
Nortel Communication Server 1000

Nortel Communication Server 1000 Release 4.5

Communication Server 1000M and Meridian 1

Small System Overview

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Revision history

August 2005

Standard 3.00. This document is up-issued to support Communication Server 1000 Release 4.5.

September 2004

Standard 2.00. This document is up-issued for Communication Server 1000 Release 4.0.

October 2003

Standard 1.00. This document is a new NTP for Succession 3.0. It was created to support a restructuring of the Documentation Library, which resulted in the merging of multiple legacy NTPs. This new document consolidates information previously contained in the following legacy documents, now retired:

- *Option 11C and 11C Mini Technical Reference Guide (553-3011-100)*
(Content from *Option 11C and 11C Mini Technical Reference Guide (553-3011-100)* also appears in *Communication Server 1000M and Meridian 1: Small System Planning and Engineering (553-3011-120)*, *Transmission Parameters (553-3001-182)*, and *Circuit Card: Description and Installation (553-3001-211)*.)
- *Option 11C Mini: Expansion using Fiber-optic and IP Connectivity Guide (553-3021-208)*
(Content from *Option 11C Mini: Expansion using Fiber-optic and IP Connectivity Guide (553-3021-208)* also appears in *Communication Server 1000M and Meridian 1: Small System Upgrade Procedures (553-3011-258)* and *Communication Server 1000M and Meridian 1: Small System Planning and Engineering (553-3011-120)*.)

- *Option 11C Mini Planning and Installation Guide (553-3021-209)*
(Content from *Option 11C Mini Planning and Installation Guide (553-3021-209)* also appears in *Communication Server 1000M and Meridian 1: Small System Installation and Configuration (553-3011-210)* and *Communication Server 1000M and Meridian 1: Small System Planning and Engineering (553-3011-120)*.)
- *Option 11C Planning and Installation Guide (553-3021-210)*
(Content from *Option 11C Planning and Installation Guide (553-3021-210)* also appears in *Communication Server 1000M and Meridian 1: Small System Installation and Configuration (553-3011-210)* and *Communication Server 1000M and Meridian 1: Small System Planning and Engineering (553-3011-120)*.)

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About this document

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

This document provides an overview of the general design and features of Small Systems.



WARNING

Before a Small 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* (553-3001-160).

Note on legacy products and releases

This NTP contains information about systems, components, and features that are compatible with Nortel Communication Server 1000 Release 4.5 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

Applicable systems

This document applies to the following systems:

- Communication Server 1000M Chassis (CS 1000M Chassis)
- Communication Server 1000M Cabinet (CS 1000M Cabinet)
- Meridian 1 PBX 11C Chassis
- Meridian 1 PBX 11C Cabinet

System migration

When particular Meridian 1 systems are upgraded to run CS 1000 Release 4.5 and configured to include a Signaling Server, they become CS 1000M systems. Table 1 lists each Meridian 1 system that supports an upgrade path to a CS 1000M system.

Table 1
Meridian 1 systems to CS 1000M systems

This Meridian 1 system...	Maps to this CS 1000M system
Meridian 1 PBX 11C Chassis	CS 1000M Chassis
Meridian 1 PBX 11C Cabinet	CS 1000M Cabinet

Note the following:

- When an Option 11C Mini system is upgraded to run CS 1000 Release 4.5 software, that system becomes a Meridian 1 PBX 11C Chassis.
- When an Option 11C system is upgraded to run CS 1000 Release 4.5 software, that system becomes a Meridian 1 PBX 11C Cabinet.

For more information, see *Communication Server 1000M and Meridian 1: Small System Upgrade Procedures* (553-3011-258).

Intended audience

This document is intended to be of general interest or an introductory overview for individuals responsible for the sale, acquisition, planning, or installation of small Private Branch Exchange (PBX) telephone systems.

Conventions

Terminology

In this document, the following systems are referred to generically as “system”:

- Communication Server 1000M (CS 1000M)
- Meridian 1

The following systems are referred to generically as “Small System”:

- Communication Server 1000M Chassis (CS 1000M Chassis)
- Communication Server 1000M Cabinet (CS 1000M Cabinet)
- Meridian 1 PBX 11C Chassis
- Meridian 1 PBX 11C Cabinet

The following systems are referred to generically as “Chassis system”:

- Communication Server 1000M Chassis (CS 1000M Chassis)
- Meridian 1 PBX 11C Chassis

The following systems are referred to generically as “Cabinet system”:

- Communication Server 1000M Cabinet (CS 1000M Cabinet)
- Meridian 1 PBX 11C Cabinet

Related information

This section lists information sources that relate to this document.

NTPs

The following NTPs are referenced in this document:

- *Signaling Server: Installation and Configuration* (553-3001-212)
- *IP Peer Networking: Installation and Configuration* (553-3001-213)
- *Branch Office: Installation and Configuration* (553-3001-214)
- *Set-Based Administration* (553-3001-303)
- *Communication Server 1000M and Meridian 1: Small System Planning and Engineering* (553-3011-120)
- *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210)
- *Communication Server 1000M and Meridian 1: Small System Upgrade Procedures* (553-3011-258)
- *Communication Server 1000M and Meridian 1: Small System Maintenance* (553-3011-500)

Online

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CD-ROM

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

Description and features

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Description



WARNING

Before a CS 1000S Small 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* (553-3001-160).

The CS 1000M Cabinet, Meridian 1 PBX 11C Cabinet, CS 1000M Chassis, and Meridian 1 PBX 11C Chassis are small digital communication systems that offer the advantages of simple installation, maintenance, and administration while retaining the full features of a Large System.

Cabinet system

The Meridian 1 PBX 11C Cabinet is a small, wall- or floor-mounted digital communication system that can include up to five cabinets: one Main Cabinet plus up to four Expansion Cabinets.

The CS 1000M Cabinet is a Meridian 1 PBX 11C Cabinet with a Signaling Server in the network configuration.

If a Signaling Server is added to a previously CISPR Class B system (previously used in some specific countries), the system is now compliant to Class A.

Figure 1 on [page 13](#) shows the NTAK11 Cabinet.

Figure 1
NTAK11 Cabinet



The Cabinet system can be expanded using either fiber or IP connectivity, or a mixture of both. Refer to “Fiber-optic and IP expansion” on [page 31](#) for more information.

A fully expanded Cabinet system can support up to 720 lines or up to 1000 IP Phones.

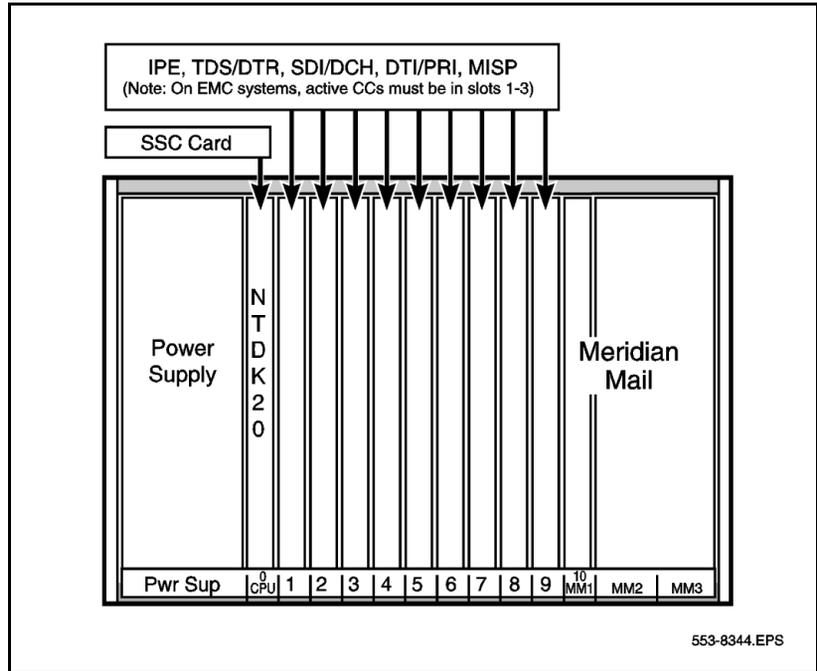
Note: When the term “Main” is used on its own, it refers to a Main Cabinet. When the term “Expansion” is used on its own, it refers to an Expansion Cabinet.

