



**NORTEL**

Nortel Communication Server 1000

# Communication Server 1000E

## Overview

Release: 6.0

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## New in this Release

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This chapter outlines the new or updated features in Communication Server 1000E Overview for Release 6.0.

### Navigation

- [“Features” \(page 7\)](#)
- [“Other” \(page 7\)](#)

### Features

CS 1000 Release 6.0 introduces the CP PM Co-resident Call and Signaling Server (CP PM Co-res CS and SS), which can run the Call Server software, the Signaling Server software, and System Management software on the same hardware platform operating under the RedHat Linux Operating System. For CS 1000 Release 6.0, the only supported hardware platform for the CP PM Co-res CS and SS Server is the Call Processor-Pentium Mobile (CP PM) platform. For more information about CP PM Co-res CS and SS, see [“CP PM Co-res CS and SS” \(page 16\)](#).

The Media Gateway 1010 (MG 1010) is a new rack mount Media Gateway chassis that provides a larger amount of card slots than a MG 1000E with Media Gateway Expander. For more information about MG 1010, see [“Media Gateway 1010” \(page 41\)](#).

The NTDW20 Media Gateway Extended Peripheral Equipment Controller (MG XPEC) card allows you to convert an NT8D37 IPE module into Media Gateways (type MGX) for use in a Communication Server 1000E system. For more information about MG XPEC, see [“Media Gateway Extended Peripheral Equipment Controller \(MG XPEC\)” \(page 44\)](#).

### Other

#### Revision History

##### October 2009

Standard 03.04. This document is up-issued to support the Media Gateway Extended Peripheral Equipment Controller (MG XPEC) card.

**September 2009**

Standard 03.03. This document is up-issued to support the Media Gateway 1010 (MG 1010).

**May 2009**

Standard 03.02. This document is issued to support Nortel Communication Server 1000 Release 6.0

**May 2009**

Standard 03.01. This document is issued to support Nortel Communication Server 1000 Release 6.0.

**December 2007**

Standard 02.03. This document is issued to support Nortel Communication Server 1000 Release 5.5.

**June 2007**

Standard 01.02. This document is up-issued to remove the Nortel Networks Confidential statement.

**May 2007**

Standard 01.01. This document is issued to support Nortel Communication Server 1000 Release 5.0. This document contains information previously contained in the following legacy document, now retired: *Nortel Communication Server 1000E: Overview* (553-3041-010).

**August 2005**

Standard 2.00. This document is up-issued to support Communication Server 1000 Release 4.5.

**September 2004**

Standard 1.00. This document is issued for Communication Server 1000 Release 4.0.



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## How to get help

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This chapter explains how to get help for Nortel products and services.

### Getting help from the Nortel Web site

The best way to get technical support for Nortel products is from the Nortel Technical Support Web site:

[www.nortel.com/support](http://www.nortel.com/support)

This site provides quick access to software, documentation, bulletins, and tools to address issues with Nortel products. From this site, you can:

- download software, documentation, and product bulletins
- search the Technical Support Web site and the Nortel Knowledge Base for answers to technical issues
- sign up for automatic notification of new software and documentation for Nortel equipment
- open and manage technical support cases

### Getting help over the telephone from a Nortel Solutions Center

If you do not find the information you require on the Nortel Technical Support Web site, and you have a Nortel support contract, you can also get help over the telephone from a Nortel Solutions Center.

In North America, call 1-800-4NORTEL (1-800-466-7835).

Outside North America, go to the following Web site to obtain the telephone number for your region:

[www.nortel.com/callus](http://www.nortel.com/callus)

### **Getting help from a specialist by using an Express Routing Code**

To access some Nortel Technical Solutions Centers, you can use an Express Routing Code (ERC) to quickly route your call to a specialist in your Nortel product or service. To locate the ERC for your product or service, go to:

[www.nortel.com/erc](http://www.nortel.com/erc)

### **Getting help through a Nortel distributor or reseller**

If you purchased a service contract for your Nortel product from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller.

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# Introduction

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This document is a global document. Contact your system supplier or your Nortel representative to verify that the hardware and software described are supported in your area.

## Subject



### WARNING

Before a Communication Server (CS) 1000E system can be installed, a network assessment **must** be performed and the network must be VoIP-ready.

If the minimum VoIP network requirements are not met, the system will not operate properly.

For information on the minimum VoIP network requirements and converging a data network with VoIP, refer to *Converging the Data Network with VoIP Fundamentals (NN43001-260)*.

This document describes CS 1000E system architecture, software and hardware requirements, components, and network connections.

### Note on legacy products and releases

This NTP contains information about systems, components, and features that are compatible with Nortel Communication Server 1000 Release 6.0 software. For more information on legacy products and releases, click the **Technical Documentation** link under **Support & Training** on the Nortel home page:

[www.nortel.com](http://www.nortel.com)

## Applicable systems

This document applies to the Communication Server 1000E (CS 1000E) system.

**Note:** When upgrading software, memory upgrades may be required on the Signaling Server, the Call Server, or both.

## Intended audience

This document is an introductory overview for individuals responsible for the sale, acquisition, planning, or installation of CS 1000E systems.

## Conventions

In this document, the CS 1000E system is referred to generically as "system."

The following Media Gateways are referred to as "Media Gateway 1000":

- Chassis (NTDK91) and Chassis Expander (NTDK92)
- Cabinet (NTAK11)

## Related information

This section lists information sources that relate to this document.

### NTPs

The following NTPs are referenced in this document:

- *Feature Listing Reference (NN43001-111)*
- *Converging the Data Network with VoIP Fundamentals (NN43001-260)*
- *IP Peer Networking Installation and Commissioning (NN43001-313)*
- *Branch Office Installation and Commissioning (NN43001-314)*
- *Features and Services Fundamentals (NN43001-106)*
- *Signaling Server IP Line Applications Fundamentals (NN43001-125)*
- *Telephones and Consoles Fundamentals (NN43001-567)*
- *IP Phones Fundamentals (NN43001-368)*
- *Communication Server 1000E Planning and Engineering (NN43041-220)*
- *Communication Server 1000E Installation and Commissioning (NN43001-310)*
- *Communication Server 1000E Upgrades (NN43041-458)*
- *Communication Server 1000E Upgrades Hardware Upgrade Procedures (NN43041-464)*
- *Communication Server 1000E Maintenance (NN43041-700)*
- *CP PM Co-resident Call Server and Signaling Server Fundamentals (NN43001-509)*

### **Online**

To access Nortel documentation online, click the **Technical Documentation** link under **Support & Training** on the Nortel home page:

[www.nortel.com](http://www.nortel.com)

### **CD-ROM**

To obtain Nortel documentation on CD-ROM, contact your Nortel customer representative.



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# Features

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## Contents

[“Introduction” \(page 15\)](#)

[“Key features” \(page 16\)](#)

## Introduction



### WARNING

Before a CS 1000E system can be installed, a network assessment **must** be performed and the network must be VoIP-ready.

If the minimum VoIP network requirements are not met, the system will not operate properly.

For information on the minimum VoIP network requirements and converging a data network with VoIP, refer to *Converging the Data Network with VoIP Fundamentals (NN43001-260)* ().

The Communication Server (CS) 1000E is a robust and highly scalable IP PBX that supports traditional Meridian features as well as new IP telephony features, including Session Initiation Protocol (SIP).

With the CS 1000E, customers can evolve from a traditional TDM network to a converged IP network. Deployment is seamless because the CS 1000E integrates with existing PBX systems from Nortel and third parties. This enables customers to expand the size and functionality of their networks while preserving their investment in legacy equipment, such as Meridian 1, Option 11C, and Succession 1000 systems.

Being IP-based, the CS 1000E supports distributed architecture. This enables customers to locate systems and components where they fit best. For example, using the Branch Office feature, customers can establish Media Gateway 1000Bs (MG 1000B) in remote sites to extend complete feature sets across multiple locations and time zones. Customers can also configure the CS 1000E to support Campus Redundancy and Geographic Redundancy to increase system availability.

Like other Enterprise Solutions from Nortel, the CS 1000E delivers business-grade availability, security, reliability, and scalability. And as always, CS 1000E customers receive industry-leading support services from Nortel to ensure successful implementation.

### **CP PM Co-res CS and SS**

CS 1000 Release 6.0 introduces the CP PM Co-res CS and SS, which can run the Call Server software, the Signaling Server software, and System Management software on the same hardware platform operating under the RedHat Linux Operating System. For CS 1000 Release 6.0, the only supported hardware platform for the CP PM Co-res CS and SS Server is the Call Processor-Pentium Mobile (CP PM) platform. For details, see *CP PM Co-resident Call Server and Signaling Server Fundamentals* (NN43001-509)

### **Key Attributes**

- **Adaptable to meet current and future needs**
  - Delivers investment protection and evolution path to next-generation multimedia communications
- **Superior IP Telephony experience**
  - More open platform to take advantage of innovative applications, and feature-rich next generation clients
- **Improved reliability and security**
  - Business continuity improvement from a reliable and secure environment
- **Simplified convergence solution**
  - Product portfolio simplified for easier deployment, configuration and management

### **Key features**

Key features of the CS 1000E system are as follows:

- [“IP-based switching with TDM capability” \(page 17\)](#)
- [“Flexible architecture” \(page 17\)](#)
- [“Industry-standard interworking and interoperability” \(page 19\)](#)
- [“Enhanced system management capabilities” \(page 19\)](#)
- [“Software applications and features” \(page 21\)](#)
- [“Desktop clients” \(page 27\)](#)

The following sections describe these features in detail.



### **IP-based switching with TDM capability**

The CS 1000E is an IP PBX that supports TDM PBX capabilities. Unlike traditional, circuit-switched PBX systems, the IP-based CS 1000E Core Call Server has no dedicated switching infrastructure. All voice communication between network elements uses a Telephony LAN (TLAN) subnet.

Evolving to the CS 1000E and a converged IP network provides several advantages. For example, it enables the customer to deliver a consistent set of services to all locations, whether large or small. It also eliminates separate voice wiring.

What's more, customers need not compromise voice quality or features by selecting a CS 1000E system. That's because the CS 1000E enables customers to route calls over their circuit-switched networks or over their QOS-managed IP network, according to their own rules and requirements.

### **Flexible architecture**

The CS 1000E supports flexible, distributed architecture across a QOS-managed IP network. With its dual, redundant Call Processor Pentium Mobile (CP PM) processors, the CS 1000E supports up to 22,000 IP Phones. To support more IP Phones, multiple CS 1000E systems can be installed across the QOS-managed IP network.

In terms of physical size, the CS 1000E is much smaller than other Large Systems, and its components are rack-mountable in industry-standard 19-inch racks.

### **Standard Availability and High Availability**

CS 1000E architecture offers options for single and redundant processors. With CS 1000 Release 6.0, a customer can deploy existing or new cabinets or chassis' as Media Gateway 1000 (MG 1000). The CP PM processor may be deployed as a single call processor (Standard Availability CS 1000E) or in a redundant processor configuration (High Availability CS 1000E). The redundant CP PIV processor configuration is also available as a High Availability CS 1000E system.

The CS 1000E Standard Availability replaces CS 1000S, CS 1000M Chassis, and CS 1000M Cabinet system types. The Standard Availability (SA) system can be upgraded to a High Availability (HA) system with the addition of a second CP PM call processor and by enabling the software package 410: HIGH\_AVAIL HIGH AVAILABILITY.



## **Redundant architecture**

The CS 1000E (HA) comes configured with fully redundant Call Servers, similar to the dual CPUs used in CS 1000M, Meridian 1 Large Systems. The sections below describe key configuration options.

### **Campus Redundancy**

With Campus Redundancy, a customer can separate the inactive Call Server from the active Call Server using a dedicated 100 Meg bit pipe between cores configured to meet specified network parameters. When this configuration is implemented, a major failure of the active Call Server (for example, due to fire or flood) does not disable the remote Call Server.

