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CallPilot

Planning and Engineering Guide

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NORTEL NETWORKS™

CallPilot

Planning and Engineering Guide

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November 2004	Standard 1.0 of the *Planning and Engineering Guide* for CallPilot 3.0 is released for general availability.

Contents

Chapter 1

Getting started

In this chapter

Scope and purpose

The *CallPilot Planning and Engineering Guide* provides information and instructions for selecting the best CallPilot system for your specific situation.

The purpose of planning and engineering is to determine the best size, platform and location for your CallPilot system. This guide provides information designed to help you plan and engineer your CallPilot system.

Issues to consider

At the beginning of the process of planning and engineering a CallPilot system, you must consider the following issues:

- the CallPilot platform that you intend to use
- the CallPilot server location
- the CallPilot server connection to the switch
- the connectivity of the PCs in your network

Reference documents

CallPilot Customer Documentation Map

NTP Number 555-7101-(nnn)

- **Fundamentals**
  - CallPilot Fundamentals (-010)
- **Planning and Engineering**
  - Planning and Engineering Guide (-101)
  - Network Planning Guide (-102)
  - Data Networking for Voice over IP (553-3001-160)
- **Installation and Configuration**
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- **End User Information**

End User Cards	End User Guides
Unified Messaging Quick Reference Card	Multimedia Messaging User Guide
Unified Messaging Wallet Card	Speech Activated Messaging User Guide
Command Comparison Card A-Style	Desktop Messaging User Guide for Microsoft Outlook
Command Comparison S-Style	Desktop Messaging User Guide for Lotus Notes
Menu Interface Quick Reference Card	Desktop Messaging User Guide for Novell Groupwise
Alternate Command Interface Quick Reference Card	Desktop Messaging User Guide for Internet Clients
	MyCallPilot User Guide

Components of a CallPilot system

A CallPilot system comprises three key components:

- CallPilot server
- switch resources related to CallPilot
- desktop client PCs (if the Unified Messaging feature is installed)

The CallPilot system can also include optional features:

- Unified Messaging—installed on the PCs in the CallPilot network
- customer-provided web server—necessary for the installation of CallPilot web services (particularly CallPilot Reporter)

The functionality of the web server and CallPilot Manager resides on the CallPilot server, since both components are automatically installed. The CallPilot Manager administrator component and My CallPilot end-user web services can require a separate web server.

If CallPilot Reporter is used for management reporting purposes, you must install it on a separate web server.

Servers and switches

The CallPilot 3.0 server is available in three platforms: 201i, 703t, and 1002rp.

The CallPilot system is connected to the Meridian 1 and Succession 1000 switches by way of an embedded local area network (ELAN) Subnet and an intelligent peripheral equipment (IPE) network loop.

Desktop PCs and wireless devices

System administrators can use the web browser on a PC to access CallPilot Manager to

- maintain and administer the CallPilot software
- view CallPilot Reporter reports

If the desktop messaging client is installed, users can download messages from the server using a PC or a wireless device.

System configuration and ordering

The *Models & Ordering Procedures* document that applies to CallPilot 3.0 lists features and ordering information for each CallPilot server platform. To obtain the *Models & Ordering Procedures* document, contact your Nortel Networks channel partner.

Nortel Networks channel partners can obtain this document from the CallPilot area established on the Partner Information Center (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 same 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.

To ensure a complete power and grounding installation:

- In rackmount server installations, ensure the CallPilot server chassis and equipment racks are isolated from other foreign sources of ground. Acceptable isolation methods include: isolation pads, grommeted washers, chassis side rail strips and non-conducting washers, etc.
- In rackmount server installations where other equipment is also installed in the same 19" rack, ensure that all equipment derives ground from the same service panel as CallPilot and the switch, whether or not the equipment is AC or DC powered.
- In rackmount DC-powered server installations, ensure the PDU (Power Distribution Unit for DC applications) is installed on the same rack as the CallPilot server. This is required since the main ground wire for the PDU is not insulated from the metal enclosure.

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.

Document title	NTP number
Meridian 1 Installation Planning	553-3001-120
Meridian 1 Power Engineering	553-3001-152
Meridian 1 System Installation Procedures	553-3001-210
Planning and Installation Guide for Option 11C Mini	553-3021-209
Planning and Installation Guide for Option 11C	553-3021-210
Planning and Engineering Guidelines - Succession 1000	553-3023-102

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.

