

HP NonStop S-Series Planning and Configuration Guide

Abstract

This guide explains how to plan for and configure HP NonStop™ S-series servers and how to plan and prepare your site, operational environment, and hardware and software configurations. In addition, the guide describes the ServerNet system area network (ServerNet SAN) and the available hardware and system configurations. It also provides a parts list, and a guide to other NonStop S-series manuals.

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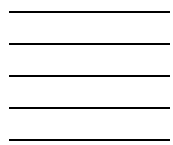
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Safety and Compliance

Glossary

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What's New in This Guide

Manual Information

Abstract

This guide explains how to plan for and configure HP NonStop™ S-series servers and how to plan and prepare your site, operational environment, and hardware and software configurations. In addition, the guide describes the ServerNet system area network (ServerNet SAN) and the available hardware and system configurations. It also provides a parts list, and a guide to other NonStop S-series manuals.

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New and Changed Information

Section

[Section 1, Terms and Concepts](#)

[Section 4, System Components](#)

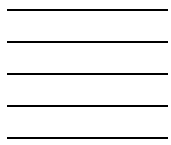
[Appendix G, Modular Power Information](#)

Changed

Added statement of support indicating Fibre Channel tape drives can be connected to an FCSA to communicate with an IOAM.

Added statement of support indicating Fibre Channel tape drives can be connected to an FCSA to communicate with an IOAM.

Added support for an optional 30A power cord.



About This Guide

This section offers a general overview of this guide, describes this guide's intended audience, and explains the contents of each section of this guide.

Who Should Use This Guide

This guide is written for those who are responsible for planning the installation, configuration, and maintenance of the server and the software environment at a particular site.

Those who perform the hardware tasks documented in this guide must have completed HP training courses on system support for NonStop S-series servers.

Note. NonStop S-series and NonStop K-series refer to hardware systems; G-series and D-series refer to system software.

- G-series software runs on NonStop S-series servers.
 - D-series software runs on NonStop K-series servers.
-

What's in This Guide

This guide is divided into these parts:

[Part I, Reference Information](#)

This part provides information about the organization, physical arrangement, and configurations that are possible with the servers. The information is descriptive rather than task oriented.

[Part II, Planning Tasks](#)

This part provides information about planning and preparing your site for the installation of system hardware.

[Part III, Appendixes](#)

These appendixes provide:

Information about part numbers for all CRUs

System specifications

Blank system installation forms

Examples of how to plan, cable, and configure systems

Lists of core hardware manuals and online help for NonStop S-series servers

Information about supported hardware and configurations

Modular power information

Where to Get More Information

For information about NonStop S-series hardware, software, and operations, refer to [Appendix E, Guide to Server Manuals](#).

Notation Conventions

Hypertext Links

Blue underline is used to indicate a hypertext link within text. By clicking a passage of text with a blue underline, you are taken to the location described. For example:

This requirement is described under [Backup DAM Volumes and Physical Disk Drives](#) on page 3-2.

General Syntax Notation

This list summarizes the notation conventions for syntax presentation in this manual.

UPPERCASE LETTERS. Uppercase letters indicate keywords and reserved words. Type these items exactly as shown. Items not enclosed in brackets are required. For example:

MAXATTACH

lowercase italic letters. Lowercase italic letters indicate variable items that you supply. Items not enclosed in brackets are required. For example:

file-name

computer type. Computer type letters within text indicate C and Open System Services (OSS) keywords and reserved words. Type these items exactly as shown. Items not enclosed in brackets are required. For example:

myfile.c

italic computer type. *Italic computer type* letters within text indicate C and Open System Services (OSS) variable items that you supply. Items not enclosed in brackets are required. For example:

pathname

[] Brackets. Brackets enclose optional syntax items. For example:

TERM [\system-name.] \$terminal-name

INT[ERRUPTS]

A group of items enclosed in brackets is a list from which you can choose one item or none. The items in the list can be arranged either vertically, with aligned brackets on each side of the list, or horizontally, enclosed in a pair of brackets and separated by vertical lines. For example:

```
FC [  num  ]
   [ -num  ]
   [ text  ]
```

K [X | D] address

{ } Braces. A group of items enclosed in braces is a list from which you are required to choose one item. The items in the list can be arranged either vertically, with aligned braces on each side of the list, or horizontally, enclosed in a pair of braces and separated by vertical lines. For example:

```
LISTOPENS PROCESS { $appl-mgr-name }
                  { $process-name   }

ALLOWSU { ON | OFF }
```

| Vertical Line. A vertical line separates alternatives in a horizontal list that is enclosed in brackets or braces. For example:

```
INSPECT { OFF | ON | SAVEABEND }
```

... Ellipsis. An ellipsis immediately following a pair of brackets or braces indicates that you can repeat the enclosed sequence of syntax items any number of times. For example:

```
M address [ , new-value ]...
[ - ] {0|1|2|3|4|5|6|7|8|9}...
```

An ellipsis immediately following a single syntax item indicates that you can repeat that syntax item any number of times. For example:

```
"s-char..."
```

Punctuation. Parentheses, commas, semicolons, and other symbols not previously described must be typed as shown. For example:

```
error := NEXTFILENAME ( file-name ) ;
LISTOPENS SU $process-name.#su-name
```

Quotation marks around a symbol such as a bracket or brace indicate the symbol is a required character that you must type as shown. For example:

```
"[ " repetition-constant-list "]"
```

Item Spacing. Spaces shown between items are required unless one of the items is a punctuation symbol such as a parenthesis or a comma. For example:

```
CALL STEPMOM ( process-id ) ;
```

If there is no space between two items, spaces are not permitted. In this example, no spaces are permitted between the period and any other items:

```
$process-name.#su-name
```

Line Spacing. If the syntax of a command is too long to fit on a single line, each continuation line is indented three spaces and is separated from the preceding line by a blank line. This spacing distinguishes items in a continuation line from items in a vertical list of selections. For example:

```
ALTER [ / OUT file-spec / ] LINE
      [ , attribute-spec ]...
```

!i and !o. In procedure calls, the !i notation follows an input parameter (one that passes data to the called procedure); the !o notation follows an output parameter (one that returns data to the calling program). For example:

```
CALL CHECKRESIZESEGMENT ( segment-id           !i
                        , error                 !o
                        ) ;
```

!i,o. In procedure calls, the !i,o notation follows an input/output parameter (one that both passes data to the called procedure and returns data to the calling program). For example:

```
error := COMPRESSEDIT ( filenum ) ;           !i,o
```

!i:i. In procedure calls, the !i:i notation follows an input string parameter that has a corresponding parameter specifying the length of the string in bytes. For example:

```
error := FILENAME_COMPARE_ ( filename1:length   !i:i
                           , filename2:length ) ; !i:i
```

!o:i. In procedure calls, the !o:i notation follows an output buffer parameter that has a corresponding input parameter specifying the maximum length of the output buffer in bytes. For example:

```
error := FILE_GETINFO_ ( filenum           !i
                        , [ filename:maxlen ] ) ; !o:i
```

Notation for Messages

This list summarizes the notation conventions for the presentation of displayed messages in this manual.

Bold Text. Bold text in an example indicates user input typed at the terminal. For example:

```
ENTER RUN CODE
?123
CODE RECEIVED:      123.00
```

The user must press the Return key after typing the input.

Nonitalic text. Nonitalic letters, numbers, and punctuation indicate text that is displayed or returned exactly as shown. For example:

```
Backup Up.
```

lowercase italic letters. Lowercase italic letters indicate variable items whose values are displayed or returned. For example:

p-register

process-name

[] Brackets. Brackets enclose items that are sometimes, but not always, displayed. For example:

Event number = *number* [Subject = *first-subject-value*]

A group of items enclosed in brackets is a list of all possible items that can be displayed, of which one or none might actually be displayed. The items in the list can be arranged either vertically, with aligned brackets on each side of the list, or horizontally, enclosed in a pair of brackets and separated by vertical lines. For example:

proc-name trapped [in SQL | in SQL file system]

{ } Braces. A group of items enclosed in braces is a list of all possible items that can be displayed, of which one is actually displayed. The items in the list can be arranged either vertically, with aligned braces on each side of the list, or horizontally, enclosed in a pair of braces and separated by vertical lines. For example:

obj-type obj-name state changed to *state*, caused by
{ Object | Operator | Service }

process-name State changed from *old-objstate* to *objstate*
{ Operator Request. }
{ Unknown. }

| Vertical Line. A vertical line separates alternatives in a horizontal list that is enclosed in brackets or braces. For example:

Transfer status: { OK | Failed }

% Percent Sign. A percent sign precedes a number that is not in decimal notation. The % notation precedes an octal number. The %B notation precedes a binary number. The %H notation precedes a hexadecimal number. For example:

%005400

%B101111

%H2F

P=%*p-register* E=%*e-register*

Notation for Management Programming Interfaces

This list summarizes the notation conventions used in the boxed descriptions of programmatic commands, event messages, and error lists in this manual.

UPPERCASE LETTERS. Uppercase letters indicate names from definition files. Type these names exactly as shown. For example:

ZCOM-TKN-SUBJ-SERV

lowercase letters. Words in lowercase letters are words that are part of the notation, including Data Definition Language (DDL) keywords. For example:

token-type

!r. The !r notation following a token or field name indicates that the token or field is required. For example:

ZCOM-TKN-OBJNAME token-type ZSPI-TYP-STRING. !r

!o. The !o notation following a token or field name indicates that the token or field is optional. For example:

ZSPI-TKN-MANAGER token-type ZSPI-TYP-FNAME32. !o

Change Bar Notation

Change bars are used to indicate substantive differences between this edition of the manual and the preceding edition. Change bars are vertical rules placed in the right margin of changed portions of text, figures, tables, examples, and so on. Change bars highlight new or revised information. For example:

The message types specified in the REPORT clause are different in the COBOL environment and the Common Run-Time Environment (CRE).

The CRE has many new message types and some new message type codes for old message types. In the CRE, the message type SYSTEM includes all messages except LOGICAL-CLOSE and LOGICAL-OPEN.

Part I. Reference Information

This part provides information about the organization, physical arrangement, and configurations that are possible with the NonStop S-series servers. The information is descriptive rather than task oriented.

Section	Title	Abstract
<u>1</u>	<u>Terms and Concepts</u>	This section defines basic terms and concepts associated with NonStop S-series servers, the ServerNet architecture, and networking.
<u>2</u>	<u>The ServerNet Communications Network</u>	This section describes the ServerNet architecture and its implementation on NonStop S-series servers.
<u>3</u>	<u>Topologies</u>	This section introduces the concept of the tetrahedral topology and describes the ServerNet topologies available on NonStop S-series servers.
<u>4</u>	<u>System Components</u>	This section describes the components of a NonStop S-series system.
<u>5</u>	<u>ServerNet Cabling</u>	This section describes ServerNet cables, how to interpret ServerNet cabling diagrams, and how to connect cables between enclosures.
<u>6</u>	<u>ServerNet Communication Pathways</u>	This section describes the structure and operations of the communication pathways provided by each PMF CRU, IOMF CRU, and SEB in a NonStop S-series system.
<u>7</u>	<u>Enclosure Arrangements and Cable Connections</u>	This section discusses arrangements and cable connections for NonStop S-series system enclosures.
<u>8</u>	<u>Initial Configurations</u>	This section discusses the initial configurations for NonStop S-series servers.

1 Terms and Concepts

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NonStop S-Series Servers

Server	Description
S74	Limited to two processors
S76	Limited to two processors
S700	Limited to two processors
S740	Limited to two processors
S760	Limited to two processors
S7000	Entry-level midrange NonStop S-series server
S7400	Midrange NonStop S-series server
S7600	Successor to the NonStop S7400 server
S7800	Successor to the NonStop S7600 server
S70000	Entry-level high-performance NonStop S-series server
S72000	Successor to the NonStop S70000 server
S74000	Successor to the NonStop S72000 server
S76000	Successor to the NonStop S74000 server
S78000	Successor to the NonStop S76000 server
S86000	Premium high-performance NonStop S-series server
S88000	Successor to the NonStop S86000 server

Enclosures

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Note. Sxx000 is a collective term for the NonStop S70000, S72000, S74000, S76000, S78000, S86000 and S88000 servers. All Sxx000 servers contain a power shelf for power supplies.

An enclosure is an assembly that contains the system hardware, such as processors, disk drives, extenders, adapters, power supplies, and fans.

An enclosure consists of a chassis containing most of the system hardware, a frame, cable management hardware, and doors, and, on certain models, a power shelf containing power supplies.

Enclosure

An enclosure is the server chassis mounted in a frame.

System Enclosure

A system enclosure is either a processor enclosure or an I/O enclosure. All system enclosures use identical chassis and can contain the following components:

- Disk drives
- Components related to the ServerNet fabrics
- Components related to electrical power
- Cable-management hardware
- Cooling fans

Base Enclosure

A base enclosure is an enclosure that is mounted on a frame base with casters and is installed directly on the floor. It can have another enclosure stacked on top of it.

Stackable Enclosure

A stackable enclosure is an enclosure that is installed on top of a base enclosure and is not mounted on a frame base.

Processor Enclosure

A processor enclosure is a system enclosure that contains processor multifunction (PMF) CRUs. A processor enclosure can also contain:

- ServerNet expansion boards (SEBs or MSEBs) (optional)
- ServerNet adapters (optional)

Processor enclosures cannot contain I/O multifunction (IOMF) CRUs.

I/O Enclosure

An I/O enclosure is a system enclosure that contains IOMF CRUs. An I/O enclosure can also contain ServerNet adapters. I/O enclosures cannot contain PMF CRUs, SEBs, or MSEBs.

Modified I/O Enclosure

A modified I/O enclosure is an I/O enclosure that has two pins cut off on one of the backplane connectors in slot 50 or 55 to correct a design defect. A modified I/O enclosure is identified by a revision label on the cable-management post.

A modified I/O enclosure can contain IOMF CRUs or IOMF 2 CRUs. A modified I/O enclosure cannot be converted to a processor enclosure containing S7000, S7400, S70000, or S72000 PMF CRUs, but it can be converted to a processor enclosure containing S7600 and S74000 or later PMF CRUs.

For more information about this modification, contact your HP service representative.

IOAM Enclosure

An IOAM enclosure is an enclosure that contains up to 10 ServerNet adapters. Unlike system enclosures that are self-contained, IOAM enclosures are mounted in 19-inch racks. IOAM enclosures do not include the system enclosure frames. IOAM enclosures and components require OSM; they are not supported by TSM.

IOAM enclosures connect to an MSEB of S76000 and later NonStop S-series systems and can be installed in place of I/O enclosure in groups 11, 12, 13, 14, or 15. I/O enclosures and IOAM enclosures can coexist in the same system.

For more information, see [IOAM Enclosures](#) on page 4-69 or the *Modular I/O Installation and Configuration Guide*.

Peripheral Enclosure

A peripheral enclosure is an enclosure that contains components related to peripheral devices.

Cluster Switch Enclosure

The cluster switch enclosure is half the height of a standard NonStop S-series system enclosure. It houses ServerNet cluster components:

Visual Image Package

Starting with NonStop S76000 servers, a visual image package, with tall front and rear enclosure doors and side panels, is standard. Enclosures with short front doors and no side panels can be ordered as an option for NonStop S76000 and S86000 servers for one year after the G06.16 RVU. Kits for the visual image package are also available for upgrading enclosures.

The visual image package includes:

- Appearance-side door that is taller than the original door and so takes the place of the original and the power-shelf panel located beneath it
- Service-side door that looks like the appearance-side door but does not have the EMI features of the appearance-side door
- Side panels that fit in the space between the vertical frame rails on the end enclosures in a row

Power Shelf

A power shelf is an assembly residing below the chassis housing two power supplies and supporting circuitry.

Appearance Side and Service Side

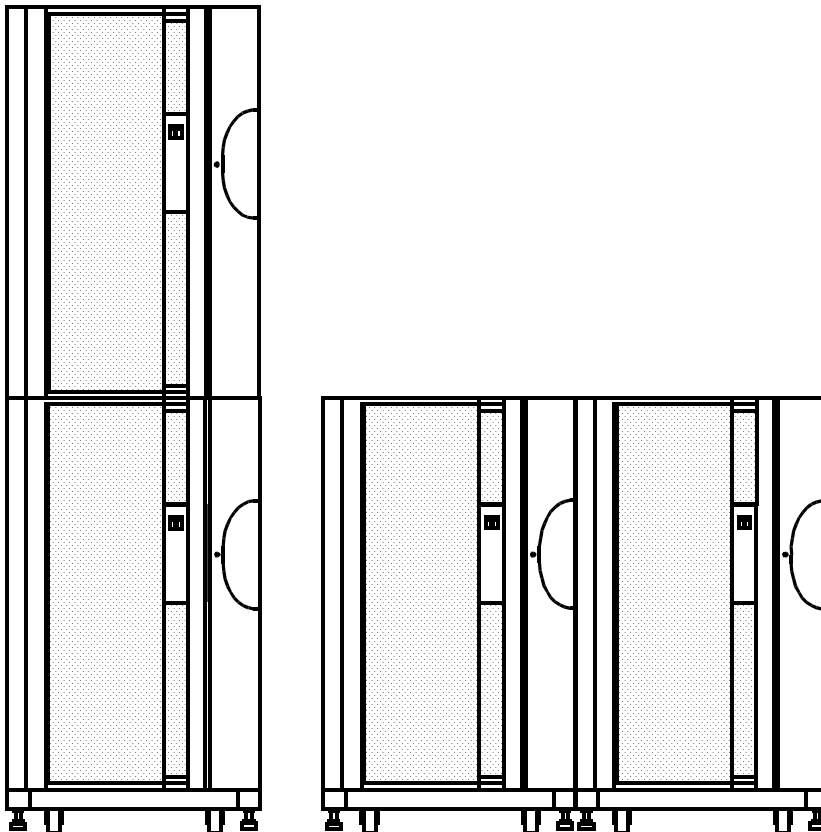
All system enclosures have an appearance side and a service side:

- The appearance side of an enclosure contains disk drives. System enclosures are usually arranged so that the appearance side is the most visible side. The appearance side is covered with a door, which must remain closed during normal operation to ensure proper cooling.
- The service side of an enclosure contains the PMF CRUs and IOMF CRUs and is the connection point for all cables to and from the enclosure.

The service side can be equipped with an optional door, which covers cabling and secures access to components.

Enclosure Arrangements

Enclosures are stackable. You can arrange your enclosures in any convenient way, as long as you do not stack more than one system enclosure on top of another. This illustration shows one double-high stack and two single-high enclosures.



VST705.vsd

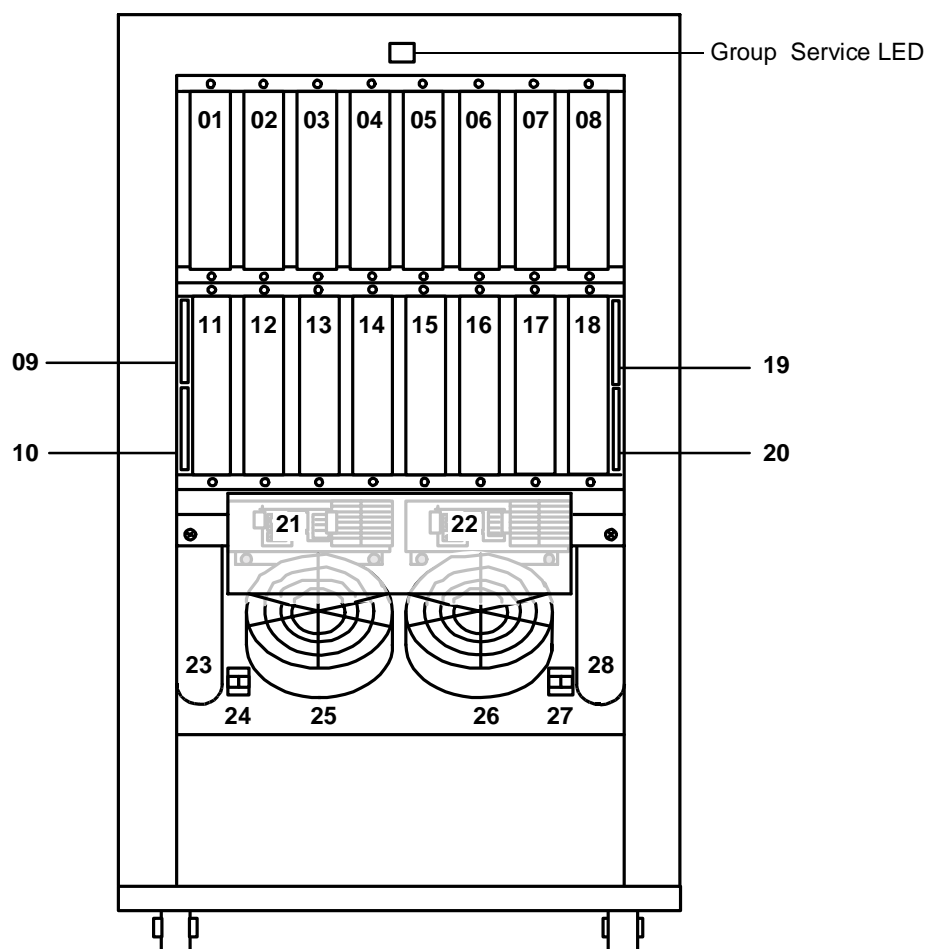
Enclosures and Power Shelf

The type of PMF CRU or IOMF CRU determines whether a power shelf is required:

CRU Type	Does Not Require Power Shelf	Requires Power Shelf
S74 PMF		X
S76 PMF		X
S700 PMF	X (with NSR-W)	X (with NSR-G or NSR-T)
S740 PMF		X
S760 PMF		X
S7000 PMF	X	
S7400 PMF		X
S7600 PMF		X
S7800 PMF		X
S70000 PMF		X
S72000 PMF		X
S74000 PMF		X
S76000 PMF		X
S78000 PMF		X
S86000 PMF		X
S88000 PMF		X
IOMF	X	
IOMF 2		X

Components

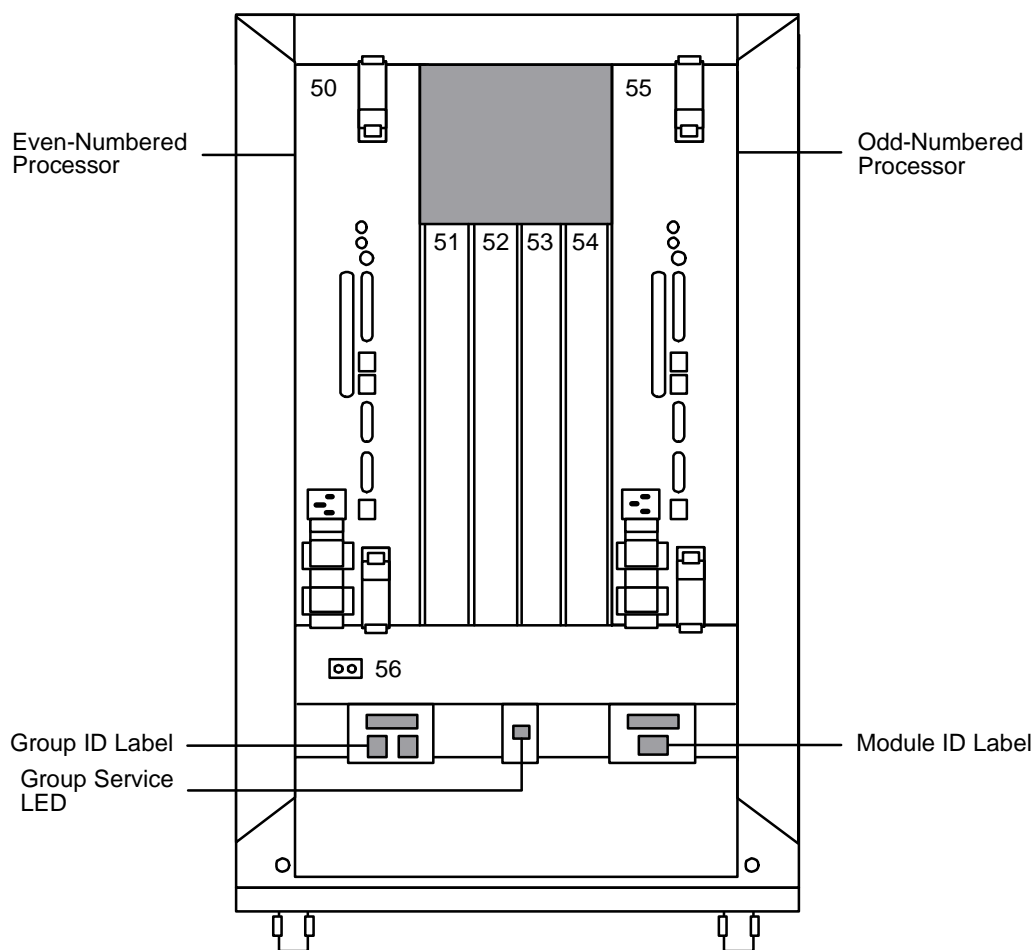
Components, Processor Enclosure Without Power Shelf, Appearance Side



VST950.vsd

Slot	Component
01 through 08	Disk
11 through 18	Disk
09, 10, 19, 20	SCSI terminator
21, 22	PMCU
23, 28	Battery
24, 27	Group ID switch
25, 26	Fan

Components, Processor Enclosure Without Power Shelf, Service Side



VST621.vsd

Slot

50, 55

Component

PMF CRU

51, 52

SEB or MSEB*

53, 54

ServerNet adapter, SEB, or MSEB

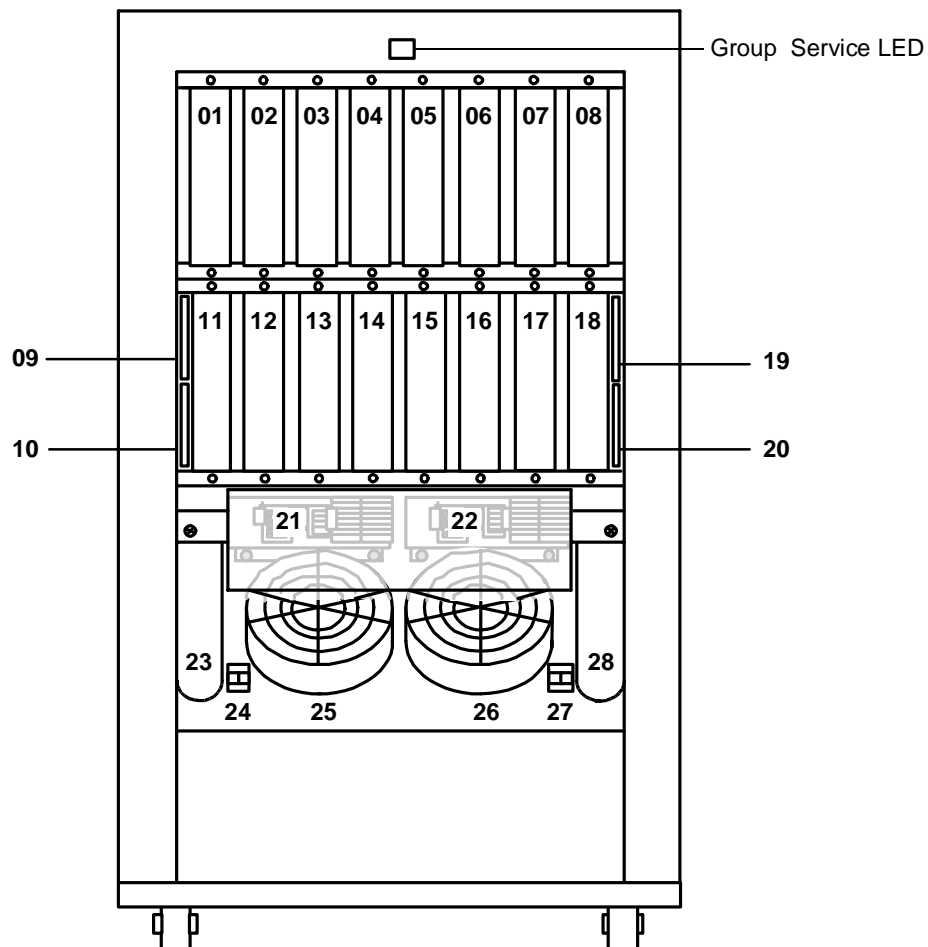
56

EPO connector

* In a two-processor system with no SEBs required for slots 51 and 52, any single-ported adapter can occupy these slots.

Components, I/O Enclosure Without Power Shelf, Appearance Side

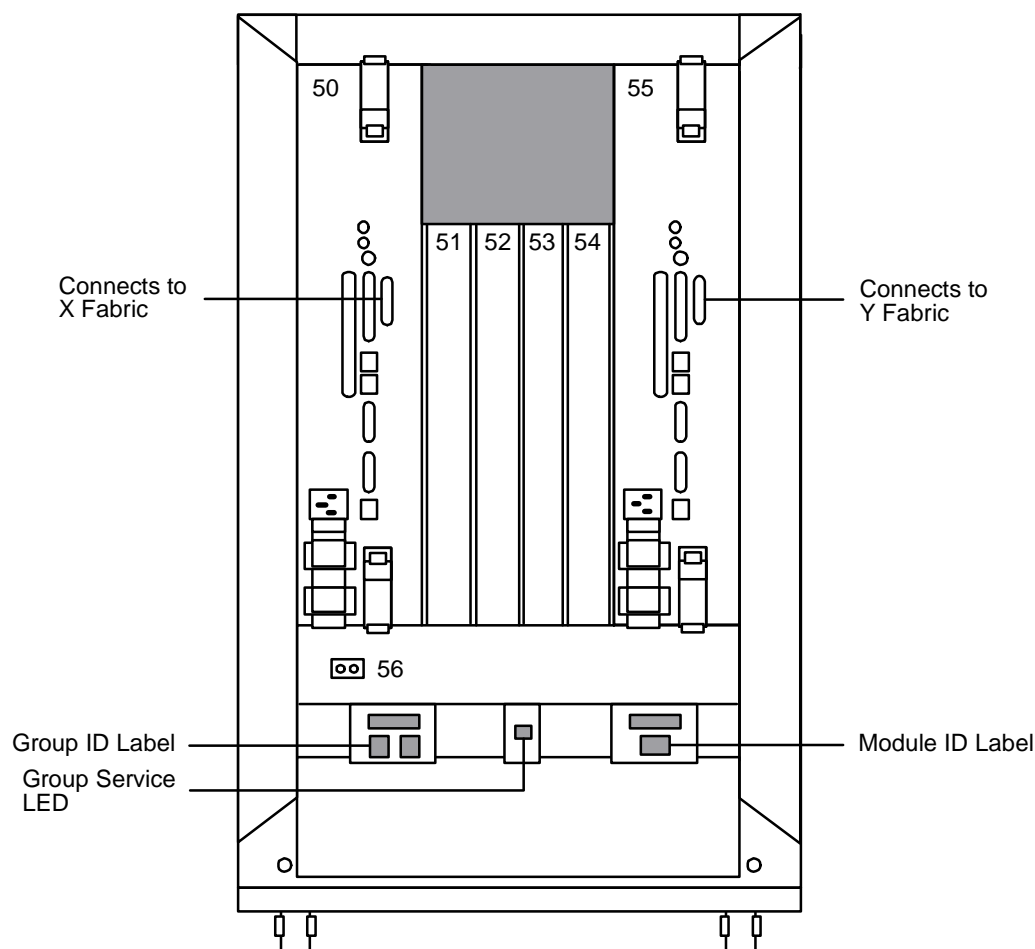
The appearance side of an I/O enclosure without a power shelf is identical to that of a processor enclosure without a power shelf.



VST950.vsd

Slot	Component
01 through 08	Disk
11 through 18	Disk
09, 10, 19, 20	SCSI terminator
21, 22	PMCU
23, 28	Battery
24, 27	Group ID switch
25, 26	Fan

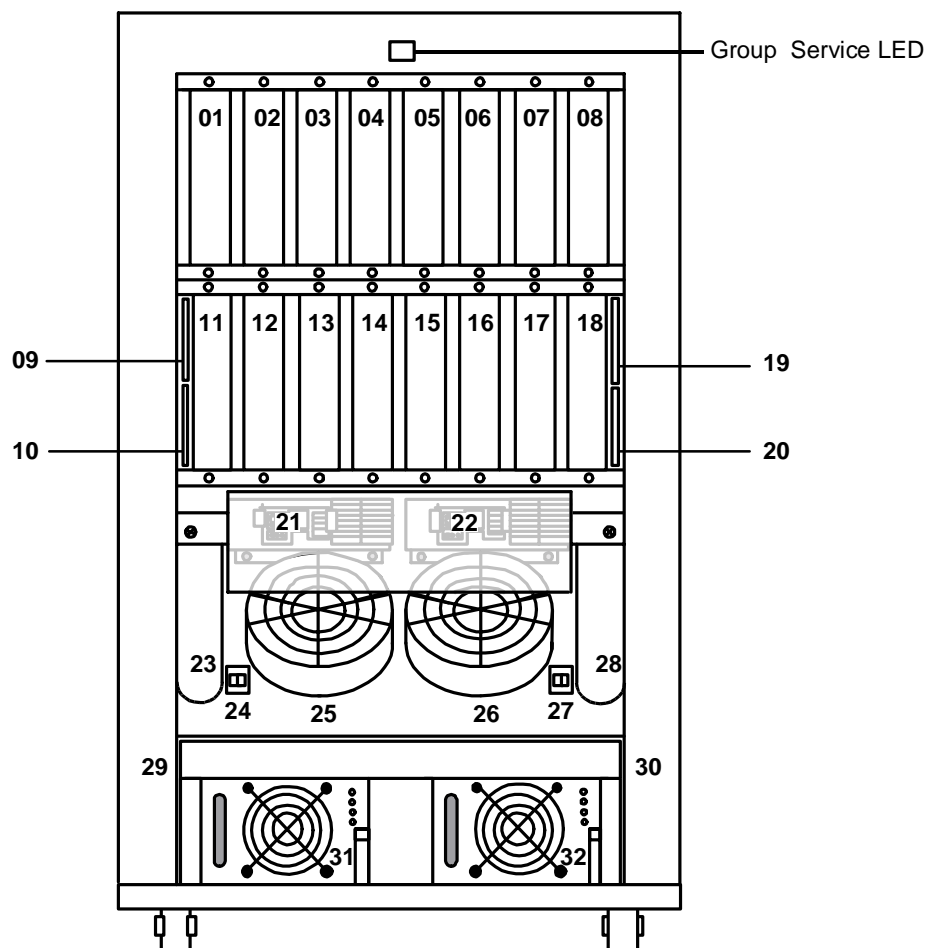
Components, I/O Enclosure Without Power Shelf, Service Side



VST971.vsd

Slot	Component
50, 55	IOMF CRU
51 through 54	ServerNet adapter
56	EPO connector

Components, Processor Enclosure With Power Shelf, Appearance Side

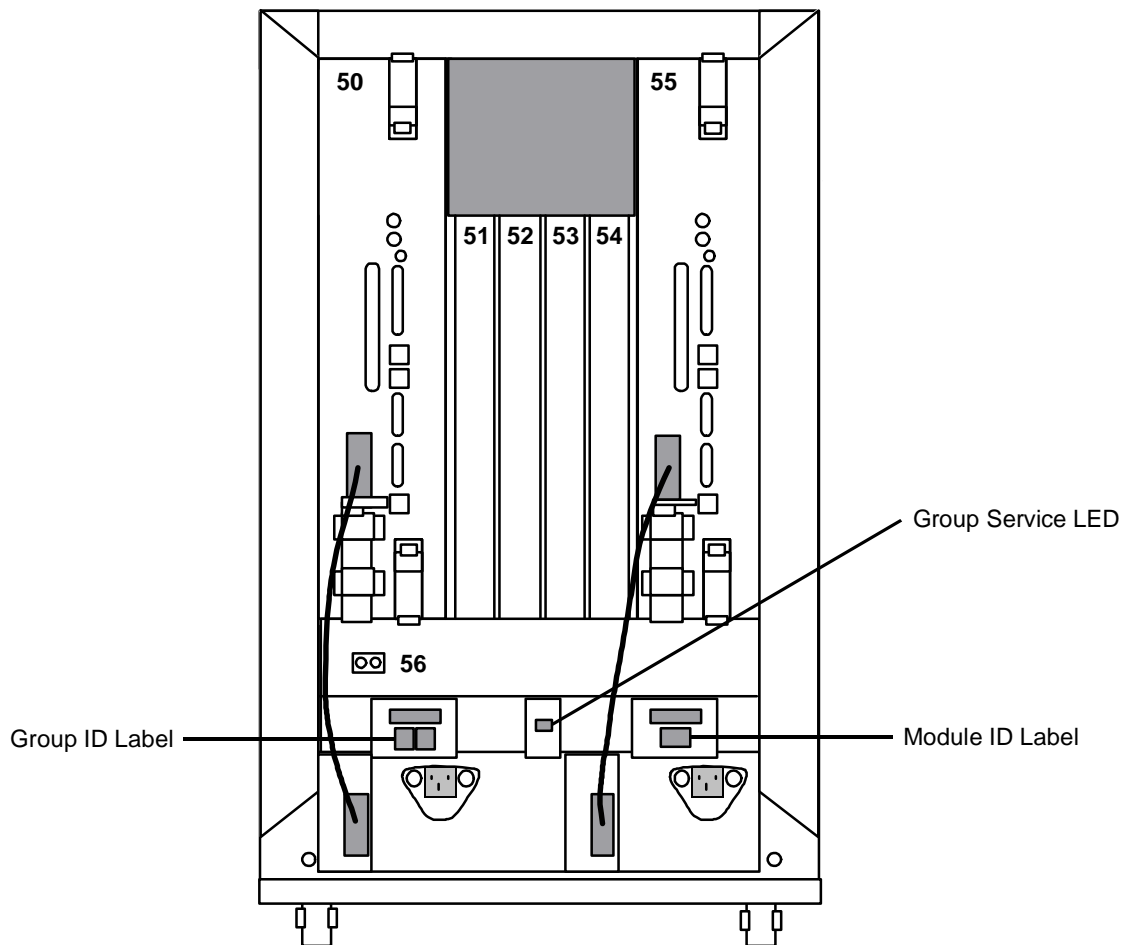


VST622.vsd

Slot	Component
01 through 08	Disk
11 through 18	Disk
09, 10, 19, 20	SCSI terminator
21, 22	PMCU
23, 28	Battery
24, 27	Group ID switch
25, 26	Fan
29, 30	Reserved
31, 32	Power supply

Components, Processor Enclosure With Power Shelf, Service Side

The PMF CRUs on your NonStop server might appear slightly different from those shown here.



VST623.vsd

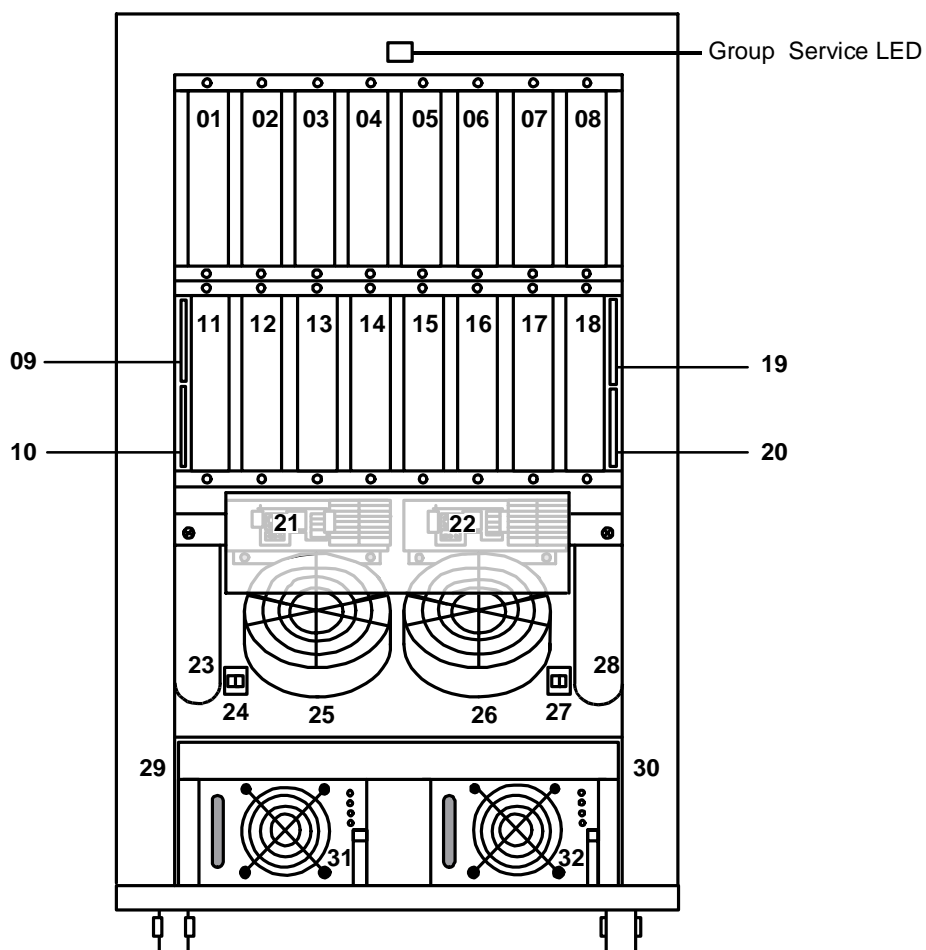
Slot	Component
50, 55	PMF CRU*
51, 52	SEB or MSEB*
53, 54	ServerNet adapter, SEB, or MSEB
56	EPO connector

* In a two-processor system with no SEBs required for slots 51 and 52:

- If PMF 2 CRUs are not used, any single-ported adapter can occupy these slots.
- If PMF 2 CRUs are used, any adapter can occupy these slots.
- Only PMF 2 CRUs support dual-ported adapters in slots 51 and 52.

Components, I/O Enclosure With Power Shelf, Appearance Side

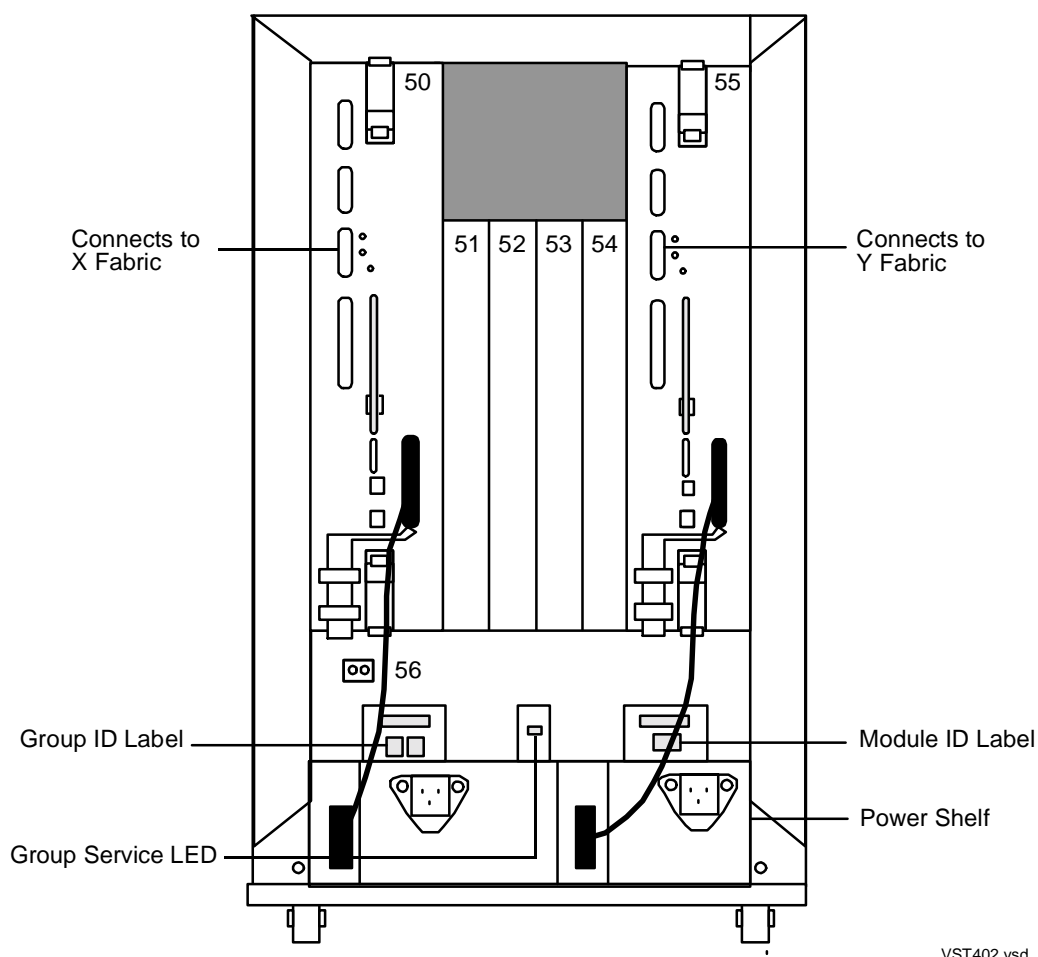
The appearance side of an I/O enclosure with a power shelf is identical to that of a processor enclosure with a power shelf.



VST622.vsd

Slot	Component
01 through 08	Disk
11 through 18	Disk
09, 10, 19, 20	SCSI terminator
21, 22	PMCU
23, 28	Battery
24, 27	Group ID switch
25, 26	Fan
29, 30	Reserved
31, 32	Power supply

Components, I/O Enclosure With Power Shelf, Service Side



Slot	Component
50, 55	IOMF CRU
51 through 54	ServerNet adapter
56	EPO connector

Components in NonStop S76000, S86000, and Later Configurations

NonStop S76000 and S86000 servers use the G06.16 RVU and later. The NonStop S88000 uses the G06.24 RVU and later. These conditions apply to the NonStop S7800, S76000, S86000, and later servers:

- MSEBs are required in slots 51 and 52 of all processor enclosures, 01 through 08.
- MSEBs (or SEBs) can be used in slots 53 and 54 of processor enclosures 01 through 04.
- ServerNet cabling between system enclosures uses either serial-copper or fiber-optic cables.
- No ECL cable adapters are allowed.

To perform an online memory dump (using RECEIVEDUMP or RCVDUMP) of a processor with 16 GB processor to a disk volume, you must have one 36 GB disk drive in which 20 GB is reserved for memory dump. The remaining 16 GB can be used for anything. This disk does not have to be \$SYSTEM.

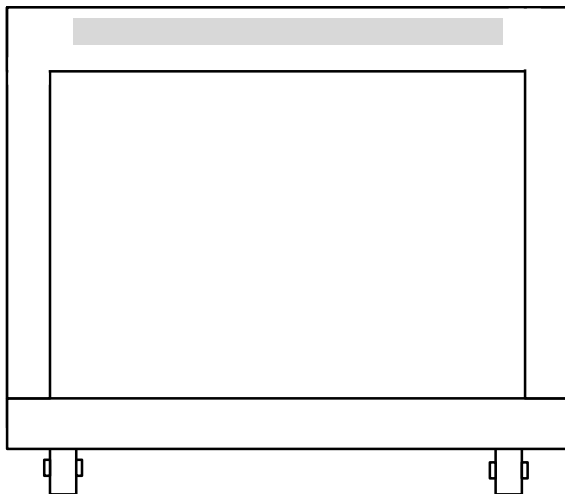
You must use one of these tape drives attached to enclosure 01 and a tape cartridge with a capacity of at least 20 GB:

- 5157, 5157ACL, and 5158ACL tape drives using DLT-IV tape cartridges
- CT9840-3 tape drive using a 9840 tape cartridge
- CT9841-x tape drive using a 9841 tape cartridge in a tape library
- 5257, 5257ACL and 5258ACL using a Super DLT tape cartridge
- N1524A LTO tape drive

Cluster Switch Enclosure

In addition to system enclosures, a NonStop cluster switch enclosure houses the 6770 ServerNet cluster components:

The cluster switch enclosure is half the height of a standard NonStop S-series system enclosure.



VST012 .vsd

For information about ServerNet clusters, see the *ServerNet Cluster Manual*.

IOAM Enclosures

An IOAM enclosure provides you with access to other storage options. It is mounted in a modular cabinet and connects to the MSEB of S76000 and later NonStop S-series systems. Up to three IOAM enclosures, a maintenance switch, two power distribution units (PDUs), and a UPS can be installed inside one cabinet. An IOAM enclosure is 11 rack units (U) high.

IOAM enclosures also can be installed in any standard 19-inch rack the customer chooses provided it is deep enough, but the number of enclosures depends on the height of the rack.

Note. IOAM enclosures and all related components are field-replaceable units (FRUs) and must be serviced by HP trained service providers. For more information about an IOAM enclosure, the *Modular I/O Installation and Configuration Guide* is available to your HP trained service provider. This manual is located in the NTL Hardware Service and Maintenance collection.

IOAM Enclosure Components

An IOAM enclosure (chassis) contains:

- I/O midplane for routing ServerNet signals
- Power midplane for routing power signals for the power-supply controls

These components are installed in an IOAM enclosure:

- Two ServerNet switch boards for routing ServerNet packets from the MSEB in the processor enclosure to the ServerNet adapters in the IOAM enclosure.
- Up to 10 new form factor ServerNet adapters. These adapters include Fibre Channel ServerNet adapters (FCSAs) and Gigabit Ethernet 4-port ServerNet adapters (G4SAs). FCSAs can be used to connect to additional storage such as Fibre Channel disk drives, Fibre Channel tape drives, or an Enterprise Storage System (ESS) disk.

Note. For more information about FCSAs and G4SAs, the *Fibre Channel ServerNet Adapter Installation and Support Guide* and the *Gigabit Ethernet 4-Port ServerNet Adapter Installation and Support Guide* are available for your service provider. For more information about Fibre Channel tape drives, see the manual for the particular tape drive product. For more information about an ESS, the *Modular I/O Installation and Configuration Guide* is available to your service provider in the NTL Hardware Service and Maintenance collection.

- Four cooling fans
- Four power supplies
- One bezel

- Cable management systems for the X and Y ServerNet switch boards and the IOAM enclosure

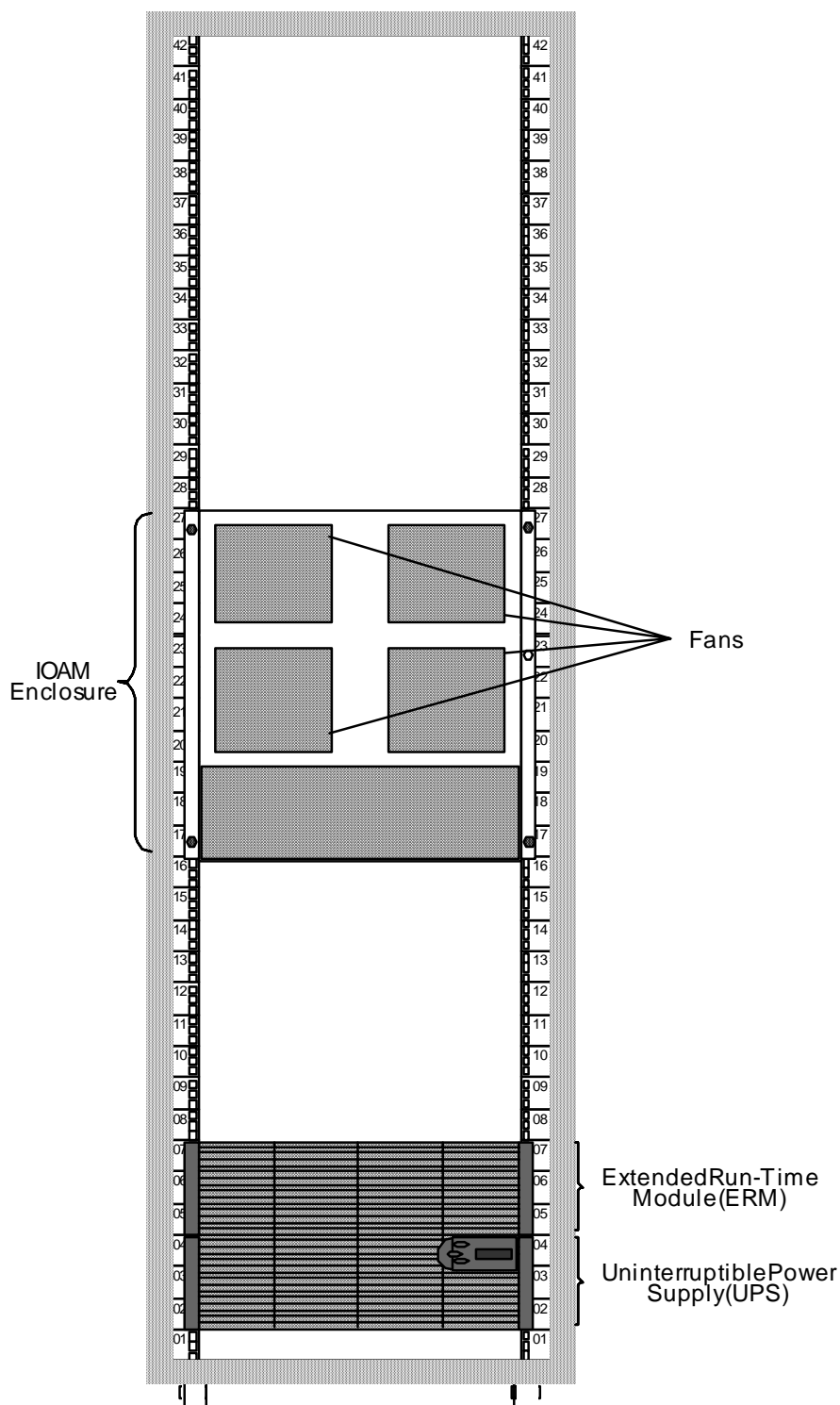
Related Components

These components are used in conjunction with IOAM enclosures:

- Maintenance switch
- Modular cabinet
- Power distribution units (PDUs)
- UPS

For additional information, see [IOAM Enclosures](#) on page 4-69.

IOAM Enclosure in a Standard 19-Inch Rack (Front)



VST196.vsd

IOAM Enclosure in a Standard 19-Inch Rack (Rear)



Disk Drive Enclosures

A disk drive enclosure contains up to fourteen Fibre Channel arbitrated loop disk drives. These disk drives connect to the server by way of FCSAs in IOAM enclosures. Disk drive enclosures are installed in modular cabinets or other 19-inch racks.

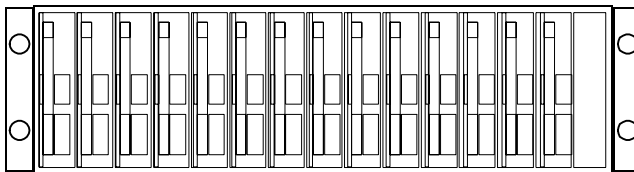
Note. Disk drive enclosures and all related components are field-replaceable units (FRUs) and must be installed by HP trained service providers. For more information about a disk drive enclosure, the *Modular I/O Installation and Configuration Guide* is available to your HP trained service provider. This manual is located in the NTL Hardware Service and Maintenance collection.

Disk Drive Enclosure Components

These components are located in a disk drive enclosure:

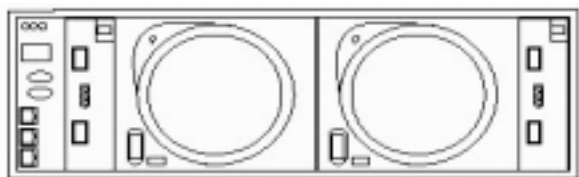
- Blowers (two) circulate cooling air through the disk drive enclosure
- Fibre Channel disk drives or drive blanks (fourteen)
- Environmental Monitoring Unit (EMU) monitors the enclosures and detects conditions such as failed power supplies, blowers, elevated temperatures, and external air sense faults.
- Fibre Channel arbitrated loop I/O modules (FC-AL-A and FC-AL-B) route data to and from the disk drives using Loop A and Loop B.
- Power supplies (two), located behind the blowers, supply power to the disk drive enclosure.

Disk Drive Enclosure, Front View



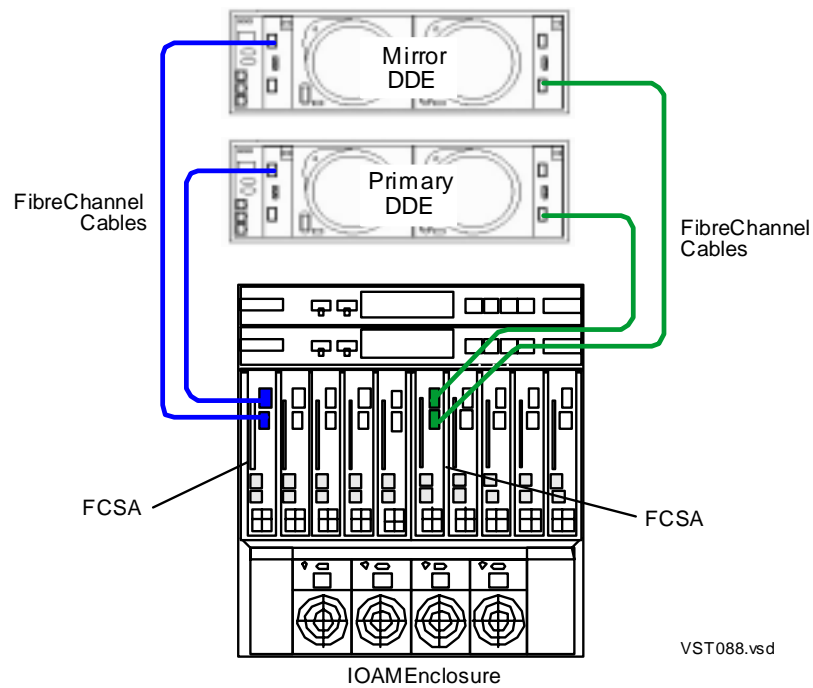
VST805.vsd

Disk Drive Enclosure, Rear View



VST804.vsd

Typical Disk Drive Enclosure Connections (2 FCSAs)



CRU Identification, System Enclosures

Customer-replaceable units (CRUs) are hardware components that can be serviced and replaced by customers. Not all components in a system enclosure are CRUs. CRUs are identified by their physical location in a processor enclosure or I/O enclosure: their group, module, and slot numbers.

Group

A group consists of all components accessible to a pair of service processors (SPs) in a system enclosure. In NonStop S-series servers, an enclosure contains one group.

Module

A module is a set of components that shares a backplane. In NonStop S-series servers, a group contains one module. In contrast, HP NonStop Integrity S4000 servers, which also implement ServerNet architecture, have several modules in a group.

Slot

A slot is a physical, labeled space in a module in which a CRU can be installed.

CRU Identification

CRU locations in a system enclosure are identified by group, module, and slot:

Identifier	Use	Label on Appearance Side	Label on Service Side
Group number	Identifies the group (the system enclosure) containing the CRU.	Visible through faceplate on appearance-side door.	On leftmost cable support and on service-side door, if present.
Module number	Identifies the module within the group. The module number is always 01 for system enclosures, and 02 and 03 for IOAM enclosures.	Inside the enclosure near the fans.	On rightmost cable support.
Slot number	Identifies the slot within the module.	Near the slot.	Near the slot.

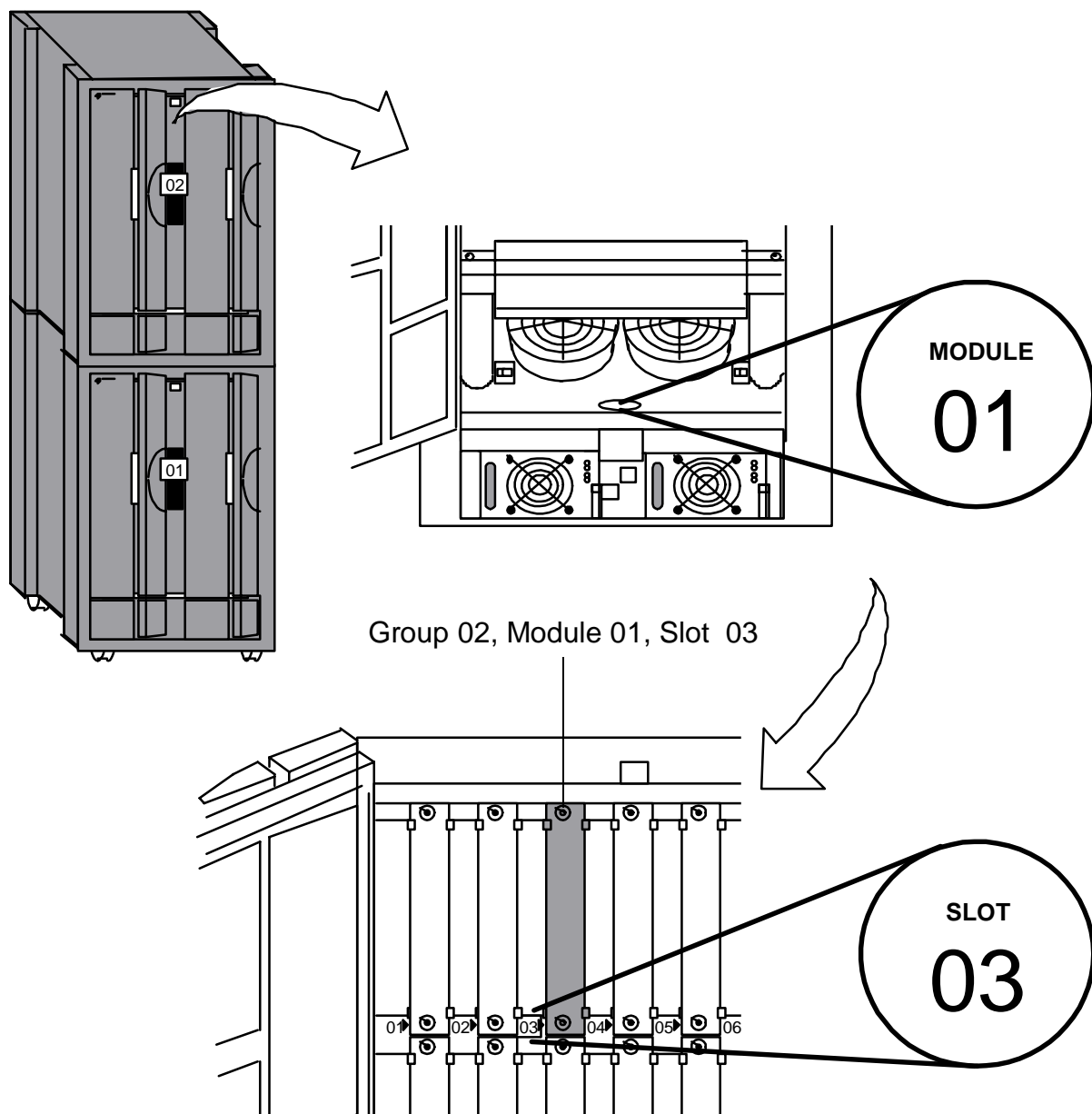
Note. Some software uses an abbreviated notation for *group*, *module*, and *slot*. For example, TSM displays the location of a fan CRU in the form:

FAN.GRP-1.MOD-1.SLOT-26

OSM displays the location of the same fan CRU in the form:

FAN (1.1.26)

This figure shows the complete CRU identification of a disk drive located in slot 03 of group 02.



VST602.vsd

FRU Identification, IOAM Enclosures

Field-replaceable units (FRUs) are hardware components that can be serviced only by service providers trained by HP. All components in an IOAM enclosure are FRUs. FRUs are identified by their physical location in an enclosure by their group, module, and slot numbers.

Group

A group consists of all components in an IOAM enclosure and derives its number from the processor enclosure to which it is cabled.

Module

A module consists of a set of components that shares a backplane. In IOAM enclosures, module 2 consists of power supplies, adapter slots, and fans in the left half of the enclosure, and module 3 is on the right half, as viewed from the rear of the cabinet. In addition, the ServerNet switch board is located in module 2 and sits on top of the other switch board in module 3.

Slot

A slot is a physical, labeled space in a module in which a FRU can be installed.

IOAM FRU Identification

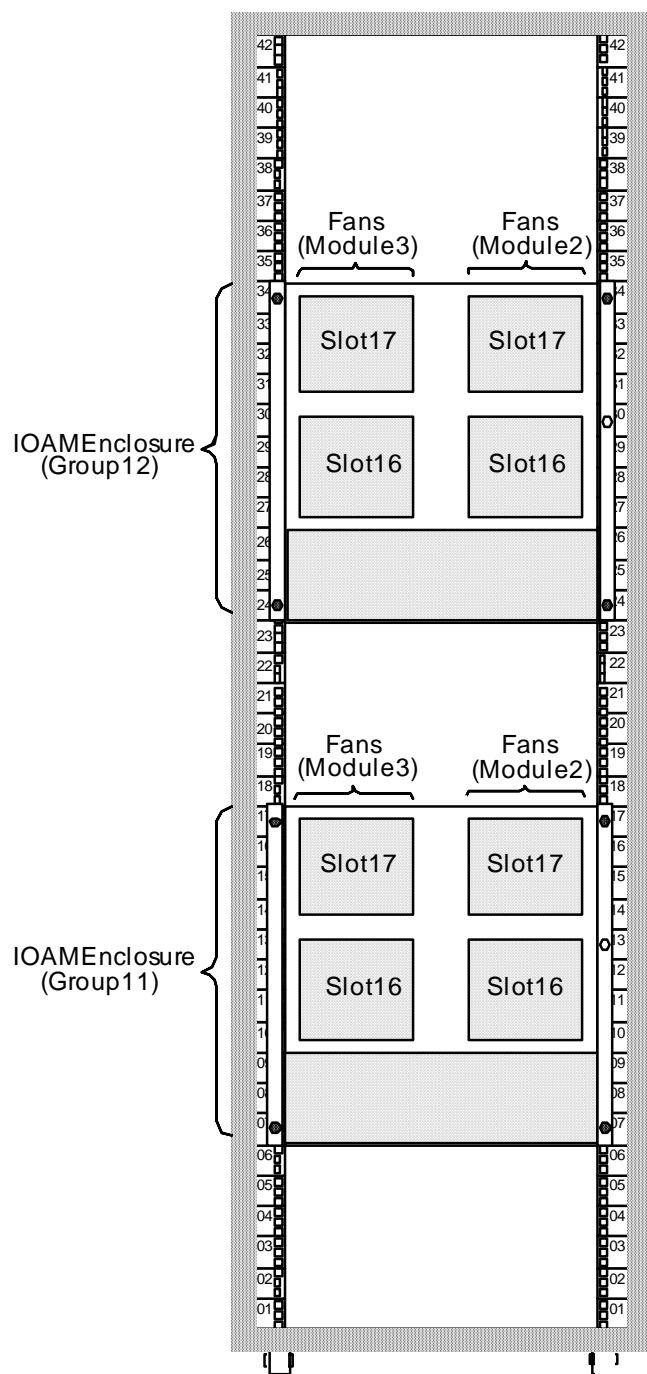
FRU locations in an IOAM enclosure are identified by group, module, and slot:

Identifier	Use	Label on the Front	Label on the Rear
Group number	Identifies the group associated with its system enclosure. The group number will be the same as if it were an I/O enclosure.	None. Identify the group number from the rear.	Displayed on the LCD in the ServerNet switch board.
Module number	Identifies the module within the group. The module number is either 02 or 03.	None. Determined by its position.	None. Determined by its position.
Slot number	Identifies the slot within the module.	Near the slot.	Near the slot.

ServerNet Switch Identification

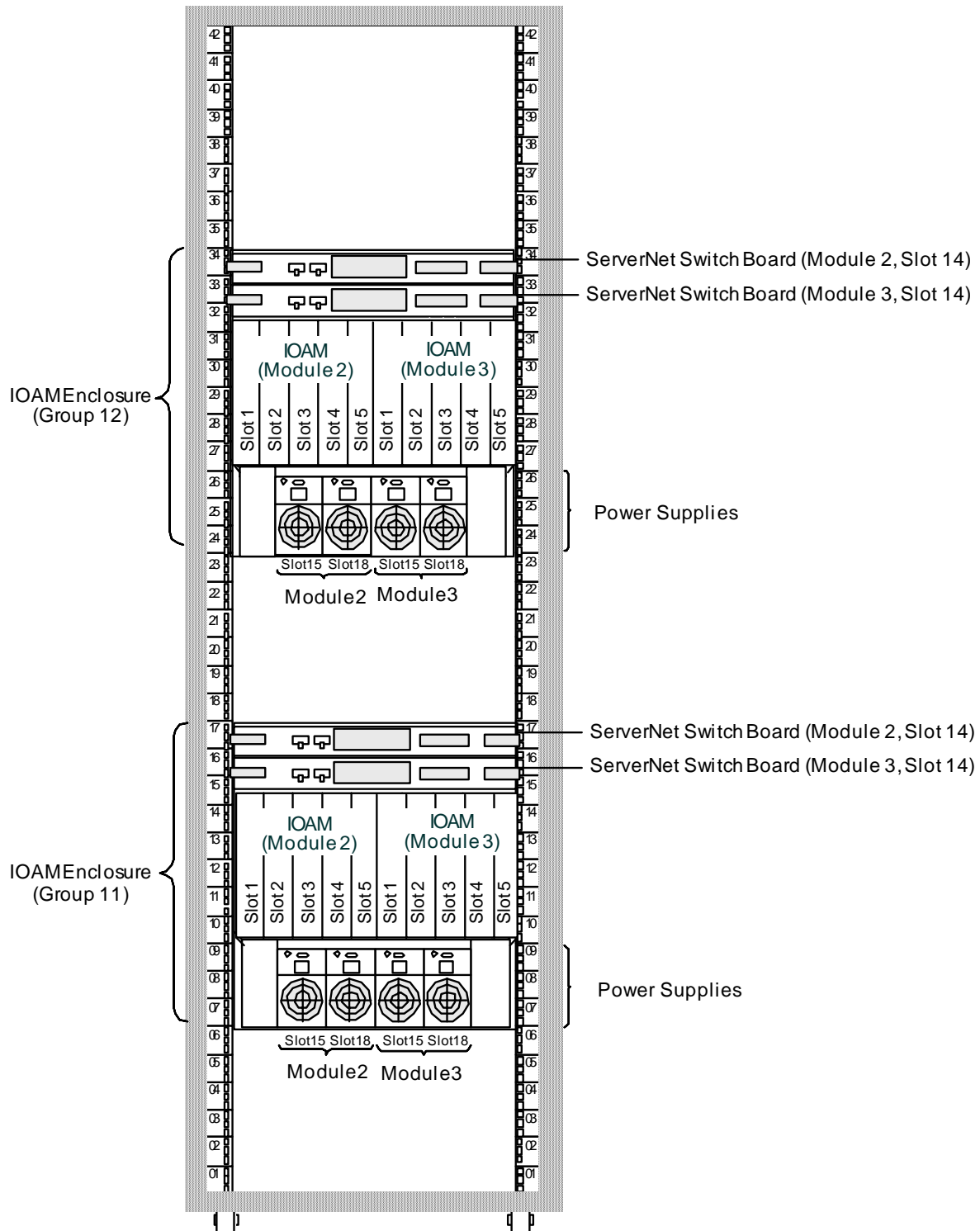
The module number of the ServerNet switch boards are displayed on the LCD in the ServerNet switch board. Also, the module and slot numbers are displayed near the slot.-; for example 2.1 for module 2, slot 1.

Group, Module, and Slot Numbers; Front of Modular Cabinet



VST005.vsd

Group, Module, and Slot Numbers; Rear of Modular Cabinet



VST006.vsd

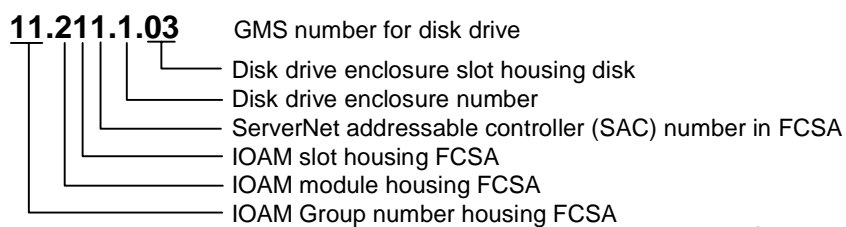
FRU Identification, Disk Drive Enclosure

Disk Drive Enclosure Group-Module-Slot Numbering

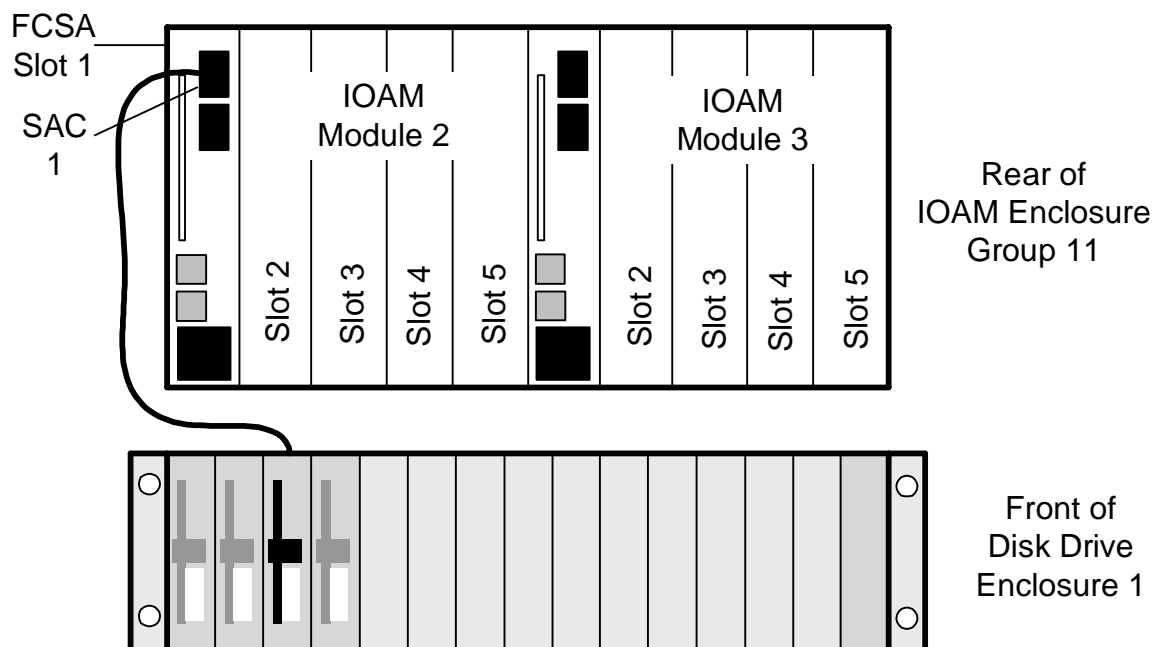
IOAM Group	IOAM Module	IOAM Slot	FCSA Controller Port	Disk Drive Enclosure Shelf	Bay	Item
11 - 15*	2 - X	1 - 5	1, 2	1 - 4 if daisy chained; 1 if single disk enclosure	0	Disk drive enclosure
21 - 25	fabric;				1-14	Disk drives
31 - 35	3 - Y				89	Transceiver A1
41 - 45	fabric				90	Transceiver A2
51 - 54					91	Transceiver B1
61 - 64					92	Transceiver B2
71 - 74					93	Left FC-AL board
81 - 84					94	Right FC-AL board
					95	Left power supply
					96	Right power supply
					97	Left blower
					98	Right blower
					99	EMU

* 11 - 15
only for
G06.25
and
G06.26

The form of the GMS numbering for a disk in a disk drive enclosure is:



VST508.vsd



509a.vsd

CRUs and FRUs

NonStop S-series system hardware components are divided into two categories: CRUs and field-replaceable units (FRUs).

CRUs

CRUs are divided into three service classes: Class-1, Class-2, and Class-3 CRUs.

Class-1 CRUs

A Class-1 CRU probably will not cause a partial or total system outage if the documented replacement procedure is not followed correctly.

Customers replacing a Class-1 CRU are not required to have previous experience with replacing CRUs. However, for some Class-1 CRUs, customers must:

- Be able to use the tools needed for the replacement procedure
- Protect components from electrostatic discharge (ESD)

Class-1 CRUs are:

Battery retainers

Cables except ServerNet cables between enclosures

Enclosure doors

External rear group service LED cable assemblies

Fans (NonStop S-series, not IOAME)

Internal and external disk drives

Loopback test connectors

Metric rack mount kits

Power cords (AC)

Power shelf front panels

Power supplies

ServerNet adapter filler panels

Class-2 CRUs

A Class-2 CRU might cause a partial or total system outage if the documented replacement procedure is not followed correctly.

Customers replacing a Class-2 CRU should have either three or more months' experience with replacing CRUs or the equivalent training. Also, they must:

- Be able to use the tools needed for the replacement procedure
- Protect components from electrostatic discharge (ESD)

Class-2 CRUs are:

3860 ATM 3 ServerNet adapters (ATM3SAs)

3861 Ethernet 4 ServerNet adapters (E4SAs)

3862 Token-Ring ServerNet adapters (TRSAs)

3863 Fast Ethernet ServerNet adapters (FESAs)

3865 Gigabit Ethernet ServerNet adapter (GESAs)

3886 asynchronous wide area network (AWAN) access servers

ServerNet cables between enclosures

ServerNet wide area network (SWAN) concentrators

ServerNet wide area network (SWAN) 2 concentrators

System consoles

Tape drives:

- 5142 digital audio tape (DAT)
- 515x digital linear tape (DLT), except 5159
- 5242 digital audio tape (DAT 72)
- 5242 ACL digital audio tape (DAT 72)
- 5258 ACL super digital linear tape (super DLT)
- 5175 open-reel
- 519x cartridge
- 9841 cartridge for automated tape library

Class-3 CRUs

A Class-3 CRU can cause a partial or total system outage if the documented replacement procedure is not followed correctly.

Customers replacing Class-3 CRUs should have either six or more months of experience with replacing CRUs or equivalent training. Also, they must:

- Be able to use the tools needed for the replacement procedure
- Protect components from electrostatic discharge (ESD)
- Understand the dependencies involved in some CRU replacement procedures, such as disk-path switching

Replacement by a HP trained service provider is recommended for Class-3 CRUs.

Class-3 CRUs are:

6760 ServerNet device adapters (ServerNet/DAs)

6763 Common Communication ServerNet adapters (CCSAs)

Fiber-optic UltraSCSI extenders

Front group service LED cable assemblies

I/O multifunction (IOMF) CRUs

I/O multifunction (IOMF) 2 CRUs

Memory units (under certain circumstances; see [Memory Units](#) on page 1-32)

Modular ServerNet expansion boards (MSEBs)

Plug-in cards (PICs)

Processor multifunction (PMF) CRUs

Processor multifunction (PMF) 2 CRUs

SCSI terminators

ServerNet expansion boards (SEBs)

Memory Units

Memory units are Class-3 CRUs for type 1950 (S7000) and 1951 (S70000) PMF CRUs. Memory units in all other types of PMF CRUs must be replaced by a manufacturing facility authorized by HP.

FRUs

These system hardware components are field-replaceable units (FRUs), which must be serviced only by HP authorized service providers.

- Backplanes

- Batteries

- Casters

- Chassis

- Disk drive enclosure

 - Blower

 - Disk drive

 - Environmental monitoring unit (EMU)

 - Fibre Channel arbitrated loop (FC-AL) I/O module

 - Power supply

- Emergency power-off (EPO) cables

- Enclosures

- Frames

- Group ID switch cables

- Internal rear group service LED cables

- IOAM enclosure components:

 - Bezel

 - Cable management system

 - Fibre Channel ServerNet adapters (FCSAs)

 - Fans (IOAM)

 - Gigabit Ethernet 4-port ServerNet adapters (G4SAs)

 - IOAM enclosure (chassis)

 - IOAM filler panel

 - Module power cord

 - Power supply

 - Rack mount kit

 - ServerNet switch boards

 - ServerNet LC-SC fiber-optic cable

- Modular cabinet:

 - Baying kit

 - Doors

 - Power distribution unit (PDU)

 - Fuse

Cabinet power cord

Modular cabinet

Side panels

Maintenance switch

Power cables (DC)

Power interface boards (PIBs)

Power monitor and control units (PMcUs)

Power shelves

6740 ServerNet/FX adapters

6742 ServerNet/FX 2 adapters

Tape drives:

5159

5257

5259

9490

CT9841FC-x

N1524A LTO

VT5xxx virtual tape

Tape libraries:

4400

9310

9710

L700

Uninterruptible power supply (UPS)

Extended run-time module (ERM)

CRU/FRU Replacement Tools

You use the following software and hardware tools to diagnose and replace failed CRUs/FRUs:

Support and Service Library	1-35
Service Management Packages	1-35
OSM Guided Procedures and Replacement Actions	1-36
TSM Guided Procedures	1-37
WAN Wizard Pro	1-41
Subsystem Control Facility (SCF)	1-42
HP Tandem Failure Data System (TFDS)	1-43
Hardware Tools	1-43

Support and Service Library

These NTL Support and Service Library categories provides procedures, part numbers, troubleshooting tips, and tools for servicing NonStop S-series systems.

- Hardware Service Maintenance Publications
- Service Information
- Service Procedures
- Tools and Download Files
- Troubleshooting Tips

Within these categories, where applicable, content might be further categorized according to server or enclosure type.

Authorized service providers can also order the Support and Service Library CD:

- Channel Partners and Authorized Service Providers: Order the CD from the SDRC at <https://scout.nonstop.compaq.com/SDRC/ce.htm>.
- HP employees: Subscribe at World on a Workbench (WOW). Subscribers automatically receive CD updates. Access the WOW order form at <http://hps.knowledgemanagement.hp.com/wow/order.asp>.

Service Management Packages

HP NonStop Open System Management (OSM) replaces TSM as the service management interface to operate and service NonStop S-series servers or ServerNet clusters. Both OSM and TSM can coexist on a system. The use of OSM is recommended for all systems that are part of a ServerNet cluster because OSM avoids generation of alarms and dial-outs on all nodes in the cluster when service actions are performed on a cluster object from any node. Starting with the G06.22 RVU, all new systems are delivered with OSM. Replacement procedures associated with OSM and TSM are treated separately in the next two subsections.

OSM Guided Procedures and Replacement Actions

OSM provides a functional equivalent for all TSM guided procedures. The OSM equivalents are more closely integrated into the OSM Service Connection. In OSM, guided procedures are either launched by OSM actions or replaced by OSM interactive actions.

[Add Node to ServerNet Cluster](#) [1-36](#)

[CRU/FRU Replacement](#) [1-37](#)

FCSA

IOAM enclosure

IOMF CRU

PMF CRU

Power supply

SEB or MSEB

ServerNet device adapter (ServerNet/DA)

ServerNet switch board

ServerNet cluster switch

[External Loopback Test](#) [1-37](#)

[SWAN CLIP Firmware Update](#) [1-37](#)

[Update Topology](#) [1-37](#)

OSM also has Replacement actions which launch service procedures (help files) for replacement of:

- Disk -drive enclosures
- Environmental monitoring unit
- FC-AL I/O modules
- Fibre Channel disk drives
- Power supplies

Add Node to ServerNet Cluster

The OSM equivalent to the Configure ServerNet Node is to use the **Add Node to ServerNet Cluster** action from the System object within the OSM Service Connection.

CRU/FRU Replacement

To replace a CRU or FRU using the OSM Service Connection:

1. Right-click the CRU you want to replace and select **Actions**
2. Select **Replace** from the list of available actions
3. Click **Perform Action**

The **Replace** action launches a guided procedure or documented service procedure to guide you through those replacements.

External Loopback Test

The OSM equivalent to Troubleshoot ServerNet Fabric is the **External Loopback Test** action on MSEB or IOMF2 PICs within the OSM Service Connection.

SWAN CLIP Firmware Update

The OSM equivalent to SWAN Fast Firmware Update is to use the **Multi-Resource Actions** dialog box in the OSM Service Connection to select, stop, update, and start the SWAN CLIPs.

Update Topology

The OSM equivalent to Add Switch is to use the **Update Topology** action from the ServerNet Cluster object within the OSM Service Connection.

TSM Guided Procedures

If you use TSM, you must use a system console to receive event messages or alarms that are generated for problems related to CRUs. For information on the TSM package, see the *TSM Online User Guide*.

Note. TSM does not support IOAM enclosures or Fibre Channel disk drives. OSM should be used to manage systems that include these components.

For information on the compatibility of TSM product versions with system software, refer to the *NonStop System Console Installer Guide*.

The guided procedures automate many of the repetitive subtasks and verifications involved in CRU replacement. They also assist you in performing manual subtasks required to replace a CRU online while maintaining the system availability.

Replacing an IOMF CRU, PMF CRU, Power Supply, or ServerNet Device Adapter	1-38
Add Switch	1-39
Configure ServerNet Node	1-39
Guided Replacement Toolkit (GRT)	1-39
Replace IOMF	1-39
Replace PMF	1-40
Replace Power Supply	1-40
Replace SEB or MSEB	1-40
Replace SNDA	1-40
Replace Switch Component	1-40
SWAN Fast Firmware Update	1-41
Troubleshoot ServerNet Fabric	1-41

Note. Before you use a guided procedure, print the appropriate sections of the online help included with all guided procedures. To access online help, select **Help > Procedure Help**.

These tools:

- Check that the system is in good working order before beginning the replacement
- Stop components affected by the replacement
- Start components after the replacement
- Can be used for replacing or upgrading CRUs

Replacing an IOMF CRU, PMF CRU, Power Supply, or ServerNet Device Adapter

In a System Running

TSM product version T7945AAW (shipped with G06.12) or earlier

TSM product version T7945AAX (shipped with G06.13) or later

G06.12 or earlier if you install SPR T7945AAX

Use

Guided Replacement Toolkit (GRT)

The guided replacement procedure for the specific CRU

The guided replacement procedure for the specific CRU

Add Switch

This guided procedure helps you to add a cluster switch to a ServerNet cluster. For more information about ServerNet clusters, refer to the *ServerNet Cluster Manual*.

Access the Add Switch guided procedure from the taskbar on your system console:

Start > Programs > Compaq TSM > Guided Configuration Tools > Add Switch

Configure ServerNet Node

This guided procedure helps you prepare a server to become a node in a ServerNet cluster. For more information about ServerNet clusters, refer to the *ServerNet Cluster Manual*.

Access the Configure ServerNet Node guided procedure from the taskbar on your system console:

Start > Programs > Compaq TSM > Guided Configuration Tools > Configure ServerNet Node

Guided Replacement Toolkit (GRT)

The Guided Replacement Toolkit (GRT) is the supported method for replacing certain CRUs on systems running G06.12 or earlier RVUs. The GRT guides you through the online replacement of the following CRUs:

- PMF CRU
- IOMF CRU
- Power supply for enclosures with power shelves
- 6760 ServerNet/DA
- Memory units

Access the GRT from the taskbar on your system console:

Start > Programs > Compaq TSM > Guided Replacement Tools > Guided Replacement Toolkit

To print the *Guided Replacement Toolkit User's Guide*, access **Help > User's Guide** and print from the link provided.

Replace IOMF

Replace IOMF is the supported method for replacing IOMF CRUs online (including IOMF 2 CRUs) online on systems running G06.13 and later RVUs.

Access the Replace IOMF guided procedure from the taskbar on your system console:

Start > Programs > Compaq TSM > Guided Replacement Tools > Replace IOMF

Replace PMF

Replace PMF is the supported method for replacing PMF CRUs online on systems running G06.13 and later RVUs.

Access the Replace PMF guided procedure from the taskbar on your system console:

Start > Programs > Compaq TSM > Guided Replacement Tools > Replace PMF

Replace Power Supply

Replace Power Supply is the supported method for replacing a power supply in a power shelf on systems running G06.13 and later RVUs.

Access the Replace Power Supply guided procedure from the taskbar on your system console:

Start > Programs > Compaq TSM > Guided Replacement Tools > Replace Power Supply

Replace SEB or MSEB

Replace SEB or MSEB is the supported method for replacing or installing an SEB or MSEB on systems running G06.13 and later RVUs.

Access the Replace SEB or MSEB guided procedure from the taskbar on your system console:

Start > Programs > Compaq TSM > Guided Replacement Tools > Replace SEB or MSEB

Replace SNDA

Replace SNDA is the supported method for replacing a 6760 ServerNet device adapter (ServerNet/DA) on systems running G06.13 and later RVUs.

Access the Replace SNDA guided procedure from the taskbar on your system console:

Start > Programs > Compaq TSM > Guided Replacement Tools > Replace SNDA

Replace Switch Component

Replace Switch Component guides you through the steps for replacing a 6770 ServerNet switch, AC transfer switch, or uninterruptible power supply (UPS).

HP recommends (but does not require) that 6770 ServerNet switches and AC transfer switches be replaced by a service provider. Only a service provider can replace a UPS.

Access Replace Switch Component from the taskbar on your system console:

Start > Programs > Compaq TSM > Guided Replacement Tools > Replace Switch Component

SWAN Fast Firmware Update

SWAN Fast Firmware Update guides you through the process of updating the firmware on the communication line interface processors (CLIPs) residing in a ServerNet wide area network (SWAN or SWAN 2) concentrator box. The SWAN Fast Firmware Update procedure can be launched only from within the TSM Service Application. No Start menu entry is available.

From the TSM Service Application, use one of the following methods to start the procedure:

- Select Display > SWAN Fast Firmware Update.
- Select the SWAN Collection object's SWAN Fast Firmware Update action.

Troubleshoot ServerNet Fabric

Troubleshoot ServerNet Fabric guides you through troubleshooting procedures for the ServerNet fabric.

Access the Troubleshoot ServerNet Fabric guided procedure on the taskbar on your system console:

Start > Programs > Compaq TSM > Guided Troubleshooting Tools > Troubleshoot ServerNet Fabric

WAN Wizard Pro

WAN Wizard Pro provides a graphical user interface (GUI) that guides you through the configuration of the following wide area network (WAN) and local area network (LAN) software and hardware:

ServerNet wide area network (SWAN) concentrators

- Ethernet adapters
- Logical interfaces (LIFs)
- TCP/IP processes that support its Ethernet connections

WAN subsystem devices

- AM3270
- ATP6100
- CP6100
- Envoy
- EnvoyACP/XF
- Expand
- SNAX/APN
- SNAX/XF

- TR3271
- X25AM input/output processes (IOPs)

LAN adapters, including

- ATM 3 ServerNet adapters (ATM3SAs)
- Common Communication ServerNet adapters (CCSAs)
- Ethernet 4 ServerNet adapters (E4SAs)
- Fast Ethernet ServerNet adapters (FESAs)
- Token-Ring ServerNet adapters (TRSAs)
- Gigabit Ethernet ServerNet adapters (GESAs)
- Gigabit 4 Ethernet ServerNet adapters (G4SAs)

Access WAN Wizard Pro from the taskbar on your system console. For G06.20 and earlier:

Start > Programs > Compaq TSM > Guided Configuration Tools > WAN Wizard Pro

For G06.21 and later, access WAN Wizard Pro on the taskbar on your system console:

Start > Programs > HP WAN Wizard Pro > WAN Wizard Pro

Subsystem Control Facility (SCF)

The Subsystem Control Facility (SCF) manages communications subsystems, storage subsystems, and system and user-created generic processes. CRUs can be replaced online manually using SCF commands. However, when guided procedures are available for online replacement, they are the only supported method for replacement. Refer to [Guided Procedures](#) on page 1-11.

For further information on using SCF, refer to these manuals:

- *SCF Reference Manual for G-Series RVUs*
- *45xx Modular Disk Subsystem Manual for G-Series Releases*
- *5190/5194 Modular Tape Subsystem Manual*
- *AWAN 3886 Server Installation and Support Guide*
- *LAN Configuration and Management Manual*
- *SCF Reference Manual for the Kernel Subsystem*
- *SCF Reference Manual for the Storage Subsystem*
- *WAN Subsystem Configuration and Management Manual*

This is a partial list of manuals that use SCF.

HP Tandem Failure Data System (TFDS)

The HP Tandem Failure Data System (TFDS) isolates software problems and provides automatic processor-failure data collection, diagnosis, and recovery services.

For more information on TFDS, refer to the *Tandem Failure Data System (TFDS) Manual*.

Hardware Tools

You might need these hardware tools when replacing a CRU:

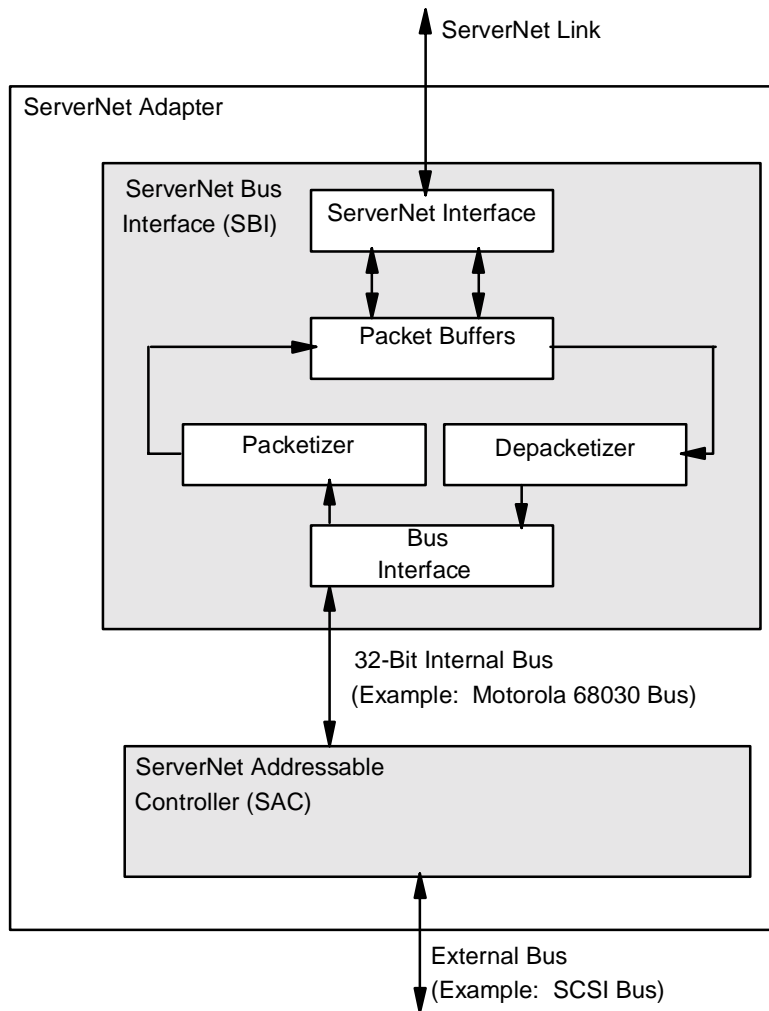
Tool	Purpose
Electrostatic discharge (ESD) protection kit	Protect electronic components against electrostatic discharge
Phillips screwdriver	Loosen and tighten Phillips screws
Short Phillips screwdriver	Loosen and tighten the AC power cord retainer screw on a PMF CRU or IOMF CRU
Set of Torx screwdrivers (including T-25)	Loosen and tighten Torx screws on the ServerNet/DA, CCSA, and visual image package
Utility knife	Cut packing tape and as needed for easing components, such as light-emitting diodes (LEDs), out of their openings in a system enclosure
Wire cutters	Cut cable ties
Cable ties	Secure cable assemblies to cable tie mounts in a system enclosure
5/32-inch (4-mm) hexagonal wrench	Unlock enclosure doors
Pointed implement (like the end of a straightened wire paper clip)	Change the group ID switch settings
Flashlight	Inspect connector pins and peer into dark places

ServerNet Architecture

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ServerNet Adapter

A ServerNet adapter provides the interface between a ServerNet fabric and an I/O bus such as a SCSI bus. A ServerNet adapter contains a ServerNet bus interface (SBI) and one or more ServerNet addressable controllers (SACs). This figure is a simplified block diagram of a ServerNet adapter:



VST901.vsd

ServerNet Addressable Controller (SAC)

A ServerNet addressable controller (SAC) is a controller that is uniquely addressable within one or more ServerNet address domains. A SAC is a component of a ServerNet adapter.

