Maintenance Guide
ShoreTel 14

August 2013

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Preface

The *ShoreTel Maintenance Guide* describes how to troubleshoot and solve problems that can arise in a highly complex system.

Conventions Used

- `Courier font`

  For code examples and information that you type.

- UPPERCASE WORDS

  For keywords related to the ShoreTel system.

- WARNING (alert)

  For preventing data loss or equipment damage (if instructions are not followed).For preventing data loss or equipment damage (if instructions are not followed).

- *Italic text*

  For variable parameters that can change depending on usage.

  For command names.

  For document names and path names.

- < > (brackets)

  For items supplied by user and variables in event codes.

For More Information

- *ShoreTel Planning and Installation Guide*

  Comprehensive guide to planning and implementing full-featured, enterprise-class VoIP system.

- *ShoreTel System Administration Guide*

  Detailed reference guide to administering the ShoreTel system.

CHAPTER

1

ShoreTel Architecture

This chapter describes how the ShoreTel phone systems works. It includes illustrations of the ShoreTel system and contains the following information:

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Overview

The ShoreTel system is a highly distributed, highly reliable voice communication system. A complete ShoreTel system is composed of the following fundamental components:

- ShoreTel servers
- ShoreTel voice switches
- IP endpoints, such as IP phones
- Client applications

The system may also include:

- ShoreTel Conferencing and Instant Messaging Services
- ShoreTel Contact Center Solution

The ShoreTel system's components interact with each other in a distributed environment. The heart of the architecture is the Telephony Management Service (TMS), which provides overall control for the entire ShoreTel system.

The administrative client, ShoreTel Director, is used to configure and manage the whole system.

Figure 1 on page 14 shows the various components of a ShoreTel system and how they interact with the public switched telephone network (PSTN) and IP-based networks.

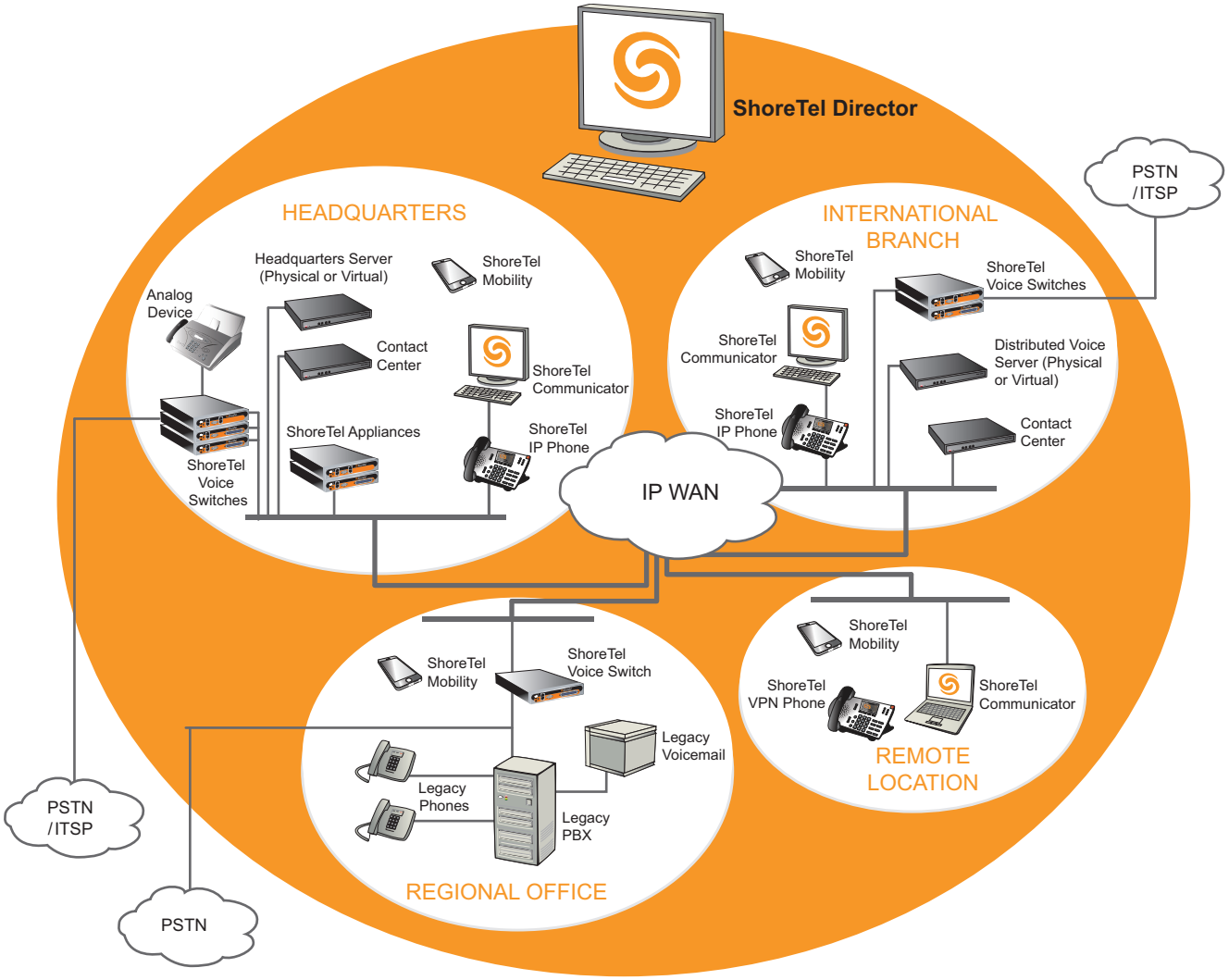

Figure 1: ShoreTel System with Single-Image Management

ShoreTel System Components

The ShoreTel system includes the following components:

- ShoreTel servers
- ShoreTel voice switches
- IP endpoints
- ShoreTel client applications

ShoreTel Servers

Each ShoreTel system includes a main server called the Headquarters server. Systems may optionally include distributed applications servers, called Distributed Voice Servers (DVSs). Each server provides a local instance of TMS that supports applications such as voicemail, workgroups and ShoreTel Communicator. Each instance of TMS manages its local softswitch and can be configured to manage ShoreTel voice switches as well. The Distributed Voice Servers rely on the Headquarters server for configuration changes, but otherwise DVSs can operate independently of the Headquarters server.

ShoreTel Voice Switches and Service Appliances

ShoreTel voice switches and service appliances provide physical connectivity for the PSTN and analog phones, and logical connectivity for IP endpoints on a reliable, highly scalable platform for the ShoreTel call control software. The ShoreTel voice switches and service appliances receive their configuration information via TMS.

IP Endpoints

The ShoreTel system manages calls and applications for two types of IP endpoints: IP phones and softphones. IP endpoints are identified by IP address and can exist anywhere on the network.

ShoreTel Client Applications

Client applications, such as ShoreTel Communicator, interact with TMS using the Client Application Server (CAS) for call and data handling. Beginning with ShoreTel 13, client applications use CAS rather than Client-Server Internet Service (CSIS) to retrieve and update data.

ShoreTel Communicator provides desktop call control as well as voicemail, directory, and call logging features. Users of supported versions of Microsoft Outlook can integrate their voicemail, contacts, and calendar with the ShoreTel system.

ShoreTel Distributed IP Voice Architecture

The ShoreTel system is a completely distributed voice communication solution with no single point of failure, which is layered on top of your IP network. Central to the system is the standards-based Distributed IP Voice Architecture, shown in Figure 2 on page 16, which uniquely distributes call-control intelligence to voice switches connected anywhere on the IP network. In addition, the Distributed IP Voice Architecture distributes voice applications (including voicemail systems, workgroups, account codes, and automated attendants) to servers across locations, rather than centralizing applications on the Headquarters server.

The resulting solution provides a single-image system for all locations and voice applications.

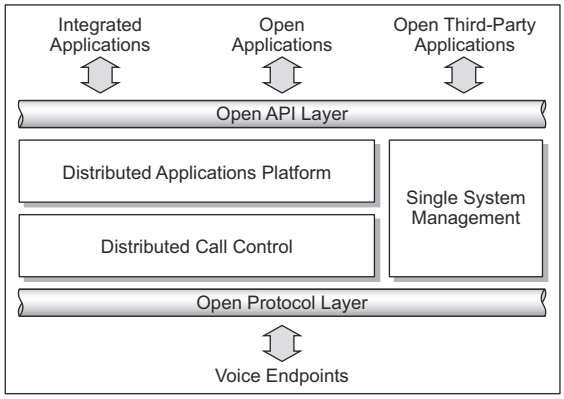

Figure 2: Distributed IP Voice Architecture

Distributed Applications Platform

The ShoreTel system's ability to support applications on distributed servers across the enterprise while maintaining a single, cohesive system depends on the ShoreTel Telephony Management Service (TMS) and the ShoreTel Distributed Telephony Application Service (DTAS).

TMS runs on each ShoreTel server and observes all call activity for the softswitch and ShoreTel voice switches it manages. DTAS, which is bundled into TMS, runs on each ShoreTel Server and DVS and directs requests to the appropriate TMS.

By installing a DVS at the same site as the users, applications such as voicemail, workgroups and Communicator can run locally, regardless of the network availability to the Headquarters server. In addition, by adding ShoreTel servers to host applications, services, and APIs, the system can scale as necessary.

For added local reliability, a working copy of the Headquarters database can reside on each DVS in the system in the event contact with the Headquarters server is lost.

The ShoreTel TMS/DTAS software supports Telephony Application Programming Interface (TAPI) for call control, media playing and recording. TAPI allows value-added applications to be added to the ShoreTel system.

Even when multiple DVSs are installed, the ShoreTel system is managed and behaves as a single-image system with complete feature transparency between sites.

Distributed Call Control

Distributed call control is a key concept of the ShoreTel system. Based on the industry-standard Session Initiation Protocol (SIP), ShoreTel's distributed call control software runs on every ShoreTel voice switch in the ShoreTel system. Each switch call-control element manages the call setup and teardown for the endpoints that it supports (both analog and IP).

The voice switches communicate on a peer-to-peer basis, eliminating any single point of failure. For instance, if one ShoreTel voice switch goes offline, all other ShoreTel voice switches continue operating. When the voice switch comes back online, it rejoins the voice network. There is no server involved with the basic telephony, so the system delivers levels of availability unmatched by even legacy vendors.

ShoreTel voice switches build an internal routing database from the peer-to-peer communication with other switches. Each ShoreTel voice switch contains routing information for all endpoints in the system, including information regarding trunk selection for outbound calls. (The exception is when Distributed Routing Service is enabled. For more information, see Distributed Routing Service.) When a user places a call from any extension, each switch can route the call to the correct ShoreTel voice switch based on its internal routing database. Sites can typically support up to 500 ShoreTel voice switches, depending on the system configuration.

The heart of the ShoreTel system is the distributed call control software that runs on the ShoreTel voice switches, which run the VxWorks® real-time operating system, and on the ShoreTel voicemail-enabled switches, which run the Linux operating system. Each call control element manages the call setup and call teardown, including features such as transfer, conference, forward, call permissions, and call routing.

Distributed Routing Service

Distributed Routing Service (DRS) allows larger systems to scale beyond 60 switches to a total of 500 switches (including softswitches). DRS is optional, but the following guidelines can help you determine when to enable it:

- For deployments of 0 to 10,000 users, you can have a maximum of 100 switches without enabling DRS.
- For deployments of 10,000 to 20,000 users, you can have a maximum of 60 switches without enabling DRS.
- In a single-system image with more than 50 voice switches installed at sites that span continents or are connected by an unreliable WAN, enabling DRS is recommended regardless of the number of users.

When Distributed Routing Service is enabled:

- ShoreTel voice switches exchange routing information only with other switches configured in the same site, rather than exchanging information with every switch in the system. Although each ShoreTel voice switch maintains routing information for only the switches within its site, each ShoreTel server also includes an instance of the Distributed Routing Service that maintains system-wide routing information. When site-to-site calls are initiated, ShoreTel voice switches contact the Distributed Routing Service to find the ShoreTel voice switch or switches necessary to complete the call.
- The switch connectivity matrix in ShoreTel Director is organized by site.
- All trunk calls are first resolved using DRS.

In a system with more than one ShoreTel server, the ShoreTel voice switches may contact an alternate instance of the routing service if the primary instance is unreachable. ShoreTel servers have a hierarchical relationship, with the Headquarters server at the top of the hierarchy. As you add DVSs to the system using ShoreTel Director, you define the order of the servers in relation to the Headquarters server and the various sites in your system.

Initially, the switches try to contact the nearest instance of the Distributed Routing Service in the hierarchy. If that instance of DRS is unreachable, the switch contacts the instance of DRS at the parent server in the hierarchy as a fallback.

If both instances of DRS are unreachable, the switch makes a best effort to route the call based on its internal routing tables built from communicating with peer ShoreTel voice switches at the same site. Additionally, if the call is an external call, the call may be routed out a local trunk even though it may not be the lowest cost. If the call is an internal intersite call, it is redirected to the Backup Auto-Attendant.

Single System Management

The ShoreTel system provides a browser-based network management tool called ShoreTel Director that provides a single management interface for all voice services and applications across all locations. Although there are multiple servers and switches to support the services and applications, the ShoreTel system provides a single image system across your entire network.

Integrated management enables a change to propagate dynamically across the system each time a modification is made on the ShoreTel system. When you add a new user to the system, that user automatically receives a dialing plan, voicemail, an extension, a mail box, an Auto-Attendant profile, and an email reminder to download the desktop software. In addition, you can add the user to a Workgroup, if needed. You can add new users and place them in Workgroups from a single management screen.

If a ShoreTel Service Appliance is used to implement ShoreTel Conferencing and Instant Messaging Services, then these services are also fully integrated into the ShoreTel single image management system.

The exceptions to this approach are ShoreTel Converged Conference Solution and the ShoreTel Enterprise Contact Center Solution, which are managed separately through their own management systems.

The ShoreTel system provides automated software distribution for all components on the system. When you add a new ShoreTel voice switch to the system, it is automatically upgraded to the current software release by the ShoreTel server. Existing ShoreTel voice switches download the current software when you reboot the switches. (For details, see ShoreTel Voice Firmware Upgrades on page 63.) The Headquarters server does not upgrade Distributed Voice Servers; these must be upgraded independently.

When you add a new user to the system, the user receives an email message containing URLs from which desktop and web-based call control and unified messaging applications can be downloaded and installed, or run.

For software upgrades at the Headquarters site, you simply install the new software on the ShoreTel servers. Users are notified of the new software release and are automatically prompted to upgrade their software, if an upgrade is required.

The ShoreTel management software also provides a complete suite of maintenance tools. The Diagnostics & Monitoring system, which is available through ShoreTel Director, provides detailed status information about the components in your ShoreTel system. It also provides a system dashboard, a topology map, alerts, call quality information, and remote packet capture functionality.

In addition, you can configure the system to include event filters that automatically generate an email message if an error occurs on the system.

ShoreTel System Communications

ShoreTel system communications can be divided into four basic communication types:

- Call Control
- Configuration
- TAPI and ShoreTAPI
- Media

The communication streams and the protocols that support them are explained in the following sections.

Call Control

ShoreTel uses the following protocols to process and manage calls:

- An enhanced version of Session Initiation Protocol (SIP)
- Secure SIP (SIPS)
- Media Gateway Control Protocol (MGCP)

Figure 3 on page 20 shows where SIP, SIPS, and MGCP are used in a ShoreTel system.

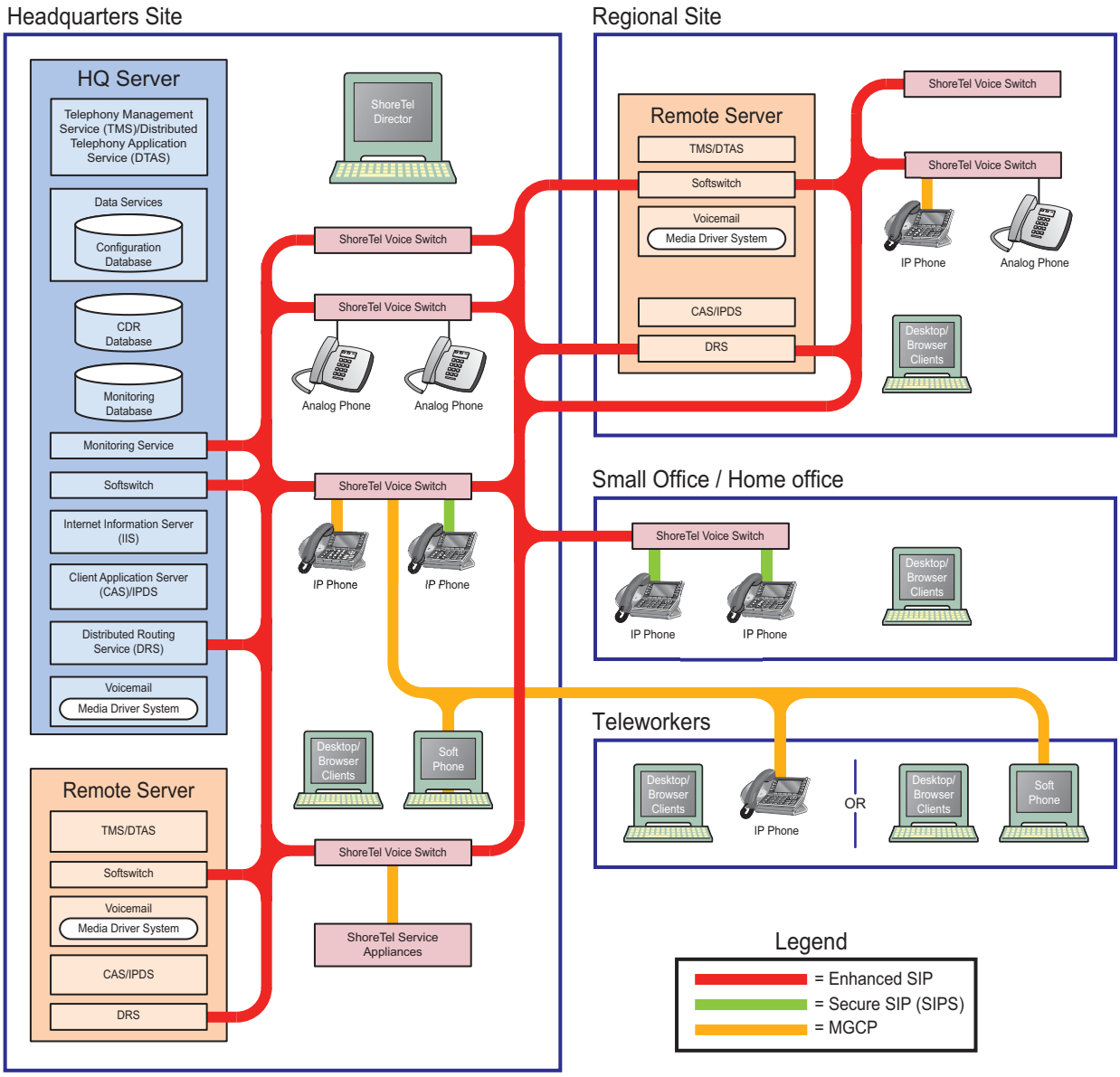

Figure 3: SIP, SIPS, and MGCP in a ShoreTel System

ShoreTel's Enhanced SIP Call Control

Call control between ShoreTel switches is based on Session Initiation Protocol (SIP), an application-layer protocol defined by IETF for voice-over-IP applications. Independent of the packet level, SIP establishes, modifies, or terminates sessions without respect to media content. Because of its extensibility and advanced integration capabilities, SIP is considered the protocol standard for real-time communications.

In ShoreTel's implementation of SIP call control, functions are split among the following software modules:

- User Agent
- Location Service
- Admission Control Service
- Bandwidth Manager

SIP architecture deploys a peer-to-peer model in which endpoints can function either as clients or servers.

User Agents

User agent objects represent call endpoints—an extension or a trunk. Each user agent is addressable by a SIP URL.

For extensions, the URL syntax is:

`sip:nnn@ip_addr:5441`, where:

- `nnn` – extension number
- `ip_addr` – IP address
- `5441` – UDP port number used by ShoreTel Call Control

For trunks, the URL syntax is:

`sip:TGrp_xxxpyy@ip_addr:5441`, where:

- `xxx` – trunk group number
- `yy` – port number
- `5441` – UDP port number used by ShoreTel Call Control

In ShoreTel's call control protocol, user agents representing endpoints on an IP network operate as peers, functioning as clients when initiating requests and as servers when responding to requests.

Location Service

Endpoint location exchange is performed via ShoreTel's proprietary Location Service Protocol (LSP). When switches first connect, they exchange all known SIP URLs. Afterwards, only configuration updates are transmitted.

LSP is based on UDP. The service relies on keep-alive pings (sent every 30 seconds) to detect switches that are unreachable.

Admission Control Service

Admission Control Service instructs Bandwidth Manager to reserve bandwidth for intersite calls. If a request is successful, updates are sent to Bandwidth Managers running on other switches at the same site.

Bandwidth Manager

A distributed Bandwidth Manager keeps track of intersite bandwidth use. A Bandwidth Manager runs on each ShoreTel voice switch.

ShoreTel voice switches reserve bandwidth from the Bandwidth Manager via the ShoreTel Bandwidth Reservation Protocol (BRP).

Secure SIP

ShoreTel uses the secure version of SIP, SIPS, for signaling between ShoreTel voice switches and 400-Series IP phones.

Media Gateway Control Protocol

ShoreTel 100-, 200-, 500-, and 600-Series IP phones and other IP endpoints communicate with ShoreTel voice switches via MGCP, a device control protocol. The relationship between the switch (call manager) and the phone (gateway) follows a master–slave model.

MGCP, an industry-standard protocol, is used to:

- Deliver information to the IP phone display
- Set up and tear down media streams
- Report phone events such as key presses, on-hook, and off-hook

Configuration

ShoreTel maintains a configuration database with all the static and dynamic system configuration data. Any modifications made to the configuration database are broadcast to other system components, such as the server applications and TMS.

The database is accessed and updated using Open Database Connectivity (ODBC). TMS on the Headquarters server talks to the local TMS Call Detail Report (CDR) database, which is in Crystal Reports format, using COM.

TMS uses Network Call Control (NCC) to send each switch its configuration information. The ShoreTel voice switches that are connected to the network (via LAN/WAN) interact with TMS using the NCC Client interface.

Figure 4 on page 23 shows how data flows within a ShoreTel system.

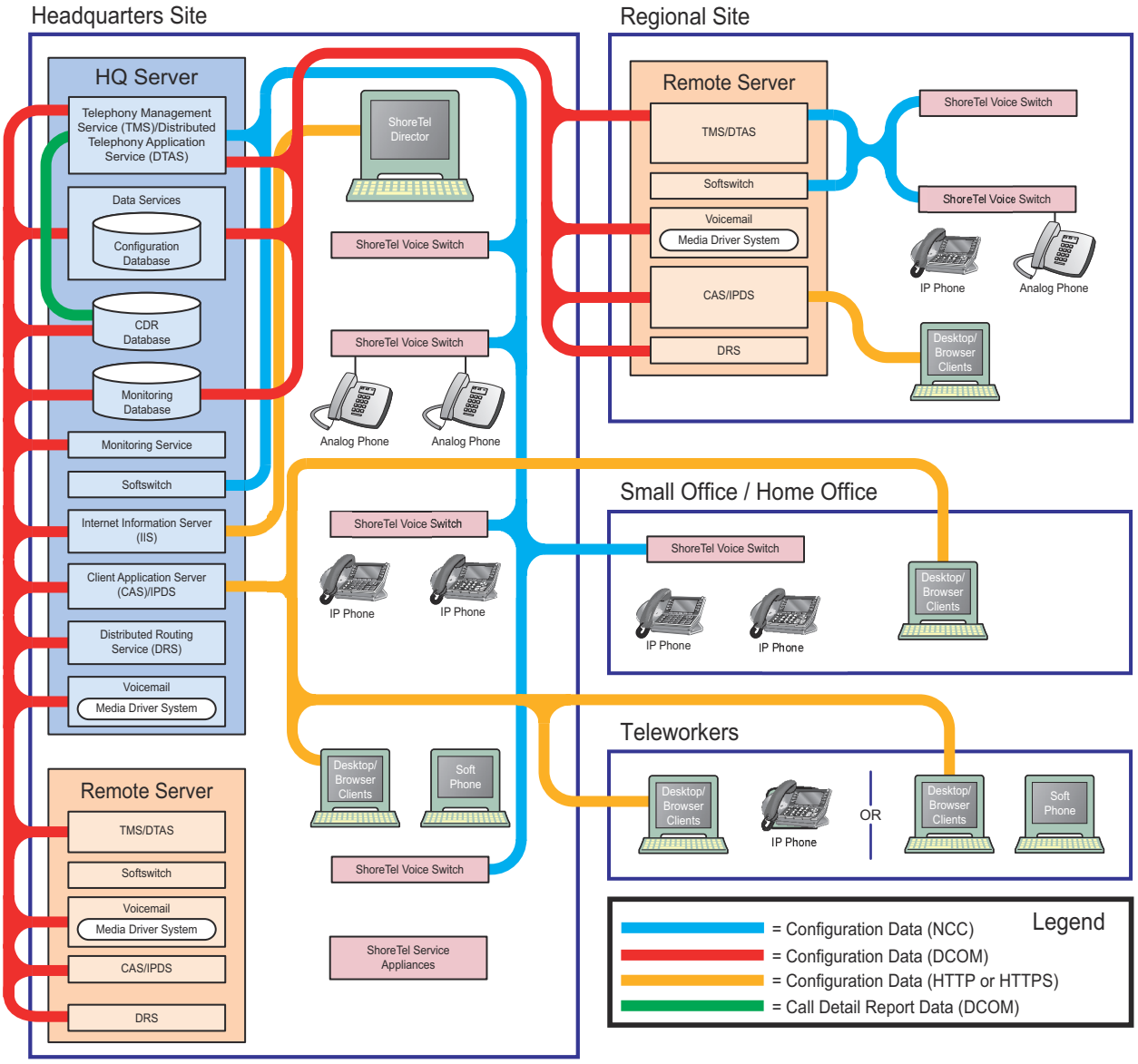

Figure 4: Data Flow in a ShoreTel System

TAPI and ShoreTAPI

ShoreTel applications use either Telephony Application Programming Interface (TAPI) or ShoreTAPI for communication to other system components, as follows:

- Client Application Server (CAS)/IPDS and workgroups use ShoreTAPI.
- Voicemail and account code collection use TAPI on Windows and a lower-level interface that is shared by TAPI and ShoreTAPI on Linux.
- Third-party applications can use TAPI.

Figure 5 on page 24 shows how the ShoreTel system uses NCC and RPC to pass TAPI or ShoreTAPI information in the system.

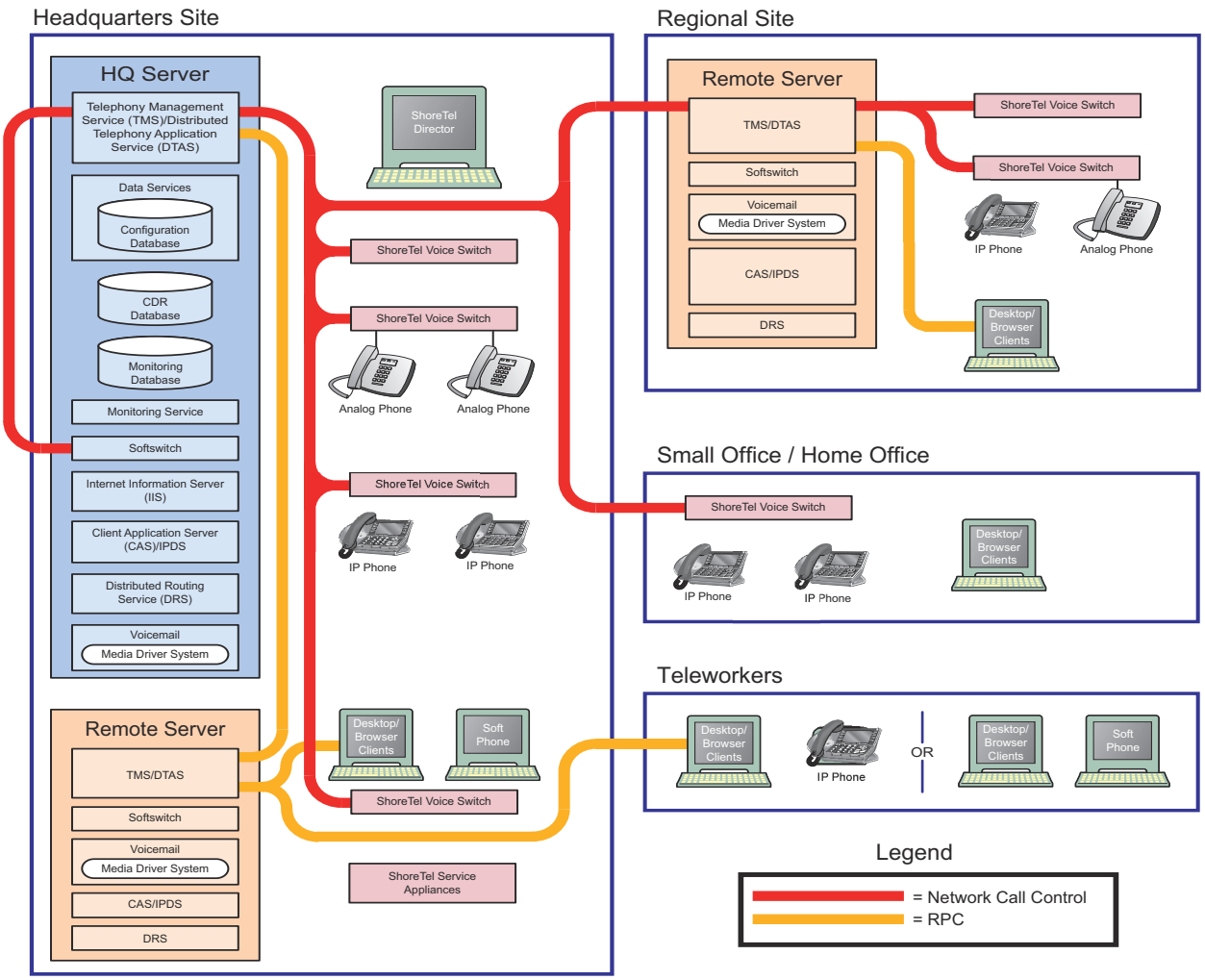

Figure 5: NCC and RPC Communications in a ShoreTel System

For example, when a user dials a number, the ShoreTel voice switch notifies TMS. TMS then presents that call information to the application via TAPI or ShoreTAPI.

A service called the Distributed Telephony Application Service (DTAS) provides connectivity between applications and TMS instances. DTAS reads the system configuration so that it knows which extensions are controlled by which TMS instances. DTAS is responsible for routing call control and events between applications and the TMS instance responsible for a given extension. For extensions controlled by the local TMS instance, DTAS routes call control to the local TMS instance. For extensions controlled by a remote TMS instance, DTAS routes call control to the appropriate remote TMS instance.

DTAS makes the distributed TMS architecture transparent to applications and reduces the number of network connections needed if every application were required to connect to every TMS instance.

Voice switches are assigned to specific TMS servers through ShoreTel Director. Assignment of a voice switch to a TMS server is restricted to TMS servers at its own site, or if there is no TMS server at that site, to the nearest TMS servers in the site hierarchy above.

ShoreTel applications that use ShoreTAPI, such as CAS/IPDS and workgroups, communicate directly with TMS. Other applications that use TAPI use ShoreTel Transport to communicate with TMS. TMS uses Network Call Control to exchange commands and events with ShoreTel voice switches so that TMS can present extensions and trunks as TAPI lines to the applications.

Media

Media travels through the ShoreTel system using Real-Time Protocol (RTP) and Secure Real-Time Protocol (SRTP). After call setup, media flows directly between IP phones via RTP. For ShoreTel 400-Series IP phones, media flows between phones using SRTP if it has been enabled through the Media Encryption option in the Call Control > Options page in ShoreTel Director. The ShoreTel voice switch is involved only when setting up or tearing down a call (Figure 6).

A voicemail message is normal RTP traffic, unless it is a recorded voicemail message moving from one server to another. Voicemail media streams conform to the G.711 codec. If a switch or IP phone is configured to use G.729 or ADPCM (for example, for an intersite call), a media server proxy is used to transcode between G.729/ADPCM and G.711. Because the media server proxy is a switch resource, there are a limited number of G.729 proxies. If there are insufficient G.729 proxies, then ADPCM is used instead.

IP Phone to IP Phone

Media between IP phones or other IP endpoints such as SoftPhones, passes directly point to point.

IP Phone to Analog Phone

Analog phones depend on the ShoreTel voice switch to which they are connected. Media from IP endpoints must pass though the ShoreTel voice switch supporting the analog phone.

Analog Phone to Analog Phone

Media between analog phones passes though the switches supporting the analog phones.

Analog Phone to Voicemail

Voicemail media from analog phones passes through the switch supporting the analog phone before going to voicemail via the server's media driver. When the analog phone is located on the same LAN as the host server, the ShoreTel voice switch connects to the server using a G711 ulaw codec. If the analog phone is connected via a WAN, and there are ShoreTel voice switch resources available, the ShoreTel voice switch uses an intersite codec (G729 or ADPCM). If ShoreTel voice switch resources are not available, the call reverts to the G711 ulaw codec.

IP Phone to Voicemail

Voicemail media from IP phones and endpoints goes directly to voicemail. IP phones at remote sites without a server send voicemail media to a ShoreTel voice switch, which then sends it to voicemail. This is done in order to use G.729 streams for voicemail across the WAN.

Voicemail Between Servers

When recorded voicemail messages are transferred between servers, they are sent using SMTP.

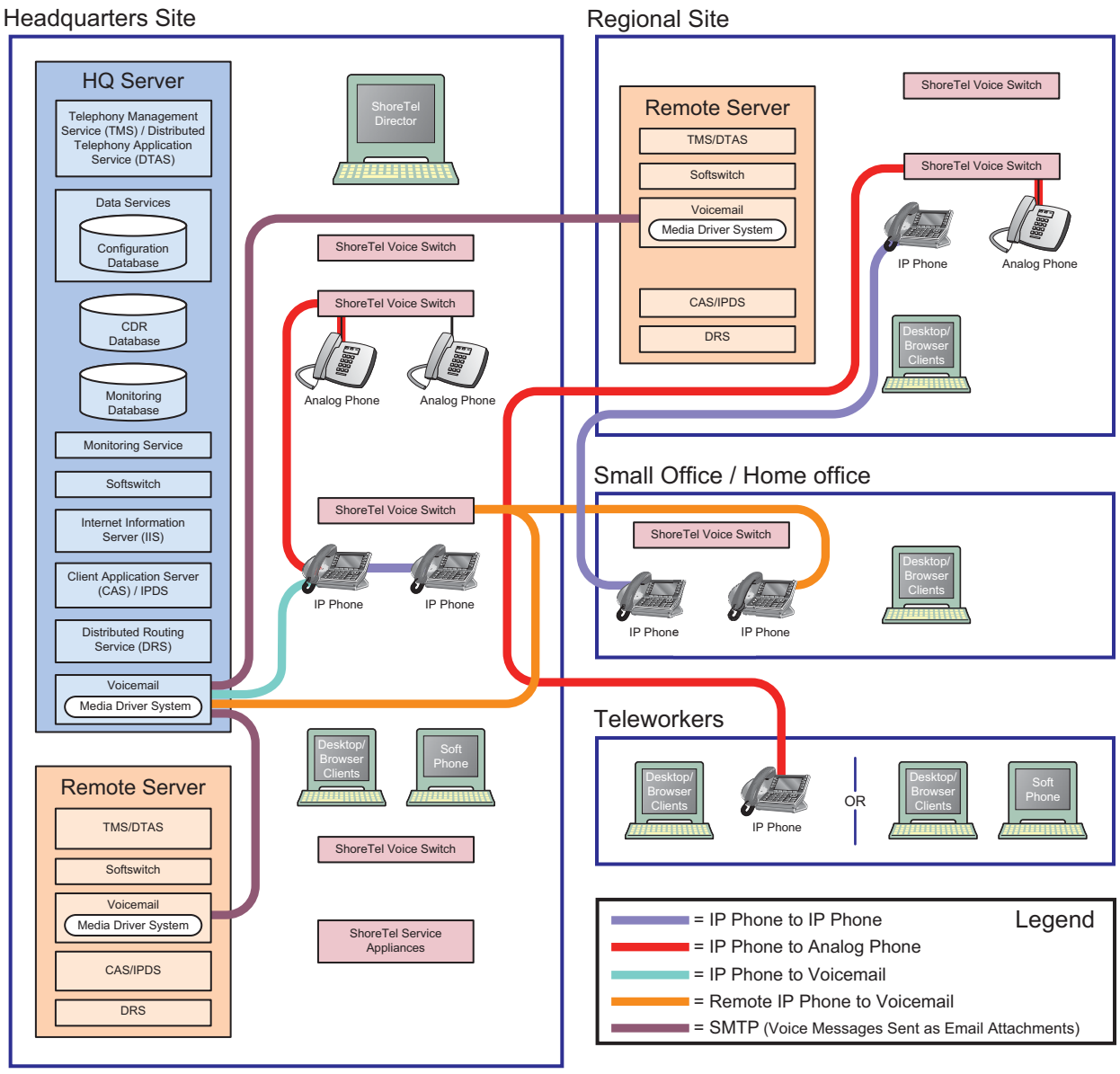

Figure 6: Media Traffic in a ShoreTel System

System Reliability

System reliability is ensured at several levels, including:

- Distributed Switch Control
- Distributed Database
- Client Application Service (CAS)
- Public Switched Telephone Network (PSTN) Failover
- CDR Data Storage

These areas are described in the following sections. For more information about failover for IP phones, see IP Phone Failover on page 163.

For configuration details about PSTN failover configuration, CDR data, or IP phone configuration, see the *ShoreTel System Administration Guide*.

Distributed Switch Control

The ShoreTel Telephony Management Service (TMS) runs on every ShoreTel Distributed Voice Server (DVS), ensuring switch control even if there a WAN outage between a remote DVS and the Headquarters site. Because multiple servers share the task of switch management, if a server fails, only the extensions it controls may be affected by a disruption in service.

Distributed TMS enables applications to handle calls on the switches at remote sites during a loss of network connectivity between the remote server site and the headquarters site. The co-located TMS provides local control of switches and local control by applications such as the Communicator client and IP Phone displays using Client Application Services (CAS). Applications are able to provide all of the features they normally provide (during full WAN connectivity) for extensions on locally controlled switches. Monitoring and control of extensions on remotely controlled switches without a local DVS are still affected by WAN outages.

Distributed TMS also reduces the affects of a particular TMS/Server outage to just those extensions controlled by that TMS instance.

Overall system scalability is increased with this feature because TMS instances control a subset of the switches in an entire system rather than all the switches in the system. Scalability is also increased because TMS instances handle a subset of Communicator clients rather than all clients in the entire system.

WAN Outage

Distributed Telephony Application Service (DTAS) is responsible for routing call control and events between applications and the TMS instance responsible for a given extension.

When there is a loss of connectivity between the HQ database and a local DVS, DTAS continues to operate, except that additions and deletions to the configuration database are not seen by local applications. DTAS services involving the local TMS are available. DTAS operations involving remote TMS instances not reachable because of WAN outage are not available.

Telephony operations involving locally controlled phones are available. Monitoring of phones controlled by TMS instances not reachable because of WAN outage are not available.

TMS continues to operate, except that additions and deletions to the configuration database are not been seen by local TMS and are not relayed to telephony clients. Telephony operations involving locally controlled phones are available. If a WAN outage results in the loss of connectivity to one or more switches, telephony operations with those switches is unavailable.

Distributed Database

ShoreTel supports a distributed ShoreTel database that allows some actions previously requiring access to the HQ server. Prior to ShoreTel 11, users of ShoreTel Call Manager (now Communicator) were able to change their call handling mode (CHM) only if the Headquarters server was available. With ShoreTel 11 and later, changes to users' CHM are handled by the local ShoreTel server (if configured appropriately), even if the Headquarters server is not available.

Client Application Server (CAS)

Some features that require writing to the database depend on the server being both operational and accessible. These features are handled by CAS on the server:

- Directory
- Options
- Speed dial (due to its reliance on the database)
- Ability to change call handling modes
- Presence information for user serviced by other switches

Public Switched Telephone Network (PSTN) Failover

User extensions can be optionally configured to route extension-to-extension calls to the public switched telephone network (PSTN) in the event that an IP connection is unavailable. Extension-to-extension calls are those a user makes to another site within a multi-site system, for example, a user in New York calling a co-worker at the company's San Francisco office.

The IP connection may be unavailable due to lack of bandwidth or connectivity. The PSTN failover option must be explicitly enabled in the user's Class of Service and bypasses the caller's call permissions. For systems using Distributed Routing Service (DRS), destinations allowing PSTN failover return a contact list with a failover number.

Assuming that the users have the proper permissions, when a remote site without a distributed voice server loses WAN connectivity, if DRS is disabled cross-site extension calls from the remote site would still happen because of PSTN failover. If DRS is enabled, however, PSTN failover would not work because DRS lookup is required to determine the PSTN failover destination. (If DRS is unreachable because of a network issue, it is not possible to discover the PSTN failover destination.) This limitation impacts remote sites that do not have a local DVS.

CDR Data Storage

In the event of a WAN outage, local CDR data is stored for up to two hours on the device (such as a DVS, voicemail-enabled switch, or service appliance). When WAN connectivity is restored, the stored data is forwarded to the Headquarters database. After two hours, the distributed server deletes the data and logs an error to the NT event log.

Call Scenarios

On-hook Call from Communicator

Figure 7 shows the communication protocols and components participating in a call dialed from Communicator to a PSTN destination.

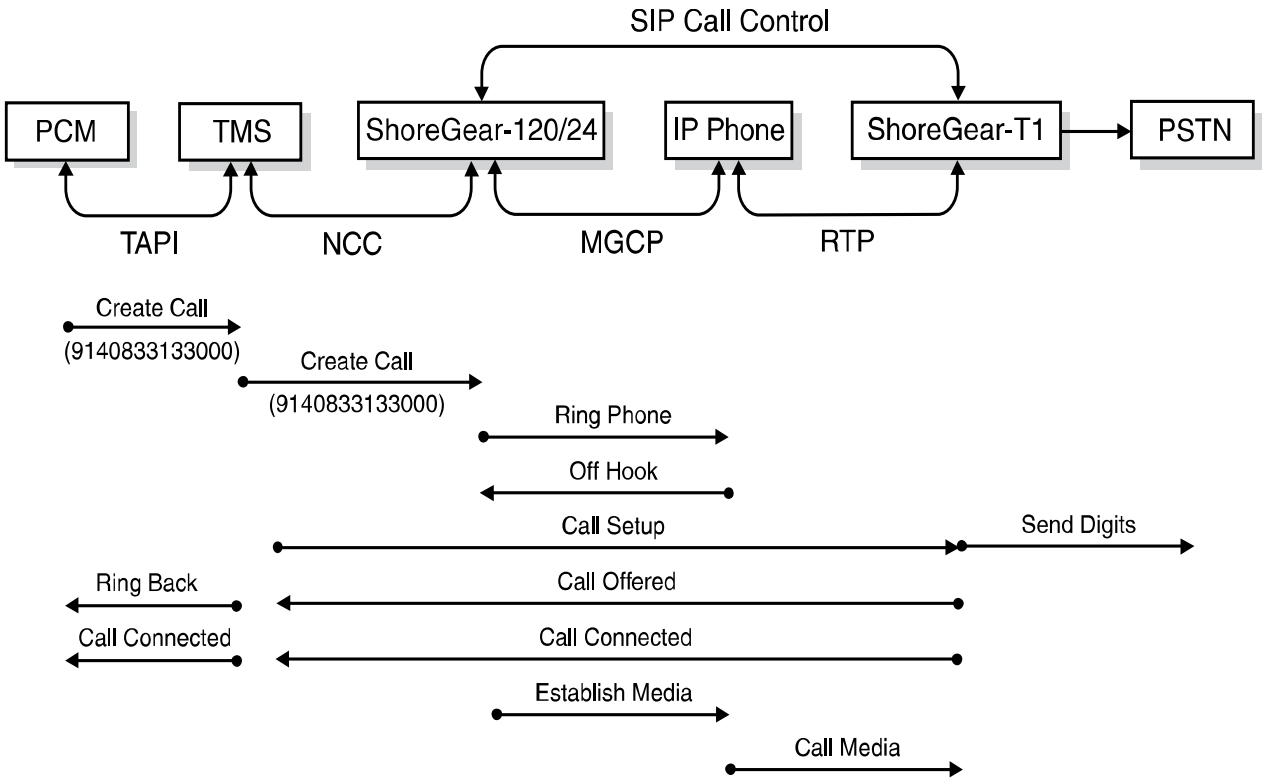

Figure 7: ShoreTel Communications for a Call from Communicator for an MGCP Phone

Quick Dial Call from Communicator

Figure 8 shows how a call dialed from a user's Communicator Quick Dial is handled by the system.

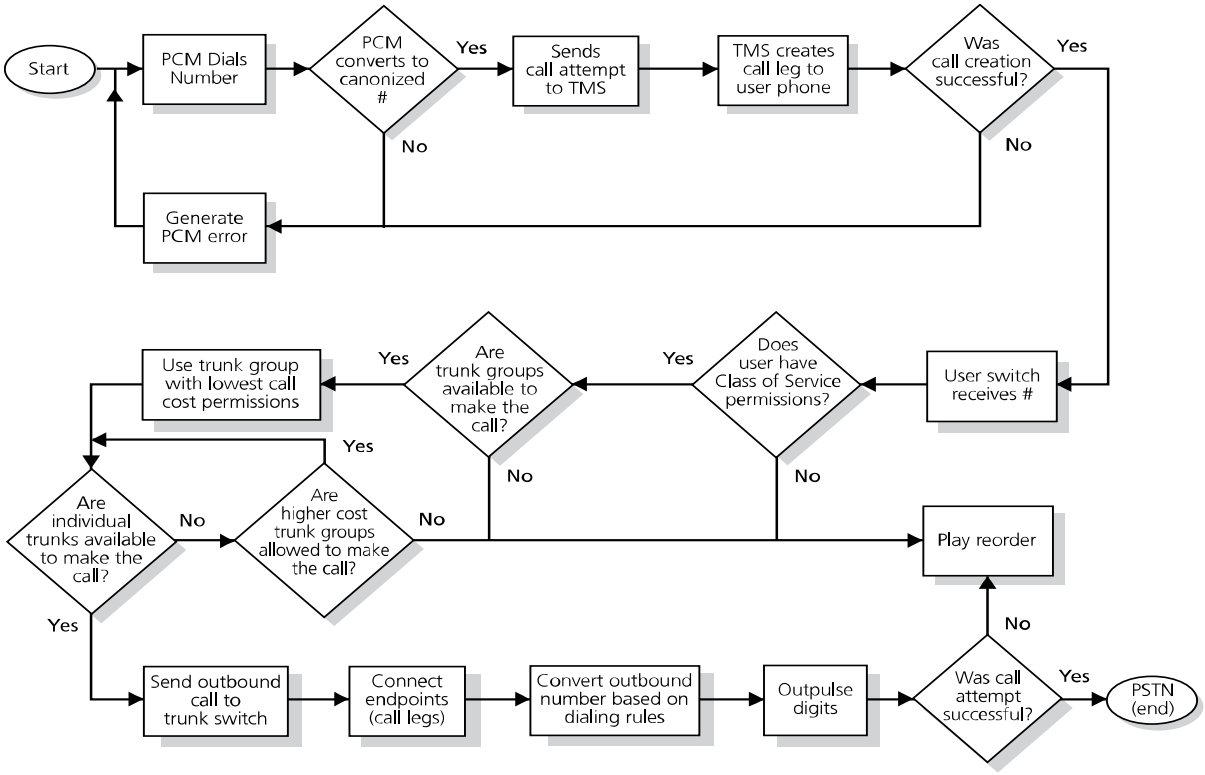

Figure 8: Call Flow for a Quick Dial Call from Communicator for an MGCP Phone

Inbound Call from a Trunk

Figure 8 shows how an inbound call on a trunk is connected to its destination.

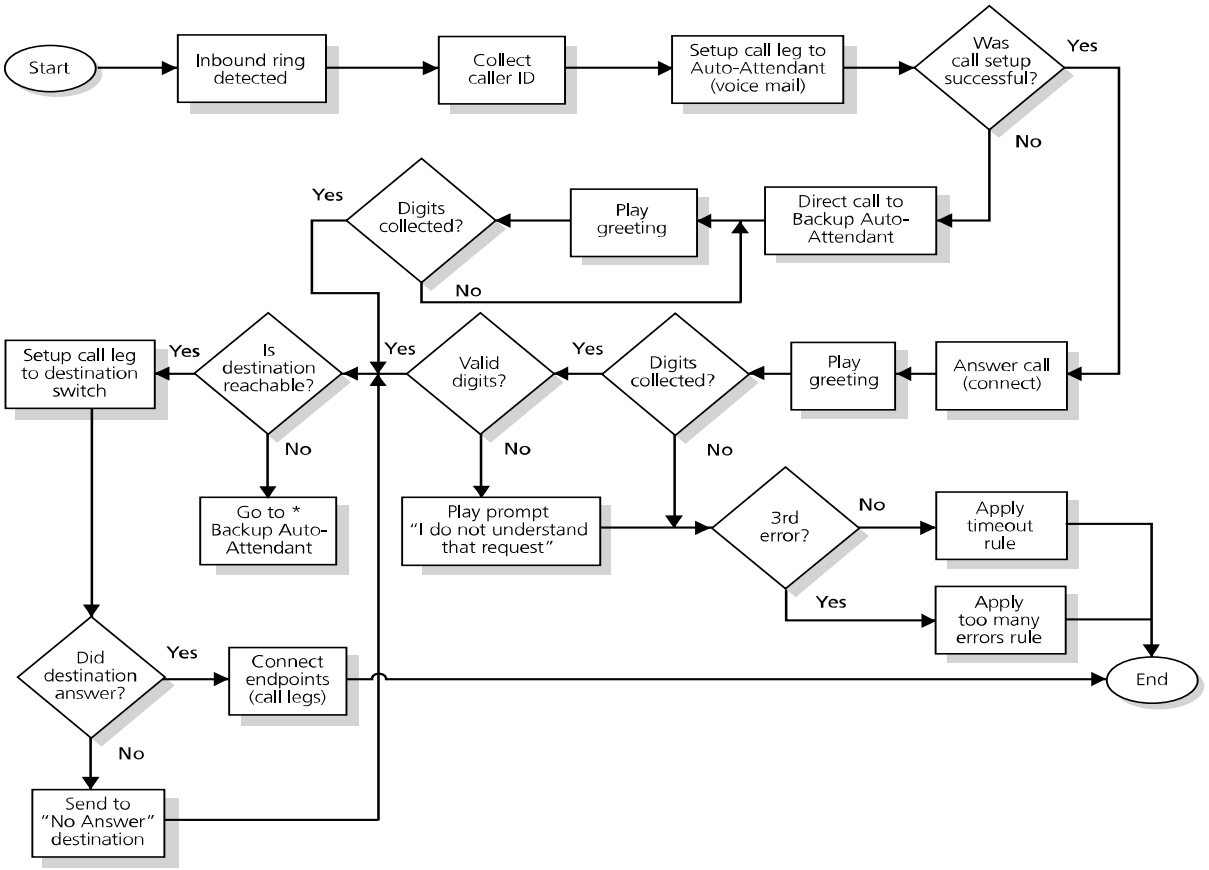

Figure 9: Call Flow for an Inbound Trunk Call

CHAPTER 2

ShoreTel Server

This chapter provides an overview of ShoreTel servers. It contains the following information:

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- Distributed Voice Servers (DVS) 34

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Overview

The ShoreTel voice over IP telephony solution is a suite of software modules, applications, and services running on a ShoreTel server. Every ShoreTel system includes a main server called the Headquarters server. In a single-site system, the Headquarters server may be the only ShoreTel server. More complex systems may include Distributed Voice Servers (DVS) to add reliability for applications and switches on remote sites or to support distributed applications. The Headquarters server remains the main server and must be available to interact with the DVS servers for full system functionality.

Headquarters Server

The Headquarters server is the main ShoreTel server and hosts the voice applications platform and the management web site, as well as the integrated voice applications. Typically, the Headquarters ShoreTel server is located at the largest location, containing the majority of users.

The Headquarters server hosts a SoftSwitch that provides extensions for the Auto-Attendant, Workgroups, and virtual users.

Distributed Voice Servers (DVS)

The ShoreTel system also supports remote distributed voice servers (DVSs). DVSs provide increased system reliability by distributing key services and applications at remote sites. Each DVS includes an instance of TMS that connects to and manages the local softswitch. The softswitch provides extensions for use by the local Auto-Attendant, Workgroups, and virtual users.

Distributed voice servers can also be configured to support distributed voice applications such as voice mail, workgroups, account codes, auto attendant and a distributed database. DVSs have TAPI access to the local SoftSwitch. If a distributed database is optionally enabled on the DVS, the distributed TMS maintains a copy of the configuration database that allows it to provide call control and voice mail service during the outage. Each DVS manages its own softswitch, as well as ShoreTel voice switches assigned to it.

Remote DVSs are valuable for the following purposes:

- They reduce bandwidth usage because local users' calls to voice mail are answered by the local voice mail application and do not pass across the WAN.
- They increase system scale by extending the unified messaging and desktop call control services to additional users of the applications.
- They increase system scale and reliability by providing distributed switch management, call control services, and unified messaging.
- They increase system reliability by locating workgroups on other servers and providing a location for backup workgroups to reside if a workgroup's primary server becomes unavailable.
- They enable integration of value added applications such as ECC, Recording Servers, and more.

Call control is provided by Headquarters and distributed voice servers even if full network connectivity is unavailable. However, calls to unreachable endpoints cannot be made, and call detail recording requires Headquarters server communication. To add reliability to your remote server, consider using redundant network paths to the Headquarters server.

The following sections provide more detail on the communications, services, and applications.

Configuration Communications

ShoreTel system processes use Open Database Connectivity (ODBC) objects to share information from the configuration database among themselves and to write configuration information to the database. Static configuration parameters are written to the database by ShoreTel Director, and system components access the database to read/write current state information. User configuration options are written to the database from Communicator, the telephone interface (voice mail options), Communicator for Web, and Communicator for Mac. ShoreTel Director is accessed via a web browser.

The service ShoreTel-ZIN, running on the Headquarters server, manages these COM communications for all services. There is a single writable instance of the ShoreTel database on the Headquarters server, even if distributed databases are created on distributed voice servers.

Each ShoreTel service on a distributed server caches a copy of the configuration database in internal data structures. When a distributed server loses connection to the Headquarters server, changes made to the Headquarters configuration database are no longer received by the distributed server. However, services continue to function with the most recent configuration data until connectivity is restored. When the connection is restored, the distributed server automatically receives and incorporates any changes made to the Headquarters database during the outage.

If a distributed server restarts without a connection to the Headquarters database, then ShoreTel services are started but are not functional. When the network connection is restored, the configuration is retrieved and again cached by each service and services become functional.

ShoreTel client applications, such as Communicator, use Client Application Server (CAS) for data handling. CAS communicates with ShoreTel clients via HTTP. ShoreTel Director accesses the configuration database though IIS.

You can use the Component Service Manager to view COM objects installed by the ShoreTel software. Component Service Manager is located in the Administrative Tools folder available from the Windows Start menu.

Do not change any permission or security settings for ShoreTel components.

Features accessible from the voice mail phone interface that require write access to the database, such as Extension Assignment and Call Handling Mode changes, are not supported during an outage unless a local distributed database instance is in use.

Figure 10 on page 36 shows how ShoreTel services use Open Database Connectivity (ODBC) to access the configuration database, and thus maintain the system status.

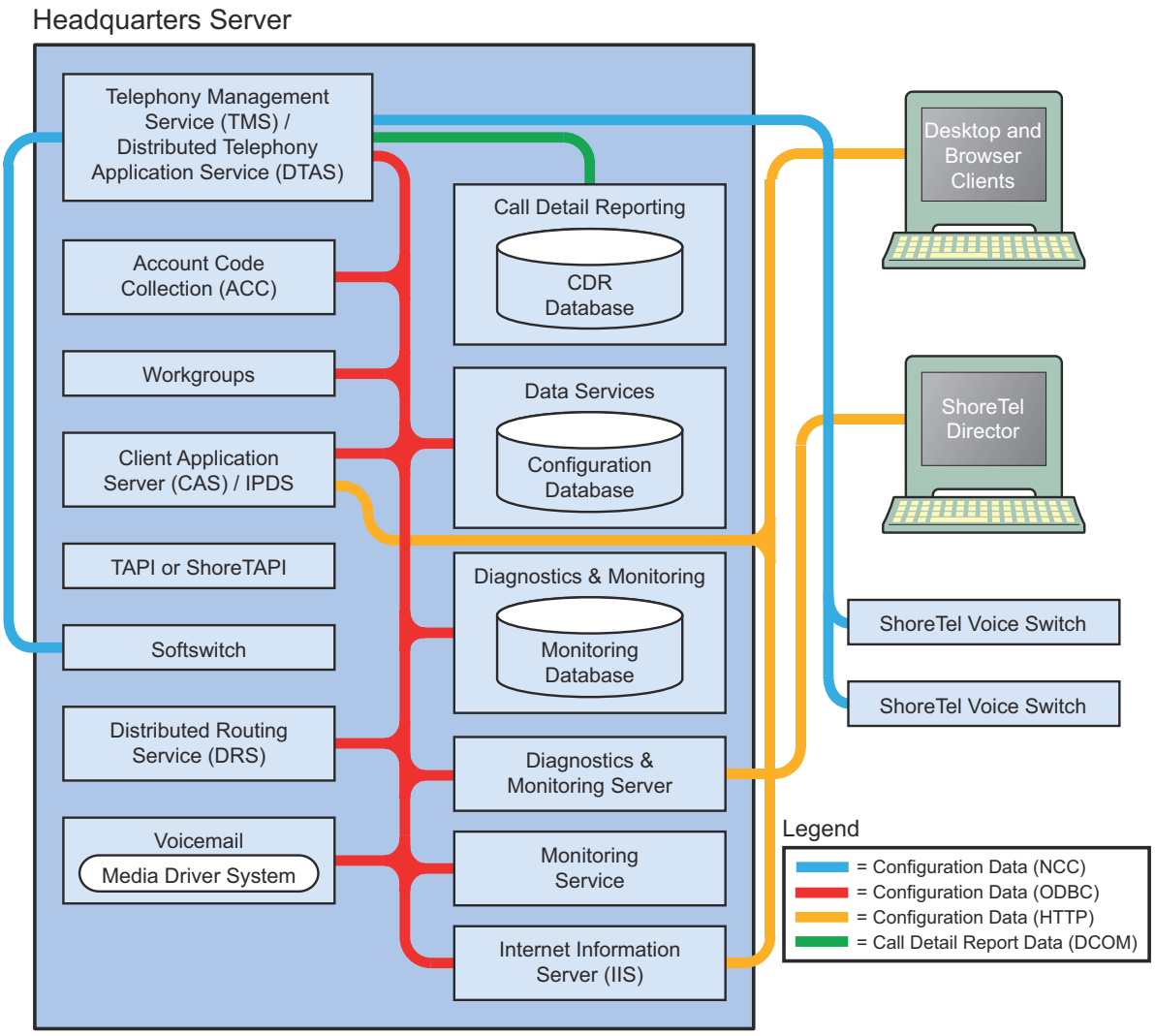

Figure 10: ShoreTel Server Database Communications

Services

The ShoreTel system relies on a variety of services to perform processes within the system. This section describes some of the key services.

Internet Information Service (IIS)

The ShoreTel server uses IIS to implement ShoreTel Director's browser-based interface. You can use the Internet Services Manager to view the configuration of the ShoreTel Director Web site. ShoreTel installs the site configuration using the installation program. Changing the default configuration installed by ShoreTel may cause ShoreTel Director or other system components to fail.

WARNING!

If the anonymous access user ID is modified or its password is changed, TMS does not start. Changing the properties of this user may require you to rebuild the server to recover.

FTP Services

Both the Headquarters and DVS servers make an FTP service available for fallback use by ShoreTel Voice Switches. While this does not have to be active on a continuous basis, the FTP site needs to be active for the fallback capability to work. ShoreTel recommends that the FTP site always be available.

The ShoreTel server also uses the FTP service to transfer prompts between applications.

The IP phones use the FTP server to download configuration information and the application program when they boot. The IP phones download these files from the server that is controlling the switch managing the IP phone.

To view the FTP site properties, use the Internet Services Manager. Anonymous FTP access must be maintained in order for all ShoreTel applications to use it.

SMTP Services

The ShoreTel software uses SMTP to send email notifications (for example, when new client software is available for installation). The voice mail system uses SMTP to transport composed messages between the distributed servers. SMTP services are also required by the Event Notification feature.

The ShoreTel installer does not make any specific configurations to the SMTP service. The applications deposit outbound email on the server for forwarding elsewhere.

For proper operation of the ShoreTel services, the hosting enterprise must have an email server configured to accept and forward SMTP mail. This is usually the exchange server or primary email server for the company.

Client Application Server (CAS)

The Client Application Server (CAS) is a ShoreTel proprietary protocol that uses HTTP messages to communicate between client PCs and ShoreTel servers. The CAS protocol communicates configuration updates such as call handling mode settings and Outlook integration. Network devices, such as firewalls and proxies, must not automatically close these pending requests

IP Phone Services

IP phones in a ShoreTel system rely on two services running on the Headquarters server and distributed servers:

- IP Phone Configuration Service (IPCS)—Runs on all servers.
- IP Phone Display Service/CAS—Runs on all servers.

The IP Phone Configuration Service (IPCS) manages the IP phone configuration process, including configuration file downloads and the database updates.

IP Phone Display Service/CAS controls any actions by the IP phone display not controlled by the device's firmware or switches.

Applications

This section provides information about applications that run on the ShoreTel server.

Event Watch

Event Watch monitors the NT Event Log and delivers email notifications of selected events. Event notifications are configured from the Events Filter page in ShoreTel Director.

For more information about Events, see the *ShoreTel System Administration Guide*.

Call Detail Reporting (CDR)

TMS uses COM to write call data to the Call Detail Report database. The ShoreTel system tracks all call activity and generates call detail records into a database as well as into a text file on the ShoreTel server. The call detail records are used to generate CDR reports.

For more information on Call Detail Reports, see the *ShoreTel System Administration Guide*.

Call Control Communications

The ShoreTel servers provides call control for server applications and for Distributed Routing Service (DRS).

Telephony Application Programming Interface (TAPI)

The ShoreTel server and its client applications use a Telephony Application Programming Interface (TAPI) to direct applications and provide the system with call control Figure 11 on page 39.

The TMS application service acts as the TAPI service provider and is responsible for managing the system's TAPI lines and routing information to other applications. When TMS starts up, it creates a TAPI line device for each endpoint in the system. Access to these TAPI lines is provided through ShoreTel Remote TAPI Service Provider (RPCTSP.tsp). This is installed on each of the systems that run ShoreTel clients (such as Communicator), ShoreTel HQ and distributed servers. Every application with access to these TAPI lines receives new calls, call state information, and line device information from TMS via RPCTSP.tsp.

The Telephony Management Service (TMS) uses NCC to communicate with the ShoreTel Voice Switches, and a combination of RPC and Windows sockets (Winsock) to communicate with a Remote TAPI Service Provider.

To view the properties of the Remote TAPI Service Provider, open the Phone and Modem Options tab in the Windows Control Panel.

WARNING!

Never modify the TAPI properties of the ShoreTel Remote TAPI Service Provider. Modified TAPI properties can cause ShoreTel clients or applications to fail. For information about how to test TAPI connectivity from the client side, see Chapter 8, ShoreTel Client Applications.

