop image		✓	
Notification toast v-card image/icon		✓	
Notification toast close image/icon		✓	
Notification toast text color		✓	

	R	A	CC
Toolbar service button image		✓	
Internet Explorer toolbar web link image		✓	
Toolbar web link item, image, label, tooltip, separator and URL		✓	
Locale			
Custom locale DLL's location	✓	✓	✓
Custom locale extension		✓	
Features			
Save password	✓	✓	✓
Save user name	✓	✓	✓
Automatically log in on application startup	✓	✓	✓
Automatically reconnect when is network detected	✓	✓	✓
Maximum number of monitored contacts	✓		
Gain focus on incoming call	✓		
Manage notification alerts		✓	
Use Outlook integration		✓	
Allow access to all Outlook contact folders		✓	
Display web page on incoming call		✓	
Outgoing call prefix		✓	
Log file maximum size	✓	✓	✓
Log file granularity	✓	✓	✓
Log file count	✓		✓
Messaging pop-up content height and width	✓		
Messaging pop-up default subject	✓		
Messaging pop-up from name, address, SMTP host and MIME type and template	✓		
Call history enhanced logging	✓		
Call center user name and password	✓		✓

	R	A	CC
Call Center save auto login	✓		✓
Call Center save availability	✓		✓
Installer			
Keep user settings on upgrade	✓	✓	✓
Prompt to close open host applications on installation		✓	
Force closure of IE if open during installation		✓	
Run a vbscript pre-install script during installation		✓	
Subroutine of pre-install vbscript to execute		✓	
Product logo in xsl directories		✓	
Directories style sheets		✓	
Directories header image		✓	
Install directory name (parent and child)	✓	✓	✓
Start menu directory name (parent and child)	✓	✓	✓
Start menu user guide name	✓	✓	✓
Start menu user guide command line	✓	✓	✓
Customized user guide	✓	✓	✓
Revision number	✓	✓	✓
Application shortcut label	✓		✓
Update			
Server update INI file	✓	✓	✓
Use a proxy for silent update checking	✓	✓	✓

	R	A	CC
Use proxy authentication for silent update checking	✓	✓	✓
Proxy user name for silent update checking	✓	✓	✓
Proxy server port, address, and type for silent update checking	✓	✓	✓
Network			
Client-to-server connection keep alive	✓	✓	✓
Login button timeout between successive presses	✓	✓	✓
Time between reconnect attempts	✓	✓	✓
BroadWorks server address	✓	✓	✓
BroadWorks server port	✓	✓	✓
BroadWorks CommPilot web portal address		✓	
Feature customization	✓	✓	✓
Plug-ins			
Speed dial directory plug-in configurations	✓		✓
Phone status directory plug-in configurations	✓		✓
Personal phone list directory plug-in configurations	✓		✓
BroadWorks enterprise/group directory plug-in configurations	✓		✓
Lightweight directory access protocol (LDAP) plug-in configurations	✓		✓

6 System Management

BroadWorks can be controlled at various management levels through an intuitive web browser called the BroadWorks Web Portal. This interface provides separate web portals for end users, group and enterprise administrators, service providers, and system providers. Each level of the management hierarchy can configure and manage their respective resources in real time. Thus, users and company administrators are empowered with more control and responsiveness, thereby increasing their customer satisfaction and loyalty, and service providers spend less time and money to support customers and process change requests.

6.1 Personal Web Portal

The CommPilot Personal web portal provides individual users with the ability to configure and manage a host of traditional and advanced telephony services. Each user is empowered with the control and flexibility to easily configure their services to meet their unique needs. Users no longer have to remember any star codes or complex procedures to configure their services, as is often the case with legacy systems. Rather, BroadWorks improves personal productivity by leveraging the web to make services understandable and actually useable.

Users can customize their services to follow them anywhere, whether at work, at home or on the road. For example, the Call Notify service (shown below) enables users to indicate which incoming calls they want to be notified of, and during which hours of the week. They can also choose to have their notifications sent to their mobile phone or e-mail address.

BROADSOFT [Call Manager](#) - [Attendant Console](#) - [Help](#) - [Home](#)
Welcome Cheryl Baldwin [\[Sign Out\]](#)

Options:
[Profile](#)
► Incoming Calls
[Outgoing Calls](#)
[Call Control](#)
[Calling Plans](#)
[Client Applications](#)
[Messaging](#)
[Service Scripts](#)
[Utilities](#)
[Conferencing](#)

Call Notify

Call Notify allows you to send a notification e-mail containing the caller's name and number, if available, when the call matches your pre-defined criteria. Use this to create an archive of callers or to determine if you missed any important calls. The criteria for each Call Notify entry can be a list of up to 12 phone numbers or digit patterns and a specified time schedule. All criteria for an entry must be true for an e-mail to be sent (phone number and day of week and time of day).

OK Apply Add Cancel

* Send e-mail to:

Active	Description	Time Schedule	Calls from	Edit
No Entries Present				

OK Apply Add Cancel

Figure 33 Call Notify

After logging in to the personal web portal with his/her user identity and password, a user can activate, deactivate, and modify the parameters of his/her own services, including: Call Forwarding (Always, Busy, No Answer, Selective), Simultaneous Ring, Do Not Disturb, Selective Call Acceptance and Rejection, Anonymous Call Rejection, Priority and Distinctive Ringing, Calling Line ID Blocking, Voice Messaging Notification, Voice Messaging to E-mail, Personalized Name Recording, and Remote Office. The left navigation area lists services and features available to the user.

The Web Portal updates features and configurations in real-time, providing utility and convenience. Convenience is important for features that are frequently updated by users

such as the call-forwarding suite. The web interface also provides a means for making sophisticated entries and configurations, very difficult to replicate through a standard voice portal. For example, in addition to specifying phone numbers for service treatments, BroadWorks enables users to provide SIP URLs, feature access codes, and/or speed codes. Selective call treatments can be defined for parameters that include line ID status such as PRIVATE, and UNAVAILABLE, along with the more common IDs such as ANONYMOUS.

The CommPilot Call Manager (shown in the following figure) provides users with a web-based alternative for managing their incoming and outgoing calling. A variety of common functions are provided, including: Click-to-Dial, Redial, Answer, Hold, Retrieve, Hang Up, Transfer, Three-Way Calling, and Calling Line ID. A visual display shows the status and details of each active call, so users no longer have to wonder which line is on hold, or whether a party was dropped. One-click dialing is performed using a variety of handy phone lists: Personal, Group, Missed, Received, and Dialed. In addition, the Outlook Integration tab enables users to search their personal Outlook Contacts by name or company for quick retrieval of phone numbers and v-cards.

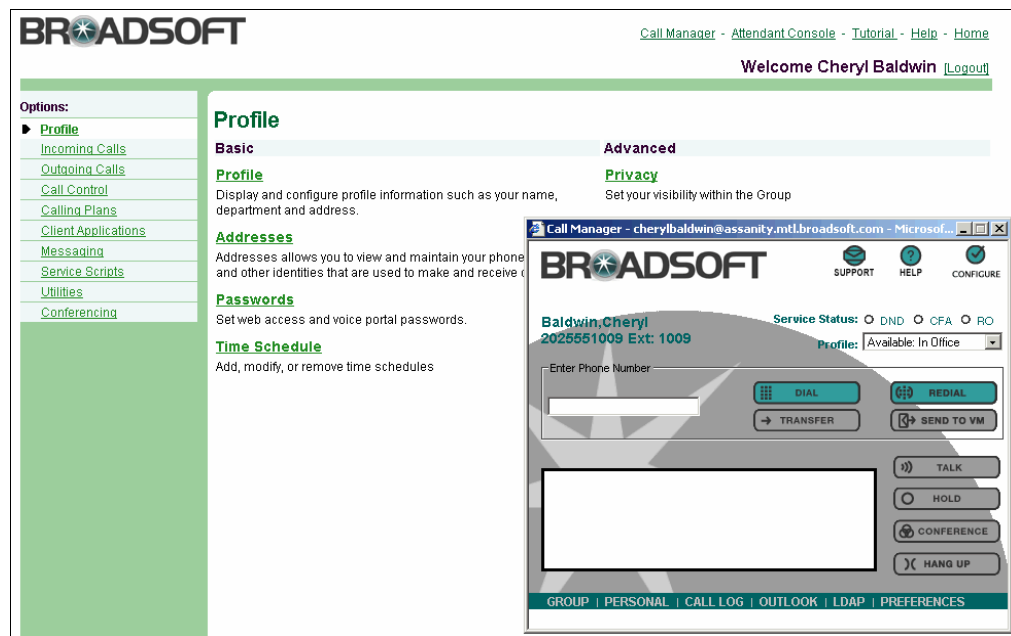


Figure 34 CommPilot Call Manager

The CommPilot Call Manager is used to augment the functions of a standard phone. It provides an alternative user interface for enhanced services, replacing flash-hook and star codes. It is not intended to replace the phone or be a stand-alone substitute for basic call functions. Calls can be initiated and manipulated using the phone or the web interface. The audio is transported through the phone, not via the user's computer.

Service providers have the option to remove the Group phone list tab, thereby making the CommPilot Call Manager more suitable for the residential user. An additional option is to display the Group tab, but have only the search field appear. Thus, all group contact information is not retrieved every time the CommPilot Call Manager is opened, improving performance for very large groups with many contacts.

6.2 Group Web Portal

The Group Web Portal empowers companies to configure and manage their telephony services with instant results. Service provider interaction is minimized and the time and expense required to make moves, adds, and changes is significantly reduced. Each group service is set up and configured by the group administrator through intuitive web pages. For example, calling plans can be set up and modified for each member of the business group (shown in the following figure), without having to call their service provider or wait for the requested changes to take effect. The group administrator simply selects the various call types to activate and deactivate them for a particular user.

BROADSOFT
Group

Options:
[Profile](#)
[Resources](#)
[Services](#)
[Service Scripts](#)
[Acct/Auth Codes](#)
Calling Plan
[Utilities](#)

Welcome Ruth Margolis [Logout](#)

Outgoing Calling Plan

Customize the Outgoing Calling Plan for the group and/or departments.

OK Apply Cancel

Originating Initiating Call Forwards/Transfers Being Forwarded/Transferred

Department	Group Local	Toll Free	Toll	International	Operator Assisted	Chargeable Directory Assistance	Special Services I	Special Services II	Premium Services I	Premium Services II	Casual	URL Dialing	Unknown
Group Default	Y	N	A	T1	T2	T3	Y	N	A	Y	T1	T2	T3
Corporate	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
Finance	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
Human Resources	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
Sales	Y	Y	A	N	T2	Y	Y	Y	N	N	Y	Y	Y

Select from drop-down list to permit call type; Users can be configured with their own custom settings in user-level Calling Plan

Legend:
 Allow Y
 Block N
 Authorization code required A
 Transfer to 1st transfer number T1
 Transfer to 2nd transfer number T2
 Transfer to 3rd transfer number T3

OK Apply Cancel

Figure 35 Outgoing Calling Plan

In another example, the web-based Auto Attendant (shown in the following figure) enables group administrators to configure hours of operation, greetings, and transfer options.

BROADSOFT
Group

Options:
[Profile](#)
[Resources](#)
Services
[Service Scripts](#)
[Acct/Auth Codes](#)
[Calling Plan](#)
[Utilities](#)

Welcome Ruth Margolis [Sign Out](#)

Business Hours Menu

Configure the automated receptionist greeting prompt and dialing menu to be used during business hours.

OK Cancel

Business Hours Greeting:
☒ Default Greeting
☐ Personal Greeting
 Load personal greeting: [Browse...](#)
 Load Personal Video Greeting: [Browse...](#)

Menu Options:
☒ Enable first-level extension dialing

Key	Description	Action	Phone Number
0	0 to operator	Transfer to operator	1001
1	1 by extension	Extension dialing	
2	2 by name	Name dialing	
3	transfer key 3	Transfer with prompt	1003
4	transfer key 4	Transfer without prompt	1004

Figure 36 Business Hours Menu (Top of Page)

Similar web pages are provided to manage a host of group services, including: Account Codes, Authorization Codes, Call Centers, Call Park and Pick-Up, Device Inventory, Hunt Groups, and Voice Portal. The group web portal also enables companies to perform administrative functions, such as setting-up users and provisioning their personal telephony services and devices.

Group administrators have the option of establishing an additional layer of administration for individual departments within their overall business group (for example, Sales, Engineering). This is especially useful for larger enterprises that want to distribute responsibilities for day-to-day administration. Department administrators can be authorized to manage the users and services within their respective departments using the group web portal.

6.3 Enterprise Web Portal

The Enterprise Web Portal provides an optional layer of administration above the group layer to facilitate the management of large enterprises spanning multiple groups and sites. This enterprise layer is parallel to the service provider layer. Thus, system administrators have the option to create service providers and/or enterprises, each of which is administered separately.

Enterprise administrators can use this administrative layer to manage selected services across their business groups and sites. For example, a Voice VPN private dialing plan can be configured to enable users to call one another using location codes and extensions instead of full phone numbers.

6.4 Service Provider Management

6.4.1 Call Capacity Management

The Call Capacity Management feature enables service providers to limit the call traffic associated with individual groups by limiting the number of simultaneous calls that can be made to or from customer premises. A maximum number of simultaneous calls can be set for any specified set of users within a group. Incoming and outgoing calls can be managed separately, thereby providing greater granularity. Service providers can leverage this capability as a means of achieving network engineering and/or pricing objectives.

6.4.2 Configurable Default Feature Access Codes

Service providers can configure a default feature access code (FAC) set. When new groups are created under that service provider, their FAC table is initialized based on the service provider's defaults.

6.4.3 Home Zones

Service providers have the option of configuring home zones on a group basis. Each home zone is comprised of a list of acceptable IP addresses or IP address ranges from which SIP registrations and call originations are accepted. Service providers can also configure this service to only deny emergency calls made when a user is roaming outside of their group's home zone, to avoid sending invalid locations to emergency response teams. An optional e-mail with detailed call information can be sent to a specified address when an emergency call is made, regardless of whether it is permitted or denied.

6.4.4 Reseller Support

System providers have the option of acting as wholesalers by partitioning their BroadWorks system into multiple virtual systems, each of which can be owned and managed by a separate service provider (or “reseller”) via the service provider web portal. The system provider sets up the phone numbers and services available to service providers who, in turn, set up groups of users and provision services to them (for more information, see section [6.5.6.2 Malicious Call Trace](#)).

Service providers have access to all aspects of group, user, and system management as it relates to their customers. The system provider retains a higher level of access to manage the overall system.

6.4.5 Restricted Administrative Access

System and service providers can define what level of control is granted to administrators and users through their web portals. Access rights are defined as “read only” or “read and write”. Read-only access makes functions viewable, but not modifiable. For example, a group administrator can be created without the ability to add or remove users.

In addition, service providers can create a special type of administrative account at the provider level, termed the customer administrator. The customer administrator has full access to the group and user configuration web pages in the web portal for all the provider’s customers, but without access to provider-level network configuration options such as call processing policies.

6.4.6 Service Packs

Service providers have the option of creating packs of user services that can be authorized and assigned according to the service provider’s marketing strategy. Service packs are authorized and assigned by service providers and do not affect the manner in which system providers authorize services to service providers. Rather than assign individual services to each user, this capability provides an option to streamline the process by assigning a pack of services all at once.

A tool is provided to automate the process of migrating to BroadWorks service packs. Individual services can be converted to service packs for a large group of users all at once. In addition, service providers who are already using service packs can use the tool to repackage services into different service packs.

6.4.7 Shared Device Support

Certain devices and/or network elements can be shared across groups of users. Shared devices can be configured by the service provider and would be accessible by group administrators when service is assigned to a user.