ServerNet Link

A ServerNet link consists of two unidirectional point-to-point communication paths, one in each direction.

A ServerNet link connects a ServerNet router to:

- A ServerNet node
- Another ServerNet router

ServerNet Node

A ServerNet node is a system in a ServerNet cluster. ServerNet nodes send and receive ServerNet packets.

ServerNet Packet

ServerNet packets are sent and received by ServerNet nodes. A ServerNet packet consists of a header, an address field, a 0-to-64-byte data field, and a 32-bit cyclic redundancy check (CRC) checksum covering the entire packet. The header contains fields for control, destination, and source fields to identify the processor or I/O device transmitting and receiving the packet. The address field contains the memory address where the data in the packet will be loaded.

ServerNet packets negotiate the network using a technique called wormhole routing.

ServerNet Router

A ServerNet router routes ServerNet packets along ServerNet links.

The router 1 used in NonStop S700, S7000, S7400, S70000, and S72000 servers is a six-port crossbar switch that can simultaneously connect any input with any output.

The NonStop S7600, S74000, and later servers use the router 2, which is a twelve-port crossbar switch.

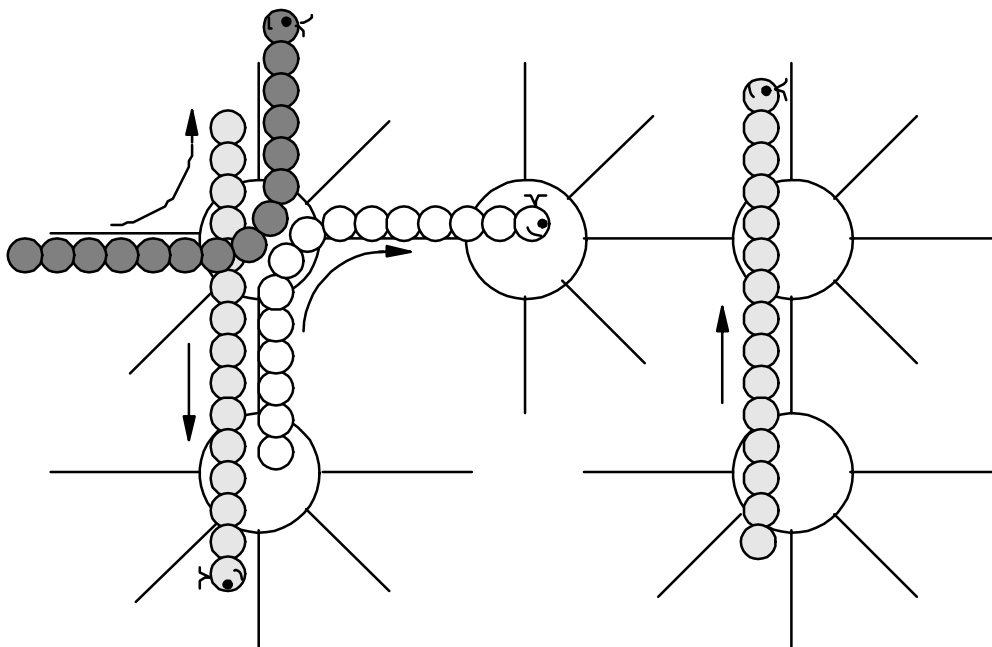
Wormhole Routing

Wormhole routing is a technique for routing ServerNet packets through ServerNet routers. Packets are immediately switched to the appropriate output ports as soon as they arrive at the router.

Wormhole routing has the following advantages over store-and-forward routing, where a packet is completely received by a router before it is sent along to its destination:

- A packet is sent on to its destination as soon as enough of the packet header has been received to determine the correct path to the destination.
- A packet can span several routers simultaneously.
- Routers do not have to perform processing that is required for store-and-forward routing.

In this figure, the big circles represent routers, the lines represent ServerNet links, and the worms represent ServerNet packets:



VST107.vsd

ServerNet Fabric

A ServerNet fabric is a collection of connected routers and ServerNet links that form an internal or external network. Two separate, identically configured fabrics, called the X fabric and the Y fabric, together provide a fault-tolerant interconnection for the ServerNet network.

Each processor connects to both fabrics. Typically, ServerNet adapters also connect to both fabrics. The X fabric and the Y fabric are not connected through routers to each other. A ServerNet packet cannot cross from one fabric to the other.

Networking

This subsection introduces the following terms and concepts related to networking:

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Protocols	1-49
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Parallel Library TCP/IP	1-49
Simple Network Management Protocol (SNMP)	1-49
File Transfer Protocol (FTP)	1-49
Point-to-Point Protocol (PPP)	1-50
Remote Procedure Call (RPC)	1-50
Internet Protocol (IP)	1-50
Challenge Handshake Authentication Protocol (CHAP)	1-50
IP Addresses	1-50

Ethernet

Ethernet is a standardized way of physically connecting computers and devices such as workstations and printers together to create a local area network (LAN). It is the most common way to set up a LAN. Ethernet specifies what kind of cables must be used, how the cables can be connected together, how long the cables can be, and how the computers transmit data to one another using the cables.

Protocols

Transmission Control Protocol (TCP)

Transmission Control Protocol (TCP) is a connection-oriented protocol that provides for the reliable exchange of data between a sending and a receiving system, no matter how many intermediate nodes the data traverses. TCP regards the data as a stream of bytes (it is not record-oriented) and guarantees that all data sent is received by the destination system and arrives in the order in which it was sent.

TCP/IP

TCP/IP is a set of layered communications protocols for connecting workstations and larger systems. TCP/IP is actually two distinct, but closely related, protocols—the [Transmission Control Protocol \(TCP\)](#) and the [Internet Protocol \(IP\)](#).

Parallel Library TCP/IP

Parallel TCP/IP is an HP product that provides increased performance and scalability over conventional TCP/IP. Parallel Library TCP/IP coexists with conventional TCP/IP on NonStop S-series systems and supports Ethernet 4 ServerNet adapters (E4SAs), Fast Ethernet ServerNet adapters (FESAs), Gigabit Ethernet ServerNet adapters (GESAs), Gigabit 4 ServerNet adapters (G4SAs), and ServerNet wide area network (SWAN and SWAN 2) concentrators.

NonStop TCP/IPv6

NonStop TCP/IPv6 is an HP product that adds IP version 6 (IPv6) functionality to the Parallel Library TCP/IP product. IPv6 is a TCP/IP protocol that extends the IP version 4 (IPv4) address of 32 bits to 128 bits. NonStop TCP/IPv6 can be run in three modes:

Mode	NonStop TCP/IPv6 supports ...
INET	Only IPv4 and is a direct replacement for Parallel Library TCP/IP
INET 6	Only IPv6
DUAL	Both IPv4 and IPv6 communications

Simple Network Management Protocol (SNMP)

Simple Network Management Protocol (SNMP) is a protocol for managing devices from multiple vendors on a network. SNMP originated in the Internet community in the late 1980s as a means for managing [Ethernet](#) networks.

File Transfer Protocol (FTP)

File transfer protocol (FTP) is used for transferring files between hosts.

Point-to-Point Protocol (PPP)

Point-to-Point Protocol (PPP) provides a standard method for encapsulating information over point-to-point links.

Remote Procedure Call (RPC)

Remote Procedure Call (RPC) is a protocol that extends a procedure-call form of process-to-process communication to a network environment. RPC is a way for programs running on client computers to invoke the services of a program running on a server computer.

Challenge Handshake Authentication Protocol (CHAP)

Challenge Handshake Authentication Protocol (CHAP) is an Internet-standard protocol for verifying encrypted passwords. CHAP is a security protocol that is implemented using [Point-to-Point Protocol \(PPP\)](#). CHAP uses a three-way handshake for authentication. The central site initiates the challenge with a key to a “secret.” This secret is used to determine a response, which is encoded and sent back to the central site. The central site evaluates the response and either accepts or rejects it.

Internet Protocol (IP)

Internet protocol (IP) handles the routing of data through a network, which typically consists of many different (heterogeneous) subnetworks. IP is connectionless—it routes data from a source address to a destination address.

IP Addresses

Note. This information applies to TCP/IP version 4. For information about TCP/IP version 6, refer to the *TCP/IPv6 Configuration and Management Manual*

IP routes data between source and destination addresses called **IP addresses**. An IP address consists of two parts—a network address, which identifies the network, and a local address, which identifies a host within a network. A network address is concatenated with a local address to form the IP address and uniquely identify a host within a network.

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Domain Name Servers	1-53
Host Tables	1-53
Host Names and Domains	1-52
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IP Address Syntax

An IP address is a 32-bit numeric value. IP addresses are typically represented by converting the bits to decimal values an octet (8 bits) at a time and separating each octet's decimal value by a period (.). This is referred to as dot notation, or dotted decimal format. IP addresses are typically of the following form:

$n.n.n.n$

where n is a number in the range 0 through 255.

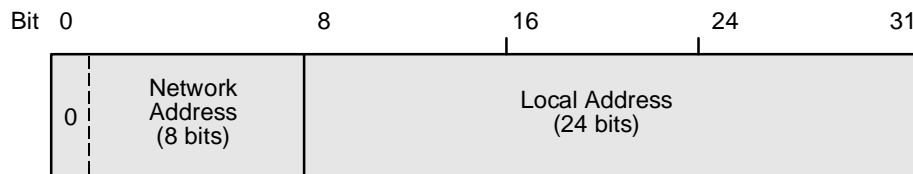
IP Address Classes

If you want to connect a LAN or a host through a gateway to any of the networks in the Internet, you must apply to have a range of IP addresses assigned to you by the Network Information Center (NIC) operated by SRI International.

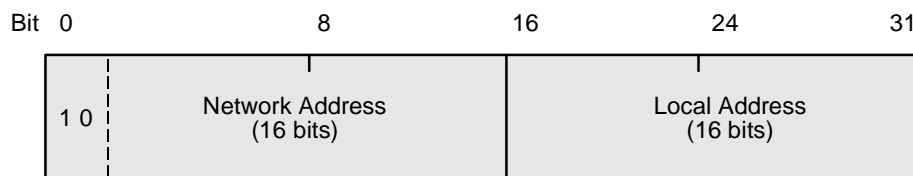
Assigned IP addresses for general use are classified as Class A, B, or C. If your LAN is stand-alone or private, you can choose a private set of IP addresses. In that case, the typical use calls for all Class A addresses.

This figure shows how the 32 bits of an IP address are divided between the network address and local address for each of the IP address classes.

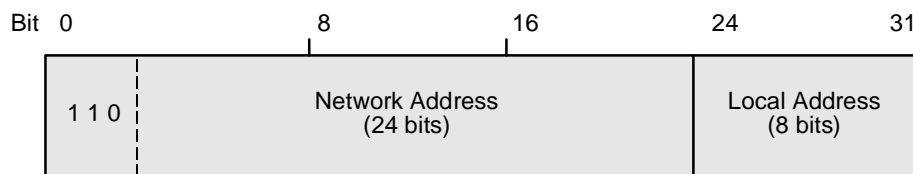
Class A IP Address



Class B IP Address

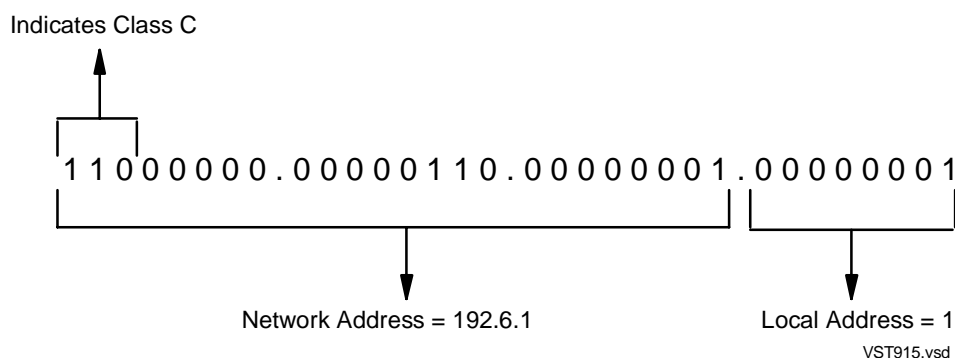


Class C IP Address



VST913.vsd

For example, to determine the network address and local address from the IP address 192.6.1.1:



The number of networks and hosts and the address ranges for each IP address class are:

Address Class	Number of Networks	Number of Hosts/Network	Address Range
A	127	16,777,215	0.0.0.0-127.255.255.255
B	16,383	65,535	128.0.0.0-191.255.255.255
C	2,097,151	255	192.0.0.0-223.255.255.255
Reserved	-	-	224.0.0.0-255.255.255.255

Host Names and Domains

When a host is assigned a unique IP address, the host is usually also assigned a unique host name. If a host can communicate with systems worldwide, its name must be unique throughout the world. The Domain Name System (DNS) defines a hierarchical, yet distributed, database of information about hosts on a network. The hierarchy allows the name space to be divided into independently managed partitions called domains. You can ensure that your host name is unique by requesting domain names from the NIC. (This process is very similar to the assignment of IP addresses.)

Host names have two component parts that identify a name domain and a specific host within that domain. Host names are written as a series of labels separated by dots, starting with a computer's name, then the locally created domains to the NIC delegated domain, and finally the top-level domain.

This example shows a fully qualified host name for the host named `mypc` in the domain `DevInc.com`:

`mypc.DevInc.com`

Locally you can refer to the computer as `mypc`. A user outside your local network would refer to the computer as `mypc.DevInc.com`. The NIC ensures that `DevInc.com` is unique, and the local administrator ensures that `mypc` is unique within the `DevInc.com` domain.

Domain Name Servers

Every domain is served by a domain name server. A domain name server takes host names and converts them into IP addresses (name-to-IP-address mapping). You are not required to use a domain name server unless your network connects to the Internet. In that case you must use a domain name server.

Host Tables

If your system is on a small, isolated network, it is possible to map host names to IP addresses using a host table. A host table is a file of host names and addresses that is read directly in your system console.

NIS Domain Names

The Network Information Service (NIS), formerly known as Yellow Pages, is a distributed name service developed by Sun Microsystems. NIS domains serve the same purpose as DNS domains. Unlike DNS, however, NIS cannot be implemented at the Internet level.

Subnet Addressing

In the DNS model, each network can be divided into a number of subnetworks (or subnets). Within a given network, each subnet is treated as a separate network. Outside that network, the subnets appear to be part of a single network.

Subnet addressing (or subnetwork addressing) is an extension of the IP addressing scheme that allows a site to use a single IP address for multiple physical networks. Outside a site that uses subnet addressing, routing continues as usual by dividing the IP address into a network address and a local address. Inside a site that uses subnet addressing, the local address portion of the IP address is further divided into a subnet address (identifying a particular subnet) and a host number (identifying the host system within the subnet).

All hosts on the same physical LAN cable are assigned the same subnet address. Hosts on different LANs are distinguished by unique subnet addresses. All hosts on a particular network, although possibly on a different subnet, share the same network address.

Subnet Masks

A 32-bit subnet mask is used to identify the part of an IP address that represents the subnet address. All bits of the subnet mask corresponding to the network address and the subnet address are set to 1, and all bits corresponding to the host number are set to 0.

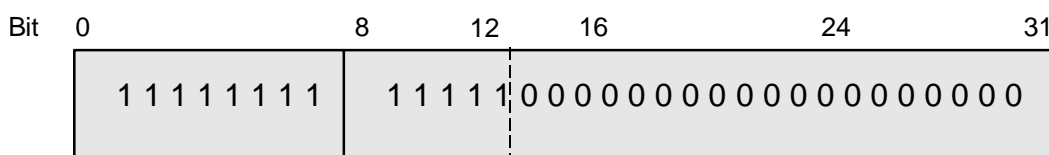
This figure shows a Class A IP address in which the first 5 bits of the local address are designated as the subnet address, leaving the last 19 bits of the local address to

identify the host number. The subnet mask consists of thirteen 1s (corresponding to 8 bits of network address and 5 bits of subnet address) followed by nineteen 0s.

Class A IP Address



Subnet Mask



Dotted Decimal Equivalent of Subnet Mask

255 • 248 • 0 • 0

VST914.vsd

The subnet mask in the previous figure designates bits 0 through 12 as the subnet address and bits 13 through 31 as the host number.

This figure shows the effect of applying the subnet mask 255.248.0.0 to the Class A IP address 73.18.11.135:

Dotted Decimal Format IP Address

73 • 18 • 11 • 135

IP Address in Binary

Bit	0	8	12	16	24	31
	0 1 0 0 1 0 0 1	0 0 0 1 0	0 1 0	0 0 0 0 1 0 1 1	1 0 0 0 0 1 1 1	

Subnet Mask

Bit	0	8	12	16	24	31
	1 1 1 1 1 1 1 1	1 1 1 1 1	0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	

Full Subnet Address = 73.2 Host Number = 2.11.135

VST916.vsd

The ServerNet Communications Network

The ServerNet communications network is a low-cost, high-speed network within a NonStop S-series system that connects processors to each other and to peripheral controllers.

This network offers the interconnectivity of a standard network, but does not depend on shared resources such as interprocessor buses or I/O channels.

Instead, the ServerNet communications network is implemented using the ServerNet architecture, which is wormhole-routed, full-duplex, packet-switched, and point-to-point. This network offers low cost, low latency, low software overhead, high bandwidth, and parallel operation.

In the ServerNet architecture, each processor maintains two independent paths to other processors, I/O devices, and ServerNet adapters. These dual paths can be used simultaneously to improve performance, while ensuring that no single failure disrupts communications among the remaining system components.

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Flexibility of the ServerNet Architecture

Concurrent Messages

The ServerNet communications network allows many messages to be sent concurrently.

Processors and I/O devices communicate over point-to-point ServerNet links connected by ServerNet routers, which are crossbar switches that can simultaneously connect any input with any output.

Interconnected Components

The ServerNet communications network allows numerous connections among many types of system components. Because each ServerNet link is point-to-point, different ServerNet links can be in use simultaneously with different messages.

For example, processor 0 might receive two kinds of messages simultaneously: data from an I/O device, and messages from another processor.

This structure allows you to transfer data directly between any two components on the ServerNet communications network.

Fault Tolerance for Complex Operations

The ServerNet architecture extends fault tolerance to operations that previously required a system outage. You can add, online, not only individual components, but also entire enclosures.

- To add individual components online, see the NTL Support and Service Library.
- To add entire enclosures online, see the *NonStop S-Series System Expansion and Reduction Guide*.

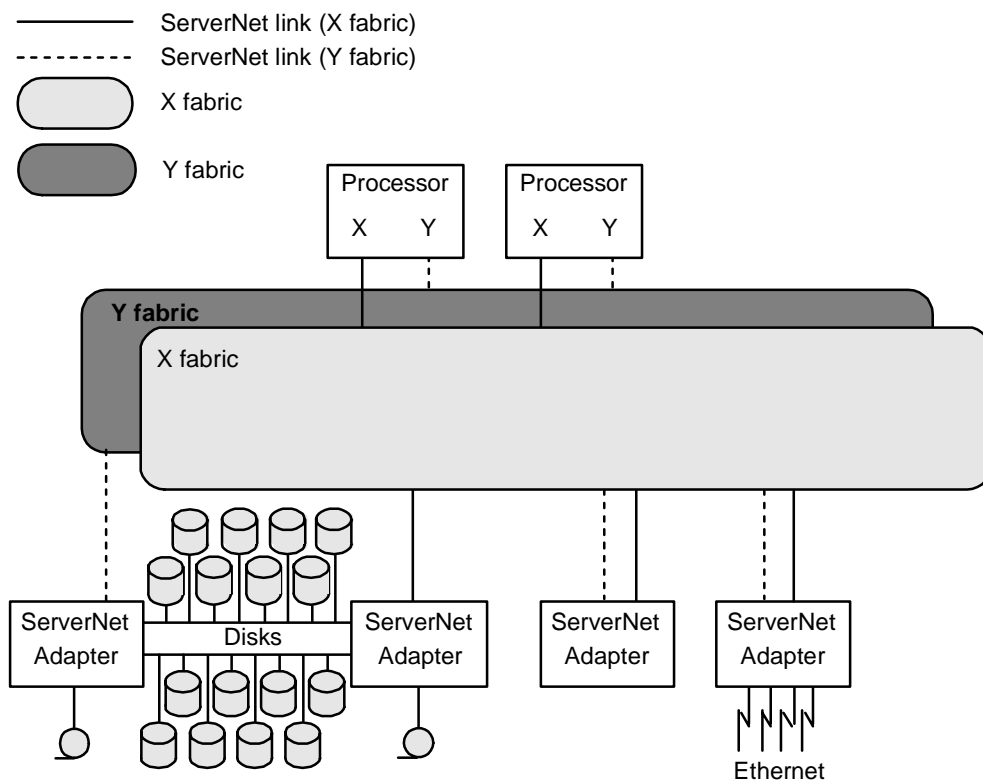
Diagramming the ServerNet Communications Network

You can represent the ServerNet communications network in simplified and detailed logical diagrams (also called ServerNet diagrams).

Simplified Logical Diagrams

Use simplified logical diagrams when it is not important to show the exact paths between endpoints on the ServerNet communications network, such as when diagramming the ServerNet architecture of an entire system. The simplified logical diagram uses lines and shaded boxes to represent links and fabrics, so it is easier to show the connections to the ServerNet adapters.

This figure is a simplified logical diagram of a typical two-processor system.

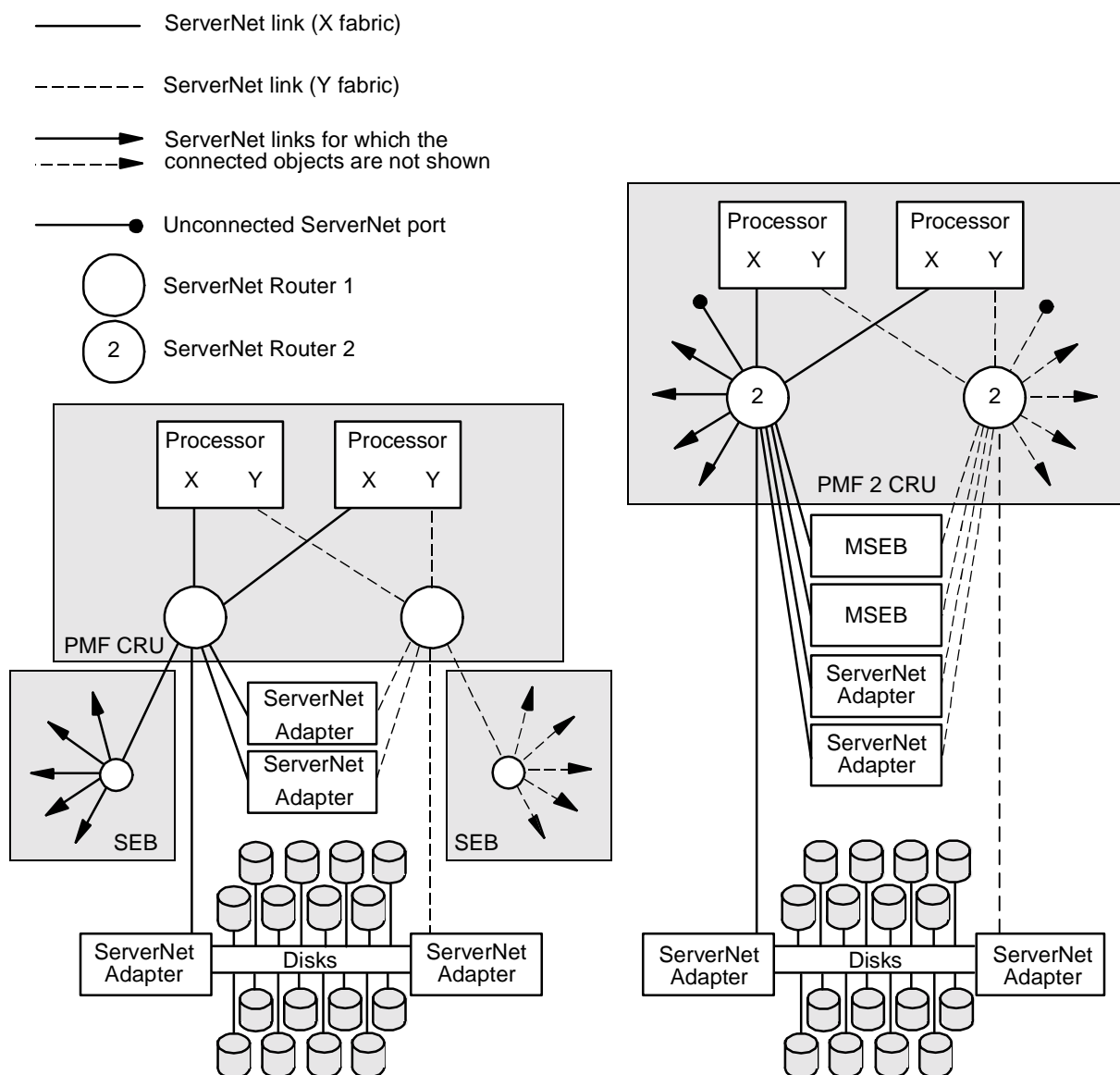


VST909.vsd

Detailed Logical Diagrams

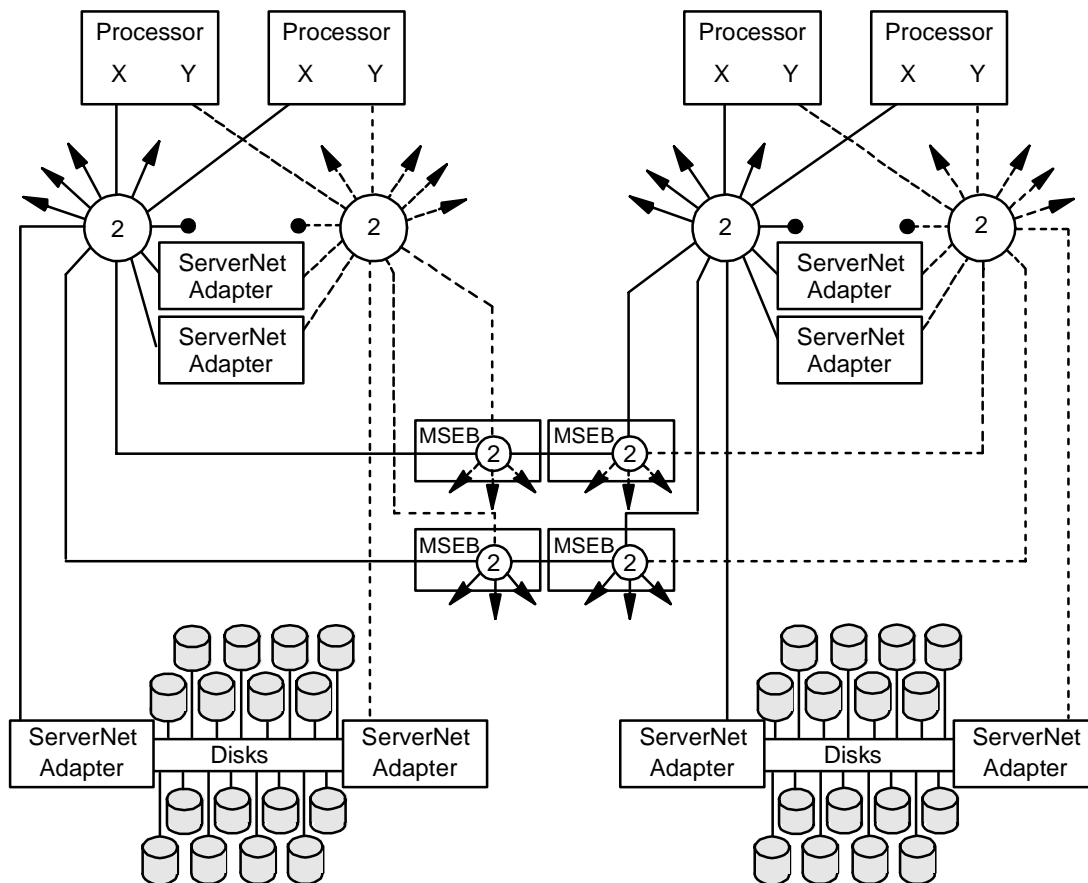
Use detailed logical diagrams when it is important to show the details of the ServerNet links and routers. The X or Y fabric is represented by a collection of circles and lines that represent individual routers and ServerNet links.

This figure is a detailed logical diagram of typical two-processor systems, one using ServerNet router 1s, the other using ServerNet router 2s. It shows that for components using ServerNet router 1, the slots housing the SEBs have one connection to the PMF CRUs. For components using ServerNet router 2, the slots housing the MSEBs have two connections to the PMF CRUs.



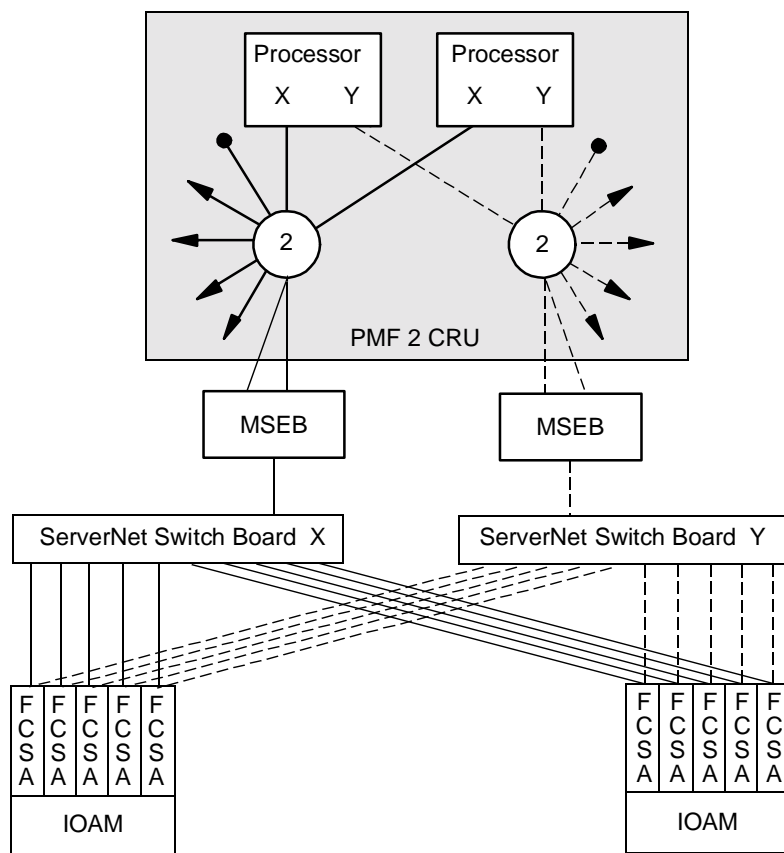
VST908.vsd

This figure is a detailed logical diagram of a four-processor system.



VST111.vsd

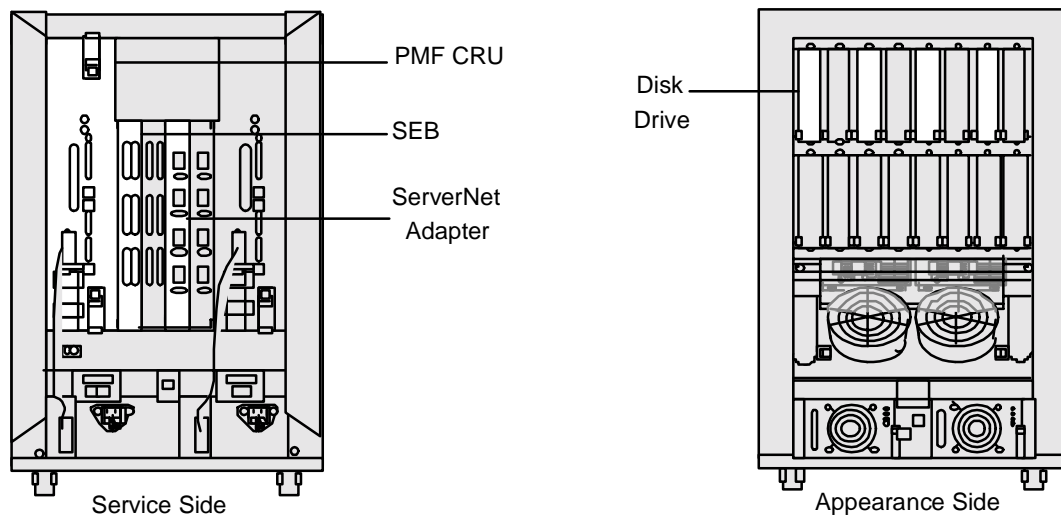
This figure is a detailed logical diagram of a two-processor system connected to an I/O adapter module (IOAM) enclosure.



VST299.vsd

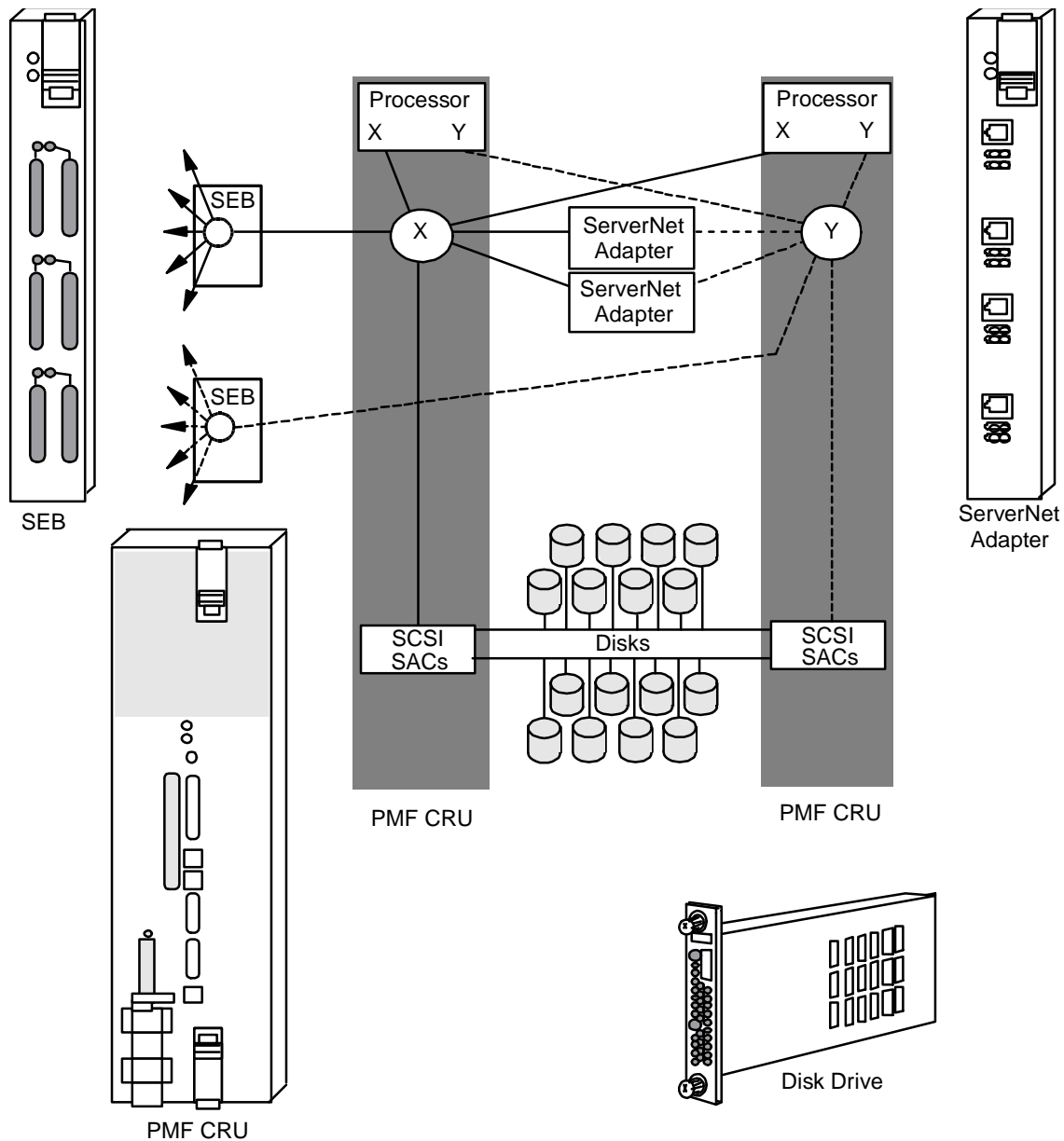
How Logical Diagrams Relate to Server Hardware

This illustration of a processor enclosure shows the location of the hardware components that support the ServerNet communications network. These hardware components are described in detail in [Section 4, System Components](#).



VST503.vsd

This figure shows these individual hardware components and how they are symbolized in a logical diagram.



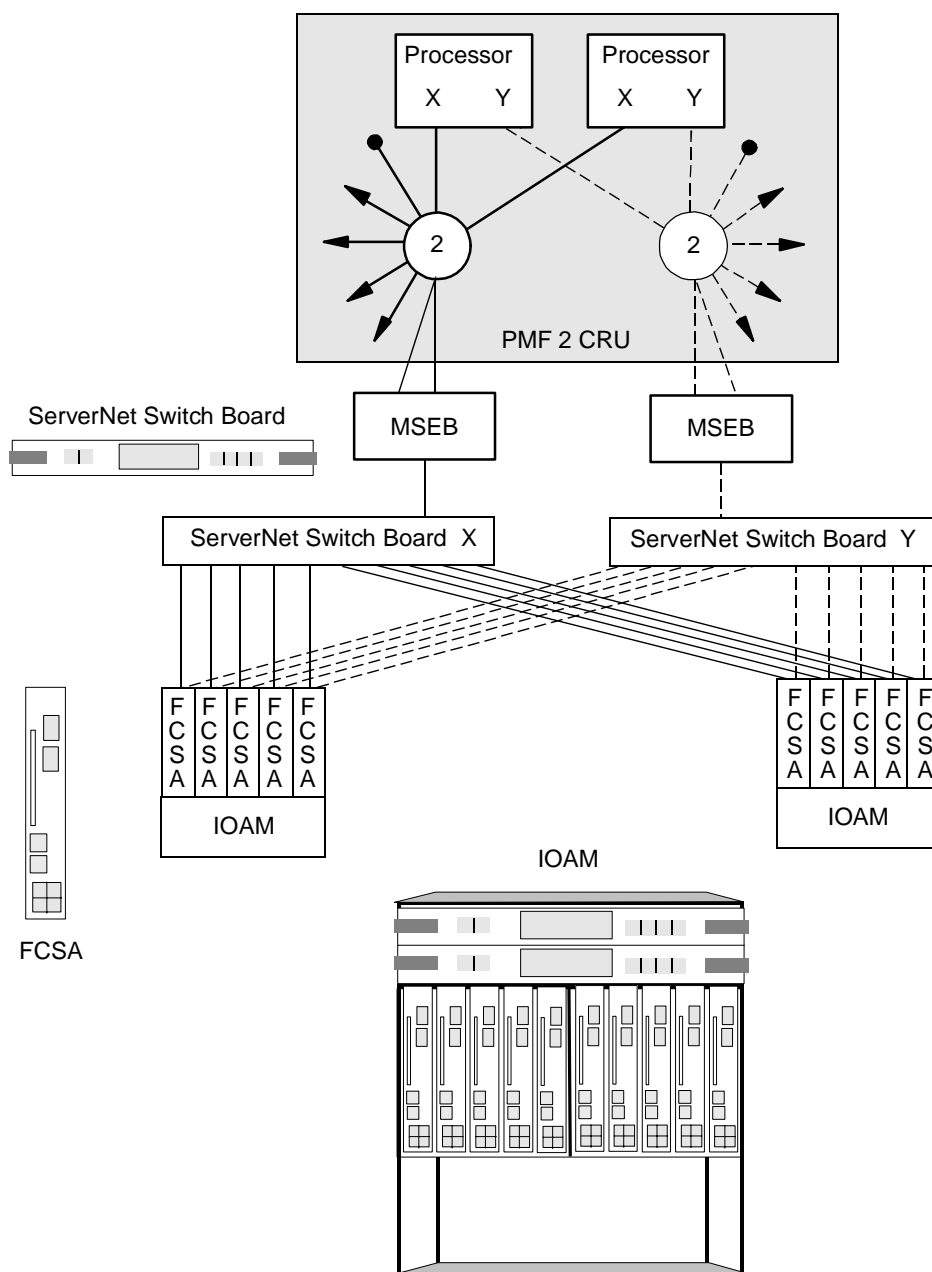
Notes:

The logical symbols illustrate only the hardware components of the ServerNet communications network, not an entire enclosure.

The hardware components are not drawn to scale.

VST502.vsd

This figure shows the individual hardware components in an IOAM enclosure and how they are symbolized in a logical diagram. The IOAM enclosure hardware components are described in detail in [Section 4, System Components](#).



VST298.vsd

Comparison to NonStop K-Series Systems

On both NonStop K-series systems and systems that use the ServerNet architecture:

- The disk drives are connected with a SCSI bus.
- Each processor maintains two independent paths to other processors.
- No single failure disrupts communications among the remaining system components.

Some of the differences between the two architectures:

NonStop K-Series System

Communications through interprocessor buses (IPBs) and I/O channels

I/O controller

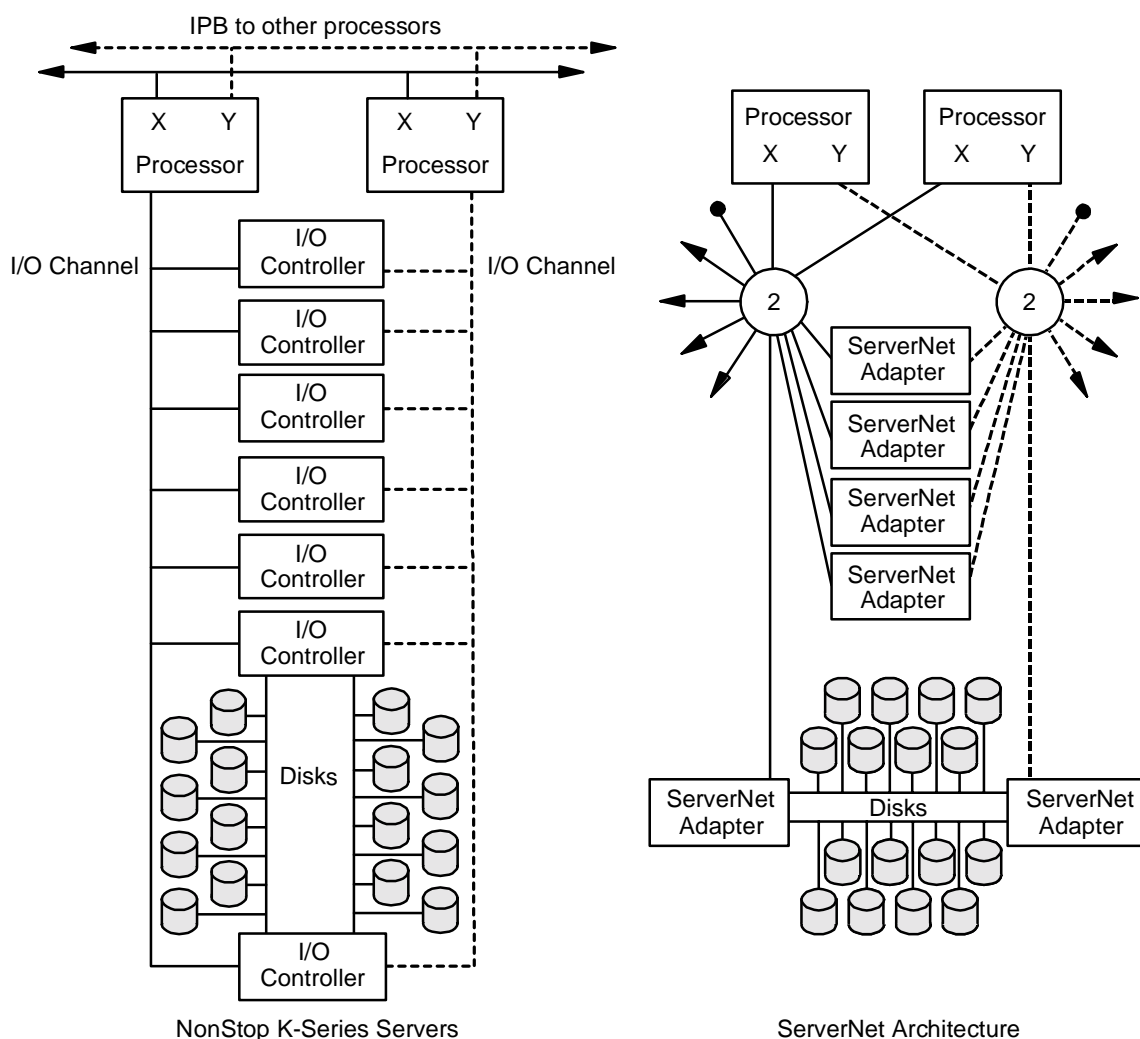
ServerNet Architecture

Communications through a ServerNet communications network:

Processor-to-processor and processor-to-ServerNet adapter

SAC on a ServerNet adapter

This detailed logical diagram compares the NonStop K-series ServerNet architecture.



VST110.vsd

3 Topologies

This section introduces the concept of the tetrahedral topology and describes the ServerNet topologies available on NonStop S-series servers.

Note. I/O adapter module (IOAM) enclosures are supported by NonStop S76000 and later NonStop S-series systems in Tetra 8 and Tetra 16 topologies.

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Tetrahedral Topology

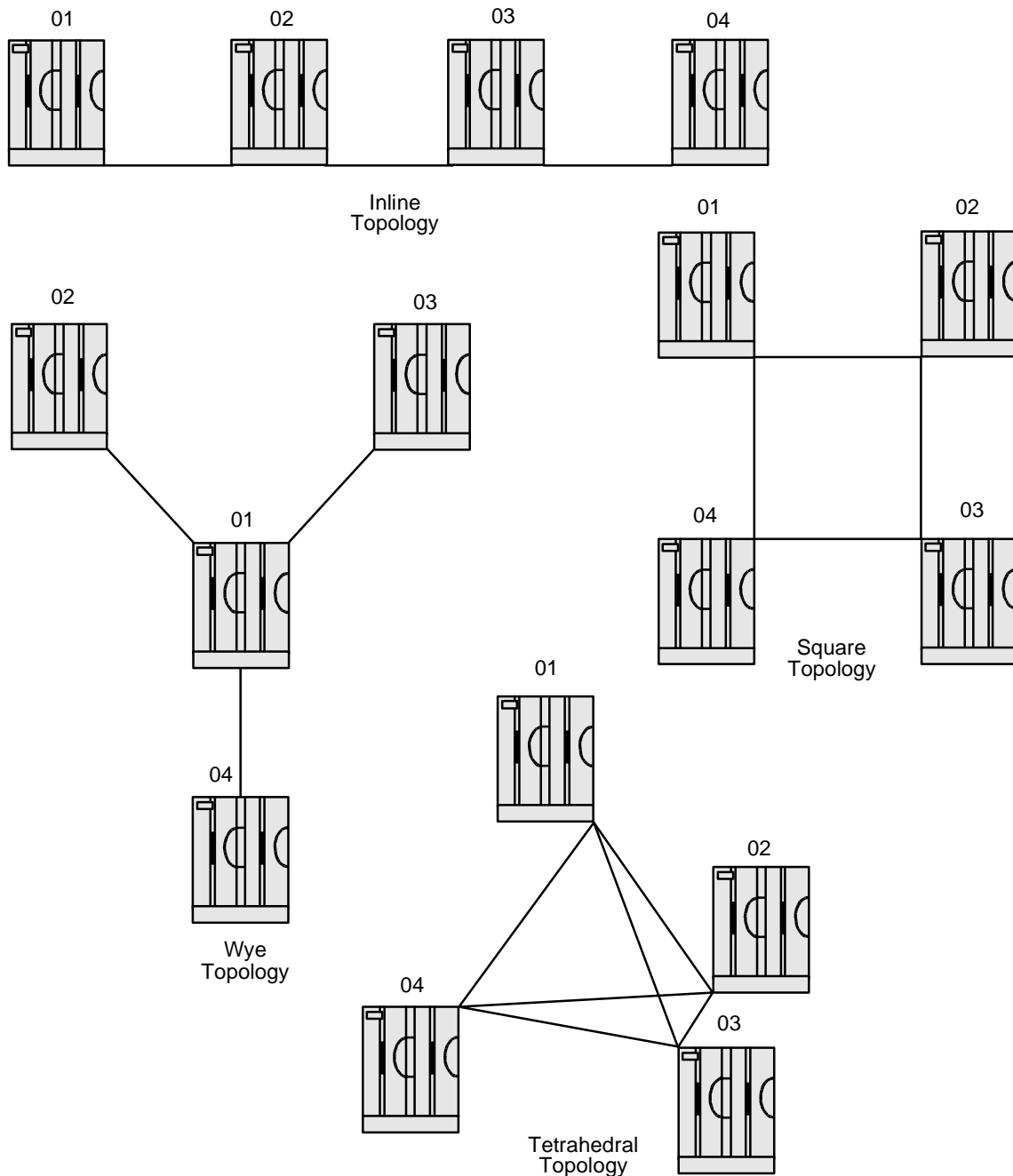
The pattern in which the enclosures of a NonStop S-series system are arranged and cabled together is called a topology. For example, four enclosures can be arranged in different topologies: straight line (inline), wye, square, or tetrahedral.

In a tetrahedral topology, the connections between the processor enclosures in the system allow each of the four enclosures to communicate directly with every other enclosure without passing the message through a second enclosure.

By comparison, in an inline topology, the first enclosure has to pass the message through two enclosures to communicate with the last enclosure. In a wye topology, the central enclosure can communicate directly with the outer enclosures, but the outer enclosures cannot communicate directly with each other. In a square topology, an enclosure can communicate directly with the two adjacent enclosures but not with the opposite enclosure.

The disadvantage of the tetrahedral topology is an increase in the number of cabling paths. Four enclosures in a tetrahedral topology require six instead of a minimal three paths for an inline topology.

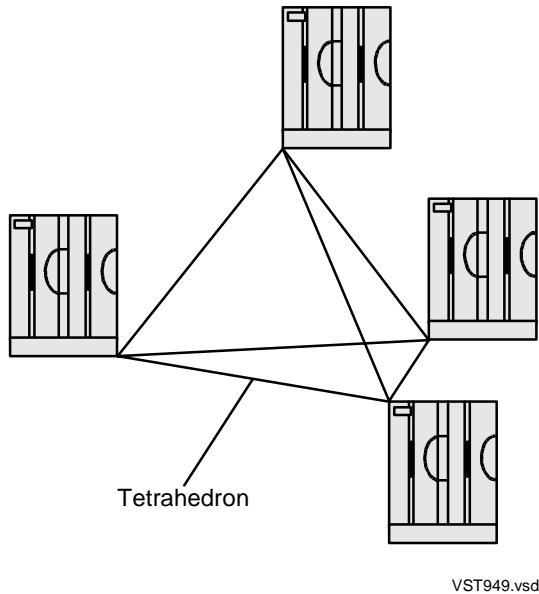
Note. The figures in this section are symbolic; they do not represent the actual wiring or enclosure placement for a server.



VST960.vsd

ServerNet Topologies

The ServerNet topologies are based on the tetrahedral topology. The connections between the first four processor enclosures of a system form a tetrahedron.



If a system has more than four processor enclosures, each additional enclosure is connected to one of the first four enclosures, at a vertex or corner of the tetrahedron. See page [3-5](#).

I/O enclosures and IOAM enclosures are connected to processor enclosures.

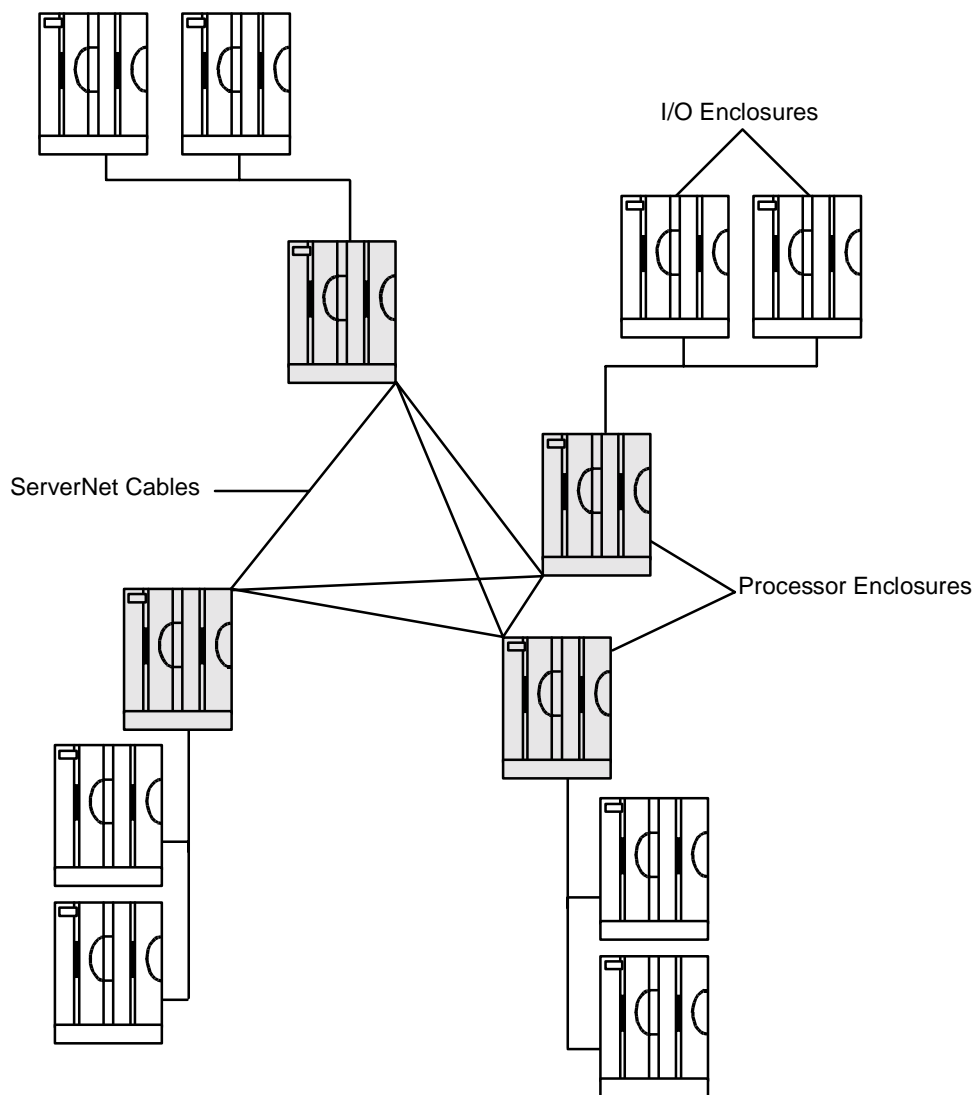
The ServerNet topologies currently supported for NonStop S-series servers are:

- | | |
|-------------------|--|
| Tetra 8 topology | Maximizes the performance of four processor enclosures, but does not support more than four processor enclosures (eight processors) and limits the number of I/O enclosures. |
| Tetra 16 topology | Allows a maximum of eight processor enclosures (16 processors) and allows more I/O enclosures than the Tetra 8 topology. |

The Tetra 8 and Tetra 16 topologies are cabled differently. When you start a system for the first time, you must specify one of the topologies in the system configuration software. To change topologies requires that you shut down the system.

Tetra 8 Topology

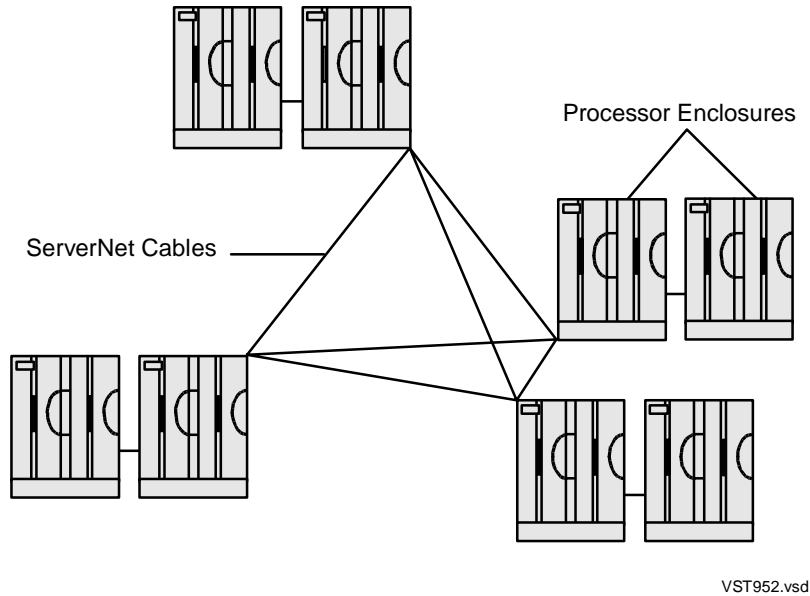
The Tetra 8 topology supports a maximum of four processor enclosures (eight processors). Each processor enclosure can have up to two I/O enclosures connected to it, for a maximum of eight I/O enclosures. One or both I/O enclosures connected to group 01 can be replaced by IOAM enclosures.



VST951.vsd

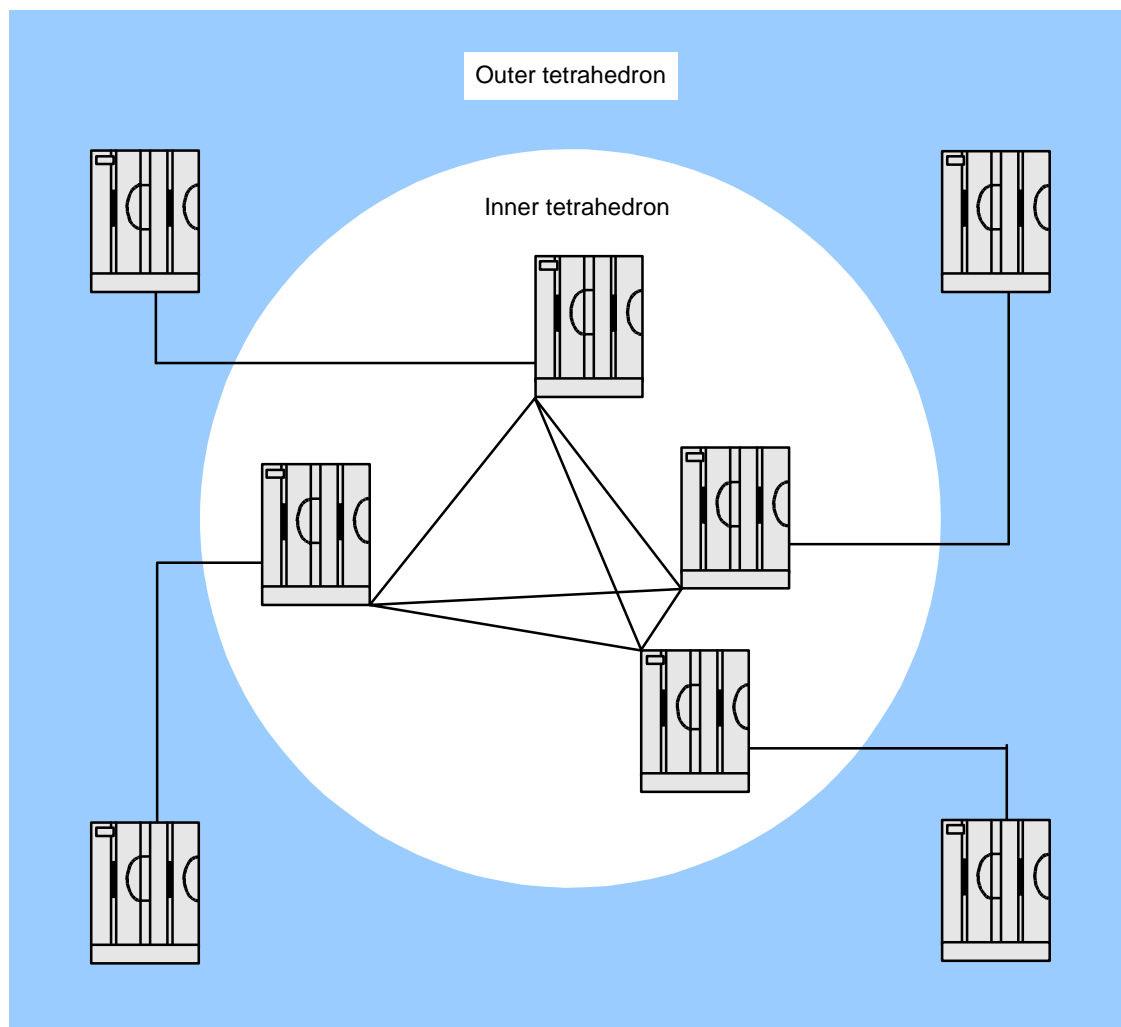
Tetra 16 Topology

The Tetra 16 topology builds on the Tetra 8 topology to a maximum of eight processor enclosures (16 processors). Each of the four processor enclosures that make up the Tetra 8 tetrahedron can have one processor enclosure connected to it.



In the Tetra 16 topology, the maximum number of I/O enclosures supported varies with the server model. A maximum of five IOAM enclosures are supported. They must all be connected to group 01. For configuration restrictions, see [IOAM Enclosures](#) on page 4-69.

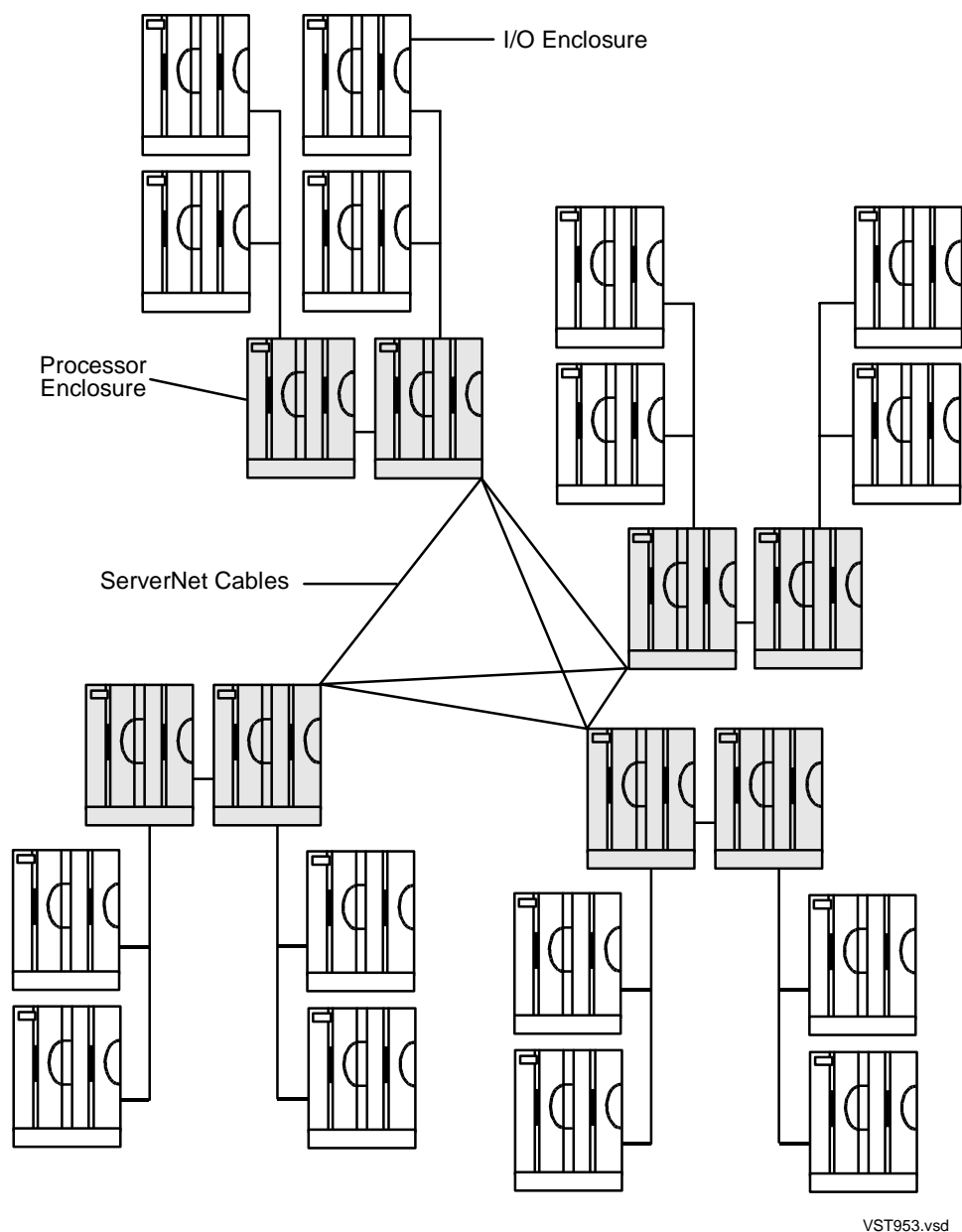
The first four processor enclosures form the *inner tetrahedron*. The rest of the processor enclosures form the *outer tetrahedron*.



VST956.vsd

The inner tetrahedrons are made up of groups 01, 02, 03, and 04, and the outer tetrahedrons of groups 05, 06, 07, and 08.

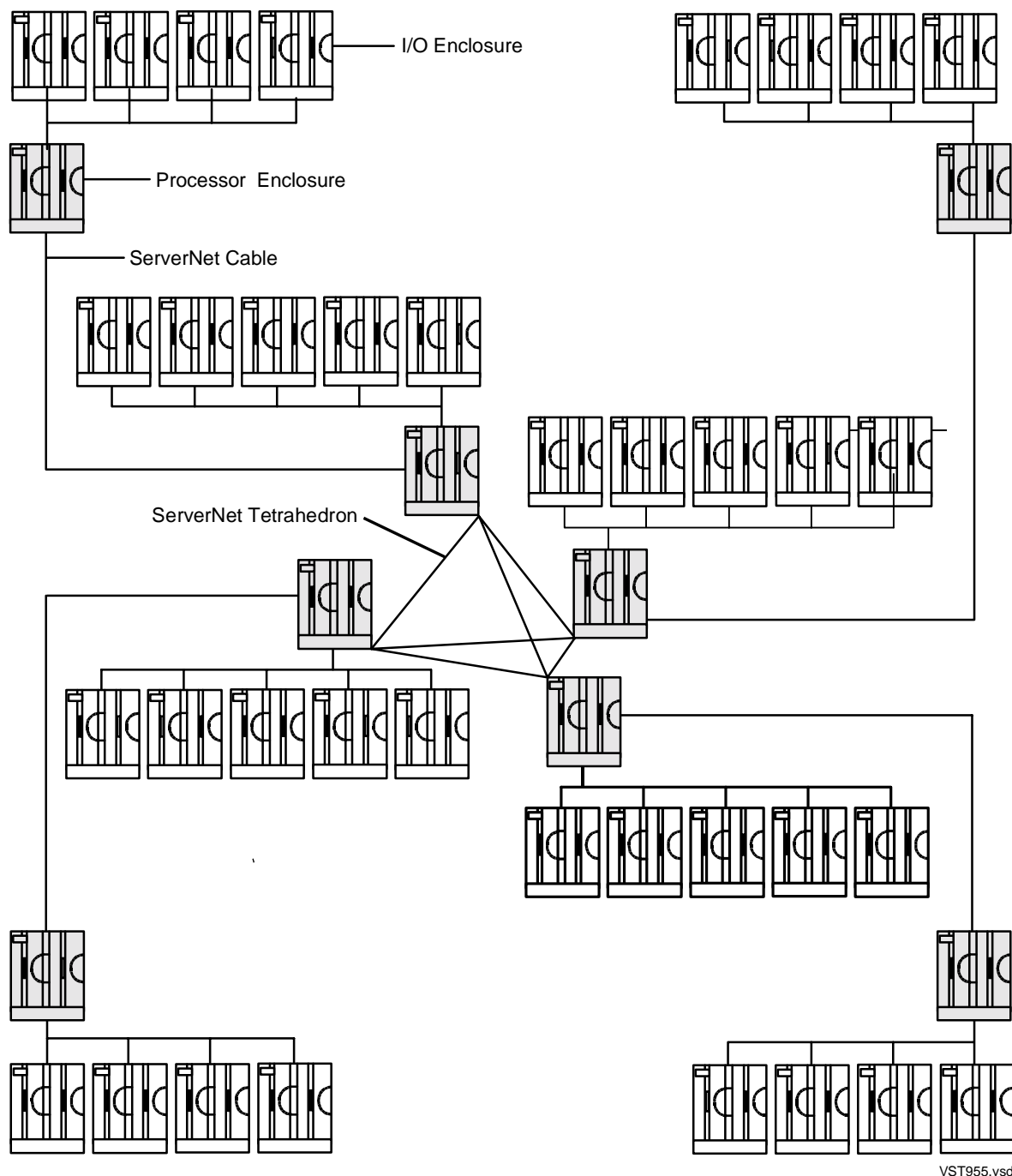
In the NonStop S7000, S7400, S7600, and S7800 servers, each processor enclosure in both the inner and outer tetrahedrons can have at most two I/O enclosures connected to it, for a maximum of 16 I/O enclosures.



In a NonStop Sxx000 system, each processor enclosure in the inner tetrahedron can have up to five I/O enclosures connected to it, and each processor enclosure in the outer tetrahedron can have up to four I/O enclosures connected to it.

Therefore, the Tetra 16 topology allows a maximum of 36 I/O enclosures.

NonStop systems populated by S76000 processors or higher, any or all of the I/O enclosures attached to group 01 can be replaced by IOAM enclosures. For configuration restrictions, refer to [IOAM Enclosures](#) on page 4-69



Topology Configuration Considerations

Considerations for planning or changing the size or topology of your system:

- Processors are always installed in pairs, two processors in each processor enclosure.
- A Tetra 8 system can have one through four processor enclosures (two through eight processors).
- You can add processor enclosures to a Tetra 8 system until the maximum of four processor enclosures (eight processors) is reached.
- A Tetra 16 system can have one through eight processor enclosures (two through sixteen processors).
- You can add processor enclosures to a Tetra 16 system until the maximum of eight processor enclosures (two through sixteen processors) is reached.
- Processor enclosures must be added to a system in order by group number.
- To change topologies, you must shut down the system. You might need to move some cables or change some system configurations.
- The NonStop S700 and other small size servers support only two processors, and it can be configured only in the Tetra 8 topology. For more information, contact your HP representative.
- Two processor enclosures are connected together with a pair of ServerNet cables, which connect a pair of SEBs or MSEBs in one enclosure and to a pair of SEBs or MSEBs in the other enclosure.
- An I/O enclosure is connected to a processor enclosure with a pair of ServerNet cables, which connect a pair of SEBs or MSEBs in the processor enclosure to a pair of IOMF CRUs or IOMF 2 CRUs in the I/O enclosure.
- An IOAM enclosure is mounted in a standard 19-inch modular rack and connects to the MSEB of S76000 and later NonStop S-series systems using multimode fiber-optic cables (with LC-SC connectors) up to a maximum length of 125 meters. The LC connector connects to the ServerNet switch board and the SC connector connects to the MSEB.
- IOAM enclosures can replace any I/O enclosure in a system starting with G06.27, and derive their group numbers from the Group I/O enclosures they displace. For the G06.26 RVU, these restrictions apply:
 - IOAM enclosures (Groups 11, 12, 13, 14, or 15) are installed only in the inner tetrahedron (Groups 01, 02, 03, and 04).
 - No I/O enclosure can be installed in the corresponding location Groups 02, 03, or 04 as shown in this table:

IOAM Enclosure Group	I/O Enclosure Groups Not Allowed for G06.26 RVUs
11	21, 31, 41
12	22, 32, 42
13	23, 33, 43
14	24, 34, 44
15	25, 35, 45

△ **Caution.** IOAM enclosures must be installed and cabled by HP trained service providers. Information is available to your HP trained service provider in the *Modular I/O Installation and Configuration Guide*.

Comparing the Tetra 8 and Tetra 16 Topologies

A system that contains more than eight processors must be configured as a Tetra 16 topology. However, a system that contains eight processors or fewer can be configured as either a Tetra 8 topology or a Tetra 16 topology.

Depending on how you use your system, one topology is likely to be more efficient than the other for your needs. Because you cannot change the topology of your system online, you should choose the topology carefully to avoid planning a system outage later.

Note. This subsection is only an overview. This guide cannot cover the unique system needs of every customer. For specific information, consult your HP representative.

Tetra 8 Topology Configurations

NonStop System	Processor Type	Processor Enclosure Group numbers	I/O Enclosure Group Numbers	IOAM Enclosure Group Numbers
S700 (two processors max)	NSR-V, NSR-W, NSR-G, NSR-T	01	11, 12	
S7000 S7400 S7600 S7800 S70000 S72000 S74000	NSR-W NSR-D NSR-E NSR-J NSR-G NSR-T NSR-V	01, 02, 03, 04	11, 12 21, 22 31, 32 41, 42	
S76000 S78000 S86000 S88000	NSR-X NSR-H NSR-Y NSR-Z	01, 02, 03, 04	11, 12 21, 22 31, 32 41, 42	11, 12

Note. All systems can have a maximum of 8 processors except the S700, which has 2.

Tetra 16 Topology Configurations

All tetra-16 systems have a maximum of 8 processor enclosures with 16 processors. S7x00 systems have a maximum of 16 I/O enclosures and S7x000 systems have a maximum of 36 I/O enclosures.

NonStopSystem	Processor Type	Processor Enclosure Group Numbers	I/O Enclosure Group Numbers	IOAM Enclosure Group Numbers	
S700	Not supported in Tetra 16 configurations				
S7000	NSR-W	Inner tetrahedron: 01, 02, 03, 04 Outer tetrahedron: 05, 06, 07, 08	Inner tetrahedron: 11, 12 21, 22 31, 32 41, 42 Outer tetrahedron: 51, 52 61, 62 71, 72 81, 82		
S7400	NSR-D				
S7600	NSR-E				
S7800	NSR-J				
S70000	NSR-G	Inner tetrahedron: 01, 02, 03, 04 Outer tetrahedron: 05, 06, 07, 08	Inner tetrahedron: 11, 12, 13, 14, 15 21, 22, 23, 24, 25 31, 32, 33, 34, 35 41, 42, 43, 44, 45 Outer tetrahedron: 51, 52, 53, 54 61, 62, 63, 64 71, 72, 73, 74 81, 82, 83, 84		Inner tetrahedron: 11, 12, 13, 14, 15
S72000	NSR-T				
S74000	NSR-V				
S76000	NSR-X				
S78000	NSR-H				
S86000	NSR-Y				
S88000	NSR-Z				

Tetra 8 Topology Features

Feature

Up to four processor enclosures are supported.

Each processor enclosure can support up to two I/O enclosures.

Processor enclosure slots 51 and 52 can contain SEBs or MSEBs. These SEBs or MSEBs support I/O enclosures.

Processor enclosure slots 53 and 54 can contain ServerNet adapters.

An IOAM enclosure can replace any group 01 I/O enclosure of a NonStop S7600 system or later

Implications

Expansion beyond four processor enclosures requires a topology change.

Expansion beyond eight I/O enclosures requires a topology change.

I/O enclosures multiply the number of available adapter slots.

If you need more adapter slots, add I/O enclosures.

Refer to [IOAM Enclosures](#) on page 4-69.

Tetra 16 Topology Features

Feature

Up to eight processor enclosures are supported.

Each processor enclosure supports:

Five I/O enclosures in the inner tetrahedron

Four I/O enclosures in the outer tetrahedron

An IOAM enclosure can replace any group 01 I/O enclosure of a NonStop S7600 system or later

Implications (page 1 of 2)

Adding processor enclosures does not require a topology change.

Adding I/O enclosures does not require a topology change.

Refer to [IOAM Enclosures](#) on page 4-69.

In the inner tetrahedron, groups 01 through 04:

Processor enclosure slots 51 and 52 always contain SEBs or MSEBs. These SEBs or MSEBs maintain ServerNet connections among all processor enclosures in the inner tetrahedron.

Processor enclosure slots 53 and 54 can contain SEBs, MSEBs, or ServerNet adapters. These SEBs or MSEBs support I/O enclosures.

All the ServerNet connectors on these SEBs or MSEBs are needed for maintaining ServerNet connections among processor enclosures.

Therefore, the SEBs or MSEBs in slots 51 and 52 are not available for supporting I/O enclosures.

You can install ServerNet adapters in slots 53 and 54 of any processor enclosure in the inner tetrahedron. However, if you do this, you cannot attach I/O enclosures to that processor enclosure.

Feature**Implications** (page 2 of 2)**In the outer tetrahedron, groups 05 through 08:**

Processor enclosure slots 51 and 52 always contain SEBs or MSEBs. These SEBs or MSEBs maintain ServerNet connections between the processor enclosure on the outer tetrahedron and its associated processor enclosure on the inner tetrahedron. Only one ServerNet connector on each SEBs or MSEBs is used for this purpose.

The SEBs or MSEBs in slots 51 and 52 have four connectors available to support I/O enclosures.

Processor enclosure slots 53 and 54 can contain only ServerNet adapters.

SEBs or MSEBs could be installed in slots 53 and 54 to attach additional I/O enclosures, but these configurations are not supported.

ServerNet Topology Configuration

A ServerNet topology configuration is a value that determines how the CRUs containing ServerNet routers (all PMF CRUs, IOMF CRUs, and SEBs, and MSEBs) are configured.

Each NonStop S-series system has two separate ServerNet topology configuration attributes:

Topology	Indicates the current ServerNet topology configuration
Topology after next power cycle	Indicates the settings for the ServerNet topology configuration to be used the next time the ServerNet routers are configured

Where the ServerNet Topology Configuration Value Is Stored

The ServerNet topology is determined by the primary SP in each enclosure. The ServerNet topology configuration value is not stored in only one place within a system. Instead, this value is stored within each system enclosure, in one of these locations:

- In the file system of both PMF CRUs or IOMF CRUs
- In the SEEROMs on the backplane (SP firmware release T1089ANN and later)

This distributed storage can make it difficult to ascertain the ServerNet topology configuration of an entire system, especially on a system where the ServerNet topology configuration value varies from CRU to CRU.

OSM, like TSM product versions 7.0 and later, reports when a system has inconsistent ServerNet topology configuration values. These product versions of OSM or TSM report a system's topology attribute as either 8, 16, or ERROR, where ERROR indicates that at least one CRU has a ServerNet topology configuration value that is different from that of the rest of the system.

The ServerNet Topology Configuration Value and CRU Replacement

When power is first applied to a PMF CRU, IOMF CRU, SEB, or MSEB, its ServerNet router is initialized. This can occur when the entire enclosure is first powered on or when one of these CRUs is inserted into a powered enclosure, such as during online CRU replacement.

If you insert a PMF CRU or IOMF CRU into an enclosure that is already initialized (powered on), the newly inserted CRU is initialized.

During a successful online CRU replacement, the ServerNet topology configuration value of the replacement CRU is overwritten by the value from the other PMF CRU or IOMF CRU in that enclosure.

If you do not follow proper PMF CRU or IOMF CRU replacement procedures, then when you insert the CRU into the enclosure, the configuration data might not be synchronized with the rest of the enclosure, which could leave the incorrect ServerNet topology configuration value stored on the newly inserted CRU. The next time that CRU is initialized, it might use the wrong ServerNet topology configuration value.

ServerNet Routing Tables

Processor enclosures in the inner tetrahedron (groups 01, 02, 03, 04) contain ServerNet routing tables that are critical. If these enclosures have incorrect ServerNet routing tables, your system does not operate correctly. For example, if group 03 contains the wrong ServerNet topology configuration value, your system cannot access any enclosures attached to that enclosure.

Note. Resetting an SP does not reconfigure ServerNet routing tables.

The ServerNet routing tables in processor enclosures in the outer tetrahedron (groups 05, 06, 07, and 08) have no effect on how your system operates. These enclosures are always automatically configured with a running ServerNet topology configuration value of Tetra 16. However, the stored ServerNet topology configuration value in these enclosures could be set to Tetra 8, which would remain Tetra 8 even after a system power cycle. This mismatch between the stored and running values is potentially confusing to system personnel. To avoid confusion, make sure that all stored ServerNet topology configuration values in the enclosures of the outer tetrahedron are Tetra 16.

All ServerNet routing tables in I/O enclosures are identical, and they have no effect on how your system operates. However, I/O enclosures can contain the wrong stored ServerNet topology configuration values for your system, and this mismatch is potentially confusing. To avoid confusion, correct any incorrect stored ServerNet topology configuration values in the I/O enclosures.

You can change stored ServerNet topology configuration values online at any convenient time. Changing the running ServerNet topology configuration values requires a system power-cycle.

4 System Components

This section describes the components of a NonStop S-series system.

Appearance Side of System Enclosures	4-1
Service Side of System Enclosures	4-16
System Console	4-66
Tape Drives	4-68
SWAN Concentrators	4-69
External Disk Drives	4-69
Metro Clusters	4-69
IOAM Enclosures	4-69

Appearance Side of System Enclosures

The appearance side of a system enclosure contains slots for these components:

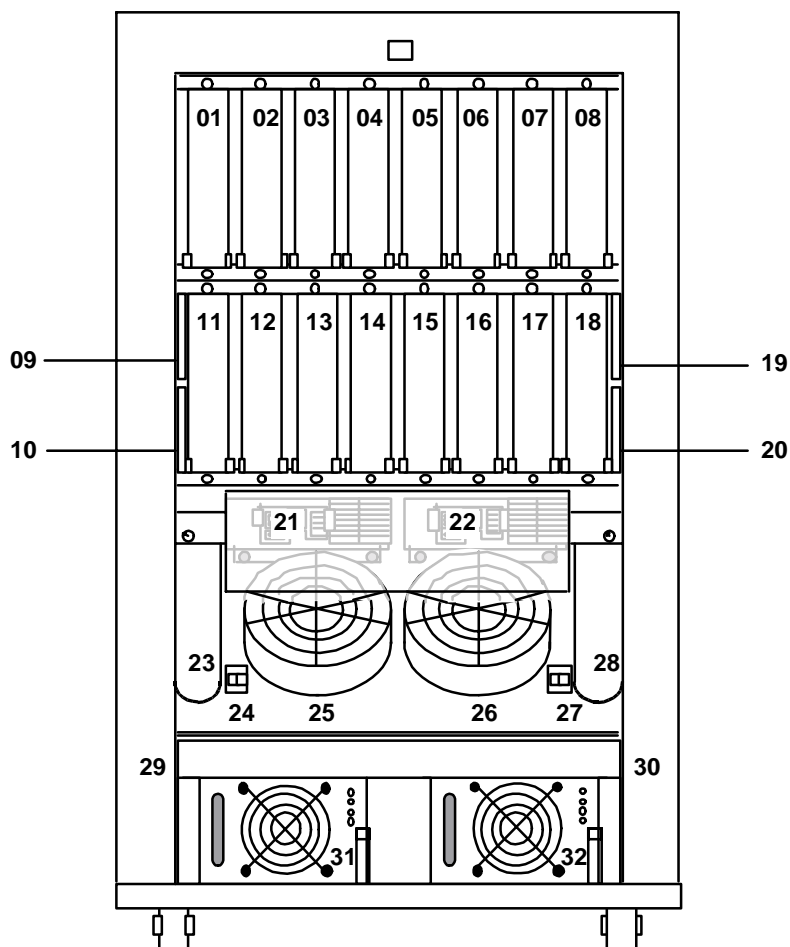
Note. For information about IOAM enclosures, see [IOAM Enclosures](#) on page 4-69.

Component	Slot Numbers	Page
Sixteen disk drives	01–08, 11–18	4-4
Four SCSI terminators	9, 10, 19, 20	4-7
Two power monitor and control units (PMcUs)	21, 22	4-8
Two batteries	23, 28	4-9
Two group ID switches	24, 27	4-10
Two fans	25, 26	4-12
Power shelf	Under the chassis	4-14
Two power supplies (only in enclosures with power shelves)	31, 32	4-14

The appearance side of a system enclosure includes these labels and LEDs:

Label or LED	Location	Page
Group ID label	Behind door (visible through faceplate)	4-3
Module ID label	Inside enclosure, near fans	4-4
Group service LED	Top of enclosure	4-4

Slot Numbers on Appearance Side of a System Enclosure

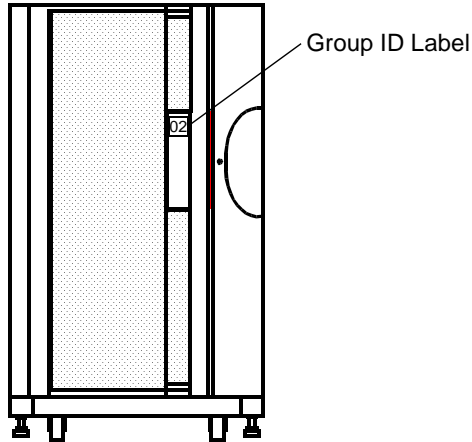


VST622.vsd

Slot	Component	Slot	Component
01–08	Disk drive	23, 28	Battery
11–18	Disk drive	24, 27	Group ID switch
09, 10	SCSI terminator	25, 26	Fan
19, 20	SCSI terminator	29, 30	(Reserved)
21, 22	PMCU	31, 32	Power supply (only in enclosures with power shelves)

Group ID Label

On the appearance side, the group ID label is visible through the enclosure door faceplate. This label identifies the group number associated with this system enclosure. For more information, see [Group ID Switches](#) on page 4-10.



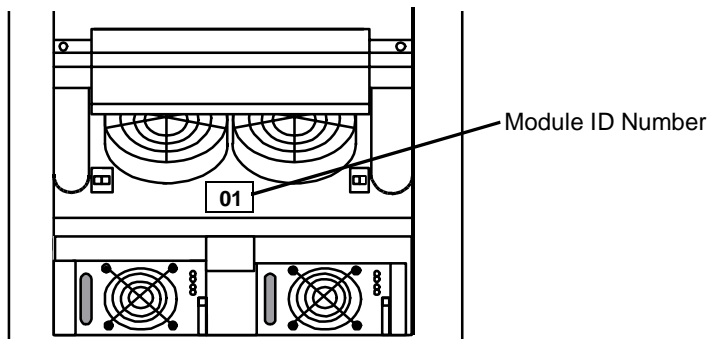
VST706.vsd

This number must match:

- The settings on the group ID switches (slots 24 and 27)
- The group ID label on the service side of the enclosure
- The group ID label on the service-side enclosure door, if present

Module ID Label

On the appearance side, the module ID label is located inside the enclosure near the fans. This label identifies the module number within this group. The module number is always 01.



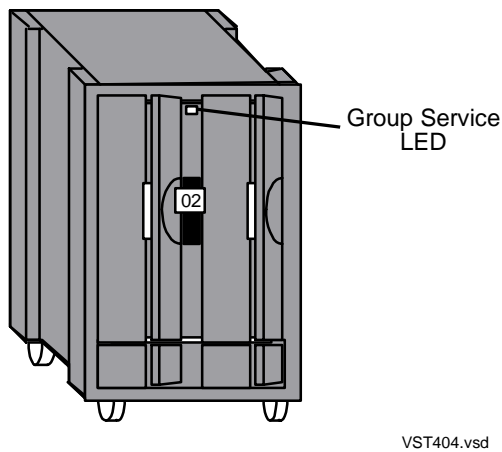
VST403.vsd

Group Service LED

On the appearance side, a group service light-emitting diode (LED) is located at the top of the enclosure.

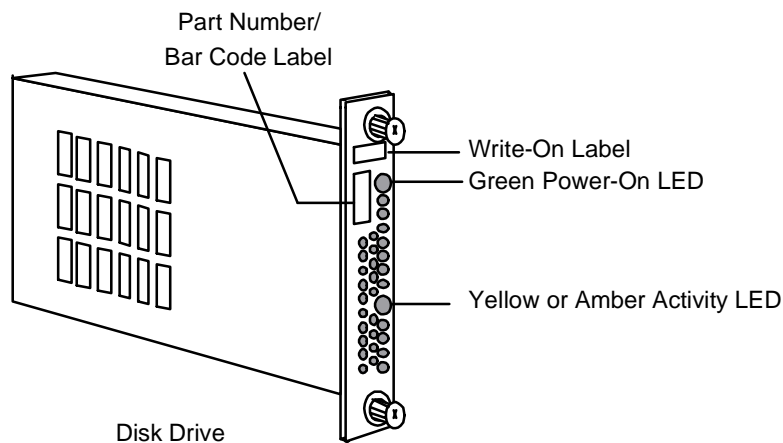
The group service LED, when lit, indicates one of the following:

- A command to light the group service LED was issued using the OSM Service Connection or the TSM Service Application.
- The group ID for this group either could not be determined or conflicts with the group ID of another group in the system. For more information, see [Group ID Switches and Stored Group Numbers](#) on page 4-11.



Internal Disk Drives

All system enclosures can contain up to sixteen internal disk drives. The disk drives occupy slots 01 through 08 and 11 through 18.



The faceplate of a disk drive includes:

- A write-on label and a part number/barcode label
- A green LED at the top that, when lit, indicates that the disk drive is operational.
- A yellow or amber LED on the lower half that indicates disk activity.

Disk drive slots are divided between two SCSI buses.

SCSI Bus Number	Disk Drive Slots
1	02, 04, 06, 08, 12, 14, 16, 18
2	01, 03, 05, 07, 11, 13, 15, 17

SCSI buses connect to ServerNet addressable controllers (SACs) on the multifunction I/O boards (MFIOBs) on the processor multifunction (PMF) customer-replaceable units (CRUs) and I/O multifunction (IOMF) CRUs. Each SCSI bus is terminated on both ends.

For fault tolerance, the two disk drives of a mirrored volume must be installed in slots that are on different SCSI buses. Two adjacent disk drive slots are on different SCSI buses.

For disk drive requirements for 16-GB processors, refer to [Disk Drives for 16-GB Processors](#) on page 8-3.

Disk Management

Location of the System Disks

Beginning with the G06.06 RVU, you can install the two disk drives of the mirrored volume \$SYSTEM in any two slots in the group 01 enclosure. That is, \$SYSTEM-P can be installed in a slot other than slot 11, and \$SYSTEM-M can be installed in a slot other than slot 12.

However, if you want to install the system disks in slots in other than 11 and 12, you must install the disks in slots that have the same SCSI ID number. If the system disks are located in slots with different SCSI IDs, the system halts. You can use any of these pairs of slots for the system disks:

SCSI ID	Primary Slot	Mirror Slot (page 1 of 2)
0	11	12
1	13	14
2	15	16
3	17	18
4	1	2

SCSI ID	Primary Slot	Mirror Slot (page 2 of 2)
5	3	4
8	5	6
9	7	8

Ensure That Alternate Volume Names Are Unique

If two disks share the same volume name and alternate volume name, you cannot access both of those disks at the same time.

This restriction also applies to \$SYSTEM. To ensure that both \$SYSTEM volumes are always accessible, verify that every disk in the system has a unique alternate volume name.

System Load Disks Are Automatically Renamed

If an alternate \$SYSTEM disk is used to load a system, that disk's name is automatically changed to \$SYSTEM in the configuration records of CONFIG file. The configuration records for that disk also become fully mirrored if they are not already.

Any other disk configuration records named \$SYSTEM are renamed with a unique disk name.

T6586AAI SPR and Alternate System Disk

If you have not installed the T6586AAI SPR on your system and if you use an alternate system disk for a system load, the system disks will not be able to use the configuration files that are created during this load.

If this situation occurs, update the CONFIG file:

1. Move the CONFIG file to a disk in slot 11 or 12 of group 01.
2. Perform a system load with a SYS_{nn} on which you have installed the T6586AAI SPR.

Disk Drives Are Shipped Already Formatted

Disk drives you receive from HP are already formatted; there is no disk format utility. You must return any disk drive that requires formatting to HP. For information about initial configurations of disk drives, refer to [Internal Disk Drives](#) on page 8-3

Disks Can Be Interleaved

Beginning with the G06.06 RVU, mirrored disk volumes can be interleaved by installing each half of the mirrored disk volume in a separate enclosure. For more information, see the Enclosure Interleaving for Storage Devices on page 9-9.

36-GB Disk Drive Requirement

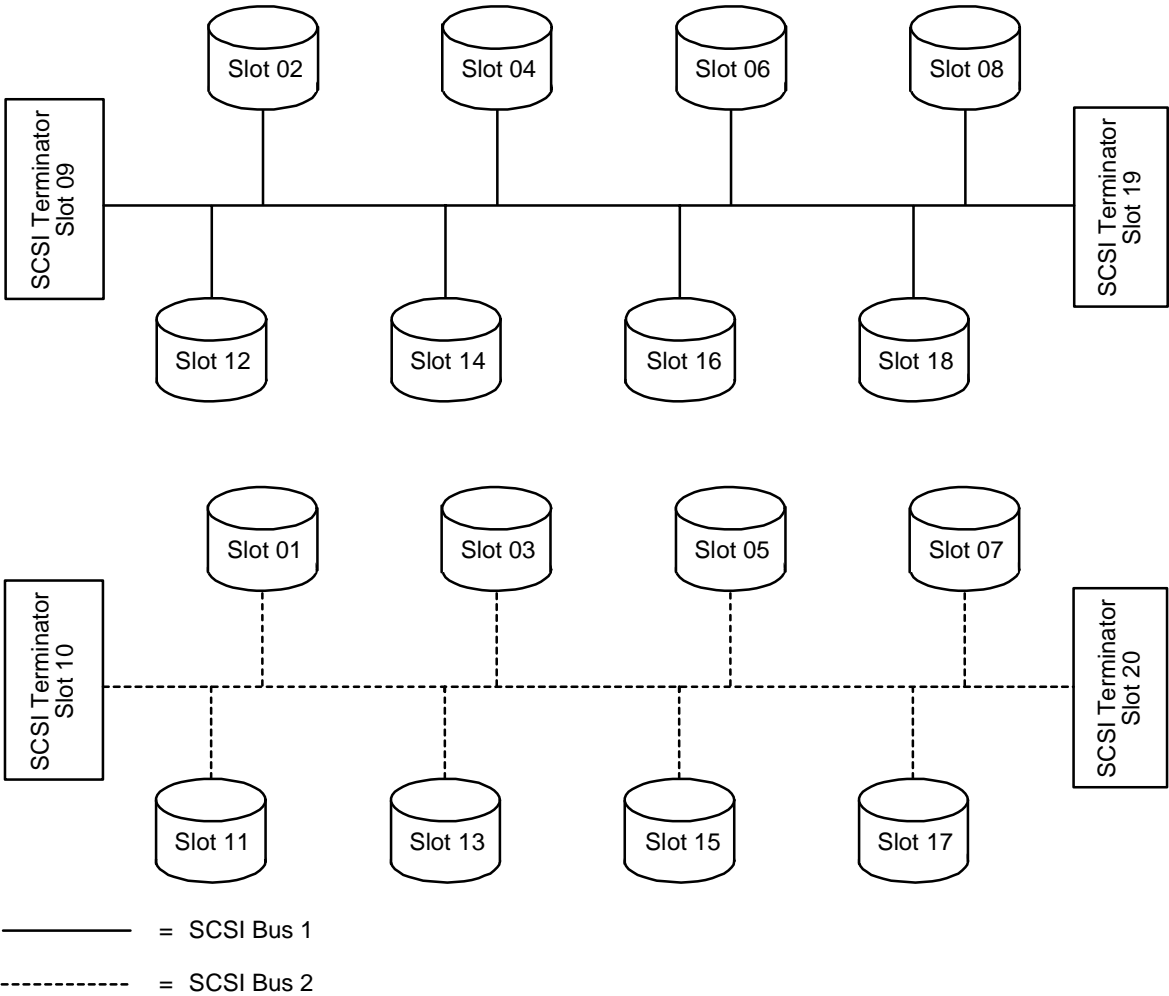
A minimum of a 36-GB disk drive is required in 16-GB NonStop S76000 and S86000 servers to receive memory dumps. 20 GB is reserved for memory dump. The remaining storage space can be used for anything. This disk does not have to be \$SYSTEM.