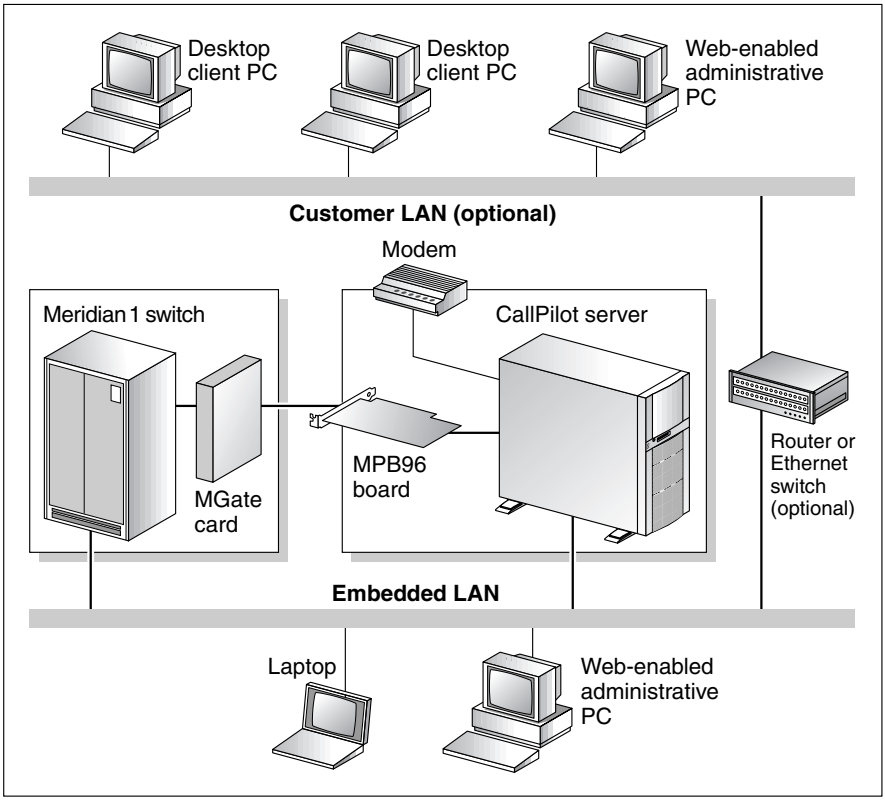
Chapter 3

System configurations

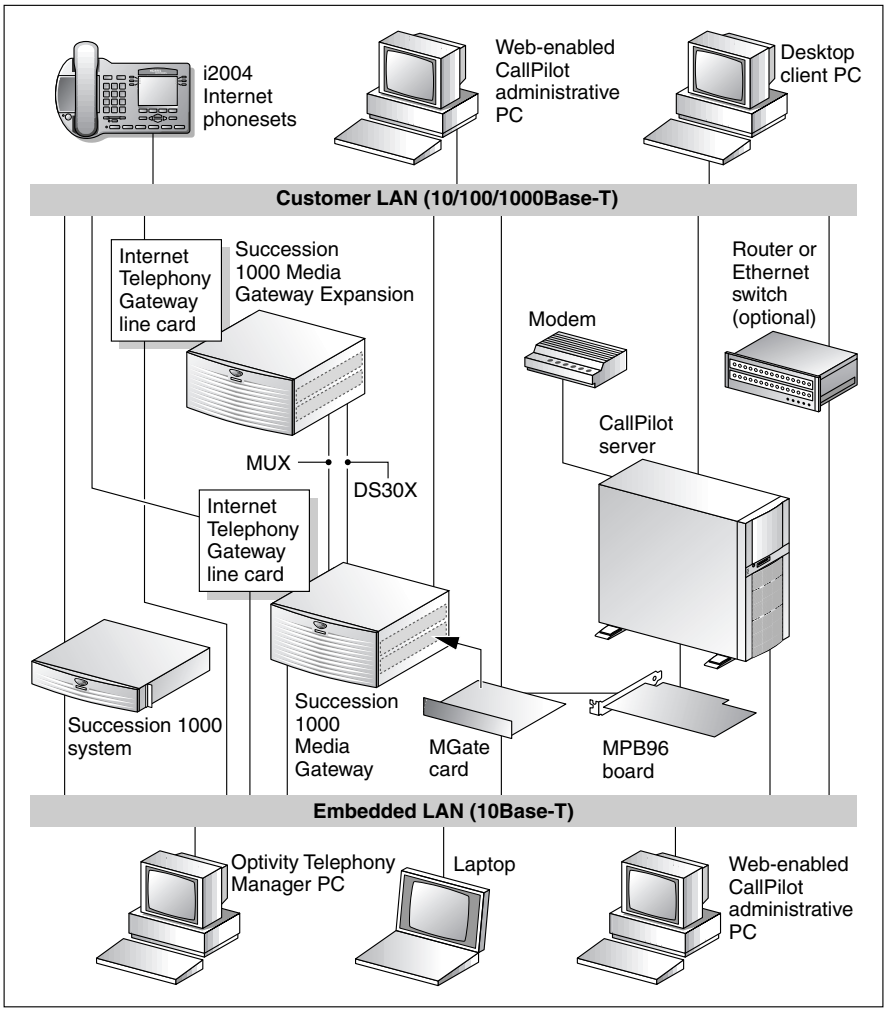
In this chapter

CallPilot architecture

The following figure shows an example of network in which a CallPilot server is connected to a Meridian 1 switch.



The following figure shows an example of network in which a CallPilot server is connected to a Succession 1000 system.



For details on the CallPilot network layout, refer to the CallPilot installation and configuration guide that applies to your CallPilot platform. The installation and configuration guides address, for example, the interaction of the switch and the CallPilot server.

The following table summarizes the CallPilot use of LAN connections to web servers.

Switch	Connection	Service
Meridian 1 and Succession 1000	ELAN Subnet	Data (signaling)
	ELAN Subnet and DS30X TDM link	Voice

The CallPilot server is connected directly to the users' PCs by way of a Nortel Networks Server Subnet.

Supported switches

The following table summarizes the compatibility of switches with the CallPilot 3.0 server platforms:

Switch	CallPilot platform		
	201i	703t	1002rp
Meridian 1	✔	✔	✔
Succession 1000	✔	✔	✔

Web server for CallPilot administration

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

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

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 PCs running Windows 98 SE, Windows 2000 Professional, or Windows XP Professional. For more information on the desktop messaging clients, refer to “Compatibility” on page 62.

Section A: Hardware and software configurations

In this section

CallPilot server

Hardware

The CallPilot application is built on the CallPilot server hardware platform.

Platform	Type
201i	IPE (the 201i server is installed in the IPE shelf of the switch)
703t	tower
1002rp	rackmount

Software

The CallPilot software configuration comprises the following items:

- server operating system—Windows 2003

  Note: The exact name of the operating system is Windows Server 2003, Standard Edition with the Telephony Service Appliance Kit (SAK)
- CallPilot software
- third-party software

Compatibility with other products and environments

Meridian Mail

CallPilot can coexist with Meridian Mail on the Meridian 1 switch. You can connect CallPilot with Meridian Mail systems on networks that use one or more of the following networking protocols:

- Audio Messaging Interchange Specification-Analog (AMIS-A)
- Enterprise

For more information on the coexistence of CallPilot and Meridian Mail on the same switch, refer to the *Meridian Mail to CallPilot Migration Guide* (555-7101-801).

Multi-tenant Meridian 1 switch

CallPilot supports users on a multi-tenant Meridian 1 switch as if the users were on a single-tenant system. However, CallPilot does not

- support more than a single customer of a multi-customer Meridian 1 switch
- know to which Meridian 1 tenant a user belongs
- provide administration or billing features by tenant

Custom controlled routing

CallPilot can coexist with Custom Controlled Routing (CCR) on the same Meridian 1 switch. CallPilot does not support the CCR command Give IVR.

Internet Telephony Gateway

The Internet Telephony Gateway (ITG) supports the following networking protocols:

ITG version	Networking protocol
1.1 (1.0.34 or later)	AMIS-A Enterprise
2.0	NMS (see Note)

Note: Additional considerations apply to the NMS implementation on Voice over IP (VoIP) networks with CallPilot. Refer to the product bulletins on the implementation of VoIP and voice messaging.

Antivirus software

The antivirus software application currently authorized for installation on the CallPilot server is Symantec Norton Anti-Virus 9.0 (corporate edition).

Refer to the *CallPilot Support for Antivirus Applications* bulletin for updated information on the antivirus applications tested and approved for installation on CallPilot.

For details on installing antivirus software on the CallPilot server, refer to the most recent version of the CallPilot *General Release Bulletin.*

Third-party software

The installation of non-authorized third-party software or hardware can destabilize the system and degrade its capacity of providing real-time call processing performance; refer to the *Distributor Technical Reference* document.

Symposium Call Center Server

In general, CallPilot has the same capabilities as Meridian Mail. As a result, CallPilot can provide integrated voice services to Symposium Call Center Server. Refer to the product bulletin for detailed information on implementing the voice service integration.

CallPilot can coexist on the same Meridian 1 switch, ELAN Subnet and Nortel Networks Server (NNS) Subnet with the following Symposium products:

Product	Version
Symposium Call Center Server	4.2 and 5.0—for call center interworking 5.0—CallPilot web services (CallPilot Manager, CallPilot Reporter and My CallPilot) reside on the Symposium Call Center Server web server
Symposium Express Call Center	4.2

Signaling between CallPilot and Symposium Call Center Server travels over the ELAN Subnet and NNS Subnet.

CallPilot supports the following voice processing script commands:

- Give IVR
- Give Controlled Broadcast Announcement
- Collect Digits
- Play Prompt
- Open…End Voice Session

Voice services

The CallPilot voice channels used to provide voice services must be dedicated to Symposium Call Center Server and cannot be used for general messaging traffic. Moreover, the CallPilot voice channels for Symposium Call Center Server are further partitioned into two groups, one for the Give IVR service and the other for the Advanced Voice Processing service.

No additional software options are required on CallPilot to ensure the integration with Symposium Call Center Server.

CallPilot Application Builder

Use the Application Builder program to create CallPilot applications that callers can access as dialable services. With Application Builder, you can perform the following tasks:

- specify the call functions that you want to include in applications such as menus and announcements
- design the call flow (the path that calls follow) in an application
- import system prompts, voice items and customized prompts
- record system prompts, voice items and customized prompts
- archive and restore applications

In Application Builder, a series of blocks connected by lines represent applications. This graphical display allows you to follow the call flow.

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.

For more information, refer to the *CallPilot Application Builder Guide* (555-7101-323).

Supported switches

Meridian 1

CallPilot supports the following Meridian 1 platforms:

- Option 11C
- Option 11C Mini
- Option 51C
- Option 61C
- Option 81C

CallPilot requires X11 Release 25.40 or later on the Meridian 1 switch.

Succession 1000

The Succession 1000 VoIP system includes the following features:

- fully installed and configured Succession 1000 server
- Media Gateway card
- Media Gateway Expansion card (optional)
- connection to a TCP/IP network (ELAN Subnet)

CallPilot requires X21 Release 3.0 or later on the Succession 1000 system.

For information about X21 patches (if any), refer to the *CallPilot General Release Bulletin.* You can find this document on the Nortel Networks Partner Information Center at http://my.nortelnetworks.com.

Web server for CallPilot

Introduction

You can install three CallPilot applications on the web server.

Application	Function
CallPilot Manager	System configuration and management
CallPilot Reporter	Report generation
My CallPilot	End-user mailbox configuration, messaging and documentation

The Microsoft Internet Information Server (IIS) established on the CallPilot server is preconfigured according to the best security practices available.

You can have multiple external web servers for a single CallPilot server.

You can use one external web server for up to 20 CallPilot servers.

Configurations of CallPilot web services

CallPilot Manager, CallPilot Reporter and My CallPilot can all reside on an external IIS server.

In a hybrid configuration, My CallPilot can reside on the CallPilot server, while CallPilot Manager and CallPilot Reporter reside on the IIS server

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. CallPilot end-users and administrators can access the IIS server on the NNS Subnet using web browsers.