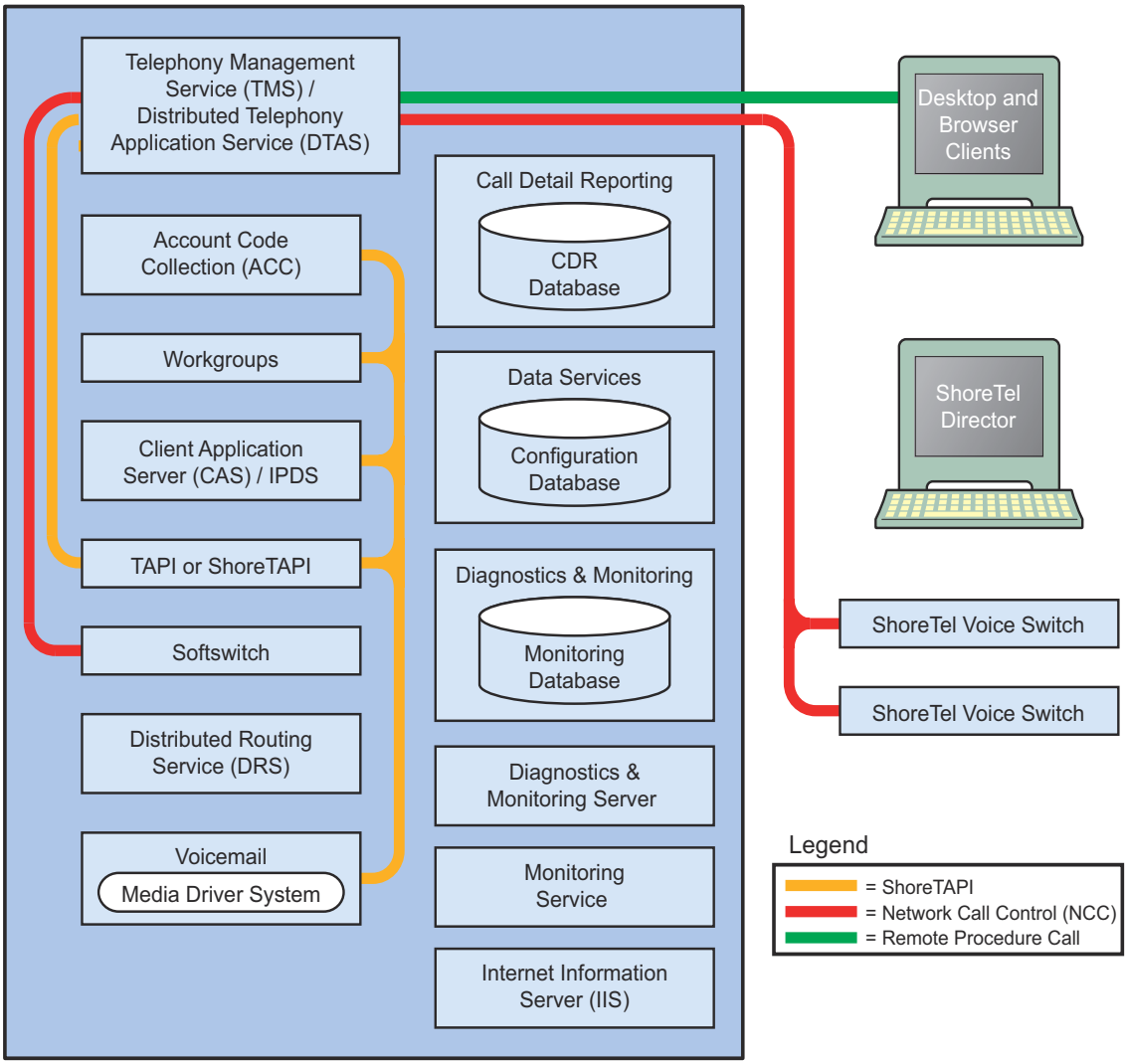

Figure 11: ShoreTel Server TAPI Communications

Distributed Routing Service (DRS)

DRS on each server provides routing information when switches cannot route the call in the local site and require intersite call routing information. ShoreTel enhanced SIP protocol is used for communications between the switch and DRS. (See Figure 12 on page 40.)

Media Communications

Media, from the perspective of the server, connects voice mail and the Auto-Attendant to switches and endpoints via the media driver. Media travels through the ShoreTel system using Real-Time Protocol (RTP).

A voice mail message is normal RTP traffic, unless it is a recorded voice mail message moving from one server to another. Voice mail media streams conform to the G.711 codec. If a switch or IP phone is configured to use G.729 or ADPCM (for example, for an intersite call), a media server proxy is used to transcode between G.729/ADPCM and G.711. Since the media server proxy is a switch resource, there are a limited number of G.729 proxies. If there are insufficient G.729 proxies, then ADPCM is used instead.

Figure 12 on page 40 shows the switch-to-switch call control and media communications flows.

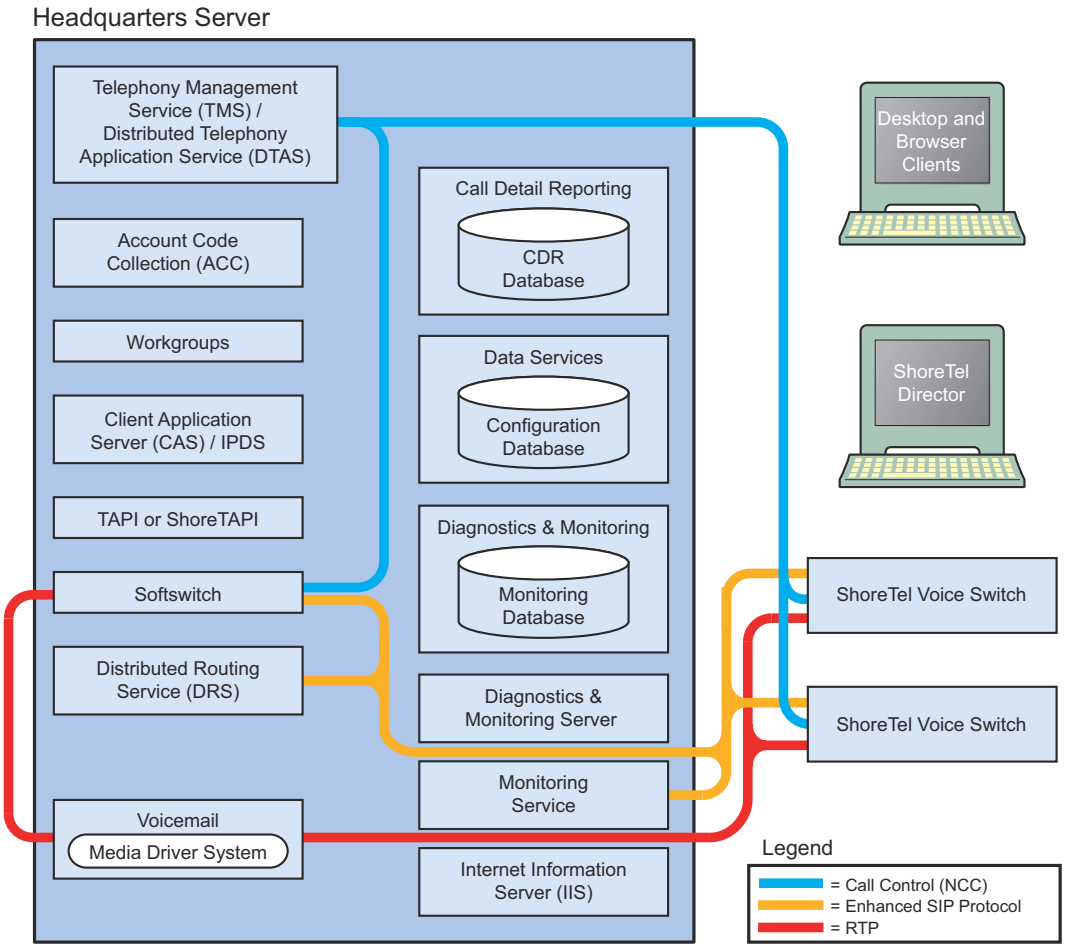

Figure 12: ShoreTel Server Call Control and Media Communications

Integrated Server Applications

There are several integrated TAPI applications running on the server. These applications use TAPI to send and receive call control information, and can also manipulate calls. These applications also use ZIN Manager and ODBC to access and update the configuration database.

Voice Mail

Voice mail is a TAPI application that supports 254 simultaneous voice mail or Auto-Attendant connections. The voice mail system uses SMTP to transport composed messages between the distributed servers. Media streams to voice mail use RTP packets to send media.

Voice messages are stored on the server's hard drive in the VMS MESSAGE subdirectory of the Shoreline Data directory. Voice mail messages are stored as .wav files. To help you calculate storage requirements, one hour of messages requires approximately 30 MB of disk space.

The voice mail application consists of the following services: Port Manager and Mail Server. The Port Manager uses TAPI to interact with TMS. The ShoreTel system also supports linking to legacy voice mail systems using AMIS and SMDI protocols.

Distributed Voice Mail

If the Headquarters server loses network connectivity, the distributed voice mail application allows softswitches on DVSs to continue handling voicemail calls and access the auto attendant.

During an outage, users can access voice mail only though their phone interface. If users were running Communicator at the time of the outage, they can still compose and play back messages. Users who were not running Communicator at the time of the outage, or who restart Communicator, are not able to access their voice mail boxes until connectivity is restored or unless their managing server includes a distributed database instance.

Voicemail messages to mail boxes hosted at other sites are stored and forwarded when connectivity to the destination voice mail service is restored.

Workgroups

Workgroups is an integrated Automated Call Distribution (ACD) application. Running on any HQ or DVS server, this TAPI application is responsible for routing and queueing calls directed to ShoreTel workgroups.

In the larger enterprise, there may be small- to medium-sized groups working together as a contact center. The ShoreTel Contact Center Solution is a server-based ACD and reporting package that includes the ability to queue and distribute calls, and provide agent and supervisor functions, as well as deliver reports on the call center activity.

Account Code Collection Service (ACC)

The Account Code Collection Service (ACC) is a TAPI application running on any HQ or DVS server. When it is enabled, it allows account codes to be required or optional for outbound calls. When a restricted PSTN call is attempted, and account code collection is enabled, the ShoreTel Voice Switch redirects the call to ACC.

Account Code Collection Service is responsible for:

- Prompting the user for the account code
- Collecting and validating the account code
- Attaching the account code to the call for reporting purposes
- Performing a blind transfer to the external number

If the managing server is down, or ACC is not available, the call is directed to the Backup Auto-Attendant.

TMS provides the following information to ACC:

- Dialed number
- User group
- Backup Auto-Attendant and correct menu number
- Account Code settings for each user group

CAS exposes a list of account code names and numbers within Communicator clients to facilitate the account selection process for the user.

Softswitch

Softswitch is used to host virtual users who are not assigned a physical telephone port on any ShoreTel Voice Switch. The softswitch for each HQ or DVS server hosts all voice mail, Auto-Attendant, and Workgroup extensions as well as route points managed by that server.

When softswitch is down loss of connectivity to the softswitch makes the voice mail, Auto-Attendant, Workgroups, and route points supported by that softswitch unavailable.

The softswitch receives and transmits information using the same communication paths and protocols as the other switches in the system.

A softswitch is automatically created for every server added to the ShoreTel system. By default, the name of the softswitch is the same as the name of the ShoreTel server hosting the switch, as specified on the Application Server page in ShoreTel Director.

Server Maintenance

Server software upgrades take place any time new ShoreTel software is loaded. The Setup program detects the installed software and automatically converts any system files or databases.

Upgrading from one minor version to another automatically converts any system files or databases. Minor upgrades typically add incremental features to the software or correct product defects found in previous releases.

Diagnostic and Troubleshooting Information for Servers

The ShoreTel system provides information about the operational status of the servers and services, as well as diagnostic and troubleshooting tools to resolve an event or error that might occur while the system is running or during installation.

The following tools are described in this section:

- Monitoring tools included in ShoreTel Director
- Installer logging
- Event log
- system logs
- Trunk Test Tool
- cfg utility

Monitoring Servers through ShoreTel Director

You can monitor the components in your ShoreTel system using either the Diagnostics & Monitoring system or Quick Look:

- With the Diagnostics & Monitoring system, you can monitor server status and other aspects of the ShoreTel system. For more information, see the “Monitoring and Diagnosing” chapter in the *ShoreTel System Administration Guide*.
- Quick Look provides an overview of the ShoreTel system’s health. It includes information about each site and the corresponding switches, ports, servers, and services. For more information, see the “Maintenance” chapter in the *ShoreTel System Administration Guide*.

You can also view system and application events in the Event Log, which you can access through ShoreTel Director.

Installer Logging

Some logging information can be gathered by the installer technology native to the operating system. ShoreTel includes added proprietary code that provides more detail in the log files to assist you in troubleshooting software installation. This proprietary code adds information about calls to the installer and return values from all custom action functions invoked by the installer.

Log files are generated in the user profile temp directory and start with *msi* and end with *.log*. Sort the directory if there are many log files or if there is any doubt as to which log file to look at.

Configuring Installer Logging

Perform the following procedure on the server that is going to run the ShoreTel software **before** the ShoreTel software is installed on the system.

1. Click on the **Start** bar and select **Run**.

2. Type *"**regedit**"* to access the Registry Editor window.
3. Navigate to the following path:

   `[HKEY_LOCAL_MACHINE\SOFTWARE\Policies\Microsoft\Windows\Installer]`

4. Right-click in the blank pane at the right of the window and select **New > String Value**.
5. Name the file "**Logging**".
6. Right-click on the file and select **Modify**.
7. In the *Value data* field, type `voicewarmup!`
8. Click **OK**.

There are no obvious signs that installer logging is enabled. However, after you have enabled the feature (and performed a software installation), you can check the temp directory for log text files at the following location.

`C:\DocumentsandSettings\username\LocalSettings\Temp`

Notes

- After installer logging is enabled, you might see installation logs in the temp directory for other non-ShoreTel software installations.
- To view the log files, you might have to change the setting for the file view features in Windows Explorer so that hidden files, directories, and file extensions are visible.

Using the Event Log

The ShoreTel system uses the Windows Event Log to report information and errors. Use the event logs in conjunction with Quick Look to determine the overall health of the system.The event log gathers information about event history. For example, the event log may provide information about an overnight T1 outage that was corrected but is no longer evident in Quick Look.

Each system task reports when it starts and stops. These messages can be helpful in determining whether the system started correctly. Events, such as switches losing connection to the server or rebooting, are also reported. For a list of all ShoreTel event codes, see Appendix A, Event Codes.

Using the System Logs

The ShoreTel system stores engineering-level log files that record transaction information about every event in the ShoreTel system. The logs are used to help ShoreTel with debugging problems that may arise during system operation. In most cases, these logs require the assistance of ShoreTel Customer Support to understand.

Two utilities, one with a graphical user interface and the other with a command-line interface, can be used to automate the collection of server logs, Windows (OS) logs, and ShoreTel databases. Both applications have the same functional capabilities and offer two different ways for accomplishing the same tasks.

Using the Graphical User Interface

The GUI can be executed from MS Windows or from a command window.

1. Launch the graphical version of the Server Log Collection Utility by clicking on the following executable:

   <ShoreTel install directory>\slogWin.exe

   <ShoreTel install directory> is the location of the ShoreTel server files. The default installation location of ShoreTel server files is as follows:

   C:\Program Files\Shoreline Communications\Shoreware Server

   The Server Log Utility displays the Banner panel.

2. Press the **Next** button to proceed.

3. On the Date Selection panel, specify the dates to collect log files. The program collects files only for a contiguous date set. The default selection is today's date.

4. Press the **Next** button to proceed.

5. On the Log Selection Method panel, specify the log file selection method and the destination directory.

   - To select all log files for inclusion in the archive, select the **Default radio button**. Press the **Next** button while **Default** is selected to begin archiving all available log files.
   - To manually select the desired log files for inclusion in the archive, select the **Custom radio button**.Press the **Next** button while **Custom** is selected, to open the **Log Selection** panel. This panel prompts you to select the log files for inclusion in the archive.
   - To select the Destination Directory, press the **Browse** button. (The destination directory is listed above the **Browse** button.)

     The program opens a **Browse for Folder** panel for selecting the destination directory.

6. On the Log Selection panel, specify the log files that the program archives. (The utility does not display this panel if you select **Default** in the Log Selection Method panel.) System information may be gathered separately.

   - The four options at the top of the panel select multiple log files. When you select one of these options, all log files included by that selection are selected and cannot be edited.
   - Select **ALL** to include all files in the archives.
   - All available log files are listed below the first four options at the top of the panel. You can select one file, all files, or any combination of files.

7. Press the **Next** button to begin saving log files.

   The utility displays the Archiving panel while the program saves the selected files. The **Next** and **Back** buttons are disabled while the program is saving the files. The **Cancel** button remains available.

8. Press the **Next** button after the Save process is completed to display the FTP Upload panel.

   After archiving the files, the program presents an option to upload the archive file to a remote FTP server.

9. Enter valid settings for all FTP parameters, then press the **Upload** button.

10. Press the **Next** button to proceed to the Completion panel.

    The Completion panel indicates that the log files were successfully archived to the specified directory.

11. Press the **Finish** button to close the utility.

Using the Command-Line Application

The command-line version of the Server Log Collection Utility provides the identical functionality as the GUI from the windows command prompt.

The following program launches the Command Line version of the Server Log Collection Utility:

<ShoreTel install directory>\ServerLog.exe

Note

`<ShoreTel install directory>` is the location of the ShoreTel server files.

The default installation location of ShoreTel server files is as follows:

C:\ProgramFiles\Shoreline Communications\Shoreware Server.

Table 1 lists and describes available command-line parameters.

Table 1: Command Line Parameters and Description

Command	Decription
`d <destDir>`	Set Destination Directory. **Note: This is a mandatory parameter.**
`-d1 <date1>`	Set Start Date. date1 – mmddyy.
`-d2 <date2>`	Set End Date. date2 – mmddyy.
`If -d1 is not specified`	<date1> and <date2> are both set to the current date.
`If -d1 is specified,`	d2 becomes a mandatory parameter where <date2> must be greater than or equal to <date1> and less than (<date1> + 7 days).
`-CDRDB`	Retrieve current CDR Database Log
`-CONDB`	Retrieve current Configuration Database Log
`-CRASH`	Retrieve Crash Dump Logs
`-NTEL`	Retrieve NT Event Logs

Table 1: Command Line Parameters and Description

Command	Decription
-TRIG	Retrieve Trigger Logs
-DB	Retrieve Database Logs
-DIR	Retrieve Director Logs
-DS	Retrieve DataServices Logs
-WGS	Retrieve Workgroup Server Logs
-VM	Retrieve Voice mail Logs
-IPDS	Retrieve IPDS Logs
-IPCS	Retrieve IPCS Logs
-DRS	Retrieve DRS Logs
-CSIS	Retrieve CSIS Logs
-ACC	Retrieve ACC Logs
-CDR	Retrieve CDR Logs
-TAPI	Retrieve TAPI Logs
-DTAS	Retrieve DTAS Logs
-SS	Retrieve SoftSwitch Log
-TMS	Retrieve TMS Logs
-ALLCONDB	Retrieve All Configuration Database Logs
-ALLCDRDB	Retrieve All CDR Database Logs
-ALLWIN	Retrieve All Current Windows Logs (ShoreTel, NT Event, Crash Dump)
-ALLDBS	Retrieve All ShoreTel Database Logs (CDR, Config)
-ALLLOGS	Retrieve All Current ShoreTel Logs
-ALL	Retrieve All retrievable logs and databases
-f	Upload the archive to the specified FTP server
<path> <user> <pass>	Specifies the FTP destination location when uploading the archive to an FTP server
-v	Display version number of command line program, then exit
-h	Display name and description of command line parameters, then exit

Examples

The following command line copies Voice Mail logs generated between 2 March 2007 and 6 March 2007 to *C:\LogsDir* directory:

```
ServerLog.exe -d1 030207 -d2 030607 -VM -d "C:\LogsDir"
```

The following command line copies all voice mail logs generated today:

ServerLog.exe -VM -d "C:\LogsDir"

The following command line generates an error message because only one date is specified:

```
ServerLog.exe -d1 030207 -VM -d "c:\LogsDir"
```

Using the Trunk Test Tool

The Trunk Test tool is a TAPI application that monitors real-time activity on a trunk. You can find the tool in the ShoreTel program folder. The Trunk Test tool allows you to select a trunk to view by site, rather than viewing all trunks across your enterprise.

The tool is divided into two sections. The top section lists all the trunks in the system and their current status. The bottom section gives real-time monitoring information about the currently highlighted trunk. If this tool remains running on the server with an excessive number of lines selected, the server may have performance problems.

The interface for the Trunk Test Tool contains the following components:

- The **File** menu allows you to save log information to disk or print it.
- The **Edit** menu allows you to copy and paste data from the Trunk Test window.
- The **View** menu allows you to turn on and off the status and toolbars, and open the Trunk Helper Settings dialog box. The **Trunk Helper Settings** dialog box allows you to set the server you want to monitor, select an extension to dial out with, and set the number of lines of data to collect for each trunk.
- The **Operations** menu allows you to make or drop calls, view the properties of selected trunks, place trunks in service, and remove them from service. You can also access this menu by right-clicking a selected trunk.
- The **Help** menu displays the version number of the Trunk Test tool.

Using the cfg Utility

The cfg utility is a command-line tool that provides detailed information about the voicemail application. The `cfg.exe` file resides in the following path:

C:\Program Files\shoreline communications\Shoreware server.

To start cfg:

1. Open a command line window pointing to the *\shoreline communications\Shoreware server* directory.
2. Type cfg and press ENTER.

   When you see the prompt `/*Local*//->,` cfg is ready.

All commands are entered at the above prompt. Results are displayed in the command line window or in the voicemail logs.

WARNING!

Some cfg utility commands may damage the system if used incorrectly. Make sure you understand the commands before you use them.

Table 2 lists and describes the commands available through the cfg utility. Variables are shown in italics.

Table 2: cfg Commands

Command	Parameters	Description	Comments
`call p`	*p* – phone number	Make a call from the voicemail application and play a prompt.	
`closem`		Close the open voicemail box.	
`dmask 0x`	*0x* – mask hex	Set voicemail debug mask in hex.	To see a list of available flags, enter without a parameter.
`exit`		Leave cfg.	
`laam t`	t – ■ 1 – DID ■ 2 – DNIS ■ 3 – Trunk	List Auto-Attendant menu mapping.	Displays mapping of trunks to Auto-Attendant menus.
`lall f`	f – 1 for more details	List all mail boxes in the system.	Enter without “1” for a summary of system mail boxes and with “1” for more detail.
`lamp m f`	*m* = mail box *f* = (1 = on, 0 = off)	Turns the message waiting light on/off for a specified mail box.	
`list pb b`	b – (0 – last name, 1 – first name)	Dump dial by names directory to the voice mail log.	
`lmbox f`	f = 1 for more details	List mail box information.	Enter without “1” for a summary of system mail box information, including messages IDs.
`lms`		List mail box schedule.	
`lmsg m`	*m* – message ID	List details about a specific message.	Message IDs can be found by using lnbox.
`loadc`		Load all voicemail configuration from the database.	
`loadm`		Load all mail box configuration from the database.	Requires that a mail box be open when you issue the command.
`lserv`		List information about all servers.	

Table 2: cfg Commands (Continued)

Command	Parameters	Description	Comments
`lsys`		List all voicemail system parameters.	
`lsmtp`		List status of distributed voicemail.	
`ltapi`		List status of TAPI lines opened by voicemail.	
`msinfo`		Dump voice mail internal table to the voicemail log.	
`openm #`	# – mail box	Open specified mail box.	
`psinfo`		Dump port server information to the voicemail log.	
`purge`		Remove message in the deleted queue.	Requires that a mail box be open when you issue the command.
`sh str`	*str* – string	Search help for a string.	Searches only from the beginning.
`starth`		Remove old deleted messages.	
`symwi`		Run message waiting indication synchronization.	Sends current MWI status to all phones in the system.
`ver`		List cfg version.	
`?`		List help commands.	

Using Dr. Watson

Dr. Watson is an application debugging program included with the Microsoft Windows operating system. ShoreTel recommends using the Dr. Watson application if you are running on Windows 2003 Server.

Note

Windows Error Reporting (WER) was enhanced in Windows Vista SP1 and Windows Server 2008 to allow collection of local crash dumps. The enhanced WER feature has a number of benefits over the older built-in crash handling of Dr. Watson. For more information, see Microsoft's website.

To enable Dr. Watson:

1. Open the **Control Panel** and then double-click **System**.
2. Click on the **Advanced** tab.
3. Click **Error Reporting** (Figure 13 on page 51). Disable it, or if you choose to enable it, leave it enabled just for the **Windows operating system**. Leave the **Programs** check box clear.

   This must be done whenever a new machine is built or ghosted.

4. Install Dr. Watson from the command line by typing `drwtsn32 -i`.
5. Run `drwtsn32` to configure it. A window is opened (similar to the one shown in Figure 14 on page 52).
6. Under **Crash Dump Type**, select the **Mini** radio button.
7. Select the **Visual notification** check box. This ensures that you are aware when a dump occurs.
8. Select the **Create Crash Dump File** check box.
9. Optionally, in case the dump file might be overwritten, it may be helpful to enable the following options by selecting the associated check boxes:
   - Dump Symbol Table
   - Dump All Thread Contexts
   - Append to Existing Log File
10. Click **OK** to store your changes.

To collect Dr. Watson dumps:

- Dumps for a logged in user appear under:
  `C:\Documents and Settings\All Users\Application Data\Microsoft\Dr Watson`
- Dumps for services appear under:
  `%systemroot%\PCHEALTH\ERRORREP\UserDumps`

Figure 13: Error Reporting Window

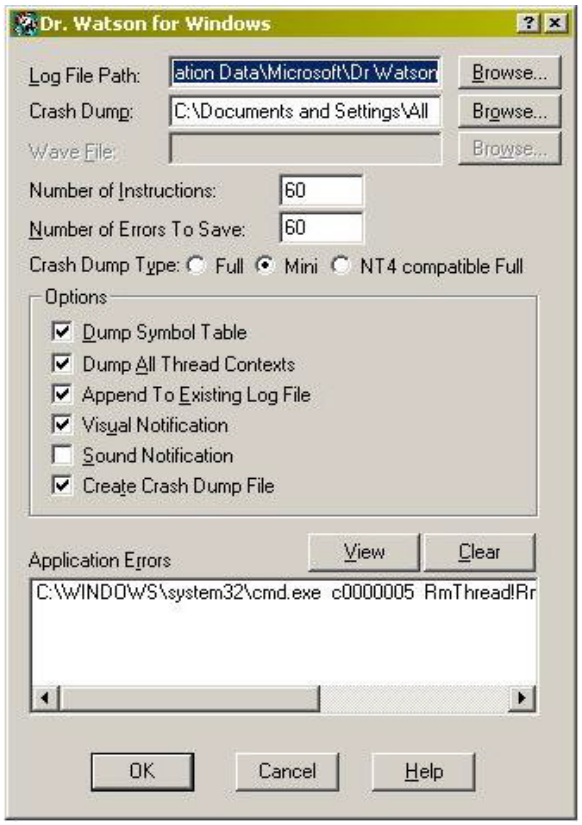

Figure 14: Configuring Dr. Watson

Services

The ShoreTel server is made up of multiple processes working together to provide applications that include voicemail, ShoreTel Director, and Workgroups. Each process runs as a Windows Service, which starts automatically when the server starts.

Table 3 on page 53 lists and describes each service and its underlying process. All services run on the Headquarters Server. Services that also run on distributed voice servers are marked in the “Distributed Server” column.

Table 3: Service Descriptions

Service Name	Service ID	Process	Description	Distributed Server
ShoreWare Call Accounting	ShoreTel-CDR	TmsCDR.exe	Records call information (call accounting information, call queuing data, and media stream data) and writes it to the CDR database	
ShoreWare CSIS Server	ShoreTel-CSISSVC	CSISSvc.exe	Provides legacy ShoreTel clients (ShoreTel 12 or earlier) with an interface to the ShoreTel server	X
ShoreWare CSIS VM Server	ShoreTel-CSISVMSVC		Provides notification for clients and voicemail	
ShoreWare Database Update Server	ShoreTel-DBUpdateSvc	DBUpdateSvc.exe	Accepts database updates from remote computers	
ShoreTel Director	ShoreTel-Director		Provides diagnostics and monitoring capabilities for ShoreTel system components	
ShoreTel Director Proxy	ShoreTel-DirectorProxy		Provides a ShoreTel Web Server and a reverse proxy for the ShoreTel-Director Service	
ShoreWare Director Utilities	ShoreTel-DirectorUtil	KadotaUtil.exe	Provides miscellaneous capabilities for ShoreTel Director, including controlling services, browsing the NT event log, and generating content for Quick Look	X
ShoreWare Distributed Routing Service	ShoreTel-DRS	DRS.exe	Allows the ShoreTel system to scale beyond 100 switches When active, this service provides location information for routing intersite calls and additional routing information for trunk group selection.	X
ShoreWare Event Service	ShoreTel-EventSvc	CEService.exe	Distributes events to ShoreTel applications and services	

Table 3: Service Descriptions (Continued)

Service Name	Service ID	Process	Description	Distributed Server
ShoreWare Event Watch Server	ShoreTel-EventWatch	EventWatch.exe	Monitors the NT Event Log and delivers email notifications of selected events	X
ShoreTel Monitoring Service	ShoreTel MonitoringService		This service enables the monitoring processes necessary for the ShoreTel Diagnostics & Monitoring system.	
ShoreWare Voice Mail Message Server	ShoreTel-MailServ	MailServ.exe	Provides user mailbox capabilities, AMIS features, and system auto-attendant menus. It also manages the voicemail message store.	X
ShoreTel-MYSQLCDR	ShoreTel-MYSQLCDR		This service is a database process related to the Call Detail Record database.	
ShoreTel-MYSQLConfig	ShoreTel-MYSQLConfig	mysqld.exe	This service is a database process related to the configuration database for ShoreTel Director.	
ShoreTel-MYSQLMonitor	ShoreTel-MYSQLMonitor		This service is a database process related to the monitoring database for the Diagnostics & Monitoring system.	
ShoreWare Client Application Server	ShoreTel-IPDS	IPDS.exe	Manages voice mail clients and IP phone display not controlled by the device's firmware or switches. Responsible for managing changes made to the database by the clients.	X
ShoreWare Notification Server	ShoreTel-Notify	TriggerServer.exe	Notifies server applications of changes to the ShoreTel configuration	X
ShoreWare Voice Mail Port Manager	ShoreTel-PortMgr		Service component of the ShoreTel voice mail system	

Table 3: Service Descriptions (Continued)

Service Name	Service ID	Process	Description	Distributed Server
ShoreWare Port Mapper	ShoreTel-Portmap	PortMap.exe	Initiates RPC communication connections between the Telephony Management Server (TMS) and ShoreTel Voice Switches	X
ShoreWare Remote Logging Service	ShoreTel-RemoteLogSvc	LogService.exe	Accepts logging from remote computers	
ShoreTel Remote Packet Capture Service	ShoreTel-RPCAP		Runs remote packet capture operations for diagnostic purposes	
ShoreTel-SAMS	ShoreTel-SAMS		Provides services to ShoreTel Director application	
ShoreWare Software Telephony Switch	ShoreTel-SoftSwitch	VTSMain.exe	The SoftSwitch hosts call endpoints for voice mail, Workgroup, route points, and other IVR extensions. Virtual users are hosted on the Headquarters SoftSwitch.	X
ShoreTel System Management Service	ShoreTel-SysMgrSvc	SysMgrSvc.exe	Provides IP phone registration and other functions	
ShoreWare Telephony Management Service (TMS)	ShoreTel-TMS	Tms.exe	The telephony platform for ShoreTel applications, ShoreTel services, and third-party TAPI applications	X
ShoreWare Transport Server	ShoreTel-TransportSvc		Provides transport services for ShoreTel applications and services	
ShoreTel Voice Mail Synchronizer	ShoreTel-VmEmSync	VmEmSyncSvc.exe	Provides voicemail and email synchronization	
ShoreTel Web Framework Server	ShoreTel-WebFrameworkSvc	WebFrameWork.exe	Provides support for ShoreTel Communicator for Web and interactions with Client Application Service	

Table 3: Service Descriptions (Continued)

Service Name	Service ID	Process	Description	Distributed Server
ShoreWare Workgroup Server	ShoreTel-WGSvc		Manages workgroups and queues	
CMCA Service		CMCA	Conference bridge application	
File Transfer Service		FTService	Transfers files using SMTP (qmail) engine	
IM Service		IMService	XMPP-based Instant Messaging engine	
Media Service		STMedia/STTS	Media engine	
QMail Service		QMailService	SMTP service on Linux servers	
Services Manager Service		SMgr	Services Manager for starting, stopping, and monitoring services	
SM Service		SMService	Backend service that enables service CLI access	

ShoreTel Server File System

Table 4 lists the directories where the ShoreTel server installs its files.

The Windows System user and the IPBX user created by the ShoreTel installer require full access to all the ShoreTel directories. All other users can be granted access on an as-needed basis.

Note

The server installs files with default access permissions. System administrators might want to ensure a more secure environment.

To ensure the security of sensitive and/or personal information, confine access to the VMS and Database directories strictly to administrator, system, and IPBX users.

Table 4: ShoreTel Server File System

Directory	Description	Default Path
ShoreTel Server	Contains all ShoreTel server system files and dlls. This directory is located on the drive where program files are stored.	*<drive>\Program Files\Shoreline Communications\Shoreware Server*
ShoreTel Director	Contains all ShoreTel Director Web site files. This directory is located on the drive where program files are stored.	*<drive>\Program Files\Shoreline Communications\Shoreware director*
ShoreTel Presenter	Installed on systems with ShoreTel Conferencing Services. Contains the files, applications and dlls required to enable screen sharing capabilities for ShoreTel Web Conference Services. This directory is located on the drive where program files are stored.	*<drive>\Program Files\Shoreline Communications\ShoreTel Presenter*
Shoreline Data	Contains all the dynamic information the server uses to run the system. This directory and all sub-directories may be saved as part of a backup and used for full system recovery.	*<drive>\Shoreline Data*
Call Records 2	Contains all call record files and databases The MySQL database is ODBC compliant. Parameter settings required to access CDR records in the MySQL database include: ■ DRIVER – {MySQL ODBC 3.51 Driver} ■ SERVER – localhost (or the server where MySQL is installed) ■ DATABASE – Shorewarecdr ■ USER – st_cdrreport ■ password – passwordcdrreport	
Database	Contains the configuration database that stores all system configuration information	
Logs	Contains all ShoreTel debugging logs	*<drive>\Shoreline Data\Logs*
Prompts	Contains copies of the auto attendant and workgroup menu prompts	*<drive>\Shoreline Data\Prompts*
Scripts	Contains scripts used by the Workgroup Server	*<drive>\Shoreline Data\Scripts*
SoftSwitch	Contains files needed to run the SoftSwitch	*<drive>\Shoreline Data\SoftSwitch*

Table 4: ShoreTel Server File System (Continued)

Directory	Description	Default Path
Templates	Contains configuration files needed for IP phones	*<drive>\Shoreline Data\Templates*
VMS	Contains all the files and configuration information used by the voice mail system. The files in this directory and its sub-directories are very dynamic. **Note**: Never open these files. Opening any of the configuration files may cause the voice mail system to become corrupted in part or completely, and can cause loss of voice mail messages. ■ MESSAGE: Contains all voice mail messages as.wav files, along with an .enl pointer file for each message. ■ NetTempIn: Used by distributed voice mail servers. ■ Servers ■ SHORETEL: Contains a subdirectory folder for each voice mailbox configured on the system. Each user, menu, and distribution list includes a mailbox. There are also system mail boxes for voice mail access and forwarding. Each of the sub-directories contain the names and greetings for that mailbox, as well as configuration and pointer files.	*<drive>\Shoreline Data\VMS* <drive>\Shoreline Data\VMS\MESSAGE <local drive>\Shoreline Data\VMS\NetTempIn <drive>\Shoreline Data\VMS\Servers <drive>\Shoreline Data\VMS\SHORETEL
Inetpub\ftproot	This is the default FTP directory installed by IIS.	*<drive>\Inetpub\ftproot*
ts	Contains the boot files and system software for Shoretel supported languages	
tsa	Contains the boot files and system software for all full-width ShoreTel Voice Switch 40/8, 60/12, 120/24, T1, and E1 switches	
tsk	Contains the boot files and system software for all half-width ShoreTel Voice Switch 30, 30BRI, 50, 90, 90BRI, T1k, E1k, 220T1, 220E1, and 220T1A switches	

Table 4: ShoreTel Server File System (Continued)

Directory	Description	Default Path
tsk1	Contains the boot files and system software for all voice mailbox model switches 50V, 90V, 90BRIV	
tsu	Contains the boot files and system software for the Service Appliance 100 (SA-100) and Service Appliance 400 (SA-400)	

Registry

The ShoreTel software uses the Windows registry to store various parameters used by the ShoreTel system. These registry keys reside at the following path:

HKEY_LOCAL_MACHINE\SOFTWARE\ShorelineTeleworks

Maximum Transmission Unit (MTU) Size for Connections

The default Maximum Transmission Unit (MTU) setting for PPP (Point-to-Point Protocol) clients, VPN (Virtual Private Network) clients, PPP servers, or VPN servers running Routing and Remote Access on ShoreTel systems is 1400. To change the MTU value, you must edit the registry. For further information, contact ShoreTel Technical Support.

Telephony Management Service (TMS)

A ShoreWare server can be configured with a registry entry that TMS pushes to the server's managed switches. The registry entry typically configures/invokes some custom behavior in the switch. For example, when an administrator modifies the SwitchDebug value in the registry to configure the switch, TMS automatically reloads the value and pushes it to the managed switches. Other registry changes, such as CDRDataExpiration, are automatically reloaded by TMS so that TMS immediately starts using the new value.

When a registry change needs to be system-wide, the administrator must manually change the registry on every distributed server. On a large system, manual updates can be slow, repetitive, and error-prone.

TMS Registry Push

An administrator configures a TMS registry entry on the HQ server and then TMS automatically propagates the registry entry to all distributed servers. Each distributed server updates its local registry, which causes TMS to automatically reload its registry settings. Each distributed TMS then uses the new registry setting. If the registry setting is SwitchDebug, each distributed server pushes SwitchDebug to its managed switches.

It's possible to prevent updating a DVS if needed; for example, when upgrading a system where a DVS has different settings from the HQ server. You can prevent the registry setting from being pushed to DVS by putting its name into the TMS registry setting NoHQPushSettings.

DVS is supported. ShoreTel Voice Mail Switch and SA-100/SA-400 Server Appliance do not get any registry pushes.

Changes on Servers (and Clients)

An administrator can add the string value HKLM\Software\Shoreline Teleworks\Telephony Management Server\Settings\NoHQPushSettings, but it is not installed. When the administrator changes a pushable TMS registry setting, TMS creates a backup:

- CDRDataExpirationBackup
- DRDataCacheSizeBackup
- LogAssertsAsNTEventsBackup
- SwitchDebugBackup
- LogEvent108Backup

ShoreTel Release Numbering Scheme

In the ShoreTel release number schema, the first number is the major build, the second number is the minor build, the third is the number of the build, and the fourth number is always 0.

The ShoreTel version numbering schema for various components is as follows:

- Major = release; minor = update within release; build = build number of the minor/major combo; fourth number = 0
- DVD or Package major.minor.build.0

  Example: 14.3.1601.0
- Server major.minor.build.0

  Example: 14.3.1601.0
- Remote Server major.minor.build.0

  Example: 14.3.1602.0
- Client major.minor.build.0

  Example: 14.3.1603.0
- Switch major.minor.build.0

  Example: 14.3.1604.0

Patches are software fixes that update a specific version of software and cannot be applied to previous major or minor versions.

CHAPTER

3

ShoreTel Voice Switches

This chapter describes maintenance considerations for ShoreTel Voice Switches. It contains the following information:

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Using the Diagnostics & Monitoring System to Upgrade Switch Firmware 63
Using Quick Look to Upgrade Switch Firmware 63
Manually Upgrading the Switch's Firmware 64
ShoreTel Voice Switch Boot Options 64
IP Address from DHCP 65
Accessing ShoreTel Voice Switch CLI on the SoftSwitch 67
Router Auto-Delete Properties for ICMP Redirects 68
Using a Telnet Session to Set IP Address and Boot Parameters 69
Boot Flags 71
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ShoreTel Voice Switch Utilities 72
Ipbxctl Utility 73
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Connecting to a ShoreTel Voice Switch 87
Power over Ethernet Switches (PoE) 88

Overview

ShoreTel Voice Switches provide physical connectivity for the PSTN and analog phones, and logical connectivity for IP endpoints on a reliable, highly scalable platform for the ShoreTel call control software. The call control software runs on the operating system of the switch, for example Linux or VxWorks®.

The ShoreTel Voice Switches have flash memory that allows permanent storage of the call control software and configuration information. The voice switches have no moving parts (that is, no hard drive) other than a highly reliable fan. The switches include the necessary DSP technology to enable toll-quality voice with features like echo cancellation, voice compression, and silence suppression.

TMS propagates configuration data from the database to each switch upon reboot of either TMS or the switch. The data sent is a subset of configuration data specific to that switch. TMS also maintains this data by propagating changes to the database to those switches affected by the change. The TMS/Switch configuration interface uses the same Network Call Control protocol that is used for other TMS/Switch communication. The TMS/Switch configuration interface uses the same Network Call Control protocol that is used for other TMS/switch communication. The NCC protocol is based on Sun RPC. You can obtain the configuration data that TMS sends to any specific switch with a CLI command. For more information, see Commands Available Through VxWorks® CLI on page 76.

Switches share their switch-specific configuration with other switches in the system using the UDP-based Location Service Protocol (LSP). Switches keep current with other switches by propagating their changes and receiving them from other switches. For information about viewing switch-to-switch communications, see Commands Available Through VxWorks® CLI on page 76.

Note

Switch-specific configuration is in FLASH but configuration for other switches is in RAM. After rebooting, the switch syncs with LSP to keep current with these configuration changes.

The ShoreTel Voice Switches communicate call control information on a peer-to-peer basis. When Distributed Routing Service (DRS) is enabled, switches exchange LSP messages only with other switches at the same site. DRS communicates directly with the database to keep the database configuration current. TMS tells each switch how to find DRS as part of the configuration process described earlier. When DRS is enabled, switches generally give DRS an opportunity to resolve numbers, so that its more complete view of the system can be leveraged to find the best contact. If the switch knows where an intra-site extension is, it does not involve DRS.

For analog phones, the switch detects whether the phone is on or off hook, collects digits from the phone, and (based on digits collected) determines when a call is established. If necessary, the switch communicates with other switches (in some cases this may not be necessary, such as when the call is to an endpoint directly on the switch) to establish a call between the appropriate endpoints.

The switch acts as a media gateway for the PSTN and analog phones by encoding the analog voice and transmitting it to the other endpoint over the IP network using RTP. The switch also uses NCC to send events to TMS about digit collection, caller ID, call establishment, and so forth. TMS makes this information available to the server applications. These applications are not necessary for many calls (such as those between two phones or a trunk and a phone, which can be established with only the switches controlling the phones and trunks), but they can enhance the user experience. For example, Communicator can provide information about the call to the user's desktop.

After the call is established, TMS monitors the call and logs call information on the Call Detail Report (CDR) database.

ShoreTel Voice Firmware Upgrades

You can see the status of ShoreTel Voice Switches using either the Diagnostics & Monitoring system or Quick Look, both of which are available through ShoreTel Director.

When a switch update is required, the value in the **Service** column in either the Diagnostics & Monitoring system or Quick Look is one of the following:

- **Firmware Update Available** indicates that a patch is available and an upgrade is required to load the patch. When a switch is in this state, it is fully functional and in communication with TMS and the other switches in the system.
- **Firmware Version Mismatch** indicates that you must upgrade the switch before it can communicate with the TMS server. A switch with mismatched firmware can communicate with other switches of the same version and manage calls, but cannot support server and client applications.

To upgrade the firmware for ShoreTel Voice Switches, use either the Diagnostics & Monitoring system or Quick Look. You can also upgrade a switch's firmware manually with the burnflash utility.

Using the Diagnostics & Monitoring System to Upgrade Switch Firmware

1. Launch ShoreTel Director.
2. Click **Maintenance** > **Diagnostics & Monitoring**.

   The Dashboard page is displayed.
3. Click **Status** > **Switches**.

   The Switches page is displayed.
4. Select the check box for the switch(es) you want to upgrade.
5. In the **Command** drop-down menu, select **Reboot**.
6. Click **Apply**.
7. In the Confirmation dialog box, click **OK**.

Using Quick Look to Upgrade Switch Firmware

1. Launch ShoreTel Director.
2. Click **Maintenance > Quick Look**.

The Quick Look page is displayed.

3. Click the Site where the switch is located.

   The Maintenance - Voice Switches and Service Appliances Summary page is displayed.

4. In the row for the switch whose firmware you want to upgrade, select **Reboot** in the Command drop-down list.

   Upon restart, the switch is automatically upgraded. You can monitor the progress of the upgrade on the Quick Look page.

Manually Upgrading the Switch's Firmware

You can use the burnflash utility to uprade a switch manually.

- From the server command line, enter the `burnflash` command in this format:

  ```
  C:\Program Files\ShorelineCommunications\ShorewareServer>burnflash -s
  <switch IP Address>
  ```

ShoreTel Voice Switch Boot Options

When a ShoreTel Voice Switch boots, it requires an IP address to connect to the network and an application program. ShoreTel Voice Switches are set to use a DHCP server for an IP address and to retrieve the application from the switch's flash memory.

If a DHCP request receives no response, the switch tries a BootP request as a backup. ShoreTel recommends using static IP parameters configured via the serial port, as this is much more reliable. If DHCP is to be used, ShoreTel strongly recommends using DHCP reservations for each switch so that the DHCP lease is not lost.

If a DHCP server is not available, you can set the IP address manually from the switch's maintenance port.

The standard method for booting a ShoreTel Voice Switch is to boot from the switch's flash memory. When a ShoreTel Voice Switch is first powered on, it reads the boot parameters stored on the boot ROM, which instructs the switch to load software from flash memory. When the software starts, it loads its configuration, which is also stored in flash memory.

Booting from FTP is available for instances when you cannot boot the switch from flash memory. When you boot a switch from FTP, the operating system and software load from the FTP site identified in the boot parameters. The loaded configuration is a configuration received from the TMS server.

If the switch fails to load the application from flash and does not have the IP address of the ShoreTel server, you can set the IP address and boot parameters by connecting to the maintenance port and using the configuration menu. The configuration menu allows you to set the IP address of the switch and enter the ShoreTel server (boot host) IP address.

IP Address from DHCP

The switch sends requests for an IP address to the DHCP server ten times at increasing intervals. When the switch receives a response from the DHCP server, the boot process begins. If the switch fails to get an IP address from the DHCP server, it uses the last assigned IP address. The switch continues sending IP address requests to the DHCP server.

If the DHCP server sends a conflicting IP address while the switch is using an address from a previous state, the entire system restarts. Use long lease times to prevent to prevent this. ShoreTel recommends either static IP parameters or DHCP reservations.

If the switch does not receive an IP address from the DHCP server and an address is not available from a previous state, the switch continues polling the DHCP server until it receives an address.

Setting the IP Address with VxWorks®

If the switch or voicemail-enabled switch is not configured with an IP address and fails to boot from flash, it cannot download the application and configuration from the FTP server. In this case, you can manually set the IP address and boot parameters from VxWorks® accessible from the maintenance port. Boot parameter changes do not take effect until the switch is rebooted.

Note

This command line interface is not available through Telnet.

Connecting to the Maintenance Port of a ShoreTel Voice Switch

1. Connect a straight serial cable between a personal computer and the ShoreTel Voice Switch.
2. Use a terminal emulation program such as Tera Term Pro or PuTTY freeware to open a connection to the switch.
3. Apply these values to the terminal settings:
   - Speed: 19.2 Kbs
   - Data bit: 8 bits
   - Stop bit: 1
   - Parity: No parity
   - Flow Control: None

The CLI Main Menu

The CLI main menu automatically appears at system startup. You can also invoke the menu at any time by entering a question mark “?”.

Table 5 on page 66 describes the commands available in the CLI main menu.

Table 5: Commands in CLI Main Menu

Command	Description	Notes
0	Exit	Exit from CLI of voicemail-enabled switch and go to the Linux shell.
1	Show version	Lists version numbers for firmware and boot ROM in addition to the base version and the CPU board version.
2	Show system configuration	Displays the switch's boot and IP configuration.
3	Change system configuration	Takes you to the system configuration menu where you can set a switch's boot and IP configuration.
4	Reboot	Reboots the switch
5	Shutdown	Shutdown the voicemail-enabled switch and be ready to power-off.
6	Archive Logs	Archive log files in /cf/shorelinedata/Logs directory and core files in /cf/core directory and save the archive file in /inetpub/ftproot directory in the server.
?	Help	Enter a ? to print this menu.

To select an option in ShoreTel Voice Switch CLI, enter the number associated with the menu item and press **ENTER**. To change or set a parameter, select the item you wish to change, then type the parameter number and press Enter.

Boot and IP Configuration Options

When you choose Change System Configuration from the CLI main menu, a menu of boot and IP configuration options appears.

Table 6 on page 66 describes the boot and IP configuration options.

Table 6: Boot and IP Configuration Options

Command	Switch Description	Voicemail-Enabled Switch Description
0	Return to previous menu	Return to previous menu
1	Change IP address	Change IP address
2	Change IP subnet mask	Change IP subnet mask
3	Change the gateway IP address	Change the gateway IP address
4	Change server IP address: **Note:** This is the IP address the ShoreTel server with the FTP service for the switch.	Change server IP address: **Note:** This is the IP address the ShoreTel server with the FTP service for the switch.

Table 6: Boot and IP Configuration Options

Command	Switch Description	Voicemail-Enabled Switch Description
5	Change boot method	
6	Enable/disable DHCP	Change boot method
7	Change network speed and duplex mode	Enable/disable DHCP
8		Change network speed and duplex mode
D		Set/change domain name
P	Set/change primary DNS IP address	Set/change primary DNS IP address
S	Set/change secondary DNS IP address	Set/change secondary DNS IP address
T		Set/change network time server IP address
*		Display current configuration.
?	Help	

After you have set your IP address and boot options, enter ? to return to the main menu. You must reboot the switch for the new setting to take effect.

Accessing ShoreTel Voice Switch CLI on the SoftSwitch

To run ShoreTel Voice Switch `CLI` diagnostics on the SoftSwitch, you must create a Telnet session. ShoreTel Voice Switch `CLI` commands are listed in VxWorks® Command Line Interface on page 75.

Note

All the information that is displayed in the session will also appear in the SoftSwitch log file.

1. Create the following `DWORD` entry in

```
HKEY_LOCAL_MACHINE\Software\Shoreline Teleworks\SoftSwitch
```

or, if you are using a 64-bit server, create the DWORD entry in

```
HKEY_LOCAL_MACHINE\Software\Wow6432Node\Shoreline
Teleworks\SoftSwitch:
```

or, if you are using a 64-bit server, create the DWORD entry in

```
HKEY_LOCAL_MACHINE\Software\Wow6432Node\Shoreline
Teleworks\SoftSwitch:

TelnetEnabled
```

2. Set the value to 1.
3. Open a Command Prompt (DOS) window and type:

```
telnet localhost 2323
```

In order to Telnet to the SoftSwitch, the Telnet port must be set to 2323. The standard Telnet port is 23.

4. Press **ENTER**.

   No User ID or Password is required. This immediately logs you into the SoftSwitch.

5. Press **ENTER** a second time to get the SoftSwitch prompt, which looks like the following:

```
????
SHELL: ????
SHELL:
```

6. Enter CLI commands as described in VxWorks® Command Line Interface on page 75.

7. End the SoftSwitch Telnet session by typing `x.`

8. Press **ENTER**.

9. Remove the “Telnet Enabled” DWORD from the registry editor by right-clicking on it and selecting **Delete**.

To start a Telnet session to the SoftSwitch from a different computer, you must specify the IP address of the ShoreTel server and modify the Telnet port to 2323.

All switch commands are available in the SoftSwitch with the exception of the following:

- Any VxWorks-specific commands
- msps

Router Auto-Delete Properties for ICMP Redirects

When WAN links fail, ICMP redirect messages are received by the ShoreTel Voice Switches from routers on the network. These ICMP redirect messages notify hosts on the network (such as ShoreTel Voice Switches) that an alternate route is available, and the switch updates its routing table accordingly.

The default behavior for ShoreTel Voice Switches is to automatically delete any ICMP redirect messages three minutes after time of receipt.

You can shorten or lengthen this period of time in one-minute increments, or you can disable the automatic deletion of ICMP redirect messages altogether.

Modifying the Time Period for the Automatic Deletion of ICMP Redirect Messages

1. Create the following DWORD entry in

   HKEY_LOCAL_MACHINE\SOFTWARE\ShorelineTeleworks

   TelephonyManagementServer\Settings:

```
SwitchDebug - "debug_options timeout_icmp_redirect n."
```

2. Set the **value of n** to the desired time period. Note that this must be an integral value and the number represents minutes, not seconds. The **value of n** can be set to zero (0) to disable the auto deletion of ICMP redirect messages.

   When this key is defined in the main server, the switches automatically delete all of their routing table entries after the specified period of time. Note that sampling occurs once per minute, so routes do not disappear exactly 360 seconds later if *n* is set to 6.

3. Reboot the ShoreTel Voice Switch for these changes to take effect.

Using a Telnet Session to Set IP Address and Boot Parameters

You have the option of setting IP address and boot parameters using the VxWorks® `bootChange` command. To access the bootChange command, you must establish a telnet session to the switch. For information on other commands available from VxWorks®, see VxWorks® Command Line Interface on page 75.

1. Start the Telnet process with an `ipbxctl` command entered in this format:

   ```
   C:\Program Files\ShorelineCommunications\ShoreWareServer>ipbxctl -telneton

   <Switch IP Address>
   ```

2. After the Telnet process is running, open a Telnet session with the switch.

   You are prompted for a User ID and Password.

3. For User ID, enter `anonymous`.

4. For Password, enter `ShoreTel` (case sensitive). The ShoreTel CLI opens and displays the menu of choices.

5. At the > prompt, enter `bootChange`.

   The boot device parameter appears.

6. Modify parameters by typing values and pressing **ENTER** [Do not backspace].

   When you press **ENTER**, the next boot parameter appears.

   Table 7 lists and describes the parameters required for flash and FTP booting of ShoreTel Voice Switches.

7. Close the Telnet connection with the following `ipbxctl` command:

   ```
   C:\ProgramFiles\ShorelineCommunications\ShoreWareServer>ipbxctl -telnetoff

   <Switch IP Address>
   ```

Table 7: Parameter Settings for Flash Boot and FTP Boot

Parameter	Description	Flash Boot	FTP Boot		
		24, T1/E1 SG-90/50/ 220t1/220E1	24	T1E1	SG-30/50/90/ 220TI/220TIA/ 220E1
boot device	A network interface or a flash location	flash = 0	fei	fei	emac0
processor number	Always 0	0	0	0	0
host name	Always bootHost	bootHost	bootHost	bootHost	bootHost
file name: SG	Path to VxWorks.sys file for SG switches	/flash0/ vxworks	/tsa/ vxworks	/tsa/ vxworks	/tsk/ vxworks
inet – ethernet	<IP address>:<Subnet Mask (hex)>[a]	10.10.0.59:ffff0000	10.10.0.59:ffff0000	10.10.0.102:ffff0000	10.10.0.102:ffff0000
inet – backplane	Not used				
host inet	IP address of the main ShoreTel server[a]	10.10.0.5	10.10.0.5	10.10.0.5	10.10.0.5
gateway inet	IP address of router[a]	10.10.0.254	10.10.0.254	10.10.0.254	10.10.0.254
user	FTP site – User name login (typically set to anonymous)	anonymous	anonymous	anonymous	anonymous
ftp password (pw) (blank – use rsh)	FTP site – Password (typically set to st1)	st1	st1	st1	tsk
flags	See Boot Flags	0x40	0x40	0x40	0x40
target name	Host name of switch that can be set to other values	ShorelineSwitch	ShorelineSwitch	ShorelineSwitch	Shoretelbuild

Table 7: Parameter Settings for Flash Boot and FTP Boot

Parameter	Description	Flash Boot	FTP Boot		
		24, T1/E1 SG-90/50/ 220t1/220E1	24	T1E1	SG-30/50/90/ 220TI/220TIA/ 220E1
startup script	Path to bootscrp.txt file for SG-24, SG-8, SG-T1	/flash0/bootflsh.txt	/tsa/bootscrp.txt	/tsa/bootscrp.txt	/tsk/bootscrp.txt
other	Set to network interface	fei	fei	fei	emac

a.These IP addresses are examples. Use the IP address for your system.

Boot Flags

The boot flags allow you to alter how the switch boots up. The hexadecimal values of the flags and their actions are listed in Table 8. You can aggregate flags to perform multiple functions by summing the hex values for the commands.

For example, the following command aggregates the flags 0x40 + 0x2000 + 0x40000 and instructs the switch to use DHCP to get boot parameters, disable the ShoreTel shell, and set network speed and duplex mode to 100 Mb HD:

```
0x42040
```

Table 8: Boot Flags

Command	Description
0x0	Network speed and duplex mode auto-negotiate.
0x20	Disable login security.
0x40	Use `DHCP` to get boot parameters.
0x1040	Use `bootp` to get boot parameters.
0x2000	Disable ShoreTel shell.
0x10000	Network speed and duplex mode 10 Mb full duplex (fixed).
0x20000	Network speed and duplex mode 10 Mb half duplex (fixed).
0x30000	Network speed and duplex mode 100 Mb full duplex (fixed).
0x40000	Network speed and duplex mode 100 Mb half duplex (fixed).

Setting IP Address and Boot Parameters from the VxWorks® Boot Monitor

If you are unable to access the ShoreTel Voice Switch CLI, you can access the same configuration options available with the bootChange command from the switch's boot monitor.

WARNING!

Making incorrect settings in the boot monitor can cause the switch to malfunction.

1. Connect a serial cable between a personal computer and the ShoreTel Voice Switch.
2. Use a terminal emulation program such as HyperTerminal to open a connection to the switch.
3. Apply these values to the terminal settings:
   - Speed: 19.2 kbps
   - Data bit: 8 bits
   - Stop bit: 1
   - Parity: No parity
   - Flow Control: None
4. Type `c` at the prompt for SG-24, T1 or E1 switches, and press **ENTER**. You are guided through the options listed in Table 7 on page 70.

Note

For SG-50/90/220T1/220T1A/220E1 and voicemail-enabled switches, change options using the `setenv` command, and save using the `saveenv` command. For example:

- To change IP address:

```
setenv ipaddr 10.10.0.59
```

- To change subnet mask:

```
setenv netmask 255.255.0.0
```

- To save all changes:

```
saveenv
```

ShoreTel Voice Switch Configuration Reset

Each switch includes a hidden reset button on the front panel that restores the switch to factory default boot settings and requests a new configuration from TMS. To enable the reset, press the button for 5 seconds. This button reboots the ShoreTel Voice Switch.

This completely clears all boot parameters and clears the switch's configuration.

ShoreTel Voice Switch Utilities

Two utilities are available to help you diagnose and update ShoreTel Voice Switches.

- The ipbxctl utility allows you to perform diagnostics and Telnet to the switch.

- The burnflash utility updates the switch to the version of firmware compatible with the ShoreTel server software.

Both utilities are available in the ShoreTel Server folder:

C:\ProgramFiles\ShorelineCommunications\ShorewareServer

Ipbxctl Utility

Table 9 lists and describes the commands available using the `ipbxctl` utility.

Table 9: ipbxctl Utility Commands

Command	Description
`-telneton <Switch IP Address>`	Enables Telnet connection on the switch.
`-reboot <Switch IP Address>`	Reboots the switch without using ShoreTel Director.
`-flash <Switch IP Address>`	Sets switch to boot from flash memory (allows you to boot without logging in).
`-ftp <Switch IP Address>`	Sets switch to boot from FTP (allows you to do this without logging in).
`-diag <Switch IP Address >`	Sends switch state information. By default, the system puts this information in the same folder where the ipbxctl utility is running. **Note:** This may be disruptive to normal switch function. Use this command only for diagnostic functions, not for reporting.
`-reset`	Clears all flash memory. Returns switch to factory defaults. **Note:** This command is not available from the ShoreTel CLI.
`-telnetoff <Switch IP Address >`	Disables Telnet connection on the switch.
`-traceroute <target IP Address >`	Network troubleshooting tool. For additional information about the parameters that can be used with this command, see Table 12 on page 86.

Password Access

After entering the `ipbxctl` command, the user is prompted to enter a password. After the user enters the correct password, the device permits access to executables that configure or diagnose the switch.

Performing a telnet session on a ShoreTel Voice Switch requires password access to `ipbxctl` before invoking the `telneton` command. After entering the correct password, a user can establish a telnet session during the next minute. At the expiration of this period, existing telnet sessions are not affected, but users cannot establish a new telnet session. Telnet access is permitted only from the IP address from where the CLI was entered and access granted through password authorization.

Telnet continues to require User ID and Password entry that is distinct from `ipbxctl` password access. However, unlike the ShoreTel `cli` command and password, Telnet transmits the User ID and Password in the clear. The ShoreTel Voice Switch continues using the user ID of “anonymous” and a password of “ShoreTel” for initiating Telnet.

CLI passwords are configurable only through Director. The default password is **ShoreTel**.

Pressing the reset button on the switch resets the password to the default value of ShoreTel. The password that was active on the switch prior to the hardware reset is restored when the switch is connected to the network and receives an update from ShoreTel.

To set the ShoreTel Voice Switch passwords, select **Administration > System Parameters > Other** in the ShoreTel Director menu to access the Edit Other Parameters page.

Burnflash Utility

Table 10 on page 74 lists and describes the commands available using the `burnflash` utility.

Table 10: Burnflash Commands

Command	Description
`burnflash - s` <Switch IP address>	Updates all bootrom areas.
`burnflash - test - s` <Switch IP address>	Checks to see if `burnflash` command can be used.

UBOOT Utility

UBOOT is the boot loader for voicemail-enabled switches. The UBOOT environment is accessed from a terminal emulator through the serial port when the switch is booted. Before starting the boot, UBOOT lists the processor characteristics and displays results of the Power On Self Test (POST). The switch then waits a specified period before starting the autoboot.

Diagnostics

This section describes the tools available for diagnosing problems with switches.

Power LED

ShoreTel Voice Switches have one power LED with standard on and off displays. When flashing, the LED indicates other information about the switch:

- 2 flashes
  - The switch failed its internal self-test.

- The switch has a hardware failure; replace the unit and submit a Return Material Authorization (RMA) to ShoreTel.

- 3 flashes
  - Booting via FTP.
  - Flash memory might be corrupted. Go to the Status > Switches page in the Diagnostics & Monitoring System or the Quick Look page to ensure that the system is running properly.
- 4 flashes
  - The IP address is unavailable.
  - DHCP and BOOTP did not respond to the IP address request, and the IP address is not available in nonvolatile memory to continue the boot process. The switch will automatically reboot in five seconds and try again. Check the BOOTP/DHCP server and the network configuration to ensure that the voice switch is receiving a valid IP address.
- 5 flashes
  - The operating system is not available.
  - The switch is booting from FTP but cannot find the boot files. It automatically reboots in five seconds.
- 6 flashes
  - The switch is using a previously stored IP address.
  - A BOOTP/DHCP transaction was attempted, but the BOOTP/DHCP server did not respond. The switch continues to use the IP address stored in nonvolatile memory until it receives a valid response. If the switch receives a response that provides a different IP address, it reboots using the new IP address. If the switch receives a response that matches the IP address stored in nonvolatile memory, it continues operation, and the power LED stops flashing. If the problem persists, check the BOOTP/DHCP server and network configuration.