### **Geographic Redundancy**

Geographic Redundancy increases the reliability of CS 1000E systems by providing a remote system to serve as a backup for a local system. Depending on the configuration, the remote backup system ensures continued service for resources in case of a catastrophic failure (for example, as a result of floods or fire). Geographic Redundancy also offers automatic database replication between main and backup systems to promote a smooth transition. When this configuration is implemented, the customer enhances the disaster recovery capability of their network and further secures ultra-high reliability.

## **Industry-standard interworking and interoperability**

The CS 1000E supports interworking and interoperability with other enterprise PBX systems from Nortel and third parties. This enables customers to smoothly migrate from traditional TDM-based telephony products to IP-based telephony products.

The CS 1000E supports interworking with many Nortel products, including Business Communications Manager (BCM) and CS 1000M, using standard SIP and H.323 protocols with Meridian Customer Defined Networking (MCDN) extensions to provide more complete feature transparency. The CS 1000E also uses industry-standard SIP and H.323 protocols to support interworking with third-party products.

For existing Meridian 1 and Succession 1000 customers, the CS 1000E supports reuse of equipment. Reuse means faster deployment, reduced cost, and lower training costs. For example, customers can reuse circuit cards and Media Gateway 1000s from Meridian 1 and Succession 1000 systems in a CS 1000E system.

## **Enhanced system management capabilities**

The CS 1000E provides enhanced system management capabilities through an integrated set of interfaces. These interfaces increase configuration capability and reduce operating cost, in part by centralizing services and service provisioning.

Management interfaces supported by the CS 1000E include Enterprise Common Manager (ECM), Network Routing Service Manager (NRSM), Element Manager (EM), Telephony Manager (TM), and traditional Command Line Interfaces (CLI).

### **Enterprise Common Manager framework**

The Nortel Enterprise Common Manager (ECM) framework provides:

- Private Certificate Authority.
- Secure Shell (SSH) access to the Command Line Interface.
- Centralized point of access for the management of users, passwords, system access, and security.
- ECM navigator provides an overview of network components from the host's perspective.
- Single point of access to manage the entire network. Element Manager and NRS Manager are components of ECM.

### **Network Routing Service Manager**

Network Routing Service Manager (NRSM) is a web-based configuration interface. You can perform the following NRS configuration functions using NRS Manager:

- configure a numbering plan
- add, modify, or delete preconfigured endpoint data
- add, modify, or delete numbering plan entries on a per-endpoint basis
- retrieve the current configuration database
- interwork with a preconfigured database
- revert to the standby database
- change system passwords

### **Element Manager**

CS 1000E supports Element Manager (EM), a web-based GUI that offers an alternative to traditional overlays and CLIs. Element Manager simplifies overall management of items like Network Routing Service (NRS), IP services, IP Peer configuration, and software downloads

### Telephony Manager

CS 1000E supports Telephony Manager (TM) 3.1, which enhances system management simplicity and control. This includes LDAP-based directory integration, station administration, call accounting, call tracking, traffic analysis, disaster recovery tools, and more. These features save time and facilities costs, simplifying management of a complex network

### Traditional Command Line Interfaces

CS 1000E fully supports traditional CLIs, including overlays.

### Software applications and features

The CS 1000E system provides access to the full suite of Meridian software applications and features. It also provides access to an emerging suite of IP-based applications and features that increase operational efficiency while lowering costs through convergence and user mobility.

In brief, the CS 1000E supports the following features and applications:

- **Traditional telephony applications.** Traditional telephony features (Call Waiting, ACD, CDR, and so on) are fully supported.
- **Networking applications.** ISDN PRI, ISDN BRI, ESN, and other Meridian 1 networking applications are fully supported.
- **Voicemail applications.** CallPilot 2.0 and CallPilot 1.5 Mini are fully supported.
- **Multimedia Communication Server 5100 (MCS 5100) applications.** The MCS 5100 portfolio of multimedia applications for the enterprise and other standards-based SIP applications are supported.
- **Call Center applications.** Contact Center applications are fully supported.
- **Wireless applications.** CS 1000E supports Nortel WLAN IP Telephony Manager 2245 and Nortel WLAN Application Gateway 2246. Support is also provided for Nortel Integrated DECT (DECT).
- **Integrated applications.** The complete suite of Integrated applications is supported, including:
  - Nortel Integrated Conference Bridge
  - Nortel Integrated Call Assistant
  - Nortel Integrated Call Director
  - Nortel Integrated Recorded Announcer
  - Nortel Hospitality Integrated Voice Services

### **SIP support**

The CS 1000E with CS 1000 Release 6.0 software supports the H.323 protocol as well as the Session Initiation Protocol (SIP) on the same Signaling Server hardware.

SIP is used to establish, modify, and terminate telephony sessions in IP networks. A session can be a simple two-way telephone call or a multimedia session that integrates voice, data, and video. SIP's text-based architecture speeds access to new services with greater flexibility and more scalability.

SIP Gateway offers an industry-standard, SIP-based, IP Peer solution that delivers a SIP interface for interoperability with standard SIP-based products, including Nortel SIP products. SIP Services, through a Converged Desktop, provides the CS 1000 telephony features as well as Multimedia Communication Server (MCS) 5100 applications.

The Converged Desktop capabilities of CS 1000E requires an MCS 5100 to be in the network. This interfaces to the CS 1000E by means of SIP trunks.

CS 1000 Release 6.0 capacity enhancements and SIP-related interoperability enhance the positioning of large-sized networks and enable users to access multimedia when MCS 5100 servers and services are added.

### **UCM Security Domain Manager**

This section describes concepts associated with the Security Domain Manager (SDM). The SDM for VxWorks controls the joining of devices to security domain of the UCM Primary Security Server.

The UCM Primary Security Server acts as the RADIUS server from which Communication Server 1000 devices obtain authentication and access control parameters for CLI access. The RADIUS related parameters are sent from the UCM Primary Security Server to Communication Server 1000 devices using SSH protocol.

When a device joins the UCM security domain, a mutually-trusted SSH channel is created with the following properties:

- the SSH server public key of the device is added to the known host key list of the UCM Primary Security Server
- the RSA public key of the UCM Primary Security Server is added to the authorized key list of the CS 1000 device

Before the UCM primary server RSA public key is added to the authorized key file, the fingerprint of the public key must be confirmed manually. This verification prevents third-party intercepts. Once a mutually trusted SSH tunnel has been established for the first time, the UCM Primary Security Server can send SSH remote commands to the device using RSA public key-based authentication.

The normal authentication process is as follows:

- the UCM Primary Security Server verifies the device SSH server public key against its known host list. Devices with a spoofed IP address are detected as they cannot possess both the public and private key pair of the original device.
- the device authenticates the UCM Primary Security Server using the authorized key list under the system account name.

The remote command is executed on the device only if it is received from a mutually authenticated SSH tunnel and the system account in question has the permissions to execute the command.

VxWorks based systems and devices can join the UCM security domain using the following modes:

- Manual mode—the joining and leaving of the UCM security domain operation is performed on each individual Call Server, MGC and MC(MC32S/SA) using the following commands:
  - LD 117 command: **UCM [JOIN / LEAVE] DEVICE**
  - OAM/PDT/IPL commands: **joinSecDomain** or **leaveSecDomain**
- User mode—the joining and leaving of the UCM security domain operation is performed centrally from the Call Server, where the administrator confirms the list of devices to be added or removed:
  - LD 117 command: **UCM [JOIN / LEAVE] SYSTEM**

### **SSH File Transfer Protocol (SFTP)**

CS 1000 system remote access capabilities were greatly improved with Secure Shell (SSH) in CS 1000 Release 5.0, but the exchange of files internally among CS 1000 systems, and externally over the IP network, was still carried out with the conventional File Transfer Protocol (FTP).

FTP is an inherently insecure method of transferring files due to the lack of encryption and authentication. In an FTP session, the user name, password, FTP commands, and transferred files are all transmitted in clear text without any security protection, thus can be intercepted by anyone

with the access to the FTP communication path. FTP has been widely viewed as a significant security weakness by almost all customers, and must be replaced by a secure file transfer protocol in CS 1000 systems.

As a solution to this problem, the SSH File Transfer Protocol (SFTP) is introduced in this security feature. SFTP is a network protocol that provides confidentiality and integrity to data (such as files or commands) transmitted between an SFTP client and a server. In addition, SFTP allows an SFTP client and an SFTP server to authenticate each other by using a password. SFTP allows data (such as file and/or command) transferred between an SFTP client and server over an encrypted and authenticated secure channel that cannot be intercepted or tampered with. SFTP is used in CS 1000 Release 6.0 to replace many usages of FTP (and other insecure data transfer protocols in some cases) in the system.

Due to development resource limitations, not all usages of insecure protocols have been addressed. To provide backward compatibility, conventional FTP is still used for file transfer sessions between CS 1000 Release 6.0 and any prior release such as CS 1000 Release 5.0.

### **Feature operation during upgrade**

After upgrading to CS 1000 Release 6.0, both SFTP and FTP servers are supported. While both SFTP and FTP clients are supported on the devices associated with the Call Server, the SFTP client is used by default. Therefore, the Call Server should always be upgraded first. To use an FTP client, users must enable it by running commands (see [Table 3 "Secure transport commands"](#) (page 26)).

There is no impact to CallPilot or TM 4.0 during an upgrade if they are part of the system, CallPilot or TM 4.0 usually function as clients and can continue to use the FTP client to communicate with a CS 1000 Release 6.0 Call Server supporting an SFTP and FTP server.

### **SFTP application support**

A number of applications that support FTP have been modified to support SFTP for CS 1000 Release 6.0.

From CS to all devices:

- account
- banner
- DBSYSCFG.db

CS redundancy:

- PSDL file update (only applicable to Call Server redundancy)



Other devices:

- MGC DB files transfer from CS
- ITG OMM (Operation Measure Module) file transfer
- Personal Directory
- PDT disk/file command transfer
- ITG log file, UMS transfer
- ITG commands, boot file, configuration, F/W, SNMP
- MGC, MC32S bootfile, configuration, loadware, installation file transfer
- IP phone F/W file transfer (EM -EM patching handler)
- Manufacturing delivery patch distribution

**Table 1**  
**SFTP application support**

Applications supporting SFTP transfer	Type of SFTP data transfer
CS to all connecting devices	Sync of account DB, SYSCFG.db, Banner
CS to CS (inactive)	Sync of PSDL
CS to MGC	F/W and DB upgrade
CS to SS/MGC/	Node info distribution
CS to SS	Manufacturing deliver patch distribution
CS to MC32S	Config/bootp file update
EM to SS/CS/SA/	Uploading of F/W, Patch, BootP file and PD. SNMP update

Applications listed in the table below continue to support FTP only. The mitigation mechanism for those applications is to use IPSec.

**Table 2**  
**Applications supporting FTP only**

Devices supporting FTP transfer	Type of FTP data transfer
CS (active) to CS (redundant)	GR DB Replication
CS to IPMG	SIPE S/W upgrade (obsolete)
SS to SS	SS patch distribution
NRS (Primary/secondary) to NRS (failsafe)	Database Replication
TM to CS	Sync of TM Inventory, DBA, Corp Dir, and ITG, and restore of DB.
SS to external FTP server	PD backup
ITG to external FTP server	swDownload (parameters, e.g., file, username, pswd) initiated from ITG.

### Secure transport commands

Different platforms, such as Signaling Server, MGC and ITG-SA, have local shell commands to enable/disable the secure/insecure transfers as well as **STAT** commands to display whether the secure/insecure transfer is allowed or not. There is no limitation for **STAT** command execution in different shells.

Enable/disable commands are only provided on the OAM and PDT2 shells. Only users with PWD2 rights can execute them. See [Table 3 "Secure transport commands"](#) (page 26).

