ShoreTel5

Maintenance Guide

Release 1.1

ShoreTel

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Version Information

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Contents

CHAPTER 1

Introduction

The *ShoreTel5 Maintenance Guide* provides a valuable resource for troubleshooting and solving problems that can arise in a highly complex system such as ShoreTel5.

Conventions

The guide uses the following text elements to identify special information.

`Courier`	Code examples and information that you type appears in this font.
UPPERCASE	Words that appear in uppercase identify keywords related to the ShoreTel5 system.

NOTE A note like this presents additional information or sidelights.

WARNING This cautionary note alerts you to situations where you can lose data or damage equipment by failing to follow instructions.

Syntax

The guide uses these typographic conventions to clarify syntax:

Italic	Indicates parameters that are variable and can change depending on usage. Also used to identify documents and path names.
< >	Brackets surround items that are supplied by a user, or are variables that appear in event codes.

For More Information

In addition to the *ShoreTel5 Maintenance Guide*, ShoreTel publishes other documents that can help you solve problems and maintain high system availability, including:

- *ShoreTel5 Planning and Installation Guide*, a comprehensive guide to planning and implementing a full-featured, enterprise-class VoIP system.
- *ShoreTel5 Administration Guide*, a detailed reference guide to administering a ShoreTel system.

CHAPTER 2

ShoreTel Architecture

Overview

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

- ShoreWare servers
- ShoreGear voice switches
- IP endpoints such as IP phones
- Client applications

The system may also include:

- ShoreTel Converged Conference Solution
- 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, ShoreWare Director, is used to configure and manage the whole system.

Figure 2-1 shows the various components of a ShoreTel system and how they interact with the public switched telephone network (PSTN) and IP-based networks.

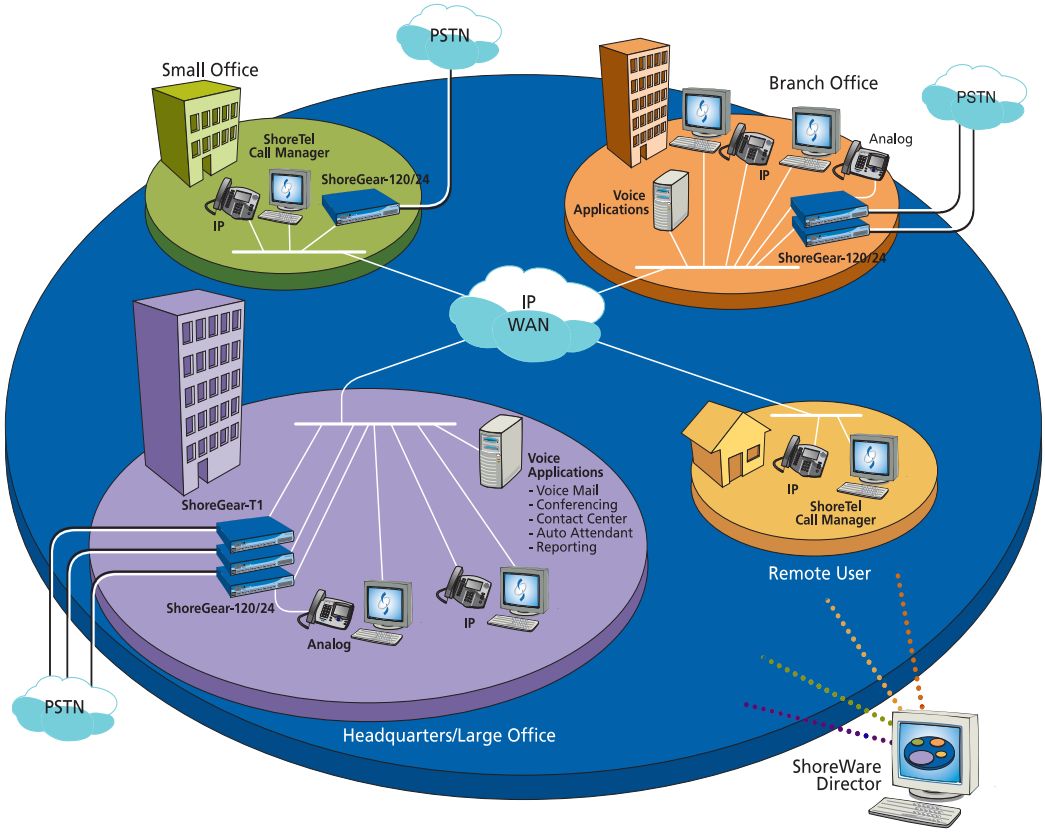


Figure 2-1 ShoreTel System

ShoreWare Servers

Each ShoreTel system has a main server called the Headquarters (HQ) server. Systems may optionally include distributed servers.Each server provides a local instance of TMS that supports applications such as voice mail and Personal Call Manager. Each instance of TMS manages its local SoftSwitch and can be configured to manage ShoreGear voice switches as well. The distributed servers continue to rely on the HQ server for configuration changes, but otherwise can operate independently of the HQ server.

ShoreGear Voice Switches

ShoreTel ShoreGear 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 ShoreGear voice switches receive their configuration information via TMS.

IP Endpoints

The ShoreTel system manages calls and applications for three types of IP endpoints: IP phones, soft phones, and ShoreTel converged conference bridges. IP endpoints are identified by IP address and can exist anywhere on the network.

ShoreWare Client Applications

The client applications, including Personal Call Manager, Voice Mail Viewer, and Operator client, interact with the TMS using the Telephony Application Programming Interface (TAPI) for call handling and the Client-Server Internet Service (CSIS) interface for data handling. Client applications use CSIS to retrieve and update data through the ZIN Manager (DCOM) interface.

Personal Call Manager

The Personal Call Manager (PCM) provides desktop call control as well as voice mail, directory, and call logging features. Microsoft Outlook users can integrate their voicemail, contacts, and calendar with the ShoreTel5 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 (Figure 2-2), 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 voice mail systems and automated attendants, to servers across locations, rather than centralizing applications at the network core.

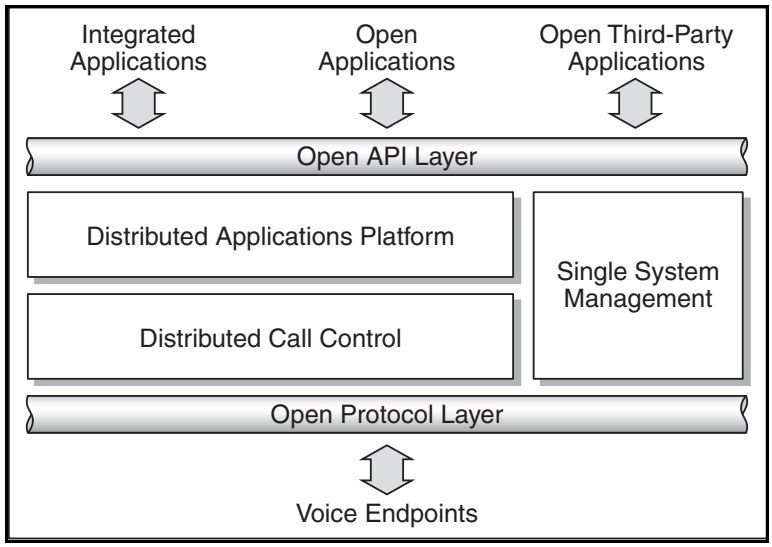


Figure 2-2 The Distributed IP Voice Architecture of the ShoreTel System

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

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 ShoreWare Telephony Management Service (TMS) and the ShoreWare Distributed Telephony Application Service (DTAS).

TMS runs on each ShoreWare server and observes all call activity for the SoftSwitch and ShoreGear voice switches it manages. DTAS also runs on each ShoreWare server and directs requests to the appropriate TMS. By putting a server at the same site as the users, applications such as voice mail and the Personal Call Manager can run regardless of the network availability to the Headquarters server. In addition, by hosting applications, services, and APIs on multiple ShoreWare servers, the system can scale as necessary by adding ShoreWare servers.

The ShoreWare TMS/DTAS software exposes a Telephony Application Programming Interface (TAPI) for call control, and a TAPI WAV interface for media playing and recording. These open APIs allow value-added applications to be added to the ShoreTel system to provide voice services.

Even when there are multiple application servers, the ShoreTel system is still 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 SIP protocol, ShoreTel's distributed call control software runs on every ShoreGear voice switch in the ShoreTel system. Each switch call control element manages the call setup and teardown, including features such as transferring, conferencing, and forwarding calls, using call permissions, and call routing 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 ShoreGear voice switch goes offline, all other ShoreGear voice switches continue operating. When the voice switch comes back online, it rejoins the voice network with no impact on system operation. There is no server involved with the basic telephony, so the system delivers levels of availability unmatched by even legacy vendors.

ShoreGear switches build an internal routing database from the peer-to-peer communication with other switches. Each ShoreGear switch contains routing information for all endpoints in the system, including information regarding trunk selection for outbound calls (unless Distributed Routing Service has been enabled. See "Distributed Routing Service" on page 2-5.) When a user places a call from any extension, each switch can route the call to the correct ShoreGear switch based on its internal routing database. Sites can typically support up to 60 ShoreGear voices switches depending on the system configuration.

The heart of the ShoreTel5 system is the distributed call control software, which runs on the ShoreGear voice switches on top of VxWorks™ a real-time 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. The voice switches communicate on a peer-to-peer basis, eliminating any single point of failure. For instance, if one ShoreGear voice switch goes offline, all other ShoreGear voice switches continue operating. When the voice switch comes back online, it rejoins the voice network with no impact on system operation. There is no server involved with the basic telephony, so the system delivers levels of availability unmatched by even legacy vendors.

Distributed Routing Service

Distributed Routing Service (DRS) allows larger systems to scale beyond 60 switches up to a total of 200 switches (including SoftSwitches). The Distributed Routing Service is optional on systems up to 60 switches, but must be enabled on systems with 60 or more switches.

When Distributed Routing Service is enabled, ShoreGear switches only exchange routing information with other switches configured in the same site, rather than exchanging information with every switch in the system. Although each ShoreGear switch only maintains routing information within its site, each ShoreWare server also includes an instance of the Distributed Routing Service, which maintains system-wide routing information. When site-to-site calls are initiated, ShoreGear switches contact the Distributed Routing Service in order to find the ShoreGear switch or switches necessary to complete the call.

In a system with more than one ShoreWare server, the ShoreGear switches may contact an alternate instance of the routing service if the primary instance is unreachable. ShoreWare servers have a hierarchical relationship, with the Headquarters server at the top of the hierarchy. As you add servers to the system using ShoreWare 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 ShoreGear switches at the same site.

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 call, the call will be redirected to the Backup Auto-Attendant.

Single System Management

The ShoreTel system provides a browser-based network management tool called ShoreWare 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, voice mail, an extension, a mailbox, an Auto-Attendant profile, and an email reminder to download the desktop software. In addition, the user can be added to a Workgroup, if needed. You add new users and place them in Workgroups from a single management screen.

NOTE The ShoreTel Converged Conference Solution and the ShoreTel Contact Center Solution are managed separately with their own management systems.

The ShoreTel system provides automated software distribution for all components on the system. When you add a new ShoreGear voice switch to the system, it is automatically upgraded to the current software release by the ShoreWare server. Existing ShoreGear voice switches will download the current software when you reboot the switch (see “ShoreGear Firmware Upgrades” on page 4-2). The Headquarters server does not upgrade distributed servers. Distributed servers must be upgraded independently.

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

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

The ShoreTel management software also provides a complete suite of maintenance tools that enable you to monitor and change the status of components on the system. The system can be configured with 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
- Media

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

Call Control

ShoreTel uses two protocols to process and manage calls:

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

Media Gateway Control Protocol (MGCP) is used between IP phones (and other IP endpoints) and ShoreGear switches. MGCP manages the setup and teardown of media streams and some basic phone operations.

Figure 2-3 shows where SIP and MGCP are used in a ShoreTel system.

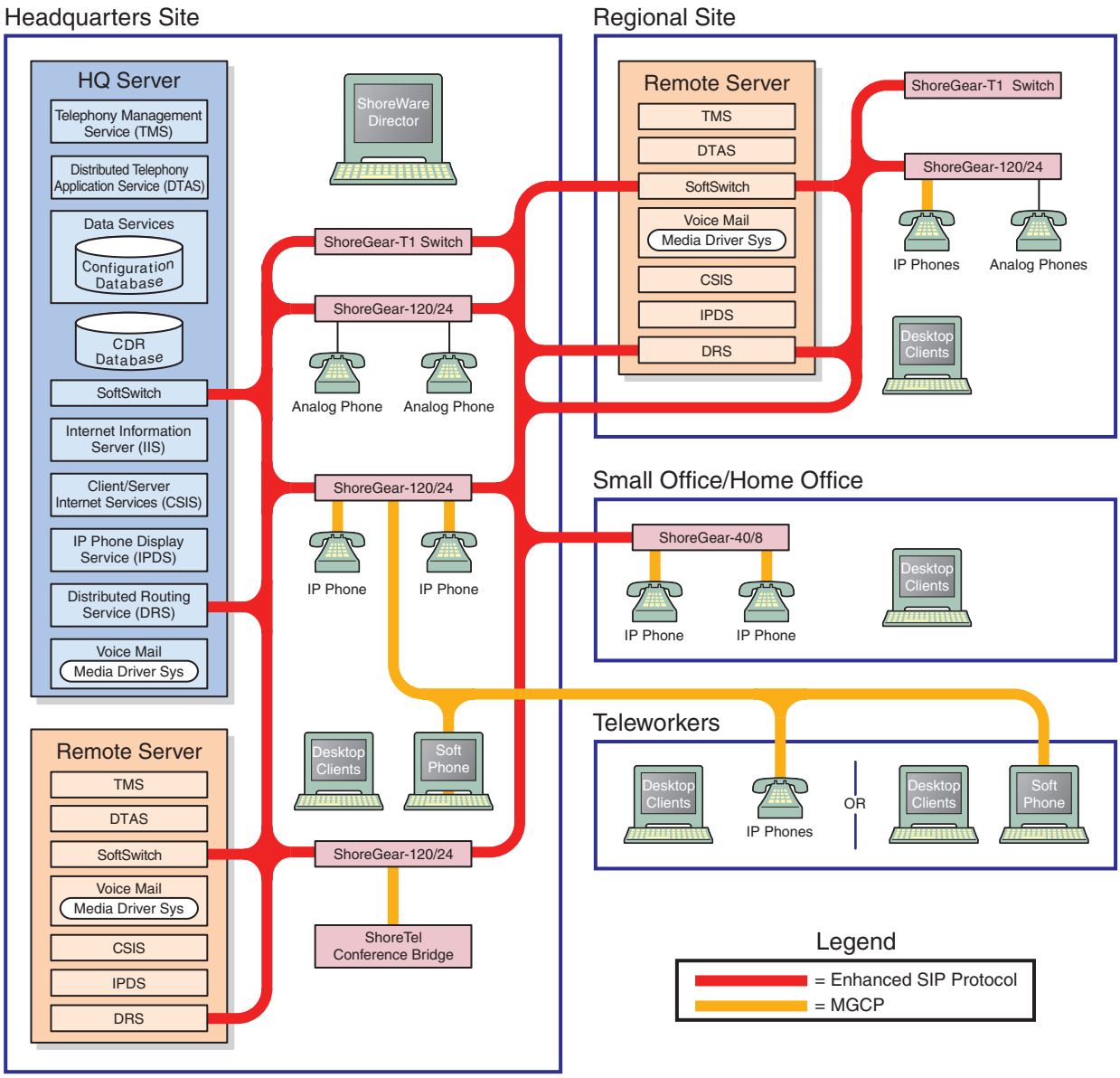


Figure 2-3 SIP and MGCP in a ShoreTel System

Call control between ShoreTel switches is based on the emerging 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 next-generation protocol standard for real-time communications.

ShoreTel's Enhanced SIP Call Control

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

- User Agent
- Location Service
- Local Call Routing 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	*nnn* = extension number
	ip_addr = ip address
	5441 = UDP port number used by ShoreTel Call Control

For trunks, the URL syntax is:

sip:TGrp_*xxx*p*yy*@*ip_addr*:5441	*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 dead switches.

Local Call Routing Service

A Local Call Routing Service (LCRS) routes calls on the basis of information obtained via LSP. It translates dialed numbers into SIP URLs—physical addresses.

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 ShoreGear switch.

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

Figure 2-3 shows a hypothetical system with the call control protocols illustrated in simplified form.

Media Gateway Control Protocol

IP phones and other IP endpoints communicate with ShoreGear 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

Figure 2-3 shows a hypothetical system with the call control protocols illustrated in simplified form.

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 via Microsoft's Distributed Component Object Model (DCOM) protocol. ShoreTel also uses DCOM to send call information to the Call Detail Report (CDR) database, which is in Crystal Reports format.

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

Figure 2-4 shows a hypothetical system with DCOM communication flows.

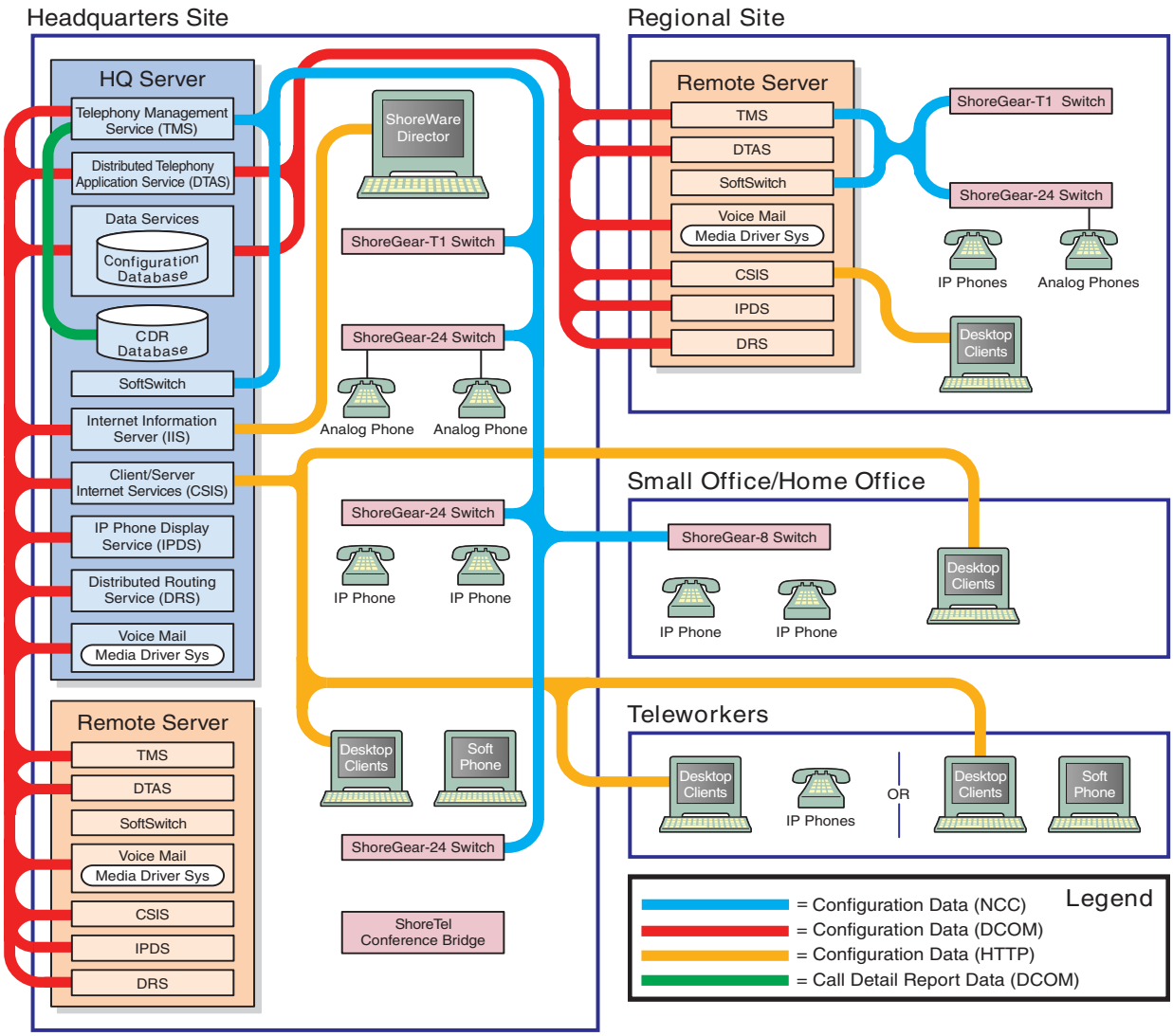


Figure 2-4 DCOM Protocol in a ShoreTel System

TAPI

All ShoreTel applications, including Workgroups, Voice Mail, and Account Code Collection, communicate via TAPI to other system components. All applications that need to interact with distributed call control do so via TAPI. Applications use TAPI to communicate call control information to TMS, and TMS communicates this information to all other system components as needed.

For example, whenever a user dials a number, the ShoreGear switch notifies TMS. TMS then presents that call information to the application via TAPI.

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 that would be needed if every application had to connect to every TMS instance.

Switches are assigned to specific TMS servers through ShoreWare Director. Assignment of a 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.

TAPI requests invoke ShoreTel's Remote TAPI Service Provider, which uses Remote Procedure Calls (RPC) to communicate with TMS. TMS uses Network Call Control to exchange commands and events with ShoreGear voice switches so that TMS can present extensions and trunks as TAPI lines to the applications.

Figure 2-5 shows how the ShoreTel system uses NCC and RPC to pass TAPI information in the system.

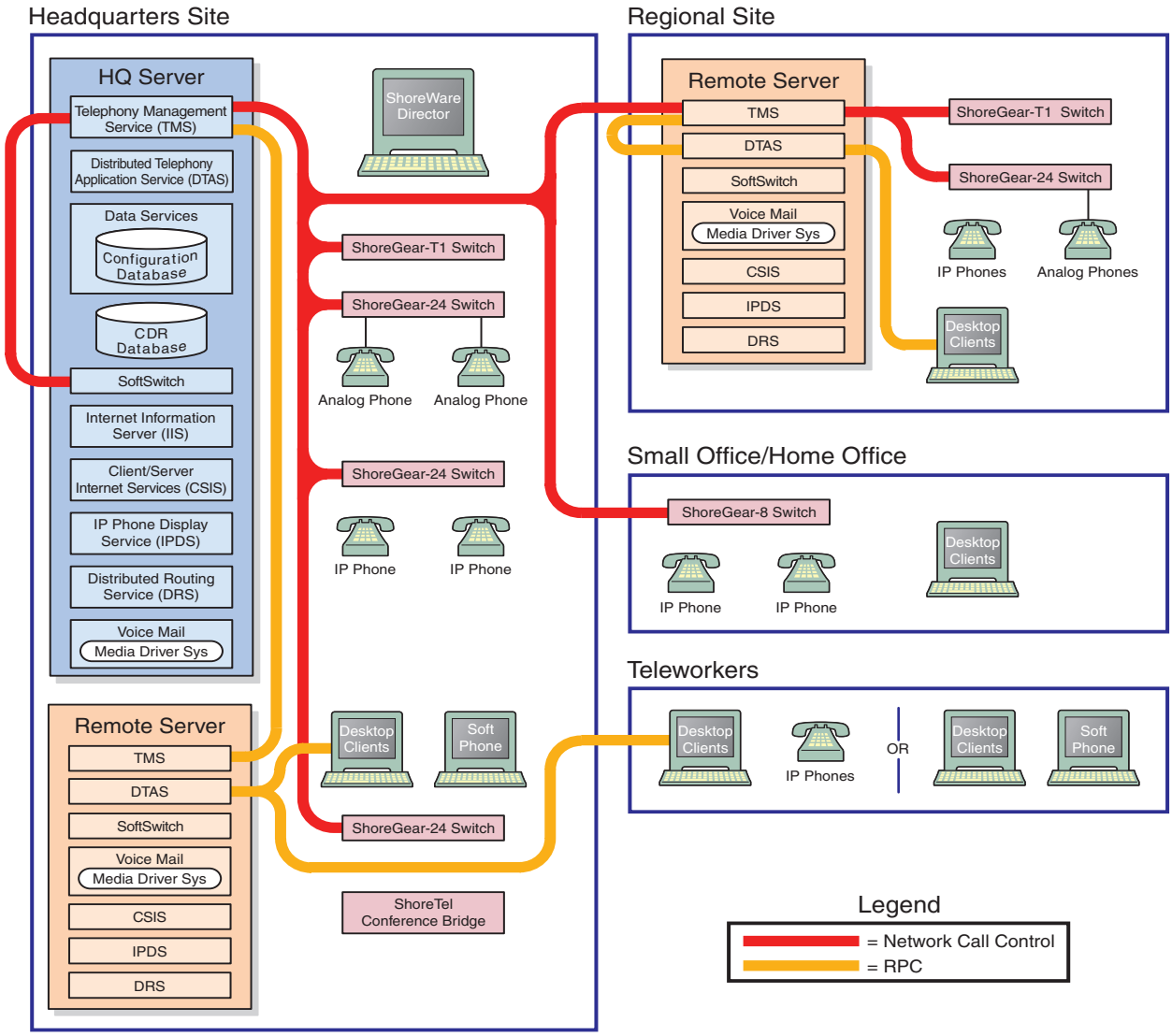


Figure 2-5 NCC and RPC Communications in a ShoreTel System

Media

Media travels through the ShoreTel system using Real-Time Protocol (RTP). After call setup, media flows directly between IP phones via RTP. The ShoreGear switch is involved only when setting up or tearing down a call.

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, 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.

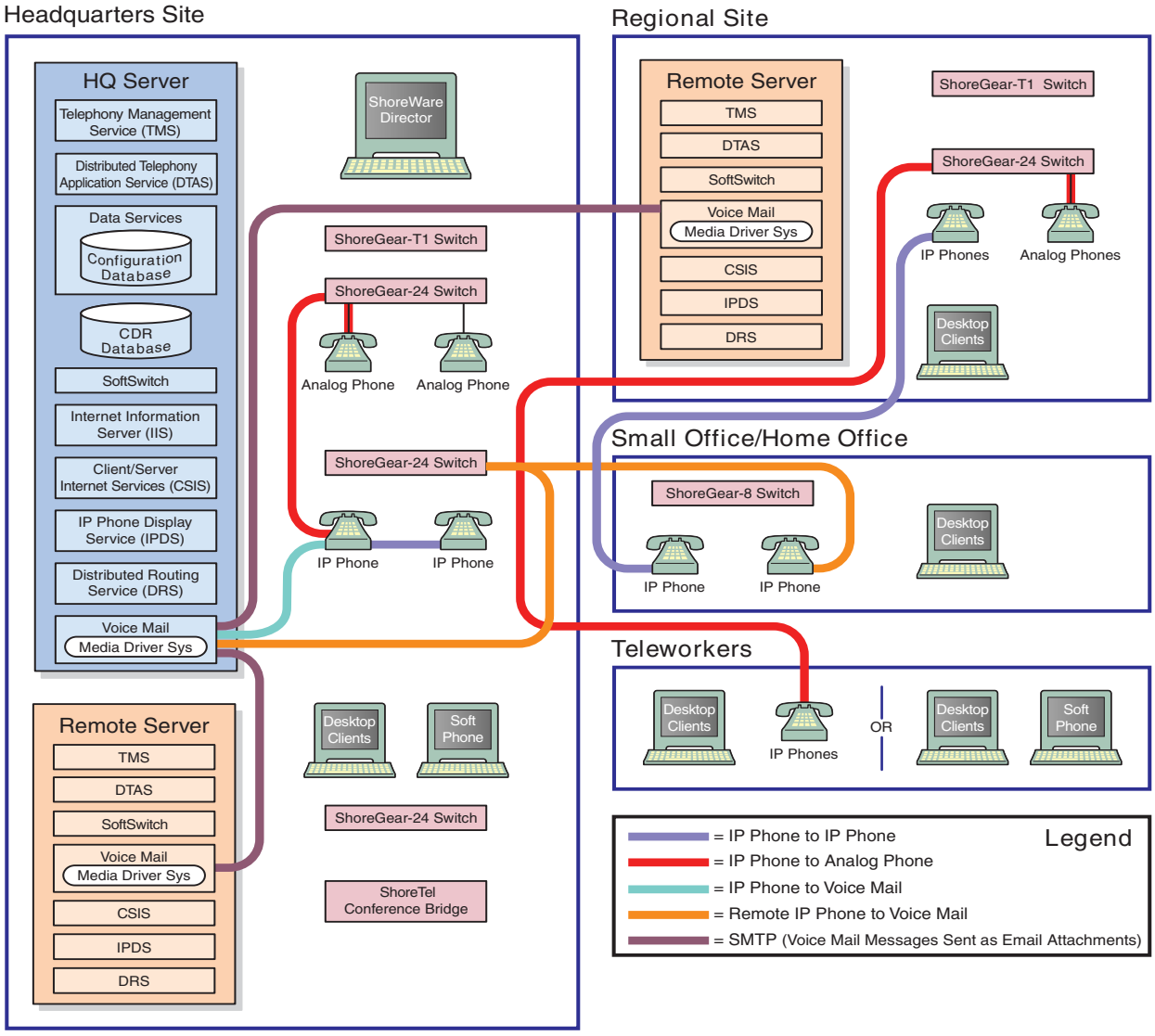


Figure 2-6 Media Traffic in a ShoreTel System

IP Phone to IP Phone

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

IP Phone to Analog Phone

Analog phones depend on the ShoreGear switch to which they are connected. Media from IP endpoints must pass though the ShoreGear 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 Voice Mail

Voice mail media from analog phones passes through the switch supporting the analog phone before going to voice mail via the server's media driver. When the analog phone is located on the same LAN as the host server, the ShoreGear voice switch connects to the server using a Mulaw codec. If the analog phone is connected via a WAN, and there are ShoreGear voice switch resources available, the ShoreGear voice switch will use an inter-site codec (G729 or ADPCM). If ShoreGear voice switch resources are not available, the call will revert to the Mulaw codec.