VxWorks® Command Line Interface

VxWorks® provides a variety of useful tools and debuggers. This command line interface offers access to both standard VxWorks® commands and ShoreTel commands. You can access the VxWorks® interface by opening a Telnet session to a switch without invoking CLI.

You may also enter the VxWorks® command line interface from a serial interface by entering the command gotoshell from the Shoreline> prompt. To return to CLI, enter the command cliStart.

Use caution when using the VxWorks® interface; running commands can degrade performance on the switch. ShoreTel does not support changing or setting IP or other parameters using the VxWorks® interface. Changes made using this interface may not be persistent and using it may cause unpredictable behavior in the system.

Note

ShoreTel does not support changing or setting IP or other parameters using the VxWorks® interface. Changes made using this interface may not be persistent, and using it may cause unpredictable behavior in the system.

Commands Available Through VxWorks® CLI

Table 11 on page 76 describes the commands available through the VxWorks® interface.

Table 11: VxWorks® CLI Commands

Command	Description	Available on Voicemail-Enabled Switches	Notes
`adm_debug_level`	Logs admission control and bandwidth manager signal flow onto serial port.		– 2 logs more diagnostics.
`adm_diag_level`	Logs admission control and bandwidth manager signal flow into IPBX log.		– 2 logs more diagnostics.
`arpShow and arptabShow`	Displays the ARP table.	X	
`autoReboot – 0`	Turns the switch watchdog off to prevent rebooting after a catastrophic failure.		Use only as directed by ShoreTel Technical Support.
`bigNvRamSetup`	Erases switch's configuration in NvRam.		
`bootChange`	Changes the boot ROM parameters.		Use with caution.
`cid_debug_level`	Logs caller ID related information for extensions.		
`cliStart`	Opens the ShoreTel command line interpreter (from a Telnet session) from serial ports only.	X	Switch reboot required for returning switch to VxWorks® interface.
`config_status`	Outputs the configuration records for the switch.		
`DEBUG_LEVEL`	Sets the ShoreSIP debugging flags.		Recommend using level 0xe00.
`diagdCommands`	Outputs full switch diagnostic information.		
`dial_num_dump`	Displays information about switch's off-system extension configuration.		

Table 11: VxWorks® CLI Commands

Command	Description	Available on Voicemail-Enabled Switches	Notes
`dn_plan_status`	Displays information about the switch's dial plan.		
`dnp_debug_level`	Displays detail information (digit by digit) about dial plan access.		Recommend using level 1.
`dtmf_debug`	Displays RFC2833 for G729 related events. Settings are variable, so contact ShoreTel TAC at (800) 742-2348 for assistance.		
`DumpSB`	Displays maximum PMCSW outputs.		
`dumpUsedBw`	Displays information about actual bandwidth used on individual calls/legs.		
`etherMonBroadcast`	Set command value to **1** to include broadcast network packets in packet capturing.	X	Default value **0** does not capture/broadcast network packets.
`etherMonDump`	Writes the ethernet trace information captured when using EtherMonStart. Writes to a .cap file in \inetpub\ftproot directory of the ShoreTel server controlling the switch. The .cap file name is ST-<lst 3 bytes of MAC-time-date>.cap.	X	
`etherMonStart <bytes>`	Bytes is the number of bytes of information you want to capture (for example, 10000000). Recommended values are between 1000000 and 3000000. Captures ethernet packets for trace purposes.	X	Requires excessive switch memory. Use `memShow` to determine memory available for command.
`etherMonStop`	Stops capturing ethernet packets.		
`eval_adm_var`	Displays information about switch's own bandwidth usage.		

Table 11: VxWorks® CLI Commands

Command	Description	Available on Voicemail-Enabled Switches	Notes
`eval_bwm_var`	Displays information about total and available bandwidth.		
`ext_bca_status`	Displays active BCA calls along with call stack usage information.		Run on switches hosting BCA extensions.
`ext_cco_status`	Displays information the switch's extension CCOs.		
`ext_conf_status`	Displays MakeMe conference port status.		
`ext_debug_level1`	Logs extension CCO configuration.		
`ext_debug_level`	Sets the extension debugging level.		Recommend using level 4.
`ext_pg_status`	Displays active pickup group calls.		To be run on the switches hosting PG extensions.
`ext_ecr_status`	Displays all configured Personalized Call Handling rules on switch.		
`ext_ecr_debug`	Displays real-time behavior of Personalized Call Handling rule.		Shows triggering of rule during inbound call.
`fax_debug_level`	Displays fax-related events and processing such as tone detection, fax determination, and fax redirect. Valid settings are 0 and 1. Default value is 0.		
`fax_verbose`	Displays fax/silence detection, jitter buffer freezing. and echo canceller disabling related events. Valid settings are 0 and 1. Default value is 0.		
`flsh_getVersion`	Displays switches firmware and bootrom versions.		
`flsh_printBootLine`	Prints the boot parameters of the switch.		
`flsh_setBootSourceFlash`	Sets the switch to boot from flash memory.		Requires a restart for changes to take effect.

Table 11: VxWorks® CLI Commands

Command	Description	Available on Voicemail-Enabled Switches	Notes
`flsh_setBootSourceFTP`	Sets the switch to boot from FTP.		Requires a restart for changes to take effect.
`g729_verbose`	Displays more information for G729 calls.		Enable this for G729 calls with mscmd_verbose
`hostShow`	Displays the known hosts.	X	
`hunt_load_debug`	Logs basic huntgroup call flow.		Use when debugging heavy call load issues
`icmpstatShow`	Displays ICMP statistics.	X	
`ipdt_debug_filter`	To print out IPDT log for one extension (Ext A). > ipdt_debug_level – -1 > ipdt_debug_filter– 1 (tell IPDT that filter is enabled) > ipdt_restrictTraceExts "Ext A's #" (turn on Ext A log) > ipdt_remRestrictTraceExt "Ext A's #"(turn off Ext log) To print log for all extensions:> ipdt_debug_filter – 0		
`ipdt_debug_level`	Recommend setting to **– -1** to turn on all logging.		
`ipdt_dumpCCOCK`	Dumps BB call key state, since there is no extension associated with BB.		
`ipdt_dumpExtCalls`	Dumps call information in the extension (e.g. callID, legID, call state and leg state, etc.)		
`ipdt_dumpExtDisplay`	Dumps the current display view from IPDT.		
`ipdt_dumpExtensions`	Dumps information for all extensions controlled by the switch and the information for monitored extensions and MAE (BCA) extensions that are in the same switch and in the different switches.		

Table 11: VxWorks® CLI Commands

Command	Description	Available on Voicemail-Enabled Switches	Notes
`ipdt_dumpExtCK`	Dumps information for call keys on the extension.		Useful for troubleshooting LED patterns and icon issues.
`ipdt_resetExtDisplay`	Redisplay on the extension. If the phone display and IPDT display (ipdt_dumpExtDisplay) are desynchronized, run ipdt_reset_ExtDisplay to synchronize them.		
`ipdt_restrictTraceExts`	Set ipdt_debug_filter to 1. Then, use ipdt_restrictTraceExts to turn on logging on a particular extension.		
`ifShow`	Displays the current configured network parameters.	X	
`laa_debug_level`	Logs backup auto attendant signal flow.		
`lspConList`	Displays switch connectivity to other switches.		
`lsp_debug_level`	Displays Location Service Protocol messages that are exchanged between switches.		Recommend using level 4.
`lsp_ping`	Tests the LSP UDP communication to the far end switch. Parameters include IP address and test iterations.		example: -> lsp_ping "192.168.1.1", 100 Sends 100 packets to the switch at 192.168.1.1 (nominally 1 second). If command lists only the IP address, 1000 packets (10 seconds) are sent.
`lspTelList`	Displays local and remote contacts.		
`lspTelList 1`	Displays detailed information about local contacts.		

Table 11: VxWorks® CLI Commands

Command	Description	Available on Voicemail-Enabled Switches	Notes
`lspTelList 2`	Displays detailed information about remote contacts.		
`mae_debug_level`	Logs BCA call flow information.		
`mailbox_debug_level`	Logs mail box destination for a particular call.		
`memShow`	Shows current memory usage of the switch.	X	
`mgcp_msg_debug`	Logs MGCP messages.		
`mgcp_trans_debug`	Logs MGCP transactions.		
`mohc_debug_level`	Prints diagnostic information for music on hold calls when set to 1.		Can be set to either 0 or 1. Default is 0.
`mpm_debug_mask - 0x40`	Sets mpm debug flag to output Caller ID information received on inbound calls.		
`mpm_debug_mask - 0x10`	Displays detailed DTMF information.		
`mpm_debug_mask - -1`	Displays detailed mpm information. Full debug of inbound calls (CallerID, DTMF).		
`mscmd_verbose`	Prints diagnostic information for the media commands sent from Switch board layer when set to 1. Default is 0.		Main media command verbose variable.
`msps`	Displays media stream statistics for all active calls on the switch.		Use for all media-related issues.
`msps 7`	Displays media stream statistics for active calls.		
`msps 8`	Displays media stream statistics.		Use only as directed by ShoreTel Support.
`msps 16`	Displays media stream statistics.		Use only as directed by ShoreTel Technical Support.

Table 11: VxWorks® CLI Commands

Command	Description	Available on Voicemail-Enabled Switches	Notes
`mwi_debug_level`	Logs message waiting indicator setting call flow.		
`ping "<IP Address>"`	Include double quotes (“) around the IP address.	X	For voicemail-enabled switch: valid on ssh CLI, not ShoreTel CLI
`pri_log – 4`	Begins output of D-Channel information.		
`pri_trace – 4`	Sets the PRI D-Channel trace debug level.		
`pri_verbose`	Traces a high level description of the PRI traffic sent and received by trunks on the switch.		Recommend setting pri_verbose=1
`print_ether_stats`	Prints Ethernet statistics from the network controller.		
`rdn_diag_level`	Used to determine why calls are routing to particular destinations, similar to what gets put in the DRSMain log when DRS is enabled.		Useful values are 0 (none) or 5 (trace resolve_dn).
`reboot`	Reboots the switch.		
`Record2File2(port,time, <file_name>;0)`	Records inbound media on the specified port for the specified time (in seconds) and writers it to */inetpub/ftproot.*		Writes to the TMS server controlling the switch. FTP write access must be enabled on the server.
`rfc2833_for_g711_debug`	Displays events related to RFC2833 for G711.		Default is 0. It is a bitmasked integer. Can be used as 1 and 2.
`routeShow`	Displays current routing table.	X	
`routestatShow`	Displays routing statistics.	X	
`sb_debug_level`	Switch board debug variable that prints debug information for the commands sent from Call control.		Useful values range from 1-5.

Table 11: VxWorks® CLI Commands

Command	Description	Available on Voicemail-Enabled Switches	Notes
`set_mpm_debug (char *)`	Used to print information regarding commands/event interface between host CPU and DSPs. Uses string as the parameter. Valid parameters include “pots”, “pstn”, “dtmfd”, “dtmfg”, “cdis”, “class”, “cpm”		Example: To print POTS related information, enter *set_mpm_debug(“pots”)*
`sip_debug_level -1`	Logs ShoreSIP to SIP translation.		
`sip_debug_level -4`	Logs SIP messages also.		
`sipuaCallList`	Displays active SIP stack calls. sipuaCallList 2 dumps more call related information.		Run on switches hosting SIP trunks/extensions.
`sipuaList`	Displays list of SIP trunk/ extension user agents.		Run on switches hosting SIP trunks/extensions.
`t2t_debug_level`	Logs trunk interval information like silence, trunk name, trunk state, etc.		
`tcpstatShow`	Displays TCP statistics.	X	
`trans_debug`	Logs ShoreSIP transactions.		
`traceroute "<IP Address>"`	For troubleshooting network by mapping route packets use to traverse an IP network.	X	Remember to include double quotes (“) around the target IP address. (For details, see Running the Traceroute Command from the ShoreTel Voice Switch CLI on page 86.)
`trunk_cco_status`	Displays information about switch's trunk CCOs.		
`trunk_debug_level`	Sets the trunk debugging flag		Recommend using level 4.
`uaCallList`	Displays information about active calls and legs.		
`ua_call_status`	Shows a snapshot of the active call status of the switch.		

Table 11: VxWorks® CLI Commands

Command	Description	Available on Voicemail-Enabled Switches	Notes
`uaList`	Displays list of ShoreSIP extension/trunk user agents.		
`unset_mpm_debug(char*)`	Disables `set_mpm_debug` command		
`udpstatShow`	Displays UDP statistics.	XS	

Creating an Ethernet Trace File Using a ShoreTel Voice Switch

You can capture the output of VxWorks® commands from the ShoreTel Voice Switches in an Ethernet Trace file that is stored on the server that is managing that switch.

To create an Ethernet Trace file:

1. Open a Telnet session and type:

   `memShow`

   Run this command to verify that the switch has at least 1 MB of memory to perform the procedure.

2. From the **Start** menu, navigate to the **Control Panel > Administrative Tools** and locate the IIS Manager.

3. Right-click on the IIS Manager and select **Properties**. Then, enable the ability to write to the FTP server by selecting the **Write** check box and clicking **OK**. This enables the ability to write to the following directory:

   C:\Inetpub\ftproot

   In Windows Server 2008, you must edit the permissions of the `C:\Inetpub\ftproot` directory and give the users group write access.

4. At the command prompt, run the following VxWorks® commands.

   (See Table 11 on page 76 for more information about the specific commands.)

   `etherMonStart 1000000`

Note

Do not exceed 6 zeroes.

`etherMonStatus`

`etherMonBroadcast`

`etherMonBroadcast=1` (enables capturing broadcast packets)
`etherMonBroadcast=0` (enables capturing broadcast packets - default)

```
etherMonDump
etherMonStop
```

The data generated by running these commands is stored in the **_.cap** file in the following directory:

C:\Inetpub\ftproot

5. When you are finished capturing data, the file can be processed using an Ethernet packet analyzer, such as Ethereal or Wireshark.

Recording Audio from a Physical ShoreTel Voice Switch Port

You can capture audio output from a ShoreTel Voice Switch physical port (for example, trunk port) using VxWorks® commands. Audio output is saved on the HQ or DVM server that controls the switch.

To capture audio output:

1. From the **Start** menu, navigate to the **Control Panel > Administrative Tools** and locate the IIS Manager.
2. Right-click on the IIS Manager and select **Properties**. Then, enable the ability to write to the FTP server by selecting the **Write** checkbox and clicking **OK**.

   This enables the ability to write to the following directory:

   C:\Inetpub\ftproot

   In Windows Server 2008, you must edit the permissions of the `C:\Inetpub\ftproot` directory and give the users group write access.

3. At the command prompt, run the following VxWorks® commands.

   (See Table 11 on page 76 for more information about specific VxWorks® commands.)

   ```
   Record2File2 (1, 60, "test")
   ```

   Audio data from running this command is stored in the `test_rx.pcm` and `test_tx.pcm` files in *C:\Inetpub\ftproot.*

When you are finished capturing data, a "PCM Raw Data" file is created with the following format profile: 8000 Hz, 16-bit, Mono."

Using the Traceroute Command from a ShoreTel Voice Switch

The traceroute command offers a useful troubleshooting tool that determines the route taken by packets as they traverse an IP network from a ShoreTel Voice Switch to a specified destination. The command sends IP packets across the network, and the successive batches of packets have increased TTL (time-to-live) values.

TTL is a packet variable that defines the number of hops (stations) that a packet can pass through before it expires. When a station receives an expired packet, it discards the packet and sends a time exceeded message to the originating station. The traceroute command uses these expiration messages to build the path map.

By determining the path to a known destination, network technicians can identify firewalls blocking access to a site and gather information about the structure of a network and the IP address ranges associated with a host.

The `traceroute` command can be executed from the switch's command line or from the *ipbxctl.exe* utility.

Running the Traceroute Command from the ShoreTel Voice Switch CLI

1. Open a Telnet session and enter:

   `traceroute "<IP address>"`

   IP address is the address of the target destination and is a mandatory parameter. It must be in double-quotation marks.

2. Press **Enter**.

   Traceroute displays information about the number of hops, host IP addresses, and the amount of time required for each hop.

Table 12 on page 86 lists and describes the parameters that can be used with the traceroute command when executing the command from the ShoreTel Voice Switch command line.

Table 12: Traceroute Parameters

Parameter	Description
"target IP address"	This parameter specifies the target IP address of the traceroute. This parameter is mandatory. IP addresses must be used and surrounded by quotes. DNS names are not supported.
-C	Probe on ShoreTel call control (ShoreSIP) port, using a ShoreSIP Request message, to determine if the packets flow from the switch through the network. This parameter uses fixed ports and version compatibility among all ShoreTel switches receiving packets.
-e	This parameter specifies the use of a fixed destination port and an incrementing source port. By default, traceroute increments the destination port with each probe. This port number is then used as a sequence number for matching packet responses to the probes. Incrementing the destination port number may complicate troubleshooting when packets are being filtered or lost at certain ports.
-I	This parameter specifies the ICMP protocol. (UDP is the default protocol used for traceroute.)

Table 12: Traceroute Parameters

Parameter	Description
-S	This parameter specifies that probes are sent with a SIP message on the SIP destination port. Set this parameter to determine if SIP is flowing from the switch through the network. This parameter uses fixed ports.
-m <max_ttl>	*max_ttl* specifies the maximum time to live (TTL) value for traceroute packets. The default maximum TTL value is 30 bytes. Valid max_ttl values range from 1 to 255.
-f <first_ttl>	*first_ttl* specifies the TTL value of initial traceroute packets. The default initial TTL value is 1. Valid settings of first_ttl range from 1 to 255 and must be less than max_ttl.
-l <length>	*length* specifies the size of traceroute packet. The default packet size is 40 bytes, but valid user-entered length settings range from 100 to 1992.
-p <port>	*port* specifies the port for the destination probe. Valid port settings range from 1 to 65535.
-q <nqueries>	*nqueries* specifies the number of queries execute with each TTL value. The default value is 3. All integers greater than 0 are acceptable nqueries values.
-t <tos>	*tos* specifies Type of Server (tos) bit settings in the IP header of traceroute packets. The default value is 0. Valid settings range from 0 to 255.
-w <waittime>	*waittime* specifies the period (seconds) a switch waits for a reply to a traceroute packet. The default value is 5 (seconds). Valid waittime settings range from 2 to 86400.
-z <pause>	*pause* specifies the period (milliseconds) between successive probes sent by the command. The default value is 0 (milliseconds). Valid pause settings range from 0 to 3600000.
Entering `traceroute` without listing any parameters returns the list of available parameters.	

Connecting to a ShoreTel Voice Switch

ShoreTel Voice Switch Half-Width and Full-Width voice switches provide a serial communications port accessible through a straight-through 9-pin serial cable.

1. Connect a serial cable between a personal computer and the ShoreTel Voice Switch.
2. Use a terminal emulation program to open a connection to the switch.
3. Apply these values to the terminal settings:
   - Speed: 19.2 Kbs
   - Data bit: 8 bits
   - Stop bit: 1
   - Parity: No parity
   - Flow Control: None

For information on port pinouts, see Appendix D, Switch Port Pinouts.

Power over Ethernet Switches (PoE)

When considering the use of Power over Ethernet (PoE) data switches in your network, keep in mind that not all PoE data switches provide power to all data ports, and not all PoE data switches provide adequate power to support all devices.

For example, when 24 IP560 phones are plugged into a switch, the maximum power requirement can reach 153.6 W (24 phones x 6.4W/phone).

- The value in the **Maximum** column in Table 13 is normally a spike – typically during bootup. During normal operation, phones require less power.
- Verify that power allocated to the PoE ports matches the switch wattage.
- ShoreTel recommends selecting a PoE data switch that includes four hardware queues for Quality of Service (QoS) to ensure that rules can be set up to ensure adequate bandwidth for VoIP and other critical traffic.

Table 13: Power Usage and Class of ShoreTel IP Phones

Model	Idle	Maximum	PoE Class
IP110	2.8 W	4.1 W	2
IP115	2.6 W	3.7 W	2
IP212k	3.0 W	5.0 W	2
IP230	2.9 W	4.4 W	2
IP265	3.5 W	5.9 W	2
IP530	3.1 W	5.9 W	2
IP560	3.3 W	6.4 W	2
IP560g	4.1 W	7.1 W	3

Table 13: Power Usage and Class of ShoreTel IP Phones

Model	Idle	Maximum	PoE Class
IP565g	4.2 W	6.9 W	3
IP655	5.7 W	9.1 W	3
BB24	2.9 W	11.5 W (with IP560 connected)	3

CHAPTER

4

Voicemail-Enabled Switches

This chapter describes maintenance operations for ShoreTel voicemail-enabled switches. It contains the following information:

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Accessing Utilities for Voicemail-Enabled Switches 91
Switch Utilities 94
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Overview

ShoreTel voicemail-enabled switches provide voicemail services and access to auto attendant menus for extensions hosted by the switch. Voicemail-enabled switches provide local access to voicemail while being controlled by a distributed voice server (DVS) at a different location.

Voicemail-enabled switches store voicemail in Compact Flash (CF) cards. Auto Attendant menus, greetings, and prompts are stored in permanent flash memory. Voicemail backup and restore routines are available through Director for protecting voicemail on a regular basis. If a switch is disabled, information on the Compact Flash is retained and can be moved to another switch of the same model.

Voicemail-enabled switches are deployed in the same manner as other ShoreTel Switch 1-U Half Width switches and managed similarly to other switches and servers. You use ShoreTel Director to configure switch, voicemail, and server settings. Device status is also monitored through pages in ShoreTel Director.

Three ShoreTel voice switches operate as ShoreTel voicemail-enabled switches (that is, a voice switch and a voicemail server):

- ShoreTel Voice Switch 90V
- ShoreTel Voice Switch 90BRIV
- ShoreTel Voice Switch 50V

Utilities

This section describes the utilities available for voicemail-enabled switches.

Accessing Utilities for Voicemail-Enabled Switches

Utilities for ShoreTel voicemail-enabled switches are accessible through the maintenance port, an SSH client, or a Microsoft Windows program executed from a command prompt on the Headquarters server or a distributed voice server (DVS). The following sections describe utility access methods.

For security purposes, voicemail-enabled switches accept requests only from CLIs running on the local host, the controlling DVS, or the Headquarters server.

Accessing Utilities from the Serial Port

Switch utilities and the `UBOOT` command interface are accessible through the maintenance port located on the faceplate. The state of the switch at the time of Maintenance port access determines the available utility.

- During normal switch operation, the maintenance port accesses a specified Linux shell. The default shell is the ShoreTel command-line interface (STCLI).
- During a switch boot, the maintenance port accesses `UBOOT`.

To access ShoreTel voice switch utilities through the maintenance port:

1. Connect one end of a serial cable to a computer with a terminal emulator program installed.
2. Connect the male end of the serial cable to the maintenance port on the front panel of the ShoreTel switch.
3. Launch the terminal emulation using the following settings for the serial port:
   - Speed: 19.2 kbps
   - Data bit: 8 bits
   - Stop bit: 1
   - Parity: No parity
   - Flow Control: None
4. Click **OK**.

   The ShoreTel command line interface appears.
5. Choose one of the following courses of action:
   - If the interface shows that the switch has a Linux operating system:
     a. Type the user ID and password as required. The default values are “admin” and “root” respectively. (Root is available only through a serial connection.)
     b. At the command line, enter **STCLI**.

        The STCLI interface opens.
   - Do nothing if the interface shows that UBOOT is being used; a user ID and password are not required.

For more information about these utilities, see Stcli on page 94 or UBOOT on page 94.

Accessing Utilities from SSH

ShoreTel provides access to several utilities for voicemail-enabled switches through a Linux BASH command line, which you can access through an SSH client. Free SSH clients, such as PuTTY, are available through the Internet.

To access the Linux utilities, including all command line interfaces for voicemail-enabled switches, use the admin account. Logging into the admin account opens the STCLI interface.

1. Open an SSH client access panel.

   If you use PuTTY, the PuTTY Configuration page appears, as shown in Figure 15.

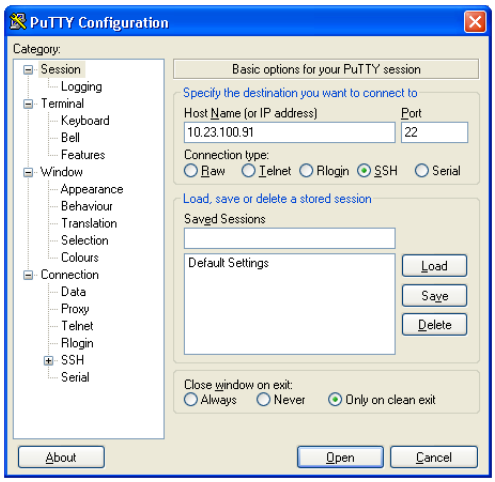

Figure 15: PuTTY Configuration Page

2. On the PuTTY Configuration page, do the following:

   a. In the **Host Name (or IP address)** field, enter the IP address of the switch.

   b. In the **Port** field, enter 22.

   c. Click **Open**.

      The command prompt window opens.

3. At the command prompt, enter **admin** and then press Enter.

   The `STCLI` command prompt opens.

Accessing Utilities from an MS Windows Server

Headquarters and distributed services contain executable files that access voicemail-enabled switches. On a normally installed server, the executable files for the utilities are located in the following directory:

```
C:\Program Files\Shoreline Communications\ShoreTel Server.
```

Commands that you can perform from a server through Microsoft Windows include:

- `svccli` (See SVCCLI on page 96.)
- `burnflash` (See Burnflash on page 99.)
- `ipbxctl` (See Ipbxctl on page 96.)

To run these utilities through MS Windows:

1. Open a command prompt by pressing the Start button and selecting **Program > Accessories > Command Prompt**.

2. Enter the name of the utility on the command line, using the IP address of the voicemail-enabled switch as the switch parameter, then press the **Enter** key.

Switch Utilities

A set of command-line interface (CLI) commands supports operations such as backing up and restoring voicemail, stopping or starting services and groups, and formatting CF cards.

UBOOT

UBOOT is the boot loader for voicemail-enabled switches. The UBOOT environment is accessed from a terminal emulator through the serial port when the switch is booted. Before starting the boot, UBOOT lists the processor characteristics and displays results of the Power On Self Test (POST). The switch then waits a specified period before starting the autoboot. You can modify the duration of this period through an svccli command; the default period is three seconds.

To stop the autoboot during this delay, press any key.

The command printenv displays all booting shell variable settings. The following is a typical response to executing printenv:

```
bootdelay=3
serial#=50VJ0724081DFA
ethaddr=00:10:49:08:1d:fa
ipaddr=10.1.4.0
netmask=255.255.0.0
gatewayip=10.1.0.1
serverip=10.1.1.255
user=anonymous
pass=tsk
bootfile=/tskl/uImage
autoload=FTP
bootcmd=dhcp;bootm
flags=0x40
```

These settings are edited through the setenv command. The setenv command has the format setenv <variable> <value>.The saveenv command saves environment variable settings to the non-volatile memory on the switch. Execute saveenv after the variables are set to the required values. Boot flags control switch operations after startup.

For a description of UBOOT commands and flag values, see UBOOT Commands and Flags on page 116.

Stcli

The ShoreTel Shell, stcli, displays and modifies system configuration parameters. . You can implement static or dynamic IP addressing for the switch from stcli. You can also reboot the switch from stcli.

The main stcli menu appears below the ShoreTel logo. The switch model number is displayed in the command introduction line directly above the menu. stcli commands are described in Stcli Commands on page 101.

To open `stcli`:

- Access the Maintenance port, as described in Accessing Utilities from the Serial Port on page 91. If the window displays the Linux prompt, enter `stcli` on the command line.
- Access through SSH and log in as the administrator, as described in Accessing Utilities from SSH on page 92.

Exiting `stcli` returns the user to the login prompt.

CLI

The command-line interface (CLI) accesses diagnostic tools, manipulates debug setting levels, and displays system information. `Cli` can be run from any remote SSH session or from Windows prompts originating from the local host, the controlling Distributed server, or the Main ShoreTel server.

To access `cli`, do one of the following:

- Open a Linux BASH shell through the root account (see Accessing Utilities from SSH on page 92) and enter `cli`.
- Open `stcli` and enter `gotoshell` at the command prompt.

To display a list of executable commands, enter `commands` on the command line. For a description of the CLI commands, see CLI Commands on page 107.

To perform actions on `cli` variables, do one of the following:

- To view all of `cli` variables and their current values, enter ***variables***.
- To view a variable current value, enter the variable name
- To change a variable's current value, enter the variable name and new value.

To specify the destination of switch trace information, type one of the following commands:

- `trace_redirect 0` (Sends trace information to the Maintenance port)
- `trace_redirect 1` (Sends trace information to the current device)

Note

Trace information is sent to the STTS log on the voicemail-enabled switch.

Only trace streams that are sent to the maintenance port can be redirected to an SSH terminal session; this prevents trace stealing from other SSH terminal sessions. All traces can be reverted to the maintenance port, making them accessible to SSH terminals.

To exit the CLI, do the following:

- Type **quit** or enter the letter **q** at the CLI prompt.
- Type **Ctrl-c** if the CLI was opened from the Linux BASH shell.

Ipbxctl

`ipbxctl` commands perform switch control and diagnostic tasks, including switch rebooting, clearing flash memory, and running traceroute. For information about `ipbxctl` commands, see ipbxctl Utility Commands on page 117.

The `ipbxctl` commands are run as a windows program from the Main Server or the controlling Distributed Server, as described in Accessing Utilities from an MS Windows Server on page 93.

Regedit

`Regedit`, a ShoreTel utility that modifies Registry-type data structures in the switch, is accessible through the Root account.

Voicemail-enabled switches have a Registry similar to Windows Servers. The Registry is a ShoreTel construct, not part of Linux. To edit the Registry, log in as root and run the RegEdit command line tool from the bash shell. RegEdit may be used to set logging levels on applications and set other parameters that change their behavior.

For more information about regedit commands, see regedit Commands on page 118.

Server Utilities

This section describes utilities available for servers: `svccli` and `cfg`.

SVCCLI

The `svccli` commands control low-level switch parameter settings and application commands, including Compact Flash storage, switch password, and service control operations. You can run `svccli` from any remote SSH session or from Windows prompts originating from the local host, the controlling distributed voice server, or the Headquarters server.

To access `svccli`, perform one of the following:

- Open a Linux BASH shell through the root account (Accessing Utilities from SSH on page 92) and enter `svccli`.
- Run `svccli` from the Main Server or a Distributed Server (Accessing Utilities from an MS Windows Server on page 93).

To display the `svccli` commands, enter **help** or **?**. For more information about `svccli` commands, see SVCCLI Commands on page 102.

To exit `svccli`, type **Ctrl-c** or enter the letter **q**.

Cfg Utility

The `cfg` utility is a command-line tool that provides detailed information about the voicemail application. The `cfg.exe` file resides in the following directory:

```
\shoreline communications\ShoreTel server
```

To start `cfg`:

1. Open a DOS window pointing to the *****`shoreline communications\ShoreTel server`* directory.
2. Enter `cfg` and press **Enter**.

   The system displays the `/*Local*//->` prompt when `cfg` is ready.

All commands are entered at the above prompt. Results are displayed in the DOS window or in the voicemail logs.

Note

You can also initiate the `cfg` command from the voicemail-enabled switch directly by typing `cfg` at the command prompt.

WARNING!

Some `cfg` utility commands may damage the system if used incorrectly. Make sure you understand the commands before you use them.

For a list of the commands available through the `cfg` utility, see Cfg Utility Commands on page 114.

Booting and Restarting Voicemail-Enabled Switches

Rebooting and restarting voicemail-enabled switches have different scopes:

- Rebooting a voicemail-enabled switch also reboots the Linux kernel. A reboot takes much longer than a restart.
- Restarting a voicemail-enabled switch only restarts the ShoreTel switch application layer without restarting the operating system and its services.

For ShoreTel voice switches running on VxWorks, rebooting and restarting are identical.

Under certain conditions, initiating a restart reboots the switch. One example is when a switch upgrade is available.

ShoreTel voicemail-enabled switches boot (loads data and programs) from contents of their internal memory. Network parameters, including IP addresses, are required to complete the boot process. Switches obtain these parameters either from a DHCP server or through manual entry. New switches always attempt to access a DHCP server.

Within installations where a DHCP server is not available, switches must be manually configured, including the designation of the IP address and other configuration parameters. For switches not yet placed on a network, this configuration must be performed through the maintenance port. For switches that are on the network, switches can be configured through `stcli`.

When using DHCP, ShoreTel recommends using DHCP reservations for each switch to ensure that DHCP leases are not lost.

A voicemail-enabled switch can be brought up through a regular boot or by a software upgrade boot. FTP booting is also available for troubleshooting. Switches booted through FTP have limited functionality because internal memory contents are not loaded.

Manually Specifying Switch Parameters

Voicemail-enabled switches normally use DHCP to dynamically set the device IP address and specify the addresses of the servers to which it communicates. Switches are set into fixed address mode through CLI instructions.

Voicemail-enabled switches require the following information:

- The IP address and subnet mask of the voicemail-enabled switch
- The IP address of the server that supervises the switch
- The gateway IP address of the supervising server if it resides on a different subnet from the voicemail-enabled switch
- The IP address of the NTP server (Voicemail-enabled switches require valid timestamps to operate; many services, including voicemail, cannot start without NTP access.)

The following procedure places the voicemail-enabled switch into fixed-address mode:

1. Access the STCLI command line interface, as described in Stcli on page 94.
2. Type “3” on the command line to select **Change System Configuration**.

   The CLI window displays the Change System Configuration options.
3. Type “6” on the command line to select **Enable/Disable DHCP/BOOTP**.

   The CLI window displays the DHCP/BOOT options.
4. Type “0” on the command line to select **Manual Configuration**.
5. Change the network parameters as required to support the fixed address from the Change System Configuration entry line.
6. After completing changes to the configuration, type **Exit** to close the CLI.
7. Reboot the switch.

Reboot Methods

A Shoretel voicemail-enabled switch can be rebooted via a flash boot, a default button, FTP, or `burnflash`, each of which is described in this section.

Flash Boot

The standard method for booting a ShoreTel voicemail-enabled switch is to boot from the switch's flash memory. When a switch is first powered on, it reads the boot parameters stored on the non-volatile memory, which instructs the switch to load software from flash memory. When the software starts, it loads its configuration, which is also stored in flash memory.

Default Button

The Default Button is the small "paperclip" button on the left side of the switch. Pressing this button replaces the two configuration files with their default variants. The Compact Flash is not affected.

Pressing this button and holding for 10 seconds, in addition to replacing the configuration files, removes all files from the Compact Flash.

FTP Boot

Booting from FTP is available when you cannot boot the switch from internal memory. When booting a switch from FTP, the operating system and software are loaded from the FTP site identified in the boot parameters. The loaded files define a default configuration.

Voicemail services on the switch are disabled after booting from FTP and are restarted only by booting from Flash. After an FTP boot, the switch can perform telephony functions as those available through other ShoreTel voice switches. Voicemail-enabled switches started with an FTP boot can operate only as a voice switch (controlling phones, trunks, and call routing).

FTP boot is typically used for troubleshooting and also supports maintenance tasks and the backup and restore facilities. FTP boot supports certain maintenance functions, such as an emergency boot if the flash becomes damaged.

Burnflash

`Burnflash` forces a reboot and installs new software.

The `burnflash` command burns a ShoreTel image to the CF card. It unconditionally replaces the resident image while rebooting the system, but it does not destroy any voicemail. The purpose of burning the image to the CF is to enable the switch to boot from solid state memory instead of performing an FTP boot from the server.

If a user created a static configuration for IP addresses and other system parameters through the `STCLI` (option 3), those parameters must be reconfigured after `burnflash` runs.

Switch Diagnostics and Repair

This section describes tools for diagnosing and repairing switch problems.

Switch Trunk Debug Tools

Trunk_debug_level is a switch setting that identifies trunk events from the switch's perspective. Because ShoreTel applications manipulate dialed digit strings for both incoming and outgoing calls, the trunk debugger is typically used to validate the traffic between the Central office and the switch. The recommended trunk debug level is 4.

1. Access the CLI shell, as described in CLI on page 95.
2. Enter the following command:

   ```
   trunk_debug_level=4
   ```

3. When finished, turn off debug by typing:

   ```
   trunk_debug_level=0
   ```

Note

The D channel monitor helps you monitor the D channel of a PRI span. To do this, turn on D channel monitor of the switches. ShoreTel recommends using an SSH interface that is capable of capturing the output of the commands.

Creating a Tcpdump File

A tcpdump is a packet sniffer that operates off a command line. ShoreTel can use tcpdump output to debug voicemail-enabled switch issues. Do not create tcpdump files without consulting ShoreTel Technical Support.

To create a `tcpdump` file:

1. Access the CLI shell, as described in CLI on page 95.
2. Execute the following: `tcpdump -C 10 -W 3 -w /var/log/tcpdump.pcap`

   This step captures ethernet traffic to the switch into ram.

3. After a brief period, press **Ctrl-C.**

   This step terminates the capture and saves the result to the following directory path:

   ```
   cp /var/log/tcpdump.* /ftproot
   ```

4. Submit the files to ShoreTel, as instructed by ShoreTel Technical Support.

Recording Audio from a Switch Port

You can capture audio output from a ShoreTel voice switch physical port (for example, a trunk port) using a CLI command. Audio output is saved on the HQ or DVM server that controls the switch.

To record audio from a switch port:

1. From the **Start** menu, navigate to **Control Panel > Administrative Tools** and locate the IIS Manager.
2. Right-click the IIS Manager and select **Properties**. This enables the ability to write to the FTP server by selecting the **Write** checkbox and clicking **OK**.

   This enables the ability to write to the following directory:

   C:\Inetpub\ftproot

   In Windows Server 2008, you must edit the permissions of the *C:\Inetpub\ftproot* directory and give the users group write access.
3. At the CLI prompt, run the following command:.

   `Record2File2 (1, 60, "test")`

   Audio data from running this command is stored in the file `test_rx.pcm` and file `test_tx.pcm` in `C:\Inetpub\ftproot`

When you are finished capturing data, a "PCM Raw Data" file is created with the following format profile: 8000 Hz, 16-bit, Mono and can be listened to using a standard application, such as "Adobe Audition."

Stcli Commands

The following describes the `stcli` commands. For a general description of `stcli`, see Stcli on page 94.

- Option 0 – Exit

  This command logs out of `stcli` and returns control to the program from where `stcli` was entered.

  A user must exit `stcli` before starting `svccli`.
- Option 1 – Show Version

  This command displays the system software version running on the voicemail-enabled switch.
- Option 2 – Show System Configuration

  This command displays current values for system parameters that are viewable through `stcli`, a user enters a 2 at the `stcli` prompt.
- Option 3 – Change System Configuration

  This command provides access to editable parameters for modifying the system configuration. When option 3 is selected, the cursor displays **ShoreTel Config** to indicate that subsequent commands could alter the system configuration.

The IP addressing mode is selected from this menu. To specify the addressing mode, select 6 from the ShoreTel Config menu. If static IP addressing is selected, all other Option 3 parameters must be configured. The static addressing configuration persists across upgrades.

The configuration file is cleared if the `svccli burnflash` command is executed.

If DHCP is enabled, the DHCP server must provide the IP address of the network time protocol (NTP) server.

Pressing 0 from the ShoreTel Config prompt returns the system to the main `stcli` menu. When exiting the `stcli` main menu, the user is prompted to confirm all configuration changes made in the Option 3 menu.

- Option 4 – Reboot

  Option 4 reboots the switch. The switch requests a confirmation of the command before rebooting.

- Option 5 – Shutdown

  Option 5 performs a graceful shutdown of the switch. This command is accessible only through the Maintenance port.

  Perform this command before removing power from the switch.

- Option 6 – Archive logs

  Option 6 archives all switch logs and uploads them to the Logs directory in the FTP root of the server managing the switch.

- Option ? – Help

  Entering a ? lists the main menu items.

- Gotoshell – Entry to CLI shell

  Type `gotoshell` to enter the voicemail-enabled switch `cli` interface. For more information, see CLI on page 95.

SVCCLI Commands

For a general description of `SVCCLI`, see SVCCLI on page 96.

- The **?** or **help** command displays a list of all commands and the syntax of each. The command takes no parameters (such as an individual command name.) An example of the command output follows:

  At the bottom of its display, `SVCCLI` states that a command can apply to all available arguments by inclusion of “all” or “*.” For example, the following `SVCCLI` entry restarts all services:

  ```
  >restartsvc *
  ```

- The `backupvm` command performs on-demand back up of voicemail, Auto-Attendant data, and the logs that are written to the CF card. On-demand backup begins immediately upon `backupvm` entry. During a backup, voicemail service continues, and an incoming voicemail message is backed up if it was already being recorded when the backup began. When the backup finishes, the `SVCCLI` displays a message indicating it is finished. (In contrast, during a restore operation, the voicemail server is stopped. Also, the restore operation can by started from the `SVCCLI` only.)

  If automatic backup is disabled in ShoreTel Director, `backupvm` still triggers the backup but only if backup is configured in the Director.

  Whether for a scheduled or an on-demand backup, pre-configuration of the backup target is necessary. For a description of how to configure an FTP server to be the target of the backup, see the *ShoreTel System Administration Guide*.

  On-demand backup can serve a variety of purposes. These purposes are usually in response to anomalous situations. The main purpose of on-demand backup is to reduce the risk of losing voicemail if a damaged or faulty CF is suspected. For example, if the installation of a new CF card is immediately required, on-demand backup is the first step. After the new card is formatted, the `restorevm` command can bring the backed-up voicemail to the new card.

  Run **getsvcstatus all** to see the state of the CF file system. At the bottom of the screen for this command's output, the state of each file system is shown. The following line is from the file system lines of the **getsvcstatus** output and shows that the CF file system is mounted.

  ```
  /dev/kcfa1                  984871      268663      666163 29% /cf
  ```

  If the"/cf "is missing, then the CF file system is not mounted, and remedial action is necessary. In this case, not only does voicemail have nowhere to go, but the logs cannot be stored on CF, so the system provides some space in RAM for holding the most important logs.

  After backup, the suspect CF card can be removed and tested in another system, and a new card can be installed after voicemail is backed up.

Note

You cannot back up voicemail in ShoreTel 9.1 running on Windows Server 2008 using the vmbackup command. You must manually add users with write permission to the FTP folder on the ShoreTel server in order for users to use the vmbackup command.

- `burnflash - Burn flash:` The `burnflash` command burns a ShoreTel image to the CF card. It unconditionally replaces the resident image and then reboots the system, but it does not destroy any voicemail. The purpose of burning the image to the CF is to enable the switch to boot from NAND flash memory rather than to do an FTP boot from the server. (FTP boot supports certain maintenance functions, such as an emergency boot, if the flash becomes damaged. Do not use FTP boot to boot the switch. It does not support certain services. For example, an FTP boot does not mount the CF file system, so voicemail does not run after an FTP boot.)

  If a user created a static configuration for IP addresses and other system parameters through the `STCLI` (option 3), those parameters must be reconfigured after `burnflash` runs.

- `chgrootpassword - Change root password:` The `chgrootpassword` command changes the root password for accessing the ShoreTel voice switch CLI. Arguments for this command are old and new passwords. This password was created in ShoreTel Director on the **System Parameters > Other** page.

  Syntax: `chgrootpassword <password>`

- `chguserpassword - Change user password:` The `chguserpassword` command changes an administrator password for accessing the ShoreTel voice switch CLI. Arguments for this command are old and new passwords. This password was created in ShoreTel Director on the **System Parameters > Other** page.

  Syntax: `chguserpassword <password>`

- `disablegroup - Disable group:` The `disablegroup` command disables a group of services. Disabling means that one group or all groups of services are suspended but not completely turned off. To enable any disabled groups, use the `enablegroup` command.

  This command is primarily for trouble shooting. During normal operation, if a group of services fails, the system automatically tries to restart the stopped services. However, for troubleshooting purposes, it can be important for the group to remain inactive.

  Syntax: `disablegroup <group name>` * or `all`

- `disablesvc - Disable service:` The `disablesvc` command disables one or all services. Disabling means that a service is suspended but not completely turned off. To enable disabled services, use the `enablesvc` command.

  This command is primarily for troubleshooting. During normal operation, if a service fails, the system automatically tries to restart any stopped services. However, for troubleshooting purposes, it can be important for the service(s) to remain inactive.

  This status of the service(s) is shown in the output of the `getsvcstatus` command.

  Syntax: `disablesvc <service name>` * or `all`

- `dump - Dump:` The `dump` command sends a dump command to certain services. This command is used by ShoreTel engineering for debug only. Typically, the `dump` command dumps a service's internal state to a log file. The `dump` command does not work on all services.

  Syntax: `dump <service name>`

- `enablegroup - Enable a group of services:` The `enablegroup` command enables one or more groups of services after they have been disabled by the `disablegroup` command. These two commands apply to troubleshooting.

  Syntax: `enablegroup <group name>` * or `all`

- `enablesvc - Enable service:` The `enablesvc` command enables one or more services after they have been disabled by the `disablesvc` command. These two commands apply to troubleshooting.

  Syntax: `enablesvc <service name>` * or `all`

- `erasecf - Erase CF:` The `erasecf` command completely erases all the contents of a CF card. Back up the CF before using this command. Examples of reasons to erase the CF are as follows:
  - To correct suspected memory corruption.
  - To erase a CF that is both formatted and mounted. (The `formatcf` command is not available for a CF card that is formatted and mounted.)

  After CF erasure, the system automatically reboots. The reason for rebooting is so that, when the system detects that the CF is empty, the system recreates the file structure and replaces all other voicemails and other needed elements on the CF card.

  Syntax: `erasecf`

- `flushlogs - Flush logs:` The `flushlogs` command is a utility that copies certain system logs to the CF card. In normal operation, the system performs very little logging. Only severe problems are logged to files on the voicemail-enabled switch. The logging system is implemented in a memory circular buffer to record the logs (and perform certain tracing tasks.) Each log file includes its own circular buffer. These circular buffers can be forced to a log file by the `flushlogs` command.

  Syntax: `flushlogs`

- `formatcf - Format CF:` The `formatcf` command formats a new CF with the Linux file system format so that Linux recognizes it.

- `getsvcstatus - Get service status:` The `getsvcstatus` command displays details about all services on the switch. Regardless of the state of a service, this command displays it. (Therefore, it also shows whether a service exists.) The command can display a particular service or all services. A service name is case-sensitive, so it must be entered exactly. To see the spelling of a service name, use the `all` or (*) argument `getsvcstatus`.

  Syntax: `getsvcstatus <service name> *` or `all`

- `killsvc -9 - Kill service:` The `killsvc -9` command immediately kills all Linux services on a voicemail-enabled switch.

  Syntax: `killsvc <service name> *` or `all`

- `Q (or CTRL+C) - Quit svccli:` The `q` command or pressing the **Ctrl-c** keys terminates the `SVCCLI` and returns the user to the Linux CLI.

  Syntax: `q` or **Ctrl-c**

- `reboot [idle] - Reboot (if switch is idle):` The `reboot` command causes the voicemail-enabled switch to reboot from NAND memory. With the optional `idle` argument, the reboot happens only if the switch is idle.

  Syntax: `reboot [idle]`

  Rebooting a voicemail-enabled switch and **restarting** a voicemail-enabled switch have different scopes. On other ShoreTel voice switches, rebooting and restarting are essentially the same. Rebooting a voicemail-enabled switch includes the Linux kernel and everything that a kernel reboot entails. In contrast, restarting a voicemail-enabled switch affects only the application layer.

- `restart [idle] - Restart services (if switch is idle):` The `restart` command stops and then re-starts services. The `idle` option means that the operation waits until the process is idle. For instance, restarting the stts process when idle means waiting for stts not to be handling any calls, stopping stts, and then starting it again. Also, during the course of a restart or a reboot, the switch upgrades, if necessary.

  Syntax: `restart [idle]`

- `restorevm - Restore voice mail files:` The `restorevm` command causes the backed up voicemail, Auto-Attendant, and logs to be restored from the server to the CF card. Voicemail operation is unavailable during a restore. This process overwrites whatever is on the CF cards and puts the voicemail-enabled switch in the same state it was in at the time of the backup. The restore operation must be started from the `SVCCLI`. (ShoreTel Director provides no option for starting a restore operation.) When the restoration is complete, the `SVCCLI` posts a message, and the switch is restarted.

Note

If ShoreTel 9.1 is installed on a Windows 2008 platform, do not issue the “restorevm” command multiple times. Issuing this command multiple times may result in a “Voice Mail System Unavailable” error.

- `sendcmd - Send command:` The `sendcmd` command causes Linux to send a command to a particular service. This command is used by ShoreTel engineers for debug only.

  Syntax: `sendcmd <service name>`

- `startgroup - Start group of services:` The `startgroup` command starts a stopped group. This command is the follow up to the `stopgroup` debug command.

  Syntax: `startgroup <group name> *` or `all`

- `startsvc - Start service:` The `startsvc` command starts one or all services that have been stopped. This command might be able to restart one or more services that have stopped working. It can also be the follow up to the `stopsvc` debug command.

  Syntax: `startsvc <service name> *` or `all`

- `stopgroup - Stop group of services:` The `stopgroup` command stops one or all service groups. It kills the targeted group’s process.

  Syntax: `stopgroup <group name> *` or `all`

- `stopmgr - Stop services manager:` The `stopmgr` command completely stops the operation of the services manager.

  Syntax: `stopmgr`

- `stopsvc - Stop service:` The `stopsvc` command completely stops one or all services. It kills the targeted service’s process.

  Syntax: `stopsvc <service name> *` or `all`

CLI Commands

Table 14 describes the CLI commands. For a general description of the CLI, see CLI on page 95.

Table 14: CLI Commands

Command	Description	Notes
`adm_debug_level`	Logs admission control and bandwidth manager signal flow onto serial port.	– 2 logs more diagnostics.
`adm_diag_level`	Logs admission control and bandwidth manager signal flow into IPBX log.	– 2 logs more diagnostics.
`arpShow and arptabShow`	Displays the address resolution protocol (ARP) table.	Not available on Voicemail-enabled Switch.
`autoReboot – 0`	Turns the switch watchdog off to prevent rebooting after a catastrophic failure.	Use this command only when directed by ShoreTel Technical Support.
`bigNvRamSetup`	Erases switch's configuration in NvRam. Use config_nv_format.	
`bootChange`	Changes the boot ROM parameters.	Use with caution. Not available on Voice Mail Switch.
`cid_debug_level`	Logs caller ID related information for extensions.	
`cliStart`	Opens the ShoreTel command line interpreter from a serial port.	Reboot the switch to return to the Linux interface. Not available on Voicemail-enabled Switch.
`config_status`	Outputs the configuration records for the switch.	
`DEBUG_LEVEL`	Sets the ShoreSIP debugging flags.	Recommend using level 0xe00.
`diagdCommands`	Outputs full switch diagnostic information.	
`dial_num_dump`	Displays information about switch's off-system extension configuration.	
`dn_plan_status`	Displays information about the switch's dial plan.	
`dnp_debug_level`	Displays detail information (digit by digit) about dial plan access.	Recommend using level 1.
`dtmf_debug`	Displays RFC2833 for G729 related events.	Values can be 0 or 1 (default is 0).

Table 14: CLI Commands (Continued)

Command	Description	Notes
`DumpSB`	Displays maximum PMCSW outputs.	
`dumpUsedBw`	Displays information about actual bandwidth used on individual calls/legs.	
`etherMonBroadcast`	Writes the ethernet broadcast messages to a .cap file in \inetpub\ftproot directory of the ShoreTel server that are not intended for that switch.	Recommend using level 1. No `etherMonBroadcast` commands on Voicemail-enabled switches.
`etherMonDump`	Writes the ethernet trace information captured when using EtherMonStart. Writes to a .cap file in \inetpub\ftproot directory of the ShoreTel server controlling the switch. The .cap file name is ST-<First 3 bytes of MAC-time-date>.cap.	
`etherMonStart <bytes>`	Bytes is the number of bytes of information you want to capture (for example, 10000000). Captures ethernet packets for trace purposes	Command consumes switch memory. Run `memShow` to display available memory. Do not specify more memory than is available.
`etherMonStop`	Stops capturing ethernet packets.	
`eval_adm_var`	Displays information about switch's own bandwidth usage.	
`eval_bwm_var`	Displays information about total and available bandwidth.	
`ext_bca_status`	Displays active BCA calls along with call stack usage information.	To be run on switches hosting BCA extensions.
`ext_cco_status`	Displays information the switch's extension CCOs.	
`ext_conf_status`	Displays MakeMe conference port status.	
`ext_debug_level1`	Logs extension CCO configuration.	
`ext_debug_level`	Sets the extension debugging level.	Recommend using level 4.
`ext_pg_status`	Displays active pickup group calls.	To be run on the switches hosting PG extensions.

Table 14: CLI Commands (Continued)

Command	Description	Notes
`ext_ecr_status`	Displays all configured Personalized Call Handling rules on switch.	
`ext_ecr_debug`	Displays real-time behavior of Personalized Call Handling rule.	Shows triggering of rule during inbound call.
`fax_debug_level`	Display fax-related events and processes, including tone detection, fax determination, and fax redirect.	Values can be 0 or 1 Default is 0
`fax_verbose`	Used to display fax/silence detection, jitter buffer freezing. and echo canceller disabling related events.	Values can be 0 or 1 Default is 0
`flsh_getVersion`	Displays switch's firmware and bootrom versions.	Not available on Voicemail-enabled Switch.
`flsh_printBootLine`	Prints the boot parameters of the switch.	Not available on Voicemail-enabled Switch.
`flsh_setBootSourceFlash`	Sets the switch to boot from flash memory.	Restart to enable changes. Not available on Voicemail-enabled Switch.
`flsh_setBootSourceFTP`	Sets the switch to boot from FTP.	Restart to enable changes. Not available on Voicemail-enabled Switch.
`g729_verbose`	Displays more information for G729 calls.	Enable this for G729 calls with mscmd_verbose
`hostShow`	Displays the known hosts.	Not available on Voicemail-enabled Switch.
`hunt_load_debug`	Logs basic huntgroup call flow.	For debugging heavy call load issues.
`icmpstatShow`	Displays ICMP statistics.	Not available on Voicemail-enabled Switch.

Table 14: CLI Commands (Continued)

Command	Description	Notes

`ipdt_debug_filter`	Assume two extensions in the system: Ext. A and Ext. B.
	To print IPDT log for Ext. A:
	`ipdt_debug_level – -1`
	`ipdt_debug_filter – 1 (tell IPDT that filter is enabled)`
	`ipdt_restrictTraceExts "Ext A's#" (turn on log for Ext A)`
	`ipdt_remRestrictTraceExt "Ext A's #" (turn off log for Ext A).`
	To print log for all extensions:
	`ipdt_debug_filter – 0`	

`ipdt_debug_level`	Recommend setting to **– -1** to turn on all logging.	
`ipdt_dumpCCOCK`	Dumps BB call key state, since there is no extension associated with BB.	Voicemail-enabled Switch does not support CCOCK.
`ipdt_dumpExtCalls`	Dumps call information in the extension (e.g. callID, legID, call state and leg state, etc.)	Not available on Voicemail-enabled Switch.
`ipdt_dumpExtDisplay`	Dumps the current display view from IPDT.	Not available on Voicemail-enabled Switch.
`ipdt_dumpExtensions`	Dumps information for all extensions controlled by the switch and the information for monitored extensions and MAE (BCA) extensions that are in the same switch and in the different switches.	Not available on Voicemail-enabled Switch.
`ipdt_dumpExtCK`	Dumps information for call keys on the extension. Useful for troubleshooting LED patterns and icon issues.	Not available on Voicemail-enabled Switch.
`ipdt_resetExtDisplay`	Redisplay on the extension. If the phone display and IPDT display (ipdt_dumpExtDisplay) are desynchronized, run ipdt_reset_ExtDisplay to synchronize them.	Not available on Voicemail-enabled Switch.
`ipdt_restrictTraceExts`	Set ipdt_debug_filter to 1. Then, use ipdt_restrictTraceExts to turn on logging on a particular extension.	Not available on Voicemail-enabled Switch.

Table 14: CLI Commands (Continued)

Command	Description	Notes
`ifShow`	Displays the current configured network parameters.	Not available on Voicemail-enabled Switch.
`laa_debug_level`	Logs backup auto attendant signal flow.	
`lspConList`	Displays switch connectivity to other switches.	
`lsp_debug_level`	Displays Location Service Protocol messages that are exchanged between switches.	Recommend using level 4.
`lsp_ping`	Tests the LSP UDP communication to the far end switch for 100 iterations. Tests LSP UDP communication to the switch at 192.168.1.1, for 100 iterations (nominally 1 second). If only the IP address is supplied, 1000 iterations (nominally 10 seconds) is used.	Example: -> `lsp_ping "192.168.1.1", 100`
`lspTelList`	Displays local and remote contacts.	
`lspTelList 1`	Displays detailed information about local contacts.	
`lspTelList 2`	Displays detailed information about remote contacts.	
`mae_debug_level`	Logs BCA call flow information.	
`mailbox_debug_level`	Logs mailbox destination for a particular call.	
`memShow`	Shows current memory usage of the switch.	Not available on Voicemail-enabled Switch.
`mgcp_msg_debug`	Logs MGCP messages.	
`mgcp_trans_debug`	Logs MGCP transactions.	
`mohc_debug_level`	Prints diagnostic information for music on hold calls when set to 1.	Valid settings are 0 and 1. Default is 0.
`mpm_debug_mask - 0x40`	Sets mpm debug flag to output Caller ID information received on inbound calls.	
`mpm_debug_mask - 0x10`	Displays detailed DTMF information.	
`mpm_debug_mask - -1`	Displays detailed mpm information. Full debug of inbound calls (CallerID, DTMF).	
`mscmd_verbose`	Prints diagnostic information for the media commands sent from Switch board layer when set to 1.	Main media command verbose variable. Default is 0.

Table 14: CLI Commands (Continued)

Command	Description	Notes
`msps`	Displays media stream statistics for all active calls on the switch.	This is a helpful command for all media-related issues.
`msps 7`	Displays media stream statistics for active calls.	
`msps 8`	Displays media stream statistics.	Use only when directed by ShoreTel.
`msps 16`	Displays media stream statistics.	Use only when directed by ShoreTel.
`mwi_debug_level`	Logs message waiting indicator setting call flow.	
`ping "<IP Address>"`		Include double quotes (“) around the IP address.
`pri_verbose`	Traces a high-level description of the PRI traffic sent and received by trunks on the switch.	Recommended setting is `pri_verbose – 1`
`print_ether_stats`	Prints the Ethernet statistics from the network controller.	Not available on Voicemail-enabled Switch.
`rdn_diag_level`	Used to determine why calls are routing to particular destinations, similar to what gets put in the DRSMain log when DRS is enabled.	Useful values are 0 (none) or 5 (trace resolve_dn).
`reboot`	Reboots the switch.	
`Record2File2(port,time, <file_name>;0)`	Records inbound media on the specified port for the specified time (in seconds) and writers it to `/inetpub/ftproot.`	Writes to the TMS server controlling the switch. FTP write access must be enabled on the server.
`rfc2833_for_g711_debug`	Displays events related to RFC2833 for G711.	Bitmask integer. Valid settings are 0, 1, and 2. Default is 0.
`routeShow`	Displays current routing table.	Not available on Voicemail-enabled Switch.

Table 14: CLI Commands (Continued)

Command	Description	Notes
routestatShow	Displays routing statistics.	Not available on Voicemail-enabled Switch.
sb_debug_level	Switch board debug variable that prints debug information for the commands sent from Call control.	Values range from 1-5.
set_mpm_debug (char *)	Used to print information regarding commands/event interface between host CPU and DSPs.	Uses a string as a parameter (e.g. “pots”, “pstn”, “dtmfd”, “dtmfg”, “cdis”, “class”, “cpm” are valid parameters). Example: To print POTS related information, use set_mpm_debug (“pots”)
sip_debug_level – 1	Logs ShoreSIP to SIP translation.	
sip_debug_level – 2	Logs SIP messages also.	
sipuaCallList	Displays active SIP stack calls. sipuaCallList 2 dumps more call related information.	For switches hosting SIP trunks/ extensions.
sipuaList	Displays list of SIP trunk/extension user agents.	For switches hosting SIP trunks/ extensions.
t2t_debug_level	Logs trunk interval information like silence, trunk name, trunk state, etc.	
tcpstatShow	Displays TCP statistics.	Not available on Voicemail-enabled Switch.
trans_debug	Logs ShoreSIP transactions.	
trunk_cco_status	Displays information about switch's trunk CCOs.	
trunk_debug_level	Sets the trunk debugging flag	Recommend using level 4.
uaCallList	Displays information about active calls and legs.	
ua_call_status	Shows a snapshot of the active call status of the switch.	

Table 14: CLI Commands (Continued)

Command	Description	Notes
`uaList`	Displays list of ShoreSIP extension/trunk user agents.	
`unset_mpm_debug(char*)`	To disable `set_mpm_debug` command	
`udpstatShow`	Displays UDP statistics.	Not available on Voicemail-enabled Switch.

Cfg Utility Commands

Table 15 describes the commands available through the cfg utility. Variables are italicized. For a general description of the cfg utility, see Cfg Utility on page 96.

Table 15: cfg Commands

Command	Parameters	Description	Comments
`call` *p*	*p* – phone number	Make a call from the voicemail application and play a prompt.	
`closem`		Close the open voicemail mailbox.	
`dmask` *0x*	*0x* – mask hex	Set voicemail debug mask (hex)	Enter without parameter to display flag list.
`exit`		Leave cfg.	
`laam` *t*	t – (1 – DID, 2 – DNIS, 3 – Trunk)	List Auto-Attendant menu map.	Displays mapping of trunks to Auto-Attendant menus.
`lall` *f*	f – 1 for more details	List all mail boxes in the system.	Enter without “1” for a summary of system mail boxes and with “1” for more detail.
`lamp` *m f*	*m* – mail box *f* – 1 - on; 2 - off	Turns the message waiting light on/off for a specified mail box.	
`list pb b`	b – (0 - last name, 1 – first name)	Dump dial by names directory to the voicemail log.	

Table 15: cfg Commands (Continued)

Command	Parameters	Description	Comments
`lmbox f`	f = 1 for more details	List mail box information.	Enter without “1” for a system mailbox summary, including message IDs.
`lms`		List mail box schedule.	
`lmsg m`	*m* – message ID	List details of a specific message.	Message IDs can be found by using lnbox.
`loadc`		Load all voicemail configuration from the database.	
`loadm`		Load all mailbox configuration from the database.	Requires that a mail box be open when you issue the command.
`lserv`		List information about all servers.	
`lsys`		List voicemail system parameters.	
`lsmtp`		List status of distributed voicemail.	
`ltapi`		List status of TAPI lines opened by voicemail.	
`msinfo`		Dump voicemail internal table to the voicemail log.	
`openm #`	# – mail box	Open specified mail box.	
`psinfo`		Dump port server information to the voicemail log.	
`purge`		Remove message in the deleted queue.	Requires that a mail box be open when you issue the command.
`sh str`	`str` – string	Search help for a string.	Searches only from the beginning.
`starth`		Remove old deleted messages.	

Table 15: cfg Commands (Continued)

Command	Parameters	Description	Comments
`symwi`		Run MWI synchronization.	Sends MWI status to all phones in system.
`ver`		List cfg version.	
`?`		List help commands.	

UBOOT Commands and Flags

Table 16 on page 116 describes the UBOOT environment variables.

