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CallPilot

Planning and Engineering Guide

Product release 2.5 Standard 1.0 October 2003

NORTEL NETWORKS™

CallPilot

Planning and Engineering Guide

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Publication history

October 2003 Standard 1.0 of the *Planning and Engineering Guide* for CallPilot 2.5 is issued for general availability.

Contents

Chapter 1

Getting started with planning and engineering

In this chapter

Overview

In this guide

The *CallPilot Planning and Engineering Guide* provides information and instructions for selecting and planning your CallPilot system.

The process of planning and engineering results in determining the best size, platform, and location for your CallPilot system. This guide provides information about the various tools available to help you plan and engineer your CallPilot system.

Questions to consider

As a framework for beginning your planning and engineering tasks, consider the following questions:

- What is the LAN connectivity for PCs?
- What type of CallPilot server do you intend to you use?
- Where do you want to install the servers?
- How do you plan to connect the servers?

This guide helps you find answers to these questions.

What's new in this release

Introduction

This section describes the new features of the CallPilot system.

Web-based features

You no longer need to install the CallPilot Administration Client software. You can use CallPilot Manager to administer the CallPilot server from any personal PC equipped with a web browser, such as Internet Explorer or Netscape.

CallPilot Reporter is also a web-based feature of CallPilot.

Supported switches

This guide provides planning and engineering information for the following switches:

- T1/SMDI connectivity switches—CallPilot 2.5 supports the following T1/SMDI connectivity switches manufactured by Nortel Networks:
  - SL-100
  - DMS-100

  Note: The abbreviation SMDI stands for simplified message desk interface.
- Digital set emulation (DSE) switch—CallPilot 2.5 supports the Rolm switch manufactured by Siemens.

Supported hardware platforms

CallPilot supports the following hardware platforms:

Platform type	Server model
Tower	■ 703t
Rackmount	■ 1001rp ■ 1002rp

Skills you need

Introduction

You need to possess specific skills and knowledge to use this guide effectively.

Nortel Networks product knowledge

Knowledge of, or experience with, previous releases of CallPilot and the following Nortel Networks products is helpful:

- SL-100 switches
- DMS-100 switches
- Meridian Mail systems

Knowledge of non-Nortel Networks switches

Knowledge of, or experience with, non-Nortel Networks switches, such as the Rolm switch, is useful when planning and engineering a CallPilot system.

Computer knowledge or experience

Knowledge of, or experience with, the following PC products is helpful:

- Microsoft Windows NT
- Microsoft Windows 95, 98, 2000, and XP

Other experience or knowledge

Experience or knowledge in the following areas can also be useful:

- network management
- client-server systems
- flowcharting

Other resources

The following documents and tools can be useful in engineering a CallPilot system:

- *CallPilot General Release Bulletin*
- *CallPilot Spares Planning Bulletin*
- Meridian Client Compatibility Check utility
- Meridian Mail comparison
- Product bulletins
- *CallPilot Engineering Spreadsheet*

To obtain these documents and tools, contact your Nortel Networks distributor.

Nortel Networks distributors can obtain the documents and tools listed above from the CallPilot area of the Partner Information Center (PIC) web site at http://my.nortelnetworks.com.

Related information

Introduction

The CallPilot technical documents listed in this section are available on the documentation CD-ROM that you receive with your system. The documents are also available from the following sources:

- CallPilot Manager
- My CallPilot
- the Nortel Networks PIC at http://my.nortelnetworks.com

You need a user ID and a password to access the PIC. If you do not have a PIC account, then click Register on the PIC web site to request an account. The processing of your account request can take up to 72 hours.

You can print part of a guide or the entire document, as needed.

Planning and engineering guides

Before installing a CallPilot system, refer to the Nortel Networks technical publications (NTP) listed below to obtain information on planning

- a CallPilot system
- a data migration from Meridian Mail to CallPilot

Document title	NTP number
Planning and Engineering Guide	555-7101-101
Installation and Configuration Planner	Not applicable
Meridian Mail to CallPilot Migration Utility Guide	555-7101-801

Installation and configuration guides

The documents listed below provide information on the following issues:

- CallPilot server hardware and software
- desktop messaging and My CallPilot software
- switch configuration

Document title	NTP number
Desktop Messaging and My CallPilot Installation Guide	555-7101-505
Installation and Configuration Guide for your server model The guide is a binder that contains the following five documents: ■ *Part 1: Installation and Maintenance Overview* ■ *Part 2: <Server model> Server Hardware Installation* ■ *Part 3: <Switch name> and CallPilot Server Configuration* ■ *Part 4: Software Installation and Maintenance* ■ *Part 5: <Server model> Server Maintenance and Diagnostics*	Refer to the documents in the *CallPilot Installation and Configuration* binder for the NTP numbers.

Administration guides

The following guides provide specialized information on configuring, administering, maintaining, and using CallPilot:

Document titles	NTP number
Administrator's Guide	555-7101-301
Reporter Guide	555-7101-310
Application Builder Guide	555-7101-325
Desktop Messaging and My CallPilot Administration Guide	555-7101-503

Networking guides

The guides listed below provide instructions on planning, installing, setting up, and troubleshooting CallPilot networking services.

The CallPilot 2.5 networking guides remain mostly unchanged since CallPilot 1.0. For instructions on configuring the networking services in CallPilot 2.5, refer to the CallPilot Manager online Help.

Document title	NTP number
Networking Enhancements Guide	555-7101-507
Networking Planning Guide	555-7101-100
AMIS Networking Implementation and Administration Guide	555-7101-303
Enterprise Networking Implementation and Administration Guide	555-7101-304
Integrated AMIS Networking Implementation and Administration Guide	555-7101-305

Document title	NTP number
VPIM Implementation and Administration Guide	555-7101-306

End-user guides

The following guides and cards are designed for CallPilot end users, such as phone set users and desktop messaging users:

Document titles
Unified Messaging What's New Card
Unified Messaging Quick Reference Card
Unified Messaging Wallet Card
Menu Interface Quick Reference Card
Alternative Command Interface Quick Reference Card
Command Comparison Cards
Multimedia Messaging User Guide
Speech Activated Messaging User Guide
Desktop Messaging User Guides
My CallPilot User Guide

Troubleshooting

The *CallPilot Troubleshooting Reference* document (P06075747) describes symptoms that can appear on all CallPilot server platforms, and provides methods of resolving the symptoms.

Nortel Networks continually updates the *CallPilot Troubleshooting Reference* document, which is available from the Nortel Networks PIC at http://my.nortelnetworks.com.

If you are not a Nortel Networks distributor, then contact your Nortel Networks technical support representative for assistance.

Using online sources

CallPilot administration online Help

CallPilot Manager and CallPilot Reporter contain administration online Help areas that provide access to

- technical documentation in Acrobat PDF format
- online Help topics in HTML format

To access the online information, use either of the following methods:

- Click the orange Help button at the top of any page to access the Administration Help area.
- Click the grey Help button on any page to display a topic that relates to the contents of the page.

For more information on using the online Help utility, access the CallPilot Manager Help, open the Getting Started book, and click “Navigating CallPilot Manager help.”

The Application Builder software contains a Windows Help system and a context-sensitive Help system (available by clicking the ? button, and then a field or label).

CallPilot end-user online Help

The My CallPilot software contains a Useful Information area that provides access to the end-user guides in PDF format.

To access the online Help for the currently selected My CallPilot tab, click the Help button on the upper-right corner of the My CallPilot page.

Desktop messaging provides product-specific Windows Help for groupware clients (Microsoft Outlook, Novell GroupWise, and Lotus Notes). The stand-alone version of CallPilot Player also provides addressing and troubleshooting information for Internet mail clients.

Contacting technical support

Contact your distributor’s technical support organization to get help with troubleshooting your system.

Components of a CallPilot system

Introduction

Before starting the planning of a CallPilot system, you must understand the key components that must be provisioned, and the interaction of these components. This section provides a high-level overview of these concepts. For more details, refer to the *CallPilot Installation and Configuration* document that applies to your CallPilot server type.

System components

A CallPilot system consists of three key components: switch, server, and PC. The Unified Messaging is an optional feature that can be installed on PCs. For web messaging, a customer-provided web server is another optional component. The web server allows PC users to access messages using a web browser, such as Internet Explorer and Netscape.

Switch types

The switch types that are compatible with CallPilot include models of the following switch families:

- T1/SMDI connectivity switches
- DSE connectivity switches

More information on the CallPilot compatibility with various types of switches is provided later in this guide.

Server types and switch connectivity

The following table summarizes the compatibility of switches with the CallPilot 2.5 platforms

Switch	CallPilot platform		
	703t	1001rp	1002rp
T1/SMDI (DMS-100, SL-100)		✔	✔
DSE (Rolm)	✔		

The following table summarizes the connectivity of the CallPilot 2.5 server to the switch:

Switch	Connectivity
T1/SMDI (DMS-100, SL-100)	T1/SMDI links
DSE (Rolm)	DSE links

Desktop PCs

Use a PC with a web browser to access CallPilot Manager to

- maintain and administer the CallPilot software
- view reports

Use a PC or a wireless device with desktop messaging installed to download messages from the CallPilot server. A web server allows desktop users to access messages using a web browser.

Components to provision

The following components must be provisioned for a CallPilot system:

- CallPilot server
- PC for CallPilot administration and CallPilot Reporter
- switch resources related to CallPilot
- desktop client PCs (if the desktop messaging feature is required)
- web server for Web Messaging, CallPilot Reporter, and CallPilot Manager

The functionality of the web server and CallPilot Manager resides on the CallPilot server, since both components are automatically installed. A separate web server is not required for CallPilot Manager administrator or My CallPilot end-user web services. However, if CallPilot Reporter is required for management reporting, then a separate web server is necessary.

Component list

The *Models & Ordering Procedures* document provides component lists for each CallPilot server platform.

To obtain the *Models & Ordering Procedures*, contact your Nortel Networks distributor.

Nortel Networks distributors can obtain this document from the CallPilot area on the PIC at http://my.nortelnetworks.com.

Chapter 2

Grounding and power requirements

In this chapter

Overview

This chapter outlines the guidelines for providing power and grounding to switch and CallPilot equipment, and describes the auxiliary power requirements. However, if the information in this chapter conflicts with the local or national code, then follow the code.

Before the CallPilot server installation, a qualified electrician must implement the single-point ground reference, as required, between the power outlets of the CallPilot server and the power outlets of the switch.

DANGER OF ELECTRIC SHOCK

If you fail to ground the switch and the CallPilot equipment correctly, the installation can be

- unsafe for personnel
- unprotected from lightning or power transients
- subject to service interruptions, degraded performance, and loss of information.

Power and grounding guidelines

General

The power and ground for the switch and the CallPilot equipment must originate from the supply service (equipment room service panel or transformer), where the ground conductor and the neutral conductor are connected and referenced to the main building ground. All power feeds must contain a separate safety conductor (green wire).

Note: Do not use the main building ground directly as the ground reference for the system.

Power

The service panel, which must be located in the equipment room, must not service lighting, air conditioning, heating, generators, or motors. Nortel Networks strongly recommends that supply conductors be dedicated and uninterrupted from a building primary source to the dedicated equipment room service panel.