IP Phone to Voice Mail

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

Voice Mail Between Servers

When recorded voice mail messages are transferred between servers, they are sent via SMTP.

System Reliability

System reliability is ensured at several levels, including:

Distributed Switch Control

The ShoreWare Telephony Management Service (TMS) runs on every ShoreWare distributed server, ensuring switch control even if there a WAN outage between the remote server and the headquarters site. Since 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's provide local control of switches and local control by applications such as the PCM client and IPDS via TAPI. 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 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 as

in previous releases. Scalability is also increased because TMS instances handle a subset of PCM 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 with the HQ database, DTAS continues to operate except that additions and deletions to the configuration will not been seen by IPDS. DTAS services involving the local TMS will be available. DTAS operations involving remote TMS instances not reachable because of the WAN outage will not be available.

Telephony operations involving locally controlled phones will be available. Monitoring of phones controlled by TMS's not reachable because of a WAN outage will not be available.

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

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' Class of Service and bypasses the caller's call permissions. For systems using Distributed Routing Service (DRS), destinations allowing PSTN failover handling return a contact list with a failover number. When a site does not have connectivity to DRS, users at other sites with DRS connectivity will be able to reach the users at that site using PSTN failover (as long as the destination site has trunks to accept the PSTN calls). This limitation has the biggest impact for small offices that do not have a local ShoreWare server.

Distributed CDR

In the event of a WAN outage, CDR data is stored for up to two hours on the distributed server. 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.

For More Information

Also refer to Chapter 5 "IP Endpoints" for more information about failover. For configuration details about PSTN failover configuration, CDR data, or IP phone configuration, see the *Shoreline5 Administration Guide*.

Call Scenarios

To understand how the ShoreTel system processes calls, review the following call scenarios and flow charts.

On-hook Call from Personal Call Manager

Figure 2-7 shows the communication protocols and components participating in a call dialed from Personal Call Manager to a PSTN destination.

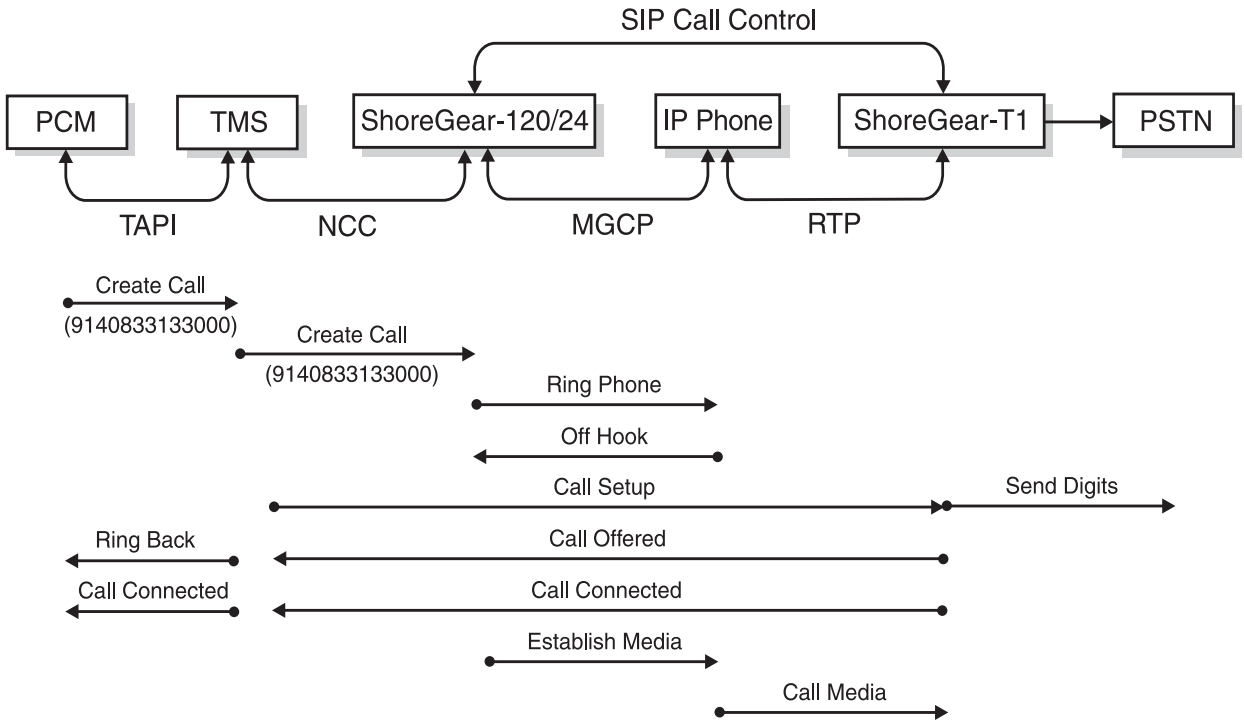


Figure 2-7 ShoreTel Communications for a Call from Personal Call Manager

Quick Dial Call from Personal Call Manager

Figure 2-8 shows how a call dialed from a user's Personal Call Manager Quick Dial is handled by the system.

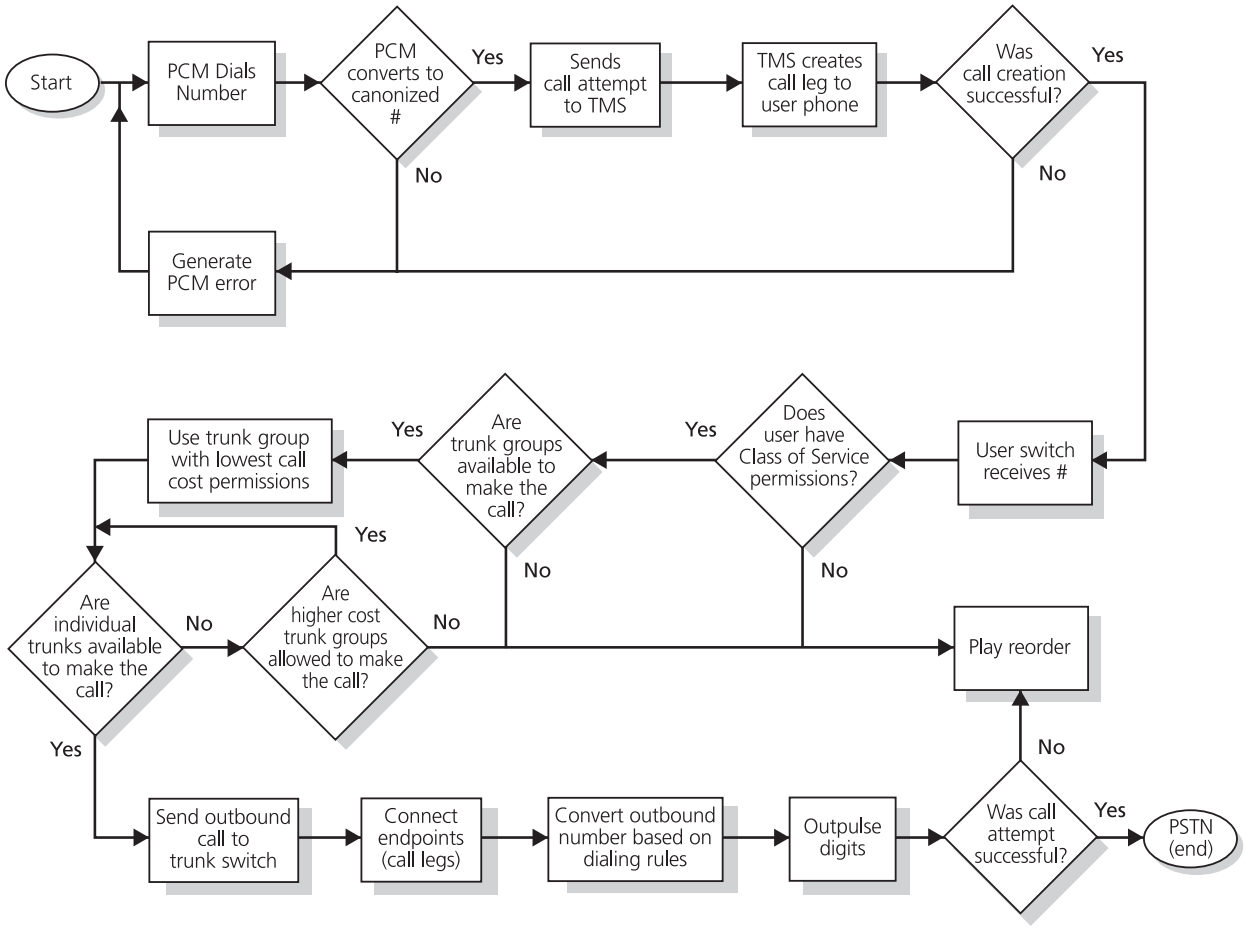


Figure 2-8 Call Flow for a Quick Dial Call from Personal Call Manager

Inbound Call from a Trunk

Figure 2-9 shows how an inbound call on a trunk is connected to its destination.

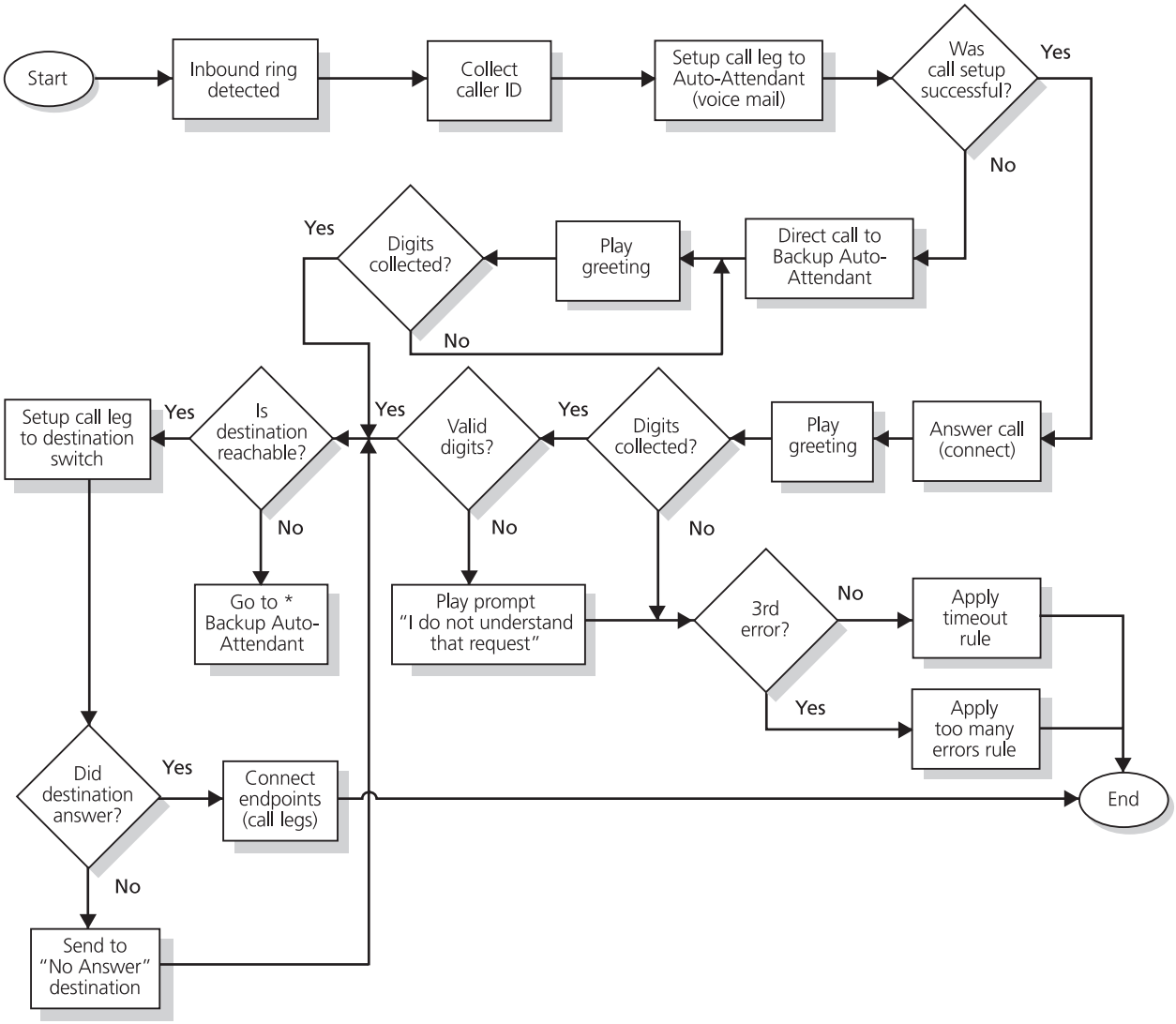


Figure 2-9 Call Flow for an Inbound Trunk Call

Reference

The following tables list the UDP and TCP ports used by ShoreTel processes.

TCP/IP Ports Used by the ShoreTel System

This section describes how ShoreTel system components interconnect via a TCP/IP network.

ShoreGear Voice Switch and ShoreWare Server Connections

Each ShoreGear voice switch exchanges information about the state of calls it is managing with the ShoreWare server. When a switch starts, it negotiates a connection to TMS using RPC. The source port used is dynamic and the destination port is negotiated with the ShoreWare server using the Sun RPC port mapper. The port mapper sends the request via TCP and UDP port 111. When the RPC port has been negotiated, the ShoreGear voice switch establishes a connection with the server using TCP ports in the 1024 to 65535 range. This connection persists until the Ethernet connection is lost, or either the switch or server is rebooted.

Each ShoreWare server uses a SoftSwitch to participate in the system's distributed call control. The SoftSwitch communicates with other ShoreGear voice switches using UDP ports 5440, 5441, 5442, 5443, 5445, and 5446. These ports are connected when the SoftSwitch is communicating with any other ShoreGear voice switch.

Switches and servers send and receive voice media using the RTP protocol on UDP port 5004. Media streams are established each time a connection between the server and switches is needed to send audio between the devices.

ShoreGear voice switches can be configured to boot using FTP as a boot source. This fallback method allows the switch to boot should its flash memory fail. When a switch is in boot from FTP mode, it downloads its operating system and call control software using FTP.

You can run switch diagnostics from the server using the ShoreTel tool ipbxctl. This tool runs a set of commands on the switch and sends the output to the server using TCP port 5555. This port is only used for the time needed to send the output.

Telnet connection to the ShoreGear voice switches is via the standard TCP port 23.

DHCP is used to set the IP parameters of the switch at boot up.

The following table illustrates the ports used for server to switch and switch to server communications.

Protocol	Transport	Source Port	Destination Port	Description
RPC	TCP		111	Used by SunRPC Port Mapper to negotiate TCP/UDP ports for TMS-to-switch communications.
RPC	UDP		111	Used by SunRPC Port Mapper to negotiate TCP/UDP ports for TMS-to-switch communications.
RPC	TCP	Dynamic	1024 - 65535	Used by Network Call Control to pass call status and control messages from the switch to the TMS. Ports are negotiated at startup and whenever the network connection is established.

Protocol	Transport	Source Port	Destination Port	Description
RTP	UDP	Dynamic	5004	Used to transport media steams to and from the ShoreGear voice switches, ShoreWare server, IP phones, and conference bridge ports.
Call Control	UDP	5440	5440	Location Service Protocol
Call Control	UDP	5441	5441	Used by ShoreTel Call Control protocol to send call control information between the ShoreGear voice switch and the server SoftSwitch.
Call Control	UDP	5442	5442	Used by Distributed Routing Service to route inter-site calls.
Call Control	UDP	5443	5443	Used by the Bandwidth Manager to communicate the bandwidth currently in use on the ShoreGear voice switch.
Call Control	UDP	5445	5445	Used by the Admission Control Manager.
Call Control	UDP	5446	5446	Used by Distributed Routing Service to route inter-site calls.
	TCP	Dynamic	5555	Used to pass output back to the server when commands are sent to the switch using the ipbxctl diagnostic tool on the ShoreWare server.
FTP	TCP	Dynamic	21	Used to download switch software when the switch is configured to boot from FTP.
Telnet	TCP	Dynamic	23	Used to connect a Telnet session to a ShoreGear voice switch.
DHCP	UDP	68	68	
BootP	UDP	68	68	Used to assign IP parameters to the switch when configured to use DHCP

ShoreGear Voice Switch to ShoreGear Voice Switch Connections

ShoreGear voice switches provide the distributed call control within the ShoreTel system. Each ShoreGear voice switch participates in the system's distributed call control. The switches communicate with other ShoreGear voice switches using UDP ports 5440, 5441, 5442, 5443, 5445, and 5446.

ShoreGear voice switches send and receive voice media using the RTP protocol on UDP port 5004. Media streams are established each time a connection between the server and voice switches is needed to send audio between the devices.

The following table illustrates the ports used for switch to switch connections.

Protocol	Transport	Source Port	Destination Port	Description
RTP	UDP	Dynamic	5004	Used to transport media steams to and from the ShoreGear voice switches, ShoreWare server, IP phones, and conference bridge ports.
Call Control	UDP	5440	5440	Location Service Protocol
Call Control	UDP	5441	5441	Used by ShoreTel Call Control protocol to send call control information between the ShoreGear voice switch and the server SoftSwitch.
Call Control	UDP	5443	5443	Used by the Bandwidth Manager to communicate the bandwidth currently in use on the ShoreGear voice switch.
Call Control	UDP	5445	5445	Used by the Admission Control Manager.

IP Phone to ShoreWare Server Connections

The IP phones participate in the distributed call control by communicating to the ShoreGear voice switches using MGCP. Each IP phone is assigned a call manager switch. The phone sends and receives call control information to the call manager switch using MGCP. MGCP uses UDP ports 2427 and 2727. These ports are established when the phone is active.

The switches and servers send and receive voice media using the RTP protocol on UDP port 5004. Media streams are established each time a connection between IP phones and switches or servers is needed to send audio between the devices.

The IP phones download firmware and configuration information from the ShoreWare servers using FTP to transport the files between the switch and the phone. FTP transport is via TCP port 21. The phone checks for software and configuration updates each time it is booted. If it detects the need for an update this happens automatically.

Telnet is used to establish a terminal session with IP phones.

DHCP is used to set the IP parameters of the IP phone at bootup.

The following table illustrates the ports used for IP phone to ShoreGear voice switch and server connections.

Protocol	Transport	Source Port	Destination Port	Description
MGCP	UDP	Dynamic	2427	MGCP call control and status from the IP phone.
MGCP	UDP	2727	2727	MGCP call control and status from the ShoreGear voice switch.
RTP	UDP	Dynamic	5004	Used to transport media steams to and from the ShoreGear voice switches, ShoreWare server, IP phones, and conference bridge ports.
FTP	TCP	Dynamic	21	Used to load firmware and configuration information from the ShoreWare server.
Telnet	TCP	Dynamic	23	Used to connect a Telnet session to a IP phone.
DHCP	UDP			Used to assign IP parameters to the switch when configured to use DHCP.

ShoreWare Server to ShoreWare Server

Each ShoreWare server uses a SoftSwitch to participate in the system's distributed call control. The SoftSwitch communicates with other ShoreGear switches using UDP ports 5440, 5441, 5442, 5443, 5445, and 5446. These ports are connected when the SoftSwitch is communicating with any other ShoreGear voice switch.

When a voice mail message is left for a user on a server where their voice mail box does not reside, it is sent to the appropriate voice mail server using SMTP. This is done using TCP port 25 and is established on an as needed basis.

The following table illustrates the ports used for server to server connections.

Protocol	Transport	Source Port	Destination Port	Description
RPC	TCP	Dynamic	1024 - 65535	Used by Network Call Control to pass call status and control messages from the switch to the server TMS process. Ports are negotiated at startup and whenever the network connection is established.
Call Control	UDP	5440	5440	Location Service Protocol
Call Control	UDP	5441	5441	Used by ShoreTel Call Control protocol to send call control information between the ShoreGear voice switch and the server SoftSwitch.
Call Control	UDP	5442	5442	Used by Distributed Routing Service to route inter-site calls.
Call Control	UDP	5443	5443	Used by the Bandwidth Manager to communicate the bandwidth currently in use on the ShoreGear voice switch.
Call Control	UDP	5445	5445	Used by the Admission Control Manager.

Protocol	Transport	Source Port	Destination Port	Description
Call Control	UDP	5446	5446	Used by Distributed Routing Service to route inter-site calls.
SMTP	TCP	Dynamic	25	Used to send voice mail messages received on the source server to the server where the users voice mail box resides.

ShoreWare Server to ShoreWare Director Client

ShoreWare Director uses an Internet Explorer browser to connect to the ShoreWare server using standard HTTP protocol. This connection used for configuration and monitoring of the system and the port is established for the duration of the session.

FTP is used to transport prompt files when they are being recorded or listened to using ShoreWare Director.

The following table illustrates the ports used for server to ShoreWare Director connections.

Protocol	Transport	Source Port	Destination Port	Description
HTTP	TCP	Dynamic	80	Used by ShoreWare Director clients to communicate to the ShoreWare Director Web server running on the ShoreWare server.
FTP	TCP	Dynamic	21	Used to transport Auto Attendant, Workgroup, Route Point prompts, and greeting recording and reviewing.

ShoreWare Server to ShoreWare Personal Call Manager

The Personal Call Manager allows a user to manage personal options such as call handling modes, notifications, and other personal parameters of the ShoreTel system. Information is sent and received to the ShoreWare server using HTTP on port 5440 This port is established each time the PCM is launched on a desktop.

The server sends voice mail notifications and attachments to the voice mail viewer and Outlook using HTTP port 5440. The PCM sends call control requests to the ShoreWare server using the winsock protocol and receives call control information and status via RPC. The RPC connection is established by negotiating a port between 1024-65535 with the server. The RPC port is established for the duration of the connection and is reset each time the PCM is launched or the Ethernet connection is lost and restored.

The following table illustrates the ports used for server to PCM connections.

Protocol	Transport	Source Port	Destination Port	Description
HTTP	TCP	Dynamic	5440	Used by CSIS to send and receive voice mail messages between the server and the client. Used to send and receive configuration information.
Winsock				Used to send call control from the PCM to the ShoreWare server.
RPC	TCP	Dynamic	1024 - 65535	Used to receive call control status from the server.

CHAPTER 3

ShoreWare Servers

Overview

The ShoreTel voice over IP telephony solution is a suite of software modules, applications, and services running on a ShoreWare server. Every ShoreTel system has a main server called the Headquarters server. In a single-site system, the Headquarters server may be the only ShoreWare server. More complex systems may include distributed servers 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 distributed servers for full system functionality.

Headquarters Server

The Headquarters server is the main ShoreWare server and hosts the voice applications platform and the management Web site, as well as the integrated voice applications. Typically, the Headquarters ShoreWare 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.

The ShoreWare server software runs on Windows 2000 Server, Windows Server 2003, or Advanced Server. Windows 2000 Server requires Service Pack 4 with all current Windows updates and Internet Information Services as well as Jet4 Service Pack 8. Windows Server 2003 (Standard, Web, or Enterprise Editions) doe not require a service pack.

Remote Servers

The ShoreTel5 system also supports remote servers. Remote servers provide increased system reliability by duplicating some key services at remote sites. Each remote server has an instance of TMS that only connects to and manages the SoftSwitch. The SoftSwitch provides extensions for use by the local Auto-Attendant, Workgroups, and virtual users.

ShoreTel remote servers can also be configured to support specific distributed voice applications such voice mail. Remote servers only have TAPI access to the local SoftSwitch. 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 remote server manages its own SoftSwitch, as well as ShoreGear switches assigned to it.

Remote servers are valuable for the following purposes:

- They reduce bandwidth 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.

Call control is provided by Headquarters and remote servers even if full network connectivity is unavailable. However, calls to unreachable endpoints cannot be made, and call detail recording requires Headquarters 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 Microsoft Distributed Component Object Model (DCOM) 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 ShoreWare Director and system components access the database to read/write current state information. User configuration options are written to the database from Personal Call Manager, the telephone interface (voice mail options), and Web Access. Director is accessed via a Web browser,

The service ShoreTel-ZIN, running on the Headquarters server, manages these DCOM communications for TMS. There is a single instance of the ShoreWare database on the Headquarters server.

Each ShoreTel service on a distributed server caches its own 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.

ShoreWare client applications, such as Personal Call Manager, use CSIS for data handling. The CSIS server communicates with ShoreWare clients via HTTP. ShoreWare Director accesses the configuration database though IIS.

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

NOTE Do not change any permission or security settings for ShoreWare components.

Features accessible from the voice mail phone interface that require write access to the database, such as Anyphone and Call Handling Mode changes, are not supported during an outage.

The block diagram below illustrates how ShoreWare services use Distributed Component Object Model (DCOM) to access the configuration database, and thus maintain the system status.

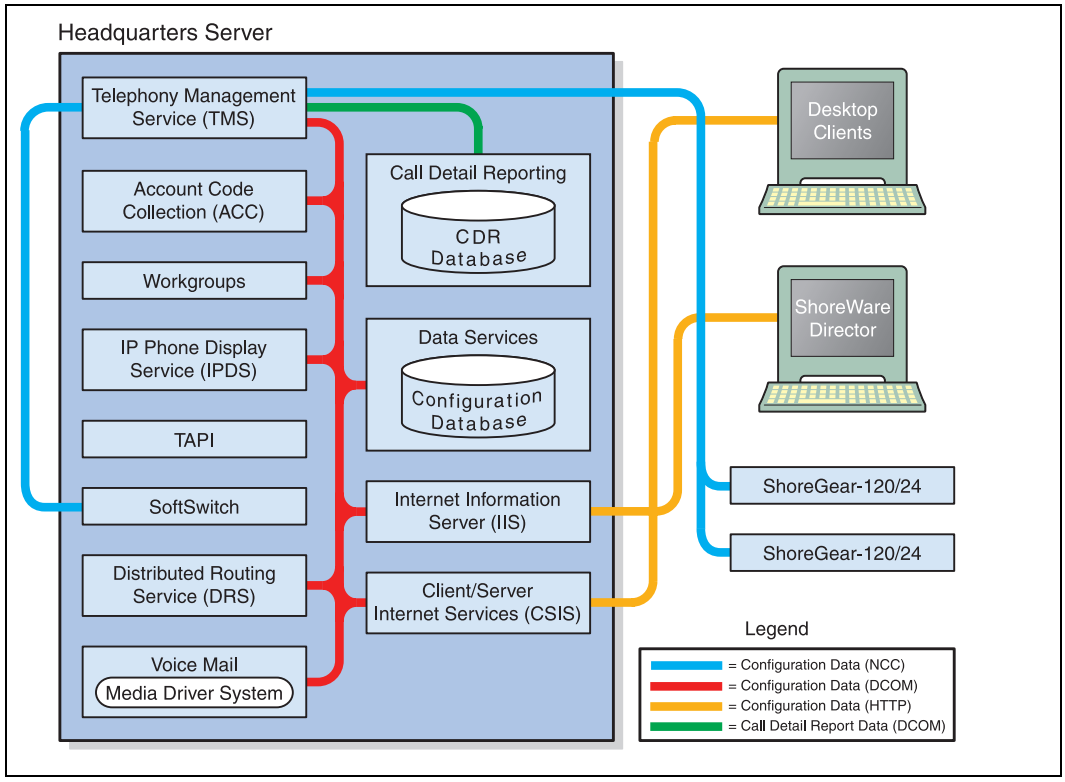


Figure 3-1 ShoreWare Server Database Communications

Internet Information Service

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

WARNING If the anonymous access user gets modified or its password is changed, the TMS service will not start. Changing the properties of this user may mean you have to rebuild the server to recover.

FTP Services

Both the Headquarters and remote servers make an FTP service available for fall-back use by ShoreGear 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 ShoreWare 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. They will 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/Server Internet Services

CSIS is a ShoreTel proprietary protocol that uses HTTP messages to communicate between client PCs and Shoreware servers. The CSIS protocol communicates configuration updates such as call handling mode settings and Outlook integration. The CSIS client holds open a pending HTTP request in order to receive notifications from the CSIS server. 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 HQ server only.
- IP Phone Display Service (IPDS)—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 (IPDS) controls any actions by the IP phone display not controlled by the device's firmware or switches.

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 ShoreWare Director. For more information, see the *ShoreTel5 Administration Guide*.

Call Detail Reporting

TMS use DCOM 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 ShoreWare server. The call detail records are used to generate CDR reports.

For more information on Call Detail Reports, see the *ShoreTel5 Administration Guide*.