Table 16: Parameter Settings for Flash Boot and FTP Boot

Parameter	Description	Flash Boot	FTP Boot
autoload	Specifies booting method for bringing up operating system	FLASH	FTP
bootcmd	Specifies boot actions that loads OS and software onto switch.		
bootfile	Path and filename of operating system file	tskl/uImage	tskl/uImage
flags	Variable passed to Linux that controls post startup operations.	0x40	0x40
gatewayip	IP address of gateway server	xxx.xxx.xxx.xxx	xxx.xxx.xxx.xxx
host	IP address of host running Director	xxx.xxx.xxx.xxx	xxx.xxx.xxx.xxx
ipaddr	IP address of the switch	xxx.xxx.xxx.xxx	xxx.xxx.xxx.xxx
netmask	Subnet mask for subnet location of the switch	xxx.xxx.xxx.xxx	xxx.xxx.xxx.xxx
pass	Password for FTP account.	default setting is *tsk*	default setting is *tsk*
script	Path and filename of bootscript file	`tskl/bootflsh.txt`	`tskl/bootscrp.txt`
serverip	IP address of host from which FTP transfer retrieves the OS image.	xxx.xxx.xxx.xxx	xxx.xxx.xxx.xxx
user	User name of FTP account.	default: *anonymous*	default: *anonymous*

The following actions are triggered by flag values:

- 0x0: Auto-negotiate network speed and duplex mode
- 0x20: Disable login security
- 0x40: Use DHCP to receive boot parameters
- 0x1040: Use bootp to receive boot parameters
- 0x2000: Disable ShoreTel shell
- 0x10000: 10 MB full duplex (fixed)
- 0x20000:10 MB half duplex (fixed)
- 0x30000:100 MB full duplex (fixed)
- 0x40000:100 MB halfduplex (fixed)

Multiple functions are specified by adding the hex values of the individual functions. For example, the command 0x42040 instructs the switch to use DHCP to receive boot parameters (0x40), disable the ShoreTel Shell (0x2000) and set the speed and duplex mode to 10 Mb, half duplex (0x40000).

Burnflash Commands

Table 17 describes the burnflash commands.

Table 17: Burnflash Commands

Command	Description
`burnflash -s <Switch IP Address>`	Updates all bootrom areas.

ipbxctl Utility Commands

Table 18 describes the `ipbxctl` commands:

Table 18: ipbxctl Utility Commands

Command	Description
`-reboot <Switch IP Address>`	Reboots the switch without using ShoreTel Director.
`-flash <Switch IP Address>`	Sets switch to boot from flash memory (allows you to boot without logging in).

Table 18: ipbxctl Utility Commands

Command	Description
`-ftp <Switch IP Address>`	Sets switch to boot from FTP (allows you to do this without logging in).
`-diag <Switch IP Address >`	Sends switch state information. By default, the system puts this information in the same folder where ipbxctl utility is running. **Note:** This may be disruptive to normal switch function. Use this command only for diagnostic functions, not for reporting.
`-reset`	Clears all flash memory. Returns switch to factory defaults.

regedit Commands

Table 19 describes the `regedit` commands.

Table 19: Regedit Commands and Descriptions

Command	Description
`key <keyname>[\<keyname>]...`	Makes subkey <keyname> current key
`<keyname>[\<keyname>]...`	Makes subkey <keyname> current key
`.`	Displays current key, values recursively depending on display mode 'd'
`key .`	Displays current key, values recursively depending on display mode 'd'
`*`	Display current values
`key *`	Display current values
`..`	Go up one level
`key ..`	Go up one level
`addkey <keyname>`	Add subkey <keyname> to current key
`delkey <keyname>`	Delete subkey <keyname> from current key
`addstr <valname> <strvalue>`	Add <valname> <strvalue> to current key
`addnum <valname> <numvalue>`	Add <valname> <numvalue> to current key. <numvalue> is <base10digit>...
`addhex <valname> <hexvalue>`	Add <valname> <hexvalue> to current key. <hexvalue> is 0x<hexdigit>...
`setstr <valname> <strvalue>`	Set <valname> <strvalue> in current key
`setnum <valname> <numvalue>`	Set <valname> <numvalue> in current key. <numvalue> is <base10digit>...

Table 19: Regedit Commands and Descriptions

Command	Description
`sethex <valname> <hexvalue>`	Set <valname> <hexvalue> in current key. <hexvalue> is 0x<hexdigit>...
`delval <valname>`	Delete value <valname> from current key
`d`	Toggle recursive display
`q`	Quit the program

`filename`
 	
`E.g RegEdit < cmdfile`
 	
`Where cmdfile has the following contents`
 	
`VoiceMail`
 	
`Logging`
 	
`sethex Level 0xff`
	Read commands from a file

ShoreTel Server File System

This section describes where the server files for a ShoreTel voicemail-enabled switch are installed.

The server installs files with default access permissions. (System administrators may want to ensure a more secure environment.)

The Windows “system” user and the IPBX user created by the ShoreTel installer require full access to all the ShoreTel directories. All other users can be granted access on an as-needed basis.

To ensure the security of sensitive and/or personal information, confine access to the `vms` and `database` directories strictly to “administrator”, “system”, and IPBX users.

The server contains the following directories:

- The `shorelinedata` directory contains all the dynamic information the server uses to run the system. This directory and all sub-directories may be saved as part of a backup and used for full system recovery.

  `<drive>\shorelinedata`

- The `prompts` directory contains copies of the auto attendant menu prompts.

  `<drive>\shorelinedata\prompts`

- The `vms` directory contains all the files and configuration information used by the voicemail system. The files in this directory and its sub-directories are very dynamic. Never open these files. Opening any of the configuration files may cause the voicemail system to become corrupted in part or completely, and can cause loss of voicemail messages.

  `<drive>\shorelinedata\vms`

- The `message` directory contains all voicemail messages as .wav files, along with an .enl pointer file for each message.

  `<drive>\shorelinedata\mms\message`

CHAPTER

5

Configuring and Maintaining 400-Series IP Phones

This chapter is about configuration and maintenance for ShoreTel 400-Series IP phones. It contains the following information:

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Overview

ShoreTel 400-Series IP phones differ from other ShoreTel IP phones in that they use the Session Initiation Protocol (SIP). While this difference requires administrators to use slightly modified configuration and maintenance procedures, the 400-Series IP phones provide telephony features similar to other ShoreTel IP phone models. Users who are familiar with other ShoreTel phone models should have an easy transition to using the ShoreTel 400-Series IP phones.

This chapter provides details about configuring and maintaining the 400-Series IP phones.

All ShoreTel IP phones are supported by ShoreTel voice switches, which must have sufficient capacity for all the phones in the system. IP endpoints are configured in the system with ShoreTel Director. For more information on configuring ShoreTel 400-Series IP phones, see the *ShoreTel Planning and Installation Guide* and the *ShoreTel System Administration Guide*.

IP Phone Failover

When IP phone failover is enabled on the IP Phone Options page in ShoreTel Director, if an IP phone cannot communicate with its switch, the phone automatically connects to another switch at the same site that has available configured IP phone resources. For IP phone failover to be effective, the system must be planned with sufficient excess capacity to handle phones from at least one switch during a failover event. For example, if a switch with 20 IP phone ports fails, 20 IP phone ports need to be available elsewhere in the system.

Date and Time

ShoreTel 400-Series IP phones depend on a Network Time Protocol (NTP) server to authenticate a secure connection and to provide the date and time to be displayed on for the phone's screen. The time displayed on the phone is the GMT value provided by the NTP server plus the offset from the time zone setting of the phone. Users can set the time zone through the phone's Options menu.

The IP address of the NTP server is delivered to the phone via DHCP or is manually configured in the phone. In the absence of an accessible NTP server, the phone can obtain the time from its controlling switch.

IP Phones and ShoreTel Voice Switches

ShoreTel voice switches provide configuration and call manager functionality for ShoreTel 400-Series IP phones. Every site where IP phones are in use must have a ShoreTel voice switch configured to support the number of IP phones at the site. SIP Proxy ports are not required for the ShoreTel 400-Series IP phones.

ShoreTel voice switches provide configuration for the ShoreTel 400-Series phones in a different manner than for other ShoreTel phone models. When a ShoreTel 400-Series IP phone downloads configuration files during the bootup process it receives a list of all available switches. The phone then randomly selects a switch from this list (starting with switches on the same subnet, if available) and attempts to register with the switch.

The contacted switch then redirects the phone to the appropriate call manager switch, which is the ShoreTel voice switch assigned to the phone to set up and tear down calls. The call manager switch handles the Session Initiation Protocol (SIP) information from the IP phones assigned to it and communicates call information to other switches in the system using SIP. After two IP endpoints are connected in a call, media streams are independent of the call manager switch.

After the phone registers with the call manager switch, any time the phone reboots it attempts to contact that same switch. If that switch does not respond, the phone attempts to contact another switch on the list until the phone successfully contacts a switch; the phone is then redirected to the appropriate call manager switch.

IP Phone Communications

Communications for ShoreTel 400-Series phones are routed through the following protocols:

- Secure Session Initiation Protocol (SIPS)
- Real-time Transport Protocol (RTP) and Secure Real-time Transport Protocol (SRTP)
- Client Application Server (CAS)

Secure Session Initiation Protocol (SIPS)

SIP is a standard protocol that is based on a client-server model and works at the application layer. Through SIP, networked users can initiate a call or receive a call. The protocol configures the parameters for the session and handles the call setup and tear-down.

ShoreTel uses the secure version of SIP, SIPS, for signaling between ShoreTel voice switches and 400-Series IP phones.

Real-time Transport Protocol (RTP) and Secure Real-time Transport Protocol (SRTP)

Media flow for the ShoreTel 400-Series IP phones is either through SRTP or RTP.

The use of SRTP, the encrypted version of RTP, depends on whether SRTP has been enabled through the Media Encryption option in the Call Control > Options page in ShoreTel Director. If the Media Encryption option is set to “SRTP - 128 bit AES,” SRTP is used in the following scenarios:

- For calls between 400-Series IP phones configured as internal extensions, after the call is set up media flows directly between the IP phones using SRTP.
- For calls between a 400-Series IP phone and an external number over a trunk, after the call is set up media flows via the trunk using SRTP.
- For three-way mesh conference calls between 400-Series IP phones, after the call is set up media flows between the phones using SRTP.
- For up to six 400-Series IP phones involved in a Make Me conference, media flows through SRTP when ShoreTel voice switches are used.
- For conference calls involving 400-Series IP phones that are initiated through a service appliance, media flows through SRTP.

When SRTP is used to encode the audio, the secure nature of the call is indicated with a lock icon in the call window.

If the Media Encryption option is not enabled, the connection negotiation between two 400-Series IP phones is through SRTP, but the resulting media stream between the two phones is through RTP.

Media flow for calls between ShoreTel 400-Series IP phones and other ShoreTel IP phones uses RTP. Make Me conference calls that involve at least one non-400-Series IP phone and a 400-Series IP phone also use RTP. (RTP is used in these scenarios even if SRTP is enabled through the Media Encryption option in ShoreTel Director.)

Client Application Server (CAS) Service

On the ShoreTel 400-Series IP phones, the ShoreTel Client Application Server (CAS) supplies information such as call history, configuration details, directory, workgroup agent status, and visual voicemail. If CAS is inaccessible, these services are not available, but a phone can still make and receive calls.

Updating IP Phone Firmware

While earlier ShoreTel phones automatically download available new firmware upon rebooting, updating firmware on the 400-Series IP phones is a process you manage through the new Diagnostics & Monitoring system that you access through ShoreTel Director. This new method of updating phone firmware is different from the method used in previous releases. With this method, the existence of new firmware on the server does not cause phones to automatically download a firmware upgrade. Instead, phones download new firmware only after they are selected and the appropriate commands are applied through the Diagnostics & Monitoring system.

For 400-Series IP phones, the previous method used for updating firmware is not supported; rebooting the 400-Series IP phones does not update the phone firmware. Rebooting earlier ShoreTel phone models updates phone firmware, but the reboot process for these phones can also be managed through the Diagnostics & Monitoring system.

Because the Diagnostics & Monitoring system selects any available server from which to download the firmware update, you should ensure that all servers in the system, including servers that do not manage voice switches, have the latest firmware installed. If the Diagnostics & Monitoring system directs the phones to download from a server that does not have the specified firmware version, the download fails and the phones do not attempt to obtain the firmware from another server.

The Diagnostics & Monitoring interface provides a flexible approach for updating firmware because you can manage the firmware download and installation process in stages:

- If you want to download firmware to phones independently of installing it, use the Download command. You can choose to run this command at a time when you can spare the network bandwidth needed to accommodate the download. After firmware is loaded onto the phones, you can use the Update or Update When Idle commands at a later time to install the firmware that you have already downloaded without downloading it again.
- If you want to download firmware to phones and install it immediately, use the Update command. You can also use this command to install phone firmware that you have previously downloaded.

- If you want to download firmware to phones and install it when phones are idle, use the Update When Idle command. You can also use this command to install phone firmware that you have previously downloaded.

When a group of phones at a site is selected for firmware download and the server is remote, to minimize bandwidth utilization some of the phones at the site automatically download firmware from other phones at the site.

When phones are running at least the latest recommended firmware version, the value in the **Firmware Status** column is “Up to Date”. For more details about the possible values for Firmware Status, see the *ShoreTel System Administration Guide*.

You should upgrade phone firmware when the value in the **Firmware Status** column on the Status > IP Phones page is one of the following:

- **Firmware Version Mismatch** indicates that the phone’s current firmware version is less than the minimum firmware version required for the phone.
- **Update Available** indicates that the phone is running an acceptable firmware version, but a more recent firmware version is available for download. In other words, the phone is running a firmware version above or equal to the minimum version, but less than the recommended version.

The Advanced option, which is available with the Download, Update, or Update When Idle commands, allows you to select a different firmware build for each model of phone. Furthermore, if there is more than one hardware version for each phone model, you can select a unique build to deploy to those phones as appropriate. The system prevents you from accidentally downloading a firmware version that is incompatible with a phone’s hardware version. If there is no firmware version appropriate for a particular phone loaded on the server, you can select **Skip** from the Version drop-down list.

To download and install a firmware upgrade:

1. Launch ShoreTel Director.
2. Click **Maintenance** > **Diagnostics & Monitoring**.

   The Dashboard page is displayed.
3. Click **Status** > **IP Phones**.

   The IP Phones page is displayed.
4. Select the check box for each phone for which you want to upgrade firmware.
5. In the **Command** drop-down menu, select **Update**.
6. Click **Apply**.
7. In the Confirmation dialog box, do one of the following:
   - To apply the recommended firmware version, click **OK**.
   - To select a particular firmware version:
     a. Click **Advanced**.

b. For each type of phone selected, in the Version drop-down list designate the firmware version.

c. Click **OK**.

The Firmware Status column shows the progress as the firmware is downloaded and applied. The phones reboot.

Boot Process

The boot process varies depending on whether your network uses Dynamic Host Configuration Protocol (DHCP) or static configuration:

- DHCP—ShoreTel IP phones are pre-configured to work with your network's DHCP server. After the servers and voice switches are configured, the phones are automatically added to your ShoreTel system when they are connected to the network. Upon booting, IP phones use the configuration server address to acquire their configuration specifications. The configuration server address is set in the DHCP site-specific options (option tag 156). Alternatively, if DHCP is used without site-specific options, the server returned by DHCP option tag 66 (Boot Server Host Name field) is used for configuration. If DHCP is used without option tags 156 or 66, the phones are not automatically added to the system.
- Static configuration—If you are not using a DHCP server or it is not currently online, you can set a static IP address and other startup parameters directly on the IP phone. For details, see Specifying Configuration Parameters on a Phone on page 128.

After the IP phone obtains the configuration server IP address or addresses, it downloads configuration files from the configuration server using HTTP (unless otherwise specified). If the configuration server cannot be reached, or if a configuration file cannot be located, the phone uses the last successfully loaded configuration parameters. After a phone is finished reading configuration files, the current parameters are saved in flash memory.

Configuring ShoreTel 400-Series IP Phones

This section describes how you can specify custom configuration parameters for the phones.

When a ShoreTel 400-Series IP phone boots, it contacts the configured server and reads an initial configuration file from the server. You can override the default configuration parameters for a phone through DHCP site-specific options, through the phone interface, or through custom configuration files. As phone firmware is upgraded, some configuration information is overwritten, but parameters specified in custom configuration files are preserved across upgrades.

Parameter Precedence

While there are some exceptions, in general configuration parameters are processed by the phone in the following order. The last parameter source takes precedence:

- Defaults
- Values specified on the phone through the MUTE **73887#** (**SETUP#**) command
- LLDP-MED
- DHCP option tags 156 or 66 (if DHCP is enabled)
- Configuration files that reside on the server. The precedence order for these files is described in Processing Order for Configuration Files on page 135.
- Configuration settings from the voice switch

Specifying Configuration Parameters on a Phone

If you are not using a DHCP server to provide IP address and configuration parameters to the phones, you must manually configure the phones. You can enter the phone configuration menu at bootup or by entering a key sequence from the phone's keypad after the phone has finished booting up.

If you are using DHCP, be aware that the order of precedence for certain parameters varies:

- Setting the **Config server** parameter on the phone (through the Admin options > Services menu) overrides the configServers parameter specified through DHCP.
- Setting the **SNTP server** parameter on the phone (through the Admin options > Internet protocol menu) does not override the SNTP value provided by a DHCP server because when the phone is rebooted the DHCP value overwrites the value entered on the phone. However, if you set this parameter on the phone, unplug the phone from the network that uses DHCP, and then plug it into a network that does not supply the SNTP server value through DHCP, the parameter value entered on the phone is retained.

Entering SETUP at Bootup

1. Connect the Ethernet cable to the data jack on the back of the IP phone.
2. As the phone is booting, when prompted press any key to enter setup.
3. At the **Admin Password** prompt, enter the default password **1234** or the password provided by your system administrator.

Note

This password is configured through ShoreTel Director on the Administration > IP Phones > Options page. The parameter name is IP Phone Password. If the phone uses factory defaults, the phone has never been connected to a server, and you have not modified the IP Phone Password, use the default password, **1234**.

4. Do one of the following:
   - On the IP420, press **#**.
   - On the IP480, IP480g, and IP485g, press the **OK** soft key.

   The **Admin Options** menu opens.

5. Use the navigation key pad and the selector button to open the submenus necessary to configure parameters as follows:
   - If you are not using a DHCP server to provide an IP address, enter the following information:
     - Internet protocol > Use DHCP (Toggle to Off.)
     - Internet protocol > IPv4 address (Enter the static IP address of the phone.)
     - Internet protocol > Subnet mask (Enter the static IP subnet mask of the phone.)
     - Internet protocol > Gateway (Enter the static IP gateway.)
     - Internet protocol > SNTP server (Enter the IP address of the time server.)
   - If you are not using DHCP to provide configuration parameters, in the Services > Config server field enter the IP address of the ShoreTel configuration server.

   For descriptions of these parameters, see Table 20 on page 130.

6. With the appropriate submenu highlighted, do one of the following:
   - On the IP420, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Edit** soft key.

7. To return to the previous menu, do one of the following:
   - On the IP420, scroll down to the **Back** option and press the selector button on the navigation key pad until you return to the top-level menu.
   - On the IP480, IP480g, and IP485g, press the **Back** soft key until you return to the top-level menu.

8. To apply the changes, do one of the following:
   - On the IP420, with **Exit** highlighted press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Apply** soft key.

Tip

On IP480, IP480g, and IP485g phones, to exit the menu and apply changes, press and hold the Back soft key for 2 seconds.

The phone reboots and applies settings.

Entering SETUP from the Key Pad

1. With the phone on hook, press the MUTE key followed by **73887# (SETUP#)**.
2. Go to step 3 in Entering SETUP at Bootup on page 128, and proceed with the steps there.

Table 20: Phone Information for ShoreTel 400-Series IP Phones

Admin Options Menu Item	Option Name	Description
Network policy	Use LLDP-MED	If On, the phone captures link policy from a Link Layer Discovery Protocol-Media Endpoint Discovery (LLDP-MED) broadcasting neighbor (presumably the upstream ethernet switch). If Off, you can manually set the policy values (such as using 802.1.Q tagging, VLAN ID, PCP, DSCP-audio). If On, these policy values are not editable. If present, the following MED data fields are used by the phone: ■ VLAN ID ■ PCP ■ DSCP If a new neighbor is found (that is, the phone has been moved to a new network), the network policy cache is updated with the new values. If no LLDP messages are found within the 5-second time-out period, the phone uses the cached network policy. If network policy caching is disabled, the default policy is used.
	LLDP neighbor	If Active, an LLDP-MED broadcasting neighbor has been found and the phone is actively using the received policy.
	Cache LLDP-MED	If On, then in the event of failure to receive an LLDP-MED messages, the previously received values are applied. If Off, the default values are used.
	Use 802.1Q	IEEE 802.1Q specifies the use of VLANs (Virtual LANs) on Ethernet. If enabled, you must also specify values for the following fields: ■ VLAN ID ■ PCP ■ DSCP audio If the value for the Use LLDP-MED option is **On**, this field is not editable.
	VLAN ID	The Virtual LAN identifier The default value is 0, which means that VLAN tagging is disabled.
	PCP	The IEEE P802.1p Priority Code Point (PCP) value The default value is 5.
	DSCP audio	The Differentiated Services Code Point (DSCP) value to be used for audio packets. (For details on DSCP, see RFC 2475.) The default value is 46.
	DSCP SIP	The Differentiated Services Code Point (DSCP) value to be used for signaling (SIP) packets. (For details on DSCP, see RFC 2475.) The default value is 26.

Table 20: Phone Information for ShoreTel 400-Series IP Phones (Continued)

Admin Options Menu Item	Option Name	Description
Ethernet	Network port	Choose automatic configuration (“Auto”) or choose speed and duplex modes. The recommended value is Auto.
	PC port	Choose to disable the PC port, or choose automatic configuration (“Auto”) or speed and duplex modes. The recommended value is Auto.
	802.1Q	On or off, as dictated by the **Use 802.1Q** option in the **Network policy** menu
	VLAN ID	The Virtual LAN identifier The default is 0, which means that VLAN tagging is disabled.
	PCP	The IEEE P802.1p Priority Code Point (PCP) value The default value is 5.
	Use 802.1X	Choose to enable or disable IEEE 802.1X link layer authentication. If enabled, enter the username and password. Note the following points about 802.1X usage: ■ If the phone has 802.1X turned on but the network does not have 802.1x authentication, the phone functions normally (and does not need a username and password). ■ If the network has 802.1X and the phone's user name and password credentials are missing or invalid, the phone prompts for a username and password on startup.
	Username	The user name to enable 802.1X link layer authentication
	Password	The password to enable 802.1X link layer authentication
	Authenticated	The current status of 802.1X authentication

Table 20: Phone Information for ShoreTel 400-Series IP Phones (Continued)

Admin Options Menu Item	Option Name	Description
Internet protocol	Use DHCP	If On, DHCP is used to collect the IP address layer information. If Off, you must manually enter the IP address layer information. If On, DHCP provides values for the following fields. If Off, specify static values for these fields: ■ IPv4 address ■ Subnet mask ■ Gateway ■ DNS ■ SNTP (Simple Network Time Protocol) server It is optional but recommended that DHCP option tag 156 be used to specify the designated configuration server for ShoreTel 400-Series IP phones. For more information about this DHCP option tag, see Specifying Configuration Parameters through DHCP Site-Specific Options on page 134.
	DHCP lease	If Active, indicates a DHCP lease has been received by the phone.
	Cache DHCP	If On, the last received DHCP lease is cached and used if a DHCP lease is not received on the next renew. If Off and static values are not provided, the phone will fail to get an IP address if the DHCP server does not respond.
	IPv4 address	The IP address of the phone. If **Use DHCP** is On, this field displays the value from the DHCP server.
	Subnet mask	If **Use DHCP** is Off, specify the static subnet mask for the phone. If **Use DHCP** is On, this field displays the value from the DHCP server.
	Gateway	If **Use DHCP** is Off, specify up to three static IP gateways. (If you do not want to specify a gateway, set the value of the Subnet mask field to 0.0.0.0 to confirm that no address needs a gateway.) If **Use DHCP** is On, this field displays the value from the DHCP server.
	DNS	The default list of static DNS servers. DHCP can override these servers. If **Use DHCP** is on, this field displays the current value.
	SNTP server	The IP address for the SNTP server, which is required for phone operation. The SNTP server should be synchronized with the time used by the ShoreTel Headquarters server. DHCP option tag 42 should be used to pass the time server IP address. If **Use DHCP** is On, this field displays the value from the DHCP server.
	DSCP audio	The Differentiated Services Code Point (DSCP) value to be used for audio packets. (For details on DSCP, see RFC 2475.) The default value is 46.
	DSCP SIP	The Differentiated Services Code Point (DSCP) value to be used for signaling (SIP) packets. (For details on DSCP, see RFC 2475.) The default value is 26.

Table 20: Phone Information for ShoreTel 400-Series IP Phones (Continued)

Admin Options Menu Item	Option Name	Description
Services	Config server	This is the IP address of the Headquarters server. It can be entered manually here or obtained from DHCP. If entered manually, this server overrides the server specified in DHCP option tags 156 or 66. If you specify a list of servers, the phone attempts to connect to subsequent servers in the list if a server fails.
	SIP	This is the IP address of the ShoreTel voice switch that the phone has successfully registered with or is attempting to register with.
	Directory	This is the IP address of the Client Application Server (CAS), which provides Directory and History services.
Phone information	Software version	The version of the phone software that the phone is running.
	Signature	ShoreTel internal use only
	Kernel version	The kernel version installed on the phone.
	Boot1 loader version	The boot1 loader version installed on the phone.
	Boot2 loader version	The boot2 loader version installed on the phone.
	Model number	The ShoreTel model number of the phone.
	MAC address	The MAC address of the phone. This is a unique number for the device.
	HW version	The hardware version of the phone.
	Country	The country for which the phone is configured
	Language	The language the phone is configured to use
Diagnostics	System	For details on these menu options, see Viewing Diagnostic Information on a Phone on page 147.
	Ping	
	Traceroute	
	Capture	
	Clear configuration	
	Reset phone	
	Log upload	

Specifying Configuration Parameters through DHCP Site-Specific Options

By default, DHCP option tag 156 is used. The following parameters are specified in the site-specific options for option tag 156:

- `configServers` (Specify a comma-separated list of IP addresses or DNS names for the configuration server. If a server is not available, the phone cycles through the list of servers until it finds a working server.)
- `ftpServers` (Specify a comma-separated list of IP addresses or DNS names for the configuration server. If a server is not available, the phone cycles through the list of servers until it finds a working server.)

Note

The `ftpServers` parameter is provided for compatibility with sites running ShoreTel MGCP phones. ShoreTel 400-Series IP phones use HTTP to download configuration files from servers specified in the `ftpServers` parameter. For new installations, the `configServers` parameter is recommended over the `ftpServers` parameter.

- `vlan`

While DHCP Option 156 can be used to enable VLAN tagging and set the VLAN ID, it is not recommended because VLAN hopping after the DHCP address is acquired forces the phone to re-start the network stack on the new VLAN a second time. LLDP-MED is the preferred method to enable VLAN tagging.

The complete Option 156 syntax including VLAN tagging is:

```
vlan=<number>,layer2tagging=<0|1>,configservers=<IP
address>,ftpservers=<IP address>
```

Specify the parameters in any order, separating multiple parameters with a comma. Not all parameters are required. When providing multiple values for one parameter, use quotation marks around the comma-separated values. For example:

```
configServers="192.168.0.13, joe.test.com",vlan=2
```

If DHCP option tag 156 is not used, DHCP option tag 66 is used. The following parameters are specified in the site-specific options for option tag 66:

- `tftpServers`
- `ftpServers`

Note

ShoreTel 400-Series IP phones use HTTP to download their configuration files from the servers specified in DHCP option tag 156.

Specifying Configuration Parameters through Custom Configuration Files

Table 21 lists the configuration file names for the ShoreTel 400-Series IP phones. These files are stored in the phone configuration directory created on the server when your ShoreTel system is installed. The default directory for these configuration files is as follows:

`<Drive>:\ftproot\phoneconfig`

Table 21: 400-Series IP Phone Model Configuration Files

ShoreTel IP Phone Model	Custom Configuration File Name for All 400-Series IP Phones	Model-Specific Custom Configuration File Name for 400-Series IP Phones
IP420	`custom.txt`	`custom_420.txt`
IP480	`custom.txt`	`custom_480.txt`
IP480g	`custom.txt`	`custom_480g.txt`
IP485g	`custom.txt`	`custom_485g.txt`

Processing Order for Configuration Files

Configuration files are processed in the following order:

- `country_<ISO>.txt`, where <*ISO*> is a two-character ISO country code (For example, the file for the United States is `country_US.txt`.)

  Do not edit these files. These files specify country-specific settings such as date/time formats.

- `generated.txt`

  Do not edit this file, because it is generated by the server and any changes would be overridden the next time the server generates the file. This file contains a list of voice switches for the phone and the default httpResources parameter setting, which specifies the default server path for wallpaper and ringtones. The server regenerates this file whenever the list of switches is updated.

- `custom.txt`

  This is the base custom configuration file for all 400-Series IP phones. Any configuration parameters that you add to this file are applied to all 400-Series IP phones in your system.

- `custom_<phone_model>.txt` (where `<phone_model>` is 420, 480, 480g, or 485g)

  This is the custom configuration file for a particular model of 400-Series IP phone. Any configuration parameters that you add to this file are applied to all phones of that model at your site.

- `custom_<MAC address>.txt` (where `<MAC address>` is the MAC address of a phone)

  This is the custom configuration file for a particular phone as identified by its MAC address (the 12-digit number on the white sticker on the back of the phone). Any configuration parameters that you add to this file will be applied to the phone identified by the MAC address.

Note

File names for MAC configuration files must be in lower case and not contain punctuation.

The following is an example of a custom configuration file name for a particular phone identified by its MAC address: `custom_00104928630b.txt`.

The phone-specific custom configuration file is the last file read. Any parameters in a custom configuration file override configuration parameters specified at a lower level of precedence, including the parameters entered on the phone, because they are processed first, before any configuration files are read. Any duplicate parameters specified in the configuration files are overridden according to their own precedence order.

Parameters are organized by group, and each parameter must begin on a new line within the proper group, as follows:

[<*group*>]
<*parameter*>=<*value*>
<*parameter*>=<*value*>

[<*group*>]
<*parameter*>=<*value*>
<*parameter*>=<*value*>

where

[<*group*>] is the configuration parameter group as shown in Table 23 on page 138.

<*parameter*> is the name of the configuration parameter as shown in Table 23 on page 138.

<*value*> is the value for the configuration parameter. (Default values are listed in Table 23 on page 138.)

In specifying parameters, the following rules apply:

- IP addresses must be provided in dotted-decimal format.
- Parameters and values in configuration files are case sensitive.
- Cases are preserved in character strings unless otherwise indicated.
- Comments may be embedded in a configuration file by starting the comment line with a **"#"**.
- If a parameter value is formatted incorrectly or is outside the range of valid entries, the phone skips the value and moves to the next parameter. Errors are not logged in these cases.

Example of a Custom Configuration File

Assume that you would like to configure the following custom settings on all of the ShoreTel 400-Series IP phones at your site:

- Specify a dedicated server other than the Headquarters server for ringtones and wallpaper (through the `httpResources` parameter)
- Specify a path where diagnostic log and capture files from the phones should be uploaded

- Use custom power settings as follows:
  - The phone screens return to partial brightness at 07:00 rather than the default of 06:00.
  - The phone screens enter sleep state (completely blank or dark) at 20:00 rather than the default of 19:00.
  - This schedule applies to the phone displays on weekdays and Saturdays, rather than the default of just weekdays.

To implement these custom configuration settings, you would add the following lines to `custom.txt`, which is the custom configuration file that applies to all models of 400-Series phones:

```
[system]
httpResources=http://10.53.53.53/fileserver
diagnosticServers=ftp://10.11.12.500/phonediagfiles

[power]
sleepInhibitStartTime=07:00
sleepInhibitStopTime=20:00
sleepInhibitDays=Mon,Tue,Wed,Thu,Fri,Sat
```

Receiving Configuration Settings from a Switch

After the configuration files are processed and the phones register with the system, they are automatically provided with the configuration information related to the system, their site, and the user assigned to the phone. This configuration information, which is specified in ShoreTel Director and ShoreTel Communicator, overrides settings specified in configuration files. As changes are made in ShoreTel Director or ShoreTel Communicator, these parameters are automatically kept up to date on the phones, whereas the configuration file values are provided only when the phone boots.

Configuration Parameters

Table 23 on page 138 lists the configuration parameters. The abbreviations listed in Table 22 on page 138 identify the source of each parameter in the “Source” column in Table 23 on page 138.

When adjusting values for any of the parameters in the [audiohaldm] group, keep in mind that analog gain and digital gain are cumulative values. To determine the total gain, add the analog gain and digital gain values. Be aware that increasing the gain level can cause echo in the network or distortion for users at either end. This distortion might only be apparent when one of the talkers is speaking loudly or close to the microphone.

WARNING!

This section contains detailed information that can be used to modify the behavior and functionality of your ShoreTel system. Make sure that you understand what you are doing before attempting to use this information to modify your system. ShoreTel is not responsible for any damage or expenses incurred through misuse of this information. If you have questions, contact ShoreTel Technical Support before attempting to modify your system.

Table 22: Source File Abbreviations

Source	Abbreviation in Table
DHCP Site Specific Option	DHCP
Configuration File	CFG
Manual Entry Using SETUP	Phone
Configuration Setting from the Voice Switch	SIP

Table 23: Configuration Parameters

Group	Parameter	Value Format and Default	Description	Source
[audiohaldm]	gains.p2.handsetMicAnalog Gain	A numerical value between 12 (louder) and 0 (quieter). Values must be divisible by 3. Default: 6	The handset microphone analog gain level for the IP420	CFG
[audiohaldm]	gains.p8.handsetMicAnalog Gain	A numerical value between 12 (louder) and 0 (quieter). Values must be divisible by 3. Default: 6	The handset microphone analog gain level for the IP480 and IP480g	CFG
[audiohaldm]	gains.p8cg.handsetMic AnalogGain	A numerical value between 12 (louder) and 0 (quieter). Values must be divisible by 3. Default: 6	The handset microphone analog gain level for the IP485g	CFG
[audiohaldm]	gains.p2.handsetMicDigital Gain	A numerical value between 9 (loud) and -3 (soft). Values must be divisible by 3. Default: 3	The handset microphone digital gain level for the IP420	CFG
[audiohaldm]	gains.p8.handsetMicDigital Gain	A numerical value between 9 (louder) and -3 (quieter). Values must be divisible by 3. Default: 3	The handset microphone digital gain level for the IP480 and IP480g	CFG
[audiohaldm]	gains.p8cg.handsetMic DigitalGain	A numerical value between 9 (louder) and -3 (quieter). Values must be divisible by 3. Default: 3	The handset microphone digital gain level for the IP485g	CFG

Table 23: Configuration Parameters

Group	Parameter	Value Format and Default	Description	Source
[audiohaldm]	gains.p2.handsetSpeaker AnalogGain	A numerical value between -6 (louder) and -18 (quieter). Values must be divisible by 3. Default: -12	The handset speaker analog gain level for the IP420	CFG
[audiohaldm]	gains.p8.handsetSpeaker AnalogGain	A numerical value between -6 (louder) and -18 (quieter). Values must be divisible by 3. Default: -12	The handset speaker analog gain level for the IP480 and IP480g	CFG
[audiohaldm]	gains.p8cg.handsetSpeaker AnalogGain	A numerical value between -6 (louder) and -18 (quieter). Values must be divisible by 3. Default: -12	The handset speaker analog gain level for the IP485g	CFG
[audiohaldm]	gains.p2.handsetSpeaker DitgitalGain	A numerical value between 6 (louder) and -6 (quieter). Values must be divisible by 3. Default: 0	The handset speaker digital gain level for the IP420	CFG
[audiohaldm]	gains.p8.handsetSpeaker DigitalGain	A numerical value between 6 (louder) and -6 (quieter). Values must be divisible by 3. Default: 0	The handset speaker digital gain level for the IP480 and IP480g	CFG
[audiohaldm]	gains.p8cg.handsetSpeaker DigitalGain	A numerical value between 6 (louder) and -6 (quieter). Values must be divisible by 3. Default: 0	The handset speaker digital gain level for the IP485g	CFG
[audiohaldm]	gains.p2.headsetMicAnalog Gain	A numerical value between 18 (louder) and 6 (quieter). Values must be divisible by 3. Default: 12	The headset microphone analog gain level for the IP420	CFG

Table 23: Configuration Parameters

Group	Parameter	Value Format and Default	Description	Source
[audiohaldm]	gains.p8.headsetMicAnalog Gain	A numerical value between 18 (louder) and 6 (quieter). Values must be divisible by 3. Default: 12	The headset microphone analog gain level for the IP480 and IP480g	CFG
[audiohaldm]	gains.p8cg.headsetMic AnalogGain	A numerical value between 18 (louder) and 6 (quieter). Values must be divisible by 3. Default: 12	The headset microphone analog gain level for the IP485g	CFG
[audiohaldm]	gains.p2.headsetMicDigital Gain	A numerical value between 9 (louder) and -3 (quieter). Values must be divisible by 3. Default: 3	The headset microphone digital gain level for the IP420	CFG
[audiohaldm]	gains.p8.headsetMicDigital Gain	A numerical value between 9 (louder) and -3 (quieter). Values must be divisible by 3. Default: 3	The headset microphone digital gain level for the IP480 and IP480g	CFG
[audiohaldm]	gains.p8cg.headsetMic DigitalGain	A numerical value between 9 (louder) and -3 (quieter). Values must be divisible by 3. Default: 3	The headset microphone digital gain level for the IP485g	CFG
[audiohaldm]	gains.p2.headsetSpeaker AnalogGain	A numerical value between -6 (louder) and -18 (quieter). Values must be divisible by 3. Default: -12	The headset speaker analog gain level for the IP420	CFG
[audiohaldm]	gains.p8.headsetSpeaker AnalogGain	A numerical value between -6 (louder) and -18 (quieter). Values must be divisible by 3. Default: -12	The headset speaker analog gain level for the IP480 and IP480g	CFG

Table 23: Configuration Parameters

Group	Parameter	Value Format and Default	Description	Source
[audiohaldm]	gains.p8cg.headsetSpeaker AnalogGain	A numerical value between -6 (louder) and -18 (quieter). Values must be divisible by 3. Default: -12	The headset speaker analog gain level for the IP485g	CFG
[audiohaldm]	gains.p2.headsetSpeaker DigitalGain	A numerical value between 6 (louder) and -6 (quieter). Values must be divisible by 3. Default: 0	The headset speaker digital gain level for the IP420	CFG
[audiohaldm]	gains.p8.headsetSpeaker DigitalGain	A numerical value between 6 (louder) and -6 (quieter). Values must be divisible by 3. Default: 0	The headset speaker digital gain level for the IP480 and IP480g	CFG
[audiohaldm]	gains.p8cg.headsetSpeaker DigitalGain	A numerical value between 6 (louder) and -6 (quieter). Values must be divisible by 3. Default: 0	The headset speaker digital gain level for the IP485g	CFG
[audiohaldm]	gains.p2.sideToneGaindB	A numerical value between -9 (very loud) and -33 (quiet). Values must be divisible by 3. Default: -24	The handset sidetone level for the IP420 Sidetone refers to the level at which you hear your voice while speaking into a handset.	CFG
[audiohaldm]	gains.p8.sideToneGaindB	A numerical value between -9 (very loud) and -33 (quiet). Values must be divisible by 3. Default: -24	The handset sidetone level for the IP480 and IP480g Sidetone refers to the level at which you hear your voice while speaking into a handset.	CFG
[audiohaldm]	gains.p8cg.sideToneGaindB	A numerical value between -9 (very loud) and -33 (quiet). Values must be divisible by 3. Default: -24	The handset sidetone level for the IP485g Sidetone refers to the level at which you hear your voice while speaking into a handset.	CFG

Table 23: Configuration Parameters

Group	Parameter	Value Format and Default	Description	Source
[net]	dot1XEnable	On or Off Default: On	Enable or disable 802.1x network	CFG Phone
[net]	dnsAddress	Comma-separated list of IP addresses	The default list of static DNS servers	DHCP CFG Phone
[net]	ntpServerAddress	Comma-separated list of IP addresses	The default list of Network Time Protocol servers	DHCP CFG Phone
[net]	policyCache	On or Off Default: On	Enable or disable caching of LLDP-MED network policy on the phone	CFG
[power]	idleBrightness	A number between 1 and 100, which indicates a percentage Default: 5	The intensity of the phone backlight when the phone is in the idle state	CFG
[power]	idleTimeout	A number that indicates minutes Default: 5	The number of minutes without phone activity (key presses or calls) that elapse before the phone transitions to the idle state, which dims the backlight. A value of 0 means that the phone never goes into the idle state.	CFG

Table 23: Configuration Parameters

Group	Parameter	Value Format and Default	Description	Source
[power]	sleepTimeout	A number that indicates minutes Default: 60	The number of minutes without phone activity (calls or key presses) that elapse before the phone transitions to the sleep state, which dims the backlight and lowers power usage depending on the settings for the sleepEthernetLowPower and sleepUsbSuspend parameters. A value of 0 means that the phone never goes into the sleep state. The value specified for the sleepTimeout parameter is in effect outside the hours specified by the sleepInhibitStartTime and sleepInhibitStopTime parameters.	CFG
[power]	sleepEthernetLowPower	On or off Default: on	Whether or not the phone reduces Ethernet power when the phone is in a sleep state. If off, Ethernet power is not reduced.	CFG
[power]	sleepUsbSuspend	On or off Default: on	Whether or not the phone supplies power to USB devices plugged into the USB port on the phone (on IP485g) when the phone is in a sleep state. If off, power to USB devices is not suspended when the phone is in a sleep state	CFG
[power]	sleepInhibitStartTime	A four-digit time on a 24-hour clock Default: 06:00	The time of day when the phone display goes from the sleep state to an idle state. This typically corresponds to the start of normal business hours at your site. During the hours when the sleep state is inhibited, the phone can go into an idle state, but it cannot go into a sleep state.	CFG

Table 23: Configuration Parameters

Group	Parameter	Value Format and Default	Description	Source
[power]	sleepInhibitStopTime	A four-digit time on a 24-hour clock Default: 19:00	The time of day when the phone transitions to the sleep state, in which the display turns blank or dark and other configured power-saving measures take effect. This typically corresponds to the end of normal business hours at your site.	CFG
[power]	sleepInhibitDays	Comma-separated list of abbreviations for days of the week. Other valid values are “none” and “all”. Default: Mon,Tue,Wed,Thu,Fri	The days of the week when the sleepInhibitStartTime and sleepInhibitStopTime parameters are in effect	CFG
[syscontrol]	displayBrightnessMax	A number between 1 and 100, which indicates a percentage Default: 100	The maximum intensity of the phone backlight when the phone is not in an idle or sleep state	CFG
[system]	diagnosticServers	A comma-separated list of IP addresses or full URL paths No default.	Specifies where log and capture files generated by the phones are uploaded through FTP The phone cycles through the list of specified servers until it finds a server it can connect to.	CFG
[system]	enableSpeakerPhone	On or off Default: on	Specifies whether the speakerphone is enabled. If off, only the handset or a headset may be used.	CFG
[system]	httpResources	An IP address or full URL path Default: <*Headquarters server*>/fileserver	The IP address or full URL path for a dedicated server that contains custom ringtone and wallpaper files. Typically, /fileserver points to the installation directory for the phone configuration files. By default, this is <Drive>:\inetpub\ftproot\ .	CFG

Table 23: Configuration Parameters

Group	Parameter	Value Format and Default	Description	Source
[system]	overrideConfigServers	A comma-separated list of IP addresses or full URL paths	The configuration server with the highest precedence. This configuration server overrides the configuration server specified in DHCP option tag 156.	CFG Phone
[system]	remoteSyslogger	A server address in the following format: *<IP_address or DNS_name>:port_number;protocol* The protocol is either tcp or udp. The protocol and port number are optional. If not specified, the default port is 514 and the default protocol is udp.	The address of the computer running the syslog server application	CFG
[user]	headsetType	One of the following values: ■ wired ■ wireless Default: wired	The default headset type Note: SIP overrides the headset setting specified in a configuration file with the user's headset preference configured in ShoreTel Director. Users can change the headset type on the IP480, IP480g, IP485g phones. For information about automatic off-hook and headset type settings, see the *ShoreTel System Administration Guide*.	CFG SIP Phone
[user]	timezone	The time zone, specified in plain text Default: Pacific Standard Time	The time zone for the time displayed on the phone The time zone specified overrides the time zone value provided by the switch.	CFG Phone

Setting up an Alternate Configuration Server

If any of the default network configuration settings on the phone are not appropriate for your production network, to save time you might want to stage phones by using a custom configuration file on an alternate configuration server and network rather than manually changing the setting on each phone. To do this, you need to configure the phones using this method before connecting the phones to the ShoreTel system on the production network.

1. Set up a Web server that is appropriate for your operating system (such as IIS on a Windows server or Apache on a Linux server).

Note

For details on setting up a Web server, consult the documentation for your operating system. When setting up a Web server for this purpose, it is generally appropriate to accept the default settings (such as using port 80 for an HTTP server) and permissions. For details about port usage, see Appendix E, Port Usage.

2. On the Web server, create the following virtual directory where the custom configuration file will reside:

   `<httproot>/phoneconfig/`

3. Create the custom configuration file (for example, `custom.txt`) with the parameter setting appropriate for your purpose, and store it in the directory created in the previous step. (For details about creating custom configuration files, see Configuring ShoreTel 400-Series IP Phones on page 127.)

4. On the staging network, use DHCP option tag 156 or 66 to configure the `ftpServers` or `configServers` parameter to specify the Web server where the custom configuration file resides.

Note

If you do not use DHCP to provide the configuration server value, you must enter the value manually on each phone.

5. Connect the phones to the staging network.

   Phones boot up and download the custom configuration file from the Web server. Because the phones have downloaded only configuration information and not switch information, the phones display a “No Service” message.

6. Connect the phones to the production network. (The configuration server value can be provided through DHCP option tag 156 or 66 or specified manually on each phone.)

   Phones boot up normally.

Viewing IP Phone Diagnostic Information

You can view diagnostic information about the 400-Series IP phones in your system by using ShoreTel Director.

You can view diagnostic information for a specific phone through that phone's user interface.

Viewing IP Phones in the ShoreTel System

You can view information about the IP phones in your ShoreTel system in the following ways:

- To check the status of IP phones in your system, use one of the following methods:
  - To use the Diagnostics & Monitoring system in ShoreTel Director to view the IP Phones status page, click **Diagnostics & Monitoring > Status > IP Phones**.
  - To use ShoreTel Director to view the IP Phones page, click **Administration > IP Phones > Individual IP Phones**.
- To view the number of IP phones connected through a switch and the switch's phone configuration capacity, check the switch configuration information in ShoreTel Director. Click **Administration > Platform Hardware > Voice Switches/Service Appliances > Primary**.

For details about viewing IP phone information, see the *ShoreTel System Administration Guide*.

Viewing Diagnostic Information on a Phone

By pressing a key combination on a phone's key pad, you can access various types of diagnostic information for a phone.

Viewing Real-Time System Status on a Phone

You can see the following real-time system status information for a phone:

- CPU load
- Memory usage
- Percentage of storage space used

1. With the phone on hook, press the MUTE key followed by **3424#** (**DIAG#**).

   The **Diagnostics** menu opens.

2. With the System submenu highlighted, do one of the following:
   - On the IP420, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Open** soft key or press the selector button on the navigation key pad.

   Details for CPU load, memory usage, and storage space are displayed.

3. To return to the Diagnostics menu, do one of the following:
   - On the IP420, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Back** soft key or press the selector button on the navigation key pad.
4. To exit, do one of the following:
   - On the IP420, scroll to the bottom of the Diagnostics menu to select the Exit option, and then press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Exit** soft key or press the selector button on the navigation key pad.

Using Ping to Check the Status of an IP Address

1. With the phone on hook, press the MUTE key followed by **3424#** (**DIAG#**).

   The **Diagnostics** menu opens.
2. Use the navigation key pad to scroll to the Ping submenu.
3. With the Ping submenu highlighted, do one of the following:
   - On the IP420, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Open** soft key or press the selector button on the navigation key pad.

   The Ping screen is displayed.

Tip

To proceed directly to the Ping screen, press the MUTE key followed by **7464#** (**PING#**).

4. Use the numbers or letters on the key pad to enter an IP address. On an IP480, IP480g, or IP485g, you also have the option of entering a DNS name.

Tip

Press the * key to insert a period in an IP address or DNS name.

On the IP420, press the speakerphone button to backspace. To proceed with the value you have entered, press **#**.

5. Do one of the following:
   - On the IP420, press **#**.
   - On the IP480, IP480g, and IP485g, press the **Start** soft key or press the selector button on the navigation key pad.

   The phone pings the IP address or DNS server five times, and then reports the ping statistics.

6. To return to the Diagnostics menu, do one of the following:
   - On the IP420, press **#**.
   - On the IP480, IP480g, and IP485g, press the **Back** soft key or press the selector button on the navigation key pad.
7. To exit, do one of the following:
   - On the IP420, scroll to the bottom of the Diagnostics menu to select the **Exit** option, and then press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Exit** soft key or press the selector button on the navigation key pad.

Using Traceroute to Determine the Network Route to a Host

1. With the phone on hook, press the MUTE key followed by **3424#** (**DIAG#**).

   The **Diagnostics** menu opens.
2. Use the navigation key pad to scroll to the Traceroute submenu.
3. With the Traceroute submenu highlighted, do one of the following:
   - On the IP420, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Open** soft key or press the selector button on the navigation key pad.

   The Traceroute screen is displayed.
4. Use the key pad to enter an IP address. On an IP480, IP480g, or IP485g, you can also enter a DNS name.

Tip

Press the * key to insert a period in an IP address or DNS name. In non-numeric mode (which is set through the left soft key), press the * key repeatedly to insert other symbols such as / : @.

On the IP420, press the speakerphone button to backspace. To proceed with the value you have entered, press **#**.

5. Do one of the following:
   - On the IP420, press **#**.
   - On the IP480, IP480g, and IP485g, press the **Start** soft key or press the selector button on the navigation key pad.

   The phone displays the network route for the IP address or DNS server.

6. To return to the Diagnostics menu, do one of the following:
   - On the IP420, press **#**.
   - On the IP480, IP480g, and IP485g, press the **Back** soft key or press the selector button on the navigation key pad.
7. To exit, do one of the following:
   - On the IP420, scroll to the bottom of the Diagnostics menu to select the **Exit** option, and then press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Exit** soft key or press the selector button on the navigation key pad.

Capturing Packets for Phone Network Traffic

To diagnose problems on a phone, you might need to capture packets to see details about network traffic to and from the phone. You can capture packets by using the phone interface, which is described here, or you can initiate packet capture and view the results (using Wireshark or a similar network protocol analysis tool) through the Diagnostics & Monitoring system. For details, see the *ShoreTel System Administration Guide*.

On the 400-Series IP phones signaling packets are encrypted, and packet capture tools available on the network cannot decrypt these packets. However, using the packet capture tool built into the phone, both the encrypted and decrypted versions of the packets are displayed.

The packet capture can run for up to two hours or until the resulting .pcap file reaches 70 MB.

If you specify a location through the diagnosticServers configuration parameter, packet capture (.pcap) files are uploaded to that location. (For details, see Table 23 on page 138.) If your installation does not have a diagnosticServers path configured, by default the .pcap files from the capture operation are uploaded to the following directory on the Headquarters server:

`<Drive>:\inetpub\ftproot` (or the default FTP location on the server)

However, unless this directory allows anonymous write access (which is not recommended), uploading the capture file to this directory will fail.

Uploaded packet capture files are named as follows:

`<Phone MAC address>_YYYYMMDD_HHMMSS.pcap`

Where:

- `YYYYMMDD` is the date (four-digit year, two-digit month, and two-digit day) when the .pcap file was created on the phone.
- `HHMMSS` is the time (two-digit hour, two-digit minute, and two-digit second) when the .pcap file was created on the phone.

The results of a packet capture operation are also accessible through the phone interface until you start a new packet capture operation.

1. With the phone on hook, press the MUTE key followed by **73887#** (**SETUP#**).

   The **Password** prompt opens.

2. Enter the admin password, and press the **OK** soft key.

3. Use the navigation key pad to scroll to the Diagnostics submenu, and press the **Open** soft key.

4. Use the navigation key pad to scroll to the Capture submenu.

5. With the Capture submenu highlighted, do one of the following:

   - On the IP420, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Open** soft key or press the selector button on the navigation key pad.

   The Capture screen is displayed.

6. Do one of the following:

   - On the IP420, with Start highlighted, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Start** soft key.

   The phone starts capturing packets. On the IP480, IP480g, and IP485g, you can see captured packet information on the phone display. You can drill down to get details about a packet by pressing the **Details** soft key.

Note

While the packet capture operation is running, you can exit the Admin options menu and perform the problematic phone operation so that packets for that particular operation can be captured and used to diagnose the problem. After running the problematic scenario, return to the Capture page using steps 1-5 in this procedure and then proceed with step 7 to stop the packet capture operation.

7. To stop the capture process, do one of the following:

   - On the IP420, with Stop highlighted, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Stop** soft key.

8. Optionally, on the IP480, IP480g, and IP485g, before or after you stop the capture process you can filter the results by protocol or IP address:

   - To filter by protocol, enter the protocol in the filter box. (For example, enter SIP.)
   - To filter by IP address, in the filter box enter `ip.addr==<IP_address>`.

Tip

To enter a period in an IP address, press the * key.

To enter the = symbol, while in either uppercase or lowercase alphanumeric entry mode, press the * key several times to move through various symbols until the = symbol is displayed.

You can change the entry mode by pressing the soft key on the left.

9. Optionally, to see the contents of a packet on the IP480, IP480g, or IP485g, press the **Details** soft key.
10. To upload the captured packet information, do one of the following:
    - On the IP420, with Upload highlighted, press the selector button on the navigation key pad. After receiving a message about the upload process, press **#** to continue.
    - On the IP480, IP480g, and IP485g, press the **Upload** soft key.

    The phone returns a message to let you know whether the upload operation succeeded.
11. To return to the Diagnostics menu, do one of the following:
    - On the IP420, with **Back** highlighted press the selector button on the navigation key pad.
    - On the IP480, IP480g, and IP485g, press the **Back** soft key or press the selector button on the navigation key pad.
12. To exit, do one of the following:
    - On the IP420, scroll to the bottom of the Diagnostics menu to select the Exit option, and then press the selector button on the navigation key pad.
    - On the IP480, IP480g, and IP485g, press the **Exit** soft key or press the selector button on the navigation key pad.

Clearing a Phone's Configuration

To return a phone to the factory settings, you can clear the phone's configuration through the Diagnostics menu. If you move phones from one ShoreTel system to another, you need to clear each phone's configuration.

You can also clear a phone's configuration by using MUTE **25327#** (**CLEAR#**), which is described in Clearing a Phone's Configuration Settings on page 160.

1. With the phone on hook, press the MUTE key followed by **3424#** (**DIAG#**).

   The **Diagnostics** menu opens.
2. Use the navigation key pad to scroll to the **Clear configuration** submenu.

3. With **Clear configuration** highlighted, do one of the following:

   - On the IP420, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Open** soft key or press the selector button on the navigation key pad.

   The **Clear configuration** screen is displayed.

4. Do one of the following:

   - On the IP420, with **Clear & reboot** highlighted, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Clear** soft key.

   The phone reboots.

Resetting a Phone

You can reset (reboot) a phone through the Diagnostics menu.

You can also reset a phone by using MUTE **73738#** (**RESET#**), which is described in Resetting an IP Phone on page 160.

1. With the phone on hook, press the MUTE key followed by **3424#** (**DIAG#**).

   The **Diagnostics** menu opens.

2. Use the navigation key pad to scroll to the **Reset phone** submenu.

3. With **Reset phone** highlighted, do one of the following:

   - On the IP420, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Open** soft key or press the selector button on the navigation key pad.

   The **Reset phone** screen is displayed.

4. Do one of the following:

   - On the IP420, with **Reset** highlighted, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Reset** soft key.

   The phone reboots and applies settings.

Uploading a Phone's Log

If a phone user experiences problems, you or the user might want to upload logs to debug the problem.

If you specify a location through the diagnosticServers configuration parameter, log files are uploaded to that location. (For details, see Table 23 on page 138.) If your installation does not have a diagnosticServers path configured, by default the log files are uploaded to the following directory on the Headquarters server:

`<Drive>:\inetpub\ftproot` (or the default FTP location on the server)

However, unless this directory allows anonymous write access (which is not recommended), uploading the log files to this directory will fail.

Uploaded log files are named as follows:

`<Phone MAC address>_YYYYMMDD_HHMMSS.tgz`

Where:

- `YYYYMMDD` is the date (four-digit year, two-digit month, and two-digit day) when the .tgz file was created on the phone.
- `HHMMSS` is the time (two-digit hour, two-digit minute, and two-digit second) when the .tgz file was created on the phone.

1. With the phone on hook, press the MUTE key followed by **3424#** (**DIAG#**).

   The **Diagnostics** menu opens.

2. Use the navigation key pad to scroll to the **Log upload** submenu.

3. With **Log upload** highlighted, do one of the following:

   - On the IP420, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Open** soft key or press the selector button on the navigation key pad.

   The **Log upload** screen is displayed.

4. To start the log upload, do one of the following:

   - On the IP420, with **Start** highlighted, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Start** soft key.

5. As the log upload is running, do one of the following:

   - To cancel the log upload after it has started:
     - On the IP420, with **Stop** highlighted, press the selector button on the navigation key pad.
     - On the IP480, IP480g, and IP485g, press the **Cancel** soft key and then the **OK** soft key.
   - To continue the log upload in the background:
     - On the IP420, with **Back** highlighted, press the selector button on the navigation key pad, or wait for the log upload to complete.

- On the IP480, IP480g, and IP485g, press the **Back** soft key or wait for the log upload to complete.

The phone displays a message indicating whether the log upload was successful.

6. When the log upload is finished, do one of the following:
   - On the IP420, press **#**.
   - On the IP480, IP480g, and IP485g, press the **OK** soft key.
7. To return to the Diagnostics menu, do one of the following:
   - On the IP420, with **Back** highlighted, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Back** soft key or press the selector button on the navigation key pad.
8. To exit, do one of the following:
   - On the IP420, scroll to the bottom of the Diagnostics menu to select the Exit option, and then press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Exit** soft key or press the selector button on the navigation key pad.

Diagnostic and Failure Messages for 400-Series IP Phones

Diagnostic failure and error messages for the 400-Series IP phones are displayed on the phone, in remote and local syslog output, or both.

You can get more information about the status of a phone by using MUTE **4636#** (INFO#) to enter the Admin options menu. Error conditions are indicated as follows:

- On the IP480, IP480g, or IP485g models, scroll to the submenu marked by an ⚠ icon, open that submenu, and with the error highlighted press the **Details** soft key. In addition, when an error message (such as “No service”) is displayed on a phone, you can see details about the error by pressing the **Details** soft key.
- On the IP420 phone, scroll to the submenu marked by **!**, press the selector button on the navigation key pad, and scroll to the menu item marked by **!**. The **>** character indicates that details are available. Press the selector button to see details about the error condition. Press the selector button again to leave the error details page.

Note

Though the Admin options menu displayed when you use MUTE **4636#** (INFO#) is similar to the menu displayed when you use MUTE **73887#** (SETUP#), the error indicators (⚠ or **!**) are not displayed when you access the Admin options menu through MUTE **73887#** (SETUP#).

In addition to messages displayed on the phone, syslog messages of CRITICAL, ALERT, and EMERGENCY priority levels are sent to a remote syslog server if configured. To configure a remote syslog server, you must specify a value for the remoteSyslogger configuration parameter. For more information about configuring the remoteSyslogger parameter, see Table 23 on page 138.

Table 24 describes some of the important diagnostic and failure messages that may be displayed on ShoreTel 400-Series IP phones or in remote syslog output. (Other messages are self-explanatory.) The messages in Table 24 are listed in alphabetical order.

Table 24: Error Messages

Message on Phone Display	Message in Remote Syslog and/or in Details View of Phone Message	Interpretation and Action
802.1X user, 802.1X password	802.1X authentication failed	802.1X authentication has failed. Reboot the phone. If that does not address the problem, check the VLAN configuration.
Download failed		If you have a dedicated server configured for the httpResources configuration parameter, check the status of that server. Otherwise, check the status of the Headquarters server.
Download file missing		If you have a dedicated server configured for the httpResources configuration parameter, check the status of that server. Otherwise, check the status of the Headquarters server.
Download server busy		If you have a dedicated server configured for the httpResources configuration parameter, check the status of that server. Otherwise, check the status of the Headquarters server.
Error applying hotfixes		Confirm that the hotfix is applicable to the current phone release. If the hotifx is not applicable, remove it.
Error downloading hotfixes		The hotfix could not be obtained from the server. Ensure that the hotfix specified in the phone configuration files on the server matches the hotfix files installed on the server.
Failed to connect to server		Check the status of the Headquarters server.
Invalid SNTP time zone		In ShoreTel Director, on the Sites page check the value of the Time Zone parameter.
Log generation failed		Reboot the phone and try the log upload again.
Log upload failed		Reboot the phone and try the log upload again. If the diagnosticServers configuration parameter was used to specify a destination for log and capture uploads, check the status of that server. Otherwise, check the status of the Headquarters server.

Table 24: Error Messages (Continued)

Message on Phone Display	Message in Remote Syslog and/or in Details View of Phone Message	Interpretation and Action
No config server specified		If using DHCP, ensure that a configuration server is specified in the settings for DHCP option tag 156 and/or option tag 66. If not using DHCP, use MUTE **73887#** (SETUP#) to specify a configuration server. For details, see Entering SETUP from the Key Pad on page 129.
No download server configured		If you have a server configured for the httpResources configuration parameter, check the status of that server. Otherwise, check the status of the Headquarters server.
No download server could be reached		If you have a dedicated server configured for the httpResources configuration parameter, check the status of that server. Otherwise, check the status of the Headquarters server.
No Ethernet	No Ethernet link detected	If “No Ethernet” is displayed on the phone while the phone reboots, you can ignore the message because it is a normal part of the phone boot-up process. If "No Ethernet link detected" is displayed in the remote syslog output, then there might be an issue with the Ethernet connection. Check the network connection and/or reboot the phone.

Table 24: Error Messages (Continued)

Message on Phone Display	Message in Remote Syslog and/or in Details View of Phone Message	Interpretation and Action
No Service	No SIP server found in config	The phone cannot connect with a SIP switch because no switch is configured. The phone did not obtain the IP address of a SIP switch from the configuration files. The most likely cause of this error is that the configuration server is down.
	SIP authorization failed SIP bad request SIP connection keep-alive timeout SIP connection timeout SIP invalid username SIP permission denied SIP registration failed SIP registration stopped SIP server internal error SIP server timeout SIP service unavailable SIP switch failure, stale calls will be dropped	You can obtain details about the error condition as follows: ■ On the IP480, IP480g, or IP485g models, press the **Details** soft key. ■ On the IP420, the **>** character indicates that details are available. Press the selector button on the navigation key pad, and scroll to the menu item marked by **!**. Press the selector button to see details about the error condition. If you need more information to resolve the problem, you can perform the following actions in the following order until the problem is resolved: ■ Use the Ping or Traceroute tools in the phone's Diagnostic menu to check network connectivity to the voice switch and configuration server. ■ Check the status of the phone's call control switch. If the switch is down, the phone cannot register with the switch. The problem should resolve when the switch returns to normal operation. ■ Check the date and time on the phone's display while the phone is idle. If the date and time are not current, there might be a problem with certificate verification. Ensure that the SNTP server settings are valid, and then reboot the phone. ■ Press the **Details** soft key (on the IP480, IP480g, and IP485g) or the selector button on the navigation key pad (on the IP420) and select the **Services** menu. Select the **SIP** submenu, and monitor the IP address. If the SIP IP address changes every few seconds, the phone is actively trying to find a voice switch with which to register, which could indicate a problem. Check the status of the Headquarters server and the switches. ■ If the switch is operating normally, these messages could indicate a problem with the phone's configuration. To address the issue, try rebooting the phone. If that does not address the problem, use MUTE **25327#** (CLEAR#) to clear the phone's configuration. For details, see Clearing a Phone's Configuration on page 152.