Card slot specifications

In addition to one dedicated card slot for system control functions, the Main and Expansion Cabinets each provide ten Intelligent Peripheral Equipment (IPE) card slots. These card slots support all IPE trunk and line cards. They also support line and trunk cards that have been specially designed to work only in Cabinet systems.

Figure 2 on page 14 shows the card slot assignments in the Main Cabinet.

Figure 2
Circuit card assignments in the Main Cabinet



Power

Two types of power supply are available for the Cabinet system:

- NTDK70 AC power supply
- NTDK72 DC power supply (when the Cabinet is powered by a -52 V DC source)

In addition, the Cabinet system supports three types of reserve power:

- NTAK75 battery box, which provides a minimum of two hours of reserve DC power

- NTAK76 battery box, which provides a minimum of 15 minutes of reserve DC power
- Uninterruptible Power Supply (UPS) for continuous AC power supply

When the main power is cut off to the system, optional Power Failure Transfer Units (PFTU) connect predetermined analog (500/2500-type) telephones directly to the Central Office (CO) trunks. The PFTU supports five to eight telephones, depending on the PFTU used.

Chassis system

The Meridian 1 PBX 11C Chassis is a small digital communication system that consists of a Chassis plus an optional Chassis Expander. Two copper cables connect the Chassis Expander to the Chassis. In addition, the Chassis system can be expanded to include up to four Chassis (or Chassis + Chassis Expander pairs).

The Chassis system can be mounted:

- in a 19-inch rack/equipment Cabinet
- on a wall in a vertical position
- on a wall in a horizontal position

The CS 1000M Chassis is a Small System with a Signaling Server in the network configuration.

If a Signaling Server is added to a previously CISPR Class B system (previously used in some specific countries), the system is now compliant to Class A.

The Chassis system can be expanded using either fiber or IP connectivity, or a mixture of both. Refer to “Fiber-optic and IP expansion” on [page 31](#) for more information.

A Chassis with Chassis Expander can support up to 160 lines or up to 1000 IP Phones. A fully expanded Chassis system can support up to 720 lines or up to 1000 IP Phones.

Note: When the term “Main” is used on its own, it refers to a Main Chassis. When the term “Expansion” is used on its own, it refers to an Expansion Chassis.

Card slot specifications

The Main Chassis has five card slots, two of which are dedicated: slot 0 is dedicated to the Small System Controller (SSC) card, and slot 4 is dedicated to the 48-port Digital Line Card (NTDK16). Slots 1–3 support existing IPE and Common Equipment (CE) cards (for example, PRI, PRI2, DTI, DTI2, MISP, and SDI/DCH).

The Chassis Expander has four card slots. The Expander supports Meridian Mail in slot 10 only. You can place any IPE card in slots 7, 8, 9, and 10. The CE-MUX bus extends to slot 10 for Meridian Mail only.

A Main with Expander supports eight physical and ten logical card slots. In a fully expanded system consisting of five Main and Expander pairs, a total of 40 physical and 50 logical card slots are supported.

Figure 3 shows the circuit card assignments in the Main Chassis. Figure 4 on [page 17](#) shows the circuit card assignments in the Expander.

Figure 3
Circuit card assignments in the Chassis

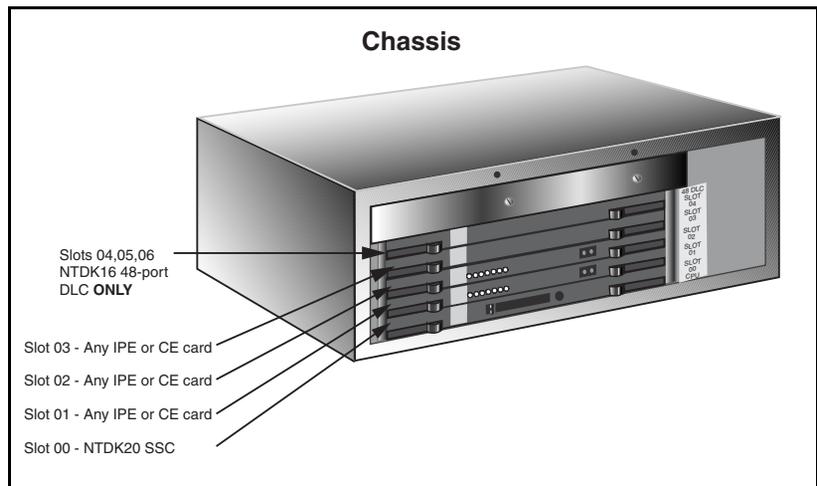
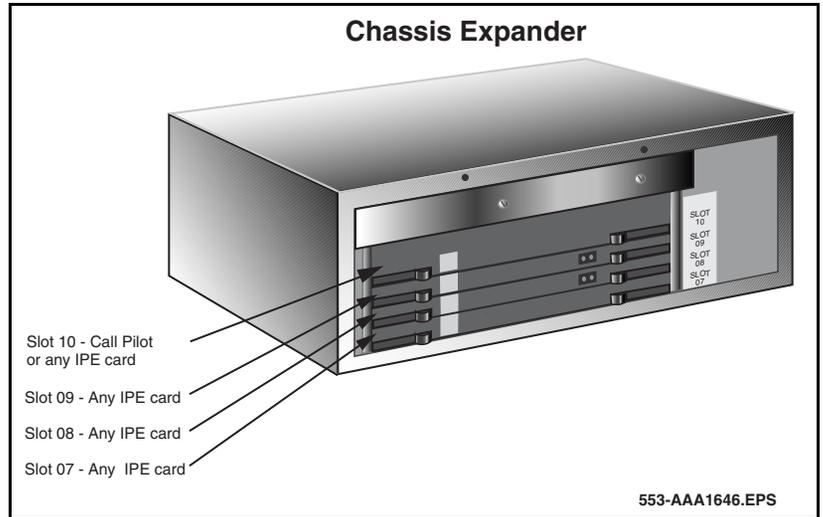


Figure 4
Circuit card assignments in the Chassis Expander



The following is an example of a common Main Chassis configuration:

- one SSC card in slot 0
- one analog line card in slot 1, 2, or 3
- one digital trunk card in slot 1, 2, or 3
- one analog trunk card in slot 1, 2, or 3
- one NTDK16, 48-port Digital Line Card in slot 4

The following is an example of a common Chassis Expander configuration:

- line cards in slots 7, 8, and 9
- Meridian Mail in slot 10

Power

The Universal Power Supply (UPS) unit is installed in the Chassis before it is sent to the customer and requires no installation by the customer. The power

supply operates on standard line voltages of 100–240 V AC. Total output power is 363 Watts.