Call Control Communications

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

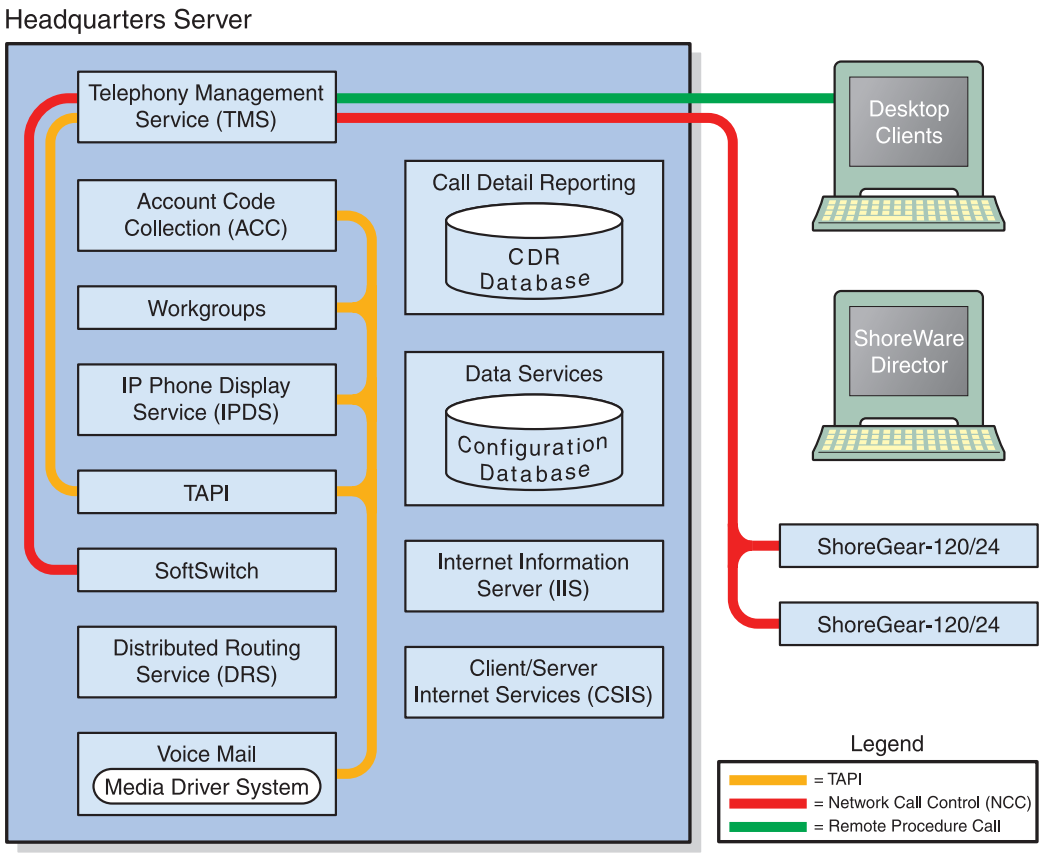


Figure 3-2 ShoreWare Server TAPI Communications

TAPI

The ShoreWare server and its client applications use Telephony Application Programming Interface (TAPI) to direct applications and provide the system with call control.

The TMS application service acts as the ShoreTel 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 ShoreWare clients, (such as Call Manager), ShoreWare server (for example, voice mail servers), and distributed servers. Every application that has 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 ShoreGear switches, and a combination of RPC and Windows sockets (Winsock) to communicate with a remote TAPI service provider.

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

Never modify the TAPI properties of ShoreTel Remote TAPI Service Provider. Modified TAPI properties can cause ShoreTel clients or applications to fail.

Distributed Routing Service

DRS on the server provides routing information when switches are unable to connect a call to through the local path. ShoreTel's enhanced SIP protocol is used for the switch to DRS communications (see Figure 3-3).

Media Communications

Media, from the perspective of the server, is connecting 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 (e.g. 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 3-3 shows the switch-to-switch call control and media communications flows.

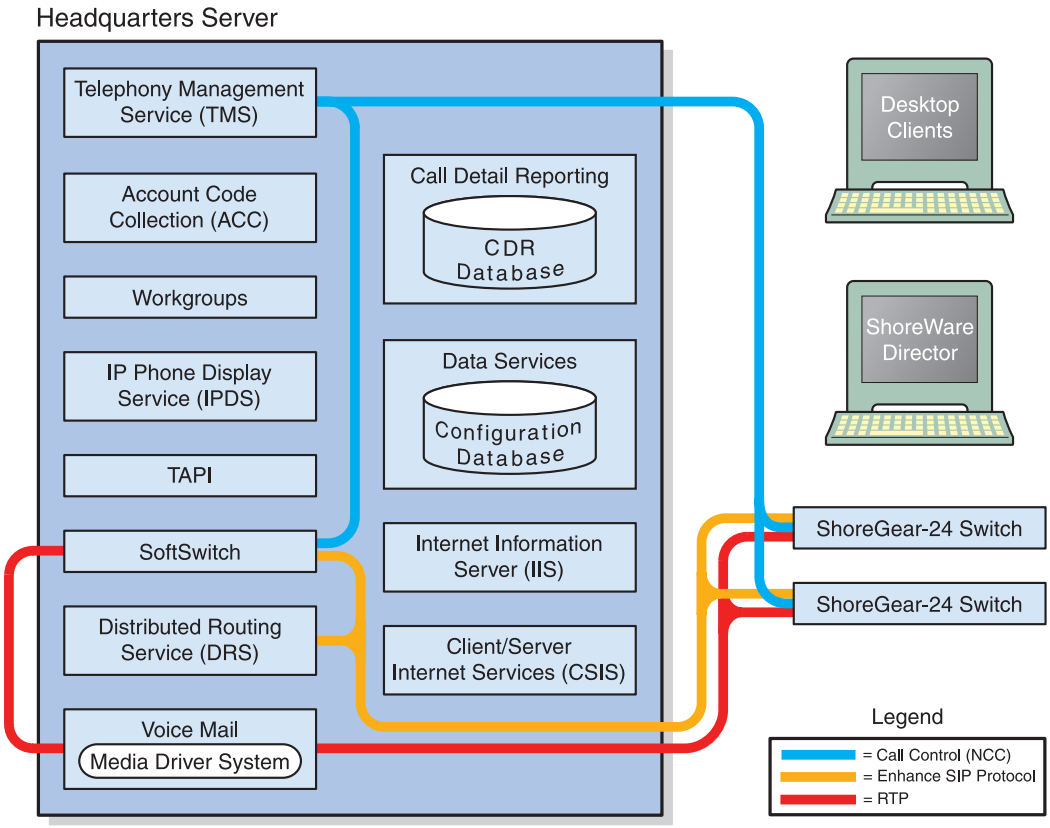


Figure 3-3 ShoreWare Server Call Control and Media Communications

For more information on ShoreTel's SIP-based call control, see "ShoreTel's Enhanced SIP Call Control" on page 2-8.

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 DCOM 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 28.8 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

Should the Headquarters server lose network connectivity, the distributed voice mail application allows SoftSwitches on distributed ShoreWare servers to continue handling voice mail calls and access the Auto-Attendant.

During an outage, users can only access voice mail though their phone interface. If users were running PCM at the time of the outage, they can still compose and playback messages. Users who were not running PCM at the time of the outage, or who restart PCM, will not be able to access their voice mail boxes until connectivity is restored.

Voice mail messages to mail boxes hosted at other sites will be 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 the Headquarters 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

The Account Code Collection Service (ACC) is a TAPI application running on the Headquarters 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 ShoreGear 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 Headquarters 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

CSIS exposes a list of account code names and numbers within Call Manager 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 ShoreGear voice switch. The SoftSwitch hosts all voice mail, Auto-Attendant, and Workgroup extensions as well as route points. There is a major impact to the system when the softswitch is down or having problems. Loss of connectivity to the SoftSwitch makes the voice mail, Auto-Attendant, Workgroups, and route points supported by the SoftSwitch unavailable.

The SoftSwitch receives and transmits information using the same communication paths and protocols as the “hard” 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 ShoreWare server hosting the switch, as specified on the Application Server page in ShoreWare Director. For more information on editing the SoftSwitch parameters, see the *ShoreTel5 Administration Guide*.

Maintenance

Server Software Upgrades

An installation of the server software refers to the first time the software is installed on a server. This takes place only once and can be done with any version of ShoreWare software.

Server software upgrades take place any time new ShoreTel software is loaded. The Setup program detects the installed software and automatically takes care of converting any system files or databases. In general, you can upgrade any two previous major versions of the ShoreTel software to the current major version. For examples, upgrades to ShoreTel5 Release 1.1 are supported from Shoreline4 Release 2 and Shoreline4 Release 3.

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.

Recommended Files to Backup

It is recommended that you save the contents of the *Shoreline Data* directory and all subdirectories to a safe location before performing any significant offline maintenance, including system upgrades or installing security patches or service packs. Typically, backing up the *Shoreline Data* directory copies every dynamic file necessary to recover a ShoreTel system.

NOTE You may not want to backup the *Shoreline Data\logs* directory since this information is not necessary to recover the system and the files are often quite large.

At a minimum, it is recommended that you back up the *Shoreline Data\Database\ ShoreWare.mdb* file after making database changes. This allows you to recover the entire ShoreTel system with the exception of saved voice mail, personal names and greetings, and menu and workgroup prompts.

Workgroup and Auto-Attendant Prompts

It is recommended that you store a copy of any Workgroup and Auto-Attendant prompts in a safe location, with the .wav files identified by their use. These files are located in the *Shoreline Data\Prompts* directory in the format *user-YYYYMMDD-HHMMSS*.wav where *user* is the name of the ShoreTel extension that was used to record the prompts. *YYYYMMDD-HHMMSS* is the time the file was saved. ShoreTel recommends renaming the file to reflects its use, for example, MainAAOnHoursprompt.wav.

Voice Mail and Auto-Attendant System Files and Messages

Files located in the VMS directory include voice mail "pointers," user names, greetings, and current voice mail messages. You may save these files as a backup, but be careful when using them to restore a system. Keep in mind that these files reflect the particular time a backup was made. The voice mail system is a dynamic, transaction-oriented system. Any transactions that occurred after the last backup will be lost.

NOTE The *Shoreline Data\VMS* directory and subdirectories also include all voice mail greetings for each user.

Diagnostic and Troubleshooting Information

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. Operational status and events are tracked by the system.

Using Quick Look

Quick Look, which is available from ShoreWare Director, gives the system administrator an overview of the ShoreTel5 system's health. It includes information about each site and the corresponding switches, ports, servers, and service. This is the first place you should look to determine the status of the system.

For details about Quick Look, please see the "Maintenance" chapter of the *ShoreTel5 Administration Guide*.

Using the Event Log

The ShoreTel system uses the Windows Event Log, viewed using the Event Viewer, to report information and errors that are of interest to system administrators. You can use the event logs in conjunction with Quick Look to determine the overall health of the system. You can also use the event log to determine whether events have happened to the system but are no longer a problem. For example, an overnight T1 outage that was corrected is no longer evident.

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

Using the System Logs

The ShoreTel system stores a number of 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 are difficult to interpret and will require the assistance of ShoreTel Customer Support to understand.

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. Figure 3-4 shows the Trunk Test tool interface.

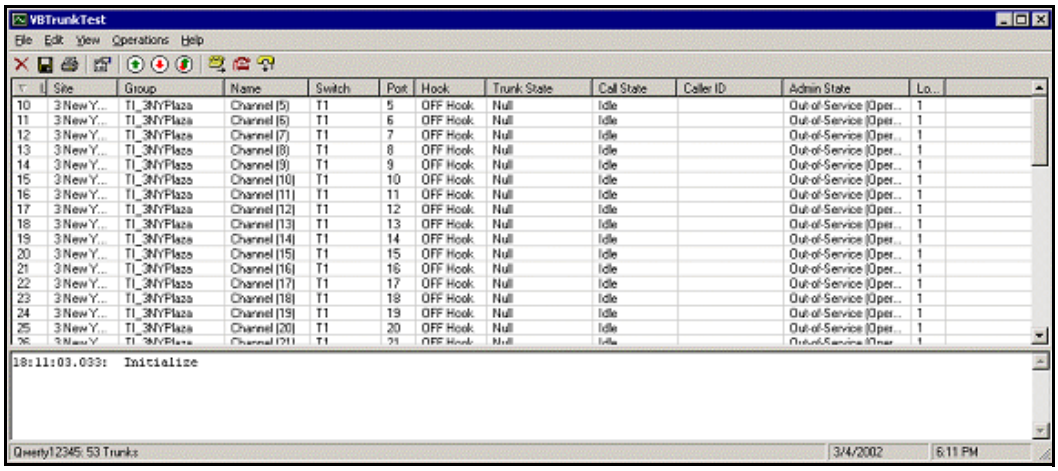


Figure 3-4 Trunk Test Tool

The tool is divided into two sections (see Figure 3-4). 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.

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.

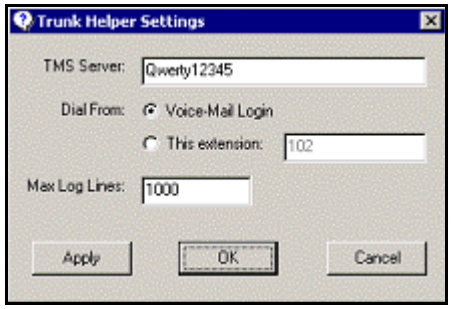


Figure 3-5 Trunk Helper Settings Dialog Box

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.

NOTE If this tool remains running on the server with an excessive number of lines selected, the server may have performance problems.

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 Phone Monitor

The Phone Monitor TAPI application allows you to view the state of a given IP phone according to TAPI (see Figure 3-6). If Phone Monitor doesn't display a phone, then

IPDS is not communicating with it. In this case, look for TMS or switch problems and not IPDS issues.

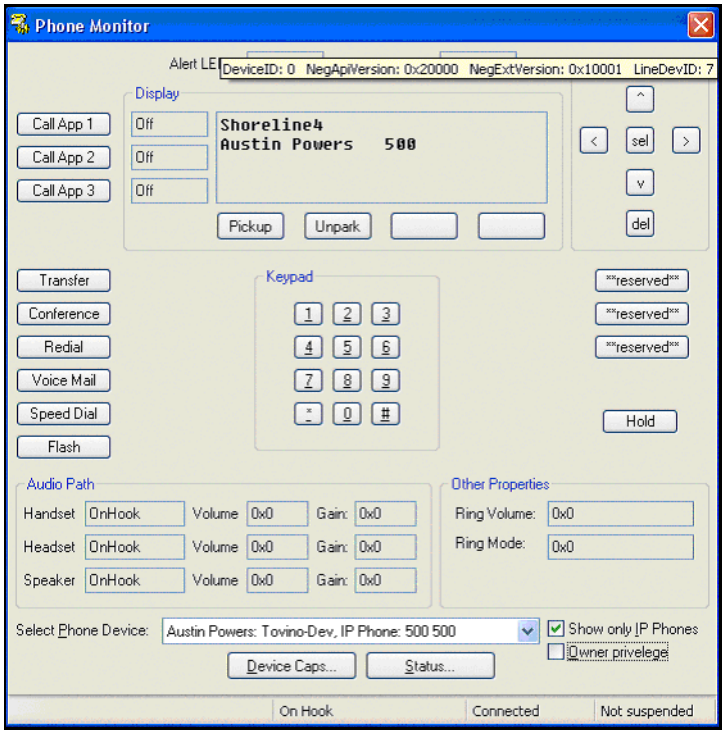


Figure 3-6 Phone Monitor

Launch the Phone Monitor from PhoneMon.exe, which is available in the Program files\Shoreline Communications\Shoreware Server folder. You can select the phone you want to monitor using the Select Phone Device drop-down list. This shows the current state of the phone according to TMS.

You can obtain details on phone capabilities and status are available from dialog boxes. The information contained in the boxes may be useful for additional troubleshooting by ShoreTel personnel.

Using TapiTest

TapiTest is a command-line TAPI application that lists all the phone and line devices supported by TMS. You can use this as an alternative method to check that a given IP phone is configured and connected, or to get a view of TAPI lines and extensions on the system. TapiTest is included on the ShoreWare server CD.

Use `TapiTest > TapiTest.txt` to dump the output to a text file.

Figure 3-7 TapiTest Output

Using the IPDS Configuration and Administration Tool

The IPDS Configuration and Administration tool allows you to set IPDS debug logging levels, reset IP phone displays, and send messages to IP phone displays.

Launch the IPDS Configuration and Administration tool by running IPPhoneCfgTool.exe, which is installed along with ShoreWare server in the Program files/Shoreline Communications/Shoreware Server/ directory.

You can use it to modify the debug flags and perform administrative and troubleshooting tasks. The IPDS Configuration and Administration Tool must run on the server.

Figure 3-8 shows the Debug Flags tab of the IPDS Configuration and Administration Tool. With this tool you can change the debug settings without editing the registry directly. IPDS tracks changes as you make them. By default, all debug flags are set to

"on." If the logs are routinely too large, turn off Tapi Flow (Level 2). Turning off anything more than that impairs your ability to troubleshoot problems effectively.

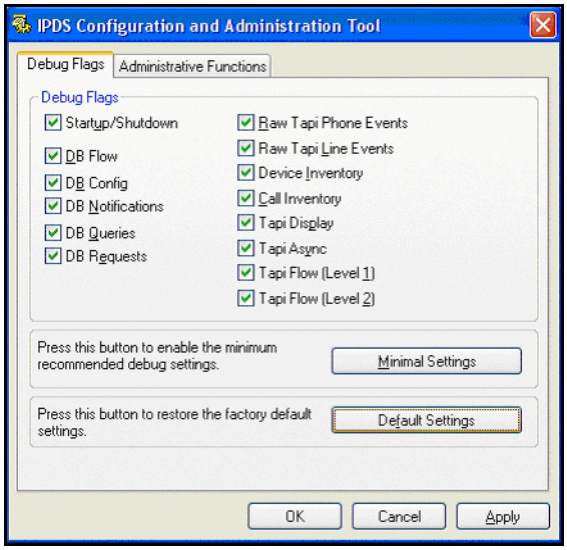


Figure 3-8 Debug Flags Tab

From the Administrative Functions tab shown in Figure 3-9, you can perform the following functions:

- **Reset Display** resets the phone display(s)
- **Send Message** sends a message to an IP phone
- **Resynch Database** resynchronizes the database information
- **Dump Statistics** dumps diagnostic statistics to the server log
- More debugging allows you to enable specific debug flags that are not specified on the Debug flags page.

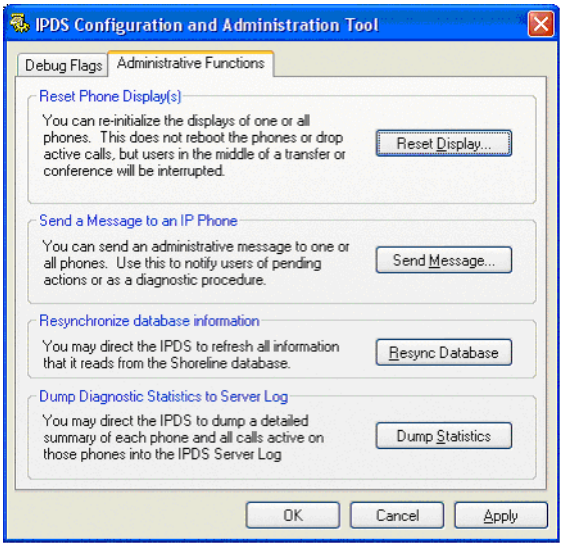


Figure 3-9 IPDS Administrative Functions Tab

Clicking **Reset Display** closes and re-opens the TAPI phone and line devices according to the settings chosen in the dialog box shown in Figure 3-10. You can select a phone by extension, specific IP address, or you can select all phones.

Figure 3-10 Reset IP Phone Display Dialog Box

Closing and re-opening the TAPI phone and line devices refreshes IPDS' knowledge of all calls for the selected phone(s) and re-sends display state(s) to TMS. If the display state sent to TMS matches TMS' current display knowledge, then display changes will not be propagated to the phones. If you use this feature and it does not appear to work, the communication between TMS, switches, and phones may be down.

Clicking **Send Message** displays the Send Administrative Message dialog box which allows you to override the display on the selected phone(s) to display the message you create (see Figure 3-11). This can be very useful, for example, if you want to notify all users of an upgrade. You can also use this feature to test the communication channel between the IPDS, TMS, switch, and IP phones.

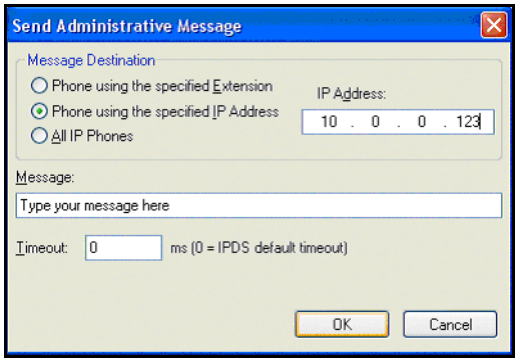


Figure 3-11 Send Administrative Message Dialog Box

The message is shown for the duration entered in the timeout box. The default value of 0 displays the message for 6 seconds (one North American ring cycle). The IP phone's LED flutters while the message is displayed. Users may cancel the message manually if they wish.

Clicking **Resynch Database** re-initializes all configuration data. This can be useful as a stopgap measure if you suspect that data is not up-to-date. Configuration data includes call handling modes, dialing locations, speed dials, and a few other items.

Clicking **Dump Statistics** sends information concerning current open phones, lines, and calls to the IPDS server log.

Using the cfg Utility

The *cfg* utility is a command-line tool that provides detailed information about the voice mail application.

Cfg.exe can be found in the *\shoreline communications\shoreware server* directory.

To start cfg:

1. Open a DOS window pointing to the *\shoreline communications\shoreware server* directory.
2. Enter `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 DOS window or in the voice mail logs.

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

Table 3-1 summarizes the commands available through the *cfg* utility. Variables are shown in italics.

Table 3-1 cfg Commands

Command	Parameters	Description	Comments
call *p*	*p* = phone number	Make a call from the voice mail application and play a prompt.	
closem		Close the open voice mail box.	
dmask *0x*	*0x* = mask hex	Set voice mail 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, 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 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 voice mail 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.	
lsys		List all voice mail system parameters.	
lsmtp		List status of distributed voice mail.	

Table 3-1 **cfg Commands**

Command	Parameters	Description	Comments
ltapi		List status of TAPI lines opened by voice mail.	
msinfo		Dump voice mail internal table to the voice mail log.	
open *m*	*m* = mail box	Open specified mail box.	
psinfo		Dump port server information to the voice mail 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.	

Reference

Services (Processes)

The ShoreTel5 ShoreWare server is made up of multiple processes working together to provide applications that include voice mail, ShoreWare Director, and Workgroups.

Each process runs as a Windows Service, starting automatically when the server starts.

The table below describes each service and its underlying process. All services run on the Headquarters Server. Services that run on distributed servers are marked in the **Dist. Server** column.

Service Name	Service ID	Process	Description	Dist. 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.mdb database.	
ShoreWare CSIS Server	ShoreTel-CSISSVC	*CSISSvc.exe*	Provides ShoreWare clients with an interface to the ShoreWare server. Manages voice mail notifications to voice mail clients, and is responsible for managing changes made to the database by the clients.	X
ShoreWare Director Utilities	ShoreTel-DirectorUtil	*KadotaUtil.exe*	Provides management capabilities for ShoreWare Director. Enables Quick Look to control services and browse the Event Log.	X
ShoreWare Event Watch Server	ShoreTel-EventWatch	*EventWatch.exe*	Monitors the NT Event Log and delivers email notifications of selected events.	X
ShoreWare IP Phone Configuration Server	ShoreTel-IPCS	*IPCSService.exe*	Manages the IP phone configuration process, including configuration files and the database updates.	
ShoreWare IP Phone Display Server	ShoreTel-IPDS	*IPDS.exe*	Controls any actions by the IP phone display not controlled by the device's firmware or switches.	

Service Name	Service ID	Process	Description	Dist. Server
ShoreWare Java Server	ShoreTel-JavaSvc	JProxy.exe	Provides update notifications for older clients.	
ShoreWare Notification Server	ShoreTel-Notify	TriggerServer.exe	Notifies server applications of changes to the ShoreWare configuration.	X
ShoreWare Port Mapper	ShoreTel-Portmap	PortMap.exe	Initiates RPC communication connections between the Telephony Management Server (TMS) and ShoreGear switches.	X
ShoreWare Software Telephony Switch	ShoreTel-SoftSwitch	VTSMain.exe VTSService.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
ShoreWare Distributed Routing Service	ShoreTel-DRS	DRS.exe	When active, this service provides location information for routing inter-site calls and additional routing information for trunk group selection.	X
ShoreWare Telephony Management Service (TMS)	ShoreTel-TMS	Tms.exe	The telephony platform for ShoreWare applications, ShoreWare services, and third-party TAPI applications.	X
ShoreWare Voice Mail Message Server	ShoreTel-MailServ	MailServ.exe	Service component of the ShoreWare voice mail system.	X
ShoreWare Voice Mail Application	ShoreTel-Vmail	VMail.exe	Service component of the ShoreWare voice mail system.	X
ShoreWare Voice Mail Port Manager	ShoreTel-PortMgr	PortMgr.exe	Service component of the ShoreWare voice mail system.	X
ShoreWare Distributed Telephony Application Server	ShoreTel-DTASSvc	DTAS.exe	Provides distributed telephony to application.	X
ShoreWare Workgroup Server	ShoreTel-WGSvc	WorkgroupServer.exe	This service manages workgroups, queues, and call distribution to agents.	
ShoreWare Database Management Service	ShoreTel-Zin	ZinManager.exe	Manages and updates the ShoreWare database via Microsoft's DCOM protocol.	
ShoreWare Account Code Collection Server	ShoreTel-ACC	ACC.exe	Provides account code services for collection and validation.	

ShoreWare Server File System

The table below identifies the directories where the ShoreWare server installs its files.

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 ShoreWare directories. All other users can be granted access on an as-needed basis.

NOTE 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.

ShoreWare Server	Contains all ShoreWare server system files and dlls.This directory is located on the drive where program files are stored: <drive>\program files\Shoreline Communications\ShoreWare Server.

ShoreWare Director	Contains all ShoreWare Director Web site files. This directory is located on the drive where program files are stored: <*drive*>\program files\Shoreline Communications\ShoreWare Director.
ShoreTel 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, including CDR.mdb used by the system's standard reports, three months of archive files, and one month of legacy text call records. The standard reports are also stored in this directory.<*drive*>\Shoreline Data\Call Records 2 NOTE The ShoreTel system stores call records in the CDR.mdb database and in text files that can be accessed by some legacy CDR storage devices. The CDR database is used by the ShoreTel standard reports.
Database	Contains the configuration database ShoreWare.mdb. This file stores all system configuration information and should be backed up regularly.<*drive*>\Shoreline Data\Database NOTE The ShoreWare database is stored in a Microsoft Jet 4 database file. The file is designed for application-level management by ShoreWare Director and other ShoreWare applications. While you can use Microsoft Access to view and troubleshoot consistency problems, do not attempt to modify the database with any other applications.
Logs	Contains all ShoreTel debugging logs. <*drive*>\Shoreline Data\Logs
Prompts	Contains copies of the 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
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 and should never be opened. 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. <*drive*>\Shoreline Data\VMS
MESSAGE	Contains all voice mail messages as .wav files, along with an .enl pointer file for each message. <*drive*>\Shoreline Data\VMS\MESSAGE
NetTempIn	Used by distributed voice mail servers. <*local drive*>\Shoreline Data\VMS\NetTempIn

Servers	<*drive*>\Shoreline Data\VMS\Servers
ShoreTel	Contains a subdirectory folder for each voice mail box configured on the system. Each user, menu, and distribution list has a mail box. There are also system mail boxes for voice mail access and forwarding. Each of the sub-directories contain the names and greetings for that mail box, as well as configuration and pointer files. <*drive*>\Shoreline Data\VMS\SHORETEL
Inetpub\ftproot	This is the default FTP directory installed by IIS. <*drive*>\Inetpub\ftproot
ts12	Contains the boot files and system software for the ShoreGear-12 and ShoreGear-Teleworker. <*drive*>\Inetpub\ftproot\ts12
ts24	Contains the boot files and system software for the ShoreGear-24.<*drive*>\Inetpub\ftproot\ts24
tsa	Contains the boot files and system software for all ShoreGear-40/8, -60/12, -120/24, -T1 switches. <*drive*>\Inetpub\ftproot\tsa
tst1	Contains the boot files and system software for earlier versions (pre-2004) of the ShoreGear-T1 and ShoreGear-E1. <*drive*>\Inetpub\ftproot\tst1

Registry

The ShoreTel software utilizes the Windows registry to store various parameters used by the ShoreTel system. These registry keys can be found in the following registry path:

HKEY_LOCAL_MACHINE\SOFTWARE\Shoreline Teleworks

ShoreTel Release Numbering Scheme

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

The following guidelines are used in the ShoreTel version numbering schema:

- Major = release; minor = update within release; build = build number of the minor/major combo; fourth number = 0
- CD or Package major.minor.build.0
  - Example 8.3.1601.0
- Server major.minor.build.0
  - Example 8.3.1601.0
- Remote Server major.minor.build.0
  - Example 8.3.1602.0
- Client major.minor.build.0
  - Example 8.3.1603.0
- Switch major.minor.build.0
  - Example 8.3.1604.0

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

CHAPTER 4

ShoreGear Switches

Overview

ShoreTel ShoreGear 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 top of VxWorks, a real-time embedded operating system designed specifically for mission-critical applications.

The 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 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 4-21).

Switches share their switch-specific configuration with the other switches in the system using the UDP-based Location Service Protocol (LSP). Switches keep up to date with other switches by propagating their own changes and receiving them from other switches. For information about how to view switch-to-switch communications, see “Commands Available Through VxWorks CLI” on page 4-21.

The ShoreGear 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 should be established. If necessary, the switch communicates with other switches (in some cases this may not be necessary, such as when 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, Personal Call Manager can provide information about the call to the user's desktop.

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

Maintenance

ShoreGear Firmware Upgrades

Each ShoreGear switch is shipped from the factory with the version of firmware that ShoreTel used to test the system.

When you install a switch, ShoreTel's TMS service is set up to detect the switch's firmware version and automatically upgrade your hardware to the latest version. This happens once while the switch still retains the factory-default settings. (You can use the ShoreWare Director Quick Look page to monitor the progress of the upgrade.)

NOTE ShoreTel also makes firmware upgrades available via system upgrades and patches.

Using Quick Look to Perform Upgrades

You can use the Shoreware Director Quick Look page to identify switches that require upgrades.

If an update is required for a switch, QuickLook reports either **Firmware Update Available** or **Firmware Version Mismatch**.

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. When a switch has mismatched firmware, it can still communicate with other switches of the same version and manage calls, but cannot support server and client applications.

To upgrade the switch:

Step 1 In ShoreWare Director, open the Maintenance > **Quick Look** page, and select the Site in which the switch is locate. Choose Reboot from the Command drop-down list in the switch row.

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

Performing a Manual Upgrade

To manually upgrade switch firmware, you need to invoke the *burnflash* command from the server.