For example, a service provider can deploy a single 24-port access device in an office building to support multiple customers. In another example, if BroadWorks is being used to provide voice mail only, a service provider could configure the “host” system as a shared access device for the purpose of delivering MWI notifications.

6.4.8 Virtual Domain Hosting

Service providers can configure virtual domain names on a per-enterprise basis. This eliminates the risk of users selecting a user ID that is already being used by another enterprise within the BroadWorks system.

6.4.9 Web Branding

Each service provider can design their own unique web branding to create a custom look (or “skin”) for their respective pages (for example, Personal, Group, and so on). Five different skins or “themes” are provided to alter the appearance of the web portals. Web branding can also include color schemes, corporate logos, banners, and home buttons. Each service provider can also customize headers, web page titles, and the left navigation menu.

Whereas many business users have traditionally been unaware of their service provider’s identity, the portal’s web branding capability can be used to generate increased brand recognition, product differentiation, and customer loyalty – not to mention the opportunity for advertising and up selling of services.

BROADSOFT [Help](#) - [Home](#)

[System](#) **Welcome Default Administrator** [Logout](#)

Options:
[Profile](#)
[Resources](#)
[Services](#)
► Utilities

Web Portal Branding

Customize the look of the CommPilot Portal pages displayed to your administrators and users. In addition to this customization, enhanced branding is also available. See the Web Branding Guide for details.

Banner Display: ☐ On ☒ Off

Banner:

Click here to win \$1,000.00!!

New Banner:

When clicked, send user to:

Web Custom Content: ☐ On ☒ Off

User Custom Web Content URL:

Web Custom Content: ☐ On ☒ Off

Group Custom Web Content URL:

Logo Display: ☒ On ☐ Off

Logo: **BROADSOFT**

New Logo:

Custom Settings:

☐ Use Custom Header

☐ Use Custom Menu

☐ Use Custom Titles

To change the current skin *Forest*, pick from the choices below:

☐ Classic
 ☐ Desert
 ☒ **Forest**
 ☐ Ocean
 ☐ Tropical



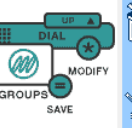

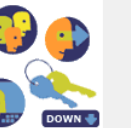






Figure 37 Web Portal Branding

6.4.10 Voice Portal Customization

Voice Portal Customization enables system providers to customize the keys and prompts that are used to navigate through their voice portal menus and submenus. A key is either 1 digit (0 through 9), *, or #. Administrators can choose from a list of valid keys that are free to use. If no key is chosen for an optional menu selection, the menu option is disabled. The association of keys to actions (choices of each menu) is configurable for most menus and submenus. The system introduces one announcement per menu option and one announcement per key value. Typically, prompts are automatically constructed to list the options and their matching keys.

6.5 System Provider Management

The system provider web portal provides access to all of the system monitoring, maintenance, and configuration functions of BroadWorks via a web interface. System providers can also access the provisioning and monitoring functions via a command line interface. The system provider web pages differ from those of the service provider web portal in that system providers can access the system monitoring and maintenance functions of BroadWorks, while service providers have access to only those web pages that affect their customers.

BroadWorks integrates seamlessly with existing operations support systems and networks, even through system upgrades and core network changes. Management of the BroadWorks network gives providers a system that remains simple through the growth and changes of the network. For example, BroadWorks offers a single provisioning interface, the OCI, that functions within a common framework and reports configuration and provisioning changes to an external system (for example, IMS HSS).

Use of industry-standard interfaces and protocols such as HTML (Hyper-Text Markup Language), HTTP (Hyper-Text Transfer Protocol), SNMP (Simple Network Management Protocol), and XML (eXtensible Markup Language) allows service providers to make use of existing tools and skills, without compromising ease of use or results of system management. In addition, BroadWorks provides configuration audit trails to log all changes made by the system provider, including adds, changes, and deletions.

Carriers can also choose to deploy the BroadWorks Element Management System. For more information, see section [4.7 BroadWorks Element Management System](#). This server provides a single node for all system OAM&P interfaces and offers a centralized point to access BroadWorks system management functionality.

The following sections describe the system management aspects of BroadWorks, which apply whether providers choose to use the Element Management System or not.

6.5.1 Accounting Management

BroadWorks accounting information is generated in the form of call events. The call events are atomic pieces of information generated during the calls upon call origination, termination, service invocation, and other events that can have an impact on the billing of a call. Additionally, a long duration call accounting option provides the ability to generate a separate accounting event for calls of a specified duration (for example, one day).

The BroadWorks call detail record (CDR) contains information about each call, including: called party, calling party, call origination time, originating tag (for IMS CSCF correlation), billable call duration, call type, media codecs used, conference data, dialed digits (prior to any translations), and IP address of access device. If a call consists of multiple legs, due to a transfer or a service activation, the CDR contains a record of all related calls and the reason for the call spanning multiple legs. The CDR also identifies which feature a user

invoked as a result of dialing a feature access code. Since feature codes are configurable per group, this enhancement simplifies the billing of usage-sensitive services.

On a periodic basis, an external mediation system retrieves the accounting files from BroadWorks and correlates the call events to aggregate them in call detail record that can be processed by the service provider's downstream billing system. This enables a system administrator to control the size of the internal CDR buffer to allow generation of CDRs in real-time, if required.

BroadWorks offers the Call Detail Server, which enables providers to break out the management of call logs within the BroadWorks system. With the availability of more call data, providers can parse and present call data for new services and applications. Enhanced Call Logs can be configured to show additional call characteristics such as call duration. Logs can also be displayed based on department, group, enterprise, or provider. For more information, see section [4.8 BroadWorks Call Detail Server](#).

6.5.1.1 RADIUS Interface

The BroadWorks Application Server uses the RADIUS interface to send call detail records to the Call Detail Server, which provides "real-time" call data for third-party accounting applications such as pre-paid calling. Requests are authenticated by the RADIUS shared secret for security.

The Application Server can also deliver real-time call detail records using the Radius Accounting protocol (RFC 2866), which is done by sending multiple call detail records per call. The content of a call's call detail record is cumulative, that is, each call detail record contains all available call information at the time it is generated. The call detail record information is conveyed in a number of vendor specific attributes (VSAs).

6.5.2 Configuration Management

6.5.2.1 System Provider Web Portal

Upon log in to the system using an ID and password, system providers have instant access to a customer list, by service provider, enterprise, or company or group name, as shown in the following figure. Links provide quick retrieval of user, service, interface, or system information.

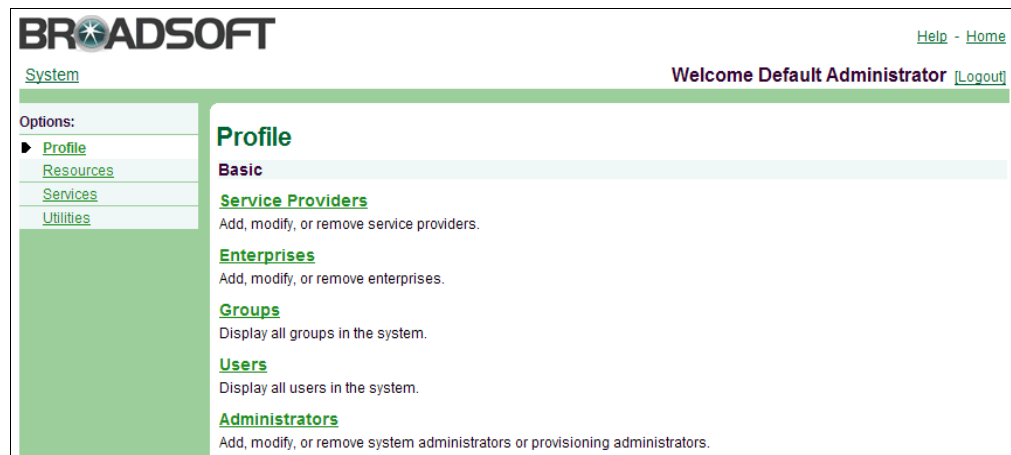


Figure 38 System Provider's Profile

System providers have the ability to add, delete, and modify users, groups, services, and interfaces to meet the customer needs, as well as perform system maintenance and management, maintain system and subscriber security, and monitor system events. With the introduction of service providers and group or company administrators to attend to the details of user requests, system providers are able to focus on performance and monitoring issues.

6.5.2.1.1 *Tiered System Provider Privileges*

System providers can create two levels of access privileges for different levels of service. The provisioning administrator web interface allows access to a subset of the functionality enabled by the system provider web portal interface. Specifically, the provisioning administrator level has full functionality with regard to users and groups, but does not permit access to system-level service or interface parameters, profiles of other administrators, or access device or server configuration information. Group provisioning administrators can view, add, modify, and delete the groups and users created by other provisioning administrators.

6.5.2.1.2 *Portal Support*

Portal support of the Application Server is a function that provides an API that allows the BroadWorks web interface to be integrated into a service provider's portal. Users who access BroadWorks via the web site of a service provider or other portal do not require re-authorization.

6.5.2.2 *Command Line Interface*

BroadWorks has a command line interface for system configuration tasks such as adding, modifying, and deleting subscriber, interface, and service information. Using simple, common commands, data can be reviewed or edited by system and service providers. Some of the functionality of the command line interface includes:

Configuration – Provides a subset of the group, user, service and interface parameters, and system configuration functionality of the system provider web interface. Individual user services cannot be assigned or edited using the command line interface.

Alarms – Provides access to system generated alarms and events (SNMP traps). The display is real time.

Audit Trails – Provides access to all changes made by the service provider, including, adds, changes and deletions. Also provides the ability to view the data.

Service Performance Measurements – Provides access to service-level operational measurements.

System Performance Measurements – Provides access to system-level operational measurements. Enables service providers to use the command line interface to query and display reports on performance measurements. Both real-time and historical (for example, last day, month, and year) reporting is available, and information can be viewed from a web page or a file.

The BroadWorks command line interface is available on the Application Server, Web Server, Media Server, Network Server, Element Management System, and Call Detail Server, in various forms with relevant commands. For more information about the command line interface for a particular server, refer to the appropriate *Command Line Interface Administration Guide*.

6.5.2.3 Service Quantities

This feature allows system or service providers to set a maximum number of instances for each service assigned to the group. When services are purchased from a provider, the number of desired instances of a service is assigned. The system permits assignment of the service to the desired number of users or the desired number of times for a group. For example, a group administrator can issue a limited number of users a service such as Selective Call Forwarding, as well as limit the number of Auto Attendants used by the company.

Service Provider Setup Step 4 of 5 - Authorize Services [Help](#) - [Close](#)

Authorize the services that this service provider can authorize for a group. You can limit the number of service instances this service provider can authorize.

Cancel < Back Next > Finish

Select All Deselect All

Authorized	Group Services	Limits
<input type="checkbox"/>	Account/Authorization Codes	<input type="checkbox"/> Limited To: <input type="text"/>
<input type="checkbox"/>	Auto Attendant	<input type="checkbox"/> Limited To: <input type="text"/>
<input type="checkbox"/>	Call Capacity Management	<input type="checkbox"/> Limited To: <input type="text"/>
<input type="checkbox"/>	Call Center	<input type="checkbox"/> Limited To: <input type="text"/>
<input type="checkbox"/>	Call Park	<input type="checkbox"/> Limited To: <input type="text"/>
<input type="checkbox"/>	Call Pickup	<input type="checkbox"/> Limited To: <input type="text"/>
<input type="checkbox"/>	City-Wide Centrex	<input type="checkbox"/> Limited To: <input type="text"/>
<input type="checkbox"/>	Customer Originated Trace	<input type="checkbox"/> Limited To: <input type="text"/>
<input type="checkbox"/>	Emergency Zones	<input type="checkbox"/> Limited To: <input type="text"/>
<input type="checkbox"/>	Enhanced Outgoing Calling Plan	<input type="checkbox"/> Limited To: <input type="text"/>
<input type="checkbox"/>	Hunt Group	<input type="checkbox"/> Limited To: <input type="text"/>
<input type="checkbox"/>	Incoming Calling Plan	<input type="checkbox"/> Limited To: <input type="text"/>

Figure 39 Service Provider Setup

6.5.2.4 User Quantities

Setting the user quantities enables system providers to set a maximum number of users that a group, or service provider, can have. Service providers also have the ability to place a limit on the number of users in each of their groups.

6.5.2.5 Feature Access Codes

Each service provider can specify their own default set of feature access codes. New groups created by the service provider start with this default set of codes. Group administrators can subsequently specify their own set of custom feature access codes and prefixes. For more information, see section [7.2.15 Configurable Feature Access Codes](#).

6.5.2.6 Call Control Interface

BroadSoft provides an external call control interface for customers that would prefer to use third-party applications for call management. The interface is open and XML-based, and can be used to develop a wide range of applications for such purposes as communication, collaboration, business process integration, and user interface customization.

For example, customers may want to deploy a customized attendant console that is tailored to a particular vertical segment. Alternatively, customers may deploy an entirely different type of application that can perform call management functions, including answer, hold, retrieve, transfer, conference, dial, and release.

Call control functionality can also be integrated into existing web applications (for example, CRM) to provide value-added collaborative applications. Applications can also leverage the call control interface to support call logs and group directories, as well as retrieve user call status for presence.

6.5.2.7 External Provisioning Interface

BroadWorks provides an external interface for customer or operations support system access. The interface allows an external system the capability of adding, removing, and modifying groups and the services, resources, and telephone numbers associated with them for both the Application Server and Network Server. In addition, SNMP event notifications are generated when users, groups, or service providers are added to the system. The simple XML-based transaction interface is secured and uses an XML document request/response model. Machine level end-user authentication is available.

6.5.2.8 Language

The text contained in the web portals can be easily changed to a non-English language. Display of double-byte language characters (that is, Japanese, Chinese) is supported as well as right-to-left languages (that is, Arabic, Hebrew). Dates and times are also displayed in the proper format corresponding with the language type.

Different languages can also be supported simultaneously for different users and administrators on a single Application Server pair. Thus, users and administrators can select which language they prefer and all the prompts, announcements, and language used on the web portal are presented in their preferred language.

6.5.3 Fault and Performance Management

BroadWorks provides a variety of alarms and counters that service providers can use for fault and performance management.

6.5.3.1 Fault Management

All BroadWorks servers generate events and alarms to indicate system and network problems that can be monitored and managed via SNMP traps. The SNMP interface is configurable and can send traps from the BroadWorks administrative interface.

BroadWorks provides a variety of tools that enable system administrators to diagnose system and network problems, including the following troubleshooting tools:

- Protocol monitor tool
- Query user tool
- Accounting record viewing tool
- Call processing diagnostics
- Connectivity test for access and network devices
- Query service usage tool

Third-party network management systems, such as HP OpenView or Micromuse Netcool, can be used to monitor the events and alarms generated by BroadWorks. These systems collect events and alarms from a variety of components and provide a user-friendly method of correlating and classifying network issues. Thus, BroadWorks servers can be easily integrated into existing network management infrastructures. Thresholds on external systems can also be set so that BroadWorks is polled and these systems generate alarms based on targeted operational devices and variables for capacity status and other critical performance measurements.

6.5.3.2 Performance Management

BroadWorks provides a set of relevant measurements for each service, tracked on a system basis. Application Server performance counters may also be provided on a per-enterprise basis.

System performance can be managed and monitored via SNMP MIBs. All system components within the BroadWorks system can be monitored and managed using GET commands. Service providers are also able to use CLI to query and display reports on performance measurements. Both real-time and historical (for example, last day, month, and year) reporting is available, and information can be viewed from a web page or a file. Data polling and archiving intervals can also be configured via the CLI.