Power is supplied to the service panel by a power transformer. The transformer typically provides secondary voltages of 208/120 V three-phase four-wire “wye” service, 240/120 V single-phase four-wire “delta” service, or 240/120 V single-phase three-wire service. Collectively, these secondary voltages are referred to as “nominal 208/240 V ac”.

A dedicated power transformer for the switch, CallPilot server, and associated auxiliary and telephone operating company interface equipment is preferred. However, a shared transformer or distribution is acceptable.

Do not use ground fault circuit interrupt (GFCI) devices on the switch and CallPilot power feeds.

Single-point ground

The switch and the CallPilot system require a single-point ground (SPG) topology for all switch equipment and all CallPilot associated auxiliary equipment respectively.

The switch and the CallPilot system have several types of grounds and several types of signal returns that are generally referred to as “grounds”:

- In AC systems, a logic return (LR or LRTN) and a green wire frame ground, called the AC equipment ground (ACEG), are typically part of the input power cord.
- In DC systems, a logic return (LR or LRTN) and a battery return (RTN), as well as an AC equipment ground (ACEG) green wire, are on the input to the rectifier(s).
- All systems must have an external hard-wired frame ground connection (also called the personal hazard safety ground). The frame ground is connected internally to the ACEG green wire. As the frame ground is hard-wired, it ensures that the equipment has a ground connection even if the system is “unplugged.”
- External Communications wiring that meets the requirements as stipulated in NEC Article 800-30 FPN 4 require the use of lightning protection. The cable sheaths, and protection grounds must be installed as indicated in NEC Article 800 - 33, and Article 800 - 40 (b).

For an SPG topology, each of the preceding grounds, from each of the columns, must terminate at a single connection point before attaching to the actual ground reference at the service panel or transformer. Physically, the SPG is usually a copper bar or plate (referred to as a “bus”). In its simplest form, the SPG (the single connection point) can be an isolated ground bus or an ACEG bus in the service panel or transformer.

Refer to the documentation associated with the PBX/switch configured with CallPilot for further information on grounding requirements. Also refer to the ANSI-J-STD-607-A-2002 standard *Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications*.

Follow these requirements when implementing the SPG:

- All ground conductors must be identified according to local codes and terminated permanently.
- Terminations must be accessible for inspection and maintenance during the life of the installation.
- All grounding conductors must be
  - continuous, with no splices or junctions
  - tagged “Do not remove or disconnect”
  - insulated against contact with foreign grounds.
- Grounding conductors must be no load, non-current carrying cables, under normal operating conditions.
- The ground interface in a steel-framed building must have a single connecting reference located at the service panel, to the building steel on the same floor as the switch and the CallPilot system (or within one floor from the switch and the CallPilot system).

  Note: Nortel Networks does not recommend the use of building steel as an integral part of the switch and CallPilot ground system. The building steel is a reference point only.

The DC resistance of the system ground conductor, which runs from the switch to the main building ground, must be as close to zero as possible. The maximum total resistance on all runs within the building must not exceed 0.5 ohms.

Auxiliary power

Terminal devices

Terminal devices located in the equipment room require local power. Power for these devices must be wired and fused independently from all other receptacles, labeled at the service panel (to prevent unauthorized power interruption), and referenced to the same interface point on the building system ground as the service panel ground.

Auxiliary power in the equipment room can be supplied by isolated or non-isolated service receptacles, which must match the grounding for the system. In other words, if the switch and the CallPilot server have an isolated ground topology, the receptacles must also be isolated.

Auxiliary equipment

If auxiliary equipment using an RS-232 interface is too remote to be powered from the service panel, a modem or fiber link is required for ground isolation. Failure to provide this isolation defeats the SPG required by the system.

Existing power and grounding

Existing powering and grounding on some sites can make it difficult to ensure that the local power grounding is referenced to the same potential as the system ground. In addition, local power grounding can form part of a common grounding network that is subject to noise from external sources. Under these conditions, where locally powered terminals and equipment connect directly to the system through DC coupled links sharing a common ground, incidental ground loops can form and inject noise onto the system.

Chapter 3

System configurations

In this chapter

Overview

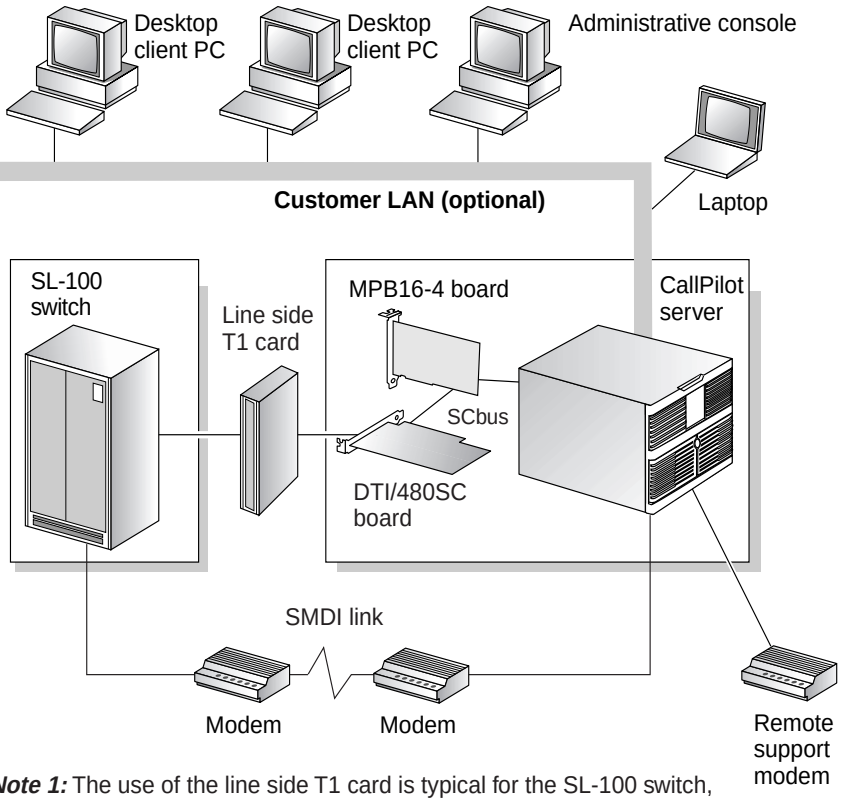
Introduction

This chapter describes the system configurations that CallPilot supports. This information is designed to help you understand the CallPilot system, as well as the hardware and software components that must be provisioned.

For more details on the CallPilot network layout, refer to the *CallPilot Installation and Configuration Guide* that applies to your CallPilot server platform. The installation and configuration guides address, for example, the interaction between the switch and the CallPilot server.

CallPilot architecture

The following figure shows an example of network in which a CallPilot server is connected to an SL-100 switch.

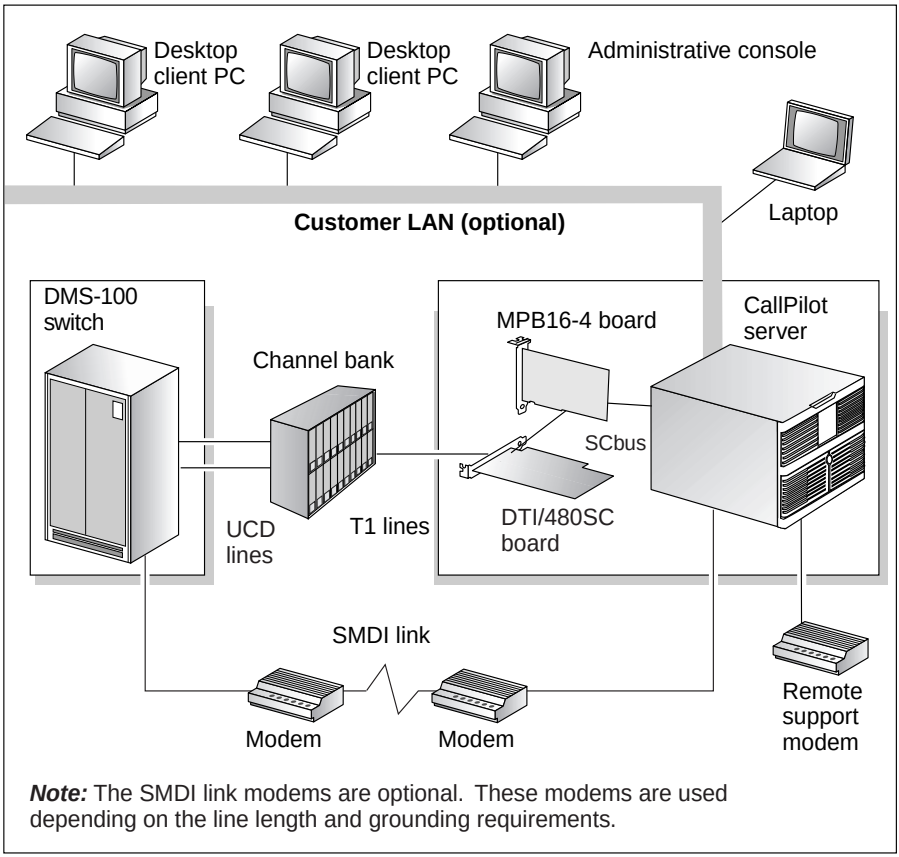


Note 1: The use of the line side T1 card is typical for the SL-100 switch, but in certain circumstances a channel bank can be used instead.

Note 2: The SMDI link modems are optional. These modems are used depending on the line length and grounding requirements.

g250007

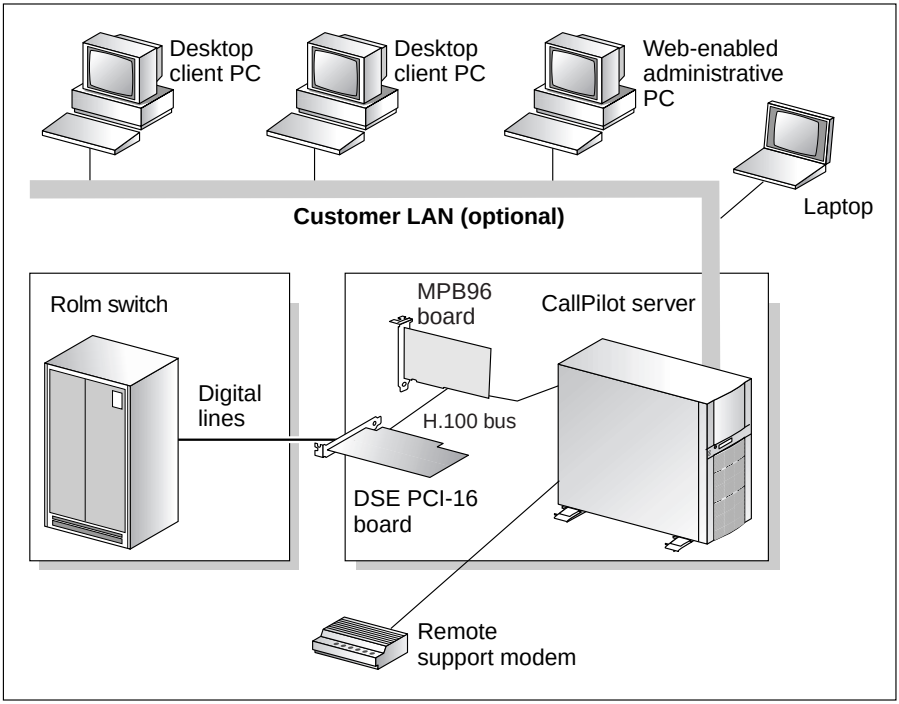
The following figure shows an example of network in which a CallPilot system is connected to a DMS-100 switch.