To manually upgrade the switch's firmware:

Step 1 From the server command line, enter the *burnflash* command in this format:

```
C:\Program Files\Shoreline Communications\ShoreWare
Server>burnflash -s <switch IP Address>
```

ShoreGear Switch Boot Options

When a ShoreGear voice switch boots, it requires an IP address to connect to the network and an application program. ShoreGear 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 will not be lost.

If a DHCP server is not available, you can set the IP address manually from the switch's maintenance port. The ShoreGear-12 and ShoreGear-Teleworker voice switches can be set to use a static IP configuration via a Telnet session after they have received an IP address via DHCP or BootP.

The standard method for booting a ShoreGear voice switch is to boot from the switch's flash memory. When a ShoreGear 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 ShoreWare 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 ShoreWare 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. If 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 will use the last assigned IP address, if known. The switch continues to send requests to the DHCP server for an IP address.

In the case of a switch using an IP address from a previous state, if the DHCP sends a conflicting IP address, the entire system will be forced to restart. Use long lease times to

help prevent this from happening. ShoreTel recommends either static IP parameters or DHCP reservations.

If the switch does not receive an IP address from the DHCP server and has no IP address available from a previous state, the switch continues to poll the DHCP server until successful.

Setting the IP Address with VxWorks

If the switch has not been configured with an IP address and fails to boot from flash, it will not be able to 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.

NOTE Any changes you make to a boot parameter do not take effect until you reboot the switch.

NOTE This command line interface is not available via Telnet.

To connect to the maintenance port of a ShoreGear-40/8, ShoreGear-60/12, ShoreGear-120/24, or ShoreGear-T1/E1:

Step 1 Connect a serial cable between a personal computer and the ShoreGear switch.

Step 2 Use a terminal emulation program such as Tera Term Pro freeware to open a connection to the switch.

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 (?).

The following table describes the commands available in the CLI main menu:

Command	Description
(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.
? -- Help	Enter a ? to print this menu.

To select an option in Shoregear 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.

Command	Description
(0) -- Return to previous menu	
(1) -- Change IP address	
(2) -- Change IP subnet mask	
(3) -- Change gateway IP address	
(4) -- Change server IP address	This is the IP Address the ShoreWare server with the FTP service for the switch.
(5) -- Change boot method	
(6) -- Enable/disable DHCP	
(7) -- Change network speed and duplex mode	
? -- 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 ShoreGear CLI on the SoftSwitch

To run ShoreGear CLI diagnostics on the SoftSwitch, you must create a Telnet session. ShoreGear CLI commands are listed in "Using VxWorks Command Line Interface" on page 4-21.

To start a SoftSwitch Telnet session on the server:

Step 1 Create the following DWORD entry in HKey_Local_Machine\Software\Shoreline Teleworks\SoftSwitch:

```
TelnetEnabled
```

Step 2 Set the value to 1.

Step 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.

Step 4 Press ENTER.

There are no usernames or passwords to enter. This immediately logs you into the SoftSwitch.

Step 5 Press ENTER a second time to get the SoftSwitch prompt.

The prompt is as follows:

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

Step 6 Enter CLI commands as described in "Using VxWorks Command Line Interface" on page 4-21.

To end a SoftSwitch Telnet session:

Step 1 Enter `exit`.

Step 2 Press ENTER.

To start a Telnet session to the SoftSwitch from a different computer, you must specify the IP address of the ShoreWare 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

Accessing ShoreGear CLI on ShoreGear-12 and ShoreGear-Teleworker Voice Switches

You can access ShoreGear CLI on a ShoreGear-12 or ShoreGear-Teleworker through a Telnet session. When you initiate a Telnet session to a ShoreGear-12 or ShoreGear-Teleworker voice switch, you enter the VxWorks shell where you must enter a *ipbxctl* command. Because Telnet requires an IP address to make a connection, you also need to assign a temporary IP address to the switch before you can initiate the Telnet session.

To set IP parameters via Telnet:

Step 1 Assign the switch a temporary IP address.

Step 2 Start the Telnet process with an ipbxctl command entered in this format:

```
C:\Program Files\Shoreline Communications\ShoreWare
Server>ipbxctl -telneton <Switch IP Address>
```

Step 3 Once the Telnet process is running, open a Telnet session with the switch by entering:

```
telnet <Switch IP Address>
```

You are prompted for a user name and password.

Step 4 For user name, enter `anonymous`.

Step 5 For the password, enter ShoreTel (case sensitive).

Step 6 At the > prompt, enter `cliStart`.

The ShoreGear CLI interface appears.

See "Setting the IP Address with VxWorks" on page 4-4 for instructions on using the CLI interface to manage the boot and IP parameters for ShoreGear switches.

WARNING You must reboot the ShoreGear-12 or ShoreGear-Teleworker to exit the CLI interface.

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 "Using VxWorks Command Line Interface" on page 4-21.

To set IP address and boot parameters via `bootChange`:

Step 1 Start the Telnet process with an *ipbxctl* command entered in this format:

```
C:\Program Files\Shoreline Communications\ShoreWare
Server>ipbxctl -telneton <Switch IP Address>
```

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

You are prompted for a user name and password.

Step 2 For the user name, enter `anonymous`.

Step 3 For the password, enter `ShoreTel` (case sensitive).

Step 4 At the > prompt, enter `bootChange`.

The boot device parameter appears.

Step 5 Modify parameters by typing values and pressing ENTER.

When you press ENTER, the next boot parameter appears.

See Table 4-1 for listings of parameters required for flash and FTP booting of ShoreGear switches.

NOTE Check the model number on the back of the switch. If model is an IPBX, use the IPBX row. If it is SG, use the SG row.

Table 4-1 **Parameter Settings for Flash Boot and FTP Boot**

Parameter	Description	Flash Boot	FTP Boot		
		12, Teleworker, 24, T1/E1	12, Teleworker	24	T1/E1
boot device	The boot device; either a network interface or a flash location	flash = 0	dc	fei	fei
processor number	Always 0	0	0	0	0
host name	Always bootHost	bootHost	bootHost	bootHost	bootHost
file name (IPBX) (See Note above)	Path to the VxWorks.sys file for IPBX model switches	/flash0/vxworks	/ts12/vxworks	/ts24/vxworks	/tst1/vxworks
file name (SG) (See Note above)	Path to the VxWorks.sys file for SG model switches	/flash0/vxworks	/tsa/vxworks	/tsa/vxworks	/tsa/vxworks
inet on ethernet	<IP address>:<Subnet Mask> (Subnet mask in hex)[a]	10.10.0.59:ffff0000	10.10.0.92:ffff0000	10.10.0.59:ffff0000	10.10.0.102:ffff0000
inet on backplane	Not used				
host inet	IP address of the main ShoreWare 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	User name for logging into FTP site (should always be set to anonymous)	anonymous	anonymous	anonymous	anonymous
ftp password (pw) (blank = use rsh)	Password required for access to FTP site (should always be st1)	st1	st1	st1	st1
flags	SeeBoot Flags	0x40	0x40	0x40	0x40
target name	Host name of switch that can be set to other values	ShorelineSwitch	ST-000127	ShorelineSwitch	ShorelineSwitch
startup script (IPBX)	Path to the bootscrp.txt file for IPBX model switches	/flash0/bootflsh.txt	/ts12/bootscrp.txt	/ts24/bootscrp.txt	/tst1/bootscrp.txt
startup script (SG)	Path to the bootscrp.txt file for SG-24, SG-8, and SG-T1 model switches	/flash0/bootflsh.txt	/tsa/bootscrp.txt	/tsa/bootscrp.txt	/tsa/bootscrp.txt
other	Set to the network interface	fei	dc	fei	fei

a. The IP addresses are examples. These must contain the correct IP addresses for your system.

Boot Flags

The boot flags allow you to alter how the switch will boot up. The hexadecimal values of the flags and their actions are listed in the table below.

Command	Description
0x20	Disable login security.
0x40	Use DHCP to get boot parameters.
0x1040	Use bootp to get boot parameters.
0x2000	Disable ShoreTel shell.
0x00000	Network speed and duplex mode auto-negotiate.
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).

You can aggregate flags to perform multiple functions by summing the hex values for the commands. For example, the command:

```
0x42040
```

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.

Setting IP Address and Boot Parameters from the VxWorks Boot Monitor

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

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

To access the boot monitor:

Step 1 Connect a serial cable between a personal computer and the ShoreGear switch.

Step 2 Use a terminal emulation program such as HyperTerminal to open a connection to the switch.

Apply these values to the terminal settings:

- Speed: 19.2 kbps
- Data bit: 8 bits
- Stop bit: 1
- Parity: No parity
- Flow Control: None

Step 3 Type `c` at the prompt and press ENTER. You will be guided through the options listed in "Parameter Settings for Flash Boot and FTP Boot" on page 4-8.

ShoreGear Switch Configuration Reset

Each switch has 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 ShoreGear voice switch.

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

ShoreGear Switch Utilities

There are two tools available for diagnosing and updating the ShoreGear voice switches. The *ipbxctl* utility allows to perform diagnostics and Telnet to the switch. You can use the *burnflash* utility to update the switch to the version of firmware compatible with the ShoreWare server software.

The utilities are available in the ShoreWare Server folder:

```
C:\Program Files\Shoreline Communications\ShoreWare Server
```

ipbxctl Utility

The following table summarizes the commands available using the *ipbxctl* utility:

Command	Description
-telneton <*Switch IP Address*>	Enables Telnet connection on the switch.
-reboot <*Switch IP Address*>	Reboots the switch without using ShoreWare Director.
-flash <*Switch IP Address*>	Sets switch to boot from flash memory (allows you to do this 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 ipbxctl utility is running. **Note** This may be distruptive 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 ShoreTel CLI.

For more information on launching the *ipbxctl* utility, see "ShoreGear Switch Boot Options" on page 4-3.

Burnflash Utility

The following table summarizes the commands available using the burnflash utility.

Command	Description
burnflash -boot -s <*Switch IP Address*>	Updates all bootrom areas.
burnflash -test -s <*Switch IP Address*>	Checks to see if burnflash command will work.

Diagnostics

LEDs on the ShoreGear-120/24, ShoreGear-60/12, ShoreGear-40/8, and ShoreGear-T1 Switches

For information on switch models, see “Identifying Switch Models” on page 4-24.

For information about the connectors, please see “ShoreGear Switch Connectors (SG-Models)” on page 4-26.

ShoreGear-120/24 Voice Switch LEDs

The ShoreGear-120/24 LEDs are shown in Figure 4-1.

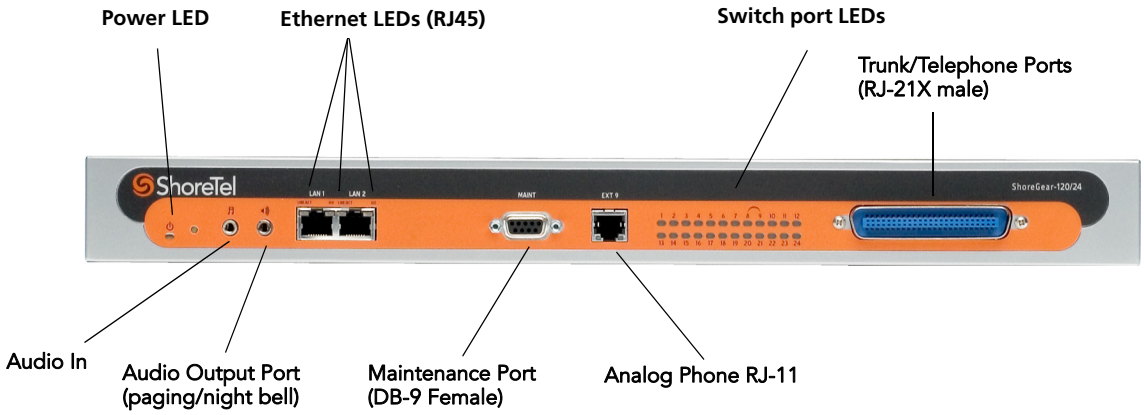


Figure 4-1 ShoreGear-120/24 LEDs

ShoreGear-60/12 Voice Switch LEDs

The ShoreGear-60/12 LEDs are show in Figure 4-2.

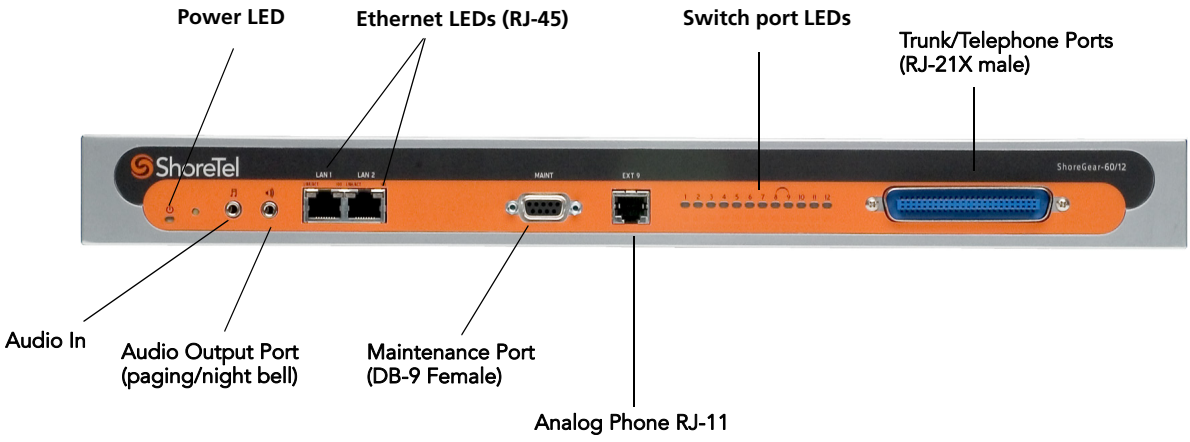


Figure 4-2 ShoreGear-60/12 LEDs

ShoreGear-40/8 Voice Switch LEDs

The ShoreGear-40/8 LEDs are shown in Figure 4-3.

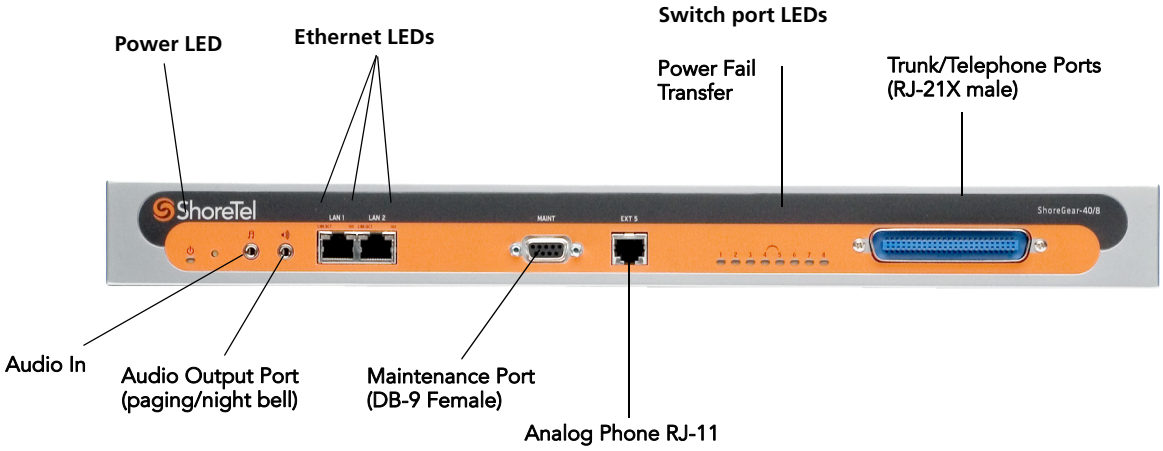


Figure 4-3 ShoreGear-40/8 LEDs

ShoreGear-T1 (SG-T1) Voice Switch LEDs

The ShoreGear-T1 (SG-T1) LEDs are shown in Figure 4-4.

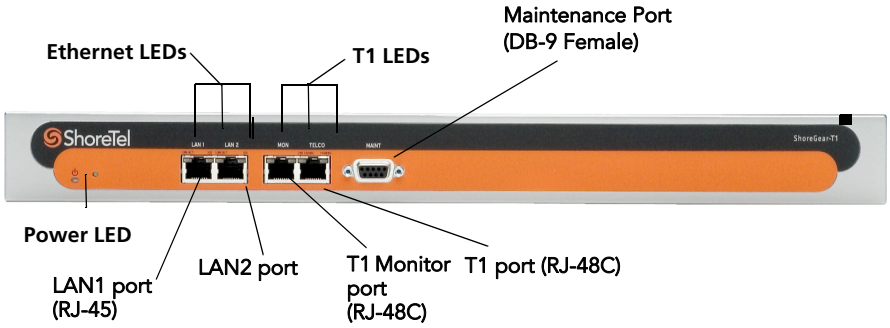


Figure 4-4 ShoreGear-T1 (SG-T1) LEDs

ShoreGear-120/24, ShoreGear-60/12, ShoreGear-40/8, and ShoreGear-T1 LED Behavior

This sections describes how to interpret the LED behavior of ShoreGear-120/24, ShoreGear-60/12, ShoreGear-40/8, and ShoreGear-T1 voice switches.

Power LED

ShoreGear voice switches have one power LED, which indicates the following:

On The switch is operating normally.

Off	The switch has no power.
Flashing	**2 flashes**—The switch failed its internal self-test. This indicates 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 **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 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**—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.

Switch Port LEDs

The color of the LED indicates the port function:

- **Green** when the port is a telephone port.
- **Yellow** when the port is a trunk port.
- **Off** indicates the port is reserved for IP phones, for conferencing, or is unconfigured.

The following describes the switch port LED behavior and meaning:

Telephone Port LEDs (Green)	• When on steady, the port is configured as a telephone port and the telephone is idle. • When flashing with ring cadence, the telephone is ringing. • When flashing slowly, the telephone is off hook. • When flashing fast, the port is in use (call in progress).
Trunk Port LED (Yellow)	When on steady, the port is configured as a trunk port and the trunk is idle. • When flashing slowly, the trunk is off hook. • When flashing fast, the trunk is in use (call in progress).
Port LED Alternating Green/ Yellow	The port is out of service. The LED periodically alternates green/yellow or yellow/green. The color of the LED between alternating colors indicates the port type: green for phone and yellow for trunk.

Off (IP phone or Conference) When the LED is off, the port is unconfigured or is configured to support IP phones or conferencing.

Network LEDs

The network LEDs (LAN1 and LAN2) indicate the speed at which the switch is communicating with the network and whether there is network activity. When you are connecting to both LAN connectors in a redundant network configuration, one network port will be active and the other will be in standby mode. If one LAN link connection fails, the switch automatically changes to the other LAN connection.

The network LED descriptions are as follows:

Link/ Activity When lit, this LED indicates that the switch is connected to an Ethernet network.

This LED indicates network activity, as follows:

- When flashing, network activity is detected.
- When on (not flashing), heavy network activity is detected.
- When off, the switch has no power.

NOTE This LED is not directly related to any particular switch's individual network activity. For example, if you have three switches that are connected to the same hub, and one switch's Link/Activity LED shows activity, the other switches will indicate the same.

100M

- When green, the switch is connected to a 100BaseT network.
- When off, the switch is connected to a 10BaseT network.
- When red, this LAN is in standby mode.

ShoreGear-T1 Monitor and Telco LEDs

The Monitor and Telco LEDs indicate line coding, network framing, and loopback status. These LEDs are color coded—green, yellow, and red. The Monitor and Telco LED descriptions follow.

NOTE Telco and Monitor LED alarms and errors are logged as switch events in ShoreWare Director's event log.

Line Coding This LED indicates line coding status, as follows:

- When green, the line coding signal is good.
- When yellow, bipolar violations (BPV) are being received at one second intervals.
- When red, a loss of signal (LOS) has occurred.
- When flashing red, loopback is active (local or CO).
- When off, the switch has no power.

Framing This LED indicates network framing status, as follows:

- When green, the T1 signal is *in frame*; the signal is synchronized.
- When yellow, a *yellow alarm* has been received from the CO.
- When flashing yellow, the frame-bit error rate has exceeded its limits.
- When flashing slow yellow, a small number of frame-bit errors ($10e^{-6}$) have occurred; this state will take up to 10 minutes to clear.
- When flashing fast yellow, a series of frame-bit errors ($10e^{-3}$) have occurred.
- When red, the T1 signal is out-of-frame (OOF). The received signal cannot be framed to the Extended Superframe (ESF) or D4 format.
- When flashing red, loopback is active (local or CO).
- When off, the switch has no power.

LEDs on the ShoreGear (IPBX) -24, -12, -TW, -T1, and -E1 Switches

For information on switch models, see “Identifying Switch Models” on page 4-24.

For information about the connectors, please see “ShoreGear IPBX Switch Connectors” on page 4-39

ShoreGear-24 (IPBX-24) Voice Switch LEDs

The ShoreGear-24 (IPBX-24) LEDs are shown in Figure 4-5.

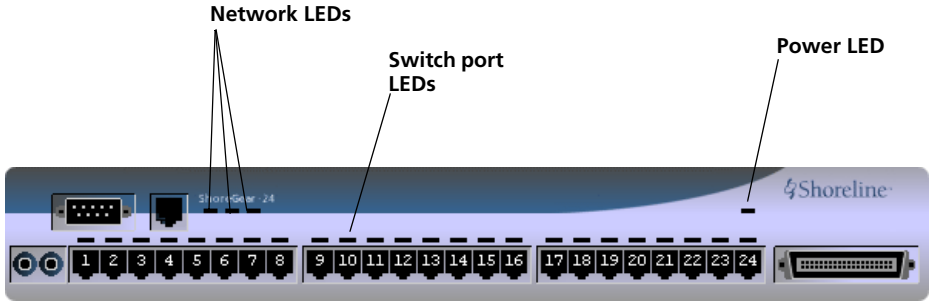


Figure 4-5 ShoreGear-24 (IPBX-24) LEDs

ShoreGear-12 (IPBX-12) Port Voice Switch LEDs

The ShoreGear-12 (IPBX-12) LEDs are shown in Figure 4-6.

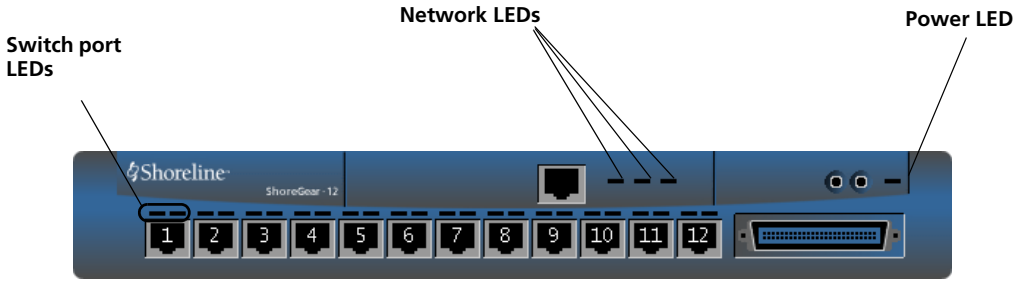


Figure 4-6 ShoreGear-12 (IPBX-12) LEDs

ShoreGear-Teleworker (IPBX-TW) Voice Switch LEDs

The ShoreGear-Teleworker (IPBX-TW) LEDs are shown in Figure 4-7.

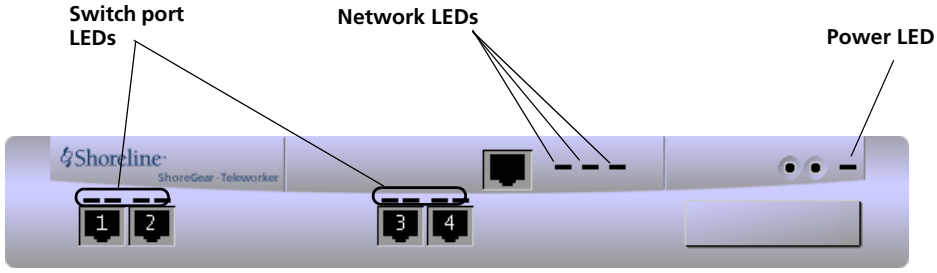


Figure 4-7 ShoreGear-Teleworker (IPBX-TW) LEDs

ShoreGear-T1 (IPBX-T1) and ShoreGear-E1 (IPBX-E1) Voice Switch LEDs

The ShoreGear-T1 (IPBX-T1) LEDs are shown in Figure 4-8.

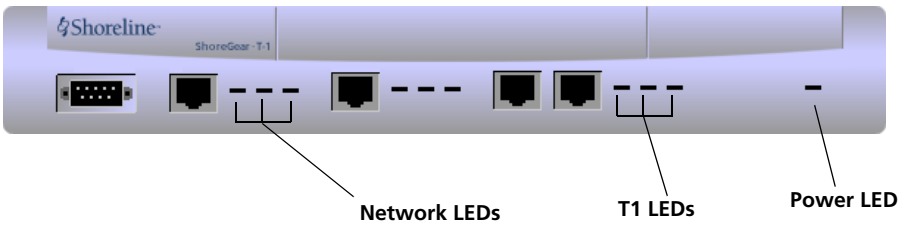


Figure 4-8 ShoreGear-T1 and ShoreGear-E1 LEDs

ShoreGear (IPBX) -24, -12, -TW, -T1, and -E1 LED Behavior

This sections describes how to interpret the LED behavior of ShoreGear (IPBX) -24, -12, -TW, -T1, and -E1 voice switches.

Power LED

ShoreGear IPBX voice switches have one green power LED, which indicates the following:

On	The switch is operating normally.
Off	The switch has no power.
Flashing	**2 flashes**—The switch failed its internal self-test. This indicates 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 **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 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**—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.

Switch Port LEDs

ShoreGear IPBX voice switches have telephone/trunk port LEDs. The color of the LED indicates the port function:

- **Green** when the port is a telephone port.
- **Yellow** when the port is a trunk port.
- **Off** indicates the port is reserved for IP phones or is unconfigured.

The following describes the switch port LED behavior and meaning:

Telephone Port LEDs (Green)	• When on steady, the port is configured as a telephone port and the telephone is idle. • When flashing with ring cadence, the telephone is ringing. • When flashing slowly, the telephone is off hook. • When flashing fast, the port is in use (call in progress).
Trunk Port LED (Yellow)	• When on steady, the port is configured as a trunk port and the trunk is idle. • When flashing slowly, the trunk is off hook. • When flashing fast, the trunk is in use (call in progress).
Port LED (Red)	When on, the port is out of service.
Off (IP phone)	When the LED is off, the port is unconfigured or is configured to support IP phones.

Network LEDs

ShoreGear IPBX voice switches network LEDs indicate the speed at which the switch is communicating with the network and whether there is network activity.

The network LED descriptions are as follows:

Link When lit, the switch is connected to an Ethernet network.

100M When lit, the switch is connected to a 100BaseT network.

When off, the switch is connected to a 10BaseT network.

Traffic This LED indicates network activity, as follows:

- When flashing, network activity is detected.
- When on (not flashing), heavy network activity is detected.
- When off, network activity is not detected.

NOTE This LED is not directly related to any particular switch's individual network activity. For example, if you have three switches that are connected to the same hub, and one switch's Traffic LED shows activity, the other switches will indicate the same.

T1 and E1 LEDs

The T1 and E1 LEDs indicate line coding, network framing, and loopback status. These LEDs are color coded—green, yellow, and red. The T1 and E1 LED descriptions follow.

NOTE T1 and E1 LED alarms and errors are logged as switch events in ShoreWare Director's event log.

Line Coding This LED indicates line coding status, as follows:

- When green, the line coding signal is good.
- When yellow, bipolar violations (BPV) are being received at one second intervals.
- When red, a loss of signal (LOS) has occurred.
- When off, the switch has no power.

Framing This LED indicates network framing status, as follows:

- When green, the T1/E1 signal is *in frame*; the signal is synchronized.
- When yellow, a *yellow alarm* has been received from the CO.
- When flashing yellow, the frame-bit error rate has exceeded its limits.
- When flashing slow yellow, a small number of frame-bit errors ($10e^{-6}$) have occurred; this state will take up to 10 minutes to clear.
- When flashing fast yellow, a number of frame-bit errors ($10e^{-3}$) have occurred.
- When red, the T1/E1 signal is out-of-frame (OOF). The received signal cannot be framed to the Extended Superframe (ESF) or D4 format.
- When off, the switch has no power.

Loopback This LED indicates loopback status for testing, as follows:

- When yellow, loopback is enabled. This may be set from within ShoreWare Director or from the CO.
- When off, loopback is disabled.

Using the Switch Trunk Debugging Tools

The ShoreGear switches have two tools that are helpful in troubleshooting trunks.

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

  Step 1 Open a Telnet session and set debug on by typing:

  ```
  trunk_debug_level=4
  ```

  Step 2 When finished, turn off debug by typing:

  ```
  trunk_debug_level=0
  ```

- 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.

NOTE ShoreTel recommends that you use a Telnet interface that is capable of capturing the output of the commands.

For IPBX switches, to turn on the D channel monitor:

Step 1 Open a Telnet session and type:

```
-> remConsoleConnect

-> remConsoleShell
```

Step 2 At the remCons> prompt, type:

```
remCons> pri_trace=10

remCons> pri_log=0
```

At this point, all D channel data is dumped to the screen.

Step 3 When you are finished capturing data, turn the monitor off by entering:

```
remCons> pri_trace=0

remCons> pri_log=0
```

Step 4 Exit the remote console shell by typing:

```
<cntrl>+d
```

Step 5 Exit the remote console by typing:

```
-> remConsoleDisconnect
```

For SG switches, to turn on the D channel monitor:

Step 1 Open a Telnet session and type:

Step 1 At the remCons> prompt, type:

```
-> pri_trace=10

-> pri_log=0
```

At this point, all D channel data is dumped to the screen.

Step 2 When you are finished capturing data, turn the monitor off by entering:

```
-> pri_trace=0

-> pri_log=0
```

Using 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`.

NOTE 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.