External web server configuration

Hardware

The My CallPilot and CallPilot Reporter web services can generate high CPU loads. The minimum hardware configuration for the external web server must include

- a 600 MHz PIII processor
- 128 Mbytes of RAM
- 1 Gbyte of free memory

Software

The external web server requires one of the following software configurations:

- Windows NT 4.0 server with service pack 6A and IIS 4.0
- Windows 2000 server with IIS 5.0
- Windows 2003 server with IIS 6.0

For Windows 2000, the Advanced Server and DataCenter Server versions are not supported.

If the secure socket layer (SSL) technology is to be used, you must purchase and install an additional SSL certificate for use with the IIS. Nortel Networks recommends the following SSL certificate vendors:

- Entrust (http://www.entrust.com/certificate_services/)
- Verisign (http://www.verisign.com/)

Free disk space

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

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

where

- `total number of channels =` the total number of channels on all CallPilot systems whose data is in the CallPilot Reporter database
- `days in DB` = the number of days that data are stored in the CallPilot Reporter database

Web server considerations

The following factors determine the web server load generated by CallPilot services:

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

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

Monitoring performance

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

The main indicators to monitor are the CPU usage, the available memory and the physical disk space. The user response time can be degraded if one or all of the following conditions are encountered:

- the CPU usage (shown as Processor Time) is constantly above 90 percent for a significant number of minutes during the busy hour
- the available memory (shown as Available Bytes) is below 4 Mbytes
- the disk space (shown as Physical Disk Space) is insufficient

CallPilot desktop messaging

Voice messages

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

Message duration	Format	Storage space
1 minute	SBC or VBK	141 kbytes
1 minute	WAV	945 kbytes

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

Fax pages

To calculate the disk space used for fax in the CallPilot store of desktop messaging, use the following conversion factor:

Message size	Format	Storage space
1 page	TIFF	40 kbytes

Desktop messaging clients

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)
- the user guide for each desktop messaging client

Section B: Connectivity requirements

In this section

NNS Subnet connections

Introduction

The CallPilot server connects to the customer's network through the NNS Subnet. The NNS Subnet connectivity is required for

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

Hardware requirements

The customer must provide the hub and cables required for the connection of the CallPilot server to the NNS Subnet or WAN.

Data transmission rates

The following table identifies the data transmission rates supported by the CallPilot servers.

CallPilot platform	Ethernet data transmission rate		
	10 Mbit/s	100 Mbit/s	1 Gbit/s
201i	✔	✔	
703t	✔	✔	✔
1002rp	✔	✔	

Note: CallPilot does not support token ring NNS Subnets (4 Mbit/s or 16 Mbit/s).

Network protocols

Supported	Not supported
Windows TCP/IP stack on client PCs	Novell IPX/SPX stack on client PCs

Note: CallPilot can coexist on networks using IPX/SPX and other non supported protocols if Windows TCP/IP is used for the CallPilot client-server communication.

NNS Subnet traffic considerations

You must ensure that the NNS Subnet has the appropriate bandwidth capacity to support the traffic between the client PCs and the CallPilot server. Calculate bandwidth capacity on the basis of the following information.

Traffic type	Volume	Bandwidth
Desktop traffic from CallPilot to a desktop client or the web server	1 minute of voice 1 page of fax (average)	200 kbytes 55 kbytes
My CallPilot web server traffic from the web server to the browser on the client PC	1 minute of voice (WAV) 1 minute of voice (VBK) 1 page of fax (average)	60 kbytes 130 kbytes 40 kbytes
VPIM networking traffic	1 minute of voice	330 kbytes

Data transfer rates

The following table identifies the average data transfer rates for each CallPilot user.

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

The following considerations apply to the information provided in the previous table.

- 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.
- The average fax messaging rates are based on the assumption that 80 percent of the fax messages are retrieved across the network by fax messaging users with either a desktop messaging or a My CallPilot web server client, while the remaining 20 percent of the fax messages are retrieved by fax machines.
- 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.

My CallPilot web server with VBK (CallPilot proprietary encoding format) requires that the Nortel Networks voice player be installed on the client PC.

ELAN Subnet connections

Introduction

The embedded LAN (ELAN) Subnet is implemented only if the CallPilot server is connected to a Meridian 1 switch or Succession Communication Server for Enterprise 1000 (Succession 1000) system.

Note: After rebranding, the Succession 1000 system is known as the Nortel Networks Communications Server 1000.

You can also implement the ELAN Subnet with Layer 2 and Layer 3 switching. However, the specific design of the ELAN Subnet is complex; for detailed information, refer to the document *Data Networking for Voice over IP* (553-3001-160).

ELAN Subnet description

The CallPilot server connects to the switch or system by way of an ELAN Subnet and one or more proprietary time division multiplexing (TDM) connections (DS30X).

The CallPilot ELAN Subnet is a segregated network that carries IP traffic only between the following equipment:

- the CallPilot server
- the Meridian 1 switch or Succession 1000 system
- a limited number of connected administration PCs

The ELAN Subnet is used for real-time, low-delay, and mission-critical signaling between CallPilot and the switch using the proprietary Application Module Link (AML) protocol. The AML protocol is also used by Meridian Mail. All customer data traffic must be kept off the ELAN Subnet.

CAUTION

Risk of severe performance degradation

Only Nortel Networks equipment must be connected to the ELAN switch (layer 2) or hub. To prevent severe performance degradation, the customer's network must not be connected to the ELAN Subnet.

The direct connection of the ELAN Subnet to external networks (such as the NNS Subnet), as well as the improper router, bridge, or switch device selection or configuration, can degrade the call processing abilities of the ELAN Subnet-based switches and CallPilot server. A direct connection can also increase the risk of hacker traffic into the network.

Nortel Networks does not recommend the implementation of router and switching technologies that are applied to the ELAN Subnet. If you require such connections, contact your Nortel Networks technical support representative.

ELAN Subnet power requirements

Customers expect telephone and messaging services to continue through power disruptions. The CallPilot server and the Meridian 1 switch or Succession 1000 system must be protected from power failures by uninterruptible power supply (UPS) devices. The ELAN switch (layer 2) or hub must also be connected to a UPS.

If power to the ELAN switch (layer 2) or hub is disrupted, CallPilot service stops because the AML signaling link to the Meridian 1 switch or Succession 1000 system is interrupted.

System administration and the ELAN Subnet

You can connect administration PCs to the ELAN Subnet to administer CallPilot and the Meridian 1 switch or Succession 1000 system.

CallPilot administration PCs are typically located on the NNS Subnet, if a NNS Subnet is available.

CAUTION

Risk of reduced system performance

Since the ELAN Subnet carries critical real-time traffic between the CallPilot server and Meridian 1 switch or Succession 1000 system, do not perform high-traffic OA&M activities on the ELAN Subnet while CallPilot call processing is in progress. The traffic-intensive tasks include, for example, remote control, large file transfers, backup and restore operations, and printing.

Desktop client PCs and the ELAN Subnet

The ELAN Subnet is dedicated to the connectivity between CallPilot and the Meridian 1 switch or Succession 1000 system, and their associated applications only.

The ELAN Subnet does not support high volumes of IP traffic originating within the local ELAN Subnet or from external interconnected networks. As a result, the ELAN Subnet does not support desktop client PCs.

ELAN Subnet hardware requirements

The ELAN Subnet runs between CallPilot, Symposium, Optivity Telephony Manager (OTM), and the Meridian 1 switch or the Succession 1000 system; see the diagram in "CallPilot architecture" on page 24. The 10Base-T ELAN Subnet is implemented using the following equipment:

- a Medium Attachment Unit (MAU) to one or more 10Base-T transceivers for the connection to the call processor
- category 5 cables
- a dedicated hub from either Nortel Networks or a third party

Hardware requirements for Option 11C

CallPilot does not support the copper-connected Option 11C switch. If you are using a copper-connected Option 11C switch, then you must upgrade it to a Fiber Cabinet Option 11C switch to support the ELAN Subnet connection.

Hardware requirements for Options 51C, 61C and 81C

Options 51C, 61C and 81C must be equipped with the appropriate Ethernet IOP/CMDU, combo, or IODU/C cards to support the connection to the ELAN Subnet.

The following table presents the Ethernet cards that work with Options 51C, 61C and 81C. The number given in parentheses next to the card identifier is the number of cards required.