SCSI Terminators

Four SCSI terminators are located in slots 09, 10, 19, and 20.

Each SCSI bus requires two terminators for proper operation.

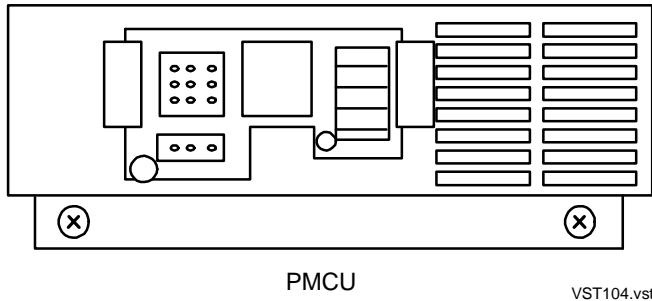
SCSI Terminator Slots	SCSI Bus Number	Disk Drive Slots
09, 19	1	02, 04, 06, 08, 12, 14, 16, 18
10, 20	2	01, 03, 05, 07, 11, 13, 15, 17



VST679.vsd

Power Monitor and Control Units (PMcus)

Two power monitor and control units (PMcus) are located in slots 21 and 22 behind the battery retainer.



Each PMCU connects to:

- One battery
- One fan
- One power supply (only in enclosures with power shelves)
- The backplane
- One DC power distribution bus

The PMCU:

- Disconnects the batteries when powering off the system
- Connects the batteries to the DC power distribution buses (when the system is plugged in or enabled by the service processor)
- Communicates with the service processors (SPs) using the serial maintenance bus (SMB) so that the SPs can diagnose the condition of:
 - Batteries
 - Fans
 - Power supplies
- Powers the fans
- Provides the interface to:
 - Group ID switches
 - Group service LEDs
 - Emergency power-off (EPO) circuitry

Batteries

Two rechargeable battery packs are located in slots 23 and 28 behind the battery retainer.

The batteries installed in all system enclosures are identical.

A battery pack contains:

- 24 sealed, cylindrical, lead-acid cells
- A nonreplaceable fuse for short-circuit protection

These batteries automatically power the system when AC power fails. In addition to powering the memory for as long as they can, usually 45 minutes, the batteries can continue to operate all the components in a system enclosure for a configurable length of time.

For Information About ...

Power losses and configurable battery backup time

Battery specifications

Refer to ...

[Section 10, Planning for System Availability and Support](#)

[Appendix B, Specifications](#)

Recharging Batteries

Batteries are continuously charged when AC power is applied to a system enclosure. Spare batteries require recharging at least every six months. To recharge your spare batteries, you can swap them with the batteries currently installed in your system every three or four months. Batteries are FRUS and must be replaced by an authorized service provider.

Batteries are designed to handle occasional power failures that occur at most computer sites. Frequent power failures (averaging more than once a week) can cause the batteries to wear out more quickly.

Disposing of Batteries

Many countries and local governments have special ordinances that must be followed when disposing of spent lead-acid batteries. United States federal, state, and local laws govern the management, recycling, and disposal of lead-acid batteries.

For Information About ...

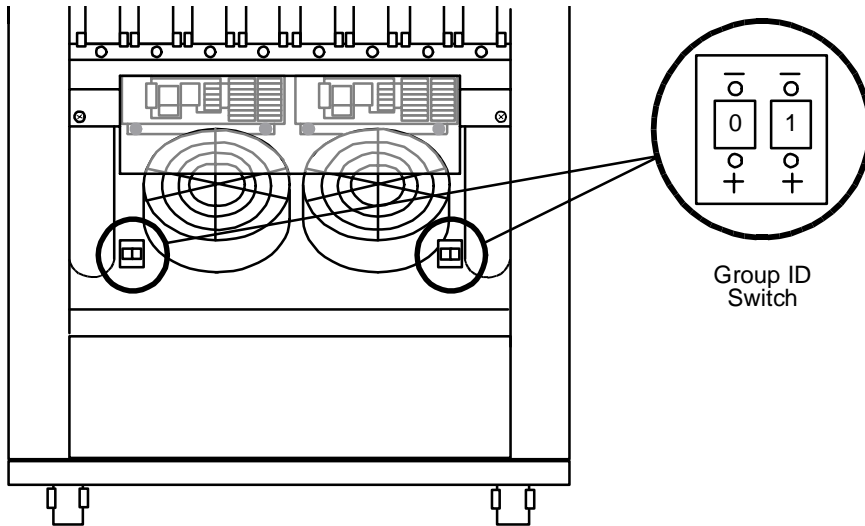
United States compliance standards for disposing of batteries

Refer to ...

[Appendix B, Specifications](#)

Group ID Switches

Two group ID switches are located in slots 24 and 27.



VST603.vsd

The settings of the group ID switches define the group number of that enclosure:

- Both group ID switches within an enclosure *must* show the same group number.
- The group number of each enclosure in your system must be unique.

Changing the Group Number

- The group number of an enclosure cannot be changed online. The group number is read only at the time the enclosure is powered on.
- After a group number is assigned to an enclosure, it is strongly recommended that you do not change it unless as part of a well planned reconfiguration of the system.
- If you change the group number on the group ID switches of an enclosure, you must also change all the group ID labels to match the new group number:
 - On the appearance side: on the enclosure door behind the faceplate
 - On the service side: on the leftmost cable support and on the service-side door, if present

Group ID Switches and Stored Group Numbers

Both group ID switches within an enclosure must be set to the same number. When the enclosure is powered on, the service processor (SP) reads the group ID switches and stores that group number. If you power the enclosure off and then power it back on, the SP retains that stored group number of the enclosure.

If, at the time the enclosure is powered back on, the group number shown on its group ID switches does not agree with the stored group number in the SP:

- If both group ID switches agree with each other but disagree with the stored group number, the stored group number is updated.
- If the group ID switches do not agree with each other but one group ID switch agrees with the stored group number, the SP assigns the stored group number to the enclosure.
- If the group ID switches do not agree with each other and neither group ID switch agrees with the stored group number, the SP generates an error and does not assign any group number to this enclosure.

Group Numbers and System Configurations

The group number is part of CRU identification, so if you change the group number of an enclosure, you change the identification of all CRUs in that enclosure.

For example, if you change group 02 to group 05 and then power on the system with no reconfiguration, a disk drive that was originally in group 02, module 01, slot 08, is now in group 05, module 01, slot 08. However, the system configuration still lists that disk drive as being in group 02. Therefore, all system resources configured for group 02 are considered missing from the system.

If you change the group number of an enclosure, you must also change the system configuration.

Processor Numbers and Group Numbers

The processor numbers associated with the group numbers in a system are:

Processor	Group	Slot	Processor	Group	Slot
0	01	50	8	05	50
1	01	55	9	05	55
2	02	50	10	06	50
3	02	55	11	06	55
4	03	50	12	07	50
5	03	55	13	07	55
6	04	50	14	08	50
7	04	55	15	08	55

Fans

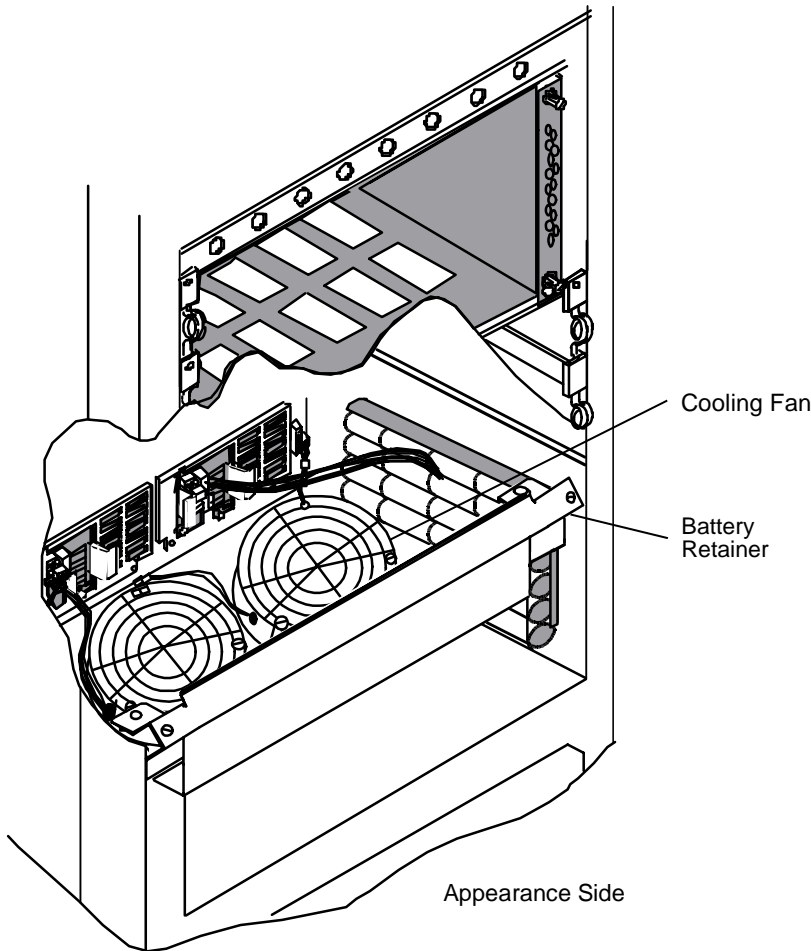
Fans are located in slots 25 and 26 on the appearance side of a system enclosure, and they provide cooling for components inside the enclosure. (See [Components, Processor Enclosure Without Power Shelf, Appearance Side](#) on page 1-7.)

Each fan is connected to one power monitor and control unit (PMCU). Each fan is also connected to the other fan in the enclosure through a fan interconnect cable. The fans are speed-control fans. If one fan fails, the other fan operates at a faster speed to compensate.

The relationships between fans and PMCUs in a system enclosure are:

PMCU in slot...	Controls the fan in slot...
21	25
22	26

This figure shows the cooling fans:



VST641.vsd

Maximum Time That an Appearance-Side Door Can Be Open

This table shows the amount of time that components in a fully loaded enclosure, with the appearance-side enclosure door open and only one fan operating, can operate before overheating:

	Ambient Room Temperature			
Altitude	25 °C (77 °F)	30 °C (86 °F)	35 °C (95 °F)	38 °C (100 °F)
Sea level	>45 minutes	36 minutes	21 minutes	13 minutes
5,000 feet (1524 meters)	38 minutes	22 minutes	13 minutes	8 minutes
10,000 feet (3048 meters)	25 minutes	14 minutes	10 minutes	5 minutes

Power Shelf

The type of CRU installed in slots 50 and 55 determines whether that enclosure requires a power shelf. Enclosures without power shelves have power supplies internal to the CRUs in slots 50 and 55. Enclosures with power shelves have external power supplies.

CRU Model	Server Type	Does Not Require Power Shelf	Requires Power Shelf
	S74		X
	S76		X
	S700	X (with NSR-W)	X (with NSR-G or NSR-T)
	S740		X
	S760		X
1950 PMF	S7000	X	
1960 PMF	S7400		X
1961 PMF	S7600		X
1962 PMF	S7800		X
1951 PMF	S70000		X
1954 PMF	S72000		X
1970 PMF	S74000		X
1971 PMF	S76000		X
1973 PMF	S78000		X
1972 PMF	S86000		X
1974 PMF	S88000		X
1952 IOMF	All servers	X	
1980 IOMF 2	All Servers		X

The power shelf is installed under the enclosure chassis.

AC power is supplied to the power shelf through AC power cords that connect to the power supply through the sheet-metal bulkhead in the center of the power shelf. AC power for enclosures without power shelves is provided by AC power cords connected directly to the PMF CRUs or IOMF CRUs.

Power Supplies

Two power supplies provide redundant power to the components in the enclosure. With two power supplies, loss of one power supply or one AC power cord does not result in a loss of system resources.

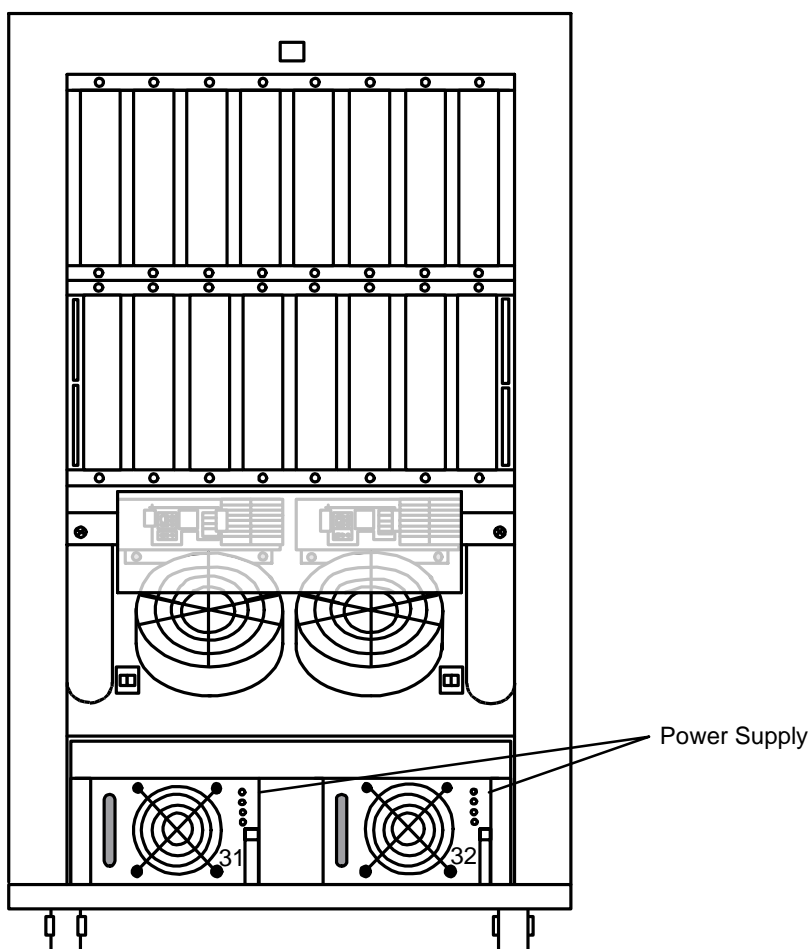
Each PMF CRU or IOMF 2 CRU in an enclosure with a power shelf receives its power from the power supplies in the power shelf as well as from the batteries. The relationships between power supplies and CRUs in a system enclosure are:

The power supply in slot... Supplies power to the CRU in slot...

31 55

32 50

The power supplies are installed in slots 31 and 32 of the power shelf:



VST 624.vsd

The power supplies connect to the power interface board (PIB), located on the sheet-metal bulkhead in the center of the power shelf. The power supplies provide DC power by way of the PIBs to the DC power cables to a PMF CRU or IOMF 2 CRU.

Service Side of System Enclosures

The service side of a system enclosure contains slots for:

Note. For information about IOAM enclosures, see [IOAM Enclosures](#) on page 4-69.

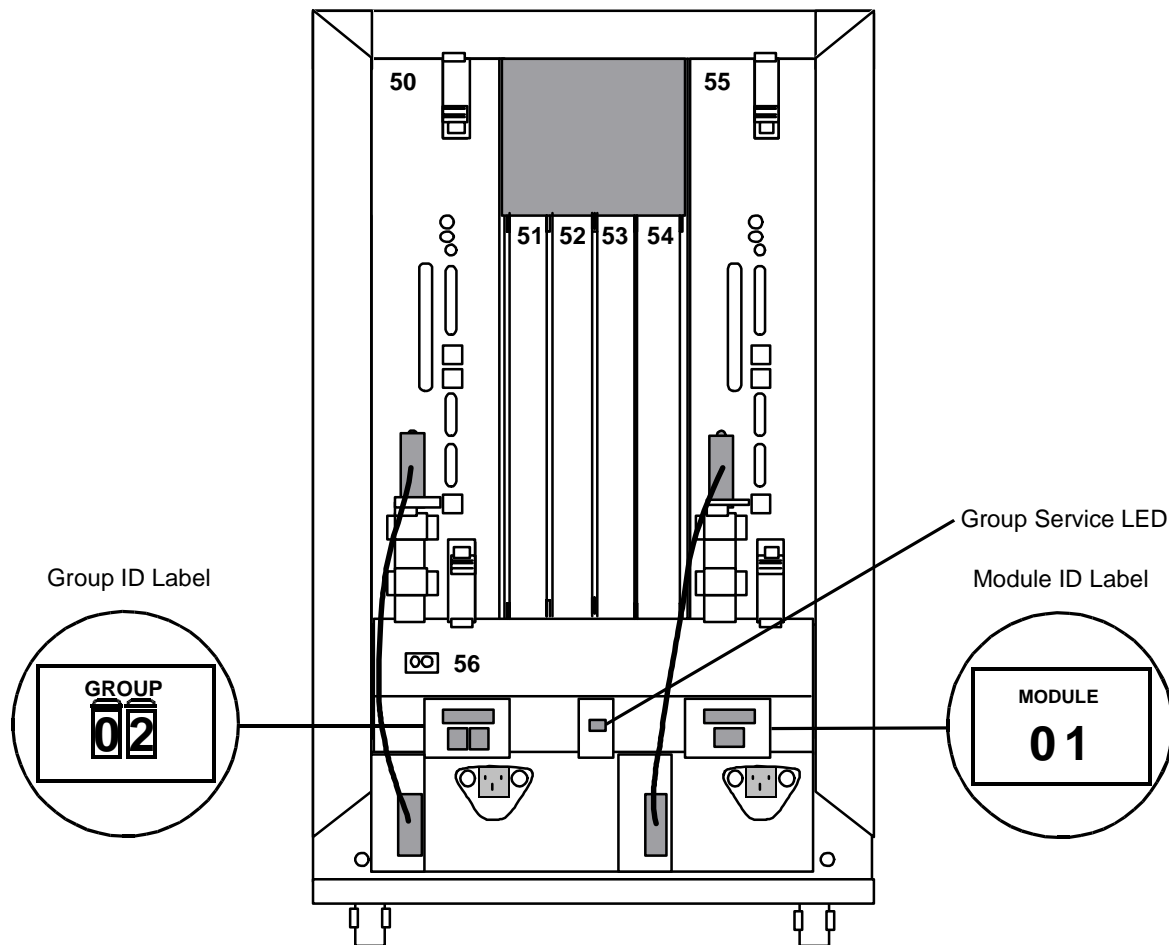
Component	Slot Numbers	Page
Two PMF CRUs (only in processor enclosures)	50, 55	4-31
Two IOMF CRUs (only in I/O enclosures)	50, 55	4-50
None, two, or four ServerNet expansion boards (SEBs) or modular SEBs (MSEBs) (only in processor enclosures)	51, 52, 53, 54	4-18
ServerNet adapters (none, two, or four adapters in processor enclosures; four adapters in I/O enclosures)	51, 52, 53, 54	4-25
Filler panels	51, 52, 53, 54	4-26
One emergency power-off (EPO) connector	56	4-31

Note. The single-ported ServerNet/FX and ServerNet/DA adapters are an exception to the slot assignments described in this subsection. They can occupy slots 51 and 52 of processor enclosures in NonStop S7xx servers if no I/O enclosures are attached.

The service side of a system enclosure also includes the following labels and LEDs:

Component	Location	Page
Group ID label	On leftmost cable support and on the service-side enclosure door, if present	4-18
Module ID label	On rightmost cable support	4-18
Group service LED	On center cable support	4-18

Slot Numbers on Service Side of a System Enclosure



VST623.vsd

Slot	Component
50, 55	PMF CRU or IOMF CRU
51–54	SEB, MSEB, or ServerNet adapter
56	EPO connector

Note. The appearance of a PMF CRU or IOMF CRU in your system might differ from that shown in the figure.

Group ID Label

On the service side, the group ID label is located on the leftmost cable support, illustrated in the figure on page [4-17](#). The label consists of changeable numbers in a holder.

A group ID label is also on the service-side enclosure door, if present.

The group ID label displays the group number associated with this system enclosure. For more information, see [Group ID Switches](#) on page 4-10.

Module ID Label

On the service side, the module ID label is located on the rightmost cable support, illustrated in the figure on page [4-17](#).

This label identifies the module number within this group. The module number is permanently labeled 01.

Group Service LED

On the service side, a group service LED is located on the center cable support, illustrated in the figure on page [4-17](#).

The group service LED, when lit, indicates one of the following:

- A command to light the group service LED was issued using the OSM Service Connection or the TSM Service Application.
- The group ID for this group either could not be determined or conflicts with the group ID of another group in the system. For more information, see [Group ID Switches and Stored Group Numbers](#) on page 4-11.

SEBs and MSEBs

There are two types of ServerNet expansion boards, the six-connector SEB and the ten-connector MSEB. MSEBs are supported on G06.09 and later RVUs.

SEBs and MSEBs are installed in processor enclosures. Each SEB or MSEB connects the ServerNet router in one PMF CRU to one ServerNet fabric. MSEBs have additional connecting functions. A system can contain both SEBs and MSEBs if they are connected using emitter-coupled logic (ECL) cables.

Enclosures are connected to form a ServerNet communications network using ServerNet cables between the connectors on the SEBs or MSEBs. These cables are the ServerNet links between the ServerNet routers of each group.

SEBs or MSEBs and Fabric Connections

For fault tolerance, SEBs are installed in an enclosure in pairs: one for the X fabric and one for the Y fabric. Each SEB provides access to either the X fabric or the Y fabric, but not both.

The relationships between SEB slots and ServerNet fabrics are:

SEB Slot Number	ServerNet Fabric
51	X
52	Y
53	X
54	Y

SEBs and MSEBs can be installed in slots 51, 52, 53, and 54. The slot assignments depend upon the topology of the system. For specific information, see [Slot Assignments for Slots 51 Through 54](#) on page 4-27.

Note. Information about the function of a six-connector SEB applies also to the MSEB. Descriptions and figures showing six-connector SEBs are also valid for MSEBs unless indicated otherwise.

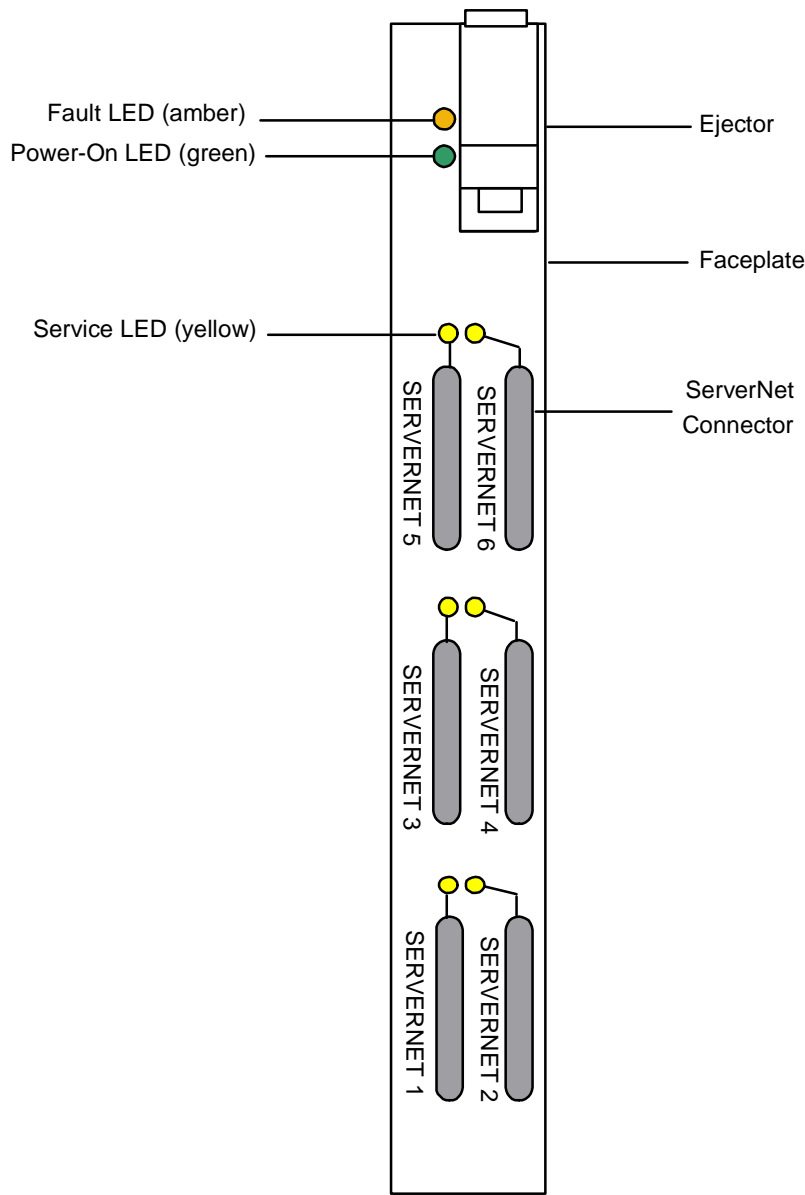
Six-Connector SEB Description

The SEBs has six 50-pin ServerNet connectors. Five of these connectors are used for connecting to other enclosures. The connector SERVERNET 6 is not used externally. SEB ports use only the ECL interfaces.

A 6-connector SEB has these indicator LEDs:

Color	Function
Green	Is lit when the power is on.
Amber	Is lit when the SEB is not fully functional. At initial power on, this LED remains lit until the SEB has been successfully configured by the service processor (SP). Then the SP turns the LED off.
Yellow, above each ServerNet connector	Is currently unused.

Six-Connector SEB Faceplate



VST114.vsd

MSEB Description

MSEBs are supported only on the G06.09 and later RVUs.

The MSEB has six slots that can contain replaceable plug-in cards (PICs). Early-model MSEBs have four fixed ports using a serial-copper interface.

An MSEB provides all the functions of a six-connector SEB. MSEBs can communicate with SEBs as well as other MSEBs.

The PICs allow for a variety of interfaces. The available interfaces:

- Emitter-coupled logic (ECL)
- Serial-copper (SCu)
- Single-mode fiber optic (SMF)
- Multimode fiber optic (MMF)
- Node-numbering agent (NNA) for Metro Clusters

All the PIC interfaces can be mixed in a system. ECL and SCu cables are limited to a distance of 25 meters (82 feet) apart.

Using MMF PICs and cables, systems support distances up to 200 meters (656 feet) between processor enclosures and between processor and I/O enclosures.

Using SMF cables, NonStop S76000, NonStop S86000, and later servers, support distances of up to 5 kilometers (3 miles) between nodes in a Metro Cluster. Also, NonStop S76000, S86000, and later servers, support a distance of 200 meters between processor enclosures and 5 kilometers between processor and I/O enclosures.

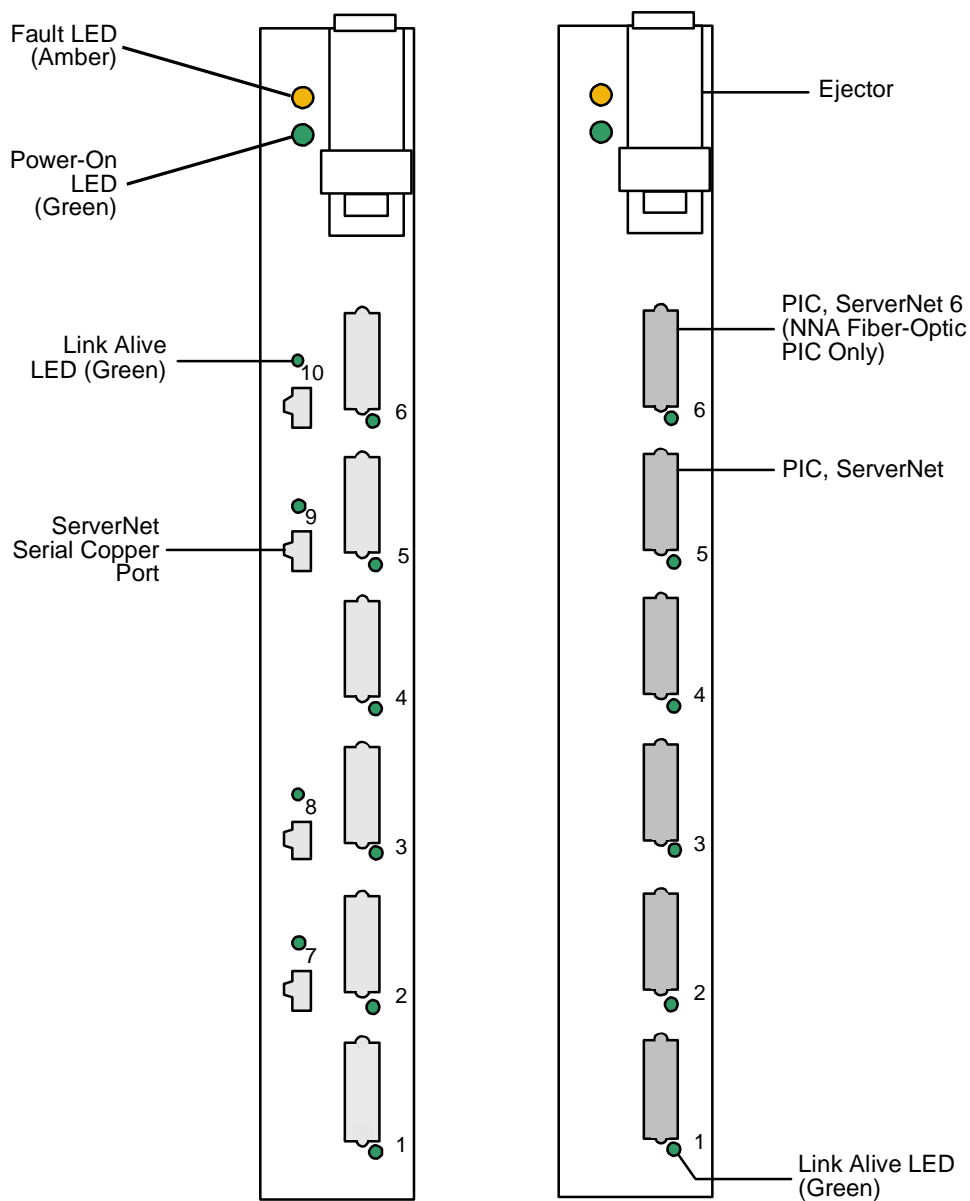
The NNA PIC for Metro Clusters can be installed only in the ServerNet 6 position.

For more information about Metro Clusters including that use the star topologies and HP NonStop Cluster Switch (model 6770), refer to the *ServerNet Cluster Manual*. For more information about Metro Clusters that use the layered topology and HP NonStop ServerNet Switch (model 6780), refer to the *ServerNet Cluster 6780 Planning and Installation Guide*. For distance limitations between an MSEB and a cluster switch, refer also to these documents.

The MSEB has these indicator LEDs:

Color	Function
Green	Is lit when the power is on.
Amber	Is lit when the MSEB is not fully functional. At initial power on, this LED remains lit until the MSEB has been successfully configured by the SP; then the LED should become unlit. If this LED remains lit, replace the MSEB.
Green, above each ServerNet connector	Is lit to signify that the link is alive (link alive).

MSEB Faceplate



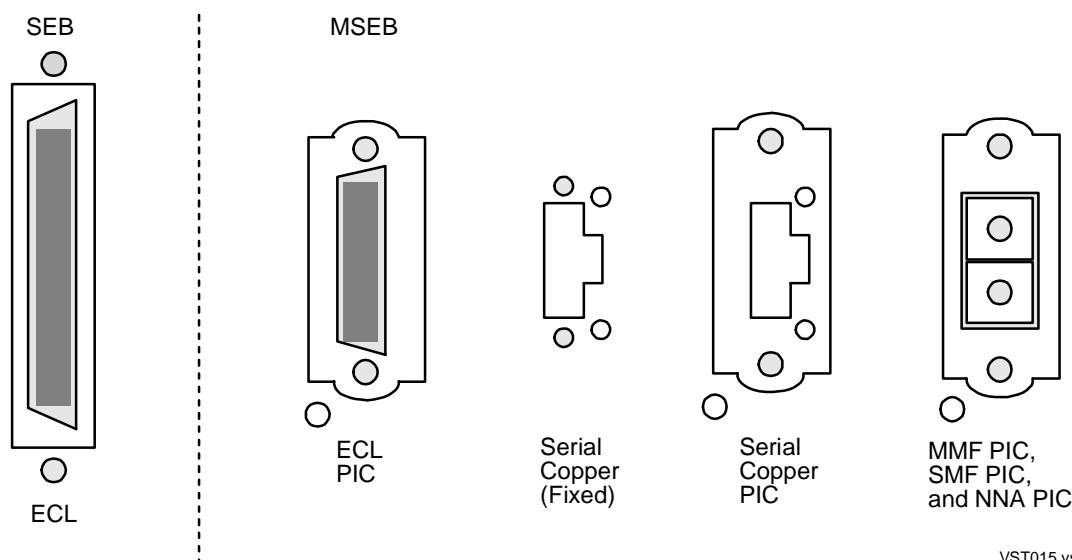
VST123.vsd

Early-model MSEBs (left) have ten ports including four fixed serial-copper ports 7, 8, 9, and 10. Current-model MSEBs (right) can contain up to six PICs, ports 1 to 6..

Selecting MSEB PICs

ECL	The six-connector SEBs use the ECL interface. To connect MSEBs to six-connector SEBs, select ECL PICs.
Serial copper	For new systems or extensive upgrading, select serial-copper PICs and use the slimmer, more flexible serial-copper cables.
MMF	If enclosures are not arranged in conventional rows, select MMF PICs for distances of 200 meters (650 feet) between processor enclosures and between processor and I/O enclosures. Separation between enclosures is limited if you want all enclosures to be connected to the same power grid. MMF cabling is the preferred method of fiber-optic cabling.
SMF	If enclosures are not arranged in conventional rows or if you already have SMF cabling, select SMF PICs. NonStop S76000 and S86000 servers, and later, support SMF PICs for distances of 200 (650 feet) meters between processor enclosures or 5 km (3.1 mi) between processor and I/O enclosures. Separation between enclosures is limited if you want all enclosures to be connected to the same power grid.
NNA	The NNA PIC is configured to operate with the HP NonStop Metro Cluster product. The NNA PIC uses the SMF interface.

Ports on SEBs and MSEBs



Fabric Connections

For fault tolerance, SEBs and MSEBs are installed in an enclosure in pairs: one SEB or MSEB provides access to only the X fabric, and one provides access to only the Y fabric.

Associated Fabrics

- A PMF CRU in slot 50 communicates directly with the X fabric.
This PMF CRU can also communicate indirectly with the Y fabric through the PMF CRU in slot 55 of the same enclosure.
- A PMF CRU in slot 55 communicates directly with the Y fabric.
This PMF CRU can also communicate indirectly with the X fabric through the PMF CRU in slot 50 of the same enclosure.

Adapter Slots and Associated Fabrics

The adapter slots 51 through 54 of system enclosures have the following access to ServerNet fabrics.

In processor enclosures:

- In PMF 1 CRUs, slot 51 is single-ported and accesses only the X fabric. This slot is usually reserved for SEBs or filler panels. In PMF 2 CRUs, slot 51 is dual-ported.
- In PMF 1 CRUs, slot 52 is single-ported and accesses only the Y fabric. This slot is usually reserved for SEBs or filler panels. In PMF 2 CRUs, slot 52 is dual-ported.

Note. ServerNet adapters can replace SEBs or MSEBs in slots 51 and 52, but then it would not be possible to expand the system to more than two processors.

- Slots 53 and 54 are both dual-ported:
 - Single-ported adapters in slot 53 access only the X fabric.
 - Single-ported adapters in slot 54 access only the Y fabric.
 - Dual-ported adapters in slots 53 and 54 access both fabrics.

In I/O enclosures:

- Slots 51, 52, 53, and 54 are all dual-ported:
 - Single-ported adapters in slots 51 and 53 access only the X fabric.
 - Single-ported adapters in slots 52 and 54 access only the Y fabric.
 - Dual-ported adapters in slots 51, 52, 53, and 54 access both fabrics.

MSEBS in S7800, S76000, S86000, and later Servers

In enclosures containing model 1962, 1971, 1972, or later PMF CRUs:

- MSEBs, not SEBs, occupy slots 51 and 52 of all processor enclosures, 01 through 08 and must not be configured for ECL cables between processor enclosures.
- Either SEBs or MSEBs can occupy slots 53 and 54 of processor enclosures 01 through 04.
- Because I/O enclosures are not supported on slots 53 and 54 of processor enclosures 05 through 08, neither SEBs nor MSEBs can occupy these slots.
- Processor enclosures are connected together with serial-copper or fiber-optic cables only.
- In a two-processor system, ServerNet adapters can occupy slots 51 and 52 because MSEBs are not required to expand the system to more than two processors.

ServerNet Adapters

ServerNet adapters provide the interface between the ServerNet communications network and a particular I/O bus, such as an Ethernet or SCSI bus.

ServerNet adapters can be installed in slots 51, 52, 53, and 54 of both processor enclosures and I/O enclosures. Slot assignments for ServerNet adapters depend upon the topology and the type of enclosure. For specific information, see [Slot Assignments for Slots 51 Through 54](#) on page 4-27.

ServerNet Adapter Description

A ServerNet adapter contains:

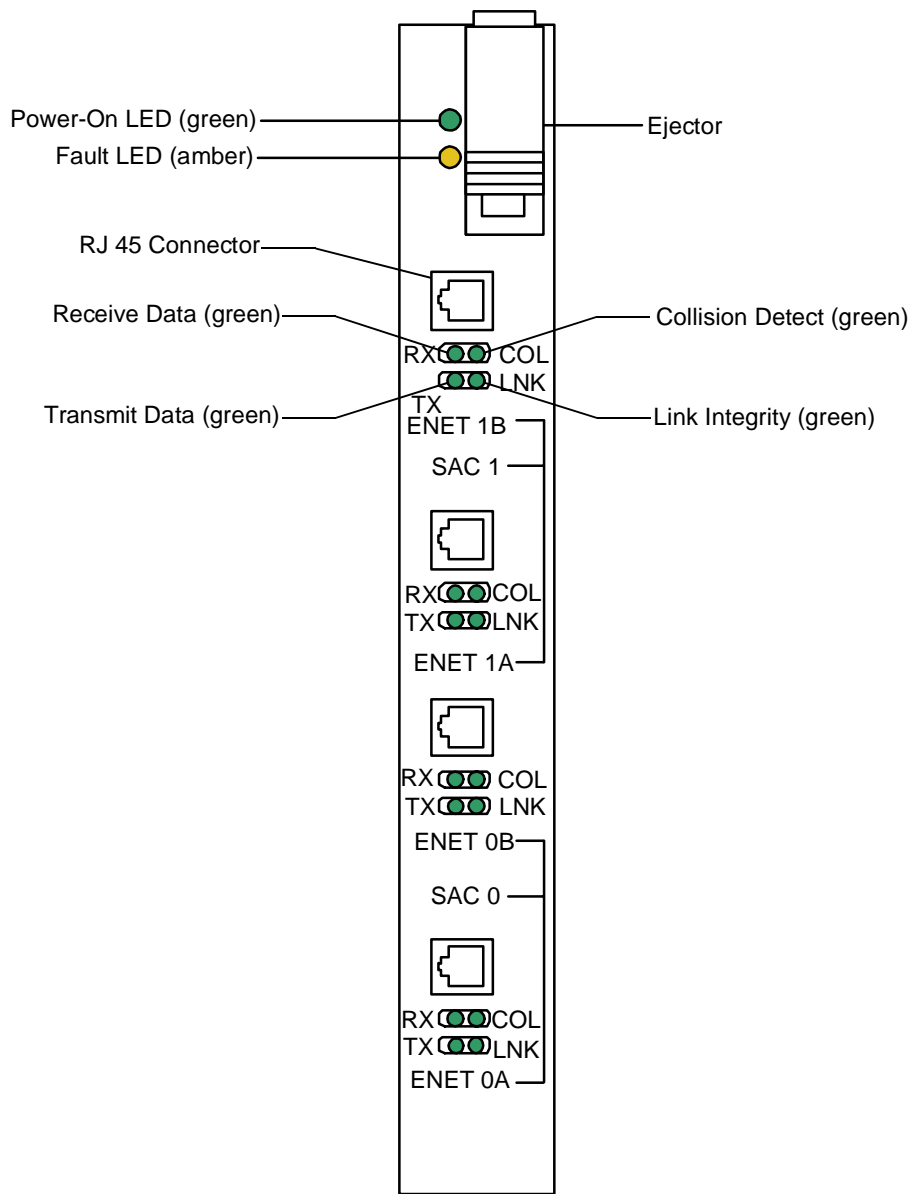
- One ServerNet bus interface (SBI)
The SBI is an application-specific integrated circuit (ASIC) that provides the interface between the ServerNet communications network and the different industry-standard bus within the adapter, such as the Motorola 68030 bus, to which SACs are attached.
- One or more ServerNet addressable controllers (SACs)
SACs provide the controller functions for ServerNet adapters: the interfaces to buses such as SCSI buses, which connect to peripheral devices.

Supported ServerNet Adapters

The ServerNet adapters currently supported on systems are listed in [Appendix F, Supported Hardware and Configurations](#). Information about each adapter is given in the manual specific to that adapter. Refer to [Appendix E, Guide to Server Manuals](#), for a complete list of NonStop S-series manuals.

A Typical ServerNet Adapter

The Ethernet 4 ServerNet adapter (E4SA) is a typical ServerNet adapter that has four ports for Ethernet connections.



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Filler Panels

If slots 51 through 54 do not contain SEBs, MSEBs, or ServerNet adapters, they must contain filler panels to maintain proper air flow and electromagnetic interference (EMI) shielding.

Slot Assignments for Slots 51 Through 54

Slot assignments for slots 51, 52, 53, and 54 depend on the type of PMF or IOMF CRU installed in slots 50 and 55 of a system enclosure. HP recommends that you reserve slots 51 and 52 for SEBs or MSEBs in processor enclosures.

Single-Ported Slots

Slots 51 and 52 are single ported in system enclosures containing models 1950, 1951, 1954, and 1960 PMF CRUs.

ServerNet/FX and ServerNet/DA adapters are single-ported and access either the X fabric or the Y fabric, but not both, depending on the slot location. These adapters can be installed in slots 51 and 52 of a processor enclosure if no SEBs or MSEBs are present. Installing dual-ported ServerNet adapters into single-ported slots is NOT recommended.

If slots 51 and 52 contain ServerNet adapters, no I/O enclosures can be attached to the system enclosure for Tetra 8 configurations.

Dual-Ported Slots

Slots 51 and 52 are also dual ported in system enclosures containing PMF 2 CRUs, IOMF CRUs, and IOMF 2 CRUs.

In processor and I/O enclosures:

- Single-ported adapters in slot 51 and 53 access only the X fabric.
- Single-ported adapters in slot 52 and 54 access only the Y fabric.
- Dual-ported adapters in slots 51 through 54 access both X and Y fabrics.

In general:

A Component in Slot	Communicates With Fabric
51	X
52	Y
53	X
54	Y

Slot Assignments for SEBs and MSEBs

Each SEB or MSEB is single-ported and accesses only the X fabric or the Y fabric, depending on its slot location.

Slot assignments for SEBs and MSEBs depend upon the topology and the type of enclosure:

Topology	Enclosure Type	SEB and MSEB Slots* and Fabrics
Tetra 8	Processor	51 (X), 52 (Y)
Tetra 16	Processor, inner tetrahedron	51 (X), 52 (Y), 53 (X), 54 (Y)
	Processor, outer tetrahedron	51 (X), 52 (Y)

*In NonStop S7800, S76000, S86000, or later servers, only MSEBs (not SEBs) can occupy slots 51 and 52 in all processor enclosures.

Slot Assignments for ServerNet Adapters

Dual-ported ServerNet adapters can be installed in any dual-ported slot:

Enclosure Type	Adapter Slots
Processor: S7000, S7400, S70000, and S72000	53, 54
Processor: S7600, S7800, S74000, S76000, S78000, S86000, and S88000	51, 52, 53, and 54
I/O	51, 52, 53, and 54

Single-ported ServerNet adapters can be installed in slots 51, 52, 53, and 54 in all enclosure types.

Slot Assignments for NonStop S-Series Servers

Topology	Enclosure	Hardware	Slots	Notes
Tetra 8	Processor	SEBs or MSEBs	51, 52	You form an inner tetrahedron using these SEBs or MSEBs. You can attach two I/O enclosures to these SEBs or MSEBs.
		ServerNet adapters	53, 54	
	I/O	ServerNet adapters	51, 52, 53, 54	Slots are numbered according to their module numbers.
	IOAM	FCSA G4SA	2.1, 2.2, 2.3, 2.4, 2.5 3.1, 3.2, 3.3, 3.4, 3.5	
Tetra 16	Processor, inner tetrahedron	SEBs or MSEBs	51, 52, 53, 54	To connect processor enclosures: <ul style="list-style-type: none"> ● You form an inner tetrahedron using the SEBs or MSEBs in slots 51 and 52. ● You form an outer tetrahedron using port 5 of the SEBs or MSEBs in slots 51 and 52. ● You can attach five I/O enclosures to SEBs or MSEBs in slots 53 and 54.
		ServerNet adapters	53, 54	
		SEBs or MSEBs	51, 52	
		ServerNet adapters	53, 54	
	Processor, outer tetrahedron	SEBs or MSEBs	51, 52	You can attach four I/O enclosures to these SEBs or MSEBs.
		ServerNet adapters	53, 54	
		SEBs or MSEBs	51, 52	
		ServerNet adapters	53, 54	
	I/O	ServerNet adapters	51, 52, 53, 54	Slots are numbered according to their module numbers.
	IOAM	FCSA G4SA	2.1, 2.2, 2.3, 2.4, 2.5 3.1, 3.2, 3.3, 3.4, 3.5	

Slots 51 and 52

Processor enclosure slot 51 is single ported to the X fabric and slot 52 to the Y fabric on all systems using ServerNet router 1 (NonStop S7000, S7400, S70000, and S72000 servers). Slots are dual ported to both the X and Y fabrics on all systems using ServerNet router 2 (NonStop S7600, S7800, S74000, S76000, and S86000 servers). In small systems that do not contain SEBs or MSEBs, ServerNet adapters can occupy slots 51 and 52 of processor enclosures. For information about the ServerNet routers, see [Detailed Logical Diagrams](#) on page 2-4.

Emergency Power-Off (EPO) Connector

The emergency power-off (EPO) connector is located in slot 56.

The EPO connector connects a system enclosure to the emergency power-off (EPO) circuitry at your site. When the EPO system is activated, building AC power is removed from the system and an EPO signal is activated, which causes the batteries to disconnect after four minutes. The EPO system is intended only for emergency use and should never be used as part of a normal power-off procedure because it shuts off power to peripheral components in the computer room and does not allow for an orderly shutdown or recovery of the system.

The EPO connector is used only when a system is installed in a computer room in the United States or when required by local regulations. For more information about EPO connections, see [Section 12, Site Planning and Preparation](#).

Processor Multifunction (PMF) CRUs

PMF CRUs occupy slots 50 and 55 of processor enclosures. They:

- Process and store instructions and data
- Maintain ServerNet links
- Supply power
- Provide power-on connections
- Provide router connections
- Provide service processor functions

PMF CRUs come in the following models:

PMF CRU Model	Associated Server
1950	S7000
1951	S70000
1954	S72000
1960	S7400
1961	S7600*
1962	S7800*
1970	S74000*
1971	S76000*
1972	S86000*
1973	S78000*
1974	S88000*

*These models are called PMF 2 CRUs.

PMF 2 CRUs contain a ServerNet router 2 instead of the ServerNet router 1 found in the earlier models of PMF CRUs.

Note. All models are referred to as PMF CRUs unless it is necessary to distinguish a PMF 2 CRU from the others.

PMF CRUs and Topics

PMF CRU Faceplates	4-33
Ports	4-37
Power Cords, Cables, and Receptacles	4-38
Power-On Push Button, Cable, and Receptacle	4-38
LEDs	4-38
Processor and Memory Board (PMB)	4-38
Compatibility of PMF CRUs	4-44
Multifunction I/O Board (MFIOB)	4-46
Multifunction I/O Board 2 (MFIOB 2)	4-46
Service Processor (SP)	4-47
ServerNet Router 1	4-48
ServerNet Router 2	4-49
Power Board	4-49

PMF CRU Faceplates

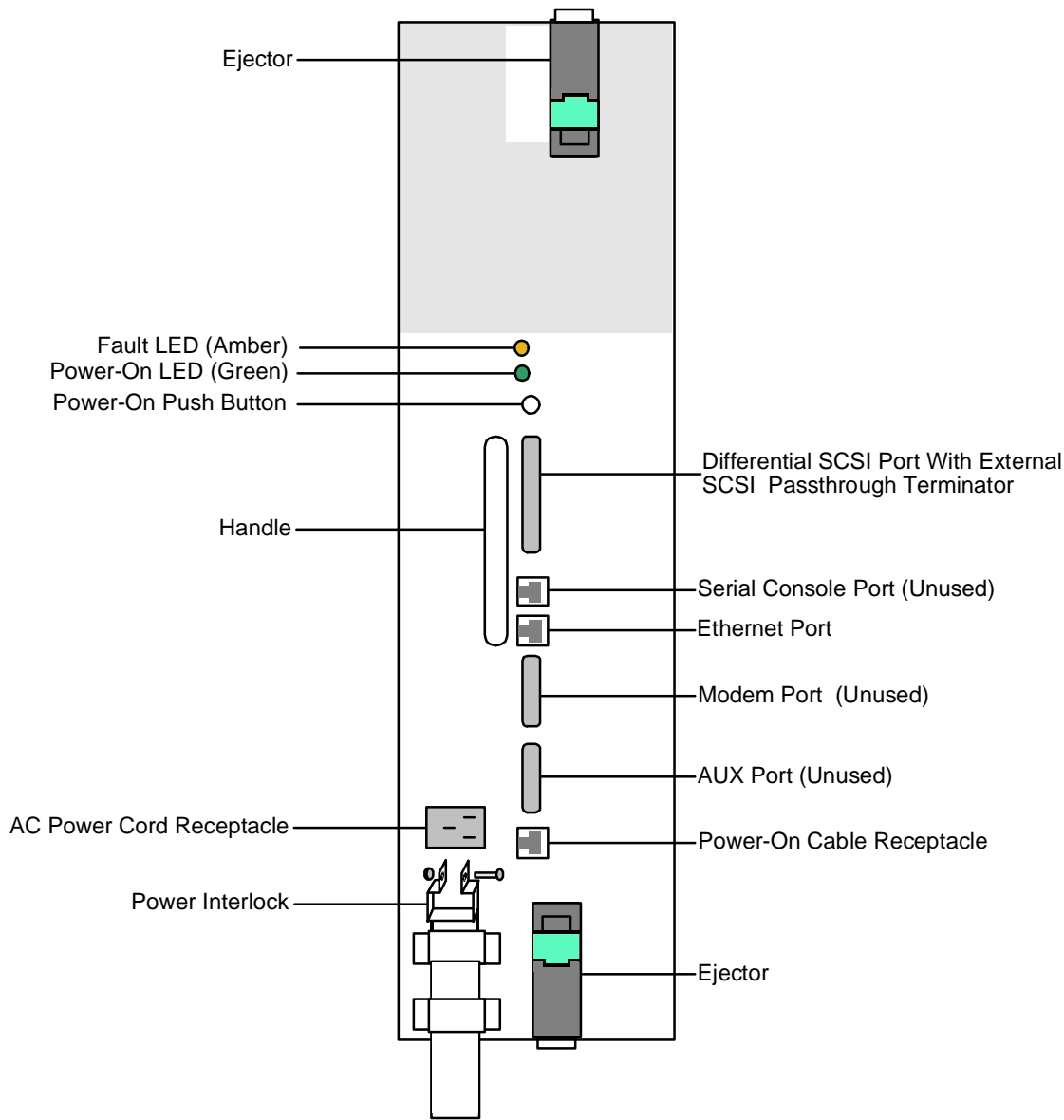
The types of PMF CRU faceplates are:

PMF CRU Model	Server	Faceplate Figure
1950	S7000	page 4-34
1951, 1954, 1960,	S7400, S70000, S72000	page 4-35
1961, 1962, 1970, 1971, 1972, 1973, 1974 (PMF 2 CRU)	S7600, S7800, S74000, S76000, S78000, S86000, S88000	page 4-36

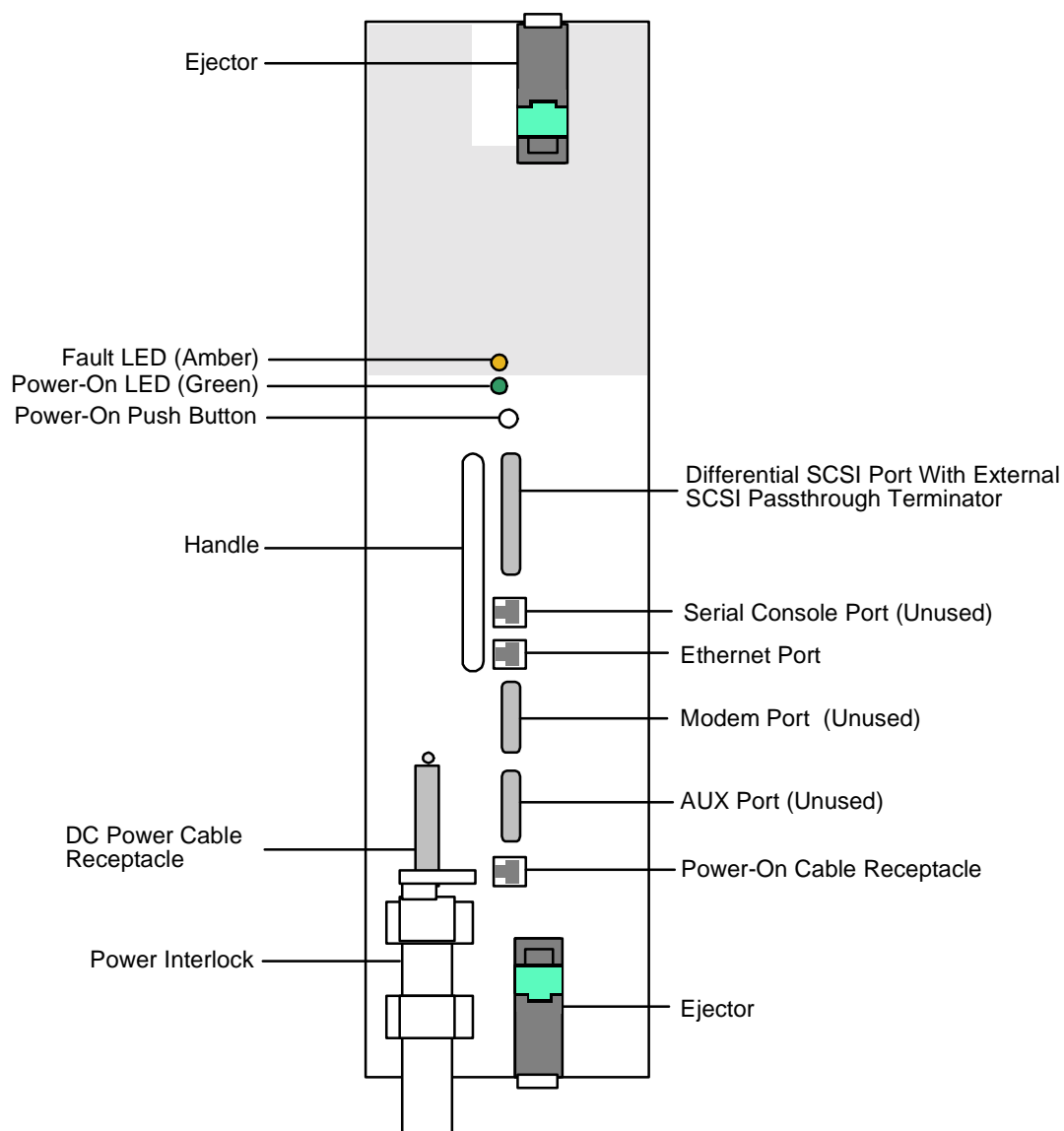
The faceplates of PMF CRUs for the various models of NonStop S-series servers contain these listed features. Each PMF CRU faceplate is illustrated on the following pages.

Feature	1950	1951 1954 1960	1961 1962 1970 1971	1972 1973 1974
LEDs:				
Amber fault LED	X	X	X	
Green power-on LED	X	X	X	
Ports:				
Auxiliary (AUX) port (unused)	X	X	X	
Differential SCSI port	X	X	X	
Ethernet port (used only in group 01)	X	X	X	
Modem port (unused)	X	X		
Serial cable port (unused)			X	
Serial console port (unused)	X	X		
Three ServerNet PIC ports (unused)			X	
SCSI terminators, external (not removable)	X	X		
Power-cord or cable receptacle for:				
AC power cord	X			
DC power cable		X	X	
Power-on cable	X	X	X	
Power-on push button	X	X	X	
Handle	X	X	X	
Two ejectors	X	X	X	
Power interlock that prevents removal of the PMF CRU from an enclosure when external power is applied to the enclosure	X	X	X	

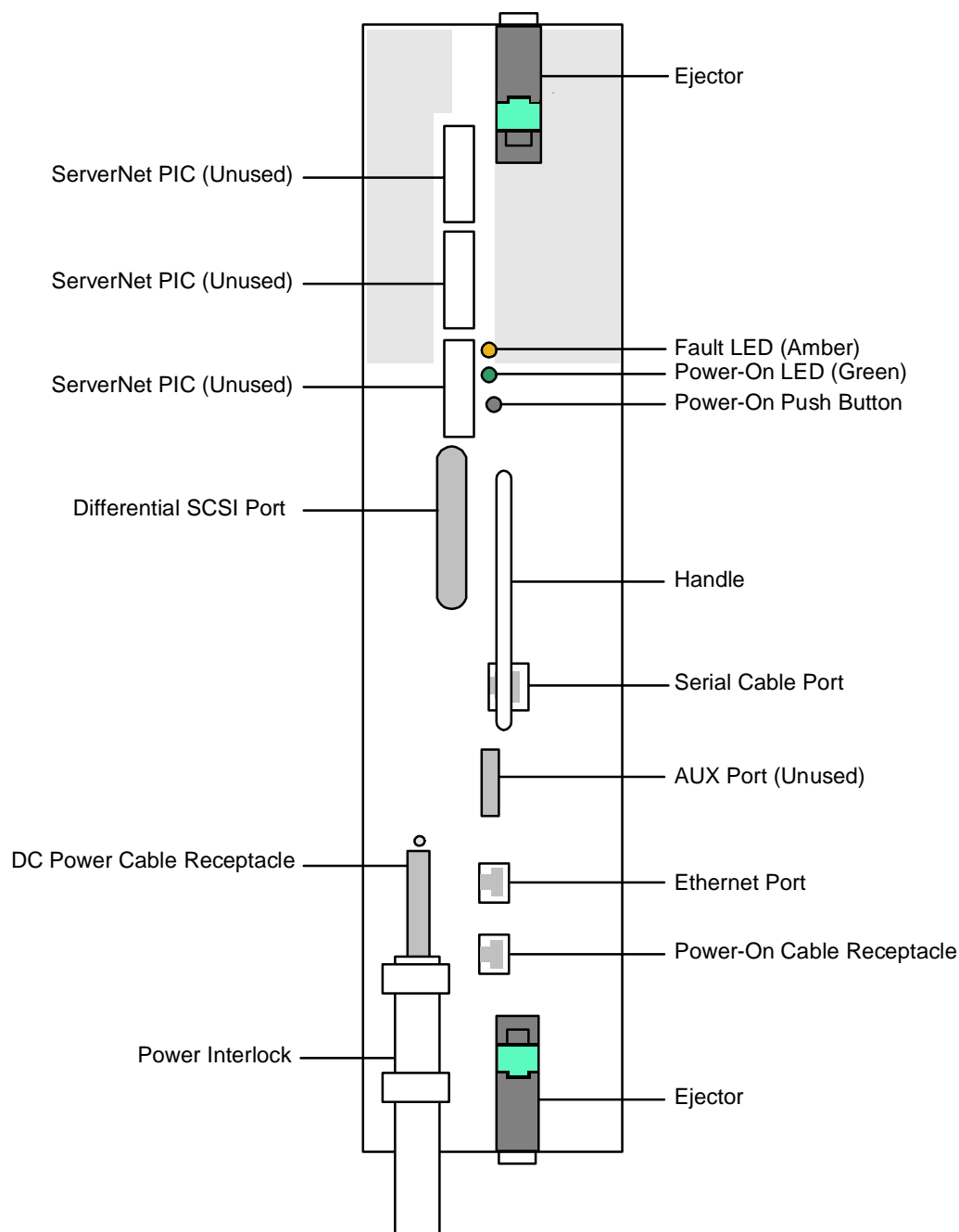
Model 1950 PMF CRU (S7000 Servers)



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Model 1951, 1954, and 1960 PMF CRUs (S7400, S70000, and S72000 Servers)

VST907.vsd

Model 1961, 1962, 1970, 1971, 1972, 1973, 1974 PMF 2 CRUs (S7600, S7800, S74000, S76000, S78000, S86000, and S88000 Servers)

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Ports

- Differential SCSI port

The differential SCSI port is on SCSI bus 3 and can be used to attach a supported tape drive or an Open SCSI device to the system.

On PMF CRUs that are not PMF 2 CRUs, an external SCSI passthrough terminator is permanently installed in the differential SCSI port.

On PMF 2 CRUs, the SCSI terminator is internal to the differential SCSI port.

- Ethernet port

System consoles connect to the system through the Ethernet ports on the PMF CRU in group 01. In other enclosures, this port is used only during online system expansion.

- AUX port (currently unused)
- Modem port (not present on PMF 2 CRUs) (currently unused)
- Serial console port (not present on PMF 2 CRUs) (currently unused)
- Serial cable port (only on PMF 2 CRUs) (currently unused)
- Three ServerNet PIC ports (only on PMF 2 CRUs) (currently unused)

Power Cords, Cables, and Receptacles

- AC power cord

In S7000 processor enclosures, the AC power cord supplies AC power to power supplies in the PMF CRU. In S7400, S7600, S7800, and Sxx000 processor enclosures, the AC power cord supplies AC power to a power supply in the power shelf.

Removing the AC power cord from a PMF CRU results in the loss of redundant power to the PMF CRU. However, the other components in the enclosure are powered by the other power supply and the batteries.

The S7000 PMF CRU cannot be removed from its enclosure while the AC power cord is connected to it.

- AC power cord receptacle

In S7000 processor enclosures, the AC power cord receptacle is on the PMF CRU, and AC power cords are held in place by a mechanical clamp or latch (the power interlock).

In S7400, S7600, S7800, and Sxx000 processor enclosures, the communications network AC power cord receptacle is on the power shelf.

- DC power cable

In S7400, S7600, S7800, and Sxx000 processor enclosures, the DC power cable supplies DC power and other signals to the PMF CRU from the power supply in the power shelf. The DC power cable extends from the power interface board (PIB), located on the power shelf bulkhead, to the DC power cable receptacle on the PMF CRU.

- DC power cable receptacle

On S7400, S7600, S7800, and Sxx000 PMF CRUs, the 50-pin DC power cable receptacle receives the DC power cable from the power supply.

The DC power cable is held in place by jackscrews. While the DC power cable is connected to a PMF CRU, the PMF CRU cannot be removed from its enclosure. A power interlock, located below the DC power cable receptacle, prevents this removal.

Power-On Push Button, Cable, and Receptacle

Power-on cables connect all enclosures in a system in series. To power on the entire system, you press the power-on push button on any PMF CRU or IOMF CRU in the system. The power-on cable sends the power-on signal to all the other PMF CRUs and IOMF CRUs in the system. Some examples of power-on cabling are located in [Power-On Cables](#) on page 7-10.

The power-on cables connect to the RJ-11 power-on cable receptacles on PMF CRUs and IOMF CRUs.

LEDs

The PMF CRU contains:

- An amber fault LED, that when lit, indicates that the PMF CRU is in an error condition.
- A green power-on LED, that when lit, indicates that the PMF CRU is operational.

Processor and Memory Board (PMB)

All data processing and storage takes place on the PMB, which contains:

Processors

A pair of processors located on the PMB processes data and instructions. These processors run in lock-step to ensure data integrity.

The processor numbers and fabric connections:

Slot Number of PMF CRU	Processor Number	Fabric Connection Through MFIOB
50	Even (0 if in group 01)	X fabric only
55	Odd (1 if in group 01)	Y fabric only

The even-numbered processor in slot 50 can also communicate with the Y fabric through its router and the processor in the other PMF CRU in the same enclosure.

The odd-numbered processor in slot 55 can also communicate with the X fabric through its router and the processor in the other PMF CRU in the same enclosure.

Processor types for NonStop S-series servers are listed in [Processor Types](#) on page B-12.

Secondary Cache

The amount depends on the model of the PMF CRU.

Memory

Memory consists of memory units. The PMB has eight memory slots, MS1 through MS8, and each memory unit is identified by its slot number.

The memory for a processor is organized into two logical memory units (LMUs) of four memory units each.

One LMU consists of memory units in slots MS1 through MS4; the other LMU consists of memory units in slots MS5 through MS8. An LMU must have memory units installed in either all of its slots or none of its slots.

All memory units within an LMU must be the same size, but the two LMUs on a PMB can be different sizes.

Memory units are not compatible between different models of customer-replaceable PMF CRUs.

For NonStop S7600 and S74000 PMF CRUs and later, memory for a processor is organized differently; each memory unit is its own LMU.

Memory units are field-replaceable only for NonStop S7000 and S70000 servers. To repair or upgrade memory in other servers, you must obtain a replacement PMF CRU from HP.

The supported memory configurations are:

PMF CRU	Memory Size (page 1 of 2)
1950	Variable: 128, 256, or 512 MB *†
1951	128 MB *†
1951-X	256 MB *

PMF CRU	Memory Size (page 2 of 2)
1951-A	512 MB *
1951	640 MB *
1951-B	1 GB *
1954-X	256 MB
1954-A	512 MB
1954-B	1 GB
1954-C	2 GB
1960-A	512 MB
1961-B	1 GB
1961-D	4 GB
1962-C	2 GB
1962-D	4 GB
1970-A	512 MB
1970-C	2 GB
1970-D	4 GB
1971-B	1 GB
1971-C	2 GB
1971-D	4 GB
1971-F	16 GB
1972-B	1 GB
1972-C	2 GB
1972-D	4 GB
1972-F	16 GB
1973-C	2 GB
1973-D	4 GB
1973-E	8 GB
1974-C	2 GB
1974-D	4 GB
1974-E	8 GB
1974-F	16 GB
* 1951 PMF CRUs do not have fixed configurations. Memory CRUs can be replaced in the field in a variety of combinations.	
† 128 MB memory is not supported for PMF CRUs on G06.16 and later.	

Configurations of Memory Units

The total amount of memory in a PMF CRU depends on the number and size of the memory units installed in the PMF CRU.

This table lists the supported configurations of memory units for NonStop S7000 and S70000 PMF CRUs:

Memory Slots for Supported 1950 Memory Configurations

Memory	MS1	MS2	MS3	MS4	MS5	MS6	MS7	MS8
128 MB	32	32	32	32	Empty	Empty	Empty	Empty
256 MB	32	32	32	32	32	32	32	32
512 MB	128	128	128	128	Empty	Empty	Empty	Empty

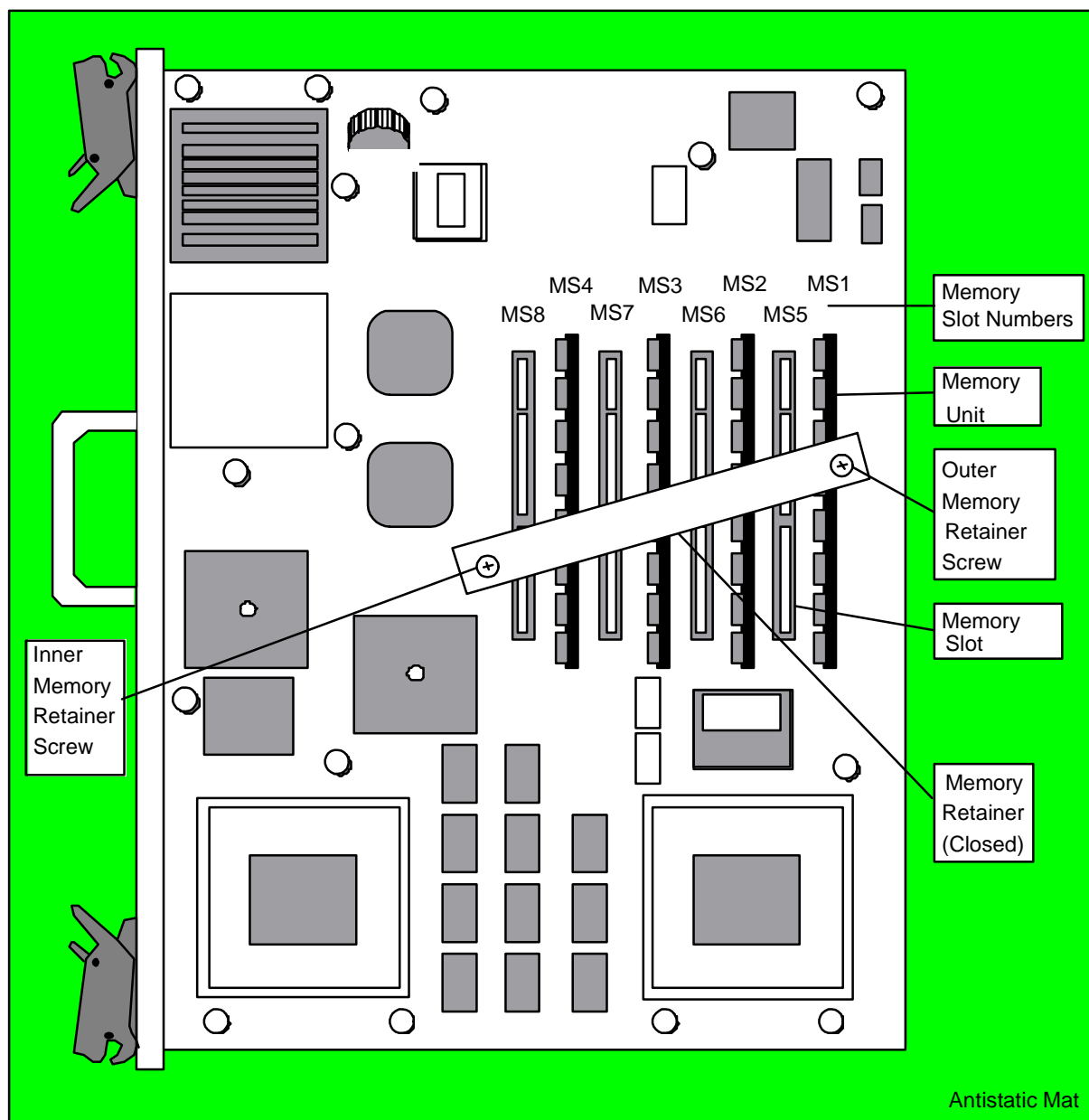
Memory Slots for Supported 1951 Memory Configurations

Memory	MS1	MS2	MS3	MS4	MS5	MS6	MS7	MS8
128 MB*	32	32	32	32	Empty	Empty	Empty	Empty
256 MB	32	32	32	32	32	32	32	32
512 MB	128	128	128	128	Empty	Empty	Empty	Empty
640 MB	128	128	128	128	32	32	32	32
1024 MB (1 GB)	128	128	128	128	128	128	128	128

* 128-MB memory is not supported on NonStop S70000 systems running G06.16 and later.

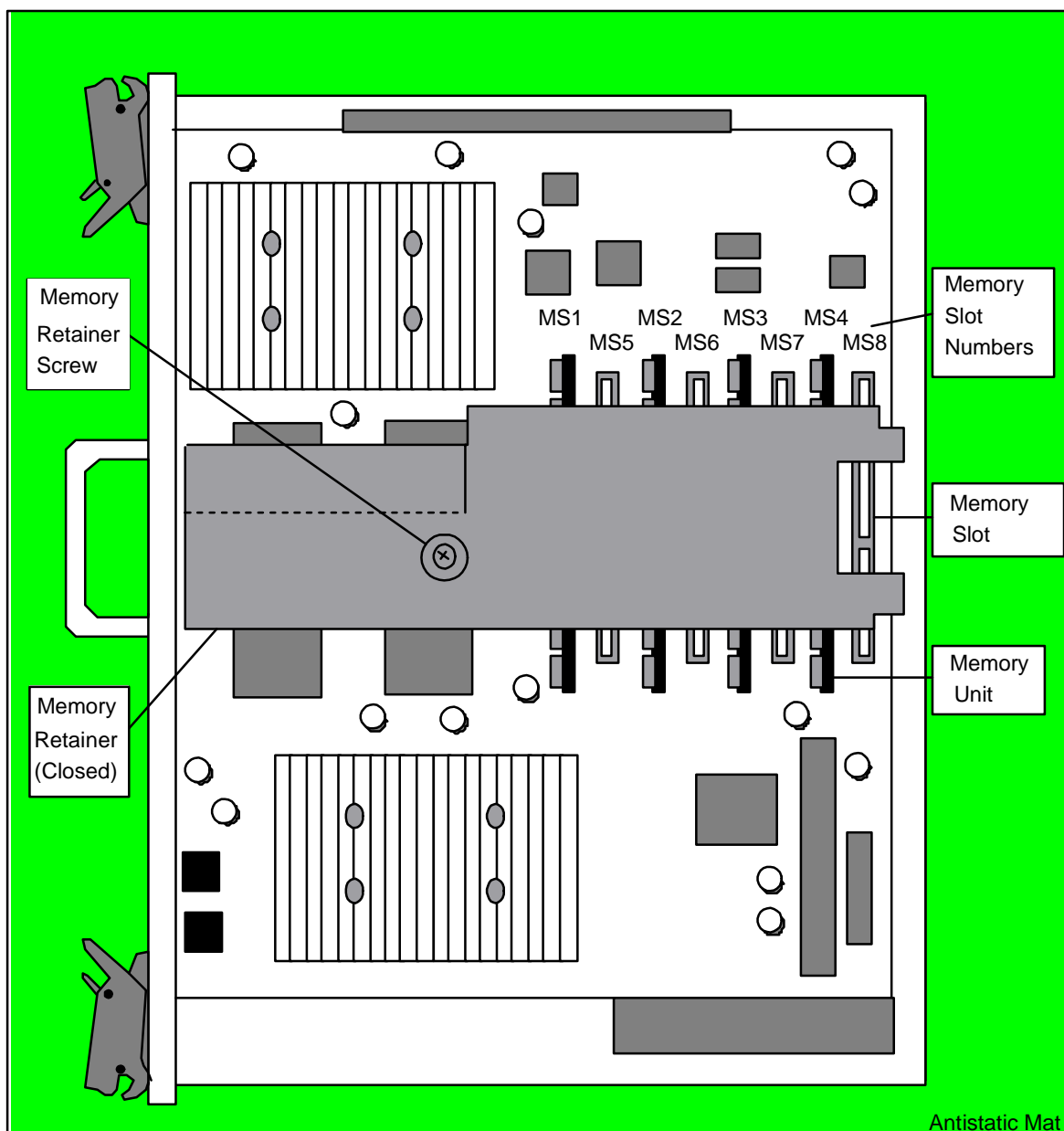
The following illustrations show memory units installed in one LMU for the PMF CRUs with field-replaceable memory units.

PMB	Page
PMB in a 1950 PMF CRU	4-42
PMB in a 1951 PMF CRU	4-43

PMB in a 1950 PMF CRU

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PMB in a 1951 PMF CRU



VST071.vsd

Compatibility of PMF CRUs

Permanent Coexistence of Enclosures in a System

The NonStop S-series model number of an enclosure is determined by the pair of PMF CRUs installed in the enclosure. These enclosures can coexist permanently within a system:

- S7000 only
- S7400, S7600, and S7800 can coexist
- S70000, S72000, and S74000 can coexist
- S72000, S74000, S76000, S78000, S86000, and S88000 can coexist

PMF CRU Compatibility within an Enclosure

Best practices require that both PMF CRUs within an enclosure should have the same model number and contain the same memory size. An application outage can occur if:

- The processor and I/O do not run at equivalent speeds
- The PMF CRU that can sustain the higher transaction rate is taken off line or fails when it is near maximum utilization.

PMF CRU Compatibility in an Enclosure During Online Replacement or Upgrade

All models of PMF CRUs can be replaced online. Some models of PMF CRUs cannot be upgraded online. This table shows which PMF CRUs can be upgraded from one model to another online.

To From	1950 7000	1960 7400	1961 7600	1962 7800	1951 70000	1954 72000	1970 74000	1971 76000	1973 78000	1972 86000	1974 88000
1950 (S7000)	X										
1960 (S7400)		X	O	O				O	O	O	O
1961 (S7600)			X	O			O	O	O	O	O
1962 (S7800)				X			O	O	O	O	O
1951 (S70000)					X	O	O				
1954 (S72000)						X	O	O	O	O	O
1970 (S74000)							X	O	O	O	O
1971 (S76000)								X	O	O	O
1973 (S78000)									X	O	O
1972 (S86000)										X	O
1974 (S88000)											X
X. Online replacement and upgrade, same processor O. Temporary coexistence during upgrade only											

Alarms When Upgrading from S7400/S72000 to S76000/S86000 or S78000/S88000 Servers

When the first 1954 or 1960 PMF CRU in an enclosure is replaced with a 1971, 1972, 1973, or 1974 PMF CRU, a ServerNet Path Down alarm is generated by OSM or TSM. This expected condition is created by router and protocol differences. When the second PMF CRU is operational, the system returns to normal, and the alarms disappear.

Multifunction I/O Board (MFIOB)

The multifunction I/O board (MFIOB) is a ServerNet adapter integrated into PMF CRUs and IOMF CRUs that contains:

Two SCSI ServerNet addressable controllers (SACs)	These SACs control SCSI buses 1 and 2 and the disk drives on the appearance side of the system enclosure.
One differential SCSI SAC	This SAC is connected to the differential SCSI port on the PMF CRU or IOMF CRU and controls SCSI bus 3.
One Ethernet SAC	This SAC is connected to the Ethernet port on the PMF CRU or IOMF CRU (used in group 01 for OSM or TSM operations).
One service processor (SP)	The SP is a processor with its own operating system that runs independently of the rest of the system to provide part of the system's diagnostic and maintenance functions. For more information, see Service Processor (SP) on page 4-47.
One ServerNet Router 1 or Router 2	This router maintains ServerNet links to various components. For: <ul style="list-style-type: none"> ● PMF CRUs, see ServerNet Router 1 on page 4-48 ● IOMF CRUs, see ServerNet Router 1 on page 4-58 ● PMF CRUs, see ServerNet Router 2 on page 4-49 ● IOMF CRUs, see ServerNet Router 2 on page 4-58
Serial maintenance bus (SMB) connections	The SMB connects components within a processor enclosure to the SPs.

Multifunction I/O Board 2 (MFIOB 2)

The MFIOB 2 implements the MFIOB functions for ServerNet Router 2.

Service Processor (SP)

The service processor (SP) on the MFIOB monitors and controls the operation of the system. The SPs:

- Initialize hardware
- Configure ServerNet routers
- Perform startup services
- Perform down system services
- Perform environmental sense and control (ESC) functions
- Control power
- Test hardware
- Configure hardware

Each SP has its own operating system that runs independently of other SPs and of the rest of the system. Thus, SPs allow you to perform operations on a NonStop S-series server independent of the HP NonStop operating system. Even when the system is down, the SPs provide a low-level link to the system.

Service processors operate in pairs. Within an enclosure, one SP is the active SP and the other is the backup SP.

The two SPs in an enclosure are referred to as peer SPs. If one SP in the pair fails, its peer SP can perform any required function.

Master Service Processors

The SPs in group 01 are called master service processors (MSPs); the SPs in other enclosures can be called expansion service processors (ESPs). The role of ESPs is typically limited to functions within a single service processor domain.

The MSPs:

- Connect to the system console through the Ethernet port on the PMF CRU
- Provides the external maintenance interface services for the system
- Provide operating system load control
- Perform down system services

Service Processor Domains

All modules and CRUs connected to a single serial maintenance bus (SMB) are controlled by one SP pair and are referred to as a service processor (SP) domain.

Service Processor Communication

Service processor communication takes place along routes that depend on the destination of the message:

- The MSPs communicate with the OSM or TSM Low-Level Link running on the system console through the Ethernet ports on the PMF CRUs in group 01 and using the Remote Procedure Call (RPC) protocol.
- The pair of SPs in one enclosure communicate with each other through the dual-ported SMB within that enclosure.
- The SP pairs in a group communicate with SP pairs in other groups and the operating system through the ServerNet communications network.

ServerNet Router 1

The PMF CRUs that are not PMF 2 CRUs contain one ServerNet router 1, which has connections to:

- The processor in the same PMF CRU
- The processor in the other PMF CRU in this enclosure, through the backplane
- One of the SEB or adapter slots 51 and 52:
 - The PMF CRU in slot 50 links to slot 51
 - The PMF CRU in slot 55 links to slot 52
- Both SEB or adapter slots 53 and 54
- Other internal components including:
 - Two SCSI controllers to the internal disk drive buses
 - One SCSI controller to the differential SCSI port
 - A service processor (SP)
 - The other ports on the PMF CRU faceplate
 - The ServerNet bus interface (SBI) on the MFIOB
 - The SMB, which provides communication between the SP and the other components within the enclosure

ServerNet Router 2

The PMF 2 CRU contains a ServerNet router 2, which has connections to:

- The processor in the same PMF CRU
- The processor in the other PMF CRU in this enclosure
- Both SEB or adapter slots 51 and 52
- Both SEB or adapter slots 53 and 54
- Three ServerNet ports, through plug-in cards (PICs)
- The peripheral component interconnect (PCI) bus on the MFIOB to two SCSI controllers for the internal disk drive buses
- The native I/O bus (NIOBus) on the MFIOB to:
 - A service processor (SP)
 - An Ethernet port
 - An auxiliary port
 - The other ports on the PMF CRU faceplate
 - The SMB

Power Board

The power board in a PMF CRU supplies power to the components within that PMF CRU. In the S7000 PMF CRU, power supplies reside on the power board. In S7400, S7600, S7800, and Sxx000 PMF CRUs, the power board receives DC power from the power supplies in the power shelf and conditions the power before distributing it to the other components.

The pair of PMF CRUs within an enclosure also supplies redundant power to the following devices within that enclosure:

- Disk drives
- SCSI terminators
- SEBs
- ServerNet adapters

I/O Multifunction (IOMF) CRUs

IOMF CRUs occupy slots 50 and 55 of I/O enclosures. They:

- Connect to ServerNet fabrics
- Connect enclosures
- Supply power
- Provide power-on connections

IOMF CRUs come in the following models:

IOMF CRU Model	Product Number
IOMF CRU	1952
IOMF 2 CRU	1980

IOMF 2 CRUs are supported on the G06.10 and later RVUs.

Note. All models are referred to as IOMF CRUs unless it is necessary to distinguish an IOMF 2 CRU from the other model.

IOMF CRUs and Topics

Associated Fabrics	4-51
Differences Between IOMF CRUs (Model 1952) and IOMF 2 CRUs	4-51
Coexistence of IOMF CRUs in an Enclosure	4-51
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Power Cords, Power Cables, and Receptacles	4-56
Power-On Push Buttons, Cables, and Receptacles	4-56
LEDs	4-56
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Power Interlock	4-57
ServerNet Router 1	4-58
ServerNet Router 2	4-58
Power Board	4-58
ServerNet Buffer Board	4-58

Associated Fabrics

IOMF CRU in Slot ...	Connects to ...
50	X fabric
55	Y fabric

Differences Between IOMF CRUs (Model 1952) and IOMF 2 CRUs

The IOMF 2 CRU has all the functions of the IOMF CRU (model 1952) except that the unused modem port is removed from the IOMF 2 CRU (model 1980).

In addition, the IOMF 2 CRU:

- Has three configurable ServerNet ports, two of which are unused at this time
- Is supported on G06.11 and later RVUs and on G06.10 with a software product revision (SPR)
- Is backward compatible with all NonStop S-series systems except NonStop S700 systems
- Offers improved throughput when used with PMF 2 CRUs
- Offers improved disk performance on sequential I/O
- Uses an Ultra SCSI PIC in the SCSI port
- Offers improved throughput when used with MSEBs

Coexistence of IOMF CRUs in an Enclosure

	IOMF	IOMF 2
IOMF	Yes	Only during online upgrade
IOMF 2	Only during online upgrade	Yes

Coexistence of IOMF CRUs in a System

	IOMF	IOMF2
IOMF	Yes	Yes
IOMF 2	Yes	Yes

IOMF CRU Faceplates

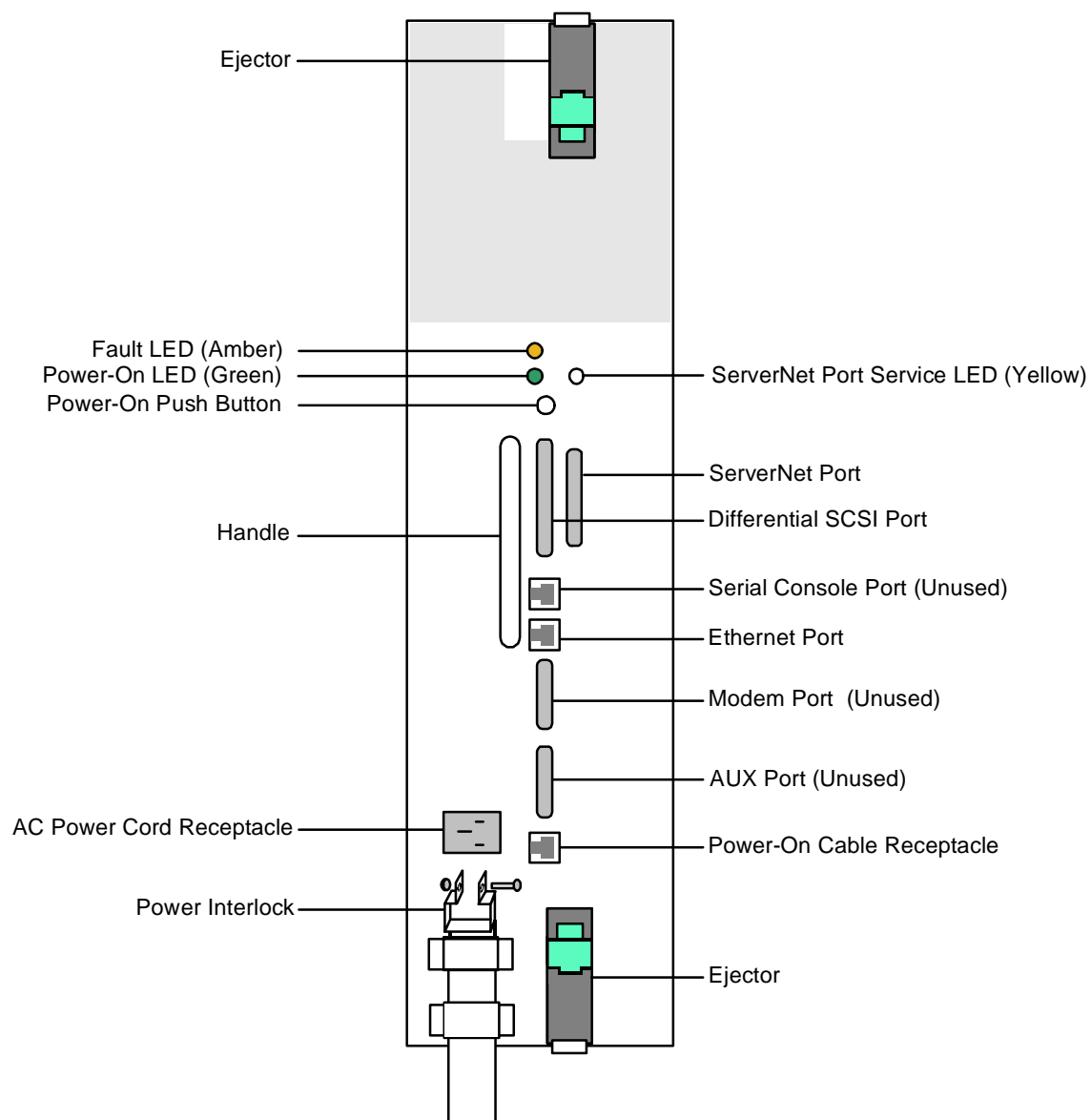
The IOMF CRU faceplates are shown in these figures:

IOMF CRU Model	Faceplate Figure
1952 IOMF CRU	page 4-53
1980 IOMF 2 CRU	page 4-54

The faceplates of the different models of the IOMF CRU contain the following features. Each IOMF CRU faceplate is illustrated on the following pages:

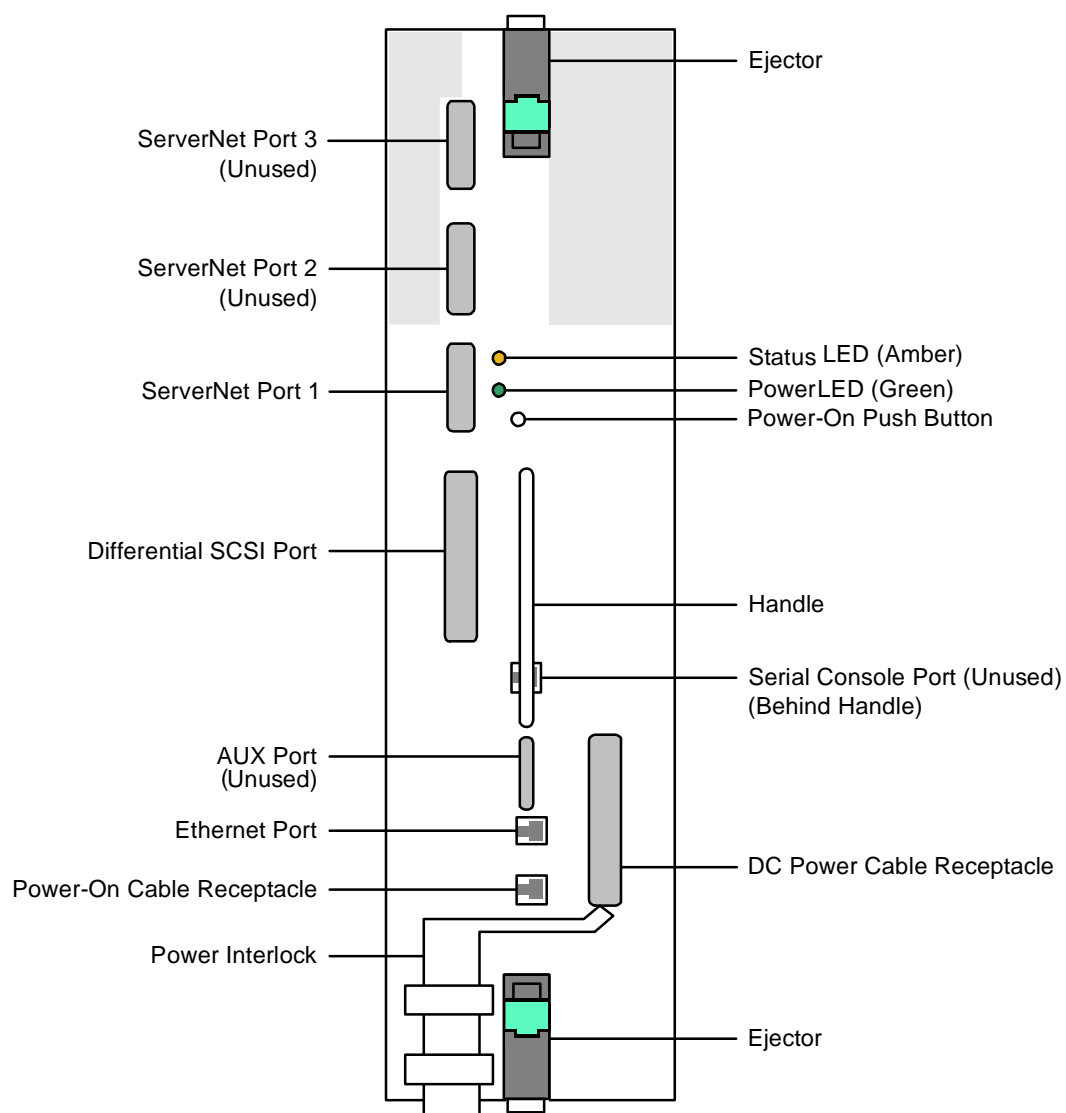
Feature	IOMF CRU (Model 1952)	IOMF 2 CRU (Model 1980)
LEDs:		
Amber fault LED	X	X
Green power-on LED	X	X
Yellow ServerNet port service LED	X	
Green link-alive LED		X
Ports:		
Auxiliary (AUX) port (unused)	X	X
Differential SCSI port	X	X
Ethernet port (used only in group 01)	X	X
Modem port (unused)	X	
Serial console port (unused)	X	X
ServerNet port	X	
ServerNet PIC port with green link-alive LED		X
Three ServerNet PIC ports (two are unused)		X
SCSI terminators, external (not removable)	X	
Power-cord or cable receptacle for:		
AC power cord	X	
DC power cable		X
Power-on cable	X	X
Power-on push button	X	X
Handle	X	X
Two ejectors	X	X
Power interlock that prevents removal of the IOMF CRU from an enclosure when external power is applied to the enclosure	X	X

1952 IOMF CRU Faceplate



VST117.vsd

1980 IOMF 2 CRU Faceplate



VST300 .vsd

Ports

- ServerNet port (on 1952 IOMF CRU)

You connect an I/O enclosure to a processor enclosure by connection a ServerNet cable between as SEB or MSEB in the processor enclosure and the ServerNet port on an IOMF CRU in the I/O enclosure.

- Three configurable ServerNet ports (on 1980 IOMF 2 CRU)

You connect an I/O enclosure to a process or enclosure by connecting a ServerNet cable between a SEB or MSEB in the processor enclosure and the PIC in ServerNet port 1 on an IOMF 2 CRU in the I/O enclosure.

ServerNet port 2 and ServerNet port 3 are currently unused.

- Differential SCSI port

The differential SCSI port is on SCSI bus 3 and can be used to attach a supported tape drive or an Open SCSI device to the system.

- Ethernet port

This port is used during online system resizing.

- AUX port (currently unused)
- Modem port (not present on 1980 IOMF 2 CRUs) (currently unused)
- Serial console port (currently unused)

Plug-In Cards (PICs)

For IOMF 2 CRUs, ServerNet port 1 can be configured with one of four models of PICs:

- Emitter-coupled logic (ECL) PICs used with the original ServerNet cables
- Serial-copper PICs used with lighter, more manageable serial-copper cables
- Multimode fiber-optic (MMF) PICs used to separate enclosures up to 200 meters feet (656)
- Single-mode fiber-optic (SMF) PICs used to separate enclosures up to 200 meters (656 feet). NonStop S76000 and S86000 servers, and later, support a distance of 200 meters between processor enclosures and 5 kilometers between processor and I/O enclosures

Power Cords, Power Cables, and Receptacles

- 1952 IOMF CRUs:

- AC power cord

The AC power cord supplies AC power to power supplies in the IOMF CRU.