Commands Available Through VxWorks CLI

The following table summarizes the commands available through the VxWorks interface. <<Alphabetize when complete>>

NOTE When configuring debug levels on SoftSwitches before ShoreTel4, Release 2, the equal sign must be omitted (for example, `ext_debug_level 1`).

cliStart	Opens the ShoreTel command line interpreter (from a Telnet session) from IPBX-12 and Teleworker Telnet session or all other switches' serial ports only.	You must reboot the switch to return to the VxWorks interface.
ping "*<IP Address>*"		Remember to include double quotes (“) around the IP address.
bootChange	Changes the boot ROM parameters.	Use with caution.
config_status	Outputs the configuration records for the switch.	
memShow	Shows current memory usage of the switch.	
autoReboot = 0	Turns the switch watchdog off to prevent rebooting after a catastrophic failure.	Use this command only when directed by ShoreTel Customer Support.
ua_call_status	Shows a snapshot of the active call status of the switch.	
lsp_debug_level	Displays Location Service Protocol messages that are exchanged between switches.	Recommend using level 4.

lspConList	Displays switch connectivity to other switches.	
lspTelList	Displays local and remote contacts.	
lspTelList 1	Displays detailed information about local contacts.	
lspTelList 2	Displays detailed information about remote contacts.	
flsh_getVersion	Displays the firmware and bootrom versions for the switch.	
flsh_printBootLine	Prints the boot parameters of the switch.	
flsh_setBootSourceFTP	Sets the switch to boot from FTP.	Requires a restart for changes to take effect.
flsh_setBootSourceFlash	Sets the switch to boot from flash memory.	Requires a restart for changes to take effect.
msps	Displays media stream statistics.	
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.
print_ether_stats	Prints the Ethernet statistics from the network controller.	
DEBUG_LEVEL	Sets the ShoreSIP debugging flags.	Recommend using level 0xe00.
trunk_debug_level	Sets the trunk debugging flag	Recommend using level 4.
ext_debug_level	Sets the extension debugging level.	Recommend using level 4.
ifShow	Displays the current configured network parameters.	
ipstatShow	Displays IP statistics.	
tcpstatShow	Displays TCP statistics.	
udpstatShow	Displays UDP statistics.	
icmpstatShow	Displays ICMP statistics.	
arpShow and arptabShow	Displays the ARP table.	
routestatShow	Displays routing statistics.	
routeShow	Displays current routing table.	
hostShow	Displays the known hosts.	
pri_trace=10	Sets the PRI D-Channel trace debug level.	Must be in Remote Shell on IPBX model switches.
pri_log=10	Begins output of D-Channel information.	Must be in Remote Shell on IPBX model switches.
ext_cco_status	Displays information the switch's extension CCOs.	
trunk_cco_status	Displays information about switch's trunk CCOs.	
eval_bwm_var	Displays information about total and available bandwidth.	
eval_adm_var	Displays information about switch's own bandwidth usage.	

dumpUsedBw	Displays information about actual bandwidth used on individual calls/ legs.	
uaCallList	Displays information about active calls and legs.	
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.
bigNvRamSetup	Erases switch's configuration in NvRam.	
reboot	Reboots the switch.	
diagdCommands	Outputs full switch diagnostic information.	
mpm_debug_mask=0x40	Sets mpm debug flag to output Caller ID information received on inbound calls.	
mpm_debug_mask=-1	Displays detailed mpm information. Full debug of inbound calls (CallerID, DTMF).	
mpm_debug_mask=0x10	Displays detailed DTMF information.	
DumpSB	Displays maximum PMCSW outputs.	
DumpSRAM	Displays Motorola 860 processor information.	For IPBX model switches only.
Record2File(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.
etherMonStart <bytes>	Bypes is the number of bytes of information you want to capture (for example, 10000000). Captures ethernet packets for trace purposes	This command consumes memory on the switch. Use `memShow` to determine available memory and never specify more than is available.
etherMonDump	Writes the ethernet trace information captured when using EtherMonStart. Writes to a .cap file in \inetpub\ftproot directory of the ShoreWare server controlling the switch. The .cap file name is ST-<lst 3 bytes of MAC-time-date>.cap.	
etherMonStop	Stops capturing ethernet packets.	

Connecting to a ShoreGear-40/8, ShoreGear-60/12, ShoreGear-120/24, and ShoreGear-T1/E1

The ShoreGear-40/8, ShoreGear-60/12, ShoreGear-120/24, and ShoreGear-T1/E1 provide a serial communications port accessible through a straight-through 9-pin serial cable.

NOTE You cannot access ShoreGear CLI on ShoreGear-40/8, ShoreGear-60/12, ShoreGear-120/24, and ShoreGear-T1/E1 switches using Telnet.

To connect to a ShoreGear-40/8, ShoreGear-60/12, **ShoreGear-120/24, or ShoreGear-T1/E1:**

Step 1 Connect a serial cable between a personal computer and the ShoreGear switch.

Step 2 Use a terminal emulation program such as HyperTerminal to open a connection to the switch.

Apply these values to the terminal settings:

- Speed: 19.2 Kbs
- Data bit: 8 bits
- Stop bit: 1
- Parity: No parity
- Flow Control: None

Reference

Switch Connectors and Pinouts

This section provides information on the switch connectors and pinouts. There are two series of ShoreGear voices switches with slight differences in connectors and pinouts.

Identifying Switch Models

Several new switches are functionally equivalent to the switches they replace. The ShoreGear-120/24 replaces the ShoreGear-24 (IPBX-24) and ShoreGear-T1 (SG-T1) replaces the ShoreGear-T1 (IPBX-T1). For smaller sites, ShoreTel's ShoreGear-40/8 or ShoreGear-60/12 Voice Switch offers a low-cost VoIP solution. The new voice switches are 1 RU and have an RJ21x connector for connection to analog phones and trunks. They also feature redundant Ethernet LAN connections for greater availability and reliability.

Figure 4-9 shows the ShoreGear-T1 (SG-T1) as representative of the new switches and Figure 4-10 shows the ShoreGear-T1 (IPBX-T1).

Figure 4-9 The ShoreGear-T1 (SG-T1)

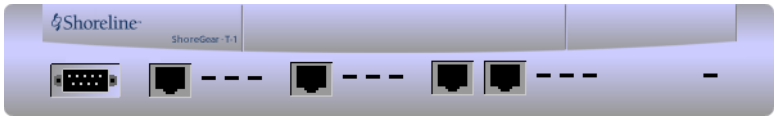


Figure 4-10 The ShoreGear-T1 (IPBX-T1)

You can locate the model number of your switches, SG or IPBX, on the rear panel as shown in Figure 4-11. This document distinguishes between switches based on the model number and number of RUs the switch occupies.

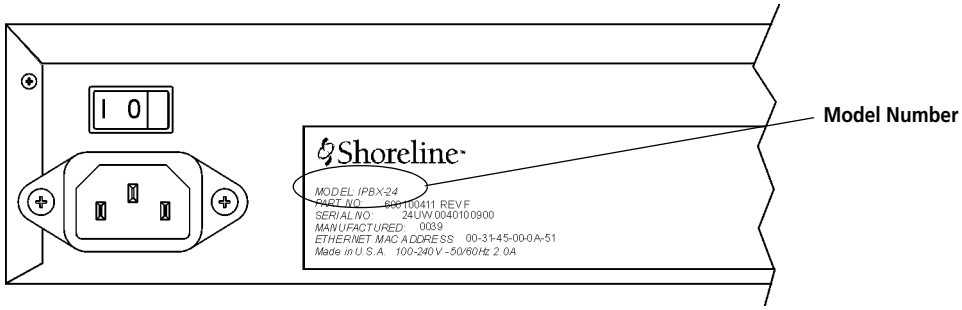


Figure 4-11 IPBX-24 Model Number Label

Your system may include the following second generation switches:

- ShoreGear-120/24 Voice Switch (1 U)
- ShoreGear-60/12 Voice Switch (1 U)
- ShoreGear-40/8 Voice Switch (1 U)
- ShoreGear-T1 (SG-T1) Voice Switch (1 U)

You may also have the following first generation switches in your system:

- ShoreGear-24 (IPBX-24) Voice Switch (2 U)
- ShoreGear-12 (IPBX-12) Voice Switch (1.5 U)
- ShoreGear-Teleworker (IPBX-TW) Voice Switch (1.5 U)
- ShoreGear-T1 (IPBX-T1) Voice Switch (1.5 U)
- ShoreGear-E1 (IPBX-E1) Voice Switch (1.5 U)

ShoreGear Switch Connectors (SG-Models)

Table 4-2 summarizes all of the connectors on the ShoreGear voice switches. Diagrams showing where these connectors are located are provided below.

Table 4-2 ShoreGear Connectors

Port/Connector	ShoreGear-120/24	ShoreGear-60/12	ShoreGear-40/8	ShoreGear-T1
Power	110 VAC	110 VAC	110 VAC	110 VAC
Ethernet	2 RJ-45	2 RJ-45	2 RJ-45	2 RJ-45
Analog telephone/trunk	RJ-21X male 0–2,000 feet*	RJ-21X male 0–2,000 feet*	RJ-21X male 0–2,000 feet*	— — —
T1 trunk	—	—	—	RJ-48C
T1 trunk monitor	—	—	—	RJ-48C
Audio input (Music on Hold)	3.5 mini-mono	3.5 mini-mono	3.5 mini-mono	—
Audio output (Paging, Night Bell)	3.5 mini-mono	3.5 mini-mono	3.5 mini-mono	—
Maintenance	DB-9 female	DB-9 female	DB-9 female	DB-9 female

* 2000 ft. length uses 26AWG wire.

ShoreGear-120/24 Connectors

The ShoreGear-120/24 voice switch (Figure 4-12) contains the following components:

- 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

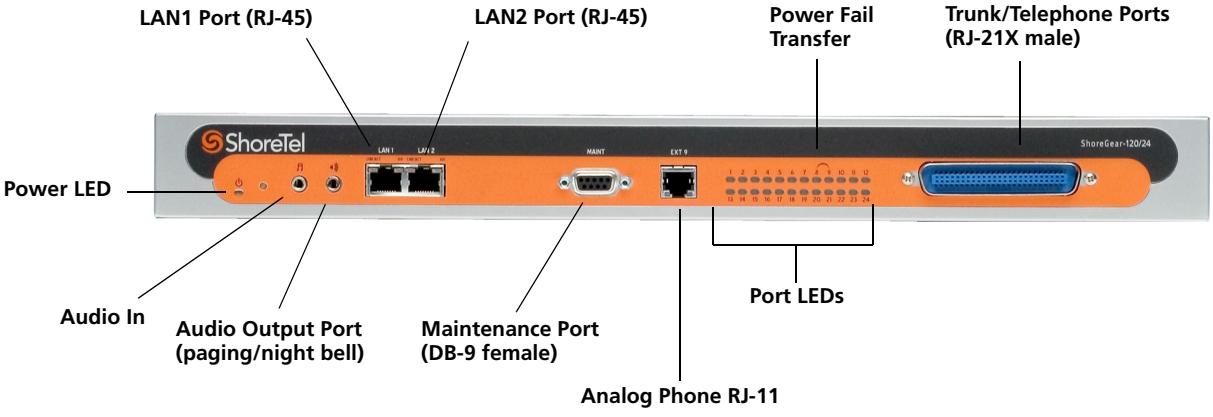


Figure 4-12 ShoreGear-120/24 Connectors and LEDs

ShoreGear-60/12 Connectors

The ShoreGear-60/12 voice switch (Figure 4-13) contains the following components:

- 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 port

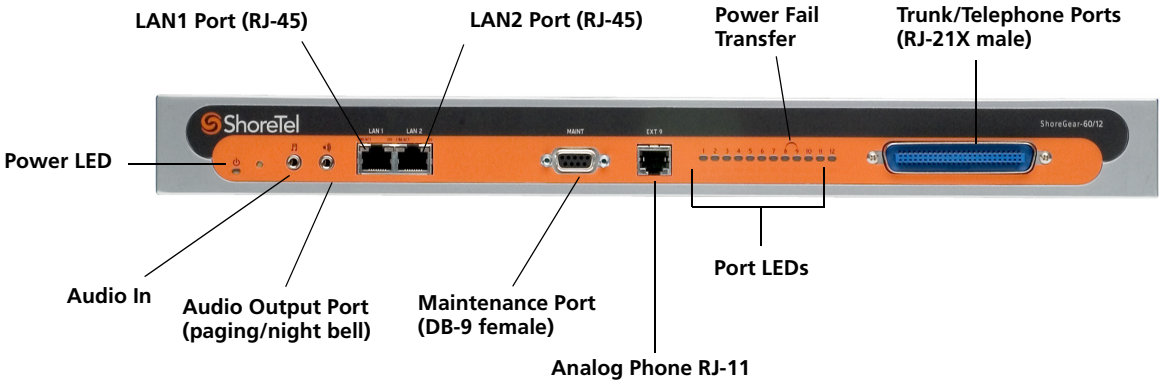


Figure 4-13 ShoreGear-60/12 Connectors and LEDs

ShoreGear-40/8 Connectors

The ShoreGear-40/8 voice switch (Figure 4-14) contains the following components:

- 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 5)
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports

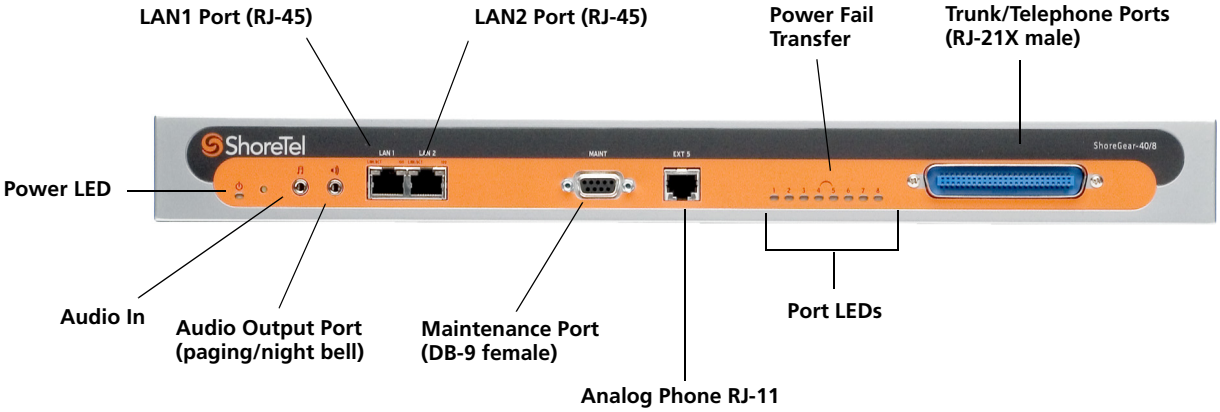


Figure 4-14 ShoreGear-40/8 Connectors and LEDs

ShoreGear-T1 Connectors

The ShoreGear-T1 voice switches (Figure 4-15) contain the following components:

- 1 DB-9 female connector for maintenance
- 2 RJ-45 connectors for the LAN interface
- 1 RJ-48C connector for T1 monitoring
- 1 RJ-48C connector for the T1 interface

NOTE The ShoreGear-T1 and ShoreGear-E1 provide an internal Channel Service Unit (CSU).

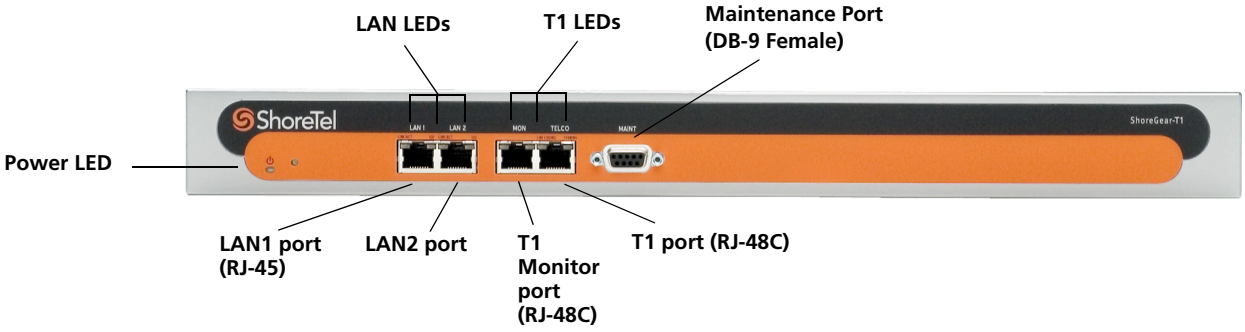


Figure 4-15 ShoreGear-T1 Connectors and LEDs

ShoreGear Switch Connector Pinouts (SG Models)

ShoreGear-120/24 RJ-21X Telephone and Trunk Connector

Port	Designation	Pin	Cable Color
1	Tip	26	White/Blue
1	Ring	1	Blue/White
2	Tip	27	White/Orange
2	Ring	2	Orange/White
3	Tip	28	White/Green
3	Ring	3	Green/White
4	Tip	29	White/Brown
4	Ring	4	Brown/White
5	Tip	30	White/Slate
5	Ring	5	Slate/White
6	Tip	31	Red/Blue
6	Ring	6	Blue/Red
7	Tip	32	Red/Orange
7	Ring	7	Orange/Red
8	Tip	33	Red/Green
8	Ring	8	Green/Red
9	Tip	34	Red/Brown
9	Ring	9	Brown/Red
10	Tip	35	Red/Slate
10	Ring	10	Slate/Red
11	Tip	36	Black/Blue
11	Ring	11	Blue/Black
12	Tip	37	Black/Orange
12	Ring	12	Orange/Black
13	Tip	38	Black/Green
13	Ring	13	Green/Black
14	Tip	39	Black/Brown
14	Ring	14	Brown/Black
15	Tip	40	Black/Slate
15	Ring	15	Slate/Black
16	Tip	41	Yellow/Blue
16	Ring	16	Blue/Yellow
17	Tip	42	Yellow/Orange
17	Ring	17	Orange/Yellow

Port	Designation	Pin	Cable Color
18	Tip	43	Yellow/Green
18	Ring	18	Green/Yellow
19	Tip	44	Yellow/Brown
19	Ring	19	Brown/Yellow
20	Tip	45	Yellow/Slate
20	Ring	20	Slate/Yellow
21	Tip	46	Purple/Blue
21	Ring	21	Blue/Purple
22	Tip	47	Purple/Orange
22	Ring	22	Orange/Purple
23	Tip	48	Purple/Green
23	Ring	23	Green/Purple
24	Tip	49	Purple/Brown
24	Ring	24	Brown/Purple
—	Tip	50	Purple/Slate
—	Ring	25	Slate/Purple

ShoreGear-60/12 RJ-21X Telephone and Trunk Connect

Port	Designation	Pin	Cable Color
1	Tip	26	White/Blue
1	Ring	1	Blue/White
2	Tip	27	White/Orange
2	Ring	2	Orange/White
3	Tip	28	White/Green
3	Ring	3	Green/White
4	Tip	29	White/Brown
4	Ring	4	Brown/White
5	Tip	30	White/Slate
5	Ring	5	Slate/White
6	Tip	31	Red/Blue
6	Ring	6	Blue/Red
7	Tip	32	Red/Orange
7	Ring	7	Orange/Red
8	Tip	33	Red/Green
8	Ring	8	Green/Red

Port	Designation	Pin	Cable Color
9	Tip	34	Red/Brown
9	Ring	9	Brown/Red
10	Tip	35	Red/Slate
10	Ring	10	Slate/Red
11	Tip	36	Black/Blue
11	Ring	11	Blue/Black
12	Tip	37	Black/Orange
12	Ring	12	Orange/Black
—	Tip	38	Black/Green
—	Ring	13	Green/Black
—	Tip	39	Black/Brown
—	Ring	14	Brown/Black
—	Tip	40	Black/Slate
—	Ring	15	Slate/Black
—	Tip	41	Yellow/Blue
—	Ring	16	Blue/Yellow
—	Tip	42	Yellow/Orange
—	Ring	17	Orange/Yellow
—	Tip	43	Yellow/Green
—	Ring	18	Green/Yellow
—	Tip	44	Yellow/Brown
—	Ring	19	Brown/Yellow
—	Tip	45	Yellow/Slate
—	Ring	20	Slate/Yellow
—	Tip	46	Purple/Blue
—	Ring	21	Blue/Purple
—	Tip	47	Purple/Orange
—	Ring	22	Orange/Purple
—	Tip	48	Purple/Green
—	Ring	23	Green/Purple
—	Tip	49	Purple/Brown
—	Ring	24	Brown/Purple
—	Tip	50	Purple/Slate
—	Ring	25	Slate/Purple

ShoreGear-60/12 RJ-21X Telephone and Trunk Connector with Converter

A converter patch cable is included with each ShoreGear-60/12 to conform with existing cabling standards.

Port	Designation	Pin	Cable Color
1	Tip	26	White/Blue
1	Ring	1	Blue/White
—	Tip	27	White/Orange
—	Ring	2	Orange/White
2	Tip	28	White/Green
2	Ring	3	Green/White
—	Tip	29	White/Brown
—	Ring	4	Brown/White
3	Tip	30	White/Slate
3	Ring	5	Slate/White
—	Tip	31	Red/Blue
—	Ring	6	Blue/Red
4	Tip	32	Red/Orange
4	Ring	7	Orange/Red
—	Tip	33	Red/Green
—	Ring	8	Green/Red
5	Tip	34	Red/Brown
5	Ring	9	Brown/Red
—	Tip	35	Red/Slate
—	Ring	10	Slate/Red
6	Tip	36	Black/Blue
6	Ring	11	Blue/Black
—	Tip	37	Black/Orange
—	Ring	12	Orange/Black
7	Tip	38	Black/Green
7	Ring	13	Green/Black
—	Tip	39	Black/Brown
—	Ring	14	Brown/Black
8	Tip	40	Black/Slate
8	Ring	15	Slate/Black
—	Tip	41	Yellow/Blue

Port	Designation	Pin	Cable Color
—	Ring	16	Blue/Yellow
9	Tip	42	Yellow/Orange
9	Ring	17	Orange/Yellow
—	Tip	43	Yellow/Green
—	Ring	18	Green/Yellow
10	Tip	44	Yellow/Brown
10	Ring	19	Brown/Yellow
—	Tip	45	Yellow/Slate
—	Ring	20	Slate/Yellow
11	Tip	46	Purple/Blue
11	Ring	21	Blue/Purple
—	Tip	47	Purple/Orange
—	Ring	22	Orange/Purple
12	Tip	48	Purple/Green
12	Ring	23	Green/Purple
—	Tip	49	Purple/Brown
—	Ring	24	Brown/Purple
—	Tip	50	Purple/Slate
—	Ring	25	Slate/Purple

ShoreGear-40/8 RJ-21X Telephone and Trunk Connector

Port	Designation	Pin	Cable Color
—	Tip	26	White/Blue
—	Ring	1	Blue/White
—	Tip	27	White/Orange
—	Ring	2	Orange/White
—	Tip	28	White/Green
—	Ring	3	Green/White
—	Tip	29	White/Brown
—	Ring	4	Brown/White
1	Tip	30	White/Slate
1	Ring	5	Slate/White
2	Tip	31	Red/Blue
2	Ring	6	Blue/Red
3	Tip	32	Red/Orange

Port	Designation	Pin	Cable Color
3	Ring	7	Orange/Red
4	Tip	33	Red/Green
4	Ring	8	Green/Red
5	Tip	34	Red/Brown
5	Ring	9	Brown/Red
6	Tip	35	Red/Slate
6	Ring	10	Slate/Red
7	Tip	36	Black/Blue
7	Ring	11	Blue/Black
8	Tip	37	Black/Orange
8	Ring	12	Orange/Black
—	Tip	38	Black/Green
—	Ring	13	Green/Black
—	Tip	39	Black/Brown
—	Ring	14	Brown/Black
—	Tip	40	Black/Slate
—	Ring	15	Slate/Black
—	Tip	41	Yellow/Blue
—	Ring	16	Blue/Yellow
—	Tip	42	Yellow/Orange
—	Ring	17	Orange/Yellow
—	Tip	43	Yellow/Green
—	Ring	18	Green/Yellow
—	Tip	44	Yellow/Brown
—	Ring	19	Brown/Yellow
—	Tip	45	Yellow/Slate
—	Ring	20	Slate/Yellow
—	Tip	46	Purple/Blue
—	Ring	21	Blue/Purple
—	Tip	47	Purple/Orange
—	Ring	22	Orange/Purple
—	Tip	48	Purple/Green
—	Ring	23	Green/Purple
—	Tip	49	Purple/Brown
—	Ring	24	Brown/Purple
—	Tip	50	Purple/Slate
—	Ring	25	Slate/Purple

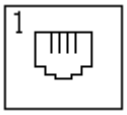
ShoreGear-40/8 RJ-21X Telephone and Trunk Connector with Converter

A converter patch cable is included with each ShoreGear-40/8 to conform with existing cabling standards.

Port	Designation	Pin	Cable Color
1	Tip	26	White/Blue
1	Ring	1	Blue/White
—	Tip	27	White/Orange
—	Ring	2	Orange/White
2	Tip	28	White/Green
2	Ring	3	Green/White
—	Tip	29	White/Brown
—	Ring	4	Brown/White
3	Tip	30	White/Slate
3	Ring	5	Slate/White
—	Tip	31	Red/Blue
—	Ring	6	Blue/Red
4	Tip	32	Red/Orange
4	Ring	7	Orange/Red
—	Tip	33	Red/Green
—	Ring	8	Green/Red
5	Tip	34	Red/Brown
5	Ring	9	Brown/Red
—	Tip	35	Red/Slate
—	Ring	10	Slate/Red
6	Tip	36	Black/Blue
6	Ring	11	Blue/Black
—	Tip	37	Black/Orange
—	Ring	12	Orange/Black
7	Tip	38	Black/Green
7	Ring	13	Green/Black
—	Tip	39	Black/Brown
—	Ring	14	Brown/Black
8	Tip	40	Black/Slate
8	Ring	15	Slate/Black
—	Tip	41	Yellow/Blue
—	Ring	16	Blue/Yellow
—	Tip	42	Yellow/Orange

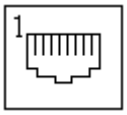
Port	Designation	Pin	Cable Color
—	Ring	17	Orange/Yellow
—	Tip	43	Yellow/Green
—	Ring	18	Green/Yellow
—	Tip	44	Yellow/Brown
—	Ring	19	Brown/Yellow
—	Tip	45	Yellow/Slate
—	Ring	20	Slate/Yellow
—	Tip	46	Purple/Blue
—	Ring	21	Blue/Purple
—	Tip	47	Purple/Orange
—	Ring	22	Orange/Purple
—	Tip	48	Purple/Green
—	Ring	23	Green/Purple
—	Tip	49	Purple/Brown
—	Ring	24	Brown/Purple
—	Tip	50	Purple/Slate
—	Ring	25	Slate/Purple

RJ-11 Telephone and Trunk Connector



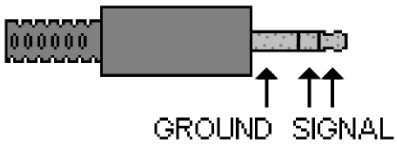
Pin	Designation
1	—
2	—
3	Tip
4	Ring
5	—
6	—

RJ-45 Ethernet Connector

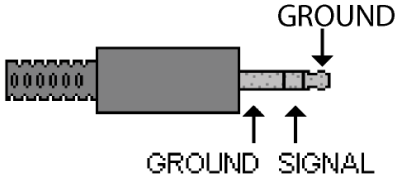


Pin	Designation
1	TX+
2	TX-
3	RX+
4	—
5	—
6	RX-
7	—
8	—

3mm Stereo Audio Input Connector for Music on Hold

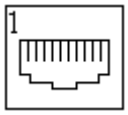


3mm Mono Audio Output Connector for Paging/Nightbell



NOTE From the cable perspective

RJ-48C T1 and T1 Monitor Connectors



Pin	Designation
1	RX Ring
2	RX Tip
3	—
4	TX Ring
5	TX Tip
6	—
7	—
8	—

NOTE When connecting the ShoreGear-T1 to a legacy PBX, you must use a crossover cable between the two systems.

DB-9 Maintenance Connector

Pin	Designation
1	—
2	TX Data
3	RX Data
4	DSR
5	GND
6	DTR
7	CTS
8	RTS
9	—

ShoreGear IPBX Switch Connectors

Table 0-1 summarizes all of the connectors on the ShoreGear IPBX voice switches. Diagrams showing where these connectors are located are provided later in this chapter.

Table 0-1 ShoreGear (IPBX) Connectors

Port/Connector	ShoreGear-24	ShoreGear-12	ShoreGear-Teleworker	ShoreGear-T1
Power	110 VAC	110 VAC	110 VAC	110 VAC
Ethernet	RJ-45	RJ-45	RJ-45	RJ-45
Analog telephone/trunk	RJ-11 x 24 RJ-21X male 0–2,000 feet*	RJ-11 x 12 RJ-21X male 0–2,000 feet*	RJ-11 x 4 — 0–2,000 feet*	— — —
T1 trunk	—	—	—	RJ-48C
T1 trunk monitor	—	—	—	RJ-48C
Audio input (Music on Hold)	3.5 mini-mono	3.5 mini-mono	3.5 mini-mono	—
Audio output (Paging, Night Bell)	3.5 mini-mono	3.5 mini-mono	3.5 mini-mono	—
Maintenance	DB-9 female	N/A	N/A	DB-9 female

* 2000 ft. length uses 26AWG wire.