Table 24: Error Messages (Continued)

Message on Phone Display	Message in Remote Syslog and/or in Details View of Phone Message	Interpretation and Action
No upload server configured		If the diagnosticServers configuration parameter was used to specify a destination for log and capture uploads, check the status of that server. Otherwise, check the status of the Headquarters server.
No upload server could be reached		If the diagnosticServers configuration parameter was used to specify a destination for log and capture uploads, check the status of that server. Otherwise, check the status of the Headquarters server.
No valid config server present		The phone has attempted to contact all configuration servers specified through DHCP option tags 156 or 66 or set manually through MUTE **73887#** (SETUP#), but no configuration server is reachable. Check the status of the configuration server or servers.
	Phone application initialization: Remote-syslog diagnostic message for <MAC Address>	This message is captured in the remote and local syslog when the phone reboots, regardless of the reason for the reboot.
	Phone crash for <MAC Address>	An error has occurred, causing the phone to automatically reboot.
	Phone deadlock detected for <MAC Address>	An error has occurred, causing the phone to automatically reboot.
	SIP server <IP Address> connection failure for <MAC Address>	The phone's connection to the switch was lost due to a switch or network issue. For example, the switch could be down because of a switch reboot or a switch error condition. Check the status of the switch and the network.
User assignment: CAS Connection failure	CAS failed to connect	The phone failed to establish a connection to CAS. As a result, no CAS-driven features (such as History and Directory) are available on the phone. Check the status of the Headquarters server. If you see this message in remote syslog output during initial bootup, wait several seconds for the error to clear and try again.
User assignment: CAS invalid login	CAS login failed	During an attempt to assign a phone to a user, the user extension and/or password provided were invalid.

Displaying Settings for an IP Phone

1. With the phone on hook, press the MUTE key followed by **4636#** (INFO#).

   The **Admin Options** menu opens.

2. Use the navigation key pad and the selector button to scroll through and open the submenus as necessary to see the phone's settings.

   For descriptions of the parameters, see Table 20 on page 130.

3. To close the Admin options menu, do one of the following:

   - On the IP420, with **Exit** highlighted press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Exit** soft key.

Resetting an IP Phone

1. With the phone on hook, press the MUTE key followed by **73738#** (**RESET#**).

   The phone displays the Reset phone screen.

2. Do one of the following:

   - On the IP420, with **Reset** highlighted, press the selector button on the navigation key pad.
   - On the IP 480, IP480g, and IP485g, press the **Reset** soft key.

The phone reboots and applies settings.

Clearing a Phone's Configuration Settings

You can clear a phone's configuration settings and return it to factory settings by entering a key sequence on the phone's key pad. If you move phones from one ShoreTel system to another, you need to clear each phone's configuration.

1. With the phone on hook, press the MUTE key followed by **25327#** (**CLEAR#**).

   The phone displays the Clear Configuration screen.

2. Do one of the following:

   - On the IP420, with **Clear & reboot** highlighted, press the selector button on the navigation key pad.
   - On the IP480, IP480g, and IP485g, press the **Clear** soft key.

   The phone reboots and applies settings.

CHAPTER

6

Other IP Endpoints

This chapter provides information about ShoreTel phone IP endpoints other than the 400-Series IP phones, which are described in Chapter 5, Configuring and Maintaining 400-Series IP Phones on page 121. This chapter contains the following information:

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Overview

The ShoreTel system manages calls and applications for three types of IP endpoints: IP phones, SoftPhones, and conference bridges. IP endpoints are identified by IP address and can exist anywhere on the network. All IP endpoints are supported by ShoreTel voice switches, which must have sufficient capacity for all the IP endpoints in the system. IP endpoints are configured in the system with ShoreTel Director. For more information on IP endpoints, see the *ShoreTel Planning and Installation Guide* and the *ShoreTel System Administration Guide*.

This chapter provides information about ShoreTel 100-, 200-, 500-, and 600-Series IP phones.

IP Phones

ShoreTel IP phones allow you to deploy your telephony system as an end-to-end IP network without dedicated station wiring. Connecting anywhere on the network, ShoreTel IP phones work with the ShoreTel Communicator client applications or can be used independently.

The IP phone controls basic display operations, such as volume level, date and time, and icons.

IP Phone Keep Alive

The ShoreTel Voice Switches that manage IP phones send a heartbeat to their associated IP phones once a minute. If the heartbeat is not acknowledged within approximately four seconds, the switch considers the IP phone to be offline or unavailable. The switch continues to broadcast the heartbeat every minute. Any currently offline IP phone that returns an acknowledgement is considered online and available.

IP Phone Failover

IP phones can be optionally configured to send a heartbeat to their ShoreTel Voice Switch every four minutes. If an IP phone cannot communicate with its switch, the phone automatically connects to another switch located at the same site with available configured IP phone resources.

For IP phone failover to be effective, the system must be planned with sufficient excess capacity to handle phones from at least one switch during a failover event. For example, if a switch with 20 IP phone ports fails, 20 IP phone ports need to be available elsewhere in the system.

Services

There are two services running on the ShoreTel HQ and DVS servers that interact with the system's IP phones:

- IP Phone Configuration Service (IPCS)
- Client Application Server (CAS)

IPCS

IPCS manages the IP phone configuration process, including configuration files and the database updates. Problems with IPCS connectivity can prevent IP phones from booting and prevent phone configuration data from being updated.

Client Application Server (CAS)

Client Application Server handles the remaining functions, such as event handling and feature button functions. It also controls any actions by the IP phone display not controlled by the device's firmware or switches. Problems with CAS or TMS connectivity can result in incorrect phone displays and errors in both the hard and soft key functions.

Embedded IP Phone Display Driver

The embedded IP phone display is provided by the server. Control of IP phone features (such as phone display, redial, and call transfers) are handled on the server. Features that require writing to the database (such as directory and speed dial) rely on the server.

Date and Time

IP phones depend on an SNTP server to maintain the correct time and date. Without an SNTP server, you can set the phone date and time via a GMT offset.

IP Phones and ShoreTel Voice Switches

IP phones in a ShoreTel system interact with two ShoreTel voice switches: the configuration switch and the call manager switch. The configuration switches help the IP phones obtain their configuration from the ShoreTel server, which functions as a FTP server for the IP phones. You must have at least one configuration switch and can designate a second configuration switch for reliability.

The call manager switch is responsible for hold, transfer, conference, and park actions.

As part of the configuration information, each IP phone is assigned a ShoreTel Voice Switch that acts as the phone's call manager to help the IP phone set up and tear down calls.

Configuration Switches

In a DHCP environment, when an IP phone is enabled, it receives the IP address of the configuration switch from DHCP and the ShoreTel server. Each system includes at least one configuration switch for this purpose.

If you have configured the IP phones to start without a DHCP server, you must set the IP address of the configuration switch manually.

The switches, communicating with the HQ server, determine which switch manages calls for a particular IP phone. You have the option of assigning two switches to this function, in case one fails.

Call Manager Switch

The call manager module of the ShoreTel Voice Switches handles the Media Gateway Control Protocol (MGCP) information from the IP phones assigned to it. After a call is connected to an endpoint, media streams are independent of the call manager switch.

The ShoreTel Voice Switch communicates call information to other switches in the system using ShoreTel's enhanced SIP protocol. Every site where IP phones are in use must have a ShoreTel Voice Switch configured to support the number of IP phones at the site.

To configure IP phone support on a ShoreTel Voice Switch, you must reserve ports for IP phone support on the ShoreTel Voice Switch edit page in ShoreTel Director.

IP Phone Communications

IP phone communications are routed through two protocols: MGCP and RTP (Real-time Protocol).

MGCP

ShoreTel IP phones (with the exception of the 400-Series IP phones) communicate with ShoreTel voice switches via MGCP, a device control protocol. The relationship between the switch (call manager) and the phone (gateway) follows a master–slave model.

MGCP is used to:

- Deliver information to the IP phone display
- Set up and tear down media streams
- Report phone events such as key presses, on hook, and off hook

Real-time Protocol

Media travels through the ShoreTel system using Real-time Protocol (RTP). After call setup, media flows directly between IP phones via RTP. The ShoreTel Voice Switch is involved only when setting up or tearing down a call.

Boot Process

ShoreTel IP phones are pre configured by ShoreTel to work in conjunction with your network's Dynamic Host Configuration Protocol (DHCP) server. After the servers are configured, when the phones deployed are automatically added to your ShoreTel system.

After the IP phone obtains the DHCP and FTP server IP addresses, it downloads the application and configuration files from the FTP server. The IP phone configuration file is modified by ShoreTel Director during IP phone configuration.

If you are not using a DHCP server or it is not currently online, you can set a static IP address and other startup parameters directly at the IP phone. Static IP addresses for IP phones can also be assigned using the IP phone setup menus.

IP Phone Firmware Upgrades

The IP phone application software can be upgraded by replacing the application file on the FTP server. When ShoreTel 100-, 200-, 500-, and 600-Series IP phones boot up or reboot, they automatically download the available new firmware.

You can also initiate firmware updates by triggering a reboot through either the Diagnostics & Monitoring system or Quick Look, which are both available through ShoreTel Director.

WARNING!

Modifying the IP phone configuration files can cause unpredictable results. If you have special needs, contact ShoreTel Technical Support for instructions.

Diagnostics

Viewing System IP Phones

IP phone connectivity is displayed in ShoreTel Director in the IP Phone List on the IP Phones page (Administration > IP Phones > Individual IP Phones).

The number of IP phones connected through a switch and the number of IP phones that can be connected to a switch are displayed in ShoreTel Director in the Primary Switches page (Administration > Switches > Primary).

You can also use the Diagnostics & Monitoring system to view status of IP phones. For details, see the *ShoreTel System Administration Guide*.

On-Screen Error Messages

Any time a user action results in an error being returned by TAPI, the error is displayed on the IP phone display for six seconds (one North American ring cycle). The error message can be dismissed more quickly by pressing the **OK** soft key.

Diagnostic and Failure Messages

Table 25 on page 166 lists and describes the diagnostic and failure messages that may be displayed on ShoreTel IP phones.

Table 25: Diagnostic and Failure Messages

Display Message	Interpretation
File System Failure	An internal, unspecified, problem detected while performing a file system operation.
Boot File Too Big	The boot file is too big and won't fit in RAM.

Table 25: Diagnostic and Failure Messages (Continued)

Display Message	Interpretation
Boot Save Failed	Writing the boot image to flash memory failed.
Reconfiguring Network	The phone is switching VLANs. **Note:** This might be displayed after DHCP and/or after configuration file processing.
Duplicate IP Address	A duplicate IP address is typically caused by DHCP or a manual entry of the IP address onto multiple devices.
FTP Unreachable	The FTP server is unable to be pinged (for IP110).
FTP Server Unreachable	The FTP server is unable to be pinged (for others).
Unresponsive task/Resetting	A task failed to respond to a keep alive request so the phone is restarted.
DSP Error/Repair Required	DSP testing failed on startup. Bad DSP.
NO MGC IP CONFIGURED	An IP address is not set for the MGC.
DSP Asserted/Resetting	The DSP crashed, and a reboot is started.
DHCP lease/invalid!	The DHCP lease expired and the phone failed to acquire a new lease.
APP download failed!/filename	Application image download failed.
Invalid App Name	The application name does not follow the required format.
Format Failed	While trying to store a new image in flash, a failure occurred when erasing the flash device.
File System Error	An error was returned by the file system API.
Invalid Signature	The boot or application image file is the wrong type for this phone.
Invalid Image Version	The .bmp image was not of a known acceptable format.
Download CFG file failed/filename	Failed to download the main configuration file specified.
Couldn't Get INCL file/filename	Failed to read the specified Include file from the FTP server.
Using Cached CFG (for IP110) Using Cached CFG Files! (for others)	If a complete `config` file and all includes cannot be downloaded, a cached `config` file is being used.
Enter Factory mode * – No # – Yes	In Response to mute-rramos.
Factory Test KPD Mode	You are in factory test mode ready to test the keypad (via mute-rramos).
Boot Application	If only a boot application is in flash and an application image cannot be downloaded, this information is displayed after the boot process is completed.
No/Ethernet	Ethernet is not detected.
100 Mbps/Ethernet	100 Mbps Ethernet speed in use.
10 Mbps/Ethernet	10 Mbps Ethernet speed in use.

Table 25: Diagnostic and Failure Messages (Continued)

Display Message	Interpretation
Request Service (for IP110) Requesting Service (for others)	Being requesting service from MGC.
No Service	MGC service is unavailable.

Troubleshooting the IP Phone Display

This section presents some techniques for troubleshooting the IP Phone Display Server. When you suspect an IPDS (CAS) problem, verify that you can call into voicemail successfully. If you can call voicemail successfully, then you have an IPDS (CAS) issue. If voicemail does not answer or you hear a message stating the voicemail system is unavailable, you have an issue with the communications to the server.

Phone Display Is Incorrect

If a phone display is incorrect, the following may occur:

- IPDS/CAS Sent a Bad Display Update

  This can be detected by searching through the IPDS log file for the display line in question. If it is found at the appropriate time and on the appropriate extension, IPDS/CAS is the cause of the problem. Provide the relevant IPDS log to your engineering resources.

- Switch Did Not Update the IP Phone Correctly

  It is possible for the switch to mishandle phone updates.

Enabling IPDT Debugging

By default, `IPDT` logging is turned off. However, you can enable `IPDT` logging to assist in troubleshooting efforts.

Enabling IPDT Debugging

To enable logging on the switch:

1. `Telnet` into the switch.
2. Type the following command.

   ```
   ipdt_debug_level - -1
   ```

3. Logging output appears on the screen.

Notes

- ShoreTel recommends that you enable `IPDT` logging only for short periods of time. This feature generates large amounts of data that consumes CPU cycles on the switch and slows it down.
- You can disable the logging feature by replacing -1 with a -0 in the command above.
- The -1 variable enables tracing for all IPDT-related components. You can selectively enable individual IPDT components by using the commands and variables listed in Table 26.

Table 26: IPDT Debugging Flags

Debug flag	Decimal value	Hexadecimal value	Purpose
DEBUG_HOTDIAL	2	0x2	timeouts and logic associated with hot dial / fast transfer feature
DEBUG_NCC_RAW_EVENTS	256	0x100	raw device status, call control, and IPDS helper events from switch core
DEBUG_NCC_DEVICE_INVENTORY	512	0x200	ncc acquisitions and releases
DEBUG_NCC_FLOW1	4096	0x1000	ncc event handling
DEBUG_NCC_FLOW2	8192	0x2000	verbose ncc event handling
DEBUG_CONFIG_NOTIFICATIONS	65536	0x10000	configuration data and changes
DEBUG_NCC_DISPLAY_BASIC	16777216	0x01000000	logic associated with determining which "screen" is shown
DEBUG_NCC_DISPLAY_DETAILS	33554432	0x02000000	the actual display commands sent to the phones

The functions listed in Table 27 can be executed from a terminal session. String arguments must be passed in quotes. Integer arguments may be passed in decimal form, or in hex form by prefixing with 0x.

Table 27: IPDT Functions

Function	Argument name	Argument Type	Purpose
`ipdt_dumpExtensions`	none	none	Lists all phones and extensions configured on switch, along with CCOID, and phone type where appropriate.
`ipdt_dumpExtDisplay`	extension number	string	shows current value of all display elements: announcement area, soft keys, custom key labels, custom key icons/leds, message waiting indicator, location and format of date and time, location of borders.
`ipdt_dumpCCODisplay`	CCOID	integer	same as above, using CCOID as key. Use ipdt_dumpExtensions to find CCOIDs of non-extension devices such as anonymous phones.

Table 27: IPDT Functions (Continued)

Function	Argument name	Argument Type	Purpose
ipdt_dumpExtCalls	extension number	string	lists all calls on the given extension. Works for "foreign extensions" too (that is, extensions whose call info is supplied by IPDS)
ipdt_dumpCCOCalls	CCOID	integer	same as above, using CCOID as key; native extensions only.
ipdt_dumpExtCfg	extension number	string	lists configuration and extension status for extension. For foreign extensions, lists those details supplied by IPDS.
ipdt_dumpCCOCfg	CCOID	integer	same as above, using CCOID as key; native extensions only.
ipdt_dumpActiveTimer	none	none	lists currently active timed objects in IPDT
ipdt_resetExtDisplay	extension number	string	redraws the entire display of the phone, by the given extension.
ipdt_resetCCODisplay	CCOID	integer	redraws the entire display of the phone, by the given CCOID.
ipdt_adminMsgExt	extension number	string	displays an administrative message in announcement area of given phone for ipdt_admin_timeout seconds. "" or "all" indicates all phones on switch.
ipdt_adminMsgCCO	CCOID	integer	displays an administrative message in announcement area of given phone for ipdt_admin_timeout seconds. 0 indicates all phones on switch

Manual Phone Configuration

Phones must be manually configured if you are not using a DHCP server to provide IP address and configuration parameters.

You can enter the phone configuration menu at bootup or by entering a key sequence from the phone's keypad.

Manually Configure the ShoreTel IP Phones at Bootup

1. Connect the Ethernet cable into the data jack on the back of the IP phone.
2. At the Password prompt, enter the default password **1234**, or the password provided by your system administrator, followed by the **#** key.

Note

You have four seconds to enter the password, after which the phone enters normal operation with its current settings.

The default Password can be changed in ShoreTel Director. For more information, see the *ShoreTel System Administration Guide.*

3. Enter the values listed in Table 28 when prompted. Press **#** to advance to the next settings or ***** to exit

Table 28: Boot up Configuration Prompts

Prompt	Value
Clear all values?	Press #. (No.)
DHCP – ON	Press * and #.
IP –	Enter the IP address for the phone. Press #.
Subnet –	Enter the Subnet mask. Press #.
Gateway –	Enter the gateway IP address. Press #.
FTP –	Enter the IP address of your ShoreTel server. Press #.
MGC –	Press #. **Note:** The phone obtains the address from configuration files on the ShoreTel server.
SNTP –	Enter the IP address of your time server. Press #.
802.1Q Tagging – OFF	Press #. **Note:** Consult your network administrator before changing this value.
VLAN ID –	Press #.
Save all changes	Press #. (Yes.)

The phone downloads the latest bootROM and firmware from the ShoreTel server and in the process, reboots several times. When the phone displays the date and time, the boot and upgrade process is complete.

Manually Configuring a Phone from the Keypad

1. With the phone on hook, press the **MUTE** key followed by **73887# (SETUP#**).
2. At the Password prompt, enter **1234**, or the password provided by your system administrator, followed by the # key.

Note

The default IP Phone Password can be changed in ShoreTel Director. For more information, see the *ShoreTel System Administration Guide.*

3. Enter the values when prompted. Press # to advance to the next settings or * to exit.

   The phone downloads the latest bootROM and firmware from the ShoreTel server and in the process, reboots several times. When the phone displays the date and time, the boot and upgrade process is complete.

Displaying IP Phone Settings

You can display the phone's current IP parameters setting by entering a key sequence from the phone's keypad.

1. With the phone on hook, press the **MUTE** key followed by **4636# (INFO#)**. The phone displays the first two parameters.
2. Press ***** to advance the display or **#** to exit.

   The phone resumes normal operation after the last parameter is displayed.

Resetting the ShoreTel IP Phone

1. With the phone on hook, press the **MUTE** key followed by **73738# (RESET#)**.

   The phone reboots.

Configuration for ShoreTel IP Phones

Boot Configuration Operation

Upon booting, IP phones use the FTP server address to acquire their configuration specifications. The FTP server address is determined from DHCP site-specific options (default option 156). If DHCP is disabled, the FTP server address can be manually entered on the phone, and the information is stored in the flash memory of the phone. Alternatively, if DHCP is used (but no site-specific option is returned), the FTP server returned by option 66 is used.

If the FTP server cannot be reached, or if a configuration file cannot be located, the phone uses the last successfully-loaded configuration parameters. After a phone is finished reading configuration files, the current parameters are saved into flash memory.

IP Phone Configuration

When an IP phone boots, it contacts the configured FTP server and reads an initial configuration file from FTP root. This file corresponds to its coded model name. Each of these initial configuration files, references a custom configuration file that can be manually edited by a system administrator. As phone software is upgraded, the contents of configuration files are overwritten at the time of update by `Kadotautil`, but custom configuration files are preserved across upgrades.

Configuration parameters are prioritized by the phone in the order that they are processed. Custom configuration files are the last file read. Any parameters in a custom configuration file override previous configuration parameters. This also includes local parameters, as they are processed first, before any configuration files are read.

Parameters and values are case sensitive. A parameter and its value are separated by one or more spaces or tabs. Each parameter must begin on a new line of the text file.

Table 29 lists the phone configuration file names.

Table 29: Phone Models

ShoreTel IP Phone Name	Name on Top of Phone	Model Name on Barcode Label Underside of Phone	Base Configuration Name	Custom File Name
IP 110	ShoreTel 110	S0	shore_s0.txt	s0custom.txt
IP 115	ShoreTel 115	S01	shore_s01.txt	s01custom.txt
IP 212k	ShoreTel 212k	S12	shore_s12.txt	s12custom.txt
IP 230	ShoreTel 230	SEV	shore_sev.txt	sevcustom.txt
IP 230g	ShoreTel 230g	SEG	shore_sevg.txt	sevgcustom.txt
IP 265	ShoreTel 265	S36	shore_s36.txt	s36custom.txt
IP 530	ShoreTel 530	S2	shore_s2.txt	s2custom.txt
IP 560	ShoreTel 560	S6	shore_s6.txt	s6custom.txt
IP 560g	ShoreTel 560g	S6G	shore_s6g.txt	s6gcustom.txt
IP 565g	ShoreTel 565g	S6C	shore_s6c.txt	s6ccustom.txt
IP 655	ShoreTel 655	SWE	shore_swe.txt	swecustom.txt
BB24	ShoreTel 24	SBB	shore_sbb.txt	sbbcustom.txt

While booting, IP phones look in FTP root for a unique configuration file, "shore_MACaddress.txt" (the MAC address of the phone).

Note

MAC configuration files must be named in lower case. While Windows is usually not case-sensitive, the LIST command within the Windows FTP server is case-sensitive.

If shore_MACaddress.txt is found, it is used to provide configuration files and configuration parameters for the phone. If shore_MACaddress.txt is not found, the phone uses the "coded-model-name.txt" file for configuration.

The format of a configuration file is:

```
Parameter1        Value

Parameter2        Value
```

where the parameter and value are separated by one or more spaces or tabs, and each parameter is on a new line of the text file (CR/LF is the nominal new line indicator).

Comments may be embedded in a configuration file by starting the line for the comment with a **"#"**.

The maximum permitted size of any configuration file is 5000 bytes.

Additional configuration files may be included in the file by using the parameter Include where its value is the name of the file (and optionally a path) to include. All include parameters should be located in the original file downloaded from the FTP server. Includes must be located at the end of the main configuration file. The maximum number of included files is 5.

The most commonly customized configuration parameters are audio levels, described in Configuring Audio Levels. All other customizable phone configuration parameters are described in Other Customizable Parameters on page 177.

Configuring Audio Levels

Four sets of audio levels can be custom configured for each phone:

- handset
- headset
- ringer
- speaker

Table 30 lists the default values for the audio levels for all ShoreTel IP phones except the IP560g.

For more information on the parameters, see Parameter Definitions on page 176.

Table 30: Default Values for All Phones (except IP560g)

Parameter	Handset Levels	Headset Levels	Ringer Levels	Speaker Levels
TxGain	5157	6144	—	8192
RxGain1	183	183	130*	258
RxGain2	258	258	258	410
RxGain3	365	365	410	649
RxGain4	516	516	649	1029
RxGain5	728	728	1029	1631
RxGain6	1029	1029	1631	2584
RxGain7	1631	1631	2584	4096
RxGain8	2303	2303	4096	6492
RxGain9	3254	3254	6492	10289
RxGain10	4596	4596	10284	16306
SideTone	460	460	—	—
Handset DTMF Attenuation	13	13	—	13
Call Progress Tone Attenuation	13	13	—	13

Note

If RxGain1 is set to 0, the audio is turned off. (The phone does not ring.)

560g Phones

The default values for the 560g are slightly different. Not only that, the default values for the audio levels for 560g phones depend on whether the 560g phones are using Release 3.0.0 or Release 3.0.1.

To check which release your phone is using, press the **Mute** button while the phone is on-hook. Then, dial **I-N-F-O** on the keypad and press **#**. Continue pressing # to scroll through the information until you arrive at the Application File Name.

If the name is *s6gap_03_00_***00**.*ebin*, your phone is using release 3.0.0.

If the name is *s6gap_03_00_***01**.*ebin*, your phone is using release 3.0.1.

Table 31 on page 175 lists the default values for the audio levels for 560g phones using Release 3.0.0.

For more information on the parameters, see Parameter Definitions on page 176.

Table 31: Default Values for 560g Phones Using Release 3.0.0

Parameter	Handset Levels	Headset Levels	Ringer Levels	Speaker Levels
TxGain	4096	5157	—	8192
RxGain1	183	183	205*	258
RxGain2	258	258	290	410
RxGain3	365	365	410	649
RxGain4	516	516	579	1029
RxGain5	728	728	817	1631
RxGain6	1029	1029	1154	2584
RxGain7	1631	1631	1631	4096
RxGain8	2303	2303	2303	6492
RxGain9	3254	3254	3254	10289
RxGain10	4596	4596	4596	16306
SideTone	344	430	—	—
Handset DTMF Attenuation	13	13	—	17
Call Progress Tone Attenuation	13	13	—	17

Note

If RxGain1 is set to 0, the audio is turned off. (The phone does not ring.)

Table 32 lists the default values for the audio levels for 560g phones using Release 3.0.1

For more information on the parameters, see Parameter Definitions on page 176.

Table 32: Default values for 560G Phones using Release 3.0.1

Parameter	Handset Levels	Headset Levels	Ringer Levels	Speaker Levels
TxGain	4096	5157	—	8192
RxGain1	183	92	205*	258
RxGain2	258	129	290	410
RxGain3	365	183	410	649
RxGain4	516	258	579	1029
RxGain5	728	364	817	1631
RxGain6	1029	515	1154	2584
RxGain7	1631	816	1631	4096
RxGain8	2303	1152	2303	6492
RxGain9	3254	1627	3254	10289
RxGain10	4596	2298	4596	16306
SideTone	344	430	—	—
Handset DTMF Attenuation	13	13	—	17
Call Progress Tone Attenuation	13	13	—	17

Note

If RxGain1 is set to 0, the audio is turned off. (The phone does not ring.)

Parameter Definitions

- The “**TxGain**” (transmit gain) parameter sets the level of the audio transmitted from the phone onto the network.
- The “**RxGain**” (receive gain) values correspond to each of the 10 volume setting levels shown when the volume on the phone is adjusted. Sometimes, the RxGains are not high enough and need to be customized for an individual system.
- “**SideTone**” is the audio picked up from the microphone and transmitted to the speaker (speakerphone, handset or headset speaker) that provides feedback to the user that the phone is working. SideTone gain is very subjective, and is sometimes lowered and sometimes raised.
- **DTMF** (dual-tone multi-frequency) Attenuation sets the receive DTMF level that the phone user hears.

  Call Progress Tone Attenuation sets the level for the various tones played after a call is placed and before audio is connected.

- **The Plantronics CS50** wireless headset provides its own side tone, plus “+” inserts 20 ms delay between the headset and the phone, which causes some people to say they hear echo when using the Plantronics headset, and in this case headset side tone may need to be reduced. When you speak, Plantronics does reduce the gain on the speaker by -24dB; but when you stop speaking, the gain is turned up, and you can hear the last little bit echoed in your ear.

  For example, inserting the following line in "s2custom.txt" or "s6custom.txt" and rebooting the phone increases the headset volume settings 11 dB at the highest setting, which may be required in noisy environments:

  Headset levels: 6144,183,258,409,649,1028,1630,2899,6491,10288,14333,917,13,13

  Inserting the following line reduces the headset side tone by 6 dB, which some CS50 users prefer:

  Headset levels: 6144,183,258,365,516,728,1029,1631,2303,3254,4596,459,13,13

  Minimum gain values are 0 and maximum are 32536. Setting values very high may saturate the speaker and create poor sound quality.

  You can change gains on an individual phone by changing the configuration files and then rebooting the phone. Eventually, all phones on the system obtain these values when they reboot.

Displaying Gain Levels

The `prtleveltabs` command can be used from telnet to display the RxGain (receive gain) levels for a device. For example, running the `prtleveltabs` command on an IP 230 phone yields the device output values shown in Table 33.

Table 33: IP 230 Receive Gain Levels

Parameter	Ringer Volume	Speaker Volume	Handset Volume	Headset Volume
RxGain1	130	258	183	183
RxGain2	258	410	258	258
RxGain3	410	649	365	365
RxGain4	649	1029	516	516
RxGain5	1029	1631	728	728
RxGain6	1631	2584	1029	1029
RxGain7	2584	4096	1631	1631
RxGain8	4096	6492	2303	2303
RxGain9	6492	10289	3254	3254
RxGain10	10289	16306	4596	4596

Other Customizable Parameters

In addition to changing the audio parameters, the custom configuration text files allow you to customize other parameters, such as phone brightness or day of week abbreviations used in time displays.

WARNING!

The tables in the following section contain detailed information that can be used to modify the behavior and functionality of your ShoreTel system. Make sure that you understand what you are doing before attempting to use this information to modify your system. ShoreTel is not responsible for any damage or expenses incurred through misuse of this information. If you have questions, contact ShoreTel Technical Support **before** attempting to modify your system.

The phones support the parameters described in Table 35 on page 179.

In specifying parameters, the following rules apply:

- IP addresses from the keypad must be provided in dotted-decimal format.
- Cases are preserved in character strings unless otherwise indicated.
- Parameter checking is performed on all parameters to look for illegal values, and illegal values are ignored.
- White space within a parameter is ignored.

The file names used for `AppName`, `BootName`, and `FontPixmap`, `IconPixmap`, `WallpaperPixmap` and `in` include parameters may also include a path to the file. Upper and lower case characters are ignored except when specified in the path or file name for these parameters to preserve operation with case-sensitive FTP servers.

For the purpose of comparing the file in flash and the value on the server, only the file name and date are used.

The abbreviations listed in Table 34 are used to identify the source of each parameter in the “Source” column in the table.

Table 34: Source File Abbreviations

Source	Abbreviation in Table
DHCP ACK	DHCP
DHCP Site Specific Option	SSON
Configuration File	CFG
Manual Entry Using SETUP	MAN
MGCP Message	MGCP

DHCP Site Specific Options

Parameters may be set from within a DHCP ACK message in the site specific option field (default is 156, but it may be modified with the `SiteOption` parameter). These parameters may be specified in the site-specific option field:

- `FtpServers`
- `Country`
- `Language`
- `Layer2Tagging`
- `VlanId`

Enclose each parameter in quotes, and separate multiple parameters with a comma. For example:

FtpServers – `"192.168.0.13, 192.168.0.23"`, Country – `1`, Language – `1`, SetupPassword – `"12345abcde12345abcde12345abcde12"`

Table 35: Phone Configuration Parameters

Parameter	Value Type	Value	Source	Default
`AppName`	Up to 32 alphanumeric characters	This is the name of the application image that is in the telephone. The application file name can be at most 24 characters long. The combination of filename and path can be up to 32 characters long. A new application name is specified in a configuration file and is checked against the NV value to decide if a new version needs to be downloaded. The NV value is updated after a successful download and flash programming sequence.	CFG	Value from factory in NV Storage
`BackLight`	Up to 4 ASCII characters	Number of minutes the backlight remains on at full brightness when the phone is idle. Format: Backlight NN, where NN is a number 0-60. 0 – n/a. 1-60 – number of minutes after which display is shut off	CFG	5

Table 35: Phone Configuration Parameters (Continued)

Parameter	Value Type	Value	Source	Default
BackLightDim	Up to 4 ASCII characters	**Note:** Only applicable to the S6C and S36. Number of additional minutes the backlight remains on at a DIM level after the BackLight interval passed since an idle state was entered. A value of 0 causes the backlight to remain at the dim level indefinitely.	CFG	120
BootName	Up to 32 alphanumeric characters	The name of the boot image is in the telephone. The boot file name can be 24 characters long. The combination of filename and path can be up to 32 characters long. A new boot name is specified in a configuration file and is checked against the NV value to decide if a new version needs to be downloaded. The NV value is updated after a successful download and flash programming sequence.	CFG	Value from factory in NV Storage
Country	Up to 3 ASCII Characters	This parameter specifies the Country that is used by the Include parameter to identify a particular file to include. May be between 1 and 255.	SSON, CFG, MAN	1
DHCP	1 ASCII Characters	DHCP enable/disable 0 – Disabled 1 – Enabled	MAN	1
DscpAudio	Up to 2 ASCII characters	Differentiated services code point for audio packets. Allowed values of 0 to 63.	CDG	0
DscpSignaling	Up to 2 ASCII characters	Differentiated services code point for audio packets. Allowed values of 0 to 63.	CFG	0
DtmfLevels	Up to 3 ASCII Characters	This specifies the DTMF level in dB of in-band tones sent from the phone to the network. The allowed values are -1 to -20. These are attenuation levels in dB, so -1 is louder than -20.	CFG	-10

Table 35: Phone Configuration Parameters (Continued)

Parameter	Value Type	Value	Source	Default
`Ethernet1`	Up to 10 ASCII Character	Status of the 1st Ethernet Interface. Ethernet2 Status, Speed/ Duplex Where: Status is 0 or 1 (disabled or enabled) Speed/Duplex is one of the following: Auto 10/FD 10/HD 100/FD 100/HD 1000/HD 1000/FD	CFG,MAN	1,Auto
`Ethernet2`	Up to 10 ASCII Character	Status of the 2nd Ethernet Interface. Ethernet2 Status, Speed/ Duplex Where: Status is 0 or 1 (disabled or enabled) Speed/Duplex is one of the following: Auto 10/FD 10/HD 100/FD 100/HD 1000/HD 1000/FD	CFG, MAN	1,Auto
`FontPixmap`	Up to 32 ASCII Character	Name of the .bmp format file that contains the font pixmap. Format is windows .bmp 16 color except on the S6c where it is 256 colors.	CFG	`"fontpixmap.bmp"`

Table 35: Phone Configuration Parameters (Continued)

Parameter	Value Type	Value	Source	Default
Font2Pixmap	Up to 32 ASCII Character	Name of the .bmp format file that contains the large font pixmap used by the U/dlt2 signal. Format is windows .bmp 16 color except on the S6c where it is 256 colors.	CFG	"font2pixmap.bmp"
FtpServers	Up to 255 ASCII Characters	A comma separated list of up to 2 FTP servers. If a server is unavailable the phone goes through the list until a working server is found.	DHCP, MAN	0.0.0.0
GatewayAddress	Dotted Decimal ASCII	Gateway address for the telephone.	DHCP, MAN	0.0.0.0
GreyLevels	Up to 3 ASCII Characters	Grey level setting for the middle grey levels on the IP530 and IP560 only. Low middle grey level may have the values: 0 – 1/4 1 – 1/3 2 – 1/2 High middle grey level may have the values: 0 – 1/2 1 – 2/3 2 – 3/4 Example: 1,2	CFG	1,1
IcmpArpTimeout	Up to 5 ASCII Characters	Number of seconds before routing table entries created by ICMP redirects are timed out of the routing table. If 0, then they never time out.	CFG	0
IconPixmap	Up to 32 ASCII characters	Name of the .bmp format file that contains the icon pixmap. Format is windows .bmp 16 color.	CFG	"iconpixmap.bmp"

Table 35: Phone Configuration Parameters (Continued)

Parameter	Value Type	Value	Source	Default
`Include`	Up to 64 ASCII Characters	The file name that is specified is read and its contents included into the master configuration file. Files may be specified completely, or may include the variables $Hardware, $Country or $Language. The value of the Hardware Version (programmed into flash at the factory e.g. K01M01P01L01), Country or Language Parameter is substituted for $Hardware, $Country or $Language when the file name is created. For example: Include “Country_$Country.txt” with the Country parameter set to 3 loads in the file “Country_3.txt” This permits parameters to be specified based on the Country and Language parameter values.	CFG	“”
`IPAddress`	Dotted Decimal ASCII	IP address to be used by the telephone.	DHCP, MAN	0.0.0.0
`KeepAlive`	Up to 3 ASCII Characters	Number of seconds to wait for an audit endpoint command before initiating the IP phone failover. **Note:** If set to zero, recovery procedures are never started. The valid range is 0 to 999 seconds.	CFG	120
`Language`	Up to 3 ASCII Characters	This parameter specifies the Language that is used by the Include parameter to identify a particular file to include. The valid range is 1 to 255.	SSON, CFG, MAN	1
`Layer2Audio`	1 ASCII character	Layer 2 audio priority values from 0 to 7.	CFG	5

Table 35: Phone Configuration Parameters (Continued)

Parameter	Value Type	Value	Source	Default
Layer2Tagging	1 ASCII character	802.1Q tagging enable on Port 1 0 – Disable 1 – Enable	SSON, CFG, MAN	0
Layer2Signaling	1 ASCII character	Layer 2 signaling priority values from 0 to 7.	CFG	0
MaxJitter	Up to 4 ASCII characters	The maximum value that the jitter buffer may be allowed to grow. Valid values are 10 to 300 mS in 1 mS steps.	CFG	50
MgcAuthenticate	Up to 1 ASCII Character	If enabled, then only authenticated MGC messages are accepted by the phone. 0 – disable 1 – enable	CFG	0
MgcServers	Up to 64 ASCII Characters	Comma separated list of up to 2 MGC Servers. Must be in dotted decimal format. Example: 192.168.0.1, 192.168.0.2	SSON, CFG, MAN	0.0.0.0
MonthsOfYear	Up to 64 ASCII Characters	Comma separated list of the months of the year abbreviations used by the phone to display the time. The first month is January.	CFG	Jan,Feb,Mar,Apr, May,Jun,Jul,Aug, Sep,Oct,Nov,Dec
NoSvc	Up to 64ASCII Characters	String displayed when phone service is lost. Characters in this string must be specified using UTF-8.	CFG	“No Service”
PersistantEvents	Up to 255 ASCII Characters	Comma separated list of persistent events. Example: L/hu,L/hd, U/kd,U/ku	CFG	“”
ReqSvc	Up to 64 ASCII Characters	String that is displayed as the phone is waiting for service from the switch. Characters in this string must be specified using UTF-8.	CFG	“Requesting Service”
RingDefine	Up to 64 ASCII Characters	See the *ShoreTel System Administration Guide* for a definition of permissible values.	CFG	“”

Table 35: Phone Configuration Parameters (Continued)

Parameter	Value Type	Value	Source	Default
RingMap	Up to 64 ASCII Characters	See the document "Custom Rings and Tones V4" for a definition of permissible values.	CFG	“”
RtpBase	Up to 5 ASCII characters	This is the base port from which the phone transmits and receives media. The valid range is an even number from 3000 to 65408. 65408 is the highest even 16-bit number that allows enough headroom for the 64 RTP and 64 RTCP ports that are reserved when you establish an RTP base value. Given an RTP base, the phone should use the next 64 consecutive even numbers for RTP ports. If within that range an existing (reserved) odd or even UDP port number is used, the phone should skip over an even/odd pair to the next even number. For example, if the user set rtpBase to 5550, then 5550, 5552, 5556, 5558, etc., is used In this example, 5554 is skipped because 5555 is a reserved port used by the phonectl server (actually, 5554 is also used and also provides a reason for skipping over 5554). If an odd number is specified, the phone should use the next lowest even number if it fits the above limitations.	CFG	3000

Table 35: Phone Configuration Parameters (Continued)

Parameter	Value Type	Value	Source	Default
SetupPassword	32 ASCII Characters	This is the MD5 hash of the password that must be entered after the mute button is pushed to enter a manual key command. **Note:** This password must be saved in flash after a value is received from the MGC so it can be enforced on subsequent reboots. It is not cleared by the CLEAR command nor the clear step in the SETUP command.	MGCP	1234
SiteOption	Up to 3 ASCII Characters	Site-specific option number used by DHCP between 128 and 254.	CFG	156
SntpServer	Dotted Decimal ASCII	SNTP server address in dotted decimal format.	DHCP, CFG, MAN	0.0.0.0
SpeakerLevels	Up to 255 ASCII Characters	Set the audio levels of the speakerphone using a comma separated list of the following settings. The default values in decimal are listed next to the name for clarity. TxGain 4096 RxGain1 258 RxGain2 410 RxGain3 649 RxGain4 1029 RxGain5 1631 RxGain6 2584 RxGain7 4096 RxGain8 6492 RxGain9 10289 RxGain10 16306 Speaker DTMF Attenuation 13 Call Progress Tone Attenuation 13	CFG	See Description
SubNetMask	Dotted Decimal ASCII	Network Mask for the telephone. On boot, the phone checks for a non-zero NV value, and if one is present it is used.	DHCP, MAN	0.0.0.0

Table 35: Phone Configuration Parameters (Continued)

Parameter	Value Type	Value	Source	Default
SysLogInfo	Up to 32 ASCII Characters	IP Address, module, verbose level, facility code, and output device of the SysLog function. The port number may be optionally identified and appended to the IP address. **Note:** The default of 514 is used if no port is specified. The module is a 32-bit integer where each bit refers to the debug enable/disable status from a specific software module. Bit assignments are defined in “Configuring Syslog Functionality for the ShoreTel IP Phones.” The verbose level indicates the level of information that is printed. Levels are 0 to 7. Facility code is the syslog facility code. The output devices are 0 – serial port, 1 – syslog server. Example: 192.168.0.3:514, 279,33,1	CFG	0.0.0.0,0,0,0,0
ToneDefine	Up to 64 ASCII Characters	See the document "Custom Rings and Tones V4" for a definition of permissible values.	CFG	“”
ToneMap	Up to 64 ASCII Characters	See the document "Custom Rings and Tones V4" for a definition of permissible values.	CFG	“”
TouchBeep	0 or 1	If enabled, the phone plays a beep when the touch screen is touched for user feedback.	CFG	0
Version	Up to 16 ASCII Characters	This parameter specifies the version identifier of the configuration file. It is then reported via the Mgc/gi signal request.	CFG	“”

Table 35: Phone Configuration Parameters (Continued)

Parameter	Value Type	Value	Source	Default
VlanId	Up to 9 ASCII Characters	VLAN ID to be used on tagged packets from the phone. Example: 1234	SSON, CFG, MAN	0
WallpaperPixmap	Up to 32 ASCII Characters	Name of the .bmp format file that contains the wallpaper pixmap. Format is windows .bmp 16 color.	CFG	"wallpaperpixmap.bmp"
WallPaper2Pixmap	Up to 32 ASCII Characters	Name of the .bmp format file that contains the user pixmap.	CFG	"wallpaper2pixmap.bmp"
WaveRinger1	Up to 64 ASCII Characters	Used to assign one wave file to any of the ring signals. The first value is the signal, and the second value is the location of the file on the FTP server. Example: L/rg	CFG	“”
WaveRinger2	Up to 64 ASCII Characters	Used to assign one wave file to any of the ring signals. The first value is the signal, and the second value is the location of the file on the FTP server. Example: L/rg 192.168.0.20/audio/dave.wav	CFG	“”

Local Keypad Procedures

If DHCP is turned off and manual settings are being used, the set should display the text "Password – ?" and "Speaker – # – OK * – ." for at least 1 second. The string assigned to SetupPassword (by the MGC server or the default) must be provided to access the SETUP command. All other commands are accessible without a password.

While the "Password?" prompt is displayed during the boot sequence the user may enter the muteINFO# (mute4636#) sequence to enter the local INFO command. When the INFO command is exited, the phone again displays the "Password" prompt and continues boot operations.

The SetupPassword is sent by the MGC in hashed MD5 format. The telephone compares the MD5 hash of the password the user entered with this value to determine if the correct password is entered.

On the IP phones, “Line 1” and “Line 2” refer to the top and bottom lines of the display. On newer models that support the programmable buttons feature, adapt the display of these positions to suit the capabilities of the LCD in use. The IP110 and 115 models are slightly different from the other models in that they have one line for displaying information. Thus, the “Line 1” information is scrolled across the LCD display and is followed by the more detailed “Line 2” information. (See Table 36 for clarification.)

The IP212k model includes a narrow LCD display. Thus, the “Line 1” and “Line 2” information cannot fit on one line (as is possible with the other phones). Instead, the text must be wrapped around to appear on as many as 4 lines, for long strings.

If at any time during normal operation these sequences are entered, the operational display state is maintained while these commands are displayed, and the display is returned to the current state after the commands are finished (unless they require a restart). While the phone is in any of these local key procedures, it returns an error code "501" indicating it is not ready, in response to any MGCP command received. Because there is not a mute key on the IP110 phone, use the transfer key instead of the mute key in the following access sequences.

Table 36: Local Command Interface

Access Sequence	Mnemonic	Procedure Description
Mute 25327#	CLEAR	A shortcut for enabling `DHCP`. Doesn’t do anything else and is not password protected (only `SETUP` is). This command is present in the event someone hijacks the phone using the `SETUP` command. `CLEAR` allows it to be brought under DHCP control without knowing the password.
Mute 4636#	INFO	Display the following information sequentially on the top and bottom lines of the display. All data is retrieved from the currently active configuration. Use ***** to exit and **#** to go to the next item. The phone returns to normal operation after the last screen. IP address static/dynamic Subnet mask Gateway Link speed FTP server MGC server SNTP server Tagging on/off Application file Boot file Config file date App version Boot version Country Language Model number MAC address Serial number Hardware version
Mute 7464#	PING	The phone prompts for an IP address and then pings that IP address 5 times and report the result after 10 seconds.

Table 36: Local Command Interface (Continued)

Access Sequence	Mnemonic	Procedure Description
Mute 73738#	RESET	After displaying a warning, resets the phone. On the top line “Reset Phone?” and on the bottom line “* – no, # – yes”.
Mute 73887	SETUP	After the mute sequence is provided, if SetupPassword is not null, then prompt for the proper password ending in #. Do not display password digits as they are entered but use *. If a match, then prompt to “Clear All Values?”. If no, then prompt for DHCP On/Off. If DHCP is on skip over the prompts for IP Address, Subnet Mask, and gateway. Then prompt for FTP Server, MGC Server, SNTP Server, Tagging On/Off, VLAN ID, Ethernet1, Ethernet 2, Country, and Language. Save to NV storage if values are modified. If “Clear all Values?” is answered with yes, in addition to returning settings to the <Not Set> state, any cached DHCP values including the IP address are cleared. If a value was never configured using SETUP, it is displayed <Not Set> when its prompt is displayed. Otherwise, the value stored in flash is displayed. The only exception is the DHCP value, which defaults and clears to the ON state. Setup value may be returned to the <Not Set> state by: ■ Answering yes to the “Clear All Values?” query ■ Executing the factory CLEAR command (only executable from the serial port) ■ All values are <Not Set> when the phone is new. Perform this error checking on IP address entries during setup: ■ Only 0-9, * and # are accepted. ■ Leading zeroes are ignored. ■ Values outside 0-255 are ignored. If 2 digits are input, a third digit that makes the value >255 is ignored. So, upon entering 654, the 4 is ignored. ■ Multiple “.” inputs are ignored. ■ If no entry is provided before “.” is entered, a 0 is automatically inserted.

Parameter Precedence

The IP phones use the following order of precedence sources for all parameters:

1. Config file
2. DHCP (if active)
3. `Setup` Command

4. Defaults

In other words, configuration parameters have precedence over DHCP over Setup over Defaults.

Not all parameter sources may be supported for every parameter. Table 35 on page 179 indicates which sources are allowed for each parameter.

To fully manually configure a phone simply turn off DHCP, then use the Setup command but be sure not to specify an FTP server that might download a config file and overwrite your manual settings.

PhoneCTL Command Line Tool

PhoneCTL is a command-line tool used to configure and diagnose ShoreTel IP phones. PhoneCTL commands can be run from the Windows command prompt.

Syntax for PhoneCTL commands can be obtained by typing `phonectl` at the prompt and pressing **Enter**.

Commands

There are several categories of commands available, including:

- Configuring syslog functionality for the IP phones
  - `setLogLevel`
  - `setServerIP`
  - `setOutputDev`
  - `dump2pc`
  - `showLogLevel`
- Retrieving information and statistics about phone connections
  - `showConnInfo`
  - `showStats`
  - `showTime`
  - `version`
- Troubleshooting data transfer issues between the phone and the syslog server
  - `ifShow`
  - `arpShow`
  - `inetstatShow`
  - `ipstatShow`
  - `udpstatShow`
  - `tcpstatShow`
  - `hostShow`
  - `routeShow`

Note

All commands are case-insensitive.

After the `phonectl` command, the user is prompted to enter a password.

After the user enters the correct password, the device permits access to executables that configure or diagnose the respective device.

CLI passwords are configurable only through ShoreTel Director. The default password is *ShoreTel*.

Configuring Syslog Functionality for the ShoreTel IP Phones

Several commands are used to set up syslog functionality. These must be run before any logging messages can be received.

SetLogLevel

The `setLogLevel` command (Table 37 on page 193) sets the logging severity level.

A log level remains in effect until a new `setLogLevel` command is issued.

Table 37: setLogLevel Command

Syntax	Example	Parameters
`Prompt:\phonectl -setLogLevel [moduleID] [level] [destIP]`	`Prompt:\phonectl -setLogLevel 3 7 192.168.0.170`	`moduleID` is the ID number of the specific IP phone software modules the logging level is being set for. It is a 32-bit integer. Values must be 0-655335. Each bit in the integer enables or disables a specific module. Any module bit that is not set is not logged. Hexadecimal values for ShoreTel phone software modules include: 0x1 Call Processing (MGCC) 0x2 Config File Processing (MCFGP) 0x4 User Storage (MUSTG) 0x8 Network Configuration (MNETC) 0x10 User Interface (MELUI) 0x20 Display Driver (MDIS) 0x40 Provisioning (MPROV) 0x80 Task Maintenance (MAINT) The number used in the parameter is the decimal equivalent of the sum of the hex values for all modules that are to be logged. For example, to turn on only the user interface module, enter 16 in the [moduleID] parameter (which is the decimal value of 0x10). To turn on call processing and config file process, enter 3 in the [moduleID] parameter (which is 0x1 + 0x2 in decimal). This is the value shown in the example command shown above. To turn on all modules, enter 255 (which is 0x1 + -x2 + 0x4 + 0x8 + 0x10 + 0x20 + 0x40 = 0x80).

SetServerIP

The `setServerIP` command (Table 38) sets the server's IP address and points to the location where messages are to be logged.

Table 38: setServerIP Command

Syntax	Example	Parameters
`Prompt:\phonectl -setServerIP [newServerIP] [destIP]`	`Prompt:\phonectl -setServerIP 192.168.0.3 192.168.0.170`	`newServerIP` is the address of the computer running the syslog server application. `destIP` is the IP address of the destination IP phone to which the command is sent.

SetOutputDev

The `setOutputDev` command (Table 39) sets the output device to which the syslog messages are sent. The device may be either a serial port or the syslog server.

Table 39: setOutputDev Commands

Syntax	Example	Parameters
`Prompt:\phonectl -setOutputDev [devID] [destIP]`	`Prompt:\phonectl -setOutputDev 0 192.168.0.170`	`devID` is set to zero if the device is a serial port or one for the syslog server. `destIP` is the IP address of the destination IP phone to which the command is sent.

Retrieving Information about the IP Phone

Dump2pc

The `dump2pc` command (Table 40) is used to retrieve the syslog messages from the ShoreTel IP phone's buffer. The results are printed to the command line.

Table 40: dump2pc Command

Syntax	Example	Parameters
`Prompt:\phonectl -dump2pc [destIP]`	`Prompt:\phonectl -dump2pc 192.168.0.170`	`destIP` is the IP address of the destination IP phone to which the command is sent.

ShowLogLevel

The `showLogLevel` command (Table 41) prints the log level of each module for which logging is active. Information is printed to the command line.

Table 41: showLogLevel Command

Syntax	Example	Parameters
`Prompt:\phonectl -showLogLevel [moduleNum] [destIP]`	`Prompt:\phonectl -showLogLevel 4 192.168.0.170`	`destIP` is the IP address of the destination IP phone the command is sent to. You retrieve the log level settings for this phone.

ShowConnInfo

The `showConnInfo` command (Table 42 on page 195) shows information about connections created by MGCP_create messages.

Table 42: showConnInfo Command

Syntax	Example	Parameters
`Prompt:\phonectl -showConnInfo [destIP]`	`Prompt:\phonectl -showConnInfo 192.168.0.170`	`destIP` is the IP address of the destination IP phone to which the command is sent.

ShowStats

The `showStats` command (Table 43) shows information about connections created by MGCP_create messages.

Table 43: howStats Command

Syntax	Example	Parameter
`Prompt:\phonectl -showStats [cxid] [destIP]`	`Prompt:\phonectl -showStats 5 192.168.0.170`	`xid` is the ID number of a specific connection. The value can be discovered by reading the value returned by the showConnInfo command. `destIP` is the IP address of the destination IP phone to which the command is sent.

ShowTime

The `showTime` command (Table 44) prints the time of day on the command line for the destination IP phone.

Table 44: showTime Command

Syntax	Example	Parameters
`Prompt:\phonectl -showTime [destIP]`	`Prompt:\phonectl -showTime 192.168.0.170`	`destIP` is the IP address of the destination IP phone to which the command is sent.

Version

The `version` command (Table 45) prints the version of the PhoneCTL software.

Table 45: version Command

Syntax	Example
`Prompt:\phonectl -version`	`Prompt:\phonectl -version`

SoftPhone

The ShoreTel SoftPhone can be launched through Communicator. SoftPhone does not support NAT or firewall transversal. Problems with the Headquarters server or network connectivity can prevent the SoftPhone from being loaded.

From a configuration and management standpoint, the SoftPhone appears to be an IP phone with some limitations. User have access to the DTMF keys (0-9, #, *), on hook, off hook, and flash.

The SoftPhone user interface does not have a display, so it does not interact with IPDS. Just like an IP phone, the SoftPhone uses MGCP for call setup and teardown, and RTP for media.

IP phones are uniquely identified by their MAC address. In most cases the SoftPhone is identified by the NIC of the user PC. If a SoftPhone is installed on a PC without a NIC, the SoftPhone generates a fake MAC address that is still unique.

The SoftPhone page contains an ActiveX control that implements the VoIP media support. Because it requires an ActiveX control, the SoftPhone only works on PCs with Internet Explorer and Microsoft Windows. The ActiveX object attempts to reach the switch call manager configured in ShoreTel Director. If the switch call manager is successfully contacted, the SoftPhone buttons are enabled.

When the switch call manager is contacted, ShoreTel Director detects that a new IP phone is being registered. Depending on licensing and IP phone port availability, a new port is automatically created in the configuration database. The SoftPhone then appears in the Individual IP Phones list in ShoreTel Director.

In some situations, Communicator waits for several seconds for a corresponding IP phone port to appear in the configuration database. If this times out, a warning message is displayed in the SoftPhone status bar.

When Communicator is closed, the operation is reversed to return the user to his or her home port.

Dial Tone Behavior

The following section discusses the dial tone behavior for various call operations.

Transfer

When a user is on a call and hits the transfer button, the phone remains off-hook and plays a dial tone. When the user completes the blind or consultative transfer while on the speakerphone or headset, the phone automatically goes on-hook. Only if a user is on the handset does the phone stay off-hook and play a dial tone. A user using hands-free mode with speaker or headset goes on-hook without a dial tone.

Park

When a user is on a call and hits the park button, the phone remains off-hook and plays a dial tone. When a user parks a call while on the speakerphone or headset, the phone automatically goes on-hook. The phone plays dial tone only if the user is on the handset. When using hands-free mode with the speaker or headset, the phone goes on-hook without a dial tone.

Hold (Multi-line IP Phones)

When a user on a multi-line IP phone places a call on hold while on the speakerphone or headset, the phone goes on-hook. If the user is on the handset, the phone plays a dial tone. A user using hands-free mode with speaker or headset goes on-hook without a dial tone.

- To retrieve the call, go off-hook by lifting the handset, pushing the speaker button, pushing the headset button, or pushing the call appearance.
- To answer a second incoming call, press the second call appearance.
- To retrieve a second held call, press the second call appearance.

Hold (Single-line IP Phones: IP110/IP115)

When a user on a single-line IP phone places a call on hold while on the speakerphone or handset, the phone remains off-hook and plays a dial tone. To retrieve a call, the user can go off-hook by lifting the handset and pushing the speaker button. A user using hands-free mode with speaker or headset goes on-hook without a dial tone.

CHAPTER

7

ShoreTel Service Appliances

This chapter contains information about ShoreTel Service Appliances. It contains the following information:

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Overview

The ShoreTel Service Appliance is a sealed appliance, optimized for resiliency and security, capable of running ShoreTel services. The Service Appliance can host Audio Conferencing, Web Conferencing and Instant Messaging services.

Service appliances are deployed in the same manner as other ShoreTel voice switches and managed similarly to the voicemail-enabled switches. Director windows configure conference settings and provide status for the Service Appliance. Network setting are configured using a serial cable or the Service Appliance's switch command line interface (`stcli`). The management of the services running on the Service Appliance switch is done via the Service Manager command line interface (`svccli`). The `stcli` and `svccli` are accessible via a serial cable or remotely via SSH.

This chapter describes the processes and procedures necessary to back up and restore your Service Appliance, locate key log files, produce logs, and various switch commands and utilities useful for monitoring and troubleshooting the Service Appliance.

Using the Service Appliance

Service Appliance Maintenance

A few key tasks are required to maintain the Service Appliance (Table 46).

Table 46: Service Appliance Maintenance Tasks

Task	Description
Backup	Performs regular automatic backups of your Service Appliance to protect conference data, generated recordings, and uploaded user content
Restore	Restore your Service Appliance based on a saved backup of both the Service Appliance and the HQ database. Coordinates the restore of the Service Appliance with the restore of the HQ database.
Disk Management	Watches disk utilization to avoid running out of disk space.

Service Appliance Backup

The Service Appliance uses the same backup and restore methods as the voicemail-enabled switches. Backup scheduling and configuration is performed in ShoreWare Director. The manual backup and restore commands are executed on the Service Appliance using the Service Manager command line interface (`svccli`).

Back up your system to protect the conference data, generated recordings, and user files uploaded to the Service Appliance. This feature is NOT meant as a method of archiving or as a method for retrieving accidentally deleted files.

Note

Install the Service Appliance on the same network as the FTP backup server to avoid bandwidth issues. The Service Appliance can generate more than 1GB of data per day and have more than 100GB stored internally.

There are two methods for backing up the Service Appliance:

- Automatic scheduled backup
- Manual backup.

Automatic Backup

Automatic backup are performed after the system administrator configures the backup parameters in ShoreTel Director.

Table 47 lists and describes the parameters.

Table 47: FTP Server Parameter

Field	Description
Enable Daily Backup	Turn on/off automatic `backupsr`
IP Address	The IP address of the FTP Server.
FTP Port	The FTP port used to access the FTP server. **Note:** The FTP port must be set to 21. The Service Appliance can only perform backup and restore against a FTP server running on port 21.
Directory	The directory on the FTP server where the backup files are stored. **Note:** If you are backing up multiple Service Appliances, use a separate directory for each Service Appliance.
User ID	The User ID for accessing the FTP server.
Password	The Password for accessing the FTPserver.

Manual Backup

To perform a manual backup, you must have configured the FTP parameters in ShoreTel Director per the automatic backup set.

1. Access the Service Appliance using either the serial Port or via SSH.
2. Start the Service Manager command line interface (`svccli`).
3. Issue the `backupweb` command.

Accessing the Service Appliance Using the DB9 Serial Port

1. Connect a serial cable from a desktop/laptop PC to the DB9 serial connector on the rear of the Service Appliance.

Note

Establishing the serial console connection requires a DB9 female to DB9 female cable, instead of a DB9 male to DB9 female as in the ShoreTel voice switches. A Null-Modem connection (crossover cable) is required, instead of the straight-through cable (extension cable) used on ShoreTel voice switches.

2. Open a terminal emulation program such as Hyper-terminal or Putty and set it for a serial connection using the following parameters:

- Serial Port: COM X (where 'X' is the port number used on your PC)
- Speed: 19200 baud
- Data Bits: 8
- Stop bits: 1
- Parity: None
- Flow control: None

3. After establishing a serial connection, login to the Service Appliance environment using '**Admin**' as the User ID and '**ShoreTel**' as the Password.

Accessing the Service Appliance Using a SSH Connection

Open an SSH client and connect to your Service Appliance using SSH.

Note

`Telnet` to the Service Appliance is not supported.

You can create a SSH connection on the command line by issuing the following command:

```
SSH -l admin <ip address or domain name of the Service Appliance>
```

Manually Backing Up the Service Appliance

1. At the `Linux` prompt ('**$**' for admin access; '**#**' for root access), issue the `svccli` command to start the services cli.
2. Start the backup using the `backupweb` command.
3. When the `backupweb` command returns you to the `svccli` prompt ('>'), exit the `svccli`.
4. Verify that the backup is complete by checking the */cf/shorelinedata/Logs/FtpSync-*<date>.<*time*> log file where:
   - <*date*> is the current date

- <*time*> is the time when the log file was created

Restoring the Service Appliance Backup

You may restore a previous backup of the Service Appliance by executing the `restoreweb` command using the `svccli`. See Automatic Backup on page 200 for more information on the location of the backup files.

Restoring Best Practices

Restore the Service Appliance with a restoration of the HQ database from the same day.

Note

Since the file pointers are stored in the database in HQ application server, users MUST back up/ restore BOTH the HQ database and Service Appliance(s) altogether to ensure consistency between HQ database and Service Appliance file system.

WARNING!

Restoring an Service Appliance backup without restoring HQ database taken from the same time as the Service Appliance backup may cause the following issues:

- Ghost files - These are the files that exist during the time when the Service Appliance backup was made, but have since been removed.
- Wrong metadata files - Service Appliance restore overwrites existing files on the Service Appliance even if the existing files might be more up to date than the ones in backup.

To ensure the file system on the Service Appliance is consistent with HQ database:

- Enable daily backup for Service Appliance in Director
- Schedule a windows task to back up the HQ database at the same time as the daily backup
- Restore HQ database from a backup that was created at the same time as the Service Appliance backup that is going to be restored
- Restore Service Appliance from a backup created at the same time as the HQ database backup

Manual Restore

A manual restore is the only method for restoring the Service Appliance. The system administrator accesses the Service Appliance (through the serial port or via SSH) and executes the `restoreweb` command from the Service Manager command line interface (`svccli`).

Manually Restoring the Service Appliance

1. At the `Linux` prompt ('**$**' for admin access; '**#**' for root access), issue the `svccli` command to start the services cli.
2. At the prompt, start the restore using the `restoreweb` command.

The restore is complete when the `restoreweb` command returns you to the `svccli` prompt ('>').

3. Verify that the restore is complete by checking the */cf/shorelinedata/Logs/FtpSync <date>.<time>.Log* file.
   - *<date>* is the current date
   - *<time>* is the time when the log file was created.

Disk Management

The system administrator must monitor the disk space usage on the Service Appliance to ensure that users can continue uploading presentation data for web meetings. The system administrator can monitor disk usage via the system administrator's Conferencing User Interface.

Note

The system administrator cannot delete media uploaded to the Service Appliance without deleting the user. Users must delete their own uploaded media files. If the system administrator deletes the user, all of the media files and recordings uploaded by the user are deleted.

Disk Usage from the Command Line

Table 48 lists and describes disk usage from the command line.

Table 48: Disk Usage From The Command Line

Name	Description
`df -h`	`Linux` free disk command. This command displays statistics about the amount of free disk space on all mounted files systems (i.e. disks) on the Service Appliance
`du -bc --excludes -'.*'*|grep -i total`	`Linux` disc usage command. This command returns the total apparent size (in bytes) for all the files and sub-directories of the current directory
`getstatus all`	ShoreTel `svccli` command that shows high cpu usage processes, memory usage and disk usage

Log Files and Processes

The Service Appliance provides log files for various processes running on the appliance. Most logs are located in the /cf/shorelinedata/Logs directory.