Note: The SMDI link modems are optional. These modems are used depending on the line length and grounding requirements.

g250052

The following figure shows an example of network in which a CallPilot system is connected to a Rolm switch.



The following table summarizes CallPilot's use of LAN connections and web servers within the CallPilot architecture:

Switch	Connection	Purpose
T1/SMDI	SMDI link	Data
■ SL-100 ■ DMS-100	T1 channels	Voice
DSE (Rolm)	Digital lines	Data and voice

Notes:

CallPilot connects directly to the users' PCs by way of a customer LAN (CLAN).

CallPilot can use an optional, external Internet Information Server (IIS) to provide management and end-user web services. However, you must have an external web server to use CallPilot Reporter.

Supported server platforms

You can install CallPilot 2.5 software on tower (703t) and rackmount (1001rp and 1002rp) platforms.

Supported switches

The 703t server supports the Rolm PBX, while the rackmount servers support the SL-100 and DMS-100 switches.

For information about the hardware and software requirements, see Section A: “Hardware and software configurations,” on page 39. For information about the connectivity requirements, see Section B: “Connectivity requirements,” on page 51.

Web server for CallPilot administration

CallPilot Manager, Reporter and My CallPilot are web-based applications. All these applications require a web server. If you are running just CallPilot Manager or My CallPilot, or both, then the CallPilot server can be used as the web server.

However, a customer-supplied, external IIS web server is required for CallPilot Reporter. See “Web server for CallPilot” on page 45 for more information on the web server configurations that CallPilot supports.

Users connect to the web applications using a web browser, such as Internet Explorer or Netscape Navigator.

The web server hard drive must have approximately 1.0 Gbyte or more of free space available for CallPilot web services and for the database of operational measurements.

Desktop messaging clients

The desktop messaging client that is available with CallPilot can be installed on a PC running Windows 95, 98, 2000 Professional, NT 4 with service pack 6a, or XP Professional.

For information on the desktop messaging clients that CallPilot supports, refer to “Customer e-mail environments” on page 66.

For information about the minimum configuration requirements, see “CallPilot desktop messaging” on page 49.

Section A: Hardware and software configurations

In this section

CallPilot server

Introduction

This section summarizes the hardware and software requirements for the CallPilot server.

Hardware

CallPilot is an application built on the CallPilot server hardware platform. The CallPilot platforms for release 2.5 are as follows:

- tower chassis (703t)
- rackmount chassis (1001rp and 1002rp)

Software

The CallPilot software configuration comprises the following items:

- server operating system—the CallPilot server uses the Windows NT Server 4.0 operating system with service pack 6a, and all applicable Microsoft security hot fixes
- CallPilot software
- third-party software

Compatibility with other products and environments

Meridian Mail

You can network CallPilot with Meridian Mail systems that use one or more of the following network protocols:

- Audio Messaging Interchange Specification-Analog (AMIS-A) networking
- Enterprise Networking
- Voice Profile for Internet Mail (VPIM) networking with Meridian Mail Net Gateway

However, some compatibility limitations apply.

Third-party Windows NT server software and hardware

Only the third-party applications that Nortel Networks identified explicitly as supported by CallPilot can be installed on a CallPilot server.

The following third-party software applications are currently authorized to be installed on the CallPilot server:

- one of the following approved antivirus software applications:
  - Computer Associates eTrust InoculateIT 6
  - McAfee NetShield for Windows NT 4.5
  - Symantec Norton AntiVirus version 2001, version 7

  Note: For more details on installing antivirus software on the CallPilot server, refer to *Product Bulletin 2002-035, "Support for Anti-Virus Applications."*
- Symantec pcAnywhere, version 10.5
- if the server is equipped with a redundant array of independent disks (RAID) device, one of the following applications:
  - Mylex Workstation Array Manager
  - Mylex Global Array Manager
  - Power Console Plus Package

The installation of non-recommended third-party Windows NT server software or hardware can destabilize the system, degrade its mission of providing real-time call processing performance, and disrupt its Year 2000 (Y2K) compliance. For more information, refer to *Product Bulletin 99067, "CallPilot Unauthorized Hardware and Software*."

See also

For detailed information on server capacity, refer to Chapter 5, "Engineering the server."

Supported switches

Introduction

This section presents the switches that CallPilot 2.5 supports.

T1/SMDI switches

CallPilot 2.5 supports the following T1/SMDI switches:

- SL-100
- DMS-100

Two hardware components must be installed and configured on the CallPilot server to ensure the connection to the T1/SMDI switches:

- the simplified message desk interface (SMDI) link
- the T1 links

SL-100 and DMS-100

The SL-100 and DMS-100 switches support the SMDI link using either an input-output controller (IOC) shelf with an NT1X89 card or an NTFX30 input-output module (IOM).

The T1 connection is integrated with the SL-100 switch by way of line side T1 interface cards installed in the intelligent peripheral equipment (IPE) module of the switch. You must have a sufficient number of line side T1 cards for the number of channels purchased. Refer to the *Line Side T-1 Interface (LT1) for IPE Services Guide* (555-4001-022) for instructions on installing the line side T1 cards.

The line side T1 cards must be configured for ground start. CallPilot does not support loop start.

The DMS-100 switch does not use line side T1 cards for the T1 connection. However, the DMS-100 switch requires an external channel bank to support Centrex service.

Note: The SL-100 switch can also use and external channel bank for call lines.

The T1 links from both the SL-100 and DMS-100 switches are terminated on Intel Dialogic network interface cards (DTI/480SC) installed in the CallPilot server.

For programming purposes, the SL-100 switch requires MSL-10 software or higher, and the DMS-100 switch requires NA08 software or higher.

For information on connectivity requirements, see "T1/SMDI connectivity" on page 56.

DSE switch

Only the CallPilot 703t server supports the digital set emulation (DSE) connectivity with the Rolm switch.

The DSE provides a connectivity mechanism that allows the CallPilot server to function with the third-party Rolm PBX manufactured by Siemens. The following third-party components ensure the connectivity:

- DSE boards (Intel PCI-16, model DL-3002-16)

  Each DSE PCI-16 board provides 16 digital channels of connectivity to the MPB96 board.
- Telephony Service Provider (TSP) software

For more information on the DSE connectivity, hardware and software requirements, refer to "Rolm connectivity," on page 59.

For detailed information on the programming of the Rolm switch, refer to the *Part 3: DSE and CallPilot Server Configuration* (555-7101-223) installation guide.

Web server for CallPilot

Introduction

This section provides the hardware, software, networking, and engineering considerations for planning CallPilot web servers.

CallPilot 2.5 provides three web services:

- CallPilot Manager (system configuration and management)
- Reporter (generating reports)
- My CallPilot (end-user mailbox configuration, messaging and documentation)

A Microsoft Internet Information Server (IIS) running either on a CallPilot server or on an external, customer-supplied, Windows NT or 2000 server hosts the three CallPilot 2.5 web services:

CallPilot web service

Configurations

CallPilot supports the following web server configurations:

1. All three web services reside on an external IIS server (recommended)

   Note: This configuration provides better security. The customer's IT department can manage and apply the latest IIS security practices to the server.

2. Hybrid configuration

   - My CallPilot resides on a CallPilot server
   - CallPilot Manager and Reporter reside on an external IIS server

CallPilot Reporter cannot be installed on the CallPilot server. The high CPU loads associated with running reports are inconsistent with the CallPilot server mission as a real-time application environment.

When CallPilot Reporter is installed on an external IIS server, CallPilot Manager is also installed on the external IIS server.

CallPilot Manager and My CallPilot can be installed on both CallPilot and the external IIS server, but Nortel Networks does not recommend this configuration.

Remarks

CallPilot is supplied pre-engineered to support My CallPilot or CallPilot Manager IIS web services, or both, and still be capable of providing high performance levels to all other services running on CallPilot. End-user and administrator web browsers can access the IIS server on CallPilot by way of the CallPilot IP address on the CLAN. No additional engineering considerations apply.

External web server configuration

The external web server, which hosts the CallPilot web services, connects with the CallPilot server by way of the CallPilot server IP address on the CLAN.

Hardware

Since web messaging through My CallPilot and Reporter web services can generate high CPU loads, the minimum recommended hardware configuration for the external web server must include the following:

- 600 MHz PIII system
- 128 Mbytes of RAM

Software

The external web server requires the following software:

- Microsoft Windows NT 4 server with service pack 6a and option pack 4, IIS 4, and the applicable Microsoft security hot fixes

or

- Windows 2000 server with IIS 5 and the applicable Microsoft security hot fixes

Note: If the secure socket layer (SSL) technology is to be used, you must purchase and install an additional IIS certificate from the vendor.

Free disk space

Generally, the server must have approximately 1 Gbyte of free disk space available for the installation of CallPilot web services. If the Reporter service is used for a large CallPilot system or a network of CallPilot systems, Nortel Networks recommends that the free disk space be estimated using the following formula:

```
Free disk space = 300 Mbytes + [total # of channels *
(days in DB + 1) * 0.2 Mbytes]
```

where

- The total # of channels is the total number of channels on all CallPilot systems whose data is in the Reporter database.
- Days in DB is the number of days that data are stored in the Reporter database.

Engineering the server

The following factors drive the web server load from CallPilot services:

- the number of My CallPilot users
- the number of users accessing messages from My CallPilot versus the number of users using desktop messaging clients such as Microsoft Outlook
- the number of reports generated during busy hours

The web server does not have to be dedicated to CallPilot web services. The same server can host other web pages or provide standard network services, such as printing and file sharing. However, running other applications and services on the server can cause slow response levels for CallPilot services and significantly lower user productivity and satisfaction with the services. Therefore, Nortel Networks recommends to dedicate the web server to CallPilot web services.

Monitoring performance

You must monitor the web server performance after an installation or major change, such as the addition of more users, to detect a possible system overload. If the response time is slow during the busy hour, then monitor the level of activity on the web server to determine if the server is overloaded. Windows NT Performance Monitor can provide this information.

The two main indicators to monitor are the CPU usage and the available memory. If the CPU usage (shown as Processor Time) is constantly above 90 percent for a significant number of minutes during the busy hour or the memory availability (shown as Available Bytes) is ever below 4 Mbytes, or both, then the user response time can be degraded.

Supported web browsers

CallPilot web services can be accessed from a PC running the Windows operating system with one of the following web browsers:

- Internet Explorer 5.0 or higher
- Netscape Navigator 6.2 or higher

Application Builder

Application Builder is the administrative service that is used to build voice menus and auto attendant application services. Application Builder requires the installation of a client on the administrator’s PC. You can download the client, on demand, from the CallPilot Manager web service to the PC.

CallPilot desktop messaging

General

Refer to Section C: “System requirements,” on page 61, for information on the desktop messaging operating systems and clients that CallPilot supports, as well as on the software requirements for each client.

Disk storage for messages

CallPilot uses a proprietary sub-band voice encoding at 18 kbit/s. To calculate the disk space used for voice in the CallPilot message store of desktop messaging, use the following conversion factor:

```
141 kbytes = 1 minute of voice (SBC or VBK)
```

Note: Messages are kept in the message store on the PC only if they are played by way of the PC.