Note: The Chassis system does not support DC power input.

A UPS can provide reserve AC power. The Chassis system does not support battery backup.

When the main power is cut off to the system, optional PFTUs connect predetermined analog (500/2500-type) telephones directly to the CO trunks. The PFTU supports five to eight telephones, depending on the PFTU used.

Memory, processing, and data storage

Small Systems use a Motorola 68040 CP with VxWorks operating system. The processor, which is located on the Small System Controller (SSC) card in the Main Cabinet or Chassis, handles call processing, serial ports, and network traffic. In addition, CS 1000M systems use a Signaling Server, which provides a central processor to drive H.323 and Session Initiation Protocol (SIP) signaling for IP Phones and IP Peer Networking.

Small Systems support global software as well as any IP cards.

The memory architecture of the system has program and data stored in physically separate memory components: flash ROM and DRAM, respectively. The majority of system and customer-configured data is both controlled and stored on the SSC card's flash ROM. The DRAM stores and processes temporary automated routines and user-programmed commands.

Two flash drives on the SSC card perform software operations and store customer data:

- The primary flash drive contains system data as well as the first copy of customer data that must exist to load and run the switch. The primary flash drive is programmed with system software before it is shipped to the customer.
- The backup flash drive stores modifiable files containing data such as configuration data, or a second copy of the customer database. If the primary flash drive fails, you can retrieve a backup set of customer data to load into the system's active database.

There are four areas on the SSC card where customer data records can be stored:

- DRAM — stores and accesses the active version of customer records, system data, and overlay data. Data from the primary flash drive overwrites data in DRAM storage during a SYSLOAD (system reload).
- Primary flash drive (C:) — contains two copies of customer records (primary and backup records).
- Backup flash drive (Z:) — retains the true backup copy of the customer database.
- PC Card slot (A: or B:) — allows a complete copy of the customer database to be stored on a Software Delivery card (PC Card) inserted into this slot. The customer database on the PC Card can then be removed for storage away from the SSC card.

SSC card and components

The NTDK20 SSC card controls call processing, stores system and customer data, and provides various expansion interfaces. It includes the following components and features:

- flash daughterboard memory, DRAM, and backup memory
- two expansion daughterboard interfaces
- PC Card socket
- three Serial Data Interface (SDI) ports
- 32 channels of Conferencing (64 if two single-port expansion daughterboards are present, or 96 if two dual-port expansion daughterboards are present)
- 10 Mbps network interface
- 30 channels of Tone and Digit Switch (TDS) and a combination of eight Digitone Receivers (DTR) or Dial Tone Detectors (DTD)
- Networking and Peripheral Signaling
- additional tone service ports (four units of MFC/MFE/MFK5/MFK6/MFR or eight DTR/XTD units)

The SSC card requires a Software Daughterboard in order to function. The Software Daughterboard can be ordered preprogrammed with system software and customer data.

A security device is required on the SSC card of the Main and all Expansions. The security device, which remains on the SSC card for the life of the system, is used for system identification. This device allows the activation of features assigned to the system, through the use of a series of keycodes. The system uses keycodes for validation purposes.

Signaling Server

CS 1000M Small Systems use a Signaling Server. The Signaling Server is an industry-standard, PC-based server that provides a central processor to drive H.323 and SIP signaling for IP Phones and IP Peer Networking. It provides signaling interfaces to the IP network using software components that operate on the VxWorks™ real-time operating system.

The Signaling Server has both an ELAN and TLAN network interface. The Signaling Server communicates with the Call Server through an ELAN subnet.

The Signaling Server is mounted in a 19-inch rack. The Signaling Server can be installed in a load-sharing redundant configuration for higher scalability and reliability.

The following software components operate on the Signaling Server:

- Terminal Proxy Server (TPS)
- SIP/H.323 Signaling Gateways
- Network Routing Service (NRS)
- Element Manager

All the software elements can coexist on one Signaling Server or reside individually on separate Signaling Servers, depending on traffic and redundancy requirements for each element.

For more information about H.323 and SIP Trunking, refer to *IP Peer Networking: Installation and Configuration* (553-3001-213).

Terminal Proxy Server

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

- converts the IP Phone UNISim messages into messages the Call Server can interpret
- allows IP Phones to access telephony features provided by the Call Server

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. SIP/H.323 Signaling Gateways 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 1000S system. Virtual TNs are configured in LD 97.

To support IP Peer Networking, dual Call Servers in a CS 1000M Small System must be associated with Signaling Servers that run SIP/H.323 Signaling Gateway software. The number of Signaling Servers required depends on the capacity and level of redundancy required.

Network Routing Service

The Network Routing Service (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 Connect Server (NCS)** — The NCS is used only for Media Gateway 1000B (MG 1000B) and Virtual Office 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.

Each system in an IP Peer network must register to the NRS. The NRS software identifies the IP addresses of systems 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.

Element Manager

Element Manager is a simple and user-friendly web-based interface that supports a broad range of system management tasks, including:

- configuration and maintenance of IP Peer and IP telephony features
- configuration and maintenance of traditional routes and trunks
- configuration and maintenance of numbering plans
- configuration of Call Server data blocks (such as configuration data, customer data, Common Equipment data, D-channels)
- maintenance commands, system status inquiries, backup and restore functions
- software download, patch download, patch activation

Element Manager has many features to help administrators manage systems with greater efficiency. Examples are as follows:

- Web pages provide a single point-of-access to parameters that were traditionally available through multiple overlays.
- Parameters are presented in logical groups to increase ease-of-use and speed-of-access.
- The "hide or show information" option enables administrators to see information that relates directly to the task at hand.
- Full-text descriptions of parameters and acronyms help administrators reduce configuration errors.
- Configuration screens offer pre-selected defaults, drop-down lists, checkboxes, and range values to simplify response selection.

The Element Manager web server resides on the Signaling Server and can be accessed directly through a web browser or Optivity Telephony Manager (OTM). The OTM navigator includes integrated links to each network system and their respective instances of Element Manager.

Installation and configuration

Small Systems support CS 1000 Release 4.5 feature functionality.

A wide choice of software is available. The software contains all of the components related to a release of software, including software patches, preconfigured customer database, feature sets, and other related databases and software.

Small Systems can be configured with software applications, such as Automatic Call Distribution (ACD), Messaging, Automatic Route Selection, Automatic Set Relocation, and Attendant Administration.

The Messaging application comes equipped with features such as Voice Menus, Automated Attendant, Message Networking, and Nortel Hospitality Integrated Voice Services.

Customers can configure the system as:

- a key system or a PBX
- a non-blocking system (because it does not need to be provisioned for speech paths or timeslots)

New systems are supplied with a Software Daughterboard that is preconfigured with system and customer data. The system uses a Software Delivery card (PC Card) to upgrade system software and provide storage for a backup copy of customer data.

The Signaling Server for a CS 1000M Small System is installed separately. Refer to *Signaling Server: Installation and Configuration (553-3001-212)* for more information.

The Software Installation Program is automatically invoked during first-time installation of the system. This menu-driven program installs the software and makes the system operational.

Preprogrammed data

When you first install the system, you must enter customer data into the overlay programs. For example, you must assign features to telephone keys in order for those features to function correctly. Data can be preprogrammed. If you load preprogrammed data during the installation process, the system automatically configures some overlay entries on the telephones.