Service Appliance Logging Process

Collaboration Manager/Collaboration Attendant (CMCA)

The CMCA provides session control for new and existing conferences. Monitoring conference extensions via TMS and manages participant and Reservation-less or Scheduled conference calls arriving at the Conference Extension. It uses the media module for playing prompts, playing files, playing tones, recording media sessions.

STTS (SoftSwitch)

The STTS process hosts local Conference Extensions (CEs). To create conference calls between users and CMCA, join and end conference calls, and provide call signaling during the conference session.

Media Module

The media module provides media resources (prompts and user audio mixing) for audio conference sessions. The CMCA uses the media module to setup media resources during conference calls.

Telephony Management Server (TMS)

The TMS provides call control for conference sessions. It also manages Participant Lists and provides the Call Detailed Record (CDR) interface for the CMCA.

Web Bridge

The Web Bridge provides Internet conference viewing screen and data sharing, and provides a server side interfaces for user conference and Service Appliance web conference administration.

Other Services

The list of services running on the Service Appliance can be viewed using the `svccli` interface.

Service Appliance Processes and Protocols

The following processes and protocols are used by the Service Appliance.

Table 49: Service Appliance Protocols

Name	Description
TAPI	Telephony API - provides call control information between CMCA and TMS. STCTSP is the client side of the TAPI connection. STSTSP is the server side of the TAPI connection
Media Control	Messages between CMCA and Media to provide media resources to conference participants

Table 49: Service Appliance Protocols

Call Control	Messages between Media and STTS to provide media resources to conference participants
CDS	Call Data Service - provides CDR records to the HQ database
NCC	Network Call Control provides call setup/teardown between TMS and network switches
SIP	Session Initiation Protocol - setup and teardown phone calls between switches. It is also used for 3rd party SIP phones
MCGP	Media Gateway Control Protocol - setup and teardown phone calls between ShoreTel IP phones and ShoreTel voice switches

Log Files

Table 50 lists and describes the key log files in the Service Appliance.

Table 50: Service Appliance Log Files

Name	Description
WC2Access and WC2Error logs	Access and error log files for web bridge
apache_access and apache_error logs	Apache access and error logs when accessing the web bridge
STMEDIA log	New media log file for audio mixing. Media are the audio prompts played to audio bridge users
STTS log	SoftSwitch Logs
CMCA log	Access and error log files for the Service Appliance CMCA process
STCTSP and STSTSP logs	TAPI client and server logs for communication between CMCA and TMS
TmsCDS, TmsMain, and TmsNCC logs	Telephony Management Server logs

Service Appliance Utilities

- `UBOOT` (page 206)
- `Stcli` (page 206)
- `CLI` (page 207)
- `Regedit` (page 207)

Accessing Utilities from SSH

ShoreTel provides access to several voicemail utilities through a Linux BASH command line. Voicemail-enabled switches define two accounts: Admin and Root.

- **Admin:** The Admin account provides access to selected ShoreTel and Linux utilities, including all voicemail-enabled switch command line interfaces.

Note

ShoreTel recommends that user log into the Admin account when accessing Linux utilities.

Unlike the voicemail-enabled switches, logging into the Admin account does not open the stcli interface. Logging into the Root account immediately opens a Linux BASH shell. The administrator must issue the stcli command to use the stcli.

- **Root:** The root account provides access to all ShoreTel and Linux utilities. Restrict access to this account to help prevent potential switch problems.

  Logging into the Root account immediately opens a Linux BASH shell.

Access to the Linux BASH command line through an SSH client.

Appliance Utilities

The Service Appliance uses the same switch architecture as the voicemail-enabled switches. The switch utilities are nearly identical to the voicemail-enabled switches. As such, only general descriptions are provided in the following sections.

See Chapter 4, Voicemail-Enabled Switches on page 90 for detailed descriptions and processes. Relevant differences between the voicemail-enabled switches and the Service Appliance are described in the following sections.

UBOOT

UBOOT is the boot loader for the Service Appliance. The UBOOT environment is accessed from a terminal emulator through the serial port when the switch is booted.

See UBOOT Commands and Flags on page 116 for a detailed description of the UBOOT boot loader.

Stcli

ShoreTel Shell (Stcli) displays and modifies system configuration parameters. You can implement static or dynamic IP addressing for the switch from stcli. You can also reboot the switch from stcli.

See Stcli Commands on page 101 for a description of the stcli commands.

Option 7 is unique to the Service Appliance; it restores the Service Appliance back to factory defaults. See Restore Factory Default on page 207 for details.

The administrator can execute this command only by using the root account for the SSH session.

Cli

The `cli` interface accesses diagnostic tools, manipulates debug setting levels, and displays system information. `cli` can be run from any remote SSH session or from Windows prompts originating from the local host, the controlling Distributed server, or the Main ShoreTel server.

Regedit

`Regedit`, a ShoreTel utility that modifies registry-type data structures in the switch, is accessible through the root account. voicemail-enabled switches have a registry similar to Windows Servers. To edit the Registry, log in as root and run the `RegEdit` command line tool from the bash shell. `RegEdit` may be used to set logging levels on applications and set other parameters that change their behavior.

Note

The Registry is a ShoreTel construct, not part of Linux.

Diagnostics and Repair

The Service Appliance uses the same switch architecture as the voicemail-enabled switches. See Booting and Restarting Voicemail-Enabled Switches on page 97 for a detailed description of the booting and restarting process. The Service Appliance does not use compact flash. As such, compact flash commands and boot methods do not apply to the Service Appliance. Also, the Service Appliance does not capture audio output from a switch port.

Restore Factory Default

If the Service Appliance becomes non-operational due to corruption of the OS or application, it may be possible to restore the appliance to an operational state.

Procedural steps to follow depend upon whether a backup exists for the appliance to be restored, whether HTTPS is being used and whether the Service Appliance is in a single appliance installation or one of multiple Service Appliances in a distributed system.

Depending on configuration, various recovery steps may be required:

- Turn off/on HTTPS and uploading of SSL certificates - detailed in the Service Appliance Planning, Installation and Administration Guide.
- Configuring an Service Appliance with original IP address settings - detailed in the Service Appliance Planning, Installation and Administration Guide.
- Installing an Service Appliance in Director - detailed in the Service Appliance Planning, Installation and Administration Guide.

- Restoring a backup to an Service Appliance - detailed in this chapter, see Restoring the Service Appliance Backup on page 202
- Perform Restore to Factory Default - detailed below in Restoring Service Appliance to Factory Default on page 208

Restoring Service Appliance to Factory Default

1. Using the serial port, login to the Service Appliance as ‘root’.
2. Type "`stcli`" to open STCLI menu.
3. Select 7 -- Restore factory default.
4. The Service Appliance reboots and start up login prompt.

Note

Following the restoration to factory default condition, the Service Appliance requires configuration with IP addressing before any backups can be restored into the appliance. See the *ShoreTel Conferencing and Instant Messaging Planning and Installation Guide* for detailed instructions.

CHAPTER

8

ShoreTel Client Applications

This chapter contains information about the ShoreTel client applications in the following sections:

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Overview

This chapter provides technical background information about the ShoreTel Communicator application suite.

The Communicator Suite

The Communicator Suite includes the following items:

- Different functional versions of the Communicator client application:
  - Personal
  - Professional
  - Workgroup Agent
  - Workgroup Supervisor
  - Operator.
- Call Monitor software, including the Agent and Queue monitors
- Viewer applications for Directory, History, and Voice Mail
- Configure ShoreTel system, a control panel applet for configuring ShoreTel clients

Theory of Operations

All Communicator applications are hosted within a single process named `ShoreTel.exe`.

TAPI objects manage all telephony-related data and tasks for Communicator. Voice mail and database operations require Client Application Services (CAS). Communicator applications use any available service and attempt to degrade gracefully if a requested service is unavailable.

A separate process `(PCMMapiRd.exe)` is invoked to load Microsoft Outlook contact data into the Communicator's "white pages."

Only the Communicator clients and three monitors (Extension, Agent, and Queue) can communicate directly with TAPI. All other applications must use Communicator as a proxy to place calls on their behalf. Applications using Communicator to dial calls are unable to provide feedback when an attempt to place a call fails. However, notification of call failure does appear in the Communicator application.

Executable Modules

Table 51 lists and describes the top-level executable modules used by Communicator applications.

Table 51: Communicator Executable Modules

Module	Description
`ShoreTel.exe`	Launches Communicator application. **Note**: The application shortcut launches this task.
`Sendclientlogs.exe`	Sends client logs to ShoreTel Customer Support.
`PCMMapiRd.exe`	Reads MAPI contacts and loads them into Communicator.
`CSISCMgr.exe`	Client-side CSIS component.
`TAPISRV.exe/ SvcHost.exe`	Microsoft TAPI applications.
`Rpctspx.tsp`	TAPI Service Provider.

Diagnostics

Troubleshooting Login or Startup Problems

The following symptoms may indicate login or startup problems:

- Double-clicking the application shortcut does not bring up the Communicator main window.
- Communicator appears, but no Call Handling Mode icon or Hands free Mode icon is visible on the status bar/application tray. This is the most common symptom of login or startup problems.
- Agent Monitor appears, but fails to list agents.
- Extension Monitor appears and lists extension numbers, but without names.
- Voice Mail Viewer does not appear.
- Control Panel appears, but most fields are grayed out.
- Directory Viewer appears, but shows no data.

Missing Icons

Missing icons often indicate that CSIS is unavailable for user login.

The first time Communicator successfully connects to CSIS, it stores a minimum amount of configuration data in the user's registry settings, including the following:

- The user's current extension number.

- The values of the system extensions (AA, BAA, VM, VM Login).
- The values of the paging and night bell extensions for the user's site.
- Basic contact information (home country, home area code, and default access code).

This initial data store provides Communicator with enough information to perform high-level tasks that include displaying call information and permitting the user to place and manage calls.

Normally, Communicator locates the cached data and loads it while waiting for login to complete. After login, Communicator updates the configuration information while it runs on the user's PC.

However, if CSIS is unavailable for login the next time the user starts Communicator, or if the login fails, Communicator uses the cached data until CSIS comes back online and login is successful.

A login problem can prevent Communicator from launching only if the application is not run after installing or upgrading to the latest ShoreTel software release.

Login Problems

If a Communicator application fails to log in:

- Test the CSIS server to verify that it is running.
- Check the login parameters.
- Open Windows Task Manager to confirm that no ShoreTel applications are running.

Troubleshooting Login Issues

1. Test the CSIS server.

   a. Verify that the CSIS server is running by copying the following URL into your browser's address field. Change `SERVERNAME` to the name of the CSIS server.

   ```
   http://SERVERNAME/CSIS/CSISISAPI.dll/?request?00000000-0000-0000-0000-000000000000;CCSISSvrCONN::ping;
   ```

   b. The browser window should display a result similar to this:

   ```
   10;0x00000000;4;5440
   ```

   Pay particular attention to the digits that appear after "0x." If "x" is followed by a string of zeroes, the CSIS server is running. If any digits other than zero appear after "x," you need to troubleshoot the ShoreTel server.

2. Check the login parameters.

   a. Open the **Windows Control Panel**, and click the **Phone and Modem Options**.

   b. Click the **Advanced** tab to display a list of telephony providers.

   c. Choose **ShoreTel Remote TAPI Service Provider** and click **Configure**.

   The **ShoreTel Remote TSP Device** tab appears.

Note

If the server name and/or login name are incorrect, continue with the sub-steps. Otherwise, skip to Step 3.

d. From the Provider Usage menu, choose Do not use this service provider (disable), and click **Apply**.

e. Change the server name and login name to the correct values.

f. From the Provider Usage menu, choose **Use this service provider (enable)**, and click **Apply**.

g. Exit all ShoreTel applications.

Note

Make sure `CSISCMgr.exe` exits. If it fails to quit, log out of Windows.

3. Open the **Windows Task Manager** and confirm that no ShoreTel applications are running.

a. If applications are running, use Task Manager to stop the applications in the order listed below.

- `ShoreTel.exe`
- `PCMMapiRd.exe`
- `CSISCMgr.exe`

Troubleshooting Telephony Issues

This is a list of common telephony issues and their resolution by reviewing the client log files.

Issue: Red-x telephony icon.

Resolution: From client side, in the Support and Debugging Utility, review the Server Status to ensure the connection to the server is available, CCOID is active and the phone online is true.

Issue: Call operations are failing.

Resolution: From client log find out request and see it’s response

Issue: Call is not appearing or ghost call.

Resolution: If call is not appearing then make sure client is connected.

If there is ghost call then restart client and see if it is stuck on server side or client side.

Issue: Call action buttons are not enabled.

Resolution: Look at the call events and review any action flags. You can also run WinCASClient to find out if this is issue is caused by the client or server.

Troubleshooting CAS/IPDS Issues

Client Application Server (CAS) is a collection of many client modules including IPDS.

Default tracing in CAS is appropriate for troubleshooting most of the issues in TAPI, history, voice mail, database activity, Data API requests and client login issues.

Default tracing in CAS is not suitable for monitoring and troubleshooting CAS-SM traffic, CHM scheduling, and presence, quick dialer issues and uploading personal contacts.

CAS Log Files

A critical resource for troubleshooting are the CAS log files.

The CASWEBSRV-YYMMDD.XXXXXX.Log file logs CAS Web server activity. It is useful for estimation of CAS loads.

The IPDS-YYMMDD.XXXXXX.Log traces core CAS/IPDS activity on phones, HTTP clients, and internally. It tracks contexts of the events using specific tags:

- No client context (>)
- Phone context (#ccoid)
- Client context (#dn)
- Both client and phone context (no tag)

Client Login Issues

If a user cannot login to the client applications, consider the following questions:

Does it have a session with CAS?. Open the Support and Debugging Utility (CTRL+F12). The Session Manager reviews the client application information and an ID is returned to the client and a session is started.

Figure 16: CAS log for client login

```
00:28:46.277 (116232:116508)


Set CAS_DETAILED trace flag

00:28:41.277 (116232:117504) >Adding login for YYY, ip=10.195.0.114,
  app-id=CASIntfCharp.CASConnection.18.5.6802.0, expiry=9, id=49365.

...

00:28:41.292 (116232:116688) >SM response (true):'{"request-
  id":49366,"topic":"system","message":"session","results":[{"action":"
  update","object":"Session","error":-117,"error-
  key":"invalid session id","error-data":"","error-message":"Invalid
  session ID","valid":false,"id":49365}],"error":0}'


Remove CAS_DETAILED trace flag after troubleshooting
```

If the client session is running, determine if it is using the home CAS session. If the client is connected to a non-home CAS, certain services such as history and personal contacts in Server status are not available.

Phone Issues

Use WinCASClient to determine if the cause of the phone issue is on the server. Review the client log for an event “device-changed-evt” or response “get-ext-props”.

If the log shows the status of the phone as “online”: false, “phone-type”: -1, or “phone-assignment”:0, debug the phone issue on the server. Cross check the results with Director. If Director properly recognizes the phone and shows is an assigned value, the issue is probably in CAS or missing database triggers.

CAS-Client Time Difference

Calculate the time different to estimate possible delays in transmission which can result in errors.

```
17:01:25:231 P/TID 2656/PCMMainThread
{"topic":"system","message":"config","timestamp":1329181285231,"sequence-id":10,”
IPDS log: 17:01:22.140 ( 7580: 8072) System topic DataAPI request:
{"topic":"system","message":"config","timestamp":1329181285231,"sequence-id":10,”
```

Knowing the time difference aids the lookup time when you switch between client and server logs.

TAPI Issues

If new calls do not appear in the client, review the IPDS log for activity on CCOID lines. Is the line opened or not?

If you see the text, “Line device successfully closed: 0x4000ae03”, the line exists, and the issue is caused by CAS.

If you see the text, “Line device successfully opened CSTline: 04EE3F98 CCOID: 0x4000ae03”, the missing calls are the result of a TAPI issue.

Voice Mail Issues

Perform the following steps to ensure that the voice mail features are enabled correctly.

Ensure the Voice Mail option is selected in the Support and Debugging utility (CTRL+F12) to create a client log.

Gather the server logs from the following location on the server: ***C:\Program Files\Shoreline Communications\ShoreWare Server\slogwin***. Gather the logs from the server where the user’s phone or mailbox is configured, and the Headquarters server.

Play Message Issues

Use the flow of requests and responses between the client and server/CAS for to determine problems with playing voice mail messages.

Find play request:

```
16:38:44:809 P/TID 7132/PCMMainThread [VoiceMailStorage]PostRequest:
{"topic":"vm","message":"play","timestamp":1328661524809,"sequence-
id":304,"request-id":304,"mbox-id":"120","msg-id":"5ILPZQIDU","drop-
call":true,"pos":0}
```

Sample error message:

```
16:38:47:165 P/TID 7132/6592 Error: CAS Asynchronous command
result:{"topic":"vm","message":"error-evt","timestamp":1328661527128,"sequence-
id":1318,"req-sequence-id":304,"error":-1055914152}
```

Find play request in IPDS server log:

```
16:38:44.980 ( 3312: 5904) >Processing JSON cmd:
{"topic":"vm","message":"play","timestamp":1328661524809,"sequence-
id":304,"request-id":304,"mbox-id":"120","msg-id":"5ILPZQIDU","drop-
call":true,"pos":0} Tick: 4889312
```

For a successful message play, TAPI activity is present:

```
14:59:41.970 ( 3044: 5148) >[VMHandler]DoPhoneDial: usr=174 calling
phoneDial(mbox=174, handle=2ea61a7c-7166-4d2b-94eb-e78d4e7797cc)
14:59:43.032 ( 3044: 4492) >Call event: 0x20000012 0x04AE2298 00050000-0026-4f29-
dcf1-00104919487e 2
{"version":1,"topic":"shoretapi","message":"event","timestamp":600091937,"sequence-
id":3015,"msg":2,"param1":32768,"param2":0,"param3":4}
```

Playing Messages From Remote Mailbox

If the user's mailbox is on a different site from the telephone, use the flow of requests and responses between the client and server/CAS for to determine problems with playing voice mail messages.

The following tasks show successful actions when playing messages from a remote mailbox.

Download request and get response:

```
15:41:30:634 P/TID 10196/628 VoiceMailStorage.PrepareDownloadMessage
Response {"topic":"vm","message":"prepare-
download","timestamp":1329349274232,"sequence-id":9027,"request-
id":54,"response":0}
```

Get download-location-evt:

```
15:41:30:823 P/TID 10196/CASEvtMgrThread
VoiceMailStorage.OnProcessEvent:{"topic":"vm","message":"download-location-
evt","timestamp":1329349274357,"sequence-id":9028,"location":"http://
10.186.0.141:5449/voicemail/download/5FXZPVBDE.wav?session-
id=0aba0044cc22c3bb890b57fb1daa1c26d27aa846dc5b89d4","mbox-id":"190","msg-
id":"5FXZPVBDE"}
```

Client downloads file from server:

```
15:41:30:842 P/TID 10196/PCMMainThread
[AudioFileWavePlayer]VoiceMail_DownloadLocation: downloading file from
```

```
location=http://10.186.0.141:5449/voicemail/download/5FXZPVBDE.wav?session-
id=0aba0044cc22c3bb890b57fb1daa1c26d27aa846dc5b89d4 to
tmpLoc=C:\Users\lokino\AppData\Local\Temp\tmpA065.tmp

15:41:30:965 P/TID 10196/PCMMainThread
[AudioFileWavePlayer]m_webClient_DownloadFileCompleted:
localFile='C:\Users\lokino\AppData\Local\Temp\tmpA065.tmp',
WaveFileLength=72160
```

Confirming TAPI Operations

1. From Communicator for Windows, click in the Quick Dialer field and then press Ctrl + F12 to launch the Communicator Support and Debugging tool.
2. In the Support and Debugging tool window, select **Telephony Status** to open the Telephony/TAPI test window.

   A listing of line devices appears, including a device displaying user statistics. If no line device appears with the user statistics, TAPI is not working properly. Either Communicator was installed incorrectly, or the TAPI Service Provider is removed or corrupted.

   Reinstall the client software to correct the problem.
3. Use the Windows phone dialer to confirm that TMS or Remote TSP is down:

   a. Double-click `dialer.exe` to start the Windows phone dialer.

   b. From the **Tools** menu, choose **Connect Using**.

      If no entries appear in the **Line** drop-down list, or the only entries are modems or other locally installed telephony devices, either TMS or Remote TSP is not working.

      If the drop-down list displays valid entries, confirm that one of the entries matches the user's switch port and extension. If there is no match, the Remote TSP is configured improperly.

   c. Reconfigure Remote TSP from the Telephony Applet in the Windows Control Panel, or by reinstalling the client software.

      If the user's entry appears in the drop-down list, select the entry and attempt to place a phone call to the number with the dialer.

Troubleshooting caller ID Problems

The following symptoms may indicate Caller ID issues:

- A call is displayed, but the Caller ID name and/or number is incorrect.
- Names and numbers listed in routing slips do not match what appears in the call display.

These problems can arise from any of these system layers:

- Communicator

- Remote TAPI Service Provider
- TMS
- ShoreTel Voice Switch
- Telephone Company Central Office

Isolating a Caller ID Problem

1. Use another TAPI application, such as Phone Dialer or TB20, to check the connected ID name and number.

   The name and number should match the information that appears in Communicator.

   If these do not match, it is probable that Communicator detected the number in another application running on the user's machine and applied formatting rules to make the entry unique.

2. Locate the call in question and use the TMSncc log to view the Caller ID information the client sent to the server.

3. Use the trunk debugger to identify what the CO sent to the switch.

Troubleshooting Configuration Problems

The following symptoms may indicate configuration issues:

- A Server Unavailable message appears when the user attempts to change his or her call handling or headset mode.
- Unable to use Configure ShoreTel System via Communicator's Options menu, or unable to access ShoreTel System from the Windows Control Panel.
- Call handling mode or headset mode display on Communicator is inaccurate.

Review Troubleshooting Login or Startup Problems on page 211. Most of the diagnostic guidelines in that section apply to configuration problems as well.

Isolating a Configuration Problem

1. Confirm that the CSIS server is running by entering the URL provided.
2. If the CSIS server is running, make sure that `CSISCMgr.exe` is also running on the client PC.
3. If the client process is running, try toggling the hands-free mode on and off, or change the call handling mode.
4. Verify that Communicator is connected to the CSIS server by placing the cursor in the QuickDialer dialog box and pressing Ctrl + F12.

   Use the diagnostics dialog to check the connection.

Troubleshooting MAPI Contact Import Problems Using SHAdrTst.exe

You can isolate MAPI contact import problems by running `SHAdrTst.exe`, which is included on the client DVD.

Running SHAdrTst.exe:

1. From a command prompt or DOS window on the client PC, run `SSHAdrTst.exe` by typing:

   ```
   SHAdrTst
   ```

   The command lists what Communicator can import.

   Table 52 lists and describes the available options for `SHAdrTst.exe`.

Table 52: SHAdrTst.exe Options

Command	Description
`SHAdrTst > filename.txt`	Transfer the output to a file.
`SHAdrTst -debug -stdout`	Include debugging statements in the output.
`SHAdrTst -debug -stdout > filename.txt`	Include debugging statement in the output file. The output lists all data imported by Communicator.

Using the History File

All Communicator call history records are now stored on the user's managing HQ or DVS server in an SQLite file.When a user accesses their Communicator call history from either the Communicator client, Communicator for Web, or Communicator for Mac, this data is recalled from the server-side history records for that user.

The records are stored under the following pathway on the user's server:

`<ShoreTel Data Folder Root>/UserData/<dnuuid>/` with the name `history.sq3`.

Each `dnuuid` corresponds to a particular user.

Note

These are SQLite files and must be opened with the appropriate tools for that format to view the data.

ShoreTel recommends you contact Technical Support for assistance in accessing these files as the call history for individual users can be damaged or lost if not correctly opened.

Using Log Files

Another critical resource for troubleshooting is the log file where Communicator logs TAPI events, configuration events, and voice mail events, as well as all unexpected errors, exceptions, and warnings.

The main log file is named `CC-YYMMDD.HHMMSS.log`. CC is literal; `YYMMDD` represents the year, month, and day of the date when the file was created; and `HHMMSS` represents the hour, minute, and second of the time the file was created.

Example

The file named `CC-081202.120000.log` was created at noon on December 12, 2008.

There are other log files, such as `CSIS-YYMMDD.HHMMSS.log`, for other processes running on the client.

Locating the Log File

You can find the log file in `<app data>\ShoreTel Client\Logs` on most Windows machines, or `<install dir>\Logs` on other platforms.

Creating Verbose Logs

By default, only unexpected errors are logged to the error log. You can change this priority from the QuickDialer if you want to create more detailed logs.

Use verbose logging only if a problem is reproducible and ShoreTel Customer Support requires additional information.

Enabling Verbose Logging

1. Position the cursor in the QuickDialer window and press **Ctrl + F12**.
2. Check the boxes for preferred types of logging. To ensure you capture as much logging information as possible, check all boxes except phone number parsing.

Preset Debug Flags

You can preset debug flags by selecting the relevant flag in the Support and Debugging Tool, which displays when you press **Ctrl + F12**.

Collecting Logs

To collect logs to send to ShoreTel Customer Support, use the `Senclientlogs.exe` utility from Windows Explorer, go to

`C:\ProgramFiles\Shoreline Communications\ShoreWareClientSendClientLogs.exe`.

Setup Wizard

Another component of the client, the Setup Wizard, continues the configuration of Communicator after installation.

The Setup Wizard appears the first time Communicator runs on any PC. It reappears if a user cancels the Wizard before completing the configuration, or installs Microsoft Outlook at a later date.

The Setup Wizard starts if any of the following conditions are true

- Any of the following string values are missing from (or blank in) the registry
  - `HKEY_CURRENT_USER\Software\Shoreline Teleworks\ShoreTel Client\UserName`
  - `HKEY_CURRENT_USER\Software\Shoreline Teleworks\ShoreTel Client\Server`
  - `HKEY_CURRENT_USER\Software\Shoreline Teleworks\ShoreTel Client\Password`
- The following `DWORD` value is missing from the registry
  - `HKEY_CURRENT_USER\Software\Shoreline Teleworks\ShoreTel Client\LoadOutlookPhoneNumbers`
- The following values are set to `TRUE` in the user row of the database `USER` table:
  - `MustChangeGUIPassword`
  - `MustChangeTUIPassword`
  - `MustRecordName`
- Microsoft Outlook is installed AND Voice Mail Outlook Integration is **not** installed AND the following `DWORD` value is missing from the registry, or set to *z* nonzero value
  - `HKEY_CURRENT_USER\Software\Shoreline Teleworks\ShoreTel Client\OfferToInstallOutlookIntegration`

If any of the specified conditions are `TRUE`, the Setup Wizard runs while also setting one or more of the conditions to `TRUE` and starting the client.

Note

Set the values only after exiting the client from the system tray and terminating all Communicator services.

V-1 Compatibility

V-1 Compatibility functionality logs messages and events to the following log files.

- CSISSvr-XXXXX.Log on server (basic level)
- CSIS-XXXX.Log at C:\Documents and Settings\client's name\Application Data\ShoreTel Client\Logs on client machine.

Note

You must enable CSIS Tracing in Communicator.

The following is an example log generated, when Communicator starts up. This information is logged on the user's computer.

```
The information of "5804: (5564) 13:35:19.992 PST [CSIS-CONNDLL]
CCSISSvrCONN::checkUpgrade for CCARR-755.USER: client version=14.40.6800.0, server
version=15.20.3400.0, status=4" is logged to file CSISSvr-XXXX.log.
The information of "3948: (3812) 16:21:08.731 CST [CSIS-CM]
CCSISCliCONN::checkUpgrade: client version=14.20.0.0, server version=15.20.3400.0,
status=1".
```

Status Codes generated by Communicator behavior:

- status – 0, no upgrade
- status – 1, optional
- status – 2, mandatory
- status – 3, incompatible
- status – 4, not allowed
- status – 5, incompatible server
- status – 6, suggest upgrade

Existing Communicator Issues

When warning pop-up windows are displayed that require an upgrade or when a pop-up window is displayed indicating “do not allow upgrade” and the user clicks **OK** or **Cancel** quickly, the Communicator may not exit properly. The user must wait 1 or 2 seconds before clicking the pop-up warning windows.

APPENDIX A

Event Codes

This appendix includes information about ShoreTel Event codes. It covers the following topics:

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IP Phone Display Server (IPDS) 269

Overview

This appendix provides a comprehensive list of ShoreTel event codes. Organized by error type and sorted by event ID numbers, the tables in this appendix are a helpful resource for troubleshooting events reported by the ShoreTel system.

ShoreTel Director provides the following methods for viewing events:

- Clicking **Maintenance > HQ Event Log > System** or **Application** lets you see all events the system or application generates. For more information, see the “Maintenance” chapter in the *System Administration Guide*.
- Clicking **Maintenance > Diagnostics & Monitoring > Alerts** lets you view the events associated with a particular alert. For more information, see the “Monitoring and Diagnosing” chapter in the *System Administration Guide*.

Event Types

The tables in this appendix list event types according to the following categories associated with components in the ShoreTel system:

- Switch
- TMS
- Voice Mail Port Manager
- Media Driver
- Event Watch
- System Management Interface
- Port mapper
- Trigger Server
- Distributed Routing Service (DRS)
- Kadota Utility
- Call Accounting
- Workgroup Server
- CSIS
- IP Phone Configuration Service (IPCS)
- IP Phone Display Server (IPDS) (also known as CAS)

Using the Event Code Tables

The event tables in this appendix provide a structured view of events you may encounter in messages and log files. Each event table entry includes a unique event ID number, a severity level, the event message text, possible causes, and suggested courses of action (if any).

In some cases, event codes result from other error conditions that cause related problems. For this reason, always review event codes in the context in which they appear. For example, if event code 171 (internal operating temperature of switch is exceeding acceptable range) appears with code 166 (internal fan failure), you should replace the fan—not the entire switch—to solve the problem.

Each event is assigned one of three levels of severity. Table 53 lists and describes the severity levels used in the tables.

Table 53: Severity Level Descriptions

Severity Level	Explanation
Information	Reports status Indicates normal operation, or a transition between normal operating states. Typically, no action is required.
Error	Reports an exception to normal operations Depending on the event and its context with other events, it requires no action, monitoring, troubleshooting, or referral.
Warning	Alerts you to a failure or an impending failure (for example, when a service or hardware component is disabled) In most cases, a warning requires immediate response and resolution.

Switches

Table 54 lists and describes event codes for switches.

Table 54: Event Codes: Switches

ID	Severity Level	Message	Cause	Action
100	Error	Switch <ShoreTel Voice Switch Host Name>: Event message lost, queue overflow.	The ShoreTel Voice Switch is receiving too many events from the NT Server. Possibly caused by an application problem on the ShoreTel server.	Check the ShoreTel server for events that might indicate an application problem. Troubleshoot the problem and reboot the server, if you cannot identify a cause.
101	Warning	Switch <ShoreTel Voice Switch Host Name>: The <area> in flash memory is corrupt and is being reset.	Flash memory area is corrupt.	If problem persists, return for repair.
102	Error	Switch <ShoreTel Voice Switch Host Name>: Unable to reset <area> in flash memory, erase failure.	Application is unable to erase area of Flash memory.	If problem persists, return for repair.
103	Error	Switch <ShoreTel Voice Switch Host Name>: Unable to update <area> in flash memory, write failure.	Application is unable to write area of flash memory.	If problem persists, return for repair.
105	Error	Switch <ShoreTel Voice Switch Host Name>: Task exception occurred. System needs to be restarted.	A software exception occurred.	Contact ShoreTel Technical Support and be prepared to provide the log files for further analysis.
106	Error	Switch <ShoreTel Voice Switch Host Name>: Task exception occurred. System automatically restarting.	A task exception occurred. The ShoreTel Voice Switch experienced an internal error and is rebooting.	Contact ShoreTel Technical Support and be prepared to provide the `ipbx` and `tmsncc` log files for further analysis.
107	Information	Switch <ShoreTel Voice Switch Host Name>: Restart request received—system is being shutdown and restarted.	ShoreTel Voice Switch restarted via the Quick Look interface.	No action.
108	Error	Switch <ShoreTel Voice Switch Host Name>: Internal error:	No longer reported in NT event log.	This event code reports internal software debug statements for use by ShoreTel developers.

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
109	Error	Switch <ShoreTel Voice Switch Host Name>: Unable to seize trunk on port <port number>. Taking trunk temporarily out of service.	The switch cannot seize a trunk.	Verify that the trunk line is connected to the ShoreTel Voice Switch. Check wiring between ShoreTel Voice Switch and the telephone company De-marc. Connect a phone or telephone test set to the line, then go off-hook and listen for a dial tone. If no dial tone is present, report the problem to your service provider.
110	Information	Switch <ShoreTel Voice Switch Host Name>: Trunk on port <port number> taken out of service by the administrator.	The system administrator took the port out of service.	No action.
111	Information	Switch <ShoreTel Voice Switch Host Name>: Trunk on port <port number> is back in service.	The trunk line is again functional and is back in service.	No action.
112	Information	Switch <ShoreTel Voice Switch Host Name>: Trunk on port <port number> put back in service by the administrator.	Trunk is back in service.	No action.
113	Warning	Switch <ShoreTel Voice Switch Host Name>: Extension on port <port number> taken out of service by the administrator.	Specified extension port removed from service.	Put the port back in service when the system administrator indicates that it is appropriate.
114	Information	Switch <ShoreTel Voice Switch Host Name>: Extension on port <port number> put back in service by the administrator.	Specified extension port is back in service.	No action.

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
115	Information	Switch <ShoreTel Voice Switch Host Name>: System restarted. Product: ShoreTel Firmware Version: <ShoreTel Voice Switch firmware version number> BootROM Version: <ShoreTel Voice Switch bootrom version number> Telephone Board: <ShoreTel Voice Switch telephone board revision number> CPU Board: <ShoreTel Voice Switch CPU revision number>	The switch was reset and subsequently restarted. (The event also provides current version information for the switch.)	No action.
116	Error	<ShoreTel Voice Switch Host Name> Lost connection to switch <ShoreTel Voice Switch Host Name>.	The switch is unable to communicate with the other ShoreTel Voice Switch specified in the event. The switches are not able to place calls to each other.	The specified switch may be off or disconnected from the network. Check the switch in question to confirm that it is powered on and connected to the network. If the switch is connected to the network, verify with Director that it is properly configured. For event 205 and 206, update the configuration and power cycle the switch. After restart, confirm network visibility and the switch'sconfiguration.
117	Information	Switch <ShoreTel Voice Switch Host Name >: Established connection to switch <ShoreTel Voice Switch Host Name>.	The switches established a connection and are communicating with each other.	No action.
119	Warning	Switch <ShoreTel Voice Switch Host Name >: Excessive number of packets lost from <ShoreTel Voice Switch Host Name>.	The switch is losing an excessive number of packets.	Verify that your network configuration meets ShoreTel requirements.

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
127	Error	Switch <ShoreTel Voice Switch Host Name>: Failed to forward call on <CHM Type> from <extension number> to <extension number>.	The call cannot be forwarded to the specified extension.	Confirm that the specified extension's call handling mode configuration is valid. This error can appear when the destination extension is connected to a ShoreTel Voice Switch that is either offline or unavailable to the network.
130	Error	Switch <ShoreTel Voice Switch Host Name>: Failed to redirect incoming fax from <extension number> to <extension number>.	An incoming fax transmission call was not redirected to the fax extension.	Confirm that the extension is properly configured for fax redirection. Confirm that the fax extension is operating properly.
131	Error	Switch <ShoreTel Voice Switch Host Name>: Extension <extension number> failed to acquire port <port number>.	The ShoreTel Voice Switch was unable to configure the specified extension on the desired port.	Reboot the switch. If this error persists, contact ShoreTel Technical Support.
132	Information	Switch <ShoreTel Voice Switch Host Name>: Call restriction violation, call placed from <extension number> to <dialed number>.	The specified extension dialed a restricted number.	Inform user about dial-out restrictions.
138	Error	Switch <ShoreTel Voice Switch Host Name>: Memory corruption detected - bad block <parameter pinpointing failing block> in partition <parameter pinpointing failing partition>.	Memory block corruption detected.	Reboot the switch. If the event persists, replace the switch.
140	Error	Switch <ShoreTel Voice Switch Host Name>: Cannot re-initialize NvRam - Cannot Continue.	The flash memory in the ShoreTel Voice Switch is bad.	Replace the switch.

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
143	Warning	Switch <ShoreTel Voice Switch Host Name>: Echo train grade F port <port number>.	The specified port did not receive proper echo cancellation properties. The trunk or phone connected to the port may exhibit poor sound quality or echo.	Use ShoreTel Director to reset the port. If the error was reported on a phone port, lift the phone's receiver to view the event log. (You may need to cover the mouthpiece to prevent ambient noise pickup.) If the error persists on a phone port, you may need to replace the phone.
144	Information	Switch <ShoreTel Voice Switch Host Name>: Trunk on port <port number> connected for more than two hours.	The specified trunk connected to the port for two or more hours.	Confirm that an active call is in progress. If no call is present, reset the port from ShoreTel Director.
145	Warning	Switch <ShoreTel Voice Switch Host Name>: Echo coeffs stuck possibly needs to be retrained port <port number>.	The echo suppression software was unable to adapt to a call in progress.	No action for an isolated occurrence. If the error persists, follow the course of action suggested for Event 143.
146	Information	Switch <ShoreTel Voice Switch Host Name>: Echo train grade A port <port number>.	The echo suppression software is properly configured.	No action.
147	Information	Switch <ShoreTel Voice Switch Host Name>: Echo train grade C port <port number>.	The echo suppression software is properly configured.	No action.
148	Warning	Switch <ShoreTel Voice Switch Host Name>: Low Erl possible hardware problem port <port number>.	The echo suppression software detected a low echo-return loss on the specified port. This error can occur when modem or fax calls connect to a port. Event is infrequent and random.	No action for an isolated occurrence. If the error persists, follow the course of action suggested for Event 143.

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
149	Warning	Switch <ShoreTel Voice Switch Host Name>: Low Erle port <port number>.	The echo suppression software detected a low echo-return loss on the specified port.	No action for an isolated occurrence. If the error persists, follow the course of action suggested for Event 143.
151	Information	Switch <ShoreTel Voice Switch Host Name>: Reboot due to configuration synchronization.	Reboot due to configuration change.	No action.
152	Warning	Switch <ShoreTel Voice Switch Host Name>: DSP< DSP number> - 80% utilization.	The DSP on this switch is nearing capacity.	No action for an isolated occurrence.
153	Error	Switch <ShoreTel Voice Switch Host Name>: DSP <DSP number> - 100% utilization.	The DSP on this switch reached maximum capacity. In most instances, this event does not affect operations.	No action for an isolated occurrence. If the error persists, reboot the switch.
157	Error	Switch <ShoreTel Voice Switch Host Name>: Received DHCP NAK for IP address <IP Address>.	The DHCP server responded negatively to a DHCP lease renewal request. The IP address previously assigned to the switch is no longer available for that device. The DHCP server assigns the switch a new IP address.	In ShoreTel Director, display the Switches page and open the switch's record. Change the switch's IP address to the address assigned to it by the DHCP server. (You can use the Find Switches page if the switch is on the same LAN as the ShoreTel server.)
158	Warning	Switch <ShoreTel Voice Switch Host Name>: DHCP lease expired for IP address <IP Address>.	The DHCP lease for the switch expired and the switch is currently obtaining a new IP address. While the switch is obtaining another IP address, it is unable to communicate with the ShoreTel server.	In ShoreTel Director, display the Switches page and open the switch's record. Change the switch's IP Address to the address assigned it by the DHCP server. (You can use the Find Switches page if the switch is on the same LAN as the ShoreTel server.)

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
159	Error	Switch <ShoreTel Voice Switch Host Name>: DHCP IP address mismatch: <IP Address> Existing address: <IP Address> Offered address: <IP Address> Fatal Error... Rebooting <ShoreTel Voice Switch Host Name>.	The IP address currently stored in the switch's flash memory is not the same as the address that DHCP is trying to assign to it. The switch automatically reboots and obtains a new address.	In ShoreTel Director, display the Switches page and open the switch's record. Change the switch's IP address to the address assigned to it by the DHCP server. (You can use the Find Switches page if the switch is on the same LAN as the ShoreTel server.)
160	Error	Switch <ShoreTel Voice Switch Host Name>: HAPI command failed. System automatically restarting.	The ShoreTel Voice Switch experienced a fatal internal software error.	Contact ShoreTel Technical Support for updated information about fatal errors.
161	Error	Switch <ShoreTel Voice Switch Host Name>: Connection to Telephony Management Service terminated - too many unacknowledged events.	The ShoreTel Voice Switch stopped communicating with the TMS Server. This error can result from a CPU overload on the ShoreTel server.	Check the ShoreTel server for applications that are placing inordinate demands on the processor. Correct any application errors causing CPU overload.
162	Error	Switch <ShoreTel Voice Switch Host Name>: Another device using the same IP address detected.	A device with the same IP address as the switch appeared on the network.	Remove the offending device from the network, or ask the network administrator to assign the switch an alternate IP address.
163	Information	Switch <ShoreTel Voice Switch Host Name>: Ethernet link established: using <Ethernet speed> <Duplex mode>.	The switch is connected to the Ethernet network.	No action.
164	Error	Switch <ShoreTel Voice Switch Host Name>: Ethernet link lost.	The switch is no longer connected to the Ethernet network.	Confirm that network cables and ports are connected properly and are in working order.
165	Warning	Switch <ShoreTel Voice Switch Host Name>: Receive pair polarity reversed.	The twisted pairing wiring for an ethernet cable is reversed.	Although the switch continues to function, replace the suspect cable.

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
166	Error	Switch <ShoreTel Voice Switch Host Name>: Fan failed.	The fan in the ShoreTel Voice Switch failed.	Replace the ShoreTel Voice Switch.
167	Warning	Switch <ShoreTel Voice Switch Host Name>: Fan running slow.	The fan in the ShoreTel Voice Switch is running slow. If the condition persists, the switch may overheat.	If this event is accompanied by Event 168, no action is required. If the error persists, replace the switch.
168	Information	Switch <ShoreTel Voice Switch Host Name>: Fan running normally.	The fan in the switch is running normally.	No action.
169	Information	Switch <ShoreTel Voice Switch Host Name>: Operating temperature: normal.	The internal operating temperature of the switch is within normal operating parameters.	No action.
170	Warning	Switch <ShoreTel Voice Switch Host Name>: Operating temperature: above normal.	The internal operating temperature of the switch is above the acceptable range.	Check if the event is accompanied by Event 166. If so, replace the switch. If the fan is working properly, check the environment in which the switch is operating to confirm that it is capable of supporting a temperature range within the switch's operating parameters.
171	Error	Switch <ShoreTel Voice Switch Host Name>: Operating temperature: too hot.	The internal operating temperature of the switch exceeded the acceptable operating range. The switch may soon fail.	Check if the event is accompanied by Event 166. If so, replace the switch. If the fan is working properly, check the physical location of the switch for environmental causes.
172	Error	Switch <ShoreTel Voice Switch Host Name>: NvRam failure.	The ShoreTel Voice Switch was unable to write to the flash memory.	Reboot the switch. If the error persists, contact ShoreTel Technical Support.
173	Error	Switch <ShoreTel Voice Switch Host Name>: VTALK failure.	The 48-Volt DC power supply failed.	Replace the switch.

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
174	Error	Switch <ShoreTel Voice Switch Host Name>: -70 Volt failure.	The 70-Volt DC power supply failed.	Replace the switch.
175	Information	Switch <ShoreTel Voice Switch Host Name>: Voltage OK.	The power supply that reported a failure is once again operating correctly.	No action.
176	Error	Switch <ShoreTel Voice Switch Host Name>: Firmware Upgrade Failed: <ShoreTel Voice Switch Host Name> <specific diagnostic message>.	The firmware upgrade for the switch failed.	Check the switch event logs for subsequent appearances of Events 177 and 178. The presence of these events means that the switch automatically recovered and you can ignore the alert of upgrade failure. If Events 177 and 178 are not also present, perform a manual upgrade of the firmware by rebooting the switch. If a reboot does not complete the upgrade, enter the `burnflash` command at the command prompt. This may indicate an installation problem.
177	Information	Switch <ShoreTel Voice Switch Host Name>: Firmware Upgrade Started.	A firmware upgrade started.	No action.
178	Information	Switch <ShoreTel Voice Switch Host Name>: Firmware Upgrade Finished	The firmware upgrade was successful.	No action.
179	Error	1.5V too high: value – d.dV 1.5V too low: value – d.dV	Board failure	Return for repair.
180	Error	1.6V too high: value – d.dV 1.6V too low: value – d.dV	Board failure	Return for repair.
181	Error	2.0V too high: value – d.dV 2.0V too low: value – d.dV	Board failure	Return for repair.
182	Error	2.5V too high: value – d.dV 2.5V too low: value – d.dV	Board failure	Return for repair.

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
183	Error	3.3V too high: value – d.dV 3.3V too low: value – d.dV	Board failure	Return for repair.
184	Error	12V too high: value – d.dV 12V too low: value – d.dV	Board failure	Return for repair.
185	Error	25V too high: value – d.dV 25V too low: value – d.dV	Board failure	Return for repair.
186	Error	48V too high: value – d.dV 48V too low: value – d.dV	Board failure	Return for repair.
187	Error	75V too high: value – d.dV 75V too low: value – d.dV	Board failure	Return for repair.
188	Warning	Operating temperature: below normal	Temperature in room too cool.	Fix the environment.
189	Error	Operating temperature: too cold	Temperature in room too cold.	Fix the environment.
1300	Information	Switch <ShoreTel Voice Switch Host Name>: Trunk on port <port number> connected for <number of minutes> minutes.	The trunk on the specified port was continuously active for the number of minutes specified. This message is generated after every two hours of continuous trunk activity.	Check the trunk and verify that an active call is in progress. If no call is present, reset the port from ShoreTel Director.
1301	Error	Switch <ShoreTel Voice Switch Host Name>: Second TMS connection attempt from <IP Address of second TMS server>.	Another ShoreTel Server attempted to take control of the switch.	Only one ShoreTel server can control a switch; multiple servers cannot manage a switch simultaneously. Decide which ShoreTel server you want to manage the switch, then delete the switch from the other server.
1303	Error	Switch <ShoreTel Voice Switch Host Name>: Configured IP <IP Address> does not match actual IP <IP Address>.	The IP address configured for the switch in Director is not the IP address the switch is using.	From Director, change the switch's IP address to match the address the switch uses.
1305	Information	Switch <ShoreTel Voice Switch Host Name>: Free memory reduction trend. Min <minimum memory used>. Avg <Average memory used>.	Reports the switch's memory usage.	No action.

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
1306	Warning	Switch <ShoreTel Voice Switch Host Name>: Call was unable to be completed due to insufficient network bandwidth between sites.	An attempted call exceeded the limit on the number of media streams allowed for multiple sites. May indicate the number of media streams configured for multiple-site calls cannot handle the inter-site call traffic.	From ShoreTel Director, open the Site Parameters page and check the number of media streams specified for the "Other Number of Media Streams for Multi_Site" parameter. Use the ShoreTel Site-Link Configuration Guide to determine the number of media streams the connection's bandwidth can support. If the bandwidth can support more media streams, raise the value specified for the site. Increasing the number of media streams may reduce sound quality for multiple-site calls.
1307	Information	Switch <ShoreTel Voice Switch Host Name>: Trunk on port <port number> forced out of service.	Not reported in NT event log.	
1308	Warning	Switch <ShoreTel Voice Switch Host Name>: T1 is in %2 loopback mode.	The T1 switch is in a local or payload loopback.	Your service provider is performing diagnostic tests.
1309	Information	Switch <ShoreTel Voice Switch Host Name>: T1 is out of %2 loopback mode.	Loopback on this switch removed.	No action.
1310	Error	Switch <ShoreTel Voice Switch Host Name>: T1 framing error <specific error>.	The T1 switch is experiencing framing errors.	Check the cabling. Contact your service provider.
1311	Information	Switch <ShoreTel Voice Switch Host Name >: T1 framing ok.	Framing restored.	No action.
1312	Error	Switch <ShoreTel Voice Switch Host Name>: T1 signal error <specific error>.	T1 switch lost the T1 carrier signal.	Check the cabling. Contact your service provider.
1313	Information	Switch <ShoreTel Voice Switch Host Name>: T1 signal ok.	T1 carrier signal restored.	No action.

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
1314	Error (Severity level varies depending on error)	Switch <ShoreTel Voice Switch Host Name>: Config Store: <specific error>.	Notable event while reading non-volatile switch configuration.	No action. The configuration received from the server supplies any missing data.
1316	Information	Switch <ShoreTel Voice Switch Host Name>: Trunk to trunk transfer from port <port number> killed after <time interval> of connection.	The system disconnected trunks on the reported ports as a result of option settings in Director.	No action.
1317	Information	Switch <ShoreTel Voice Switch Host Name>: ShoreTel Software Telephony Switch <ShoreTel Voice Switch> Starting.	ShoreTel SoftSwitch started.	No action.
1319	Warning	Switch <ShoreTel Voice Switch Host Name>: Emergency Services Call on port <port> from user <user> at <ext or ani>.	User called emergency number.	No action -- someone already called for help.
1320	Error	Switch <ShoreTel Voice Switch Host Name>: SoftSwitch Cannot Start: Logger Failed.	The ShoreTel SoftSwitch failed to start because it was unable to contact the NT event log.	This message appears only after SoftSwitch successfully contacts the NT Event Log Manager—meaning that the error condition is cleared (possibly by the clearing of a full NT event log).
1324	Information	Switch <ShoreTel Voice Switch Host Name>: Reboot due to configuration change.	Certain configuration changes, for example, changing signalling protocols for a SG-T1, requires a switch reboot.	No action.
1325	Warning	Switch <ShoreTel Voice Switch Host Name>: Received request to reset the configuration and restart the system.	Can only be caused by issuing a command via *ipbxctl*. The command is only for use by ShoreTel Technical Support personnel.	This message confirms that SoftSwitch stopped on command from the NT Service Manager. No action is needed.

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
1326	Information	Switch <ShoreTel Voice Switch Host Name>: SoftSwitch Stopping %2.	SoftSwitch service stopped.	If the SoftSwitch service does not restart within two minutes, perform a manual restart and contact ShoreTel Technical Support.
1330	Error	Switch <ShoreTel Voice Switch Host Name>: Soft Switch Stopping <reason>.	SoftSwitch service stopped.	If the SoftSwitch service does not restart within two minutes, perform a manual restart and contact ShoreTel Technical Support.
1331	Error	Switch <ShoreTel Voice Switch Host Name>: Assertion failure <failure>	A software assertion failed.	If the problem persists, contact ShoreTel Technical Support and be prepared to provide the log files for further analysis.
1332	Information	Switch <ShoreTel Voice Switch Host Name>: Trunk <trunk> received digits <digits> (no match), redirected to <destination>.	Incoming call on trunk failed to route.	Check trunk configuration.
1333	Information	Switch <ShoreTel Voice Switch Host Name>: Trunk <trunk> received digits <digits> (too many), used <number>, redirected to <destination>.	Incoming call on trunk failed to route.	Check trunk configuration
1334	Information	Switch <ShoreTel Voice Switch Host Name>: Trunks unavailable to route <extension> to <dialed number>.	Outgoing call failed due to no available trunks.	Verify that trunks are in-use.
1338	Information	Switch <ShoreTel Voice Switch Host Name>: Using PSTN failover to reach extension <extension> from extension <extension>, reason <reason>.	PSTN failover feature invoked.	Verify network connectivity between sites.
1339	Error	Switch <ShoreTel Voice Switch Host Name>: <message>.	Request to record a call failed.	If the problem persists, contact ShoreTel Technical Support and be prepared to provide the log files for further analysis.

Table 54: Event Codes: Switches (Continued)

ID	Severity Level	Message	Cause	Action
1340	Warning	Switch <ShoreTel Voice Switch Host Name>: <message>.	Attempt to conference using switch conference resources failed.	Check switch configuration.
1341	Warning	Switch <ShoreTel Voice Switch Host Name>: Call was unable to be completed due to insufficient network bandwidth at site <site name>.	Bandwidth limits have been exceeded.	Check site configuration.
1342	Error	Switch <ShoreTel Voice Switch Host Name>: T1/E1 PRI D channel down.	PRI D channel down.	If the problem persists, contact PRI service provider.
1343	Information	Switch <ShoreTel Voice Switch Host Name>: T1/E1 PRI D channel up.	PRI D channel up.	No action.
1344	Information	Switch <ShoreTel Voice Switch Host Name>: SIP Dynamic Trunk Event: <description>.	Information about SIP trunk registrations.	No action.
1355	Information	Switch <ShoreTel Voice Switch Host Name>: Monitoring Agent was started. or Switch <ShoreTel Voice Switch Host Name>: Monitoring Agent was stopped.	The ShoreTel Monitoring Agent was started or stopped.	No action.
1356	Warning	Switch <ShoreTel Voice Switch Host Name>: Monitoring Agent Warning: <message>	A recoverable error occurred for the ShoreTel Monitoring Agent.	Be aware that metrics collected for a specific call might be inaccurate.
1357	Error	Switch <ShoreTel Voice Switch Host Name>: Monitoring Agent Warning: <message>	The ShoreTel Monitoring Agent experienced a fatal error and is no longer running. As a result, call metrics are not collected for calls to that switch.	Restart the switch. If the problem persists, contact ShoreTel Technical Support.

Telephony Management Service (TMS)

Table 55 lists and describes event codes for TMS.

Table 55: Event codes: TMS

ID	Severity Levels	Message	Cause	Action
200	Error	TMS Assertion Failure: <parameters>.	TMS encountered a non-fatal error.	Restart the TMS service. Contact ShoreTel Technical Support and submit a support incident.
201	Information	ShoreTel-TMS service started. Version: <version number>.	TMS service started.	No action.
202	Information	ShoreTel-TMS service stopped.	TMS service stopped.	No action. If the stoppage was unintentional, check the event logs for a cause.
203	Information	Updated switch <ShoreTel Voice Switch Host Name> switch firmware to revision <version number>.	Switch upgraded to the version of firmware identified in the event.	No action.
204	Error	Failed to update switch <ShoreTel Voice Switch Host Name> switch firmware to revision <version number>.	An upgrade to the switch's firmware failed. This switch does not operate properly until the firmware upgrade is complete.	Review the event log and correct any errors related to the upgrade failure. Reset the switch from ShoreTel Director. If the event persists, contact ShoreTel Technical Support.
205	Warning	Switch Ethernet Address to IP Address mapping change. Old Mapping: <MAC Address> <IP Address> New Mapping: <MAC Address> <IP Address> Detected telephony switch that changed its IP address or is using an IP address previously in use by a different switch.	TMS detected a configured switch with a changed IP address changed. The event reports previously assigned and current MAC and IP addresses for the switch.	Ensure that the Switch <MAC Address> is set up with a correct IP address. If the DHCP lease for the switch expires and the switch receives a new IP address. If this happens frequently, contact ShoreTel Technical Support.

Table 55: Event codes: TMS (Continued)

ID	Severity Levels	Message	Cause	Action
206	Error	Switch Ethernet-Address IP-Address conflict. Expect: <MAC Address> <IP Address> Found: <MAC Address> <IP Address> Detected telephony switch with IP address or Ethernet address in conflict with the configuration database.	TMS detected a switch with a MAC address and/or an IP address that conflicts with the address(es) configured for the device in ShoreTel Director. The conflicting address or addresses result from a misconfigured DHCP server or an incorrect switch record.	If address information was entered incorrectly for the switch, use ShoreTel Director to edit the record to include the correct address(es). (The switch reboots automatically when you save the record.) If the DHCP server assigned an incorrect IP address to the switch, correct the DHCP record and reboot the switch force reassignment of a new IP address.

Table 55: Event codes: TMS (Continued)

ID	Severity Levels	Message	Cause	Action
211	Warning	Switch <ShoreTel Voice Switch Host Name> booted via FTP. Possible switch firmware corruption. If a failure occurs during firmware upgrade, a switch must boot via FTP instead of from its firmware.	The switch is no longer able to boot from flash memory and is now booting via FTP. The cause of the error is a failed firmware upgrade, bad firmware, or a reset caused by pressing the reset button.	Reburn flash memory. On the ShoreTel server, open a command prompt window and change the directory to the ShoreTel server directory (typical path is *Program Files\Shoreline Teleworks\ShoreTel Server).* Enter the `burnflash` command in this format: `burnflash -s` <IP address> (Use the IP address of the switch you are upgrading.) When the `burnflash` process is complete, check the event logs to confirm that the switch is no longer booting from FTP. If the event persists, replace the switch.

Table 55: Event codes: TMS (Continued)

ID	Severity Levels	Message	Cause	Action
212	Warning	Switch <ShoreTel Voice Switch Host Name> software version mismatch: TMS Version: <TMS version> Switch Version:<ShoreTel Voice Switch version> The switch firmware is upgraded the next time the switch boots.	TMS detects a switch with outdated firmware.	New switches ship with base firmware that is “down” from the current version. An automatic upgrade is confirmed when the device is put into service. (This event also appears during field upgrades.) From ShoreTel Director, open the Quick Look page and reboot the switch.
213	Error	Unexpected Ethernet address for switch <ShoreTel Voice Switch Host Name> Expect:<MAC Address> Found:<MAC Address>. The switch is reporting an Ethernet address different from the one specified in the configuration database.	The MAC address in the switch’s configuration record is incorrect.	From ShoreTel Director, open the switch configuration record and correct the MAC address.
214	Warning	Switch “<ShoreTel Voice Switch Host Name>” firmware file version mismatch: TMS Version: <TMS Version> File Version: <File version> Cannot upgrade switch firmware. The firmware file used to upgrade the switch firmware does not have the correct version.	The firmware file *filessys.dll* does not match the TMS file version. The switch’s firmware cannot be upgraded.	Re-install the ShoreTel server software. If the event persists, contact ShoreTel Technical Support.

Table 55: Event codes: TMS (Continued)

ID	Severity Levels	Message	Cause	Action
221	Error	Failed to load firmware image file <FileSys.dll>. Telephony Management Service was unable to load the switch firmware image file.	A switch firmware upgrade may not be possible.	This error appears when the "\Shoreline Communications\ShoreTel Server" does not have the "FileSys.dll" file, and TMS can't find or access this file. If this error appears frequently, contact ShoreTel Technical Support.
223	Warning	Detected an unexpected configuration change. This may indicate that TMS was not notified of a change. Configuration inconsistency corrected.	TMS corrected a configuration mismatch that it detected on a switch.	No action. If this error appears frequently, contact ShoreTel Technical Support.
227	Information	ShoreTel-TMS service starting. Version: <TMS version>	TMS service started.	No action.
230	Warning	TMS was unable to find an TCP/IP network interface. This computer may not have a network adapter or may not be connected to a network. Operation continues in stand-alone mode until the next TMS restart.	TMS failed to detect a network interface on the ShoreTel server.	Reboot the server. Troubleshoot the server's network configuration and make necessary repairs or modifications.

Table 55: Event codes: TMS (Continued)

ID	Severity Levels	Message	Cause	Action
231	Error	The configuration for switch "<ShoreTel Voice Switch Host Name>" no longer matches the system configuration database. This condition may exist on additional switches, and may result in unexpected behavior. To resolve the problem, restart any switch having a configuration mismatch (as shown on the Director-QuickLook page).	The configuration on the switch does not match the one stored on TMS. The mismatch can cause irregular behavior on devices connected to this switch. The error appears when there are network problems between the ShoreTel server and the switch, or is generated as a result of corrupted flash memory.	To synchronize the configuration data, reboot the switch. After the switch restarts, check the event log for messages that indicate network problems between the switch and the ShoreTel server to correct any network errors. If the event persists, check for events that indicate corrupted flash memory and follow the instructions for correcting the problem.
233	Warning	TMS disconnected from switch "<ShoreTel Voice Switch Host Name>" (<ShoreTel Voice Switch IP Address>). This may be as a result of a network outage, administrative action, or unexpected switch behavior.	TMS is reporting that it cannot communicate with the switch.	The disconnect is typically caused by a network-related problem such as outage or degraded performance. Correct the network problem. (The event also appears when the switch is taken offline for maintenance.)
234	Information	TMS connected to switch "<ShoreTel Voice Switch Host Name>" (<ShoreTel Voice Switch IP Address>).	TMS detected a switch and opened communications with the device.	No action.

Table 55: Event codes: TMS (Continued)

ID	Severity Levels	Message	Cause	Action
235	Information	<Connection type user or App Server> TAPI connection for login <user ID> from <IP address or name of system initiating the connection> initiated.	New TAPI connection accepted from a user at a specific IP address.	No action.
237	Information	TAPI connection for login <user ID> from <IP address or name of system that is connected> closed.	The TAPI connection to the specified user was closed.	No action.
238	Warning	TAPI connection with login <user ID> from <IP address> denied access to extension <Extension DN>.	A user's remote TSP configuration tried to get ownership access to an extension the user does not own.	Contact the user and help him or her correct the client configuration.
239	Error	Attempting to connect to switch at IP address <IP address> with incorrect product type: Expected product type: <Product Type ID> Actual product type: <Product Type ID>. Configuration database includes incorrect product type for the switch at this IP address.	The switch at an IP address does not correspond to the switch type identified in the configuration database.	Edit the switch configuration information to reflect the correct data. Correct the IP address, or delete the switch, and create a new switch configured with the correct switch type.
241	Error	The Call Accounting Service returned the following error (<Error code>, Source = <ShoreTel component that returned error>): <Message description>.	TMS received an error code from the call accounting service in response to logged data.	Contact ShoreTel Technical Support and be prepared to provide server logs from the day of the occurrence. Note: This error is sometimes the result of a "false positive" and may not indicate serious problems.

Table 55: Event codes: TMS (Continued)

ID	Severity Levels	Message	Cause	Action
243	Warning	TAPI request thread timed out after <number of seconds> seconds for context <context handle ID> performing request type <request type ID>.	TMS is not responding to internal messages in a timely fashion.	This event can precede a significant failure in TMS. Contact ShoreTel Technical Support and be prepared to provide server logs from the day of the occurrence.
244	Warning	<Connection type user or App Server> TAPI connection attempt for login <user ID> from <IP address> failed. Invalid <LoginID>.	A TAPI connection request was denied due to an invalid login or password.	Contact the user and assist him or her with login information.
246	Information	Telephony Management Service logged an informational debug message. The debug message contents are:<Message>	A logic assertion within TMS failed.	No action, unless the event is accompanied by system failures. If system failures are occurring, contact ShoreTel Technical Support.
247	Information	The log file <log file name> current size is <log file size> bytes. It exceeded its maximum size limit of <max log size> bytes. Further logging is suspended.	The log file cannot write new events because it reached its maximum size.	This event typically results from a configuration that creates an event loop. Review all configured call handling modes for loops. Example: UserA forwards calls to userB, who in turn is forwarding all calls to userA. If no logic fault is found, contact ShoreTel Technical Support.

Table 55: Event codes: TMS (Continued)

ID	Severity Levels	Message	Cause	Action
248	Information	Failed to write to the log file <log file name> (Error Code – <error code>). Further logging is suspended until midnight or service restart. The ShoreTel log files collect diagnostics and are not required for correct system behavior.	TMS failed to write to a log files. (The embedded error code identifies the cause of the write failure.)	No action. Log files are not essential for telephony operations. If the problem persists, contact ShoreTel Technical Support.
249	Information	Failed to write to the log file <log file name> because another process locked a portion of the file.	A write to the log file failed because the file was locked by another process.	This event can occur during normal backups of system log files. Local administrators can choose to suspend logging activity during scheduled backups.
251	Information	<Connection type user or App Server> TAPI connection did not give NEWCALL event (CallID – <Call ID>, Login: <user ID>, From: <IP address>). This may indicate a TAPI connectivity outage between the ShoreTel server and Telephony Management Service on the machine specified.	When TMS notified a remote TSP of a new call, the remote TSP failed to accept or acknowledge that notification.	No action. If the event is accompanied by unusual client behavior, report the error to ShoreTel Technical Support.