If a voice message is converted and saved to disk as a WAV file, then use this conversion factor:

```
945 kbytes = 1 minute of voice (WAV)
```

See also

For more information on the desktop messaging software available with CallPilot, refer to the following documents:

- *Desktop Messaging and My CallPilot Administration Guide* (555-7101-503)
- *Desktop Messaging User Guide* for each client

Section B: Connectivity requirements

In this section

General

CallPilot uses both LAN and voice switch connectivity.

The CallPilot server connects to the customer’s IP network through the CLAN.

For more information on the CallPilot connectivity, refer to “CallPilot architecture” on page 33.

CLAN connections

Introduction

The CLAN connectivity is required for

- Unified Messaging
- Voice Profile for Internet Mail (VPIM) networking
- Simple Network Management Protocol (SNMP) network management
- CallPilot web services: CallPilot Manager, Reporter, My CallPilot

Hardware requirements

You must provide your own LAN hub and associated cables for the connection of your LAN or WAN to the CallPilot server.

Supported LAN topologies

The following table identifies the LAN protocols that each CallPilot server supports:

CallPilot platform	Ethernet		
	10 Mbit/s	100 Mbit/s	1 Gbit/s
703t	✔	✔	✔
1001rp	✔	✔	
1002rp	✔	✔	

Supported network protocols

CallPilot supports only the Windows transmission control protocol/Internet protocol (TCP/IP) stack (Windows TCP/IP networking) on client PCs. CallPilot does not support Novell internetwork packet exchange/sequenced packet exchange (IPX/SPX) or TCP/IP stack on client PCs. However, CallPilot can coexist on networks running both IPX/SPX and other protocols as long as Windows TCP/IP is used for CallPilot client-server communication.

CLAN traffic considerations

You must ensure that the CLAN has the appropriate bandwidth capacity to support the traffic between the client PCs and the CallPilot server. When calculating the bandwidth capacity, consider the facts identified in the following table.

Traffic type	Bandwidth
Desktop traffic from CallPilot to a desktop client or the web server	One minute of voice consumes 200 kbytes. One page of fax averages 55 kbytes.
My CallPilot web server traffic from the web server to the browser on the client PC	One minute of voice in WAV format consumes 60 kbytes. One minute of voice in VBK format takes 130 kbytes. One page of fax averages 40 kbytes.
VPIM networking traffic	One minute of voice consumes 330 kbytes.

Data transfer rates

The following table identifies the average data transfer rates per user

Traffic type	Voice messaging (kbit/s)	Fax messaging (kbit/s)	Both (kbit/s)
Desktop Messaging	0.09	0.06	0.15
My CallPilot web server traffic in WAV format	0.12	0.10	0.22
My CallPilot web server traffic in VBK format	0.15	0.10	0.25

Notes:

1. The average voice messaging rates are based on the assumption that 60 percent of the voice messages are transferred across the customer data network, and the remaining 40 percent are retrieved by phone.
2. The average messaging rates are based on the assumption that 80 percent of the fax messages are transferred across the network, and that fax messaging users retrieve their fax messages using either a desktop messaging or My CallPilot web server client. The remaining 20 percent of the fax messages are retrieved by way of fax machine.
3. The transfer rates for My CallPilot web server files include the message transfer from CallPilot to the web server, and the subsequent transfer from the web server to the web browser.
4. My CallPilot web server with VBK (CallPilot proprietary encoding format) requires that the Nortel Networks voice player be installed on the client PC.
5. The embedded player in My CallPilot plays messages in VBK format.

T1/SMDI connectivity

Introduction

The SL-100 and DMS-100 switches exchange data with the CallPilot server using

- a simplified message desk interface (SMDI) link
- T1 links

Dialogic DTI/480SC network interface card

One or more DTI/480SC network interface cards (NIC) reside in the CallPilot server. Each DTI/480SC NIC supports up to two T1 links to the switch. Each T1 link supports up to 24 channels.

The DTI/480SC NIC receives the calls from the switch and passes them to the MPB16-4 carrier boards for processing. An SCbus cable connects the DTI/480SC NIC with the MPB16-4 carrier board.

MPB16-4 carrier board

The MPB16-4 carrier board provides 16 media processing unit (MPU) resources, contains two embedded digital signal processing (DSP) cards, and connects to the personal computer interface (PCI) bus of the server. Four MPC-8 cards are supplied with the MPB16-4 board for a total capacity of 48 DSP MPUs. The MPC-8 cards process the voice and data signals that pass through the DTI/480SC boards.

SL-100 and DMS-100 switches

SMDI link

The SMDI link is a data link between the serial port COM2 on the CallPilot server and the multimedia processing card (MPC) port on the switch. The SMDI link transports incoming call information and message waiting indicator (MWI) control messages. If the CallPilot server is close enough to the switch, then the SMDI link can be a direct cable connection between the server and the switch.

The criteria for direct cable connection depend on whether the switch has an input output controller (IOC) shelf or an input output module (IOM):

- With an IOC shelf in the switch, the CallPilot server must be within 15.25 m (50 ft) of the switch.
- With an IOM in the switch, the CallPilot server must be within 230 m (750 ft) of the switch.

Use a modem connection for distances that are greater than those specified in the preceding list. The General DataComm 060A010-001 (North American AC version) modem is approved for ensuring the connection between the CallPilot server and the switch.

Line side T1 cards

The line side T1 cards in the SL-100 switch send the voice and data signals to the CallPilot server.

Note: The SL-100 switch can also use an external channel bank for the call lines.

Channel bank for DMS-100

The DMS-100 switch does not use line side T1 cards, and requires an external channel bank for the call lines. The channel bank multiplexes up to 48 universal call distribution (UCD) lines configured on the DMS-100 switch onto two T1 links that are attached to the T1 network cards in the CallPilot server

Software requirements

CallPilot requires the following software on the T1/SMDI switches:

- SL-100 switch—MSL10 software or later
- DMS-100 switch—NA08 software or later

The following considerations apply to the programming of the SL-100 and DMS-100 switches:

- A UCD group is defined for each desired media type on the switch. Each UCD group has unique directory numbers (DN) and supporting UCD agents.
- Line DNs are created for each directly dialable service. The DNs must be set up so that they can be forwarded to the UCD groups defined for each media type.
- The switch subscriber forwards the calls to the primary voice messaging DN if the condition Busy or No Answer is encountered.
- The MWI feature must be configured for each subscriber set.

The forwarding DN can be configured as either the originally called DN (the first forwarding DN in a call forward chain is the default option) or the redirecting DN (the last forwarding DN in a call forward chain) if the LASTFWDN option is assigned to the SMDI link.

Rolm connectivity

Introduction

The digital set emulation (DSE) Rolm switch uses 16 digital channels (lines) to exchange data with the CallPilot server.

The Rolm switch can be used only with the CallPilot 703t platform. Each CallPilot 703t server connected to a Rolm switch contains the following boards:

- up to four DSE PCI-16 boards (model DL-3002-16)
- one MPB96 board

DSE PCI-16 boards

Each DSE PCI-16 board provides 16 channels of DSE connectivity to the switch. Therefore, a CallPilot 703t server can provide a maximum of 64 channels of connectivity with the switch.

The DSE PCI-16 board performs the signal exchange between the switch and the server as follows:

- When signals arrive from the switch, the DSE PCI-16 board interprets the signals and passes them to the MPB96 board.
- When the CallPilot server transmits data to the switch, the DSE PCI-16 board converts data to emulate the signals sent by the digital phone sets that the switch supports.

MPB96 board

The MPB96 board installed in the CallPilot server has a capacity of 96 media processing units.

H.1000 voice bus cable

The H.1000 voice bus cable connects the MPB96 board to the DSE PCI-16 boards.

Channel requirement for MWI signaling

The message waiting indicator (MWI) signaling to the switch requires a dedicated channel. The 16th channel (last channel on the first DSE PCI-16 board) on the CallPilot system is configured as an MWI channel. This channel is not available for general traffic.

Rolm switch software and hardware requirements

The following table summarizes the software and line cards supported by various models of Rolm switches.

Rolm switch model	Software	Line card
8000	8003	RPI set (63C24 and 506328)
9000	All versions	RLI-90678
9751 (9005)	All versions	RLI-90678
9751 (9006)	9006.3 and 9006.4	SLRM, SLRM2, SLRM3

For detailed information on the programming of the Rolm switch, refer to *Part 3: DSE and CallPilot Server Configuration* (555-7101-223) installation and configuration guide.

Section C: System requirements

In this section

Compatibility issues

Products and environments

The following table summarizes the compatibility of CallPilot with products and environments that it is likely to encounter.

Product	CallPilot compatibility
Meridian Mail	■ Audio Messaging Interchange Specification—Analog (AMIS-A) ■ Enterprise Networking ■ VPIM with Meridian Mail Net Gateway. **Note:** Some compatibility limitations apply.
Meridian Mail Reporter	You cannot use Meridian Mail Reporter to generate reports from a CallPilot server. Meridian Mail supports only Meridian Mail Reporter and CallPilot Reporter supports only CallPilot.
Meridian Administration Tool (MAT)	The CallPilot Application Builder client can coexist with MAT 6.1, 6.5 and 6.6 on the same personal computer (PC). Refer to *Product Bulletin 99092* on the Nortel Networks web site for a detailed listing of the compatibility issues with MAT.
Symposium Messenger Microsoft Exchange and Outlook client	CallPilot is compatible with these products. Symposium Messenger release 4.0.0.13 or later is recommended.
Symposium Messenger Lotus Notes client	Not supported

Product	CallPilot compatibility
Symposium Messenger Unified client	CallPilot is compatible with the Symposium Messenger Unified client. Symposium Messenger release 4.0.0.13 or later is recommended.
Meridian Text Telephony System (MTTS)	CallPilot does not support the MTTS at this time.
Microsoft Office 2000 and 2002 (Microsoft Office XP)	CallPilot Desktop Messaging clients are compatible. CallPilot Application Builder client is compatible.

Operating systems for Desktop Messaging clients

The following table defines the compatibility of CallPilot Desktop Messaging with the operating systems that it is likely to encounter.

Product	CallPilot compatibility	
	Supported	**Not supported**
Application Builder client	■ Windows 95A or Windows 95A with service pack 1 ■ Windows 95B OEM service release 2 (OSR2) ■ Windows 98 and 98SE ■ Windows NT 4.0 Workstation with service pack 6A ■ Windows 2000 Professional with ISO-8859-1 (Latin-1) character set versions only (see the note below) ■ Windows XP Professional	■ Windows ME ■ Windows NT 4.0 Workstation with service packs 1 through 6 ■ Windows NT Server 4.0 ■ Windows 2000 Server and Advanced Server ■ Dual-boot (Windows 95 and Windows NT) configurations ■ Novell NetWare Clients ■ Mac OS

Note: The ISO-8859-1 (Latin-1) character sets cover most West-European languages including, but not limited to, the following: English, French, Spanish, Catalan, Basque, Portuguese, Italian, Albanian, Rhaeto-Romanic, Dutch, German, Danish, Swedish, Norwegian, Finnish, Faeroese, Icelandic, Irish, Scottish, Afrikaans, and Swahili.