**Table 3**  
**Secure transport commands**

Command	Description
disInsecureTransfers	Disables all insecure FTP transfers in the system
enlInsecureTransfer	Enables all insecure FTP transfers in the system
disSecureTransfers	Disables all insecure SFTP transfers in the system
enlSecureTransfers	Enables all insecure SFTP transfers in the system
statInsecureTransfers	Displays enabled or disabled status of insecure transfer access
statSecureTransfers	Shows whether secure transfer access is enabled or disabled

### SSH Library upgrade

The Mocana embedded security suite version 1.36 supported in CS 1000 Release 5.0 is upgraded to the latest version 1.38 for CS 1000 Release 6.0. Version 1.38 features the following improvements:

- Enhanced Security solution
- SSH server now supports both RSA and DSA key generation and authentication negotiation with an SSH client. For example, a CS 1000 SSH server uses RSA key authentication to communicate with a UCM Primary Server SSH client, since UCM only supports RSA key authentication.
- An SFTP server
- standard DTLS solution

## Desktop clients

The CS 1000E supports many new IP telephony devices, including IP Phones, SIP phones, and soft clients for desktop, tablet, and PDA devices. The CS 1000E also supports a wide range of traditional desktop clients, including analog (500/2500-type) telephones, digital telephones, and attendant consoles.

For more information on IP Phones, see *IP Phones Fundamentals (NN43001-368)* (). For more information on analog and digital telephones, see *Telephones and Consoles Fundamentals (NN43001-567)* ().

## IP Phones

The CS 1000E supports Nortel IP Phones, which convert voice into data packets for transport over IP. The functionality and call features of IP Phones are similar to those on a standard digital telephone, such as the M2616.

**UNiStim phones** The CS 1000E supports the following UNiStim IP Phones: Nortel IP Phone 2001, IP Phone 2002, IP Phone 2004, IP Phone 2007, IP Audio Conference Phone 2033, and IP Softphone 2050. The CS 1000E system also supports the Meridian IP Phone adapter package for the M26xx and M39xx telephones. The IP Phone adapter package is intended for local deployment and does not support analog PSTN fallback.

## Digital telephones

The CS 1000E system supports the M3900 series Meridian Digital Telephones. This includes the M3901 Entry Level Telephone, the M3902 Basic Telephone, the M3903 Enhanced Telephone, the M3904 Professional Telephone, and the M3905 Call Center Telephone.

The CS 1000E also supports other digital telephones, including the M2006, the M2008, the M2008HF, the M2616, the M2016S, the M2216ACD, and the M2317 Telephone.

## Attendant consoles

The CS 1000E also supports the Attendant PC software console and the M2250 attendant console.

The Attendant PC software enables users to perform attendant console and call processing functions on a Windows® PC using a mouse or keyboard. The Attendant PC combines the call-processing power of the M2250 attendant console with the processing power and storage capacity of a PC to enhance attendant services.

## Analog (500/2500-type) telephones and fax

The CS 1000E supports analog line cards that support analog (500/2500-type) telephones and T.38 fax interfaces.



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# System architecture

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## Contents

- ["Main components" \(page 29\)](#)
- ["CS 1000E Call Server" \(page 31\)](#)
- ["Media Gateway 1000" \(page 33\)](#)
- ["Media Gateway Expander" \(page 38\)](#)
- ["Signaling Server" \(page 45\)](#)
- ["Terminal Server" \(page 53\)](#)
- ["Layer 2 switch" \(page 54\)](#)

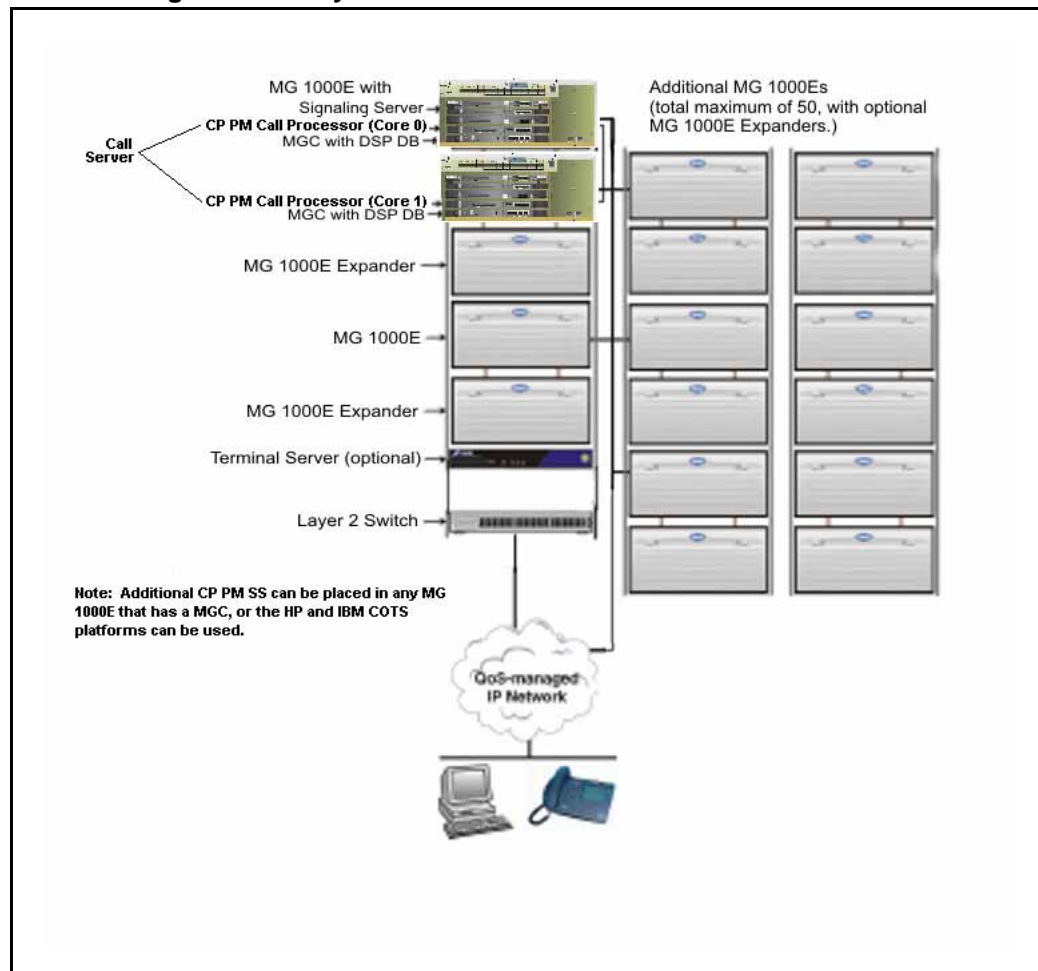
## System Types

add table of system types (PIV 3621 and CP PM 4021) be sure to add tdm system 4121

## Main components

[Figure 2 "CS 1000E High Availability" \(page 30\)](#) shows the main components of a typical CS 1000E High Availability system. The remainder of this section discusses each component in further detail.

**Figure 2**  
**CS 1000E High Availability**



The CS 1000E system provides core processing capability and IP functionality. It includes:

- Call Server containing dual CS 1000E Call Processors (Core 0 and Core 1)
- 1 to 50 Media Gateway 1000s and optional Media Gateway Expanders
- Signalling Servers (total number required depends on capacity and survivability levels)
- an MRV Terminal Server (optional)
- Ethernet Switches

The CS 1000E uses the Large System Terminal Number (TN) format of the Loop, Shelf, Card, Unit (l s c u). The system software is based on the core software of the CS 1000MLS;s. Each Call Server in the CS 1000E has a Common Processor Pentium Mobile (CP PM) card. A Call Server

does not have an external System Utility (SUTL) card. The CP PM card provides functionality similar to that provided by the SUTL card in a Call Processor Pentium IV system without requiring any external hardware.

## CS 1000E Call Server

### Main role

The CS 1000E Call Server hosts one call processor in the Standard Availability configuration and two call processors in the High Availability configuration for the CS 1000E system.

### Physical description

Figure 3 "CS 1000E Call Server " (page 31)(without cover) with CP PM processor and MGC installed.

Figure 3  
CS 1000E Call Server



### Hardware components

Each Call Server contains the following:

- CP PM processor
- Media Gateway Controller

### **Common Processor Pentium Mobile processor**

The CP PM card (NTDW61AA) is the main processor for the Call Server, controlling all call processing and telephony services. It also provides the system memory required to store operating software and customer data.

The CP PM card provides the following connectors:

- **Port 0** is used for maintenance access.
- **Port 1** is for an external modem connection. It connects to an IP-based Terminal Server, which provides standard serial ports for system maintenance and third-party applications. (For more information, see [“Terminal Server” \(page 53\)](#).) **Port 1** can also be directly connected to a system terminal for system access.
- **LAN 0** is an unassigned 10/100 BaseT spare.
- **LAN 1** connects the Call Server to an Embedded LAN (ELAN) subnet through an ELAN Layer 2 switch to provide IP connections between the Call Server, Signaling Servers, and Media Gateway 1000s.
- **LAN 2** connects Call Server 0 to Call Server 1 over a 10/100/1000 BaseT high speed pipe (HSP) to provide communication and database synchronization.
- The **USB 2.0 port** is not supported by the CS 1000E system and cannot be used.

### **Power supply module**

The AC power supply module (NTDU65) is the main power source for the Call Server and is field-replaceable.

### **Alarm/fan module**

The alarm/fan module (NTDU64) provides fans for cooling the Call Server and provides status LEDs indicating the status of Call Server components. The alarm/fan module is field-replaceable.

### **Functional description**

The Call Server provides the following functionality:

- provide main source of call processing
- process all voice and data connections
- control telephony services
- control circuit cards installed in Media Gateway 1000s
- provide resources for system administration and user database maintenance



## Operating parameters

The CS 1000E (HA) has dual call processors (core 0 and core 1) to provide a fully redundant system.

Call processors (core 0 and core 1) operate in redundant mode: one runs the system while the other runs in a "warm standby" mode, ready to take over system control if the active Call Server fails.

The system configuration and user database are synchronized between the active and inactive Call Servers. This allows the inactive Call Server to assume call processing in the event of failure of the active Call Server.

The Call Server uses a proprietary protocol to control the Media Gateway 1000s. This proprietary protocol is similar to industry-standard Media Gateway Control Protocol (MGCP) or H.248 Gateways.

The Call Server can control up to 50 Media Gateway 1000s.

**Note:** The Call Server provides connectivity to telephony devices using IP signaling through Media Gateway 1000s rather than by direct physical connections.

## Media Gateway 1000 Main role

The Media Gateway 1000 functions as a gateway controller under the control of a CS 1000E call server.