Operational measurements can also be retrieved using standard performance management systems. Thresholds on external systems can be set so that BroadWorks is polled and alarms are generated based on targeted operational devices and variables for capacity status and other critical performance measurements. System administrators can configure BroadWorks to send periodic performance reports formatted in XML to one or more external network management systems via FTP.

6.5.3.3 Element Management System

BroadWorks system providers also have the option of using the Element Management System (EMS) as a single point of entry for monitoring and maintaining their complete BroadWorks system. For more information, see section [4.7 BroadWorks Element Management System](#).

6.5.4 Security

6.5.4.1 Web Portal and CLI Access

Based upon the login identity and password, the appropriate Application Server or Network Server portal is entered by the system provider (or provisioning administrator), service provider, group administrator, or end user. SSL support provides a secure link for logins on the web server.

BroadWorks has five tiers of password management (system provider, service provider, provisioning administrator, group administrator, and user), the format of each determined by the next higher level of user. For instance, user passwords may or may not be required to be of a certain length, contain numeric or special characters, be different than the user ID, and expire at regular intervals. Group administrators determine which of these format requirements to impose upon users. In turn, system providers can specify the password requirements of the group and provisioning administrators.

For added security, BroadWorks provides a password wizard. Using the wizard, system administrators can force users to change passwords on an incremental basis. Administrators can also set up password rules that remove trivial patterns and repeated

passcodes. A specified number of unsuccessful login attempts blocks users or administrators from entering the system, protecting against password guessing. When a user is blocked from the system, an e-mail message is sent to an administrator, warning of the login attempt and subsequent block.

For the Application Server, Media Server, and Network Server, the *web interface* permits secure access for the following:

Application Server	Media Server	Network Server
System provider Service provider Group provisioning administrator Group administrator End user	Not accessible by any user type (CLI access only)	System provider Group provisioning administrator Enterprise administrator (manages dial plan information for specific groups)

For the Application Server, Media Server, and Network Server, the *command line interface* permits secure access for the following:

Application Server	Media Server	Network Server
System provider Service provider Group provisioning administrator	System provider	System provider Group provisioning administrator Enterprise administrator (manages dial plan information for specific groups)

To protect against unauthorized access to the system via transmission protocols, BroadWorks uses MGCP access control. MGCP access control provides the ability to reject packets from unauthorized sources. When packets are received on the MGCP ports, BroadWorks inspects the source IP address of the packet and compares it to the IP address or resolved hostname in the end point identifier contained in the message. If they match, the packet is allowed and processed by the system. Otherwise, the packet is ignored and no further processing is performed.

As a secondary level of security, BroadWorks only allows hostnames or IP addresses in the end point identified that have been configured in the access device list for a group. Therefore, if a packet is received where the source IP address and the IP address or resolved hostname match, but the IP address of end point identifier is not provisioned in the access device list for any of the groups, the packet is discarded.

System providers can use the command line interface to enable or disable this security feature.

6.5.4.2 Third-Party Authentication Server Support

System providers have the option of integrating BroadWorks with an external authentication server that prompts users for their credentials and performs login authentication. Once an external server has authenticated a user, BroadWorks' own internal authentication system is bypassed and the user's web session can be launched using BroadWorks.

6.5.4.3 Network-Level Security

To build next generation networks, service providers are faced with the challenge of integrating a variety of networking components into a complete converged voice and data service solution. Often different equipment vendors make design decisions that tie them to a specific networking topology. BroadWorks has been designed to accommodate the most common topologies deployed in today's carrier grade Voice over IP (VoIP) networks.

Converged networks also present a variety of security issues. If not properly deployed, VoIP networks can be vulnerable to fraud and conventional data network attacks. BroadWorks addresses these issues by offering a variety of built-in security features, thereby giving services providers a number of options to protect their resources from attacks. BroadWorks servers internally classify all signaling events as coming from either the "access interface" or the "network interface". This helps identify what security policies to apply to each event and to optimize event processing appropriately. Events coming from the access interface are generally considered to be coming from un-trusted end points, such as: integrated access devices, PBX gateways, IP phones, and web browsers on workstations. Events coming from the "network interface" are generally considered to be coming from trusted end points such as: network gateways, softswitches, and proxies.

BroadWorks supports two different configurations for mapping the access and network interfaces to the physical network plane. Note that a network plane can optionally be redundant. A non-redundant network plane consists of one network interface card (NIC). A redundant network plane consists of a redundant pair of network interface cards.

- *Common Signaling Interface* – In this configuration, both access and network signaling interfaces are mapped to the same physical network interface plane.
- *Separate Network and Access Signaling Interface* – In this configuration, the network-signaling interface is mapped to one interface card while the access-signaling interface is mapped to a separate interface card. This offers a high degree of security, as it physically segments the service provider's network resources from the devices on the public access network.

Thus, with a great degree of network configuration flexibility, the service provider is free to mix and match BroadWorks with various network-signaling elements without worrying about basic network topology compatibility.

6.5.5 Voice Messaging

6.5.5.1 Voice Mail Configuration

System providers have the following capabilities to configure BroadWorks Voice Messaging for individual groups:

- *Message Aging* – enables service providers to set a maximum duration for the storage of saved messages by each group.
- *Multiple Mail Servers* – enables service providers to specify a different POP3 mail server or IMAP (including Exchange 2000) mail server for each group or user.
- *Variable Mailbox Sizes* – enables service providers to set a different maximum mailbox size for each group or user (up to 900 minutes, and/or 10 minutes/message).

6.5.5.2 IMAP Mailbox Cleanup

When using IMAP for storage, the system never purges deleted messages from the message store. This means that a manual action must be taken to delete the messages,

making use of IMAP impractical for deployment. This feature replaces the IMAP LOGOUT with an IMAP CLOSE and IMAP LOGOUT, forcing the system to purge messages marked for deletion.

6.5.5.3 Integrated Voice and Fax Messaging

The Voice Messaging system can handle both audio messages and faxes. When retrieving messages by phone, the Voice Messaging service plays users the fax message envelope, indicating the date and time the message was left. Users can forward the message to a fax message to print it. Alternatively, users can access their messages by e-mail, in which case voice and fax messages are attached to mail messages as audio and image files. Users can also have the system notify them of new messages by e-mail.

6.5.5.4 Outgoing Message Waiting Indicator

BroadWorks can control the Message Waiting Indicator (MWI) status of users with BroadWorks Voice Messaging who have their access lines on a PBX, a Class 5 switch, or another IP-based application server. BroadWorks supports this service through an outgoing SIP NOTIFY MWI. For legacy-based users on a PBX or Class 5 switch, an MWI converter and terminal server are required to convert the SIP NOTIFY MWI message to SMDI TCP MWI and SMDI RS-232 MWI messages, respectively.

6.5.5.5 Third-Party Voice Mail Support

BroadWorks can facilitate the integration of a third-party voice mail platform with BroadWorks and its services. Busy and unanswered calls can be forwarded to a phone number or URL configured at the group level by the service provider. The number of rings before considering a call unanswered is defined at the user level. The *Send to VM* button on the CommPilot is still visible and enabled for users with Third-Party Voice Mail. CommPilot Express can also be deployed with an external voice mail system.

6.5.5.6 Third-Party Voice Mail MWI

BroadWorks enables the receipt of MWI status for users whose voice mail service is hosted on a third-party system. Thus, even without using BroadWorks own integrated voice messaging, users can still be notified of messages via their phone lamp and stutter dial tone. BroadWorks supports both of the following:

- Receipt of SMDI-based MWI notification from TDM-based voice mail systems (terminal server required)
- Receipt of SIP-based MWI notification from other IP-based voice mail systems

6.5.6 Regulatory

6.5.6.1 Lawful Intercept

Most countries have regulations and laws requiring local exchange carriers to cooperate with law enforcement to conduct lawfully authorized surveillance on their subscribers. As a result, carriers must ensure that their telecommunication systems provide the necessary electronic surveillance capabilities so they can meet the legal requirements on the country where they operate.

Specifically, in the United States, the 1994 Communications Assistance of Law Enforcement Act (CALEA) mandates carriers to provide assistance to law enforcement in

conducting surveillance on their users. The surveillance requirements that apply to US carriers are documented in the J-STD-025 standard.

BroadSoft is committed to providing its customers with a solution that complies with their Lawfully Authorized Electronic Surveillance (LAES) regulatory requirements. BroadWorks enables the following necessary functions for lawful intercept:

- *Administration* – Enables a system provider or law agency to assign and configure surveillances against particular users. Up to five surveillances can be assigned to one user. BroadWorks provides the option to disable media intercept for intra-site calls.
- *Event Monitoring* – Generates call events for users under surveillance and delivers to the law agencies requesting the surveillance.
- *Media Monitoring* – Mixes the media of all parties of a call under surveillance and delivers to the corresponding law agencies based on the delivery IP address. Digits dialed after a call is connected are also reported, as well as signals initiated by the user (for example, when a user flashes to toggle between two calls).

BroadWorks complies with European Telecommunications Standards Institute (ETSI) standards for Lawful Intercept, allowing Law Enforcement Agencies to correlate the content of call content channels with call data channels.

BroadWorks also complies with the ANSI T1.678.v2 standard, by allowing the administrator to prevent any information that could identify the subject of the interception from being included in signaling messages.

The BroadWorks Lawful Intercept solution is designed to adapt to any VoIP network configuration and leverages existing network surveillance capabilities, as applicable. Also, by operating independently of other network elements, BroadWorks provides flexibility in putting together a complete surveillance solution.

6.5.6.2 Malicious Call Trace

System providers can proactively trace calls terminating to a user that has been assigned the Malicious Call Trace service. Incoming calls trigger the generation of a report (or trace) that is delivered to the system provider in an SNMP trap. The report contains information about the calling party (number and name), the time and date that the call was received and other relevant information (for example, redirection information).

6.6 Provisioning Work Flow

In BroadWorks, tasks traditionally associated with system providers are now distributed among service providers, provisioning administrators, group administrators, and end users. Distributing the workload of the system provider allows more control and interaction on the part of the customer. It also reduces the customer need for and turnaround time of moves, adds, and changes, further reducing the work of the service department.

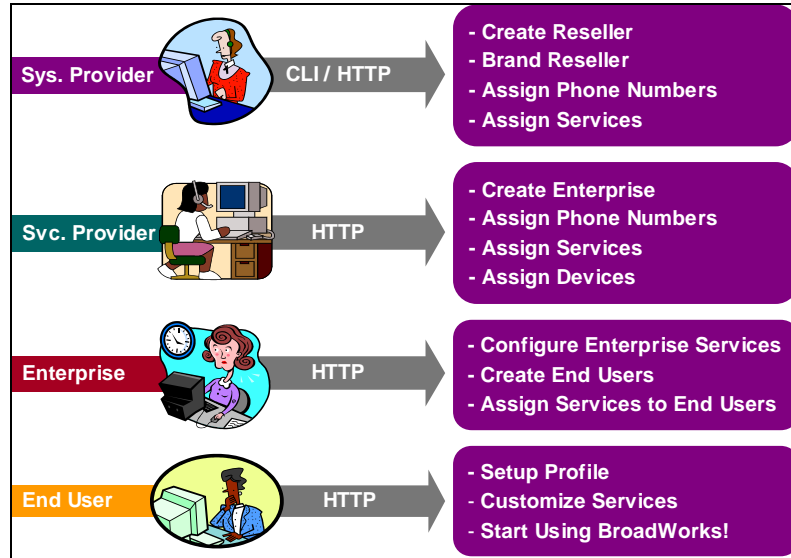


Figure 40 Provisioning Work Flow

Specifically, the *system provider* is responsible for the following, which can be accomplished via the command line interface on the Application Server or Network Server:

- Set system-wide service and interface parameters
- Configure routing and translations functionality
- Configure network devices and servers
- Add service providers and provisioning administrators

The following tasks can be accomplished by a *system provider*, *service provider*, or *provisioning administrator* via the Application Server, or by system providers or group provisioning administrators via the Network Server. Changes are synchronized between servers instantly.

- Create a group with an administrator
- Allocate a range of directory numbers to the group
- Allocate access devices to the group
- Authorize purchased services and service quantities for the group

Recommended responsibilities of a service provider *customer administrator* or a *group administrator*, which are entered via the web interface of the Application Server, can be:

- Add users, assign phone numbers and access resources
- Assign services
- Configure group services
- Assist or train end users in personal service configuration

Users can customize and configure their own services.

In the above scenario, which reduces the cost and need for customer service, self-managed customers also benefit from reduced lag time for service orders. The design of

the system allows for the possibility of requesting and receiving new services, additional numbers, and expanded access online.

6.7 Service Creation Scripts

Service providers are constantly seeking new and innovative technologies that enable them to increase revenues, reduce expenditures, and differentiate themselves in the ever-changing telecom arena. BroadWorks' Service Creation capabilities can assist service providers in reaching these objectives by enabling them to create new value-added services, as well as customize existing ones to meet their customers' needs. In the traditional PSTN world, new services required months or years and significant capital investment to develop and deploy. With the BroadWorks' Service Creation, the development time is now reduced to weeks. Furthermore, in-house or third-party implementation of new services reduces the lifecycle cost of new service creation compared to the traditional single-vendor model.

BroadWorks enable users to create XML-based service scripts which, when executed in combination with other network components such as web-based servers, can deliver powerful new call management services. Service scripts are created using CPL (Call Processing Language), an easy-to-use service description language greatly simplifying the creation and deployment of new Internet telephony services. Based on Internet Engineering Task Force (IETF) standards, new CPL-enabled service scripts can be implemented by third-party developers, service providers, or enterprises, with the same ease and effort as developing web pages in HTML. Furthermore, BroadWorks' patented ServiceOS™ technology ensures predictable service execution and feature interaction compatibility.

New services can be created as standalone BroadWorks service scripts or used in tandem with IP-based network services. The following are examples of how BroadWorks service scripts can be used to enable innovative call management services:

- Call setup decisions based on contextual data (for example, origin of the call, language of the caller, and subject of the call)
- Call routing decisions based on a user's presence
- Instant messaging for real-time, "anywhere" communication
- Outgoing call restrictions to a specific area code (NPA) or local exchange (NXX)
- Routing client calls to the appropriate Call Center customer representative

Service providers can leverage BroadWorks Service Creation capabilities to prototype and trial new service ideas before proceeding to full-scale deployment. New services can then be implemented to reflect trial feedback, thereby minimizing service introduction risk, reducing the delivery interval, and accelerating profitability.

7 Services and Features

BroadWorks provides both expected and enhanced features. Expected features are Centrex or other standard call processing and handling call treatments. Enhanced features are additional functionality such as the CommPilot and services for additional devices, such as Simultaneous Ring. Many features are managed via a web portal, giving the user a point-and-click interface for invoking services, and some features have an additional star code or flash-hook method of invocation. There are features that are assigned to and customized by individual users, called personal services, and services that are assigned to an entire group and managed by the administrator, called group services. The group services section is followed by a description of system/service provider features, which explains several group-specific options available for service providers. Finally, network features explains the call translation and routing policies on the Network Server.

7.1 Personal (User) Services

7.1.1 Alternate Numbers

The Alternate Numbers service enables users to have up to ten additional phone numbers and/or extensions assigned to them. Normal ringing is provided for incoming calls to the primary phone number and users have the option of enabling one of five distinctive rings for the other ten. For outgoing calls from the user, the user's primary phone number is the calling line identity.

7.1.2 Anonymous Call Rejection

The Anonymous Call Rejection service enables a user to reject calls from anonymous parties who have explicitly restricted their Caller ID. By activating the service via a web interface, callers without available caller identification are informed that the user is not accepting calls at that time. The user's phone does not ring and the user sees or hears no indication of the attempted call. This service does not apply to calls from within the group.