Product	CallPilot compatibility	
	Supported	**Not supported**
Desktop Messaging clients	■ Windows 95A or Windows 95A with service pack 1 ■ Windows 95B OEM service release 2 (OSR2) ■ Windows 98 and 98SE ■ Windows NT 4.0 Workstation with service pack 6A ■ Dual-boot (Windows 95 and Windows NT) configurations ■ Non-English versions of Windows with localized client ■ Windows 2000 Professional (all clients) ■ Windows XP Professional (all clients)	■ Windows ME ■ Windows NT 4.0 Workstation with service packs 1 through 6 ■ Windows NT 4.0 Server ■ Windows 2000 Server and Advanced Server (all clients)

If desktop messaging, My CallPilot, or both are used, refer to *Desktop Messaging and My CallPilot Installation Guide* (555-7101-505) for more information.

Customer e-mail environments

The following general considerations apply to the compatibility of CallPilot with customer e-mail environments:

- The CallPilot 2.5 server supports clients only in Windows operating system environments.
- The CallPilot 1.07 server supports CallPilot 2.5 Desktop Messaging clients.
- The CallPilot 2.5 server supports CallPilot 1.07 Desktop Messaging client (with reduced functionality).
- It is recommended that a CallPilot 2.5 Desktop Messaging client be used with a CallPilot 2.5 server.
- The CallPilot 2.5 server does not support CallPilot 1.05 and 1.06 Desktop Messaging clients.

CallPilot Desktop Messaging supports the following e-mail clients:

Product	CallPilot compatibility
Microsoft Outlook	Versions released with Windows 98, Windows 2000 and Windows XP
Novell GroupWise	Versions 5.5 and 6.0x
Lotus Notes	Versions 4.6x, 5.x and 6.x (released in the first quarter of 2003)
Microsoft Outlook Express	Versions 5.x and 6.x (released with Internet Explorer 5.x and 6.x)
Microsoft Outlook 98, 2000 and 2002 (Windows XP) [Internet mail mode]	Yes
Netscape Messenger (Netscape Communicator)	Versions 6.2 and later
Qualcomm Eudora Pro	Version 5.x

My CallPilot web messaging

My CallPilot web messaging supports the following operating systems and Internet browsers:

Product	CallPilot compatibility
Server side	
Operating system	■ Windows NT Server 4.0 with service pack 6A and option pack 4 ■ Windows 2000 with service pack 1 or later
Internet service software	■ Internet Information Server 4.0 ■ Internet Information Server 5.0
Client side	
Operating system	■ Windows NT Workstation 4.0 with service pack 6A and option pack 4 ■ Windows 95B OEM service release 2 (OSR2) ■ Windows 95 retail ■ Windows 98 and Windows 98SE ■ Windows 2000 Professional ■ Windows XP Professional
Internet browser	■ Netscape Communicator 6.2 and 7.0 ■ Internet Explorer 5.x with service pack 2 and Internet Explorer 6.x

The following considerations apply to the compatibility of CallPilot with My CallPilot web messaging:

- If CallPilot Desktop Messaging and web messaging are installed on the same client PC, CallPilot web messaging is compatible with all versions of the player.
- Java script and cookies must be enabled in the web browser.
- Support for localized web browsers is available in English, French, Dutch, German, and traditional Chinese.

Server operating system and Internet browser support with My CallPilot, CallPilot Manager, and CallPilot Reporter

My CallPilot, CallPilot Manager and CallPilot Reporter in CallPilot support the following server operating systems and Internet browsers:

Product	CallPilot compatibility
Server side	
Operating system and Internet Information Server	■ Windows NT Server 4.0 with service pack 6A and Internet Information Server 4.0 ■ Windows 2000 Server with service pack 1 or service pack 2 and Internet Information Server 5.0
Client side	
Operating system	■ Windows NT Workstation 4.0 with service pack 6A ■ Windows 95B OEM service release 2 (OSR2) ■ Windows 95 retail ■ Windows 98 and Windows 98SE ■ Windows ME ■ Windows 2000 Professional ■ Windows XP Professional

Product	CallPilot compatibility
Internet browser	■ Netscape Communicator 6.2 with proper Java J2SE extension ■ Netscape Communicator 7.0 ■ Internet Explorer 5.x and 6.x

The following general considerations apply to the support of My CallPilot, CallPilot Manager and CallPilot Reporter for server operating systems and browsers:

- When using CallPilot Reporter, the J2SE extension version 1.3.1_05 must be installed to ensure the proper operation of Java on Netscape Communicator 6.2.
- Java script and cookies must be enabled in the web browser.
- Support for localized web browsers is available in English, French, Dutch, German, and traditional Chinese.

Software feature key adapter (dongle)

You must install the CallPilot software feature key adapter correctly before accessing CallPilot Manager.

Network support

CLAN

The CallPilot 2.5 servers support the following CLANs:

CLAN type	CallPilot 2.5 compatibility
10Base-T	■ all CallPilot server models
100Base-T	■ all CallPilot server models
1000Base-T	■ 703t server

CallPilot 2.5 does not support token ring CLANs (4 or 16 Mbit/s).

Support for WAN networking protocols

CallPilot supports only the TCP/IP networking protocol.

CallPilot does not support the Novell IPX/SPX protocol.

Third-party Windows NT server software and hardware

CallPilot server does not support the addition of any third-party Windows NT server software or hardware, with the exception of the approved anti-virus applications. For more information, refer to the Product Bulletin 2002-035, *CallPilot Support for Anti-Virus Applications*. If you install third-party software or hardware that is not approved, then you can

- destabilize the system
- degrade the system ability to provide real-time call processing performance
- disrupt the system Y2K compliance
- cause future upgrades to fail

For more information on this issue, refer to the Product Bulletin 99067, *CallPilot Unauthorized Hardware and Software*.

Proper power and grounding

All CallPilot server installations must follow the switch and CallPilot guidelines for power and grounding given in Chapter 2, “Grounding and power requirements.”. You must therefore implement the single-point grounding (SPG) reference requirements. If you do not follow the SPG guidelines, the electrical transients resulting from lightning and other power-ground disturbances can damage the switch and the CallPilot equipment.

The implementation of the SPG reference requirements must cover all the power devices that are attached directly to the private branch exchange (PBX) and its ancillary equipment.

In a typical CallPilot installation, the following components must be protected as indicated in the SPG guidelines:

- PBX
- CallPilot server
- uninterruptible power supply (UPS), if installed

  Note: Nortel Networks highly recommends that the tower and rackmount servers be equipped with UPSs.
- remote maintenance modem
- CLAN hubs
- administration and maintenance PC, as well as the associated printer

Switch connectivity before running the Configuration Wizard

The CallPilot server operates properly if you ensure that the switch connectivity is configured and operational before running the Configuration Wizard. The switch connectivity configuration must include at least the following:

- one or more voice channels or automatic call distribution (ACD) agent terminal numbers (TN)
- the control directory number (CDN) for voice messaging

Since CallPilot integrates with the switch, the connectivity resources are required to allow CallPilot services to function as designed. If you prepare a CallPilot server and configure the system before the installation at the customer location, ensure that the system has temporary switch connectivity before running the Configuration Wizard. As a result, you avoid the virtual memory low and other problem conditions that can occur.

Migration from Meridian Mail

The Meridian Mail migration utility NTUB25AA supports the migration from Meridian Mail systems to CallPilot systems. The NTUB25AA migration tool supports the migration to CallPilot from Meridian Mail releases 11, 12 and 13 for all Meridian Mail platforms except the MSM. The NTUB25AA migration utility is required for all Meridian Mail releases, including release 13.14, as this tape supersedes the migration utility available at the TOOLS level.

You cannot use previous CallPilot 1.07 versions of the migration utility (NTUB24AA, NTUB24AB or NTUB24AC). For information about the applicable limitations, refer to the *Meridian Mail to CallPilot Migration Utility Guide* (555-7101-801).

Chapter 4

Determining system size

In this chapter

Overview

Introduction

This chapter provides an overview of the enterprise capacity issues that you must consider before installing CallPilot. Nortel Networks provides engineering tools that automatically calculate what type of system you need on the basis of the following information that you must provide:

- the number of users
- the application usage
- the busy hour activity

System sizing

Engineering tools

The following engineering tools are available from Nortel Networks:

- Meridian Configurator (North and South America)
- NetPrice (Europe, the Middle East, Africa, and Asia)
- CallPilot Engineering Spreadsheet in Microsoft Excel format

  This spreadsheet is available in the CallPilot area of the Partner Information Center (PIC) web site at http://my.nortelnetworks.com.

System requirements

Use the engineering tools to determine the following system requirements:

- channel requirements
- digital signal processor (DSP) media processing unit (MPU) requirements
- storage requirements
- CPU real-time requirements

The engineering tools also help you determine

- the CallPilot platform having sufficient channel, DSP, and CPU real-time capacity to meet the requirements
- the required switch channel connectivity hardware
- the required DSP hardware

Channel requirements

The number of voice, fax, and speech recognition channels required to meet the customer needs is determined by

- estimating the busy hour traffic using a parameter-driven traffic model
- looking up the corresponding channel capacity in a P05 Erlang C traffic table

The parameters available for modeling traffic are described later in this chapter. Also refer to Appendix A, “Traffic capacity tables”, on page 125.

DSP MPU requirements

The DSP capacity is calculated in terms of MPUs. The engineering tool determines the required DSP processing power by using the following ratios:

- 1 MPU for each voice channel
- 2 MPUs for each fax channel
- 4 MPUs for each speech recognition channel

Storage requirements

The storage capacity is calculated in terms of hours of voice messages. The engineering tool estimates the voice message storage requirements by multiplying the number of mailboxes by the minutes of voice messages for each mailbox parameter.

Storage for fax is determined by multiplying the estimated number of fax pages stored by a mix of the normal and fine storage densities:

- 212 pages of normal density fax = 1 hour of voice messages
- 106 pages of fine density fax = 1 hour of voice messages

CPU real-time requirements

With the introduction of CPU-intensive services (such as E-Mail by Phone) that use host-based text-to-speech algorithms, it is now necessary to calculate the CPU load of a given set of applications. The engineering tool calculates the CPU load by

- estimating the total traffic in centum call seconds (CCS) for applications, messaging, and E-mail by Phone services
- multiplying by load factors for each service type
- adding up the results of the estimations and calculations

CallPilot platform

CallPilot 2.5 is available in two platforms: tower and rackmount. Considering the selected platform, the engineering tool performs the following tasks:

- checks the platform capacity for channels, DSP MPUs, and CPU real-time load against the calculated requirements
- flags instances in which the platform capacity is exceeded

Switch channel connectivity hardware

The engineering tool provisions the switch channel connectivity hardware that is necessary to meet the channel requirements.

DSP hardware

The engineering tool provisions the DSP hardware that is necessary to meet the DSP MPU requirements.

Customer requirements

Principal input

Customer requirements are the principal input into the engineering tools and the major driver of the system capacity. The following parameters must be determined as part of the customer requirements:

Parameter	Initial value	Minimum	Maximum	Comments
System Type (tower or rackmount)	None	Not applicable	Not applicable	The selection of any option enables all the CallPilot inputs.
Voice Users	Blank	0	703t (tower): 20 000 1001rp (rackmount): 20 000 1002rp (rackmount): 40 000 See “Voice Users maximums” on page 82.	Enter the number of voice mailboxes.
Email by Phone Users	Blank	0	Less than or equal to the number of voice mailboxes	Enter the number of mailboxes with E-mail by Phone using text to speech.
Speech Activated Messaging	Blank	0	Less than or equal to the number of voice mailboxes	Enter the number of mailboxes with speech activated messaging (SAM).