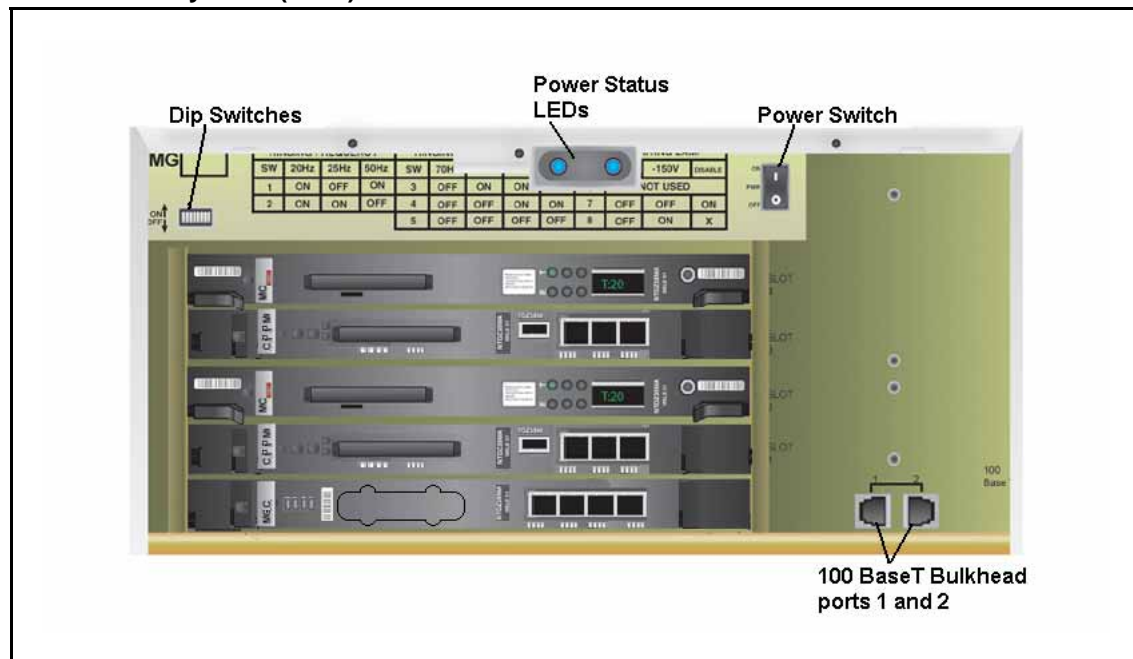
The Media Gateway 1000 houses circuit cards and connectors to support the functionality of a Media Gateway 1000 and provides basic telephony media services, including tone detection and generation and conference, to CS 1000E telephones. The Media Gateway 1000 also supports Nortel Integrated Applications, including Integrated Recorded Announcer. It can also provide connectivity for digital and analog (500/2500-type) telephones as well as analog trunks for telephone and fax.

**Note:** The MG 1000B also uses the same base Media Gateway 1000 hardware as the Media Gateway 1000. (For more information, see *Branch Office Installation and Commissioning (NN43001-314)*. )

## Physical description

[Figure 4 "Media Gateway 1000 \(front\)" \(page 34\)](#) shows the Media Gateway 1000 (NTDU14).

**Figure 4**  
**Media Gateway 1000 (front)**



## Hardware components

### Front components

Figure 4 "Media Gateway 1000 (front)" (page 34) shows the Media Gateway 1000 with the front cover removed. Note the following:

- The DIP switches set ringing voltages, ringing frequencies, and message waiting voltages.
- The 100BaseT bulkhead ports 1 and 2 provide direct connections to the rear bulkhead ports.

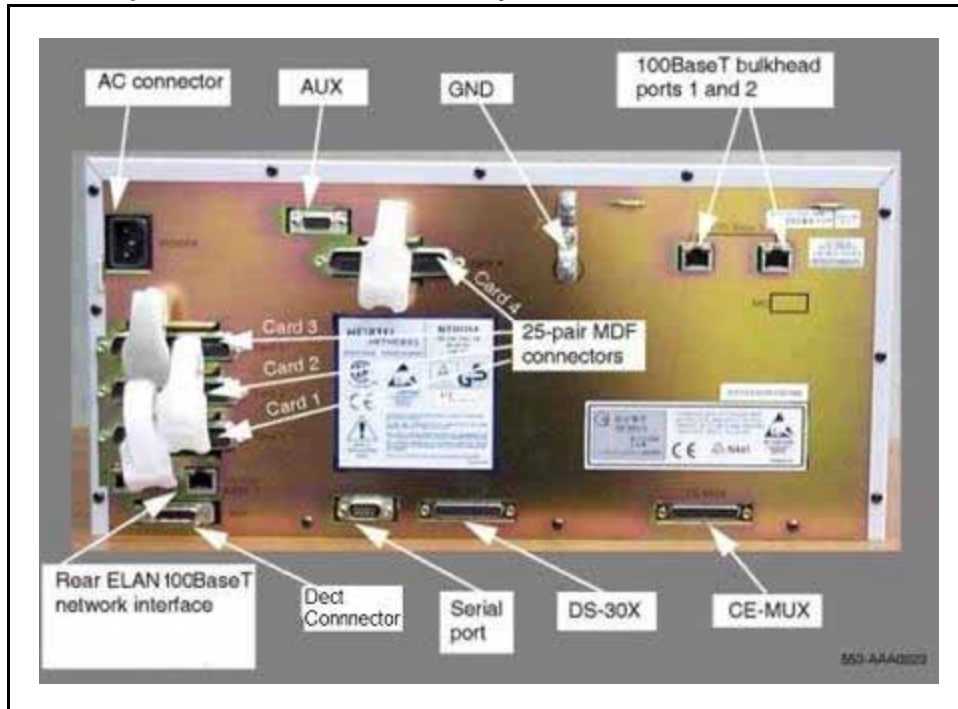
### Rear components

Figure 5 "Rear components in the Media Gateway 1000" (page 35) shows the rear components on the Media Gateway 1000. Note the following:

- The AC power cord connector provides AC connection to the Media Gateway 1000.
- AUX extends Power Failure Transfer Unit (PFTU) signals to the Main Distribution Frame (MDF).
- GND is used for ground cable termination.
- 100BaseT bulkhead ports 1 and 2 provide direct connections from the front bulkhead.

- On Media Gateway 1000s, these ports provide connections to the Call Server through an ELAN switch.
- The serial port connects to maintenance terminals.
- DS-30X and CE-MUX interconnect the Media Gateway 1000 to the Media Gateway Expander.
- 25-pair connectors extend the IPE card ports to the MDF.

**Figure 5**  
Rear components in the Media Gateway 1000



### Circuit cards

Each Media Gateway 1000 can house the following circuit cards:

- Media Gateway Controller card
- Media Card and Voice Gateway Media card
- Intelligent Peripheral Equipment (IPE) cards

**Media Gateway Controller Card** The Media Gateway Controller (MGC) card occupies the system controller slot 0 in the Media Gateway 1000 Chassis. MGC is an upgrade over the NTDK20 Small System Controller (SSC).

The NTDW60 MGC card provides a gateway controller for Media Gateways in a CS 1000E system. The MGC only functions as a gateway controller under control of a CS 1000E (CP PIV or CP PM) Call Server.

Figure 6 "Media Gateway Controller card (NTDW60)" (page 36) shows the MGC faceplate and MGC circuit card (with both DSP daughterboards installed).

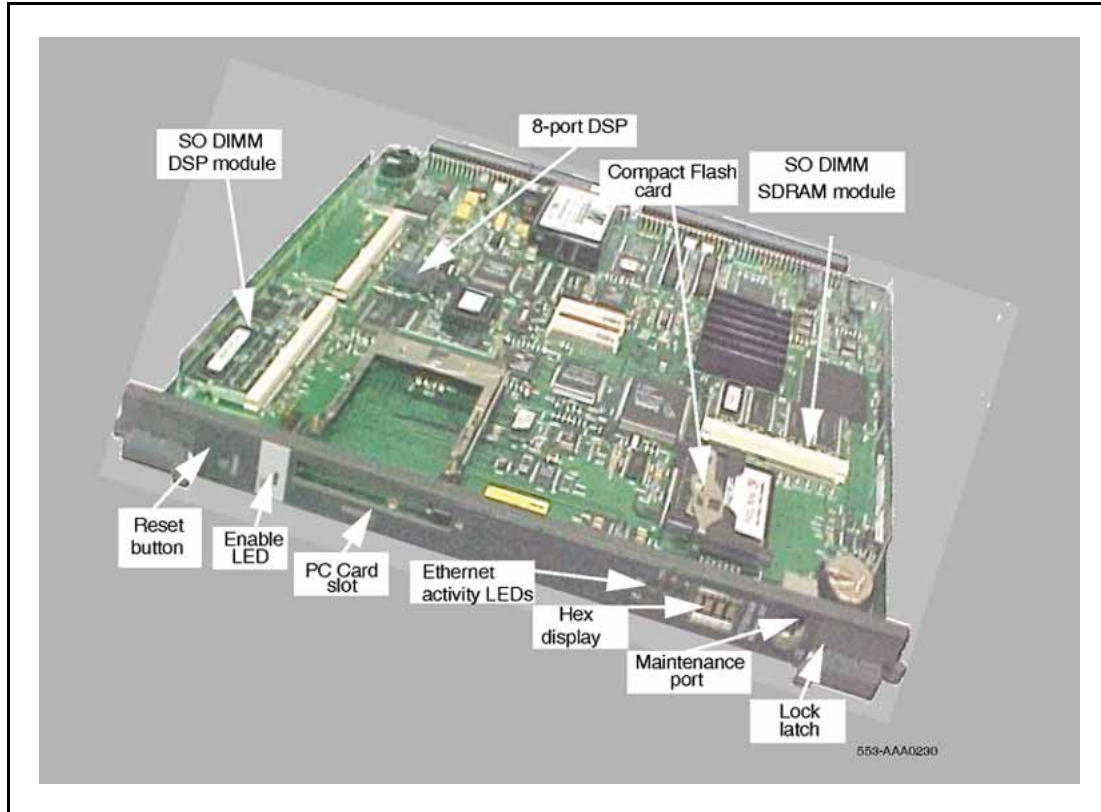
**Figure 6**  
**Media Gateway Controller card (NTDW60)**



**Media Card** The Media Card provides interfaces that connect to the Telephony Local Area Network (TLAN) and Embedded Local Area Network (ELAN) subnets. The Media Card can also run various applications. Figure 7 "Media Card" (page 37) shows faceplate connectors and indicators on the Media Card. For more information on Media Card

features, refer to *Signaling Server IP Line Applications Fundamentals (NN43001-125)*.

**Figure 7**  
**Media Card**



**Voice Gateway Media Card** Voice Gateway Media Card is a term used to encompass any Media Card that runs the IP Line application. A Voice Gateway Media Card provides Digital Signal Processor (DSP) ports to transcode between IP and TDM. Voice Gateway Media Cards can provide up to 32 DSP ports.

The following cards are supported and plug into any Intelligent Peripheral Equipment (IPE) slot in either a Media Gateway 1000 or Media Gateway 1000 Expander:

- Media Card 32-port card
- Media Card 32S card

For additional information on the IP Line application, see *Signaling Server IP Line Applications Fundamentals (NN43001-125)*.

## Media Gateway Expander

### Main role

The Media Gateway Expander supports up to four circuit cards.

### Physical description

Figure 8 "Media Gateway Expander (NTDU15)" (page 38) shows the Media Gateway Expander (NTDU15).

**Figure 8**  
**Media Gateway Expander (NTDU15)**

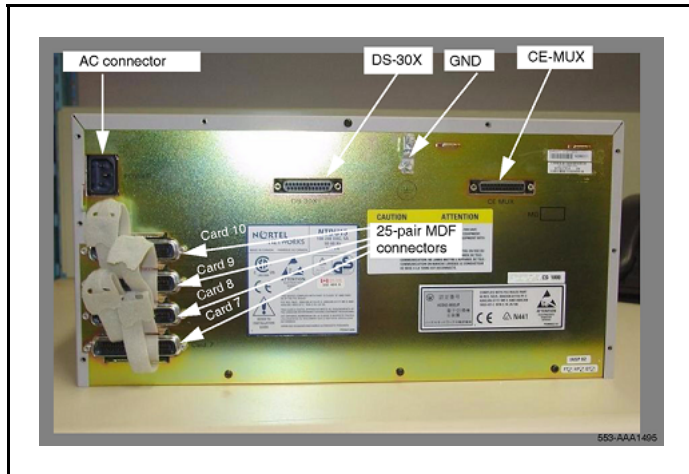


### Rear components

Figure 9 "Rear components in the Media Gateway Expander" (page 39) shows the rear components in the Expander. Note the following:

- The AC power cord connector provides an AC connection to the Expander.
- GND is used for ground cable termination.
- DS-30X and CE-MUX are used to interconnect the Media Gateway 1000 and the Expander.
- 25-pair connectors are used to extend IPE card ports to the MDF.

**Figure 9**  
Rear components in the Media Gateway Expander



### Operating parameters

Each Media Gateway 1000 supports one optional Expander.