Table 55: Event codes: TMS (Continued)

ID	Severity Levels	Message	Cause	Action
252	Information	A time change of %1 was detected in the system clock.	The system clock was changed.	No action. Changing the system clock can result in inaccurate call timers for applications and skew call detail reporting records. A system clock adjustment only affects calls in progress at the time of the change.
253	Error	Detected rogue IP Phone Call Agent that established a control connection with an IP Phone. IP Phone Details: IP Address:<IP address> MAC Address:<MAC Address> Call Agent Details:<Call Agent Details> Config'd Agent:<Configured Agent> Rogue Agent:<Rogue Agent>.	This error can occur when a Call Agent switch is replaced and the previous switch is still on-line, or if an IP phone is moved from one ShoreTel IP Phone System to another. This error can cause the IP phone to exhibit unexpected behavior.	Reconfigure the IP phone from the rogue Call Agent or take the rogue agent off-line. Typically this event occurs when two call agents attempt to control the same IP phone.
255	Warning	The configuration database does not list this server as a configured ShoreTel server. The TMS (Telephony Management Services) on this system remains in standby and is not fully available while this condition is present. Check the ShoreTel Director configuration of servers for correctness.	This server is not configured in ShoreTel Director as one of the ShoreTel servers; or IP addresses on this server do not match any of the configured IP addresses for servers in ShoreTel Director.	The administrator must configure this server correctly in ShoreTel Director and ensure that a correct IP address is given.

Table 55: Event codes: TMS (Continued)

ID	Severity Levels	Message	Cause	Action
256	Warning	This server is configured with `Loopback` IP address. This may prevent other servers from reaching this server. Configure with proper IP address for this server.	ShoreTel servers cannot be configured with `loopback` IP addresses.	The administrator must configure this server correctly in ShoreTel Director and ensure that the correct IP address is given.
257	Error	Telephony Management Service (TMS) was unable to connect to or access the configuration database on the computer. Ensure that network connectivity exists between this computer and the configuration database, and that the database services are operational on the main server. TMS on this system remains in standby and is not fully available while this condition is present. Check the ShoreTel Director configuration of servers for correctness. (Error code – <Error code>).	This server is unable to connect to the ShoreTel database on the Headquarters server.	The administrator must ensure there is network connectivity between this server and headquarters server. If the network connection is present and this condition persists, contact ShoreTel Technical Support.
258	Error	The main ShoreTel server is configured in the configuration database with `loopback` IP address 127.0.0.1. Ensure that proper IP address is configured for the main ShoreTel server. The TMS (Telephony Management Service) remains in standby and is not fully available while this condition is present. Check the ShoreTel Director configuration of servers for correctness.	The main Headquarters server is configured with a `loopback` IP address.	The administrator must provide the correct IP address of the Headquarters server.

Table 55: Event codes: TMS (Continued)

ID	Severity Levels	Message	Cause	Action
259	Information	The ShoreTel Telephony Management Service is reinitializing because new configuration changes have occurred. <Version of ShoreTel Server>	When an administrator changes the IP address of a remote server, the ShoreTel Telephony Management Service on that remote server is reinitialized with the new IP address. This event indicates the start of the initialization process.	No action needed.
260	Information	The ShoreTel Telephony Management Service is reinitialized with the new configuration changes. <Version of ShoreTel Server>	When the administrator changes the IP address of a remote server, The ShoreTel Telephony Management Service on that remote server is reinitialized with the new IP address. This event indicates end of the reinitialization process.	No action needed.

Table 55: Event codes: TMS (Continued)

ID	Severity Levels	Message	Cause	Action
261	Warning	This ShoreTel Server is deleted from the configuration database. The server was deleted permanently or configuration changes were made to this server that caused it to be deleted and added again. TMS (Telephony Management Service) on this server is reinitialized and remains in standby until the server is added again.	The ShoreTel Telephony Management Service is reinitialized if configuration changes caused this server to be deleted and added again, or the service remains in standby if this server is deleted.	If administrator made the configuration changes that caused server to be deleted and added again, check the Quicklook page in ShoreTel Director to see if all the services are running correctly. If not, contact ShoreTel Technical Support.
262	Error	Configured IP address for this ShoreTel server changed in the configuration database. TMS (Telephony Management Service) needs to bind to new IP address and needs to be reinitialized with the new IP address.	The IP address configured for this ShoreTel server changed in configuration database and ShoreTel Telephony Management service is reinitialized with the new IP address.	Check whether all the services are reinitialized correctly after the IP address is changed. Check the Quicklook page in ShoreTel Director to see if all the services are running correctly. If not, contact ShoreTel Technical Support.

Voice Mail Port Manager

Table 56 lists and describes event codes for voice mail.

Table 56: Event Codes: Voice Mail Port Manager

ID	Severity Level	Message	Cause	Action
401	Information	Voice Mail Port Manager starting.Version: <version number>.	Voice Mail Port Manager service started.	No action.
402	Information	Voice Mail Port Manager stopping.	Voice Mail Port Manager service stopped. This error usually results from an intentional service stoppage, stoppage by a dependant service, or application failure.	No action if the service was intentionally stopped by a user. Otherwise, check the event log for related errors and correct them. If necessary, restart the service.
410	Information	Recording stopped. The disk got full during recording.	A message was not completely recorded. The hard drive on which \shoreline data\vms resides is full.	Free up space on the drive.
411	Information	Recording stopped. The caller went silent during recording.	The person leaving a voice message was silent for more than 30 seconds, triggering automatic termination of the recording. The message is still sent so no action is required.	No action. The recipient is still able to retrieve the partial message.
412	Information	Recording stopped. No response from the switch.	The recording of a message halted when the connection to the switch dropped.	Check the event log and correct any errors related to the dropped connection.
414	Error	The outbound AMIS phone number %1 for System ID %2 was a wrong number. No more attempts are made to this system/number until it is corrected. Verify that the number is correct.		Verify that the phone number is correct.

Table 56: Event Codes: Voice Mail Port Manager (Continued)

ID	Severity Level	Message	Cause	Action
415	Error	The outbound AMIS phone number for System ID %1 was not found. Verify that the System ID includes a phone number associated with it.		Verify that the System ID includes a phone number associated with it.
416	Error	An internal error occurred. The system was unable to delete an AMIS message from the outbound message queue. System ID%1 mail box ID %2 Message ID %3		
417	Error	The undeliverable AMIS message from %2 was not able to be delivered to %3 for AMIS System ID %1. The message is being deleted.		
418	Error	An error occurred during the delivery of an AMIS message from %2 to %3 for AMIS System ID %1, which prevents retrying delivery at a later time. The message is missing.		
419	Error	An error occurred during the delivery of an AMIS message from %2 to %3 (AMIS System ID:mail box), and the system tried %1 times to deliver this message. The message is returned to the sender and deleted from the outbound queue.		
420	Error	An internal error occurred communicating between the Port Manager and another server. The error code was %1.		

Table 56: Event Codes: Voice Mail Port Manager (Continued)

ID	Severity Level	Message	Cause	Action
421	Error	Number of delivery attempts (%2) to AMIS System ID %1 exceeded. Verify that the number is correct.		
1001	Information	Voice Mail Message Server starting. Version: <version number>	Voice Mail Message Server service started.	No action.
1002	Information	Voice Mail Message Server stopping.	Voice Mail message service stopped. This error usually results from an intentional service stoppage, stoppage by a dependant service, or application failure.	No action if the service was intentionally stopped by a user. Otherwise, check the event log for related errors and correct them. If necessary, restart the service.
1003	Information	Voice Mail disk usage reached maximum capacity.	A message was not completely recorded. The hard drive on which \shoreline data\vms resides is full.	Take necessary action to free up space on the hard disk.
1004	Information	No available message stores in Voice Mail.	The voice mail system cannot locate message storage directory \shoreline data\vms on the ShoreTel server.	Verify that the hard drive or drive partition where \shoreline data\vms resides is operating properly. Correct any disk problems and restart the server. If event persists, call ShoreTel Technical Support.
1005	Information	Voice Mail disk usage is greater than 90 percent.	The hard drive on which the message storage directory \shoreline data\vms resides is nearly full. When no disk space remains, Voice Mail is unable to store new messages. This error appears once each day when the system disk is more than 90% full.	Free up disk space on the hard drive where \shoreline data\vms resides.

Table 56: Event Codes: Voice Mail Port Manager (Continued)

ID	Severity Level	Message	Cause	Action
1006	Information	Error writing mail box file to disk.	The Voice Mail system failed to a mailbox.dat file on the disk where the message storage directory \shoreline data\vms resides.	The write failure can result from corrupted data or a Windows NT error. Verify that the hard drive or drive partition where \shoreline data\vms resides is operating properly. Correct any disk problems and restart the server.
1007	Information	Error, disk got full when writing mail box <mail box number>.	The hard drive on which the message storage directory \shoreline data\vms resides is full. The mail box a user attempted to create was not added.	Free up disk space on the hard drive where \shoreline data\vms resides.
1009	Information	Failed to get <registry string> from registry	Unable to open required entry in the registry.	This may indicate an installation problem. Contact ShoreTel Technical Support and be prepared to provide the voice mail log files for further analysis.
1011	Information	Voice Mail Message Server was unable to open message <file name> Error <ShoreTel specific error>.	The Voice Mail server was unable to retrieve a message because it was unable to read the disk.	Verify that the hard drive or drive partition where \shoreline data\vms resides is operating properly. Correct any disk problems and restart the server. If the error persists, contact ShoreTel Technical Support and be prepared to provide the voice mail log files for further analysis.
1014	Information	Failed to attach message <file name> to mail box <mail box ID> Error <ShoreTel specific error>.	Error resulted from a failure with a specific mail box.	This event results from a full mail box included in a distribution list (or any other general failure related to a mail box). Verify that the mail box is full. If not, contact ShoreTel Technical Support and be prepared to provide the voice mail log files for further analysis.

Table 56: Event Codes: Voice Mail Port Manager (Continued)

ID	Severity Level	Message	Cause	Action
1015	Error	All Voice Mail Message Server threads in use.	The mail server cannot access resources.	This event corresponds to a logged NT event indicating serious problems that can prevent clients from retrieving voice mail. Contact ShoreTel Technical Support and be prepared to provide the voice mail log files for further analysis.
1016	Error	The system failed to send voice message <file name>.	The Voice Mail server failed to add a message to a user mail box.	The probable cause is corrupted mail box data. Verify that the mail box is functioning properly. If not, contact ShoreTel Technical Support and be prepared to provide the voice mail log files for further analysis.
1018	Error	The SMTP server used by voice mail is not sending messages.	The SMTP server is not forwarding stored messages on to recipients.	Verify that the SMTP server is down or that its address is set up incorrectly
1019	Error	Voice message sent to voice mail server <file name> returned.	Message sent to a remote server returned.	Contact ShoreTel Technical Support and be prepared to provide the voice mail log files for further analysis.
1020	Error	Failed to find entry in database for voice mail server.	A Voice Mail server looks up its own address in the database. The event indicates that the server was unable to locate a database record that matched its server name and/or IP address.	The probable cause is incorrect server information or incorrect IP address in the database. Edit the database record to include the correct data.
1101	Information	Voice Mail Application starting. Version: <version number>.	Voice Mail Application service started.	No action.
1102	Information	Voice Mail Application stopping.	Voice Mail Application service stopped. This error usually results from an intentional service stoppage, stoppage by a dependant service, or application failure.	No action if the service was intentionally stopped by a user. Otherwise, check the event log for event watch errors and correct them. If necessary, restart the service.

Table 56: Event Codes: Voice Mail Port Manager (Continued)

ID	Severity Level	Message	Cause	Action
1109	Information	Unable to create message <message number> Error <error number>.	The system was unable to write to the mailbox.dat file on the disk where the message directory \shoreline data\vms resides.	A write failure is usually the result of corrupted data or a Windows NT error. Verify that the hard drive or drive partition where \shoreline data\vms resides is operating properly. Correct any disk problems and restart the server.
1110	Information	Voice Mail disk usage reached maximum capacity.	The hard disk drive or disk partition where the message directory \shoreline data\vms resides is full. Voice mail is unable to accept any new messages until disk space is made available.	Free up disk space on the drive where \shoreline data\vms resides.
1111	Information	Removed <file name> millisecond message. Messages from callers must be at least <configured limit> milliseconds to send.	The message was too short to retain. Error is no longer logged.	
1112	Information	Message notification was unable to open phrase libraries.<file name> Error <error number>.	The voice mail system was unable to locate system prompts. The hard disk drive or disk partition where the message directory \shoreline data\vms resides is unavailable, was intentionally removed from the system, or is corrupted.	Verify that the hard drive or drive partition where \shoreline data\vms resides is operating properly. Correct any disk problems and restart the server.
1113	Information	There have been too many invalid logon attempts for mail box <mail box number>.	An attempt to log into this mail box failed. While this event can indicate an unauthorized user, it most often results from a forgotten (or mistyped) password.	No action.

Table 56: Event Codes: Voice Mail Port Manager (Continued)

ID	Severity Level	Message	Cause	Action
1114	Information	Listen unheard was unable to open message <message number>.	The server was unable to locate the indicated message number. The hard disk drive or disk partition where the message directory \shoreline data\vms resides is unavailable or someone intentionally removed the message file from the system.	Verify that the hard drive or drive partition where \shoreline data\vms resides is operating properly. Correct any disk problems and restart the server.
1115	Information	Listen saved was unable to open message <message number>.	The server was unable to locate the indicated message number. The hard disk drive or disk partition where the message directory \shoreline data\vms resides is unavailable or someone intentionally removed the message file from the system.	Verify that the hard drive or drive partition where \shoreline data\vms resides is operating properly. Correct any disk problems and restart the server.
1116	Information	Listen deleted was unable to open message <message number>.	The server was unable to locate the indicated message number. The hard disk drive or disk partition where the message directory \shoreline data\vms resides is unavailable or someone intentionally removed the message file from the system.	Verify that the hard drive or drive partition where \shoreline data\vms resides is operating properly. Correct any disk problems and restart the server.
1119	Error	Voice Mail Application determined that the Voice Mail Message Server is down.	Sending of voice messages failed.	Restart mail server.

Media Driver

Table 57 lists and describes event codes for the ShoreTel Media Driver.

Table 57: Event Codes: Media Driver

ID	Severity Level	Message	Cause	Action
2100	Information	ShoreTel Media Driver started.Version: <Version Number>.	ShoreTel Media Driver started.	No action.
2101	Information	ShoreTel Media Driver stopped.	ShoreTel Media Driver stopped.	No action.
2102	Error	ShoreTel Media Driver failed to start. <Message>.	The ShoreTel Media Driver failed to start.	Contact ShoreTel Technical Support and be prepared to provide the NT system, and NT application log files for further analysis.
2103	Error	Failed to allocate non-paged pool memory. <Message>	The ShoreTel Media driver was unable to allocate non-paged pool memory. This failure can result in an inability to deliver media to IVR applications, and/or force a system restart with a crash dump.	Perform a system restart. Contact ShoreTel Technical Support and be prepared to provide the NT system application log files for further analysis.
2104	Information	Poor audio timer resolution. <Message>	The ShoreTel Media driver's internal timer detected an inaccuracy that was corrected.	No action. The event can indicate the occurrence of a voice-quality event that caused the driver to reset its internal timer.
2105	Error	Unable to map application buffer into kernal memory space. <Message>	The ShoreTel Media driver was unable to translate a user buffer to system memory. This failure can result in an inability to deliver media to IVR applications, and/or force a system restart with a crash dump.	If this error is appearing frequently, perform a system restart, In addition, contact ShoreTel Technical Support and be prepared to provide the NT system, and NT application log files for further analysis.
2106	Information	Recording of call was terminated due to silence. <Message>	The ShoreTel Media driver detected silence when recording a message. This may be due to incorrect behavior from one of the ShoreTel switches.	If this error is appearing frequently, perform a system restart, In addition, contact ShoreTel Technical Support and be prepared to provide the NT system, and NT application log files for further analysis.

Table 57: Event Codes: Media Driver

ID	Severity Level	Message	Cause	Action
2107	Error	ShoreTel Media Driver is unable to bind all media channels within the configured UDP port range. Either the UDP port range given is not sufficient, or some of the UDP ports are being used by other components in this system. <Configured UDP Range from registry for the Driver>	The UDP ports to be used by the Media Driver can be configured using the registry by giving the range of UDP ports. ShoreTel Driver is unable to bind to the UDP ports given in the range.	The administrator must ensure that the UDP port range configured in the registry includes at least 255 empty UDP ports, and reboot the server. Or this configuration option may be completely eliminated by removing the registry setting. This option enables the driver to choose any empty UDP port.
2108	Error	ShoreTel Media Driver is configured with invalid UDP port range. <Configured UDP Range from registry for the Driver>	The UDP ports to be used by the Media Driver can be configured using the registry by giving the range of UDP ports. The driver is configured with an invalid UDP port range.	The administrator must ensure that the UDP port range configured in the registry is between 1024 and 65535. After providing the correct UDP port range, the system must be rebooted.
2109	Warning	ShoreTel Media Driver encountered an assertion statement that failed. In some cases an assertion failure may precede a more significant problem. The assertion statement details follow. <Message description>	A logic assertion in ShoreTel Media Driver failed.	If this error is appearing frequently, perform a system restart. In addition, contact ShoreTel Technical Support and be prepared to provide the NT system, and NT application log files for further analysis.

Event Watch

Table 58 lists and describes event codes for event watch.

Table 58: Event Codes: Event Watch

ID	Severity Level	Message	Cause	Action
1200	Information	Event Watch service successfully started.		No action.
1201	Information	Event Watch service successfully stopped.		No action.

System Management Interface

Table 59 lists and describes event codes for the system management interface.

Table 59: Event codes: System Management Interface

ID	Severity Level	Message	Cause	Action
900	Information	User <user name> successfully logged in.	Specified user logged into ShoreTel Director. A user history is maintained for auditing purposes.	No action.
901	Information	User <user name> failed to log in.	The specified user unsuccessfully attempted to log into ShoreTel Director. A user history is maintained for auditing purposes.	No action. (Monitor if the event persists.) While this event may indicate an unauthorized user is trying to access ShoreTel Director, it most often results from a forgotten (or mistyped) password.

Port Mapper

Table 60 lists and describes event codes for port mapper.

Table 60: Event Codes: Port Mapper

ID	Severity Level	Message	Cause	Action
700	Information	<ShoreTel-PortMap> service starting. Version: <version number>	Port Mapper service started.	No action.

Table 60: Event Codes: Port Mapper (Continued)

ID	Severity Level	Message	Cause	Action
701	Information	<ShoreTel-PortMap> service stopping.	Port Mapper service stopped.	No action.
702	Error	Can't bind <protocol type> socket; port <port number> in use.	The preferred port for the RPC Portmapper (111) is already in use. Another network application or service is probably running on that system. While the port remains unavailable, no communication is possible between TMS and the switches.	Notify ShoreTel Technical Support, and be prepared to provide server log files.

Trigger Server

Table 61 lists and describes event codes for trigger server.

Table 61: Event Code: Trigger Server

ID	Severity Level	Message	Cause	Action
800	Information	<Service name> service starting. Version: <Software version number>.	Trigger Server started.	No action.
801	Information	<Service name> service stopping.	Trigger Server stopped.	No action.

Table 61: Event Code: Trigger Server

ID	Severity Level	Message	Cause	Action
805	Error	The notification server lost connectivity with a notification client. This may indicate a network outage or unexpected client behavior. Client: <name of affected service> Status: <error code>.	Usually indicates that one of the ShoreTel services crashed without properly closing its connection.	No action, when related to a service failure. In other instances, check for network outages.
806	Error	The notification server lost connectivity with the master notification server. This may indicate a network outage or unexpected behavior from the master notification server.	The connection between a Distributed Voice Mail Server and the HQ Server failed.	No action, when related to a network outage or other administrative action. In the problem persists, collect log files from affected servers and contact ShoreTel Technical Support.

Distributed Routing Service (DRS)

Table 62 lists and describes event codes for DRS.

Table 62: Event Codes: Distributed Routing Service (DRS)

ID	Severity level	Message	Cause	Action
3100	Information	The Distributed Routing Service (Version %1) started successfully.	The specified version of DRS started.	No action.
3101	Information	The Distributed Routing Service stopped.	DRS stopped.	No action.
3108	Information	The Distributed Routing Service reconnected to this switch: %n%1	DRS re-established communications with the specified switch.	No action.
3109	Information	The Distributed Routing Service failed to connect to this switch: %n%1	Network connectivity may be lost to the specified switch, or the switch may be down.	Fix network connectivity issues, and confirm that the switch is up.

Kadota Utility

Table 63 lists and describes event codes for Kadota utility.

Table 63: Event Codes: Kadota Utility

ID	Severity level	Message	Cause	Action
1400	Information	<ShoreTel-KadotaUtil> service starting. Version: <version number>	Specified version of Kadota Utility started.	No action.
1401	Information	<ShoreTel-KadotaUtil> service stopping.	Kadota Utility stopped.	No action.

Call Accounting

Table 64 lists and describes event codes for call accounting.

Table 64: Event Codes: Call Accounting

ID	Severity level	Message	Cause	Action
2000	Warning	TmsCdr records an attempt to archive an entry from table <table name> of <database name> to that of <archive name> with a duplicate <duplicate ID> primary key. It might be caused by a manual manipulation between CDR.mdb and its backup version.	During archiving, the call accounting service encountered a duplicate key value in a table. A duplicate value usually means the item was already archived. Results from renaming or moving the CDR database file without also renaming or moving the CDR archive database files.	Remove or replace the CDR archive database files.
2008	Information	ShoreTel-CDR service <starting or stopping>	Used to record service start/stop events.	No action.

Workgroup Server

Table 65 lists and describes event codes for workgroup server.

Table 65: Event Codes: Workgroup Server

ID	Severity level	Message	Cause	Action
1600	Information	WorkgroupServer Started.	Workgroup server started.	No action.
1604	Information	WorkgroupServer Stopping.	The workgroup server is stopping.	No action if server was stopped intentionally. Otherwise, review the WG*.log and SC*.log to identify reason for stoppage.

CSIS

Table 66 lists and describes event codes for CSIS.

Table 66: Event Codes: CSIS

ID	Severity Level	Message	Cause	Action
1898	Information	CSIS Web Services starting.		No action.
1899	Error	CSIS Web Services failed to start (<error code>).	CSIS Web services failed to start. (The embedded error code is a Microsoft error code.)	Contact ShoreTel Technical Support and be prepared to provide the CSIS log for review.
2400	Information	CSIS Web Services stopping.	CSIS Web services are stopping. (Occurs when web services are stopped.)	No action.

Table 66: Event Codes: CSIS (Continued)

ID	Severity Level	Message	Cause	Action
2401	Error	CSIS Web Services contained an error (<error code>).	CSIS Web services experienced a non-fatal error. (The embedded error code is a CSIS or Microsoft error code.)	Contact ShoreTel Technical Support and be prepared to provide the CSIS log for review.
2402	Information	User <username> at Workstation <workstation name> authenticated.	The specified user is authenticated for CSIS server access.	No action.
2403	Information	User <username> at Workstation <workstation name> authentication revoked <reason>.	The specified user is no longer authorized for CSIS server access. Causes include client logout, or an inactive connection as the result of a client going offline without logging out.	No action.
2405	Information	CSIS Web Services execution enabled.	CSIS Service started. Client access to CSIS Services is enabled.	No action.
2406	Warning	CSIS Web Services execution disabled.	CSIS Service stopped. Client access to CSIS Services is disabled. (Web services continue to run.)	No action. The event is assigned a severity level of “warning,” because a service (CSIS) is disabled and no longer accept logins or requests. But the result is “non-destructive”; the service can be enabled at any time.

IP Phone Configuration Service (IPCS)

Table 67 lists and describes event codes for IPCS.

Table 67: Event Codes: IP Phone Configuration Service (IPCS)

ID	Severity Level	Message	Cause	Action
2700	Information	ShoreTel IPCS Server started.	IPCS Server started.	No action.
2701	Error	Handler not installed.	The service was not installed properly.	Re-install the service.
2702	Information	The ShoreTel IPCS Server Stopped.	IPCS Server stopped.	No action.
2703	Information	Bad Service Request.	The service is not running.	Re-install the service.
2704	Information	Maximum capacity for Switch ID: <*switch identifier*> reached.	The switch reached its maximum capacity of IP phones.	To support more IP phones, configure a new switch or add additional IP Ports to existing switches.
2705	Information	IP-Phone was unable to be configured. No switches are available on Site: <*site name*> The existing switch(es) have reached maximum capacity or may be temporarily down.	Switches at the destination site have reached maximum capacity of IP phones.	To support more IP phones, configure a new switch or add additional IP Ports to existing switches.
2706	Information	IP-Phone was unable to be configured. No IP Phone switches are configured on Site: <*site name*>.	No switches are configured to support IP phones at the destination site.	To support more IP phones, configure a new switch, or add additional IP ports to existing switches.

Table 67: Event Codes: IP Phone Configuration Service (IPCS) (Continued)

ID	Severity Level	Message	Cause	Action
2707	Information	IP Address for IP-Phone Device: <*MAC address of phone*> is set to NULL in the configuration database.	The IP address for a “downed” IP phone is set to NULL. This usually indicates that a new IP phone appeared on the system using the same IP address as the phone that is “down.”	No action.
2708	Information	The IP-Phone Device: <*MAC address of phone*> was unable to be configured since another IP Phone device is using the same IP Address.	The IP address assigned to an IP phone is already in use by another IP phone. The new phone cannot be configured.	Troubleshoot the DHCP server to determine why it is assigning the same IP address to two different phones.

IP Phone Display Server (IPDS)

Table 68 lists and describes event codes for IPDS.

Table 68: P Phone Display Server (IPDS)

ID	Severity Level	Message	Cause	Action
2800	Information	The ShoreTel IP Phone Display Service (Version x.x.xxxx.x) started successfully.	IPDS service started.	No action.
2801	Information	The ShoreTel IP Phone Display Service stopped.	IPDS service stopped.	No action.
2802	Error	The ShoreTel IP Phone Display Service (Version x.x.xxxx.x) encountered a fatal error during startup; the service is terminated.	The IPDS service crashed upon startup. (This is a fatal condition.)	Contact ShoreTel Technical Support and be prepared to provide server logs.

Table 68: P Phone Display Server (IPDS) (Continued)

ID	Severity Level	Message	Cause	Action
2803	Warning	An unexpected service control message <Message ID as hexadecimal integer> was encountered.	The Win32 Service Control Manager reports an unexpected message. The IPDS installation was probably modified manually by the user.	Contact ShoreTel Technical Support and be prepared to provide server logs.
2804	Warning	An unexpected exception was encountered and handled. Exception description <Description here>.	An exception occurred and was handled by the logging of the error. Typically, one or more of the phones are displaying anomalies; a display update may not have been sent or a phone display is out of sync.	Contact ShoreTel Technical Support and be prepared to provide server logs. If users are experiencing problems, perform an administrative restart on the phones.
2805	Error	An unhandled exception was encountered. Exception description: <Description here>.	An exception occurred, but was not handled.	Immediately notify all IP phone users and restart IPDS to restore normal service. (Use the Send Diagnostic Message to dispatch a message to all phone displays.) Contact ShoreTel Technical Support and be prepared to provide server logs.
2806	Warning	The following warning condition was encountered in the ShoreTel IP Phone Display Service: <Warning description>.	A general error message that can indicate minor user problems. Usually the result of a non-fatal TAPI error.	Contact ShoreTel Technical Support and be prepared to provide server logs.

Table 68: P Phone Display Server (IPDS) (Continued)

ID	Severity Level	Message	Cause	Action
2807	Error	The following error condition was encountered in the ShoreTel IP Phone Display Service: <Error Description>.	A general error message that can accompany extensive user problems. Usually the result of a fatal TAPI error.	Contact ShoreTel Technical Support and be prepared to provide server logs. Perform other diagnostics at your discretion.
2808	Information	The phone display was reinitialized because of an administrative request: Extension: <Extension number>.	An administrator reset the display on the phone at the specified extension.	No action.
2809	Information	The phone display was reinitialized because of an administrative request: Port ID: <Port ID>.	An administrator reset the display on the phone configured for the specified port.	No action.
2810	Information	All phone displays were reinitialized because of an administrative request.	An administrator reset the display on all IP phones.	No action.
2811	Information	The phone display was reinitialized because of an administrative request: IP Address <IP address>.	An administrator reset the display on the phone having the specified IP address.	No action.
2812	Warning	The IP Phone Display service encountered an apparent crash in the Microsoft Telephony Service. IPDS attempts to recover from this problem. If users report anomalous behavior, stop and restart the Microsoft Telephony Service and all ShoreTel services that depend on it.	Fault in Microsoft Telephony Service; there is potential to recover automatically.	Watch for anomalous behavior. Restart the following if problems persist: TMS IPDS Workgroup All Voice Mail Services

Table 68: P Phone Display Server (IPDS) (Continued)

ID	Severity Level	Message	Cause	Action
2813	Error	The IP Phone Display service was unable to recover from an apparent crash in the Microsoft Telephony Service. Stop and restart the Microsoft Telephony Service and all ShoreTel services that depend on it.	Fault in Microsoft Telephony Service; there is no potential to recover automatically.	Restart the following if problems persist: TMS IPDS Workgroup All Voice Mail Services
2814	Warning	The following config option was set to a value that is only intended for engineering use: <option name>.	An administrator set a debug flag in the registry that was only intended for use by ShoreTel engineers.	Unset the option listed in the event message.
2815	Warning	The IP Phone display service is unable to connect to the ShoreTel database. It retries in 30 seconds. <error code that was encountered>	IPDS was unable to access the database upon startup. It tries again in 30 seconds. No action needs to be taken at this time.	Also see 2816 and 2817.
2816	Error	The IP Phone display service is unable to connect to the ShoreTel database. It continues to retry once every minute. <error code that was encountered>	This only happens 30 seconds after a 2815 error, in the event that the retry for 2815 failed. At this point, the most common cause is that the most recent installation or upgrade on the server where the even t is generated did not properly register the ShoreTel database access libraries.	If recovery is not possible (see error 2817), contact ShoreTel Technical Support.

Table 68: P Phone Display Server (IPDS) (Continued)

ID	Severity Level	Message	Cause	Action
2817	Information	The IP Phone display service's connection to the ShoreTel database recovered from the previous error.	A database retry after 2815/1816 errors was successful and the situation was recovered from.	No action.
2818	Error	The ShoreTel database is missing a table or stored procedure needed to run the following stored procedure: (name if query). This causes degraded functionality in IPDS. Ensure that the HQ server and all Remote servers are running the same version of ShoreTel software.	Database file corrupted, or a query removed or otherwise inaccessible at this time.	Call ShoreTel Technical Support.

APPENDIX B

Alerts

This chapter includes information about ShoreTel alerts. It contains the following information:

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Connection Alerts 277
Server Alerts 277
Switch Alerts 278
Trunk Group Alerts 280
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Overview of Alerts

This appendix provides a comprehensive list of ShoreTel alerts organized by category. These alerts are a valuable resource for understanding events reported by the ShoreTel system.

Alerts identify system issues by correlating events that occur in the ShoreTel system. The data for these correlations comes from the Windows event log, the Monitoring Database and an internal database that keeps track of status information on sites and switches.

Alerts are available for the following aspects of the ShoreTel system:

- Bandwidth
- Connections
- Servers
- Switches
- Trunk Groups
- Voice Quality

The tables in this appendix provide a structured view of alerts displayed in the Diagnostics & Monitoring web application. Each alert includes a severity level, ID number, description text, possible causes, suggested courses of action (if any), and whether the alert clears automatically or must be cleared manually.

For information about monitoring alerts using the Diagnostics & Monitoring system in ShoreTel Director, see the *System Administration Guide*.

Each alert is assigned a level of severity. Table 69 describes the three severity levels.

Table 69: Severity Levels of Alerts

Severity Level	Explanation
Information	Indicates normal operation, or a transition between normal operating states Typically, no action is required.
Warning	Reports an exception to normal operations that might need to be monitored
Critical	Reports a failure or an impending failure (for example, when a service or hardware component is disabled) that requires immediate response and resolution

Bandwidth Alerts

Table 70 describes the alerts related to bandwidth. Messages are listed alphabetically within each severity level.

Table 70: Bandwidth Alerts

Severity Level	Description	Cause	Action and Clearing Status
Critical	Bandwidth utilization critical threshold has been exceeded.	A site has reported a bandwidth utilization percentage above the accepted threshold. High bandwidth utilization could result from excessive network activity because of high call volume or some other cause. High bandwidth utilization could also mean that there is simply not enough network bandwidth for the site.	Monitor the (outbound) call volume and trunk utilization within the site to determine if there could be a correlation between the number of calls and the bandwidth usage. This alert clears automatically when the bandwidth utilization percentage for the site sustains a level below the critical threshold for 3 minutes. Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists.
Warning	Bandwidth utilization warning threshold has been exceeded.	A site has reported a bandwidth utilization percentage above the accepted threshold. High bandwidth utilization could result from excessive network activity because of high call volume or some other cause. High bandwidth utilization could also mean that there is simply not enough network bandwidth for the site.	Monitor the (outbound) call volume and trunk utilization within the site to determine if there could be a correlation between the number of calls and the bandwidth usage. This alert clears automatically when the bandwidth utilization percentage for the site sustains a level below the threshold for 3 minutes. Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists.
Warning	Switch is experiencing low bandwidth.	The switch has reported that it does not have sufficient bandwidth to initiate an intersite call.	Increase the amount of intersite bandwidth or decrease the amount of call traffic between the two sites that are experiencing the issue. This alert clears automatically when the bandwidth utilization percentage for the target site increases or decreases. A decrease in the percentage of bandwidth utilization represents a decrease in call traffic or an increase in configured intersite bandwidth. An increase in the percentage of bandwidth utilization indicates that an intersite call was successfully established since the alert was generated.

Connection Alerts

Table 71 lists and describes the alerts related to connections. Messages are listed alphabetically within each severity level.

Table 71: Connection Alerts

Severity Level	Description	Cause	Action and Clearing Status
Critical	Switch has lost connection to the network.	The switch's managing server cannot communicate with the switch.	Ensure that the switch is running and is connected to the network. If you manually restarted the switch, you can ignore this alert, as it was generated while the switch was restarting. This alert clears automatically after the switch is running and connected to the network. Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists.
Information	IP phones are having DHCP issues with IP addresses.	The phone is having issues related to its IP address.	Review the events associated with the alert, and take corrective action as appropriate. After correcting the switch configuration, you must clear this alert manually. Otherwise, the system deletes the alert according to the parameters set for purging and reclaiming space used for alerts in the shorewaremonitoring database. (The default is three days.) Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists.

Server Alerts

Table 72 describes the alert related to servers.

Table 72: Server Alerts

Severity Level	Description	Cause	Action and Clearing Status
Warning	TMS has detected invalid Director configurations.	The server is having issues with its current IP address, which could be due to a configuration issue.	Review the associated events and determine appropriate configuration changes. After resolving the configuration issue, you must clear the alert manually. Otherwise, the system deletes the alert according to the parameters set for purging and reclaiming space used for alerts in the shorewaremonitoring database. (The default is three days.) Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists.

Switch Alerts

Table 73 describes the alerts related to switches. Messages are listed alphabetically within each severity level.

Table 73: Switch Alerts

Severity Level	Description	Cause	Action and Clearing Status
Warning	Invalid switch configurations detected.	The switch has been configured with a characteristic that does not match what the switch is reporting.	Review the events associated to the alert, and modify the configuration of the switch as appropriate. After correcting the configuration issue, you must clear this alert manually. Otherwise, the system deletes the alert according to the parameters set for purging and reclaiming space used for alerts in the shorewaremonitoring database. (The default is three days.)
Warning	Possible switch firmware corruption.	The switch has failed in an attempt to upgrade its firmware and has resorted to an alternate booting method.	Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists. After resolving the switch issue so that the switch boots normally, you must clear this alert manually.

Table 73: Switch Alerts

Severity Level	Description	Cause	Action and Clearing Status
Warning	Switch core is operating at an unsafe temperature.	The switch is operating at a temperature level that is over the switch's threshold.	Ensure that the switch is running in a temperature-friendly environment. This alert clears automatically if the switch's temperature returns to normal. Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists.
Warning	Switch is experiencing issues with its trunks.	A trunk on the switch is experiencing unexpected behaviors.	Review the events associated with the alert. If the identified trunk is causing issues in the system, restart the switch. This alert clears automatically when the trunk re-establishes expected behavior and is back in service, or when the switch is restarted. However, if this alert was generated because you intentionally forced all ports on a switch to the "Unavailable" state, you can manually clear this alert. Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists.
Warning	Switch is experiencing issues with the fan.	The fan on the switch is having trouble running and may be too old.	The fan or switch may need to be replaced. Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists. This alert clears automatically if the fan begins running at normal speed.
Warning	Switch is experiencing issues with the power supply.	The switch is experiencing unexpected power failures.	Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists. This alert clears automatically if the voltage level of the switch returns to normal.
Warning	Switch is experiencing memory issues.	The memory on the switch may be corrupt, or an invalid memory access may have occurred.	Restart the switch. Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists. This alert clears automatically after the switch is restarted.
Warning	Switch is having firmware upgrade issues.	The switch has failed in an attempt to upgrade its firmware. This could be a result of a disconnection between the switch and its managing server.	Ensure that the managing server is connected to the network and that the managing server can communicate with the switch. Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists. This alert clears automatically when the firmware upgrade is successful.

Table 73: Switch Alerts

Severity Level	Description	Cause	Action and Clearing Status
Warning	Switches have reached maximum capacity of IP phones.	No ports allocated for IP phones are available on any of the available switches.	Reserve a port on a switch for an IP phone, or if no ports can be reserved add a switch to the system. Refer to the ShoreTel *System Administration Guide* or contact ShoreTel Technical Support for assistance. After making the necessary configuration changes (reserving a port for the phone or assigning the phone to a switch that has adequate port capacity for additional phones), you must clear this alert manually. Otherwise, the system deletes the alert according to the parameters set for purging and reclaiming space used for alerts in the shorewaremonitoring database. (The default is three days.)
Warning	The switch is not running a sufficient firmware version.	The switch is running a firmware version that is not compatible with the version of the PBX. This is typically encountered during an upgrade, because after the Headquarters server is upgraded switches require an updated firmware version.	Restart the switch to initiate a firmware upgrade. This alert clears automatically when the firmware upgrade has completed.
Warning	TMS has detected invalid switch configurations.	The switch is having issues that are related to its IP address.	Review the events associated with the alert, and take corrective action as appropriate. If necessary, contact ShoreTel Technical Support for assistance. If the switch is restarted, the alert clears automatically. Otherwise, after taking corrective action, you must clear the alert manually.

Trunk Group Alerts

Table 74 on page 281 describes the alerts related to trunk groups. Messages are listed alphabetically within each severity level.

Table 74: Trunk Group Alerts

Severity Level	Description	Cause	Action and Clearing Status
Critical	Trunk occupancy critical threshold has been exceeded.	A trunk on a switch is being used for a high volume of calls. This situation could occur for either of the following reasons: ■ An insufficient number of ports are allocated for use as trunks. ■ Outbound call volume is high.	Allocating more ports on the switch for trunk usage will more evenly distribute the trunk utilization load. Refer to the ShoreTel *System Administration Guide* for more information, or contact ShoreTel Technical Support for assistance. This alert clears automatically when the trunk utilization percentage on the switch has sustained a level below the critical threshold for 3 minutes.
Warning	Switch is experiencing issues with its trunks.	A trunk on the switch is experiencing unexpected behaviors.	Review the events associated to the alert. If the identified trunk is causing issues in the system, restart the switch. Contact ShoreTel Technical Support for further assistance. This alert clears automatically when the trunk reestablishes expected behavior and is back in service, or when the switch is restarted.
Warning	Trunk occupancy warning threshold has been exceeded.	A trunk on a switch is being used for a high volume of calls. This situation could occur for either of the following reasons: ■ An insufficient number of ports are allocated for use as trunks. ■ Outbound call volume is high.	Allocating more ports on the switch for trunk usage will more evenly distribute the trunk utilization load. Refer to the ShoreTel *System Administration Guide* for more information, or contact ShoreTel Technical Support for assistance. This alert clears automatically when the trunk utilization percentage on the switch has sustained a level below the warning threshold for 3 minutes.

Voice Quality Alerts

Table 75 on page 282 describes the alerts related to voice quality. Messages are listed alphabetically within each severity level.

Table 75: Voice Quality Alerts

Severity Level	Description	Cause	Action and Clearing Status
Critical	Call quality critical threshold has been exceeded.	A stream within a call occurring over a switch has been identified as having poor voice quality (“bad call”).	Monitor the calls on the switch and any alerts from the same switch that could be related. If the issue consistently occurs or a possible issue is identified, collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists. Assuming that no “bad” calls occur over the switch, this alert clears automatically 3 minutes after a “good” call occurs. (A “good” call is one in which all streams of the call are identified as having good voice quality.)
Warning	Call Quality warning threshold has been exceeded.	A stream within a call occurring over a switch has been identified as having poor voice quality (“bad call”).	Monitor the calls on the switch and identify any alerts from the same switch that could be related. If the issue occurs consistently or a possible issue is identified, collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists. Assuming that no “bad” calls occur over the switch, this alert clears automatically 3 minutes after a “good” call occurs. (A “good” call is one in which all streams of the call are identified as having good voice quality.)
Warning	Switch DSP is reaching its limit.	The switch has reported that its digital signal process is experiencing issues.	Restart the switch. Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists. This alert clears when the switch is restarted.
Warning	Switch is experiencing issues with echo cancellation.	The switch has reported that its echo-suppression software is experiencing issues.	Restart the switch. Collect all necessary logs and screen shots before contacting the ShoreTel Technical Support for further assistance if the problem persists. This alert clears automatically when the switch reports that its echo-suppression software has been corrected or when the switch is restarted.

APPENDIX C

DCOM Permissions

This chapter contains an overview of DCOM permissions in the following sections:

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Editing DCOM Permissions 284
- My Computer Properties 284
- TriggerServer Properties 285
- Kadota Utilities properties 286
- TMSManager2 properties 287
- ZinManager Properties 287

Overview

ShoreTel systems have one HQ server and multiple remote servers. Applications running on remote servers access data service components residing on the HQ server through DCOM. DCOM permissions are configured by the Installer when the servers are installed and by the SP1Repair command line utility.

The following service logon accounts are available in Windows:

- Local System account: This account includes full system access, including the directory service on domain controllers. Services logged onto the Local System account on domain controllers can access the entire domain. Some services log onto the Local System account by default. Do not change default service settings.
- Local Service account: This account is similar to authenticated user accounts. Services logged onto the Local Service account have the same access rights as members of the Users group and access network resources as null sessions with no credentials.
- Network Service account: This account is similar to authenticated user accounts. Services logged onto this account have the same access rights as members of the Users group and access network resources through the credentials of the computer account.

Editing DCOM Permissions

DCOM permissions are modified on the HQ system through user interface actions listed in the following sections.

My Computer Properties

1. Open the My Computer Properties panel by selecting **MMC > Component Services > Computers > My Computer > Properties**.
2. Open the Default Properties panel, and select **Enable DCOM**.
3. Open the COM Security panel.
   a. Click **Edit Default** in the Access Permissions section.

      Select the following permissions, as shown in:

      - SELF: Local Access – allow; Remote Access – allow
      - SYSTEM: Local Access – allow; Remote Access – no selection.

      Return to the My Computer Properties window by clicking **OK**.

   b. Click **Edit Default** in the Launch and Activation Permissions section.

Select the following permissions:

- Administrators: Local Launch – allow; Remote Launch – allow
  Local Activation – allow; Remote Activation – allow
- INTERACTIVE: Local Launch – allow; Remote Launch – allow
  Local Activation – allow; Remote Activation – allow
- SYSTEM: Local Launch – allow; Remote Launch – allow
  Local Activation – allow; Remote Activation – allow

TriggerServer Properties

1. Open the TriggerServer Properties window by selecting **MMC > Component Services > Computers > My Computer > DCOM Config > Trigger Server > Properties**.
2. Open the General panel, and set **Authentication level to Default**.
3. Open the **Location** panel, and select **Run application on this computer**.
4. Open the Security panel.
   a. Click **Edit** in the Launch and Activation Permissions section.

      Select the following permissions.

      - Administrators: Local Launch – allow; Remote Launch – allow
        Local Activation – allow; Remote Activation – allow
      - ANONYMOUS LOGON: Local Launch – no selection; Remote Launch – no selection;
        Local Activation – allow; Remote Activation – allow
      - SYSTEM: Local Launch – allow; Remote Launch – allow
        Local Activation – allow; Remote Activation – allow

      Return to the TriggerServer Properties: Security panel by clicking **OK**.

   b. Click **Edit** in the Configuration Permissions section.

      Select the following permissions, as shown in:

      - Administrators: Full Control – allow; Read – allow
      - SYSTEM GROUP: Full Control – allow; Read – allow
      - CREATOR OWNER: Full Control – no selection; Read – no selection
      - other Users: Full Control – no selection; Read – allow

      Return to the TriggerServer Properties window by clicking **OK**.
5. Open the Identity panel.

   Select **The system account (services only)**.

Kadota Utilities properties

1. Open the KadotaUtil Properties window by selecting **MMC > Component Services > Computers > My Computer > DCOM Config > KadotaUtil**.
2. Open the General panel, and set **Authentication level to Default**.
3. Open the Location panel, and select **Run application on this computer**.
4. Open the Security panel.
   a. Click **Edit** in the Launch and Activation Permissions section.

      Select the following permissions:

      - Administrators: Local Launch – allow; Remote Launch – allow
        Local Activation – allow; Remote Activation – allow
      - Internal Guest Account: Local Launch – allow; Remote Launch – allow
        Local Activation – allow; Remote Activation – allow
      - SYSTEM: Local Launch – no selection; Remote Launch – no selection
        Local Activation – allow; Remote Activation – allow.

      Return to the KadotaUtil Properties: Security window by clicking **OK**.

   b. Click **Edit** in the Configuration Permissions section.

      Select the following permissions:

      - Administrators group: Full Control – allow; Read – allow
      - CREATOR OWNER: Full Control – no selection; Read – no selection
      - SYSTEM GROUP: Full Control – allow; Read – allow
      - other User Groups: Full Control – no selection; Read – allow

      Return to the KadotaUtil Properties window by clicking **OK**.
5. Open the Identity panel.
   c. Select **The system account (services only)**.
   d. Select the following permissions:

      - Administrators group: Full Control – allow; Read – allow
      - CREATOR OWNER: Full Control – no selection; Read – no selection
      - SYSTEM GROUP: Full Control – allow; Read – allow
      - other User Groups: Full Control – no selection; Read – allow

Return to the KadotaUtil Properties window by clicking **OK**.

6. Open the Identity panel, and select **The system account (services only)**.

TMSManager2 properties

1. Open the TMSManager2 Properties window by selecting **MMC > Component Services > Computers > My Computer > DCOM Config > TMSManager2 > Properties**.
2. Open the General panel, and set **Authentication level** to **Default**.
3. Open the Location panel, and select **Run application on this computer**.
4. Open the Security panel, and click **Edit** in the Launch and Activation Permissions section.

   Select the following permissions:

   - Administrators: Local Launch – no selection; Remote Launch – no selection; Local Activation – allow; Remote Activation – allow
   - SYSTEM: Local Launch – no selection; Remote Launch – no selection; Local Activation – allow; Remote Activation – allow

   Return to the TMSManager2 Properties window by clicking **OK**.

   a. Click **Edit** in the Configuration Permissions section, and select the following permissions:

      - Administrators: Full Control – allow; Read – allow
      - CREATOR OWNER: Full Control – no selection; Read – no selection
      - SYSTEM GROUP: Full Control – allow; Read – allow
      - other Users: Full Control – no selection; Read – allow

   b. Return to the TMSManager2 Properties window by clicking **OK**.

   c. Open the Identity panel, and select **The system account (services only)**.

ZinManager Properties

1. Open the ZinManager Properties window by selecting **MMC > Component Services > computers > My Computer > DCOM Config > ZinManager > Properties**.
2. Open the General panel, and set **Authentication level** to **Default**.
3. Open the Location panel, and select **Run application on this computer**.
4. Open the Security panel and complete the following steps:

   a. Click **Edit** in the Launch and Activation Permissions section.

Select the following permissions:

- Administrators: Local Launch – no selection; Remote Launch – no selection; Local Activation – allow; Remote Activation – allow
- SYSTEM: Local Launch – no selection; Remote Launch – no selection; Local Activation – allow; Remote Activation – allow

Return to the ZinManager Properties window by clicking **OK**.

b. Click Edit in the Configuration Permissions section. Select the following permissions

- Administrators: Full Control – allow; Read – allow
- CREATOR OWNER: Full Control – no selection; Read – no selection
- SYSTEM: Full Control – allow; Read – allow

Return to the ZinManager Properties window by clicking **OK**.

5. Open the Identity panel, and select **The system account (services only)**.

APPENDIX D

Switch Port Pinouts

This chapter contains information about ShoreTel switch port pinouts. It contains the following information:

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Switch Models 291
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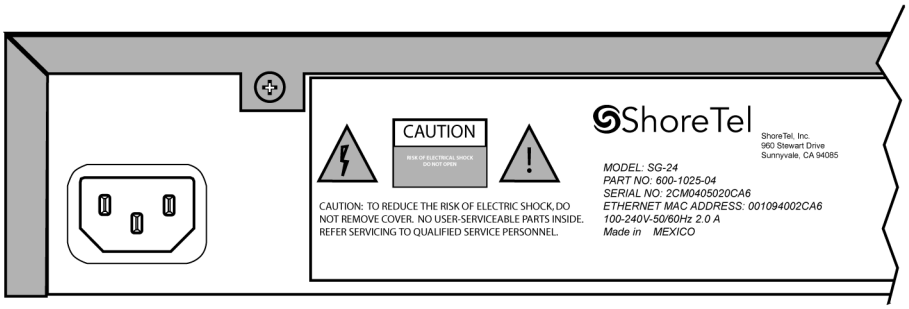
Switch Model Numbers

Switch model numbers are located on the rear panel (*Figure 17*).

Figure 17: Switch Model Number Label



Switch Models

ShoreTel Switch models are classified into four switch families, based on chassis type:

ShoreTel 1-U Half Width Voice Switches

- ShoreTel 30 (SG 30)
- ShoreTel 30BRI (SG 30BRI)
- ShoreTel 50 (SG 50)
- ShoreTel 90 (SG 90)
- ShoreTel 90BRI (SG 90BRI)
- ShoreTel 220T1 (SG 220T1)
- ShoreTel 220T1A (SG 220T1A)
- ShoreTel T1k (SG T1k)
- ShoreTel 220E1 (SG 220E1)
- ShoreTel E1k (SG E1k)

ShoreTel Voicemail-Enabled Switches

- ShoreTel 90V (SG 90V)
- ShoreTel 50V (SG 50V)
- ShoreTel 90BRIV (SG 90BRIV)

ShoreTel 1-U Full Width Voice Switches

- ShoreTel 120 (SG 120) – also referred to as ShoreTel 120/24 (SG 120/24)
- ShoreTel 60 (SG 60) – also referred to as ShoreTel 60/12 (SG 60/12)
- ShoreTel 40 (SG 48) – also referred to as ShoreTel 40/8 (SG 40/8)
- ShoreTel T1 (SG T1)
- ShoreTel E1 (SG E1)
- ShoreTel 24A (SG 24A)

ShoreTel IPBX Voice Switches

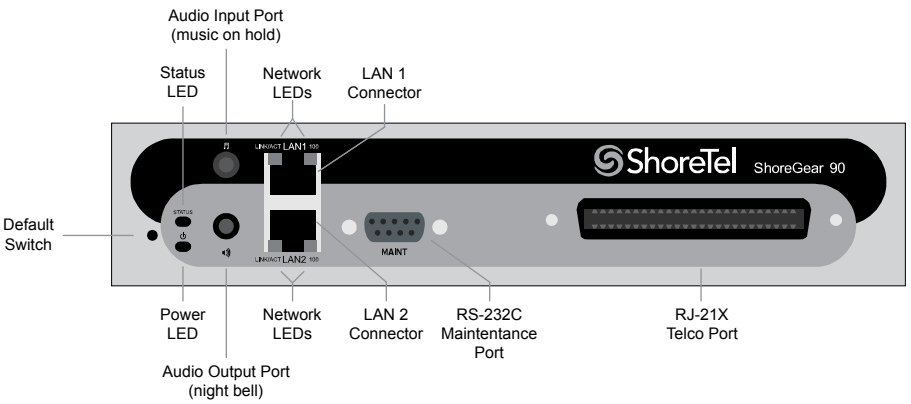
- ShoreTel 24 (IPBX 24) Voice Switch (2 RU)
- ShoreTel T1 (IPBX T1) Voice Switch (1.5 RU)
- ShoreTel E1 (IPBX E1) Voice Switch (1.5 RU)

Specifications – SG 1-U Half-Width Switches

ShoreTel 90 Voice Switch

The ShoreTel 90 (*Figure 18*) is not supported in installations outside the U.S. and Canada.

Figure 18: ShoreTel 90 Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 1-8:** Eight Loop Start Trunks
  - **Ports 9-12:** Four Extensions or DID Trunks. A single command configures all ports as either Extensions or DID trunks.

- **Power Failure Transfer Unit:** Trunk Port 1 to Extension Port 12

- **Make Me Conference Resources:** 12 ports
  - **Ports 1-12**
- **Maximum IP Phone Resources:** 90 devices
  - **Analog Port Reallocation:** 60
  - **Built-in Resources:** 30

ShoreTel 90 Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports
  - **Power Failure Transfer Unit:** Trunk Port 1 to Extension Port 12
  - **Backup Operator:** Extension Port 12

ShoreTel 90 RJ-21X Telephone and Trunk Connector

Table 76: ShoreTel 90 RJ-21X Telephone and Trunk Connector Pins

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
1	Trunk	1	Blue/White	26	White/Blue
–		2	Orange/White	27	White/Orange
2	Trunk	3	Green/White	28	White/Green
–		4	Brown/White	29	White/Brown
3	Trunk	5	Slate/White	30	White/Slate
–		6	Blue/Red	31	Red/Blue
4	Trunk	7	Orange/Red	32	Red/Orange
–		8	Green/Red	33	Red/Green
5	Trunk	9	Brown/Red	34	Red/Brown
–		10	Slate/Red	35	Red/Slate
6	Trunk	11	Blue/Black	36	Black/Blue
–		12	Orange/Black	37	Black/Orange
7	Trunk	13	Green/Black	38	Black/Green

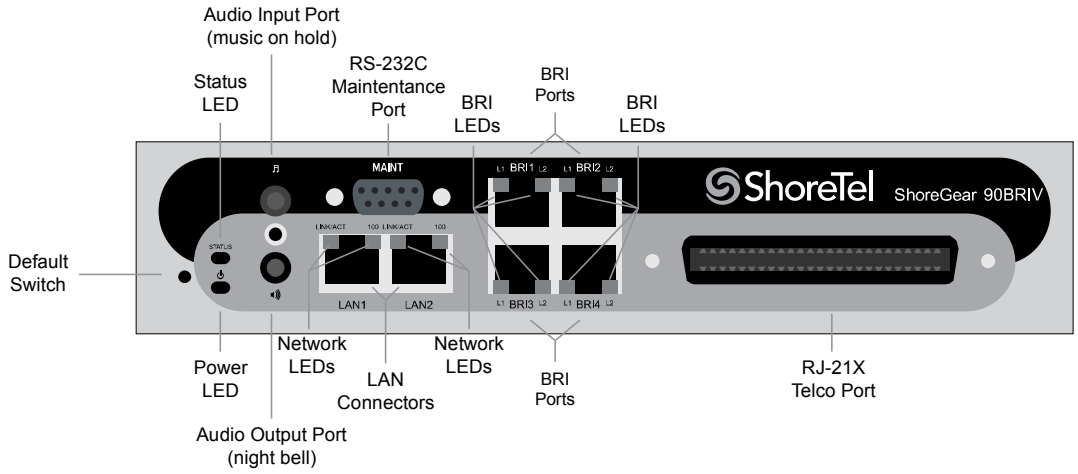
Table 76: ShoreTel 90 RJ-21X Telephone and Trunk Connector Pins(Continued)

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
–		14	Brown/Black	39	Black/Brown
8	Trunk	15	Slate/Black	40	Black/Slate
–		16	Blue/Yellow	41	Yellow/Blue
9	Extension - DID	17	Orange/Yellow	42	Yellow/Orange
–		18	Green/Yellow	43	Yellow/Green
10	Extension - DID	19	Brown/Yellow	44	Yellow/Brown
–		20	Slate/Yellow	45	Yellow/Slate
11	Extension - DID	21	Blue/Violet	46	Violet/Blue
–		22	Orange/Violet	47	Violet/Orange
12	Extension - DID	23	Green/Violet	48	Violet/Green
–		24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

ShoreTel 90BRI Voice Switch

Figure 19

Figure 19: ShoreTel 90BRI Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 9-12:** Extensions
- Digital Circuit Resources

  - **Four BRI Spans, each comprising two channels:** Eight channels maximum

- **Make Me Conference Resource:** None
- **Maximum IP Phone Resources:** 90 devices
  - **Analog Port Reallocation:** 20
  - **Digital Channel Reallocation:** 40
  - **Built-in Resources:** 30

ShoreTel 90BRI Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports
- 4 RJ-45 T1 telco port

ShoreTel 90BRI RJ-21X Telephone and Trunk Connector

Table 77: ShoreTel 90BRI RJ-21X Telephone and Trunk Connector Pins

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
–		1	Blue/White	26	White/Blue
–		2	Orange/White	27	White/Orange
–		3	Green/White	28	White/Green
–		4	Brown/White	29	White/Brown
–		5	Slate/White	30	White/Slate
–		6	Blue/Red	31	Red/Blue
–		7	Orange/Red	32	Red/Orange
–		8	Green/Red	33	Red/Green
–		9	Brown/Red	34	Red/Brown
–		10	Slate/Red	35	Red/Slate
–		11	Blue/Black	36	Black/Blue
–		12	Orange/Black	37	Black/Orange
–		13	Green/Black	38	Black/Green
–		14	Brown/Black	39	Black/Brown
–		15	Slate/Black	40	Black/Slate
–		16	Blue/Yellow	41	Yellow/Blue
9	Extension	17	Orange/Yellow	42	Yellow/Orange
–		18	Green/Yellow	43	Yellow/Green

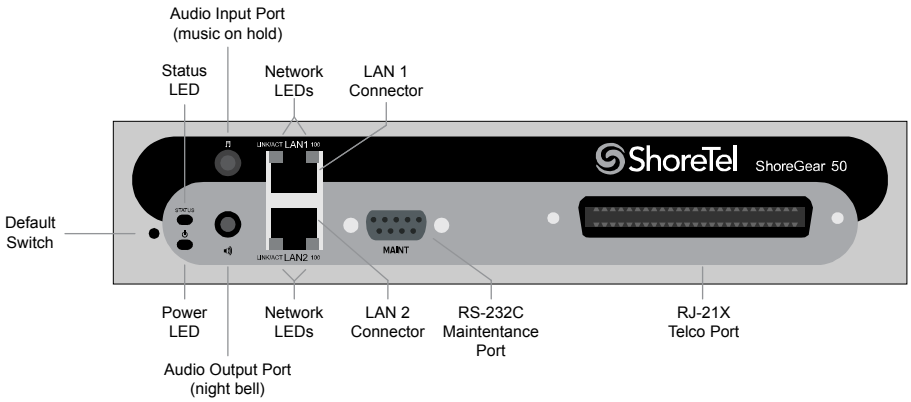
Table 77: ShoreTel 90BRI RJ-21X Telephone and Trunk Connector Pins(Continued)

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
10	Extension	19	Brown/Yellow	44	Yellow/Brown
–		20	Slate/Yellow	45	Yellow/Slate
11	Extension	21	Blue/Violet	46	Violet/Blue
–		22	Orange/Violet	47	Violet/Orange
12	Extension	23	Green/Violet	48	Violet/Green
–		24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

ShoreTel 50 Voice Switch

The ShoreTel 50 (*Figure 20*) is not supported in installations outside the U.S. and Canada.