Parameter	Initial value	Minimum	Maximum	Comments
Fax Users	Blank	0	Less than or equal to the number of voice mailboxes	Enter the number of mailboxes with Fax Messaging.
Users with Single (Voice/Fax) DN	Blank	0	Less than or equal to Fax Users	Enter the number of fax mailboxes with a Single DN used for both voice and fax access.
Desktop Messaging	Blank	0	Both tower and rackmount systems: 20 000	Enter the number of mailboxes with desktop messaging.
Switch: (SL-100, DMS-100 or Rolm)	None	Not applicable	Not applicable	Select a switch to determine the setup requirements for system connectivity.
Power (AC/DC)	AC	Not applicable	Not applicable	The AC and DC power options are available for the rackmount systems. The tower systems are available only with the AC power option, but selecting DC causes the configuration tool to provision a DC power inverter.

Parameter	Initial value	Minimum	Maximum	Comments
Number of Voice Menu Applications	2	0	2500	Enter the number of voice applications created by Application Builder.
Number of Fax On Demand Applications	0	0	2500	Enter the number of Fax On Demand applications created by Application Builder.

Voice Users maximums

The Voice Users maximums are the limits to software right-to-use (RTU) licences only. That is, the number associated with the Voice User parameter (such as 8000, 20 000 and 40 000) represents the maximum number of mailboxes that can be configured on a platform; see page 80. The actual limit to the number of voice users that a CallPilot system can support at an adequate service level is affected by many factors and can be determined only with an engineering tool.

Channel requirements

Overview of channel types

CallPilot provides three types of channel media:

- voice channels (support for voice services, such as Voice Mail)
- fax channels (support for both voice and fax services, such as Fax on Demand)
- speech recognition channels (support for voice, fax, and speech-activated messaging services)

Sizing the number and type of channels

The engineering tools perform the following steps:

1. Estimate the busy hour traffic in CCS for each channel type.
2. Look up the channel requirements in the Erlang C P05 traffic table. See “CCS values and channel requirements table” on page 127.

You can determine the traffic levels using one of the following factors:

- default assumptions in the system sizing tools
- estimations and/or measures of calls and faxes for each day

Default assumptions in the system sizing tools

The system sizing tools contain default assumptions for typical business usage levels for voice, fax, and SAM services. The traffic modeling parameters and their default values are covered later in this section. Use the default values of traffic modeling parameters to obtain the overall channel sizing for different user populations.

The percentages of feature usage stated in 2 and 3 on pages 84 and 85 depend on the nature of the customer business and are not necessarily exact. Also, light or infrequent users of these features can be disregarded from a system engineering standpoint.

1. Channel requirements for users without multimedia feature usage

Users	Voice	Fax	Speech recognition
100	4	0	0
200	6	0	0
500	12	0	0
1000	20	0	0
2000	36	0	0
5000	72	0	0

2. Channel requirements for users with the following multimedia feature usage:
   - 10% Mobile User (SAM and E-mail by Phone)
   - 20% Fax Messaging
   - 50% Desktop Messaging

Users	Voice	Fax	Mobile user
100	4	2	2
200	6	4	2
500	12	6	4
1000	18	8	4
2000	32	14	6
5000	Not supported because more than 96 MPUs are required.		

3. Channel requirements for users with the following multimedia feature usage:

- 25% Mobile User (SAM and E-mail by Phone)
- 50% Fax Messaging
- 100% Desktop Messaging

Users	Voice	Fax	Mobile user
100	4	4	2
200	6	6	4
500	10	10	4
1000	18	16	6
2000	Not supported because more than 96 MPUs are required.		
5000	Not supported because more than 96 MPUs are required.		

Use estimates or measures of calls/faxes for each day

If existing traffic reports are not available, but average numbers of calls or faxes per day are known or estimated, then you can determine the number of calls/faxes during the peak busy hour using this formula:

Peak hour traffic = 13% of daily traffic

Voice traffic services

Principal services

The principal services that generate traffic on voice channels are as follows:

- Voice Call Answering Service
- Voice Logon (Mail) Service
- Email by Phone on Voice channels
- Application Builder Services
  - Voice Menus
  - Auto Attendants
- Fax On Demand Requests
- Outcalling (Remote Notification and Delivery to Telephone)
- Networking (Enterprise and AMIS)

Provisioning voice channels on CallPilot

Customers often purchase CallPilot to replace an existing voice mail system. If the port capacity on the existing voice mail system provided satisfactory service levels, then simply provision the same number of voice channels on CallPilot without engineering the solution. Enter the number of voice channels in the Voice Channels Override parameter of the Meridian Configurator or NetPrice tool.

If a single CallPilot system replaces two or more voice mail systems, then it is not necessary to provision as many voice channels on the CallPilot system as on each of the voice mail systems that are replaced, since larger systems have increased traffic efficiency. When a single CallPilot server replaces two or more systems, Nortel Networks recommends using the engineering tool to size the channel requirements on the basis of the number of CallPilot users.

Modeling busy hour voice traffic

The table below presents the parameters that are used in calculating the traffic estimation for each of the principal voice traffic services in hours. The engineering tools consider these parameters to be advanced parameters. The sales engineer generally leaves the advanced parameters unchanged. However, the engineering tools uses the advanced parameters to enable the sales engineer to adapt the traffic model to the needs and behavior of the customer.

Field name	Initial value	Minimum	Maximum	Comments
Voice Call Answering Session Calls	0.4	0.1	5	Enter the number of call answering calls in the busy hour (BH) per mailbox.
Voice Call Answering Session AHT	40	10	200	Enter the average hold time (AHT) in seconds for the BH.
Voice Logon Session AHT	70	10	300	Enter the AHT in seconds for the BH.
Total Busy Hour Message Access	0.35	0.1	1.0	The number of expected single message retrievals from all potential modes (DTMF, SAM, and Desktop) per mailbox during the BH.
EBP Session AHT	240	10	600	Enter the E-mail by Phone session AHT in seconds for the BH.
Pct DTMF Voice Mail Accesses using EBP	10%	00	100	This is the percentage of dual-tone multifrequency (DTMF) logons that make use of E-mail by Phone.

Field name	Initial value	Minimum	Maximum	Comments
Voice Menus Calls	5	1	200	Enter the number of calls per voice menu application in the BH.
Voice Menus AHT	60	5	200	Enter the AHT in seconds for the BH.
Voice Menus: %Xfrd	33	0	100	Enter the percentage of voice menu calls that are be transferred.
Auto Attendant Calls	40	5	1000	Enter the number of auto attendant calls in the BH.
Auto Attendant AHT	30	5	90	Enter the AHT in seconds for the BH.
Fax On Demand Request Calls	2	1	200	Enter the number of request calls (on voice channels) per Fax On Demand application in the BH.
Fax On Demand Requests AHT	60	5	200	Enter the AHT for fax requests in seconds.
Outcalling (RN and DTT)% of Calls	5%	0	100	Enter the percentage of Voice Call Answering calls (%Calls) that can result in Outcalling calls.
Outcalling (RN and DTT) AHT	60	10	180	Enter the AHT in seconds.

Field name	Initial value	Minimum	Maximum	Comments
Analog Networking Percentage	3%	0	100%	Enter the percentage of messaging traffic that can be analog (Enterprise or AMIS networking). The more VPIM Networking is used, the lower this percentage must be. If VPIM Networking is the only protocol used, then set this parameter to zero.

Fax traffic services

Principal services

The principal services that generate traffic on fax channels are the following:

- Fax on Demand applications with same call fax access
- Fax on Demand callback delivery
- Fax auto attendant (fax express messaging)
- Fax call answering
- Delivery to fax services
- Fax broadcasting (multicast to fax service)

Estimating fax channels

Nortel Networks does not recommend that you simply count the number of existing fax machines and replace them with fax channels on a one-for-one basis when replacing a small number of machines that have high inbound traffic with fax channels. Instead, Nortel Networks recommends you to estimate

- the average number of fax messages per fax user
- the average number of pages per fax message

Enter the estimated average numbers into the “advanced parameters” box of the engineering tool.

Modeling busy hour fax traffic

The table below presents the parameters that are used in calculating the traffic estimation for each of the principal fax services. The engineering tools consider these parameters to be advanced parameters. The sales engineer generally leaves the advanced parameters unchanged. However, the engineering tools uses the advanced parameters to enable the sales engineer to adapt the traffic model to the needs and behavior of the customer.

Field name	Initial value	Minimum	Maximum	Comments
Fax Messaging Calls	0.1	0.05	1000	Enter the number of Fax Messaging calls within the BH per mailbox.
Fax Messaging Pages	3	1	100	Enter the average number of pages for fax messaging within the BH.
Fax Printing Displaced By Desktop	90%	10	100	Enter the percentage of fax printing that is displaced by the users reading the message via the desktop instead of printing the message.
Fax On Demand—Call Back Calls	2	1	200	Enter the number of calls that can be made by the Call Back feature for each fax on demand application during the BH.
Fax On Demand—Call Back Pages	4	0	99	Enter the number of pages that can be sent by way of the Call Back feature.

Field name	Initial value	Minimum	Maximum	Comments
Fax Broadcast Recipients	Blank	0	5000	Enter the number of fax broadcast recipients. Set this parameter to a non-zero value only if broadcasts are to occur during BHs.
Fax Broadcast Max Wait time	4	0.2	20	Enter the maximum waiting time (in hours) for delivering the fax broadcast to all recipients.
Fax Broadcast Pages	3	1	100	Enter the average number of pages per fax broadcast message.

Speech recognition traffic services

Principal services

The principal services that generate traffic on speech recognition channels are the following:

- speech activated messaging
- E-mail by Phone on speech recognition channels

Mobile users typically use these services from wireless phones to pick up voice and e-mail messages with hands-free, eyes-free access.

Modeling busy hour speech recognition traffic

The table below presents the parameters that are used in calculating the traffic estimation for each of the principal speech recognition traffic services. The engineering tools consider these parameters to be advanced parameters. The sales engineer generally leaves the advanced parameters unchanged. However, the engineering tools uses the advanced parameters to enable the sales engineer to adapt the traffic model to the needs and behavior of the customer.

Field name	Initial value	Min.	Max	Comments
Speech Activated Messaging Session AHT	75	10	300	Enter the AHT (in seconds) for SAM sessions.

Field name	Initial value	Min.	Max	Comments
Telset Accesses Via SAM	70%	10	100	Busy-hour users of SAM are either desktop or SAM users away from their desks, or SAM users without desktop messaging rights. The SAM users prefer SAM to DTMF, yet some SAM users can use DTMF logons in environments where it is inappropriate to speak commands; for example, in open cubicles. The value of this parameter reflects the likelihood that a user with SAM rights, who must access messages using a phone set, chooses SAM over DTMF.
Pct SAM Accesses with EBP	20%	00	100	Enter the percentage of time that users access E-mail by Phone by way of a SAM session.

Storage hour estimation

Storage calculation assumptions

The engineering tools make the following assumptions when calculating storage:

- one page of normal fax = 1/212 hour
- one page of fine resolution fax = 1/106 hour
- voice storage overhead factor = 20% of voice stored
- average voice message length = 1 minute

The following parameters are used in calculating the storage hours:

Field name	Initial value	Minimum	Maximum
Minutes of voice messages for each mailbox	6	1	100
Pages of fax for each mailbox	5	1	100

Chapter 5

Engineering the server

In this chapter

CallPilot server capacities at a glance

The following table summarizes the CallPilot 2.5 server capacities. For other capacities and features, refer to the appropriate server section in this chapter.