If the preprogrammed data does not apply to users at one site, you can revise the data on-site with a TTY. You can also revise the preprogrammed data remotely over a modem connection. You can start with a basic configuration, which is the least possible amount of data required for initial software programming. You must perform this step while you are working in the Software Installation Program.

Model telephones

Small Systems offer a variety of preprogrammed model telephone layouts. By using these telephone layouts (which serve as templates), technicians can perform a few simple steps at installation to activate multiple telephones.

Administration telephone

If you use the default model layouts for telephones and trunk routes, you can use an administrative telephone to make adjustments to items such as the numbering plan and access codes. You do not need a TTY input terminal to program a Small System unless a custom layout is used.

You can use a digital telephone for administrative functions. The administrative telephone can double as a user's working telephone.

Changing or removing preprogrammed data

If preprogrammed data does not apply to users at a particular site, data can be revised on-site with a TTY or remotely over a modem connection. If desired, the user can start with the minimal amount of data required for initial software programming, which is the configuration record. This step must be performed while the user is in the Software Installation Program.

Meridian Mail

Meridian Mail comes preconfigured with preprogrammed extensions for mailboxes. If the numbering plan is being modified, then the mailboxes can be changed from any TTY used for system administration.

Set-Based Administration

The Set-Based Administration feature simplifies system installation and administration by enabling a telephone to perform several administrative and maintenance procedures. Use the Set-Based Administration feature to perform tasks such as changing data for specific features related to telephones or changing Calling Party Name Display on a telephone.

For more information about Set-Based Administration, refer to *Set-Based Administration* (553-3001-303).

Multiple-terminal access

Small Systems allow access to up to five users for logging in, loading, and executing overlays simultaneously. For example, if you have Expansion Cabinets, users can access the system through the Main or Expansion Cabinets at the same time.

Three SDI ports are provided on the main SSC card, while each Expansion can be accessed through the three SDI ports on the SSC card of each IP Expansion or the single SDI port available on the Fiber Receiver card of each Fiber Expansion.

The advantage of multiple-terminal access is that it allows for more efficient programming and maintenance of the system, especially when system components are located up to 3 km (1.8 mi) apart.

Database Archive feature

The Software Installation program allows the archiving of databases that you can subsequently use to load a customer site. This feature allows you to configure multiple databases in an off-site lab environment. The Database Archive feature also allows you to save databases on a PC Card until the databases are required. You can load the database into the system using the PC Card.

The off-site programming of databases is subject to all security keycode restrictions. The off-site system must either use the security device that will be installed in the system at the customer site, or have its own keycodes for the feature set.

Refer to *Communication Server 1000M and Meridian 1: Small System Upgrade Procedures* (553-3011-258) and *Communication Server 1000M and Meridian 1: Small System Maintenance* (553-3011-500) for additional information.

Supported telephones

Small Systems support a full range of telephones, including the following:

- Attendant Console (PC and M2250)
- Nortel IP Phones 2001, 2002, 2004, and 2007
- Nortel IP Audio Conference Phone 2033
- Nortel IP Softphone 2050
- Nortel Mobile Voice Client (MVC) 2050
- WLAN Handsets 2210/2211

Supported applications

Small Systems also support the following applications:

- Nortel Integrated Recorded Announcer
- Nortel Integrated Conference Bridge
- Nortel Messaging Server
- Nortel Integrated DECT
- Optivity Telephony Manager (OTM)
- Symposium Call Center Server
- Symposium Express Call Center
- Symposium Desktop Applications

Data backup and restore methods

Small Systems support several methods to back up customer-configured data during normal system operation:

- on-site backup
 - to primary flash drive
 - to backup flash drive
 - to external PC Card
- remote backup over a modem connection, using the Customer Configuration Backup and Restore (CCBR) feature. The CCBR feature enables you to back up customer-configured data to an external IBM-type PC or a Macintosh computer over a modem connection.

If data becomes corrupt or inoperable, you can restore backed up data to the main database and primary flash drive from one of the following:

- external PC Card drive
- backup flash drive
- computer over a modem connection

For more information about database backup and restore methods, refer to *Communication Server 1000M and Meridian 1: Small System Maintenance* (553-3011-500).

Support for IP connectivity

Both the Cabinet and Chassis systems support IP expansion, which provides IP interconnection between the Main and the Expansion. This IP interconnection enables:

- increased digital trunking capacity
- survivable expansion
- voice distribution over a Campus Data Network

Increased digital trunking/SDI capacity

IP Expansion provides increased networking capacity for Small Systems. Any IP Expansion, when connected through CAT5 or 100BaseF cable, can support digital trunks. A Cabinet system can support a total of 45 digital trunk cards. A Chassis system can support a total of 15 digital trunk cards.

IP Expansions can support the following Common Equipment (CE) cards:

- 1.5MB DTI/PRI (NTAK09)
- 1.5MB TMDI (NTRB21)
- 2.0MB DTI (NTAK10)
- 2.0MB PRI (NTAK79)
- 2.0MB PRI (NTBK50)
- MISP (NTBK22)
- SDI/DCH (NTAK02) (only DCH is supported in IP expansion; ESDI AML, and TTY are not supported)

IP expansion also provides increased SDI/D-channel capacity: three SDI ports are provided with each IP Expansion Cabinet/Chassis, and D-channel capacity increases to up to 16 D-channels per IP Expansion.

Refer to “Fiber-optic and IP expansion” on [page 31](#) for a description of the hardware required for IP expansion.

Survivable IP expansion

IP Expansions can be configured to be survivable in the event of a link failure or a catastrophic failure of the Main.

Based on the system configuration, if IP connectivity to the Main is lost or a manual command is issued, an IP Expansion can enter survival mode, in which it acts as a fully functional “stand-alone” system.

The number of survivable Expansions allowed on one system is controlled through a software license called “Survivability”, which has a range of 0–4. The license default value is zero.

Voice distribution over a Campus Data Network

IP expansion connectivity provides a high-capacity, cost-effective solution that can distribute Small Systems over a high-performance data network.

Full feature functionality and non-blocking architecture is maintained when systems are distributed over high-performance data networks. This patented solution delivers the exceptional functionality and reliability of legacy systems, while delivering the benefits of voice and data convergence.

Packaging requirements

IP connectivity is provided by IP Expansion (IPEX) package 295. If the IP Expansion package is restricted, IP connectivity between the Main and IP Expansion is not allowed, whether or not IP daughterboards are connected to the Main. CE-MUX expansion is not a separately packaged option, but does depend on IP Expansion (IPEX) package 295.

The Small System as a branch office

The Branch Office feature extends Communication Server 1000 features from a main office to one or more branch offices. The branch office connects to the main office over Virtual Trunks on a LAN or a WAN.

A CS 1000M Small System can function as a main office.

With CS 1000 Release 4.5 software, customers can reconfigure existing satellite Small Systems to function as branch offices to their main office IP PBX. This configuration allows customers to incorporate systems that were previously stand-alone into a Branch Office network. In this configuration, the main office can be any CS 1000S system or CS 1000M Large System or Small System operating CS 1000 Release 4.5 software. Any single-cabinet or single-chassis Small System is eligible for conversion to a branch office.

For more information about the Branch Office feature, refer to *Branch Office: Installation and Configuration* (553-3001-214).

Fiber-optic and IP expansion

Contents

This section contains information on the following topics:

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Small System expansion

Both the Cabinet system and the Chassis system support fiber-optic and IP expansion. Up to four Expansion Cabinets or Chassis can be connected to the Main with CAT5 or 100BaseF cable and located up to 3 km (1.8 mi) from the Main. With the introduction of IP connectivity, IP expansion can be distributed over a Campus Data Network.