ShoreGear-24 Connectors (IPBX-24)

The ShoreGear-24 (IPBX-24) voice switch (Figure 4-16) contains the following components:

- 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-45 connector for the LAN interface
- 24 RJ-11 connectors for the trunk and telephone ports:
  - — 8 universal telephone/trunk ports (Ports 1 through 8)
  - — 16 telephone ports (Ports 9 through 24)
  - — Power fail transfer (between Ports 8 and 9)
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports

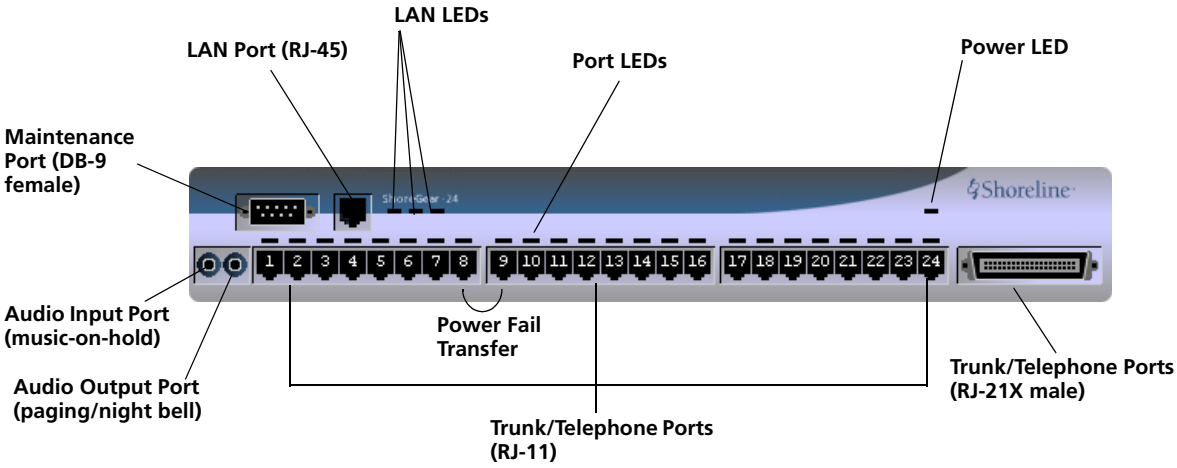


Figure 4-16 ShoreGear-24 (IPBX-24) Connectors and LEDs

ShoreGear-12 Connectors (IPBX-12)

The ShoreGear-12 voice switch (Figure 4-17) contains the following components:

- 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 RJ-45 connector for the LAN interface
- 12 RJ-11 connectors for the trunk and telephone ports:
  - 12 universal telephone/trunk ports (Ports 1 through 12)
  - Power fail transfer (between Ports 1 and 2)
- 1 RJ-21X male connector for mass termination of the telephone/trunk ports

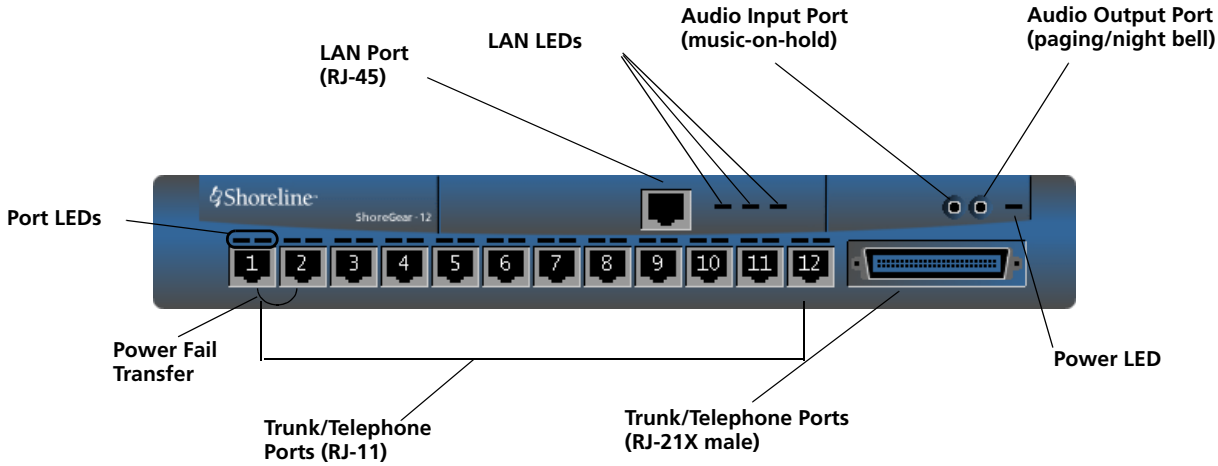


Figure 4-17 ShoreGear-12 Connectors and LEDs

ShoreGear-Teleworker Connectors (IPBX-TW)

The ShoreGear-Teleworker voice switch (Figure 4-18) contains the following components:

- 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 RJ-45 connector for the LAN interface
- 4 RJ-11 connectors for the trunk and telephone ports:
  — 4 universal telephone/trunk ports (Ports 1 through 4)
  — Power fail transfer (between Ports 1 and 2)
- 4 ports for connections to any combination of trunk and telephone lines

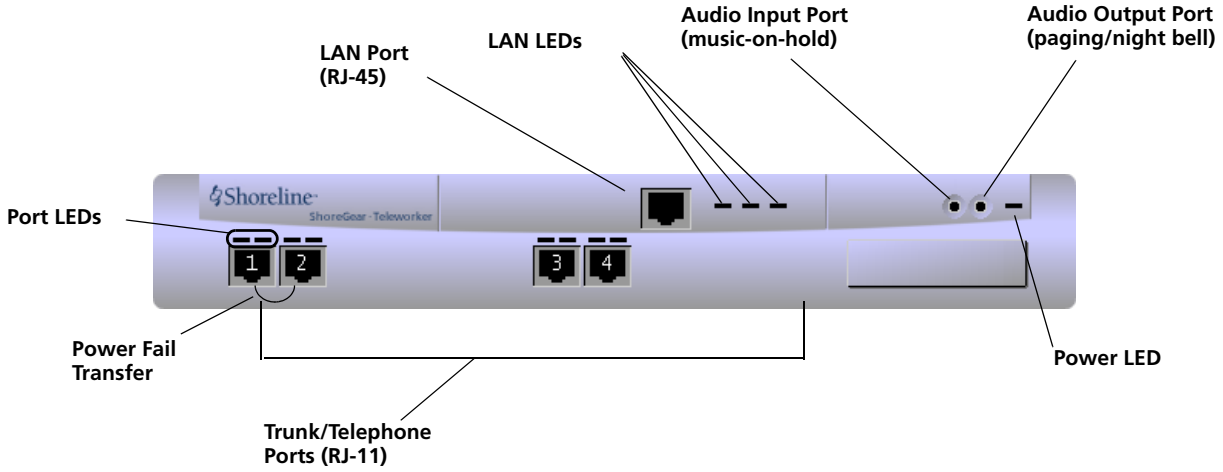


Figure 4-18 ShoreGear-Teleworker (IPBX-TW) Connectors and LEDs

ShoreGear-T1 Connectors (IPBX-T1)

The ShoreGear-T1 voice switch (Figure 4-19) contains the following components:

- 1 DB-9 female connector for maintenance
- 1 RJ-45 connector for the LAN interface
- 1 RJ-48C connector for T1 monitoring
- 1 RJ-48C connector for the T1 interface

NOTE The ShoreGear-T1 provides an internal Channel Service Unit (CSU).

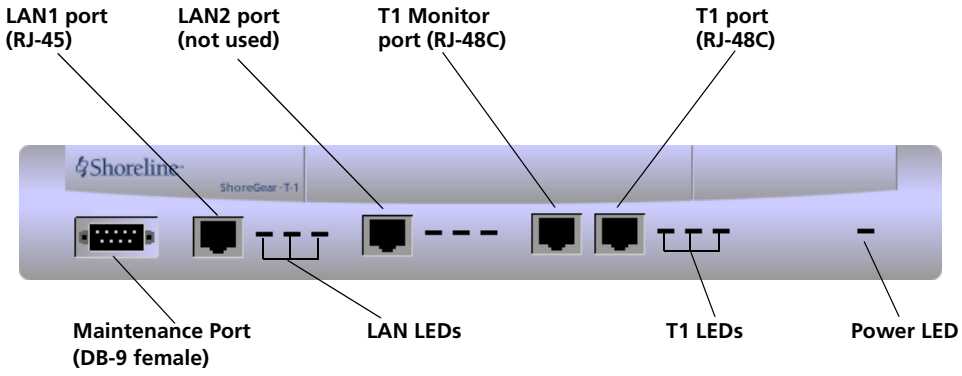


Figure 4-19 ShoreGear-T1 Connectors and LEDs

ShoreGear IPBX Switch Connector Pinouts

RJ-21X Telephone and Trunk Connector (ShoreGear-24/IPBX-24)

Port	Designation	Pin	Cable Color
1	Tip	26	White/Blue
1	Ring	1	Blue/White
2	Tip	27	White/Orange
2	Ring	2	Orange/White
3	Tip	28	White/Green
3	Ring	3	Green/White
4	Tip	29	White/Brown
4	Ring	4	Brown/White
5	Tip	30	White/Slate
5	Ring	5	Slate/White
6	Tip	31	Red/Blue
6	Ring	6	Blue/Red
7	Tip	32	Red/Orange
7	Ring	7	Orange/Red
8	Tip	33	Red/Green
8	Ring	8	Green/Red
9	Tip	34	Red/Brown
9	Ring	9	Brown/Red
10	Tip	35	Red/Slate
10	Ring	10	Slate/Red
11	Tip	36	Black/Blue
11	Ring	11	Blue/Black
12	Tip	37	Black/Orange
12	Ring	12	Orange/Black
13	Tip	38	Black/Green
13	Ring	13	Green/Black
14	Tip	39	Black/Brown
14	Ring	14	Brown/Black
15	Tip	40	Black/Slate
15	Ring	15	Slate/Black
16	Tip	41	Yellow/Blue
16	Ring	16	Blue/Yellow
17	Tip	42	Yellow/Orange
17	Ring	17	Orange/Yellow

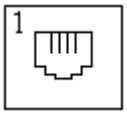
Port	Designation	Pin	Cable Color
18	Tip	43	Yellow/Green
18	Ring	18	Green/Yellow
19	Tip	44	Yellow/Brown
19	Ring	19	Brown/Yellow
20	Tip	45	Yellow/Slate
20	Ring	20	Slate/Yellow
21	Tip	46	Purple/Blue
21	Ring	21	Blue/Purple
22	Tip	47	Purple/Orange
22	Ring	22	Orange/Purple
23	Tip	48	Purple/Green
23	Ring	23	Green/Purple
24	Tip	49	Purple/Brown
24	Ring	24	Brown/Purple
—	Tip	50	Purple/Slate
—	Ring	25	Slate/Purple

ShoreGear-12 RJ-21X, IPBX-24 Telephone and Trunk Connector

Port	Designation	Pin	Cable Color
1	Tip	26	White/Blue
1	Ring	1	Blue/White
—	Tip	27	White/Orange
—	Ring	2	Orange/White
2	Tip	28	White/Green
2	Ring	3	Green/White
—	Tip	29	White/Brown
—	Ring	4	Brown/White
3	Tip	30	White/Slate
3	Ring	5	Slate/White
—	Tip	31	Red/Blue
—	Ring	6	Blue/Red
4	Tip	32	Red/Orange
4	Ring	7	Orange/Red
—	Tip	33	Red/Green
—	Ring	8	Green/Red

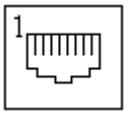
Port	Designation	Pin	Cable Color
5	Tip	34	Red/Brown
5	Ring	9	Brown/Red
—	Tip	35	Red/Slate
—	Ring	10	Slate/Red
6	Tip	36	Black/Blue
6	Ring	11	Blue/Black
—	Tip	37	Black/Orange
—	Ring	12	Orange/Black
7	Tip	38	Black/Green
7	Ring	13	Green/Black
—	Tip	39	Black/Brown
—	Ring	14	Brown/Black
8	Tip	40	Black/Slate
8	Ring	15	Slate/Black
—	Tip	41	Yellow/Blue
—	Ring	16	Blue/Yellow
9	Tip	42	Yellow/Orange
9	Ring	17	Orange/Yellow
—	Tip	43	Yellow/Green
—	Ring	18	Green/Yellow
10	Tip	44	Yellow/Brown
10	Ring	19	Brown/Yellow
—	Tip	45	Yellow/Slate
—	Ring	20	Slate/Yellow
11	Tip	46	Purple/Blue
11	Ring	21	Blue/Purple
—	Tip	47	Purple/Orange
—	Ring	22	Orange/Purple
12	Tip	48	Purple/Green
12	Ring	23	Green/Purple
—	Tip	49	Purple/Brown
—	Ring	24	Brown/Purple
—	Tip	50	Purple/Slate
—	Ring	25	Slate/Purple

RJ-11 Telephone and Trunk Connector



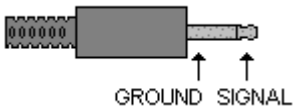
Pin	Designation
1	—
2	—
3	Tip
4	Ring
5	—
6	—

RJ-45 LAN Connector



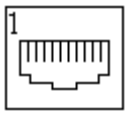
Pin	Designation
1	TX+
2	TX-
3	RX+
4	—
5	—
6	RX-
7	—
8	—

3mm Mono Audio Input and Output Connectors



NOTE From the cable perspective.

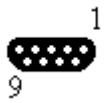
RJ-48C T1 and T1 Monitor Connectors



Pin	Designation
1	RX Ring
2	RX Tip
3	—
4	TX Ring
5	TX Tip
6	—
7	—
8	—

NOTE When connecting the ShoreGear-T1 to a legacy PBX, you must use a crossover cable between the two systems.

DB-9 Maintenance Connector



Pin	Designation
1	—
2	TX Data
3	RX Data
4	DSR
5	GND
6	DTR
7	CTS
8	RTS
9	—

CHAPTER 5

IP Endpoints

Overview

The ShoreTel system manages calls and applications for three types of IP endpoints: IP phones, soft phones, and conference bridges. IP endpoints are identified by IP address and can exist anywhere on the network. All IP endpoints are supported by ShoreGear switches, which must have sufficient capacity for all the IP endpoints in the system. IP endpoints are configured in the system with ShoreWare Director. For more information on IP endpoints, see your *ShoreTel5 Planning and Installation Guide* and *ShoreTel5 Administration Guide*.

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 Call Manager client applications or can be used independently, providing an intuitive interface to essential telephone features.

The IP phone controls basic display operations, such as volume level, date and time, and icons. To provide IP telephony in a ShoreTel system, IP phones rely on services, switches, and industry-standard protocols. The following sections describe these dependencies.

IP Phone Keep Alive

The ShoreGear-120/24, ShoreGear-60/12, and ShoreGear-40/8 voice switches 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 ShoreGear 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. 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. For more information, refer to the IP phone configuration settings in the *ShoreTel5 Administration Guide*.

Services

There are two services running on the ShoreWare server that interact with the system's IP phones: IP Phone Configuration Service (IPCS) and IP Phone Display Service (IPDS).

IPCS

The IP Phone Configuration Service 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.

IPDS

The IP Phone Display Service 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 IPDS or TMS connectivity can result in incorrect phone displays and errors in both the hard and soft key functions.

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. For more information, see "Setting IP100 Phone Configuration from the Phone Interface" on page 5-8.

IP Phones and ShoreGear Switches

IP phones in a ShoreTel system interact with two types of ShoreGear switches: the configuration switch and the call manager switch. The configuration switches help the IP phones obtain their configuration from the ShoreWare 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.

As part of the configuration information, each IP phone is assigned a ShoreGear switch that acts as the phone's call manager to help the IP phone set up and tear down calls.

Configuration Switch(es)

In a DHCP environment, when an IP phone is booted, it receives the IP address of the DHCP and ShoreWare server from the configuration switch. Each system has at least one configuration switch for this purpose. The IP addresses of these switches are downloaded to the IP phones whenever the IP phones are booted.

If you have configured the IP phones to boot without a DHCP server, you must set the IP address of the configuration switch manually. For more information, see "Setting IP100 Phone Configuration from the Phone Interface" on page 5-8.

These switches communicate with the ShoreTel server to 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. For information on configuration switches, see the *ShoreTel5 Administration Guide*.

<<Needs more complete info about config switches. Engineering to update.>>

Call Manager Switch

The IP phones' ShoreGear switch is responsible for actions such hold, transfer, conference, and park. The call manager module of the ShoreGear switches handles the Media Gateway Control Protocol (MGCP) information from the IP phones assigned to it. Once a call has been connected to an endpoint, media streams are independent of the call manager switch.

The ShoreGear 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 ShoreGear voice switch configured to support the number of IP phones at the site.

The ShoreGear voice switches send a heartbeat to the 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 voice switches continue to broadcast the heartbeat every minute. Any currently offline IP phone that returns an acknowledgement is considered online and available.

To configure IP phone support on a ShoreGear-120/24, ShoreGear-60/12, or ShoreGear-40/8 voice switch, you must reserve ports for IP phone support on the ShoreGear **Switch** edit page in ShoreWare Director. See the "Configuring Switches" chapter in the *ShoreTel5 Administration Guide* for additional information.

IP Phone Communications

MGCP

IP phones communicate with ShoreGear 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

Media

Media travels through the ShoreTel system using Real-Time Protocol (RTP). After call setup, media flows directly between IP phones via RTP. The ShoreGear switch is involved only when setting up or tearing down a call.

For more information on MGCP and RTP communications, see "ShoreTel System Communications" on page 2-6.

Boot Process

ShoreTel IP phones are preconfigured by ShoreTel to work in conjunction with your ShoreTel system and your network's Dynamic Host Configuration Protocol (DHCP) server. Once the servers are configured, you simply plug the phones into the network and they are automatically added to your ShoreTel system.

Once the IP phone has 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 ShoreWare 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. For more information, see “Setting IP100 Phone Configuration from the Phone Interface” on page 5-8.

ShoreTel Conference Bridges

The ShoreTel system interfaces with the ShoreTel Conference Bridge using IP phone ports to facilitate call control and media between the two systems. To the ShoreTel system, the ShoreTel Conference Bridge is 12, 24, 48, or 96 IP phones. The ShoreTel system has the same requirements for conference bridges as for IP phones.

The conference bridge uses MGCP to set up and tear down media streams between the ShoreTel system and the bridge. The conference bridge uses the G.711 codec for all conference calls.

The bridge must have one IP address statically assigned for each port supported by the bridge and one IP address for management and configuration access. These ports appear in the system as consecutively addressed IP phones.

The conference bridge IP ports are consecutive IP phone ports and are listed on ShoreWare Director’s IP Phone List page. For more information, see the *ShoreTel5 Administration Guide*.

The conference bridge is assigned one number for users to dial into the bridge. Each port of the conference bridge is configured as a “user” in the system with an extension. Calls to the bridge are routed either by the call handling settings of the conference bridge ports (users) or by the ACD feature of a Workgroup. Incorrectly configured call handling can make conference bridge ports unavailable for calls. For reliability, ShoreTel recommends using call handling since it is switch dependant whereas Workgroup call handling is server dependant.

For more information, see the *ShoreTel Converged Conference Solution Administration Guide*.

Soft Phone

The ShoreWare Soft Phone is a Web-based application running from the ShoreTel server. The Soft Phone can be launched either from a URL supplied by the administrator or through Personal Call Manager. Soft Phone does not support NAT or firewall transversal. Problems with the Headquarters server or network connectivity can prevent the page from being loaded.

From a configuration and management standpoint, the Soft Phone 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 Soft Phone user interface does not have a display, so it does not interact with IPDS. Just like an IP phone, the Soft Phone uses MGCP for call setup and teardown, and RTP for media.

IP phones are uniquely identified by their MAC address. In most cases the Soft Phone is identified by the NIC of the user PC. If a Soft Phone is installed on a PC without a NIC, the Soft Phone generates a fake MAC address that is still unique.

The Soft Phone page contains an ActiveX control that implements the VoIP media support. Because it requires an ActiveX control, the Soft Phone only works on PCs with Internet Explorer and Microsoft Windows. The ActiveX object attempts to reach the switch call manager configured in ShoreWare Director. If a the switch call manager is successfully contacted, the Soft Phone buttons are enabled.

When the switch call manager is contacted, ShoreWare 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 Soft Phone then appears in the Individual IP Phones list in ShoreWare Director.

If the Anyphone option is enabled, PCM 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 Soft Phone status bar.

When the Soft Phone or Personal Call Manager is closed, the Anyphone operation is reversed to return the user to his or her home port. Even if users are Anyphoned somewhere else before invoking the Soft Phone, they are still returned to their home port.

ShoreTel Analog Phones

- ShorePhone-AP100
- ShorePhone-AP110

ShoreTel IP Phones

- ShorePhone-IP100
- ShorePhone-IP210
- ShorePhone-IP530
- ShorePhone-IP560

Maintenance

IP Phone Firmware Upgrades

The IP phone application software can be upgraded by replacing the application file on the FTP server. If you need to upgrade your phone application, refer to the instructions provided with the new phone software.

WARNING Modifying the IP phone configuration files can cause unpredictable results. If you have special needs, contact ShoreTel Customer Support for instructions.

Diagnostics

The following recommendations will help you install your IP phones:

- Make sure you have reviewed your network bandwidth and Quality of Service (QoS) strategies and configured your network for your IP phones.
- Make sure the phones are configured to use DHCP vendor option 155 for configuring boot server information, and are configured to use anonymous FTP.

  The phones will not boot properly if static configuration data is present in the telephone. This can occur if the telephones were previously used in an environment where DHCP and automatic provisioning was not used, or the telephone is from a vendor other than ShoreTel. See “Setting IP100 Phone Configuration from the Phone Interface” on page 5-8 and “Diagnostics & Configuration for IP210/530/560” on page 5-14 for information about changing the telephone to the correct settings.

Viewing System IP Phones

IP phone connectivity can be viewed from the **IP Phone List** in ShoreWare Director. The ShoreGear-120/24, ShoreGear-60/12, and ShoreGear-40/8 **Switch Maintenance**

screens have an additional section for IP phone maintenance. This shows how many IP phones are connected through the switch and the capacity of the switch. ShoreGear-24 switches can support as many as 120 IP phones, the ShoreGear-60/12 can support up to 60, and the ShoreGear-40/8 can support up to 40 IP phones. For more information, see the *ShoreTel5 Administration Guide*.

Onscreen 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 sooner by pressing the "OK" soft key.

IP100 Phone Troubleshooting

If an IP100 phone becomes unresponsive or behaves in an undesired fashion, use the following diagnostic steps to collect diagnostic information and forward to ShoreTel Customer Support for analysis.

Step 1 Record the IP address and MAC address of the problematic IP phone. These can be found in Shoreware Director under **IP Phones** and **Individual IP Phones**.

Step 2 On the IP phone, press the menu button and record any information displayed on the screen.

Step 3 Record the state of the IP phone. View the IP phone state by selecting the IP phone's host switch in QuickLook and clicking **IP Phones Maintenance**. Record the IP address of the host switch.

Step 4 Ping the problematic IP phone using the 'ping' command on the IP Phones Maintenance page.

`Ping xxx.xxx.xxx.xxx` (IP address).

If the IP phone returns the following message(s), go to Step 5.

```
Reply from xxx.xxx.xxx.xxx: bytes=32 time<10ms TTL=64
```

Step 5 If you do not receive a response to the ping command, collect application and boot logs in the *inetpub\ftproot* directory, stop here, and send the available information to ShoreTel Customer Support. File naming convention is `IP_Phone_MAC-app.log` and `IP_Phone_MAC-boot.log`.

Example: `0004F2003896-app.log`

Step 6 On the ShoreWare server, enable a Telnet session to the host switch as follows:

a Open a CMD window and navigate to the *Program Files\Shoreline Communications\Shoreware Server* directory.

b Type `ipbxctl -telneton xxx.xxx.xxx.xxx` using the IP address of the host switch and press ENTER.

c Telnet into the host switch using the `telnet` command. Use the following login name and password:

Login: `anonymous`
Password: `ShoreTel` (case sensitive)

d Type `ext_cco_status` and press ENTER. Capture the returned information.

e Type `mgcp_msg_debug=1` and press ENTER to turn on MGCP message trace.

f Type `ext_iphone_status` and press ENTER. Wait for 5 seconds and capture the returned information. Wait an additional 30 seconds and capture any additional output from the switch.

g Type `mgcp_msg_debug=0` to turn off MGCP trace.

Step 7 Restart the IP phone by either unplugging the data cable and reconnecting, or holding down the volume keys, the hold button, and the second soft key directly above the hold button for 5 seconds to initiate a restart of the phone.

Step 8 After the phone completes rebooting, collect the new application and boot logs created for the IP phone (as described above).

Step 9 Forward all the information you recorded to ShoreTel Customer Support for analysis.

Troubleshooting the IP Phone Display

This section presents some techniques for troubleshooting the IP Phone Display Server. The first step is to identify that the problem is actually an IPDS problem.

You should suspect an IPDS problem whenever a phone configured in the database (which appears on the IP phone list in ShoreWare Director) does not have the correct display, or doesn't respond properly when you press the feature buttons. When you suspect an IPDS problem, verify that the server has TAPI access to the phone or phones in question. To check TAPI access, use any TAPI application that supports phone devices such as TapiTest and PhoneMon. For details on these programs, see "Using Phone Monitor" on page 3-11 and"Using TapiTest" on page 3-12.

Phone Display is Incorrect

If a phone display is incorrect, one of two things may have happened:

IPDS 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 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. Use PhoneMon (see "Using Phone Monitor" on page 3-11) to verify the current display state according to TMS.

Phone Display is Not Responding

If the phone display is not responding, use Phone Monitor (see "Using Phone Monitor" on page 3-11) to verify the current display state according to TMS. Change the display—for example, place a call or put one on hold using Flash—and see if PhoneMon shows information other than the display.

- If PhoneMon tracks your call and the phone display does not, the issue is related to switch or phone connectivity.
- If PhoneMon agrees with the phone display, then the issue is related to IPDS.

Administrative Messages

The system administrator may send messages to a single IP phone or to all of them. These messages can alert users of upgrades or downtimes, or simply test the communication channel from IPDS through TMS and the switch to the phones. For details on how to send administrative messages using IPPhoneCfgTool.exe, see "Using the cfg Utility" on page 3-16.

Reference

Manually Configuring the ShorePhone-IP100

The IP phones require configuration files in the *inetpub\ftproot* directory of the ShoreWare server. These files contain the configuration parameters and point to the application that is downloaded to the IP phone every time it boots. There is a master configuration file (000000000000.cfg) that provides the path to the phone application file and lists application files used to configure the phones.

Table 5-1 lists the configuration files and their function.

Table 5-1 IP Phone Configuration Files

Type	Description	File Name
Default Master	The default master is the global master configuration file. Certain settings in the master configuration file are changed when you configure the system through ShoreWare Director.	000000000000.cfg
Baseline	These files contain global parameters that affect the basic operation of the IP phone, including voice codecs, gain, tone, and so on.	ipmid.cfg
Application	These files contain global parameters that set the basic mode of the application.	func.cfg
User	These files contain parameters that are unique to a particular phone user. Typical parameters include the user name and MAC ID of the IP phone. Each phone has its own customized version of this file identified by user name.	gmx<*user*>.cfg

ShoreTel5 manages the configuration files for the IP phones. ShoreWare Director changes the contents of some configuration files according to the settings you make in Director. If you wish to modify the behavior of the IP phones via the configuration files, contact ShoreTel Customer Support.

Setting IP100 Phone Configuration from the Phone Interface

If you are not using a DHCP server, you must set configuration parameters from the IP phone's setup menu. You can also use the setup menu to set a custom Boot Server Option for the DHCP server and set the phone's VLAN identifier.

Accessing the Setup Menu

The setup menu is accessible when the IP phone boots. You can enter this menu during a six-second period, after which the phone enters normal operation using the current settings.

Rebooting the IP Phone

There are two ways to reboot the IP phone:

- By reapplying power
- By pressing four of the phone's keys simultaneously

The IP phone reboots whenever power is reapplied. You can accomplish this by disconnecting the power cable momentarily and then reconnecting it.

You can also reboot the IP phone by pressing four keys simultaneously. The four keys (as illustrated in Figure 5-1) are:

- Middle Blank Key
- Hold
- Volume –
- Volume +

Hold down these keys until the display shows that the IP phone is rebooting.

Figure 5-1 Reboot Keys on the ShorePhone IP Phone

During the boot process, the phone displays an option to enter the setup menu by pressing one of the soft keys (see Figure 5-2). To enter the setup menu, press the soft key below SETUP on the display.

Navigating the Menu Interface

You can navigate the IP phone menu interface using the IP phone keys shown in Figure 5-2.

Figure 5-2 Menu Keys

Table 5-2 explains the functions of these keys.

Table 5-2 **Function of Menu Keys**

Key	Description
Scroll and Select	Use these keys to scroll through menu items and options. For some options, you can use the top and bottom arrow keys to skip to the first or last parameter in a range. The left-arrow key functions as a backspace key.
Soft Keys	The function of these keys changes with the current menu. The display shows the function of the active soft keys.
Alphanumeric keys	Use these keys and the soft keys to enter numbers and letters, such as for IP addresses and name strings.

Menu Options

The IP phone menu interface consists of the main setup menu and two submenus. The submenus set parameters for the Dynamic Host Configuration Protocol (DHCP) server and the ShoreWare server. You can scroll through menu options as described in the preceding section.

Table 5-3 describes the options available from the main menu in the order in which they appear.

Table 5-3 **Main Menu Options**

Option Name	Value	Description
DHCP Client	Enable or Disable	Set to Enable by default. To configure TCP/IP parameters, disable **DHCP Client**.
DHCP Menu		If you are using the setup menu to modify the DHCP **Boot Server Option**, enter this menu. **DHCP Client** must be enabled.
Phone IP Address	Dotted-decimal IP address	The phone's IP address.

Option Name	Value	Description
Subnet Mask	Dotted-decimal subnet mask	The phone's subnet mask.
IP Gateway	Dotted-decimal IP address	The phone's default router.
Server Menu		See Table 5-5 for ShoreWare server options.
SNTP Address	Dotted-decimal IP address	The SNTP server from which the IP phone obtains the current time.
GMT Offset	–12 through +13	The offset from Greenwich Mean Time in half-hour increments.
DNS Server	Dotted-decimal IP address	The primary server to which the IP phone directs Domain Name System queries.
DNS Alternate Server	Dotted-decimal IP address	The secondary server to which the IP phone directs Domain Name System queries.
DNS Domain	Domain name string	The IP phone's domain.
VLAN ID	0 through 4094	The IP phone's 802.1Q VLAN identifier.