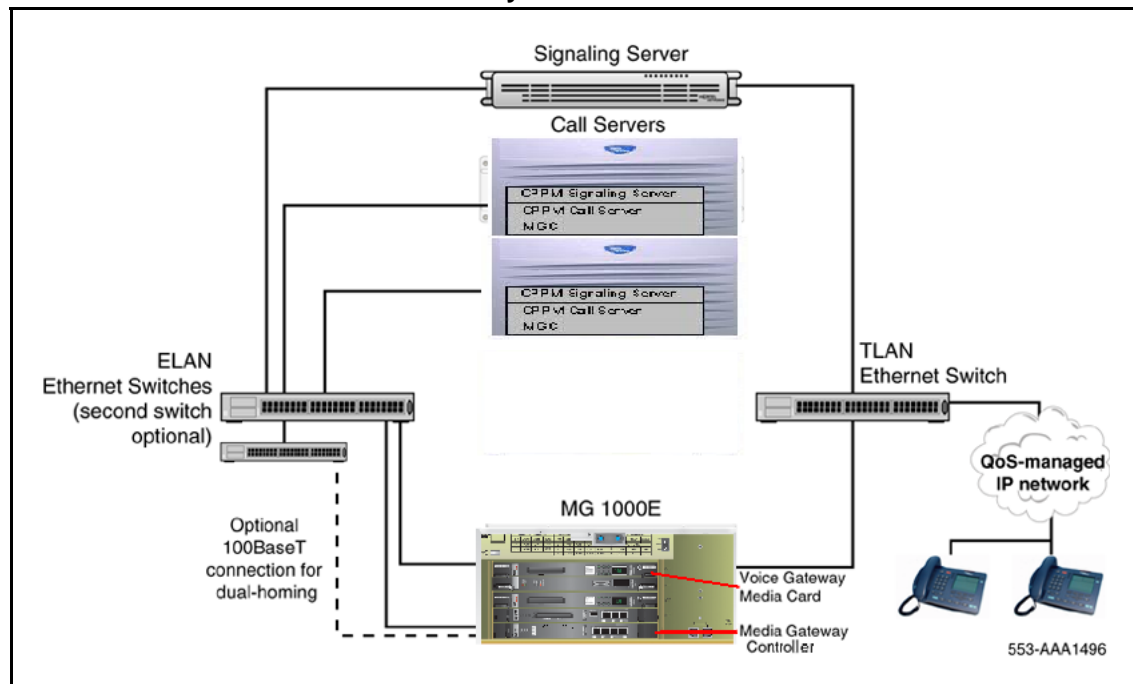
### Security Devices

Control for the activation of features assigned to the CS 1000E system, including the Media Gateway 1000, is provided by the security device on the CP PM call processor .

### Network Connections

Figure 11 shows a schematic representation of the typical network connections for one Media Gateway 1000.

**Figure 10**  
**Network connections on Media Gateway 1000**



The separate LAN subnets that connect the Media Gateway 1000 and the Call Server to the customer IP network are as follows:

- **ELAN subnet.** The ELAN subnet (100BaseT, full-duplex) is used to manage signaling traffic between the Call Server, Signaling Server, and Media Gateway 1000s. The ELAN subnet isolates critical telephony signaling between the Call Servers and the other components.
- **TLAN subnet.** The TLAN subnet (100BaseT, full-duplex) is used to manage voice and signaling traffic. It connects the Signaling Server and Voice Gateway Media Cards to the enterprise IP network. It also isolates the IP Telephony node interface from broadcast traffic.

### Functional description

The Media Gateway 1000 provides the following functionality:

- provides digital trunks to the PSTN and trunking to other PBX systems using E1, T1, ISDN PRI, and ISDN BRI circuit cards
- supports Voice Gateway Media Cards for transcoding between IP and TDM
- provides tones, conference, and digital media services (for example, Music and Recorded Announcement) to all phones
- provides support for CallPilot and Nortel Integrated Applications



- provides direct physical connections for analog (500/2500-type) phones, digital phones, and fax machines
- provides direct physical connections for analog trunks
- supports the DECT application

The Media Gateway 1000 operates under the direct control of the Call Server. Up to 50 Media Gateway 1000s can be configured on the Call Server.

The Media Gateway 1000 supports the following circuit cards and applications:

- Voice Gateway Media Cards: transcode between IP and TDM
- Service cards: provide services such as Music or Recorded Announcements (RAN)
- DECT Mobility cards
- Digital PSTN Interface Cards, including E1, T1, ISDN PRI, and ISDN BRI: provide access to PSTN
- Analog interfaces to lines and trunks: support analog (500/2500-type) phones and fax, PSTN trunks, and external Music or RAN sources
- Digital line cards: support digital terminals, such as attendant consoles, M2000/M3900 series digital phones, and external systems that use digital line emulation, such as CallPilot Mini
- CLASS Modem card (XCMC)
- Nortel Integrated Applications, including:
  - Integrated Conference Bridge
  - Integrated Call Assistant
  - Integrated Call Director
  - Integrated Recorded Announcer
  - Hospitality Integrated Voice Services
- MGate cards for CallPilot
- CallPilot IPE

## Media Gateway 1010

### Main Role

The Media Gateway 1010 (MG 1010) is a rack mount Media Gateway chassis that provides a larger amount of card slots than a MG 1000E with Media Gateway Expander. The CS 1000E Call Server can connect to and control a maximum of 50 MG 1010s. Each MG 1010 provides a dedicated

MGC slot, two dedicated CP PM card slots, and ten slots for IPE cards. The MG 1010 is a single chassis that can provide more processing power and card capacity than a MG 1000E with Media Gateway Expander.

### Physical description

The following sections describe the front and rear components of the MG 1010 (NTC310).

#### Front components

Figure 11 "MG 1010 front components" (page 42) shows the Media Gateway 1010 without the front cover. Note the following features:

- Ten IPE card slots
- Two CP PM card slots
- One MGC card slot
- One Media Gateway Utility (MGU) card provides LED status, ringing, message waiting voltage, dual homing Ethernet cable ports, and serial cable ports.
- One metal divider in chassis to separate MGU, CP PM, and MGC from the IPE cards.

**Figure 11**  
**MG 1010 front components**

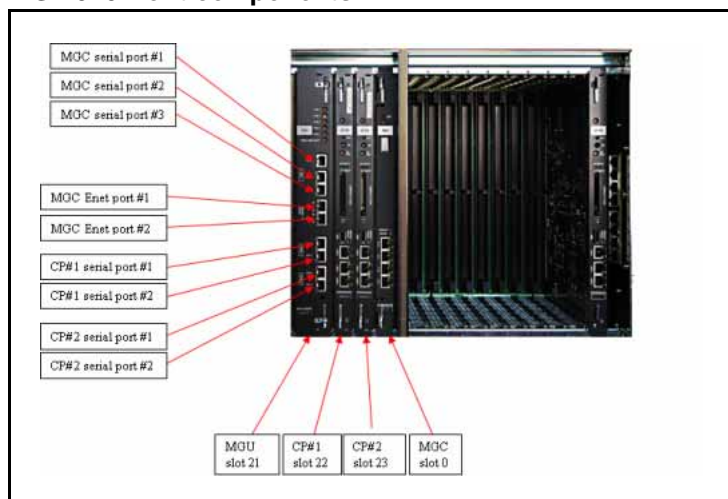


Figure 12 "MG 1010 front cover" (page 43) shows the MG 1010 with the front cover. Note the following features:

- Window to view LED status of all cards
- Decorative cover provides additional EMC
- Two locking latches in top corners of front cover.

**Figure 12**  
**MG 1010 front cover**



### **Rear components**

[Figure 13 "MG 1010 rear components" \(page 44\)](#) shows the rear components of the MG 1010. Note the following features:

- Hot swappable redundant power supplies
- Hot swappable fans in a redundant N + 1 configuration for chassis cooling
- One DECT connector
- One AUX connector
- Ten MDF connectors

**Figure 13**  
**MG 1010 rear components**



## Media Gateway Extended Peripheral Equipment Controller (MG XPEC)

### Overview

The Media Gateway Extended Peripheral Equipment Controller (MG XPEC) card provides a cost effective solution to migrate from a Meridian 1 or CS 1000M to a CS 1000E system while allowing customers to re-use most of their existing peripheral equipment. The NTDW20 MG XPEC card converts a NT8D37 IPE module into two Media Gateway shelves (type MGX) for use in a CS 1000E system.

Routes can be added to the ELAN of the MGC and MG XPEC using Element Manager.

### Functional description

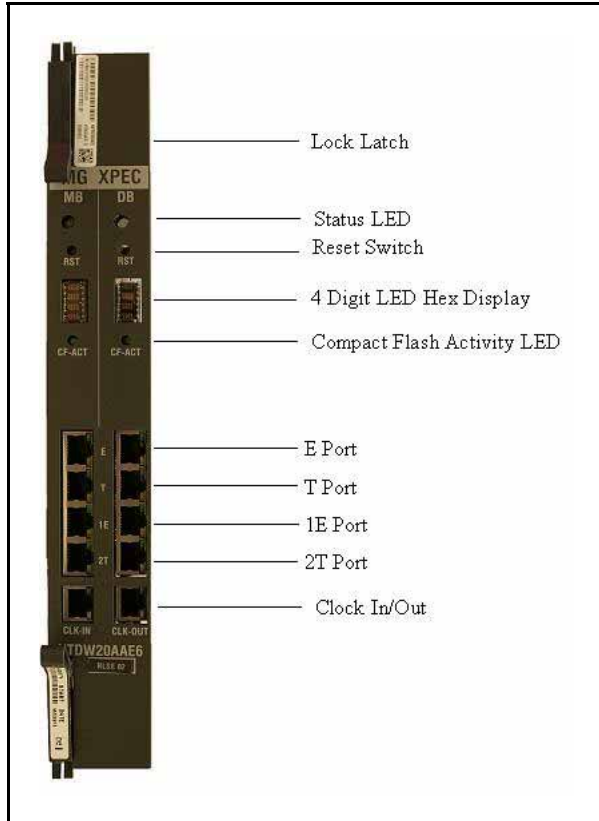
The MG XPEC is a double wide, dual card assembly using ported MGC hardware. It is used to control PE line cards in an IPE shelf. The MG XPEC features a motherboard and daughterboard architecture which act independently and provide the same hardware functionality as that of an MGC.

Each board of the dual assembly is populated with 192 DSP resources which are recognized by the software as the equivalent of two MGC DSP daughterboards.

The MG XPEC card can be thought of as two separate MGCs bolted together with the left board (motherboard) controlling the left half of the of the IPE shelf and the right (daughterboard) controlling the right half of the IPE shelf.

Figure 14 "MG XPEC faceplate" (page 45) provides a view of the MG XPEC faceplate.

**Figure 14**  
**MG XPEC faceplate**



For more information about converting IPE modules into Media Gateways with the MG XPEC card, see *Communication Server 1000M and Meridian 1 Planning and Engineering* (NN43021-220).

## Signaling Server

### Main role

The Signaling Server provides a central processor to drive Session Initiation Protocol (SIP), and H.323 signaling, IP Phone signaling, and IP Peer Networking in the CS 1000E system. The Signaling Server has both an ELAN and a TLAN network interface, and communicates with the Call Server through the ELAN subnet.

CS 1000 Release 6.0 supports the following Signaling Servers:

- Nortel CP PM Signaling Server
- Industrial Business Machines (IBM) X306m Signaling Server
- Hewlett Packard (HP) DL320-G4 Signaling Server
- IBM x3350 Signaling Server
- Dell R300 Signaling Server

The Signaling Server provides signaling interfaces to the IP network using the following software components that run on the VxWorks™ real-time operating system:

- SIP/H.323 Signaling Gateways
- IP Phone Terminal Proxy Server (TPS)
- Network Routing Service (NRS)
- Element Manager
- Application Server for Personal Directory, Redial List, and Callers List for IP Phones

### **Nortel Common Processor Pentium Mobile server**

The Nortel Common Processor Pentium Mobile (CP PM) server is a high performance, circuit card-based server that can be configured as a Call Server or a Signaling Server in a CS 1000 Release 6.0 system. The NTDW61 – can be configured as a Call Server or Signaling Server in a CS 1000E system.