For fiber-optic expansion, the following three basic components, in addition to other hardware, are required:

- Small System Controller (SSC) card in the Main
- Fiber Expansion daughterboard
- Fiber Receiver card in the Expansion

For IP expansion, the following three basic components, in addition to other hardware, are required:

- SSC card in the Main
- IP Expansion daughterboards (minimum two)
- SSC card in the Expansion

For a complete list of required hardware, refer to *Communication Server 1000M and Meridian 1: Small System Planning and Engineering* (553-3011-120). For information on installing Expansions, refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210). For details on expanding an existing system, refer to *Communication Server 1000M and Meridian 1: Small System Upgrade Procedures* (553-3011-258).

SSC card

For fiber-optic expansion, you must install an SSC card, containing Fiber Expansion daughterboards, in slot 0 of the Main.

For IP expansion, you must install an SSC card, containing IP Expansion daughterboards, in slot 0 of the Main. You must also install an SSC card, containing one IP Expansion daughterboard, in slot 0 of the Expansion.

For CS 1000 Release 4.5 software, the minimum requirements are:

- 32 Mbyte DRAM
- 16 Mbyte primary flash
- 32 Mbyte program store

Note: An NTDK20 SSC card with 32 Mbyte DRAM and equipped with an NTKK13 or NTKK25 Software daughterboard meets the minimum requirements.

New systems are shipped with the NTDK20HA SSC card equipped with the NTKK25BA Software daughterboard.

Existing Cabinet or Chassis systems equipped with earlier vintages of the SSC card must:

- upgrade the SSC card using the NTDK19 SSC upgrade kit
- if necessary, upgrade to the NTKK25 Software daughterboard

Existing Chassis systems equipped with the NTDK97 Mini System Controller (MSC) card must replace the MSC card with a suitable SSC card.

Note: The MSC card supports certain limited configurations.

Fiber Expansion and IP Expansion daughterboards

The SSC card supports both Fiber Expansion daughterboards and IP Expansion daughterboards. You must install Fiber Expansion or IP Expansion daughterboards on the SSC card. The supported daughterboard configurations supported are as follows:

- two single-port daughterboards
- two dual-port daughterboards

Each single-port daughterboard supports one Expansion. Each dual-port daughterboard supports up to two Expansions.

Fiber Expansion daughterboard

The Fiber Expansion daughterboards support the following fiber-optic cable solutions between Expansions:

- 10-meter solution
- 3-kilometer single-mode glass fiber solution
- 3-kilometer multi-mode glass fiber solution

IP Expansion daughterboard

The IP Expansion daughterboards support the following IP cable solutions between Expansions:

- 100-meter solution

- 2-kilometer solution
- Customer Local Area Network (LAN) solution

Fiber Receiver card

You must install a Fiber Receiver card in slot 0 of each Expansion Cabinet or Expansion Chassis. Match the correct Fiber Receiver card with the Fiber Expansion daughterboard installed on the SSC card in the Main.

Like the Fiber Expansion daughterboards, the Fiber Receiver cards support the following fiber-optic cable solutions:

- 10-meter solution
- 3-kilometer single-mode glass fiber solution
- 3 -kilometer multi-mode glass fiber solution

Expansion scenarios

The expansion capabilities for Small Systems allow great flexibility in the design and configuration of a system. Figures 5 through 10, starting on [page 35](#), illustrate the following options:

- Main Cabinet connected to Expansion Cabinets with fiber-optic cable (see Figure 5 on [page 35](#))
- Main Cabinet connected to Expansion Cabinets with IP connectivity (see Figure 6 on [page 36](#))
- Chassis connected to a Chassis Expander (see Figure 7 on [page 37](#))
- Chassis connected to an Expansion Chassis with fiber-optic connectivity (see Figure 8 on [page 38](#))
- Chassis system fiber-optic expansion configuration including Chassis Expander (see Figure 9 on [page 39](#))
- Chassis system IP expansion configuration including Chassis Expander (see Figure 10 on [page 40](#))