Item	703t	1001rp	1002rp
Channels	64	96	96
DSP MPU	96	96	96
Storage hours[a]	1 200	1 000	2 400
Maximum number of mailboxes[b]	20 000	20 000	50 000
Maximum number of voice-only users[c]	20 000	7 000	7 000
Maximum number of logged-in unified messaging users[d e f]	12 200	5 800	12 200
RAID (level 1 hardware mirroring only)	Standard	Standard	Standard
Disks			
Hot swappable?	No	Yes	Yes
Redundant?	Yes	Yes	Yes

Item		703t	1001rp	1002rp
Power supply fans				
Hot swappable?	No	Yes	Yes	
Redundant?	No	Yes	Yes	

a.The storage hours do not include the storage reserved for voice prompts.

b.The maximum number of mailboxes that can be created on a system. However, this is not necessarily the number of users who can practically use the system.

c.The maximum number of voice-only users, with typical voice mail usage, that can be supported with a P05 grade of service with all voice channels. User capacity is lower if fax or mobile user features are configured. Use the Meridian Configurator or NetPrice tool in all cases for an engineered solution.

d.The limit is not enforced.

e.The maximum number of unified messaging clients that can be logged on at one time. This is not the keycode limit. The keycode limit for desktop messaging is the same as the maximum limit for mailboxes.

f.The value represents the maximum number of mailboxes for the platform minus the number of mailboxes implemented.

CallPilot product capacities

Overview

The product capacities provided in the table below are reference values.The footnotes at the bottom of the table indicate the special conditions that can apply to a specific item.

Item	Limit
Number of Application Builder services	2500
Levels of imported applications in an Application Builder service	20
Number of faxes stored in an Application Builder service	3000
Number of voice prompts in an Application Builder service	3000
Voice messages for each mailbox	1000
Minutes for each mailbox	360
SDNs (previously known as Voice Service DNs)[a]	1500
Minutes of voice for each message	120
Pages of fax for each message	500
Number of voice prompt languages	6
Number of speech recognition languages[b]	3
Number of shared distribution lists (SDL)	500
Entries for each SDL	999

Item	Limit
Number of personal distribution lists (PDL) for each mailbox	99
Entries for each PDL	200
Selections for each fax on each fax on demand session	99
Pages for each fax selection	99
User Greeting length (each) in minutes	10
Seconds for a Personal Verification, Site Spoken Name	30
System Greeting length in minutes	10
Maximum Announcement length in minutes	10
Classes of service	unlimited
Number of temporary remote user references	1000
Private Network Sites	500
Open VPIM Short-Cut Network Sites	500
Number of CDP steering codes for each network location	500
Number of NMS satellite location	0
Tenants	1
Customers	1
Restriction Permissions Lists[c]	200
DNs for each mailbox	8
Number of concurrent administration sessions	16
Maximum Simultaneous E-Mail-by-Phone Sessions	20

Item	Limit
Maximum E-Mail by Phone Languages	10

a.The SDN actual limit is not enforced. Each entry also requires that a phantom DN be defined on the switch.
b. Voice prompt and speech recognition languages must be identical.
c. Each list contains up to 30 restriction and 30 permission codes.

703t server features

Introduction

You must be familiar with 703t server capacities to ensure that the 703t server meets your requirements.

MPB96 and DSE boards

The MPB96 board installed in the CallPilot server has a capacity of 96 media processing units (MPU).

A maximum of four digital set emulation (DSE) PCI-16 boards can be installed in the CallPilot server. Each DSE PCI-16 board provides 16 channels of DSE connectivity with the switch. Therefore, a CallPilot 703t server can provide a maximum of 64 channels of switch connectivity.

The H.1000 voice bus cable connects the MPB96 board to the DSE PCI-16 boards.

Hard disks

The 703t server is supplied with two hard disks in a redundant array of independent disks (RAID) configuration: one disk is primary and the other disk is redundant. The total storage capacity is 1200 hours. The hard disks are not hot swappable.

Volume capacities

The 703t server contains one system volume (VS1), which is on the system disk. User volumes VS102 and VS103 are also on the system disk. The following table shows the recommended number of storage hours for each volume:

Volume	Storage hours
VS1	400
VS102	400
VS103	400

Data port provisioning

The 703t server has two serial ports, but only one serial port (COM1) is installed. The serial port connects the server to an external modem for remote access (particularly for remote technical support).

The parallel port of the 703t server is dedicated to the software feature key (dongle).

DSE switch connectivity

The DSE PCI-16 boards in the CallPilot 703t server provide the connectivity to the DSE switch (Rolm). Each DSE PCI-16 board is connected to the Rolm switch with a DSE cable by way of the building interoffice cross-connect (BIX) block.

Remote access connectivity

The RS-232 COM1 connector at the rear of the CallPilot server provides the connection to an external modem. The modem allows administrators and technical support personnel to administer the CallPilot server from a remote location.

The Microsoft Windows NT Remote Access Service (RAS) is used to establish the remote access connection to the server. The Symantec pcAnywhere remote control software is then used to control the server over the RAS connection.

1001rp server features

Introduction

You must be familiar with 1001rp server capacities to ensure that the 1001rp server meets your requirements. The 1001rp server is no longer a currently shipped product, but it is in sustained status.

MPB-16 carrier boards and MPC-8 cards

The 1001rp server supports the MPB16-4 board, which has two onboard digital signal processing (DSP) units. Four additional slots on the MPB16-4 board allow you to insert a total of four MPC-8 cards for a maximum of 48 channels for each MPB16-4 board. You can insert a maximum of two MPB16-4 boards into the 1001rp server.

Number of disks

The 1001rp server is supplied with six disks in a RAID configuration. Three disks are primary and the other three disks are redundant. The 1001rp server offers a total of 1000 hours of storage capacity. The hard disks are hot swappable.

Volume capacities

The 1001rp server contains one system volume (VS1), which is on the system disk. The user volumes (VS102 and VS103) are located on separate hard disks that are configured on the server. The following table shows the recommended number of storage hours for each volume:

Volume	Storage hours
VS1	200
VS102	400
VS103	400

Data port provisioning

The 1001rp server has two serial ports. One serial port supports an external modem (particularly for remote technical support) and the other is a spare port.

The parallel port on the 1001rp server is dedicated to the software feature key (dongle).

LAN connectivity

The CallPilot server provides 10Base-T or 100Base-T Ethernet connectivity through network interface cards (NIC) installed in the server. The function of each NIC varies depending on the switch connectivity.

T1/SMDI connectivity

The 1001rp server equipped with a NIC supports customer LAN (CLAN) connectivity to the T1/SMDI switches SL-100 and DMS-100. The CLAN connection is required to support the Unified Messaging CallPilot feature.

Note: No ELAN is created when the 1001rp is connected to a T1/SMDI switch.

Network requirements

Appropriate networking equipment must be available for the CLAN.

The CLAN must be properly configured for correct CallPilot operation. To ensure that the proper configuration is implemented, Nortel Networks recommends that you consult a network specialist.

Remote access connectivity

The RS-232 COM1 connector on the rear of the CallPilot server provides the connection to an external high-speed modem. The modem allows administrators and technical support personnel to administer the CallPilot server from a remote location.

Microsoft Windows NT Remote Access Service is used to establish the remote access connection to the server. The Symantec pcAnywhere remote-control software is then used to control the server over the RAS connection.

1002rp server features

Introduction

You must be familiar with 1002rp server capacities to ensure that the 1002rp server meets your requirements.

MPB-16 carrier boards and MPC-8 cards

The 1002rp server supports the MPB16-4 board, which has two onboard DSP units. Four additional slots on the board allow you to insert a total of four MPC-8 cards for a maximum of 48 channels for each MPB16-4 board. You can insert a maximum of two MPB16-4 boards into the 1002rp server.

Hard disks

The 1002rp server is supplied with six hard disks in a RAID configuration. Three disks are primary and the other three disks are redundant. The 1002rp server offers a total of 2400 hours of storage capacity. The hard disks are hot swappable.

Volume capacities

The 1002rp server contains one system volume (VS1), which is on the system disk. The user volumes (VS102 and VS103) are located on separate hard disks configured on the server.

The following table shows the recommended number of storage hours for each volume:

Volume	Storage hours
VS1	500
VS102	950
VS103	950

Data port provisioning

The 1002rp server has two serial ports. One serial port supports an external modem (particularly for remote technical support) and the other is a spare port.

The parallel port on the 1002rp server is dedicated to the software feature key (dongle).

LAN connectivity

The 1002rp CallPilot server provides 10Base-T or 100Base-T Ethernet connectivity through NICs installed in the server. The function of each NIC varies depending on the switch connectivity.

T1/SMDI connectivity

The 1002rp server can be equipped with a NIC to support CLAN connectivity to the T1/SMDI switches SL-100 and DMS-100. The CLAN connection is required to support the Unified Messaging CallPilot feature.

Note: No ELAN is created when the 1002rp is connected to a T1/SMDI switch.

Network requirements

Appropriate networking equipment must be available for the CLAN.

The CLAN must be properly configured for correct CallPilot operation. To ensure that the CLAN is properly configured, Nortel Networks recommends that you consult a network specialist.

Remote access connectivity

The RS-232 COM1 connector on the rear of the CallPilot server provides the connection to an external high-speed modem. The modem allows administrators and technical support personnel to administer the CallPilot server from a remote location.

Microsoft Windows NT Remote Access Service is used to establish the remote access connection to the server. The Symantec pcAnywhere remote-control software is then used to remotely control the server over the RAS connection.

Chapter 6

Selecting a site

In this chapter

Space requirements for the CallPilot server

Introduction

You must consider the physical space occupied by the CallPilot server as part of your planning activities. This section provides guidelines for determining the adequate space that must be provided for the servers.

General requirements

Install the CallPilot server in an area that is

- not subject to static electricity
- not subject to vibrations
- away from a sprinkler system, and water, steam, or other liquid-carrying pipes
- physically safe for personnel and equipment
- not subject to electomagnetic interference (EMI), which can be caused by the following sources:
  - broadcast stations
  - radar
  - mobile communications
  - high-voltage power lines
  - power tools
  - office machines, such as photocopiers

Space requirements

Install the server in an area where technicians have enough access room at the front and rear of the server to service server components. Therefore, situate the server in an area with

- enough space for the front and rear cabinet doors to open and close
- extra access room for the service or removal of components

Switch room space planning

When you plan for the incremental and mounting space needed for the CallPilot server and peripherals, you must consider the space required in the switch room.

Ethernet hub and cables

Ensure that sufficient space is available for the Ethernet hub and cables.

ATTENTION!

Due to electromagnetic compliance issues, the Ethernet hub must be located in a different room than the 703t and 1002rp servers.

Always use shielded Ethernet cables to connect the CallPilot servers to the switch or Ethernet hub.