Configured as a Signaling Server, the NTDW61 model is installed in a Media Gateway 1000 chassis or cabinet in a CS 1000E system.

The Nortel CP PM Signaling Server delivers capacity improvement by providing flexible scaling from 0 to 22,000 IP phones and a 70% increase in power for Signaling Server applications. The increased application power and capacity, coupled with the reduction in foot print and power consumption, means a lower cost of ownership.

The Nortel CP PM Signalling Server has the following components:

- Intel Pentium M processor (1.4 Ghz)
- Internal hard drive
- hot-pluggable Compact Flash (CF) card slot in the faceplate
- 2 Gb of SDRAM
- One 1 Gb/s Ethernet port

- Two 100BaseT Ethernet ports
- Two serial ports
- One USB port

### **IBM X306m server**

The International Business Machines (IBM) X306m 1U server is a rack-mounted, Pentium 4, PC-based, industry-standard, commercial off-the-shelf (COTS) server.

The IBM X306m 1U server has the following components:

- Intel Pentium 4 processor (3.6 GHz)
- Two 80 GB simple swap Serial ATA hard drives (1 drive configured)
- 8 GB of RAM PC4200 DDR II by means of 4 DIMM slots (2 GB configured)
- Two 1 Gb/s Ethernet ports
- One DVD-COMBO (DVD/CD-RW) drive
- One serial port
- Four USB ports

### **HP DL320-G4 server**

The Hewlett Packard (HP) DL320-G4 1U server is a rack-mounted, Pentium 4, PC-based, industry-standard, commercial off-the-shelf (COTS) server.

The HP DL320-G4 1U server has the following components:

- Intel Pentium 4 processor (3.6 GHz)
- Two 80 GB SATA Hard drives (1 configured)
- 4 GB PC2-4200 ECC DDR2 SDRAM (2 GB configured)
- Two 10/100/1000BaseT Ethernet ports
- One CD-R/DVD ROM drive
- One serial port
- Three USB ports

### **IBM x3350 server**

The IBM x3350 server is a rack-mounted, Intel Core 2 Quad CPU, commercial off-the-shelf (COTS) server.

The IBM x3350 server has the following components:

- Intel Core 2 Quad CPU –2.66GHz
- 250Gb RAID 1 Array (2x 250Gb Hard Drives, Hot-Swappable)
- 4Gb Memory
- CD-RW/DVD Drive
- Redundant Power Supply (Hot-Swappable)
- Dual GigaBit Ethernet Ports
- BIOS and RAID settings preconfigured for Nortel applications

### **Dell R300**

The Dell R300 server is a rack-mounted, Intel Quad Core Xenon CPU, commercial off-the-shelf (COTS) server.

The Dell R300 server has the following components:

- Intel Quad Core Xenon CPU –2.5GHz
- 250Gb RAID 1 Array (2x 250Gb Hard Drives, Hot-Swappable)
- 4Gb Memory
- CD-RW/DVD Drive
- Redundant Power Supply (Hot-Swappable)
- Dual 1Gbit Ethernet Ports
- BIOS and RAID settings preconfigured for Nortel applications

### **Software applications**

The Signaling Server runs the following software applications:

- [“Terminal Proxy Server \(TPS\)” \(page 49\)](#)
- [“SIP/H.323 Signaling Gateways” \(page 49\)](#)
- [“Network Routing Service \(NRS\)” \(page 49\)](#)
- [“Element Manager” \(page 51\)](#)
- [“Application Server for Personal Directory, Callers List, and Redial List” \(page 52\)](#)



### Terminal Proxy Server (TPS)

The Terminal Proxy Server (TPS) acts as a signaling gateway between the IP Phones and the Call Servers using the UNISlim protocol. It performs the following functions:

- Converts the IP Phone UNISlim messages into messages the Call Server can interpret.
- Allows IP Phones to access telephony features provided by the Call Server.

**Note:** UNISlim stands for the Unified Networks Internet protocol Stimulus.

The TPS also controls the IP Phone registration.

### SIP/H.323 Signaling Gateways

SIP/H.323 Signaling Gateways are software components configured on virtual loops, similar to IP Phones. SIP/H.323 Signaling Gateways bridge existing call processing features and the IP network. They also enable access to the routing and features in the MCDN feature set.

**Note 1:** The SIP/H.323 Signaling Gateway must register with the Network Routing Service (NRS).

**Note 2:** Virtual TNs enable you to configure service data without hardwiring IP Phones to the CS 1000E system. Virtual TNs are configured in LD 97.

To support IP Peer Networking in a CS 1000E system the Call Server must be associated with Signaling Servers that run SIP/H.323 Signaling Gateway software (see *IP Peer Networking Installation and Commissioning (NN43001-313)* () for details). The number of Signaling Servers required depends on the capacity and level of redundancy required.

### Network Routing Service (NRS)

NRS for CS 1000 Release 6.0 software is offered in two versions: a SIP Redirect Server NRS and a SIP Proxy NRS.

The SIP Redirect Server NRS is hosted either co-resident with Signaling Server applications, or in a stand-alone mode on a dedicated Common Processor Pentium Mobile (CP PM) server running the VxWorks™ real-time operating system. There are no changes to the SIP Redirect Server NRS in CS 1000 Release 6.0.

The SIP Proxy NRS is hosted in a stand-alone mode on a dedicated commercial off the shelf server running the Linux™ real-time operating system. The SIP Proxy NRS is referred to as the Linux-based NRS.

The NRS application provides network-based routing, combining the following into a single application:

- **H.323 Gatekeeper:** The H.323 Gatekeeper provides central dialing plan management and routing for H.323-based endpoints and gateways.
- **SIP Redirect Server:** The SIP Redirect Server provides central dialing plan management and routing for SIP-based endpoints and gateways.
- **NRS Database:** The NRS database stores the central dialing plan in XML format for both the SIP Redirect Server and the H.323 Gatekeeper. The SIP Redirect Server and H.323 Gatekeeper both access this common endpoint and gateway database.
- **Network Connection Service (NCS):** The NCS is used only for Virtual Office, Branch Office, and Geographic Redundancy solutions.
- **NRS Manager web interface:** The NRS provides its own web interface to configure the SIP Redirect Server, the H.323 Gatekeeper, and the NCS.

The NRS application provides routing services to both H.323 and SIP-compliant devices. The H.323 Gatekeeper can be configured to support H.323 routing services, while the SIP Redirect Server can be configured to support SIP routing services.

The H.323 Gatekeeper and the SIP Redirect Server can reside on the same Signaling Server. Examples of H.323 and SIP-compatible endpoints needing the services of the NRS are CS 1000E. The NRS also supports endpoints that do not support H.323 Registration, Admission, and Status (RAS) or SIP registration with the NRS.

**Note:** Systems that do not support H.323 RAS procedures and H.323 Gatekeeper procedures are referred to as non-RAS or static endpoints.

Each CS 1000E in an IP Peer network must register to the NRS. The NRS software identifies the IP addresses of PBXs based on the network-wide numbering plan. NRS registration eliminates the need for manual configuration of IP addresses and numbering plan information at every site.

### SIP Proxy

Communication Server (CS) 1000 Release 6.0 adds a transaction stateful SIP Proxy to the IP Peer Network.

A SIP Proxy acts as both a server and a client. A SIP Proxy receives requests, determines where to send the requests, and acting as a client on behalf of SIP endpoints, passes requests to another server.

A SIP Proxy makes the following features and functionality, which are provided by CS 1000 Release 6.0, possible:

1. Transport Layer Security (TLS).

TLS provides the NRS with private, secure signaling, message authentication, confidentiality, and integrity through end-to-end encryption of media exchanged between two SIP endpoints.

2. Mixed transport layer protocol.

A mixed transport layer protocol enables gateways using TCP, TLS over TCP, or UDP to interoperate.

3. Network features.

By default the SIP Proxy and Redirect Server functions as a SIP Proxy. However, an endpoint can request transaction by transaction that the SIP Proxy act as a SIP Redirect Server.

A SIP Redirect Server receives requests, but does not pass the requests to another server. Instead, a SIP Redirect Server sends a response back to the SIP endpoint, indicating the IP address of the called user.

4. Post-routing SIP URI modification.

5. Transaction forking.

### **Element Manager**

Element Manager is a software application that provides a web interface to support administration of system components, including the Signaling Server. With Element Manager, single web pages provide access to information traditionally spread throughout multiple overlays.

Element Manager provides tools to configure and maintain the following components:

- Call Servers
- Media Gateway, Expander)
- MG 1000B
- Signaling Servers
- Voice Gateway Media Cards

### **NRS Manager**

NRS Manager is a web-based management application used to configure, provision, and maintain the NRS. Key usability improvements introduced in the Linux-based NRS Manager are:

- Enhanced searching and sorting capabilities including wild cards and selectable scope of the search
- Capability to copy and move routing entries
- Simplified configuration for geographic redundancy
- Routing tests are fully integrated with endpoint and routing entry configuration
- SIP phone context mapping tools are fully integrated with endpoint and routing entry configuration
- Security infrastructure provided by the Enterprise Common Manager framework

For more information, see *Network Routing Service Installation and Commissioning (NN43001-564)* ()

### **Application Server for Personal Directory, Callers List, and Redial List**

The Application Server maintains the database for the Personal Directory, Caller's List, and Redial List features for UNIstim IP Phones. These features provide the following functionality.

- **Personal Directory:** stores up to 100 entries per user of user names and DNS.
- **Callers List:** stores up to 100 entries per user of caller ID information and most recent call time.
- **Redial List:** stores up to 20 entries per user of dialed DNS and received Call Party Name Display with time and date.

### **Functional description**

The Signaling Server provides the following functionality:

- provides IP signaling between system components on the LAN
- enables the Call Server to communicate with IP Phones
- supports key software components (see [“Software applications”](#) (page 48))

### Operating parameters

The Signaling Server provides signaling interfaces to the IP network using software components that run on the VxWorks operating system.

The Signaling Server can be installed in a load-sharing, survivable configuration.

The total number of Signaling Servers that you require depends on the capacity and redundancy level that you require.

## Terminal Server

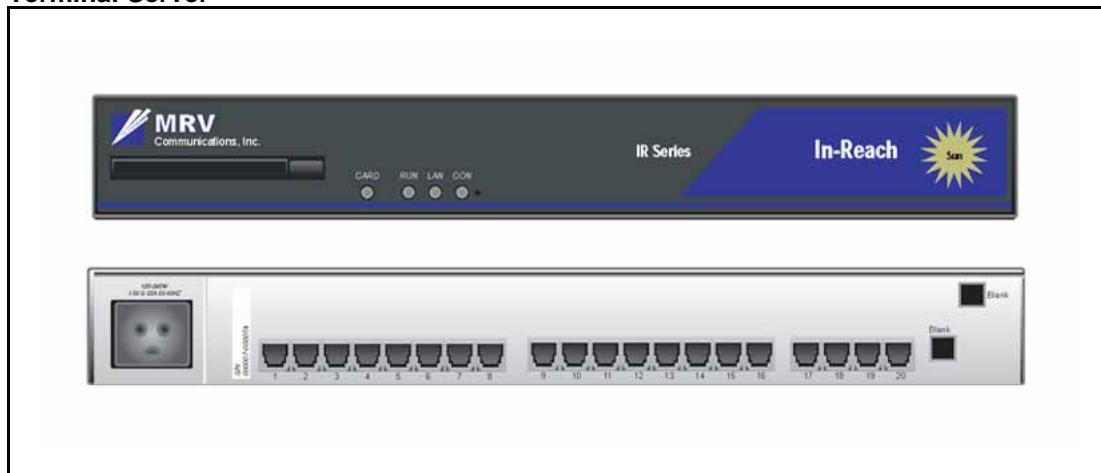
### Main role

The optional MRV IR-8020M IP-based Terminal Server provides the Call Server with standard serial ports for applications and maintenance.