Removing the AC power cord from an IOMF CRU results in loss of power to the IOMF CRU and its associated PMCU and loss of the capability to charge the associated battery. However, the other components in the enclosure are powered by the other power supply and the batteries.

The IOMF CRU cannot be removed from its enclosure while the AC power cord is connected to it.

- AC power cord receptacle

This receptacle is for the AC power cord. The AC power cord is held in place by a mechanical clamp (the power interlock).

- 1980 IOMF 2 CRUs

- DC power cable

The DC power cable supplies DC power to the IOMF 2 CRU from the power supply in the power shelf.

The IOMF 2 CRU cannot be removed from its enclosure while the DC power cable is connected to it.

- DC power cable receptacle

This receptacle is for the DC power cable.

Power-On Push Buttons, Cables, and Receptacles

The power-on push button, cable, and cable receptacle in an IOMF CRU are identical to those in a PMF CRU; see [Power-On Push Button, Cable, and Receptacle](#) on page 4-38.

LEDs

The 1952 IOMF CRU contains:

- An amber fault LED, that when lit, indicates that the IOMF CRU is in an error condition.
- A green power-on LED, that when lit, indicates that the IOMF CRU is operational.
- A yellow ServerNet port service LED that is currently unused.

The 1980 IOMF 2 CRU contains:

- An amber status LED, that when lit, indicates that the IOMF 2 CRU is in an error condition.
- A green power LED, that when lit, indicates that the IOMF CRU is operational.
- Two service LEDs that are currently unused.

Multifunction I/O Board (MFIOB)

The MFIOBs in IOMF CRUs are identical to those in PMF CRUs. The MFIOB provides:

- Service processor (SP) functions for the enclosure (group), such as initial power on for the CRUs within the group and environmental and maintenance functions. The SPs in IOMF CRUs are always expansion service processors (ESPs).
- Two SCSI ServerNet addressable controllers (SACs) that connect only to SCSI devices within the I/O enclosure.
- One SCSI SAC for an external differential SCSI port.
- One Ethernet SAC that is used only during system resizing.
- Interconnection of ServerNet links in the ServerNet fabrics.

For descriptions of these boards, see [Multifunction I/O Board \(MFIOB\)](#) on page 4-46.

Each IOMF CRU connects to one of the ServerNet fabrics through the MFIOB.

The fabric connections are:

Slot Number of IOMF CRU	Fabric Connection Through MFIOB
50	X
55	Y

The I/O enclosure allows any processor in the associated processor enclosure to access to both the X and Y fabrics. The internal disk drives in an I/O enclosure can also access both fabrics.

Power Interlock

The power interlock prevents removal of the IOMF CRU from an enclosure when external power is applied to the enclosure.

ServerNet Router 1

The 1952 IOMF CRU contains one ServerNet router 1, which has connections to:

- The backplane
- The ServerNet bus interface (SBI) on the MFIOB
- ServerNet adapter slots 51, 52, 53, and 54
- The serial maintenance bus (SMB), which provides communication between the SP and the other components within the enclosure

ServerNet Router 2

The 1980 IOMF 2 CRU contains one ServerNet router 2, which has connections to:

- The backplane
- The ServerNet bus interface (SBI) on the MFIOB
- ServerNet adapter slots 51, 52, 53, and 54
- The serial maintenance bus (SMB), which provides communication between the SP and the other components within the enclosure

Power Board

The power board in an IOMF CRU supplies power to the components within that IOMF CRU. In the 1952 IOMF CRU, power supplies reside on the power board; in the 1980 IOMF 2 CRU, the power board receives DC power from the power supplies on the power shelf and conditions the power before distributing it to the other components.

The pair of IOMF CRUs within an enclosure also supplies redundant power to the following devices within that enclosure:

- Disk drives
- SCSI terminators
- ServerNet adapters

ServerNet Buffer Board

The ServerNet buffer board provides the interface between the IOMF CRU and its associated processors (that is, between the I/O enclosure and its associated processor enclosure). The ServerNet buffer board is connected to the ServerNet port on the IOMF CRU faceplate.

Enclosure Doors

System enclosures have a short enclosure door on the appearance side. When closed, it reduces electromagnetic interference (EMI) and ensures maximum cooling for components inside the enclosure. You must keep the appearance-side enclosure door closed during normal operation of the server.

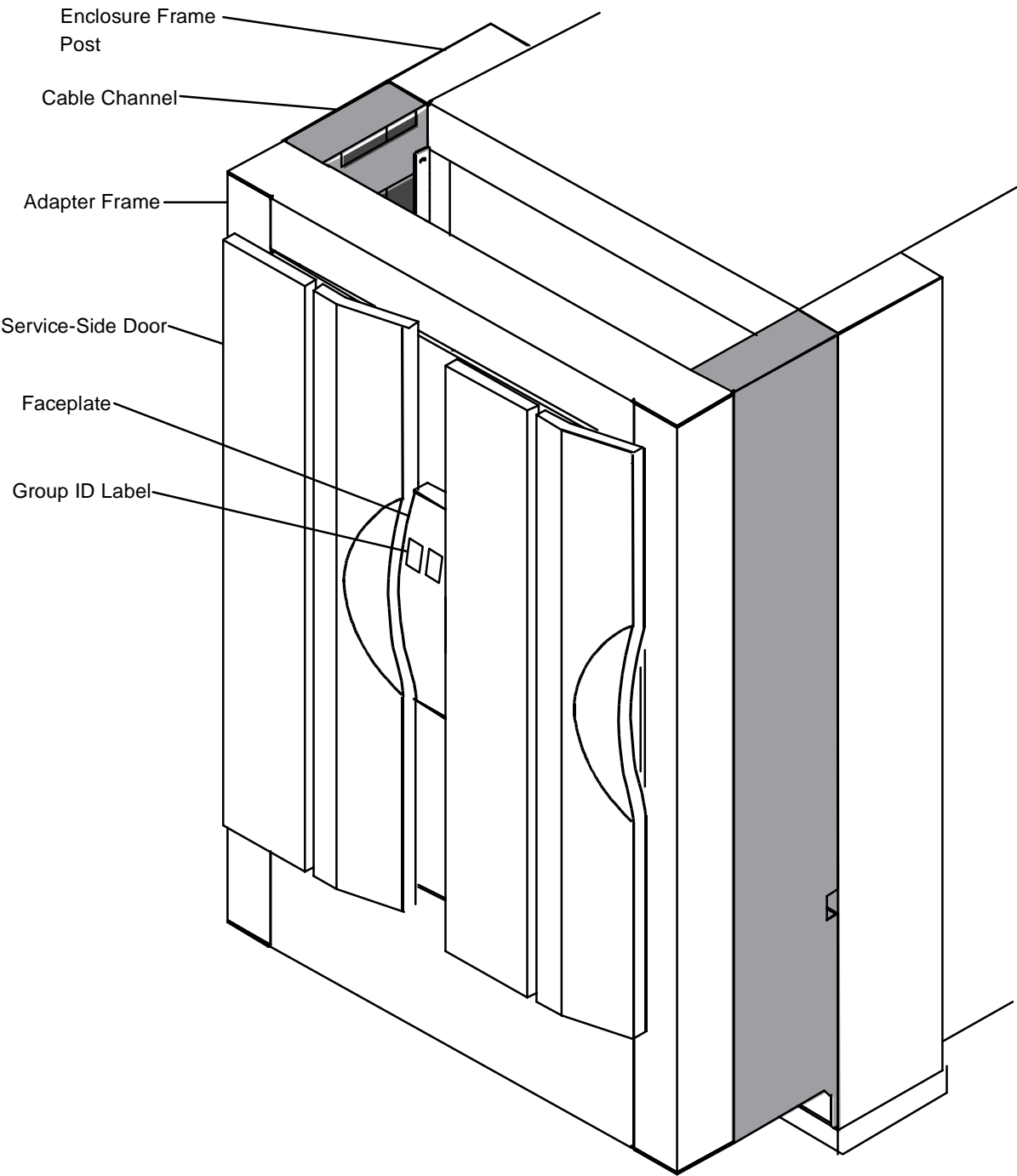
Starting with the NonStop S76000 and S86000, servers are equipped with tall doors on the appearance side and service side as part of the visual image package. (See [Visual Image Package](#) on page 4-61.)

A short service-side door is also available.

When both fans are operating, you can safely open the appearance-side door for a limited time to perform maintenance or upgrade procedures. For the time that a system can operate before overheating with the appearance-side door open and only one fan operating, see [Maximum Time That an Appearance-Side Door Can Be Open on page 4-13](#).

All doors are mounted on the enclosures using hinge pins attached to the door assembly.

This figure shows a short enclosure door installed on the service side of an enclosure.



VST020.vsd

Visual Image Package

Starting with the NonStop S76000 and S86000, servers are equipped with a different visual image package. The package consists of:

- A tall appearance-side door that extends from the top of the enclosure to the bottom, eliminating the need for the panel covering the power shelf
- A tall service-side door (standard) that matches the tall appearance-side door
- Side panels that change the appearance of an enclosure or row of enclosures as viewed from the end of the row

Servers having the original image can be ordered until June 2003.

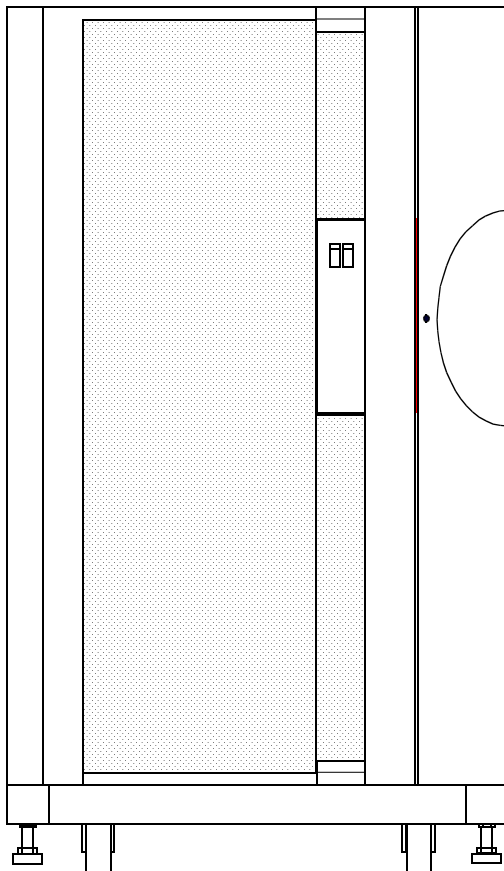
Visual image upgrade kits are available.

Hinges and locks for the tall doors are identical to the those of the original short doors.

The appearance-side tall door contains EMI shielding. The lighter service-side tall door contains baffles for air-flow control.

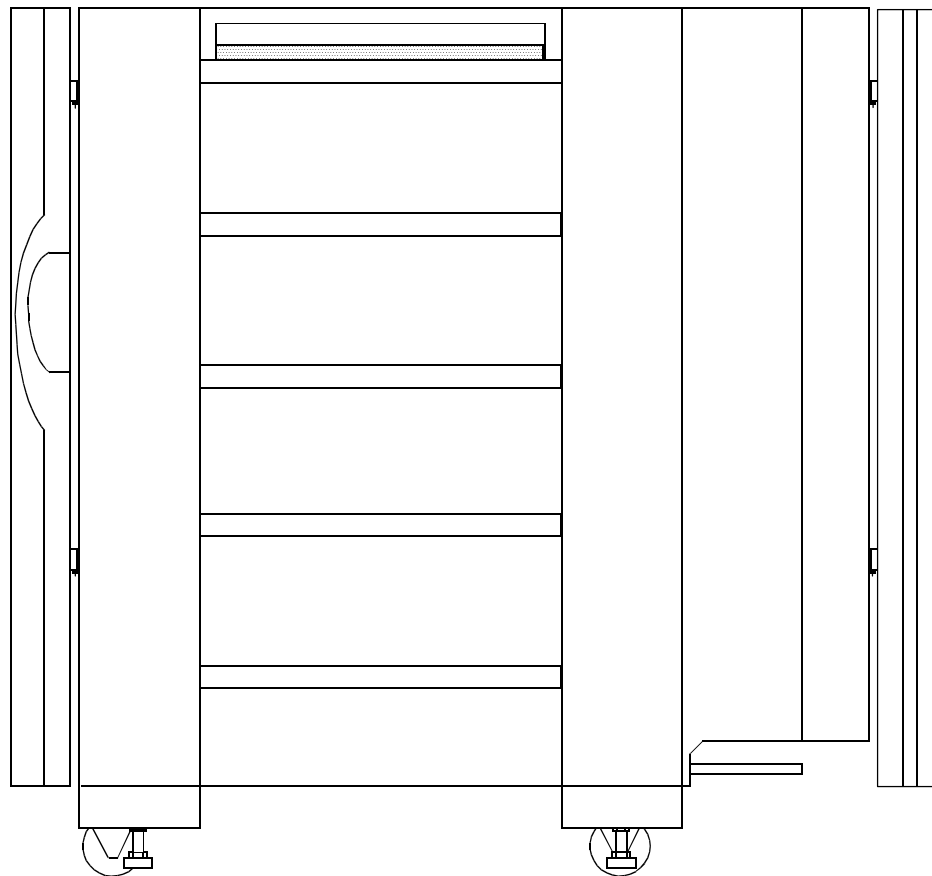
The depth is seven inches greater than the original appearance.

Tall Enclosure Door



VST702.vsd

Enclosure Side Panel



VST701.vsd

Plug-in Cards

A plug-in card (PIC) is a replaceable component in ServerNet adapters, MSEBs, and IOMF 2 CRUs. It provides a choice of connection media for ServerNet cables.

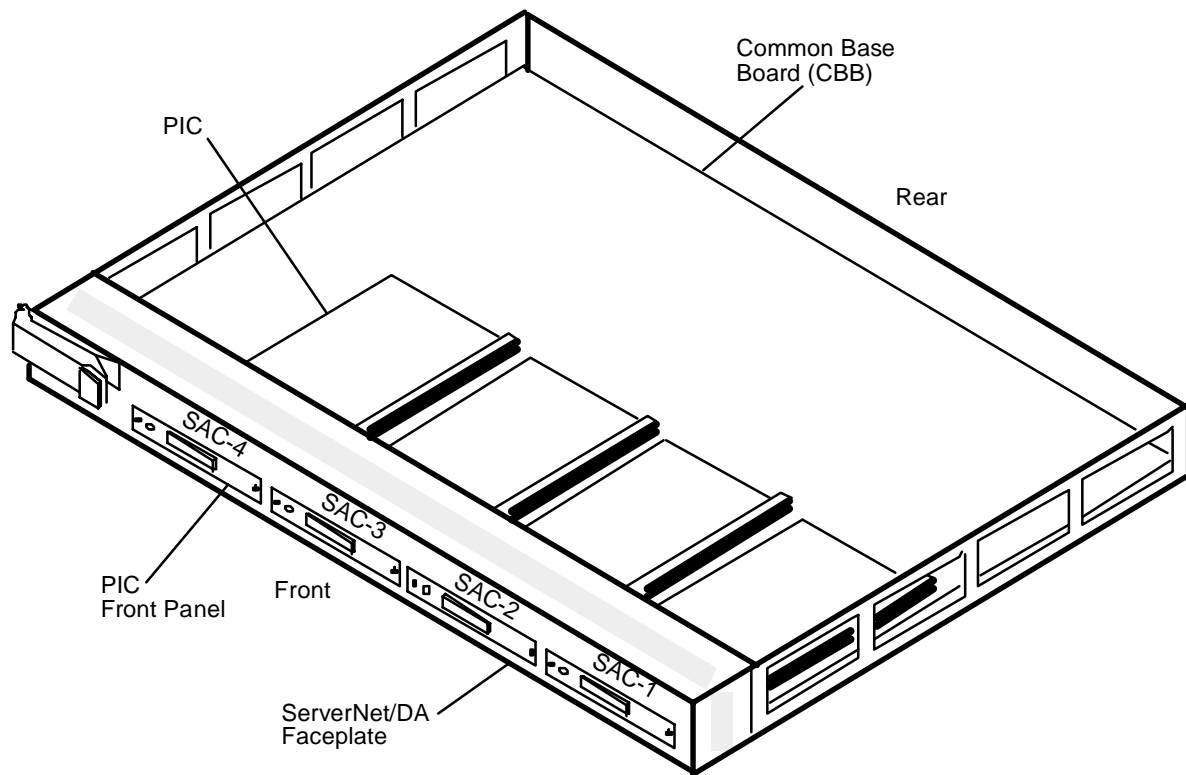
All PICs:

- Reside on a printed wiring assembly (PWA)
- Have a front panel that becomes part of the front panel of the CRU where it is installed
- Can be replaced if defective or to reconfigure the CRU where it is installed

If no PIC is installed in a slot, a filler panel must cover the opening in the faceplate.

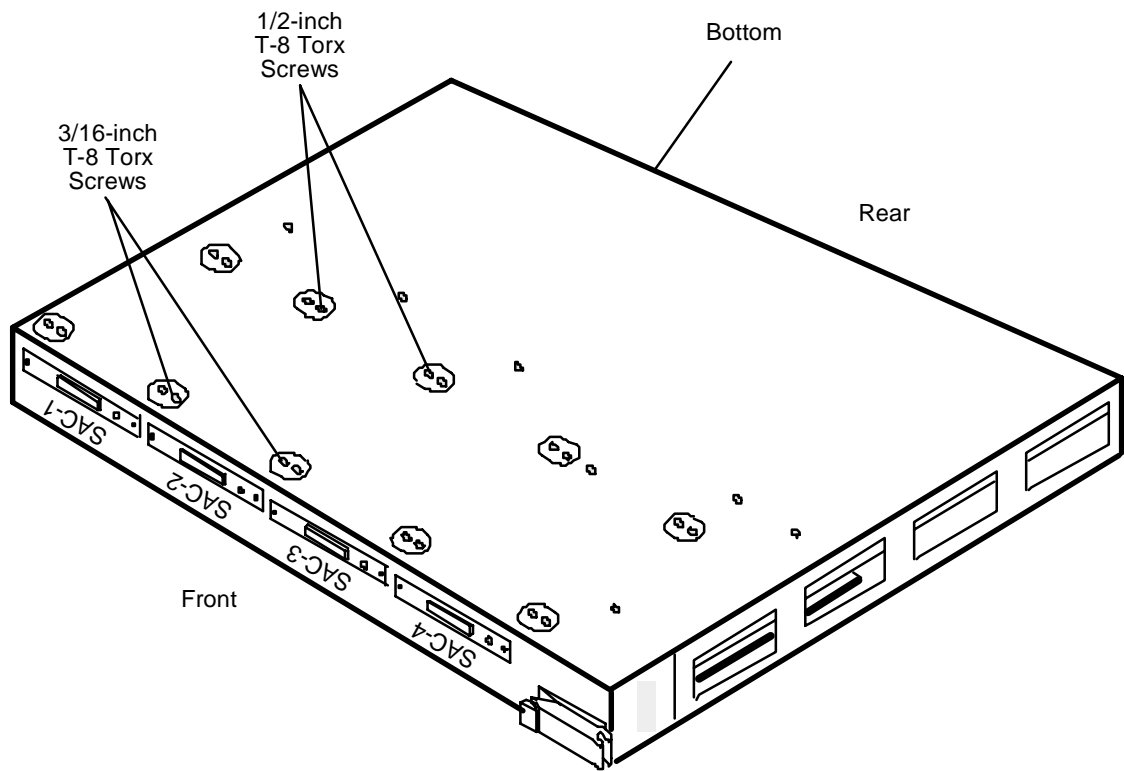
Typical PIC Installations

This figure shows four PICs installed in a ServerNet/DA:



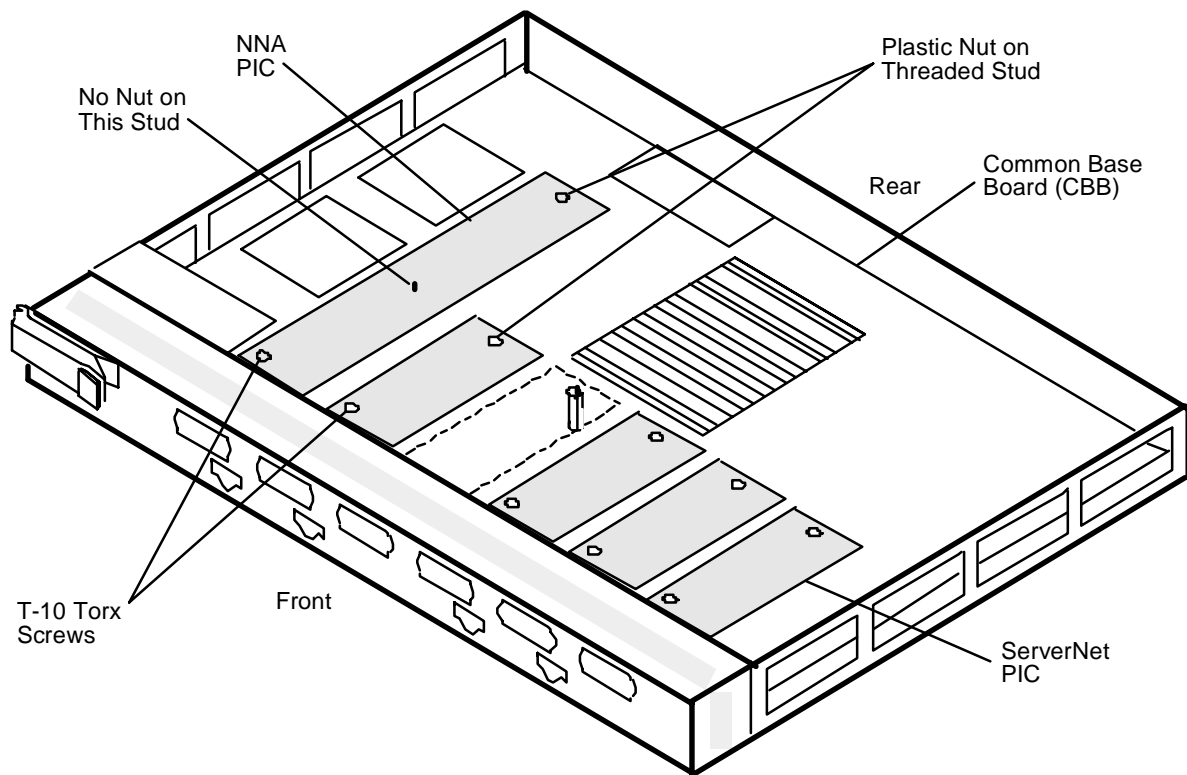
VST835.vsd

The PICs in ServerNet adapters are secured from the bottom of the adapter.



VST834.vsd

This figure shows four ServerNet PICs, one NNA PIC, and an empty PIC slot in an MSEB. PICs in an MSEB are secured from above.



VST838.vsd

System Console

A system console is a personal computer, approved by HP, used to run maintenance and diagnostic software for NonStop S-series servers. New system consoles are preconfigured with the required HP and third-party software. Existing system consoles can be upgraded to latest software versions from the HP NonStop System Console Installer CD.

System consoles communicate with NonStop S-series servers over a dedicated local area network (LAN) or a nondedicated (public) LAN. A dedicated LAN is required for use of OSM or TSM Low-Level Link and Notification Director functionality, which includes configuring primary and backup dial-out points (referred to as the primary and backup system consoles, respectively).

This table provides examples of the types of operations you can perform using HP and third-party software installed on your system console.

DSM/SCM	Perform software configuration changes
OSM or TSM Low-Level Link	<ul style="list-style-type: none"> ● By connecting to the master service processors (MSPs), allows client software to communicate with a NonStop S-series server even when the NonStop operating system is not running. ● Start a server ● Check Processor Status
OSM Service Connection or TSM Service Application	<ul style="list-style-type: none"> ● Display physical, hierarchical, and inventory views of the system or cluster. ● Monitor the current status of system and cluster components. ● Perform actions (diagnostic, recovery, hardware replacement, and so on.) on system and cluster components.
OSM or TSM Event Viewer	<ul style="list-style-type: none"> ● Retrieve, view, and save EMS events from event logs. ● Get event details such as cause, effect, and recovery information.
OSM or TSM Notification Director	<ul style="list-style-type: none"> ● Configure primary and backup system consoles to receive incident reports. ● Configure automatic dial-out to a service provider. ● Configure site contact information.
OutsideView	Run HP TACL sessions using a terminal emulation program.
NetMeeting (formerly Carbon Copy)	Implement remote monitoring and maintenance functions.
Adobe Acrobat Reader	View HP documentation.

The primary system console is connected to group 01 through a local area network (LAN) and the Ethernet ports on PMF CRUs. (HP recommends that you also configure a backup system console on the same LAN.)

OSM or TSM running on the system console communicates with the system at two levels:

OSM or TSM Communicates With ...	Through the ...	Using This Protocol
MSPs	OSM or TSM Low-Level Link	Remote Procedure Call (RPC)
NonStop operating system	OSM Service connection or TSM Service Application	TCP/IP

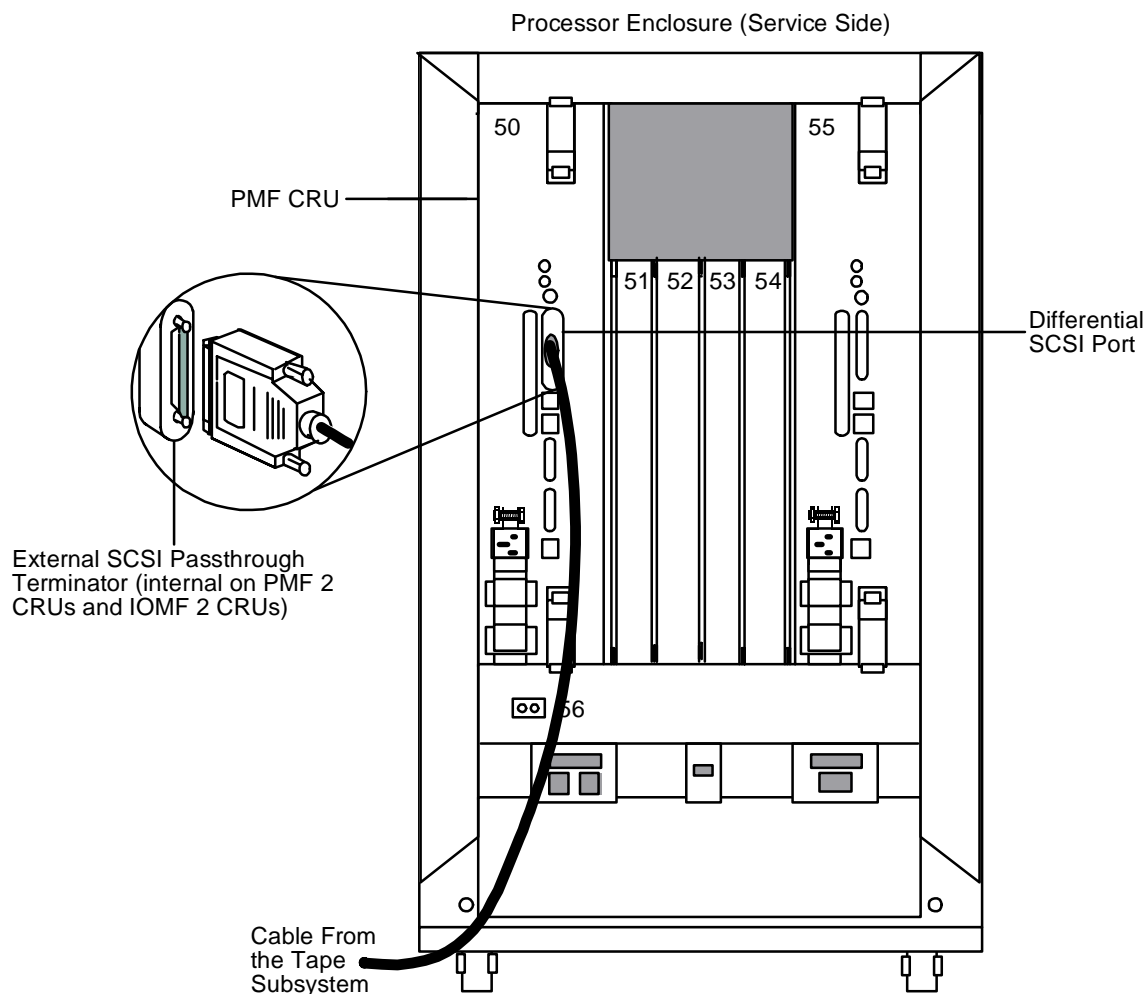
Your system configuration can be any of the following:

- One system console managing one system (not recommended)
- One system console managing multiple systems (not recommended)
- Multiple system consoles managing one system
- Multiple system consoles managing multiple systems

For Information About ...	Refer to ...
Planning for system consoles	Section 11, Planning for LAN Communications <i>OSM Migration Guide</i>
System consoles	<i>NonStop S-Series Hardware Installation and FastPath Guide</i> <i>NonStop System Console Installer Guide</i>
RPC and SNMP protocols, and functions you can perform with them	<i>OSM Migration Guide</i> <i>TSM Online User Guide</i> <i>TSM Configuration Guide</i>

Tape Drives

An external tape drive is connected to a server through a SCSI cable to the differential SCSI port on a PMF CRU, IOMF CRU, or plug-in card (PIC) on a 6760 ServerNet device adapter (ServerNet/DA).



VST550.vsd

Note. For a PMF CRU or IOMF CRU to operate properly, a SCSI passthrough terminator must be attached to the differential SCSI port. This SCSI passthrough terminator is internal on PMF 2 CRUs and IOMF 2 CRUs. Do not remove the external SCSI passthrough terminator from any other models of PMF CRU or IOMF CRU.

For information about tape drives connected to 6760 ServerNet device adapters, see the *6760 ServerNet/DA Manual*.

For information about a particular tape drive, see the manual for that product.

SWAN Concentrators

ServerNet wide area network (SWAN) concentrators are communications devices that connect to a NonStop S-series server through dual Ethernet ports and provide connections that support bit-synchronous, byte-synchronous, and asynchronous protocols over a variety of electrical interfaces.

For detailed information on SWAN concentrators, see:

- *SWAN Concentrator Installation and Support Guide*
- *SWAN 2 Concentrator Installation and Support Guide*
- *WAN Subsystem Configuration and Management Manual*

External Disk Drives

The 45xx modular disk subsystem, an external disk drive, is supported on NonStop S-series servers.

Metro Clusters

The Metro Cluster product allows multiple NonStop S-series systems to work together and appear to client applications as one processing entity called a Metro Cluster.

Both Tetra 8 and Tetra 16 topologies can be connected in a Metro Cluster.

A Metro Cluster consists of individual servers connected using NonStop cluster switches and fiber-optic cables. The Metro Cluster product extends the ServerNet X and Y fabrics outside the system boundaries and allows the ServerNet protocol to be used for intersystem messaging.

For information about the installation, configuration, and management of Metro Cluster hardware and software, refer to the *ServerNet Cluster Manual* (for the HP NonStop Cluster Switch) and the *ServerNet Cluster 6780 Planning and Installation Guide* (for the HP NonStop ServerNet Switch (model 6780)).

IOAM Enclosures

This subsection describes the components associated with an IOAM enclosure and the group, module, and slot hierarchy for components located in an IOAM enclosure.

-
- △ **Caution.** IOAM enclosures and all related components are field-replaceable units (FRUs) and must be installed by HP trained service providers. For more information about an IOAM enclosure, the *Modular I/O Installation and Configuration Guide* is available to your HP trained service provider. This manual is located in the NTL Hardware Service and Maintenance collection.
-

Components

These components are associated with or reside in an IOAM enclosure.

IOAM enclosure (chassis)

The IOAM enclosure (chassis) contains two installed midplanes:

- I/O midplane for routing ServerNet signals
- Power midplane for routing power signals for the power-supply controls

It can accommodate these components:

- ServerNet switch boards
- ServerNet adapters
- Fans
- Power supplies
- Bezel
- Cable management system

ServerNet Switch Board

A NonStop S-series system communicates with an IOAME through the ServerNet switch board. Two ServerNet switch boards route ServerNet packets from MSEBs in NonStop S-series systems to the ServerNet adapters in the IOAM enclosure, one for the X fabric, the other for the Y.

ServerNet Adapters

Fibre Channel ServerNet adapters (FCSAs) are used to communicate between an IOAM and additional storage such as Fibre Channel disk drives, Fibre Channel tape drives, or an Enterprise Storage System (ESS) disk. Gigabit 4-port ServerNet adapters (G4SAs) provide a communications interface.

Note. For more information about FCSAs and G4SAs, the *Fibre Channel ServerNet Adapter Installation and Support Guide* and the *Gigabit Ethernet 4-Port ServerNet Adapter Installation and Support Guide* are available for your service provider. For more information about Fibre Channel tape drives, see the manual for the particular tape drive product. For more information about an ESS, the *Modular I/O Installation and Configuration Guide* is available to your service provider in the NTL Hardware Service and Maintenance collection.

Fans

Four fans provide the cooling for components inside an IOAM enclosure. The fans are located in slots 16 and 17 on the front side of an IOAM enclosure.

Power Supplies

Four power supplies with universal AC input provide power to the components in an IOAM enclosure. The power supplies are installed in slots 15 and 18 on the rear side of an IOAM enclosure.

Bezel

The bezel is a hinged cover on the front on the IOAM enclosure.

Cable Management System

There are two types of cable management systems: cable trays which manage the fiber-optic cables at the module level, vertical cable guides, which manage cables when installed on the modular cabinet.

Maintenance Switch

The maintenance switch is mounted in a standard 19-inch rack and provides the communication between the IOAM enclosure and the OSM console.

Modular Cabinet

The modular cabinet is a 19-inch, 42 U high, industry-standard rack for mounting modular components. It houses the IOAM enclosure, uninterruptible power supply, extended run time modules, and maintenance switches. The modular cabinet comes equipped with front and rear doors. In order to mount power distribution units (PDUs) without occupying any U-space in the cabinet, the cabinet includes an extension, which makes it deeper than the industry-standard rack.

Power Distribution Unit (PDU)

The PDU supports power outlets for the components in the rack. The PDU is installed on a rack extender frame attached to the rack. For an IOAM enclosure, the IOAM power supplies plug into the PDU.

UPS

For IOAM enclosures, a UPS is optional but recommended where a site UPS is not available. You can choose to use any UPS that meets the modular cabinet power requirements for all enclosures being powered by the UPS. One UPS option to support the IOAM enclosure is the HP R5500 UPS.

The standard configuration for cabinets with an R5500 XR UPS assumes that you also install one extended runtime module (ERM). Each ERM is a rack-mountable battery module that extends the overall battery run time.

If you add an R5500 XR UPS to a modular cabinet in the field, you must change the right PDU to be compatible with UPS.

For power and environmental requirements, planning, installation, and emergency power-off (EPO) instructions for the R5500 UPS, refer to the documentation shipped with the UPS.

For information about planning for a site UPS, contact your HP trained service provider.

Group, Module, and Slot Hierarchy for IOAM Enclosures

Hardware in an IOAM enclosure is organized according to group, module, and slot hierarchy:

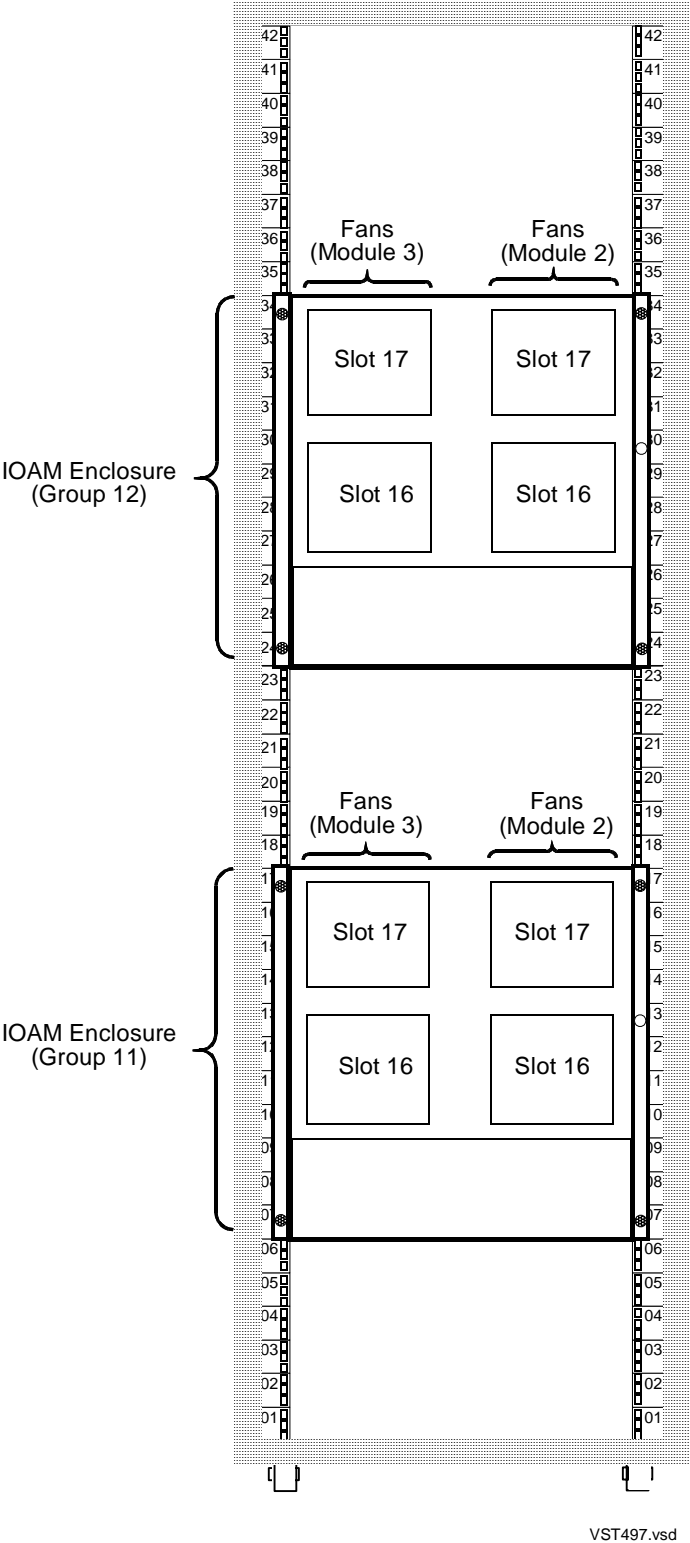
Term	Definition
Group	The IOAM enclosure and all the components within it. IOAM enclosures are numbered in the same way as I/O enclosures.
Module	<p>One logical module. There are two logical modules (module 2 and module 3) in an IOAM enclosure. Each logical module contains:</p> <ul style="list-style-type: none">● ServerNet switch board● Two power supplies● Two fans● Up to five ServerNet adapters (FCSA or G4SA) <p>Each module is numbered according to the fabric it supports:</p> <ul style="list-style-type: none">● Module 2 (X fabric)● Module 3 (Y fabric) <p>Note. Both module 2 and module 3 are supported by the X and Y fabrics. The X fabric connection is through the ServerNet switch board in module 2, slot 14 and the Y fabric connection is through the ServerNet switch board in module 3, slot 14. All adapters in modules 2 and 3 have connections to both the X and Y fabrics.</p>
Slot	<p>A physical space in the IOAM module in which a component can be installed. Slot numbers are assigned per logical module:</p>

Slot #	Component	Page
1, 2, 3, 4, 5	ServerNet adapter	4-70
14	ServerNet switch board	4-70
15 and 18	Power supplies	4-71
16 and 17	Fans	4-70

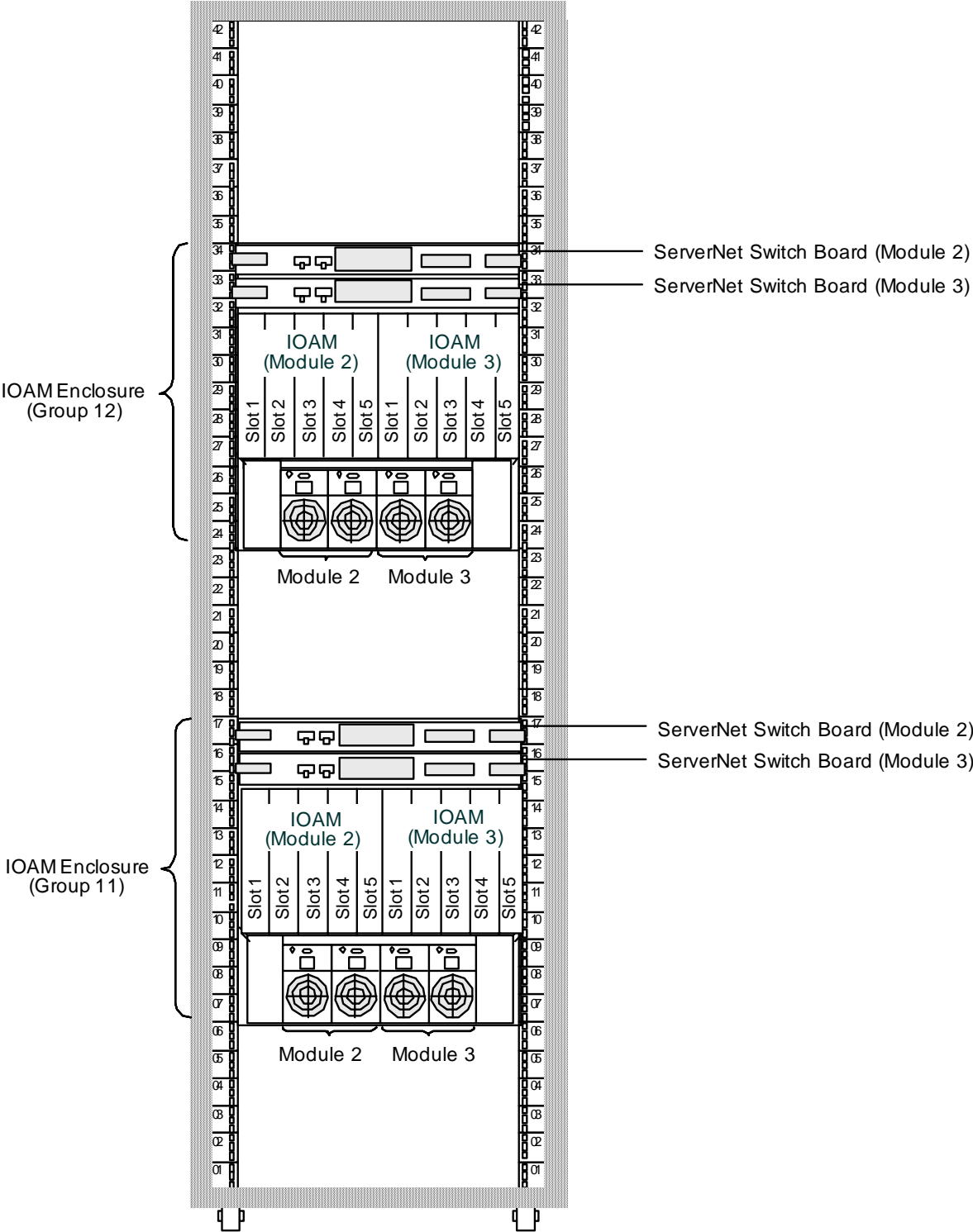
To perform software or hardware operations using SCF or OSM, you must be familiar with the organization and naming conventions and know how to identify individual components within an IOAM enclosure. For example, OSM displays the location of a fan in group 11, module 3, slot 17 in this form:

Fan (11.3.17)

IOAM Enclosure (Front) Group, Module, and Slot Hierarchy



IOAM Enclosure (Rear) Group, Module, and Slot Hierarchy



VST499.vsd

IOAM Configuration Requirements

Starting with the G06.27 RVU and later, an IOAM enclosure (IOAME) can be configured in any location that would be available for an I/O enclosure. The group number of the IOAME is the same as that of the I/O enclosure it replaces. An IOAM and I/O enclosure cannot have the same group number because only one enclosure can connect to one of the MSEB slots (X and Y) for a group.

IOAM enclosures can be installed in any order.

For the G06.25 and G06.26 RVUs, the following restrictions apply:

- An IOAM enclosure can only be group 11, 12, 13, 14, or 15.
- MSEB slots corresponding to the group 01 slot in which the IOAME is installed must be empty. Each IOAME takes the place of four I/O enclosures.
- When installing IOAM enclosures in the field, install them in an available location. Any I/O enclosure groups that are not allowed must be removed or moved to another location.

If necessary, move I/O enclosures in your system as follows:

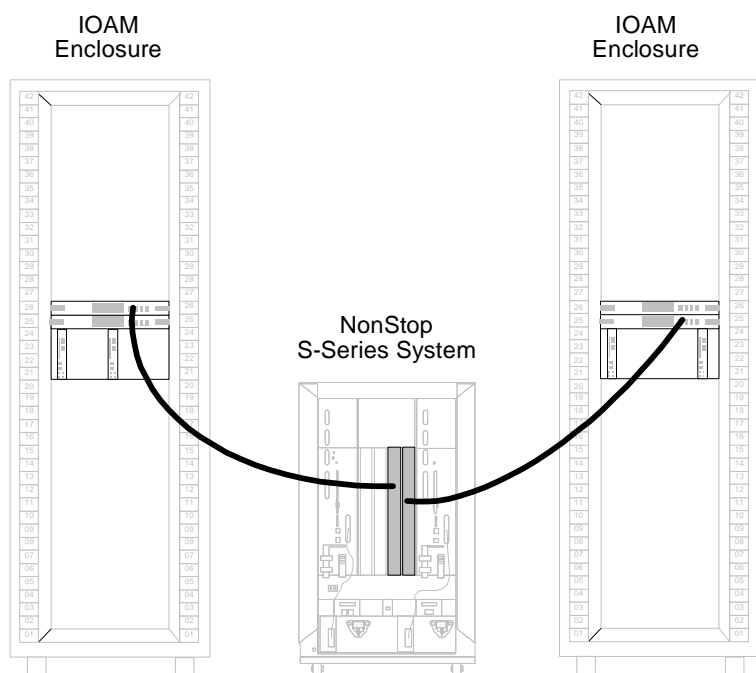
To add an IOAM enclosure as group ...	You must vacate any I/O enclosures from these groups so the IOAM enclosure can be connected to the corresponding MSEB ports...
11	21, 31, 41
12	22, 32, 42
13	23, 33, 43
14	24, 34, 44
15	25, 35, 45

Cabling IOAM enclosures is illustrated in [Cabling IOAM Enclosures](#) on page 4-76.

For an IOAM enclosure cabling diagram, see [Cabling Diagram, IOAM Enclosure, X Fabric, G06.25 and G0.26](#) on page 5-19.

Cabling IOAM Enclosures

This Figure shows two IOAM enclosures connected to a NonStop S-series processor enclosure.



VST013.vsd

Disk Drive Enclosures

A disk drive enclosure contains up to fourteen Fibre Channel arbitrated loop disk drives. These disk drives connect to the server by way of FCSAs in IOAM enclosures. Disk drive enclosures are installed in modular cabinets or 19-inch racks.

Note. For more information about disk drive enclosures, the *Modular I/O Installation and Configuration Guide* is available to your HP trained service provider. This manual is located in the NTL Hardware Service and Maintenance collection.

Disk drive enclosures are supported on NonStop S76000, S86000, series and later servers.

Disk Drive Enclosure Components

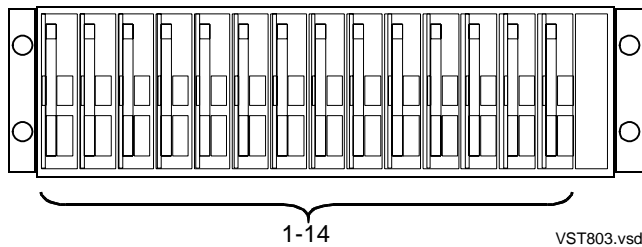
The front of a disk drive enclosure has fourteen disk drive slots. The slots are numbered 1 to 14 from left to right.

The disk drives are Fibre Channel drives. Two disk drive models are available: 73 GB and 146 GB. 73 GB and 146 GB can be mixed but not mirrored to each other. Any slot that does not contain a disk drive must be covered by disk drive blanks.

Each Fibre Channel disk drive accesses both the X and Y fabrics by way of the FCSAs.

In a NonStop S-series server, all disks can be in disk drive enclosures except the system disk and its backup disk. These two disks must be internal SCSI disk drives located in system enclosures.

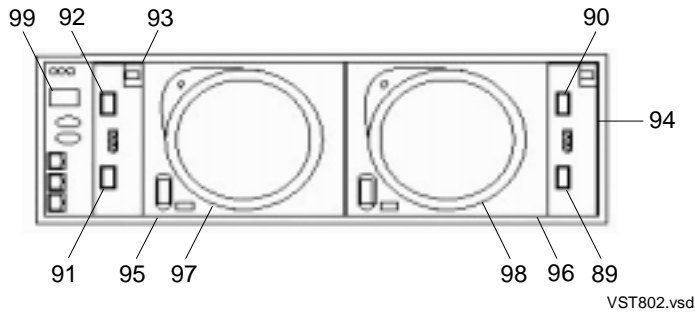
Disk Drive Enclosure, Front View



These components are located in the rear of a disk drive enclosure:

- Two blowers draw cooling air through the disk drive enclosure from front to rear.
- One Environmental Monitoring Unit (EMU) is located at the left of the enclosure. The EMU monitors the enclosure and detects conditions such as failed power supplies, blowers, elevated temperatures, and external air sense faults.
- Two Fibre Channel arbitrated loop I/O modules (FC-AL I/O A and FC-AL I/O B), located on either side of the blowers, route data to and from the disk drives using Loop A and Loop B. The FC-AL I/O modules pass Fibre Channel signals from FCSAs in the IOAME to the disks in the disk drive enclosure and to any disk drive enclosures daisy-chained to the first disk drive enclosure.
- Two power supplies, located behind the blowers, power the disk drive enclosure components.
- Connections between IOAM enclosures and disk drive enclosures are made by MMF cables.
- Two AC power cords bring power from the PDU to the power supplies in the disk drive enclosure.

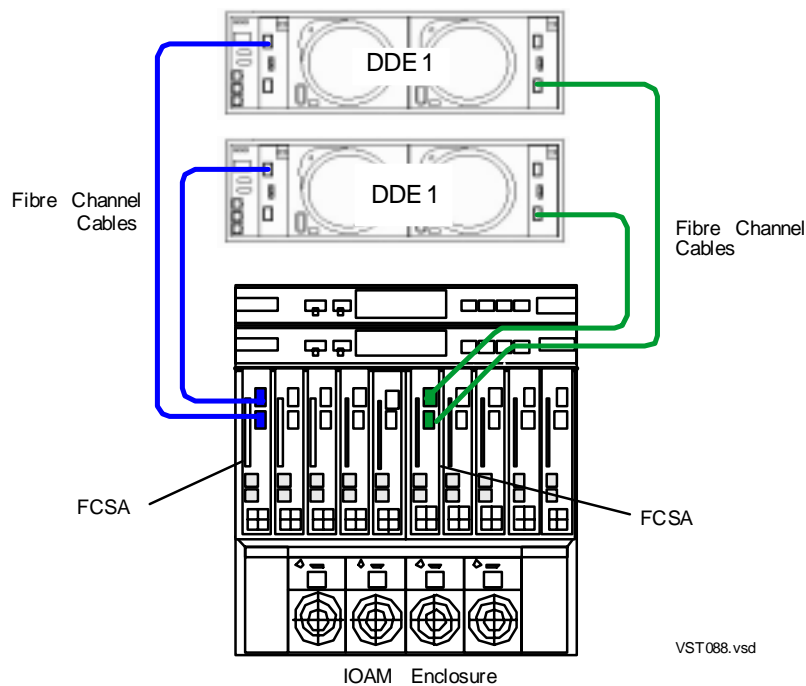
Disk Drive Enclosure, Rear View



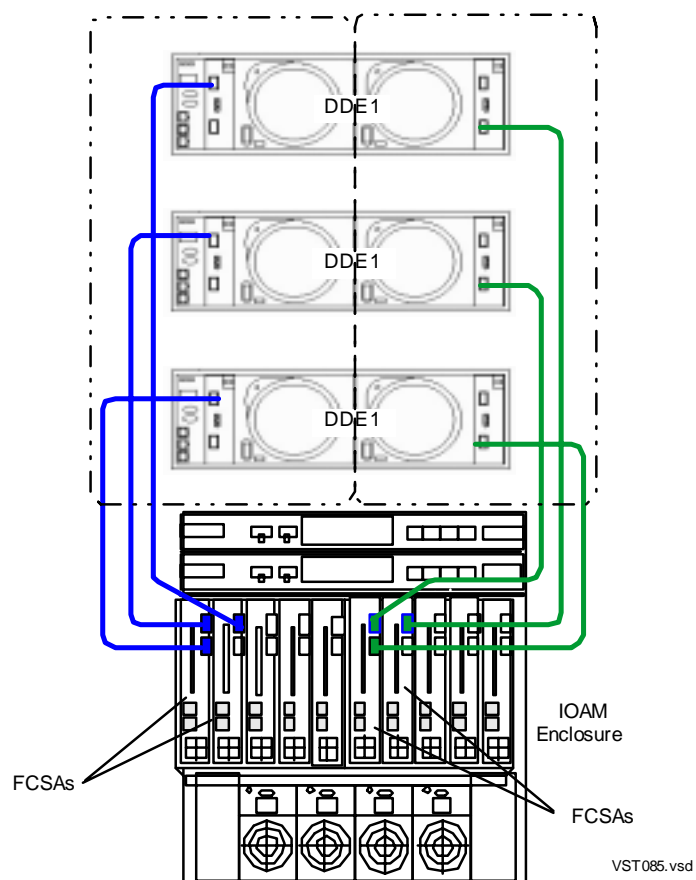
Disk Drive Enclosure Connection Examples

The following cabling diagrams illustrate different possible configurations. They are in order of increasing fault-tolerance and storage capacity. DDE numbers designate DDE shelves.

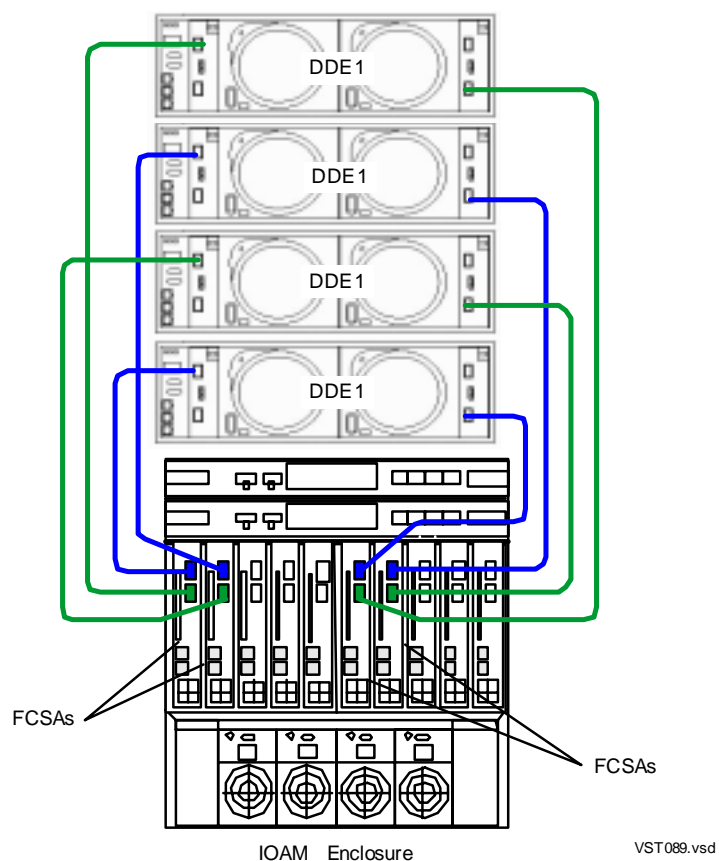
Two FCSAs, Two DDEs, One IOAM Enclosure



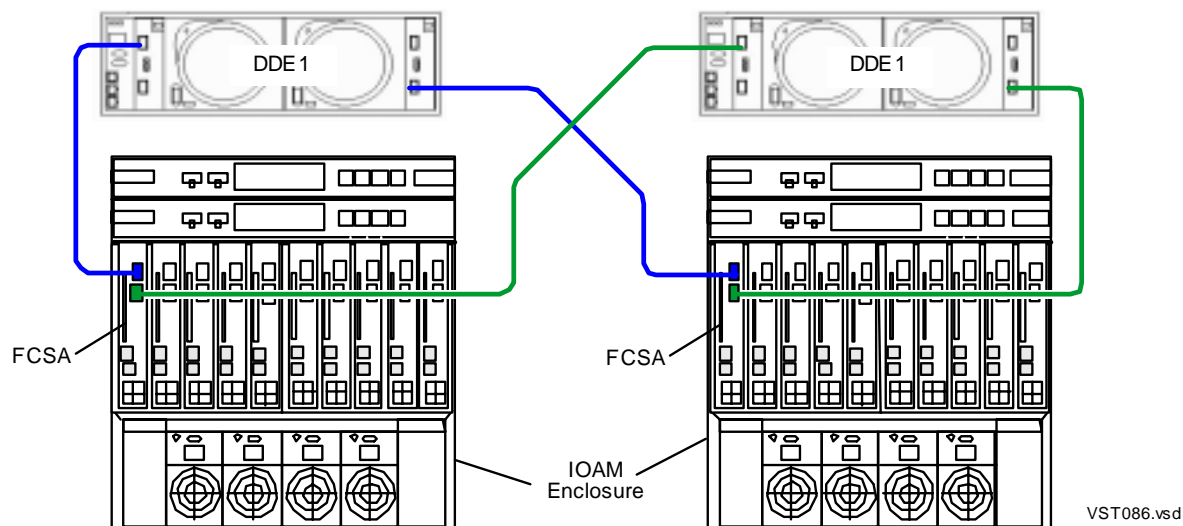
Four FCSAs, Three DDEs, One IOAM Enclosure



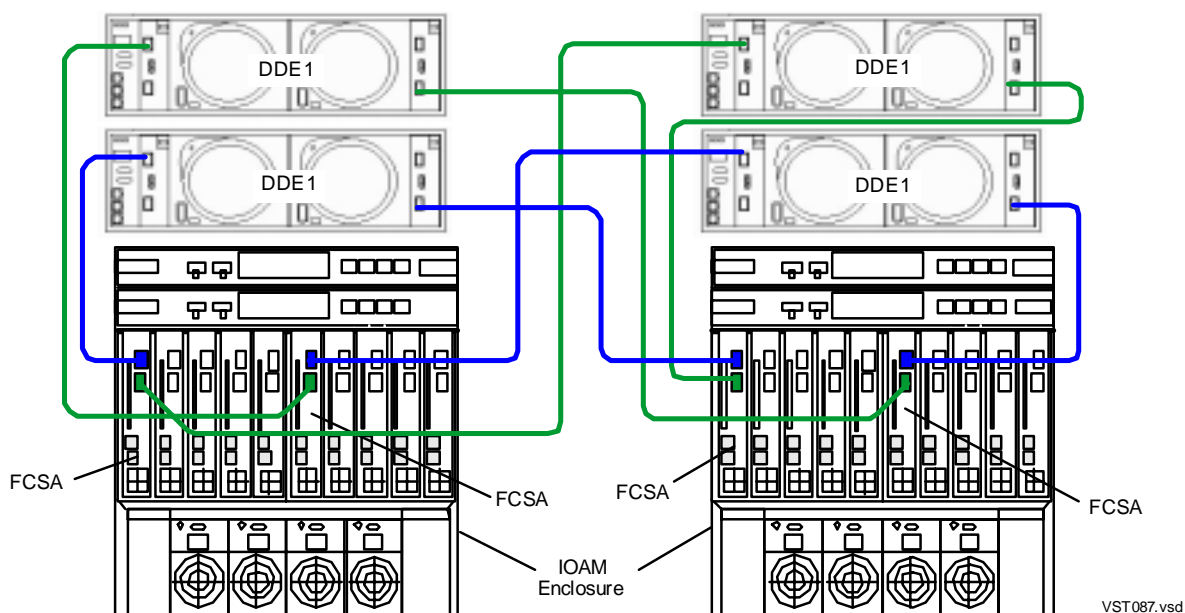
Four FCSAs, Four DDEs, One IOAM Enclosure



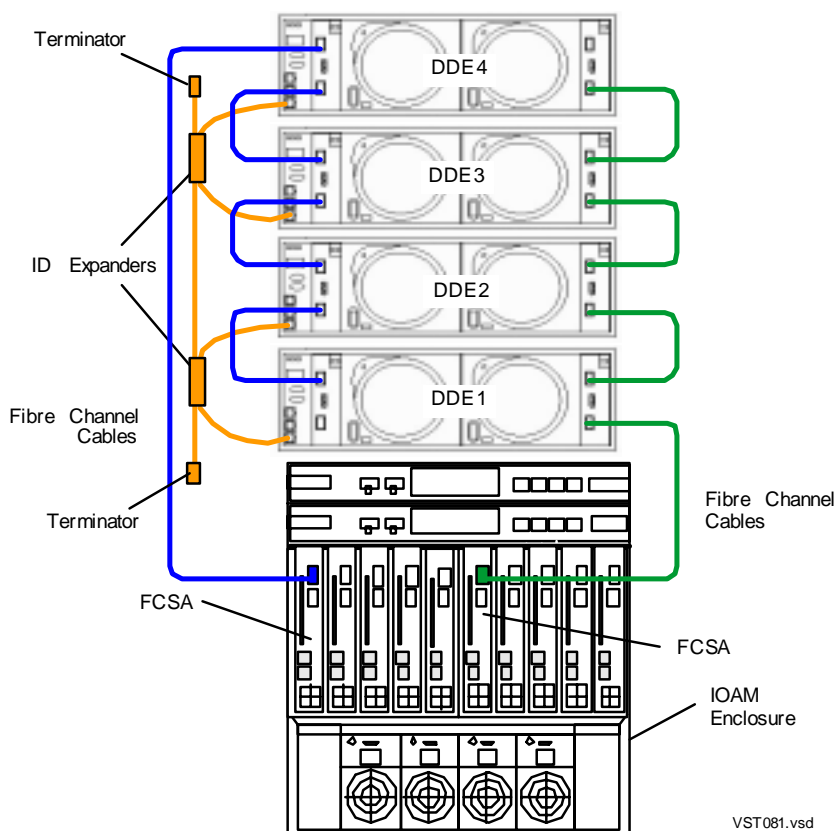
Two FCSAs, Two DDEs, Two IOAM Enclosures



Four FCSAs, Four DDEs, Two IOAM Enclosures



Daisy-Chained Two FCSAs, Four DDEs, One IOAM Enclosure



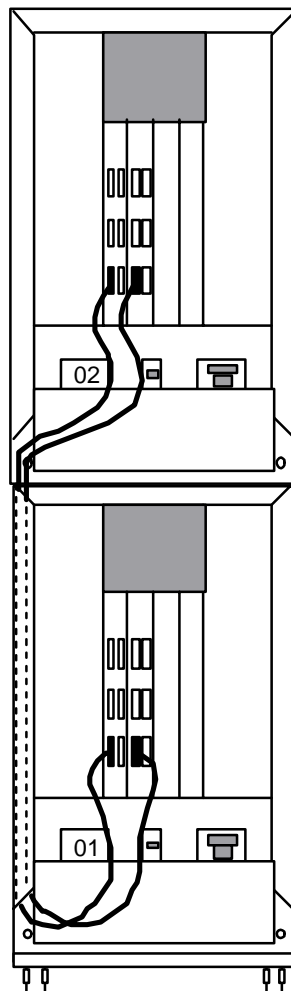
5

ServerNet Cabling

This section describes ServerNet cables, how to interpret ServerNet cabling diagrams, and how to connect cables between enclosures.

ServerNet Cables	5-2
ECL Cables	5-2
Serial-Copper Cables	5-4
MMF and SMF Fiber-Optic Cables	5-4
Fiber-Optic Cables With LC-SC Connectors	5-5
How Cabling Diagrams Represent Server Hardware	5-6
ServerNet Cabling: Tetra 8 Topology	5-8
ServerNet Cabling: Tetra 16 Topology	5-12

This illustration shows the SEB slot locations and the ServerNet cabling for a four-processor system:



VST570.vsd

ServerNet Cables

These types of ServerNet cables are available:

- SEB-to-SEB ECL
- SEB-to-MSEB ECL
- MSEB-to-MSEB ECL
- Serial-copper
- Multimode fiber-optic
- Single-mode fiber-optic

The use of the ECL cable adapter to connect an SEB-to-SEB cable to an MSEB has been discontinued.

For part numbers for ServerNet cables refer to [Appendix A, Part Numbers](#).

System enclosures are connected by ServerNet cables as follows:

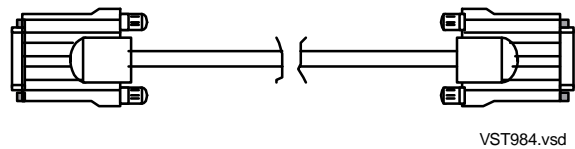
SEB/MSEB in Processor Enclosure to...	Six-Connector SEB in Processor Enclosure	MSEB in Processor Enclosure	ServerNet Port in IOMF Enclosure	ServerNet Port in IOMF 2 Enclosure
SEB (Six-Connector)	SEB-to-SEB ECL cable	SEB-to-MSEB ECL cable	SEB to SEB ECL type cable	SEB-to-MSEB ECL type cables
MSEB	SEB to MSEB ECL cable	Any (depends on PICs)	SEB-to-MSEB ECL type cable	Any (depends on PICs)

Note. A ServerNet switch board in an IOAM enclosure uses a fiber-optic cable with LC-SC connectors to connect to the MSEB in a processor enclosure.

ECL Cables

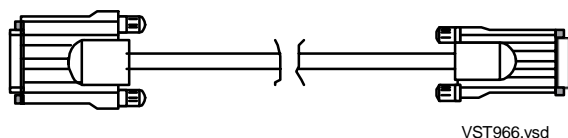
SEB-to-SEB ECL Cable

Both ends of this cable have 50-pin connectors to fit six-connector SEBs and IOMF CRUs.



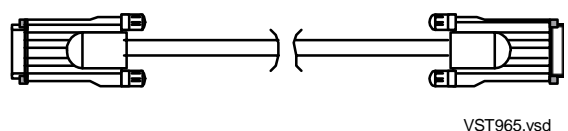
SEB-to-MSEB ECL Cable

One end of this cable has a 50-pin connector for a six-connector SEB or IOMF CRU; the other end has a smaller connector for an ECL PIC on an MSEB or IOMF 2 CRU.



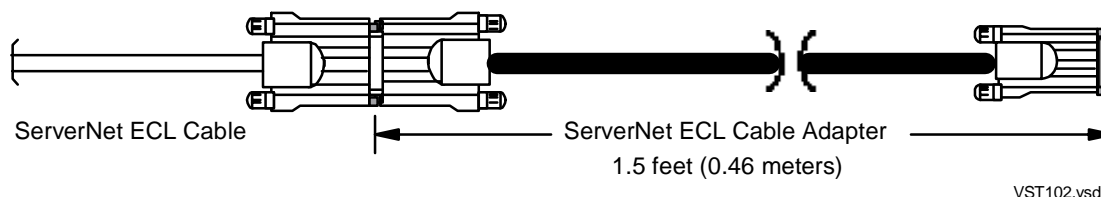
MSEB-to-MSEB ECL Cable

Both ends of this cable have the smaller connectors for the ECL PICs on MSEBs and IOMF 2 CRUs.



ECL Cable Adapter

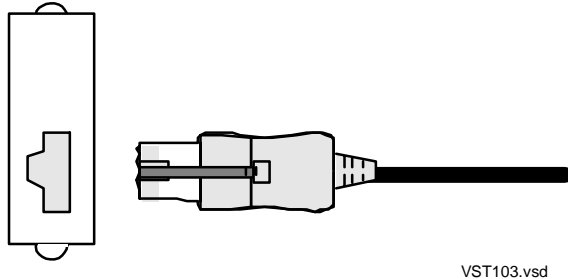
An SEB-to-SEB ECL cable adapter was used to connect a six-connector SEB to an MSEB. The ECL cable adapter is no longer available.



The ECL cable adapter added 18 inches of slack and a bulky connector to the existing cable which made cable routing difficult. Replacing SEB-to-SEB ECL cables with SEB-to-MSEB cables is required.

Serial-Copper Cables

You can connect a serial-copper cable to a serial-copper PICs installed in an MSEB or IOMF 2 CRU. Serial-copper cables are lighter than ECL cables and do not require an adapter cable. Therefore, serial-copper cables are preferred over ECL cables.



VST103.vsd

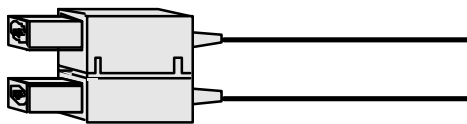
-
- △ **Caution.** Do not force the cable connector when disconnecting a serial-copper connector. Press the retainer fully, and the connector should release easily. Failure to unlatch the connector can result in damage to the connector.
-

MMF and SMF Fiber-Optic Cables

You can use multimode fiber-optic (MMF) or single-mode fiber-optic (SMF) cables to connect MSEBs to MSEBs or IOMF 2 CRUs that have the proper fiber-optic PICs installed. Fiber-optic cables also connect an MSEB to a ServerNet switch board in an IOAM enclosure or an MSEB to a cluster switch if a node-numbering agent (NNA) PIC is installed in the MSEBs. Fiber-optic cables allow you to place enclosures farther apart than you can with ECL or serial-copper cables.

MMF cables are recommended for use between MSEBs if you use fiber-optic cables. SMF cables connect an MSEB to cluster switches. MMF cables are usually orange, and SMF cables are usually yellow.

For a specification of the bend radius and performance requirements of fiber-optic cables, refer to [Fiber-Optic Cables](#) on page B-6.



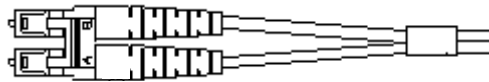
VST109.vsd

Fiber-Optic Cables With LC-SC Connectors

For the ServerNet Cluster product and IOAM enclosures, fiber-optic cables with LC-SC connectors are used to connect to the MSEBs in processor enclosures.

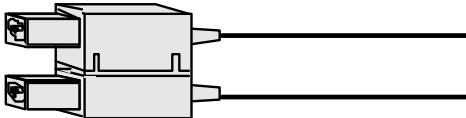
-
- △ **Caution.** IOAM enclosures must be installed by service providers trained by HP. All cabling connections must be performed by your service provider.
-

The duplex Lucent connectors (LC) are used to connect to the transceivers on a 6780 switch in the ServerNet cluster product or to the ServerNet switch boards in an IOAM enclosure. This diagram shows a fiber-optic cable terminated by an LC connector.



VST598.vsd

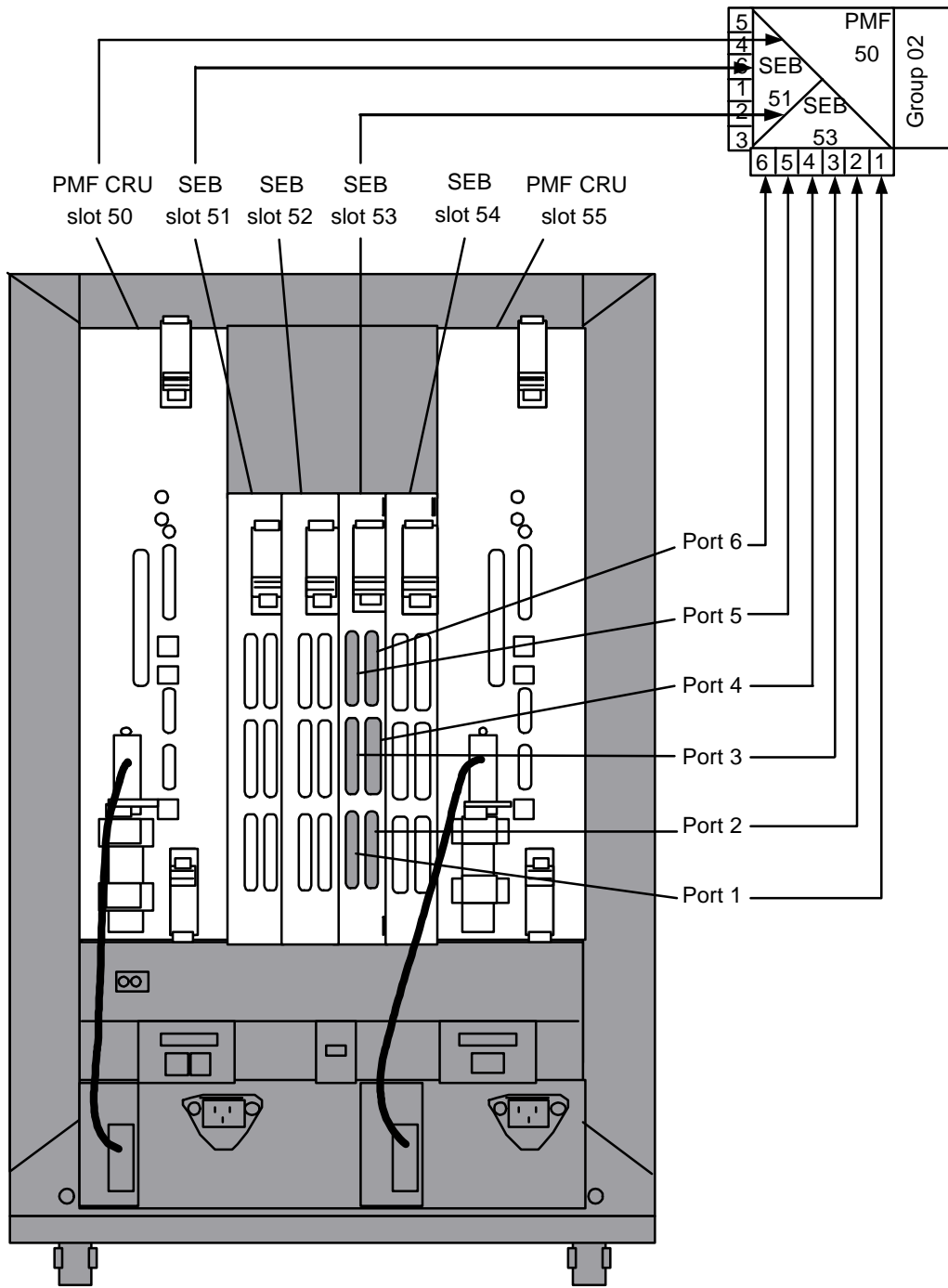
The duplex subscriber connector (SC) connects to an MSEB. This diagram shows a fiber-optic cable terminated by an SC connector.



VST599.vsd

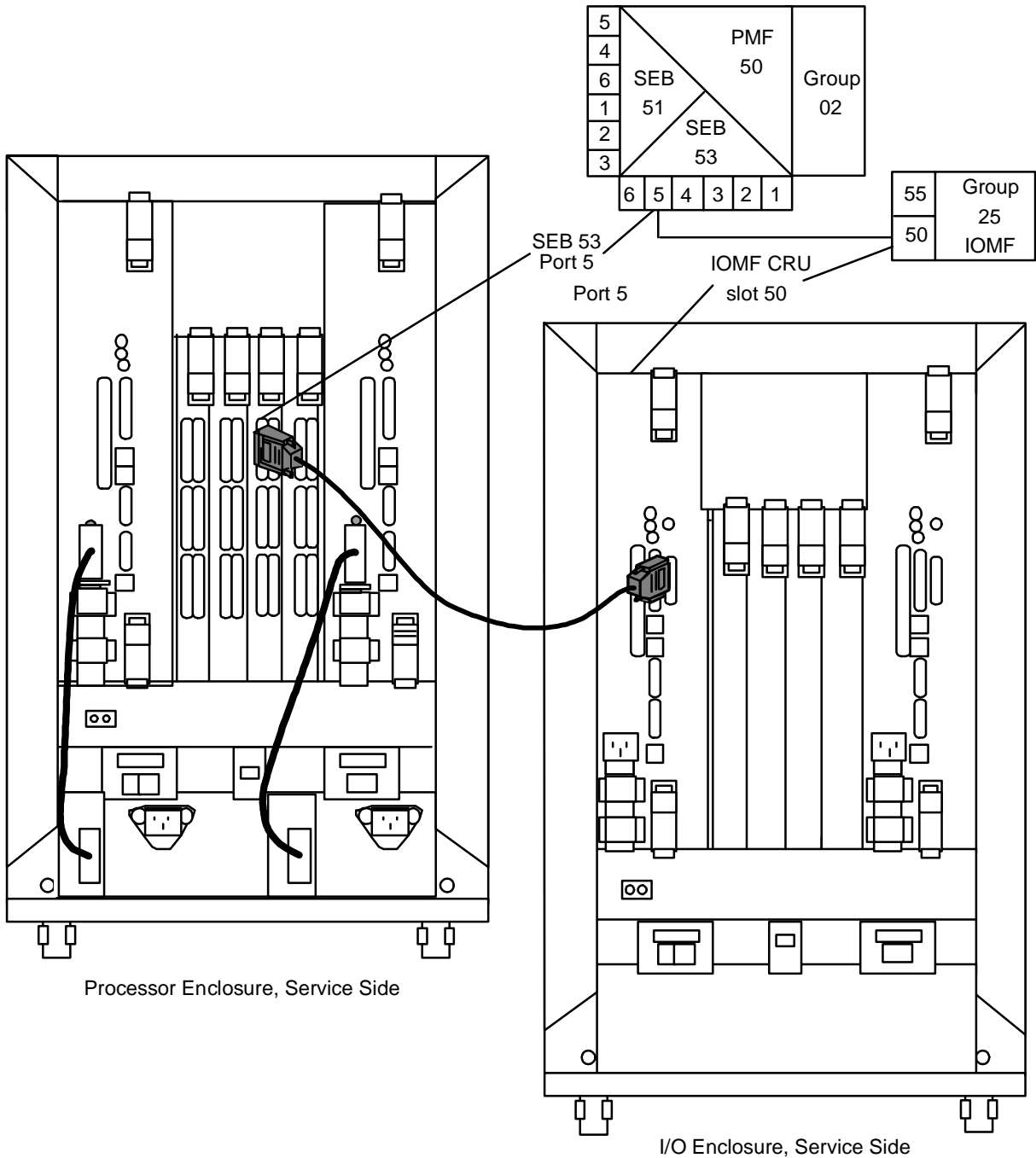
How Cabling Diagrams Represent Server Hardware

This subsection introduces cabling diagrams and shows how they represent the hardware components of a server. This figure shows a cabling diagram for the hardware components of a processor enclosure.



VST504.vsd

This figure shows a cabling diagram for two enclosures connected by a cable.



VST505.vsd

ServerNet Cabling: Tetra 8 Topology

This subsection describes the ServerNet cable connections for the Tetra 8 topology, which is supported by all models of NonStop S-series servers, and supports a maximum of:

- Four processor enclosures
- Eight I/O enclosures (two for each processor enclosure)

[Tetra 8 Cabling Diagram, X Fabric](#) on page 5-9

[Tetra 8 Cabling Diagram, Y Fabric](#) on page 5-9

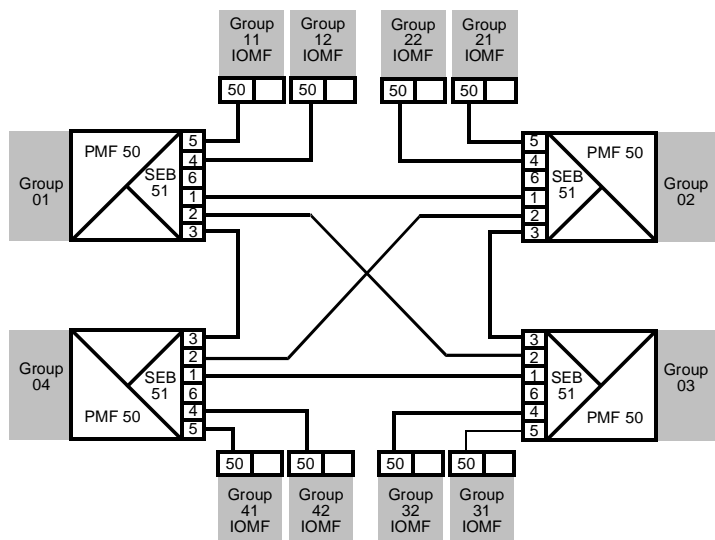
[Tetra 8 Cabling Table, Processor Enclosures](#) on page 5-10

[Tetra 8 Cabling Table, I/O Enclosures](#) on page 5-11

Note. IOAM enclosures are supported in group 01. For important configuration restrictions, refer to [IOAM Enclosures](#) on page 4-69.

Tetra 8 Cabling Diagram, X Fabric

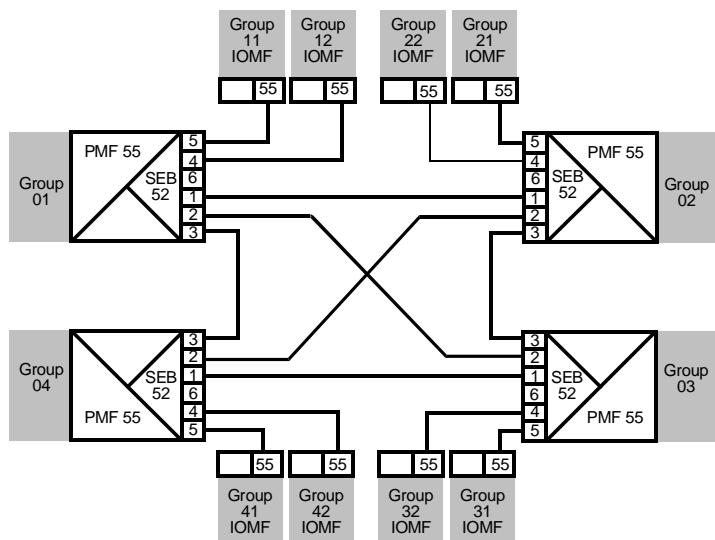
This diagram shows the ServerNet cable connections for the X fabric in the maximum Tetra 8 topology.



VST247.vsd

Tetra 8 Cabling Diagram, Y Fabric

This diagram shows the ServerNet cable connections for the Y fabric in the maximum Tetra 8 topology.



VST248.vsd

Tetra 8 Cabling Table, Processor Enclosures

This table describes the ServerNet cable connections among the processor enclosures in the maximum Tetra 8 topology.

Each cable appears twice in this table, once for the connection at each end. For example, the cable from (group 01, SEB 51, ServerNet connector 1) to (group 02, SEB 51, ServerNet connector 1) is the same cable as the one from (group 02, SEB 51, ServerNet connector 1) to (group 01, SEB 51, ServerNet connector 1). The shaded areas in this table indicate the redundant entries for the cables.

From			To		
Group	Slot	ServerNet Connector	Group	Slot	ServerNet Connector
01	51	1	02	51	1
01	52	1	02	52	1
01	51	2	03	51	2
01	52	2	03	52	2
01	51	3	04	51	3
01	52	3	04	52	3
02	51	1	01	51	1
02	52	1	01	52	1
02	51	2	04	51	2
02	52	2	04	52	2
02	51	3	03	51	3
02	52	3	03	52	3
03	51	1	04	51	1
03	52	1	04	52	1
03	51	2	01	51	2
03	52	2	01	52	2
03	51	3	02	51	3
03	52	3	02	52	3
04	51	1	03	51	1
04	52	1	03	52	1
04	51	2	02	51	2
04	52	2	02	52	2
04	51	3	01	51	3
04	52	3	01	52	3

Tetra 8 Cabling Table, I/O Enclosures

This table describes the ServerNet cable connections between I/O enclosures and processor enclosures in the maximum Tetra 8 topology.

From		To		
Group	Slot	Group	Slot	ServerNet Connector
11	50	01	51	5
11	55	01	52	5
12	50	01	51	4
12	55	01	52	4
21	50	02	51	5
21	55	02	52	5
22	50	02	51	4
22	55	02	52	4
31	50	03	51	5
31	55	03	52	5
32	50	03	51	4
32	55	03	52	4
41	50	04	51	5
41	55	04	52	5
42	50	04	51	4
42	55	04	52	4

ServerNet Cabling: Tetra 16 Topology

This subsection describes the ServerNet cable connections for the Tetra 16 topology, which is supported by the following models of NonStop S-series servers:

Note. IOAM enclosures can replace I/O enclosures in cabling diagrams. For information about what is supported, contact your HP representative.

Note. Cabling information for IOAM enclosures is available to your HP trained service provider in the *Modular I/O Installation and Configuration Guide*.

- NonStop S7000, S7400, S7600, and S7800 servers support a maximum of:
 - Eight processor enclosures
 - Sixteen I/O enclosures (two for each processor enclosure)
- NonStop Sxx000 servers support a maximum of:
 - Eight processor enclosures
 - Thirty-six I/O enclosures (five for each processor enclosure on the inner tetrahedron and four for each processor enclosure on the outer tetrahedron)

Note. IOAM enclosures are supported in group 01. For important configuration restrictions, refer to [IOAM Enclosures](#) on page 4-69.

[Tetra 16 Cabling Diagram, X Fabric](#) on page 5-13

[Tetra 16 Cabling Diagram, Y Fabric](#) on page 5-14

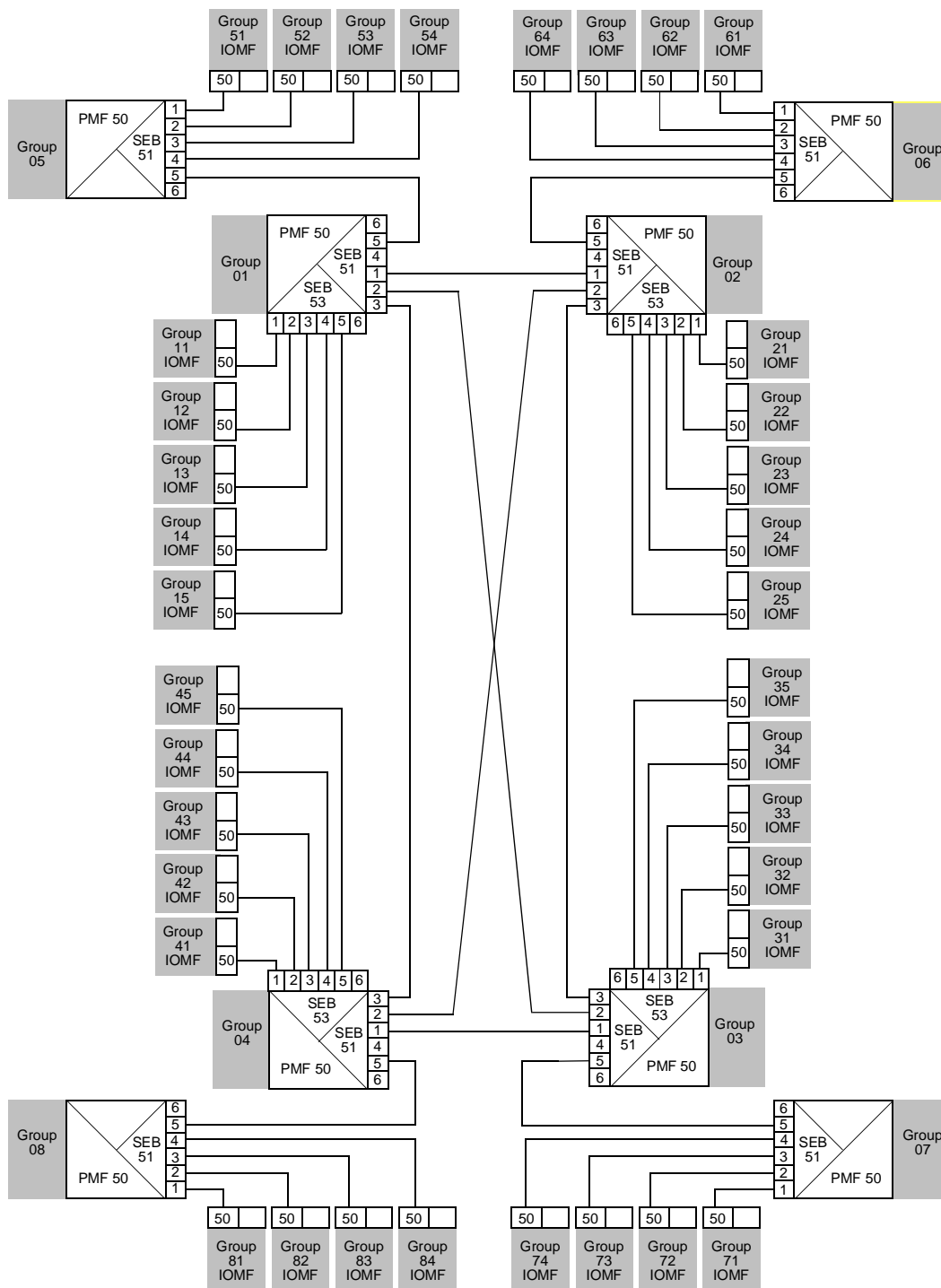
[Tetra 16 Cabling Table, Processor Enclosures](#) on page 5-15

[Tetra 16 Cabling Table, I/O Enclosures](#) on page 5-16

[Cabling Diagram, IOAM Enclosure, X Fabric, G06.25 and G0.26](#) on page 5-19

Tetra 16 Cabling Diagram, X Fabric

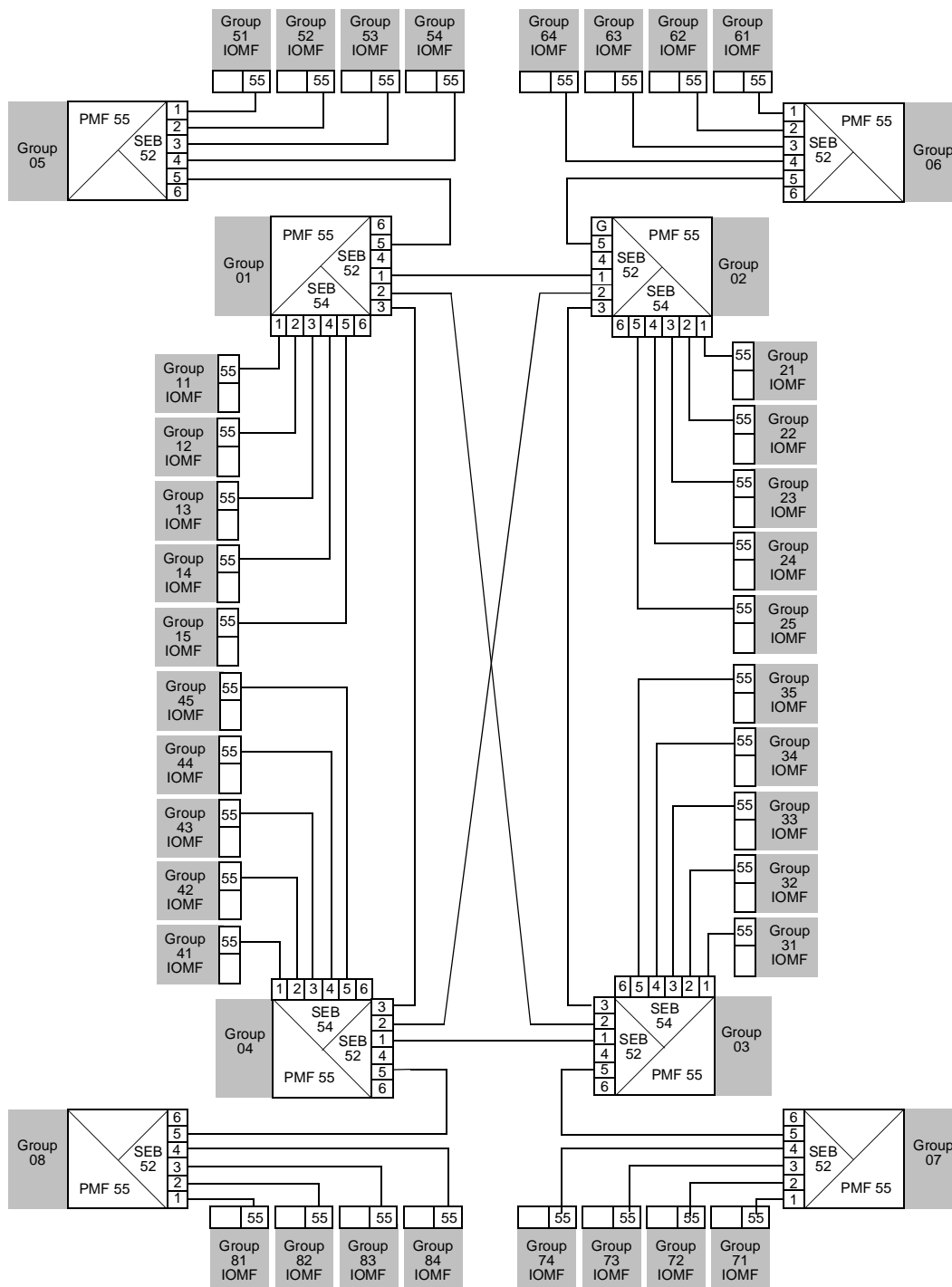
G-series RVUs do not support I/O enclosures connected to SEBs in slot 53 of Groups 05, 06, 07, and 08.



VST244.vsd

Tetra 16 Cabling Diagram, Y Fabric

G-series RVUs do not support I/O enclosures connected to SEBs in slot 54 of Groups 05, 06, 07, and 08.



VST246.vsd

Tetra 16 Cabling Table, Processor Enclosures

This table describes the ServerNet cable connections among the processor enclosures in the maximum supported Tetra 16 topology.

Each cable appears twice in this table, once for the connection at each end. For example, the cable from (group 01, SEB 51, ServerNet connector 1) to (group 02, SEB 51, ServerNet connector 1) is the same cable as the one from (group 02, SEB 51, ServerNet connector 1) to (group 01, SEB 51, ServerNet connector 1). The shaded areas in this table indicate the redundant entries for the cables.

From			To (page 1 of 2)		
Group	Slot	ServerNet Connector	Group	Slot	ServerNet Connector
01	51	1	02	51	1
01	52	1	02	52	1
01	51	2	03	51	2
01	52	2	03	52	2
01	51	3	04	51	3
01	52	3	04	52	3
01	51	5	05	51	5
01	52	5	05	52	5
02	51	1	01	51	1
02	52	1	01	52	1
02	51	3	03	51	3
02	52	3	03	52	3
02	51	2	04	51	2
02	52	2	04	52	2
02	51	5	06	51	5
02	52	5	06	52	5
03	51	2	01	51	2
03	52	2	01	52	2
03	51	3	02	51	3
03	52	3	02	52	3
03	51	1	04	51	1
03	52	1	04	52	1
03	51	5	07	51	5
03	52	5	07	52	5
04	51	3	01	51	3
04	52	3	01	52	3
04	51	2	02	51	2

From			To (page 2 of 2)		
Group	Slot	ServerNet Connector	Group	Slot	ServerNet Connector
04	52	2	02	52	2
04	51	1	03	51	1
04	52	1	03	52	1
04	51	5	08	51	5
04	52	5	08	52	5
05	51	5	01	51	5
05	52	5	01	52	5
06	51	5	02	51	5
06	52	5	02	52	5
07	51	5	03	51	5
07	52	5	03	52	5
08	51	5	04	51	5
08	52	5	04	52	5

Tetra 16 Cabling Table, I/O Enclosures

This table describes the ServerNet cable connections between I/O enclosures and processor enclosure in the maximum supported Tetra 16 topology.