Meridian 1 switch	IOP/CMDU card	Combo card	IODU/C card
Option 51C	NT6D63BA (1)	NT5D20BA (1)	NT5D61AA/BA (1)
Option 61C	NT6D63BA (2)	NT5D20BA (2)	NT5D61AA/BA (1)
Option 81C	Not applicable	NT5D20BA (2)	NT5D61AA/BA (2)

A Meridian 1 switch that runs X11 Release 25.40 can be upgraded with IODU/C cards. The IODU/C cards provide

- Ethernet connectivity to the ELAN Subnet (comparable to the capability provided by the IOP/CMDU cards)
- drive unit functions
- input/output processing functions

Cabling between the Meridian 1 switch and the ELAN switch (layer 2) or hub

The following table presents the cables required to connect the Meridian 1 switch to the ELAN switch (layer 2) or hub.

Switch	Cable PEC	Cable CPC	Connection
Option 11C	NTDK27AA	A0630723	backplane—position P1
Option 51C Option 61C Option 81C	NT7D90CA	A0406481	CORE backplane—slot 16, position F

A DB-15 to 10Base-T transceiver is necessary to convert the DB-15 end of the Ethernet cable to a 10Base-T end. The RJ-45 connector of the transceiver can then be connected to the ELAN switch (layer 2) or hub.

Each site must have one or two DB-15 to 10Base-T transceivers, depending on the number of CORE backplanes. You can purchase the DB-15 to 10Base-T transceiver (DB-15 to RJ-45) in any computer supply store or you can order it from Nortel Networks.

Description	PEC	CPC
Transceiver (MAU to 10Base-T)	NTRH9069	A0795886

ELAN Subnet connectivity requirements on the switch

The CallPilot server connects to the Meridian 1 switch or Succession 1000 system by way of a proprietary TDM DS30X connection for voice services, and through the ELAN Subnet for data (signaling) services.

Separate ELAN Subnet connections are required as follows:

- Meridian 1 Option 81 switch: one connection for each call processor
- Succession 1000 system: one connection for the call server and one connection for the Media Gateway or Media Gateway Expansion card

Meridian 1 connectivity

Introduction

The CallPilot server connects to the Meridian 1 switch by way of an ELAN Subnet, using the TCP/IP protocol at a rate of 10 Mbit/s.

IPE (201i) platform connectivity

Each 201i CallPilot server occupies two slots in the Meridian 1 intelligent peripheral equipment (IPE) shelf and interfaces with the network loops through the IPE backplane. Both slots have access to the DS30X connection associated with the second slot. From the Meridian 1 switch perspective, the 201i server appears logically equivalent to two regular cards or to one extended digital line card (XDLC).

The 201i CallPilot server contains one embedded digital signal processor (DSP) and can accept optional DSPs through inserted multimedia processing cards (MPC-8). Each MPC-8 is equipped with a DSP; each DSP provides 8 media processing units (MPU) and DS0 channels (the number of DS0 channels is equal to the number of MPUs).

A 201i server can support up to 40 DS0 channels:

- 8 channels in the embedded DSP
- 32 additional channels in 4 optional MPC-8 cards

The 201i server is supplied with 24 MPUs and DS0 channels.

Tower and rackmount connectivity

MPB96 board

The MPB96 board is installed in the 703t and 1002rp servers and provides 96 MPUs and DS0 channels to the Meridian 1 switch through embedded DSPs.

MGate card

Three MGate cards installed in the switch connect the 703t and 1002rp platforms to the network loops.

An MGate card provides a maximum of 32 channels. A fully configured 96-channel tower or rackmount system requires three MGate cards in the switch.

The MGate card occupies one slot in the switch IPE shelf and connects to the MPB96 board installed in the CallPilot server with a 20-m (60-ft) twisted pair cable.

For information on establishing the connection between the CallPilot server and the Meridian 1 switch, refer to the *Meridian 1 and CallPilot Server Configuration* document.

Meridian 1 IPE resource requirements

A non-blocking configuration recommended for the IPE shelf can require the provisioning of additional network loops to the IPE shelf. The IPE shelf version must be NT8D37BA/EC or later.

Meridian 1 software requirements

CallPilot requires X11 release 25.40 or later on the Meridian 1 switch.

If the CallPilot server provides Symposium voice services, then X11 release 24 or later is required on the Symposium Call Center Server.

The X11 base software must include the following feature packages:

Number	Name	Mnemonic
41	Automatic Call Distribution (ACD), Package B	ACDB
46	Message Waiting Center	MWC
214	Enhanced ACD Routing	EAR
215	Enhanced Call Trace	ECT
218	Hold in Queue for IVR	IVR
247	Call identification	CALL ID
254	Phantom TN	PHTN
324	Next Generation Connectivity (see Note)	NGEN
364	Meridian Communication Exchange/CallPilot	NMCE
Note: Package 324 (NGEN) has the following dependencies:		
77	Command Status Link	CSL
153	Application Module Link	X25AP
164	Limited Access to Overlays	LAPW
242	MultiUser Login	MULI
243	Alarm Filtering	ALRM_FILTER
296	Meridian Administration Tools	MAT

Certain X11 Performance Enhancement Packages (PEP) must also be installed to support CallPilot. For more information on the applicable PEPs, refer to the *CallPilot General Release Bulletin*.

Meridian 1 memory and real-time engineering

The real-time impact of CallPilot on Meridian 1 is essentially the same as the impact of Meridian Mail for the equivalent call traffic.

A Meridian 1 switch upgraded to X11 release 25.40 or later can require additional memory. Refer to *Product Bulletin 98097* for details.

CallPilot usage of Meridian 1 software resources

Ensure that sufficient software resources are provisioned on the Meridian 1 switch to support CallPilot. The software resources are, for example, terminal number (TN) levels, automatic call distribution (ACD) agents, control directory numbers (CDN) and voice ports. CallPilot does not share Meridian 1 resources with other applications.

The following considerations apply to the provisioning of software resources on the Meridian 1 switch to support CallPilot:

- A primary CDN is required for most traffic. A secondary CDN is required for fax call answering.
- One phantom TN/DN or dummy ACD queue is required for each service that has an entry in the Service DN table, which is equivalent to the voice service directory number (VSDN) table on Meridian Mail. CallPilot uses the phantom TN/DN in the same way as Meridian Mail.
- CallPilot uses one ACD queue to manage its hardware channels. A second ACD DN is required for the default DN.
- CallPilot uses one ACD agent for each channel.
- Each fax user with a virtual fax machine DN requires one phantom DN and one optional direct inward dial (DID) line.
- Each service accessed from outside the Meridian 1 switch requires one DID line.

ACD DN overflow

The Meridian 1 switch does not permit the ACD DN to overflow to a CDN. Therefore, the ACD DN overflow is not possible with CallPilot, which uses a CDN model for call management and control. If ACD DN overflow is desired, then use either Symposium Express or Symposium Call Center Server integrated with CallPilot as a viable alternative that provides enhanced call routing capabilities.

Succession 1000 connectivity

Introduction

The CallPilot server connects to the Succession 1000 system on the ELAN Subnet through the Media Gateway or Media Gateway Expansion card. Voice services are routed through the Media Gateway card and data (signaling) services are routed through the ELAN Subnet.

Note: After rebranding, the Succession 1000 system is known as the Nortel Networks Communications Server 1000.

IPE (201i) platform connectivity

The 201i server occupies two slots in the Media Gateway or Media Gateway Expansion. Refer to the *201i Server Hardware Installation* document for details on the 201i server installation.

The 201i CallPilot server contains one embedded digital signal processor (DSP) and can accept optional DSPs through inserted multimedia processing cards (MPC-8). Each MPC-8 is equipped with a DSP; each DSP provides 8 media processing units (MPU) and DS0 channels (the number of DS0 channels is equal to the number of MPUs).

A 201i server can support up to 40 DS0 channels:

- 8 channels in the embedded DSP
- 32 additional channels in 4 optional MPC-8 cards

The 201i server is supplied with 24 MPUs and DS0 channels.

Tower and rackmount server connectivity

For detailed information on tower and rackmount server connectivity, refer to the *Succession 1000 and CallPilot Server Configuration* document.

MPB96 board

The MPB96 board is installed in the 703t and 1002rp servers and provides 48 (out of a maximum of 96) MPUs and DS0 channels to the Succession 1000 switch through embedded DSPs. The MPB96 board does not contain MPC-8 cards.

MGate card

One or two MGate cards installed in the Succession 1000 switch connect the 703t and 1002rp platforms to network loops. The MPB96 board in the CallPilot server is connected to the MGate cards on the Succession 1000 system.