Figure 5
Main Cabinet connected to Expansion Cabinets with fiber-optic cable

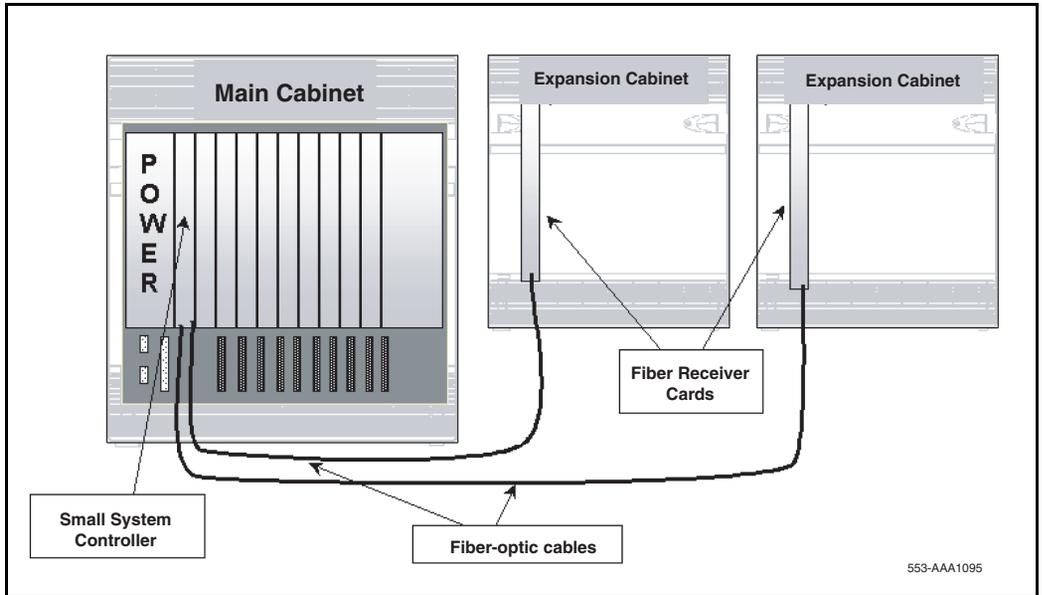
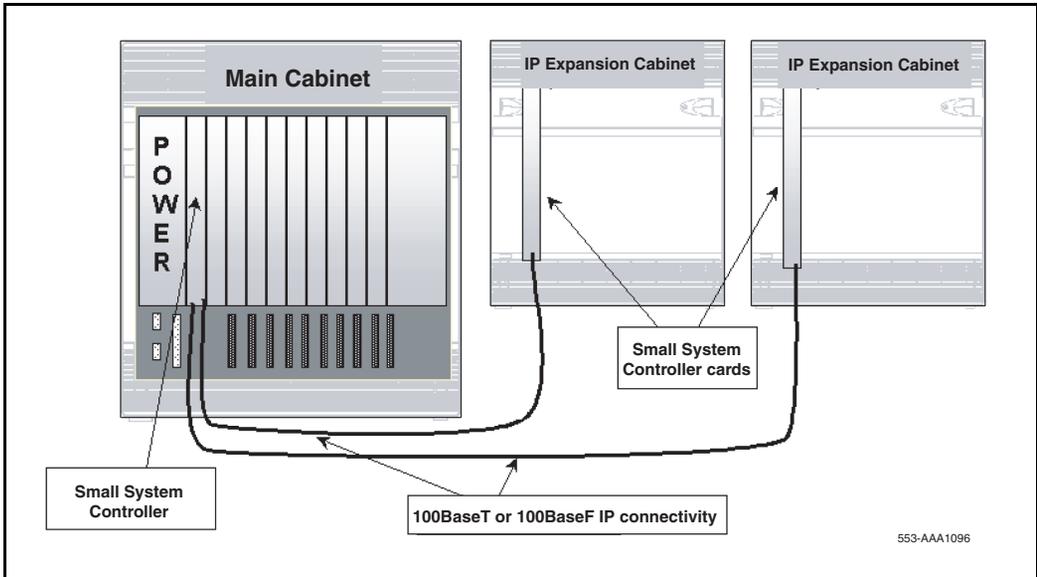
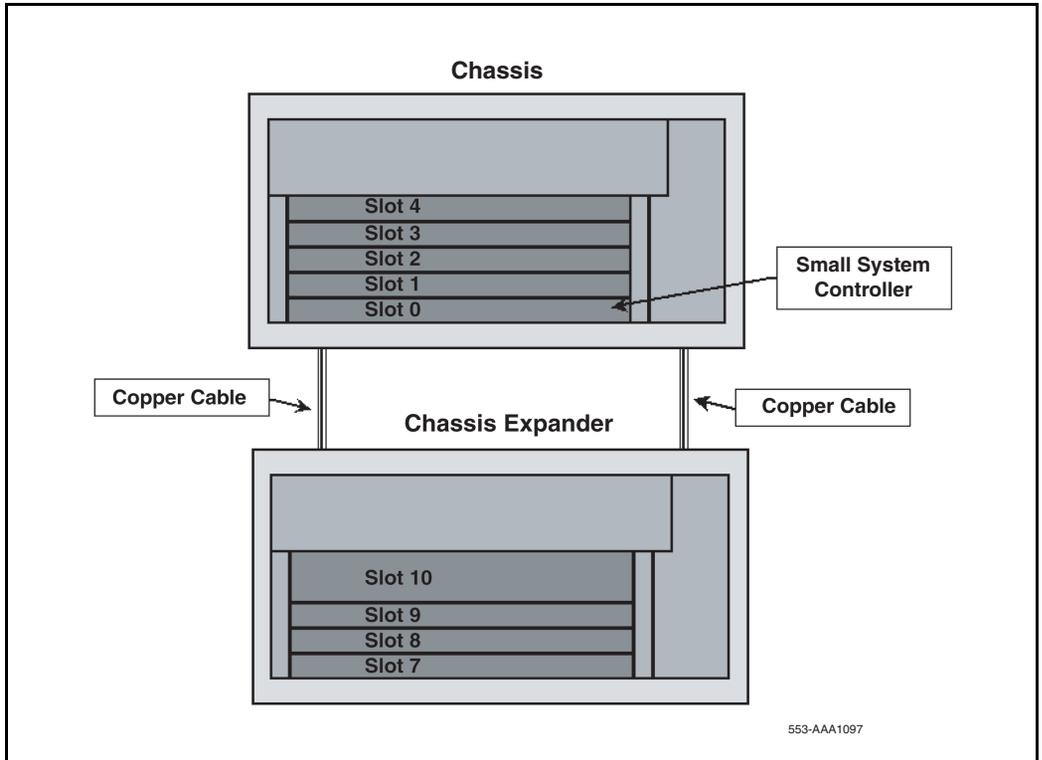


Figure 6
Main Cabinet connected to Expansion Cabinets with IP connectivity



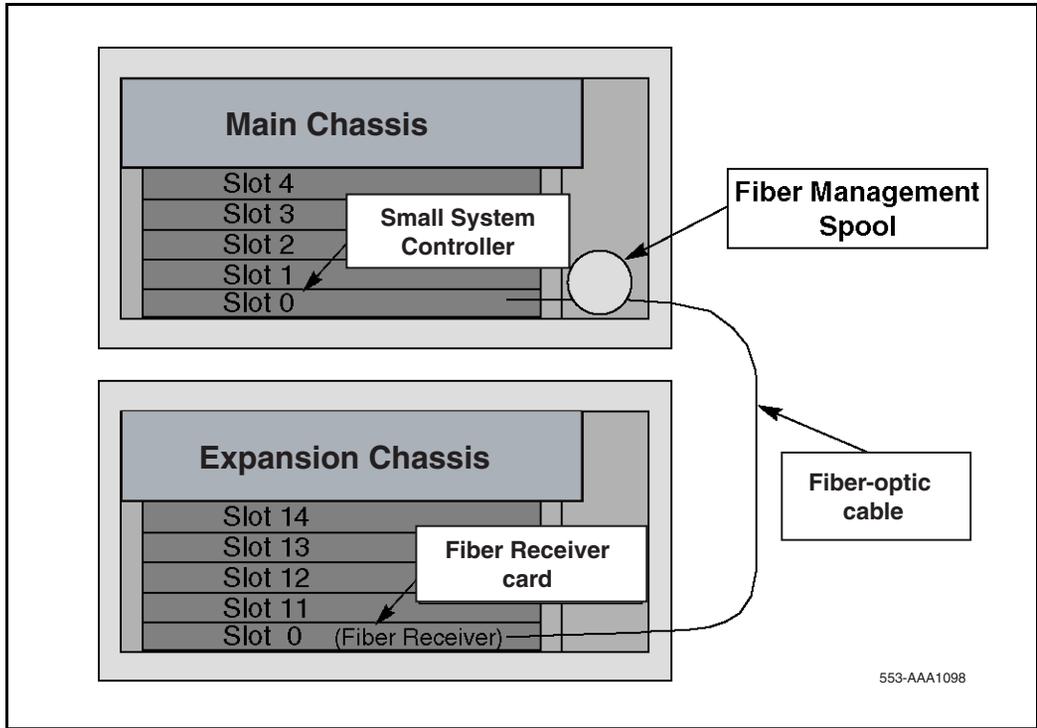
Note: In Figures 5 and 6, slots 1 to 10 are available in the Main, and slots 11 to 20 and 21 to 30 are available in the two Expansion Cabinets.