Peripheral devices

You must ensure that sufficient space is available for the following peripheral devices:

- modem
- monitor
- keyboard (with integrated track-ball)
- mouse

Characteristics of the 703t server

The 703t server is freestanding. The following table lists the characteristics of the 703t server:

Characteristic	Value
Height	42 cm (16.75 in.)—chassis only 44 cm (17.5 in.)—with chassis feet
Width	21.5 cm (8.6 in.)—chassis only 32 cm (12.7 in.)—with chassis feet
Depth (distance from front to back)	65 cm (26 in.)
Clearance	■ front: 25 cm (10 in.) ■ rear: 12.5 cm (5 in.) ■ side: 7.5 cm (3 in.)—additional side clearance is required for service ■ top: 7.5 cm (3 in.)
Weight of fully loaded system with ■ two small computer system interface (SCSI) drives ■ six populated boards ■ CD-ROM drive ■ floppy drive ■ tape drive	Approximately 22 kg (48.50 lb)

Characteristics of the 1001rp and 1002rp servers

Each 1001rp or 1002rp server is installed in a customer-supplied shelf. The following table lists the shelf characteristics:

Characteristic	Value
Height	32 cm (12.5 in.)
Width	48.3 cm (19 in.)
Depth (distance from front to back)	■ without front bezel: 49.5 cm (19.5 in.) ■ with front bezel: 53.3 cm (21 in.)
Weight of fully loaded system with ■ six SCSI drives ■ CD-ROM drive ■ floppy drive ■ tape drive	45.5 kg (100 lb)

Administrative PC

Any suitable PC that can access the CallPilot CLAN can serve as an administrative PC. Administration is performed through the CallPilot Manager web-based interface.

CallPilot power supply requirements

Introduction

You must consider the power supply requirements for the CallPilot server as part of your planning activities. This section defines the power supply requirements.

Single-point grounding

WARNING

Risk of personal injury and risk of hardware failure

The power outlets that are used by the CallPilot server and peripheral devices must be connected to the same single-point ground (SPG) reference as the one used by the switch connected to the CallPilot server.

If this requirement is not met, power transients can cause personal injury, hardware failure, or both.

Nortel Networks strongly recommends that a qualified electrician establish proper SPG before the installation of the CallPilot server.

For more information on the SPG reference, refer to Chapter 2, “Grounding and power requirements.”

UPS recommendations

Nortel Networks recommends using an uninterruptible power supply (UPS) or an equivalent device to power the CallPilot server. The UPS provides two important services that are essential to maintaining high-availability and mission-critical messaging:

1. The UPS conditions the power by filtering power brown-outs and transients, which can shorten the server life and damage the server hardware.
2. The UPS greatly reduces the risk of unplanned power outages, which can corrupt severely the operating system components of a server.

If a UPS protects the switch, then Nortel Networks recommends using a UPS to power the hub to prevent service loss due to power outages.

CallPilot server power requirements

The CallPilot servers require different types of power input and different levels of power usage. The following table summarizes the CallPilot server power requirements:

Device	Power input	Power usage
703t	Auto-ranges from 90 V AC to 120 V AC and from 200 V AC to 240 V AC at 50 Hz or 60 Hz	450 W
1001rp AC	120 V AC 240 V AC	400 W
1001rp DC	48 V, 20 A DC See the note that follows this table.	500 W
1002rp AC	120 V AC 240 V AC	400 W

Device	Power input	Power usage
1002rp DC	48 V, 20-A DC See the note that follows this table.	500 W
Hub	110 V	1.8 W
External tape drive	110 V	7.2 W
Modem	110V via a power adapter that provides 9 V AC to 15 V AC at 10 W	10 W
Monitor	110 VAC	90 W

Note: If you are using the Nortel Networks MFA150 rectifier (which comes with 30-A breakers and two 20-A breakers in the Spare Circuit Breaker Kit, 20 A [P0729846]), then you must configure the rectifier to supply the two 20-A DC circuits for the rackmount server.

Environmental specifications for the CallPilot servers

General

Always consider the environmental specifications when planning an adequate location for the CallPilot servers.

However, before considering the server environmental specifications, you must take into account the switch environmental specifications.

The proper operating temperature and humidity are important for the longevity of the servers. The tables in the following sections summarize the key environmental specifications of the CallPilot servers.

Specifications for the 703t server

The term “non-operating” used in the table refers to the environmental conditions that have to be maintained during shipping, storage, or both.

Environmental condition	Specification
Operating temperature	10°C to 35°C (50°F to 95°F) The maximum rate of change must not exceed 10°C (18°F) for each hour.
Non-operating (storage) temperature	-40°C to 70°C (-40°F to 158°F)
Non-operating humidity	95%, non-condensing, at 30°C (86°F)
Altitude	1 829 m (6 000 ft)
Electrostatic discharge	15 kV or more

Environmental condition	Specification
Acoustic noise	50 dBA in a typical office ambient temperature (18°C to 25°C) [64.4°F to 77°F]
Operating shock	No errors with a half sine wave shock of 2 G (with 1 millisecond duration)
Handling drop	Operational after a free fall from 45 cm to 60 cm (18 in. to 24 in.), depending on weight

Specifications for the 1001rp and 1002rp servers

The term “non-operating” used in the table refers to the environmental conditions that have to be maintained during shipping, storage, or both.

Parameter	Condition	Specification
Temperature	Operating	5°C to 35°C (41°F to 95°F)
	Non-operating	-40°C to 70°C (-40°F to 158°F)
Humidity	Operating	5% to 95% at 40°C (104°F) non-condensing
	Non-operating	0% to 95% at 40°C (104°F), non-condensing
Shock	Operating	1.25 G, 10 ms (10.0 Gs, 11 ms in the appropriate chassis)
	Non-operating	30.0 G, 10 ms (40.0 G, 11 ms in the appropriate chassis)
Vibration	Operating	0.25 Gs at 5 Hz to 100 Hz (1.5 G over 5 Hz to 100 Hz in the appropriate chassis)
	Non-operating	5 G at 5 Hz to 100 Hz

Parameter	Condition	Specification
Altitude	Operating	4 572 m (15 000 ft)
	Non-operating	15 240 m (50 000 ft)

Appendix A

Traffic capacity tables

In this appendix

Types of traffic capacity tables

Types of tables to use

The following table identifies the type of traffic capacity table to use for your CallPilot system and switch type. The actual traffic capacity tables begin on page 127.

	Busy hour CCS (BHCCS) traffic capacity table type			
Switch and media type	**Erlang C P.05 BHCCS (40-second AHT)**	**Erlang C P.05 BHCCS (adjust for one MWI channel)**	**Erlang B P.02 BHCCS**	**Erlang B P.02 BHCCS (adjust for one MWI channel)**
SL-100 Voice, Fax, and ASR	✔			
DMS-100	✔			
Rolm		✔		✔

CCS values and channel requirements table

Introduction

This section provides traffic capacity tables to use when calculating channel requirements.

Before using this table

To determine which column of the following table to use when calculating channel requirements, refer to “Types of tables to use” on page 126.

	CCS values			
Number of channels	**Erlang C P.05 GOS**	**Erlang C P.05 (adjusted for one MWI channel)**	**Erlang B P.02 GOS**	**Erlang B P.02 (adjusted for one MWI channel)**
1	2	< 2	1	< 1
2	14	2	8	1
3	32	14	22	8
4	54	32	40	22
5	77	54	60	40
6	103	77	83	60
7	129	103	106	83
8	156	129	131	106
9	184	156	157	131

	CCS values			
Number of channels	**Erlang C P.05 GOS**	**Erlang C P.05 (adjusted for one MWI channel)**	**Erlang B P.02 GOS**	**Erlang B P.02 (adjusted for one MWI channel)**
10	213	184	183	157
11	242	213	210	183
12	271	242	238	210
13	301	271	267	238
14	331	301	295	267
15	362	331	325	295
16	392	362	356	325
17	424	392	386	356
18	455	424	416	386
19	486	455	447	416
20	518	486	477	447
21	550	518	508	477
22	582	550	539	508
23	614	582	570	539
24	646	614	602	570
25	678	646	633	602
26	711	678	665	633

	CCS values			
Number of channels	**Erlang C P.05 GOS**	**Erlang C P.05 (adjusted for one MWI channel)**	**Erlang B P.02 GOS**	**Erlang B P.02 (adjusted for one MWI channel)**
27	744	711	697	665
28	776	744	729	697
29	809	776	761	729
30	842	809	793	761
31	875	842	825	793
32	908	875	857	825
33	941	908	890	857
34	974	941	922	890
35	1008	974	955	922
36	1041	1008	987	955
37	1074	1041	1020	987
38	1108	1074	1053	1020
39	1141	1108	1086	1053
40	1175	1141	1119	1086
41	1209	1175	1152	1119
42	1242	1209	1185	1152
43	1276	1242	1218	1185

	CCS values			
Number of channels	**Erlang C P.05 GOS**	**Erlang C P.05 (adjusted for one MWI channel)**	**Erlang B P.02 GOS**	**Erlang B P.02 (adjusted for one MWI channel)**
44	1310	1276	1252	1218
45	1344	1310	1285	1252
46	1378	1344	1318	1285
47	1412	1378	1352	1318
48	1445	1412	1385	1352
49	1479	1445	1418	1385
50	1513	1479	1452	1418
51	1548	1513	1486	1452
52	1582	1548	1519	1486
53	1616	1582	1553	1519
54	1650	1616	1587	1553
55	1684	1650	1620	1587
56	1718	1684	1654	1620
57	1753	1718	1688	1654
58	1787	1753	1722	1688
59	1821	1787	1756	1722
60	1856	1821	1790	1756

	CCS values			
Number of channels	**Erlang C P.05 GOS**	**Erlang C P.05 (adjusted for one MWI channel)**	**Erlang B P.02 GOS**	**Erlang B P.02 (adjusted for one MWI channel)**
61	1890	1856	1824	1790
62	1924	1890	1858	1824
63	1959	1924	1892	1858
64	1993	1959	1926	1892
65	2028	1993	1960	1926
66	2062	2028	1994	1960
67	2097	2062	2028	1994
68	2131	2097	2063	2028
69	2166	2131	2097	2063
70	2200	2166	2131	2097
71	2235	2200	2165	2131
72	2269	2235	2200	2165
73	2304	2269	2234	2200
74	2339	2304	2268	2234
75	2373	2339	2303	2268
76	2408	2373	2337	2303
77	2443	2408	2372	2337

	CCS values			
Number of channels	**Erlang C P.05 GOS**	**Erlang C P.05 (adjusted for one MWI channel)**	**Erlang B P.02 GOS**	**Erlang B P.02 (adjusted for one MWI channel)**
78	2477	2443	2406	2372
79	2512	2477	2441	2406
80	2547	2512	2475	2441
81	2582	2547	2510	2475
82	2616	2582	2544	2510
83	2651	2616	2579	2544
84	2686	2651	2613	2579
85	2721	2686	2648	2613
86	2756	2721	2682	2648
87	2791	2756	2717	2682
88	2825	2791	2752	2717
89	2860	2825	2786	2752
90	2895	2860	2821	2786
91	2930	2895	2856	2821
92	2965	2930	2891	2856
93	3000	2965	2925	2891
94	3035	3000	2960	2925

	CCS values			
Number of channels	**Erlang C P.05 GOS**	**Erlang C P.05 (adjusted for one MWI channel)**	**Erlang B P.02 GOS**	**Erlang B P.02 (adjusted for one MWI channel)**
95	3070	3035	2995	2960
96	3105	3070	3030	2995

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