### Physical description

Figure 15 "Terminal Server" (page 53) shows the Terminal Server.

**Figure 15**  
**Terminal Server**



### Hardware components

The MRV Terminal Server provides 20 console ports for modular RJ-45 connectors. It is also equipped with one RJ-45 10BaseT connection for network interface to the ELAN subnet and an internal modem to provide remote access.

### Operating parameters

Traditionally, serial ports are used to connect terminals and modems to a system for system maintenance. As well, many third-party applications require serial port interfaces to connect to a PBX. Because the Call Server provides only two local serial ports for maintenance purposes, an IP-based Terminal Server is required to provide the necessary serial ports.

The Terminal Server provides standard serial ports for applications. These applications include billing systems that analyze Call Detail Recording (CDR) records, Site Event Buffers (SEB) that track fault conditions, and various legacy applications such as Property Management System (PMS) Interface and Intercept Computer applications. In addition, serial ports are used to connect system terminals for maintenance, modems for support staff, and printers for system output.

The Terminal Server is configured to automatically log in to the active Call Server at start-up. For this reason, each Call Server pair requires only one Terminal Server. Customers can configure up to 16 TTY ports for each Call Server pair.

The Terminal Server can be located anywhere on the ELAN subnet. However, if the Terminal Server is used to provide local connections to a Com port on the Call Server, it must be collocated with the system.

The Terminal Server can also be used as a central point to access and manage several devices through their serial ports.

**ATTENTION**

Currently, the CS 1000E only supports the MRV IR-8020M commercial Terminal Server.

## Layer 2 switch

### Main role

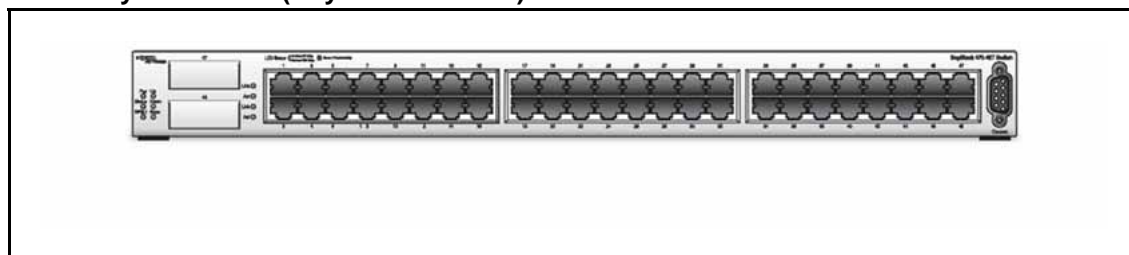
The Layer 2 switch transmits data packets to devices interconnected by Ethernet to the ELAN or TLAN subnets. The switch only directs data to the target device, rather than to all attached devices.

### Physical description

#### ELAN Layer 2 switch

To provide Layer 2 connections on the ELAN subnet, Nortel recommends the BayStack 470-48T Ethernet switch. [Figure 16 "ELAN Layer 2 switch \(BayStack 470-48T\)" \(page 54\)](#) shows an example of an ELAN Layer 2 switch.

**Figure 16**  
**ELAN Layer 2 switch (BayStack 470-48T)**



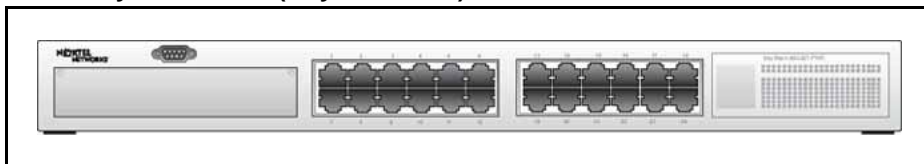
### TLAN Layer 2 switch

To provide Layer 2 connections on the TLAN subnet, Nortel recommends the BayStack 460 Ethernet switch, which has embedded Power-over-LAN capabilities for powering IP Phones.

Optionally, other Power-over-LAN units can also be used to provide power to IP Phones.

Figure 17 "TLAN Layer 2 switch (BayStack 460)" (page 55) shows the BayStack 460 Layer 2 switch.

**Figure 17**  
**TLAN Layer 2 switch (BayStack 460)**



### Operating parameters

These components must be supplied by the customer. See *Converging the Data Network with VoIP Fundamentals (NN43001-260)* () for further details.





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# Configuration options

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[“Option 3: Campus Redundancy” \(page 59\)](#)

[“Option 4: Branch Office” \(page 60\)](#)

[“Option 5: Geographic Redundancy” \(page 61\)](#)

## Introduction

The IP-distributed architecture of the CS 1000E enables flexibility when it comes to component location.

The Call Processor platform (CP PM) occupies a slot in a MG 1000 cabinet or chassis. This processor may be deployed as a single call processor (Standard Availability CS 1000E) or in a redundant processor configuration (High Availability CS 1000E).

Given this flexibility, the CS 1000E offers many configuration options to support increased system redundancy. The CS 1000E can be deployed in many ways in LAN and WAN environments. Although many different installations are possible, most fall into one of the following categories:

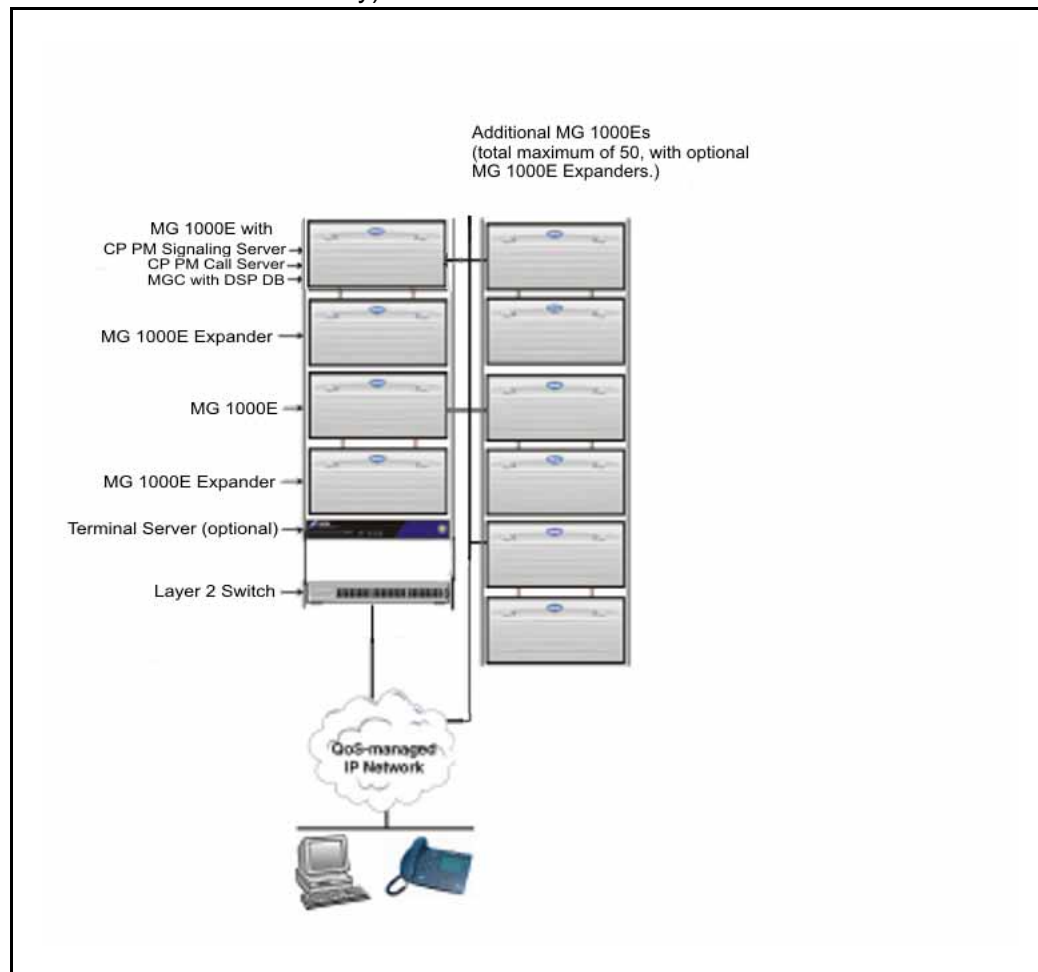
- Multiple buildings in a campus
  - Campus-distributed Media Gateway 1000
  - Campus Redundancy
- Multiple sites
  - Central Call Server with Branch Office
  - Geographic Redundancy

The following sections describe each of these configuration options.

**Note:** These configurations provide CS 1000E systems with many options for redundancy and reliability. Careful planning is required to determine which configuration is right for your needs.

### Option 1: Standard Availability Configuration

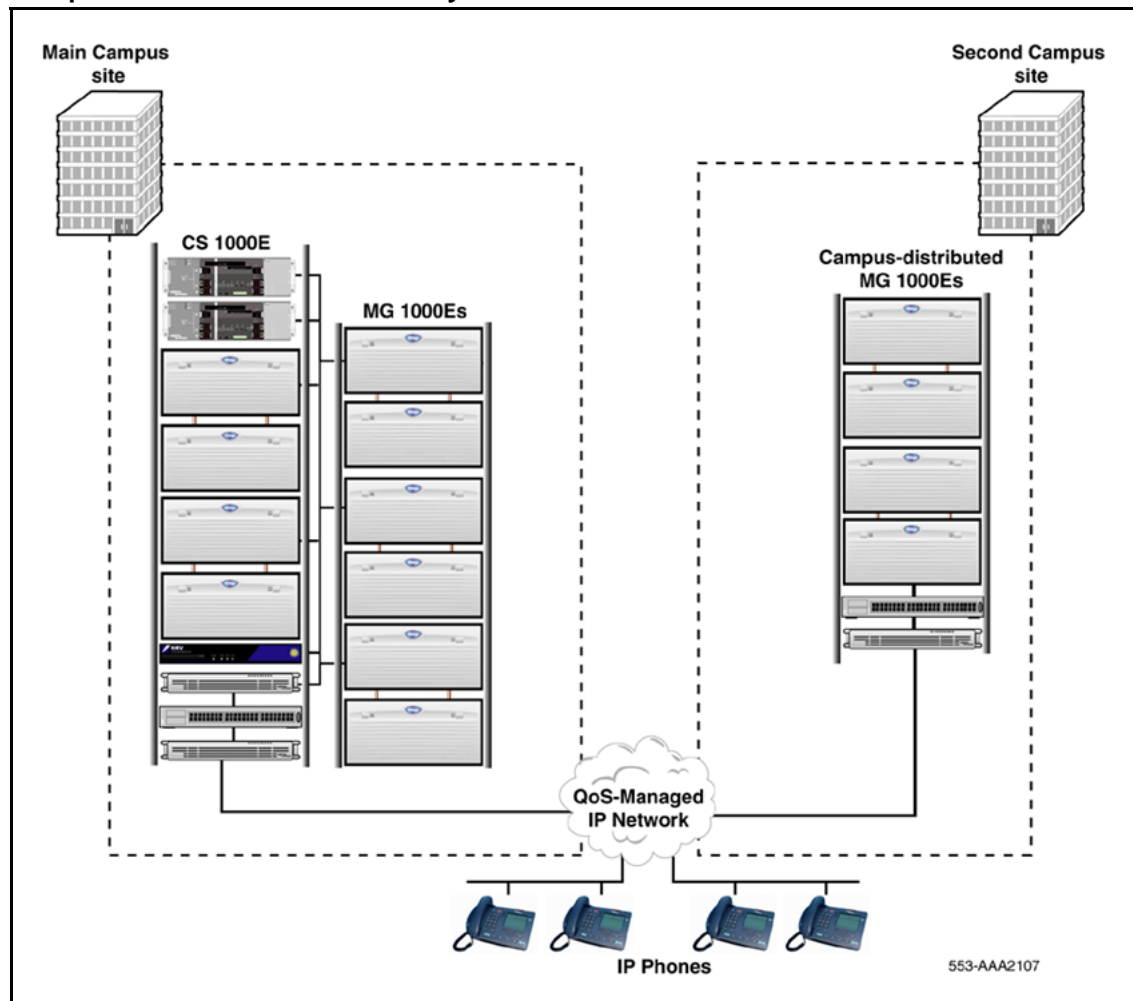
A CS 1000E system configured with one call processor (Standard Availability).