7.1.3 Authentication

Authentication is performed upon the registration of an IP phone. This ensures that the user of the device is authorized to gain access into BroadWorks. SIP invites may also be authenticated on an on-going basis at pre-defined intervals. Standard digest authentication is used. The authentication information is configured both in the phone and via the group web portal. BroadWorks also provides policies that ensure that the location in a received call origination matches the registered location. If not then the system returns an appropriate error return code. All call originations from unregistered phones are denied.

7.1.4 Auto Callback

Auto Callback enables users who receive a busy condition to monitor the busy party and automatically establish call when busy party becomes available. This service can only be activated when calling within the same group.

7.1.5 Automatic Hold/Retrieve

The Automatic Hold/Retrieve service provides an alternate method to hold and retrieve calls for BroadWorks users. Specifically, service can be setup where calls are held without having to use feature access codes. The service is especially useful to attendants handling large volume of incoming calls by allowing them to hold calls by simply transferring them to dedicated parking stations.

7.1.6 Barge-In Exempt

Users with Barge-In Exempt assigned to them cannot have their calls barged-in on by other users.

7.1.7 Blind Call Transfer

Blind Call Transfer enables a user to transfer a call unattended before or after the call is answered. Users can only execute blind call transfer from the CommPilot.

7.1.8 Call Forwarding Always

Call Forwarding Always enables a user to redirect all calls to another destination. The user controls the service via a web interface or from his/her phone, via a star code. Both provide the ability to activate and deactivate the service. If activated, a user must specify the forwarding number.

The screenshot shows the BroadSoft web interface for the 'Call Forwarding Always' settings. The top navigation bar includes links for 'Call Manager', 'Attendant Console', 'Help', and 'Home'. A welcome message for 'Cheryl Baldwin' is displayed. On the left, a sidebar lists various options: Profile, Incoming Calls (selected), Outgoing Calls, Call Control, Calling Plans, Client Applications, Messaging, Service Scripts, Utilities, and Conferencing. The main content area is titled 'Call Forwarding Always' and contains the following text: 'Call Forwarding Always allows you to forward all your incoming calls to a different phone number or SIP-URI, such as your home office or cell phone. You can also make your primary phone emit a short ring burst to inform you if you are next to your phone when the call is forwarded by using the Ring Reminder. This is important when you have forgotten the service is turned on and you are at your primary phone waiting to receive calls. Note that the address (phone number or SIP-URI) you forward your calls to must be permitted by your outgoing calling plan. You can also set the phone number or SIP-URI to forward to using the voice portal or on the phone using the feature access code.' Below this text are two sets of controls. The first set includes 'OK', 'Apply', and 'Cancel' buttons. The second set includes a radio button for 'Call Forwarding Always' set to 'On', a text input field for '* Calls Forward to phone number / SIP-URI:', and a checkbox for 'Play Ring Reminder when a call is forwarded'. A final set of 'OK', 'Apply', and 'Cancel' buttons is at the bottom.

Figure 41 Call Forwarding Always

7.1.9 Call Forwarding Busy

Call Forwarding Busy enables a user to redirect calls to another destination when an incoming call encounters a busy condition. The user can control the service via a web interface, which provides the ability to activate and deactivate the service. Alternatively, users have the option of enabling and disabling the service using the respective feature access codes (that is, star codes). If activated, a user must specify the forwarding number.

7.1.10 Call Forwarding No Answer

Call Forwarding No Answer enables a user to redirect calls to another destination when an incoming call is not answered within a specified number of rings. The user can control the service via a web interface, which provides the ability to activate and deactivate the service. Alternatively, users have the option of enabling and disabling the service using the respective feature access codes (that is, star codes). If activated, a user must specify the forwarding number and the number of rings before forwarding.

7.1.11 Call Forwarding Remote Access

Call Forwarding Remote Access enables users to activate, deactivate, and program their Call Forwarding Always service from any phone via their Voice Portal.

7.1.12 Call Forwarding Selective

Call Forwarding Selective enables a user to define criteria that causes certain incoming calls to be redirected to another destination. If an incoming call meets user specified criteria, the call is redirected to the user specified destination. The user controls the service via a web interface, which provides the ability to set the forwarding destination address and the criteria sets for determining which calls require forwarding. A criteria set is based on incoming calling line identity, time of day, and day of week. Multiple criteria sets can be defined and a different forward-to number can be set for each.

The screenshot shows the Broadsoft web interface for the 'Call Forwarding Selective' configuration page. The page has a green header with the Broadsoft logo and navigation links: 'Call Manager', 'Attendant Console', 'Help', and 'Home'. Below the header, a green bar displays 'Welcome Cheryl Baldwin' and a 'Sign Out' link. On the left, a sidebar lists 'Options:' including Profile, Incoming Calls (highlighted), Outgoing Calls, Call Control, Calling Plans, Client Applications, Messaging, Service Scripts, Utilities, and Conferencing. The main content area is titled 'Call Forwarding Selective' and contains a description of the service. Below the description are buttons for 'OK', 'Apply', 'Add', and 'Cancel'. A text field is labeled '* Default Call Forward to phone number / SIP-URI:'. Below this is a checkbox for 'Play Ring Reminder when a call is forwarded'. A table with columns 'Active', 'Description', 'Time Schedule', 'Calls from', 'Forward to', and 'Edit' is shown, with a message 'No Entries Present' below it. At the bottom of the table area are buttons for 'OK', 'Apply', 'Add', and 'Cancel'.

Figure 42 Call Forwarding Selective

7.1.13 Call Notify

Call Notify enables a user to define criteria that causes certain incoming calls to trigger an e-mail notification. If an incoming call meets user specified criteria, an e-mail (or short message to a cell phone) is sent to the notify address informing the user of the details of the incoming call attempt. The user controls the service via a web interface, which provides the ability to set the notify e-mail address and the criteria sets for determining which calls trigger a notification. A criteria set is based on incoming calling line identity, time of day and day of week. Multiple criteria sets can be defined.

7.1.14 Call Return

Call Return enables a user to call the last party that called, whether or not the call was answered. To call back the last party that called, the user dials the call recall star code. The system stores the number of the last party to call, and connects the user to that party. Users can also execute call recall via the CommPilot.

7.1.15 Call Screening by Digit Patterns

This service enables users to specify digit patterns instead of individual phone numbers on the following selective services: Selective Call Forwarding, Selective Call Acceptance, Selective Call Rejection, Call Notification, and Priority Alert. Digit patterns consist of a sequence of digits followed by the * wildcard. For example, 240* would apply to any calls from phone numbers starting with 240.

Users may also use the "?" wildcard character in specifying digit patterns. The "?" wildcard character represents any single digit (0 through 9) and can be used multiple times anywhere within a digit string. The "?" wildcard can be used with or without the "*" wildcard at the end of the digit string.

7.1.16 Call Trace

Call Trace enables users to request that a call they have received to be automatically traced by dialing a feature access code after the call.

7.1.17 Call Transfer with Three-Way Consultation

This service enables a user to make a three-way call with the caller and add-on party before transferring the caller. To initiate call transfer with three-way consultation, the user depresses the flash hook and dials the add-on party. When the call is answered, the user depresses the flash hook and forms a three-way call with the add-on party and caller. To transfer, the user hangs up causing the caller to be connected to the add-on party. Users can also execute call transfer with three-way consultation via the CommPilot.

7.1.18 Call Transfer with Third-Party Consultation

This service enables a user to consult with the add-on party before transferring the caller. To initiate call transfer with consultation, the user depresses the flash hook and dials the add-on party. When the call is answered, the user can consult with the add-on party. To transfer, the user hangs up causing the caller to be connected to the add-on party. Users can also execute call transfer with consultation via the CommPilot.

7.1.19 Call Waiting

Call Waiting enables a user to answer a call while already engaged in another call. When a second call is received while a user is engaged in a call, the user is informed via a call waiting tone. To answer the waiting call, the user depresses the flash hook. The user connects with the waiting party and holds the original party. By depressing the flash hook, the user reconnects to the original party and holds the waiting party. The feature completes when any party hangs up. Users can also execute call waiting via the CommPilot.

Users can activate/deactivate the Call Waiting service for all incoming calls via their web interface. Users also have the option of canceling their Call Waiting on a per-call basis by dialing a star code before making the call, or after a switch-hook flash during the call. Once the call is over, Calling Waiting is restored.

7.1.20 Calling Line ID Blocking

Calling Line ID Blocking enables a user to block delivery of his/her identity to the called party. The user controls the service via a web interface, which provides the ability to activate and deactivate the service. If activated, all calls made by the user have the user's identity blocked.

If this service is activated, users can still choose to allow the delivery of their Calling Line ID on a specific call by entering the respective feature code (*65 default). Once the call is over, Calling Line ID Blocking is restored.

7.1.21 Calling Line ID Blocking per Call

Calling Line ID Blocking per Call enables users to block their outgoing caller ID on a per-call basis by dialing a star code before making the call.

7.1.22 Calling Line ID Blocking Override

Calling Line ID Blocking Override enables users with this service assigned to always receive the Calling Line ID if available, regardless of whether or not it is blocked by the calling party. As an example, this capability could be used by law enforcement agencies in certain countries.

7.1.23 Calling Line ID Delivery

Calling Line ID Delivery enables the delivery of a caller's identity to a user via the CommPilot and phone (if capable). Delivered information includes the caller's phone number and name. The information is delivered to the web interface and the phone (if capable) only if the information is available and has not been blocked by the caller.

Service providers have the ability to assign the following capabilities independently of each other: Internal Calling Line ID Delivery and External Calling Line ID Delivery. Once assigned, users have the ability to enable or disable the service.

7.1.24 Calling Name Delivery

Calling Name Delivery provides the calling name for incoming calls by querying an external database for the information if it is not received in the call set-up messaging. Although BroadWorks' standard Calling Line ID Delivery provides the calling number and name for all calls within BroadWorks, calling name information is typically not passed with calls received from external parties (for example, PSTN-originated calls).

7.1.25 CommPilot

The CommPilot provides users with a web-based tool for invoking their services, as an alternative to using star codes and depressing the flash hook.

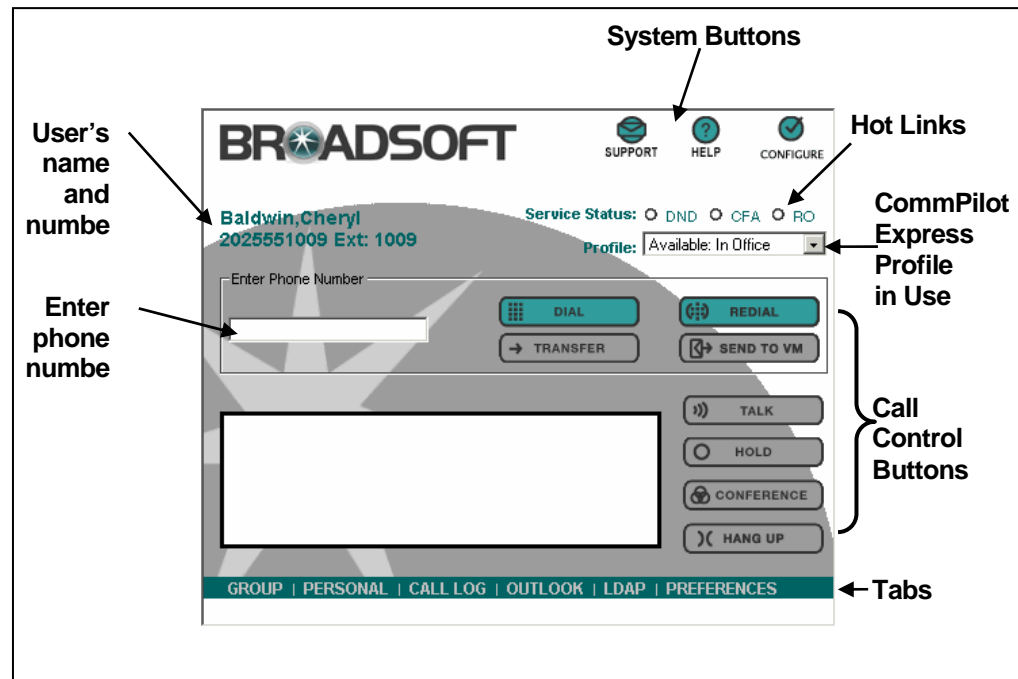


Figure 43 CommPilot Call Manager

The following features can be provided with the CommPilot Call Manager:

- **Dial/Redial** (click-to-dial) – Enables a user to enter and dial a number, dial directly from a drop-down Phone List (Group, Personal, or Call Log) or from Outlook or LDAP tabs, or click the Redial button.
- **Transfer** – Enables a user to redirect a ringing, active, or held call to another number or directly to voice mail. Before transferring the caller, the user can choose to consult with the third party first or establish a three-way consultation.
- **Send to VM** – Enables a user to transfer calls to voice mail.
- **Talk** – Enables a user who is already engaged in call to answer another waiting call. When available, Calling Line ID is displayed with caller's name and number.
- **Hold** – Enables a user to place an existing call on hold for an extended period of time, and then retrieve the call to resume conversation. While the calling party is held, the user can choose to make a consultation call to another party.
- **Conference** – Enables a user to establish a three-way call involving two other parties.
- **Hang Up** – Enables a user to disconnect a call that has been answered.
- **Hot Links** – Buttons are provided to enable a user to turn on/off frequently-used services such as Call Forwarding Always and Do Not Disturb. Alternatively, if CommPilot Express has been configured, the user can change their CommPilot Express status (for example, Available, Busy, Unavailable) by choosing from a drop-down list.
- **System Buttons** – Buttons are provided to enable a user to send an e-mail for technical support, get context-sensitive online help, and configure the CommPilot Call Manager.

7.1.26 CommPilot Express

The CommPilot Express service provides a single web page for end users to pre-configure their call treatments for incoming calls. This macro provides an alternative to individually configuring services through multiple web pages. Users configure how their calls should be handled for each of the following profiles:

- Available – In the Office
- Available – Out of the Office
- Busy
- Unavailable

Figure 44 CommPilot Express

Each profile includes preferences for managing the relevant incoming call functions (for example, Call Forwarding (Busy, No Answer, Always, or Selective), Voice Messaging, Simultaneous Ringing or Call Notify). Users can also select their active profile via the CommPilot Express page, via their CommPilot, or via an IVR menu accessed through the Voice Portal. If a user elects to use CommPilot Express, it takes precedence over all of their other service settings associated with processing incoming calls.

7.1.27 Consultation Hold

Consultation Hold enables a user to put the caller on hold, and make a consultation call to another party. To initiate consultation hold, the user depresses the flash hook and dials the add-on party. When the call is answered, the user can consult with the add-on party. To drop the add-on party and reconnect to the original party, the user depresses the flash hook twice. Users can also execute consultation hold from the CommPilot.

7.1.28 Custom Ringback

Customer Ringback enables a user to specify custom media files to be used for ringback, when incoming calls are received. When the user is called, the system allocates a media resource and plays a custom ringback file to the caller instead of the standard ringback tone.

The user services allow a user to specify multiple profiles. Each profile is associated with a set of criteria (phone numbers, time of day, and so on) and a custom media file. When a call is received, it is compared with the profiles associated with the user. If a match is found then the associated custom media file is used, otherwise the group service is checked. If active then the group's custom media file is used, otherwise system ringback is provided.

7.1.29 Direct Inward/Outward Dialing

Users can be assigned a 10-digit directory number that can be used to place/receive calls directly from/to their phone, without forcing access via a central number. Incoming and outgoing calls can be placed/received via the phone or the CommPilot (except an initial incoming call, for which the phone must be taken off hook).