From		To (page 1 of 3)		
Group	Slot	Group	Slot	ServerNet Connector
11	50	01	53	1
11	55	01	54	1
12	50	01	53	2
12	55	01	54	2
13	50	01	53	3
13	55	01	54	3
14	50	01	53	4
14	55	01	54	4
15	50	01	53	5
15	55	01	54	5
21	50	02	53	1
21	55	02	54	1
22	50	02	53	2
22	55	02	54	2
23	50	02	53	3
23	55	02	54	3

From		To (page 2 of 3)		
Group	Slot	Group	Slot	ServerNet Connector
24	50	02	53	4
24	55	02	54	4
25	50	02	53	5
25	55	02	54	5
31	50	03	53	1
31	55	03	54	1
32	50	03	53	2
32	55	03	54	2
33	50	03	53	3
33	55	03	54	3
34	50	03	53	4
34	55	03	54	4
35	50	03	53	5
35	55	03	54	5
41	50	04	53	1
41	55	04	54	1
42	50	04	53	2
42	55	04	54	2
43	50	04	53	3
43	55	04	54	3
44	50	04	53	4
44	55	04	54	4
45	50	04	53	5
45	55	04	54	5
51	50	05	51	1
51	55	05	52	1
52	50	05	51	2
52	55	05	52	2
53	50	05	51	3
53	55	05	52	3
54	50	05	51	4
54	55	05	52	4
61	50	06	51	1
61	55	06	52	1
62	50	06	51	2

From		To (page 3 of 3)		
Group	Slot	Group	Slot	ServerNet Connector
62	55	06	52	2
63	50	06	51	3
63	55	06	52	3
64	50	06	51	4
64	55	06	52	4
71	50	07	51	1
71	55	07	52	1
72	50	07	51	2
72	55	07	52	2
73	50	07	51	3
73	55	07	52	3
74	50	07	51	4
74	55	07	52	4
81	50	08	51	1
81	55	08	52	1
82	50	08	51	2
82	55	08	52	2
83	50	08	51	3
83	55	08	52	3
84	50	08	51	4
84	55	08	52	4

Cabling IOAM Enclosures

For G06.25 and G06.26 RVUs, MSEB slots corresponding to the group 01 slot in which the IOAM enclosure is installed must be empty.

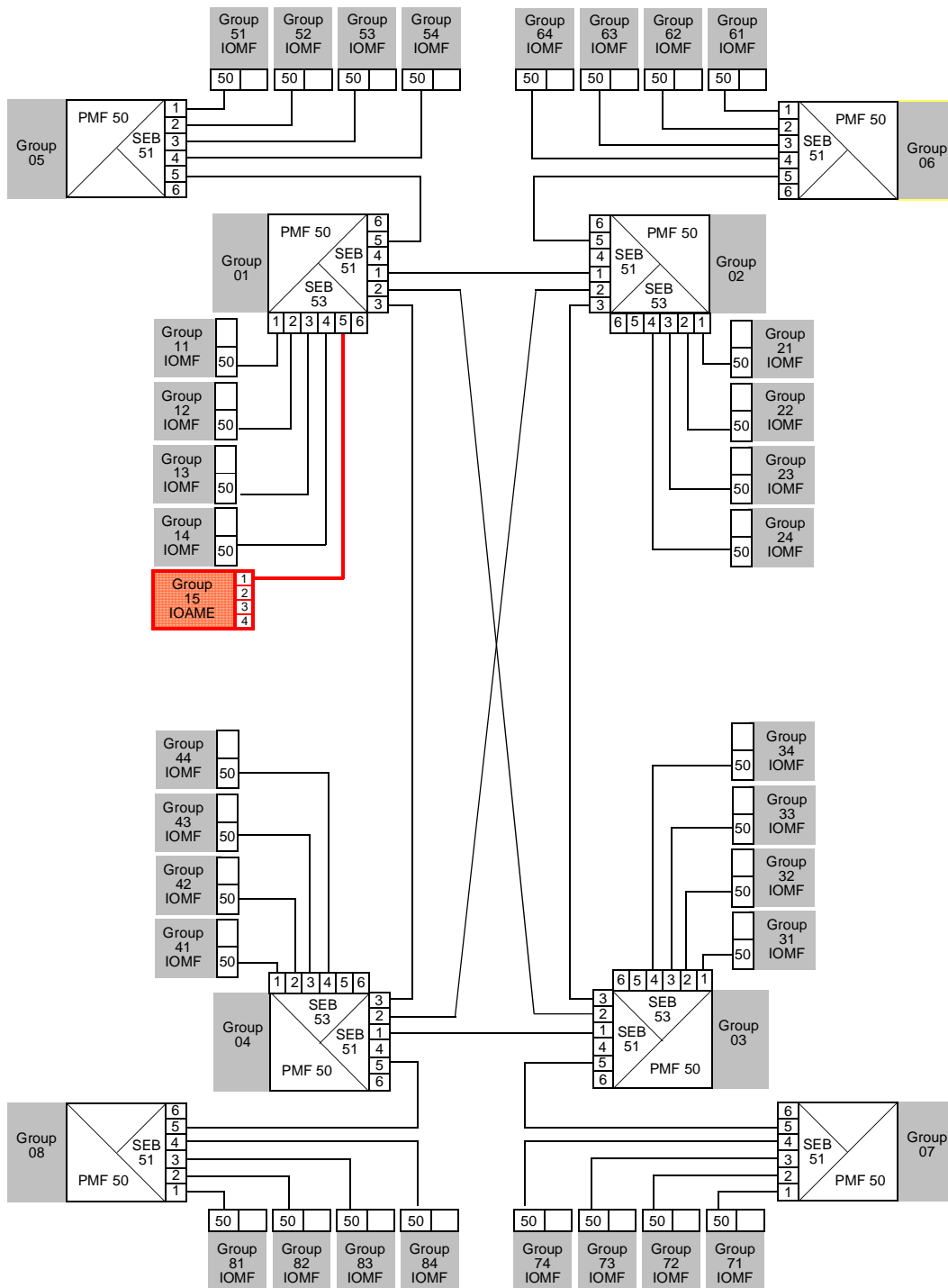
To configure an IOAM enclosure as group ...

These MSEB ports cannot connect to an I/O enclosure

11	21, 31, 41
12	22, 32, 42
13	23, 33, 43
14	24, 34, 44
15	25, 35, 45

Cabling Diagram, IOAM Enclosure, X Fabric, G06.25 and G0.26

This figure shows an IOAM enclosure group 15 and the other groups that must not be occupied for G06.25 and G06.26. This restriction does not apply to the G06.27RVU and later. See [Cabling IOAM Enclosures](#) on page 4-76.



VST255.vsd

NonStop S7800, S76000, S78000, S86000, and S88000 Servers With 1952 IOMF CRUs

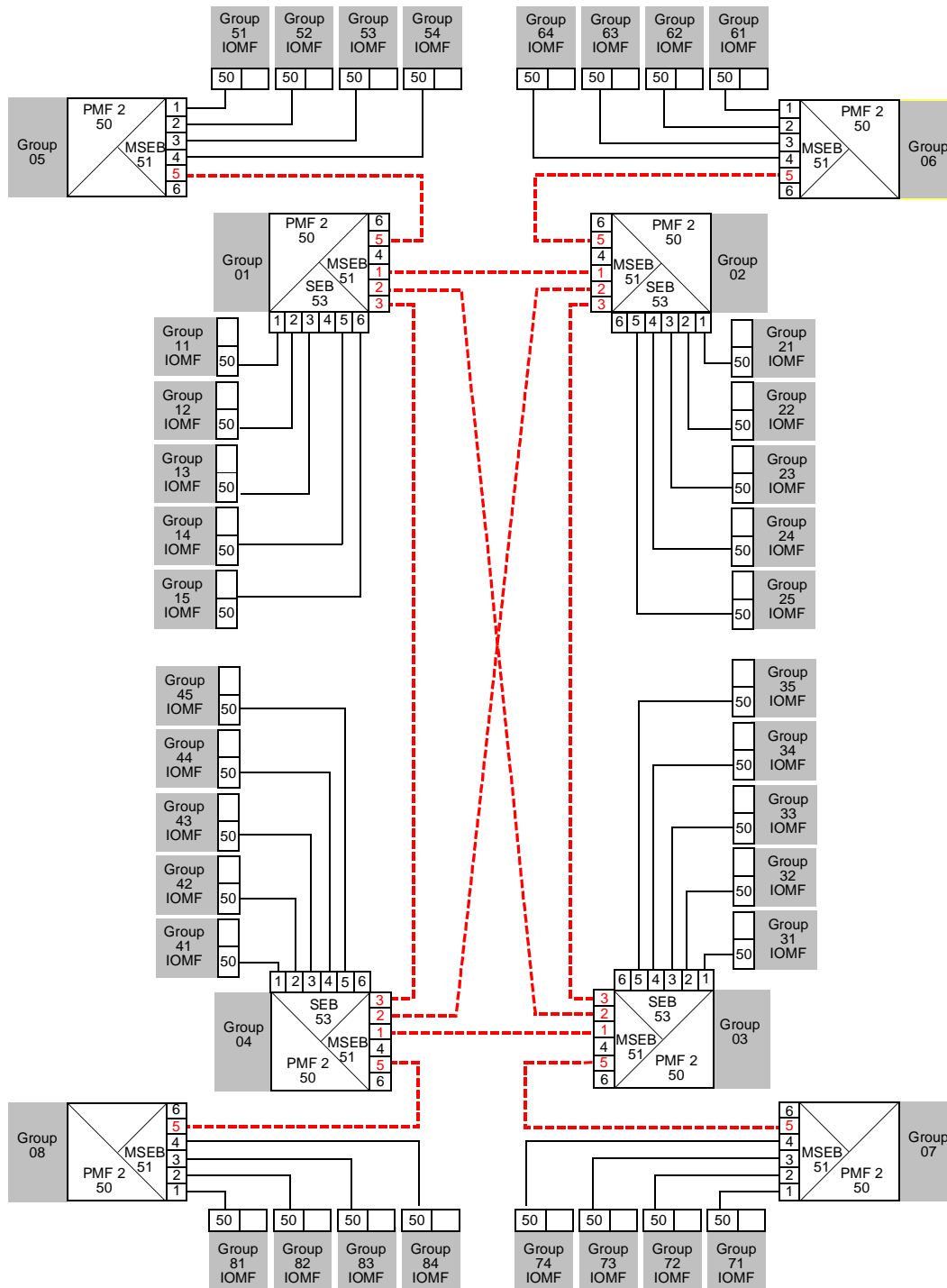
NonStop S7800, S76000, S78000, S86000, or S88000 processor enclosures must be cabled together using either serial-copper or fiber-optic ServerNet cables. ECL cables are not allowed. However, you can use model 1952 IOMF CRUs in these systems with ECL cables and MSEBs. For a fully populated server, the MSEBs should contain these PICs:

- For Groups 01, 02, 03, and 04, MSEBs in slots 51 and 52 configured with serial-copper or fiber-optic PICs in ports 1, 2, 3, 5.
- For Groups 01, 02, 03, and 04, slots 53 and 54 can contain SEBs having ECL ports or MSEBs configured with ECL PICs in ports 1, 2, 3, 4, and 5.
- For Groups 05, 06, 07, and 08, MSEBs in slots 51 and 52 must contain a serial-copper or fiber-optic PIC in port 5 and ECL PICs in ports 1, 2, 3, and 4.
- For Groups 05, 06, 07, and 08, slots 53 and 54 can not contain SEBs or MSEBs.

Connecting SEBs to model 1952 IOMF CRUs requires SEB-to-SEB ServerNet cables. Connecting MSEBs to model 1952 IOMF CRUs requires SEB-to-MSEB ServerNet cables.

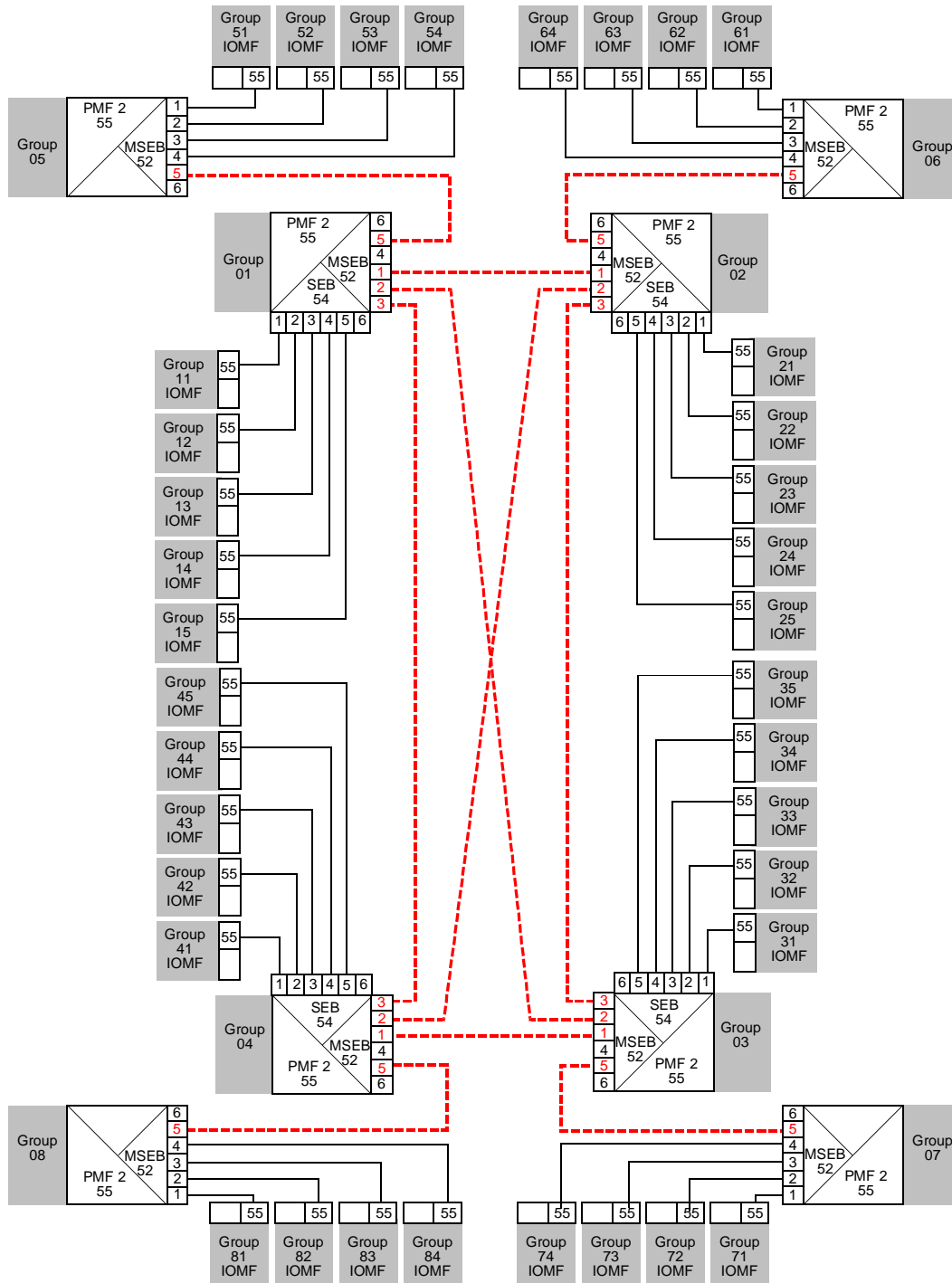
Cabling Diagram, Model 1962, 1971, 1972, 1973, or 1974 PMF CRUs With 1952 IOMF CRUs, X Fabric

In this diagram, the broken lines represent serial-copper or fiber-optic cables. Solid lines represent ECL cables.



VST253.vsd

Cabling Diagram, Model 1962, 1971, 1972, 1973, or 1974 PMF CRUs With 1952 IOMF CRUs, Y Fabric



VST254.vsd

ServerNet Communication Pathways

This section describes the structure and operations of the communication pathways provided by each PMF CRU, IOMF CRU or IOAM, and SEB in your NonStop S-series system.

Note. In this section, unless otherwise indicated:

- Information about PMF CRUs also applies PMF 2 CRUs.
 - Information about IOMF CRUs also applies to IOMF 2 CRUs.
 - Information about SEBs also applies to MSEBs.
 - The IOAM enclosure appears to the NonStop S-series server as though it were another I/O enclosure, and it is interchangeable with I/O enclosures attached to group 01 in ServerNet communication pathways on S76000 and later NonStop S-series systems.
-

When CRU Removal Might Stop Communications	6-1
PMF CRUs and Communication Pathways	6-2
SEBs, MSEBs, and Communication Pathways	6-9
Communication Pathways in Different Topologies	6-15
Determining the Communication Pathways in Your System	6-18

When CRU Removal Might Stop Communications

If you remove a PMF CRU, IOMF CRU, or SEB from your NonStop S-series system, your system can continue operating. Your system maintains two ServerNet fabrics, and all processes simply switch to the other fabric.

However, after all processes have shifted to that other fabric, your system can experience errors under these circumstances:

- **CRU removal:** The CRU you removed might provide the only pathway along which several components can communicate with the only remaining fabric. Thus, you disconnect those components from the rest of the system.
- **Preexisting faults:** If a fault then occurs on the second fabric, some components will be affected.

Therefore, before you remove a PMF CRU, IOMF CRU, or SEB from any enclosure, you must ensure that the rest of the system is fully functional.

-
- △ **Caution.** If you remove more than one CRU at a time from anywhere in a system while the system is online, results are unpredictable. Always complete the entire replacement procedure for any CRU, including resuming operations, before beginning to replace another CRU. Any exceptions to this rule will be stated in the replacement procedure.
-

For Information About ...	Refer to ...	Page
Components and functions of a PMF CRU	Processor Multifunction (PMF) CRUs	4-31
Components and functions of an IOMF CRU	I/O Multifunction (IOMF) CRUs	4-50
Components and functions of an SEB	SEBs and MSEBs	4-18
Tetra 8 and Tetra 16 topologies	Section 3, Topologies	3-1
Symbols used in cabling diagrams	Section 5, ServerNet Cabling	5-1

PMF CRUs and Communication Pathways

SEBs (including MSEBs) provide communication pathways between enclosures. Within each enclosure, additional communication pathways are provided by ServerNet routers in the PMF CRUs and IOMF CRUs, which also connect to other components. The routers in the PMF CRUs and IOMF CRUs transfer data to and from routers in the SEBs. This subsection describes communications between PMF CRUs and other enclosures by way of SEBs.

ServerNet Router Inside a PMF CRU	6-2
PMF CRU Pathways Within One Enclosure	6-5
PMF CRU Pathways Within One Enclosure: One PMF CRU Removed	6-5
PMF CRU Pathways Between Enclosures	6-6
PMF CRU Pathways With a PMF CRU Removed From the Outer Tetrahedron	6-7
PMF CRU Pathways With a PMF CRU Removed From the Inner Tetrahedron	6-8

ServerNet Router Inside a PMF CRU

The ServerNet router inside a PMF CRU provides connections over a ServerNet fabric including connections between the processor in that PMF CRU and either:

- One SEB in a Tetra 8 system
- Two SEBs in a Tetra 16 system

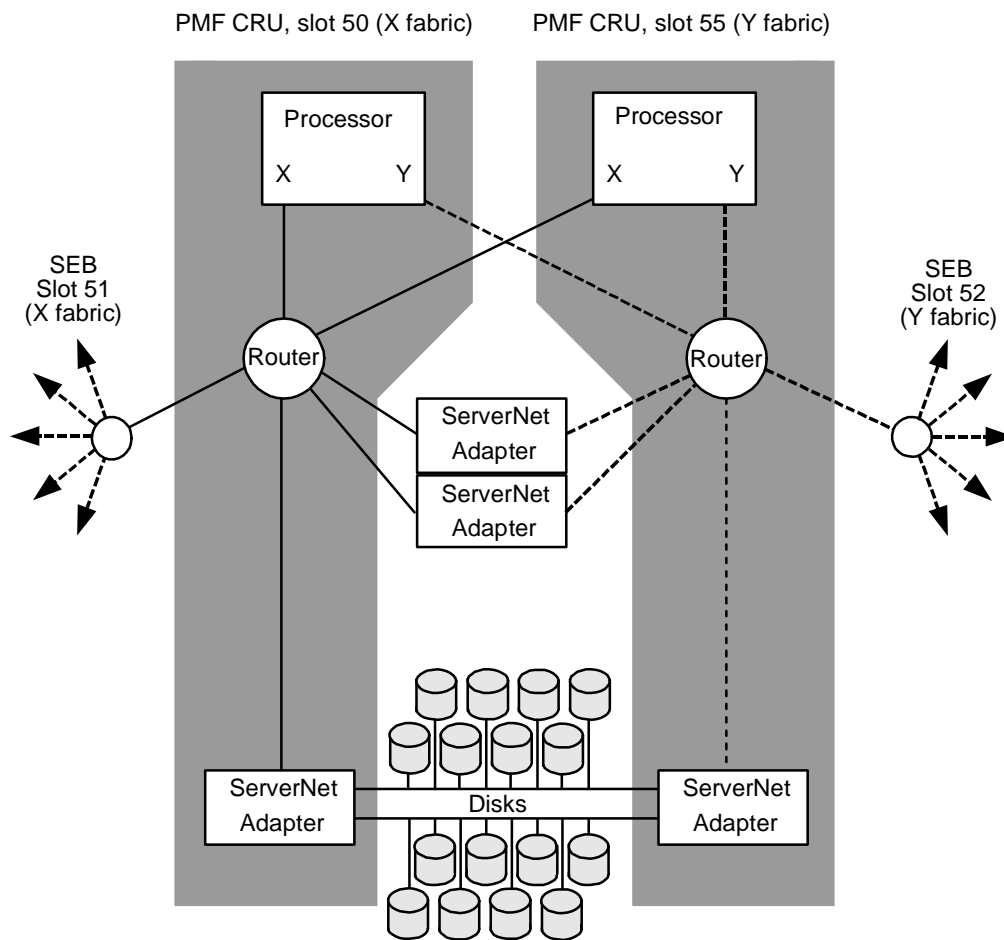
Note. The information in this section about routers applies to all models of ServerNet routers. For more information about the differences between the ServerNet router 1 and router 2, refer to [Processor Multifunction \(PMF\) CRUs](#) on page 4-31.

Router Types

- PMF CRU has router 1 (6 ports, 50 MB).
- PMF 2 CRU has router 2 (12 ports, 125 MB).

ServerNet Router Connections in an Enclosure

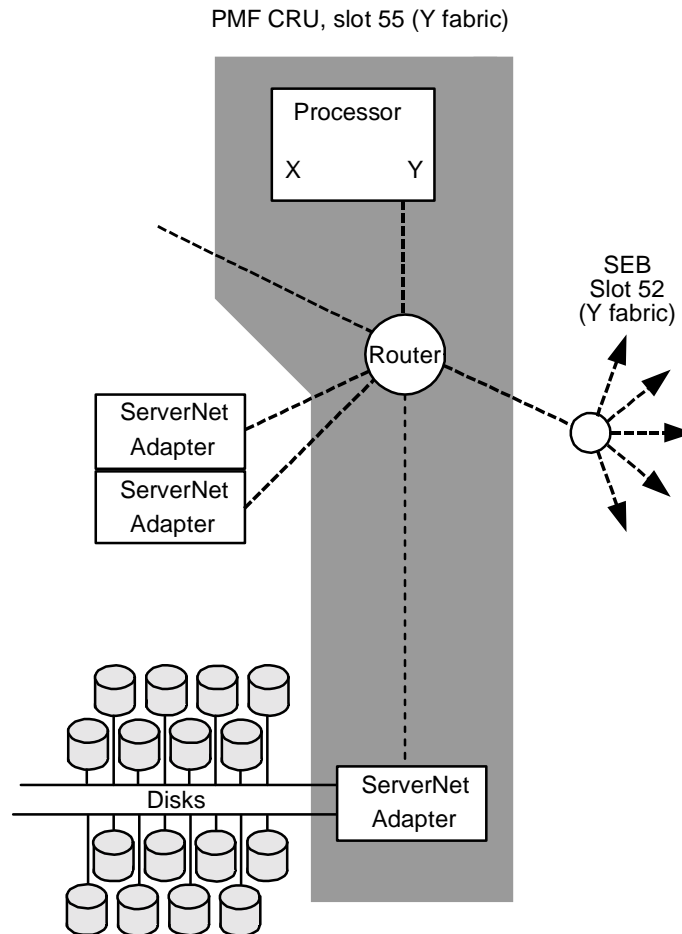
Each PMF CRU in an enclosure provides a connection to its associated fabric for the other PMF CRU in that enclosure. In this figure, the PMF CRU in slot 50 provides access to the X fabric for the PMF CRU in slot 55.



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ServerNet Router Connection in an Enclosure, One PMF CRU Removed

In this figure, the PMF CRU in slot 50 has been removed from the enclosure. The PMF CRU in slot 55 can still access the Y fabric, but it can no longer access the X fabric through the PMF CRU in slot 50.



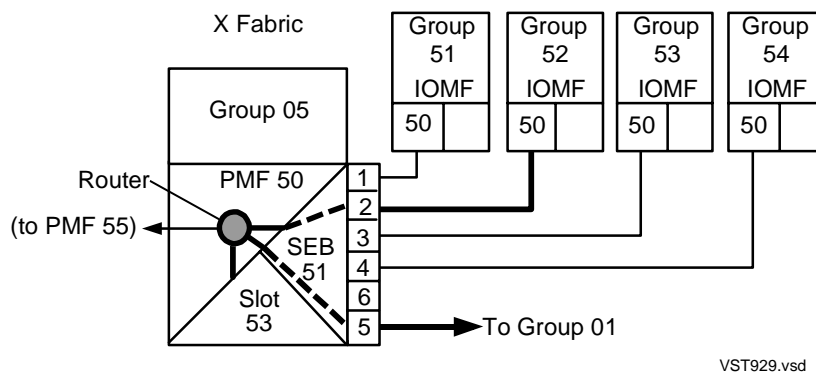
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PMF CRU Pathways Within One Enclosure

The router in a PMF CRU provides pathways to slots 51 and 53 (X fabric) or slots 52 and 54 (Y fabric). It also provides a pathway to the PMF CRU in the opposite fabric as well as other destinations of no concern to this discussion. The examples in this section are of the X fabric.

The SEB router (not shown) in slot 51 connects the PMF CRU to all ports on the SEB. The heavy lines in this figure shows pathways from the router in PMF CRU 50:

- Through SEB 51 to the Group 52 IOMF CRU
- Through SEB 51 to Group
- To slot 53

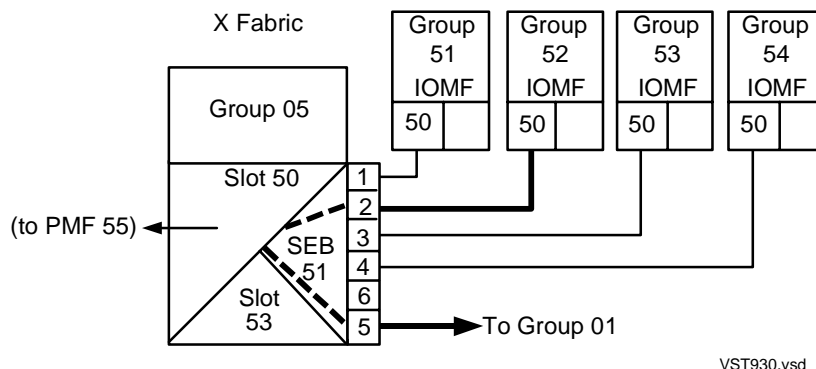


PMF CRU Pathways Within One Enclosure: One PMF CRU Removed

When you remove a PMF CRU from an enclosure, the SEBs or adapters in that enclosure can no longer communicate with a router that should be in slots 50 or 55.

The heavy lines in this figure shows that with the PMF CRU in slot 50 removed, slot 53 cannot communicate with:

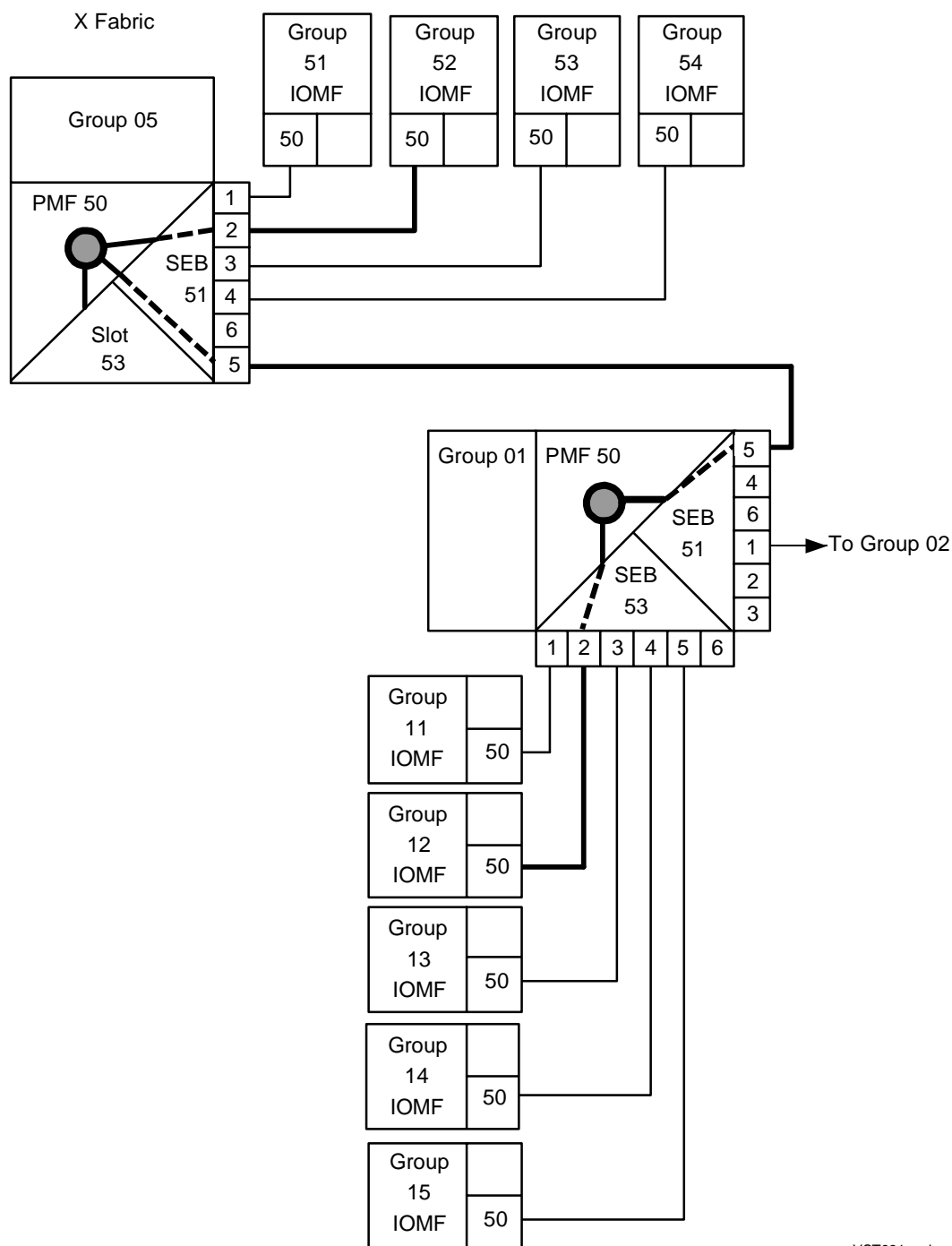
- Group 52 (and the other I/O enclosures)
- Group 01



PMF CRU Pathways Between Enclosures

The heavy lines in this figure show typical pathways:

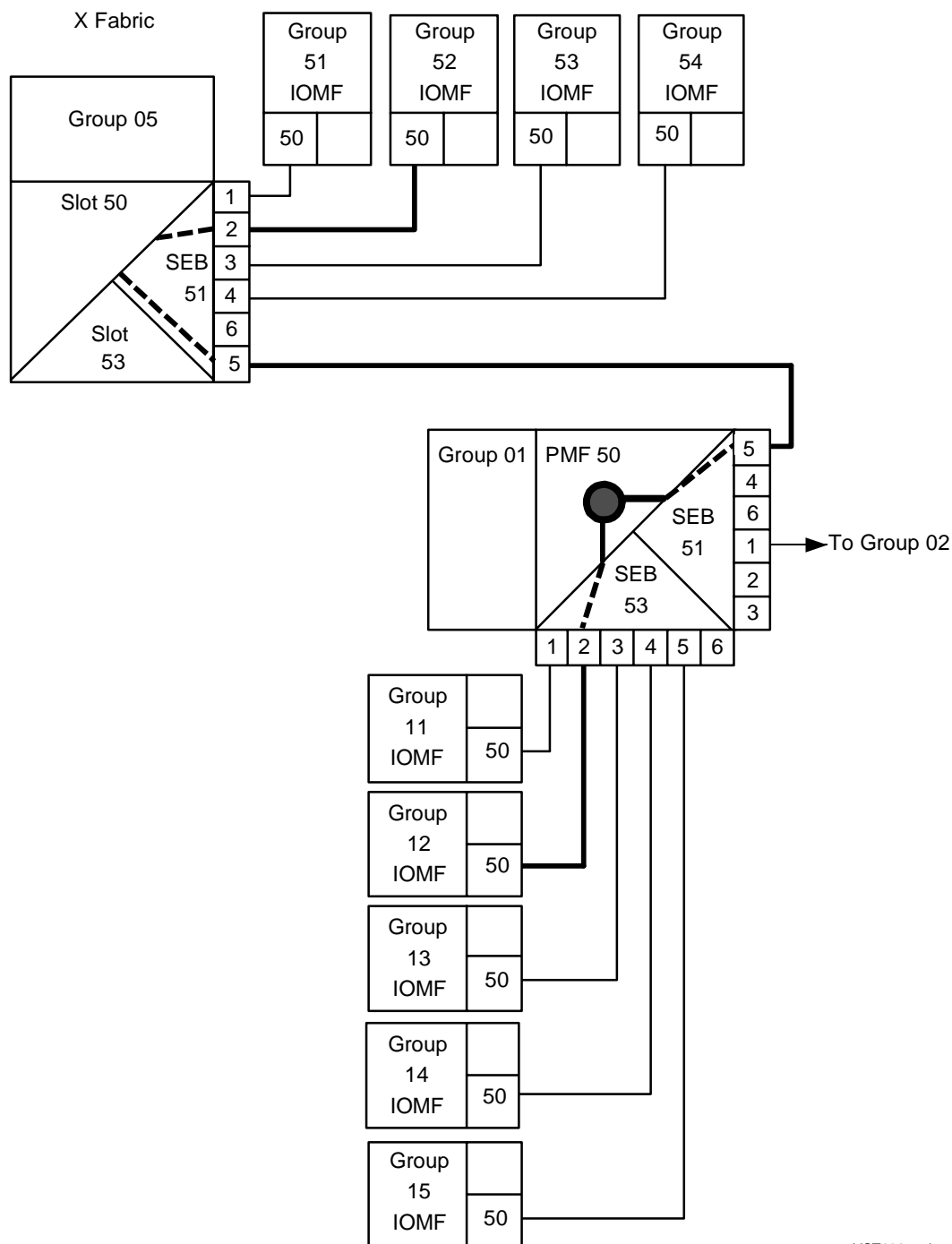
- In Group 05, from slot 53, through the PMF CRU in slot 50, to the SEB in slot 51
- From the SEB in slot 51 in Group 05 to the SEB in slot 51 in Group 01
- In Group 01, from the SEB in slot 51 through the PMF CRU in slot 50, to the I/O enclosures connected to the SEB in slot 53.



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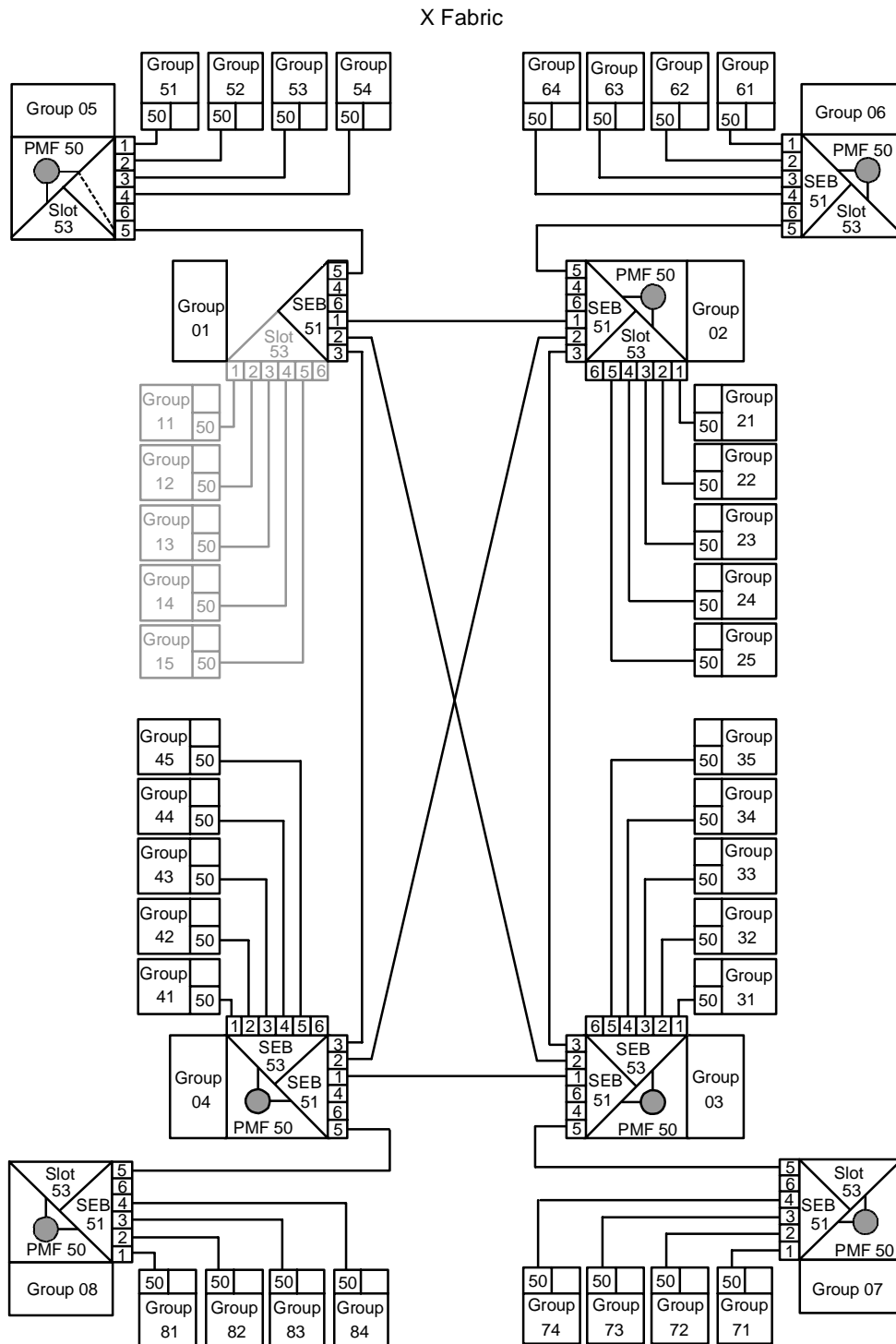
PMF CRU Pathways With a PMF CRU Removed From the Outer Tetrahedron

In this figure, the PMF CRU in group 05, slot 50, has been removed. As a result, any device attached to Group 05 slot 53 is isolated from the rest of the system over the X fabric.



PMF CRU Pathways With a PMF CRU Removed From the Inner Tetrahedron

In this figure, the PMF CRU in group 01, slot 50, has been removed. The pathway between SEB 51 and SEB 53 of group 01 is gone. Therefore, the Group 01 I/O enclosures are isolated from the system over the X fabric.



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SEBs, MSEBs, and Communication Pathways

[SEB Pathways Within One Enclosure](#) [6-9](#)

[SEB Pathways Within One Enclosure: One SEB Removed](#) [6-10](#)

[SEB Pathways Between Enclosures](#) [6-11](#)

[SEB Pathways Between Enclosures: One SEB Removed](#) [6-12](#)

Communication pathways between enclosures are provided by SEBs (or MSEBs). Each SEB in an enclosure connects to one fabric. If you remove an SEB from any processor enclosure, the enclosures and their devices that were connected to that SEB are no longer accessible to the rest of the system.

This subsection describes these pathways and the consequences of losing an SEB.

SEB Pathways Within One Enclosure

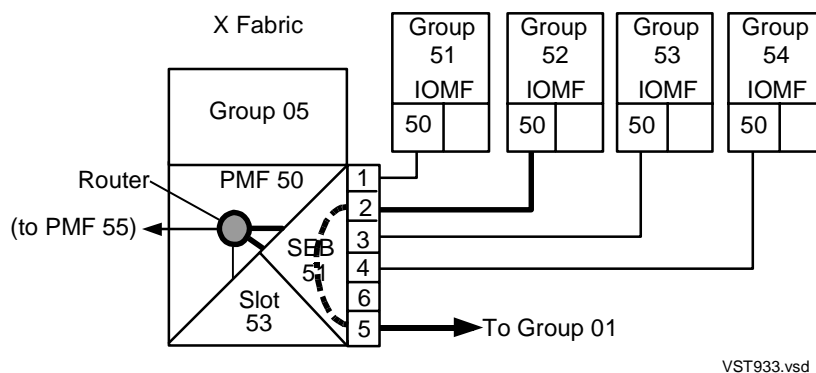
SEBs or MSEBs can occupy slots 51 through 54 in inner tetrahedron processor enclosures and slots 51 and 52 in outer tetrahedron processor enclosures.

SEBs in Slots	Communicate with
51, 53	X fabric
52, 54	Y fabric

SEBs provide a gateway from one processor enclosure to another. The router inside an SEB provides pathways between all ports within the SEB and to its related PMF CRU. The ports on an SEB can communicate with each other in the absence of its related PMF CRU.

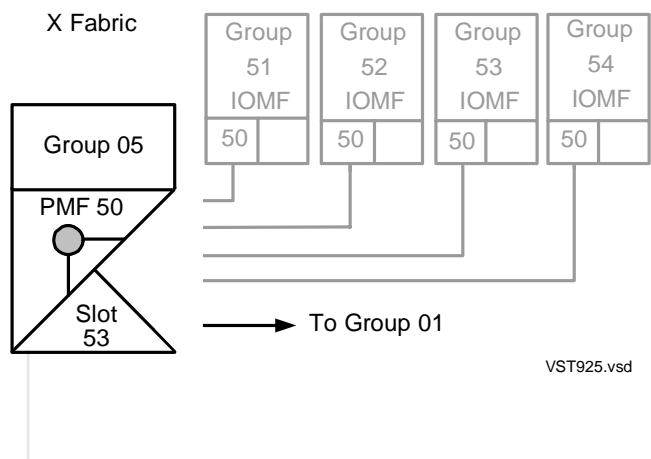
The heavy lines in the following figure show a pathway:

- From Group 01 to PMF CRU 50
- From IOMF Group 52 to PMF CRU 50
- From Group 01 to I/O Group 52



SEB Pathways Within One Enclosure: One SEB Removed

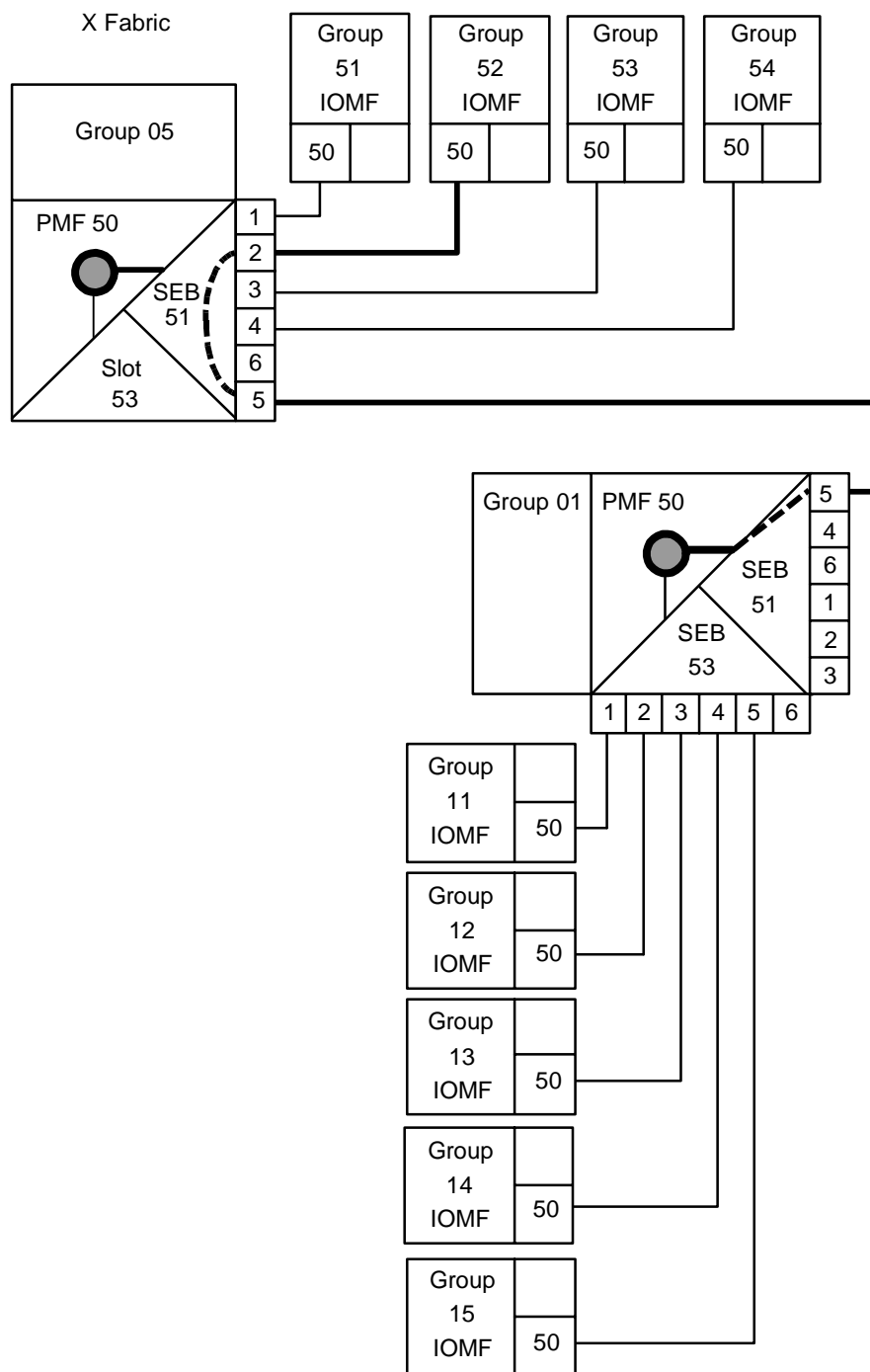
When the SEB is removed from group 05, slot 51, the PMF CRU in slot 50 is isolated from the system over the X fabric and from groups 51 through 54.



SEB Pathways Between Enclosures

When one processor enclosure communicates with another processor enclosure, the communication must pass through SEBs or MSEBs. The group number of each enclosure is determined by the ports to which the ServerNet cables are connected.

In this figure, group 01 communicates over the X fabric with group 05 and group 52 along paths shown in heavy lines.



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SEB Pathways Between Enclosures: One SEB Removed

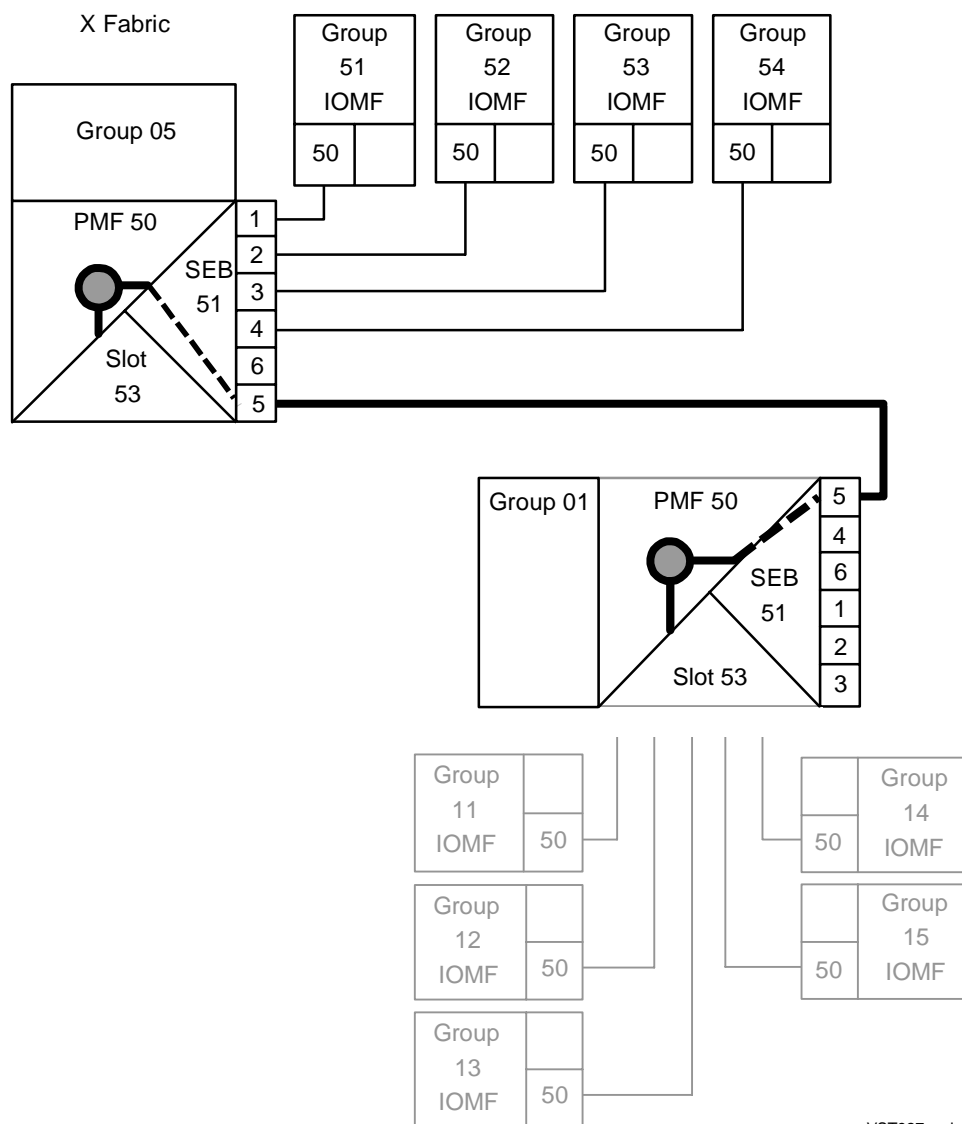
[Removing SEB 53 From the Inner Tetrahedron](#) [6-12](#)

[Removing SEB 51 From the Outer Tetrahedron](#) [6-13](#)

[Removing SEB 51 From the Inner Tetrahedron](#) [6-14](#)

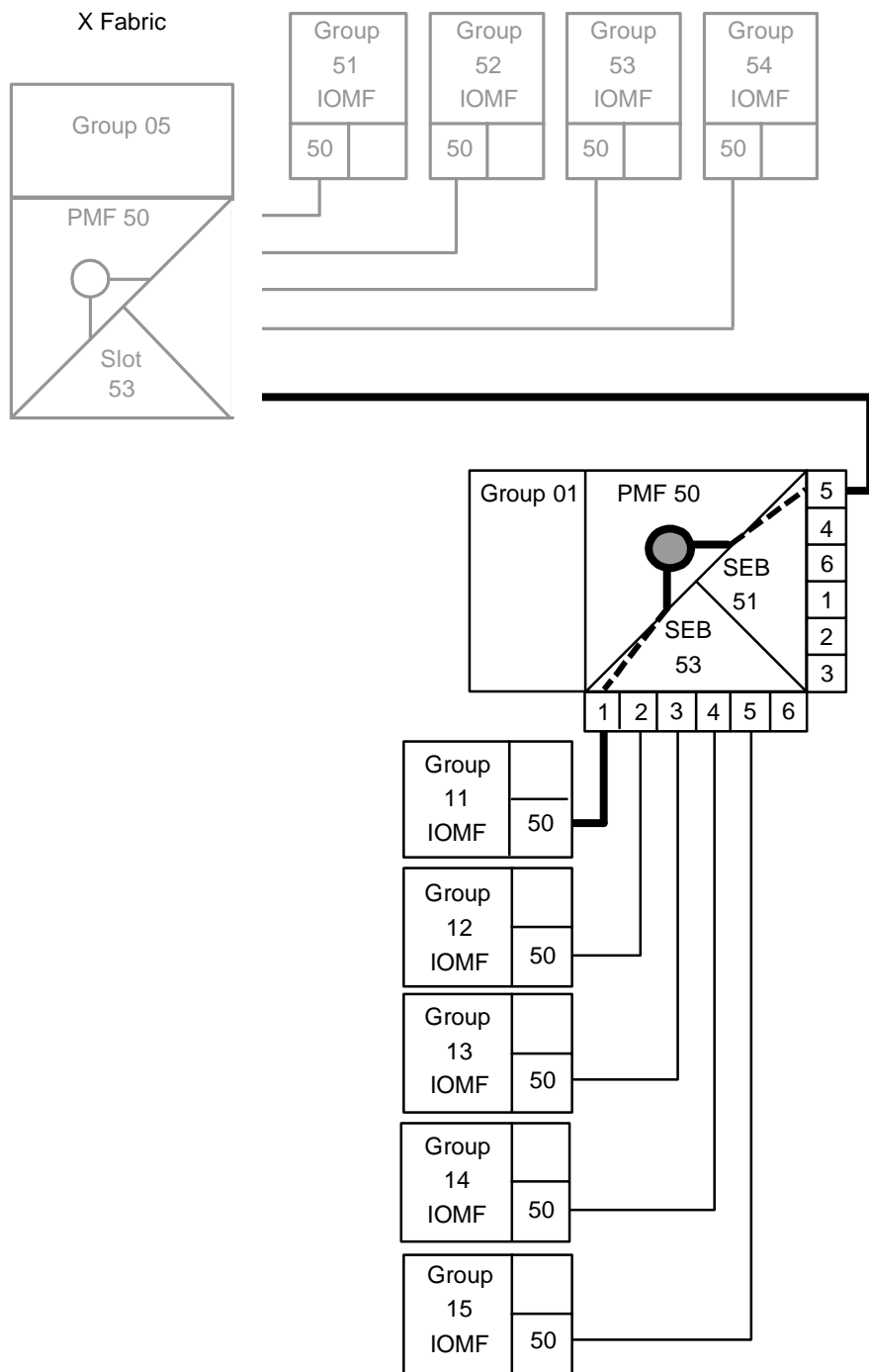
Removing SEB 53 From the Inner Tetrahedron

In this figure, SEB 53 has been removed from group 01. Groups 11 through 15, represented with pale lines, are isolated from the rest of the system over the X fabric.



Removing SEB 51 From the Outer Tetrahedron

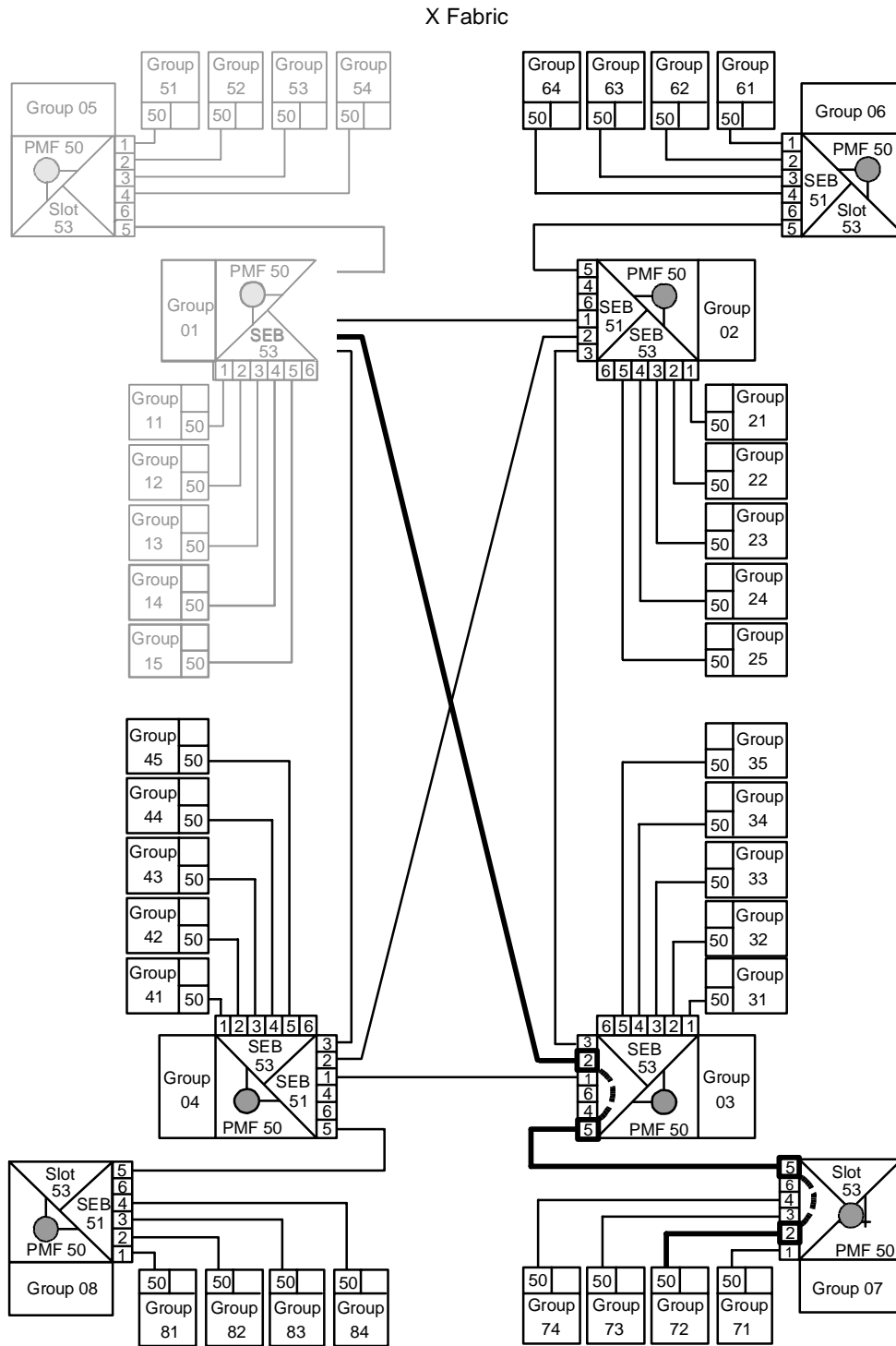
In this figure, SEB 51 has been removed from group 05. The PMF CRU in Group 05 slot 50, Groups 51 through 54, and slot 53, represented by pale lines, are not accessible over the X fabric to the rest of the system.



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Removing SEB 51 From the Inner Tetrahedron

With the SEB removed from group 01 slot 51, groups 01 and 05, and all their associated I/O enclosures, are not accessible over the X fabric to the rest of the system. The heavy line shows a pathway that is interrupted by the missing SEB in Group 01.



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Communication Pathways in Different Topologies

Tetra 8 Topology

For the X fabric, a system can have an SEB only in slot 51.

Each processor enclosure supports one SEB for each ServerNet fabric.

Removing an SEB from a processor enclosure disconnects that processor enclosure and all associated I/O enclosures from that ServerNet fabric.

SEB ServerNet connectors 4 and 5 can connect to I/O enclosures.

Each processor enclosure connects to a ServerNet fabric through one SEB ServerNet router.

Tetra 16 Topology

For the X fabric, a system can have SEBs in slots 51 and 53 of the inner tetrahedron.

Each inner tetrahedron processor enclosure can support up to two SEBs for each ServerNet fabric.

Each outer tetrahedron processor enclosure can support up one SEB for each ServerNet fabric.

Therefore, removing an SEB from a processor enclosure has one of two results:

Removing SEB 51 (or 52) disconnects that processor enclosure, plus all its associated enclosures, from the ServerNet fabric associated with that SEB.

Removing SEB 53 (or 54) disconnects the I/O enclosures associated with that SEB from that ServerNet fabric, but does not disconnect the processor enclosure itself from the fabric.

ServerNet connectors 4 and 5 on an SEB connect differently:

In the inner tetrahedron, SEB ServerNet connectors 4 and 5 in slot 51 (and 52) can not connect to I/O enclosures.

In the outer tetrahedron, only SEB ServerNet connector 4 in slot 51 (and 52) can connect to an I/O enclosure.

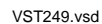
In the inner tetrahedron, SEB ServerNet connectors 4 and 5 in slot 53 (and 54) can connect to I/O enclosures

Some processor enclosures connect to a ServerNet fabric through two ServerNet SEB routers.

For example, group 05 connects to the ServerNet fabric through group 01. Therefore, group 05 depends on group 01 for communication with the ServerNet fabric. If group 01 is disconnected from the fabric, group 05 is disconnected as well.

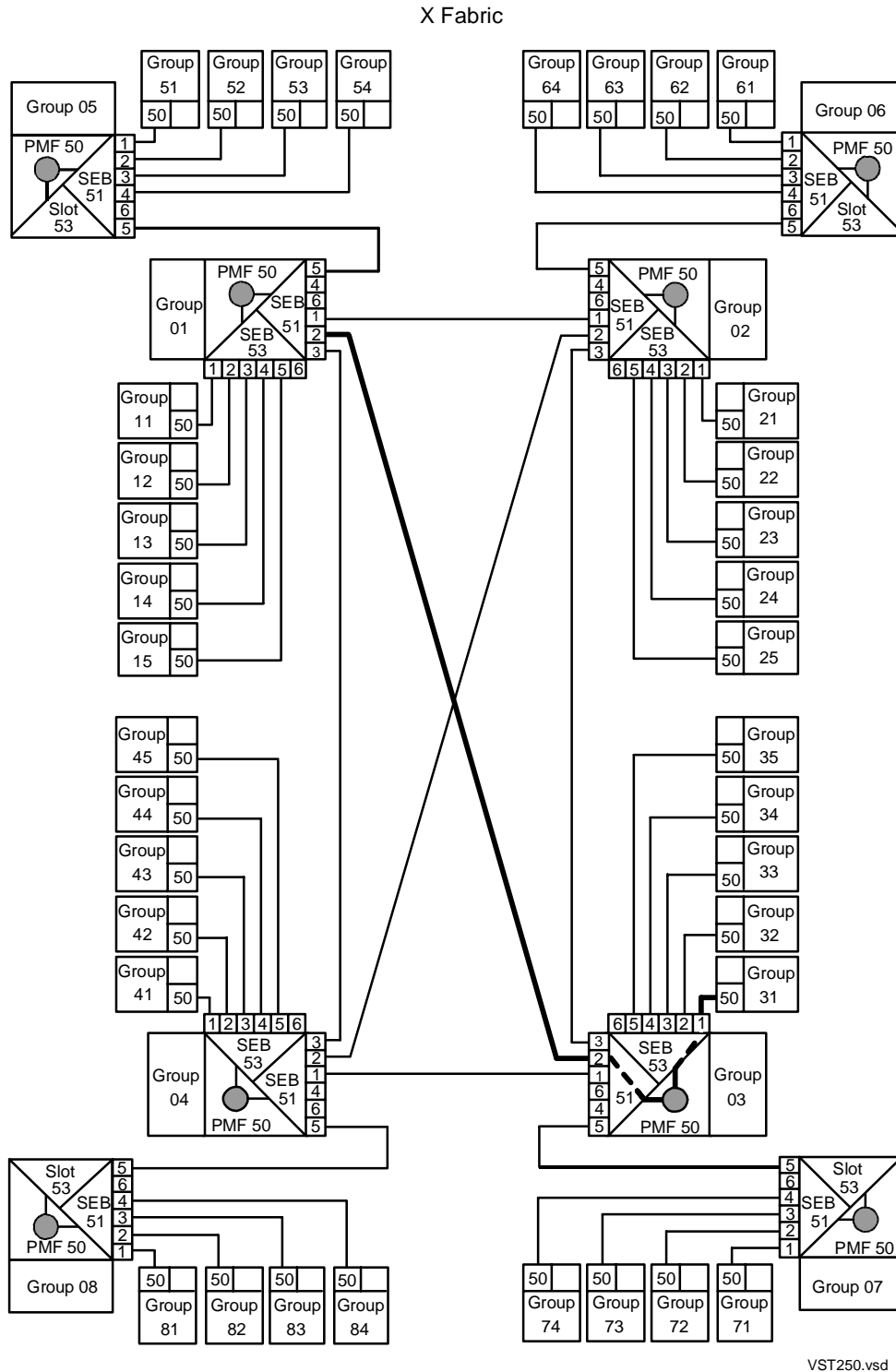
In both of the following subsections, groups 01 and 31 are communicating over the X fabric. However, the pathway between them goes through different SEBs and different ServerNet connectors.

The heavy line in this figure shows the pathway between group 01 and group 31 over the X fabric on a Tetra 8 topology. All communication between I/O enclosures and processor enclosures is routed through one SEB in each processor enclosure.



Pathway Between Groups 01 and 31, Tetra 16 Topology

This cabling diagram shows the pathway, over the X fabric, between group 01 and group 31. The communication is routed through one SEB in one processor enclosure, and two SEBs in another processor enclosure.



Determining the Communication Pathways in Your System

You can determine the communication pathways in your particular system by using:

For ...

Worksheets to determine the
communication pathways in your system

Instructions on using these worksheets

Refer to ...

[Appendix C, Blank Forms](#)

[Section 14, Planning for CRU Replacement](#)

Enclosure Arrangements and Cable Connections

This section discusses arrangements and cable connections for NonStop S-series system enclosures.

Considerations for Enclosure Arrangements	7-1
Choosing ServerNet Cable Lengths	7-4
Power-On Cables	7-10
Requirements for Grounding	7-12
Considerations for Expanding a System	7-13

Note. For G06.25 and G06.26 RVUs, IOAM enclosures can replace I/O enclosures in group 01 of cabling diagrams. For G06.27 and later, IOAM enclosures can replace any I/O enclosure in a system. For important configuration restrictions, refer to [IOAM Enclosures](#) on page 4-69.

Note. IOAM enclosure installation and cabling information is available to your HP trained service provider in the *Modular I/O Installation and Configuration Guide*.

Considerations for Enclosure Arrangements

System enclosures can be arranged to fit the space available in your computer room. You can arrange your enclosures in single-high or double-high stacks, and in multiple rows.

When you plan how to arrange system enclosures:

- Enclosures can be stacked. However, system enclosures must not be stacked more than two high.
- You can simplify ServerNet cabling by arranging enclosures appropriately. You can minimize cable lengths by arranging connected enclosures close to each other. See the following pages for suggested arrangements.
- If you arrange enclosures in multiple rows, your computer room should be equipped with either a raised floor or overhead cable troughs.

A multiple-row system has cables that connect between the rows. If these cables are not routed beneath a raised floor or in overhead cable troughs, they would lie on the floor across the service aisle, creating a hazard.

Even if you have overhead cable troughs, you should also have a raised floor so that you can connect your system to a signal reference grid. You must allow at least 48 inches for service clearance between rows.

- To ensure signal integrity, a multiple-row system should be connected to a signal reference grid. See [Requirements for Grounding](#) on page 7-12.

Examples of Enclosure Arrangements

[Example Enclosure Arrangements: Tetra 8 Topology](#) on page 7-2

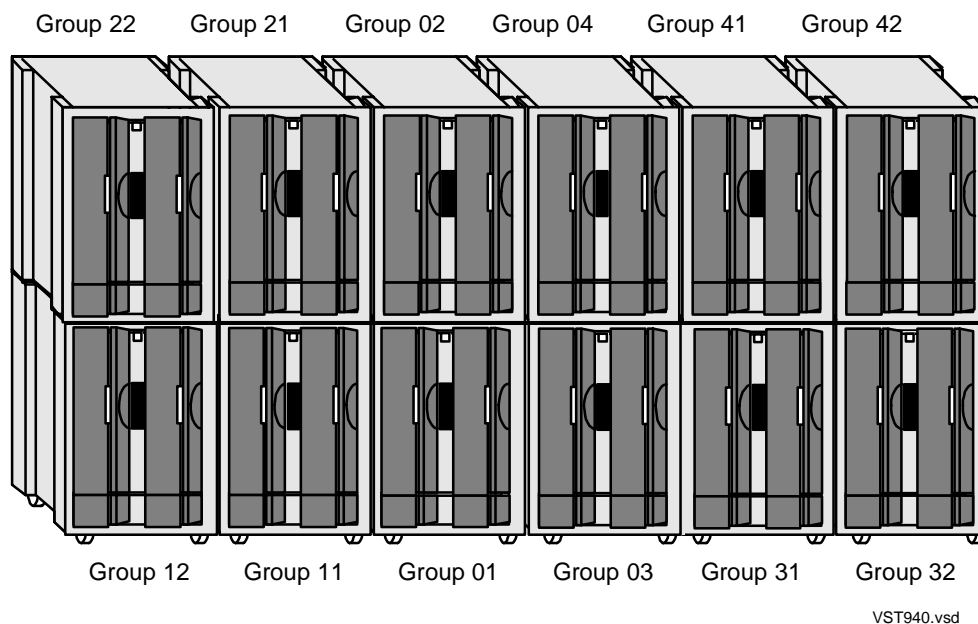
[Example Enclosure Arrangements: Tetra 16 Topology](#) on page 7-3

Note. The arrangement of system enclosures does not change the requirements for how they are cabled together. ServerNet cables must always be connected according to the requirements of the topology you have chosen. Required cable connections for the different topologies are described in [Section 5, ServerNet Cabling](#).

Example Enclosure Arrangements: Tetra 8 Topology

This figure shows a recommended arrangement of system enclosures for the maximum configuration of the Tetra 8 topology. Smaller Tetra 8 configurations can also use this arrangement.

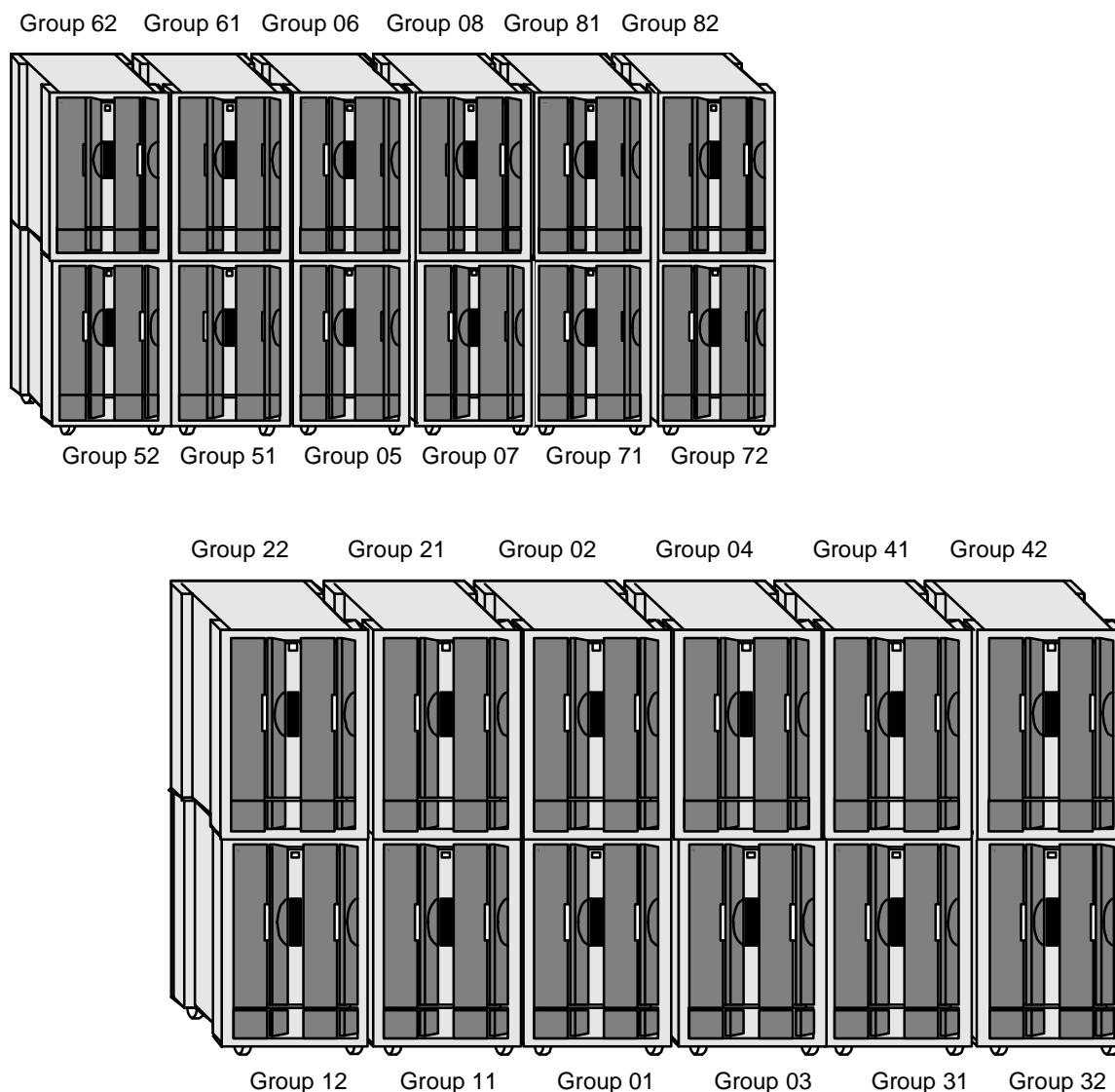
This arrangement minimizes the number of times ServerNet cables cross over each other.



Example Enclosure Arrangements: Tetra 16 Topology

This figure shows a recommended arrangement of system enclosures for a configuration using the Tetra 16 topology. Smaller and larger Tetra 16 configurations can also use this arrangement. This arrangement minimizes the number of times ServerNet cables cross over each other.

In the Tetra 16 topology, you should establish the inner tetrahedron (groups 01 through 04) before you add the outer tetrahedron (groups 05 through 08).



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Choosing ServerNet Cable Lengths

The following information about ServerNet cable lengths applies to ECL and serial-copper ServerNet cables. The lengths of fiber-optic ServerNet cables available from HP is limited; refer to [Appendix A, Part Numbers](#).

The lengths of the ServerNet cables you need depends on the arrangement of the enclosures you want to connect.

For Information About ...	Refer to ...	Page
Choosing cable lengths for two enclosures in the same row	Cable slack is 6 inches (15.25 cm) for a single cable in any enclosure.	7-5
Choosing cable lengths for two enclosures in different rows	Different-Row Connections	7-9
An example of choosing cable lengths	Appendix D, Case Study: ServerNet Cable Lengths	

Obtain the following information about the enclosures and how cables will be laid.

- The arrangement of the enclosures.
- The amount of cable slack that is to be allowed beneath the raised floor.
- Whether the cable will be part of a bundle of cables at either end.

If you are bundling together a large group of cables, you will need extra slack in each cable in that group. How much slack you need depends on the size of that group of cables. For more information, contact your service provider.

Methods of Estimating Cable Lengths

- Use the lookup tables [SEB-to-SEB Connections in Same Row](#) on page B-4 and [SEB-to-IOMF CRU Connections in Same Row](#) on page B-5 and the illustration [Dimensions Within an Enclosure \(Service Side\)](#) on page B-9.
- Measure from a scale drawing of your system.
- Measure cables directly from another system, if available.
- Lay out the system dimensions on the floor and measure distances directly.

Avoid describing the same ServerNet connection twice. Refer to the following tables, which shade the second occurrence of all duplicate listings in gray:

- [Tetra 8 Cabling Table, Processor Enclosures](#) on page 5-10
- [Tetra 8 Cabling Table, I/O Enclosures](#) on page 5-11
- [Tetra 16 Cabling Table, Processor Enclosures](#) on page 5-15
- [Tetra 16 Cabling Table, I/O Enclosures](#) on page 5-16

Cable slack is 6 inches (15.25 cm) for a single cable in any enclosure.
Extra cable length allows cable to bend to attach to connector. If you are tying together a large group of cables, you will need extra slack in each cable in that group. How much slack you need depends on the size of that group of cables. For more information, contact your service provider.

Same-Row Connections

To choose the correct ServerNet cable length for connecting two enclosures in the same row:

1. Determine the arrangement of the two enclosures:

Arrangement Type	Page
ServerNet Connections Between Adjacent Enclosures	7-6
Horizontal ServerNet Connections With Intervening Enclosures	7-7
Diagonal ServerNet Connections With Intervening Enclosures	7-8

Note. These illustrations do not differentiate between SEBs and IOMF CRUs; they show only enclosure relationships and positioning.

2. Note whether you are connecting an SEB to another SEB or to an IOMF CRU, and refer to the appropriate table:

[SEB-to-SEB Connections in Same Row](#) on page B-4
[SEB-to-IOMF CRU Connections in Same Row](#) on page B-5

3. If the cables will be routed under a raised floor or overhead in cable troughs, determine how much slack the cables must have.
4. Determine how many cables will be tied together with one cable tie at the back of each enclosure.

If you will be tying together a large group of cables, you need extra slack in each cable in that group. How much slack you need depends on the size of that group of cables. For more information, contact your service provider.

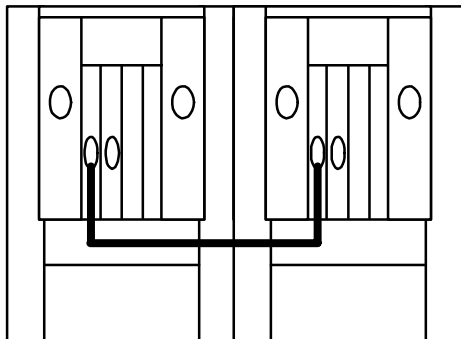
Note. If you want to route the ServerNet cables beneath a raised floor rather than through the cable channels on each enclosure, see [Different-Row Connections](#) on page 7-9, which gives information about calculating the additional cable length that this procedure requires.

5. Refer to [Appendix A, Part Numbers](#). If no cable is exactly the length you need, always chose the next longer cable.

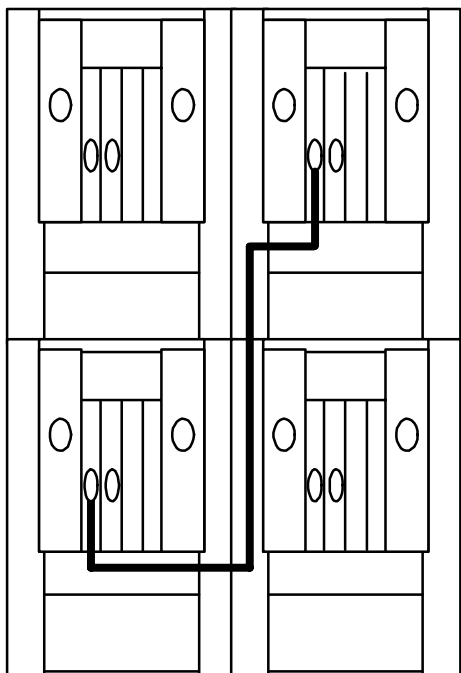
ServerNet Connections Between Adjacent Enclosures

These illustrations show ServerNet cable connections between two system enclosures that are horizontally, vertically, and diagonally adjacent.

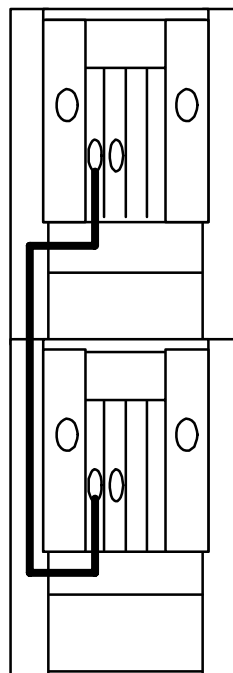
Horizontally Adjacent



Diagonally Adjacent



Vertically Adjacent

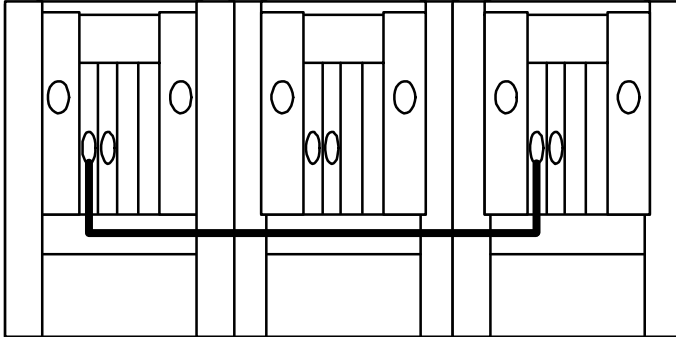


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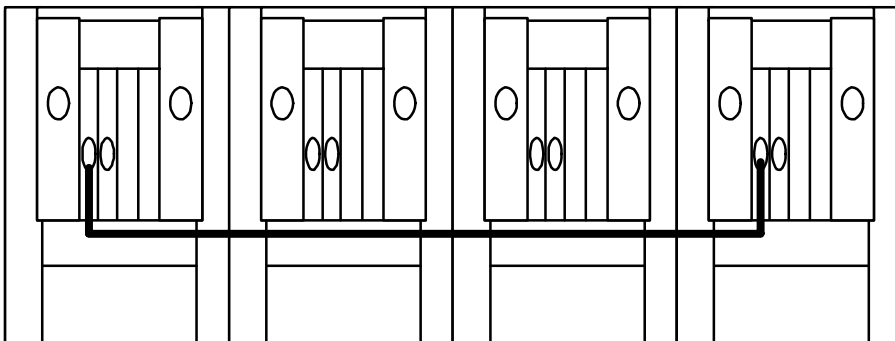
Horizontal ServerNet Connections With Intervening Enclosures

These illustrations show ServerNet cable connections between nonadjacent system enclosures that are in the same row at the same level.

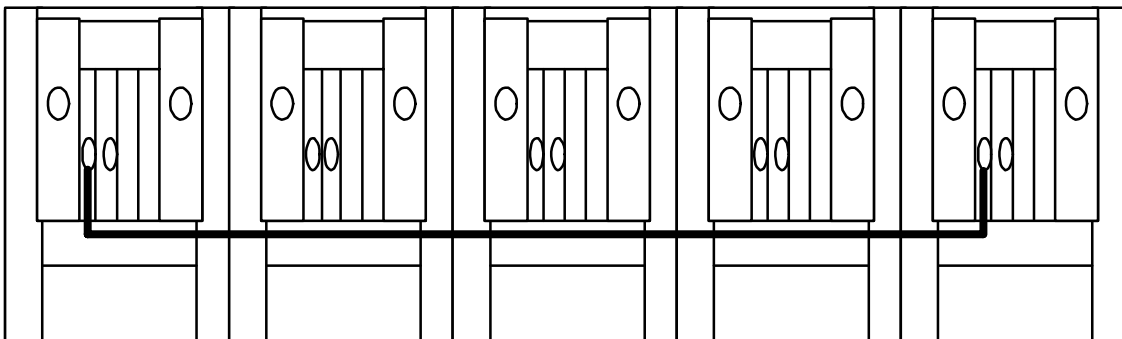
Horizontal with 1 intervening enclosure



Horizontal with 2 intervening enclosures



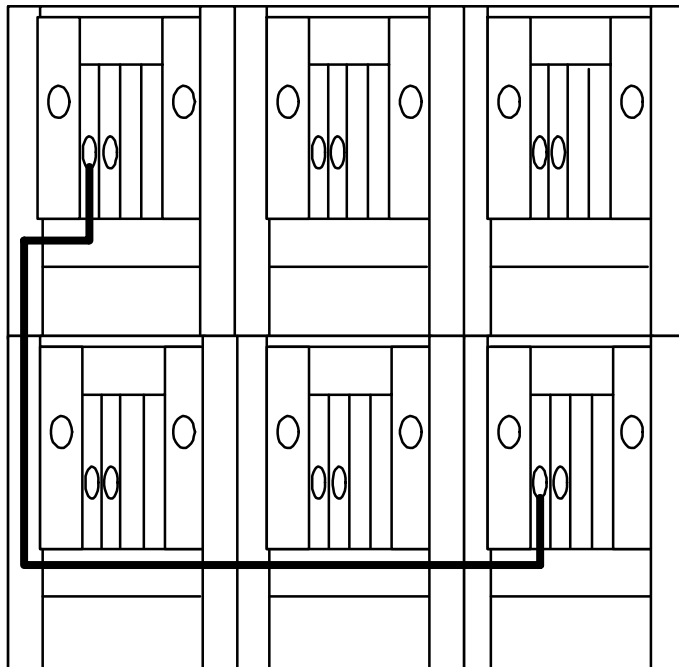
Horizontal with 3 intervening enclosures



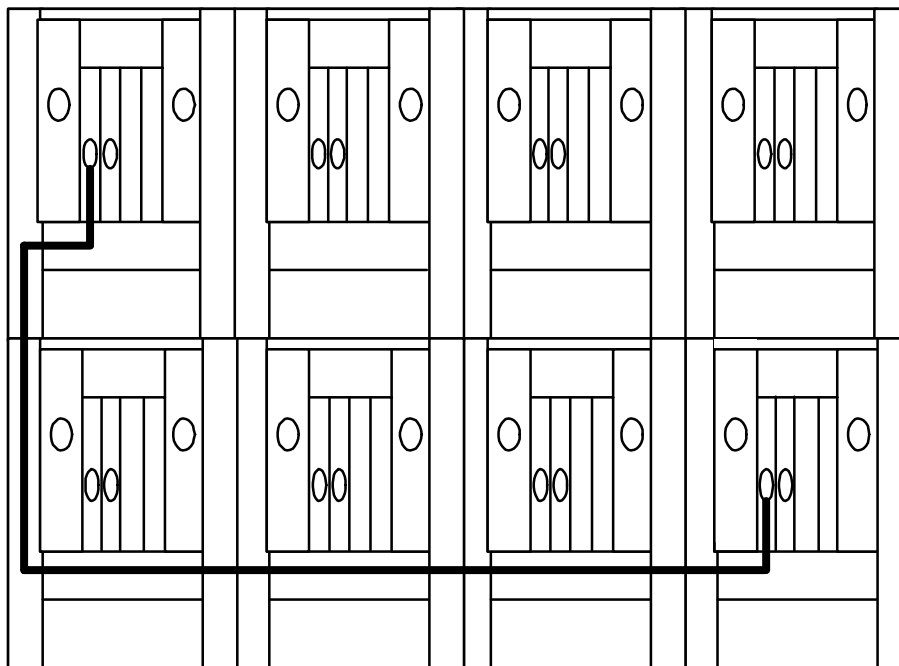
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Diagonal ServerNet Connections With Intervening Enclosures

These illustrations show ServerNet cable connections between nonadjacent system enclosures that are in the same row but at different levels.



Diagonal with 1
intervening enclosure



Diagonal with 2
intervening enclosures

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Different-Row Connections

If you are connecting two enclosures that are in different rows, you must calculate the length of the ServerNet cable you need. This length depends on:

- The arrangement of the enclosures
- Whether the enclosures to be connected are directly opposite each other

If the enclosures are not directly opposite each other, the cable must cross the service aisle and then extend down the other row to reach its enclosure.

- Whether you are connecting each SEB to another SEB or an IOMF CRU
- The dimensions of the components of your system

For Information About...	Page
Dimensions of System Components	B-7
Dimensions of Enclosures and Service Aisles	B-8
Dimensions Within an Enclosure (Service Side)	B-9

- The width of the service aisle between the rows of enclosures
HP requires that a service aisle be a minimum of 48 inches wide.
- For cables that will be routed under a raised floor or overhead in cable troughs, the amount of slack you prefer cables to have
- Whether the cable will be part of a bundle of cables at either end
If you are bundling together a large group of cables, you will need extra slack in each cable in that group.
- The number of cables that will be tied together with one cable tie at the back of each enclosure
If you will be tying together a large group of cables, you need extra slack in each cable in that group. How much slack you need depends on the size of that group of cables. For more information, contact your service provider.
- Whether the enclosures are facing the same direction

Note. Do not lay a cable under or over a service aisle diagonally. Keep the cable at right angles to the service aisle. If, after you have laid the cable perpendicular to the aisle, you then want to route the cable to an enclosure further down the row, use the cable tie-downs and cable channels on each system enclosure as though you were connecting two enclosures in the same row.

Use the following worksheets to calculate the length of the ServerNet cable you need:

For ...

Worksheets to help you determine which cables to order

Cross-Row Cabling Worksheet

An example of a completed worksheet

Refer to ...

[Appendix C, Blank Forms](#)

[Appendix C, Blank Forms](#)

[Appendix D, Case Study: ServerNet Cable Lengths](#)

Refer to [Appendix A, Part Numbers](#). If no cable is exactly the length you need, always choose the next longer cable.

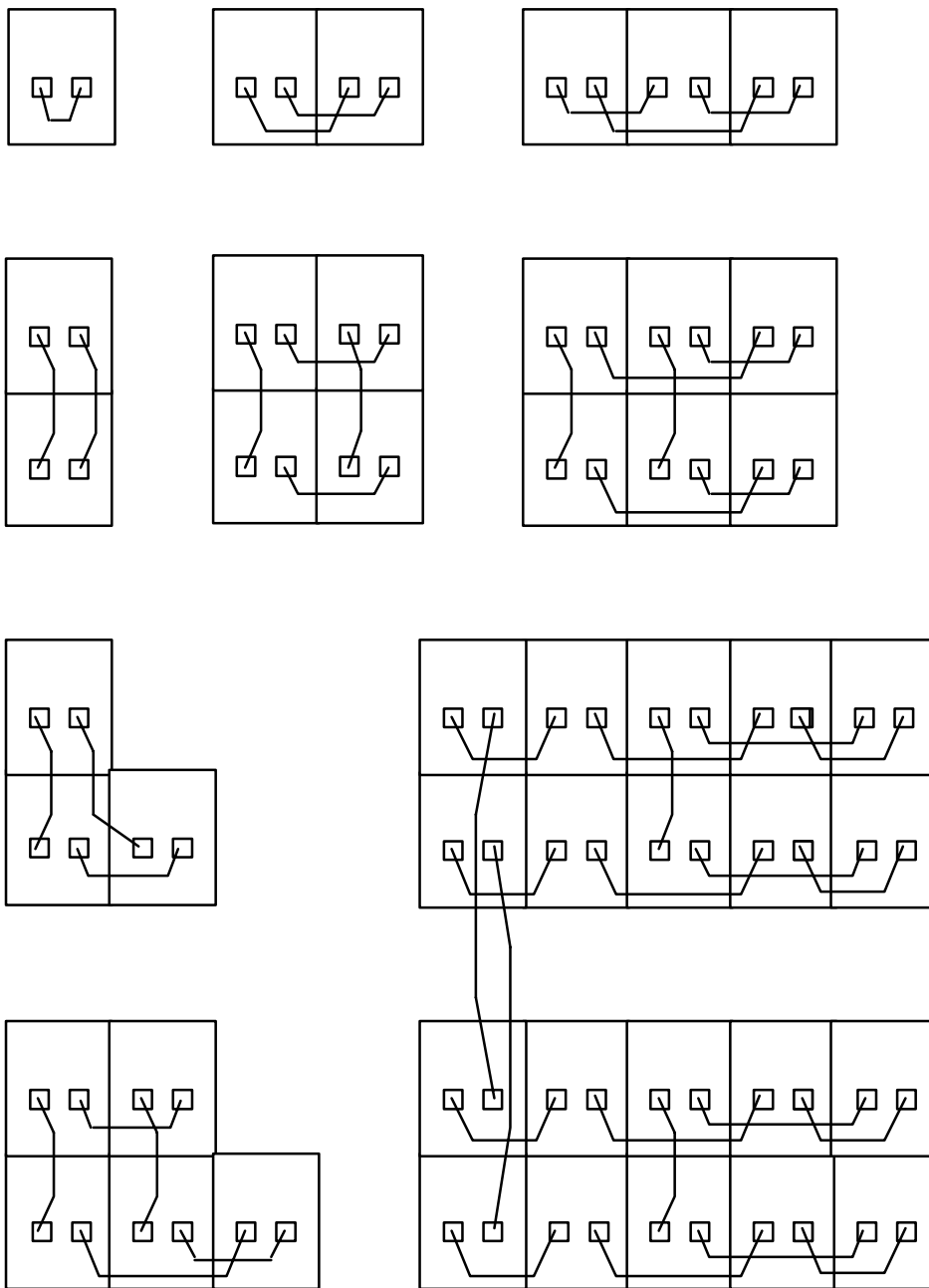
Power-On Cables

External power-on cables connect all system enclosures in a system together in series, enabling the system to be powered on from a single point.

Power-on cables are 4-wire cables with RJ-11 connectors, and they are attached to all the PMF CRUs and IOMF CRUs in a system. The procedures for connecting the power-on cables are discussed in the *NonStop S-Series Hardware Installation and FastPath Guide*.

Note. IOAM enclosures do not require power-on cables.

These illustrations show typical power-on cable routing.



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Powering On

A system can be powered on from a single power-on push button. To power on an entire system, press the power-on push button on either of the PMF CRUs in group 01.

Powering Off

There are several ways to power off a system:

- For nonemergency power-offs, issue a software command.
- In an emergency, power off the system in one of these ways.

Emergency Power-Off Method	Batteries Continue to Power the System for a Short Time	Results
Unplug the AC power cords from the external power source.	Yes	System treats this as a power failure and continues to draw power from the batteries.
Shut off power at the circuit breaker.	Yes	System treats this as a power failure and continues to draw power from the batteries.
In sites with installed EPO equipment, use the EPO switch.	No	You might disconnect power to entire computer room. Use caution when using the EPO switch.

Requirements for Grounding

To ensure signal integrity in a multiple-row system, a signal reference grid is recommended.

If a system is not connected to a signal reference grid, impedance points might cause voltage differential between enclosures, degrading signals and causing loss of data integrity.

A signal reference grid creates multiple, parallel ground conducting paths between system enclosures, by distributing ground currents throughout multiple paths in a raised floor structure, simulating a nearly equipotential reference plane for all computer equipment installed on and connected to the grid.

When fiber-optic ServerNet cables are used instead of ECL or serial-copper cables, grounding requirements might not be as restrictive.

For information, contact your HP trained service provider.

Considerations for Expanding a System

- NonStop S7xx servers are limited to two processors.
- NonStop S-series servers can grow from two to 16 processors, in pairs. The more processors a system has, the more I/O enclosures it can have.

For more information about which systems support which topologies, and how many enclosures are supported by each system, refer to [Section 3, Topologies](#).

- For information about changing the system configuration, refer to [Section 9, The Planning and Configuration Process](#), and [Section 13, Completing the Installation Plan](#).
- You select the topology of a system at the time you order the system. You cannot change the topology online. You can change the topology of a system using the OSM or TSM package, but you must bring down the system and change some cable connections.

For information about changing the system topology, see [Changing the System Topology](#) on page 15-3.

- You should establish the inner tetrahedron on a system before you establish the outer tetrahedron. For more information, refer to [Tetra 16 Topology](#) on page 3-5.
- When you add I/O enclosures to a system, you should balance them evenly across processor enclosures; that is, every processor enclosure in the system should have one I/O enclosure attached to it before any processor enclosure has two I/O enclosures attached to it.

The first I/O enclosure connected to a processor enclosure has a group number that ends in 1 (11, 21, 31, and so forth, where the first digit is the group number of the processor enclosure it is connected to).

The second I/O enclosure connected to a processor enclosure has a group number that ends in 2 (12, 22, 32, and so forth).

If the topology allows it, third, fourth, and fifth I/O enclosures can then be connected to a processor enclosure. Those I/O enclosures have group numbers that end in 3, 4, and 5, respectively.

8

Initial Configurations

This section discusses the initial configurations for NonStop S-series servers.