### Option 2: Campus-distributed Media Gateway 1000

With multiple buildings in a campus, you can distribute a Media Gateway 1000 across a campus IP network. [Figure 18 "Campus-distributed Media Gateway 1000" \(page 59\)](#) shows Media Gateway 1000s distributed across multiple buildings in a campus setting.

**Figure 18**  
**Campus-distributed Media Gateway 1000**



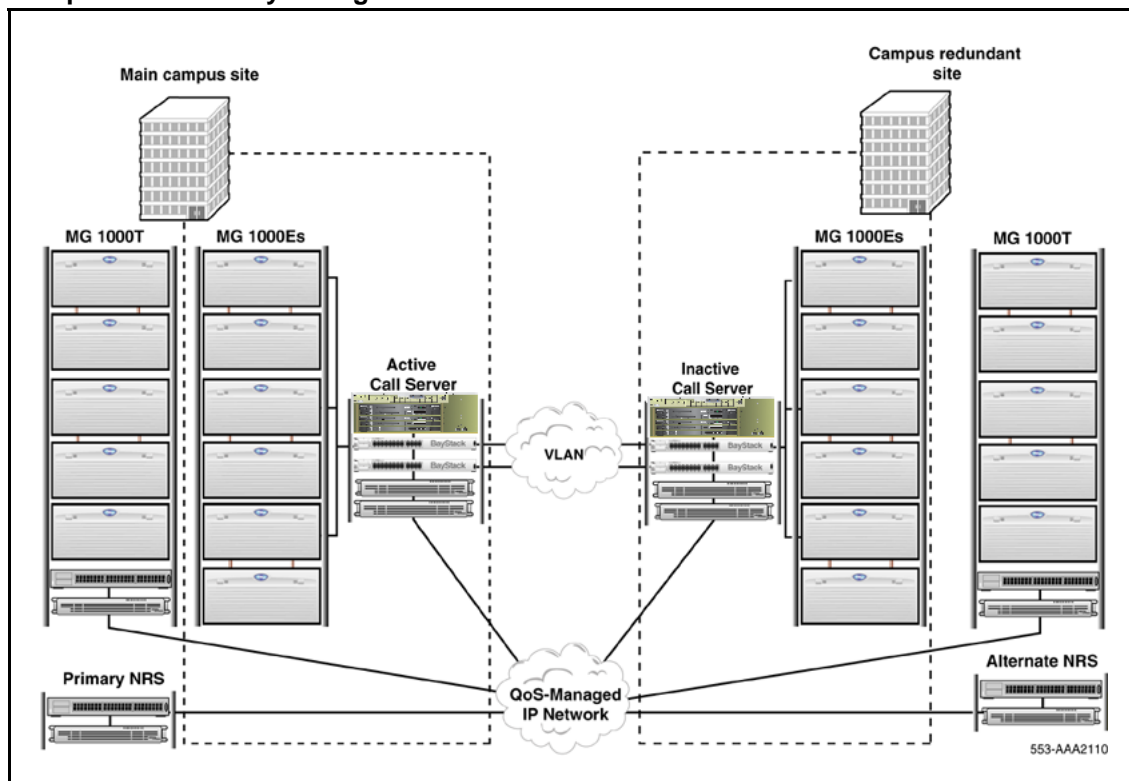
In this configuration, a CS 1000E system is installed at the main site, and additional Media Gateway 1000s and an optional Signaling Server are installed at a second campus site. All IP Phones are configured and managed centrally from the main site.

### Option 3: Campus Redundancy

With Campus Redundancy, customers can separate Call Server core 0 and core 1 across a campus IP network. This provides additional system redundancy within a local configuration. The Call Server function normally and the inactive Call Processor assumes control of call processing if the active Call Processor fails.

To do this, the ELAN subnet and the subnet of the High Speed Pipe (HSP) are extended between the two Call Processor using a dedicated Layer 2 Virtual LAN configured to meet specified network parameters. [Figure 19 "Campus Redundancy configuration" \(page 60\)](#) shows a CS 1000E system in a Campus Redundancy configuration.

**Figure 19**  
**Campus Redundancy configuration**

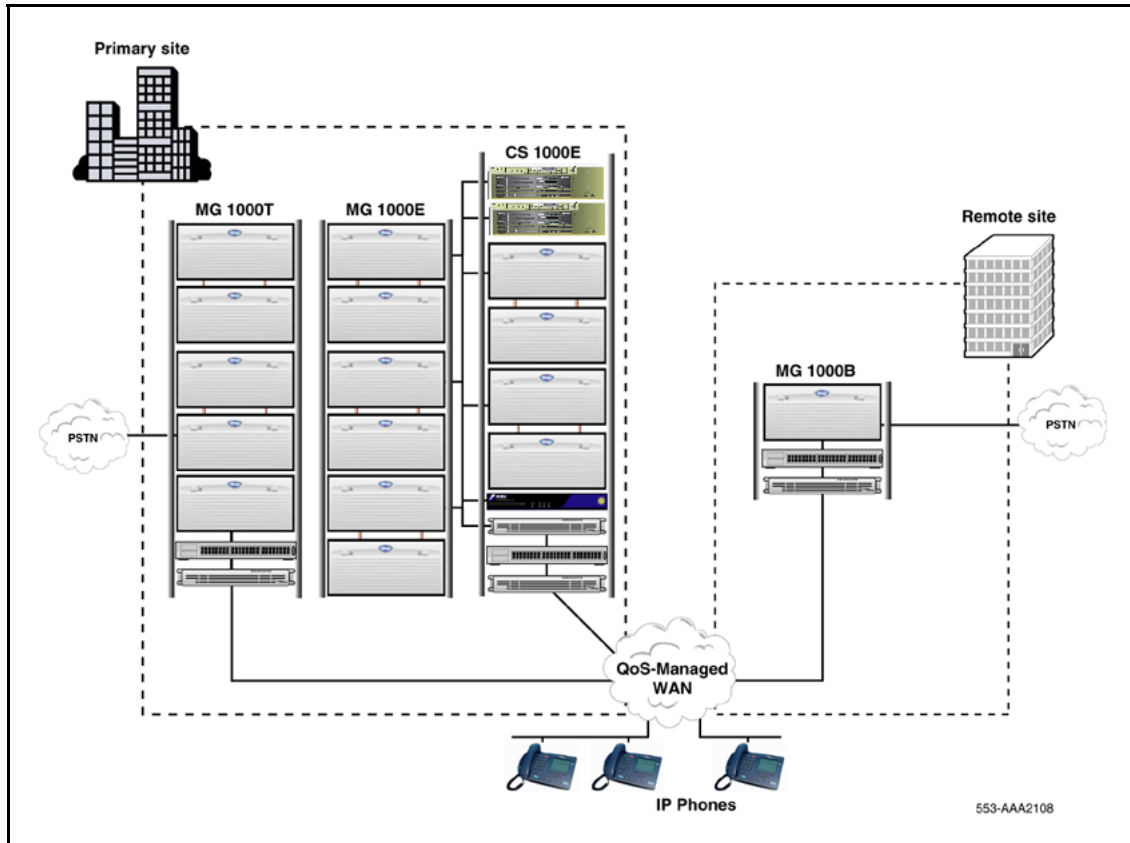


For more information on *Campus Redundancy*, see *System Redundancy Fundamentals (NN43001-507)* ().

#### Option 4: Branch Office

The CS 1000E system supports the Branch Office feature, which provides central administration of Media Gateway 1000B (MG 1000B) at remote sites. [Figure 20 "Branch Office configuration" \(page 61\)](#) shows a CS 1000E system with an MG 1000B installed at a remote branch office.

**Figure 20**  
**Branch Office configuration**



In this configuration, the MG 1000B is survivable. This ensures that telephone service remains available if the main office fails. For more information, refer to *Branch Office Installation and Commissioning (NN43001-314)* ().

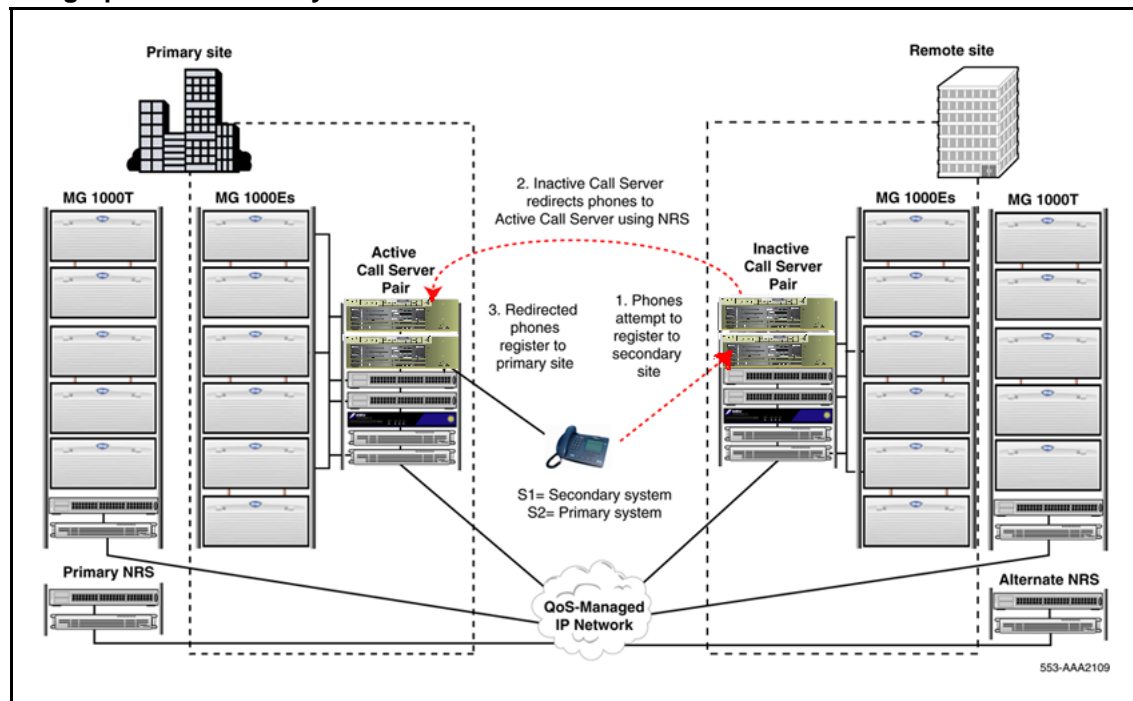
## Option 5: Geographic Redundancy

Geographic Redundancy provides an additional layer of system redundancy. It allows a customer to locate a secondary backup system at a distance from a primary system. This ensures redundancy in the event of catastrophic failure of the primary site. With Geographic Redundancy, the configuration and user database of the primary system can be replicated across the WAN.

Figure 20 "Branch Office configuration" (page 61)Figure 20 "Branch Office configuration" (page 61) shows an inactive CS 1000E system backing up an active system using Geographic Redundancy.

**Note:** Geographic Redundancy provides redundancy for IP Phones only.

Figure 21  
Geographic Redundancy



For more information on Geographic Redundancy, see *System Redundancy Fundamentals (NN43001-507)* ().



Nortel Communication Server 1000

## Communication Server 1000E Overview

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