7.1.30 Directed Call Pick-Up with Barge-In

In addition to the ability to pick-up a call directed to another user in the same customer group, this version of the Directed Call Pick-Up service also enables the user to barge-in on the call if already answered, thereby creating a three-way call. Administrators can configure whether or not a warning tone is played when a barge-in occurs.

7.1.31 Diversion Inhibitor

The Diversion Inhibitor service prevents calls redirected by a user to be redirected again by the called party. This service is especially useful to prevent calls from being answered by another user's voice mail when using Simultaneous Ring or Sequential Ring.

7.1.32 Distinctive Alert/Ringing

Distinctive Alert/Ringing service provides a different call waiting tone (that is, alert) or a different ringing cadence for intra-group calls versus calls received from outside of the group. Calls made within a multi-group enterprise are also recognized as internal calls.

This service is provisioned as part of the Priority Alert/Ringing service, so users must choose to enable either Distinctive Alert/Ringing or Priority Alert/Ringing (different tone/ring for user-specified phone numbers) at any given time.

7.1.33 Do Not Disturb

Do Not Disturb allows a user to set their station as *unavailable*. All calls to the user are given busy treatment. The user controls the service via a web interface, which provides the ability to activate and deactivate the service. An indicator on the CommPilot is also available for users. Alternatively, users have the option of enabling and disabling the service using the respective feature access codes (that is, star codes). If activated, all calls to the user are given busy treatment.

7.1.34 Fax Messaging

The BroadWorks Fax Messaging service offers an optional add-on service that provides integrated fax messaging. From the phone interface, users can listen to information about fax messages, such as the date and time they were delivered, and the number of pages. Users can also send the messages to a fax machine for printing. Alternatively, users can retrieve their fax messages by e-mail, as attachments in TIFF image file format.

7.1.35 Feature Access Code Service Chaining

This activity enhances the validation performed on the phone number entered on the configuration page of various BroadWorks services to allow for entering feature access codes and speed codes in addition to phone numbers and extensions.

For instance, this allows for configuring the Auto Attendant to go directly to a user's voice mail by prefixing the destination number by the "Direct Voice Mail Transfer" feature access code.

7.1.36 Enhanced Privacy on Hold

This feature introduces a specification to identify a held call as being "privately held" so that BroadWorks does not allow the call to be retrieved from another station. This is important for Shared Call Appearance applications where BroadWorks supports hold and retrieve across stations. Currently, if the call is held on one station, then any other station in the shared call group can retrieve it.

7.1.37 Extension Dialing

End users are able to dial extensions via their CommPilot or phone to call other members of their business group.

7.1.38 Flash Call Hold

Flash Call Hold enables users to hold a call for any length of time by flashing the switch-hook on their phone and dialing the respective feature activation code. Parties are reconnected again when the switch-hook is flashed and the feature activation code is dialed again.

7.1.39 Force Use of Uncompressed Codec

This feature allows an administrator to force a user to use an uncompressed codec on a system, service provider/enterprise, group, or user basis. For all calls to or from a user with this feature enabled, the codec is forced to G.711 and all appropriate features are disabled. This feature is important considering that for some CPE, it is not possible to configure ports to use different codecs. This causes problems when a carrier uses a compressed codec on a device, but needs to designate ports on the device for fax machines or modems. Fax machines and modems require the use of a clear channel and an uncompressed codec.

7.1.40 Hoteling

Companies often reserve a set of cubicles and phones for mobile workers who come in to the office from time to time. "Hoteling" enables mobile users to share office space and phones on an as-needed basis, like a hotel room.

The BroadWorks Hoteling service supports this activity by enabling users with guest privileges to log in to a host account via their web portal or voice portal. This enables the employee to use the host phone to make and receive their calls as usual, while retaining their own BroadWorks user profile.

7.1.41 IP Phone Support

SIP-based IP phones are supported by BroadWorks (as well as basic analog phones or soft clients). Users with IP phones can choose to leverage the full capabilities of the CommPilot, or they can choose to use their IP phone to perform some of the multi-call functions, such as conferencing and transfer with consultation.

7.1.42 Last Number Redial

Last Number Redial enables users to redial the last number they called by clicking the "Redial" button on their CommPilot or by dialing a feature code (for example, *66).

7.1.43 LDAP Directory Integration

LDAP Directory Integration enables users to access contact names and phone numbers from an external LDAP (Lightweight Directory Access Protocol) directory using an additional tab on their CommPilot. The *LDAP* tab enables users to click-to-dial a contact and perform searches by contact name. This services can be integrated with an enterprise's own private directory or a public directory provided by the service provider.

7.1.44 Multiple Call Arrangement

Multiple Call Arrangement overlays Shared Call Appearance (SCA), allowing users to make and receive multiple calls simultaneously on their different SCA locations. This feature provides more effective support for the manager/administrative assistant scenario in the following ways: a) all incoming calls are presented to all locations, regardless of ongoing calls, b) when a location is busy on a call, other locations can still originate calls.

7.1.45 N-Way Calling

The N-Way Calling service is similar to the Three-Way Calling service, except that it allows users to create impromptu conferences with any number of other parties up to a maximum value configured at the system level.

7.1.46 Outlook Integration

This service enables users to integrate their personal contacts in Microsoft Outlook 2000 with their CommPilot. Using the Outlook Contacts tab in the Call Manager, users can perform a search of their personal Outlook contacts by name or company. Once the desired contact is located, users can click-to-dial one of the contact's phone numbers or the user can choose to display the contact's v-card by clicking their name.

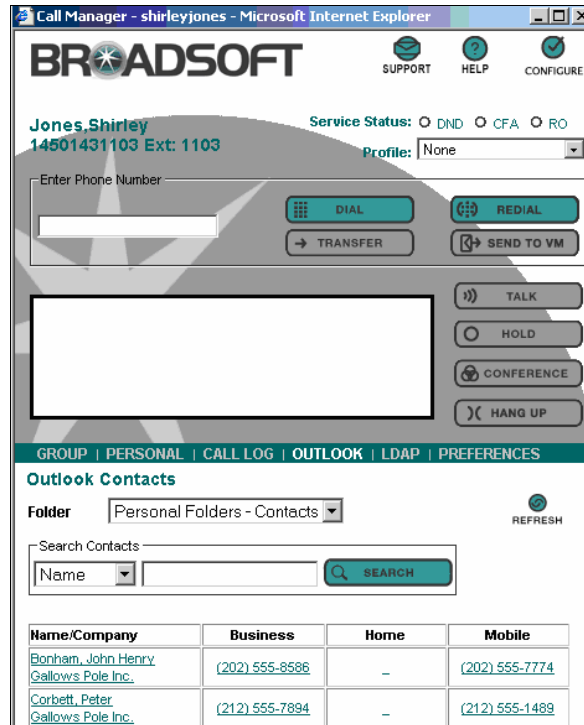


Figure 45 Outlook Integration

When receiving a call, the user's Microsoft Outlook contact database is searched for a match of the caller's phone number. If a number is matched, the user is given the option of clicking the icon next to the incoming calling name in their Call Manager window to open the caller's v-card. Users can also choose to have new Outlook journal entries automatically opened for incoming and/or outgoing calls.

7.1.47 Personalized Name Recording

Users can record their name to be played back to incoming callers in conjunction with multiple services, including Voice Messaging and Auto Attendant. A .wav file is recorded and uploaded via phone and respective CommPilot Personal web page.

7.1.48 Phone Lists

7.1.48.1 Group Phone List

This phone list enables users to dial any other member of their business group by selecting from a list of names on their CommPilot. The list also serves as a searchable company directory, listing names, numbers, and e-mail addresses.

Each user added to the group is automatically added to this list. Also included are the extensions for reaching the Auto Attendant(s), Hunt Group(s), and the Voice Portal, when applicable. Group administrators can add additional phone numbers to the Group Phone List by either adding them individually via their web portal or by importing them from a file.

7.1.48.2 Personal Phone List

This phone list enables users to dial frequently called numbers by selecting from a searchable list of names on their CommPilot. Each user can add, delete, edit, and re-order numbers in their Personal Phone List, which serves as a personal speed dial list. Users can add multiple numbers to this list by uploading them from a flat file.

7.1.48.3 Call Log

The Call Log enables users to view and dial from the following lists of stored numbers: missed, received, and dialed. The call log is accessed through the CommPilot and includes the most recent numbers registered for each category, as well as the respective call times and dates.

7.1.49 Printable Group Directory

This function enables users to view and print a directory listing of all the business group members and their respective contact information (for example, extension, mobile phone number, e-mail address). The information can be displayed in either the "Summary" or "Detailed" format. The Group Directory is accessible from the CommPilot Group Portal or via each user's CommPilot.

7.1.50 Priority Alert

The Priority Alert (or ringing) service enables a user to define criteria to have certain incoming calls trigger a different call waiting tone (that is, alert) or a different ringing cadence than normal calls. The user sets the criteria (for example, incoming calling number, time of day, day of week) for determining which calls require priority notification via their CommPilot Personal web interface. Multiple criteria sets, or profiles, can be defined.

7.1.51 Privacy Service

Users with the Privacy service assigned and activated are not visible to other users in any group or enterprise directories, whether within the CommPilot Personal web portal, the CommPilot Call Manager, or another BroadWorks client.

7.1.52 Push To Talk (Intercom)

Push To Talk provides user-to-user intercom service across an enterprise. When a user dials the respective feature access code followed by the called party's extension, the system requests that the called station answer automatically. Users and administrators can define accept and reject lists, which may include wildcards.

7.1.53 Remote Office

The Remote Office service enables users to access and use their BroadWorks service from any end point, on-net, or off-net (for example, home office, mobile phone). This service is especially useful for telecommuters and mobile workers, as it enables them to use all of their CommPilot features while working remotely (for example, extension dialing, transfers, conference calls, Outlook Integration, directories, and so on). In addition, since calls are still originated from BroadWorks, the service provides an easy mechanism for separating personal and business phone expenses, as well as keeping alternate phone numbers private. This service must be set-up by the group administrator.

7.1.54 Residential and Wireless Dialing

This feature allows an administrator to force all calls to query the Network Server on a system, service provider/enterprise, or group basis. With this feature enabled, all calls from a group are directed to the Network Server.

Using the Network Server for all originating calls is typically used for inter-working with legacy enterprise offerings as well as for residential deployments. It is also similar to how calls are handled in the IMS architecture.

This feature also supports the deployment of residential and enterprise users on the same system by designating groups that have calling line identity restrictions enabled or disabled. For enterprise groups, they should be disabled (default) and for residential groups, they should be enabled. This feature allows an administrator to specify if calling line identity restrictions are enabled or disabled for a group on a system, service provider/enterprise, or group basis. When incoming calls are received, this feature is checked to determine if calling line identity restrictions are enforced or not.

All of the configuration parameters are provided in a hierarchical manner. There are identical parameters at the system, service provider/enterprise, group and user (if applicable) layers. The user has the highest precedence, and the system has the lowest precedence. On a per call basis, the system selects the parameter to use based on the precedence. Thus, the user parameter is used if it is configured, otherwise the group parameter is used if it is configured, otherwise the service provider/enterprise parameter is used if it is configured, and lastly the system parameter is used if all other layers are not configured.

7.1.55 Residential Call Restrictions

In residential deployments, it is advantageous to limit the maximum time allowed for an answered call. This restriction can help prevent fraud and provides a mechanism to cut off calls that have accidentally been left off-hook. An administrator can specify the maximum call time in minutes for answered calls, including unlimited (default), on a system, service provider/enterprise, group, and user basis. If an answered call exceeds the maximum call time allowed, then the call is released by the system.

In residential deployments, it is also advantageous to limit the maximum time allowed for an unanswered call. This restriction can reduce fraud and also provides a mechanism to cut off calls that have accidentally been left off-hook. An administrator can specify the maximum call time in minutes for unanswered calls, including unlimited (default), on a system, service provider/enterprise, group, and user basis. If an unanswered call exceeds the maximum call time allowed, then the call is released by the system.

7.1.56 Ring Splash

Ring Splash enables users to have a short ring burst played on their phone when the following services are triggered: Call Forwarding Always, Call Forwarding Selective, and Do Not Disturb. Ring Splash can be enabled for each of these services individually and serves as a reminder that the respective service is active.

7.1.57 Selective Call Acceptance

Selective Call Acceptance enables a user to define criteria that causes certain incoming calls to be allowed. If an incoming call meets user specified criteria, the call is allowed to connect to the user. All other calls are blocked and the caller is informed that the user does not wish to receive their call. The user controls the service via a web interface, which provides the ability to set the criteria sets for determining which calls are allowed to

complete. A criteria set is based on incoming calling line identity, time of day, and day of week. Multiple criteria sets can be defined.

7.1.58 Selective Call Rejection

Selective Call Rejection enables a user to define criteria that causes certain incoming calls to be blocked. If an incoming call meets user specified criteria, the call is blocked and the caller is informed that the user is not accepting calls. The user controls the service via a web interface, which provides the ability to set the criteria sets for determining which calls require blocking. A criteria set is based on incoming calling line identity, time of day, and day of week. Multiple criteria sets can be defined.

7.1.59 Sequential Ring

Sequential Ring enables users to define a “find-me” list of phone numbers that are alerted sequentially for incoming calls that match specified criteria. While the service searches for the user, the calling party is provided with a greeting followed by periodic comfort announcements. The caller can also interrupt the search to leave a message by pressing a DTMF key.

BROADSOFT [Call Manager](#) - [Attendant Console](#) - [Help](#) - [Home](#)
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Options:
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Sequential Ring

Sequential Ring allows you to sequentially ring up to 5 locations in addition to the base location for a specified number of rings. The 5 locations can be either a phone number or a SIP-URI. The feature applies to calls matching your pre-defined criteria. Use this service to ring calls from your manager, a family member, or an important customer on your cell phone, alternate business phone, or home phone. The criteria for each Sequential Ring entry can be a list of up to 12 phone numbers or digit patterns and a specified time schedule. All criteria for an entry must be satisfied for the call to enter Sequential Ring (phone number and day of week and time of day). If the criteria do not match, the call continues as if this service was not turned on.

☒ Use Base Location first
 Number of rings for Base Location: ☐ None ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
☒ Continue the search process if the base location is busy.
☒ Enable caller to skip search process. Assumes forwarding or messaging is enabled.

Location	Phone Number / SIP-URI	Number of rings
1	<input type="text"/>	<input type="radio"/> 2 <input checked="" type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6
2	<input type="text"/>	<input type="radio"/> 2 <input checked="" type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6
3	<input type="text"/>	<input type="radio"/> 2 <input checked="" type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6
4	<input type="text"/>	<input type="radio"/> 2 <input checked="" type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6
5	<input type="text"/>	<input type="radio"/> 2 <input checked="" type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6

Active	Description	Time Schedule	Calls from	Edit
No Entries Present				

Figure 46 Sequential Ring

7.1.60 Service Scripts

The Service Scripts feature allows the use of custom scripts, written in Call Processing Language (CPL), to perform custom call enhancements, such as call routing, screening, or notification services. Service scripts can be provided at both the user and group level; group-level scripts apply to all users in the group, except users with a different script set specifically for them.

7.1.61 Shared Call Appearance

Shared Call Appearance (SCA) ties multiple devices to the same user, allowing incoming calls to ring on up to 35 additional phones simultaneously and connecting to the first phone to be answered. A call on a shared line can be held on one phone and retrieved from any other phone. Users can also elect to make and receive multiple calls simultaneously on their different SCA locations using Multiple Call Arrangement (MCA), for more information, see section [7.1.44 Multiple Call Arrangement](#). If MCA is not engaged and one of the phones is already hosting an active call under the line ID, incoming calls are delivered to the active phone and any outgoing calls from another phone using the same line ID are blocked.