When DHCP is used to provide the IP address and configuration parameters to the telephone, the DHCP settings indicate which DHCP option is used to provide the ShoreWare server's address as the telephone's boot server. The settings configured in the telephones must match that of the DHCP server.

Table 5-4 **DHCP Menu Options**

Option Name	Value	Description
Timeout	1 through 600	This value is the number of seconds the IP phone waits for secondary DHCP offers before selecting an offer.
Boot Server	Default, Custom, Static	When set to Default, the IP phone looks for option number 66 (string type) in the response sent from the DHCP server. The DHCP server must be configured to send the boot server address in option 66. When set to Custom, you specify the option number in the **Boot Server Option** field and the option type in the **Boot Server Option Type** field. The IP phone looks in the option having this number and type for its boot server. When set to Static, the IP phone uses the boot server configured through the Server menu options. See Table 5-5.
Boot Server Option	128 through 254	When the **Boot Server** parameter is set to Custom, this parameter specifies the number of the DHCP option in which the IP phone looks for its boot server.
Boot Server Option Type	IP address, string	When the **Boot Server** parameter is set to Custom, this parameter specifies the type of DHCP option in which the IP phone looks for its boot server.

When DHCP is not used to configure the telephone's boot server as the ShoreWare server, set the options described in Table 5-5 using the telephone's Server Menu.

Table 5-5 **Server Menu Options**

Option Name	Value	Description
Server Type	FTP, Trivial FTP	When set to FTP, the IP phone uses the File Transfer Protocol (FTP) to obtain configuration and application files at boot time. When set to Trivial FTP, the IP phone uses the Trivial File Transfer Protocol to obtain configuration and application files at boot time. To configure the phone to use the ShoreWare server as its boot server, the Server Type is configured to FTP.
Server Address	Dotted-decimal IP address	This is the boot server used in any of the following situations: • If the DHCP client is disabled • If the DHCP server does not send a boot server address. • If the **Boot Server** parameter is set to Static. To configure the phone to use the ShoreWare server as its boot server, the Server Address is configured as the name or IP address of the ShoreWare server.
FTP User	Any string	When the **Server Type** parameter is set to FTP, this is the user name used when the IP phone logs in to the ShoreWare server. The default is `anonymous`. To configure the phone to use the ShoreWare server as its boot server, the FTP User setting must be configured to "ftp."
FTP Password	Any string	When the **Server Type** parameter is set to FTP, this is the password used when the IP phone logs in to the ShoreWare server. The default password is `ftp`. To configure the phone to use the ShoreWare server as its boot server, the FTP Password should be configured to "shoreline."

Manually Configuring the ShorePhone-IP210/530/560

If you are not using a DHCP server to provide the IP address and configuration parameters to the phone, you need to manually set configuration parameters on the phone.

You can enter the phone configuration menu at bootup or by entering a key sequence from the phone's keypad.

To manually configure the ShorePhone-IP210/530/560 at bootup:

Step 1 Connect the Ethernet cable into the data jack on the back of the IP phone.

Step 2 At the Password prompt, enter the default password 1234, or the password provided by your system administrator, followed by the # key.

You have four seconds to enter the password, after which the phone enters normal operation with its current settings.

NOTE The default password can be changed in ShoreWare Director. For more information, see the Shoreline5 Administration Guide.

Step 3 Enter the values listed below when prompted. Press # to advance to the next settings or * to exit.

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 ShoreWare server. Press #.
MGC=	Press #. (The phone will obtain the address from configuration files on the ShoreWare server.)
SNTP=	Enter the IP address of your time server. Press #.
802.1Q Tagging=OFF	Press #. 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.

To manually configure an operational ShorePhone-IP210/530/560 from the keypad:

Step 1 With the phone on hook, press the MUTE key followed by 73887# (SETUP#).

Step 2 At the Password prompt, enter 1234, or the password provided by your system administrator, followed by the # key.

NOTE The default password can be changed in ShoreWare Director. For more information, see the *Shoreline5 Administration Guide*.

Step 3 Enter the values listed in Table 5-4 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 ShorePhone-IP210/530/560 Settings

You can display the phone's current IP parameters setting by entering a key sequence from the phone's keypad.

To display the phone's IP parameter settings:

Step 1 With the phone on hook, press the MUTE key followed by 4636# (INFO#). The phone will display the first two parameters.

Step 2 Press * to advance the display or # to exit. The phone will resume normal operation after the last parameter has been displayed.

Resetting the ShorePhone-IP210/530/560

To reset the phone:

Step 1 With the phone on hook, press the MUTE key followed by 73738# (RESET#). The phone will reboot.

Diagnostics & Configuration for IP210/530/560

Configuring IP Phone Parameters

Three files are provided for you to customize parameters used on ShoreTel IP Phones. Parameters include day of week abbreviations used in time displays, use (on/off) of port 5004 for RTP traffic, audio level of the handset/headset, and more.

The three files are located in the *ftp root* directory at *Shoreline Data\Templates*. They are named:

- `s1custom.txt`—Shoreline S1 MGCP Configuration Template File
- `s2custom.txt`—Shoreline S2 MGCP Configuration Template File
- `s6custom.txt`—Shoreline S6 MGCP Configuration Template File

Refer to the base configuration files in the Shoreline Data\Templates directory. The parameters are documented in these files: shore_s1.txt, shore_s2.txt, and shore_s6.txt, but customizations should be made in the custom file. To customize the parameters, simply place the file `s[N]custom.txt` in *ftp root*. These will be processed at the end and will override any other parameters. `Kadotautil` will add a line with an include statement at the end, so that additional parameters can be set by the administrator.

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.

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.

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.

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. The commands are as follows:

setLogLevel

The setLogLevel command sets the logging severity level. A log level remains in effect until a new setLogLevel command is issued.

Usage	`Prompt:\phonectl -setLogLevel [moduleID] [level] [destIP]`
Example	`Prompt:\phonectl -setLogLevel 3 7 192.168.0.170`
Parameters	`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 not set will not be 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).

	`level` sets the severity level to be logged. Values are 0—7, where zero is the most verbose. Levels are defined as follows: 0 Emergency 1 Alert 2 Critical 3 Error 4 Warning 5 Notice 6 Informational 7 Debug (This is the value set in the example shown above.)
	`destIP` is the IP address of the destination IP phone the command is sent to.

setServerIP

The setServerIP command sets the server's IP address and points to the location where messages are to be logged.

Usage	`Prompt:\phonectl -setServerIP [newServerIP] [destIP]`
Example	`Prompt:\phonectl -setServerIP 192.168.0.3 192.168.0.170`
Parameters	`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 sets the output device to which the syslog messages are sent. The devise may be either a serial port or the syslog server.

Usage	`Prompt:\phonectl -setOutputDev [devID] [destIP]`
Example	`Prompt:\phonectl -setOutputDev 0 192.168.0.170`
Parameters	`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 is used to retrieve the syslog messages from the ShoreTel IP phone's buffer. The results are printed to the command line.

Usage	`Prompt:\phonectl -dump2pc [destIP]`
Example	`Prompt:\phonectl -dump2pc 192.168.0.170`
Parameters	`destIP` is the IP address of the destination IP phone to which the command is sent.

showLogLevel

The showLogLevel command prints the log level of each module for which logging is active. Information is printed to the command line.

Usage	`Prompt:\phonectl -showLogLevel [moduleNum] [destIP]`
Example	`Prompt:\phonectl -showLogLevel 4 192.168.0.170`
Parameters	`moduleNum` is the IP address of the destination IP phone the command is sent to.
	`destIP` is the IP address of the destination IP phone the command is sent to. You will retrieve the log level settings for this phone.

showConnInfo

The showConnInfo command shows information about connections created by MGCP_create messages.

Usage	`Prompt:\phonectl -showConnInfo [destIP]`
Example	`Prompt:\phonectl -showConnInfo 192.168.0.170`
Parameters	`destIP` is the IP address of the destination IP phone the command is sent to.

showStats

The showStats command shows information about connections created by MGCP_create messages.

Usage	`Prompt:\phonectl -showStats [cxid] [destIP]`
Example	`Prompt:\phonectl -showStats 5 192.168.0.170`
Parameters	`cxid` 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 the command is sent to.

showTime

The showTime command prints the time of day on the command line for the destination IP phone.

Usage	`Prompt:\phonectl -showTime [destIP]`
Example	`Prompt:\phonectl -showTime 192.168.0.170`
Parameters	`destIP` is the IP address of the destination IP phone the command is sent to.

version

The version command prints the version of the PhoneCTL software.

Usage	`Prompt:\phonectl -version`
Example	`Prompt:\phonectl -version`

CHAPTER 6

ShoreTel Client Applications

Overview

This chapter provides technical background information about the ShoreTel Call Manager application suite.

Call Manager Application Suite

The Call Manager suite includes:

- Different functional versions of the Call Manager client application: Personal, Advanced, Workgroup Agent, Workgroup Supervisor, and 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 Shoreware clients.

Theory of Operations

All Call Manager applications are hosted within a single process named *STCHost.exe*.

TAPI objects manage all telephony-related data and tasks for Call Manager. Voice mail and database operations require CSIS. Call Manager applications use any available service and attempt to degrade gracefully if a requested service is unavailable.

A separate process (*STMapiRd.exe*) is invoked to load Microsoft Outlook contact data into the Call Manager's "white pages."

Only the Call Manager clients and three monitors (Extension, Agent, and Queue) can communicate directly with TAPI. All other applications must use Call Manager as a proxy to place calls on their behalf. Applications using Call Manager 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 Call Manager application.)

Executable Modules

The table below provides descriptions of the top-level executable modules used by Call Manager applications.

Module	Description
StartCli.exe	Launches Call Manager application. (The application shortcut launches this task.)
STCHost.exe	Call Manager task.
STCfgApp.cpl	Call Manager Control Panel application.
SendLogs.exe	Sends client logs to ShoreTel Customer Support.
STMapiRd.exe	Reads MAPI contacts and loads them into Call Manager.
CSISCMgr.exe	Client-side CSIS component.
TAPISRV.exe/ SvcHost.exe	Microsoft TAPI applications.
RPCTSP.TSP	TAPI Service Provider.

Starting Call Manager Applications

All Call Manager applications are hosted from the process *STCHost.exe*, an out-of-process COM server.

To start a Call Manager client application, click the Call Manager application shortcut that appears on the desktop or Start menu. This starts *StartCli.exe*, opening Call Manager and any other applications left running when Call Manager was last exited.

Diagnostics

If a Call Manager application appears to be malfunctioning, use the following diagnostic guidelines to determine the point of failure.

Troubleshooting Login or Startup Problems

NOTE For the purpose of this discussion, login problems refer to issues related to CSIS.

The following symptoms may indicate login or startup problems:

- Double-clicking the application shortcut does not bring up the Call Manager main window.
- Call Manager appears, but no Call Handling Mode icon or Handsfree 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 was unavailable for user login.

The first time Call Manager successfully connects to CSIS, it stores a minimum amount of configuration data in the user's registry settings, including 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; and basic contact information (home country, home area code, and default access code).

This initial data store provides Call Manager with enough information to perform high-level tasks that include displaying call information and permitting the user to place and manage calls.

Normally, Call Manager locates the cached data and loads it while waiting for login to complete. After login, Call Manager 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 Call Manager (or if the login fails), Call Manager uses the cached data until CSIS comes back online and login is successful.

NOTE The only time that a login problem can prevent Call Manager from launching is if the user has not run the application since installing or upgrading to the latest ShoreTel software release.

Login Problems

If a Call Manager application fails to log in, test the CSIS server to verify that it is running, check the login parameters, and open Windows Task Manager to confirm that no ShoreTel applications are running.

To troubleshoot login issues:

Step 1 Test the CSIS server.

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
```

The browser window should display a result similar to this:

10;0x00000000;4;5440

Pay particular notice 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 ShoreWare server.

Step 2 Check the login parameters.

Open the Windows Control Panel, and click the Phone and Modem Options (Windows 2000 or higher), or the Telephony tab (earlier versions of Windows).

Click the Advanced tab to display a list of telephony providers.

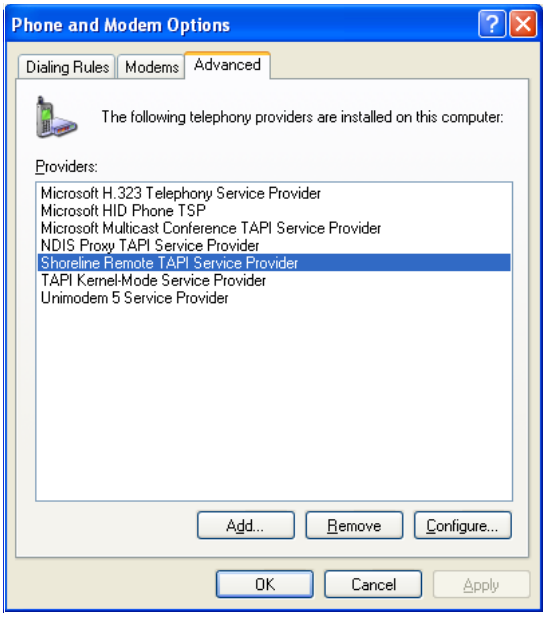


Figure 6-1 Phone and Modem Options, Advanced Tab

Choose Shoreline Remote TAPI Service Provider and click Configure.

The Shoreline Remote TSP Device tab appears.

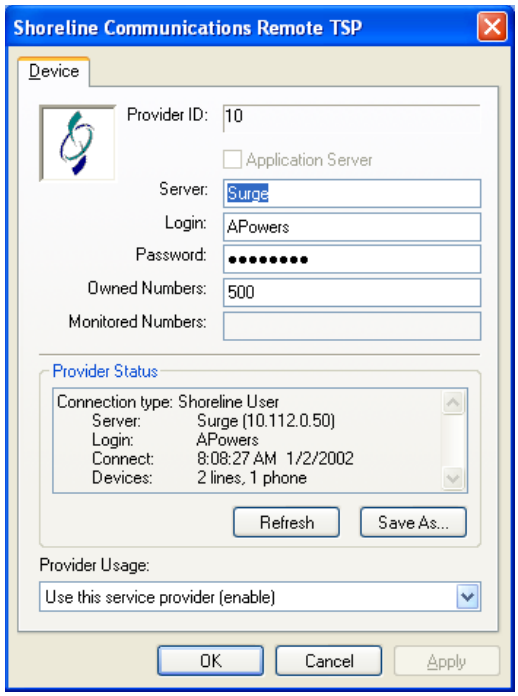


Figure 6-2 ShoreTel Remote TSP, Device Tab

If the server name and/or login name are incorrect, continue with the sub-steps. Otherwise, skip to Step 3.

From the Provider Usage menu, choose Do not use this service provider (disable), and click Apply.

Change the server name and login name to the correct values.

From the Provider Usage menu, choose Use this service provider (enable), and click Apply.

Exit all ShoreTel applications. (Make sure *CSISCMgr.exe* exits. If it fails to quit, log out of Windows.)

Step 3 Open the Windows Task Manager and confirm that no ShoreTel applications are running.

If applications are running, use Task Manager to stop the applications in the order listed below. (If unsuccessful, wait for a brief period and try again.)

STCHost.exe

STMapiRd.exe

CSISCMgr.exe

Troubleshooting Telephony Problems

The following symptoms may indicate a telephony problem:

- On-hook/off-hook indicator is inaccurate.
- No call information is displayed for incoming calls.
- The user is unable to place an outgoing call.
- Nonexistent call information is displayed in the client.
- The user cannot perform a basic operation such as transferring an active call.

The following operations are useful in troubleshooting telephony issues.

Confirming TAPI Operations

The first task in troubleshooting telephony issues is to confirm that TAPI is functioning properly.

To confirm that TAPI is operating correctly:

Step 1 From a command prompt of the DOS window on the client PC, change the current directory to the *ShoreWare Client* directory and run the *tapitest.exe* test tool.

```
C:\Program Files\Shoreline Communications\ShoreWare
Client>tapitest
```

A listing of line devices appears, including a device displaying user statistics.

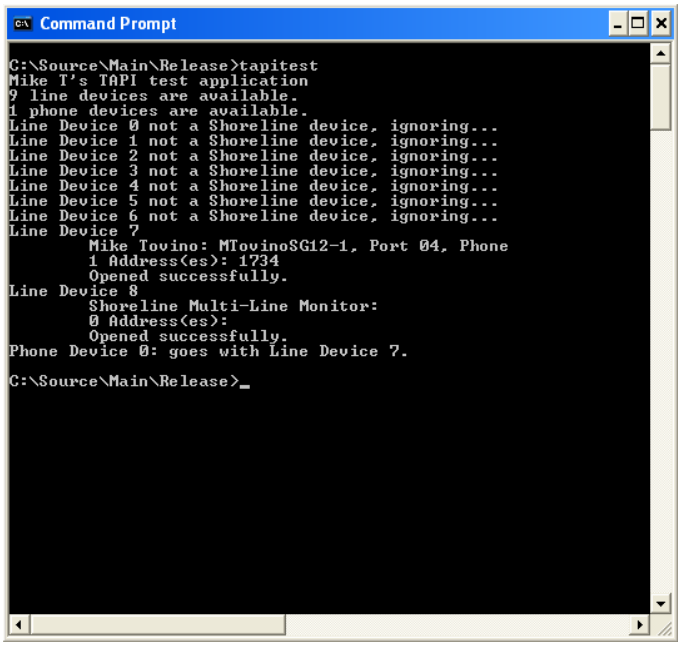


Figure 6-3 Line Device Statistics

If no line device appears with the user statistics, TAPI is not working properly. Either the Call Manager was installed incorrectly, or the TAPI Service Provider has been removed or corrupted.

Reinstall the client software to correct the problem.

Step 2 Use the Windows phone dialer to confirm that TMS or Remote TSP is down.

Start the Windows phone dialer (*dialer.exe*).

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.

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, choose and attempt to place a phone call to the number with the dialer.

If the call fails, TAPI is only partially functioning.

If the call succeeds, TAPI is not the problem. Try restarting the Call Manager. If it still is not functioning, call ShoreTel Customer Support.

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:

- Call Manager
- Remote TAPI Service Provider
- TMS
- ShoreGear Switch
- Telephone Company Central Office

To isolate a Caller ID problem:

Step 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 Call Manager.

If these do not match, it is probable that Call Manager detected the number in another application running on the user's machine and applied formatting rules to make the entry unique.

Step 2 Locate the call in question and use the *TMSncc* log to view the Caller ID information the client sent to the server.

Step 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 Options/Shoreline Config or the Shoreline System applet from the Windows Control Panel.
- Call handling mode or headset mode display on Call Manager is inaccurate.

NOTE Review the section, “Troubleshooting Login or Startup Problems” on page 6-2. Most of the diagnostic guidelines in that section apply to configuration problems as well.

To isolate a configuration problem:

Step 1 Confirm that the CSIS server is running by entering the URL provided in the earlier section.

Step 2 If the CSIS server is running, make sure that *CSISCMgr.exe* is also running on the client PC.

Step 3 If the client process is running, try toggling the hands-free mode on and off, or change the call handling mode.

Step 4 Verify that Call Manager is connected to the CSIS server by placing the cursor in the QuickDialer dialog box and pressing CTRL + F12.

You should see a diagnostics dialog that you can use to check the connection.

Troubleshooting MAPI Contact Import Problems Using *SHAdrTst.exe*

You can isolate MAPI contact import problems by running *SHAdrTst.exe* (included on the client CD).

To run *SHAdrTst.exe*:

Step 1 From a command prompt or DOS window on the client PC, run *SHAdrTst.exe*, by typing:

```
SHAdrTst
```

The command lists what Call Manager will import.

The table below lists available options for *SHAdrTst.exe*.

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 Call Manager.

Using the History File

Call Manager stores all history data in the text file *History.txt*, which is a valuable resource for troubleshooting application problems.

Locating the History File

On Windows 2000 or higher, the file is located in <*user app data*>\ShoreWare Client\<*username*>.

An example path:

```
C:\Documents and Settings\mtovino\Application Data\ShoreWare
Client\Mtovino\history.txt
```

On other platforms, the file is located in <*client install*>\<*username*>.

An example path:

```
C:\Program Files\Shoreline Communications\ShoreWare
Client\Mtovino\History.txt
```

The History file stores text in a tab-delimited format, making the file available for viewing with other applications such as Excel.

Using Log Files

Another critical resource for troubleshooting is the log file where Call Manager 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-MMDDYY.log*. CC is literal and *MMDDYY* is a variable representing the month, day, and year. (For example, CC-061403.log). There are other log files, such as CSIS-MMDDYY.log, for other processes running on the client.

Locating the Log File

You can find the log file in <*app data*>\ShoreWare Client\Logs on Windows 2000, or <*install dir*>\Logs on other platforms. (See the section, "Using the History File" on page 6-8" for examples of pathnames.)

Creating Verbose Logs

Generally, 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.

NOTE Use verbose logging only if a problem is reproducible and ShoreTel Customer Support requires additional information.

To turn on verbose logging:

Step 1 Position the cursor in the QuickDialer window and press CTRL + F12.

Step 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.

The resulting logs are voluminous.

Preset Debug Flags

You can preset debug flags by running *STClient –d* from the command line instead of *Stclient*.

Collecting Logs

To collect logs to send to ShoreTel Customer Support, use the SendLogs utility.

From the Start menu, go to *Programs/Shoreline Communications/Support/Send Client Log*s. A wizard guides you through the rest of the process.

Reference

Call Activity Log File

Call Manager saves all call activity logs to the file *history.txt*. (When users open the History Viewer application to view a call history, they are displaying log data read from *history.txt*.)

On servers running Windows NT, Windows 2000, or Windows XP, *history.txt* is stored in the user's application data directory (ShoreWare Client/<*username*>). Under Windows 98 and Windows ME, *history.txt* is saved to a subdirectory in the ShoreWare Client install directory.

Customizing StartCli

The table below describes command line arguments you can use with *StartCli.exe* to run single applications or test modes.

Flags		Description
-cm		Runs Personal Call Manager.
	Option flags for Call Manager (append to *-cm* in any combination):	
	-n [*ext num*]	Runs Personal Call Manager against the specified extension in TAPI-only mode. No MAPI or CSIS connection is made. (Add MAPI connections via the *–o* or *–p* flag.)
	–d [*debug flags*]	Runs Personal Call Manager with the specified debug flags set, overriding the registry. No *-d* [debug flags] argument activates all the debug flags.
	–g [*level*]	Runs the Call Manager in GUI-only mode. The client does not make any TAPI, MAPI, or CSIS connections. This mode is useful for debugging painting issues. Level 1 is the full-featured GUI. Levels 2 and higher do not permit application docking.
	–j	Turns on just-in-time (JIT) monitoring (regardless of client type). The *-j* flag turns a Personal client into an Advanced client. *–j x* adds Extended JIT info (call stack details and call handling details).
	–x	Provides access to the Extension Monitor, regardless of client type. Using *–j x –x* turns any client type into an Operator client. An Operator client invoked this way includes all Workgroup features as well.
	–l [*# seconds*]	Forces automatic exit from the client after the specified number of seconds. (Default value is 30 seconds.) This command flag is useful for running automated login/out tests when used in conjunction with *loginout_cc.bat*.
	–o	Activates Microsoft Outlook contact import, regardless of any other settings. Use this command flag in conjunction with *–n*.
	–p	Activates Microsoft Outlook contact import and popping, regardless of any other settings. Use this command flag in conjunction with *–n*.
-vm		Runs the Voice Mail Viewer. (A shortcut appears on Start menu.)
-cpl		Runs the Control Panel applet.
-amon		Runs the Agent Monitor.
-qmon		Runs the Queue Monitor. (Only if the user is a member of a workgroup.)
	Option flags for Queue Monitor:	
	–a	Shows all calls made against the Queue extension, not just those tagged as "queued" by the Workgroup server.
	–q [queue ext]	Runs against the specified queue extension. (Must be used with *–n*.)
	–n [*user ext*]	Runs client as the specified user. (Must be used with *–q*.)
	–d [*debug flags*]	Sets debug flags. If *–test* is not used, this flag sets debug flags for all applications running inside *STCHost.exe*.
-xmon		Runs the Extension Monitor.
-hist		Runs the History Viewer.
	Option flags for History Viewer:	

	-n [ext number]	Runs History Viewer as extension number. Use to read previously created history files in TAPI-only mode.
-stop		Shuts down all Call Manager applications. Use the flag to change users without logging off. (The flag does not shut down Microsoft Outlook or other MAPI applications.)
-test		Runs a specified application from within *StartCli.exe* instead of invoking *STCHost.exe*. Use the flag to run applications from the debugger and to isolate individual application processes. Note: *–test must* be the first argument in the command line.
-ShoreDevHelp		Displays a help screen of first-tier options.

Examples of *StartCli* Command Lines

Example 1 Runs Personal Call Manager in TAPI-only mode against extension 500.

```
StartCli -cm -n 500
```

Example 2 Same as above, but runs Call Manager with *StartCli.exe* instead of *STCHost.exe*.

```
StartCli -test -cm -n 500
```

Example 3 Make yourself an Operator using this command line.