Figure 7
Chassis connected to a Chassis Expander



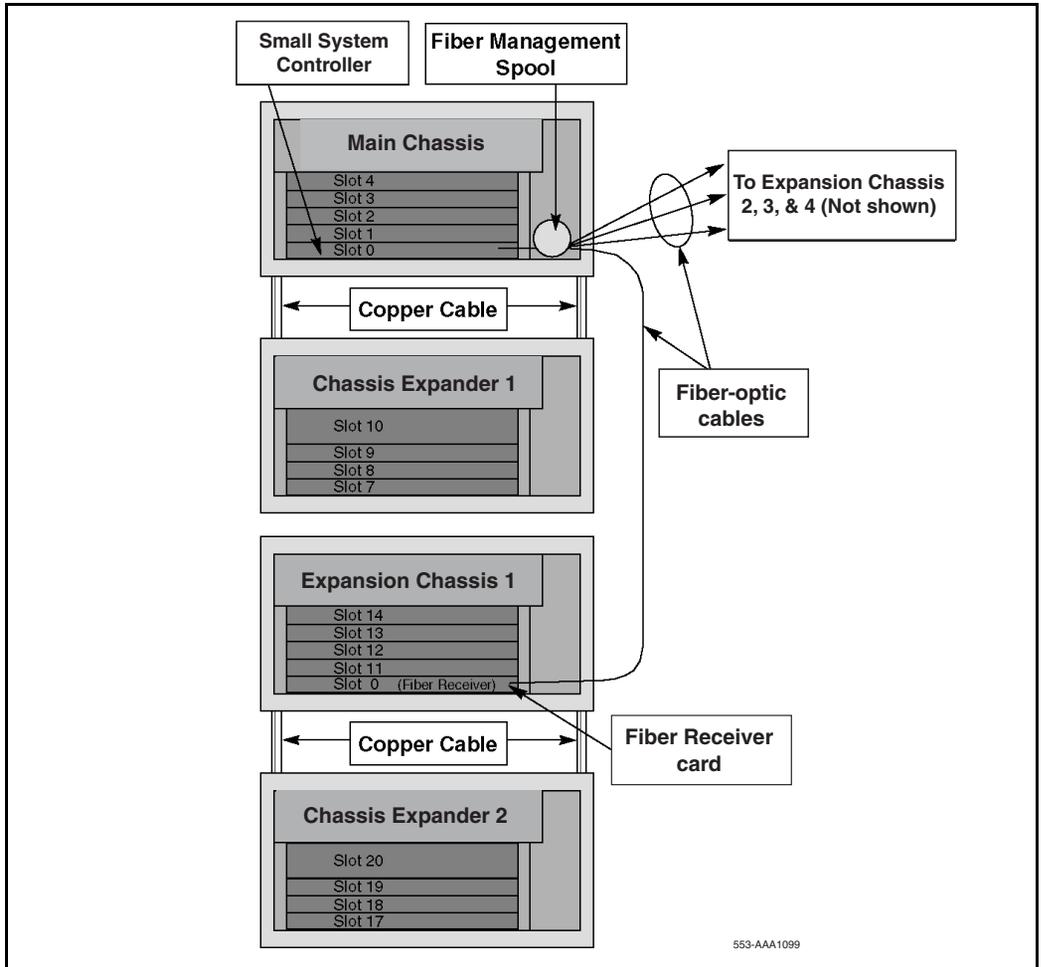
Note: In Figure 7, slots 0 to 4 are available in the Chassis. Slot 0 is designed to contain the SSC card only. Slot 4 is designed to contain the NTDK16 48-port Digital Line Card only. This is equivalent to three NT8D02 Digital Line Cards (slots 4 to 6). Slots 7 to 10 are available in the Chassis Expander.

Figure 8
Chassis connected to an Expansion Chassis with fiber-optic connectivity



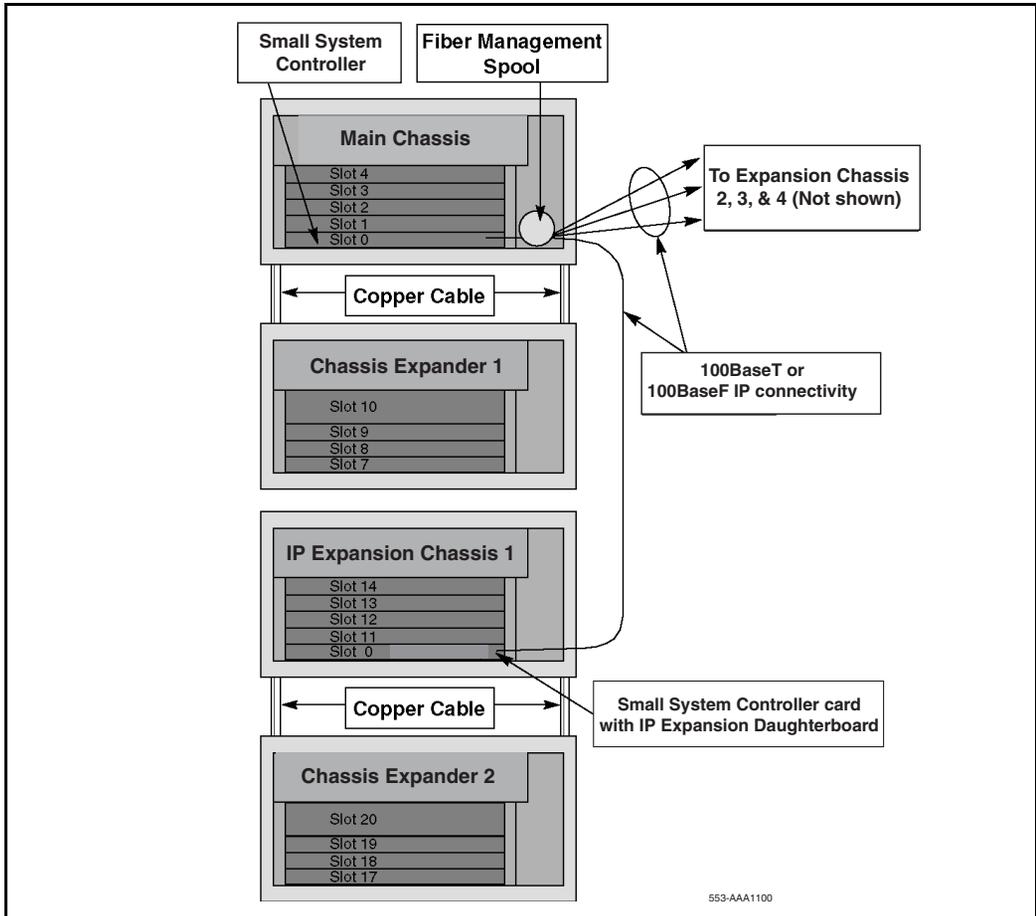
Note: In Figure 8, slots 0 to 4 are available in the Main. Slots 11 to 14 are available in the Expansion. Slot 0 in the Expansion contains the Fiber Receiver card. Slots 4 and 14 contain the NTDK16 48-port Digital Line card.

Figure 9
Chassis system fiber-optic expansion configuration including Chassis Expander



Note: In Figure 9, slots 0 to 4 are available in the Main. Slot 4 contains the NTDK16 48-port Digital Line card. Slots 7 to 10 are available in Chassis Expander 1. Slots 11 to 14 are available in Expansion Chassis 1. Slot 0 in Expansion Chassis 1 contains the Fiber Receiver card and slot 14 contains the NTDK16 48-port Digital Line card. Slots 17 to 20 are available in Chassis Expander 2.