The MGate card provides a maximum of 32 DS0 channels. The maximum capacity of a CallPilot tower or rackmount server on a Succession 1000 system is 48 channels, which requires two MGate cards.

Each MGate card occupies one slot in the Media Gateway or Media Gateway Expansion of the Succession 1000 system and connects to the board in the CallPilot server with a 20-m (60-ft) twisted pair cable.

Succession 1000 software requirements

CallPilot requires X21 Release 3.0 or later on the Succession 1000 system. The X21 base software must include the following feature packages.:

Number	Name	Mnemonic
41	Automatic Call Distribution (ACD), Package B	ACDB
46	Message Waiting Center	MWC
214	Enhanced ACD Routing	EAR
215	Enhanced Call Trace	ECT
218	Hold in Queue for IVR	IVR

Number	Name	Mnemonic
247	Call identification	CALL ID
254	Phantom TN	PHTN
324	Next Generation Connectivity (see Note)	NGEN
364	Meridian Communication Exchange/CallPilot	NMCE
Note: Package 324 (NGEN) has the following dependencies:		
77	Command Status Link	CSL
153	Application Module Link	X25AP
164	Limited Access to Overlays	LAPW
242	MultiUser Login	MULI
243	Alarm Filtering	ALRM_FILTER
296	Meridian Administration Tools	MAT

Certain X21 PEPs must also be installed to support CallPilot. For more information on the X21 PEPs, refer to the most recent version of the *CallPilot General Release Bulletin*.

Real-time engineering

CallPilot has a real-time impact on Succession 1000. The engineering tool performs the real-time engineering when a Succession 1000 system and a CallPilot server are provisioned together.

CallPilot usage of Succession 1000 software resources

Ensure that sufficient software resources are provisioned on the Succession 1000 system to support CallPilot. The software resources are, for example, ACD agents, CDNs, and voice ports. CallPilot does not share Succession 1000 resources with other applications.

The following considerations apply to the provisioning of software resources on the Succession 1000 system to support CallPilot:

- A primary CDN is required for most traffic. A secondary CDN is required for fax call answering.
- Each service that has an entry in the CallPilot Service DN table requires one phantom TN/DN.
- CallPilot uses one ACD queue to manage hardware channels. The default DN requires a second ACD queue.
- CallPilot uses an ACD agent for each channel.
- Each fax user with a virtual fax machine DN requires one phantom DN and one optional DID line for each fax user.
- Each service accessed from outside the Succession 1000 system requires one DID line.

Section C: System requirements

In this section

Compatibility

Products and environments

The following table summarizes the compatibility of CallPilot with various products and environments.

Product	CallPilot compatibility
Meridian Mail	Meridian Mail and CallPilot can coexist on the same Meridian 1 switch. Networking to Meridian Mail is available with the following protocols: ■ 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 supports only CallPilot Reporter.
Meridian Administration Tool (MAT)	The CallPilot Application Builder client can coexist with MAT 6.x on the same PC. Refer to the *Product Bulletin 99092* document for a detailed list of the MAT compatibility issues.
Custom Controlled Routing (CCR)	CallPilot and CCR can coexist on the same Meridian 1 switch. CallPilot does not support the CCR command Give IVR.

Product	CallPilot compatibility
Symposium Call Center Server 4.2 and 5.0; Symposium Express Call Center 4.2	CallPilot can coexist with Symposium Call Center Server or Symposium Express Call Center on the same ELAN Subnet and Meridian 1 switch. CallPilot supports the following Symposium Call Center Server voice-processing script commands: ■ Give IVR ■ Give Controlled Broadcast ■ Collect Digits ■ Play Prompt ■ Open...End Voice Session—this command requires Symposium Call Center Server 4.2 and at least SU07.
Internet Telephony Gateway (ITG)	CallPilot AMIS-A and Enterprise networking protocols are supported with ITG release 1.1 (version 1.0.34 or later). ITG 1.1 does not support Network Message Service (NMS), which requires ITG 2.0.
Microsoft Office 2000 and 2002 (Microsoft Office XP)	CallPilot Desktop Messaging clients are compatible.

Application Builder clients—operating systems

CallPilot 3.0 supports the following operating systems for Application Builder clients.

- Windows 98 SE
- Windows NT 4.0 Workstation with service pack 6A
- Windows 2000 Professional with ISO-8859-1 (Latin-1) character set versions (see Note)
- Windows XP Professional

  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.

Desktop Messaging clients—operating systems

CallPilot 3.0 supports the following operating systems for Desktop Messaging clients.

- Windows 98 SE
- Non-English versions of Windows with localized client
- Windows 2000 Professional
- Windows XP Professional

If desktop messaging or My CallPilot or both are used, refer to the *Desktop Messaging and My CallPilot Installation Guide* for more information.

Customer e-mail clients

CallPilot Desktop Messaging supports the following e-mail clients:

Product	Supported versions
Microsoft Outlook Express	5.x and 6.x (released with Internet Explorer 5.x and 6.x)
Microsoft Outlook	Versions released in 2000, 2002 and 2003, including Internet Mail Mode versions
Netscape	6.2x and 7.x
Lotus Notes	5.0x, 6.0 and 6.5
Novell GroupWise	5.5x, 6.0x and 6.5

My CallPilot web messaging

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

Product	Supported versions
Server side	
Operating system and Internet Information Server (IIS)	Windows NT Server 4.0 with service pack 6A and IIS 4.0 Windows 2000 Server with service pack 1 or later and IIS 5.0 Windows 2003 Standard Edition and IIS 6.0
Note: For Windows 2000, the Advanced Server and DataCenter Server versions are not supported.	
Client side	
Operating system	Windows NT Workstation 4.0 with service pack 6A Windows 98 SE Windows 2000 Professional Windows XP Professional Mac OS 9.0 and 9.1 Mac OS X (limited support only)
Internet browser	Internet Explorer 5.x and 6.x Netscape Communicator 6.2x and 7.x

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.

Operating system and Internet browser support with My CallPilot, CallPilot Manager and CallPilot Reporter

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

Product	Supported versions
Server side	
Operating system and IIS	Windows NT Server 4.0 with service pack 6A and IIS 4.0 Windows Server 2000 with service pack 1 or later and IIS 5.0 Windows 2003 Standard Edition and IIS 6.0
Client side	
Operating system	Windows NT Workstation 4.0 with service pack 6A Windows 98 SE Windows 2000 Professional Windows XP Professional
Internet browser	Internet Explorer 5.x and 6.x Netscape Communicator 6.2x and 7.x

If you use CallPilot Reporter and your Internet browser does not have a built-in Java virtual machine, then you must install the Sun Java run-time environment version 1.3.1_11. This software is available on your CallPilot Applications CD-ROM.

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

You must install the CallPilot software feature key adapter (dongle) correctly so that you can access CallPilot Manager.

Migration from Meridian Mail

The Meridian Mail migration utility supports the migration from Meridian Mail systems to CallPilot systems.

For information on the Meridian Mail platforms and releases that can be migrated to CallPilot and on the migration process, refer to the *Meridian Mail to CallPilot Migration Utility Guide* (555-7101-801).

The migration from Meridian Mail to CallPilot provides support for full voice prompt migration. You can migrate the following Meridian Mail voice services to CallPilot:

- menus
- announcements
- fax items
- voice items

Each voice service (for example, a menu) migrated from Meridian Mail is represented as an Application Builder application on CallPilot. This application contains voice or fax items, or both, that were associated with the migrated voice service on Meridian Mail.

The logic of the voice services is not migrated to CallPilot. Only a default application is created in Application Builder. You must complete the application manually so that you can put it into service in CallPilot.

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 a CallPilot system. Nortel Networks provides engineering tools that determine automatically the type of CallPilot system that you need on the basis of the information that you provide:

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

System sizing

Sales engineering tools

Nortel Network Enterprise Configurator

After completing the gathering of solution planning requirements, you can obtain a customer quotation by way of the Nortel Network Enterprise Configurator (NNEC) tool. The NNEC is the global enterprise configurator and quotation tool for Nortel Networks voice and voice over IP (VoIP) portfolios.

Use the NNEC tool to determine the following system requirements:

- Channel media type and resources driven by the number and type of seats and feature usage required.
- Server platform determined by the total number of channels, resiliency requirements, and storage requirement.
- The integration type and amount of interworking connectivity required depending on the selected solution host.

The NNEC replaces Meridian Configurator in North and South America.