Figure 20: ShoreTel 50 Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 1-4:** Four Loop Start Trunks
  - **Ports 11-12:** Two Extensions or DID Trunks. A single command configures all ports as either Extensions or DID trunks.
  - **Power Failure Transfer Unit:** Trunk Port 1 to Extension Port 12
- **Make Me Conference Resources:** six ports
  - **Ports 1-4, 11-12**
- **Maximum IP Phone Resources:** 50 devices

- **Analog Port Reallocation:** 30
- **Built-in Resources:** 20

ShoreTel 50 Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports
  - **Power Failure Transfer Unit:** Trunk Port 1 to Extension Port 12
  - **Backup Operator:** Extension Port 12

ShoreTel 50 RJ-21X Telephone and Trunk Connector

Table 78: ShoreTel 50 RJ-21X Telephone and Trunk Connector Pins

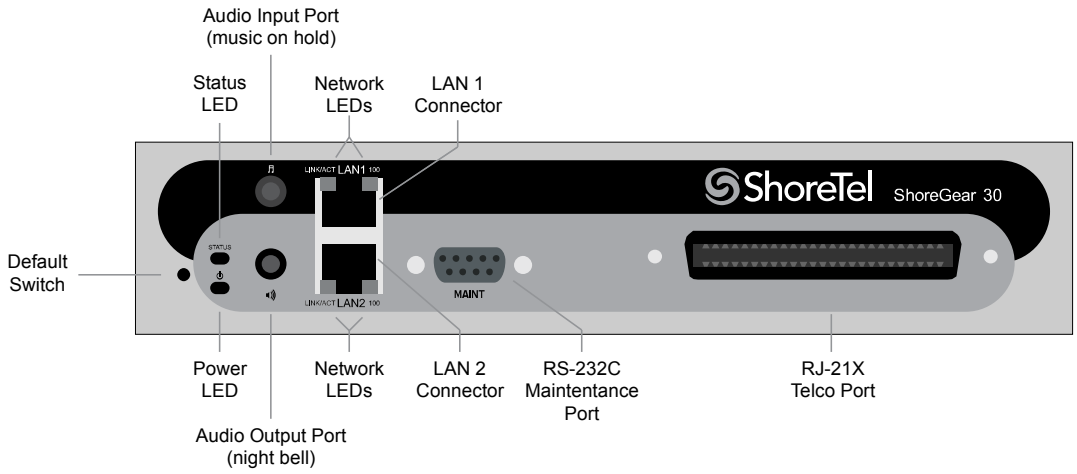
Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
1	Trunk	1	Blue/White	26	White/Blue
–		2	Orange/White	27	White/Orange
2	Trunk	3	Green/White	28	White/Green
–		4	Brown/White	29	White/Brown
3	Trunk	5	Slate/White	30	White/Slate
–		6	Blue/Red	31	Red/Blue
4	Trunk	7	Orange/Red	32	Red/Orange
–		8	Green/Red	33	Red/Green
–		9	Brown/Red	34	Red/Brown
–		10	Slate/Red	35	Red/Slate
–		11	Blue/Black	36	Black/Blue
–		12	Orange/Black	37	Black/Orange
–		13	Green/Black	38	Black/Green
–		14	Brown/Black	39	Black/Brown
–		15	Slate/Black	40	Black/Slate
–		16	Blue/Yellow	41	Yellow/Blue
–		17	Orange/Yellow	42	Yellow/Orange
–		18	Green/Yellow	43	Yellow/Green

Table 78: ShoreTel 50 RJ-21X Telephone and Trunk Connector Pins(Continued)

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
–		19	Brown/Yellow	44	Yellow/Brown
–		20	Slate/Yellow	45	Yellow/Slate
11	Extension - DID	21	Blue/Violet	46	Violet/Blue
–		22	Orange/Violet	47	Violet/Orange
12	Extension - DID	23	Green/Violet	48	Violet/Green
–		24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

ShoreTel 30 Voice Switch

Figure 21: ShoreTel 30 Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 1-2:** Two Loop Start Trunks
  - **Ports 11-12:** Two Extensions or DID Trunks. A single command configures all ports as either Extensions or DID trunks.
  - **Power Failure Transfer Unit:** Trunk Port 1 to Extension Port 12
- **Make Me Conference Resources:** none
- **Maximum IP Phone Resources:** none
  - **Analog Port Reallocation:** 20
  - **Built-in Resources:** 10

ShoreTel 30 Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports
  - **Power Failure Transfer Unit:** Trunk Port 1 to Extension Port 12
  - **Backup Operator:** Extension Port 12

ShoreTel 30 RJ-21X Telephone and Trunk Connector

Table 79: ShoreTel 30 RJ-21X Telephone and Trunk Connector Pins

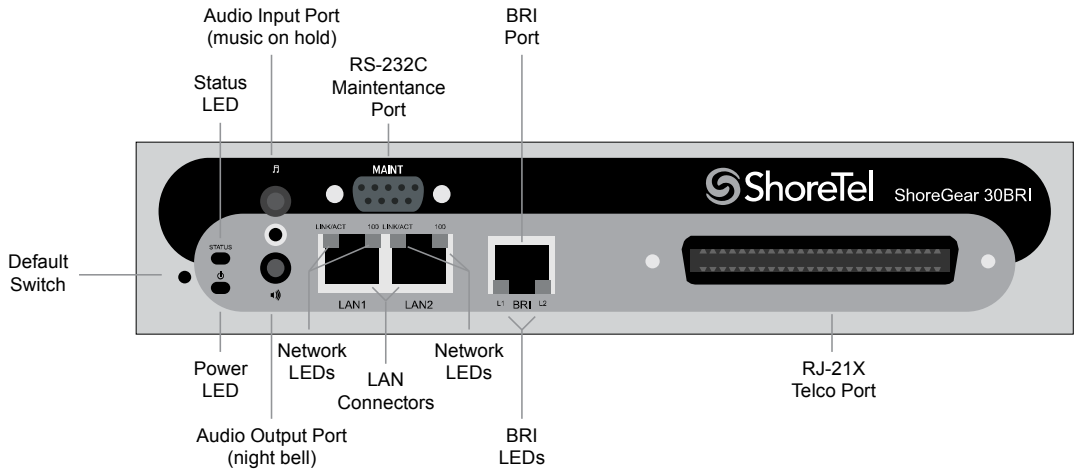
Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable olor
1	Trunk	1	Blue/White	26	White/Blue
–		2	Orange/White	27	White/Orange
2	Trunk	3	Green/White	28	White/Green
–		4	Brown/White	29	White/Brown
–		5	Slate/White	30	White/Slate
–		6	Blue/Red	31	Red/Blue
–		7	Orange/Red	32	Red/Orange
–		8	Green/Red	33	Red/Green
–		9	Brown/Red	34	Red/Brown
–		10	Slate/Red	35	Red/Slate
–		11	Blue/Black	36	Black/Blue
–		12	Orange/Black	37	Black/Orange
–		13	Green/Black	38	Black/Green
–		14	Brown/Black	39	Black/Brown
–		15	Slate/Black	40	Black/Slate
–		16	Blue/Yellow	41	Yellow/Blue
–		17	Orange/Yellow	42	Yellow/Orange
–		18	Green/Yellow	43	Yellow/Green
–		19	Brown/Yellow	44	Yellow/Brown
–		20	Slate/Yellow	45	Yellow/Slate
11	Extension - DID	21	Blue/Violet	46	Violet/Blue

Table 79: ShoreTel 30 RJ-21X Telephone and Trunk Connector Pins(Continued)

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable olor
–		22	Orange/Violet	47	Violet/Orange
12	Extension - DID	23	Green/Violet	48	Violet/Green
–		24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

ShoreTel 30BRI Voice Switch

Figure 22: ShoreTel 30BRI Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 11-12:** Extensions
- Digital Circuit Resources
  - **One BRI Span comprising two channels:** two channels maximum
- Make Me Conference Resource: None
- Maximum IP Phone Resources: 30 devices
  - **Analog Port Reallocation:** 10
  - **Digital Channel Reallocation:** 10
  - **Built-in Resources:** 10

ShoreTel 30BRI Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports
- 4 RJ-45 T1 telco port

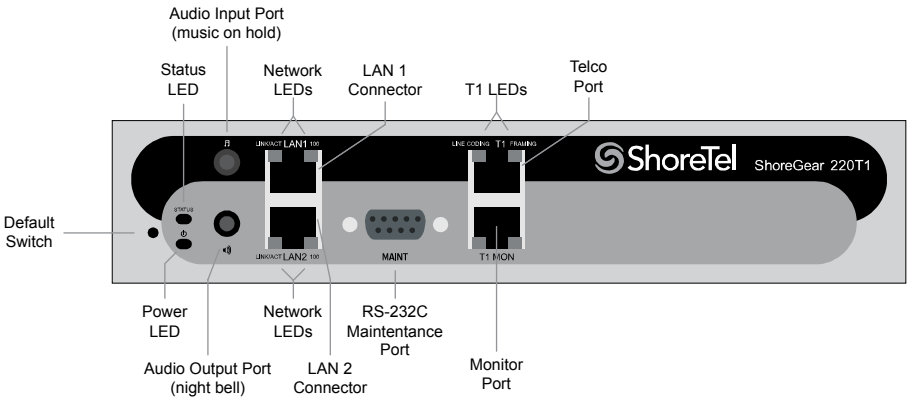
ShoreTel 30BRI RJ-21X Telephone and Trunk Connector

Table 80: ShoreTel 30BRI RJ-21X Telephone and Trunk Connector Pins

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
–		1	Blue/White	26	White/Blue
–		2	Orange/White	27	White/Orange
–		3	Green/White	28	White/Green
–		4	Brown/White	29	White/Brown
–		5	Slate/White	30	White/Slate
–		6	Blue/Red	31	Red/Blue
–		7	Orange/Red	32	Red/Orange
–		8	Green/Red	33	Red/Green
–		9	Brown/Red	34	Red/Brown
–		10	Slate/Red	35	Red/Slate
–		11	Blue/Black	36	Black/Blue
–		12	Orange/Black	37	Black/Orange
–		13	Green/Black	38	Black/Green
–		14	Brown/Black	39	Black/Brown
–		15	Slate/Black	40	Black/Slate
–		16	Blue/Yellow	41	Yellow/Blue
9	Extension	17	Orange/Yellow	42	Yellow/Orange
–		18	Green/Yellow	43	Yellow/Green
10	Extension	19	Brown/Yellow	44	Yellow/Brown
–		20	Slate/Yellow	45	Yellow/Slate
11	Extension	21	Blue/Violet	46	Violet/Blue
–		22	Orange/Violet	47	Violet/Orange
12	Extension	23	Green/Violet	48	Violet/Green
–		24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

ShoreTel 220T1 Voice Switch

Figure 23: ShoreTel 220T1 Front Plate



Switch Capacity

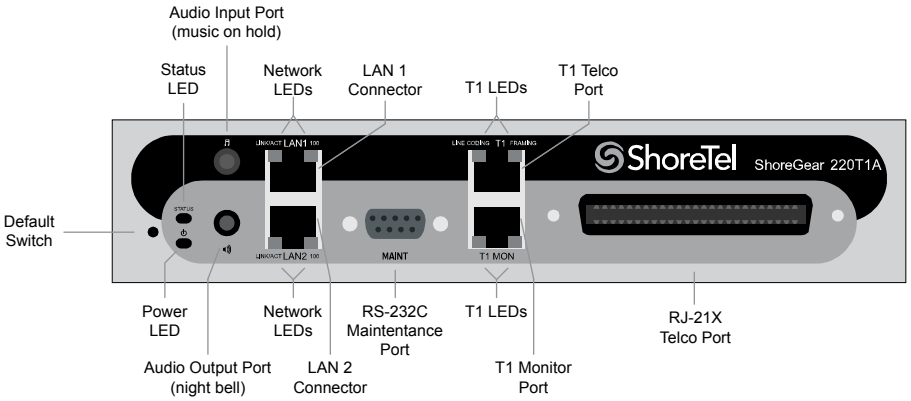
- **Digital Circuit Resources:** 24 channels maximum
  - **One T1 circuit, 24 channels per circuit:** 24 channels maximum
- **Make Me Conference Resource:** None
- **Maximum IP Phone Resources:** 220
  - **Digital Channel Reallocation:** 120
  - **Built-in Resources:** 100

ShoreTel 220T1 Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-45 T1 telco port
- 1 RJ-45 T1 monitor port for connecting test equipment

ShoreTel 220T1A Voice Switch

Figure 24: ShoreTel 220T1A Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 1-2:** Two Loop Start Trunks
  - **Ports 9-12:** Four Extensions or DID Trunks. A single command configures all ports as either Extensions or DID trunks.
  - **Power Failure Transfer Unit:** Trunk Port 1 to Extension Port 12
- **Digital Circuit Resources:** 24 channels maximum
  - One T1 circuit, 24 channels per circuit
- **Make Me Conference Resource:** Six ports
  - **Ports 1-2, 9-12**
- M**aximum IP Phone Resources:** 220 devices
  - **Analog Channel Reallocation:** 30
  - **Digital Channel Reallocation:** 120
  - **Built-in Resources:** 70

ShoreTel 220T1A Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance

- 1 RJ-21X male connector for mass termination of the telephone/trunk ports
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-45 T1 telco port
- 1 RJ-45 T1 monitor port for connecting test equipment

ShoreTel 220T1A RJ-21X Telephone and Trunk Connector

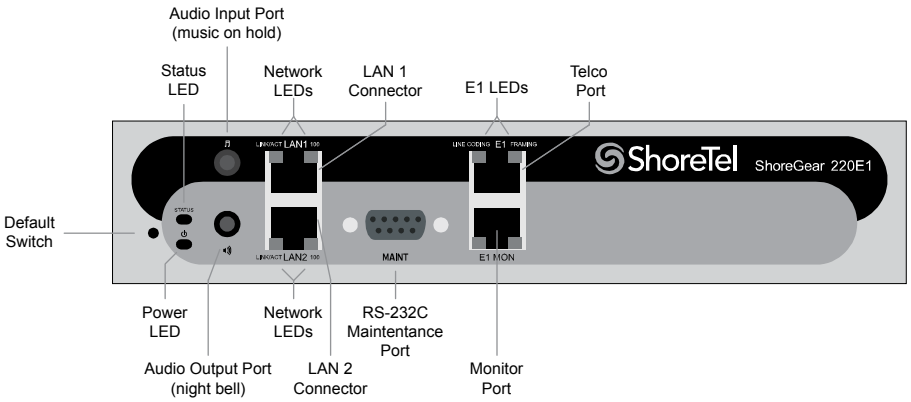
Table 81: ShoreTel 220T1A RJ-21X Telephone and Trunk Connector Pins

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
1	Trunk	1	Blue/White	26	White/Blue
–		2	Orange/White	27	White/Orange
2	Trunk	3	Green/White	28	White/Green
–		4	Brown/White	29	White/Brown
–		5	Slate/White	30	White/Slate
–		6	Blue/Red	31	Red/Blue
–		7	Orange/Red	32	Red/Orange
–		8	Green/Red	33	Red/Green
–		9	Brown/Red	34	Red/Brown
–		10	Slate/Red	35	Red/Slate
–		11	Blue/Black	36	Black/Blue
–		12	Orange/Black	37	Black/Orange
–		13	Green/Black	38	Black/Green
–		14	Brown/Black	39	Black/Brown
–		15	Slate/Black	40	Black/Slate
–		16	Blue/Yellow	41	Yellow/Blue
9	Extension	17	Orange/Yellow	42	Yellow/Orange
–		18	Green/Yellow	43	Yellow/Green
10	Extension	19	Brown/Yellow	44	Yellow/Brown
–		20	Slate/Yellow	45	Yellow/Slate
11	Extension	21	Blue/Violet	46	Violet/Blue
–		22	Orange/Violet	47	Violet/Orange
12	Extension	23	Green/Violet	48	Violet/Green
–		24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

ShoreTel-220E1 Voice Switch

Figure 25

Figure 25: ShoreTel-220E1 Front Plate



Switch Capacity

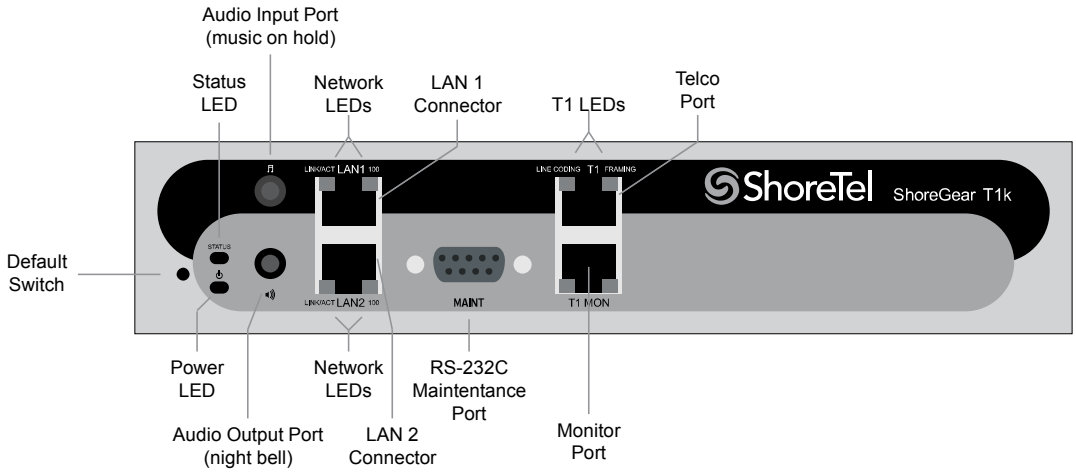
- **Digital Circuit Resources:** 30 channels maximum
  - **One E1 circuit:** 30 channels per circuit
- **Make Me Conference Resource:** none
- **Maximum IP Phone Resources:** 220
  - **Digital Channel Reallocation:** 150
  - **Built-in Resources:** 70

ShoreTel-220E1 Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-45 T1 telco port
- 1 RJ-45 T1 monitor port for connecting test equipment

ShoreTel T1k Voice Switch

Figure 26: ShoreTel T1k Front Plate



Switch Capacity

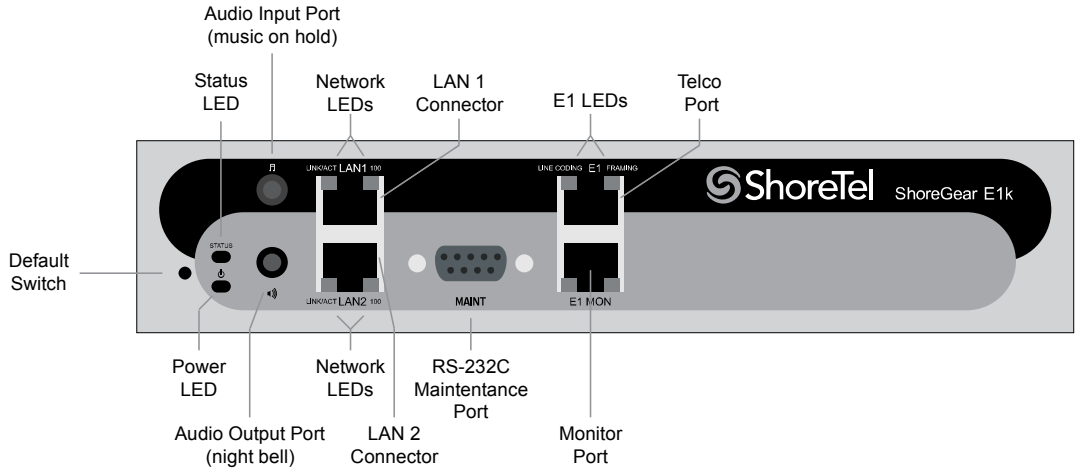
- **Digital Circuit Resources:** 24 channels maximum
  - **One T1 circuit:** 24 channels per circuit
- **Make Me Conference Resource:** None
- **Maximum IP Phone Resources:** None

ShoreTel T1k Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-45 T1 telco port
- 1 RJ-45 T1 monitor port for connecting test equipment

ShoreTel E1k Voice Switch

Figure 27: ShoreTel E1k Front Plate



Switch Capacity

- **Digital Circuit Resources:** 30 channels maximum
  - **One E1 circuit:** 30 channels per circuit
- **Make Me Conference Resource:** None
- **Maximum IP Phone Resources:** None

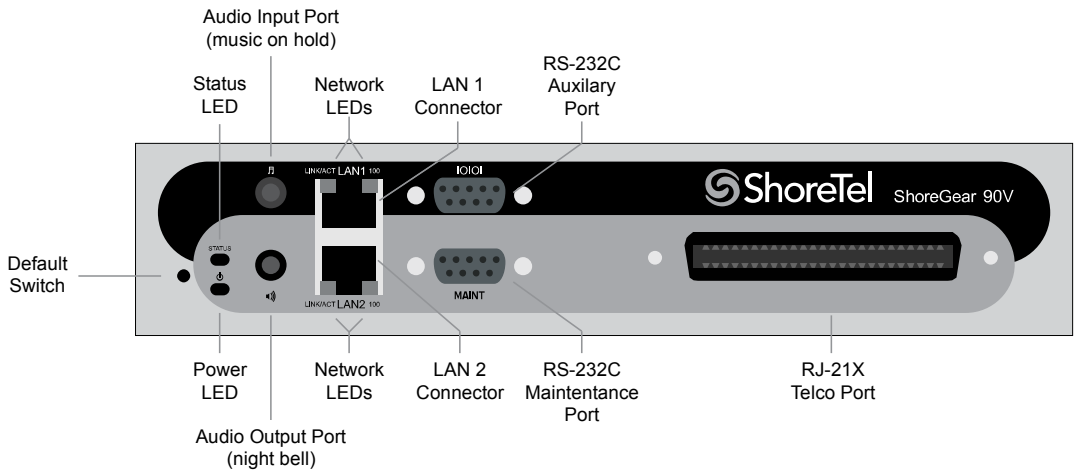
ShoreTel E1k Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-45 T1 telco port
- 1 RJ-45 T1 monitor port for connecting test equipment

Specifications – SG Voice Switches

ShoreTel 90V Voice Switch

Figure 28: ShoreTel 90V Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 1-8:** Eight Loop Start Trunks
  - **Ports 9-12:** Four Extensions or DID Trunks. A single command configures all ports as either Extensions or DID trunks.
  - **Power Failure Transfer Unit:** Trunk Port 1 to Extension Port 12
- **Make Me Conference Resources:** 12 ports
  - **Ports 1-12**
- **Maximum IP Phone Resources:** 90 devices
  - **Analog Port Reallocation:** 60
  - **Built-in Resources:** 30

ShoreTel 90V Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)

- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports
  - **Power Failure Transfer Unit:** Trunk Port 1 to Extension Port 12
  - **Backup Operator:** Extension Port 12

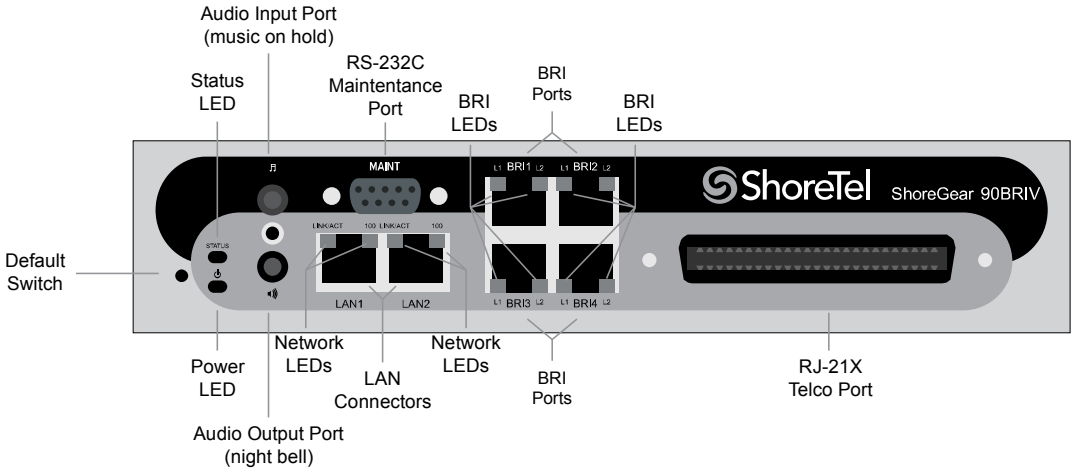
ShoreTel 90V RJ-21X Telephone and Trunk Connector

Table 82: ShoreTel 90V RJ-21X Telephone and Trunk Connector Pins

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
1	Trunk	1	Blue/White	26	White/Blue
–		2	Orange/White	27	White/Orange
2	Trunk	3	Green/White	28	White/Green
–		4	Brown/White	29	White/Brown
3	Trunk	5	Slate/White	30	White/Slate
–		6	Blue/Red	31	Red/Blue
4	Trunk	7	Orange/Red	32	Red/Orange
–		8	Green/Red	33	Red/Green
5	Trunk	9	Brown/Red	34	Red/Brown
–		10	Slate/Red	35	Red/Slate
6	Trunk	11	Blue/Black	36	Black/Blue
–		12	Orange/Black	37	Black/Orange
7	Trunk	13	Green/Black	38	Black/Green
–		14	Brown/Black	39	Black/Brown
8	Trunk	15	Slate/Black	40	Black/Slate
–		16	Blue/Yellow	41	Yellow/Blue
9	Extension - DID	17	Orange/Yellow	42	Yellow/Orange
–		18	Green/Yellow	43	Yellow/Green
10	Extension - DID	19	Brown/Yellow	44	Yellow/Brown
–		20	Slate/Yellow	45	Yellow/Slate
11	Extension - DID	21	Blue/Violet	46	Violet/Blue
–		22	Orange/Violet	47	Violet/Orange
12	Extension - DID	23	Green/Violet	48	Violet/Green
–		24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

ShoreTel 90BRIV Voice Switch

Figure 29: ShoreTel 90BRIV Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 9-12:** Extensions
- Digital Circuit Resources
  - **Four BRI Spans, each comprising two channels:** Eight channels maximum
- **Make Me Conference Resource:** None
- **Maximum IP Phone Resources:** 90 devices
  - **Analog Port Reallocation:** 20
  - **Digital Channel Reallocation:** 40
  - **Built-in Resources:** 30

ShoreTel 90BRIV Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports

- 4 RJ-45 T1 telco port

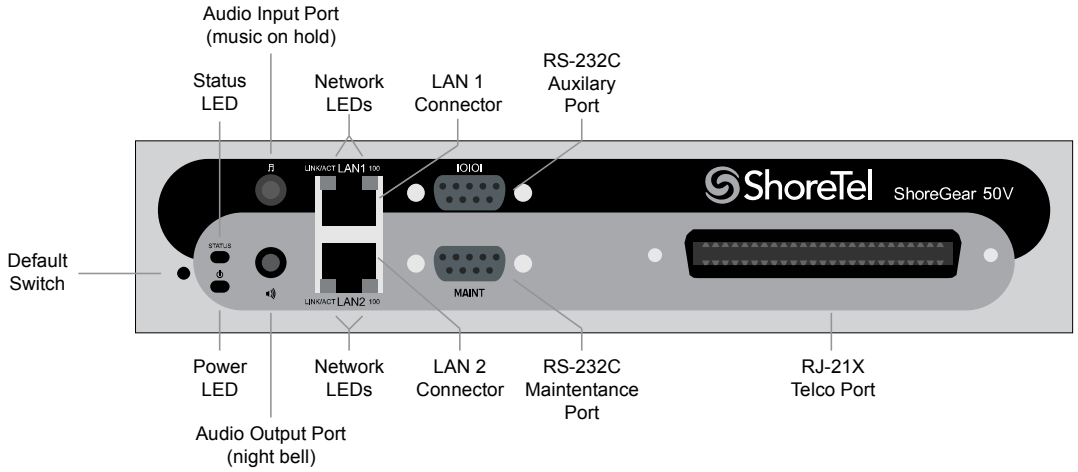
ShoreTel 90BRIV RJ-21X Telephone and Trunk Connector

Table 83: ShoreTel 90BRIV RJ-21X Telephone and Trunk Connector Pins

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
–		1	Blue/White	26	White/Blue
–		2	Orange/White	27	White/Orange
–		3	Green/White	28	White/Green
–		4	Brown/White	29	White/Brown
–		5	Slate/White	30	White/Slate
–		6	Blue/Red	31	Red/Blue
–		7	Orange/Red	32	Red/Orange
–		8	Green/Red	33	Red/Green
–		9	Brown/Red	34	Red/Brown
–		10	Slate/Red	35	Red/Slate
–		11	Blue/Black	36	Black/Blue
–		12	Orange/Black	37	Black/Orange
–		13	Green/Black	38	Black/Green
–		14	Brown/Black	39	Black/Brown
–		15	Slate/Black	40	Black/Slate
–		16	Blue/Yellow	41	Yellow/Blue
9	Extension	17	Orange/Yellow	42	Yellow/Orange
–		18	Green/Yellow	43	Yellow/Green
10	Extension	19	Brown/Yellow	44	Yellow/Brown
–		20	Slate/Yellow	45	Yellow/Slate
11	Extension	21	Blue/Violet	46	Violet/Blue
–		22	Orange/Violet	47	Violet/Orange
12	Extension	23	Green/Violet	48	Violet/Green
–		24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

ShoreTel 50V Voice Switch

Figure 30: ShoreTel 50V Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 1-4:** Four Loop Start Trunks
  - **Ports 11-12:** Two Extensions or DID Trunks. A single command configures all ports as either Extensions or DID trunks.
  - **Power Failure Transfer Unit:** Trunk Port 1 to Extension Port 12
- **Make Me Conference Resources:** six ports
  - **Ports 1-4, 11-12**
- **Maximum IP Phone Resources:** 50 devices
  - **Analog Port Reallocation:** 30
  - **Built-in Resources:** 20

ShoreTel 50V Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports

- **Power Failure Transfer Unit:** Trunk Port 1 to Extension Port 12
- **Backup Operator:** Extension Port 12

ShoreTel 50V RJ-21X Telephone and Trunk Connecto

Table 84: ShoreTel 50V RJ-21X Telephone and Trunk Connector Pins

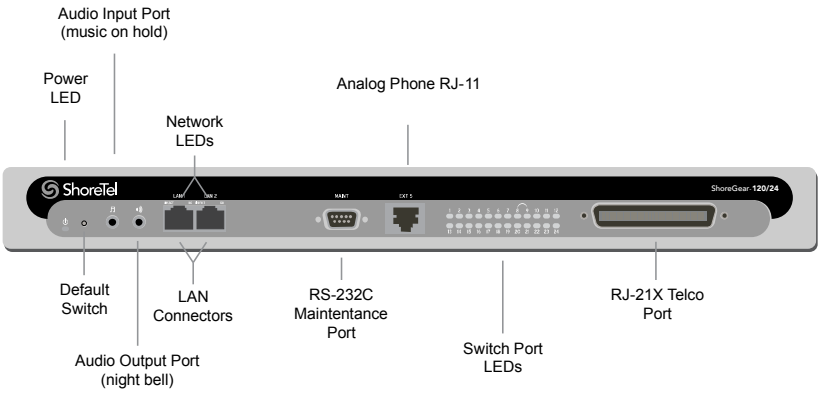
Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
1	Trunk	1	Blue/White	26	White/Blue
–		2	Orange/White	27	White/Orange
2	Trunk	3	Green/White	28	White/Green
–		4	Brown/White	29	White/Brown
3	Trunk	5	Slate/White	30	White/Slate
–		6	Blue/Red	31	Red/Blue
4	Trunk	7	Orange/Red	32	Red/Orange
–		8	Green/Red	33	Red/Green
–		9	Brown/Red	34	Red/Brown
–		10	Slate/Red	35	Red/Slate
–		11	Blue/Black	36	Black/Blue
–		12	Orange/Black	37	Black/Orange
–		13	Green/Black	38	Black/Green
–		14	Brown/Black	39	Black/Brown
–		15	Slate/Black	40	Black/Slate
–		16	Blue/Yellow	41	Yellow/Blue
9	Extension - DID	17	Orange/Yellow	42	Yellow/Orange
–		18	Green/Yellow	43	Yellow/Green
10	Extension - DID	19	Brown/Yellow	44	Yellow/Brown
–		20	Slate/Yellow	45	Yellow/Slate
11	Extension - DID	21	Blue/Violet	46	Violet/Blue
–		22	Orange/Violet	47	Violet/Orange
12	Extension - DID	23	Green/Violet	48	Violet/Green
–		24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

Specification – SG 1U Full Width Switches

ShoreTel 120 Voice Switch

The ShoreTel 120 is also referred to as the ShoreTel 120/24 (SG 120/24).

Figure 31: ShoreTel 120 Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 1-8:** Eight Loop Start Trunks, DID Trunks, or Extensions
  - **Ports 9-24:** Sixteen Extensions.
  - **Power Failure Transfer Unit:** Trunk Port 8 to Extension Port 9
- **Make Me Conference Resource:** 24 Ports
  - **Ports 1-24**
- **Maximum IP Phone Resources:** 120 devices
  - **Analog Port Reallocation:** 120

ShoreTel 120 Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface

- 1 RJ-11 connector for connecting an analog phone (extension 9)
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports
  - **Power Failure Transfer Unit:** Trunk Port 8 to Extension Port 9
  - **Backup Operator:** Extension Port 9

ShoreTel 120 RJ-21X Telephone and Trunk Connector

Table 85: ShoreTel 120 RJ-21X Telephone and Trunk Connector Pins

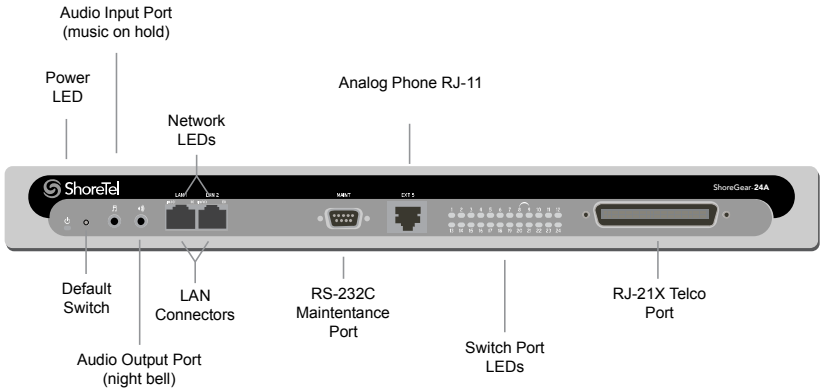
Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
1	Trunk, DID, Extension	1	Blue/White	26	White/Blue
2	Trunk, DID, Extension	2	Orange/White	27	White/Orange
3	Trunk, DID, Extension	3	Green/White	28	White/Green
4	Trunk, DID, Extension	4	Brown/White	29	White/Brown
5	Trunk, DID, Extension	5	Slate/White	30	White/Slate
6	Trunk, DID, Extension	6	Blue/Red	31	Red/Blue
7	Trunk, DID, Extension	7	Orange/Red	32	Red/Orange
8	Trunk, DID, Extension	8	Green/Red	33	Red/Green
9	Extension	9	Brown/Red	34	Red/Brown
10	Extension	10	Slate/Red	35	Red/Slate
11	Extension	11	Blue/Black	36	Black/Blue
12	Extension	12	Orange/Black	37	Black/Orange
13	Extension	13	Green/Black	38	Black/Green
14	Extension	14	Brown/Black	39	Black/Brown
15	Extension	15	Slate/Black	40	Black/Slate
16	Extension	16	Blue/Yellow	41	Yellow/Blue
17	Extension	17	Orange/Yellow	42	Yellow/Orange
18	Extension	18	Green/Yellow	43	Yellow/Green
19	Extension	19	Brown/Yellow	44	Yellow/Brown
20	Extension	20	Slate/Yellow	45	Yellow/Slate
21	Extension	21	Blue/Violet	46	Violet/Blue

Table 85: ShoreTel 120 RJ-21X Telephone and Trunk Connector Pins(Continued)

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
22	Extension	22	Orange/Violet	47	Violet/Orange
23	Extension	23	Green/Violet	48	Violet/Green
24	Extension	24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

ShoreTel 24A Voice Switch

Figure 32: ShoreTel 24A Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 1-24:** Twenty four extensions
- **Make Me Conference Resource:** 24 Ports
  - **Ports 1-24**
- **Maximum IP Phone Resources:** None.

ShoreTel 24A Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-11 connector for connecting an analog phone (extension 9)

- 1 RJ-21X male connector for mass termination of the telephone/trunk ports

ShoreTel 24A RJ-21X Telephone and Trunk Connector

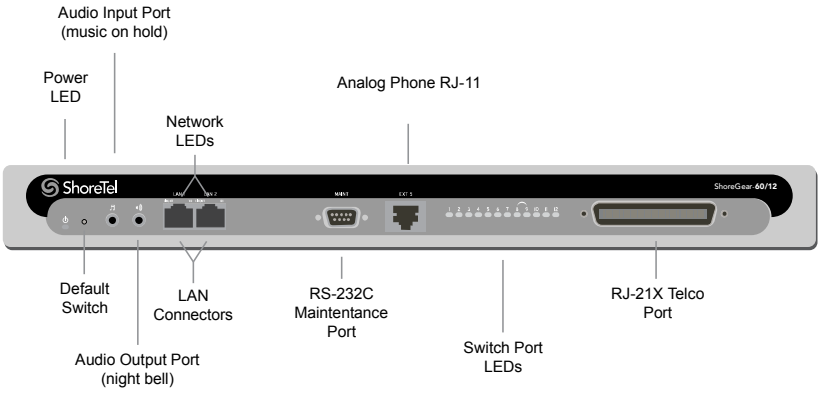
Table 86: ShoreTel 24A RJ-21X Telephone and Trunk Connector Pins

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
1	Extension	1	Blue/White	26	White/Blue
2	Extension	2	Orange/White	27	White/Orange
3	Extension	3	Green/White	28	White/Green
4	Extension	4	Brown/White	29	White/Brown
5	Extension	5	Slate/White	30	White/Slate
6	Extension	6	Blue/Red	31	Red/Blue
7	Extension	7	Orange/Red	32	Red/Orange
8	Extension	8	Green/Red	33	Red/Green
9	Extension	9	Brown/Red	34	Red/Brown
10	Extension	10	Slate/Red	35	Red/Slate
11	Extension	11	Blue/Black	36	Black/Blue
12	Extension	12	Orange/Black	37	Black/Orange
13	Extension	13	Green/Black	38	Black/Green
14	Extension	14	Brown/Black	39	Black/Brown
15	Extension	15	Slate/Black	40	Black/Slate
16	Extension	16	Blue/Yellow	41	Yellow/Blue
17	Extension	17	Orange/Yellow	42	Yellow/Orange
18	Extension	18	Green/Yellow	43	Yellow/Green
19	Extension	19	Brown/Yellow	44	Yellow/Brown
20	Extension	20	Slate/Yellow	45	Yellow/Slate
21	Extension	21	Blue/Violet	46	Violet/Blue
22	Extension	22	Orange/Violet	47	Violet/Orange
23	Extension	23	Green/Violet	48	Violet/Green
24	Extension	24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

ShoreTel 60 Voice Switch

The ShoreTel 60 is also referred to as the ShoreTel 60/12 (SG 60/12).

Figure 33: ShoreTel 60 Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 1-8:** Eight Loop Start Trunks, DID Trunks, or Extensions
  - **Ports 9-12:** Four Extensions.
  - **Backup Operator:** Extension Port 9
  - **Power Failure Transfer Unit:** Trunk Port 8 to Extension Port 9
- **Make Me Conference Resource:** 12 ports
  - **Ports 1-12**
- **Maximum IP Phone Resources:** 60 devices
  - **Analog Port Reallocation:** 60

ShoreTel 60 Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-11 connector for connecting an analog phone (extension 9)
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports
  - **Power Failure Transfer Unit:** Trunk Port 8 to Extension Port 9
  - **Backup Operator:** Extension Port 9

ShoreTel 60 RJ-21X Telephone and Trunk Connector

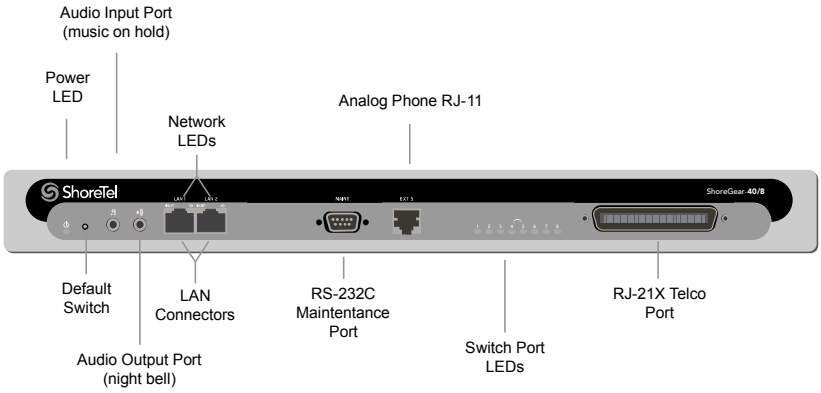
Table 87: ShoreTel 60 RJ-21X Telephone and Trunk Connector Pins

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
1	Trunk, DID, Extension	1	Blue/White	26	White/Blue
2	Trunk, DID, Extension	2	Orange/White	27	White/Orange
3	Trunk, DID, Extension	3	Green/White	28	White/Green
4	Trunk, DID, Extension	4	Brown/White	29	White/Brown
5	Trunk, DID, Extension	5	Slate/White	30	White/Slate
6	Trunk, DID, Extension	6	Blue/Red	31	Red/Blue
7	Trunk, DID, Extension	7	Orange/Red	32	Red/Orange
8	Trunk, DID, Extension	8	Green/Red	33	Red/Green
9	Extension	9	Brown/Red	34	Red/Brown
10	Extension	10	Slate/Red	35	Red/Slate
11	Extension	11	Blue/Black	36	Black/Blue
12	Extension	12	Orange/Black	37	Black/Orange
–		13	Green/Black	38	Black/Green
–		14	Brown/Black	39	Black/Brown
–		15	Slate/Black	40	Black/Slate
–		16	Blue/Yellow	41	Yellow/Blue
–		17	Orange/Yellow	42	Yellow/Orange
–		18	Green/Yellow	43	Yellow/Green
–		19	Brown/Yellow	44	Yellow/Brown
–		20	Slate/Yellow	45	Yellow/Slate
–		21	Blue/Violet	46	Violet/Blue
–		22	Orange/Violet	47	Violet/Orange
–		23	Green/Violet	48	Violet/Green
–		24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

ShoreTel 40 Voice Switch

The ShoreTel 40 is often referred to as the ShoreTel 40/8 (SG 40/8).

Figure 34: ShoreTel 40 Front Plate



Switch Capacity

- Analog Circuit Resources
  - **Ports 1-2:** Two Loop Start Trunks, DID Trunks, or Extensions
  - **Ports 3-4:** Two Loop Start Trunks.
  - **Ports 5-8:** Four Extensions
  - **Power Failure Transfer Unit:** Trunk Port 4 to Extension Port 5
- **Make Me Conference Resource:** eight ports
  - **Ports 1-8**
- **Maximum IP Phone Resources:** 40 devices
  - **Analog Port Reallocation:** 40

ShoreTel 40 Connectors

- 1 3.5 mm mono connector for audio input (music on hold)
- 1 3.5 mm mono connector for audio output (overhead paging and night bell)
- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-11 connector for connecting an analog phone (extension 9)
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports
  - **Power Failure Transfer Unit:** Trunk Port 4 to Extension Port 5
  - **Backup Operator:** Extension Port 5

ShoreTel 40 RJ-21X Telephone and Trunk Connector

Table 88: ShoreTel 40 RJ-21X Telephone and Trunk Connector Pins

Port	Type	Ring Pin #	Ring Cable Color	Tip Pin #	Tip Cable Color
–		1	Blue/White	26	White/Blue
–		2	Orange/White	27	White/Orange
–		3	Green/White	28	White/Green
–		4	Brown/White	29	White/Brown
1	Trunk, DID, Extension	5	Slate/White	30	White/Slate
2	Trunk, DID, Extension	6	Blue/Red	31	Red/Blue
3	Trunk	7	Orange/Red	32	Red/Orange
4	Trunk	8	Green/Red	33	Red/Green
5	Extension	9	Brown/Red	34	Red/Brown
6	Extension	10	Slate/Red	35	Red/Slate
7	Extension	11	Blue/Black	36	Black/Blue
8	Extension	12	Orange/Black	37	Black/Orange
–		13	Green/Black	38	Black/Green
–		14	Brown/Black	39	Black/Brown
–		15	Slate/Black	40	Black/Slate
–		16	Blue/Yellow	41	Yellow/Blue
–		17	Orange/Yellow	42	Yellow/Orange
–		18	Green/Yellow	43	Yellow/Green
–		19	Brown/Yellow	44	Yellow/Brown
–		20	Slate/Yellow	45	Yellow/Slate
–		21	Blue/Violet	46	Violet/Blue
–		22	Orange/Violet	47	Violet/Orange
–		23	Green/Violet	48	Violet/Green
–		24	Brown/Violet	49	Violet/Brown
–		25	Slate/Violet	50	Violet/Slate

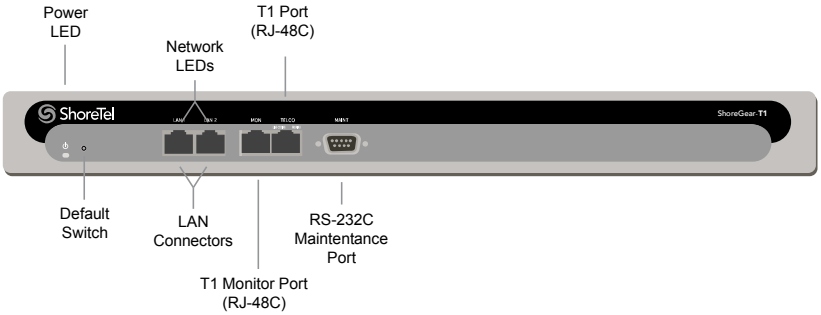
ShoreTel T1 and ShoreTel E1 Voice Switches

The ShoreTel E1 front plate is identical to the ShoreTel T1 front plate, except for the E1 labeling.

The ShoreTel T1 provides higher-density trunking to the central office using CAS or PRI signaling. The ShoreTel T1 can also be used as a gateway to legacy PBX systems.

The ShoreTel E1 provides higher-density trunking to the central office using PRI signaling. The ShoreTel E1 can also be used as a gateway to legacy PBX systems.

Figure 35: ShoreTel T1 Front Plate



Switch Capacity

- Digital Circuit Resources
  - **SG T1 – One T1 circuit, 24 channels per circuit:** 24 channels maximum.
  - **SG E1 – One T1 circuit, 30 channels per circuit:** 30 channels maximum.
- **Make Me Conference Resources:** None
- **Maximum IP Phone Resources:** None

ShoreTel T1 and ShoreTel E1 Connectors

- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-45 T1 telco port
- 1 RJ-45 T1 monitor port for connecting test equipment

APPENDIX E

Port Usage

This appendix contains ShoreTel port usage information and includes the following sections:

Port Usage Tables 325
Port Usage Part 1 325
Port Usage Part 2 331

Port Usage Tables

The following sections provide port usage information for the ShoreTel System. For easier printing and viewing, the information is divided into two parts.

Port Usage Part 1

Table 89 contains the first part of the port usage information for the ShoreTel system.

Table 89: Port Usage – Part 1

Originating Device	Destination Device				
	Switch	V-Switch	Service Appliance	IP Phone	Communicator
Switch	**Call Control** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Call Control** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Call Control** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Call Control** UDP 2427 MGCP **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	
V-Switch	**Call Control** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP same as RTP	**Call Control** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Call Control** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Call Control** UDP 2427 MGCP **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	

Table 89: Port Usage – Part 1 (Continued)

Originating Device	Destination Device				
	Switch	V-Switch	Service Appliance	IP Phone	Communicator
Service Appliance	**Call Control** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Call Control** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Call Control** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP CMCA (Web Share) TCP/UDP 5450 Ping Sync TCP 80 HTTP Web share TCP 443 HTTPS Web share **IM** UDP 5451 UDP 5463 TCP/UDP 5466 **SMTP** TCP 25 - SMTP	**Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Windows Instant Messaging** TCP 5222 - XMPP **Conference Bridge Integration** TCP 80 HTTP - Configuration Control **Presenter** TCP 443 TCP 80
Communicator			**Windows Instant Messaging** TCP 5222 - XMPP **Conference Bridge Integration** TCP 80 or 443 HTTP - Configuration Control (Configurable) **Presenter** TCP 443 TCP 80		**Windows Video** CMCP (Server) – TCP 5464 CMCP (Client) – TCP 5465 **Media Stream** UDP 10000-10550 RTP (configurable)

Table 89: Port Usage – Part 1 (Continued)

Originating Device	Destination Device				
	Switch	V-Switch	Service Appliance	IP Phone	Communicator
IP Phone	**Call Control** UDP 2727 MGCP **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Call Control** UDP 2727 MGCP **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Media Stream** UDP 10000-10550 RTP (configurable)	**Media Stream** UDP 10000-10550 RTP (configurable)	
Softphone	**Call Control** UDP 2727 MGCP **Media Stream** UDP 10000-10550 RTP (configurable)	**Call Control** UDP 2727 MGCP **Media Stream** UDP 10000-10550 RTP (configurable)	**Media Stream** UDP 10000-10550 RTP (configurable)	**Media Stream** UDP 10000-10550 RTP (configurable)	

Table 89: Port Usage – Part 1 (Continued)

Originating Device	Destination Device				
	Switch	V-Switch	Service Appliance	IP Phone	Communicator
Distributed Voice Server (DVS)	**Port Mapper** TCP 111 RPC Port Mapper UDP 111 RPC Port Mapper **Call Control** UDP 2427 MGCP - Media proxy UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control TCP 5452 RPC NCC commands UDP 5453 - Broadcasts Configuration Control TCP 1024-65535 - Firmware download **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Port Mapper** TCP 111 RPC Port Mapper UDP 111 RPC Port Mapper **Call Control** TMS RPC UDP 5458 SUNRPC Broadcast **SoftSwitch** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control TCP 5452 RPC/ NCC commands UDP 5453 - Broadcasts **Transport** TCP 5432 - CDS **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Call Control** TMS RPC UDP 5458 SUNRPC Broadcast **SoftSwitch** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control TCP 5452 RPC/ NCC commands UDP 5453 - Broadcasts **Transport** TCP 5432 - CDS CMCA TCP 80 HTTP Web share, KU TCP 443 HTTPS Web share **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Windows Configuration & Call Control** TCP 5447 – CAS TCP 5449, 5469 – web-proxy, Mgmt API TCP 80 HTTP - Session Manager **Web** TCP 5449, 5469 – web-proxy, WCM Options page/ Mgmt API TCP 80 HTTP - Session Mgmt AD/non-AD login auth & web content TCP 5447 - CAS **Mac** TCP 5449, 5469 – web-proxy, WCM Options page/ Mgmt API TCP 80 HTTP - Session Mgmt AD/non-AD login auth & web content TCP 5447 - CAS **MCM Mobile** TCP 80 – MCM Server **CMiPhone** TCP 5447 – CAS TCP 80 **iPhone non-reverse proxy** TCP 443 - Default TCP 5449 - Data API TCP 5447 - CAS API TCP 80 - Session manager API **Note**: Regardless of whether CMiPhone is using a reverse proxy, the ingress ports for all traffic coming from CMiPhone on the HQ/DVS server will be 80, 5447, and 5449. If a reverse proxy is used, the traffic from the proxy to the HQ/DVS will use 80.5447/5449, and the traffic between CMiPhone and the reverse proxy will go over whatever reverse proxy port the reverse proxy deployment is configured to use. **Conferencing iOS** TCP 80/443 **TAPI & CSIS API (Custom Solutions)** RPC Connection Negotiation TCP 135 MS RPC Port Mapper **Call Control** TCP/UDP 5500-5600 MSRPC Remote TAPI Commands TCP 1024-65535 - Remote TAPI Events **CSIS** TCP 5440

Table 89: Port Usage – Part 1 (Continued)

Originating Device	Destination Device				
	Switch	V-Switch	Service Appliance	IP Phone	Communicator
Headquarters Server	**Port Mapper** TCP 111 RPC Port Mapper UDP 111 RPC Port Mapper **Call Control** UDP 2427 MGCP - Media proxy UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control TCP 5452 RPC NCC commands UDP 5453 - Broadcasts **Configuration Control** TCP 1024-65535 - Firmware download **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Port Mapper** TCP 111 RPC Port Mapper UDP 111 RPC Port Mapper **Call Control** TMS RPC UDP 5458 SUNRPC Broadcast **SoftSwitch** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control TCP 5452 RPC/ NCC commands UDP 5453 - Broadcasts **Transport** TCP 5432 - CDS **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Call Control** TMS RPC UDP 5458 SUNRPC Broadcast **SoftSwitch** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control TCP 5452 RPC/ NCC commands UDP 5453 - Broadcasts **Transport** TCP 5432 - CDS **CMCA** TCP 80 HTTP Web share, KU TCP 443 HTTPS Web share **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP **Maintenance** TCP 5555 - Diagnostic phonectl	**Windows** **Configuration & Call Control** TCP 5447 – CAS TCP 5449, 5469 – web-proxy, Mgmt API TCP 80 HTTP - Online help TCP 80 HTTP - Session manager **Web** TCP 5449, 5469 – web-proxy, WCM Options page/Mgmt API TCP 80 HTTP - Session Mgmt AD/non-AD login auth & web content TCP 5447 - CAS **Mac** TCP 5449, 5469 – web-proxy, WCM Options page/ Mgmt API TCP 80 HTTP - Session Mgmt AD/non-AD login auth & web content TCP 5447 - CAS **MCM Mobile** TCP 80 – MCM Server **CMiPhone** TCP 5447 – CAS TCP 80 **iPhone non-reverse proxy** 443 - Default 5449 - Data API 5447 - CAS API 80 - Session manager API Conferencing iOS TCP 80/443 **Note**: Regardless of whether CMiPhone is using a reverse proxy, the ingress ports for all traffic coming from CMiPhone on the HQ/DVS server will be 80, 5447, and 5449. If a reverse proxy is used, the traffic from the proxy to the HQ/DVS will use 80.5447/5449, and the traffic between CMiPhone and the reverse proxy will go over whatever reverse proxy port the reverse proxy deployment is configured to use **TAPI & CSIS API (Custom Solutions)** **RPC Connection Negotiation** TCP 135 MS RPC Port Mapper **Call Control** TCP/UDP 5500-5600 MSRPC Remote TAPI Commands TCP 1024-65535 - Remote TAPI Events **CSIS** TCP 5440

Table 89: Port Usage – Part 1 (Continued)

Originating Device	Destination Device				
	Switch	V-Switch	Service Appliance	IP Phone	Communicator
Other (Like SIP endpoints)	**Configuration Control** UDP 68 DHCP Client **Call Control** UDP 5060 SIP **Media Stream** UDP 10000-10550 RTP - for SIP **Maintenance** TCP 23 Telnet UDP 161 SNMP	**Configuration Control** UDP 68 DHCP Client **Call Control** UDP 5060 SIP **Media Stream** UDP 10000-10550 RTP - for SIP **Maintenance** TCP 22 SSH UDP 123 NTP UDP 161 SNMP	**Configuration Control** UDP 68 DHCP Client **Media Stream** UDP 10000-10550 RTP - for SIP **Maintenance** TCP 22 SSH UDP 123 NTP UDP 161 SNMP	**Configuration Control** UDP 68 DHCP Client **Maintenance** TCP 23 Telnet	**Windows** **Instant Messaging (OCS)** Refer to Microsoft documentation for Office Communicator ports - http://technet.microsoft.com/en-us/library/bb870402.aspx **Instant Messaging (Converged Conferencing)** TCP 80

Port Usage Part 2

Table 90 contains the second part of the port usage information for the ShoreTel system.

Table 90: Port Usage - Part 2

Originating Device	Destination Device			
	Softphone	Distributed Voice Server	Headquarters Server	Other
Switch	**Call Control** UDP 2427 MGCP **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Port Mapper** TCP 111 RPC Port Mapper UDP 111 RPC Port Mapper **Call Control** TMS RPC TCP 5457 NCC Event port UDP 5458 SUNRPC Broadcast TCP/UDP 5500-5600 MSRPC **SoftSwitch** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5442 - DRS UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control UDP 5446 - DRS keepalive **Configuration Control** TCP 21 FTP CTL – Boot files TCP 20 FTP DATA – Boot files **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Port Mapper** TCP 111 RPC Port Mapper UDP 111 RPC Port Mapper **Call Control** TMS RPC TCP 5457 NCC Event port UDP 5458 SUNRPC Broadcast TCP/UDP 5500-5600 MSRPC **SoftSwitch** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5442 - DRS UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control UDP 5446 - DRS keepalive **Configuration Control** TCP 21 FTP CTL – Boot files TCP 20 FTP DATA – Boot files **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Configuration Control** UDP 67 DHCP Server **Maintenance** UDP 162 SNMP TRAP Call Control UDP 5060 SIP **Media Stream** UDP 1024-65535 RTP - for SIP **Traceroute** UDP, same as RTPCall

Table 90: Port Usage - Part 2 (Continued)

Originating Device	Destination Device			
	Softphone	Distributed Voice Server	Headquarters Server	Other
V-Switch	**Call Control** UDP 2427 MGCP **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Port Mapper** TCP 111 RPC Port Mapper UDP 111 RPC Port Mapper **Call Control** TMS RPC: TCP 5457 NCC Event port UDP 5458 SUNRPC Broadcast TCP/UDP 5500-5600 MSRPC **SoftSwitch** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5442 - DRS UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control UDP 5446 - DRS keepalive **Database** TCP 4306 MYSQLCC TCP 4308 – MYSQL config **Transport** TCP 5432 - CDS Configuration Control: TCP 21 FTP CTL – Boot files TCP 20 FTP DATA – Boot files **Media Stream**: UDP 10000-10550 RTP (configurable) **Traceroute**: UDP, same as RTP	**Port Mapper**: TCP 111 RPC Port Mapper UDP 111 RPC Port Mapper **Call Control**: TMS RPC: TCP 5457 NCC Event port UDP 5458 SUNRPC Broadcast TCP/UDP 5500-5600 MSRPC **SoftSwitch:** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5442 - DRS UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control UDP 5446 - DRS keepalive **Database**: TCP 4306 MYSQLCC TCP 4308 – MYSQL config **Transport**: TCP 5432 - CDS Configuration Control: TCP 21 FTP CTL – Boot files TCP 20 FTP DATA – Boot files **Media Stream**: UDP 10000-10550 RTP (configurable) **Traceroute**: UDP, same as RTP	**Configuration Control**: UDP 67 DHCP Server **Maintenance**: UDP 162 SNMP TRAP **Call Control**: UDP 5060 SIP **Media Stream**: UDP 1024-65535 RTP - for SIP UDP 123 NTP **Traceroute**: UDP, same as RTP

Table 90: Port Usage - Part 2 (Continued)

Originating Device	Destination Device			
	Softphone	Distributed Voice Server	Headquarters Server	Other
Service Appliance	**Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Call Control** TMS RPC: TCP 5457 NCC Event port UDP 5458 SUNRPC Broadcast TCP/UDP 5500-5600 MSRPC **SoftSwitch** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5442 - DRS UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control UDP 5446 - DRS keepalive Database: TCP 4306 MYSQLCC TCP 4308 – MYSQL config **Transport** TCP 5432 - CDS **IM** TCP 80 any HTTP TCP 5449, 5469 web-proxy, session manager Configuration Control: TCP 21 FTP CTL – Boot files TCP 20 FTP DATA – Boot files **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**Call Control** TMS RPC: TCP 5457 NCC Event port UDP 5458 SUNRPC Broadcast TCP/UDP 5500-5600 MSRPC **SoftSwitch** UDP 5440 - Location Service UDP 5441 - Call Control UDP 5442 - DRS UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control UDP 5446 - DRS keepalive **Database** TCP 4306 MYSQLCC TCP 4308 – MYSQL config TCP 4309 – MYSQL CDR **Transport** TCP 5432 - CDS **IM** TCP 80 any HTTP TCP 5449, 5469 web-proxy, session manager TCP 5470 SAMS TCP 5479 D2 Framework **Configuration Control** TCP 21 FTP CTL – Boot files TCP 20 FTP DATA – Boot files **Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	UDP 123 - NTP UDP 67 - DHCP Server UDP 162 - SNMP TRAP TCP 25 - SMTP TCP/UDP 53 - DNS **Media Stream** UDP 1024-65535 RTP - for SIP endpoints **Traceroute** UDP, same as RTP

Table 90: Port Usage - Part 2 (Continued)

Originating Device	Destination Device			
	Softphone	Distributed Voice Server	Headquarters Server	Other
Communicator		**Windows** **RPC Connection Negotiation** TCP 135 MS RPC Port Mapper **Call Control** TCP/UDP 5500-5600 MSRPC Remote TAPI Commands TCP 1024-65535 - Remote TAPI Events **CMiPhone** TCP 5447 – CAS TCP 80 **iPhone non-reverse proxy** 443 - Default 5449 - Data API 5447 - CAS API 80 - Session manager API Conferencing iOS TCP 80/443 **Note**: Regardless of whether CMiPhone is using a reverse proxy, the ingress ports for all traffic coming from CMiPhone on the HQ/DVS server will be 80, 5447, and 5449. If a reverse proxy is used, the traffic from the proxy to the HQ/DVS will use 80.5447/5449, and the traffic between CMiPhone and the reverse proxy will go over whatever reverse proxy port the reverse proxy deployment is configured to use **Configuration Control** TCP 5447 – CAS TCP 5449, 5469 – web-proxy, Mgmt API **Web** TCP 5449, 5469 –web-proxy, WCM Options page/ Mgmt API TCP 80 HTTP - Session Mgmt AD/non-AD login auth & web content TCP 5447 - CAS **Mobile** TCP 80 – MCM Server	**Windows** **RPC Connection Negotiation** TCP 135 MS RPC Port Mapper **Call Control** TCP/UDP 5500-5600 MSRPC Remote TAPI Commands TCP 1024-65535 - Remote TAPI Events **CMiPhone** TCP 5447 – CAS TCP 80 **iPhone non-reverse proxy** 443 - Default 5449 - Data API 5447 - CAS API 80 - Session manager API Conferencing iOS TCP 80/443 **Note**: Regardless of whether CMiPhone is using a reverse proxy, the ingress ports for all traffic coming from CMiPhone on the HQ/DVS server will be 80, 5447, and 5449. If a reverse proxy is used, the traffic from the proxy to the HQ/DVS will use 80.5447/5449, and the traffic between CMiPhone and the reverse proxy will go over whatever reverse proxy port the reverse proxy deployment is configured to use **Configuration Control** TCP 5440 – CSIS TCP 5447 – CAS TCP 5449, 5469 – web-proxy, Mgmt API TCP 80 HTTP - Online help **Web** TCP 5449, 5469 – web-proxy, WCM Options page/ Mgmt API TCP 80 HTTP - Session Mgmt AD/non-AD login auth & web content TCP 5447 - CAS **Mobile** TCP 80 – MCM Server	**Windows** **Instant Messaging (OCS)** Refer to Microsoft documentation for Office Communicator ports - http://technet.microsoft.com/en-us/library/bb870402.aspx **Instant Messaging (Converged Conferencing)** TCP 80

Table 90: Port Usage - Part 2 (Continued)

Originating Device	Destination Device			
	Softphone	Distributed Voice Server	Headquarters Server	Other
IP Phone	**Media Stream** UDP 10000-10550 RTP (configurable)	**Media Stream** UDP 10000-10550 RTP (configurable) **FTP** TCP port 21	**Media Stream** UDP 10000-10550 RTP (configurable) **FTP** TCP port 21	
Softphone	**Media Stream** UDP 10000-10550 RTP (configurable)	**Media Stream** UDP 10000-10550 RTP (configurable)	**Configuration Control** TCP 80 HTTP **Media Stream** UDP 10000-10550 RTP (configurable)	
Distributed Voice Server	**Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**RPC Connection Negotiation** TCP 135 MS RPC Port Mapper **Call Control** TCP/UDP 5500-5600 MSRPC DTAS/TMS Commands TCP 1024-65535 - DTAS/TMS Events UDP 5440 - Location Service TCP 5441 – Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control UDP 5446 - DRS keepalive **TMS** UDP dynamic [1024-65535] – broadcast. TMS-TMS disaster recovery TCP 5430 – TMS/DTAS interserver communication **Distributed Voice Mail** TCP 25 SMTP - Voice Mail transport **Transport** TCP 5432 – events (R8.1), triggers (R11), DDB (R11), DBUpdate (R10)	**RPC Connection Negotiation** TCP 111 RPC Port Mapper UDP 111 RPC Port Mapper TCP 135 MS RPC Port Mapper TCP 1024-65535 RPC - Quicklook **Call Control** TCP/UDP 5500-5600 MSRPC - DTAS/TMS Commands TCP 1024-65535 - DTAS/TMS Events TCP 1024-65535 MS RPC - DB access UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control UDP 5446 - DRS keepalive	Voice Mail Notification TCP 25 SMTP

Table 90: Port Usage - Part 2 (Continued)

Originating Device	Destination Device			
	Softphone	Distributed Voice Server	Headquarters Server	Other
Distributed Voice Server (continued)			**TMS** *UDP dynamic [1024-65535] – broadcast. TMS-TMS disaster recovery* TCP 5430 – TMS/DTAS interserver communication **Distributed Voice Mail** TCP 25 SMTP - Voice Mail transport **Database** TCP 4308 – config DB (RO via ODBC for DDB) (R11.x) **CAS Session Manager (R11.x)** TCP 5449, 5469 – web-proxy, WCM Options page TCP 80 – HTTP for SM AD/non-AD login authentication **Transport** TCP 5432 – events (R8.1), triggers (R11), DDB (R11), DBUpdate (R10), VMstats (R8.1)	

Table 90: Port Usage - Part 2 (Continued)

Originating Device	Destination Device			
	Softphone	Distributed Voice Server	Headquarters Server	Other
Headquarters Server	**Media Stream** UDP 10000-10550 RTP (configurable) **Traceroute** UDP, same as RTP	**RPC Connection Negotiation** TCP 111 RPC Port Mapper UDP 111 RPC Port Mapper TCP 135 MS RPC Port Mapper **Maintenance** TCP 1024-65535 RPC - Quicklook **Call Control** TCP/UDP 5500-5600 MSRPC DTAS/TMS Commands TCP 1024-65535 - DTAS/TMS Events TCP 1024-65535 MS RPC - DB Notify TCP 5441 - Call data UDP 5440 - Location Service UDP 5441 - Call Control UDP 5443 - Bandwidth Manager UDP 5445 - Admission Control UDP 5446 - DRS keepalive **Distributed Voice Mail** TCP 25 SMTP - Voice Mail transport **Transport** TCP 5432 – events (R8.1), triggers (R11), DDB (R11) **TMS** UDP dynamic [1024-65535] – broadcast. TMS-TMS disaster recovery 5430 – TMS/DTAS interserver communication	**Third Party Double-Take (If Configured)** TCP 8000 Heartbeat Transmit TCP 8005 Status Transmit TCP 8006 Stats Report	**Voice Mail Notification** TCP 25 SMTP **CDR** TCP 3306 - CDR archive on remote server (pre R10.x) TCP 4309 – CDR archive on remote server (R10.x)
Other (SIP endpoints, for example)		**Maintenance** TCP 80 HTTP – Quicklook **TCP** 5431 – 3rd party TAPI to TMS/DTAS communication	**Configuration Control** TCP 80 HTTP – Director Access Control-Session Manager (R11.x) TCP 80 – HTTP for SM AD/non-AD login authentication **TCP** 5431 – 3rd party TAPI to TMS/DTAS communication	