For more information, see the *G.nn Release Version Update Compendium*.

Note. Not all the products, configurations, features, and functions described in this guide are available with the current RVU. Ask your service provider about the availability dates for these products, configurations, features, and functions.

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Processor Numbers and Locations

This table lists each processor by processor number and gives the physical location of the processor multifunction (PMF) CRU that contains that processor.

Processor Number	PMF CRU Location		
	Group	Module	Slot
0	01	01	50
1	01	01	55
2	02	01	50
3	02	01	55
4	03	01	50
5	03	01	55
6	04	01	50
7	04	01	55
8	05	01	50
9	05	01	55
10	06	01	50
11	06	01	55
12	07	01	50
13	07	01	55
14	08	01	50
15	08	01	55

Processor Types and Memory Sizes

This table lists the memory sizes available for each processor type. The processors within a system are not required to have the same amount of memory. However, if you are planning for a system containing processors with different memory sizes, you might want to perform a capacity analysis to ensure that, in the event of a processor failure, the backup processor can maintain the performance level for the increased load.

Memory	NonStop S-Series Processor Type										
	1950 S7000	1960 S7400	1961 S7600	1962 S7800	1951 S70000	1954 S72000	1970 S74000	1971 S76000	1972 S86000	1973 S78000	1974 S88000
128 MB	*				*						
256 MB	X				X	X					
512 MB	X	X			X	X	X				
1 GB			X		X	X		X	X		
2 GB				X		X	X			X	X
4 GB			X	X			X	X	X	X	X
8 GB										X	X
16 GB								X	X		X

* 128 MB memory is not supported for PMF CRUs on G06.16 and later.

For more information about the memory in NonStop S-series servers, see [Memory](#) on page 4-39.

Internal Disk Drives

Each NonStop S-series system enclosure can contain up to 16 internal disk drives.

Supported Internal Disk Drives

The internal disk drives supported in all NonStop S-series system enclosures for the current RVU are listed in [Internal Disk Drives](#) on page F-4.

Disk Drives for 16-GB Processors

To perform an online memory dump of a 16-GB processor to a disk volume using RECEIVEDUMP or RCVDUMP, you must have one 36-GB or larger disk drive in which 20 GB is reserved for memory dump. The remaining storage space can be used for anything. This disk does not have to be \$SYSTEM.

Disk Drive Enclosure

A disk drive enclosure (DDE) contains up to fourteen Fibre Channel disk drives. The DDE connects to the system by way of an FCSA in the IOAME. The system and mirror disks cannot be located on these disk drives.

Minimum Disk-Drive Configuration

A system must include a minimum of four internal disk drives, all having the same product number. This table lists the factory-default device name, location, and purpose of each of these four internal disk drives.

Factory Default Device Name	Location	Purpose
\$SYSTEM-P	Group 01, module 01, slot 11	Contains files related to the operating system (primary drive of mirrored volume)
\$SYSTEM-M	Group 01, module 01, slot 12	Contains files related to the operating system (mirror drive of mirrored volume)
\$DSMSCM	Group 01, module 01, slot 13	Contains the Distributed Systems Management/Software Configuration Manager (DSM/SCM) database files, the CIIN file, and the CONFTEXT configuration file
\$AUDIT	Group 01, module 01, slot 14 if nonmirrored; see Locations of \$DSMSCM and \$AUDIT as Mirrored Volumes on page 8-4	Contains HP NonStop Transaction Management Facility (TMF) audit-trail files, and the archive files of DSM/SCM

Locations of \$DSMSCM and \$AUDIT as Mirrored Volumes

HP recommends that you configure \$DSMSCM and \$AUDIT as mirrored volumes. This table lists the locations of \$DSMSCM and \$AUDIT if they are configured as mirrored volumes.

Device Name	Location	Purpose
\$DSMSCM-P	Group 01, module 01, slot 13	Primary drive
\$DSMSCM-M	Group 01, module 01, slot 14	Mirror drive
\$AUDIT-P	Group 01, module 01, slot 15	Primary drive
\$AUDIT-M	Group 01, module 01, slot 16	Mirror drive

Other Internal Disk Drives

Any other internal disk drives that are ordered are also configured and named at the factory. To determine the factory-default configuration of a system's internal disk drives, after you install and start your system, use SCF to determine the system configuration. Refer to the *SCF Reference Manual for G-Series RVUs* for more information about this task.

The two physical disk drives of a mirrored volume must have the same product number (except during an online upgrade).

External Disk Drives

The external disk drives supported in all NonStop S-series systems for the current RVU are listed in [External Disk Drives](#) on page F-5.

Tape Drives

The external tape drives supported in NonStop S-series systems for the current RVU are listed in [Tape Drives](#) on page F-6.

Each PMF CRU and IOMF CRU in a system has a SCSI port to which you can connect an external tape drive. You can also connect a tape drive to an S-PIC on a 6760 ServerNet device adapter.

You must connect a tape drive to group 01 to perform a tape dump.

To determine SCSI port to connect a tape drive to, you need to know the factory-default configuration for the tape drive. Refer to the SCF Configuration File printout that is shipped with your server for a listing of names and locations of configured drives. This file can also be found on the ZSYSCONF subvolume under the name SCF0000.

Virtual TapeServer

Virtual TapeServer allows one or more host systems to read and write data to and from a RAID array, just as if the system was doing so with a real tape drive. For every host connection to Virtual TapeServer, the host system “sees” a tape drive. These virtual tape drives perform in exactly the same way a real tape drive would, without all of the problems generally associated with real tape drives. For more information about Virtual TapeServers, See *Introduction to Virtual TapeServer Operations (Tape Labs)*.

Tape Drives for 16-GB Processors

To perform an offline tape dump of a 16-GB processor, you must use a tape drive attached to enclosure 1 and a tape cartridge with a capacity of at least 20 GB. The following tape drives and tape media are recommended.

Tape Drive	Tape Cartridge
DLT7000 (5157, 5158, and 5189)	Type IV cartridge Type III XT cartridge Type III cartridge
CT9840-x	9480 cartridge
CT9841-x	9481 cartridge
N1524A ACL	C7972A cartridge
Super DLT (5257, 5258, 5259)	Super DLT 1 cartridge

Before planning to use a different tape drive, contact your HP representative.

Initial Default Values for System Attributes

System Attribute	Default Value	To Change This Attribute (page 1 of 2)
BREAKPOINT_CONTROL_BLOCKS	Automatically set to 50	You cannot change an automatically configured system attribute.
BUILD_Z0_PROCESS	Automatically built during system generation	You cannot change an automatically configured system attribute.
DAYLIGHT_SAVINGS_TIME	NONE	Use SCF for the Kernel subsystem.
DP2_UPSOPTION	OFF	For G05.00 and later G-series RVUs, use SCF for the storage subsystem.
FILES_TO_COPY_TO_NEW_SYSTEM	TANDEM^FILES^TO^COPY	Change in the CONFTEXT file.
FORMATTER_TEMPLATE	TANDEM^FORMATTER^TEMPLATE	Change in the CONFTEXT file.
FORMATTER_TEMPLATE_FILES	TANDEM^FORMATTER^TEMPLATE^FILES	Change in the CONFTEXT file.
INITIAL_COMMAND_FILE or INITIAL_COMINT_INFILE	\$DSMSCM.SYS.CIIN	Configured in the CONFTEXT file.
MAXIMUM_SYSTEMS	Automatically set to 255	You cannot change an automatically configured system attribute.
OPERATOR_PROCESSORS	Automatically set to processors 0 and 1	You cannot change an automatically configured system attribute.
POWERFAIL_DELAY_TIME	30 seconds	Use SCF for the Kernel subsystem.
PROCESS_CONTROL_BLOCKS	Automatically set to 1800 (before G06.08), 2200 (G06.08 to G06.G06.18) or 4000 (G06.19 and later)	You cannot change an automatically configured system attribute.
PROCESSORS	Automatically configured	You cannot change automatically configured system attributes.
STANDARD_MICROCODE	TANDEM^STANDARD^MICROCODE	Change in the CONFTEXT file.
SUPER_SUPER_IS_UNDENIABLE	- -	Change in the CONFTEXT file.

System Attribute	Default Value	To Change This Attribute (page 2 of 2)
SYSTEM_LIBRARY_CODE_FILES	TANDEM^LIBRARY^CODE^FILES	Change in the CONFTEXT file.
SYSTEM_NAME	\NONAME	Use SCF for the Kernel subsystem. See Changing System Name and Number on page 8-8.
SYSTEM_NUMBER	254	Use SCF for the Kernel subsystem. See Changing System Name and Number on page 8-8.
SYSTEM_PROCESS_CODE_FILES	TANDEM^PROCESS^CODE^FILES	Change in the CONFTEXT file.
SYSTEM_PROCESS_LIBRARY_FILES	TANDEM^PROCESS^LIBRARY^FILES	Change in the CONFTEXT file.
SYSTEM_PROCESS_MODIFIERS		
Buffer space for operator processes	Automatically set to 128	You cannot change an automatically configured system attribute.
Mode for compatibility distributor	- -	Use the EMSCCTRL commands.
SYSTEM_PROCESSOR_TYPE	Refer to Processor Types on page B-12.	Configured in the CONFTEXT file.
SYSTEM_VOLUME_SUBVOL	\$SYSTEM.SYS00	Change in the CONFTEXT file.
TAPE_LABEL_PROCESSING	For G05.00 and G06.00 RVUs, the value in the CONFTEXT file is ignored after the first time you change this attribute using SCF for the storage subsystem.	Use SCF for the storage subsystem.
TIME_LIST_CONTROL_BLOCKS	Automatically set to 3600 (before G06.08) or 4400 (G06.08 and later)	You cannot change an automatically configured system attribute.
TIME_ZONE_OFFSET	0:00 (London)	Use SCF for the Kernel subsystem.

After you install and start a system, you can use SCF to determine the system configuration. Refer to the *SCF Reference Manual for G-Series RVUs* for more information about this task.

Changing System Name and Number

Changing the system name and Expand node number (system number) involves more than using SCF to change the system name and system number attributes. For information about changing the system name and number, refer to [Changing the System Name or System Number](#) on page 9-8. If you want to change the system name or number after you have installed HP NonStop SQL/MP, refer to the *SQL/MP Installation and Management Manual* and contact the Global Customer Support Center (GCSC).

Initial Configuration Files

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Objects Configured in the Initial CONFIG File

When a system is delivered, the file \$SYSTEM.ZSYSCONF.CONFIG contains a standard system configuration created by HP. This initial CONFIG file is also saved on your system as the ZSYSCONF.CONF0000 file.

Object	Comments
Disk drives	
ServerNet adapters	
Tape drives	
SWAN concentrators	
SWAN 2 concentrators	
\$CLCI	The system-load TACL process
\$OSMM0, \$OSMM1	Startup processes for the TCP subsystems used by OSM
\$TSMM0, \$TSMM1	Startup processes for the TCP subsystems used by TSM
\$ZCMOM	OSM CIM Object Manager
\$ZCVP0, \$ZCVP1	TSM event servers used by OSM and TSM
\$ZHOME	The system home terminal process
\$ZLOG	The alternate EMS collector used by OSM or TSM
\$ZM _{xx}	A QIO monitor process for each processor
\$ZNET	The SCP process
\$ZOEV	OSM Event Manager
\$ZOLHI	EMS Routing Distributor used by OSM
\$ZOSM	OSM Applet Server
\$ZSPE	The SP-to-EMS event conversion process
\$ZTCP0, \$ZTCP1	TCP/IP processes used by OSM or TSM
\$ZTSM	The TSM server process
\$ZTSMS	The SNMP agent process
\$ZZLAN	The SLSA subsystem manager process
\$ZZWAN	The WAN subsystem manager process

Objects That Must Not Be Renamed

After you verify that your system is in working order, you can rename most configured SCF objects. The exceptions are:

- Do not rename the following processes and devices that are used by OSM or TSM:
 - MIOE0 and MIOE1
 - LANX and LANY
 - \$ZCVP0 and \$ZCVP1
 - \$ZTCP0 and \$ZTCP1
 - \$ZTNP0 and \$ZTNP1
 - \$ZPRP0 and \$ZPRP1
- Do not rename the generic processes configured in the initial current configuration database. Examples are:
 - \$ZZKRN.#CEV-SERVER-MANAGER-P0
 - \$ZZKRN.#QIOMON-1
 - \$ZZKRN.#SCP
 - \$ZZKRN.#ZZLAN

You can display a list of these generic processes by typing the following command at the TACL prompt:

```
> SCF NAMES $ZZKRN
```

- Do not change the name or location of the \$SYSTEM disk volume on systems running RVUs earlier than G06.06. As of G06.06, \$SYSTEM can be moved to other locations within group 01.

Command Files for Objects Not Configured in the Initial CONFIG File

The following command files that configure and start objects that are not configured in the initial CONFIG file. These files can serve as examples for you to modify as necessary. They also provide the basic files for recovery from system failure.

Note. Objects that are not configured in the CONFIG file must be reconfigured after a system load.

File Name	Purpose
\$SYSTEM.ZSYSCONF.STARTCOM	Starts TCP/IP services using the LAN devices configured by the SCF0000 file: <ol style="list-style-type: none"> 1. Starts the TCP/IP processes 2. Invokes the STARTSCF file 3. Starts the TELSERV and LISTNER processes
\$SYSTEM.ZSYSCONF.STARTSCF	Contains SCF commands to configure and start the TCP/IP routers and subnets and to start the processes used by the SWAN concentrator.

Files Used to Create the Initial CONFIG File

File Name	Purpose
\$SYSTEM.SYS _{nn} .CONFBASE	Configures: <ul style="list-style-type: none"> ● \$SYSTEM disk volume ● \$ZZKRN Kernel subsystem manager ● \$ZZSTO storage subsystem manager ● \$ZHOME reliable home-terminal process
\$SYSTEM.ZSYSCONF.SCF0000	Configures and starts: <ul style="list-style-type: none"> ● Disk drives ● Tape drives ● ServerNet adapters ● Data communications subsystems ● SNMP configuration parameters for TSM ● Several other system processes

CONFBASE File

The CONFBASE file is placed on the target SYS_{nn} subvolume specified in DSM/SCM. The CONFBASE file for a new system is on \$SYSTEM.SYS00.

It is unlikely you will ever need to load the system from the CONFBASE file. However, if the current configuration file has become corrupted and there is no other configuration file from which you can load the system, use the CONFBASE procedure in *SCF Reference Manual for G-Series RVUs*.

Naming Conventions Used in the SCF0000 File for SCF Objects

This table describes the SCF0000 file-naming conventions for many SCF objects. This information is also contained in the \$SYSTEM.ZSYSCONF.SCF0000 file.

Refer to [Objects That Must Not Be Renamed](#) on page 8-10 before renaming any SCF objects.

Type of Object	Naming Convention	Example	Description
Disk drive	\$D<cabid><slot>	\$D3217	I/O group 32, slot 17
Tape drive	\$T<cabid><slot>	\$T0150	Processor group 01, slot 50
LAN adapter	E<cabid><slot>	E8254	I/O group 82, slot 54
LIFs	L<cabid><portid>	L51A	I/O group 51, slot 53, ServerNet connector 2
TCP process	\$ZB<cabid><portid>	\$ZB51A	TCP/IP process for the associated LIF
Telnet process	\$ZN<cabid><portid>	\$ZN51A	Telnet process associated with TCP/IP
Listener process	\$ZP<cabid><portid>	\$ZP51A	Listener process associated with TCP/IP
TFTP process	\$ZF<cabid><portid>	\$ZF51A	TFTP process associated with TCP/IP
Fast Ethernet adapter	F<cabid><slot>	F5154	I/O group 51, slot 54
Token ring adapter	TR<cabid><slot>	TR5155	I/O group 51, slot 55
WANBoot process	\$ZW<cabid><portid>	\$ZW51A	WANBoot associated with TCP/IP
SWAN concentrator	S<adapter>	S19	Nineteenth SWAN concentrator
SS7 Telco	\$C<cabid><portid>	\$C	Telco process associated with SS7 protocol
G4SA	E<group><module><slot#>	G1121	A G4SA in group 11, module 2, slot 1
G4SA LIF	L<group><module><slot> <port>	L1125C	LIF for PIF at location 11.2.5.0.C

<cabid>

is a two-digit number that identifies the group number of the enclosure.

<slot>

is the actual physical slot number in the enclosure.

<portid>

is the slot number and port number mapped in the following way:

Slot Number	Router Port Number	<portid>	Slot Number	Router Port Number	<portid>
51	0	0	53	0	8
51	1	1	53	1	9
51	2	2	53	2	A
51	3	3	53	3	B
52	0	4	54	0	C
52	1	5	54	1	D
52	2	6	54	2	E
52	3	7	54	3	F

<adapter>

is a number in the range 00 through 99.

SCF Commands to Automate Disk Configuration

You can use SCF to configure your system so that, upon system load or the insertion of a disk CRU, several tasks are automated. These are tasks and commands to automate disk processes.

Process	SCF Command	Purpose
Auto-configuration	ALTER SUBSYS \$ZZSTO, AUTOCONFIG { OFF ON }	To automatically configure internal disks
Auto-start	ALTER SUBSYS \$ZZSTO, AUTOSTART { OFF ON }	To automatically start the disk process when an internal disk CRU is inserted in a slot
Auto-revive	ALTER SUBSYS \$ZZSTO, AUTOREVIVE { OFF ON }	To automatically start a disk revive, if necessary, during a system load or when a disk CRU is inserted in a slot

For more information on these tasks and the procedures to automate them, see the *SCF Reference Manual for the Storage Subsystem*.

Note. The SCF AUTOCONFIG command cannot be used if the storage devices in your enclosures are interleaved.

OSM Configurations

HP Manufacturing sets the initial system configuration so that OSM is enabled on the system and TSM is disabled. For information about using TSM instead of OSM, see [Using TSM instead of OSM](#) on page 15-2

SWAN Concentrator Configurations

ServerNet wide area network (SWAN and SWAN 2) concentrators are connected to Ethernet switches or hubs that are connected to ports on Ethernet 4 ServerNet adapters (E4SAs). Each SWAN concentrator is uniquely identified by a case-sensitive configuration track-ID. This track-ID, which is case sensitive, is an important part of the system configuration for the SWAN concentrator.

When you install a SWAN concentrator that has already been added to the system configuration, you must ensure that you are connecting the SWAN concentrator with the correct configuration track-ID to the correct Ethernet switch or hub, which is, in turn, connected to the correct ports on the correct E4SAs.

SWAN 2 concentrators can be connected to Ethernet 4 ServerNet adapters (E4SAs), Fast Ethernet ServerNet adapters (FESAs), or Gigabit Ethernet ServerNet adapters (GESAs).

All SWAN concentrators ordered with a the system are added to the system configuration at the factory. To determine the factory-default configuration for your SWAN concentrators, after you install and start your system, follow the instructions in the *SCF Reference Manual for the Storage Subsystem* or *SWAN 2 Concentrator Installation and Support Guide*.

Refer to the *WAN Subsystem Configuration and Management Manual* for detailed information about configuring a SWAN or SWAN 2 concentrator.

Ethernet Ports on PMF CRUs and IOMF CRUs

Each PMF CRU and IOMF CRU in a system has a port labeled ETHERNET. The Ethernet LAN connected to the system consoles connects to the Ethernet port of both PMF CRUs in group 01.

The Ethernet ports in group 01 can be used only for the LAN dedicated to OSM or TSM. (Refer to [Section 11, Planning for LAN Communications](#), for more information about this LAN.) The Ethernet ports on IOMF CRUs, and on PMF CRUs that are not in group 01, cannot be used.

ServerNet Adapter Configurations

Any ServerNet adapters that are ordered with a system are configured at the factory and named using default names that include the adapter type. Subordinate objects associated with the ServerNet adapters, such as logical interface (LIF) names, are also given default names. After you install and start your system, use SCF to determine the factory-default configuration for your ServerNet adapters and their associated objects. Refer to the *SCF Reference Manual for G-Series RVUs* and to the *LAN Configuration and Management Manual* for more information about this task.

Factory-Default Configuration of MFIOBs

The multifunction I/O boards (MFIOBs) in the PMF CRUs in group 01 contain ServerNet adapters that are configured at the factory as described here. The MFIOBs in the other groups are not configured.

PMF CRU

Location

(Group, Module, Slot)	Adapter Type	Adapter Name	SAC Name	Access List (Processor Numbers)	PIF Name	LIF Name
(01,01,50)	MIOE	MIOE0	MIOE0.0	0,1	MIOE0.0.A	LANX
(01,01,55)	MIOE	MIOE1	MIOE1.0	1,0	MIOE1.0.A	LANY

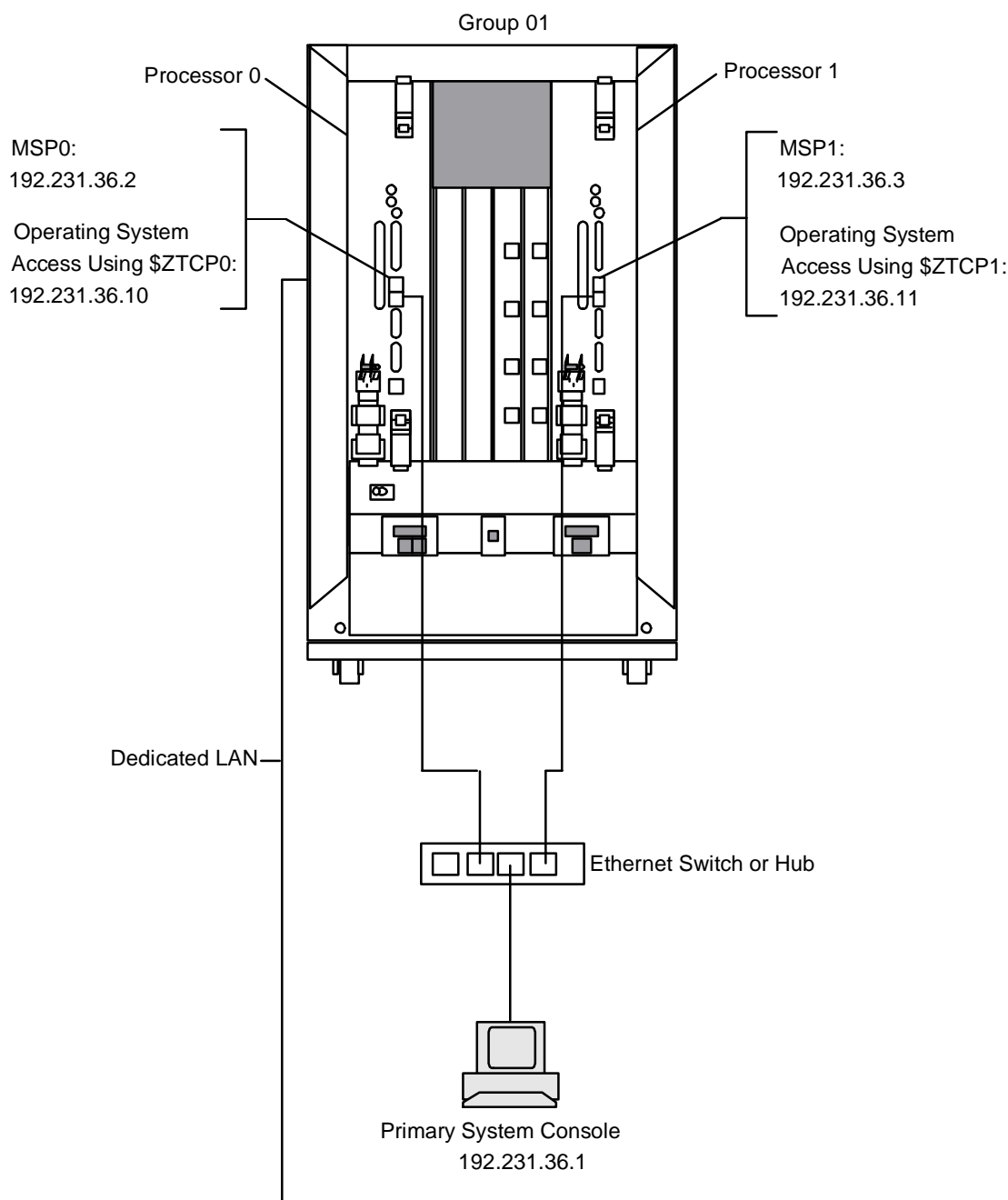
Initial IP Addresses for System and System Consoles

New systems are shipped with Internet protocol (IP) addresses preconfigured for communication between the primary system console and your system (including those needed by OSM or TSM). After you install a new system, you must reconfigure these IP addresses to the addresses that are appropriate for your LAN environment:

Note. The modular components in an IOAM enclosure can have IP addresses that are either static or dynamically-assigned. If you have an operations LAN with DHCP/DNS capability, you can use this LAN to assign IP addresses dynamically. If you do not have such a LAN, HP offers DHCP/DNS software that can be installed on the system console to give your console DHCP/DNS capabilities. For additional information, contact your HP representative.

Component	Preconfigured IP Address	Notes
Primary system console	192.231.36.1	System consoles on the same LAN must not use the same IP address. If the primary system console uses this preconfigured IP address, you must change the IP addresses on all other system consoles before connecting them to the LAN.
Backup system console	192.231.36.4	The recommended IP address for a backup system console is 192.231.36.4. HP does not assign that IP address to any other devices
MSP0	192.231.36.2	Allows you to establish an OSM or TSM low-level link through the Ethernet port on the PMF CRU in group 01, module 01, slot 50.
MSP1	192.231.36.3	Allows you to establish an OSM or TSM low-level link through the Ethernet port on the PMF CRU in group 01, module 01, slot 55.
NonStop OS access using \$ZTCP0	192.231.36.10	Allows you to establish an OSM or TSM service connection through the Ethernet port on the PMF CRU in group 01, module 01, slot 50.
NonStop OS access using \$ZTCP1	192.231.36.11	Allows you to establish an OSM or TSM service connection through the Ethernet port on the PMF CRU in group 01, module 01, slot 55.
Subnet	192.231.36.0	
Subnet mask	255.255.255.0	
Gateway	192.231.36.9	

This figure shows the physical connections between the system and a system console, their initial IP addresses, and their functions. This configuration is called the setup configuration.



VST905.vsd

IOAM Enclosures

IOAM enclosures must be installed and configured by service providers trained by HP. Information is available to your HP trained service provider in the *Modular I/O Installation and Configuration Guide*.

Part II. Planning Tasks

This part provides information about planning and preparing your site for the installation of NonStop S-series system hardware.

Section	Title	Abstract
<u>9</u>	<u>The Planning and Configuration Process</u>	This section provides overviews of the process of installing a new system and the process of making hardware or software changes to an existing system.
<u>10</u>	<u>Planning for System Availability and Support</u>	This section describes advance planning required for minimizing the total number of minutes that an application or system is unavailable.
<u>11</u>	<u>Planning for LAN Communications</u>	This section describes requirements and considerations for configuring local area networks (LANs) for NonStop S-series servers.
<u>12</u>	<u>Site Planning and Preparation</u>	This section provides information you need to plan and prepare the site for a NonStop S-series system.
<u>13</u>	<u>Completing the Installation Plan</u>	This section describes how to finish the planning tasks, including assembling the Installation Document Packet.
<u>14</u>	<u>Planning for CRU Replacement</u>	This section describes how to plan for CRU replacement by completing the ServerNet communication pathways worksheets.
<u>15</u>	<u>Planning for System Configuration</u>	This section describes factors to consider when you plan the installation or reconfiguration of a system.

The Planning and Configuration Process

This section provides overviews of the process of installing a new system and the process of making hardware or software changes to an existing system.

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People and Functions

The people involved in the planning, installation, and configuration of a NonStop S-series system are:

Person*	Function
System planner	Plans for the hardware and software installation of a new system or for changes to a system already installed. Arranges for site preparation, schedules the installation, and completes the Installation Document Packet.
Configuration planner	Manages software configuration changes and system configuration changes. Creates SCF command files for system configuration changes. Creates the new operating system image for software configuration changes.
Support planner	Creates the operational environment for the system and is responsible for the support of the system. Creates the startup and shutdown files. Performs replacement operations. Prepares the system for upgrades and additions.
Installer	Installs the system equipment for a new system. Installs new equipment when additions are made to the system. Performs hardware configuration changes. Might install software and perform system verification procedures as directed by the system planner, configuration planner, or support planner.
Operator	Performs the routine operations for the system.

* This guide does not assume that the person performing these tasks has any particular job title or that these tasks must be performed by different people.

The Installation Forms

The installation forms referred to in this guide provide information about an existing or planned system or planned configuration, including the hardware configuration, the names of the devices, and the system configuration to be used. The same forms are used both by the configuration planner to customize the system configuration and by the installer to install the system.

For the configuration planner, the forms provide the following information:

- Diagrams of the hardware configuration
- The logical device names of peripheral equipment such as disk drives, terminals, and printers
- The communications access methods (if any) to be used

For the installer, the forms provide the following information:

- A list of the equipment that was ordered
- A floor plan to indicate the arrangement of equipment in the chosen rooms
- Diagrams of the hardware connections to be made, including the connections between the external equipment and the ServerNet adapters

Most of the blank installation forms are in [Appendix C, Blank Forms](#). However, forms for ServerNet adapters and other components are in manuals specific to the component or its subsystem. Use [Appendix E, Guide to Server Manuals](#), to determine which manuals you might need.

You are authorized to photocopy these forms only for the purpose of installing and configuring your system.

Advantages of Using the Installation Forms

An up-to-date set of completed installation forms provides:

- For the installer, identification of the equipment to install or move and the cable connections to make or change.
- For the person responsible for modifying the configuration, a layout of the hardware, the names of devices, and the IP addresses used.
- A map of the components in a system that can assist operators and service providers with troubleshooting.
- A layout of the hardware that the system planner can use to determine available slots and ports when planning for future upgrades. This record can be particularly useful when planning for a system that is in a remote location.

Preparing to Plan

Before you plan to install a new system, or change an existing system:

- Read Part I, [Reference Information](#), for general descriptions of the organization, physical arrangement, features, capabilities, and configurations of NonStop S-series servers.
- With your system analyst and service provider:
 - Decide what equipment and supporting software, such as software product releases (SPRs) or a new RVU, to order.
 - Decide which ServerNet configuration (Tetra 8 or Tetra 16) to order.
 - If you are planning to add or reconfigure ServerNet adapters, determine which adapters require changes to your standard procedures for online tasks.
- If you are planning to add or upgrade hardware, check whether a set of completed installation forms describing your current system exists.

Installing a New System

Installing a new system involves:

[Plan the System](#) on page 9-4

[Install the System](#) on page 9-6

[Test the Customized Operating System](#) on page 9-7

[Perform Final Tasks](#) on page 9-7

Plan the System

1. Decide what size system to order.
2. Decide what system components (such as internal disk drives and ServerNet adapters) and other system equipment (such as terminals, printers, modems, tape drives, and SWAN concentrators) are needed for the new system and order them.
3. Make sure the system planner has access to information about the hardware ordered and about which communications protocols are preferred.
4. Plan for the environmental requirements of the system. This involves:
 - Select the rooms that will contain system equipment
 - Arrange for the installation of a raised floor if desired
 - Install any necessary air conditioning and other environmental controls

[Section 12, Site Planning and Preparation](#), discusses the environmental requirements of the system.

5. Plan for the power requirements of the system equipment. Make arrangements for power installation early in the planning process, because it can take a long time to get new electrical circuits installed.

[Section 12, Site Planning and Preparation](#), discusses the power requirements of the system.

6. Arrange for telecommunications lines. Make these arrangements for telecommunications lines early in the planning process, because it can take a long time to get telecommunications lines installed.
7. Prepare the delivery route from the building entrance to the installation site.

8. Complete an Installation Document Packet containing all the installation forms for the new system. You need to complete the following forms:
 - Installation Document Checklist.
 - System Equipment Inventory Form. List only the equipment that you expect to receive with this order.
 - Enclosure Arrangement Diagram.
 - Floor Plan.
 - Preinstalled I/O Device Cable Checklist, if you are connecting this equipment to cables that are already installed at your site.
 - System Enclosure Checklist. Show equipment that is to be included in the enclosure when it arrives.
 - PMF CRU Configuration Form or PMF 2 CRU Configuration Form.
 - IOMF CRU Configuration Form or IOMF 2 CRU Configuration Form.
 - Configuration forms for the ServerNet adapters to be installed. Refer to the manuals that describe the ServerNet adapters for blank forms and instructions on completing the forms.
 - ServerNet cabling forms.
 - Cross-row cabling worksheets, if the enclosures in this system are to be arranged in multiple rows.
 - IOAM worksheets. These worksheets are available to your HP trained service provider in the *Modular I/O Installation and Configuration Guide*.
 - Configuration planning worksheets for the WAN subsystem if you are installing any SWAN or SWAN 2 concentrators. These worksheets are in the *WAN Subsystem Configuration and Management Manual*.
 - Plans for your system consoles using the *OSM Migration Guide* or *TSM Configuration Guide*.

Instructions for completing the forms in the Installation Document Packet are in this guide and in the manuals for the components and subsystems you are installing.

9. Create policies and procedures for:
 - System security
 - Disaster prevention and recovery
 - Change control and configuration management
 - Problem reporting and tracking
 - Routine operations tasks

Refer to the *Introduction to NonStop Operations Management* for guidelines for creating these policies and procedures.

Install the System

1. Install and cable the new system according to the instructions provided in the *NonStop S-Series Hardware Installation and FastPath Guide*. (This step does not include installing SWAN concentrators.)
2. Your HP trained service provider must install, cable, power-on, and configure IOAM enclosures in the new system.
3. Install, start, and test the system console according to the instructions provided in the *NonStop S-Series Hardware Installation and FastPath Guide*.
4. Start and test the new system according to the instructions provided in the *NonStop S-Series Hardware Installation and FastPath Guide*.
5. Adding a super group user ID for the local operator and (if you are allowing access to the system for remote support) for your service provider and set the passwords and default characteristics for these user IDs. Adding user IDs and setting default characteristics for user IDs is described in the *Guardian User's Guide*.

Ask the local operator to log on to the system and verify the passwords.

6. Add the remaining user IDs required for your system, with the appropriate default characteristics and passwords. Refer to the *Guardian User's Guide*.
7. Configure passwords for the super ID, null user, and root user. See the *NonStop S-Series Hardware Installation and FastPath Guide*.
8. Configure Kernel-managed swap files. See the *Kernel-Managed Swap Facility (KMSF) Manual*.
9. Reconfigure the initial IP addresses for communication between the primary system console and your system (including those needed by OSM or TSM) to the IP addresses appropriate for your systems management environment. See the *OSM Migration Guide*, *TSM Configuration Guide*, or *NonStop S-Series Hardware Installation and FastPath Guide*.
10. Complete remaining OSM or TSM configuration tasks. See the references in Step 8. Also see the appropriate Low-Level Link or Notification Director online help.
11. Configure system attributes, including the system name and number. Refer to [Section 15, Planning for System Configuration](#).
12. Configure DSM/SCM using the instructions in the *DSM/SCM User's Guide*. For the minimum DSM/SCM configuration required, see the *NonStop S-Series Hardware Installation and FastPath Guide*.
13. If you ordered SWAN or SWAN 2 concentrators with the system, install them using the instructions in the *SWAN Concentrator Installation and Support Guide* or *SWAN 2 Concentrator Installation and Support Guide*.

14. Decide whether you want or need to make any other configuration changes, such as adding other devices connected to Ethernet LANs to the system configuration or changing configuration attributes of disk or tape drives.
15. If you want to change the system configuration, follow the instructions in the *NonStop S-Series Hardware Installation and FastPath Guide*.

Test the Customized Operating System

After each of the following steps, verify:

- The status of the operating system
- The status of processes brought up by the startup files
- The status of devices on the system
- The status of communications lines
- The status of the network
- The correct operation of the startup and shutdown files
- The correct operation of the spooler subsystem
- The correct operation of the other subsystems in the system
- The correct operation of applications

Note. Your HP trained service provider will verify the correct operation of all IOAM components in the new system.

1. Use SCF to customize your system configuration.
2. Using your startup files, start up all the system devices, except for any network communications lines, to verify the configuration and to test the devices, subsystems, and applications.
3. Using the startup files to bring up your network, start the communications lines and verify the correct operation of the applications and the network.

Perform Final Tasks

1. Create the operational environment command files needed to start up and shut down the system in the \$SYSTEM.STARTUP and \$SYSTEM.SHUTDOWN subvolumes. See the *NonStop S-Series Hardware Installation and FastPath Guide*.
2. Set the proper ownership and file security for the startup and shutdown command files. Refer to the *Guardian User's Guide*.
3. Configure and initialize the Spooler subsystem. Refer to the *Guardian User's Guide*.
4. Configure and initialize the TMF subsystem.
5. Back up your \$SYSTEM, \$DSMSCM, and \$AUDIT disks to tape.
6. Load and configure your system applications.

Changing an Existing System

Changing the System Name or System Number

The system name and Expand system (node) number can be changed through the SCF Kernel subsystem. Because the attributes that change the system name and system number are stored in a SEEPROM in the enclosure backplane, changes to them require a system reset and reload to take effect. You must also update references to the system name and system number in the DSM/SCM SQL database, SNMP, and TMF. The procedure for changing the system name and system number is described in detail in the *NonStop S-Series Hardware Installation and FastPath Guide*.

Note. The Expand system (node) number can be changed through the SCF Kernel subsystem, the system serial number cannot.

When you change the system name of a system already installed at your site, update the system name on all the forms in the Installation Document Packet.

If you change the system number of a system already installed, update the system number on the System Enclosure Arrangement Form in the Installation Document Packet.

Adding a System Enclosure

Add-on enclosures are shipped with the ServerNet adapters and disk drives already installed. The procedure for physically installing an enclosure is described in the *NonStop S-Series Service Provider Supplement*. The procedure for adding a system enclosure to a running system is described in the *NonStop S-Series System Expansion and Reduction Guide*.

△ **Caution.** IOAM enclosures must be installed by service providers trained by HP.

Adding Memory to a Processor

To add memory to a processor that has fixed memory configurations, you replace the PMF CRU with another having more memory. Where fixed memory configurations are not available, you add memory by adding or replacing memory units in the PMF CRU.

Adding a System Console

For information about adding a system console, see the *NonStop S-Series Hardware Installation and FastPath Guide*. For information about configuring an added system console, see the *OSM Migration Guide*, *TSM Configuration Guide*, or *NonStop S-Series Hardware Installation and FastPath Guide*.

Enclosure Interleaving for Storage Devices

Within a topology branch (a processor enclosure and all the I/O enclosures connected directly to it), you can configure paths to disk, tape, and Open SCSI devices through adapters in different enclosures. This feature is called enclosure interleaving. Interleaving paths across multiple enclosures increases availability, because no enclosure is a single point of failure that could prevent access to the storage device.

Limitations

For All Disk, Tape, and Open SCSI Devices

Note. This subsection does not apply to the Fibre Channel disk drives that reside in modular disk drive enclosures (DDEs). \$SYSTEM cannot exist on these disk drives. For more information about the DDE, refer to the *Modular I/O Installation and Configuration Guide*.

- All paths to a device must use the same or compatible adapter types. A PMF CRU is compatible with an IOMF CRU and vice versa, but a 6760 adapter is not compatible with either a PMF CRU or an IOMF CRU.
- The primary and backup processors configured for a device must be able to access all the adapters used by all paths to the device. Use the SCF INFO ADAPTER command to view the access list for an adapter.
- The first device that is configured to use a particular SAC determines which two processors share ownership of that SAC. Devices that are later configured to use the same SAC must also be configured to use the same two processors.

If no device paths are currently configured to use a particular SAC, then the first device that is configured to use that SAC can use any two processors on the access list of that SAC's adapter.

For All Internal Disk Drives

- The primary (-P) and backup (-B) paths must be to adapters that are in the same enclosure.
- The mirror (-M) and mirror-backup (-MB) paths must be to adapters that are in the same enclosure, but these adapters need not be in the same enclosure as the adapters for the -P and -B paths.
- Both halves of the system-load disk volume must be in processor enclosure 01.

For All Open SCSI devices

- The two paths to an Open SCSI device must not use SACs with identical SCSI bus addresses.

Use the SCF INFO ADAPTER, DETAIL command to view the SCSI bus addresses of SACs.

Recommendations

These recommendations are not required, except where they conform to the preceding limitations.

Note. This subsection does not apply to the Fibre Channel disk drives that reside in modular disk drive enclosures (DDEs). \$SYSTEM cannot exist on these disk drives. For more information about the DDE, refer to the *Modular I/O Installation and Configuration Guide*.

For all disk, tape, and Open SCSI Devices

- Configure the -P and -B paths to a device through different adapters, one on the X fabric and the other on the Y fabric.
- Configure a device to use the two processors that are in the same topology branch as the adapter used for the -P path to the device. These processors are chosen by default if no processors are specified in an SCF ADD command.

For All Disk Drives

- Within a topology branch, interleave the adapters for mirrored disk volumes across enclosures in a circular pattern. For example, in a topology branch consisting of enclosures 04, 41, and 42, arrange the primary and mirror drives as follows.

Primary in Enclosure	Mirror in Enclosure
04	41
41	42
42	04

For All Open SCSI Devices

- Configure the -P and -B paths to an Open SCSI device to use adapters in the same enclosure.

For All External Disk Drives

- Configure the primary and mirror halves of a mirrored external disk volume to have the same device ID in two different external disk modules.
- Configure all paths to an external disk drive to use SACs with the same SAC number on different 6760 adapters.
- Configure the -P and -B paths to an external disk to use 6760 adapters in the same enclosure. You can also configure the -P and -M paths to different enclosures, but that is not necessary for fault tolerance, because the primary drive and mirror drive are configured in different enclosures.
- Configure the -M and -MB paths to an external disk to use 6760 adapters in the same enclosure.

- Configure the -P and -M paths to an external disk to use 6760 adapters on different ServerNet fabrics.

For All Internal Disk Drives

- Configure the primary half of a mirrored internal disk volume in an odd-numbered slot and the mirror half in the next higher even-numbered slot. Follow this recommendation even when the two halves are in different enclosures.
- Before you install disks that you intend to configure as interleaved, use the SCF ALTER \$ZZSTO, AUTOCONFIGURE OFF command to prevent automatic, noninterleaved configuration of the disks.

Configuring \$SYSTEM Disk Slots

When NonStop S-series servers were first released, the \$SYSTEM volume was restricted to slots 11 and 12 of group 01. Beginning on the G06.06 RVU (and on the G06.04 RVU using SPR T6586AAH), you can install the two halves of the \$SYSTEM volume in any two slots of group 01 that have the same SCSI ID. These slot pairs are:

SCSI ID	Slot for Primary	Slot for Mirror
0	11	12
1	13	14
2	15	16
3	17	18
4	1	2
5	3	4
8	5	6
9	7	8

Limitations and Considerations

- The alternate volume name for every disk in the system must be unique.
- The CONFIG file used to load a system can contain at most one disk configuration for the \$SYSTEM volume, and this configuration can configure only slots that have the same SCSI ID.
- If the CONFIG file contains a disk configuration record that has a name other than \$SYSTEM, and if this disk is used to load the system, that configuration record is renamed \$SYSTEM and any other disk configuration record with the name \$SYSTEM is renamed with a unique disk name. The new \$SYSTEM also becomes mirrored if it was not already. For more information, refer to the *SCF Reference Manual for the Storage Subsystem*.

Adding an Internal Disk Drive

1. Complete or modify the following forms for the installer:
 - Installation Document Checklist.
 - System Equipment Inventory Form. List only the disk drive that is being added to the system.
 - System Enclosure Checklist. Show where in the enclosure the disk drive is to be installed.
2. Install the disk drive as described in the installation part of the replacement procedures on the NTL Support and Service Library. See [Support and Service Library](#) on page 1-35.
3. Use SCF to add the disk drive to the system configuration database as described in the *SCF Reference Manual for the Storage Subsystem*. You can configure your system to do this automatically.
4. Test the new system configuration.

Changing the Configuration of a Disk Drive

You can change many of the configuration attributes of a disk drive, such as:

- The logical device name of the disk volume (except for the \$SYSTEM disk volume)
- The alternate volume name of the disk volume
- The cache size of the disk
- Attributes related to the reviving half of a mirrored volume

All system configuration changes to a disk drive can be performed online. Refer to the *SCF Reference Manual for the Storage Subsystem* for information about configuring disk drives.

Online Disk Remirroring (ODR) is a new feature of storage subsystem management for disks. ODR allows you to perform the following tasks without their having to stop the entire disk volume:

- Add a mirror disk drive to an unmirrored disk volume.
- Delete a mirror disk drive from a mirrored disk volume.
- Switch the roles between the primary and mirror disk drive of a mirrored disk volume.

Throughout the performance of these tasks, at least one disk is always available to applications. OSM automatically recognizes online mirrored disks. However, if you use TSM, special steps are required before it can recognize the online mirrored disks. Detailed syntax and explanations for using SCF commands to configure ODR are documented in the *SCF Reference Manual for the Storage Subsystem*. See also the *Operator Messages Manual* and the OSM Online Help.

Adding a Fibre Channel Disk Drive

For information about adding a Fibre Channel disk drive and a disk drive enclosure, see the *Modular I/O Installation and Configuration Guide*.

Adding a Tape Drive

1. Complete or modify the following forms for the installer:
 - Installation Document Checklist.
 - System Equipment Inventory Form. List only the tape drive that is being added to the system.
 - If you plan to connect the added tape drive to a PMF CRU or IOMF CRU, modify the appropriate configuration form for that PMF CRU or IOMF CRU.
 - If you plan to install a 6760 ServerNet/DA for the added tape drive, modify the 6760 Adapter and Modular Tape Subsystem Configuration Form. This form is located in the *6760 ServerNet/DA Manual*.
 - Floor Plan. Show where in the room the tape drive is to be installed.
2. Install the tape drive as described in the *NonStop S-Series Hardware Installation and FastPath Guide* or the documentation for your tape drive.
3. Use SCF to add the tape drive to the system configuration database as described in the *SCF Reference Manual for the Storage Subsystem*. Tape drives can be added on line.
4. Test the new system configuration.

Changing the Configuration of a Tape Drive

You can change many of the configuration attributes of a tape drive, such as:

- The logical device name of the tape drive
- The default density
- The default compression mode

All system configuration changes to a tape drive can be performed online. Refer to the *SCF Reference Manual for the Storage Subsystem* and to the manual for your tape drive for information about configuring tape drives.

Adding a ServerNet Adapter

The supported ServerNet adapters are listed in [ServerNet Adapters and Communication Devices](#) on page F-3.

1. Complete or modify the following forms for the installer:
 - Installation Document Checklist.
 - System Equipment Inventory Form. List only the ServerNet adapter that is being added to the system.
 - System Enclosure Checklist. Show where in the enclosure the adapter is to be installed.
 - Preinstalled I/O Device Cable Checklist. Complete this form only if you are connecting this adapter to preinstalled cables.
 - Configuration forms, if any, for the adapter. Refer to the manual that describes the adapter for the configuration forms.
2. Install the ServerNet adapter as described in the manual for that adapter. ServerNet adapters can be added to a system online.
3. Add the ServerNet adapter to the system configuration database as described in the manual for that adapter. For example, the *LAN Configuration and Management Manual* describes how to add an E4SA to the system configuration.
4. Test the new system configuration.
5. Modify your startup and shutdown files to include the added ServerNet adapter. Startup and shutdown files are described in [Startup and Shutdown Files](#) on page 15-10.

Changing the System Configuration of a ServerNet Adapter

For information about changing the configuration of a ServerNet adapter, refer to the manual that describes that ServerNet adapter and the software associated with it.

Adding a SWAN or SWAN 2 Concentrator

Information about a SWAN concentrator also applies to a SWAN 2 concentrator unless otherwise noted.

1. Perform any site planning tasks needed for the SWAN concentrator, such as planning cable routing and determining where the SWAN concentrator should be installed. General site planning is described in [Section 12, Site Planning and Preparation](#). Site planning requirements for the SWAN concentrator are described in the *SWAN Concentrator Installation and Support Guide* or *SWAN 2 Concentrator Installation and Support Guide*.
2. Determine which Ethernet ports on which ServerNet adapters will be connected to the added SWAN concentrator. [Section 8, Initial Configurations](#), provides information about choosing Ethernet ports for SWAN concentrators.
3. Complete or modify the following forms for the installer:
 - Installation Document Checklist.
 - System Equipment Inventory Form. List only the SWAN concentrator that is being added to the system.
 - Floor Plan Diagram. Show where in the room the SWAN concentrator is to be installed.
 - Preinstalled I/O Device Cable Checklist. Complete this form only if you are connecting the SWAN concentrator to preinstalled cables.
 - Configuration planning worksheets for the WAN subsystem, which are in the *WAN Subsystem Configuration and Management Manual*.
4. Install the SWAN concentrator and add it to the system configuration database as described in the *WAN Subsystem Configuration and Management Manual*.
5. Test the new system configuration.
6. Modify your startup and shutdown files to include the added SWAN concentrator. Startup and shutdown files are described in [Startup and Shutdown Files](#) on page 15-10.

Changing the Configuration of a SWAN Concentrator

System configuration changes to SWAN concentrators can be performed online. For information about changing the configuration of a SWAN concentrator, refer to the *SWAN Concentrator Installation and Support Guide* or *SWAN 2 Concentrator Installation and Support Guide*.

Adding an AWAN Server

You can add an asynchronous wide area network (AWAN) server to your system online. For information about adding an AWAN 3883, 3884, or 3885 server, refer to the *AWAN 3883/4/5 Access Server Installation and Support Guide*. (These models are now obsolete.) For information about the AWAN 3886 access server, refer to the *AWAN 3886 Server Installation and Configuration Guide*.

Complete the following forms:

- Asynchronous Terminal Port Configuration Worksheet
- User Configuration Worksheet
- Port Configuration Worksheet

These configuration forms are in the *AWAN 3883/4/5 Access Server Installation and Support Guide*.

Changing the Configuration of an AWAN Server

For information about changing the configuration of an AWAN 3883, 3884, or 3885 server, refer to the *AWAN 3883/4/5 Access Server Installation and Support Guide*; for the AWAN 3886 server, see the *AWAN 3886 Server Installation and Configuration Guide*.

Adding or Changing the WAN Subsystem

The wide area network (WAN) subsystem can configure and manage the following data communications subsystems:

- AM3270
- ATP6100
- CP6100
- Envoy
- EnvoyACP/XF
- Expand
- SNAX/APN
- SNAX/XF
- TR3271
- X25AM

The WAN subsystem software components consist of:

- One WAN manager process
- One or more concentrator manager (ConMgr) processes
- One or more SNMP trap multiplexer processes
- One or more Trivial File Transfer Protocol (TFTP) server processes
- One or more WANBoot processes
- WAN shared driver

WAN hardware requires two Ethernet controllers for fault tolerance, 10-megabit switches or hubs, cables, interface converter cables, and SWAN concentrators. For information about the WAN subsystem, refer to the *WAN Subsystem Configuration and Management Manual*.

The WAN subsystem is implemented using the SWAN concentrator. The SWAN concentrator uses the following interfaces:

- RS-232
- RS-449
- V.35
- X.21

The WAN ports on the front panel of the SWAN concentrator are 50-pin connectors. An appropriate interface converter cable is used to adapt the port for the intended interface.

The SWAN concentrator is configured using the WAN Wizard Pro Configuration Tool. For more information about the SWAN concentrator, refer to [Adding a SWAN or SWAN 2 Concentrator](#) on page 9-15, [Changing the Configuration of a SWAN Concentrator](#) on page 9-15, the *SWAN Concentrator Installation and Support Guide*, or the *SWAN 2 Concentrator Installation and Support Guide*.

Adding an Open SCSI Device

You can configure an Open SCSI device to connect to the SCSI port of a PMF CRU or IOMF CRU. Beginning with the G06.06 RVU, you can configure an Open SCSI device to connect to a SCSI SAC (S-SAC) of a 6760 ServerNet/DA. For more information about connecting an Open SCSI device, refer to the *Open SCSI Integrator's Manual for NonStop S-Series Servers* or the *6760 ServerNet/DA Manual*.

Adding or Changing the Configuration of Other Peripheral Devices

The procedure for adding or changing the configuration of a peripheral device depends on the device being added or changed. Configuration changes to peripheral devices can be performed online.

In G06.12 and previous RVUs, the system manager must explicitly configure the WANBoot, TFTP, and SNMPTMUX processes. In G06.13 and later RVUs, the WAN manager process can configure these processes automatically.

For information about configuring peripheral devices, refer to the manual that describes the device.

After you have added a peripheral device:

- Test the new system configuration.
- Modify your startup and shutdown files to include the added peripheral device. Startup and shutdown files are described in [Startup and Shutdown Files](#) on page 15-10.

Planning for System Availability and Support

This section describes advance planning required for minimizing the total number of minutes that an application or system is unavailable.

Related Reading	10-1
System Outage	10-1
How Availability Is Measured	10-2
Minimizing Planned Outage Frequency	10-2
Minimizing Planned Outage Minutes	10-4
Preventing Unplanned Outages	10-5
Minimizing Unplanned Outage Minutes	10-6
Power Failures	10-6

Related Reading

This section suggests strategies and techniques for increasing the availability of your system. The following manuals describe these subjects in detail:

- *Availability Guide for Application Design*
- *Availability Guide for Change Management*
- *Availability Guide for Problem Management*
- *DSM/SCM Event Management Programming Manual*
- *DSM/SCM Quick Reference Guide*
- *DSM/SCM User's Guide*
- *Introduction to NonStop Operations Management*

For abstracts of these manuals, refer to [Appendix E, Guide to Server Manuals](#).

System Outage

An outage is time during which your system is not capable of doing useful work. From the end user's perspective, an outage is any time an application is not available.

In this guide, outages are categorized as either planned outages or unplanned outages. A planned outage is time during which a system is scheduled to be shut down (taken offline), usually for reconfiguration that cannot be performed while the system and applications are operational (online). An unplanned outage is system or application downtime caused by a problem situation such as faulty system or application software, faulty hardware, operator error, disaster, and so forth.

How Availability Is Measured

HP believes that the measurement of availability should be from the end user’s perspective. Simply recording that a certain hardware or software component is not operating is not enough; you must also take into consideration the user’s ability to access the service, the quality of the service provided, and the acceptability of the response time to the user.

Although major changes—such as installing a new operating system—obviously affect availability, the effect of other types of changes might be less apparent. For example, changing the characteristics of a communications line could cause response time to become unacceptable to an end user who is trying to use that line to access a file on a remote system while the change is being performed.

While the computer industry has typically measured availability in percentages, HP recommends measuring availability by outage minutes in 24-hour-a-day, 365-day-a-year operations.

Outage Minutes/Year

An outage-minutes/year measurement is easy to understand and provides more meaningful data than percentile numbers such as “95 percent available.”

	Percent Availability					
	90%	99%	99.9%	99.99%	99.999%	100%
Outage Minutes/Year*	50,000	5,000	500	50	5	0
User Impact*	35 days	3.5 days	8.3 hours	50 minutes	5 minutes	0 minutes

*These impacts are approximations.

Minimizing Planned Outage Frequency

By taking the time to anticipate and plan for changes, you can avoid taking your system down for unnecessary planned outages.

You can take action now to prevent planned outages in the future in these areas:

- [Evaluating System Performance and Growth](#) on page 10-3
- [Providing Adequate Computer-Room Resources](#) on page 10-3
- [Configuring Your System to Accommodate Future Changes](#) on page 10-3
- [Implementing a Formal Change-Control Process to Manage Change](#) on page 10-4

Evaluating System Performance and Growth

Evaluating system performance and growth involves tracking and anticipating growth and then establishing plans to accommodate that growth.

Common Performance-Management Tasks	Definition	How This Task Helps Plan for Growth
Application sizing	Using models to determine how well new applications will handle their intended workloads	Helps you plan for growth in system workloads caused by new applications
Capacity planning	Forecasting future capacity needs based on performance trends and the growth in users, applications, and your company's business	Helps you plan for growth in system workloads based on business growth
Performance analysis and tuning	Measuring system performance and acting on the results of the measurements	Improves system performance and availability
Usage accounting	Tracking the use of system resources for accounting purposes	Helps you plan for system growth if user activity is known in sufficient detail.

HP provides a wide variety of tools that provide data useful for your growth forecasts.

Providing Adequate Computer-Room Resources

Some changes require more power and air conditioning. You can avoid unnecessary downtime by ensuring that you have enough physical space, power capacity, and cooling capacity for additional equipment. [Section 12, Site Planning and Preparation](#), describes environmental and other site-planning requirements.

Configuring Your System to Accommodate Future Changes

Your system is designed so that most changes can be performed while the system is operational (online). Some changes that can require the system to be offline can be performed online if you have configured your system to allow that. The *NonStop S-Series Hardware Installation and FastPath Guide* describes how you can avoid taking your system offline to add new hardware.

An example of configuring your system to accommodate future change is to select limits that allow some space for growth. For example, you can avoid shutting down your Pathway system to increase the maximum number of Pathway objects by configuring one or two more objects than you currently need.

Implementing a Formal Change-Control Process to Manage Change

Change control is the process for proposing, planning, implementing, and testing change and is a key requirement for minimizing the duration of planned outages. Change control ensures the successful migration of a system or application from one stable configuration to another by:

- Ensuring that the scope and ramifications of the change are fully understood
- Providing a recovery plan
- Ensuring that problems and errors are anticipated and reacted to appropriately
- Maintaining the security of your system and applications

The *Availability Guide for Change Management* provides detailed information about managing changes to NonStop systems.

Minimizing Planned Outage Minutes

Although most changes can be performed while your system is online, certain changes must be made offline. Offline change is any change that requires your system to be shut down.

HP currently requires that you shut down your system to install a new version of the operating system. The *NonStop S-Series Hardware Installation and FastPath Guide*, and the *Availability Guide for Change Management* provide more information about how to minimize the time needed to install a new version of the operating system. The effect that software product revision (SPR) installation will have on availability depends on the particular SPR being installed. Refer to the documentation for the SPR for information about the outage requirements for that SPR.

An important component of many outages is the time required to shut down and start up your system and applications. The following general techniques can help you reduce this time:

- Writing efficient startup and shutdown command files
- Implementing change-management practices to keep configuration, startup, and shutdown command files current.
- Using parallel processing to distribute startup and shutdown processes across multiple processors

The *Introduction to NonStop Operations Management* provides detailed information about these techniques.

Preventing Unplanned Outages

In addition to minimizing the number and duration of planned outages, preventing unplanned outages is an important component of minimizing outage minutes.

Causes of Unplanned Outages

Studies have identified four common causes of unplanned outages (in order of greatest frequency):

1. Operations management errors
2. Hardware configuration that is not fault-tolerant
3. Application design that is not fault-tolerant
4. Environmental problems such as AC power failures

Some of the strategies used to minimize planned outage minutes are also useful in preventing unplanned outages. An example is automating startup and shutdown of applications and system resources by creating startup and shutdown command files. Using command files reduces the opportunity for operator errors that can cause an unplanned outage.

Other ways of preventing unplanned outages include developing strategies for managing problems that occur in your operations environment.

Problem Management

Prevent problems from becoming unplanned outages by:

- Predicting potential problems before they occur.
- Preparing for problems that might occur. Three important strategies are:
 - Preparing for environmental problems and disasters
 - Documenting your operations-management procedures
 - Documenting your problem-detection, escalation, and recovery procedures
- Managing the system and applications to ensure that:
 - Operators are quickly notified of error conditions, state changes, and when threshold conditions are exceeded, before they escalate into unplanned outages.
 - Messages are logged and provide a chronological list of events to aid in problem diagnosis and resolution.
 - A single source of information exists for both system and application events.

- Monitoring critical objects in your system environment.
- Automating operations, intervention, recovery, and performance-monitoring tasks and auditing your system and applications for fault tolerance.
- Creating an alternate system disk so that it is possible to recover from unexpected difficulties in any of these problem-management procedures.

Minimizing Unplanned Outage Minutes

The following strategies can help you reduce the number of outage minutes caused by an unplanned outage:

- Using a systematic problem-solving approach to handling problems
- Automating recovery procedures
- Preparing a disaster-recovery plan
- Reviewing, testing, and documenting problem-detection, escalation, and recovery procedures

These and other problem-management strategies are described in detail in the *Availability Guide for Problem Management*.

Power Failures

An AC power failure is one cause of unplanned outage. During an AC power failure, the batteries in a system enclosure can power all the components in that enclosure for a short, configurable period of time.

Power Failure Functional Description

The amount of time that the batteries can operate all the equipment in the system enclosure at full power is called the power-fail delay time. After that amount of time expires, the batteries switch to Low Power Mode where the batteries power the processor memory for as long as they can, usually 45 minutes.

A system has two possible maximum power-failure delay times:

- Calculated maximum power-fail delay time: the delay time calculated by the service processors
- Configured maximum power-fail delay time: the delay time configured by the customer

Calculating the Maximum Power-Fail Delay Time

1. Software in each processor calculates a power-fail delay time using the following information from the service processor:
 - The battery charge.
 - The hardware configuration of that group. The more components in the group, the shorter the amount of time the batteries can power all the components.

The master service processors in group 01 receive information from the service processors in all the other groups and use that information when calculating a power-fail delay time.

2. The shortest power-fail delay time calculated by the processors is compared to the configured maximum power-fail delay time, and the shorter of these two times is the calculated maximum power-fail delay time for the system.

Configuring the Maximum Power-Fail Delay Time

The configured maximum power-fail delay time, in seconds, is set using the `POWERFAIL_DELAY_TIME` attribute of the SCF Kernel subsystem.

Refer to the *SCF Reference Manual for the Kernel Subsystem* for information about configuring the maximum power-fail delay time.

Battery Considerations

- New systems are shipped with a default configured maximum power-fail delay time of 30 seconds. Use SCF to configure this time to up to 50 seconds. However, the actual, calculated maximum power-fail delay time for any group might be shorter than 50 seconds, depending on the battery charge and hardware configuration for that group.

Note. The architectural maximum power-fail delay time is 300 seconds. SCF issues an error message if you try to configure a larger value.

The functional maximum power-fail delay time, with current battery technology, is 50 seconds. If you attempt to configure a maximum power-fail delay time in the range 50 through 300 seconds, the system automatically limits it to the current functional maximum.

- Because the battery charge and hardware configuration for each group might be different, each group in a system might have a different calculated maximum power-fail delay time.

- In case of an AC power failure, all equipment in all the system enclosures continues to operate for the shorter of these two times:
 - The configured maximum power-fail delay time
 - The shortest calculated maximum power-fail delay time of any group in the entire system

The operating system continues to process data until that shortest calculated maximum power-fail delay time expires.

The minimum power-fail delay time is in the range 300 through 600 milliseconds.

- The batteries provide power only for the components in a system enclosure. They do not provide power for other external system equipment, such as SWAN concentrators, tape drives, or LAN routers.

Therefore, you need to determine the system impact if processors continue operating but one or more external devices fail. If external devices used by the system are not powered by uninterruptible power sources (UPSs) during AC power failures, unexpected errors might occur.

You might want to configure a shorter maximum power-fail delay time if the loss of power to external system equipment negates the advantage of having the system enclosures continue to operate during a power failure. Also, by configuring a shorter maximum power-fail delay time, the batteries might have enough power to power the memory for longer than 45 minutes.

- The batteries are automatically charged while the system is running.

Spare batteries require recharging at least every six months. To recharge your spare batteries, you can swap them with the batteries currently installed in your system every three or four months.

- Batteries are designed to handle occasional power failures that occur at most computer sites. Frequent power failures (averaging more than once a week) can cause the batteries to wear out more quickly.
- For IOAM enclosures, a UPS is optional but recommended where a site UPS is not available. You can choose to use any UPS that meets the IOAM enclosure power requirements for all enclosures being powered on from the UPS. One UPS option to support the IOAM enclosure is the HP R5500 UPS. For additional information, contact your HP trained service provider.

Planning for LAN Communications

This section describes requirements and considerations for configuring local area networks (LANs) for NonStop S-series servers.

Dedicated LANs	11-1
Dedicated Service LAN for OSM or TSM	11-1
Dedicated LAN for SWAN Concentrators	11-2
Secure Operations LANs	11-2
Multiple IP Addresses Needed	11-4
Planning for a Dedicated Service LAN	11-5
Initial Dedicated Service LAN Configuration	11-5
Operating Configurations of Dedicated Service LANs	11-6
Planning for Remote Dial-In and Dial-Out Support	11-13

Except for the disk drives and tape drives connected to SCSI ports on PMF CRUs and IOMF CRUs, peripheral devices connect to a server through a local area network (LAN).

Dedicated LANs

NonStop S-series servers require a dedicated LAN for each of these sets of components:

- Components related to OSM or TSM
- Components related to SWAN concentrators

A dedicated LAN can connect only to components specified by HP. No other access to the LAN is permitted.

Dedicated Service LAN for OSM or TSM

The dedicated service LAN for use by OSM or TSM can connect only to system consoles, the Ethernet ports on the PMF CRUs in group 01, Ethernet switches or hubs, and maintenance switches provided by HP.

Note. System consoles can also be connected to a secure operations LAN. However, the dedicated LAN is required for installation and use of the complete set of OSM or TSM client applications (the Low-Level Link and Notification Director applications cannot be used on a system console connected to a secure operations LAN). See [Secure Operations LANs](#) on page 11-2.

Dedicated LAN for SWAN Concentrators

The dedicated LAN for SWAN concentrators can connect only to SWAN or SWAN 2 concentrators, the Ethernet ports on E4SAs and FESAs that connect to the SWAN concentrators, and Ethernet switches or hubs provided by HP.

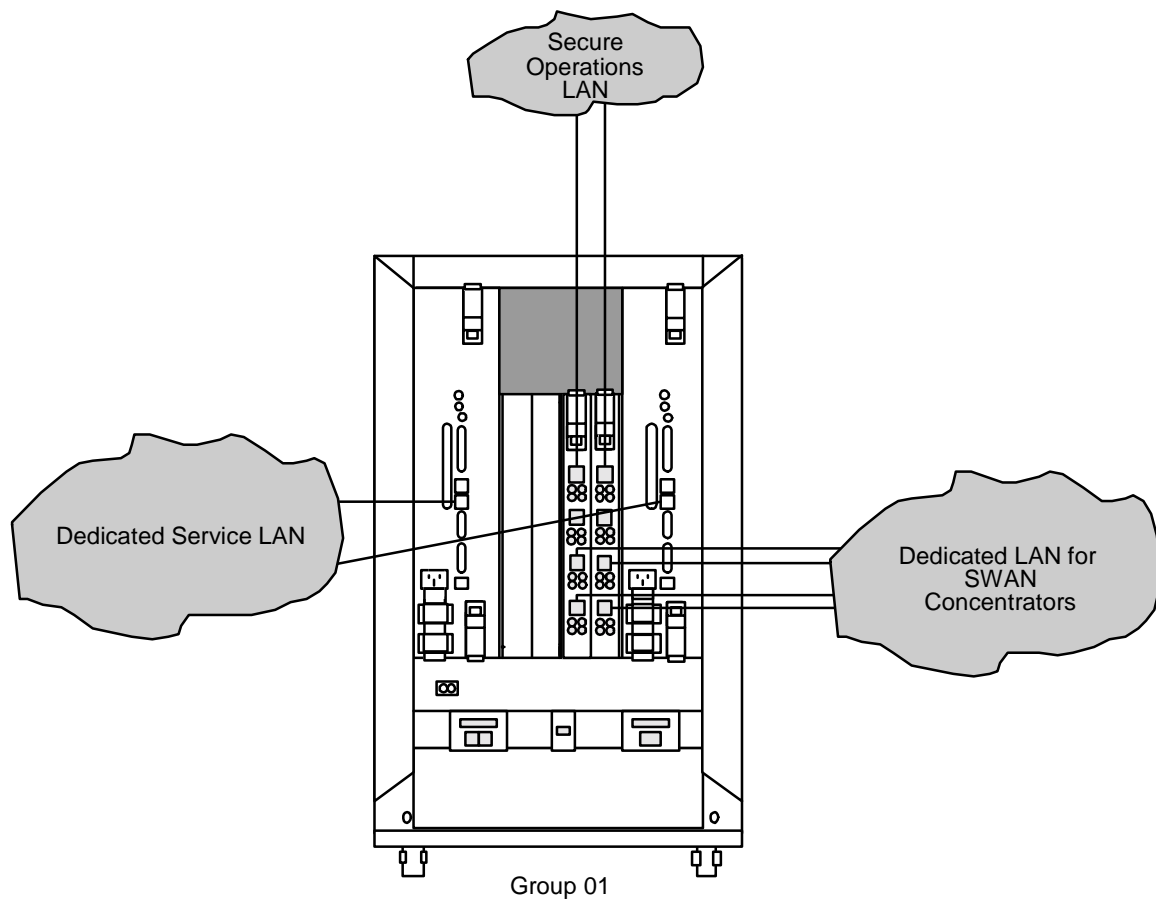
Secure Operations LANs

A secure operations LAN can connect to many clients and servers and might or might not be connected to routers and bridges. NonStop S-series servers can connect to secure operations LANs using E4SA Ethernet ports that are not connected to SWAN concentrators. Routers and bridges are supported for SWAN concentrators beginning on the G06.06 RVU.

Note. System consoles can be connected to a secure operations LAN that connects to the Ethernet ports on an E4SA, FESA, GESA, or G4SA. This LAN configuration provides extra flexibility in placing system consoles but does not replace the dedicated service LAN, which is required for use of Low-Level Link and Notification Director applications in OSM or TSM. See [Dedicated Service LAN for OSM or TSM](#) on page 11-1.

For more information on the secure operations LAN, see the *NonStop S-Series Hardware Installation and FastPath Guide* or the *TSM Configuration Guide*.

This figure shows a processor enclosure connected to several LANs.



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Multiple IP Addresses Needed

Servers require Internet protocol (IP) addresses for some of the system components that are connected to LANs:

System Component	Number of IP Addresses Required
MSP0. Ethernet port on the PMF CRU in group 01, module 01, slot 50. Used for a low-level link.	1
MSP1. Ethernet port on the PMF CRU in group 01, module 01, slot 55. Used for a low-level link.	1
Ethernet port on the PMF CRU in group 01, module 01, slot 50. Used for a service connection.	1
Ethernet port on the PMF CRU in group 01, module 01, slot 55. Used for a service connection.	1
IOAM enclosure	2 (1 for each ServerNet switch board)
System console	1 for each console
Ethernet 4 ServerNet adapter (E4SA)	4 (1 for each port)
SWAN concentrator	6 (1 for each port)
SWAN 2concentrator	12 (1 for each port)

For example, a two-processor system with two E4SAs, two SWAN concentrators, a primary and a backup system console, and no other equipment connected through the LANs requires 26 IP addresses.

Some modular I/O components also require IP addresses. For more information, see the *Modular I/O Installation and Configuration Guide*.

Planning for a Dedicated Service LAN

System consoles for OSM and TSM connect to a server through a dedicated Ethernet LAN. Ethernet cables are connected from the Ethernet ports on the PMF CRUs in group 01 to Ethernet switches or hubs, and system consoles then connect to the Ethernet switches or hubs. Refer to [Fault-Tolerant Dedicated Service LAN Configuration](#) on page 11-6 for an illustration of several system consoles connected to a server.

Initial Dedicated Service LAN Configuration

New systems are shipped with an initial set of IP addresses configured. These initial IP addresses are listed and illustrated in [Initial IP Addresses for System and System Consoles](#) on page 8-17.

Factory-default IP addresses for E4SAs can be found in the *LAN Configuration and Management Manual*. IP addresses for SWAN concentrators can be found in the *WAN Subsystem Configuration and Management Manual*.

HP recommends that you change these preconfigured IP addresses to addresses appropriate for your LAN environment. You must change the preconfigured IP addresses on:

- A backup system console if you want to connect it to a dedicated service LAN that already includes a primary system console or other system console
- Any system console if you want to connect it to a dedicated service LAN that already includes a primary system console or to a secure operations LAN
- The MSP and Ethernet port IP addresses of any NonStop S-series server if you want to connect it to a dedicated service LAN or secure operations LAN that already includes another NonStop S-series server

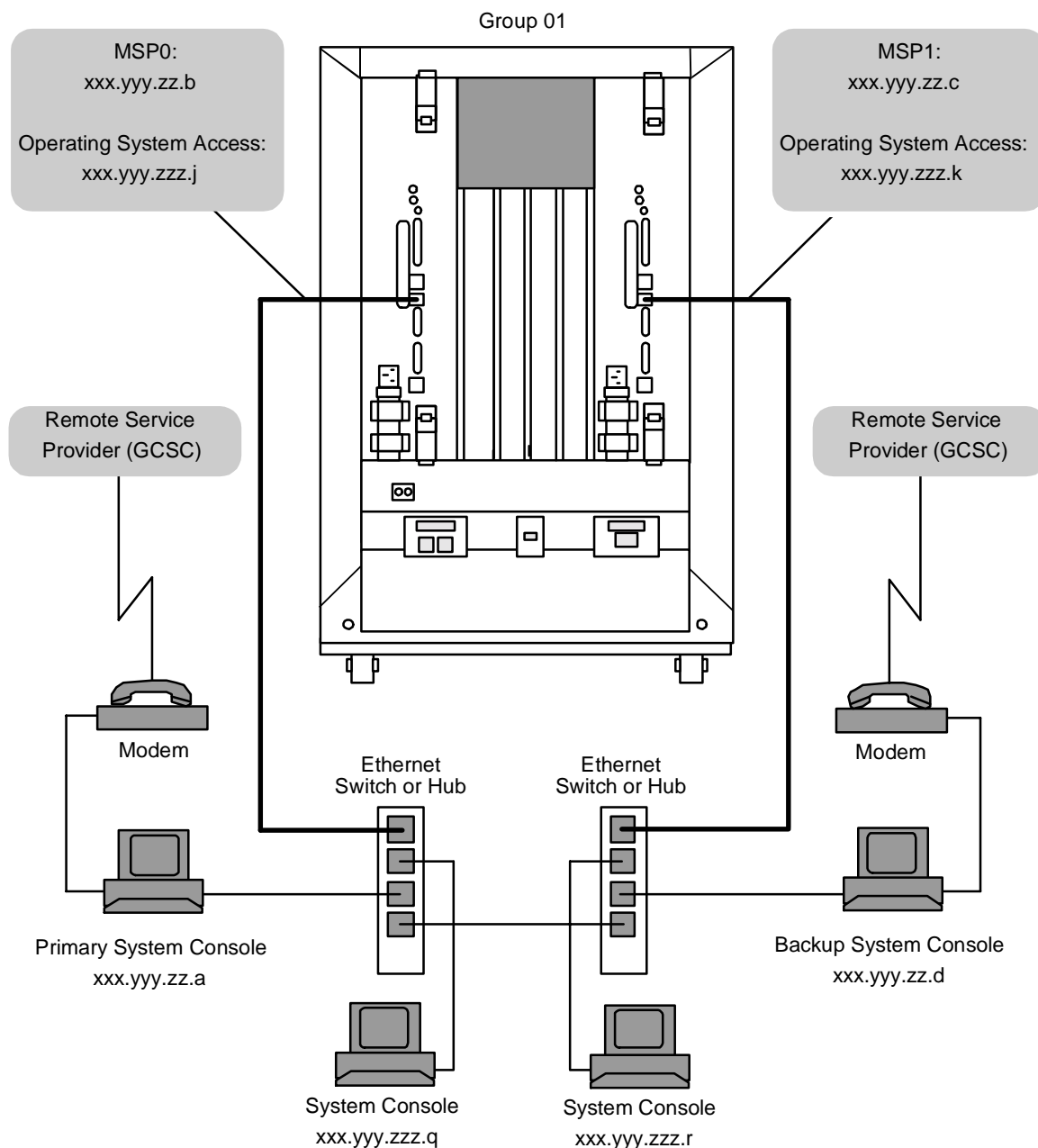
Keep track of all the IP addresses in your system so that no IP address is assigned twice.

Operating Configurations of Dedicated Service LANs

You can configure the dedicated service LAN in several different ways, as described in the *OSM Migration Guide* or *TSM Configuration Guide*. HP recommends that you use a fault-tolerant LAN configuration.

For a faster configuration option for the OSM Service Connection only, see the *OSM Migration Guide*.

Fault-Tolerant Dedicated Service LAN Configuration



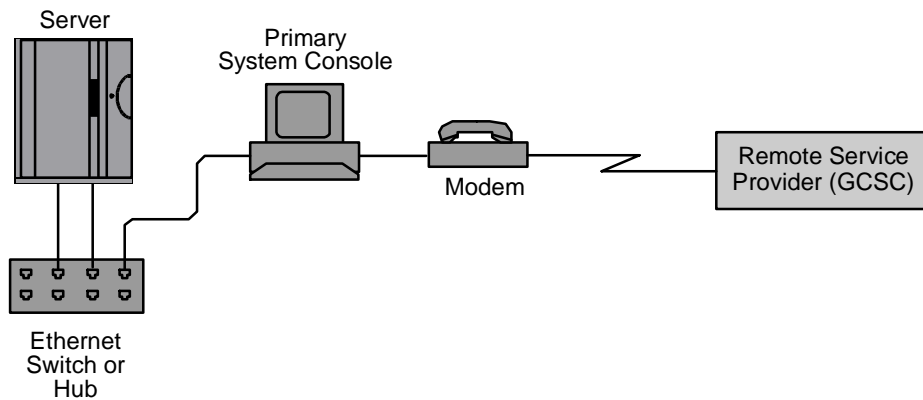
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You can use these basic types of operating configurations:

- [One System Console Managing One System \(Setup Configuration\)](#) on page 11-7
- [One System Console Managing Multiple Systems](#) on page 11-8
- [Multiple System Consoles Managing One System](#) on page 11-9
- [Multiple System Consoles Managing Multiple Systems](#) on page 11-12

Note. The figures in this section are not intended as wiring diagrams. The actual connections to the Ethernet switches or hubs are described in the *NonStop S-Series Hardware Installation and FastPath Guide*.

One System Console Managing One System (Setup Configuration)



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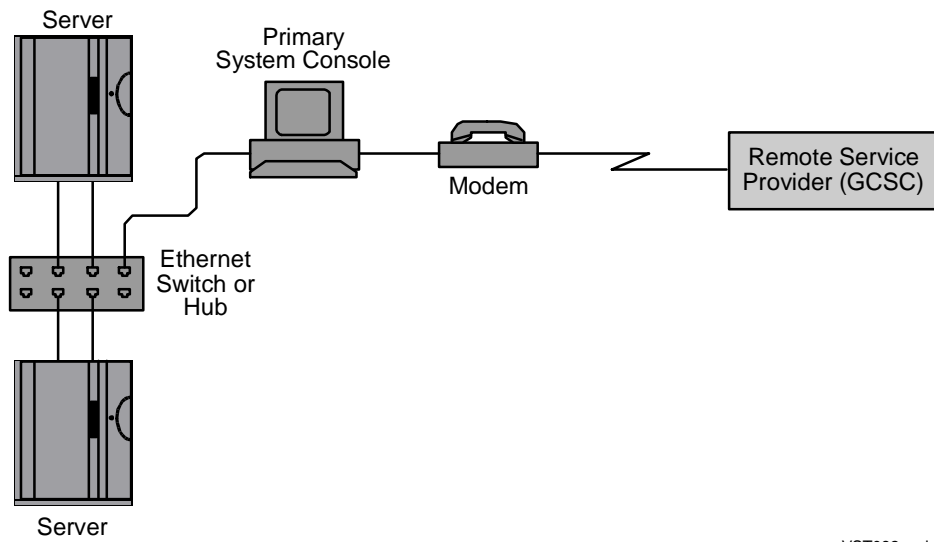
The one system console on the LAN must be configured as the primary system console. This configuration is called the *setup configuration* and is used during initial setup and installation of the system console and the server.

The setup configuration is an example of a secure, stand-alone network. A LAN cable connects the primary system console to an Ethernet switch or hub, and two additional LAN cables connect the Ethernet switch or hub to the processor multifunction (PMF) CRUs in group 01 of the server. The Ethernet switch or hub allows you to later add a backup system console and additional system consoles.

Note. Because the system console and Ethernet switch or hub are single points of failure that could disrupt access to OSM or TSM, the setup configuration is not recommended for operations that require high availability.

When you use this configuration, you do not need to change the preconfigured IP addresses.

One System Console Managing Multiple Systems



The one OSM or TSM system console on the LAN must be configured as the primary system console.

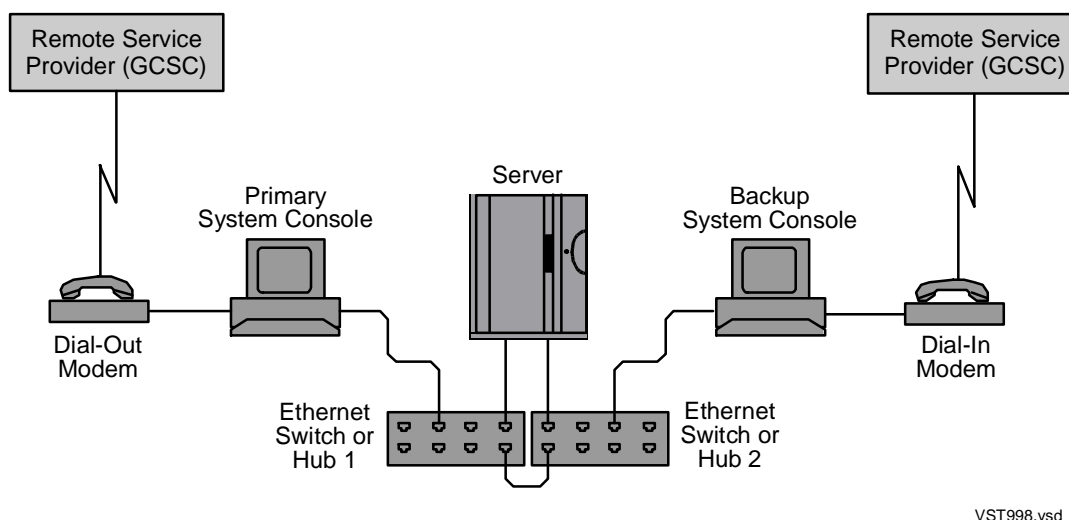
Because all servers are shipped with the same preconfigured IP addresses for MSP0, MSP1, \$ZTCP0, and \$ZTCP1, you must change these IP addresses for the second and subsequent servers before you can add them to the LAN.

Multiple System Consoles Managing One System

This subsection contains three variations of this configuration:

- [Primary and Backup System Consoles Managing One System \(Recommended Operating Configuration\)](#) on page 11-9
- [Multiple System Consoles Managing One System](#) on page 11-10
- [Cascading Ethernet Switch or Hub Configuration](#) on page 11-11

Primary and Backup System Consoles Managing One System (Recommended Operating Configuration)



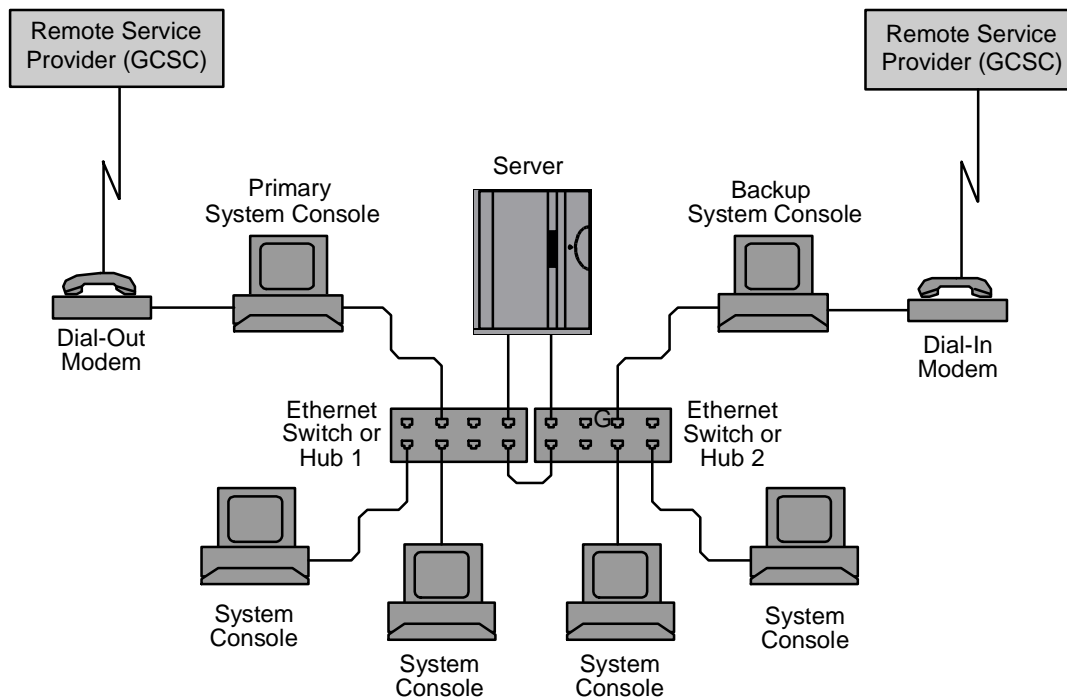
This configuration is the recommended operating configuration.

This configuration is similar to the setup configuration but includes a second Ethernet switch or hub and a backup system console with a modem for fault tolerance. The Ethernet switches or hubs provide a dedicated LAN in which all nodes use the same subnet. A reversing switch allows a cable to link the two Ethernet switches or hubs.

Note. A subnet is a network division within the TCP/IP model. Within a given network, each subnet is treated as a separate network. Outside that network, the subnets appear as part of a single network. The terms *subnet* and *subnetwork* are used interchangeably.

You must change the preconfigured IP address of the backup system console before you add it to the LAN.

Multiple System Consoles Managing One System

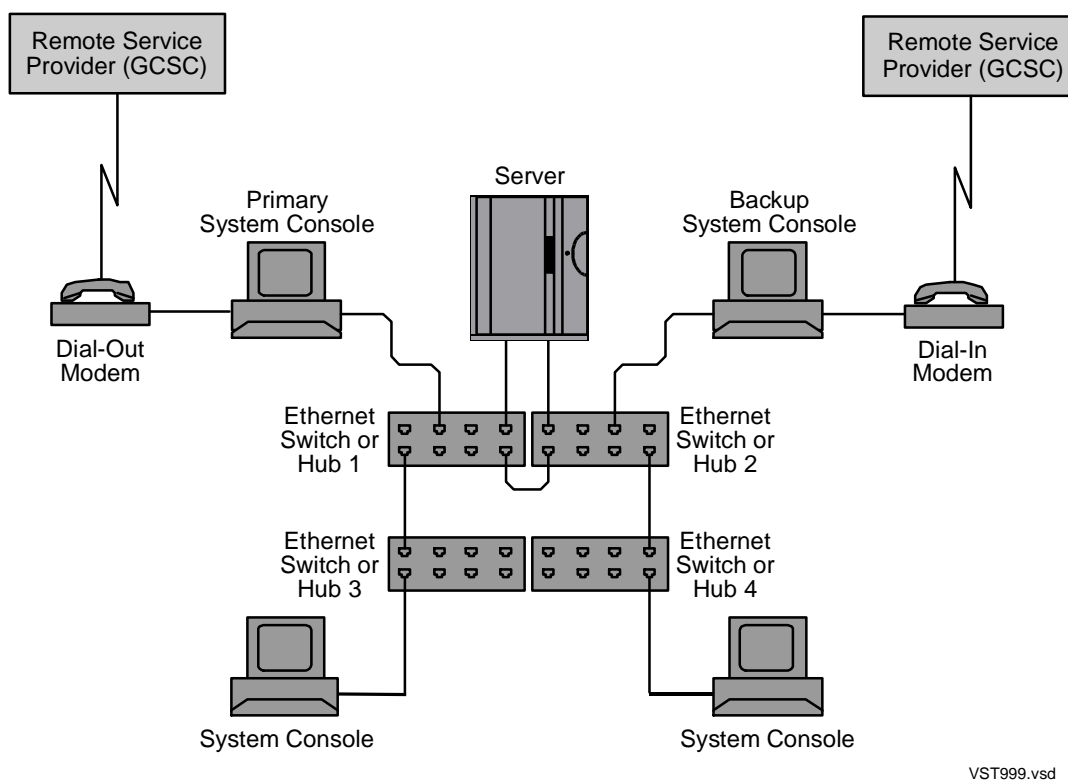


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Two Ethernet switches or hubs provide fault tolerance and extra ports for adding system consoles.

You must change the preconfigured IP addresses of the second and subsequent system consoles before you can add them to the LAN.

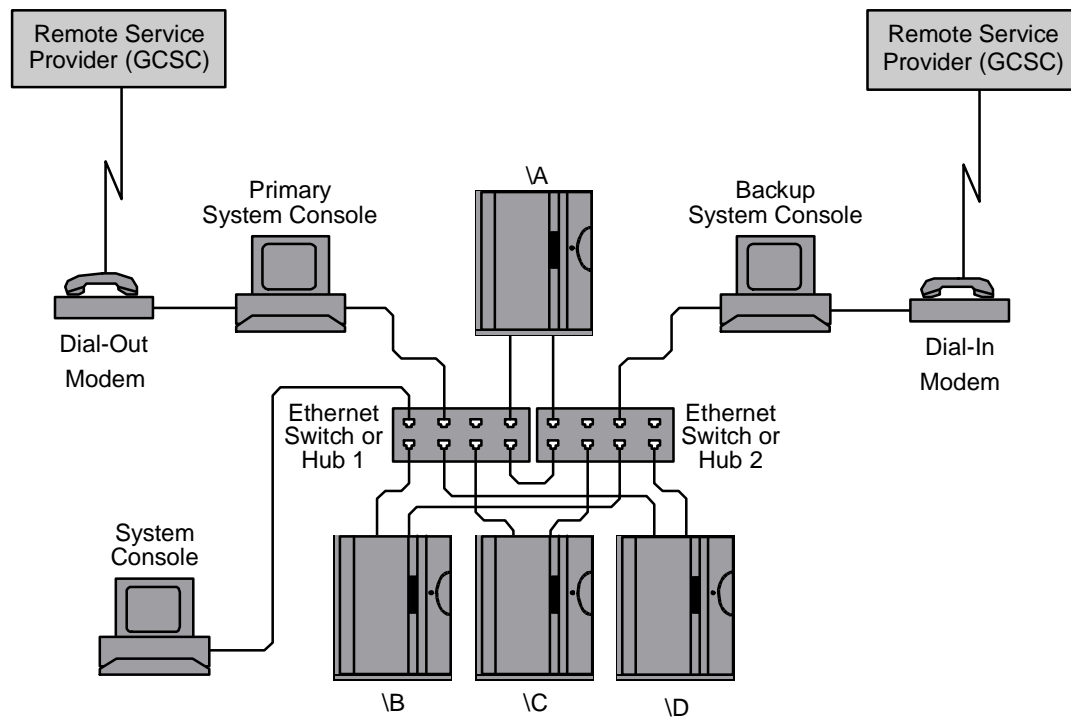
Cascading Ethernet Switch or Hub Configuration



Additional Ethernet switches or hubs can be connected (*cascaded*) to the Ethernet switches or hubs already installed. Primary and backup system consoles and the server must be on the same subnet, but the system consoles can be on different subnets.

You must change the preconfigured IP addresses of the second and subsequent system consoles before you can add them to the LAN.

Multiple System Consoles Managing Multiple Systems



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The servers must have fault-tolerant connections to the Ethernet switches or hubs. In addition, the system consoles and the servers must be on the same subnet. If a server is configured to receive dial-ins, the server must occupy the same subnet as the system console receiving the dial-ins.

For best OSM or TSM performance, no more than 10 servers should be included within one subnet.

Because all servers are shipped with the same preconfigured IP addresses for MSP0, MSP1, \$ZTCP0, and \$ZTCP1, you must change these IP addresses for the second and subsequent servers before you can add them to the LAN.

You must change the preconfigured IP addresses of the second and subsequent system consoles before you can add them to the LAN.

Planning for Remote Dial-In and Dial-Out Support

If you plan to configure a system for both dial-in and dial-out remote support, HP recommends that you configure two system consoles and two modems. One system console and modem is used for dial-in access to the system, and the other system console and modem is used for dial-out access from the system. Dial-ins and dial-outs are possible using only one system console and one modem on a system, but this configuration lacks fault-tolerance.

Note. Remote access and remote notification are not available in countries where the modem provided by HP is not certified. In these countries, you cannot use the OSM or TSM client software to dial out to or accept dial-in communications from a service provider.

Dial-Outs

Two system consoles can be designated as primary and backup dial-out points for each system. These consoles, also called primary and backup system consoles, must be connected to a dedicated LAN (one used for OSM or TSM only). If your system has only one system console (the primary system console), this workstation is defined as the primary dial-out point. If the dedicated LAN contains multiple servers, HP recommends that the primary and backup system consoles each be configured to receive incident reports from no more than 10 servers on the LAN.

△ **Caution.** Removal of hardware that has not failed will register as a failure and will cause a dial-out to the GCSC call center.

Dial-Ins

All system consoles provided by HP include remote operations software for dial-in capability, and any system console connected to a modem can receive a dial-in. The workstation must reside on the same subnet as the primary system console. For more information about dial-in and dial-out, refer to the OSM or TSM Notification Director online help.

12 Site Planning and Preparation

This section provides information you need to plan and prepare the site for a NonStop S-series system.

Related Sources	12-1
Selecting the Rooms and Assigning Floor Space	12-2
Planning for Data Communications	12-3
Planning for System Consoles	12-5
Planning for System Power	12-6
Meeting the Environmental Requirements	12-10
Preparing the Delivery Route	12-13

Site planning is a crucial step in ensuring the smooth installation of new equipment. Before you install a new system:

1. Select the room or rooms your system will occupy and assign the floor space for the system, peripheral devices, and office furniture.
2. Ensure that the necessary data communications lines are installed.
3. Plan for the installation of system consoles.
4. Ensure that the proper power sources are installed.
5. Ensure that the environmental requirements of the system are met.
6. Prepare the delivery route.

Related Sources

These sources can provide guidelines for site planning:

- Your HP trained service provider
- Local laws and regulations
- If you are planning for ServerNet clusters, the *ServerNet Cluster Manual*

Selecting the Rooms and Assigning Floor Space

By carefully selecting the one room or several rooms that will contain the system equipment, you can making a lot of adjustments to make the rooms you select suitable for the equipment, and you can avoid moving your equipment if you later decide to expand the system.

Consider the following:

- The room or rooms must be large enough to accommodate both the system equipment and any furniture or other related equipment.
 - Ensure that any rooms you select have enough space for any needed office furniture.
 - Consider the lengths of the cables you will be using to connect enclosures to each other, to power sources, and to peripheral equipment such as tape drives, printers, and SWAN concentrators.
 - Provide adequate walkways through the room and around the equipment and furniture.
 - The rooms must satisfy the placement requirements for system enclosures described in [Dimensions of Enclosures and Service Aisles](#) on page B-8.
 - The rooms must satisfy service requirements for peripheral devices or subsystems that are installed only by service providers trained by HP. These service requirements are included in the maintenance manuals for the specific products.
 - Consider the work flow. Especially in environments with large amounts of batch jobs, the layout of the computers and peripherals can either ease or impede the flow of work. For example, by placing tape drives and printers in different areas, you can prevent operators who are loading tapes from getting in the way of operators who are maintaining the printers.
 - Reserve storage space for data processing supplies, manuals, equipment, and archival material.
 - Ensure that the AC power outlets and plugs are accessible to operators so that, in an emergency, system equipment can be unplugged from the AC power outlets.
- To protect other equipment from paper dust and static electricity, install printers in a different room from the room where you install the system enclosures.
- Local regulations might require you to install emergency power-off (EPO) circuitry. Refer to [Emergency Power-Off \(EPO\) Equipment](#) on page 12-11 for more information about these requirements.
- Select a room that is big enough to allow for possible future expansion.