Figure 10
Chassis system IP expansion configuration including Chassis Expander



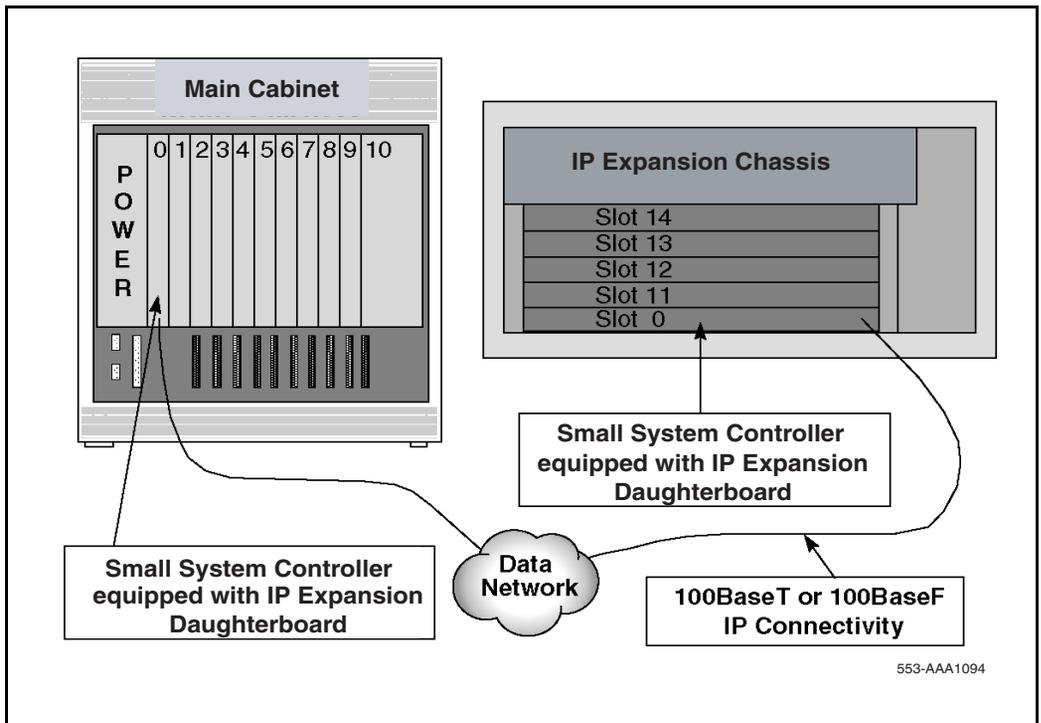
Note: In Figure 10, slots 0 to 4 are available in the Main. Slot 0 contains the SSC card equipped with an IP Expansion daughterboard. Slot 4 contains the NTDK16 48-port Digital Line card. Slots 7 to 10 are available in Chassis Expander 1. Slots 11 to 14 are available in Expansion Chassis 1. Slot 0 in Expansion Chassis 1 contains the SSC card equipped with an IP Expansion daughterboard, and slot 14 contains the NTDK16 48-port Digital Line card. Slots 17 to 20 are available in Chassis Expander 2.

Cabinet and Chassis system mix-and-match expansion

In a mix-and-match scenario, a Chassis can be connected to IP Expansion Cabinet(s). Similarly, a Main Cabinet can be connected to IP Expansion Chassis.

Figure 11 shows an IP configuration in which a Main Cabinet is connected to an Expansion Chassis using IP connectivity.

Figure 11
Cabinet and Chassis system IP expansion configuration



Note: In Figure 11, slots 0 to 10 are available in the Main and slots 11 to 14 are available in the Expansion. Slot 0 of the Expansion contains an SSC card equipped with an IP Expansion daughterboard. Slot 14 of the Expansion contains the NTDK16 48-port Digital Line card.

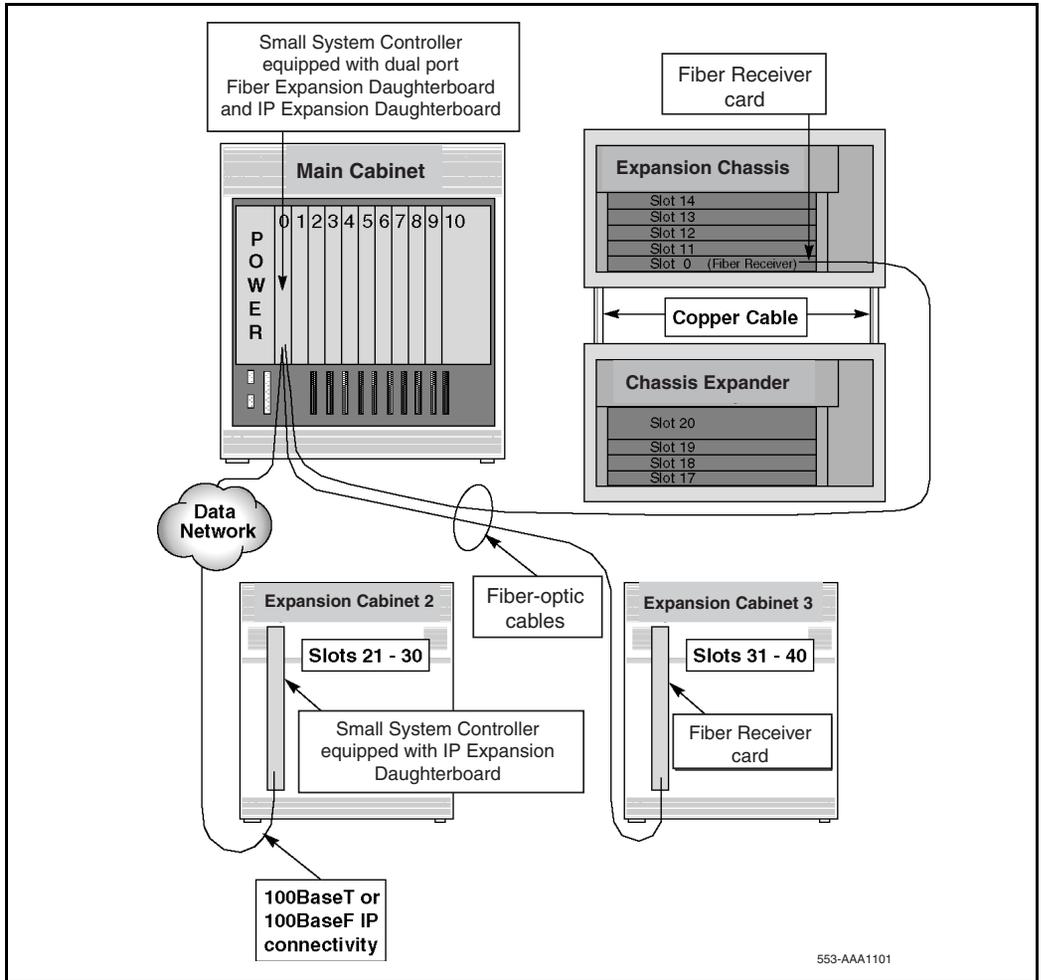
Figure 12 on [page 43](#) shows another example of a “mix-and-match” configuration in which a Main Cabinet uses both fiber and IP cabling to connect two Expansion Cabinets and one Expansion Chassis. The Expansion Chassis is equipped with a Chassis Expander.

Note: Figure 12 is only an example of one of many possible configurations using Cabinets and Chassis.

In this example, the SSC card in the Main Cabinet has one dual-port Fiber Expansion daughterboard installed in the top connector and one single-port IP Expansion daughterboard installed in the bottom connector. The dual-port Fiber Expansion daughterboard in the top connector supports card slots 11–20 and 31–40. The single-port IP Expansion daughterboard in the bottom connector supports card slots 21–30.

Note: When both Fiber and IP Expansion daughterboards co-exist in a system, configure the Fiber Expansion daughterboard as expansions 1 and 3 and the IP Expansion daughterboard as expansions 2 and 4.

Figure 12
Cabinet and Chassis system IP and fiber expansion configuration



Note: In Figure 12, slots 0 to 10 are available in the Main, slots 11 to 14 in the Expansion Chassis, and slots 17 to 20 in the Chassis Expander. Slots 21 to 30 are available in Expansion Cabinet 2 over the data network. Slots 31 to 40 are available in Expansion Cabinet 3. Slot 0 in the Expansion Chassis contains the Fiber Receiver card and slot 14 contains the NTDK16 48-port Digital Line card.

Nortel Communication Server 1000
**Communication Server 1000M
and Meridian 1**
Small System Overview

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