The NNEC provides the following quotation methods:

- Engineered Offer Quote (North and South America)
- Functional Offer Quote (Europe, the Middle East, Africa, and Asia)

CallPilot Capacity Engineering Spreadsheet

The CallPilot Capacity Engineering Spreadsheet in Microsoft Excel format is available for pre-quotation planning. This spreadsheet is available in the CallPilot area established on the Partner Information Center (PIC) web site at http://my.nortelnetworks.com.

System requirements

Use the engineering tools to determine the requirements for the following system factors:

- channels
- digital signal processors (DSP) media processing units (MPU)
- storage
- CPU real-time resources

The engineering tools also help you determine

- the CallPilot platform having sufficient channel, DSP, and CPU real-time capacity to meet the requirements of your specific situation
- the hardware for the switch channel connectivity
- the DSP hardware

Channel requirements

Determine the number of voice, fax, and speech-recognition channels required to meet the customer needs as follows

1. Estimate the busy-hour traffic using a parameter-driven traffic model.
2. Look up the corresponding channel capacity in the 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 119.

DSP MPU requirements

The DSP capacity is calculated in MPUs. The engineering tool determines the required DSP processing power on the basis of 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 hours of voice messages. The engineering tool multiplies the number of mailboxes by the minutes of voice messages for each mailbox to estimate the voice message storage requirements.

The storage capacity for fax services is determined by multiplying the estimated number of stored fax pages by a mix of the normal and fine 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 uses host-based text-to-speech algorithms), it is necessary to calculate the CPU load of a given set of applications. The engineering tool calculates the CPU load by

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

CallPilot platform capacity

The engineering tool performs the following tasks for the selected CallPilot platform:

- 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 (IPE, tower, rackmount)	None	Not applicable	Not applicable	The selection of any option enables all the CallPilot inputs.
Voice Users	Blank	0	IPE (201i): 8 000 703t: 20 000 1002rp: 40 000 See "Voice Users maximums" on page 80.	Enter the number of voice mailboxes.
Email by Phone Users	Blank	0	The number of voice mailboxes	Enter the number of mailboxes with E-mail by Phone using text to speech.
Speech Activated Messaging	Blank	0	The number of voice mailboxes	Enter the number of mailboxes with speech activated messaging (SAM).
Fax Users	Blank	0	The number of voice mailboxes	Enter the number of mailboxes with Fax Messaging.

Parameter	Initial value	Minimum	Maximum	Comments
Users with Single (Voice/Fax) DN	Blank	0	The number of fax users	Enter the number of fax mailboxes with a Single DN used for both voice and fax access.
Desktop Messaging	Blank	0	5000 (201i) 20 000 (703t, 1002rp)	Enter the number of mailboxes with desktop messaging.
Switch (Meridian 1, Succession 1000)	None	Not applicable	Not applicable	Select a type of switch to determine the setup requirements for connectivity (see notes).
NMS (yes or no) [Network Message Service]	N/A	N/A	N/A	Drives the CallPilot NMS feature enablement and potential Meridian 1 software.
Mobile Users	Blank	0	The number of voice mailboxes	Enter the number of mailboxes with SAM and e-mail by phone seats.

Parameter	Initial value	Minimum	Maximum	Comments
Users on NMS Satellite M1s	Blank	0	The number of voice mailboxes	Enter the number of mailboxes that are to be used by users in one or more NMS satellite locations (remote Meridian 1 switches) via the NMS feature. ■ The maximum number of NMS satellite locations is 59. ■ This field is disabled when system connectivity is selected for non-Meridian 1 switches.
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; 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	500 (201i) 2500 (703t, 1002rp)	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.
Number of Symposium Channels	0	0	Maximum number of voice channel capacity for the selected platform	Enter the number of voice channels that are dedicated to the Symposium Call Center Server.

Note 1: If the IPE option is selected as the System Type parameter, then only Meridian 1 or Succession 1000 can be selected as the Switch parameter.

Note 2: If CallPilot is ordered in conjunction with a Meridian 1 switch, then only the Meridian 1 parameter can be selected.

Note 2: If CallPilot is ordered in conjunction with a Succession 1000 system, then only the Succession 1000 parameter can be selected.

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 Users parameter value (such as 8 000, 20 000 and 40 000) represents the maximum number of mailboxes that can be configured on a platform. 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

Channel types

CallPilot provides three types of media channels:

Channel type	Support
voice	voice services (Voice Mail)
fax	voice and fax services (Fax on Demand)
speech recognition	voice, fax, and speech-activated messaging services

Busy hour

The busy hour (BH) can be different for each channel type.

- Voice channels are typically busiest in mid-morning and mid-afternoon, although the BH can vary according to the business schedule of the customer.
- Speech recognition (SR) channels can be busiest during the time when users drive to work and back home.
- Faxes tend to arrive most frequently at yet a different time of day.

Consider the BH traffic separately for each channel type.

Usage assumptions

Basic user

The following assumptions apply to the BH voice port usage for a basic user:

- 0.4 call answering sessions of forty seconds each
- 0.35 DTMF login sessions of 70 seconds each
- 10% of messages require a 60-second BH telephone call
- analog networking increases traffic by 5%

Mobile user

The following assumptions apply to the SAM and SR usage for mobile user:

- The frequency of SAM usage during the SR BH is 70% of the telephone set usage during the voice BH.
- A SR session lasts 70 seconds.

Fax user

A fax user receives 0.2 faxes (three pages each) during the fax BH.

Desktop user

The desktop users view received faxes on their PCs and therefore reduce the usage of fax ports needed for printing faxes.

Sizing the number and type of channels

Perform the following tasks to size the number and type of channels:

1. Estimate the busy hour traffic in CCS for each channel type.
2. Look up the channel requirements in the Erlang C P.05 traffic table. See “CCS values and channel requirements table” on page 121.

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

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

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 various user populations.

1. Typical channel requirements for users without fax and SR usage.

Users	Voice	Fax	SR	Total channels	Total MPUs
100	4	0	0	4	4
200	6	0	0	6	6
500	12	0	0	12	12
1000	18	0	0	18	18
2000	32	0	0	32	32
3000	48	0	0	48	48
5000	72	0	0	72	72

2. Typical channel requirements assuming that 2% of the users are mobile users, 2% of the users are fax users, and 100% of the users are desktop users

Users	Voice	Fax	SR	Total channels	Total MPUs
100	4	2	2	8	16
200	6	2	2	10	18
500	12	2	2	16	24
1000	18	2	2	22	30
2000	32	2	2	36	44
3000	48	4	2	54	64
5000	72	4	4	80	96

3. Typical channel requirements assuming that 10% of the users are mobile users, 20% of the users are fax users, and 50% of the users are desktop users.

Users	Voice	Fax	SR	Total channels	Total MPUs
100	4	2	2	8	16
200	6	2	2	10	18
500	12	4	2	18	28
1000	18	6	4	28	46
2000	32	8	4	44	64
3000	44	10	4	58	80
5000	Not supported because more than 96 MPUs are required.				

4. Typical channel requirements assuming that 25% of the users are mobile users, 50% of the users are fax users, and 100% of the users are desktop users.

Users	Voice	Fax	SR	Total channels	Total MPUs
100	4	4	2	10	20
200	6	4	2	12	22
500	10	6	4	20	38
1000	18	10	4	32	54
2000	32	16	6	54	88
3000	Not supported because more than 96 MPUs are required.				
5000	Not supported because more than 96 MPUs are required.				

Daily calls and faxes

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

Peak hour traffic = 13% of daily traffic

Voice traffic services

Principal services

The following principal services generate traffic on voice channels:

- 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 existing voice mail systems, then it is not necessary to provision as many voice channels on the CallPilot system as the number of voice channels on all the voice mail systems that are replaced. Larger systems have increased traffic efficiency. When a single CallPilot server replaces two or more existing voice mail 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 following table presents the parameters used to estimate the traffic in hours for each principal voice traffic service. The engineering tools consider these parameters to be advanced parameters. The sales engineer generally leaves the advanced parameters unchanged. However, the engineering tools use 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) for each 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	Enter the number of expected single message retrievals from all potential modes (DTMF, SAM, and Desktop) for each mailbox during the BH.
EBP Session AHT	240	10	600	Enter the E-mail by Phone (EBP) session AHT in seconds for the BH.
Pct DTMF Voice Mail Accesses using EBP	10%	00	100	Enter the percentage of dual-tone multifrequency (DTMF) logins that make use of EBP.