- To ensure the security of your system, you might want to isolate parts of the system into different rooms and control access to those rooms.
- Depending on your needs, you might want to plan a tape library, which is a separate area or room that contains system image tapes (SITs), site update tapes (SUTs), backup tapes, RVU tapes, TMF online dumps and audit dumps, and any tapes required to run applications. Tape libraries help you store, organize, and protect information.

Tape libraries usually have:

- A controlled environment to preserve the tapes
- Locks to prevent unauthorized personnel from accessing stored data and programs
- Fire detection and fire extinguishing equipment
- Storage racks

In addition, you might want to consider installing fireproof vaults.

- Determine whether you need to install dust, smoke, and static electricity controls.
- If many systems and peripherals (such as printers) will be in the same room, you might need to add noise control devices (for example, baffles or white-noise generators).
- The rooms must be accessible to the delivery receiving area for all required deliveries (the initial system delivery and regular supply deliveries). For more information, see [Preparing the Delivery Route](#) on page 12-13.

Draw floor plans of the selected rooms to tell the installer where the preinstalled equipment and I/O device cables are placed, where the power outlets and data communications lines are installed, and where the new equipment and cables will be placed.

Planning for Data Communications

[Requirements](#) [12-4](#)

[Labeling Communications Cables](#) [12-4](#)

[SWAN Concentrators](#) [12-5](#)

I/O device cables and communications lines installed in the building before system installation require advance planning. You need to determine, as soon as possible, the lead time required by the telephone company and communications facilities suppliers to schedule and install your data communications lines and modems. In addition, the local operator needs very specific information in order to connect communications lines to the system.

Requirements

If you plan to allow access to your system by a remote service provider, you must have at least one telephone line available in the room where the system is installed. It must be a direct line that does not go through a switchboard. If you want to allow a dial-out support connection to a remote service provider, such as the Global Customer Support Center (GCSC), or to your support organization, you must connect the modem that is connected to the system console to this line.

△ **Caution.** Removal of hardware that has not failed will register as a failure and will cause a dial-out to the GCSC call center.

A second telephone line for voice communication with the local operator is highly recommended. This line should be installed in the same room as the system, preferably near the system console.

To ensure that at least one data communications line is up at all times, ask your supplier to select different routes for each line.

Labeling Communications Cables

When the communications lines are installed, to tag each cable with a physical label, preferably at both ends. The label must include at least one of the following:

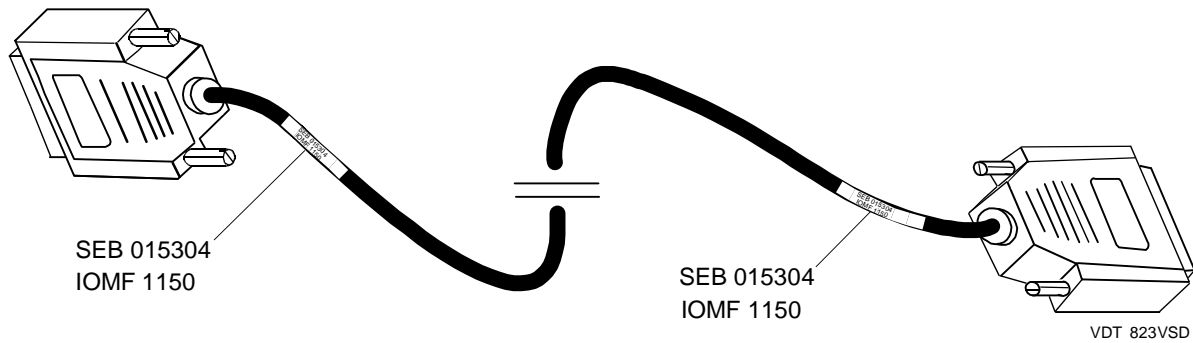
- The logical device name or physical interface name assigned to the line
- A description of the equipment and connector that will connect to the cable
- The slot location of the ServerNet adapter that will connect to the cable

More detailed labels might be more helpful:

- You can color-code the labels for the X fabric and the Y fabric.
- You can tag a cable at each end with information about where both ends go.

For example, a cable running between an SEB and an IOMF CRU can be tagged at each end with complete information about which devices, groups, slots, and ports it connects. You can use any labeling convention appropriate for your site; one labeling convention is shown here.

Device	Group	Slot	ServerNet Connector	Label
SEB	01	53	4	SEB 015304
IOMF CRU	11	50	-	IOMF 1150



SWAN Concentrators

ServerNet wide area network (SWAN) concentrators can support modem connections. When planning for data communications, be sure to consider data communications lines that are to be connected to SWAN concentrators.

For more information about SWAN concentrators, refer to the *SWAN Concentrator Installation and Support Guide*. For more information about SWAN 2 concentrators, refer to the *SWAN 2 Concentrator Installation and Support Guide*.

Planning for System Consoles

The processor multifunction (PMF) CRUs in group 01 of your server must be connected to an Ethernet LAN connected to at least one system console. Two system consoles, a primary system console and a backup system console, are recommended.

An Ethernet switch or hub is required; if you do not order an Ethernet switch or hub with your system console, you must provide one when you install the system console.

Modems give system consoles a dial-in and dial-out capability for remote service of the system. HP recommends that primary and backup system consoles be equipped with modems, each connected to a dedicated phone line.

Note. Remote access and remote notification are not available in countries where the modem provided by HP is not certified. In these countries, you cannot use the OSM or TSM client software to dial out to or accept dial-in communications from a service provider.

If the primary and backup system consoles will be connected to modems, the consoles must be within 15 feet (4.6 meters) of a wall jack for a telephone line that can be used for the modem. The RS-232-C cable shipped with the modem requires that the modem be no more than 6 feet (1.8 meters) from the system console or a power outlet.

For detailed information about system consoles and their configuration, refer to the *OSM Migration Guide* or *TSM Configuration Guide*. For information about installing the system console, refer to the *NonStop S-Series Hardware Installation and FastPath Guide*.

Planning for System Power

Considerations	12-6
Branch Circuits	12-8
Uninterruptible Power Supplies (UPSs)	12-8
Ethernet Switches or Hubs	12-9
System Enclosures	12-9
Peripheral Devices	12-9
AC Power Cords	12-9

Considerations

For detailed information about planning for system power, contact your HP trained service provider. The following is a partial list of considerations:

- Design your computer site to satisfy the requirements in this guide as well as national and local electrical codes.
- If you are upgrading an existing site to meet the specifications for a new system, your service provider can assist you in determining the existing electrical power resources available at your site.
- Power installation must be done only by a licensed electrical contractor.
- Your site might have local regulations and safety information concerning site preparation and power installation. Your site must comply with any local codes as well as with the requirements in this guide.
- HP highly recommends that the design, installation, and maintenance practices for electrical power and grounding of computer equipment follow the guidelines in IEEE standard 1100-1992, IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment. Following these practices minimizes the likelihood of equipment disturbance due to power transients, noise, and grounding problems.
- An isolation transformer is recommended for computer rooms and large system installations. An isolation transformer reduces noise or transients from nearby loads; steps down voltages when necessary; provides a separately derived, final point of electrical service for computer equipment; and helps keep common mode voltage potentials within acceptable performance limits. The isolation transformer must be within 75 feet (22.9 meters) of the system equipment.
- There must be no more than 3 volts root mean squared (rms) difference between neutral and ground.
- Earth grounding and grounded neutral are required for the AC power source.

- Contact your HP trained service provider for information about establishing a signal grounding reference grid. A reference grid is highly recommended for systems consisting of more than four enclosures.
- For information about IOAM power requirements, refer to [Appendix G, Modular Power Information](#).
- For systems that include more than two system enclosures, HP strongly recommends using a three-phase AC power source. The electrical installation should distribute all the single-phase enclosures among the three phases so as to minimize the unbalanced neutral current. Consult a qualified electrician or facilities planner for assistance.
- A phase dropout contactor is not required for multiphase installations. NonStop S-series servers have the ability to continue to power the system enclosures during a short AC power loss. (See [Power Failures](#) on page 10-6.) A phase dropout contactor would cause short outages to be stretched to long durations and would require manual intervention to reset the contactor.
- For IOAM enclosures, a UPS is optional but recommended where a site UPS is not available. You can choose to use any UPS that meets the IOAM enclosure power requirements for all enclosures being powered by the UPS. One UPS option to support the IOAM enclosure is the HP R5500 UPS. For additional information, contact your HP trained service provider.
- If you are installing a system in a computer room in the United States of America, an emergency power-off (EPO) disconnect is required by the National Electrical Code. (See [Emergency Power-Off \(EPO\) Equipment](#) on page 12-11.)
- Convenience receptacles must be provided at the computer site for electrical devices unrelated to the computer system. These convenience receptacles must be labeled so that they are not mistaken for dedicated system receptacles. Because devices connected to convenience receptacle circuits can feed noise back into the power system, these circuits must not be fed from the computer system power panel. If the installation site includes emergency disconnect switches, they must also disable power to the convenience receptacles.
- All outlets and circuit breakers should be clearly labeled to indicate the loads they are intended to power. Examples of labels include “Group 01 PMF 50,” “Group 01 PMF 55,” “Tape 0,” and “Primary System Console.”
- All outlets must be physically accessible to the operators who need to disconnect AC power from the computer equipment.

△ **Caution.** Consult the documentation for any peripheral devices to determine if they have any special power requirements.

Branch Circuits

Branch circuit requirements are:

- All dedicated branch circuits supplying the system enclosures and tape drives must originate from the same branch circuit breaker panel. HP highly recommends that branch circuits for other peripheral equipment, such as system consoles, also originate from the same branch circuit breaker panel as that for system enclosures. This arrangement ensures a common ground reference for all enclosures, provides the best likelihood of homogeneous power failures, and minimizes noise and power transients.
- Each branch circuit must include a phase, a ground, and a neutral conductor. The ground conductor must be positioned inside the branch circuit conduit.
- If duplex outlets are used, each half of each duplex outlet must be connected to a separate circuit.
- Two dedicated branch circuits are required for each system enclosure. Refer to [Appendix B, Specifications](#), for more information about the power requirements for these circuits.
- One dedicated branch circuit is required for each external tape drive. Refer to the documentation for the tape subsystem you are installing for information about the requirements for this circuit.
- One dedicated branch circuit is required for each system console and each system workstation. HP recommends that each system console and workstation be provided with four receptacles originating from a single circuit breaker, so that related items, such as a large screen monitor, an Ethernet switch or hub, a modem, or a printer, can be easily connected. Normally, there are two system consoles on each system.
- System console outlet locations must be far enough away from enclosure outlet locations so that enclosure power cords will not be inadvertently plugged in to a system console outlet. Approximately 10 feet (3 meters) of separation is sufficient.

Uninterruptible Power Supplies (UPSs)

The power supplies in a system enclosure with a power shelf use power factor correction (PFC). The uninterruptible power supply (UPS) system you use must have a low output impedance to ensure the stability of AC power lines. The power supplies in a system enclosure with a power shelf have been designed to work with most UPS systems. However, if you choose a UPS system that uses ferroresonant transformers, you must ensure that it is designed to work with power supplies that use PFC.

The output voltage of the UPS must be sinusoidal with a total harmonic distortion (THD) of no more than 5 percent, and a distortion of any single harmonic of no more than 3 percent. Do not use UPS systems with a square or trapezoidal output voltage waveform.

Ethernet Switches or Hubs

Each Ethernet switch or hub you plan to install requires an AC power source. For information about the use of Ethernet switches or hubs, refer to [Section 11, Planning for LAN Communications](#).

System Enclosures

Auto-ranging power supplies in the PMF CRUs and IOMF CRUs automatically configure themselves for either 100-120 V AC or 200-240 V AC operation upon application of AC power. In system enclosures without power shelves, the power supplies are within the PMF CRUs and IOMF CRUs. In system enclosures with power shelves, the power supplies are independent CRUs contained in the power shelf.

For the power requirements for a system enclosure, refer to [AC Power Requirements for One System Enclosure](#) on page B-11.

IOAM Enclosures

For the power requirements for an IOAM enclosure, refer to [Appendix G, Modular Power Information](#).

Peripheral Devices

Tape drives and other peripheral devices installed outside of system enclosures must each have a dedicated branch circuit. Different devices have their own power requirements. Refer to the documentation for the peripheral device for power and other site planning information.

If a tape drive is connected to the SCSI port of a PMF CRU, you must use a specific cable to connect the tape drive to the PMF CRU. For available cables, refer to [Appendix A, Part Numbers](#).

AC Power Cords

Each system enclosure requires two AC power cords. The types of AC power cords vary by country, enclosure type, and voltage required; for the AC power cords that are appropriate for your system, refer to [Appendix A, Part Numbers](#).

Meeting the Environmental Requirements

In addition to system power, these environmental factors affect the performance of your system:

Computer-Room Construction	12-10
Temperature and Humidity	12-10
Fire and Safety Precautions	12-11
Emergency Power-Off (EPO) Equipment	12-11
Electrostatic Discharge (ESD) Control and Protection	12-12
Other Factors	12-13

These environmental factors are briefly discussed here. For greater detail, contact your HP trained service provider.

Computer-Room Construction

A properly constructed computer room provides these benefits:

- Secured access to computer equipment and proprietary computer-stored information
- Precise control over environmental factors such as power, grounding, temperature, humidity, and airborne dust
- Noise control and isolation of computer system operations
- Better protection of computer resources against fires originating in other areas
- Compliance with raised-floor requirements and recommendations

Temperature and Humidity

Contact a qualified heating, ventilating, and air-conditioning contractor to determine any additional air-conditioning needs if any of the following are true:

- The computer room is smaller than 300 square feet (27 square meters) or is unventilated.
- The system will have more than one enclosure.
- Other heat-producing equipment is in the room.
- You are designing a raised-floor computer room.

Humidifiers can be used to maintain the ambient humidity within acceptable levels. The temperature and humidity requirements for the system enclosures are listed in [Environmental Specifications for One System Enclosure](#) on page B-11. Peripheral devices and subsystems might have different environmental requirements. Your service provider or the manufacturer of the equipment can provide specific environmental information about each external subsystem.

Fire and Safety Precautions

Proper precautions for fire prevention and safety in a computer room include:

- Use noncombustible materials and supplies
- Install smoke detectors and fire-extinguishing equipment
- Install emergency power-off (EPO) equipment
- Follow proper power and grounding guidelines
- Develop proper emergency procedures

Emergency Power-Off (EPO) Equipment

An emergency power-off (EPO) disconnect is required in the United States of America when the system is installed in a computer or data processing room designed to comply with the special construction and fire protection provisions of NFPA-75, Standard for the Protection of Electronic Computer/Data Processing Equipment, and article 645 of NFPA-70, National Electric Code. An EPO disconnect is generally not required for installations outside of the United States of America, unless specified otherwise by local authorities.

In computer-room environments in the United States of America, EPO equipment must meet certain requirements, including:

- The EPO equipment must disconnect AC power to all computer equipment in the room and to all cooling and ventilation systems for the room.
- For equipment containing batteries capable of supplying more than 750 voltamperes (VA) for more than 5 minutes, the internal equipment batteries must also be disconnected within 5 minutes of EPO activation.

If you must comply with EPO requirements, the provider of your EPO alarm system must install an EPO switch near the primary exits and any other designated location.

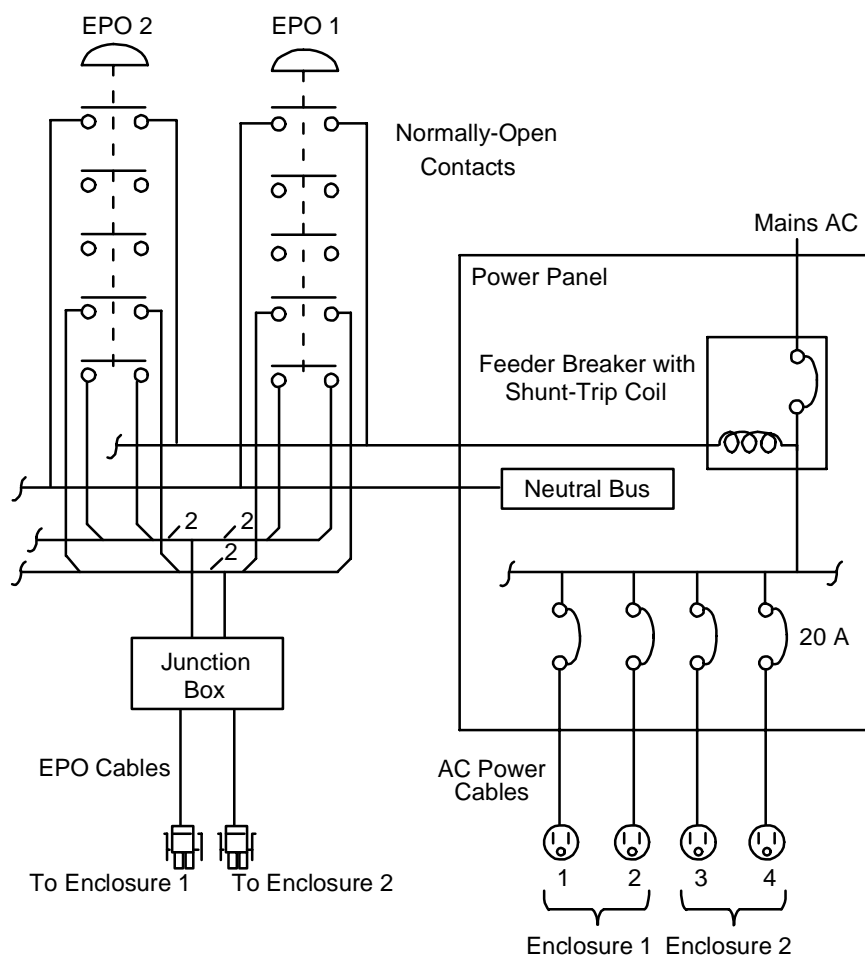
The fixed EPO wiring must be installed in conduit, metal raceway, or other means approved by local authorities, and it must have a junction box close enough to the computer equipment so that the equipment EPO cable can be connected. A 13-foot (4-meter) cable is provided with each system enclosure. (Refer to [Appendix A, Part Numbers](#).) The cable has a connector for attachment to the enclosure at one end and is unterminated at the other end. The installer must install the unterminated end to the EPO switch or junction box.

Each system enclosure contains batteries supplying more than 750 VA for more than 5 minutes. An EPO connector is located on each system enclosure, and a cable leads from each EPO connector to the EPO switch or EPO relay contactor. When the EPO switch is closed, it signals the system to start the emergency shutdown procedure, which disconnects the batteries in less than five minutes.

You can use an EPO switch with one pair of contacts for all enclosures or one with a separate pair of contacts for each enclosure. The EPO switch with one pair of contacts is the easiest and most economical solution.

When the EPO contacts are open, there is 56 V DC across them. The contacts should be rated at a minimum of 75 V. When the EPO switch closes (the switch shorts out the pins on the EPO connector on the system enclosure) there is a 5 mA current for each enclosure connected to the switch. A single pair of contacts rated at 200 mA can support a 16-enclosure system. If you want to use separate contacts for each enclosure, the contacts should be rated at 20 mA.

EPO Wiring Diagram for a Typical Two-Enclosure System



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Electrostatic Discharge (ESD) Control and Protection

HP highly recommends that when you replace a system component, you wear a properly grounded wriststrap with an in-series resistor to protect the component from damage caused by electrostatic discharge (ESD).

In dry environments or in rooms containing materials likely to generate static electricity, HP recommends that electrostatic protection (antistatic) mats be placed in front of and behind each enclosure.

Other Factors

Other environmental factors to consider include:

- Site cleaning and maintenance
- Ergonomics and human factors
- Acoustic noise control
- Computer-room lighting
- Computer-room security

Preparing the Delivery Route

Before your system arrives, you must prepare the delivery route to the computer rooms. HP recommends that you move the equipment on its shipping pallet into the room in which it will be installed before unpacking the shipping container. Make sure that the paths and doorways are clear and wide enough for the enclosures on their shipping pallets, the shipping containers, and the equipment used to transport them. Make sure that the elevators can carry the weight of the enclosures, shipping containers and shipping pallets, moving equipment, and movers. The dimensions and weight of system enclosures are listed in [Enclosure Dimensions](#) on page B-7 and [Weights for System Enclosures](#) on page B-10.

Completing the Installation Plan

This section describes how to finish the planning tasks described in this guide, including preparing an Installation Document Packet containing forms and worksheets that describe how to arrange the enclosures, what hardware is present, and what cables are required to build your system:

Create the Installation Schedule	13-1
Assemble the Installation Document Packet	13-2
Installation Document Checklist	13-3
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Floor Plan	13-9
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PMF CRU Configuration Forms	13-16
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ServerNet Adapter Configuration Forms	13-22
ServerNet Cluster Configuration Form	13-22
ServerNet Cabling Forms	13-23
Cross-Row Cabling Worksheets	13-25
IOAM Worksheets	13-26
Final Planning Checklist	13-27
Finish Planning	13-28

Note. Not all the products, configurations, features, and functions described in this guide are available with the current RVU. Ask your HP representative about the availability of these products, configurations, features, and functions.

Create the Installation Schedule

Create the installation schedule based on all of the planning you have done. Ensure that:

- Before the equipment is delivered, the installation site is prepared.
- After the equipment arrives, time is allowed to:
 - Test the system
 - Create and test the operational environment

Assemble the Installation Document Packet

This subsection contains instructions for completing and assembling the installation forms into a Installation Document Packet. If you are adding to or reconfiguring an existing system, you might not use all these forms. If you are making a large addition or reconfiguration, make sure you also have forms that show the system before the addition or reconfiguration.

Complete and assemble these forms in this recommended order:

1. Installation Document Checklist
2. System Equipment Inventory Form
3. Enclosure Arrangement Diagram
4. Floor Plan
5. Preinstalled I/O Device Cable Checklist
6. For each system enclosure, a System Enclosure Checklist and the following forms for the components installed in or attached to the enclosure. Place all forms for a particular system enclosure after the System Enclosure Checklist for that enclosure and arrange these sets of forms in order by group number.
 - a. PMF CRU Configuration Form or PMF 2 CRU Configuration Form, IOMF CRU Configuration Form, or IOMF 2 CRU Configuration Form
 - b. Network equipment configuration forms
 - c. ServerNet adapter configuration forms
 - d. ServerNet Cluster Configuration Form
7. Cabling forms:
 - a. ServerNet Cabling forms
 - b. Cross-Row Cabling Worksheets
8. Final Planning Checklist

Include any additional configuration forms, notes or instructions to the installer, configuration planner, or support planner.

You are authorized to photocopy these installation forms only to install and configure your system.

An example of an Installation Document Packet is included in [Appendix D, Case Study: ServerNet Cable Lengths](#).

Installation Document Checklist

The Installation Document Checklist tells the installer and the configuration planner which forms, and how many of each form, are present in the Installation Document Packet. Complete the Installation Document Checklist as follows, after you have completed all the installation forms for your system.

Task	Comments
Be sure that you have completed all the other installation forms for your system.	Which forms you need to complete depends upon what you will be adding, reconfiguring, or installing in your system.
Enter the name of the system in the System Name field.	This system name must match the system name on all other forms in this packet.
Enter a mark in the box to the left of the title of each form included in this packet.	
If you have used forms or other documents that do not appear on the checklist, write the titles of these forms and documents on the blank lines.	If you need more lines on which to list other forms, make more copies of this checklist.
In the # Pages column for each form, enter the total number of pages of that form included in this packet.	Some forms appear more than once.
Enter the page number of this page and the total number of pages of this form in the Page ___ of ___ field.	
When you have completed this form, enter the date in the Date field.	

Example of a Completed Installation Document Checklist

<div style="float: right; text-align: right;"> System Name <u>\Case1</u> Date <u>07</u> / <u>22</u> / <u>96</u> Page <u>1</u> of <u>1</u> </div> Installation Document Checklist			
<input checked="" type="checkbox"/> Form, Diagram, or Checklist	# Pages	<input checked="" type="checkbox"/> Form, Diagram, or Checklist	# Pages
<input checked="" type="checkbox"/> System Equipment Inventory Form	<u>1</u>	Other forms, notes, or checklists: <input type="checkbox"/> _____	
<input checked="" type="checkbox"/> Preinstalled I/O Device Cable Checklist	<u>1</u>	<input type="checkbox"/> _____	
<input checked="" type="checkbox"/> Enclosure Arrangement Diagram	<u>1</u>	<input type="checkbox"/> _____	
<input checked="" type="checkbox"/> Floor Plan	<u>1</u>	<input type="checkbox"/> _____	
<input checked="" type="checkbox"/> System Enclosure Checklist	<u>2</u>	<input type="checkbox"/> _____	
<input checked="" type="checkbox"/> PMF CRU Configuration Form and PMF 2 CRU Configuration Form	<u>4</u>	<input type="checkbox"/> _____	
<input type="checkbox"/> IOMF CRU Configuration Form and IOMF 2 CRU Configuration Form		<input type="checkbox"/> _____	
<input checked="" type="checkbox"/> Adapter Configuration Form	<u>4</u>	<input type="checkbox"/> _____	
<input type="checkbox"/> ServerNet Communication Pathways Worksheet		<input type="checkbox"/> _____	
<input type="checkbox"/> ServerNet Cabling Form		<input type="checkbox"/> _____	
<input type="checkbox"/> Cross-Row Cabling Worksheet, SEB to SEB		<input type="checkbox"/> _____	
<input type="checkbox"/> Cross-Row Cabling Worksheet, SEB to IOMF CRU		<input type="checkbox"/> _____	
Special Notes or Instructions: <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>			

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System Equipment Inventory Form

The System Equipment Inventory Form lists system enclosures and equipment that is **not** installed in a system enclosure that you expect to receive from HP. The installer uses this list to verify that all equipment ordered is received. (Equipment installed in a system enclosure, such as ServerNet adapters and disk drives, appears on the System Enclosure Checklist.)

If you have the technical documentation for your order, you can make a copy of that documentation and use it instead of the System Equipment Inventory Form. However, you must alert the installer to any substitutions.

Note. The System Equipment Inventory Form cannot be used for an order form.

Complete the System Equipment Inventory Form as follows.

Task	Comments
Enter the name of the system in the System Name field.	The system name must match the system name on all other forms in this packet.
For each system enclosure ordered: <ul style="list-style-type: none"> ● Enter the product number of each type of system enclosure. ● Enter the description of each type of system enclosure. ● Enter the number of each type of system enclosure. 	In this form, do not list the individual components installed in the system enclosures at the factory.
For each piece of system equipment ordered: <ul style="list-style-type: none"> ● Enter the product number or part number of the equipment in the Part or Product Number column. ● Enter a description of the equipment in the Description column. ● Enter the number of items of this equipment that you have ordered in the Quantity Ordered column. 	This list indicates all equipment that is NOT installed in a system enclosure. Examples of equipment you might list here are terminals, printers, tape drives, and ServerNet wide area network (SWAN) concentrators.
Enter the page number of this page and the total number of pages of this form in the Page ____ of ____ field.	
When you have completed this form, enter the date in the Date field.	

When the equipment is received, the installer makes an entry in the Quantity Received column as each piece of equipment is unpacked.

[illegible]

HP NonStop S-Series Planning and Configuration Guide—523303-020

Enclosure Arrangement Diagram

The Enclosure Arrangement Diagram tells the installer how the system enclosures are to be arranged.

Complete the Enclosure Arrangement Diagram as follows.

Task	Comments
Enter the name of the system in the System Name field and date in the date field.	This system name must match the system name on all other forms in this packet.
Enter the Building name or number and room number in the Building and Room fields.	
Enter the system number in the System Number (In Expand Network) field.	This number must be in the range 0 through 254.
Enter the number of rows in which your system is arranged in the Number of Rows field.	
Draw each enclosure included in the configuration on the diagram.	Distinguish between base enclosures and stackable enclosures. You can indicate base enclosures by drawing casters (wheels) on them.
When you have completed this form, enter the date in the Date field.	

Example of a Completed Enclosure Arrangement Diagram

Enclosure Arrangement Diagram

Building 5 Room 2239

Scale: 1/4 inch = 1 foot

System Name \Case1

Date 07 / 21 / 96

System Number
(In Expand Network) 10

Number of Rows 1

Processor Enclosure

Group 02

Processor Enclosure

Group 01

Note which enclosures are base enclosures and which are stacked enclosures.
You can indicate a base enclosure by drawing casters on it.

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Floor Plan

The Floor Plan allows you to plan and indicate where the system components and furniture should be placed in your computer rooms relative to preinstalled cables, power outlets, and communications lines.

With this form and the templates for furniture and system components from [Appendix C, Blank Forms](#), you can represent each computer room and its contents to scale. (These templates are drawn to the scale 1/4 inch = 1 foot—0.64 centimeter = 30.5 centimeters). Copy the templates so that you can cut out the items and attach them directly to the Floor Plan.

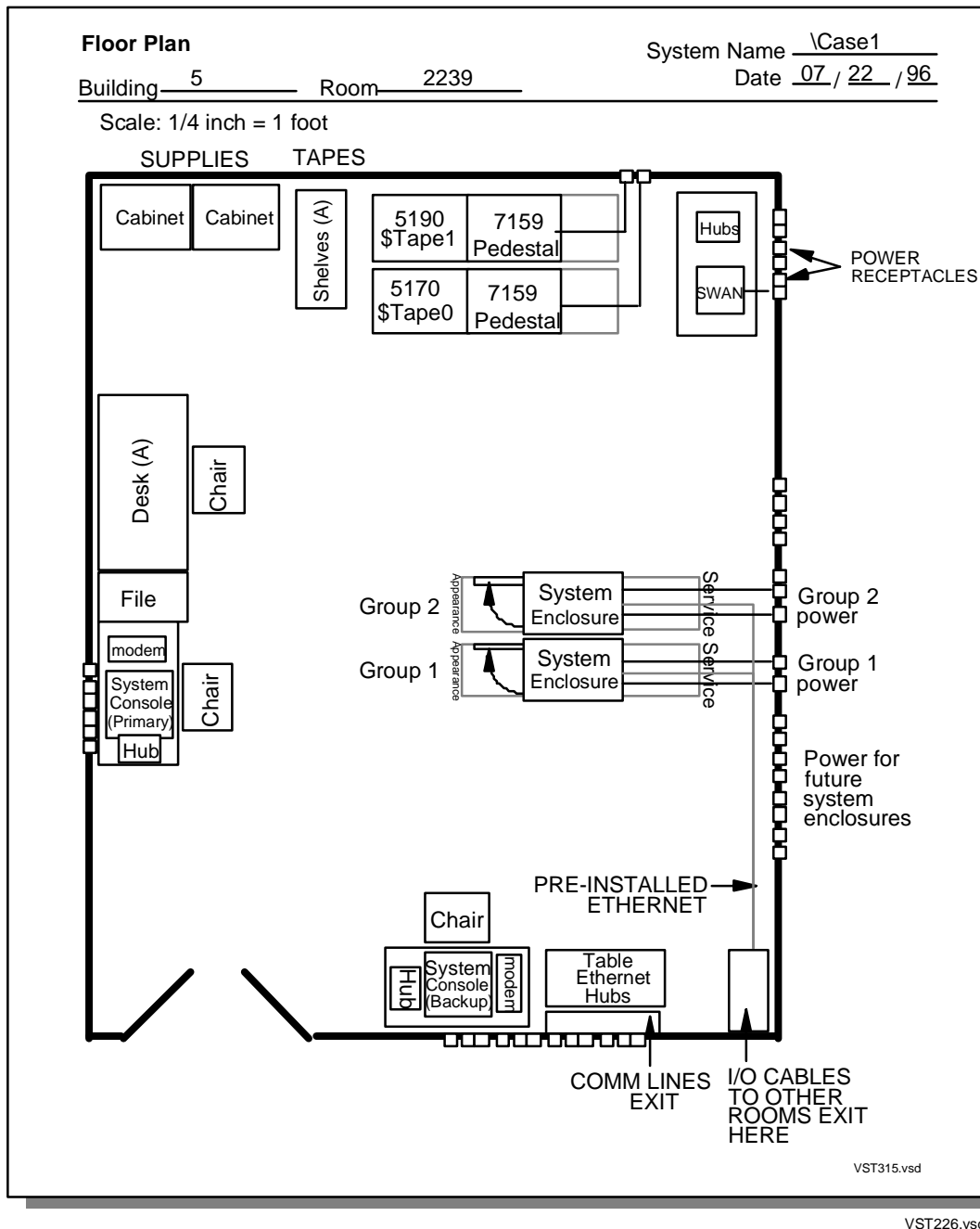
Instead of this form, you can substitute a floor plan drawn to scale.

Make a copy of the blank Floor Plan for each room in which system equipment will be installed.

Complete a Floor Plan as follows.

Task	Comments
Enter a unique identifier for the building in the Building field.	You can describe the building in any way that is unique for your site. For example, you can use the number assigned to the building within the company.
Enter a unique identifier for the room in the Room field.	You can describe the room in any way that is unique for that building, such as a room number or location.
Enter the name of the system in the System Name field.	This system name must match the system name on all other forms in this packet.
Draw an outline of the room to scale on the Floor Plan.	
Within the outline, indicate the positions of: <ul style="list-style-type: none"> ● AC power outlets ● Communications lines ● Any preinstalled I/O device cables 	
Indicate the positions of system components using the system components template.	These templates include the required access space, but be sure to allow adequate space for walkways as well.
Indicate the positions of furniture using the furniture template.	Be sure to allow adequate space around the furniture for walkways.
Indicate where the I/O device cables are to be installed.	
When you have completed this form, enter the date in the Date field.	

Example of a Completed Floor Plan



Preinstalled I/O Device Cable Checklist

If you have already installed I/O device cables for use with this system, use the Preinstalled I/O Device Cable Checklist to tell the installer which cables are to be connected to the system equipment being installed.

(This information also included in the Floor Plan.)

Complete a Preinstalled I/O Device Cable Checklist as follows.

Task	Comments
Enter the name of the system in the System Name column.	This system name must match the system name on all other forms in this packet.
Enter the information from the cable ID tag in the Cable ID Tag column.	The cable ID tag is the physical label attached to the I/O device cable.
In the Floor Plan field, describe the location of the cable.	If the room contains only one preinstalled cable, listing the room number is sufficient. Otherwise, provide a more detailed description.
Enter the page number of this page and the total number of pages of this form in the Page ____ of ____ field.	Some forms are designed to be duplicated.
When you have completed this form, enter the date in the Date field.	

The column headed by a check mark is provided for you to check off each line item to make certain that all required preinstalled I/O device cables are installed and ready for operation.

[illegible]

System Enclosure Checklist

The System Enclosure Checklist tells the installer what configurable items were ordered and are installed in each processor enclosure and I/O enclosure.

Make a copy of this form for each system enclosure in the configuration you are documenting.

Complete the System Enclosure Checklist as follows.

Task	Comments (page 1 of 2)
Enter the name of the system in the System Name field.	This system name must match the system name on all other forms in this packet.
Enter the group number of the enclosure in the Group Number field.	
<p>Complete the Appearance Side area of the form:</p> <p>For each disk drive in the enclosure, in the illustration of the disk drive slot, enter:</p> <p>Logical device name</p> <p>Product number</p> <p>If this form is for group 01:</p> <p>Enter "\$SYSTEM-P" and its product number in slot 11 and enter "\$SYSTEM-M" and its product number in slot 12.</p> <p>Enter logical device names and product numbers for the disk volumes \$DSMSCM and \$AUDIT in the appropriate slots.</p>	Make entries only for those disk drives you are ordering.
<p>Complete the Service Side area of the form:</p> <p>For processor enclosures:</p> <p>In slots 50 and 55: enter "PMF." You might also want to enter the processor number for each processor.</p> <p>In slots 51 through 54:</p> <p>If the slot will contain a ServerNet adapter, enter the name and type of the ServerNet adapter.</p> <p>If the slot will contain an SEB or MSEB, enter "SEB."</p> <p>If the slot will not contain a ServerNet adapter, enter "filler panel."</p>	

Task	Comments (page 2 of 2)
<p>Complete the Service Side area of the form:</p> <p>For I/O enclosures:</p> <p>In slots 50 and 55: enter "IOMF."</p> <p>In slots 51 through 54:</p> <p>If the slot will contain a ServerNet adapter, enter the name and type of the ServerNet adapter.</p> <p>If the slot will not contain a ServerNet adapter, enter "filler panel."</p>	
<p>When you have completed this form, enter the date in the Date field.</p>	

Example of a Completed System Enclosure Checklist

System Name \Case1

Group Number 01

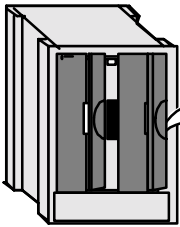
Module Number 01

Date 07 / 21 / 96

System Enclosure Checklist

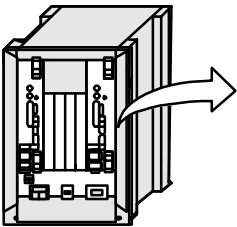
Shaded areas indicate nonconfigurable components

Appearance Side:



\$DATA04-M	\$DATA00-M
4608	4608
08	18
\$DATA04-P	\$DATA00-P
4608	4608
07	17
\$DATA03-M	\$AUDIT-M
4608	4608
06	16
\$DATA03-P	\$AUDIT-P
4608	4608
05	15
\$DATA02-M	\$DSMSCM-M
4608	4608
04	14
\$DATA02-P	\$DSMSCM-P
4608	4608
03	13
\$DATA01-M	\$SYSTEM-M
4608	4608
02	12
\$DATA01-P	\$SYSTEM-P
4608	4608
01	11

Service Side:



50	51	52	53	54	55
PMF	SEB	SEB	E4SA	E4SA	PMF
Processor 0			E0153	E0154	Processor 1

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PMF CRU Configuration Forms

The PMF CRU Configuration Form and PMF 2 CRU Configuration Form tell the installer about each PMF CRU in the system and the configurable items associated with it. These completion instructions apply to both forms.

Task	Comments (page 1 of 2)
Enter the name of the system in the System Name field.	This system name must match the system name on all other forms in this packet.
Enter the group number of the enclosure that contains this PMF CRU in the Group field.	
Enter the slot number of this PMF CRU in the Slot field.	
<p>If you are attaching a tape drive to the SCSI port on this PMF CRU, complete the SCSI Port block:</p> <ol style="list-style-type: none"> 1. In the Product Number field, enter the product number of the tape drive. 2. In the SCF Name field, enter the SCF object name of the tape drive. 3. In the SCSI Cable field, enter the part number of the SCSI cable you will use with this tape drive. 	If you are not attaching a tape drive to the SCSI port on this PMF CRU, leave the SCSI Port block empty.

Task	Comments (page 2 of 2)
<p>If this PMF CRU is in group 01, complete the Ethernet Port block.</p> <p>If this PMF CRU is in group 01, slot 50:</p> <ol style="list-style-type: none"> 1. In the IP Address field, enter the initial IP address assigned to this port. You might want to indicate the IP address that will replace the initial IP address. 2. In the Adapter Name field, enter \$ZZLAN.MIOE0. 3. In the SAC Name field, enter \$ZZLAN.MIOE0.0. 4. In the SAC Access List field, enter 0,1. 5. In the PIF Name field, enter \$ZZLAN.MIOE0.0.A. 6. In the LIF Name field, enter \$ZZLAN.LANX. 	<p>If this PMF CRU is not in group 01, leave this Ethernet Port block empty.</p>
<p>If this PMF CRU is in group 01, slot 55:</p> <ol style="list-style-type: none"> 1. In the IP Address field, enter the initial IP address assigned to this port. You might want to indicate the IP address that will replace the initial IP address. 2. In the Adapter Name field, enter \$ZZLAN.MIOE1. 3. In the SAC Name field, enter \$ZZLAN.MIOE1.0. 4. In the SAC Access List field, enter 1,0. 5. In the PIF Name field, enter \$ZZLAN.MIOE1.0.A. 6. In the LIF Name field, enter \$ZZLAN.LANY. 	
<p>When you have completed this form, enter the date in the Date field.</p>	

Example of a Completed PMF CRU Configuration Form

PMF CRU Configuration Form Shaded areas indicate nonconfigurable components		System Name <u>\Case1</u> Date <u>07</u> / <u>21</u> / <u>96</u>
Group <u>01</u> Module <u>01</u> Slot <u>55</u>		

SCSI Port

Product Number: 5175

SCF Name: \$TAPE0

SCSI Cable: PN 131369

Ethernet Port

IP Address: Initially 192.231.36.11
Get new address from LAN department

Adapter Name: \$ZZLAN.MIOE1

SAC Name: \$ZZLAN.MIOE1.0

SAC Access List: 1,0

PIF Name: \$ZZLAN.MIOE1.0.A

LIF Name: \$ZZLAN.LANY

VST304.vsd

VST209.vsd

Example of a Completed PMF 2 CRU Configuration Form

PMF 2 CRU Configuration Form		System Name <u>\Case1</u> Date <u>07 / 21 / 96</u>
Shaded areas indicate nonconfigurable components		Group <u>01</u> Module <u>01</u> Slot <u>50</u>
	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center;">SCSI Port</p> <p>Product Number: <u>5794</u></p> <p>SCF Name: <u>\$TAPE0</u></p> <p>SCSI Cable: <u>PN 131369</u></p> </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">Ethernet Port</p> <p>IP Address: <u>Initially 192.231.36.10</u> <u>Get new address from LAN department</u></p> <p>Adapter Name: <u>\$ZZLAN.MIOE0</u></p> <p>SAC Name: <u>\$ZZLAN.MIOE0.0</u></p> <p>SAC Access List: <u>0,1</u></p> <p>PIF Name: <u>\$ZZLAN.MIOE0.0.A</u></p> <p>LIF Name: <u>\$ZZLAN.LANX</u></p> </div>	

VST308.vsd

VST208.vsd

IOMF CRU Configuration Forms

The IOMF CRU Configuration Form and IOMF 2 CRU Configuration Form tell the installer about each IOMF CRU in the system and the configurable items associated with it. These instructions apply to both forms.

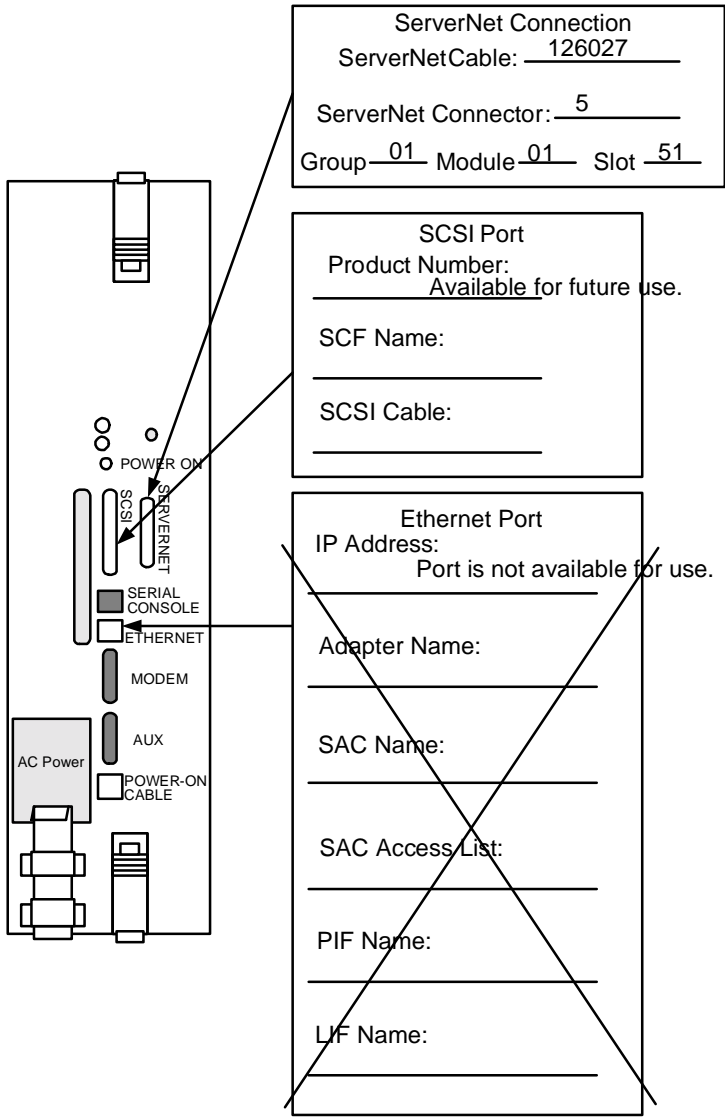
Task	Comments
Enter the name of the system in the System Name field.	This system name must match the system name on all other forms in this packet.
Enter the group number for the enclosure that contains this IOMF CRU in the Group field.	
Enter the slot number of this IOMF CRU in the Slot field.	
<p>Complete the ServerNet Connection block:</p> <p>In the ServerNet Cable field, enter the part number of the ServerNet cable that connects to this IOMF CRU.</p> <p>In the ServerNet Connector field, enter the ServerNet connector on the SEB to which this cable connects.</p> <p>In the Group and Slot fields, enter the group and slot numbers of the SEB to which this cable connects.</p>	
<p>If you are attaching a tape drive to the SCSI port on this IOMF CRU, complete the SCSI Port block:</p> <p>In the Product Number field, enter the product number of the tape drive.</p> <p>In the SCF Name field, enter the SCF object name of the tape drive.</p> <p>In the SCSI Cable field, enter the part number of the SCSI cable you will use with this tape drive.</p>	If you are not attaching a tape drive to the SCSI port on this IOMF CRU, leave the SCSI Port block empty.
Leave the Ethernet Port block empty.	You cannot use the Ethernet port on IOMF CRUs at this time.
When you have completed this form, enter the date in the Date field.	

Example of a Completed IOMF CRU Configuration Form

System Name \Case 1
Date 07 / 21 / 96

IOMF CRU Configuration Form
Shaded areas indicate nonconfigurable components

Group 11 Module 01 Slot 50



ServerNet Connection
ServerNetCable: 126027
ServerNet Connector: 5
Group 01 Module 01 Slot 51

SCSI Port
Product Number: Available for future use.
SCF Name: _____
SCSI Cable: _____

Ethernet Port
IP Address: _____
Port is not available for use.
Adapter Name: _____
SAC Name: _____
SAC Access List: _____
PIF Name: _____
LIF Name: _____

VST307.vsd

VST240.vsd

ServerNet Adapter Configuration Forms

A variety of ServerNet adapters are available for use in NonStop S-series servers. Configuration forms for each adapter are located in the installation and support guide for that adapter.

To add ServerNet adapter configuration forms to your Installation Document Packet, copy the necessary forms from the adapter manuals. Follow any planning instructions in the adapter manuals.

The ServerNet adapters currently supported and their manuals are:

Adapter	Manual
3860 ATM 3 ServerNet adapter (ATM3SA)	<i>ATM Adapter Installation and Support Guide</i>
3861 Ethernet 4 ServerNet adapter (E4SA)	<i>Ethernet Adapter Installation and Support Guide</i>
3862 Token-Ring ServerNet adapter (TRSA)	<i>Token-Ring Adapter Installation and Support Guide</i>
3863 Fast Ethernet ServerNet adapter (FESA)	<i>Fast Ethernet Adapter Installation and Support Guide</i>
3865 Gigabit Ethernet ServerNet adapter (GESA)	<i>Gigabit Ethernet Adapter Installation and Support Guide</i>
6740 ServerNet/FX adapter	<i>ServerNet/FX Adapter Installation and Support Guide</i>
6742 ServerNet/FX 2 adapter	<i>ServerNet/FX 2 Adapter Installation and Support Guide</i>
6760 ServerNet device adapter (ServerNet/DA)	<i>6760 ServerNet/DA Manual</i>
6763 Common Communication ServerNet adapter (CCSA)	<i>6763 Common Communication ServerNet Adapter Installation and Support Guide</i>

ServerNet Cluster Configuration Form

A configuration form for installing a ServerNet cluster is located in the *ServerNet Cluster Manual*.

ServerNet Cabling Forms

The ServerNet cabling forms are provided to help you determine the number and type of ServerNet cables that you need to cable a system in one row. If you are cabling a system with enclosures arranged in multiple rows, you also use the [Cross-Row Cabling Worksheets](#) described on page [13-25](#).

The following cabling forms are located in alphabetic order in [Appendix C, Blank Forms](#):

ServerNet Cabling: Tetra 8 Topology, I/O Enclosures
 ServerNet Cabling: Tetra 8 Topology, Processor Enclosures
 ServerNet Cabling: Tetra 16 Topology, I/O Enclosures 11-25
 ServerNet Cabling: Tetra 16 Topology, I/O Enclosures 31-45
 ServerNet Cabling: Tetra 16 Topology, I/O Enclosures 51-64
 ServerNet Cabling: Tetra 16 Topology, I/O Enclosures 71-84
 ServerNet Cabling: Tetra 16 Topology, Processor Enclosures

Complete a ServerNet Cabling form as follows.

Task	Comments
Make photocopies of the ServerNet cabling forms you need.	
On each ServerNet cabling form, enter the system name and page _ of _.	This system name must match the system name on all other forms in this packet.
On each ServerNet cabling form, mark the row for each cable required for your system.	For example, place a check mark next to "01 51 02 51."
For each ServerNet cable required for your system, enter the estimated length you need in the Length Needed column.	
Enter the part number of each cable in the Part Number column.	
When you have completed this form, enter the date in the Date field.	

Example of a Completed ServerNet Cabling Form

ServerNet Cabling: Tetra 16 Topology, Processor Enclosures				System Name	UCase 1
				Date	07 / 21 / 97
				Page	01 of 01
From Group	Slot	To Group	Slot	Length Needed	Part Number
✓ 01	51	02	51	1 meter	U24314
01	52	02	52		
01	51	03	51		
01	52	03	52		
01	51	04	51		
01	52	04	52		
01	51	05	51		
01	52	05	52		
02	51	04	51		
02	52	04	52		
02	51	03	51		
02	52	03	52		
02	51	06	51		
02	52	06	52		
03	51	04	51		
03	52	04	52		
03	51	07	51		
03	52	07	52		
04	51	08	51		
04	52	08	52		

VST383.vsd

VST963.vsd

Cross-Row Cabling Worksheets

The cross-row cabling worksheets are provided to help you determine the number and type of ServerNet cables that you need to cable a system with enclosures arranged in multiple rows. These worksheets are used with the [ServerNet Cabling Forms](#) described on page [13-23](#).

The following worksheets are located in alphabetic order in [Appendix C, Blank Forms](#):

Cross-Row Cabling Worksheet, SEB to IOMF CRU

Cross-Row Cabling Worksheet, SEB to SEB

Complete a cross-row cabling worksheet as follows.

Task	Comments
Make photocopies of the cross-row cabling worksheets you need.	
On each ServerNet cabling form, enter the system name and Page _ of _.	This system name must match the system name on all other forms in this packet.
Enter the group numbers of the two enclosures in the From group _ and to _ group fields.	
Enter the width of the service aisle	
Check the boxes on the worksheet that describes the enclosures that are to be cabled together and enter the corresponding measurements on the worksheet.	
Add all the measurements in the column and enter that value in the Total Cable Length field.	
Enter the part number of this cable in the Cable Part Number field.	
When you have completed this form, enter the date in the Date field.	

Example of a Completed Cross-Row Cabling Worksheet

System Name <u>/Case 1</u> Date <u>07 / 21 / 97</u> Page <u>01</u> of <u>01</u>	
	From group <u>01</u> to group <u>12</u>
Standard Measurements	
31 inches (cabinet depth)	+ <u>37</u>
6 inches of slack (3 inches per cable end)	
Variable Measurements	
Width of service aisle (48 inches minimum)	+ <u>60 in</u>
<input checked="" type="checkbox"/> If cable is installed under a raised floor	+ <u>12 in</u>
Amount of slack for cable, based on depth of raised floor	
If cable runs down from a	
<input checked="" type="checkbox"/> single enclosure, or base enclosure in a double-high stack, add 25 inches	+ <u>25 in</u>
<input type="checkbox"/> stacked enclosure in a double-high stack, add 59 inches	
<input type="checkbox"/> If cable runs in overhead cable trough	+ _____
Distance from top of cabinet to cable trough	
If cable runs up from a	
<input type="checkbox"/> stacked enclosure in a double-high stack, add 20 inches	+ _____
<input type="checkbox"/> single enclosure, or base enclosure in a double-high stack, add 54 inches	
<input type="checkbox"/> If you tie the cable down, then stretch it across the service side of its enclosure to the other cable trough before routing it across a row to another enclosure, add the appropriate length:	+ <u>99 in</u>
To a horizontally adjacent enclosure, 75 inches	
To a vertically adjacent enclosure, 99 inches	
To a diagonally adjacent enclosure, 114 inches	
For each additional intervening enclosure, add 23 inches	
<input type="checkbox"/> If the enclosures are placed with their service sides facing each other, subtract 31 inches	- _____
<input type="checkbox"/> If the enclosures are placed with their appearance sides facing each other, add 31 inches	+ _____
<input type="checkbox"/> If this cable will be bundled with a large number of other cables, add extra slack. For information about what is appropriate for your configuration, contact your service provider.	+ _____
Total Cable Length	<u>233 in = 19.42 feet</u>
Cable Part Number	<u>130033</u>

VST379.vsd

VST204.vsd

IOAM Worksheets

The IOAM worksheets are available to your HP trained service provider in the *Modular I/O Installation and Configuration Guide*.

Final Planning Checklist

Use the Final Planning Checklist to determine whether you have done all planning that must be done before you are ready to install or upgrade your system. Check off each item as you complete it and enter the date when you are done.

Example of a Final Planning Checklist

Final Planning Checklist	System Name <u>\Case1</u> Date <u>06</u> / <u>22</u> / <u>99</u>
<input checked="" type="checkbox"/> Raised floor, if necessary, including cable cutouts <input checked="" type="checkbox"/> Air conditioning <input checked="" type="checkbox"/> Adequate lighting <input type="checkbox"/> Fire and safety provisions <input type="checkbox"/> Electrical outlets for system enclosures <input type="checkbox"/> Electrical outlets for subsystems or peripheral devices <input type="checkbox"/> Electrical utility outlets <input type="checkbox"/> Direct communication line for the system console modem <input type="checkbox"/> Communications lines for other modems <input type="checkbox"/> Data communications lines and local area network wiring <input type="checkbox"/> Work area available near the installation site for unpacking equipment <input type="checkbox"/> Installation site is clear objects and debris <input type="checkbox"/> Delivery route, including door and hallway clearance, elevators <input type="checkbox"/> Personnel to help move equipment (two are required to move double-high stacks) <input type="checkbox"/> Required tools: <input type="checkbox"/> Equipment to move shipping pallets <input type="checkbox"/> Heavy freight handling equipment <input type="checkbox"/> Safety eye glasses <input type="checkbox"/> Scissors or cutters to cut banding straps <input type="checkbox"/> Phillips screwdriver <input type="checkbox"/> Stubby Phillips screwdriver <input type="checkbox"/> Small slotted screwdriver <input type="checkbox"/> 3/4-inch (19-mm) open end wrench (system enclosure legs) <input type="checkbox"/> 15/16-inch (24-mm) open end wrench (modular storage system pedestal legs) <input type="checkbox"/> Labels and pens to mark cables	
VST 961.vsd	

VST 962.vsd

Finish Planning

After you complete the Installation Document Packet:

- 1. If you completed this Installation Document Packet while planning for an upgrade, update all copies of the original Installation Document Packet.
- 2. File a copy of the Installation Document Packet for future reference.
- 3. Distribute copies of the Installation Document Packet as needed.

This person ...	Might Use the Installation Document Packet for
Installer	Installing or upgrading hardware
Configuration planner	Modifying the system configuration file
Support planner	Planning startup files, shutdown files, and procedures
Operator	Troubleshooting

14 Planning for CRU Replacement

When you replace a CRU online, you must prepare all elements in the system that are affected by the removal of that CRU, such as other CRUs and processes. Use the procedure in this section and worksheets to determine which components of a system are affected by removal of a PMF CRU, SEB, or MSEB.

To replace a PMF CRU, SEB, or MSEB, you must use a guided replacement tool which automatically detects the affected components and prepares the system for CRU replacement. See the [Service Management Packages](#) on page 1-35 for guided replacement tools which contain online help topics.

For more information about the pathways, see [ServerNet Communication Pathways](#) on page 6-1.

[ServerNet Communication Pathways Worksheets](#) [14-1](#)

[Completing the Worksheets](#) [14-3](#)

ServerNet Communication Pathways Worksheets

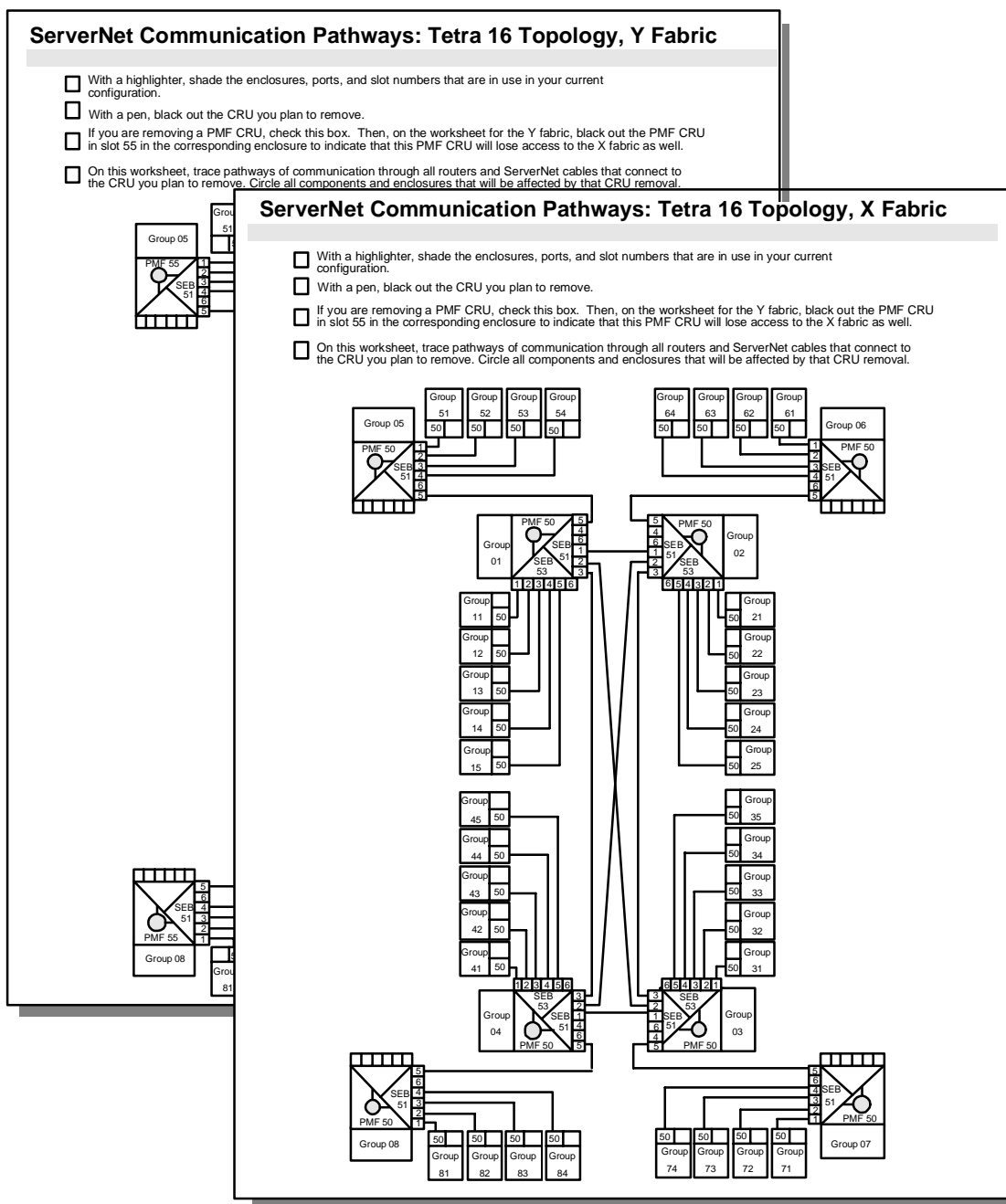
The ServerNet communication pathways worksheets help you trace the ServerNet communication pathways in your system so that you can determine which components and enclosures would be affected by the removal of a PMF CRU, SEB, or MSEB.

Copy the appropriate worksheets from [Appendix C, Blank Forms](#).

System Topology	Copy These Worksheets
Tetra 8	ServerNet Communication Pathways: Tetra 8 Topology
Tetra 16	ServerNet Communication Pathways: Tetra 16 Topology, X Fabric or ServerNet Communication Pathways: Tetra 16 Topology, Y Fabric

Note. The worksheets illustrate the maximum configuration of each topology; your system might contain fewer components or enclosures.

This figure shows the worksheets for the X and Y fabrics for a system configured as a Tetra 16 topology.



VST392.vsd

Completing the Worksheets

An example illustrates the steps for completing the ServerNet communication pathways worksheets. The example system is a Tetra 16 system containing the following enclosures:

01, 11, 12, 13, 14, 15

02, 21, 22, 23, 24, 25

03, 31, 32, 33, 34, 35

04, 41, 42, 43, 44, 45

05, 51, 52, 53, 54

06, 61, 62, 63, 64

In this example, the SEB will be removed from group 02, slot 51 (the X fabric).

To complete any ServerNet communication pathways worksheet:

[1. Highlight All System Enclosures](#)

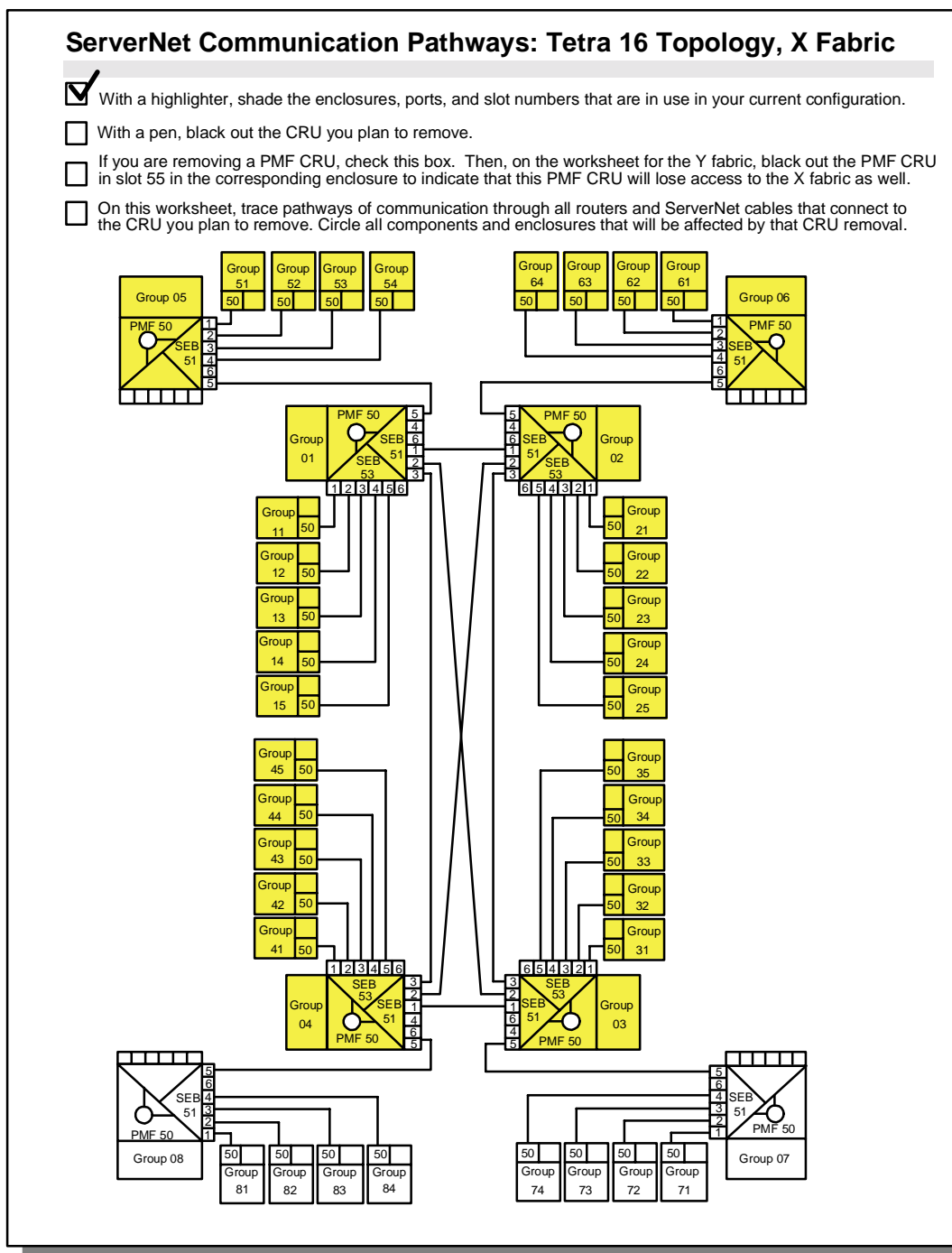
[2. Black Out the CRU to Be Removed](#)

[3. Trace Unaffected Pathways](#)

[4. Draw a Line Around Affected Groups](#)

1. Highlight All System Enclosures

Using a highlighter, highlight all the enclosures your system currently contains. Put a check mark in the first box.

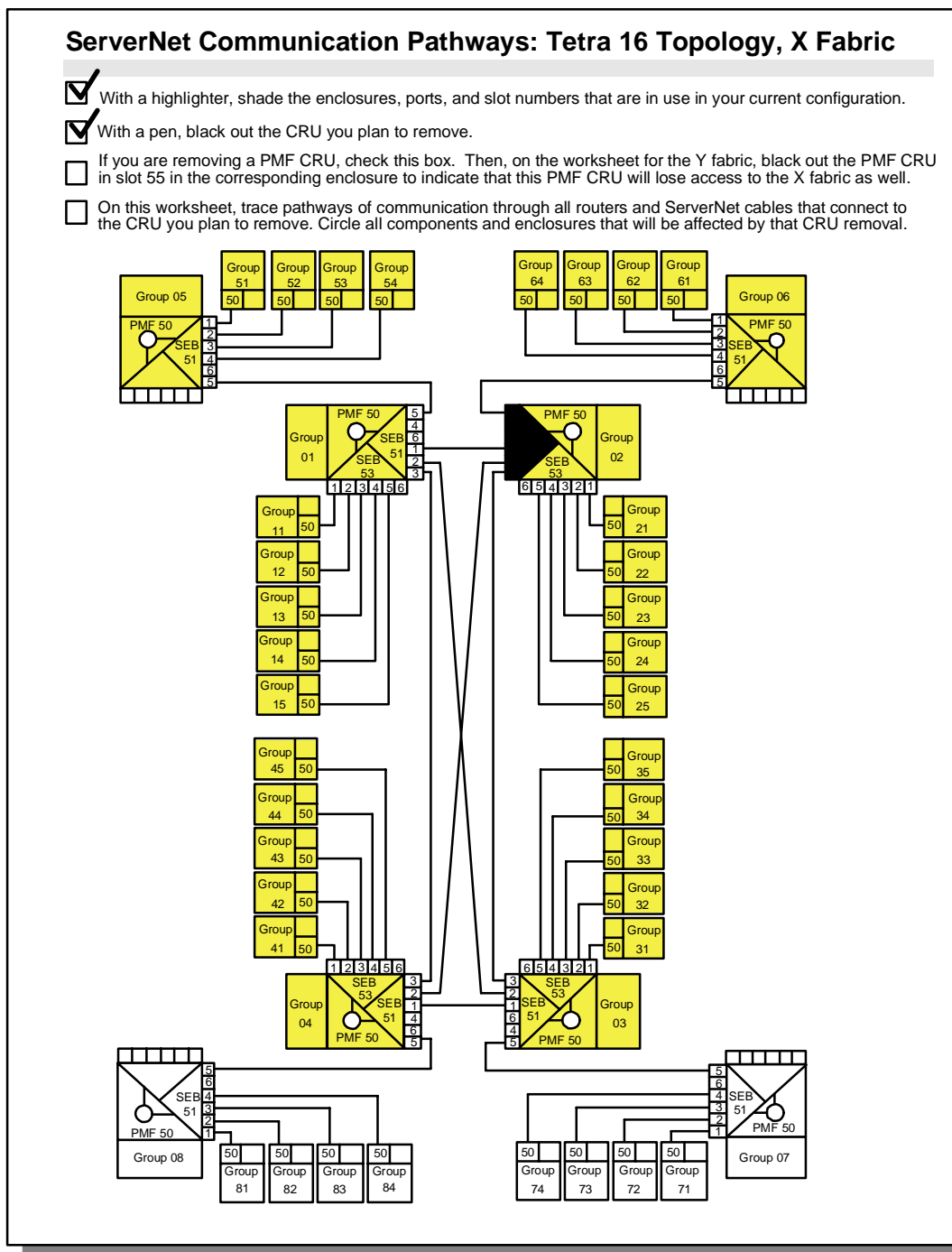


VST393.vsd

2. Black Out the CRU to Be Removed

Black out the CRU you plan to remove. Put a check mark in the second box.

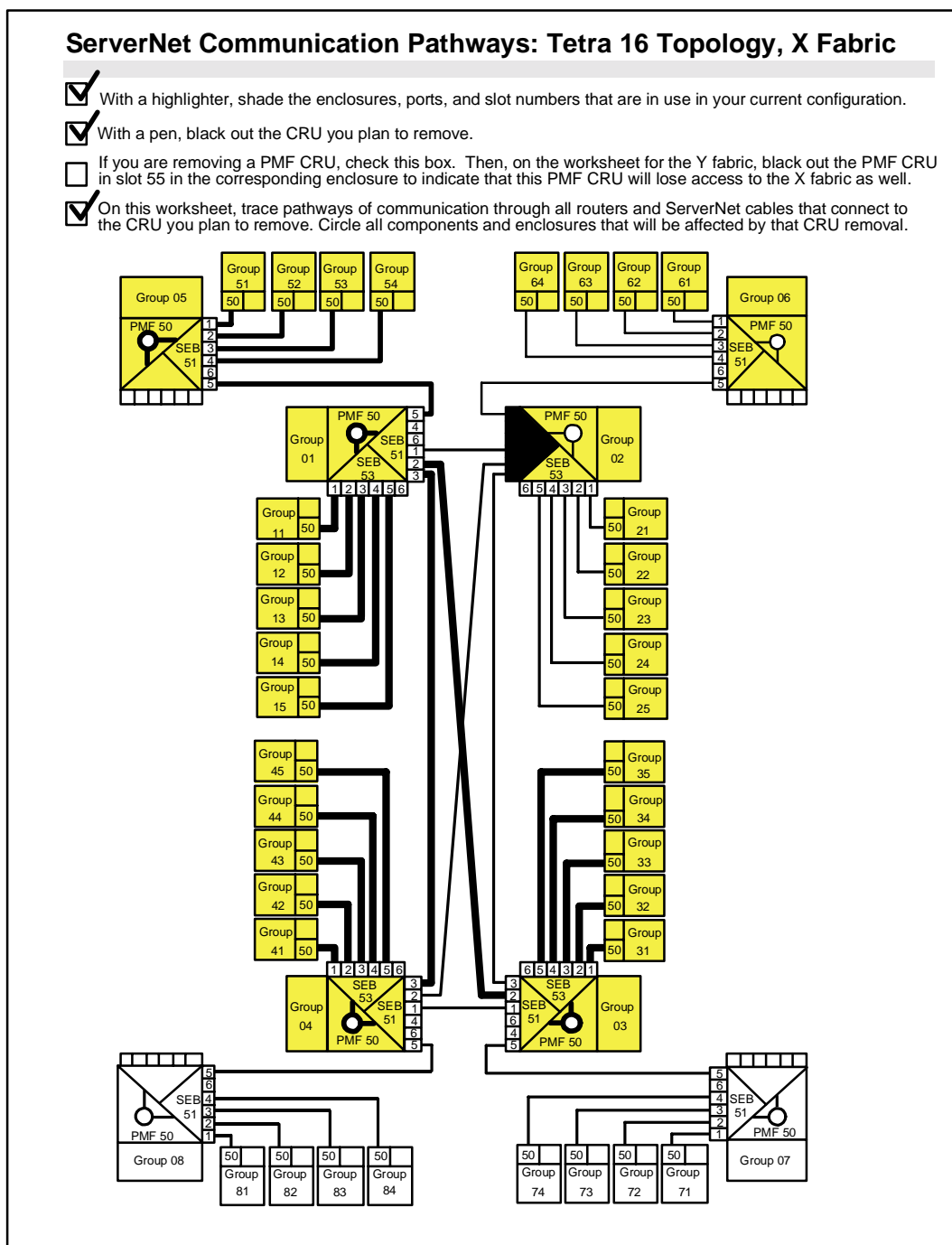
If you are removing a PMF CRU, put a check mark in the third box and black out the PMF CRU shown in the same enclosure on the worksheet for the other fabric. The other PMF CRU in the same enclosure will also lose access to this fabric.



VST394.vsd

3. Trace Unaffected Pathways

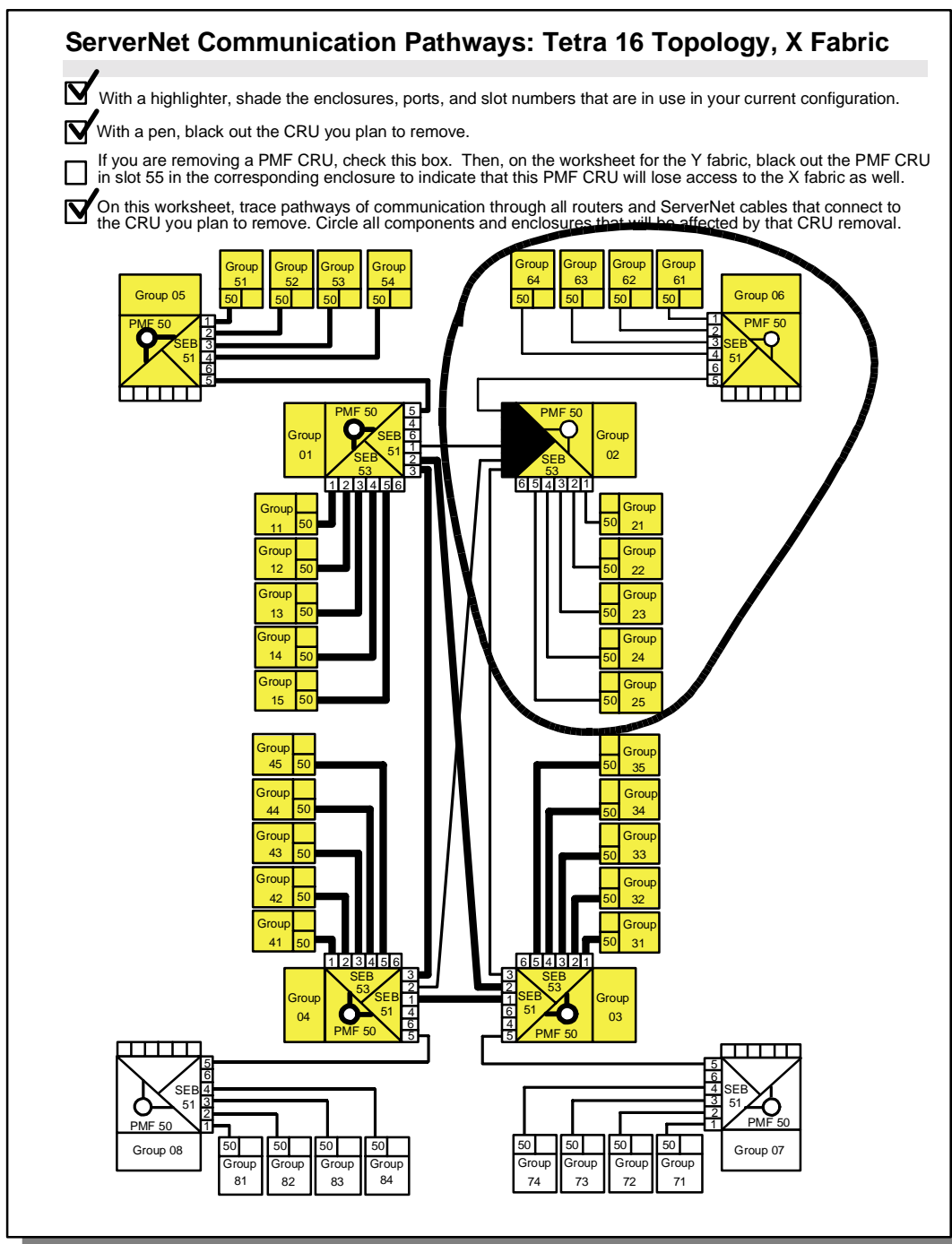
Darken the pathways of communication that remain on your system with a heavy line.



VST395.vsd

4. Draw a Line Around Affected Groups

Draw a line around the groups that cannot be reached when the CRU is removed, indicated by the pathways that are not darkened. Put a check mark in the last box.



VST396.vsd

In this example, the affected groups are groups 02, 21, 22, 23, 24, 25, 06, 61, 62, 63, and 64.

Planning for System Configuration

When you install a new system or change the configuration of a system, you must plan configuration tasks in advance.

This section provides an overview of configuration tasks. Detailed instructions for performing the configuration tasks are located in the *NonStop S-Series Hardware Installation and FastPath Guide* or other manuals referred to here for related configuration needs.

-
- △ **Caution.** IOAM enclosures and related components must be installed by HP trained service providers. Information is available to your HP trained service provider in the *Modular I/O Installation and Configuration Guide*.
-

Configuring a NonStop S-series system involves:

- Offline configuration tasks
- Online configuration tasks
- Creating Startup and Shutdown files

Offline Configuration Tasks

A few configuration changes must be made offline. Some online PMF CRU upgrades are not allowed. For upgrades that can be made online, see [Compatibility of PMF CRUs](#) on page 4-44. No others are supported.

Offline changes are usually performed during a planned outage. For more information about planned outages, see [Section 10, Planning for System Availability and Support](#).

Application Reconfiguration

Reconfiguring an application can sometimes require that the application be taken offline. A discussion of application reconfiguration is beyond the scope of this guide. However, the *Availability Guide for Application Design* provides information on designing highly available applications.

Installing a New RVU

HP currently requires that you shut down your system to activate a new RVU. By using the Distributed Systems Management/Software Configuration Manager (DSM/SCM), your current system can continue to run while you create a new SYS_{nn}. You have to shut down the system only to perform the system load.

To install a new RVU, perform the tasks described in the *G06.xx Software Installation and Upgrade Guide*.

Installing a Product Revision

A product revision, such as an SPR, might include one or more fixes to programs supplied by HP, or it might contain code that adds new function to an HP software product. Installing a product revision might or might not require that the system be shut down. Follow the installation instructions provided with the product revision. The *DSM/SCM User's Guide* describes installing product revisions in detail.

Using TSM instead of OSM

HP Manufacturing sets the initial system configuration so that OSM is enabled on the system and TSM is disabled. This includes disabling power scrub and processor alarms by TSM. If you want to use TSM instead of OSM, instructions are available in “TSM Coexistence and Fallback” in the OSM Migration Guide.

Changing the System Name, System Number, or Time Attributes

After the first system load, use SCF to modify the values for the following system attributes:

- SYSTEM_NAME
- SYSTEM_NUMBER
- TIME_ZONE_OFFSET
- DAYLIGHT_SAVINGS_TIME

Refer to the *SCF Reference Manual for the Kernel Subsystem*.

Because the attributes that change the system name and Expand system (node) number are stored in a SEEPROM in the enclosure backplane, changes to them require a system reset and reload to take effect. If you do not modify these attribute values, they default to the values shipped by HP:

SYSTEM_NAME	\NONAME
SYSTEM_NUMBER	254
TIME_ZONE_OFFSET	0:00 (London)
DAYLIGHT_SAVINGS_TIME	NONE

-
- △ **Caution.** Changing the system name or Expand system (node) number is intended for a newly installed system. If you change the system name or system number on an existing system and are running complex applications such as NonStop SQL/MP, TMF, or HP NonStop Open System Services (OSS), you must reconfigure the applications and take additional precautions to avoid losing data.
-

Changing the System Topology

To change the topology of a system, you must shut down the system. The *NonStop S-Series System Expansion and Reduction Guide* gives complete information about the procedures necessary to reconfigure your system offline.

Changing the CONFTEXT File

Any changes to the CONFTEXT file take effect after the next system load. If you want to modify the CONFTEXT file, refer to the *System Generation Manual for G-Series RVUs*.

You can generate a new operating system by modifying the CONFTEXT file using DSM/SCM. Refer to the *DSM/SCM User's Guide*.

Online Configuration Tasks

Subsystem Control Facility (SCF)

The Subsystem Control Facility (SCF) configures, controls, and collects information about subsystems and the objects (devices, subdevices, processes, and so forth) belonging to each subsystem.

Using SCF commands, you can:

- Add, alter, or delete objects (such as I/O processes or generic processes) in the system configuration
- Obtain configured or current information about objects

System configuration changes that are made online using SCF take effect as soon as the object is restarted (using the SCF START command). For subsystems that are new for the G-series, these changes are permanent; that is, they persist through processor and system loads (unless you load the system with a different configuration file). Refer to the *SCF Reference Manual for G-Series RVUs*.

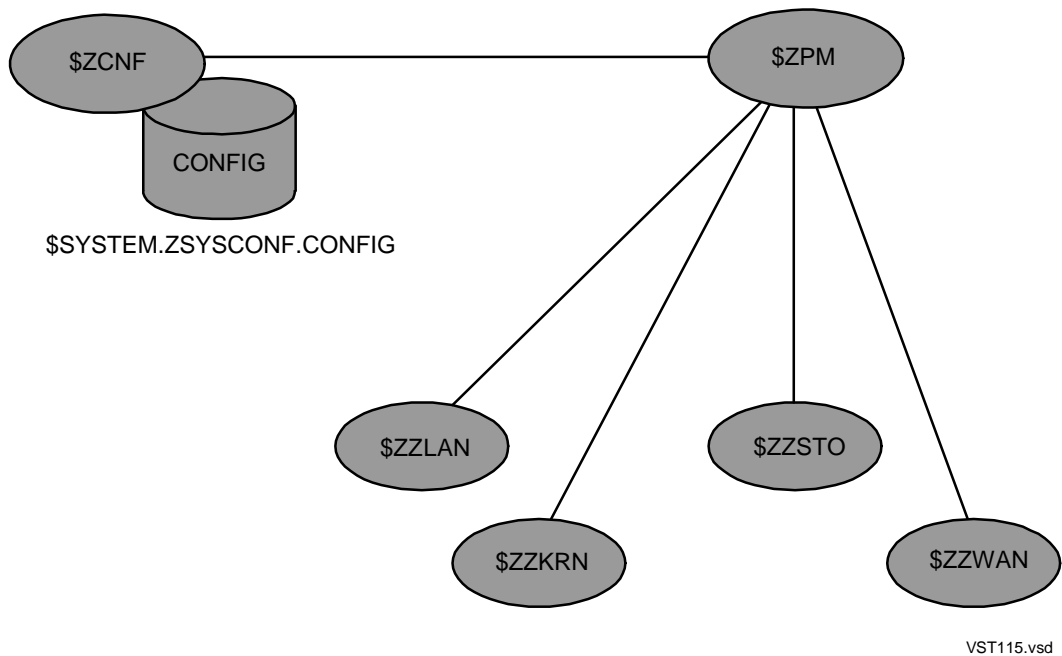
Initial CONFIG file

When a system is delivered, the \$SYSTEM.ZSYSCONF.CONFIG file contains a standard system configuration created by HP. The contents of this file, called the initial CONFIG file, are described in [Section 8, Initial Configurations](#).

This initial CONFIG file is also saved on your system as the ZSYSCONF.CONF0000 file. For example displays from the CONF0000 file. Refer to the *SCF Reference Manual for G-Series RVUs*.

Subsystems Running a G-Series RVU

A system running a G-series RVU has multiple subsystems that handle the configuration and management of subsystem-specific generic processes, I/O processes, and system hardware. This illustration provides an overview of the configuration components in these systems:



The configuration components are:

Component	Function
CONFIG system configuration database file	Contains information about the location and characteristics of all system components. This file is on the \$SYSTEM.ZSYSCONF subvolume.
\$ZCNF configuration utility process	Is the database server for the subsystem managers and monitor processes. Controls access to the system configuration database. Manages requests for information about the CONFIG file. Starts and maintains the \$ZPM persistence manager process.
\$ZPM persistence manager process	Starts and maintains persistence of subsystem managers and monitor processes. Starts, stops, and (optionally) restarts generic processes. Coordinates system load and processor reload activities.
Subsystem managers and monitor processes	Configure and control subsystem devices.

Each subsystem manager or monitor process is started by the \$ZPM persistence manager process at system load and has the following functions:

- Creates I/O processes and other manager processes within the subsystem
- Configures subsystem objects such as adapter hardware and the ServerNet addressable controllers (SACs) supported by those adapters
- Identifies the names of processes that must be reserved at system load
- Monitors its processes to immediately re-create any process that has terminated (if it was configured to be persistent)

Each configuration manual listed in [Generic Process Manuals](#) on page E-4 describes a subsystem, the objects the subsystem supports, and how to configure those objects.

Generic Processes

Generic processes can be created by the operating system or by a user. Examples of generic processes created by a user are an HP program, a third-party program, or a user-written program that you configure to be controlled by the operating system.

When the system is started, all generic processes that are configured to be persistent are started automatically by the \$ZPM persistence manager or by the subsystem manager, which is started by \$ZPM.

For more information about generic processes, refer to the *SCF Reference Manual for the Kernel Subsystem*.

Making Important Processes Persistent

You can make important system processes, such as the Expand manager process or the Subsystem Control Point (SCP) process, start automatically at system load and be persistent (that is, restart automatically if stopped abnormally) by creating them as generic processes in the system configuration database and specifying the AUTORESTART parameter. Refer to the *NonStop S-Series Hardware Installation and FastPath Guide*.

Types of System Configuration Files

On systems running G-series RVUs, most I/O processes are not prebuilt by SYSGENR. Instead, the subsystems place information about these processes in the system configuration database.

On systems running G-series RVUs, the SYS_{nn}.OSCONFIG file contains only Software Problem Isolation and Fix Facility (SPIFF) and Software ID (SWID) records.

On systems running G-series RVUs, the system configuration database files are stored on the \$SYSTEM.ZSYSCONF subvolume, independent of the SYS_{nn} subvolume that the operating system is running on.

The system configuration files used on systems running G-series RVUs are:

On the \$SYSTEM.SYS_{nn} subvolume:

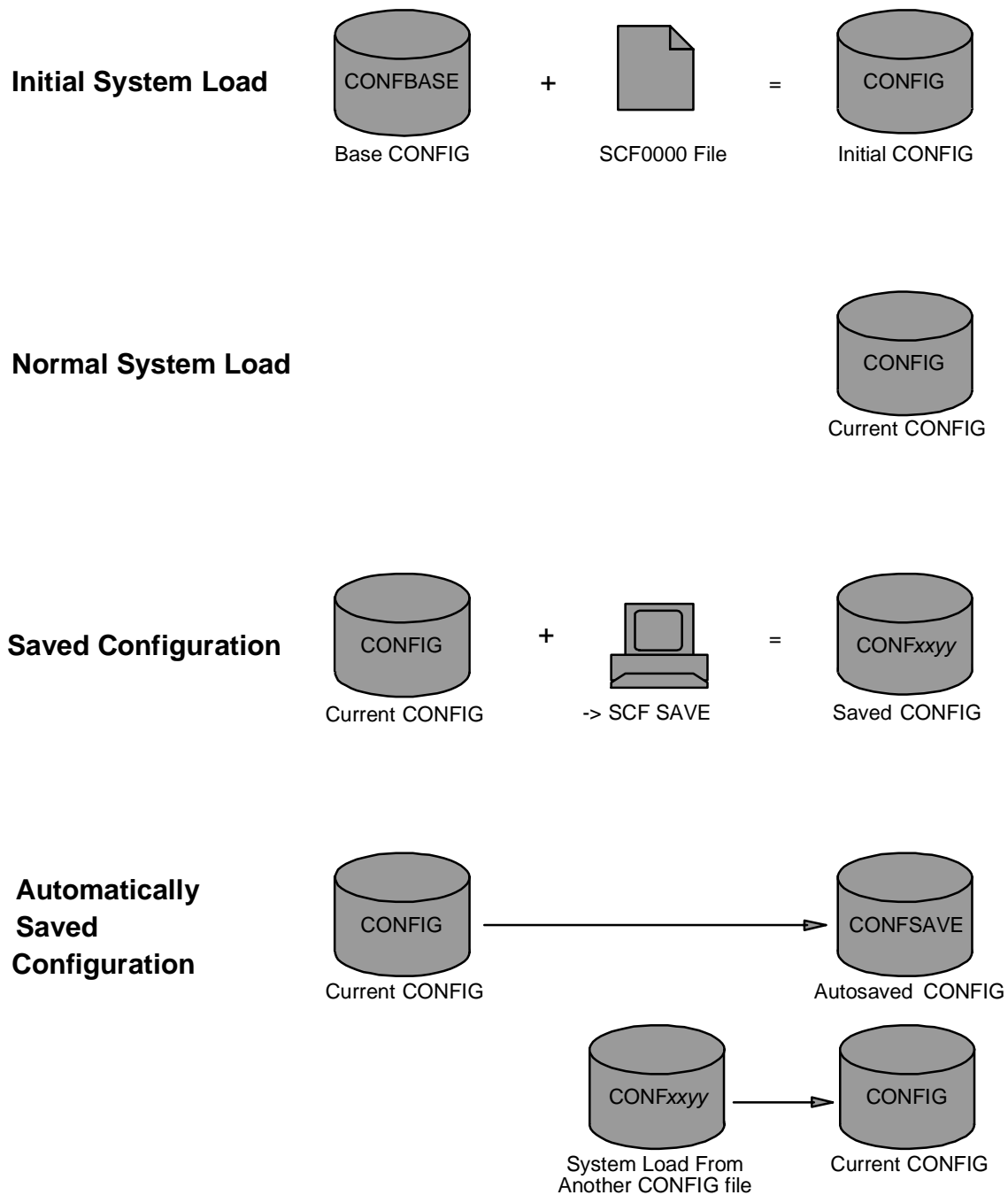
File Type	File Name	Description
Base CONFIG	CONFBASE	Contains the minimal configuration to load the system. You use this file when you want to rebuild the system configuration from the absolute minimum configuration.

On the \$SYSTEM.ZSYSCONF subvolume:

File Type	File Name	Description
Input to initial CONFIG	SCF0000	Is used to create the CONF0000 file, which HP uses to configure and test a standard system before shipment.
Current CONFIG	CONFIG	Contains the current system configuration.
Saved CONFIG	CONF _{xxyy}	Contains a copy of a CONFIG file, saved for future use. You can use one of these files to return to an earlier, stable configuration. The file-naming convention is to let <i>xx</i> indicate a major configuration change and <i>yy</i> indicate a minor change.
Autosaved CONFIG	CONFSAVE	Contains a saved version of the current CONFIG file that the operating system automatically creates when you load the system from a saved CONFIG file. If you load the system from CONFBASE or a CONF _{xxyy} file to abandon a corrupt configuration, HP can analyze the corrupt configuration file to determine the reason for the corruption. If the CONFSAVE file is not corrupt, you can use it to reload the system if you first rename it to CONF _{xxyy} .

For instructions on how to select a system configuration file during system load, refer to the *OSM Migration Guide* or *TSM Configuration Guide*.

This figure illustrates the differences between the types of system configuration files:



VST911.vsd

Kernel-Managed Swap Facility (KMSF)

Kernel-managed swap space manages virtual memory using swap files controlled by the operating system. Pages of memory not currently in use are *swapped*, or copied, to disk during a shortage of available physical memory. These memory pages are swapped back or overwritten to physical memory when the code or data are needed. When swapped to disk, the data are stored in *swap files*. Through the Kernel-Managed Swap Facility (KMSF), the operating system opens one or more swap files for each processor and manages the files for all the processes needing them. Proper configuration and management of kernel-managed swap space is critical to the operation of your system.

When you set up a new system, you must configure KMSF swap files. Using the guidelines provided in the *Kernel-Managed Swap Facility (KMSF) Manual*, you must decide:

- How much swap space to configure
- Where to place swap files
- What guidelines you need to create for operations staff to monitor and alter swap files

Initial Configuration of KMSF Swap Files

New systems are initially configured with these default KMSF swap files:

Attribute	Value
Location	\$SYSTEM
Number	1 swap file for each processor
Name	\$SYSTEM.ZSYSSWAP.SWAP _{nn} , where <i>nn</i> is the processor number
Size	128 MB with at least 64 MB allocated

Changing the Configuration of KMSF Swap Files

You must change the configuration of KMSF swap files if:

- Your system is using the default swap file configurations. These configurations are minimums for system load. To run most applications, you need to configure additional swap files for your system.
- You want to increase the number or size of your swap files.
- You want to change the location of one or more swap files.

The *Kernel-Managed Swap Facility (KMSF) Manual* describes how to configure KMSF swap files.

KMSF and the Operations Environment

KMSF affects routine operations. Operations staff must monitor KMSF and operator messages to spot potential problems and dynamically add swap space as needed. Event Management Service (EMS) messages are generated to alert staff to swap files that have reached a configured threshold and to changes in KMSF configuration.

OSM Package

The HP Open System Management (OSM) product replaces TSM as the system management tool of choice for NonStop S-series systems. OSM applications perform all of the same functions that TSM does. However, OSM offers a browser-based interface that improves scalability and performance and overcomes other limitations that exist in TSM. TSM is still supported, but OSM is required to support new functionality in G06.21 and later. For example, OSM is required to support 6780 ServerNet switches in ServerNet clusters, Online Disk Remirroring (ODR), IOAM enclosures, and Fibre Channel disk-drive enclosures.

For more information on the OSM package, including a description of the individual applications and how they differ from their TSM counterparts, see the *OSM Migration Guide* and the *OSM User's Guide*.

TSM Package

The TSM package is a collection of software products that provide troubleshooting, maintenance, and service tools.

Using the TSM package, you can make the following configuration changes online:

- Verify and update firmware for components.
- Implement remote monitoring and maintenance functions.
- Specify the IP addresses of the system consoles, other workstations, and the master service processors.

Using the TSM Notification Director Application and the TSM Low-Level Link Application, you can configure:

- User names and passwords for the TSM package (recommended for security)
- Remote dial-in access to the system from a service provider
- Remote access from the system to an unattended line
- Remote dial-out access from the system to a service provider
- IP addresses for the dedicated TSM local area network (LAN)

For more information, refer to the *TSM Configuration Guide*. For the information you need to configure remote access, contact your service provider.

For information about performing these configuration changes using TSM, refer to:

- *TSM Configuration Guide*
- *TSM Low-Level Link Application online help*
- *TSM Notification Director Application online help*
- *TSM Online User Guide*

Note. TSM does not support IOAM or Fibre Channel disk drive enclosures.

Creating an Alternate System Disk

Reasons to create an alternate system disk include:

- You can minimize unplanned outage minutes by having an alternate system disk configured as a backup.
- You can avoid a planned outage by configuring an alternate system disk to use in case you must stop your current system disk.
- You can use the alternate system disk to keep your system running while the main system disk is offline.

For more information, see the *DSM/SCM User's Guide* or the *NonStop S-Series Hardware Installation and FastPath Guide*.

Startup and Shutdown Files

Automating System Startup

You can use startup command files to automate the starting of devices and processes on the system, which minimizes the possibility of operator errors caused by forgotten or mistyped commands. The system is shipped with a basic startup file named CIIN, located on the \$SYSTEM.SYS00 subvolume.