```
StartCli –cm –j x –x
```

The Setup Wizard

Another component of the client, the Setup Wizard, continues the configuration of Call Manager after installation.

The Setup Wizard appears the first time Personal Call Manager 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\ShoreWare Client\User-Name*
  - *HKEY_CURRENT_USER\Software\Shoreline Teleworks\ShoreWare Client\Server*
  - *HKEY_CURRENT_USER\Software\Shoreline Teleworks\ShoreWare Client\Pass-word*
- The following *DWORD* value is missing from the registry:
  - *HKEY_CURRENT_USER\Software\Shoreline Teleworks\ShoreWare Client\Load-OutlookPhoneNumbers*
- 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\ShoreWare 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 *STCHost.exe*. Otherwise, exiting the client applications may overwrite the settings.

APPENDIX A

Event Codes

This appendix provides a comprehensive table of ShoreTel event codes. Organized by error type and sorted by event ID numbers, the tables are a valuable resource for troubleshooting events reported by the ShoreTel system.

Event Types

The tables list event types according to component functions of the ShoreTel telephony system:

- Switch
- TMS
- Voice Mail
- TDI Media
- Event Watch
- Configuration Administration
- Port Mapper
- Trigger Server
- Distributed Routing Service (DRS)
- Kadota Utility
- Call Accounting
- Workgroup Server
- CSIS
- IP Phone Console Server (IPCS)
- IP Phone Display Server (IPDS)

Using the Event Code Tables

In some cases, event codes result from other error conditions that cause related problems.

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), it is likely that replacing the fan—and not the entire switch—will solve the problem.

Reading the Event 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).

About Severity Levels

Each event is assigned one of three levels of severity. The table below provides a guide to the severity levels in the tables.

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

ID	Severity Level	Message	Cause	Action
100	Error	Switch <*ShoreGear Switch Host Name*>: Event message lost, queue overflow.	The ShoreGear switch is receiving too many events from the NT Server. Possibly caused by an application problem on the ShoreWare server.	Check the ShoreWare server for events that might indicate an application problem. Troubleshoot the problem and reboot the server if you cannot identify a cause.
106	Error	Switch <*ShoreGear Switch Host Name*>: Task exception occurred. System automatically restarting.	A task exception has occurred. The ShoreGear switch experienced an internal error and is rebooting.	Contact ShoreTel Customer Support and be prepared to provide the *ipbx* and *tmsncc* log files for further analysis.
107	Information	Switch <*ShoreGear Switch Host Name*>: A restart request has been received—system is being shutdown and restarted.	The system administrator has restarted the ShoreGear switch via the Quick Look interface.	No action.
108	Error	Switch <*ShoreGear 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.
109	Error	Switch <*ShoreGear Switch Host Name*>: Unable to seize trunk on port <*port number*>. Taking trunk temporarily out of service.	The switch cannot seize a trunk.	Make sure the trunk line is connected to the ShoreGear switch. Check the wiring between the ShoreGear switch and the telephone company Demarc. Connect a telephone or telephone test set to the line, then go off-hook and listen for a dial tone. If no dial tone is present, call your service provider and report the problem.
110	Information	Switch <*ShoreGear Switch Host Name*>: Trunk on port <*port number*> has been taken out of service by the administrator.	The system administrator has taken the identified port out of service.	No action.
111	Information	Switch <*ShoreGear Switch Host Name*>: Trunk on port <*port number*> is back in service.	The trunk line is again functional and has been placed back in service.	No action.
112	Information	Switch <*ShoreGear Switch Host Name*>: Trunk on port <*port number*> has been put back in service by the administrator.	The system administrator has put the trunk back in service.	No action.
113	Warning	Switch <*ShoreGear Switch Host Name*>: Extension on port <*port number*> has been taken out of service by the administrator.	The system administrator has removed the specified extension port from service.	Put the port back in service when the system administrator indicates that it is appropriate.
114	Information	Switch <*ShoreGear Switch Host Name*>: Extension on port <*port number*> has been put back in service by the administrator.	The system administrator has put the specified extension port back in service.	No action.

ID	Severity Level	Message	Cause	Action
115	Information	Switch <*ShoreGear Switch Host Name*>: System has restarted. Product: ShoreWare Firmware Version: <*ShoreGear Switch firmware version number*> BootROM Version: <*ShoreGear Switch bootrom version number*> Telephone Board: <*ShoreGear Switch telephone board revision number*> CPU Board: <*ShoreGear 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	<*ShoreGear Switch Host Name*> Lost connection to switch <*ShoreGear Switch Host Name*>.	The switch is unable to communicate with the other ShoreGear switch specified in the event. The switches will not be able to place calls to each other.	The remote switch identified in the event may be turned 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 properly connected to the network, use ShoreTel Director to verify that it is properly configured. If you see event ID 205 and 206, update the configuration and power cycle the switch. After restart, confirm network visibility and the switch's configuration.
117	Information	Switch <*ShoreGear Switch Host Name* >: Established connection to switch <*ShoreGear Switch Host Name*>.	The switch has established a connection with the other ShoreGear switch and the two switches are communicating with each other.	No action.
119	Warning	Switch <*ShoreGear Switch Host Name* >: Excessive number of packets lost from <*ShoreGear Switch Host Name*>.	The switch is experiencing an excessive number of lost packets.	Verify that your network configuration meets ShoreTel requirements.
127	Error	Switch <*ShoreGear 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 ShoreGear switch that is either offline or unavailable to the network.
130	Error	Switch <*ShoreGear 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 <*ShoreGear Switch Host Name*>: Extension <*extension number*> failed to acquire port <*port number*>.	The ShoreGear switch was unable to configure the specified extension on the desired port.	Reboot the switch. If this error persists, contact ShoreTel Customer Support.
132	Information	Switch <*ShoreGear 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.

ID	Severity Level	Message	Cause	Action
138	Error	Switch <*ShoreGear Switch Host Name*>: Memory corruption detected - bad block <*parameter pinpointing failing block*> in partition <*parameter pinpointing failing partition*>.	A memory block corruption has been detected.	Reboot the switch. If the event persists, replace the switch.
140	Error	Switch <*ShoreGear Switch Host Name*>: Cannot re-initialize NvRam - Cannot Continue.	The flash memory in the ShoreGear switch is bad.	Replace the switch.
143	Warning	Switch <*ShoreGear 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 ShoreWare 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 <*ShoreGear Switch Host Name*>: Trunk on port <*port number*> has been connected for more than two hours.	The specified trunk has been 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 ShoreWare Director.
145	Warning	Switch <*ShoreGear 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 <*ShoreGear Switch Host Name*>: Echo train grade A port <*port number*>.	The echo suppression software is properly configured.	No action.
147	Information	Switch <*ShoreGear Switch Host Name*>: Echo train grade C port <*port number*>.	The echo suppression software is properly configured.	No action.
148	Warning	Switch <*ShoreGear Switch Host Name*>: Low Erl possible hardware problem port <*port number*>.	The echo suppression software has 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.
149	Warning	Switch <*ShoreGear Switch Host Name*>: Low Erle port <*port number*>.	The echo suppression software has 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.
152	Warning	Switch <*ShoreGear 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 <*ShoreGear Switch Host Name*>: DSP <*DSP number*> - 100% utilization.	The DSP on this switch has reached maximum capacity. In most instances, this event will not affect operations.	No action for an isolated occurrence. If the error persists, reboot the switch.

ID	Severity Level	Message	Cause	Action
157	Error	Switch <*ShoreGear Switch Host Name*>: Received DHCP NAK for IP address <*IP Address*>.	The DHCP server has 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 will assign the switch a new IP address.	In ShoreWare 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 ShoreWare server.)
158	Warning	Switch <*ShoreGear Switch Host Name*>: DHCP lease expired for IP address <*IP Address*>.	The DHCP lease for the switch has expired and the switch is currently obtaining a new IP address. While the switch is obtaining another IP address, it will be unable to communicate with the ShoreWare server.	In ShoreWare 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 ShoreWare server.)
159	Error	Switch <*ShoreGear Switch Host Name*>: DHCP IP address mismatch: <IP *Address*> Existing address: <IP *Address*> Offered address: <IP *Address*> Fatal Error... Rebooting <*ShoreGear 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 will automatically reboot and obtain a new address.	In ShoreWare 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 ShoreWare server.)
160	Error	Switch <*ShoreGear Switch Host Name*>: HAPI command failed. System automatically restarting.	The ShoreGear switch has experienced a fatal internal software error.	Contact ShoreTel Customer Support for updated information about fatal errors.
161	Error	Switch <*ShoreGear Switch Host Name*>: Connection to Telephony Management Server terminated - too many unacknowledged events.	The ShoreGear switch has stopped communicating with the TMS Server. This error can result from a CPU overload on the ShoreWare server.	Check the ShoreWare server for applications that are placing inordinate demands on the processor. Correct any application errors causing CPU overload.
162	Error	Switch <*ShoreGear Switch Host Name*>: Another device using the same IP address has been detected.	A device with the same IP address as the switch has 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 <*ShoreGear Switch Host Name*>: Ethernet link established: using <*Ethernet speed*> <*Duplex mode*>.	The switch is connected to the Ethernet network.	No action.
164	Error	Switch <*ShoreGear 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 <*ShoreGear Switch Host Name*>: Receive pair polarity reversed.	The twisted pairing wiring for an ethernet cable is reversed.	Although the switch will continue to function, replace the suspect cable.
166	Error	Switch <*ShoreGear Switch Host Name*>: Fan failed.	The fan in the ShoreGear switch has failed.	Replace the ShoreGear switch.
167	Warning	Switch <*ShoreGear Switch Host Name*>: Fan running slow.	The fan in the ShoreGear 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.

ID	Severity Level	Message	Cause	Action
168	Information	Switch <*ShoreGear Switch Host Name*>: Fan running normally.	The fan in the switch is running normally.	No action.
169	Information	Switch <*ShoreGear Switch Host Name*>: Operating temperature: normal.	The internal operating temperature of the switch is within normal operating parameters.	No action.
170	Warning	Switch <*ShoreGear 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 <*ShoreGear Switch Host Name*>: Operating temperature: too hot.	The internal operating temperature of the switch has 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 <*ShoreGear Switch Host Name*>: NvRam failure.	The ShoreGear switch was unable to write to the flash memory.	Reboot the switch. If the error persists, contact ShoreTel Customer Support.
173	Error	Switch <*ShoreGear Switch Host Name*>: VTALK failure.	The 48-Volt DC power supply has failed.	Replace the switch.
174	Error	Switch <*ShoreGear Switch Host Name*>: -70 Volt failure.	The 70-Volt DC power supply has failed.	Replace the switch.
175	Information	Switch <*ShoreGear Switch Host Name*>: Voltage OK.	The power supply that reported a failure is once again operating correctly.	No action.
176	Error	Switch <*ShoreGear Switch Host Name*>: Firmware Upgrade Failed: <*ShoreGear Switch Host Name*> <*specific diagnostic message*>.	The firmware upgrade for the switch has failed.	Check the switch event logs for subsequent appearances of Events 177 and 178. The presence of these events means that the switch has 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 <*ShoreGear Switch Host Name*>: Firmware Upgrade Started.	A firmware upgrade has begun.	No action.
178	Information	Switch <*ShoreGear 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.

ID	Severity Level	Message	Cause	Action
182	Error	2.5V too high: value = d.dV 2.5V too low: value = d.dV		Board failure. Return for repair.
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 <*ShoreGear Switch Host Name*>: Trunk on port <*port number*> has been connected for <*number of minutes*> minutes.	The trunk on the specified port has been 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 ShoreWare Director.
1301	Error	Switch <*ShoreGear Switch Host Name*>: Second TMS connection attempt from <*IP Address of second TMS server*>.	Another Shoreware Server has attempted to take control of the switch.	Only one ShoreWare server can control a switch; multiple servers cannot manage a switch simultaneously. Decide which ShoreWare server will manage the switch, then delete the switch from the other server.
1303	Error	Switch <*ShoreGear Switch Host Name*>: Configured IP <*IP Address*> does not match actual IP <*IP Address*>.	The IP address configured for the switch in ShoreWare Director does not match the IP address the switch is currently using.	From ShoreWare Director, change the switch's IP address to match the address the switch currently uses.
1305	Information	Switch <*ShoreGear Switch Host Name*>: Free memory reduction trend. Min <*minimum memory used*>. Avg <*Average memory used*>.	Reports the switch's memory usage.	No action.

ID	Severity Level	Message	Cause	Action
1306	Warning	Switch <*ShoreGear Switch Host Name*>: Call could not be completed due to insufficient network bandwidth between sites.	An attempted call has exceeded the limit on the number of media streams allowed for multiple sites.	The event may indicate that the number of media streams configured for multiple-site calls is not sufficient to handle the call traffic between sites. 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 additional media streams, raise the value specified for the site parameter. Note: Raising the number of permitted media streams may cause a reduction of sound quality for multiple-site calls.
1307	Information	Switch <*ShoreGear Switch Host Name*>: Trunk on port <*port number*> has been forced out of service.	Not reported in NT event log.	
1308	Warning	Switch <*ShoreGear Switch Host Name*>: T1 is in %2 loopback mode.	The T1 switch has been placed in either a local or payload loopback.	Your service provider is performing diagnostic tests.
1309	Information	Switch <*ShoreGear Switch Host Name*>: T1 is out of *%2* loopback mode.	The loopback on this switch has been removed.	No action.
1310	Error	Switch <*ShoreGear 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 <*ShoreGear Switch Host Name* >: T1 framing ok.	Framing has been restored.	No action.
1312	Error	Switch <*ShoreGear Switch Host Name*>: T1 signal error <*specific error*>.	The T1 switch has lost the T1 carrier signal.	Check the cabling. Contact your service provider.
1313	Information	Switch <*ShoreGear Switch Host Name*>: T1 signal ok.	The T1 carrier signal has been restored.	No action.
1314	Error (Severity level varies depending on error)	Switch <*ShoreGear Switch Host Name*>: Config Store: <*specific error*>.	Notable event while reading non-volatile switch configuration.	No action. The configuration received from the server will supply any missing data.
1316	Information	Switch <*ShoreGear Switch Host Name*>: Trunk to trunk transfer from port <*port number*> has been killed after <*time interval*> of connection.	The system disconnected trunks on the reported ports as a result of option settings in ShoreWare Director.	No action.
1317	Information	Switch <*ShoreGear Switch Host Name*>: ShoreTel Software Telephony Switch <*ShoreGear Switch*> Starting.	The ShoreTel Softswitch has started.	No action.

ID	Severity Level	Message	Cause	Action
1320	Error	Switch <*ShoreGear Switch Host Name*>: SoftSwitch Cannot Start: Logger Failed.	The ShoreTel Softswitch failed to start because it could not contact the NT event log.	This message appears only after Softswitch has successfully contacted the NT Event Log Manager—meaning that the error condition has been cleared (possibly by the clearing of a full NT event log).
1324	Information	Switch <*ShoreGear Switch Host Name*>: Reboot due to configuration change.	Certain configuration changes, for example, changing signalling protocols for a SG-T1, E15, requires the switch to reboot.	No action.
1325	Warning	Switch <*ShoreGear Switch Host Name*>: A request has been received 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 support personnel.	This message confirms that Softswitch has stopped on command from the NT Service Manager. No action is needed.
1326	Information	Switch <*ShoreGear Switch Host Name*>: SoftSwitch Stopping %2.	The Softswitch service has stopped.	If the Softswitch service does not restart within two minutes, perform a manual restart and contact ShoreTel Technical Support.

TMS

ID	Severity Level	Message	Cause	Action
200	Error	TMS Assertion Failure: <*parameters*>.	TMS has encountered a non-fatal error.	Restart the TMS service. Contact ShoreTel Customer Support and submit a support incident.
201	Information	ShoreTel-TMS service started. Version: <*version number*>.	The TMS service has started.	No action.
202	Information	ShoreTel-TMS service stopped.	The TMS service has stopped.	No action. If the stoppage was unintentional, check the event logs for a cause.
203	Information	Updated switch <*ShoreGear Switch Host Name*> switch firmware to revision <*version number*>.	The switch has been upgraded to the version of firmware identified in the event.	No action.
204	Error	Failed to update switch <*ShoreGear Switch Host Name*> switch firmware to revision <*version number*>.	An upgrade to the switch's firmware failed. This switch will 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 ShoreWare Director. If the event persists, contact ShoreTel Customer Support.
205	Warning	Switch Ethernet Address to IP Address mapping change. Old Mapping: <*MAC Address*> <*IP Address*> New Mapping: <*MAC Address*> <*IP Address*> A telephony switch has been detected that has either changed it's IP address or is using an IP address previously in use by a different switch.	TMS has detected a configured switch that has had its IP address changed. The event reports previously assigned and current MAC and IP addresses for the switch.	Ensure the Switch <*MAC Address*> has been setup 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 Customer Support.
206	Error	Switch Ethernet-Address IP-Address conflict. Expect: <*MAC Address*> <*IP Address*> Found: <*MAC Address*> <*IP Address*> A telephony switch has been detected with IP address or Ethernet address that is in conflict with the configuration database.	TMS has detected a switch with a MAC address and/or an IP address that conflicts with the address(es) configured for the device in ShoreWare 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.
211	Warning	Switch <*ShoreGear Switch Host Name*> booted via FTP. Possible switch firmware corruption. A failure experienced during firmware upgrade will leave a switch booting 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 ShoreWare server, open a command prompt window and change the directory to the ShoreWare server directory (typical path is *Program Files\Shoreline Teleworks\ShoreWare 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.

ID	Severity Level	Message	Cause	Action
212	Warning	Switch <*ShoreGear Switch Host Name*> software version mismatch: TMS Version: <*TMS version*> Switch Version:<*ShoreGear Switch version*> The switch firmware will be 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 ShoreWare Director, open the Quick Look page and reboot the switch.
213	Error	Unexpected Ethernet address for switch <*ShoreGear 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 ShoreWare Director, open the switch configuration record and correct the MAC address.
214	Warning	Switch "<*ShoreGear 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 ShoreWare server software. If the event persists, contact ShoreTel Customer Support.
221	Error	Failed to load firmware image file <*FileSys.dll*>. The Telephony Management Server was unable to load the switch firmware image file.	A switch firmware upgrade may not be possible.	This error appears when the "\Shoreline Communications\ShoreWare Server" does not have the "FileSys.dll" file, and TMS can't find or access this file. If this error appears frequently, contact ShoreTel Customer Support.
223	Warning	Detected an unexpected configuration change. This may indicate that TMS was not notified of a change. The configuration inconsistency has been corrected.	TMS has corrected a configuration mismatch it detected on a switch.	No action. If this error appears frequently, contact ShoreTel Customer Support.
227	Information	ShoreTel-TMS service starting. Version: <*TMS version*>	The TMS service has 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 will continue in stand-alone mode until the next TMS restart.	TMS failed to detect a network interface on the ShoreWare server.	Reboot the server. Troubleshoot the server's network configuration and make necessary repairs or modifications.

ID	Severity Level	Message	Cause	Action
231	Error	The configuration for switch "<*ShoreGear Switch Host Name*>" no longer matches the system configuration database. This condition may exist on additional switches, and may result in unexpected behavior. Any switches shown to have a configuration mismatch in the Director-QuickLook page should be restarted to resolve the problem.	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 ShoreWare 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 ShoreWare server to correct any network errors. If the event persists, check for events that indicate corrupted flash memory and and follow the instructions for correcting the problem.
233	Warning	TMS has disconnected from switch "<*ShoreGear Switch Host Name*>" (<*ShoreGear 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 has connected to switch "<*ShoreGear Switch Host Name*>" (<*ShoreGear Switch IP Address*>).	TMS has detected a switch and opened communications with the device.	No 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.	A new TAPI connection has been 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*>. The configuration database has the 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 Customer 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.

ID	Severity Level	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 Customer 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	The Telephony Management Server has 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 within TMS failed.	No action, unless the event is accompanied by system failures. If system failures are occurring, contact ShoreTel Support.
247	Information	The log file <*log file name*> current size is <*log file size*> bytes. It has exceeded its maximum size limit of <*max log size*> bytes. Further logging will be suspended.	The log file cannot write new events because it has 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 Customer Support.
248	Information	Failed to write to the log file <*log file name*> (Error Code = <*error code*>). Further logging will be suspended until midnight or service restart. The ShoreWare 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 Customer Support.
249	Information	Failed to write to the log file <*log file name*> because another process has 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 ShoreWare server and the telephony server 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 Customer Support.

ID	Severity Level	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	A rogue IP Phone Call Agent has been detected that has 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 has been replaced and the previous switch is still on-line, or if an IP phone has been moved from one ShoreWare 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 ShoreWare server. The Telephony Management Services on this system will remain in stand-by and will not be fully available while this condition is present. The ShoreWare Director configuration of servers should be checked for correctness.	This server is not configured in ShoreWare Director as one of the ShoreWare servers; or IP addresses on this server do not match any of the configured IP addresses for servers in ShoreWare Director.	The administrator must configure this server correctly in ShoreWare Director and ensure the correct IP address has been given.
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.	ShoreWare servers cannot be configured with loopback IP addresses.	The administrator must configure this server correctly in ShoreWare Director and ensure the correct IP address has been given.
257	Error	The Telephony Management Service was unable to connect to or access the configuration database on the computer. Please ensure that network connectivity exists between this computer and the configuration database, and that the database services are operational on the main server. The Telephony Management Services on this system will remain in stand-by and are not fully available while this condition is present. The ShoreWare Director configuration of servers should be checked for correctness. (Error code = <*Error code*>).	This server is unable to connect to ShoreWare database on 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 Customer Support.

ID	Severity Level	Message	Cause	Action
258	Error	The main ShoreWare server has been configured in the configuration database with loopback IP address 127.0.0.1. Please ensure that proper IP address is configured for the main ShoreWare server. The Telephony Management Services remain in stand-by and will not be fully available while this condition is present. The ShoreWare Director configuration for the servers should be checked for correctness.	The main headquarters server has been configured with a loopback IP address.	The administrator must provide the correct IP address of the headquarters server.
259	Information	The ShoreWare Telephony Management Service is reinitializing because new configuration changes have occurred. <Version of ShoreWare Server>	When administrator changes the IP address of a remote server, The ShoreWare Telephony Management Service on that remote server will be reinitialized with the new IP address. This event indicates the start of reinitialization process.	No action needed
260	Information	The ShoreWare Telephony Management Service is reinitialized with the new configuration changes. <Version of ShoreWare Server>	When the administrator changes the IP address of a remote server, The ShoreWare Telephony Management Service on that remote server will be reinitialized with the new IP address. This event indicates end of reinitialization process.	No action needed.
261	Warning	This ShoreWare Server has been deleted from the configuration database. Either this server has been deleted permanently or configuration changes have been made to this server that caused it to be deleted and added again. The Telephony Management Services on this server will be reinitialized and will remain in stand-by until the server is added again.	The ShoreWare Telephony Management Service will be reinitialized if configuration changes caused this server to be deleted and added again or it will remain in standby if this server is deleted.	If administrator has made the configuration changes that caused server to be deleted and added again, check the Quicklook page in ShoreWare Director to see if all the services running correctly. If not, please contact ShoreTel support.
262	Error	The configured IP address for this ShoreWare server has been changed in the configuration database. The Telephony Management Services needs to bind to new IP address and it will be reinitialized with the new IP address.	The IP address configured for this ShoreWare server has been changed in configuration database and ShoreWare Telephony Management service will be reinitialized with the new IP address.	The administrator has to check whether all the services are reinitialized correctly after IP address change. Check the Quicklook page in ShoreWare Director to see if all the services running correctly. If not, please contact ShoreTel support.

Voice Mail

ID	Severity Level	Message	Cause	Action
401	Information	Voice Mail Port Manager starting.Version: <*version number*>.	The Voice Mail Port Manager service has started.	No action.
402	Information	Voice Mail Port Manager stopping.	The Voice Mail Port Manager service has 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 will still be 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 will be made to this system/number until it is corrected. Please verify the number is correct.		Verify that the phone number is correct.
415	Error	The outbound AMIS phone number for System ID %1 was not found. Please verify that the System ID has a phone number associated with it.		Verify that the System ID has a phone number associated with it.
416	Error	An internal error occurred. The system could not delete an AMIS message from the outbound message queue. System ID%1 Mailbox ID %2 Message ID %3		
417	Error	The undeliverable AMIS message from %2 could not 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 has been deleted.		

ID	Severity Level	Message	Cause	Action
419	Error	An error occurred during the delivery of an AMIS message from %2 to %3 (AMIS System ID:mailbox), and the system has tried %1 times to deliver this message. The message is being 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.		
421	Error	The number of delivery attempts (%2) to AMIS System ID %1 has been exceeded. Please verify the number is correct.		
1001	Information	Voice Mail Message Server starting. Version: <*version number*>	The Voice Mail Message Server service has started.	No action.
1002	Information	Voice Mail Message Server stopping.	The Voice Mail message service has 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 has 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	Voice Mail has no available messages stores.	The voice mail system cannot locate message storage directory *shoreline data*\vms on the ShoreWare 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 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 will be 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.
1006	Information	Error writing mailbox 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.

ID	Severity Level	Message	Cause	Action
1007	Information	Error, disk got full when writing mailbox <*mailbox number*>.	The hard drive on which the message storage directory *shoreline data*\vms resides is full. The mailbox 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	Could not open required entry in the registry.	This may indicate an installation problem. Contact ShoreTel Customer Support and be prepared to provide the voice mail log files for further analysis.
1011	Information	Voice Mail Message Server could not open message <*file name*> Error <*ShoreTel specific error*>.	The Voice Mail server could not 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 Customer Support and be prepared to provide the voice mail log files for further analysis.
1014	Information	Failed to attach message <*file name*> to mailbox <*mailbox ID*> Error <*ShoreTel specific error*>.	Error resulted from a failure with a specific mailbox.	This event results from a full mailbox included in a distribution list (or any other general failure related to a mailbox). Verify that the mailbox is full. If not, contact ShoreTel Customer Support and be prepared to provide the voice mail log files for further analysis.
1015	Error	All Voice Mail Message Server threads in use.	The mail server no longer has access to resources.	This event corresponds to a logged NT event indicating serious problems that can prevent clients from retrieving voice mail. Contact ShoreTel Customer 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 mailbox.	The probable cause is corrupted mailbox data. Verify that the mailbox is functioning properly. If not, contact ShoreTel Customer 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 whether the SMTP server is down, or if its address is set up incorrectly
1019	Error	A voice message sent to voice mail server <*file name*> has been returned.	A message sent to a remote server has been returned.	Contact ShoreTel Customer 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 could not 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*>.	The Voice Mail Application service has started.	No action.

ID	Severity Level	Message	Cause	Action
1102	Information	Voice Mail Application stopping.	The Voice Mail Application service has 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.
1108	Information	Voice Mail disk usage has reached maximum capacity for a caller.	A user's voice mail box has reached maximum disk capacity. Until mailbox space is made available, callers will be unable to leave messages. (This error is logged the first time a caller attempts to record a message to a full mailbox.)	Send the user a reminder to reclaim space by deleting old messages from the mailbox.
1109	Information	Could not create message <*message number*> Error <*error number*>.	The system could not 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 has reached maximum capacity.	The hard disk drive or disk partition where the message directory *shoreline data**vms* resides is full. Voice mail will be 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 could not open phrase libraries.<*file name*> Error <*error number*>.	The voice mail system could not 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 mailbox <*mailbox number*>.	An attempt to log in to this mailbox has failed. While this event can indicate an unauthorized user, it most often results from a user who has forgotten (or mistyped) the password.	No action.
1114	Information	Listen unheard could not open message <*message number*>.	The server could not 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.

ID	Severity Level	Message	Cause	Action
1115	Information	Listen saved could not open message <*message number*>.	The server could not 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 could not open message <*message number*>.	The server could not 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	The Voice Mail Application has determined that the Voice Mail Message Server is down.	Sending of voice messages has failed.	Restart mail server.

TDI Media

ID	Severity Level	Message	Cause	Action
2100	Information	ShoreWare Media Driver started.Version: <*Version Number*>.	The ShoreWare Media Driver has started.	No action.
2101	Information	ShoreWare Media Driver has stopped.	The ShoreWare Media Driver has stopped.	No action.
2102	Error	ShoreWare Media Driver failed to start. <*Message*>.	The ShoreWare Media Driver failed to start.	Contact ShoreTel Customer 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 ShoreWare 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 Customer Support and be prepared to provide the NT system application log files for further analysis.
2104	Information	Poor audio timer resolution. <*Message*>	The ShoreWare 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 ShoreWare 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 Customer Support and be prepared to provide the NT system, and NT application log files for further analysis.

ID	Severity Level	Message	Cause	Action
2106	Information	Recording of call was terminated due to silence. <*Message*>	The ShoreWare Media driver detected silence when recording a message. This may be due to incorrect behavior from one of the ShoreWare switches.	If this error is appearing frequently, perform a system restart, In addition, contact ShoreTel Customer Support and be prepared to provide the NT system, and NT application log files for further analysis.
2107	Error	ShoreWare 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. ShoreWare 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 has 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	ShoreWare 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	ShoreWare Media Driver has 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 ShoreWare Media Driver failed.	If this error is appearing frequently, perform a system restart. In addition, contact ShoreTel Customer Support and be prepared to provide the NT system, and NT application log files for further analysis.

Event Watch

ID	Severity Level	Message	Cause	Action
1200	Information	The Event Watch service has successfully started.		No action.
1201	Information	The Event Watch service has successfully stopped.		No action.

Configuration Administration

ID	Severity Level	Message	Cause	Action
900	Information	User <*user name*> successfully logged in.	The specified user has 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 could indicate an unauthorized user is trying to access ShoreTel Director, it usually means that a user has forgotten (or mistyped) his or her password.

Port Mapper

ID	Severity Level	Message	Cause	Action
700	Information	<*ShoreTel-PortMap*> service starting. Version: <*version number*>	The Port Mapper service has started.	No action.
701	Information	<*ShoreTel-PortMap*> service stopping.	The Port Mapper service has 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 Customer Support, and be prepared to provide server log files.

Trigger Server

ID	Severity Level	Message	Cause	Action
800	Information	<*Service name*> service starting. Version: <*Software version number*>.	The Trigger Server has started.	No action.

801	Information	<*Service name*> service stopping.	The Trigger Server has stopped.	No action.
805	Error	The notification server has 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 ShoreWare 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 has 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 has 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 Customer Support.
807	Error	The ShoreWare notification service on this server has received keep-alive message from an invalid client. The master notification may have already lost connection from this client. The client will reinitialize the connection back to master server (ShoreWare HQ server)	This event is sent to indicate flaky connection between ShoreWare notification services running on ShoreWare Remote Servers and ShoreWare HQ server	If this event is seen consistently, administrator has to make sure network connection between HQ server and remote server is up and running. If the problem still persists, please contact ShoreTel Support

Distributed Routing Service (DRS)

ID	Severity Level	Message	Cause	Action
3100	Information	The Distributed Routing Service (Version %1) has started successfully.	The specified version of DRS has started.	No action.
3101	Information	The Distributed Routing Service has been stopped.	DRS has stopped.	No action.
3108	Information	The Distributed Routing Service reconnected to this switch: %n%1	DRS has 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

ID	Severity Level	Message	Cause	Action
1400	Information	<*ShoreTel-KadotaUtil*> service starting. Version: <*version number*>	The specified version of Kadota Utility has started.	No action.
1401	Information	<*ShoreTel-KadotaUtil*> service stopping.	The Kadota Utility has stopped.	No action.

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 has been archived previously. 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

ID	Severity Level	Message	Cause	Action
1600	Information	WorkgroupServer Started.	The workgroup server has 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

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 Customer 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.
2401	Error	CSIS Web Services had 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 Customer 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 long authorized for CSIS server access. Causes include client logout, or an inactive connection as the result of a client who has gone offline without logging out.	
2405	Information	CSIS Web Services execution enabled.	CSIS Service has started. Client access to CSIS Services is enabled.	No action.
2406	Warning	CSIS Web Services execution disabled.	CSIS Service has stopped. Client access to CSIS Services is disabled. (Web services will 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 Console Server (IPCS)

ID	Severity Level	Message	Cause	Action
2700	Information	ShoreWare IPCS Server started.	The IPCS Server has started.	No action.
2701	Error	Handler not installed.	The service was not installed properly.	Re-install the service.
2702	Information	The ShoreWare IPCS Server Stopped.	The IPCS Server has stopped.	No action.

ID	Severity Level	Message	Cause	Action
2703	Information	Bad Service Request.	The service is not running.	Re-install the service.
2704	Information	Maximum capacity for Switch ID: <*switch identifier*> has been reached.	The switch has 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 could not 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 could not 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.
2707	Information	The IP Address for IP-Phone Device: <*MAC address of phone*> has been set to NULL in the configuration database.	The IP address for a "downed" IP phone has been set to NULL. This usually indicates that a new IP phone has 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*> could not 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)

ID	Severity Level	Message	Cause	Action
2800	Information	The ShoreTel IP Phone Display Service (*Version x.x.xxxx.x*) has started successfully.	The IPDS service has started.	No action.
2801	Information	The ShoreTel IP Phone Display Service has been stopped.	The IPDS service has been stopped.	No action.
2802	Error	The ShoreTel IP Phone Display Service (*Version x.x.xxxx.*x) has encountered a fatal error during startup; the service will be terminated.	The IPDS service crashed upon startup. (This is a fatal condition.)	Contact ShoreTel Customer Support and be prepared to provide server logs.
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 has probably been modified manually by the user.	Contact ShoreTel Customer 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 Customer 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 Customer 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 Customer Support and be prepared to provide server logs.
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 Customer 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 has 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 has 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 has reset the display on all IP phones.	No action.

ID	Severity Level	Message	Cause	Action
2811	Information	The phone display was reinitialized because of an administrative request: IP Address <*IP address*>.	An administrator has 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 will attempt to recover from this problem. If users report anomalous behavior, you should stop and restart the Microsoft Telephony Service and all ShoreWare 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
2813	Error	The IP Phone Display service was unable to recover from an apparent crash in the Microsoft Telephony Service. You should stop and restart the Microsoft Telephony Service and all ShoreWare 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 has 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 will retry in 30 seconds. <*error code that was encountered*>	IPDS was unable to access the database upon startup. It will try again in 30 seconds. No action need 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 will continue 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.	Unless the error is recovered from (see error 2817), this should generate a support call.
2817	Information	The IP Phone display service's connection to the ShoreTel database has recovered from the previous error.	A database retry after 2815/ 1816 errors was successful and the situation has been recovered from.	No action.