The following states can be presented across the lamps of certain IP phones: idle, progressing, alerting, active, held, and privately held. "Privately held" calls can not be picked up at another station.

Example applications of Shared Call Appearance include setting up a second line for an executive assistant or creating a hosted key system solution with multiple lines being shared across multiple phones in an office.

For managing multiple appearances, it is often preferable to use an attendant console device that provides a busy lamp field (BLF) status. BroadWorks offers support for the configuration and management of these devices.

The Shared Call Appearance service provides an attribute that is used to allow or disallow bridging between the SCA locations. This allows for bridging calls between shared call appearance locations to facilitate manager/administrative assistant interactions.

7.1.62 Simultaneous Ring

Simultaneous Ring enables users to have multiple phones ring simultaneously when any calls are received on their BroadWorks phone number. The first phone to be answered is connected. For example, calls to a user's desk phone could also ring the user's mobile phone, in case they are not at their desk.

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Simultaneous Ring Personal

Simultaneous Ring Personal allows you to list phone numbers or SIP-URI addresses you would like to ring in addition to your primary phone when you receive a call. This feature is helpful when you are not at your phone but you would like your cell phone to ring when you get a call. You can also turn off simultaneous ringing when you are at your desk on a call. Warning: if your cell phone or other phone has voice mail that picks up before your office voice messaging picks up, your voice mails could be on your cell phone messaging system!

OK Apply Cancel

Simultaneous Ring Personal: ☐ On ☒ Off

How to handle incoming calls: ☒ Don't ring my Simultaneous Ring Numbers if I'm already on a call
☐ Ring all my Simultaneous Ring Numbers for all incoming calls

Sim Ring Phone List

* Phone Number / SIP-URI:	Add
Delete Phone Number / SIP-URI	
No Entries Present	
Delete	

OK Apply Cancel

Figure 47 Simultaneous Ring

7.1.63 Soft Client Support

The Microsoft Messenger soft client can be used as an alternative to analog or IP phones for making and receiving calls, while still having access to all of the features of BroadWorks.

7.1.64 Speed Dial 8

Speed Dial 8 enables users to dial single digit codes to call up to eight different numbers, such as frequently dialed numbers or long strings of digits that are hard to remember.

7.1.65 Speed Dial 100

Speed Dial 100 enables users to dial two-digit codes to call up to 100 frequently called numbers. Entry of the two-digit code is preceded by a configurable prefix: 0-9, A-D, *, or # (default). Users can program the numbers in their directory via the Speed Dial 100 page in their CommPilot Personal web portal, or directly through their phone using the respective feature access code (*75 default).

7.1.66 Three-Way Calling

This service enables a user to make a three way call with two parties, where all parties can communicate with each other. To initiate a three-way call while engaged in a regular two party call, the user depresses the flash hook and dials the third party. Before or after the third party answers, the user depresses the flash hook and forms a three-way call with the two parties. To drop the third party, the user depresses the flash hook and is reconnected with the original party in a regular two party call. If the user hangs up, all parties are released. Users also have the ability to execute three-way calls using the CommPilot. BroadWorks supports the REFER method so it can be used to initiate a three-way conference.

7.1.67 Two-Stage Dialing

Two-Stage Dialing is service that allows users to integrate their cell phone or PSTN landline with their BroadWorks services by prompting for additional dialed digits for call origination attempts when the original dialed digits matches their phone number(s), extension(s), or aliases. The collected digits replace the original dialed digits and are used to complete the call. By associating the user's cell phone or PSTN landline with their primary device or alternate location, they can originate calls from their cell phone or PSTN landline to their BroadWorks phone number and get prompted for additional digits allowing them to leverage enterprise dialing and other BroadWorks services from their cell phone or PSTN landline.

It is a service that optionally prompts the user with a stutter dial tone or an announcement, and collects dual-tone multi-frequency (DTMF) digits. The service is triggered when a user originates a call, and the dialed digits match the user's phone number, alternate phone number, extension, alternate extensions, or SIP aliases. The dialed digits are contained in the *Request-URI* header of the SIP INVITE. Once the service is triggered, the user is optionally prompted based on the configuration and localization of the Two-Stage Dialing announcement. Next, DTMF digits are collected based on the public dialing plan and digit map corresponding to the group for the user with this service. The collected digits replace the dialed digits. The collected digits are then used in all subsequent call processing and service execution.

For example, this service can be used in conjunction with BroadWorks Mobile - Assistant, residing on a user's mobile phone, to allow access to BroadWorks originating services from their mobile phone.

A user can enable or disable the service. When disabled, the system executes in the usual manner, translating and routing on the dialed digits and not the collected digits, no matter what the user dials to originate the call. Note that this service applies to all locations associated with the user applicable with Shared Call Appearance and Multiple Call Arrangement.

7.1.68 Video Add-On

Video Add-On enables the use of video media in conjunction with regular audio media. If a user's primary device does not support video, this service can be used to configure a video-capable device to deliver the video portion of their call. BroadWorks "splits" the multimedia call, directing the audio portion to the primary device and the video portion to the video add-on device. All services continue to operate as they would for a regular audio call.

7.1.69 Video Custom Ringback

Video Custom Ringback supports the delivery of video custom ringback media. All other functions of Custom Ringback remain the same (for more information, see section [7.1.28 Custom Ringback](#)).

7.1.70 Video Messaging

Video Messaging supports video greetings, message recording, and message playback. All the other functions of Voice Messaging remain the same (for more information, see section [7.1.71 Voice Messaging](#)).

7.1.71 Voice Messaging

The Voice Messaging service enables users to record messages from callers for calls that are not answered within a specified number of rings, receive busy treatment, or are transferred directly to voice mail. Callers have the option of reviewing and/or changing their message and hear a warning tone if the maximum message length is about to be reached.

From the CommPilot Personal web portal, a user controls whether voice mail messages are to be delivered to their e-mail account as .WAV attachments and/or to the system repository for retrieval from a phone. The web interface also enables users to enter their password and elect to give callers the option of connecting to an attendant by pressing 0.

By accessing the Voice Portal from any phone, users can listen to, save and delete each message, as well as move to the previous or next message. During the playback of a message, users have the option of skipping forward, skipping back, or pausing. Replies to message senders can be sent, and messages can be forwarded with an introductory message to one or more group members, or to the entire group. Messages can also be composed and sent to one or more users in the group, or the entire group. Users have the option of marking a message as Urgent or Confidential. Users can also pre-configure lists of users to whom voice messages can be sent. The Voice Portal also enables users to record their name and multiple personal greetings for busy and unavailable.

A feature access code is available for users to send incoming calls directly to their mailbox or the mailbox of any other user within their group.

Service providers can set a maximum duration for the storage of saved messages, specify a different POP3 or IMAP (including Exchange 2000) mail server for each user/group, and set a different maximum mailbox size for each user/group (10 minutes/message, 900 minutes total, and 15 distribution lists).

7.1.71.1 Immediate Voice Mail

This feature provides an “always on” voice mailbox for a user by allowing that user to set the “number of rings before greeting” parameter to “0”. When set to “0”, a caller is immediately provided the user’s no-answer greeting and the user’s device is not alerted.

7.1.71.2 Message Configuration per Service Provider

This feature enables the “from” header to be configurable on a service provider basis instead of a system basis when sending an e-mail for message deposit and message notification.

7.1.71.3 Voice Message Call Back

Voice Message Call Back enables users to automatically call back the person who left them a message by hitting an option during or after listening to the message from their voice portal. Users revert back to their voice mail menu after calling back the party who left message. This feature only works when the caller’s line ID is available.

7.1.71.4 Voice Message Waiting Indication

Voice Message Waiting Indication provides a stutter tone via the user’s telephone when new messages reside in their voice mailbox. A visual indicator on the phone is also provided, if applicable.

7.1.71.5 Voice Messaging Notification

Voice Messaging Notification enables a user to be informed of new voice messages. The notification is in the form of an e-mail (or short message to a cell phone) or an indication on the user’s station. The user controls the service via a web interface, which provides the ability to activate and deactivate e-mail notification as well as the e-mail notification address.

7.1.71.6 Voice Messaging to E-mail

Users can configure the Voice Messaging service to have their voice messages delivered to a specified e-mail address in the form of an e-mail message with a .WAV file attachment. If available, the caller’s name and number is also included in the e-mail subject line.

7.1.71.7 Voice Mailbox Integration

Users can configure their single BroadWorks voice mailbox to also support a secondary non-BroadWorks line (for example, mobile phone, PBX), in addition to their primary BroadWorks line. Thus, a BroadWorks user can eliminate the need for maintaining and possibly paying for separate voice mail service (for example, for their mobile phone) by also having those unanswered calls routed to their BroadWorks voice mailbox.

To enable this service, a user must simply register their secondary phone number via the CommPilot Personal web portal and configure their secondary phone service with Call

Forward Busy and Call Forward No Answer to route to the respective BroadWorks voice portal. Calls received by the group voice portal from this secondary number are automatically recognized and prompted with the user's voice mailbox greeting.

7.1.71.8 Voice Portal Auto-Login

Voice Portal Auto-Login provides a new user option "auto-log in to voice portal if calling from own phone". If set to "yes" then when a user calls in to the voice portal from their own phone, they are not prompted for a passcode but are granted immediately access the voice portal menu. If set to "no", then the existing functionality is used and the user is prompted for their passcode.

7.1.71.9 Voice Portal Calling

Voice Portal Calling enables users to make calls directly from their voice portal, as if making calls from their desk. Calls are still made on the user's account but can be made from any phone.

7.1.72 Web Portal Call Logs

A new page in the CommPilot Personal Portal provides users with call logs for received, missed, and placed calls. This service is deployed in conjunction with the BroadWorks Call Detail Server.

7.2 Group Services

7.2.1 Account Codes

The Account Codes service enables the tracking of calls made to outside of the group by prompting users for an account code. This service does not validate the codes entered (see [7.2.3 Authorization Codes](#)), so calls are not blocked. Account codes are managed by the group administrator and can be 2 to 14 digits long. Please note that groups cannot have this service and the Authorization Codes service enabled at the same time.

Account Codes can also be implemented on a per-call basis in which users have the option to enter an account code by dialing a feature code before the call, or by flashing the switch-hook during a call and then dialing the feature code (for example, to register an incoming call from a client).

7.2.2 Attendant Console

The web-based Attendant Console enables a user (for example, receptionist) to monitor a configurable set of users within their business group. The Attendant Console window is also integrated with the CommPilot, thereby enabling the attendant to perform functions such as click-to-transfer or click-to-dial.

The Attendant Console graphically displays users' status (busy, idle, do not disturb), as well as detailed call information. A variety of options are provided for managing the display, including: sort list of monitored users by name, department or title; filter user list by these categories; enter multiple letters of name to be displayed via automatic scrolling; select which column should appear, and in which order (for example, name, title, department, number, extension, mobile, pager, status, e-mail); and option to view duration of monitored users' calls, as well as name and number of parties they are talking to.

7.2.3 Authorization Codes

This service performs an authorization of calls made to outside of the group by prompting users for an authorization code. Calls are not connected unless a valid code is entered. Authorization codes are managed by the group administrator and can be of 2 to 14 digits in length. Note that groups cannot have this service and the Account Codes service enabled at the same time.

7.2.4 Auto Attendant

The Auto Attendant serves as an automated receptionist that answers the phone and provides a personalized message to callers with options for connecting to an operator, dialing by name (last and first) or extension, or connecting to up to six configurable extensions (for example, 1 for Marketing, 2 for Sales, and so on). Configuration via the CommPilot Group web interface also allows for hours of operation to be modified, with different options available for hours that the company is open or closed. The hours of operation can be configured to be different for different days of the week or for specific dates (for example, recurring holidays).

Group administrators use their voice portal to record custom auto attendant greetings. For example, a message can be left remotely to indicate that the office has been closed due to inclement weather. In addition, users have the ability to record their name for play back when a caller dials by name or extension.

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[Group](#) **Welcome Ruth Margolis** [Sign Out](#)

Options:

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- [Acct/Auth Codes](#)
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Business Hours Menu

Configure the automated receptionist greeting prompt and dialing menu to be used during business hours.

Business Hours Greeting:

☒ Default Greeting

☐ Personal Greeting

Load personal greeting:

Load Personal Video Greeting:

Menu Options:

☒ Enable first-level extension dialing

Key	Description	Action	Phone Number
0	0 to operator	Transfer to operator	1001
1	1 by extension	Extension dialing	
2	2 by name	Name dialing	
3	transfer key 3	Transfer with prompt	1003
4	transfer key 4	Transfer without prompt	1004

Figure 48 Auto Attendant (Top of Page)

A group can have multiple Auto Attendants configured, either individually (for example, customer service with separate business hours) or integrated into a multi-level Auto Attendant (for example, enterprise's main Auto Attendant is configured to seamlessly route to the Auto Attendant of a particular department or location).

7.2.5 Business Trunking

Business trunking enables a service provider to provision and manage a maximum number of simultaneous calls assigned to a select group of users. It is required that those users are hosted on customer premises equipment such as PBXs, IP PBXs, or analog key telephone systems.

7.2.6 Busy Lamp Field Support for Hardware Attendant Console

BroadWorks offers an SCA service that can be leveraged to enable an attendant console busy lamp field application; however, it has a few issues. It is very event intensive and it is hard to configure and manage.

This feature adds a new service to allow users to easily configure and manage an attendant console device. Several major vendors have CPE deliverables this year that can leverage this functionality. This feature also enhances the SIP stack to support a streamlined protocol for this application.

7.2.7 Call Center

The Call Center service enables business groups to set up a basic Call Center with incoming calls received by a single phone number distributed among a group of users, or agents. The following functionality is included:

- Agent log in and log out
- Uniform distribution of incoming calls to the available agents
- Weighted call distribution to specified agents

- Queuing of the incoming calls that cannot be answered immediately
- Overflow to a given destination when the group is unable to accept calls
- Group policies (circular, regular, simultaneous, uniform, or weighted call distribution) used to redirect calls to agents
- Deflection to a given destination outside of business hours
- Music or video on hold

Figure 49 Call Center Add (Top of Page)

Various services, such as the Priority Alert service can be assigned to a Call Center as a whole, rather than assigning services to each agent individually. In addition, a prefix can be appended to the Caller ID for calls distributed by the Call Center service, thereby enabling Call Center agents to be distinguished from direct incoming calls, for example, "Support – John Smith".

A variety of statistics are provided to monitor the performance of Call Centers, such as *Average number agents busy* and *Average hold time before call loss*. Statistics are also provided to track individual agent performance, such as *Average time each agent spends on a call* and *Amount of time each agent logged on and idle*. A statistics report can be generated daily and sent to one or two e-mail addresses.

BROADSOFT [Help](#) - [Home](#)
[Group > Call Centers](#) : CallCenterA **Welcome Ruth Margolis** [Sign Out](#)

Options:
 ▶ [Profile](#)
[Calling Plans](#)

Call Center Statistics
 Call Center Statistics allows you to view the statistics of this Call Center's activity and, as required, clear today's statistics, and configure e-mail statistics reporting.