Field name	Initial value	Minimum	Maximum	Comments
Voice Menus Calls	5	1	200	Enter the number of calls for each 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 to 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) for each Fax On Demand application in the BH.
Fax On Demand Requests AHT	60	5	200	Enter the AHT in seconds for fax requests.
Outcalling (RN and DTT)% of Calls	5%	0	100	Enter the percentage of Voice Call Answering calls (% of 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 analog messaging traffic (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

These are the principal services that generate traffic on fax channels:

- 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)
- Fax printing to fax machines

Estimating fax channels

In some situations, the CallPilot fax channels replace a small number of fax machines that have high inbound traffic. Nortel Networks does not recommend that you replace the fax machines with fax channels on a one-for-one basis. Instead, Nortel Networks recommends that you estimate the average number of

- fax messages per fax user
- pages per fax message

Enter the estimated average numbers into the Advanced parameters box of the engineering tool.

Modeling busy hour fax traffic

The following table presents the parameters used to estimate the traffic for each principal fax service. The engineering tools consider these parameters to be advanced parameters. The sales engineer generally leaves the advanced parameters unchanged. However, the engineering tools use 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 during the BH per mailbox.
Fax Messaging Pages	3	1	100	Enter the average number of pages per fax message during the BH.
Fax Printing Displaced By Desktop	90%	10	100	Enter the percentage of fax printing that is displaced by users reading fax messages on the desktop (and possibly printing them to a network printer) instead of printing the fax messages to a fax machine.
Fax On Demand—Call Back Calls	2	1	200	Enter the number of calls that can be made by the Call Back feature per 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 the broadcasts 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

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

- speech activated messaging (SAM)
- E-mail by Phone on speech recognition channels

Mobile users typically use these services from wireless phones to listen to voice and e-mail messages without using their hands and looking at a telephone display.

Modeling busy hour speech recognition traffic

The busy hour for speech recognition services can be different from the overall system busy hour.

The following table presents the parameters used to estimate the traffic for each principal speech recognition traffic service. The engineering tools consider these parameters to be advanced parameters. The sales engineer generally leaves the advanced parameters unchanged. However, the engineering tools use 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 average hold time (AHT) in seconds for SAM sessions.

Field name	Initial value	Min.	Max	Comments
Telset Accesses Via SAM	70%	10	100	Enter the number of BH users of SAM. These users are 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 logins 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 (EBP) by way of a SAM session.

Storage estimation

Storage calculation assumptions

The engineering tools make the following assumptions when estimating the storage space:

- 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 length of a voice message = 1 minute

The following parameters are used to calculate the storage hours:

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

Chapter 5

Engineering the server

In this chapter

CallPilot server capacities at a glance

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

Item	201i	703t	1002rp
Channels	40	96	96
DSP MPUs	40	96	96
Storage hours[a]	350	1 200	2 400
Maximum number of mailboxes[b]	10 000	20 000	50 000
Maximum number of voice-only users[c]	2 500	7 000	50 000
Maximum number of logged-in unified messaging users[d e f]	2 200	12 200	12 200
RAID (level 1 hardware mirroring only)	Not supported	Standard	Standard
Disks			
Hot swappable	No	No	Yes
Redundant	Yes	Yes	Yes
Power supply fans	Not applicable		
Hot swappable		No	Yes
Redundant		No	Yes

a. The number of storage hours does 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 use the system.

c. The maximum number of voice-only users with typical voice mail usage that can be supported with a P.05 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 to obtain an engineered solution.

d. The limit is not enforced.

e. The maximum number of unified messaging clients that can be logged in 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 is based on platform memory limits. Each logged-in desktop or web user requires 20 bytes.

CallPilot product capacities

Overview

The product capacities provided in the following table are reference values.The footnotes at the end of the table indicate special conditions that apply to specific items.

Item	Limit
Number of Application Builder services	2500[a]
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
Service directory numbers (SDN)—previously known as Voice Service directory numbers (DN)	300 (201i) 1500 (703t and 1002rp)
Minutes of voice per 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

Item	Limit
Entries for each SDL	999
Number of personal distribution lists (PDL) per 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 locations	0
Tenants	1
Customers	1
Restriction Permission Lists (RPL)[c]	200

Item	Limit
DNs for each mailbox	8
Number of concurrent administration sessions	16
Maximum simultaneous E-Mail-by-Phone sessions	20
Maximum number of E-Mail by Phone languages	10

a.This limit is for tower and rackmount systems only. In those configurations, disk drive D supports 500 services. Each of the disk drives E and F supports 1000 services. The IPE platform supports up to 500 services.

b. The number of voice prompts and speech recognition languages must be identical.

c. Each list contains up to 30 restriction and 30 permission codes.

201i server features

Feature	Characteristics
DSP configuration	One embedded DSP—eight MPUs. Four MPC-8 cards inserted into the server faceplate increase the server capacity to forty MPUs.
Hard disk	One IDE hard disk
Volume	VS1 (system volume)—350 hours of storage
Data port	One serial port—COM1
Routing and remote access service (RRAS) connectivity	The 9-pin RS-232 COM1 connector on the multi-I/O cable provides the connection to an external modem.
Parallel port	Not available
Software feature key	Installed on the motherboard
ELAN Subnet connectivity	10Base-T built-in Ethernet controller on the motherboard
Nortel Networks Server (NNS) Subnet connectivity	10/100Base-T Ethernet controller on the motherboard

703t server features

Feature	Characteristics
DSP configuration	Twelve DSPs on the MPB96 board—96 MPUs
Hard disks	■ two hard disks in a RAID configuration (a primary disk and a redundant disk) ■ total storage capacity: 1200 hours ■ the hard disks are not hot swappable
Volumes	VS1 (system volume)—400 hours VS102 (user volume)—400 hours VS103 (user volume)—400 hours
Data port	Two serial ports, but only one is installed—COM1. The serial port connects the server to an external modem for remote access (particularly for remote technical support).
RRAS connectivity	The RS-232 COM1 connector on the rear of the CallPilot server provides the connection to an external modem.
Parallel port	Available
Software feature key	Installed in the parallel port
ELAN Subnet connectivity	10/100Base-T Ethernet controller on the motherboard
NNS Subnet connectivity	10/100/1000Base-T Ethernet controller on the motherboard

1002rp server features

Feature	Characteristics
DSP configuration	Twelve DSPs on the MPB96 board—96 MPUs
Hard disks	■ six hard disks in a RAID configuration (three primary disks and three redundant disks) ■ total storage capacity: 2400 hours ■ the hard disks are hot swappable
Volumes	VS1 (system volume)—500 hours VS102 (user volume)—950 hours VS103 (user volume)—950 hours
Data port	Two serial ports—one serial port that supports an external modem (particularly for remote technical support) and a spare port.
RRAS connectivity	The RS-232 COM1 connector on the rear of the CallPilot server provides the connection to an external modem.
Parallel port	Available
Software feature key	Installed in the parallel port
ELAN Subnet connectivity	10/100Base-T Ethernet network card
NNS Subnet connectivity	10/100Base-T Ethernet optional network card

Remote access service connectivity

The external modem allows administrators and technical support personnel to administer the CallPilot server from a remote location.

- Use the Microsoft Windows 2003 Routing and Remote Access Service (RRAS) to establish the remote connection to the CallPilot server.
- Use the Symantec pcAnywhere software to control the CallPilot server over the RRAS connection.

Chapter 6

Selecting a site

In this chapter

Space requirements for the CallPilot server

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 you must provide for the server.

General requirements

Install the CallPilot server in an area that is

- free of static electricity
- exempt from vibrations
- away from a sprinkler system, as well as from water, steam and any liquid-carrying pipes
- safe for personnel and equipment
- protected against electromagnetic interference (EMI) from the following sources:
  - broadcast stations
  - radar
  - mobile communications
  - high-voltage power lines
  - power tools
  - office equipment such as photocopiers

Space requirements

Install the server in an area that provides enough space for

- the front and rear cabinet doors to open and close
- the servicing or removal of components

Switch room space planning

When you plan for the space needed for the CallPilot server and peripherals, you must also 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!

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

Peripheral devices

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

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

The monitor, keyboard and mouse do not have to be permanently connected to the 201i server.

201i server

The 201i server occupies two slots in the intelligent peripheral equipment (IPE) shelf of the switch and weighs approximately 2.1 kg (4.5 lb). You must ensure that sufficient space is available for the following equipment:

- the multi-I/O cable
- the tape drive
- the CD-ROM drive

703t server

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

Characteristic	Value
Height	420 mm (16.75 in.)—chassis only 440 mm (17.5 in.)—with chassis feet
Width	215 mm (8.6 in.)—chassis only 320 mm (12.7 in.)—with chassis feet
Depth (distance from front to back)	650 mm (26 in.)
Clearance	■ front: 250 mm (10 in.) ■ rear: 125 mm (5 in.) ■ side: 75 mm (3 in.)—additional side clearance is required for service ■ top: 75 mm (3 in.)

Characteristic	Value
Weight of fully loaded system equipped with ■ two SCSI drives ■ six populated boards ■ CD-ROM drive ■ floppy drive ■ tape drive	Approximately 22 kg (48.50 lb)

1002rp server

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

Characteristic	Value
Height	320 mm (12.5 in.)
Width	483 mm (19 in.)
Depth (distance from front to back)	■ without front bezel: 495 mm (19.5 in.) ■ with front bezel: 533 mm (21 in.)
Weight of fully loaded system equipped with ■ six SCSI drives ■ CD-ROM drive ■ floppy drive ■ tape drive	45.5 kg (100 lb)

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 its peripheral devices must be connected to the single-point ground (SPG) reference used by the switch connected to the CallPilot server.

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

Nortel Networks strongly recommends that a qualified electrician establish the 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 recommendation

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 the maintaining of high-availability and mission-critical messaging:

- The UPS conditions the power by filtering power brown-outs and transients, which can shorten the server life and damage the server hardware.
- The UPS 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.

Power requirements

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

Device	Power input	Power usage
201i	Provided by the Meridian 1 IPE shelf	40 W
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 (see Note)	450 W
1002rp ac	120 V ac 240 V ac	400 W
1002rp dc	48 V, 20 A dc (see Note)	500 W
Hub	110 V	1.8 W

Device	Power input	Power usage
External tape drive	110 V	7.2 W
MGate card	Provided by the Meridian 1 IPE shelf or Succession 1000 system	5 W
Modem	110 V via a power adapter that provides 9 V ac to 15 V ac at 10 W	10 W
Monitor	110 V ac	90 W

Note: The NTRH9032 dc to ac power converter is no longer available. Nortel Networks recommends that you supply a third-party dc to ac power converter that provides at least 600 W of capacity for the 703t server and its peripherals. Ensure that the power converter is properly installed, according to the manufacturer's instructions.

If you use the Nortel Networks MFA150 rectifier (which is supplied 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

General

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

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 provided in this section summarize the key environmental specifications of the CallPilot servers.

The “non-operating” term used in the tables refers to the environmental conditions that have to be maintained during shipping and storage.

201i server

Environmental condition	Specification
Recommended temperature	15°C to 30°C (59°F to 86°F)
Absolute temperature	10°C to 45°C (50°F to 113°F)
Long-term storage temperature	–20°C to 60°C (–4°F to 140°F)
Short-term storage temperature	–40°C to 70°C (–40°F to 158°F) for less than 72 hours
Change rate temperature	less than 1°C (1.8°F) per 3 minutes
Recommended relative humidity (RH)	20% to 55% RH (non-condensing)
Absolute RH	20% to 80% RH (non-condensing)
Long-term storage RH	5% to 95% RH at –40°C to 70°C (–40°F to 158°F) respectively (non-condensing)

703t server

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)

Environmental condition	Specification
Electrostatic discharge	15 kV or more
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 450 mm through 600 mm (18 in. to 24 in.), depending on weight

1002rp server

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 G, 11 ms in the appropriate chassis)
	Non-operating	30.0 G, 10 ms (40.0 G, 11 ms in the appropriate chassis)

Parameter	Condition	Specification
Vibration	Operating	0.25 G 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
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

Introduction

When calculating the number of channels required on your CallPilot system, take into consideration the differences between sizing Meridian 1 switches and sizing non-Meridian 1 switches.

Types of tables to use

The following table identifies the traffic capacity table to use for your CallPilot system and switch type. The actual traffic capacity tables begin on page 121.

Switch and media type	Busy hour CCS (BHCCS) traffic capacity table 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)
Meridian 1 and Succession 1000 Voice, Fax, and ASR	✔			

CCS values and channel requirements table

Introduction

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

Before using the table

To determine which column of the following table to use when calculating channel requirements, refer to “Types of tables to use” on page 120.

Number of channels	CCS values			
	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

Number of channels	CCS values			
	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)
9	184	156	157	131
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

Number of channels	CCS values			
	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)
26	711	678	665	633
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

Number of channels	CCS values			
	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)
43	1276	1242	1218	1185
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

Number of channels	CCS values			
	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)
60	1856	1821	1790	1756
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

Number of channels	CCS values			
	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)
77	2443	2408	2372	2337
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

Number of channels	CCS values			
	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)
94	3035	3000	2960	2925
95	3070	3035	2995	2960
96	3105	3070	3030	2995

Appendix B

Regulatory information

In this appendix

General information

This chapter includes regulatory information for international installations pertinent to Small System applications.

WARNING

Risk of eye damage

The fiber optic interface product used in the Small System is considered safe. However, as a precaution, do not look directly at the optical port or the end of a fiber optic cable. Under certain conditions (such as during cable testing or under light magnification), the cable or port may expose your eyes beyond the limits of Maximum Permissible Exposure recommended in some jurisdictions. Do not remove protective caps or plugs until ready to connect the cable.

Grounding

Make sure that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, connect together. This precaution is for the users' protection, and is particularly important in rural areas.

CAUTION

Risk of equipment damage

The Small System frame ground of each system cabinet or chassis must be tied to a reliable building ground reference.

WARNING

Risk of electrocution

Do not attempt to make electrical ground connections yourself. Contact your local electrical inspection authority or electrician to make electrical ground connections.

For more information on the preceding issues, refer to Chapter 2, "Grounding and power requirements."

Notice for international installations

If insufficient planning or technical information is available for your country of operation, contact your regional telecommunications distributor or authority for assistance.

European compliance information

Safety specifications

The Small Systems meet the following European safety specifications: EN 60825 and EN 60950.

Electromagnetic compatibility

The following table summarizes the electromagnetic compatibility (EMC) specifications for Class A devices.

Jurisdiction	Standard	Title
United States	FCC CFR 47 Part 15	FCC Rules for Radio Frequency Devices (see Note 1)
Canada	ICES-003	Interference-Causing Equipment Standard: Digital Apparatus
Europe	EN 55022/ CISPR 22	Information technology equipment — Radio disturbance characteristics — Limits and methods of measurement (see Note 2)
	EN 55024	Information technology equipment — Immunity characteristics — Limits and methods of measurement
	EN 61000-3-2	Limits for harmonic current emissions (equipment input current <= 16 A per phase)
	EN 61000-3-3	Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current <= 16 A
Australia	CISPR 22/ AS/NZS 3548	Limits and methods of measurement of radio disturbance characteristics of information technology equipment (see Note 2)
Korea	KN22	Information technology equipment — Radio disturbance characteristics — Limits and methods of measurement

Jurisdiction	Standard	Title
Korea (continued)	KN24	Information technology equipment — Immunity characteristics — Limits and methods of measurement
Taiwan	CNS 13438	Limits and methods of measurement of radio disturbance characteristics of information technology equipment

Note 1: FCC CFR 47 Part 15.21 statement:
"Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense."

Note 2: EN 55022/CISPR 22 statement:
"WARNING
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures."

Radio and TV interference

Information for the United States

The Small Systems comply with Part 15 of the FCC rules in the United States. Operation is subject to the following two conditions:

- The system must not cause harmful interference.
- The system must accept any interference received, including interference that can cause undesirable operation.

If the Small System causes interference to radio or television reception, which can be determined by placing a telephone call while monitoring, the user is encouraged to try to correct the interference by the following measures:

- Reorient the receiving TV or radio antenna where this can be done safely.
- Move the TV or radio in relation to the telephone equipment.

If necessary, ask a qualified radio or television technician or supplier for additional information. Also, you can refer to the document “How to Identify and Resolve Radio-TV Interference”, prepared by the Federal Communications Commission. This document is available from:

U.S. Government Printing Office
Washington DC 20402

Information for Canada

The Small Systems do not exceed Class A limits for radio noise emissions from digital apparatus, as set out in the radio interference regulations of Industry Canada.

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