☐ Clear today's statistics
☐ Daily Report

Reporting Period: 15Minutes

E-mail Address(es):

Number of calls in queue now:	0	
Number of incoming calls:	0	0
Number of calls queued:	0	0
Number of busy overflows:	0	0
Number of calls answered:	0	0
Average time spent with an agent:	0:00	0:00
Average time in queue:	0:00	0:00
Average number of agents busy:	0.0	0.0
Average number of agents logged off:	0.0	0.0
Average hold time before call loss:	0:00	0:00

Number of calls received for each agent
 Average time each agent spends with a call

Figure 50 Call Center Statistics

In addition, the Open Client Interface (OCI) allows third-party developers to offer Call Center agent clients that overlay BroadWorks embedded Call Center functionality. The OCI can also be configured to expose real-time Call Center statistics to support third-party Call Center supervisor clients.

7.2.8 Call Intercept

Call Intercept enables group administrators to intercept calls routed to a non-working internal line with informative announcements and alternate routing options. The service can be assigned to an individual user's phone number (for example, when they have left the company) or it can be assigned to all the members of the group.

7.2.9 Call Park and Call Pickup

7.2.9.1 Call Park

Call Park enables a user to hold a call and to retrieve it from another station within the group. To park a call, a user depresses the flash hook and dials the call park star code. The call is parked and the caller is held. To retrieve the call, the user goes to any phone in the group and dials the call retrieve star code, followed by the user's extension. The call is retrieved and connected to the retrieving user. Users can also execute Call Park via the CommPilot.

7.2.9.2 Directed Call Park

Directed Call Park enables a user to hold a call against a specific extension and to retrieve it from another station within the group. To park a call, a user depresses the flash hook and dials the directed call park star code followed by the extension to park against. The call is parked and the caller hears silence. To retrieve the call, the user goes to any other phone in the group and dials the call retrieve star code, followed by the extension to which the call was parked. The call is retrieved and connected to the retrieving user.

7.2.9.3 Call Pickup

Call Pickup enables a user to answer any ringing line within their pick-up group. A pickup group is a group administrator defined set of users within the group, to which the call pickup feature applies. To pick up a ringing call, a user dials the call pick up star code. The user is then connected to the caller. If more than one line in the pick up group is ringing, the call that has been ringing the longest is answered. Users can also execute call pickup via a web interface.

7.2.9.4 Directed Call Pickup

Directed Call Pickup enables users to answer a call directed to another phone in their group by dialing the respective feature access code followed by the extension of the ringing phone.

7.2.10 Calling Group ID Delivery

Calling Group ID Delivery provides the name and number of the group (or company) for outgoing calls from users in the group, rather than providing the user's own name and number. The group number can be defined on a per user basis, which is often appropriate for multi-location groups.

7.2.11 Calling Plans

Separate Calling Plans are provided for each of the following types of calls: Incoming, Outgoing, and Forwarded/Transferred. Configuration of the Calling Plans is done via the CommPilot Group web portal. Group administrators configure Calling Plans at the group level for all users in the group. Separate Calling Plans are also available to the group administrator at the user level to override the group calling plans for individual users.

7.2.11.1 Incoming Calling Plan

The Incoming Calling Plan enables administrators to block specified incoming calls to their company, department, and/or individual users. For example, selected users can be prevented from receiving collect calls, calls from outside the company, or calls from within the group. User profiles can be configured to receive all regular calls from within the group, or just those that have *not* been transferred from within the group.

The Incoming Calling Plan is configured via the CommPilot Group web interface. In addition to being able to configure which types of calls each user is restricted from receiving (for example, intra-group), group administrators can regulate incoming calling by restricting specific digit patterns. For example, users can be prevented from receiving calls from a competitor's number or a particular area code or country code. If a profile has not been configured for a particular user, the default set of incoming call privileges for the department or group is applied.

7.2.11.2 Outgoing Calling Plan

The Outgoing Calling Plan enables group administrators to block users from making certain types of outgoing calls, such as long distance, toll, or premium numbers. The Outgoing Calling Plan is configured via the CommPilot Group web interface. In addition to being able to configure which types of calls each user is restricted from making, group administrators can regulate outgoing calling by restricting specific digit patterns. For example, users can be prevented from calling a competitor's number or a particular area

code or country code. If a profile has not been configured for a particular user, the default set of outgoing call privileges for the department or group is applied.

7.2.11.3 Enhanced Outgoing Calling Plan

This enhanced version of the basic Outgoing Calling Plan provides administrators with a greater degree of control over outgoing calls made from within their group. In addition to “blocking” or “allowing” given call types and digit strings, administrators have the following options for configuring the outgoing calling profile of their group, department, and individual users:

- **Authorization Codes** – Selected users can be prompted for an authorization code to allow specified call types or digit strings. Administrators can pre-configure one or multiple authorization codes to be entered by users. Rather than being prompted for an authorization code every time they make such calls, users have the option of entering a Sustained Authorization Code to unlock calling from their phone. Separate feature access codes are used to turn this feature on and off. Use of this feature within the Enhanced Outgoing Calling Plan takes precedence over the standalone Authorization Code service.
- **Call Transfer** – Specified outgoing call types and digit strings can be automatically transferred to one of up to three transfer destinations that administrators can pre-configure. For example, international calls made from a conference room can be transferred to a company operator who validates the user’s identity and their purpose for making an international call.

Existing configurations are retained when Enhanced Outgoing Calling Plan is assigned to replace the basic version of the service.

All new users receive the call types assigned to the *Group Default* or if assigned to a department, they receive the call types assigned to that department.

BROADSOFT
Group

Options:
[Profile](#)
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[Service Scripts](#)
[Auth Codes](#)
Calling Plan
[Utilities](#)

Welcome Ruth Margolis [Logout](#)

Outgoing Calling Plan

Customize the Outgoing Calling Plan for the group and/or departments.

OK Apply Cancel

Originating Initiating Call Forwards/Transfers Being Forwarded/Transferred

Department	Group Local	Toll Free	Toll	International	Operator Assisted	Chargeable Directory Assistance	Special Services I	Special Services II	Premium Services I	Premium Services II	Casual	URL Dialing	Unknown
Group Default	Y	N	A	T1	T2	T3	Y	N	A	Y	T1	T2	T3
Corporate	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
Finance	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
Human Resources	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
Sales	Y	Y	A	N	T2	Y	Y	Y	N	N	Y	Y	Y

Select from drop-down list to permit call type; Users can be configured with their own custom settings in user-level Calling Plan

Legend:
 Allow Y
 Block N
 Authorization code required A
 Transfer to 1st transfer number T1
 Transfer to 2nd transfer number T2
 Transfer to 3rd transfer number T3

OK Apply Cancel

Figure 51 Enhanced Outgoing Calling Plan (Originating)

7.2.11.4 Forwarded/Transferred Calling Plans

This complement to the Outgoing Calling Plan enables group administrators to prevent users in a specified group from forwarding or transferring calls to certain types of numbers,

such as long distance, toll, or premium numbers. This capability is especially useful for preventing fraudulent calling, such as company employees calling their office number at night or on the weekend to make personal calls to international destinations. Calling plans are configured via the CommPilot Group web interface. If a profile has not been configured for a particular user, the default set of incoming call privileges for the department or group is applied.

Figure 52 Outgoing Calling Plan Initiating Call Forwards/Transfers Tab

The system can be configured to assign a unique set of call types for calls a user transfers or forwards (system default). The system can also be configured to apply a unique set of call types only for calls a user forwards.

Tab	Description
Initiating Call Forwards/Transfers	Set of call types for calls a user transfers or forwards.
Initiating Call Forwards	Set of call types for calls a user forwards.

7.2.12 Charge Number

The Charge Number service allows administrators to assign an additional phone number to selected users. This additional number is recorded in all CDRs originated by the assigned user for billing purposes.

7.2.13 Configurable Calling Line ID

Configurable Calling Line ID enables the group administrator to configure each of the displayed user names and calling numbers. This information is visible to users in their profiles as read-only. Configuration of this service determines whether the Configurable Calling Line ID should be used for regular (non-emergency) calls, emergency calls, all calls, or no calls.

7.2.14 Configurable Extension Dialing

Configurable Extension Dialing provides the ability to map directory numbers (DNs) within a group to unique extensions. The extensions can be of any length (2 to 6 digits) as defined by the group administrator and dialed via a web interface or by phone. All extensions within a group must be of the same length.

7.2.15 Configurable Feature Access Codes

Configurable feature access codes enable each group administrator to specify the feature codes (also known as star codes) associated with their services (for example, Last Number Redial, Call Return) via the CommPilot Group web portal. Group administrators have the option of configuring two different feature access codes for the same service. For example, *69 and #81 could both be used to enable Call Return. Users can see, but not edit, the star code associated with each service at any time by referencing their CommPilot Personal web portal.

Feature Access Codes

Configure two feature access codes prefixes that are used for authorized services for the group. If Speed Dial 100 is used, the prefix for that service may be set. Be careful to avoid conflicts between Feature Codes, Speed Dial Codes, Extensions, and Emergency Numbers.

OK Apply Cancel

* Speed Dial 100 Prefix:

[Revert Back to Default FAC Setting](#)

Feature Access Code Name	Main (Required)	Alternate (Optional)
Automatic Callback Deactivation	<input type="text" value="#8"/>	<input type="text"/>
Call Forwarding Always Activation	<input type="text" value="*72"/>	<input type="text"/>
Call Forwarding Always Deactivation	<input type="text" value="*73"/>	<input type="text"/>
Call Forwarding Always To Voice Mail Activation	<input type="text" value="*21"/>	<input type="text"/>
Call Forwarding Always To Voice Mail Deactivation	<input type="text" value="#21"/>	<input type="text"/>
Call Forwarding Busy Activation	<input type="text" value="*90"/>	<input type="text"/>

Figure 53 Feature Access Codes

7.2.16 Configurable Feature Code Prefix

This service enables each business group to define up to two different prefixes to precede their feature codes. Each prefix can include one to two characters, with the default being a single star “*”.

7.2.17 Configurable Time Zones

A default time zone is specified for each business group. The respective time zone is used for all services requiring date/time stamps, such as Voice Messaging, Auto Attendant, and Selective Call Forwarding. Users have the option of individually changing their own effective time zone in cases where it differs from the group’s default.

7.2.18 Department Support

Department Support provides group administrators with the option of establishing an additional department layer of administration (for example, Sales, Engineering) to which users would be associated. This capability is especially useful for larger enterprises that want to distribute responsibilities for day-to-day administration. Group administrators have the option of establishing default calling plans (incoming, outgoing) for each department. In addition, name dialing within an Auto Attendant can be restricted to the users within a department.

Department administrators can be created to manage the following tasks within their respective departments:

- Add, modify, and delete users within a department

- Assign, modify, and remove personal services for users within a department
- Configure the following group services, if they have been assigned to the department: Call Centers, Hunt Groups, Account Codes, Authorization Codes, Series Completion, and Attendant Console
- Configure department-specific audio source for Music on Hold

Users can sort and search their group phone list in the CommPilot by department.

7.2.19 Device Inventory

Device Inventory enables group administrators to inventory their integrated access devices (IADs), trunking gateways, and IP phones via their CommPilot Group web portal. Devices can be easily added, deleted, and modified. In addition, group administrators can assign users directly to a device and/or a port on a device. The location and default aliases for a user are automatically generated.

7.2.20 Group Resource Inventory Reporting

This capability enables group administrators to generate reports on the resources used in their group and, if applicable, in each of their departments. Information includes phone numbers, devices, services, users, and departments. The reports are generated on a web page in comma-separated value (CSV) format, so they can be easily imported in to a spreadsheet for sorting and archiving.

7.2.21 Hunt Group

A Hunt Group allows users within a group to be included in a specified sub-group to handle incoming calls received by an assigned Hunt Group phone number. Group administrators can choose from any of the following “hunt” schemes, each of which rings the specified phones in a different manner:

- **Circular** sends calls in a fixed order. The call is sent to the first available person on the list, beginning where the last call left off.
- **Regular** sends calls to users in the order listed by an administrator. Incoming calls go to the first available person on the list, always starting with the first person on the list.
- **Simultaneous** rings all of the users in the group simultaneously; the first user to pick up the ringing phone is connected.
- With **Uniform**, as a call is completed, the user moves to the bottom of the call queue in a shuffling fashion. The next incoming call goes to the user who has been idle the longest. If a user receives a call that was not directed to them through the Hunt Group, the call cannot be included in the receiving order for Uniform calls.
- **Weighted Call Distribution** sends calls to users according to a pre-defined weighting. Calls are sent randomly to users according to percentages assigned on the *Hunt Group – Weighted Call Distribution* page.

BROADSOFT [Help](#) - [Home](#)

[Group](#) **Welcome Ruth Margolis** [Logout](#)

Hunt Group Add
Create a new hunt group.

* Hunt Group ID: @

* Name:

* Calling Line ID Last Name: * Calling Line ID First Name:

Department: Language:

Time Zone:

☐ Allow Call Waiting on Agents

Group Policy: ☐ Circular ☒ Regular ☐ Simultaneous ☐ Uniform ☐ Weighted Call Distribution

No Answer Settings

☐ Skip to next agent after rings

☐ Forward call after waiting seconds

Calls Forward to:

Enter search criteria below

Last Name Starts With

Available Users Assigned Users

Figure 54 Hunt Group

The Priority Alert service can be assigned to the entire Hunt Group, rather than assigning it to each line individually. In addition, a prefix can be appended to the Caller ID for calls distributed by the Hunt Group service, thereby enabling users to distinguish from direct incoming calls, for example, "Support – John Smith".

Group administrators can enable Call Waiting for agents and can also establish a No Answer Settings to redirect calls to the next agent if not answered in a specific number of rings by the previous agent. If all idle phones have been visited once without answer, there are two options for handling the call: forward call to an external number, or give the call a *Temporarily Unavailable* treatment, which can trigger a service such as Voice Mail.

Directory Number Hunting is a service extension that allows a caller to reach a hunt group (or call center) by calling the number of one of the hunt group users. When Directory Number Hunting is enabled and a caller calls a user's number, the Hunt Group service directs the call to the called user first. If that user is unavailable, the Hunt Group service then applies the distribution policy that has been configured. For example, for the Regular (sequential) hunting policy, the called user is skipped and for the Simultaneous hunting policy, the hunt group alerts all users simultaneously (as if the caller had called the pilot number).

When a legacy voice mail system is involved, the SMDI Message Desk service can be assigned to Hunt Groups to send redirecting information over an analog SMDI interface. This information (calling number, called number, redirection information) can be used by the voice mail system to redirect the calling party to user's mailbox and provide the correct greeting.

7.2.22 Instant Group Call

Instant Group Call allows a user to call a group of members by dialing a single number, after which the system simultaneously alerts all members in the group. As the members answer, they are joined into a multi-way conference.

If the originating user uses the Push To Talk feature, then the attributes of the Push To Talk feature are used (one-way or two-way broadcast, auto-answer, access control list). The Push To Talk profiles are used when a member receives a Push To Talk group call.

This feature allows an administrator to define a group composed of a list of member users. These members can be part of the same group or enterprise (specified by user name, extension or location code + extension) or can be external users (specified by a phone number or SIP URI).

7.2.23 Loudspeaker Paging

The Loudspeaker Paging service enables users to access an intercom paging system by dialing an extension within the group. The paging system is simply configured in BroadWorks as a user and inter-connected via a standard two-wire interface.

7.2.24 Music On Hold

Music On Hold enables group administrators to upload an audio file (.wav file containing music, advertising, and so on) onto the system to be broadcast to held parties. This service can be used in conjunction with the following services: Call Centers, Call Hold, and Call Park.

Music On Hold can be configured at the department level. Otherwise, the group-defined audio source is used by default.

Users can enable/disable Music On Hold on a per call or persistent basis by either using the respective feature access code or their web portal. This service is especially useful for users are participating in a conference call.

The Music On Hold service also includes a configurable timer that can be set to prevent the system from playing Music On Hold audio files in common call scenarios with very short hold durations, such as call forwards and transfers.

7.2.25 External Source for Music On Hold

Live audio can be played to held parties directly from an external audio source that is controlled by the enterprise and is typically located on their premises. The external audio source is comprised of a gateway with an analog audio line-in jack. A radio, CD player, or any other audio device connects into the audio line-in jack. Music from an external audio source can be used for calls that are put on hold by Call Waiting, Call Hold, or Call Park, but *not* calls waiting on a Call Center queue.

7.2.26 Phone Status Monitoring

Phone Status Monitoring enables users to monitor the phone status of users within group (for example, Busy, Idle, or Do Not Disturb). This capability is assignable to users independently of the BroadWorks Attendant Console and can be leveraged by third-party clients (for example, other attendant console applications).

7.2.27 Series Completion

The Series Completion service can be assigned to a selected series of lines to forward calls on a busy condition. It is a form of “hunting” in which the next line in the group is tried in a prearranged order, without any limit on the number of sequential forwards. Please note that “phantom” users cannot be included in the Series Completion group.

This service is used to support key system functionality. Key systems typically ring all available lines in a specified order for incoming calls, regardless of the number dialed to reach the company. For example, when calling a technical support hotline, the user dials 1-800-555-HELP. That number attempts to ring line 1 of the company. If line 1 is busy, it attempts to ring line 2. If line 2 is busy...and so on. If all lines are busy, the call can be sent to Voice Messaging or another assigned service of the group. Similarly, if all lines or users of this company were assigned to a Series Completion group, BroadWorks acts just like a key system.

7.2.28 Service Scripts

The Service Scripts feature allows the use of custom scripts, written in Call Processing Language (CPL), to perform custom call enhancements, such as call routing, screening, or notification services. Service scripts can be provided at both the user and group level; group-level scripts apply to all users in the group, except users with a different script set specifically for them.

7.2.29 Video Auto Attendant

The BroadWorks Auto Attendant can be configured to support uploading and playback of video greetings. All other Auto Attendant functions remain the same (for more information, see section [7.2.4 Auto Attendant](#)).

7.2.30 Video Call Center

BroadWorks Call Center can be configured support uploading and playback of video to be played for greeting and queued calls. All other Call Center functions remain the same (for more information, see section [7.2.7 Call Center](#)).

7.2.31 Video Call Intercept

BroadWorks Call Intercept (user and group) can be configured to support uploading and playback of video announcements. All other Call Intercept functions remain the same (for more information, see section, [7.2.8 Call Intercept](#)).

7.2.32 Video On Hold

This feature enables uploading and playback of video for held and parked calls. All other Music On Hold functions remain the same (for more information, see section [7.2.24 Music On Hold](#)).

7.2.33 Voice Portal

The Voice Portal provides an entry point for end users to access, use, and configure the following services via any phone interface: Voice Messaging, Call Forwarding Remote Access, CommPilot Express, and Personalized Name Recording. The Voice Portal can also be used to record Auto Attendant greetings remotely. The Voice Portal can be

reached from any phone. Each party uses their own configurable passcode to access their respective menu of services.

Service providers and/or group administrators can customize (or “brand”) the voice portal entry greeting heard by users who are logging into the Voice Portal. When both a service provider message and a group message are provisioned, the group message is played.

Business groups also have the option of enabling a Voice Portal Wizard to run the first time users log into their Voice Portal. The wizard guides users through the following steps: change default passcode to a personalized passcode, and record personalized name.

Multi-group enterprises have the option of creating an enterprise-wide voice portal to enable all users within their enterprise to call into a common directory number to access their voice portal. Compose/forward/reply messaging functions and distribution lists also operate across multiple groups within their enterprise. The called voice portal automatically redirects each user to the voice portal of their business group to begin the login process. Users can also be directed to their group through their location code and extension.

Service providers can also deploy a residential voice portal. This portal spans all groups within a service provider without requiring a public phone number for each group voice portal. The user can be configured to use the service provider voice portal or the group voice portal. If a carrier is using the service provider voice portal, a user is assigned a service provider voice mailbox, which is unique for the service provider.

7.2.34 Web Conferencing

Web Conferencing enables the set up, use, and monitoring of *n*-way conferences via a web interface. Both internal and external participants can use a conference bridge once it has been set up. A single

The Conferencing service includes the following features:

- Audio and web conferencing
 - Scheduled, recurring, reservation-less, and ad-hoc
 - Meet-me dial-in numbers
- Web collaboration
 - Share Microsoft PowerPoint, Excel, and Word files (extensions are automatically checked by BroadWorks for validity)
 - Secure SSL and password protection
 - Web browser viewable, no client required
 - Optional click-to-download of web presentations
- Moderator control
 - Dial-out capability
 - Mute, hold, drop, and add participants
 - DTMF and web portal interfaces
 - Roll call (service can record and announce participants' names as they join)

- In-call functions
 - Hand raising (muted participants can request the conference leader to un-mute them temporarily)
 - Optional leader
- PIM integration
 - Automated e-mail invitations and Outlook calendar entries
- Reporting
 - Web-based reporting
 - Department and project codes
- Recording
 - Recording and playback of individual conferences (the CDR can account for recording duration)
- Access code generation
 - Automatic, pre-assigned, or user-defined

BROADSOFT [Call Manager](#) - [Attendant Console](#) - [Tutorial](#) - [Help](#) - [Home](#)

Welcome Cheryl Baldwin [Logout](#)

Options:

- [Profile](#)
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Conferences

List of conferences owned by yourself and your delegators.

OK Quick Add Add Cancel

Current Future Expired

Bridge Name ▲	Title	Owner	Type	Start Time	Edit
Assistant	New	Baldwin, Cheryl (cherylalbaldwin)	One-Time	12:45 PM	Edit

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Bridge Name Starts With Find Find All

OK Quick Add Add Cancel

Figure 55 Conferences

BROADSOFT [Help](#) - [Configure](#) - [Close](#)

Title: Call on 8/25/06 at 1:36 PM

Add a Participant

* Phone Number / SIP-URI: Name: Call

[Join](#) [Lock](#) [Pause Recording](#) [Stop Recording](#) [Mute Participants](#) [Resume Participants](#) [Hold All](#) [Drop All](#) [Refresh](#)

Leader	Phone Number / SIP-URI (Name)	Status	Action
✓	12025551009 (Baldwin, Cheryl (cherylalbaldwin))	Answered	Resume Mute Hold Drop

Figure 56 Join a Conference Immediately

7.3 Enterprise Services

7.3.1 Enterprise Layer of Administration

An additional layer of administration can be created above the group layer to facilitate the management of large enterprises spanning multiple groups and sites. This enterprise layer is parallel to the service provider layer. Thus, system administrators have the option to create service providers and/or enterprises, each of which is administered separately.

Enterprise administrators can use this administrative layer to create a private dialing plan shared across multiple groups and sites, thereby enabling users to call one another using location codes and extensions instead of full phone numbers.

7.3.2 Enterprise-Wide Department

The feature enables departments to span across multiple groups within an enterprise to reflect the organizational structure. Enterprise-wide departments can be used for bulk provisioning of directories and enterprise-wide services, thereby streamlining the management of large volumes of users. Departments can be configured in a multi-level hierarchy (for example, Engineering – Montreal, Engineering – Washington).

7.3.3 Enterprise-Wide Directory

Directories can be configured to span across multiple groups within an enterprise. Users would continue to access their directories via their CommPilot or third-party client, and administrators could continue to supplement the directory with frequently dialed numbers. The web portal also includes a search mechanism that enables users and administrators to search by name.

7.3.4 Enterprise Level Group

The Enterprise Level Group enables the following group-based services and policies to be deployed across multiple groups within an enterprise: Hunt Groups, Call Centers, Voice Portal, Messaging, Push To Talk, Hoteling, Rules for defining Extension Dialing, Passwords, Digit Collection, Feature Access Codes, and LDAP Configuration.

7.3.5 Enterprise Network Gateway Routing

The Enterprise Network Gateway Routing policy enables enterprises to use PSTN gateways that are located on their own premises. Enterprises can use the policy to define which off-net calls should be sent to the PSTN through the enterprise-hosted network gateway for specified users. Thus, one application of this service would allow service providers to serve customers in service areas where the service provider does not have local PSTN connections. In this case, all off-net calls originating from users at such sites would be routed to the PSTN through an enterprise-based network gateway.

7.3.6 Far-End Hop-Off

The BroadWorks Far-End Hop-Off capability allows an enterprise to carry PSTN-destined calls on-net and drop them off through private gateways that are local to the call destination. For example, an enterprise with many locations throughout the country can carry originating calls over the service provider's packet telephony network to the enterprise location closest to the destination, and have the call "hop-off" to the PSTN from that location. As backup, the service provider's public routes are also identified, should an

enterprise's private routes be unavailable. This capability enables a beneficial business arrangement between service provider and enterprise that shares the cost of transporting and terminating PSTN-destined calls.

7.3.7 PBX Dialing Transparency

PBX Dialing Transparency gives system providers or group administrators the option of enabling users to dial a digit to access an outside line (for example, 9+ dialing), thereby standardizing dialing practices across a company that is using a combination of BroadWorks and a PBX. This customization is executed via the command line interface.

7.3.8 Voice VPN

The Voice VPN solution enables multi-location enterprises to configure their private dial plans for on-net call routing. Using simplified dial patterns, users within an enterprise can call each other by dialing the appropriate location code and extension. Thus, Voice VPN integrates the "islands" of user groups across an enterprise into one unified private dial plan. Multi-location enterprises with non-homogeneous equipment can be easily supported, including any combination of BroadWorks Application Servers, PBXs, and even PSTN switches. Access to specified third parties (for example, partners, customers, and so on) can also be integrated within the dial plan, thereby providing an "Extranet" type of functionality. The Voice VPN service is configured directly by the enterprise through the CommPilot Enterprise web portal.

7.4 Network Features

7.4.1 Centralized Translations and Routing

This service enables system providers to centrally manage all translations and routing within their network. This alleviates the service provider from having to manage similar data in distributed network elements. Any changes are instantly made available to all network elements requiring call routing functions. The default Network Server policy routes calls through the network elements closest to the call originator and destination.

7.4.1.1 Call Typing Policy

The Call Typing Policy performs pre-screening of incoming calls using a system-defined dial plan. A dial plan defines the meaning of various dialed digit sequences, and thus allows recognition of long distance calls, operator-assisted calls, emergency calls, or any other specific type of calls. Call types identified through this policy allow subsequent policies to apply any given call type, dictating the actions to be taken for a call. For example, BroadWorks can restrict users from making inter-LATA calls.

7.4.1.2 North American Call Screening Policy

The North American Call Screening Policy has been designed to work with the North American Numbering Plan. It enables validation that the call type found by the Call Typing Policy is coherent with NPA/NXXs implied in the call.

Knowing the NPA/NXX of the originator and at least the NXX of the terminator, the Call Screening Policy searches the NPA/NXX active code list and local calling area database to determine the category of the call. It then validates that the call type found by the Call Typing Policy is valid based on the dialed digits.

7.4.2 E911 Support

This service enables routing of emergency calls to the correct tandem switch based on the caller's phone number. The system ignores user disconnects and disallows features to be used when an emergency number (that is, 911) is dialed.

7.4.3 Equal Access Policy

The Equal Access Policy enables system providers to determine how long distance calls are routed. After determining the type of long distance call and the caller's preferred inter-exchange carrier, this service determines, for example, whether the call is to be carried on-net through least-cost routing or if the call is to be handed off to a preferred carrier as close as possible to the originator.

This policy also allows for the assignment of Preferred Inter-Exchange Carriers (PICs) to service providers, enterprises, groups, and users. Precedence is given to the lowest entity in the hierarchy that has a PIC assigned to it. For example, a PIC assigned to an individual user overrides any PICs assigned to the group and service provider.

7.4.4 Incoming Trunk Group

This policy supports the use of an Enterprise ID, or Incoming Trunk Group (ITG), to map incoming calls to an enterprise, group, or site. Use of ITG avoids having to perform phone number-based validation.

7.4.5 Least-Cost Routing

Least-Cost Routing enables system providers to specify which routes are most advantageous to use for various types of calls. By stipulating cost and weighting factors, system providers can more accurately control routing of calls within their network.

7.4.6 Local Number Portability

Routing policy supports the porting of users onto and out of BroadWorks. Please note that this policy only supports Local Number Portability (LNP) in markets where the SCP query method is not mandatory, because the policy does not rely on SS7 or SCP queries.

7.4.7 Media Server Selection Policy

The Media Server Selection Policy enables system providers to decouple their Media Servers from specific Application Servers, thereby deploying their media resources as a large pool that can be shared among Application Servers. This practice results in improved utilization and lower deployment requirements for Media Servers. In addition, the Media Servers can be geographically deployed, which can optimize call latency and bandwidth utilization.

7.4.8 Multi-Country Code Support per Application Server

System providers can support multiple country codes simultaneously on an Application Server. Thus, a single pair of Application Servers can serve multiple countries.

7.4.9 Network URL Dialing

Network URL Dialing allows for the routing of calls to BroadWorks subscribers using SIP URLs. All subscribers within a system provider's network can have up to three URL aliases to receive calls.

7.4.10 Outgoing Trunk Group

This policy supports the use of an Enterprise ID, or Outgoing Trunk Group (OTG). The OTG is populated by BroadWorks and is based on the originator's enterprise, group, or site, and is sent to other network elements, thereby avoiding phone number-based validation.

7.4.11 Enterprise Local Calling Areas

Service providers can offer customized local calling zones to their customers by supporting multiple Local Calling Areas (LCA) files concurrently.

7.4.12 Pre-Typing Policy

Enhanced translations provide a leading call typing policy instance that can be applied to certain translation profiles. This facilitates the adoption of call typing rules per profile and makes dial plans easier to manage and customize.

7.4.13 Rate Center Routing

Rate Center Routing enables service providers to select a destination based on the call originator's rate center and call type. The rate center identification can either be based on

the Telcordia NNACL file or based on zones assigned directly against National Destination Codes.

7.4.14 Service Center Routing

Service Center Routing enables system providers to support routing to service centers, such as emergency Call Centers, repair centers, operator centers, and directory assistance. The service also enables system providers to support routing to MGCP trunks.

7.4.15 Subscriber Location Service

The Subscriber Location Service provides system providers with a single-point-of-contact for all subscribers in their network. Provisioning new subscribers is made easy with automatic synchronization of the group and user data between Application Servers and the Network Server. Call routing to subscribers is simplified with the Network Server serving as the central ingress point to the BroadWorks network.

7.4.16 Subscriber Location Overflow Routing

System providers have this mechanism to complete a list of contacts returned by the Network Server with overflow routes. The overflow option is configured on a per DN/URL basis and allows the Subscriber Location policy to continue processing even though a Hosting NE is identified for a call.

8 Summary

BroadWorks services and service management capabilities enable service providers to market a very competitive service offering versus other Centrex, KEY SYSTEM, or PBX offerings. The integration of telephony, the web, presence, and messaging make it possible for new services to be created and deployed faster than ever before. Thus, BroadWorks is able to complement the functionality that customers have come to expect with new enhanced services that differentiate the service provider's offering.

By enabling service providers to empower their end users and group/enterprise administrators with self-service management, BroadWorks can streamline business processes and reduce service provider costs. And customers benefit from improved response time and management control, which raises customer satisfaction and loyalty.

BroadWorks enables service providers to market a comprehensive product offering that costs less and can be deployed rapidly. The platform is compatible with both existing and emerging network architectures, thereby giving service providers the necessary foundation for long-term success.

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