After the commands in the CIIN file are executed, other startup files can be invoked either automatically, from another startup file, or manually, in commands entered by the operator. The startup file sequence usually starts the spooler and other system software first and then starts applications.

The sequence in which you invoke startup files can be important. Some processes require other processes to be running before they can be started.

Because the TCP/IP configurations are not stored in the configuration database, they are not preserved after system loads. Therefore, TCP/IP stacks must be configured as well as started each time the system is started.

Automating System Shutdown

Automating system shutdown with a collection of shutdown files helps the operator bring the system to an orderly halt. The shutdown file sequence reverses the order of commands in the startup file sequence: applications are shut down first, followed by the spooler and other system software.

Processes That Represent the System Console

On NonStop S-series servers, the system console is a pair of windows on a LAN-connected system console. It is represented by the processes \$YMIOP.#CLCI and \$YMIOP.#CNSL.

The home terminal is represented by the \$ZHOME process pair. Instead of \$ZHOME, you might want to use the optional NonStop Virtual Hometerm Subsystem (VHS) product.

For more information, refer to the *NonStop S-Series Hardware Installation and FastPath Guide*.

CIIN File

The CIIN file contains a limited set of commands that usually:

- Start a TACL process pair on the system console for the system console TACL window (\$YMIOP.#CLCI)

The OSM or TSM client software allows you to define primary and backup IP addresses for the TACL windows. For more information about configuring OSM or TSM software, refer to the *OSM User's Guide* or *TSM Configuration Guide*.

- Load all processors that are not currently running or can reload a minimal set of processors (such as processor 1) to bring up a minimal system.

The CIIN file is initially configured at the factory as \$DSMSCM.SYS.CIIN. You do not need to do anything to establish this file. DSM/SCM automatically copies the CIIN file from the initial location to each SYS_{nn} you create. For more information, refer to the *NonStop S-Series Hardware Installation and FastPath Guide*.

Process Persistence

When the system is started, all processes that are configured to be persistent are started automatically by the \$ZPM persistence manager or by the subsystem manager, which is started by \$ZPM.

To make important system processes such as the Expand manager process or the Subsystem Control Point (SCP) process start automatically at system load and be

persistent, create them as generic processes in the system configuration database as described in the *NonStop S-Series Hardware Installation and FastPath Guide*.

For more information about persistence and the \$ZPM persistence manager, refer to the *SCF Reference Manual for G-Series RVUs*.

Adding Super-Group User IDs

After you determine that the system is performing correctly, you can add the super-group user IDs for your local operators and your service provider, such as the GCSC. For information about adding user IDs and setting default characteristics for user IDs, see the *Guardian User's Guide*.

Part III. Appendixes

These appendixes provide part numbers for all CRUs; system specifications; blank system installation forms; examples of how to plan, cable, and configure systems; lists of manuals and online help for NonStop S-series servers; and information about supported hardware and configurations.

Appendix	Title	Abstract
A	Part Numbers	This appendix lists the part numbers for all CRUs used on NonStop S-series servers.
B	Specifications	This appendix describes system specifications.
C	Blank Forms	This appendix contains blank system installation forms in alphabetic order by title.
D	Case Study: ServerNet Cable Lengths	This case study documents the planning and installation of ServerNet cables in a NonStop S70000 system for a fictitious company.
E	Guide to Server Manuals	These manuals support the HP NonStop S-series hardware. Abstracts for these manuals begin on the next page. Generic process manuals are listed, without abstracts, on page E-4.
F	Supported Hardware and Configurations	This appendix list the devices and peripherals currently supported by NonStop S-series servers for this RVU.
G	Modular Power Information	This appendix refers the reader to the <i>HP NonStop System Glossary</i> in NTL.

A Part Numbers

Part numbers for NonStop S-series servers are located in the NTL Hardware Service and Maintenance collection. In NTL, follow this path:

NTL Support and Service > Service Information > Part Numbers

Note. These are links to parts numbers:

- NTL Customer Site:
<http://h30163.www3.hp.com/NTL/view/?id=090015ea8016b821&p=800-83f/090015ea8016b821/gen00952.htm&toc=y>
 - NTL Employee Site:
<http://techlibrary.cac.cpqcorp.net/NTL/view/?id=090015ea8016b821&p=800-83f/090015ea8016b821/gen00952.htm&toc=y>
-

Customers who encounter a prompt for an eServices logon can use the same logon that is used for Scout.

B Specifications

This appendix describes system specifications.

<u>Batteries</u>	<u>B-2</u>
<u>Battery Voltage and Amperage</u>	<u>B-2</u>
<u>Battery Disposal and Recycling in the United States</u>	<u>B-2</u>
<u>Cables</u>	<u>B-3</u>
<u>ServerNet Cables for Same-Row Connections</u>	<u>B-3</u>
<u>Fiber-Optic Cables</u>	<u>B-6</u>
<u>Modified System Enclosures</u>	<u>B-6</u>
<u>Enclosure Dimensions</u>	<u>B-7</u>
<u>Dimensions of System Components</u>	<u>B-7</u>
<u>Dimensions of Enclosures and Service Aisles</u>	<u>B-8</u>
<u>Dimensions Within an Enclosure (Service Side)</u>	<u>B-9</u>
<u>Enclosure Specifications</u>	<u>B-10</u>
<u>Weights for System Enclosures</u>	<u>B-10</u>
<u>AC Power Requirements for One System Enclosure</u>	<u>B-11</u>
<u>Environmental Specifications for One System Enclosure</u>	<u>B-11</u>
<u>Processor Types</u>	<u>B-12</u>
<u>Memory Sizes for Each Model of Processor</u>	<u>B-12</u>
<u>Internal Disk Drives</u>	<u>B-13</u>
<u>MSEB PICs</u>	<u>B-13</u>
<u>Weight of Selected Components</u>	<u>B-13</u>
<u>IOAM Enclosure</u>	<u>B-14</u>
<u>This subsection contains these specifications:</u>	<u>B-14</u>
<u>Dimensions for an IOAM Enclosure</u>	<u>B-15</u>
<u>Modular Cabinet</u>	<u>B-16</u>

Batteries

The batteries in NonStop S-series processor enclosures and I/O enclosures are identical.

A battery contains:

- Nonreplaceable fuses for short-circuit protection
- 24 sealed, cylindrical, lead-acid cells

Battery Voltage and Amperage

- Each cell is rated at 2.5 ampere-hours.
- The 24 cells in each battery are partitioned into two groups of 12 cells each (24 volts in each group).
- A power monitor and control unit (PMCU) connects the two cell groups in series to form a -48 (minus 48)-volt string.

Battery Disposal and Recycling in the United States

Federal Regulations

United States federal legislation requires that spent lead-acid batteries be managed in the following ways:

If Spent Battery Is to Be ...	It Is ...	In Compliance With ...
Disposed of	Managed as hazardous waste	40 CFR parts 260 through 272
Recycled	Sent for reclamation	40 CFR part 266, subpart G

State and Local Regulations

Many states and cities require that lead batteries be recycled, or they have restrictions on or have completely banned the disposal of lead batteries with municipal solid waste.

For information about recycling spent batteries in the United States, contact your service provider. Batteries are FRUs and must be serviced by trained service providers.

Cables

ServerNet Cables for Same-Row Connections

This subsection lists which ServerNet cables you need for connections between two enclosures that are in the same row in your system.

For Information About ...	Refer to ...
Definitions and illustrations of terms used in these tables	Section 7, Enclosure Arrangements and Cable Connections
Choosing cable lengths for enclosures in different rows	Section 7, Enclosure Arrangements and Cable Connections
Worksheets for choosing cable lengths	Appendix C, Blank Forms
An example of how to choose cable lengths	Appendix D, Case Study: ServerNet Cable Lengths

Cable slack is 6 inches (15.25 cm) for a single cable in any enclosure.

Extra cable length allows cable to bend to attach to connector. If you are tying together a large group of cables, you will need extra slack in each cable in that group. How much slack you need depends on the size of that group of cables. For more information, contact your service provider.

SEB-to-SEB Connections in Same Row

You need these ServerNet cables for each SEB-to-SEB connection within a row of enclosures.

Arrangement of Enclosures	Distance Between Connections		Cable Length Required		Part Number			
	Feet	Meters	Feet	Meters	ECL SEB to SEB	ECL SEB to M5EB	ECL M5EB to M5EB	Serial Copper
Spaced								
Vertically								
0	8.2	2.5	8.2	2.5	U26027	427047	427029	427226
Horizontally								
0	5.2	1.6	5.2	1.6	U26026	427045	427027	427224
1	7.5	2.3	8.2	2.5	U26027	427047	427029	427226
2	9.4	2.9	9.8	3.0	U24316	427048	427030	421580
3	11.2	3.4	13.1	4.0	U24317	427049	427031	427227
4	13.1	4.0	13.1	4.0	U24317	427049	427031	427227
5	14.9	4.5	16.4	5.0	U24319	427050	427032	421581
6	16.7	5.0	19.7	6.0	U30033	427051	427033	427228
7	18.6	5.7	19.7	6.0	U30033	427051	427033	427228
8	20.4	6.2	23.0	7.0	U30034	427052	427034	427229
9	22.2	6.8	23.0	7.0	U30034	427052	427034	427229
10	24.1	7.3	26.2	8.0	U30035	427053	427035	427230
Diagonally								
0	8.2	2.5	8.2	2.5	U26027	427048*	427030	421580
1	11.2	3.4	13.1	4.0	U24317	427049	427031	427227
2	13.1	4.0	13.1	4.0	U24317	427049	427032	427227
3	14.8	4.5	16.4	5.0	U24319	427050	427032	421581
4	16.7	5.1	19.7	6.0	U30033	427051	427033	427228
5	18.5	5.6	19.7	6.0	U30033	427051	427033	427228
6	20.3	6.2	23.0	7.0	U30034	427052	427034	427229
7	22.2	6.8	23.0	7.0	U30034	427052	427034	427229
8	24.0	7.3	26.2	8.0	U30035	427053	427035	427230
9	25.9	7.9	26.2	8.0	U30035	427053	427035	427230
10	27.7	8.4	29.5	9.0	U30036	427054	427036	427231

SEB-to-IOMF CRU Connections in Same Row

You need these ServerNet cables for each SEB-to-IOMF-CRU or MSEB-to-IOMF CRU connection within a row of enclosures.

Arrangement of Enclosures	Distance Between Connections		Cable Length Required		Part Number			
	Feet	Meters	Feet	Meters	ECL SEB to IOMF	ECL SEB to IOMF 2	ECL MSEB to IOMF 2	Serial Copper
Spaced								
Vertically								
0	8.2	2.5	8.2	2.5	U26027	427047	427029	427226
Horizontally								
0	6.2	1.9	8.2	2.5	U26027	427047	427029	427226
1	8.2	2.5	8.2	2.5	U26027	427047	427029	427226
2	10.0	3.1	9.8	3.0	U24316	427048	427030	421580
3	11.9	3.6	13.1	4.0	U24317	427049	427031	427227
4	13.7	4.2	16.4	5.0	U24319	427050	427032	421581
5	15.6	4.7	16.4	5.0	U24319	427050	427032	421581
6	17.4	5.3	19.7	6.0	U30033	427051	427033	427228
7	19.2	5.9	19.7	6.0	U30033	427051	427033	427228
8	21.1	6.4	23.0	7.0	U30034	427052	427034	427229
9	22.9	7.0	23.0	7.0	U30034	427052	427034	427229
10	24.7	7.5	26.2	8.0	U30035	427053	427035	427230
Diagonally								
0	9.5	2.9	9.8	3.0	U24316	427048	427030	421580
1	11.5	3.5	13.1	4.0	U24317	427049	427031	427227
2	13.3	4.1	16.4	5.0	U24319	427050	427032	421581
3	15.2	4.6	16.4	5.0	U24319	427050	427032	421581
4	17.0	5.2	19.7	6.0	U30033	427051	427033	427228
5	18.8	5.7	19.7	6.0	U30033	427051	427033	427228
6	20.7	6.3	23.0	7.0	U30034	427052	427034	427229
7	22.5	6.9	23.0	7.0	U30034	427052	427034	427229
8	24.3	7.4	26.2	8.0	U30035	427053	427035	427230
9	26.2	8.0	26.2	8.0	U30035	427053	427035	427230
10	28.0	8.5	29.5	9.0	U30036	427054	427036	427231

Fiber-Optic Cables

The minimum bend radius for SMF and MMF fiber-optic cables is:

- Unsheathed: 1.7 inch (4.3 cm)
- Sheathed (ruggedized): 4.2 inch (10.7 cm)

You can use fiber-optic cables available from HP or you can provide your own fiber-optic cables.

If you provide your own fiber-optic cables, the attenuation specification is:

- 3.5 db/km of length
- 0.5 db/connector insertion
- 10.5 db maximum allowable loss for any link

You or your installer should verify that the link does not exceed the maximum allowable loss by using a calibrated optical power source to measure the optical power at the distant end of the cable and calculating the attenuation.

Any loss of 10.5 db or less is acceptable. Any attenuation above 10.5 db might appear to work, but the bit error rate will be unacceptable and you must repair or replace the cable.

Modified System Enclosures

A modified system enclosure has two pins cut and removed from the backplane connector in slot 55, correcting a design defect when the enclosure is populated with IOMF CRUs. A modified enclosure is identified by a revision label on the cable-management post.

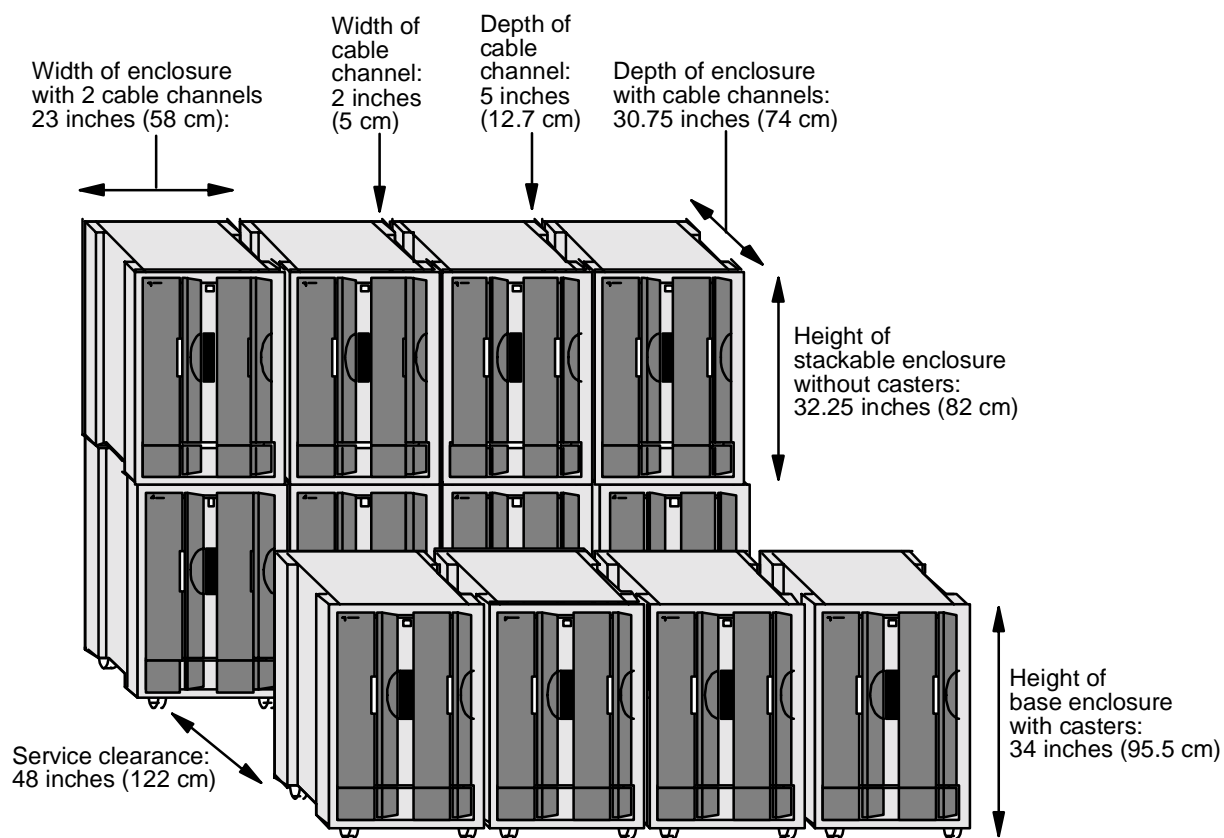
A modified enclosure cannot be used with S7000, S7400, S70000, or S72000 PMF CRUs but can be used with S7600 or later and S74000 or later PMF CRUs, IOMF CRUs, or IOMF 2 CRUs.

Enclosure Dimensions

Dimensions of System Components

Dimension	Description	Measurement	
		Inches	cm
Height	1 base enclosure (includes casters)	37.6	95.5
	1 base enclosure and 1 stackable enclosure (casters on base enclosure)	71.7	182.1
	Stackable enclosure (no casters)	32.25	81.9
	Caster	1.75	4.5
	Bottom connector to top of enclosure	20	50.8
	Bottom connector on base enclosure to top of stackable enclosure (in a double-high stack)	54	137.2
	Top connector to floor (single-high stack)	25	63.5
	Top connector to floor (double-high stack)	59	149.9
Width	Enclosure including two cable channels	23	58
	Enclosure without cable channels	19	48.3
	Cable channel	2	5
	Side of enclosure to connector farthest from that side	13	33
Depth	Visual appearance (front and rear doors)	39	99
	Enclosure with cable channels	30.75	73.8
	Enclosure without cable channels	25.75	65.4
	Cable channel	5	12.7
Service clearance	Appearance side	24	61
	Service side	30	77
	Between rows	48	121.9
Footprint	Enclosure	5 ft ²	0.47 m ²
	Enclosure with clearance	13.2 ft ²	1.23 m ²

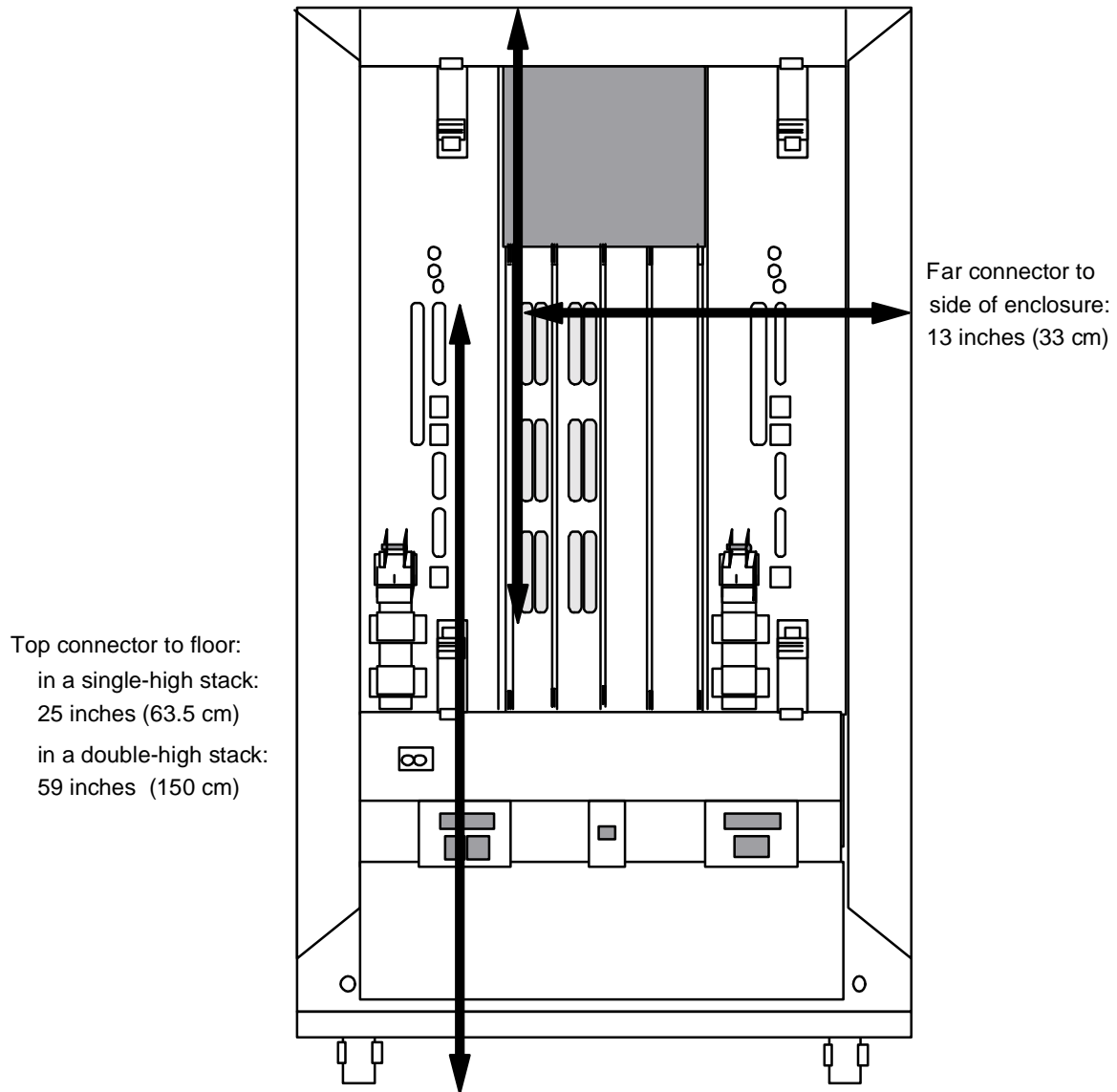
Dimensions of Enclosures and Service Aisles



VST939.vsd

Dimensions Within an Enclosure (Service Side)

Bottom connector to top of enclosure: 20 inches (51 cm)



VST948.vsd

Enclosure Specifications

This subsection contains these specifications for system enclosures:

[Weights for System Enclosures](#) on page B-10

[AC Power Requirements for One System Enclosure](#) on page B-11

[Environmental Specifications for One System Enclosure](#) on page B-11

Note the following about these specifications:

- All weights are approximate.
- Sizes and weights include:
 - Cable management hardware
 - Appearance-side door
- Sizes and weights do not include the optional service-side door.
- A fully populated enclosure contains components in all slots.
- Reduced weights are based on the removal of all the following components: disk drives, PMF CRUs, IOMF CRUs, SEBs, ServerNet adapters, and power supplies.

Weights for System Enclosures

Factor	Notes	Enclosures Without a Power Shelf		Enclosures With a Power Shelf	
		lb	kg	lb	kg
Weight: frame	Base enclosure	118	54	118	54
	Stackable enclosure	71	32	71	32
	Frame base	47	22	47	22
Weight: enclosure	Components removed	107	49	142	66
	Fully populated	223	101	304	138
Weight: frame and enclosure	Components removed	178	81	213	97
	Fully populated	294	134	375	170
Weight: frame and stacked enclosures	Components removed	332	151	402	183
Weight: service-side door	Optional	20.5	9.3	20.5	9.3

AC Power Requirements for One System Enclosure

Factor	100-120 Volts AC Operation	200-240 Volts AC Operation
Nominal voltage	100-120 V AC	200-240 V AC
Line frequency	50/60 Hz nominal	50/60 Hz nominal
Voltage tolerance	85-132 V AC	170-264 V AC
Frequency tolerance	47-63 Hz	47-63 Hz
Branch circuits	2 for each enclosure	2 for each enclosure
Amperage	20 A	10 A
Branch circuit rating	Without power shelf: 15 A With power shelf: 20 A	10 A
Inrush input current	Without power shelf: 40 A peak With power shelf: 80 A peak	
Nominal VA	600 VA for each power cord (1200 VA total)	600 VA for each power cord (1200 VA total)
Heat output	Without power shelf: 960 W (3275 Btu/h) With power shelf: 1600 W (5456 Btu/h)	Without power shelf: 960 W (3275 Btu/h) With power shelf: 1600 W (5456 Btu/h)

Note the following about NonStop S-series power supplies:

- Auto-ranging power supplies automatically configure themselves for either 100-120 V AC or 200-240 V AC operation upon application of AC power.
- The power supplies for enclosures without power shelves are contained within the PMF CRUs and the IOMF CRUs.
- The power supplies for enclosures with power shelves are independent CRUs contained in the power shelf section of the enclosure.

Environmental Specifications for One System Enclosure

Temperature	Operating	40 to 100 °F (5 to 38 °C)
	Up to 72-hour storage	-40 to 150 °F (-40 to 66 °C)
	Up to 6-month storage	-20 to 131 °F (-29 to 55 °C)
Relative Humidity	Operating	10% to 85%, noncondensing
	Nonoperating	10% to 95%, noncondensing
Power Dissipation	Without power shelf	960 W (3275 Btu/h)
	With power shelf	1600 W (5456 Btu/h)
Altitude	Operating	0 to 10,000 feet (0 to 3,048 meters)
	Nonoperating	0 to 40,000 feet (0 to 12,192 meters)
Noise		60 dB(A)

Processor Types

The processor type is specified in the CONFTEXT configuration file before the system is shipped from the factory.

NonStop Server	Processor Type	Full Name of Processor Type
S700	NSR-W	NonStop System RISC Model W processor
	NSR-D	NonStop System RISC Model D processor
	NSR-G	NonStop System RISC Model G processor
	NSR-T	NonStop System RISC Model T processor
	NSR-V	NonStop System RISC Model V processor
S7000	NSR-W	NonStop System RISC Model W processor
S7400	NSR-D	NonStop System RISC Model D processor
S7600	NSR-E	NonStop System RISC Model E processor
S7800	NSR-J	NonStop System RISC Model J processor
S70000	NSR-G (NSR-C)	NonStop System RISC Model G processor (only when upgrading to an G06.24)
S72000	NSR-T	NonStop System RISC Model T processor
S74000	NSR-V	NonStop System RISC Model V processor
S76000	NSR-X	NonStop System RISC Model X processor
S78000	NSR-H	NonStop System RISC Model H processor
S86000	NSR-Y	NonStop System RISC Model Y processor
S88000	NSR-Z	NonStop System RISC Model Z processor

Memory Sizes for Each Model of Processor

Memory Size	Processor Type										
	1950 S7000	1960 S7400	1961 S7600	1962 S7800	1951 S70000	1954 S72000	1970 S74000	1971 S76000	1973 S78000	1972 S86000	1974 S88000
128 MB	*				*						
256 MB	X				X	X					
512 MB	X	X			X	X	X				
640 MB					X						
1 GB			X		X	X		X		X	
2 GB				X		X	X		X		X
4 GB			X	X			X	X	X	X	X
8 GB									X		X
16 GB								X		X	X
* 128 MB memory is not supported for PMF CRUs on G06.16 and later.											

Internal Disk Drives

Each NonStop S-series system enclosure can contain up to 16 disk drives. These are the disk drive models that system enclosures can contain.

Product Number	Capacity
4604	4.2 gigabytes (7,200 rpm)
4608	8.8 gigabytes (7,200 rpm)*
4609	8.8 gigabytes (10,000 rpm) *
4618	18 gigabytes (7,200 rpm)
4619	18 gigabytes (15,000 rpm)
4636	36 gigabytes (7,200 rpm)*
4637	36 gigabytes (10,000 rpm)*
4638	36 gigabytes (15,000 rpm)*
4672	72 gigabytes (15,000 rpm)*
46114	144 gigabytes (15,000 rpm)*
*Mirrored volume must always be the same model numbers except during a replacement or upgrade.	

MSEB PICs

PIC	Description
ECL	A ServerNet PIC using emitter-coupled logic (ECL) technology
MMF	A ServerNet PIC using multimode fiber-optic technology Maximum distance: 25 m (82 ft)
NNA	An SMF PIC with a node-numbering agent (NNA) field-programmable gate array (FPGA) used in ServerNet Cluster applications
Serial-copper	A ServerNet PIC permitting the use of serial-copper cables, which are lighter gauge than ECL cables
SMF	A ServerNet PIC using single-mode fiber-optic technology Maximum distance: 25 m (82 ft)
Blank	A filler panel installed in the MSEB faceplate where no PIC is installed

Weight of Selected Components

Component	lb	kg
Disk drive	3.5	1.6
IOMF CRU	9.5	4.3
PMF CRU	20	9.1
SEB	7	3.15

IOAM Enclosure

This subsection contains these specifications:

[IOAM Enclosure Configuration Rules](#) on page B-14

[Environmental Specifications for an IOAM Enclosure](#) on page B-14

[Dimensions for an IOAM Enclosure](#) on page B-15

[Weights for an IOAM Enclosure and Selected Components](#) on page B-15

IOAM Enclosure Configuration Rules

IOAM enclosures can be attached only to group 01. IOAM enclosures can have these tetrahedral group numbers,

Configuration	Groups
Tetra 8	11, 12
Tetra 16	11, 12, 13,14,15

For any IOAM enclosure group number, the corresponding groups numbers in the other three inner tetrahedron quadrants cannot be configured to another I/O enclosure. This restriction does not apply to the groups in the outer tetrahedron.

For example, If you configure an IOAM enclosure in group 01, its group number will be Group11, therefore:

- You cannot have an I/O enclosure configured as group 21, 31, or 41
- You can have I/O enclosure configured as groups 51, 61, 71, and 81

In general, If you add an IOAM enclosure in group 1x, you cannot have an I/O enclosure configured as 2x, 3x, or 4x, but you can have I/O enclosures configured in groups 5x, 6x, 7x, and 8x where x is the I/O enclosure identifier for each processor number.

Environmental Specifications for an IOAM Enclosure

Temperature	Operating	41 to 95 ° F (5 to 35 ° C)
	Up to 72-hour storage	-20 to 131 ° F (-29 to 55 ° C)
Relative Humidity	Operating	10% to 85%, noncondensing
	Nonoperating	10% to 95%, noncondensing
Altitude	Operating	0 to 10,000 feet (0 to 3,048 meters)

Dimensions for an IOAM Enclosure

Component	Measurement	
	Inches W x H x D	cm
Bezel door	17.5 x 19 x 1.5	44.5 x 48.3 x 3.8
Chassis	19 x 19 x 26.75	48.3 x 48.3 x 68.0
Fan	6 x 6 x 4	15.2 x 15.2 x 10.2
Power supply	4 x 1.5 x 15	10.2 x 3.8 x 38
I/O midplane	17.3 x 7.2 x 0.12	44 x 18.1 x 0.3
Power midplane	15.5 x 0.087 x 4	39 x 0.22 x 10
ServerNet switch board	16.2 x 1.5 x 17.5	41.1 x 3.8 x 44.5
ServerNet adapter	1.5 x 8.5 x 15.4	3.8 x 21.6 x 39.1
Cable management system	17.3 x 2 x 5	44 x 5.1 x 12.7

Weights for an IOAM Enclosure and Selected Components

Component	lb	kg
IOAM enclosure, empty	85	39
IOAM enclosure fully populated	234	106
ServerNet switch board	12	5.4
ServerNet adapter		
FCSA	7.5	3.4
G4SA	7	3.2
Fan	3.5	1.6
Power supply	7.5	3.4
Modular Cabinet		
Cabinet, empty	253	115
Add for shipping pallet	40	18
Disk drive enclosure		
Enclosure, without elements	24.5	11.1
Enclosure, with elements	72.2	32.8
Enclosure, with elements and disk drives	89	40
All weights are approximate.		

Modular Cabinet

This subsection contains these specifications:

[Dimensions for a Modular Cabinet](#) on page B-16

[AC Power Requirements for a Modular Cabinet](#) on page B-17

In these specifications, all weights are approximate and include cable management hardware and doors.

Dimensions for a Modular Cabinet

Factor	English inches	Metric cm
Rack		
Width	23.5	60
Depth without doors	41	104
Depth with doors	43.25	110
height (42 u)	78.75	200
Weight, empty with PDUs	253	115
Shipping dimensions on pallet		
Width	35.5	90.1
Depth	50.5	128.3
Height	85	216
Weight, empty with PDU (add weight of installed modules to obtain gross weight)	293*	133*
Front door		
Width	23.5	59.7
Depth (thickness)	2	5.1
Height	78.75	200
Rear door, left		
Width	11	28
Depth (thickness)	0.5	1.3
Height	78.75	200
Rear door, right		
Width	12	14.5
Depth (thickness)	0.5	1.3
Height	78.75	200
* Add installed weights to obtain gross weight,		

AC Power Requirements for a Modular Cabinet

This subsection contains:

[PDU Power Configurations](#) on page B-17

[Modular Cabinet AC Power](#) on page B-17

[Modular Cabinet Modules AC Power](#) on page B-18

PDU Power Configurations

Geography	Configuration
USA, Japan	208 VAC, three phase delta, 60 A RMS, 4 wire
EMEA	230/400 VAC, three phase wye, 63 A RMS, 5 wire
EMEA	230/400 VAC, three phase wye, 63 A RMS, 5 wire, harmonized
WW	200 to 250 VAC, single phase, 63 A RMS, 3 wire
WW	200 to 250 VAC, single phase, 63 A RMS, 3 wire, harmonized

Modular Cabinet AC Power

Factor	208 VAC, three-phase delta, 4-wire PDU (North America, Japan)	230/400 VAC, three-phase wye, 5-wire PDU (EMEA)	200 to 250 VAC, single-phase PDU (worldwide)
Nominal voltage	208 VAC	230 VAC	240 VAC
Line frequency	50/60 Hz	50/60 Hz	50/60 Hz
Voltage tolerance	200-264 VAC	200-264 VAC	200-264 VAC
Frequency tolerance	47-63 Hz	47-63 Hz	47-63 Hz
Branch circuit	yes	yes	yes
Branch circuit rating	12 A	12 A	12 A
Amperage	60 A	63 A	63 A
Nominal VA	12,480 VA	14,490 VA	15, 120 VA

Modular Cabinet Modules AC Power

Factor	IOAM Enclosure	Maintenance switch	R5500XR UPS (North America, Japan)	R5500XR UPS (International)
Nominal voltage	208/230/240 VAC	208/230/240 VAC	208/230/240 VAC	208/230/240 VAC
Line frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Voltage tolerance	200-264 VAC	200-264 VAC	200-264 VAC	200-264 VAC
Frequency tolerance	47-63 Hz	47-63 Hz	47-63 Hz	47-63 Hz
Amperage	2.5 A @ 200 VAC per side	1.2 A @ 200 VAC per side	22.5 A @ 200 VAC per side	22.5 A @ 200 VAC per side
Nominal VA	500	276	5000	5000
Heat output BTU/hr	2008	123	629 online 2730 on battery	629 online 2730 on battery
Inrush current, fully populated enclosure	<80 A	<50 S	<120 A	<120 A

Blank Forms

This appendix contains blank system installation forms in alphabetic order by title.

HP recommends that you make copies of these forms because you need several copies of each form when planning to install or add to a system. You are authorized to photocopy these forms only for the purpose of installing and configuring your system.

If you need forms other than those included in this appendix, consult the manuals that describe the subsystem or adapter for which you need the form.

Cross-Row Cabling Worksheet, SEB to IOMF CRU

Cross-Row Cabling Worksheet, SEB to SEB

Enclosure Arrangement Diagram

Final Planning Checklist

Floor Plan

Installation Document Checklist

IOMF CRU Configuration Form

IOMF 2 CRU Configuration Form

PMF CRU Configuration Form

PMF 2 CRU Configuration Form

Preinstalled I/O Device Cable Checklist

ServerNet Cabling: Tetra 8 Topology, I/O Enclosures

ServerNet Cabling: Tetra 8 Topology, Processor Enclosures

ServerNet Cabling: Tetra 16 Topology, I/O Enclosures 11-25

ServerNet Cabling: Tetra 16 Topology, I/O Enclosures 31-45

ServerNet Cabling: Tetra 16 Topology, I/O Enclosures 51-64

ServerNet Cabling: Tetra 16 Topology, I/O Enclosures 71-84

ServerNet Cabling: Tetra 16 Topology, Processor Enclosures

ServerNet Communication Pathways: Tetra 8 Topology

ServerNet Communication Pathways: Tetra 16 Topology, X Fabric

ServerNet Communication Pathways: Tetra 16 Topology, Y Fabric

System Enclosure Checklist

System Equipment Inventory Form

Template, Furniture

Template, System Components (page 1 of 2)

Template, System Components (page 2 of 2)

Cross-Row Cabling Worksheet, SEB to IOMF CRU

From group _____ to group _____

Standard Measurements

31 inches (cabinet depth), 6 inches of slack (3 inches per cable end)

+ 37**Variable Measurements**

Width of service aisle (48 inches minimum)

+ _____

☐ If the cable is installed under a raised floor:

Distance from bottom of base enclosure to subfloor, multiply by 2

+ _____

If cable originates from:

☐ a stacked enclosure, add 59 inches

} + _____

☐ a base enclosure in a double-high stack, add 25 inches

If cable inserts in:

☐ a stacked enclosure, add 59 inches

} + _____

☐ a base enclosure in a double-high stack, add 25 inches☐ If cable runs in overhead cable trough

Distance from top of cabinet to cable trough, multiply by 2

+ _____

If cable originates from:

☐ a stacked enclosure, add 20 inches

} + _____

☐ a base enclosure in a double-high stack, add 25 inches

If cable inserts in:

☐ a stacked enclosure, add 54 inches

} + _____

☐ a base enclosure in a double-high stack, add 25 inches☐ If you tie the cable down, then stretch it across the service side of its enclosure to the other cable trough before routing it across a row to another enclosure, add the appropriate length:

To a horizontally adjacent enclosure, 75 inches

To a vertically adjacent enclosure, 99 inches

To a diagonally adjacent enclosure, 144 inches

} + _____

☐ For each additional intervening enclosure, add 23 inches

+ _____

☐ If the enclosures are placed with their service sides facing each other, subtract 31 inches

- _____

☐ If the enclosures are placed with their appearance sides facing each other, add 31 inches

+ _____

☐ If this cable will be bundled with a large number of other cables, add extra slack.

+ _____

Total Cable Length _____**Cable Part Number** _____

Cross-Row Cabling Worksheet, SEB to SEB

From group _____ to group _____

Standard Measurements

31 inches (cabinet depth), 6 inches of slack (3 inches per cable end)

+ 37**Variable Measurements**

Width of service aisle (48 inches minimum)

+ _____

☐ If the cable is installed under a raised floor:

Distance from bottom of base enclosure to subfloor, multiply by 2

+ _____

If cable originates from:

☐ a stacked enclosure, add 59 inches

} + _____

☐ a base enclosure in a double-high stack, add 25 inches

If cable inserts in:

☐ a stacked enclosure, add 59 inches

} + _____

☐ a base enclosure in a double-high stack, add 25 inches☐ If cable runs in overhead cable trough

Distance from top of cabinet to cable trough, multiply by 2

+ _____

If cable originates from:

☐ a stacked enclosure, add 20 inches

} + _____

☐ a base enclosure in a double-high stack, add 25 inches

If cable inserts in:

☐ a stacked enclosure, add 54 inches

} + _____

☐ a base enclosure in a double-high stack, add 25 inches☐ If you tie the cable down, then stretch it across the service side of its enclosure to the other cable trough before routing it across a row to another enclosure, add the appropriate length:

To a horizontally adjacent enclosure, 63 inches

To a vertically adjacent enclosure, 99 inches

To a diagonally adjacent enclosure, 99 inches

} + _____

☐ For each additional intervening enclosure, add 23 inches

+ _____

☐ If the enclosures are placed with their service sides facing each other, subtract 31 inches

- _____

☐ If the enclosures are placed with their appearance sides facing each other, add 31 inches

+ _____

☐ If this cable will be bundled with a large number of other cables, add extra slack.

+ _____

Total Cable Length _____**Cable Part Number** _____

Enclosure Arrangement Diagram

System Name _____

Building _____ Room _____

Date ____ / ____ / ____

Scale: 1/4 inch = 1 foot

System Number
(In Expand Network) _____

Number of Rows _____

Note which enclosures are base enclosures and which are stacked enclosures.
You can indicate a base enclosure by drawing casters on it.

Final Planning Checklist

System Name _____

Date _____ / _____ / _____

-
- ☐ Raised floor, if necessary, including cable cutouts
 - ☐ Air conditioning
 - ☐ Adequate lighting
 - ☐ Fire and safety provisions
 - ☐ Electrical outlets for system enclosures
 - ☐ Electrical outlets for subsystems or peripheral devices
 - ☐ Electrical utility outlets
 - ☐ Direct communication line for the system console modem
 - ☐ Communications lines for other modems
 - ☐ Data communications lines and local area network wiring
 - ☐ Work area available near the installation site for unpacking equipment
 - ☐ Installation site is clear objects and debris
 - ☐ Delivery route, including door and hallway clearance, elevators
 - ☐ Personnel to help move equipment (two are required to move double-high stacks)
 - ☐ Required tools:
 - ☐ Equipment to move shipping pallets
 - ☐ Heavy freight handling equipment
 - ☐ Safety eye glasses
 - ☐ Scissors or cutters to cut banding straps
 - ☐ Phillips screwdriver
 - ☐ Stubby Phillips screwdriver
 - ☐ Small slotted screwdriver
 - ☐ 3/4-inch (19-mm) open end wrench (system enclosure legs)
 - ☐ 15/16-inch (24-mm) open end wrench (modular storage system pedestal legs)
 - ☐ Labels and pens to mark cables

Floor Plan

System Name _____

Building _____ Room _____

Date ____ / ____ / ____

Scale: 1/4 inch = 1 foot

System Name _____

Date ____ / ____ / ____

Page _____ of _____

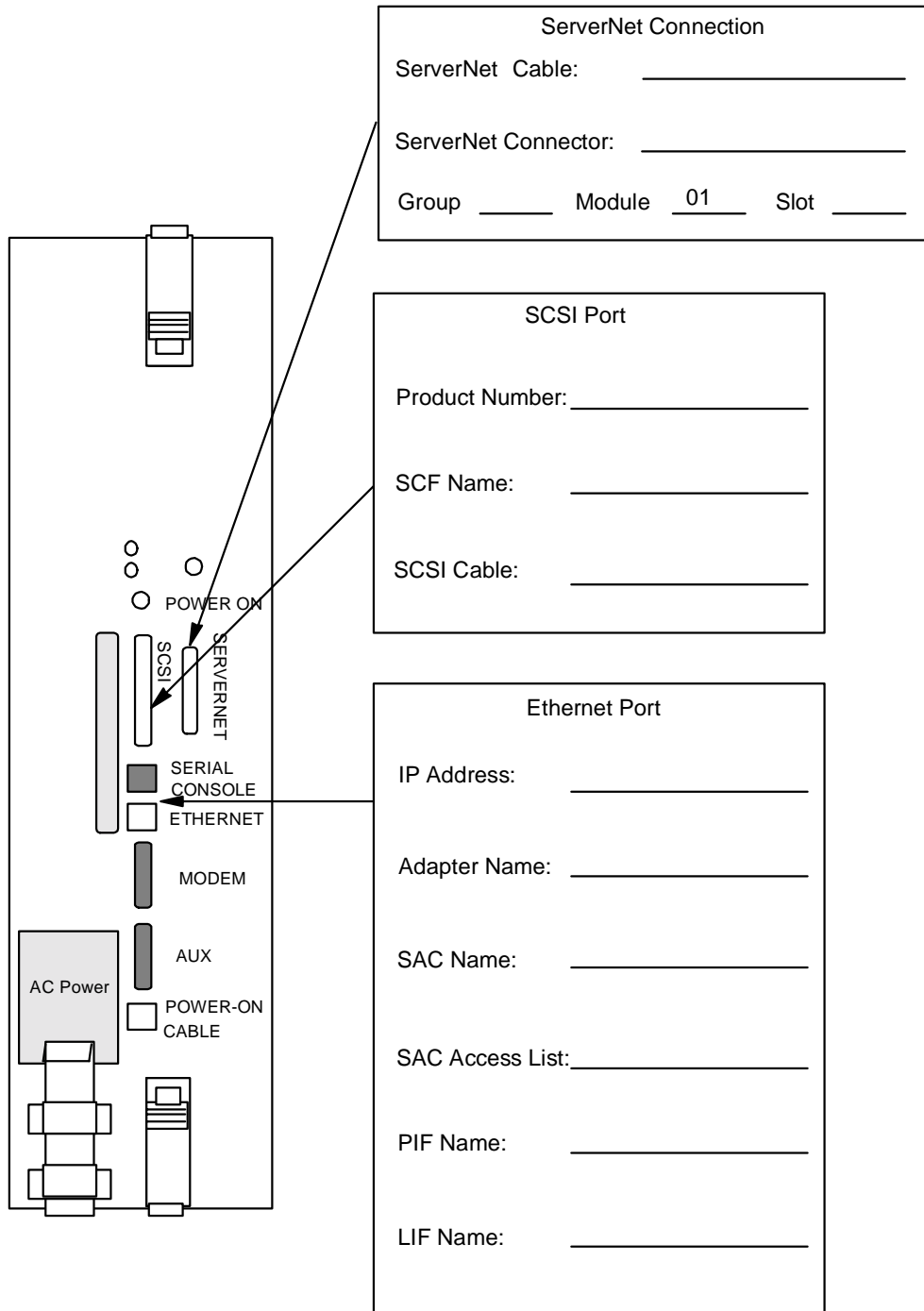
Installation Document Checklist

✓ Form, Diagram, or Checklist	# Pages	✓ Form, Diagram, or Checklist	# Pages
<input type="checkbox"/> System Equipment Inventory Form	_____	Other forms, notes, or checklists:	
<input type="checkbox"/> Preinstalled I/O Device Cable Checklist	_____	<input type="checkbox"/> _____	_____
<input type="checkbox"/> Enclosure Arrangement Diagram	_____	<input type="checkbox"/> _____	_____
<input type="checkbox"/> Floor Plan	_____	<input type="checkbox"/> _____	_____
<input type="checkbox"/> System Enclosure Checklist	_____	<input type="checkbox"/> _____	_____
<input type="checkbox"/> PMF CRU Configuration Form and PMF 2 CRU Configuration Form	_____	<input type="checkbox"/> _____	_____
<input type="checkbox"/> IOMF CRU Configuration Form and IOMF 2 CRU Configuration Form	_____	<input type="checkbox"/> _____	_____
<input type="checkbox"/> Adapter Configuration Form	_____	<input type="checkbox"/> _____	_____
<input type="checkbox"/> ServerNet Communication Pathways Worksheet	_____	<input type="checkbox"/> _____	_____
<input type="checkbox"/> ServerNet Cabling Form	_____	<input type="checkbox"/> _____	_____
<input type="checkbox"/> Cross-Row Cabling Worksheet, SEB to SEB	_____	<input type="checkbox"/> _____	_____
<input type="checkbox"/> Cross-Row Cabling Worksheet, SEB to IOMF CRU	_____	<input type="checkbox"/> _____	_____

Special Notes or Instructions:

Shaded areas indicate nonconfigurable components

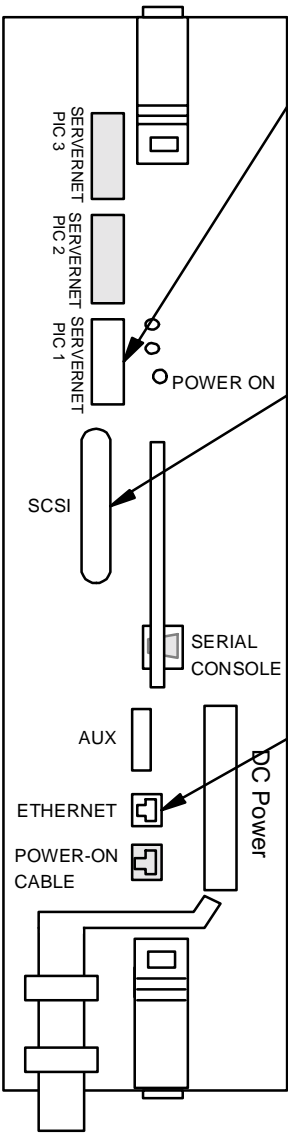
Group _____ Module 01 Slot _____



IOMF 2 CRU Configuration Form

Shaded areas indicate nonconfigurable components

Group _____ Module 01 Slot _____



ServerNet Connection

ServerNet Cable: _____

ServerNet Connector: _____

Group _____ Module 01 Slot _____

SCSI Port

Product Number: _____

SCF Name: _____

SCSI Cable: _____

Ethernet Port

IP Address: _____

Adapter Name: _____

SAC Name: _____

SAC Access List: _____

PIF Name: _____

LIF Name: _____

PMF CRU Configuration Form

Shaded areas indicate nonconfigurable components

Group _____ Module 01 Slot _____

POWER ON

SCSI

SERIAL
CONSOLE

ETHERNET

MODEM

AUX

AC Power
or
DC Power

POWER-ON
CABLE

SCSI Port

Product Number: _____

SCF Name: _____

SCSI Cable: _____

Ethernet Port

IP Address: _____

Adapter Name: _____

SAC Name: _____

SAC Access List: _____

PIF Name: _____

LIF Name: _____

PMF 2 CRU Configuration Form

Shaded areas indicate nonconfigurable components

Group _____ Module 01 Slot _____

SERVERNET
PIC (unused)

SERVERNET
PIC (unused)

SERVERNET
PIC (unused)

SERVERNET
PIC (unused)

POWER ON

SCSI

SERIAL
CONSOLE

AUX

DC Power

ETHERNET

POWER-ON
CABLE

SCSI Port

Product Number: _____

SCF Name: _____

SCSI Cable: _____

Ethernet Port

IP Address: _____

Adapter Name: _____

SAC Name: _____

SAC Access List: _____

PIF Name: _____

LIF Name: _____

System Name _____

Date / /

Page _____ of _____

Preinstalled I/O Device Cable Checklist

[illegible]

System Name _____

Date ____/____/____

Page _____ of _____

ServerNet Cabling: Tetra 8 Topology, I/O Enclosures

From		To		Length Needed	Part Number
Group	Slot	Group	Slot		
11	50	01	51	_____	_____
11	55	01	52	_____	_____
12	50	01	51	_____	_____
12	55	01	52	_____	_____
21	50	02	51	_____	_____
21	55	02	52	_____	_____
22	50	02	51	_____	_____
22	55	02	52	_____	_____
31	50	03	51	_____	_____
31	55	03	52	_____	_____
32	50	03	51	_____	_____
32	55	03	52	_____	_____
41	50	04	51	_____	_____
41	55	04	52	_____	_____
42	50	04	51	_____	_____
42	55	04	52	_____	_____

ServerNet Cabling: Tetra 8 Topology, Processor Enclosures

From Group	Slot	To Group	Slot	Length Needed	Part Number
01	51	02	51	_____	_____
01	52	02	52	_____	_____
01	51	03	51	_____	_____
01	52	03	52	_____	_____
01	51	04	51	_____	_____
01	52	04	52	_____	_____
02	51	04	51	_____	_____
02	52	04	52	_____	_____
02	51	03	51	_____	_____
02	52	03	52	_____	_____
03	51	04	51	_____	_____
03	51	04	51	_____	_____

System Name _____

Date ____/____/____

Page ____ of ____

ServerNet Cabling: Tetra 16 Topology, I/O Enclosures 11-25

From Group	Slot	To Group	Slot	Length Needed	Part Number
11	50	01	53	_____	_____
11	55	01	54	_____	_____
12	50	01	53	_____	_____
12	55	01	54	_____	_____
13	50	01	53	_____	_____
13	55	01	54	_____	_____
14	50	01	53	_____	_____
14	55	01	54	_____	_____
15	50	01	53	_____	_____
15	55	01	54	_____	_____
21	50	02	53	_____	_____
21	55	02	54	_____	_____
22	50	02	53	_____	_____
22	55	02	54	_____	_____
23	50	02	53	_____	_____
23	55	02	54	_____	_____
24	50	02	53	_____	_____
24	55	02	54	_____	_____
25	50	02	53	_____	_____
25	55	02	54	_____	_____

ServerNet Cabling: Tetra 16 Topology, I/O Enclosures 31-45

From		To		Length Needed	Part Number
Group	Slot	Group	Slot		
31	50	03	53	_____	_____
31	55	03	54	_____	_____
32	50	03	53	_____	_____
32	55	03	54	_____	_____
33	50	03	53	_____	_____
33	55	03	54	_____	_____
34	50	03	53	_____	_____
34	55	03	54	_____	_____
35	50	03	53	_____	_____
35	55	03	54	_____	_____
41	50	04	53	_____	_____
41	55	04	54	_____	_____
42	50	04	53	_____	_____
42	55	04	54	_____	_____
43	50	04	53	_____	_____
43	55	04	54	_____	_____
44	50	04	53	_____	_____
44	55	04	54	_____	_____
45	50	04	53	_____	_____
45	55	04	54	_____	_____

System Name _____

Date ____/____/____

Page ____ of ____

ServerNet Cabling: Tetra 16 Topology, I/O Enclosures 51-64

From		To		Length Needed	Part Number
Group	Slot	Group	Slot		
51	50	05	53	_____	_____
51	55	05	54	_____	_____
52	50	05	53	_____	_____
52	55	05	54	_____	_____
53	50	05	53	_____	_____
53	55	05	54	_____	_____
54	50	05	53	_____	_____
54	55	05	54	_____	_____
61	50	06	53	_____	_____
61	55	06	54	_____	_____
62	50	06	53	_____	_____
62	55	06	54	_____	_____
63	50	06	53	_____	_____
63	55	06	54	_____	_____
64	50	06	53	_____	_____
64	55	06	54	_____	_____

System Name _____

Date ____/____/____

Page ____ of ____

ServerNet Cabling: Tetra 16 Topology, I/O Enclosures 71-84

From Group	Slot	To Group	Slot	Length Needed	Part Number
71	50	07	53	_____	_____
71	55	07	54	_____	_____
72	50	07	53	_____	_____
72	55	07	54	_____	_____
73	50	07	53	_____	_____
73	55	07	54	_____	_____
74	50	07	53	_____	_____
74	55	07	54	_____	_____
81	50	08	53	_____	_____
81	55	08	54	_____	_____
82	50	08	53	_____	_____
82	55	08	54	_____	_____
83	50	08	53	_____	_____
83	55	08	54	_____	_____
84	50	08	53	_____	_____
84	55	08	53	_____	_____

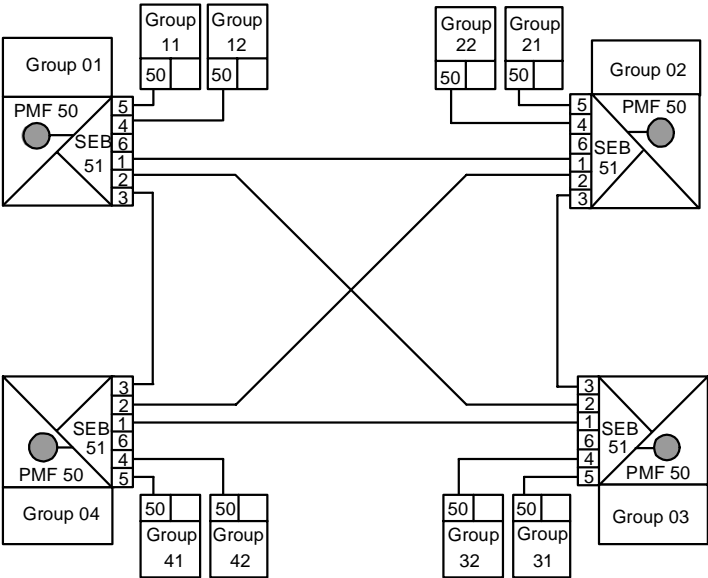
ServerNet Cabling: Tetra 16 Topology, Processor Enclosures

From		To		Length Needed	Part Number
Group	Slot	Group	Slot		
01	51	02	51	_____	_____
01	52	02	52	_____	_____
01	51	03	51	_____	_____
01	52	03	52	_____	_____
01	51	04	51	_____	_____
01	52	04	52	_____	_____
01	51	05	51	_____	_____
01	52	05	52	_____	_____
02	51	04	51	_____	_____
02	52	04	52	_____	_____
02	51	03	51	_____	_____
02	52	03	52	_____	_____
02	51	06	51	_____	_____
02	52	06	52	_____	_____
03	51	04	51	_____	_____
03	52	04	52	_____	_____
03	51	07	51	_____	_____
03	52	07	52	_____	_____
04	51	08	51	_____	_____
04	52	08	52	_____	_____

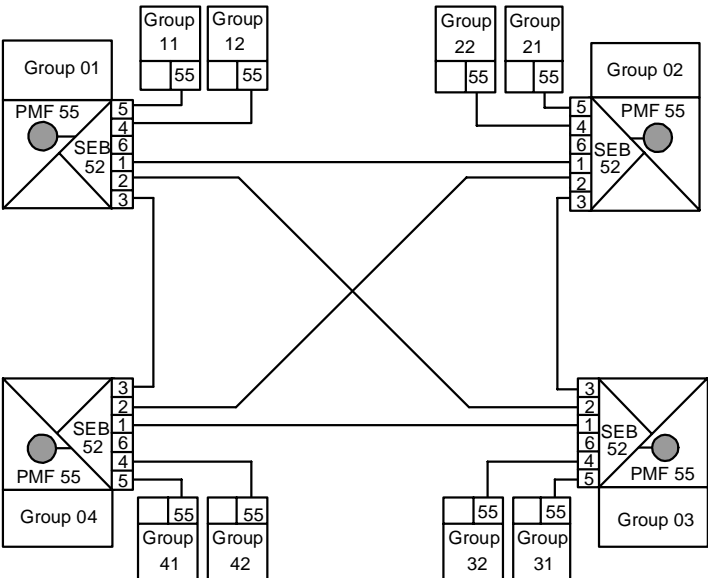
ServerNet Communication Pathways: Tetra 8 Topology

- ☐ With a highlighter, shade the enclosures, ports, and slot numbers that are in use in your current configuration.
- ☐ With a pen, black out the CRU you plan to remove.
- ☐ If you are removing a PMF CRU, check this box. Then, on the other fabric, black out the PMF CRU in slot 55 or 50 in the corresponding enclosure to indicate that this PMF CRU will lose access to the other fabric as well.
- ☐ On this worksheet, trace pathways of communication through all routers and ServerNet cables that connect to the CRU you plan to remove. Circle all components and enclosures that will be affected by that CRU removal.

**X
Fabric**

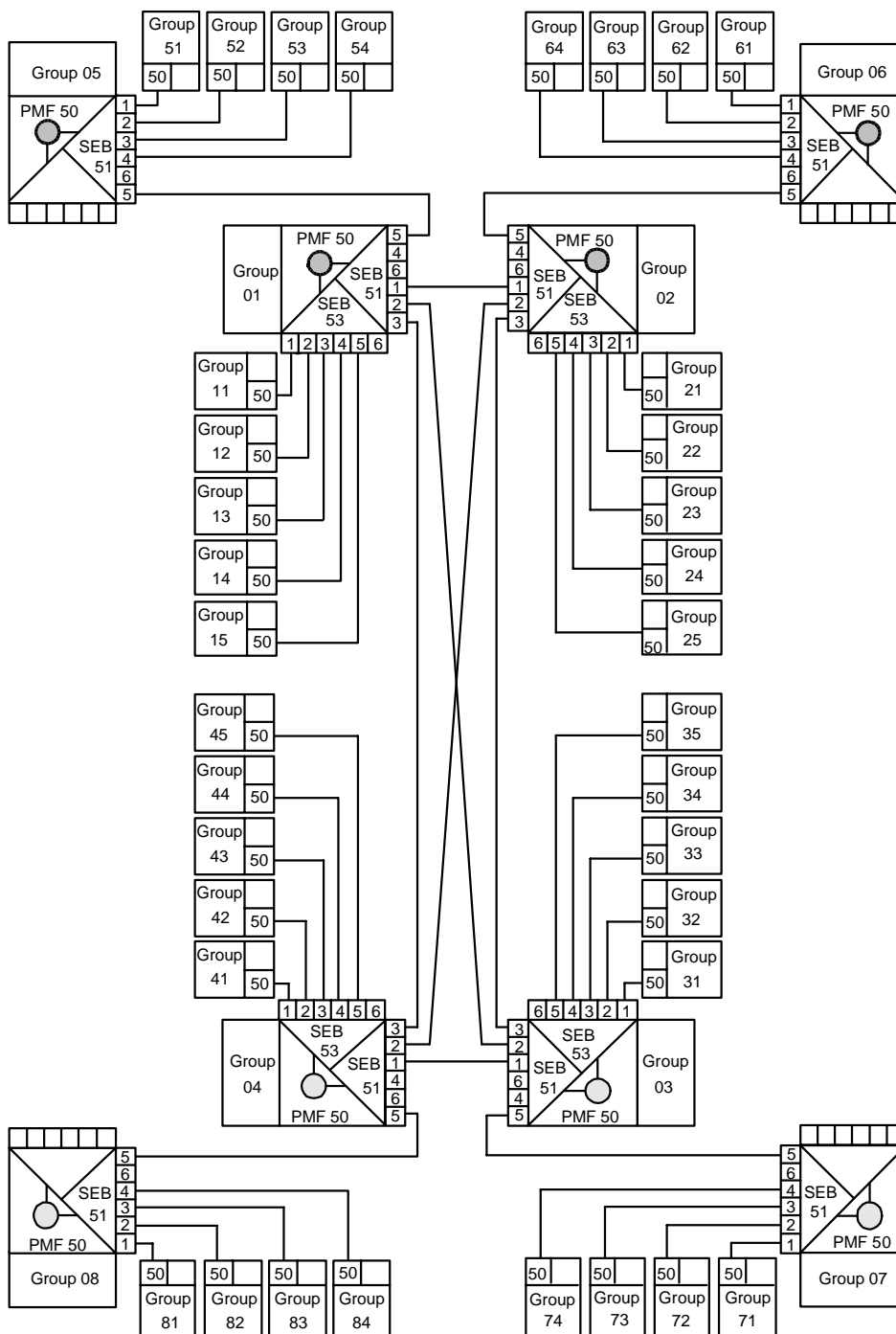


**Y
Fabric**



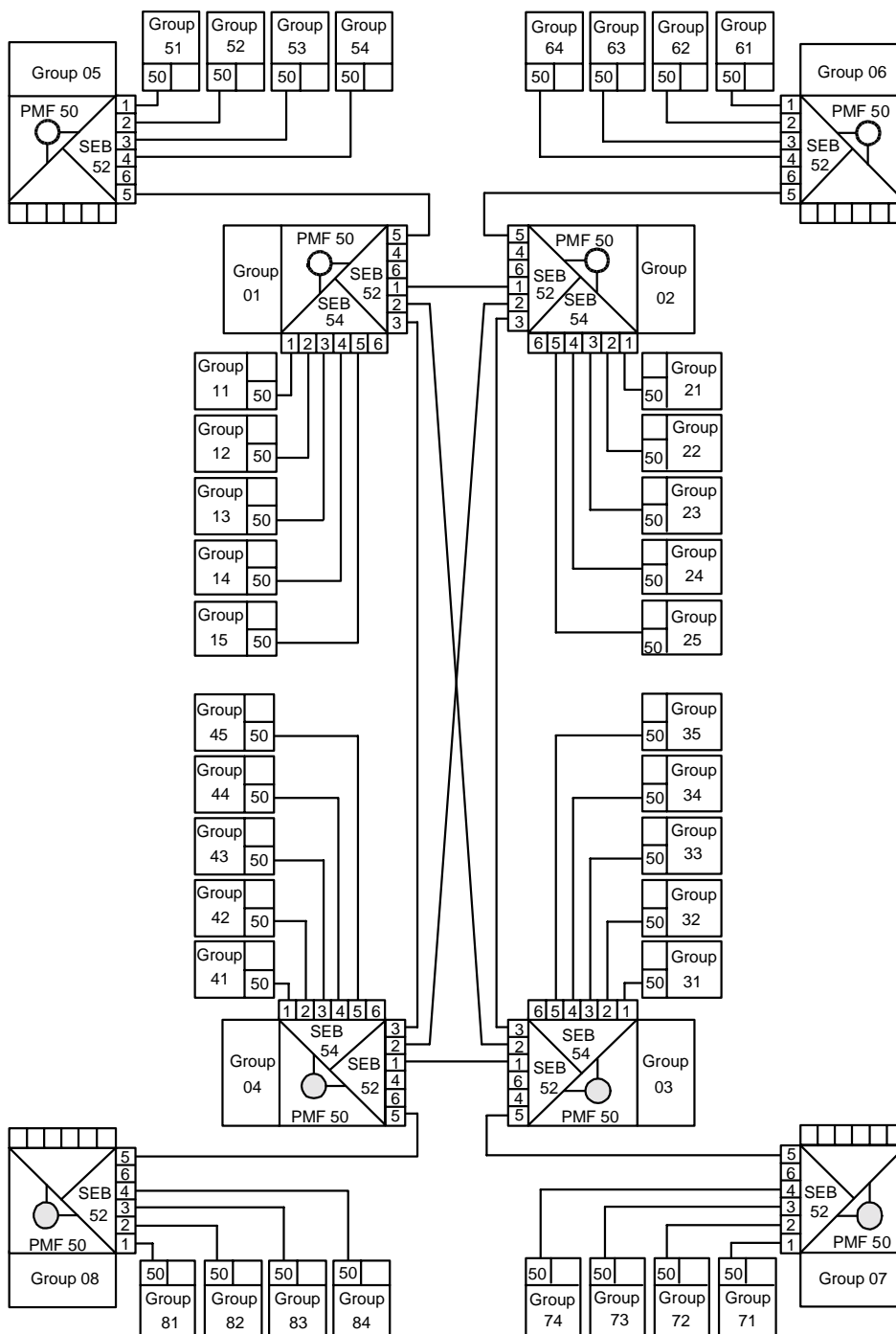
ServerNet Communication Pathways: Tetra 16 Topology, X Fabric

- ☐ With a highlighter, shade the enclosures, ports, and slot numbers that are in use in your current configuration.
- ☐ With a pen, black out the CRU you plan to remove.
- ☐ If you are removing a PMF CRU, check this box. Then, on the worksheet for the Y fabric, black out the PMF CRU in slot 55 in the corresponding enclosure to indicate that this PMF CRU will lose access to the X fabric as well.
- ☐ On this worksheet, trace pathways of communication through all routers and ServerNet cables that connect to the CRU you plan to remove. Circle all components and enclosures that will be affected by that CRU removal.



ServerNet Communication Pathways: Tetra 16 Topology, Y Fabric

- ☐ With a highlighter, shade the enclosures, ports, and slot numbers that are in use in your current configuration.
- ☐ With a pen, black out the CRU you plan to remove.
- ☐ If you are removing a PMF CRU, check this box. Then, on the worksheet for the Y fabric, black out the PMF CRU in slot 55 in the corresponding enclosure to indicate that this PMF CRU will lose access to the X fabric as well.
- ☐ On this worksheet, trace pathways of communication through all routers and ServerNet cables that connect to the CRU you plan to remove. Circle all components and enclosures that will be affected by that CRU removal.



System Name _____

Group Number _____

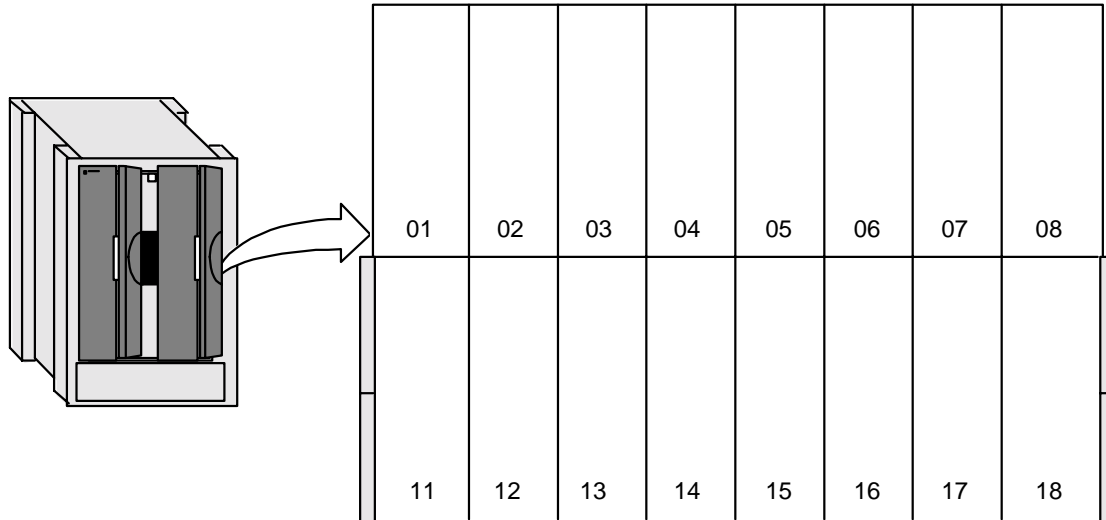
Module Number 01

Date / /

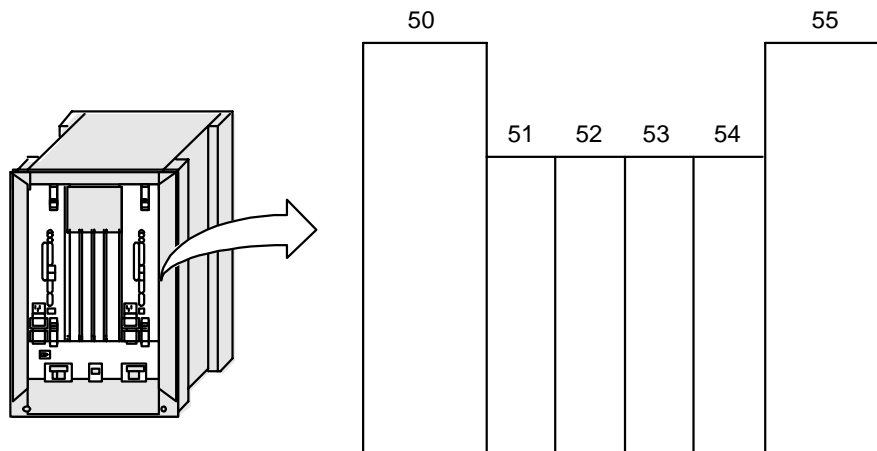
System Enclosure Checklist

Shaded areas indicate nonconfigurable components

Appearance Side:



Service Side:



System Name _____

Date ____ / ____ / ____

Page _____ of _____

System Equipment Inventory Form

[illegible]

Template, Furniture

Scale 1/4 inch = 1 foot

Equipment	Dimensions: Inches (cm)
Desk (A)	66 (168) x 33 (84)
Desk (B)	54 (137) x 30 (76)
Shelves (A)	45 (114) x 18 (46)
Shelves (B)	33 (84) x 18 (46)
Cabinet	33 (84) x 24 (61)
File	33 (84) x 18 (46)
Chair	24 (61) x 18 (46)
Table	45 (114) x 21 (53)

Chair	Chair	Chair	Chair	Chair
Chair	Chair	Chair	Chair	Chair
Shelves (B)	Shelves (B)	Shelves (B)	Shelves (B)	
Shelves (B)	Shelves (B)	Shelves (B)	Shelves (B)	

Desk (A)	Desk (A)	Desk (A)	File	File
			File	File
Desk (A)	Desk (A)	Desk (A)	File	File
			File	File


Desk (B)	Desk (B)	Desk (B)	Table	Table
			Table	Table
Desk (B)	Desk (B)	Desk (B)	Table	Table

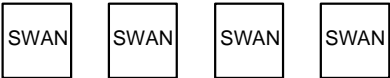
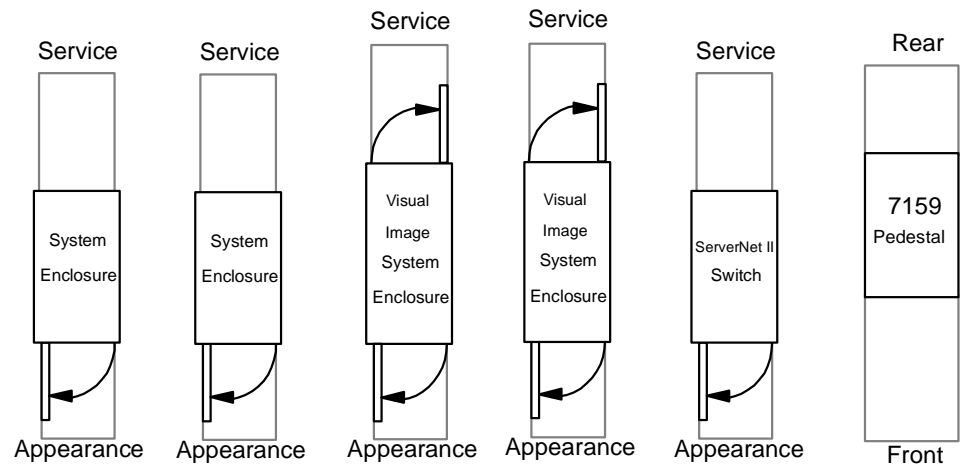
Shelves (A)	Shelves (A)	Shelves (A)	Cabinet	Cabinet	Cabinet
Shelves (A)	Shelves (A)	Shelves (A)	Cabinet	Cabinet	Cabinet
Shelves (A)	Shelves (A)	Shelves (A)			

Template, System Components

Scale: 1/4 inch = 1 foot

Equipment	Dimensions	Service Clearance
System Enclosure	22 inches (56 cm) W 32 inches (81.5 cm) D	24 inches (61.0 cm) appearance side 30 inches (76.2 cm) service side
Visual Image	22 inches (56 cm) W 39 inches (99.1 cm) D	Same
ServerNet II Switch Enclosure	22 inches (56 cm) W 37.6 inches (95.5 cm) D	24 inches (61.0 cm) appearance side 30 inches (76.2 cm) service side
7159 Pedestal	23 inches (58.4 cm) W 35 inches (90 cm) D	36 inches (91.4 cm) front 22 inches (56 cm) rear
SWAN Concentrator	17.3 inches (43.3 cm) W 17.3 inches (43.3 cm) D	

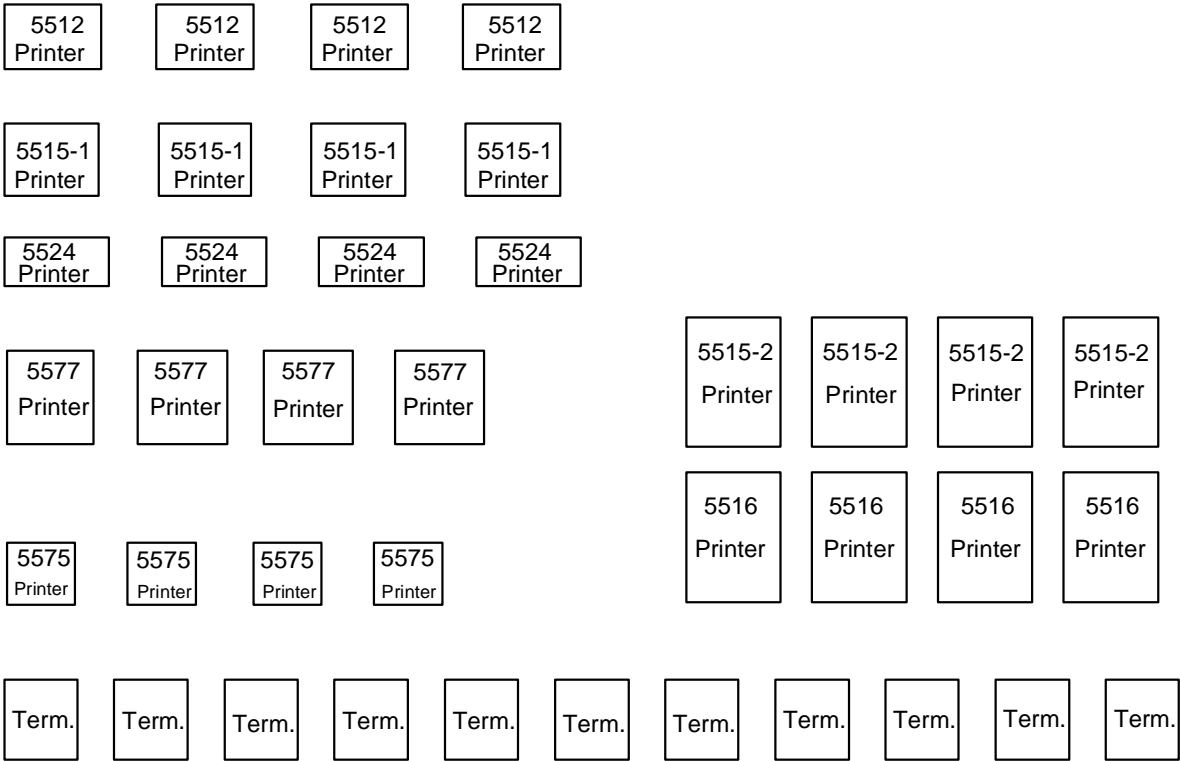
Note:  = service clearance



Template, System Components

Scale: 1/4 inch = 1 foot

Equipment	Dimensions: Inches (cm)
5512 Desktop or with Stand	24.0 (61.0) x 16.0 (41.0)
5515-1 Line Printer	23.4 (59.5) x 17.7 (45.0)
5515-2 Line Printer	23.4 (59.5) x 32.7 (83.0)
5516 Line Printer	23.4 (59.5) x 32.7 (83.0)
5524 Serial Matrix Printer	24.5 (62.0) x 12.5 (30.5)
5575 Desktop Laser Printer	16.4 (41.6) x 15.9 (40.3)
5577 Desktop Laser Printer	21.5 (55.0) x 23.5 (60.0)
Terminal, generic	18.0 (46.0) x 20.0 (51.0)



Case Study: ServerNet Cable Lengths

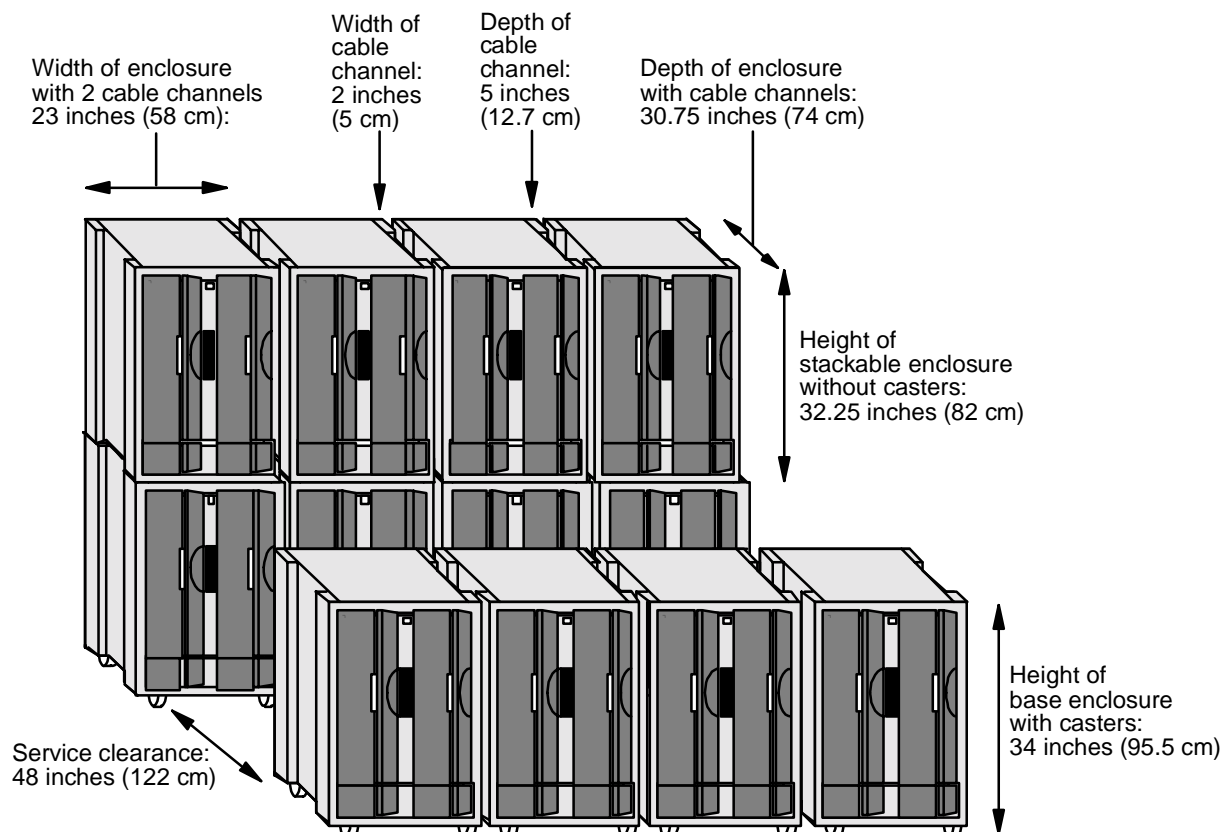
This case study documents the planning and installation of ServerNet cables in a NonStop S70000 system for a fictitious company.

Note. Examples and sample cable routes are for illustration only and might not be suited for your particular purpose. HP does not warrant, guarantee, or make any representations regarding the use, or the results of the use, of any examples or cable routes in any documentation. You must verify the applicability of any example or cable route before placing the hardware into production use.

Hardware Configuration

This system has four processor enclosures and eight I/O enclosures. The planner for Developers Inc. has decided to arrange the enclosures in two rows that both face in the same direction. Processor enclosures are arranged in one row of single-high stacks, and I/O enclosures are arranged in one row of double-high stacks behind them.

This figure shows the enclosure arrangement in this example system.



VST939.vsd

Choosing Cable Lengths

The planner begins to choose the cable lengths for the system starting with processor enclosure group 01.

Group 01 must be connected to I/O enclosure group 12. Because the processor enclosures and I/O enclosures are in different rows, the cables between them must cross the service aisle. The planner knows that the computer room at Developers Inc. is equipped with a raised floor. Therefore, the planner obtains the following information:

- The width of the service aisle
 - The amount of cable slack that is to be allowed beneath the raised floor
 - Whether the cable will be part of a bundle of a large group of cables at either end
- If you are bundling together a large group of cables, you will need extra slack in each cable in that group. How much slack you need depends on the size of that group of cables. For more information, contact your service provider.
- Whether the enclosures to be connected are directly opposite each other, or whether the cable must cross the service aisle and then extend down the other row to reach its enclosure
 - Whether the enclosures all face the same way

The planner then completes the following steps:

1. Copies all forms, because planning will require more than one copy of each form.
2. Chooses the SEB-to-IOMF CRU worksheet, because the cable runs between a processor enclosure and an I/O enclosure.
3. Checks off the appropriate sections on the worksheet that describes the enclosures that are to be cabled together.
4. Enters the measurements given in these sections.
5. Adds all the measurements.
6. Compares the total to these tables, which list ServerNet cable lengths and part numbers according to enclosure arrangement and positioning:
 - [SEB-to-SEB Connections in Same Row](#) on page B-4
 - [SEB-to-IOMF CRU Connections in Same Row](#) on page B-5

7. Repeats Step [2](#) through Step [6](#) for each ServerNet connection that goes across rows. To avoid describing the same ServerNet connection twice, refer to the following tables, which shade the second occurrence of all duplicate listings in gray:
 - [Tetra 8 Cabling Table, Processor Enclosures](#) on page 5-10
 - [Tetra 8 Cabling Table, I/O Enclosures](#) on page 5-11
 - [Tetra 16 Cabling Table, Processor Enclosures](#) on page 5-15
 - [Tetra 16 Cabling Table, I/O Enclosures](#) on page 5-16
8. Collects all forms and calculates the total number of each ServerNet cable to order.

Installation Document

The following example is a completed cross-row cabling worksheet for an SEB-to-IOMF CRU connection.

System Name <u>/Case 1</u> Date <u>07 / 21 / 97</u> Page <u>01</u> of <u>01</u>	
Cross-Row Cabling Worksheet, SEB to IOMF CRU	
	From group <u>01</u> to group <u>12</u>
Standard Measurements	
31 inches (cabinet depth)	+ <u>37</u>
6 inches of slack (3 inches per cable end)	
Variable Measurements	
Width of service aisle (48 inches minimum)	+ <u>60 in</u>
<input checked="" type="checkbox"/> If cable is installed under a raised floor Amount of slack for cable, based on depth of raised floor If cable runs down from a	+ <u>12 in</u>
<input checked="" type="checkbox"/> single enclosure, or base enclosure in a double-high stack, add 25 inches <input type="checkbox"/> stacked enclosure in a double-high stack, add 59 inches	+ <u>25 in</u>
<input type="checkbox"/> If cable runs in overhead cable trough Distance from top of cabinet to cable trough	+ _____
If cable runs up from a <input type="checkbox"/> stacked enclosure in a double-high stack, add 20 inches <input type="checkbox"/> single enclosure, or base enclosure in a double-high stack, add 54 inches	+ _____
<input type="checkbox"/> If you tie the cable down, then stretch it across the service side of its enclosure to the other cable trough before routing it across a row to another enclosure, add the appropriate length:	
To a horizontally adjacent enclosure, 75 inches To a vertically adjacent enclosure, 99 inches To a diagonally adjacent enclosure, 114 inches	+ <u>99 in</u> + _____ + _____
For each additional intervening enclosure, add 23 inches	
<input type="checkbox"/> If the enclosures are placed with their service sides facing each other, subtract 31 inches	- _____
<input type="checkbox"/> If the enclosures are placed with their appearance sides facing each other, add 31 inches	+ _____
<input type="checkbox"/> If this cable will be bundled with a large number of other cables, add extra slack. For information about what is appropriate for your configuration, contact your service provider.	+ _____
Total Cable Length	<u>233 in = 19.42 feet</u>
Cable Part Number	<u>130033</u>

VST379.vsd

VST204.vsd

Guide to Server Manuals

These manuals support the HP NonStop S-series hardware. Abstracts for these manuals begin on the next page. Generic process manuals are listed, without abstracts, on page E-4.

NonStop S-Series Server Manuals

Category	Purpose	Title
Adding or removing processors	Describes how to expand or reduce processors in a system	<i>NonStop S-Series System Expansion and Reduction Guide</i>
Change planning and control	Describe how to prepare for changes to software or hardware configurations	<i>Interactive Upgrade Guide 2</i> <i>Managing Software Changes</i> <i>NonStop S-Series Planning and Configuration Guide</i> <i>NonStop S-Series System Expansion and Reduction Guide</i>
Installation	Describe how to install, configure, and upgrade components and systems	<i>G06.27 Software Installation and Upgrade Guide</i> <i>Modular I/O Installation and Configuration Guide</i> <i>NonStop S-Series Hardware Installation and FastPath Guide</i>
Online support	Guided replacement procedures and tools	For replacement procedures, see the Support and Service Library on page 1-35. For guided replacement tools that contain online help topics, see Service Management Packages on page 1-35.
Operations and support	Describe how to operate and maintain the system	<i>NonStop S-Series Operations Guide</i> <i>NonStop S-Series Service Provider Supplement</i> <i>Operator Messages Manual</i>
Reference	Contain information about the manuals, the RVUs, and hardware that support NonStop S-series servers	<i>G06.27 Release Version Update Compendium</i> <i>Interactive Upgrade Guide 2</i> <i>NonStop S-Series Planning and Configuration Guide</i> <i>NonStop Systems Introduction</i>

Titles and Abstracts

Title	Abstract (page 1 of 2)
<i>G06.27 Release Version Update Compendium</i>	Provides a summary for the products that have major changes in the G06.27 release version update (RVU), including the products' new features, migration issues, and fallback considerations. The compendium is written for system managers or anyone who needs to understand how migrating to G06.27 affects installation, configuration, operations, system management, maintenance, applications, networks, and database files.
<i>G06.27 Software Installation and Upgrade Guide</i>	Provides detailed procedures for upgrading to the G06.27 RVU of the HP NonStop operating system on a single NonStop S-series server from any G03.00 or later G-series RVU.
<i>Interactive Upgrade Guide 2</i>	The Interactive Upgrade Guide 2 is a browser-based tool that offers upgrade planning information for the HP NonStop operating system. It supports the G06.16 and later release version updates (RVUs). It highlights new features and migration and fallback considerations that are specific to a migration path.
<i>Managing Software Changes</i>	Introduces the TRM2000 release model and how it defines the distribution of HP NonStop software products. This manual also explains the software installation, upgrade, and maintenance processes, including related documents, services, and tools. It provides information on how to decide which release version updates (RVUs) and software product revisions (SPRs) have value for your installation.
<i>Modular I/O Installation and Configuration Guide</i>	Provides instructions for installing the I/O adapter module (IOAM) and using it to connect an HP NonStop S-series server to an Enterprise Storage System (ESS). It explains the architecture of the IOAM enclosure and the ESS, and describes fault-tolerant configuration for both.
<i>NonStop S-Series Hardware Installation and FastPath Guide</i>	Describes how to install and start a NonStop S-series server for the first time. It includes information about installing server hardware, cabling system enclosures, installing and starting system consoles, installing external system devices, starting the server, and configuring the server after startup. This guide also includes a case study of installing a sample system and a quick reference to installing and configuring a two-processor or four-processor NonStop S-series server in the Tetra 8 topology. This guide is written for anyone qualified to install a NonStop S-series server.

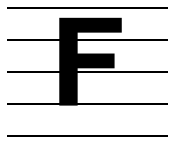
Title	Abstract (page 2 of 2)
<i>NonStop S-Series Operations Guide</i>	Describes how to perform routine system hardware operations for NonStop S-series servers. These tasks include monitoring the system, performing recovery operations, operating disk and tape subsystems, performing routine hardware maintenance, and starting and stopping the system. This guide is written for system operators.
<i>NonStop S-Series Planning and Configuration Guide</i>	Explains how to plan and configure NonStop S-series servers, plan and prepare your site, operational environment, and hardware and software configurations. In addition, the guide describes the ServerNet system area network (ServerNet SAN) and the available hardware and system configurations. The guide provides a glossary, parts list, and a guide to other NonStop S-series manuals. This guide is written for those who plan the installation, configuration, and maintenance of the server and the software environment.
<i>NonStop S-Series Service Provider Supplement</i>	<p>Provides information for service providers about removing and installing field-replaceable units (FRUs) that are not customer-replaceable units (CRUs) and installing enclosures in 19-inch racks. Installation and service information about equipment identified as CRUs is located in the NonStop S-series server manual set for which this manual is a supplement. This supplement also contains information for upgrading an enclosure from a NonStop S7000 server for use in a NonStop S7400 or Sxx000 server.</p> <p>The <i>NonStop S-Series Service Provider Supplement</i> is available only to service providers who have completed special training provided by HP.</p>
<i>NonStop S-Series System Expansion and Reduction Guide</i>	Describes how to add enclosures to, and remove enclosures from, a NonStop S-series system online.
<i>NonStop Systems Introduction</i>	Gives new users an orientation to HP NonStop systems by describing their use in Zero Latency Enterprise (ZLE) architectures. The manual introduces ZLE concepts and components, describes the application integration and development environment and architecture on NonStop systems, and describes basic concepts, terms, and entities in the NonStop environment.
<i>Operator Messages Manual</i>	Describes all messages that are distributed by the Event Management Service (EMS). This manual provides an explanation of the cause of each message, discussion of its effects on the system, and suggestions for corrective action.

Generic Process Manuals

Manuals about configuring generic processes for G-series RVUs referred to in [Generic Processes](#) on page 15-5:

Subsystem	Manager or Monitor Process Name	Manual
ATM	\$ZZATM	<i>ATM Configuration and Management Manual</i>
Expand	\$ZEXP *	<i>Expand Configuration and Management Manual</i>
Kernel	\$ZZKRN	<i>SCF Reference Manual for the Kernel Subsystem</i>
OSS	\$ZPMON*	<i>Open System Services Installation Guide</i>
PAM	\$ZZPAM *	<i>PAM Configuration and Management Manual</i>
QIO	\$ZMnn	<i>QIO Configuration and Management Manual</i>
ServerNet/FX Adapter	\$ZZFOX	<i>ServerNet/FX Adapter Configuration and Management Manual</i>
SLSA	\$ZZLAN	<i>LAN Configuration and Management Manual</i>
SMN	\$ZZSMN	<i>ServerNet Cluster Manual</i>
SNETMON	\$ZZSCL	<i>ServerNet Cluster Manual</i>
Storage	\$ZZSTO	<i>SCF Reference Manual for the Storage Subsystem</i>
WAN	\$ZZWAN	<i>WAN Subsystem Configuration and Management Manual</i>

* Users have the option of configuring this process through TACL or SCF.



Supported Hardware and Configurations

This appendix list the devices and peripherals currently supported by NonStop S-series servers for this RVU.

This information is subject to change. For updated information about the supported hardware for every G-series RVU, refer to the *Interactive Upgrade Guide 2*. For detailed information about each of these products, refer to the individual manuals for the products.

Information about modular products in NonStop S-series servers is located in the *Modular I/O Installation and Configuration Guide*.

These devices are grouped as follows:

\$SYSTEM Disk Slots	F-2
ServerNet Adapters and Communication Devices	F-3
Plug-In Cards (PICs)	F-4
Supported ServerNet/DA Configurations	F-4
Internal Disk Drives	F-4
External Disk Drives	F-5
Tape Libraries	F-5
Tape Drives	F-6
Printers	F-7
Maximum Number of Enclosures for Each RVU	F-8

\$SYSTEM Disk Slots

The mirrored \$SYSTEM volume is configured in slots 11 and 12 of group 01. Beginning on the G06.06 RVU (and beginning on the G06.04 RVU using SPR T6586AAH), you can place two halves of the \$SYSTEM volume in any two slots of the group 01 processor enclosure as long as the two slots have the same SCSI ID. These slot pairs are the following.

SCSI ID	Slot for Primary	Slot for Mirror
0	11	12
1	13	14
2	15	16
3	17	18
4	1	2
5	3	4
8	5	6
9	7	8

For more information, see [Adding a Tape Drive](#) on page 9-13.

ServerNet Adapters and Communication Devices

3860 ATM 3 ServerNet adapter (ATM3SA)**
3861 Ethernet 4 ServerNet adapter (E4SA)**
3862 Token-Ring ServerNet adapter (TRSA)**
3863 Fast Ethernet ServerNet adapter (FESA)**
3865 Gigabit Ethernet ServerNet adapter (GESA-C) (copper)**
3865 Gigabit Ethernet ServerNet adapter (GESA-F) (fiber)**
3880 ServerNet wide area network (SWAN) concentrator
3881 ServerNet wide area network 2 (SWAN 2) concentrator
3886 asynchronous wide area network (AWAN) concentrator
3890 ES Connect IBM ESCON Channel Controller
6740 ServerNet/FX adapter*
6742 ServerNet/FX 2 adapter*
6760 ServerNet device adapter (6760 ServerNet/DA)*
6763 Common Communication ServerNet adapter (CCSA)**
M8800 Gigabit Ethernet, 4-port ServerNet adapter (G4SA)**
M8840 Fibre Channel ServerNet adapter (FCSA)**

* Single-ported adapter

** Dual-ported adapter

Plug-In Cards (PICs)

PICs and Components	Used In
6761 fiber-optic PIC (F-PIC)	ServerNet/DA
6762 SCSI PIC (S-PIC)	ServerNet/DA
Emitter-coupled logic (ECL) PIC	MSEB, IOMF 2 CRU
Multimode fiber-optic (MMF) PIC	MSEB, IOMF 2 CRU
Node-numbering agent (NNA) PIC	MSEB, ServerNet cluster
Serial-copper (SCu) PICS	MSEB, IOMF 2 CRU
Single-mode fiber-optic (SMF) PIC	MSEB, IOMF 2 CRU
SS7TE PIC	CCSA
SS7TE1 PIC	CCAA
SS7TE2 PIC	CCSA
SS7TE3 PIC	CCSA
Filler panel	All

Supported ServerNet/DA Configurations

Storage Device	F-PIC	S-PIC
45xx disk drives	X	
515x tape drives	X*	X
519x tape drives	X*	X
9490 tape drives		X
9890 tape drives		X
Open SCSI devices		X

*With special BEB installed on the tape drive

Internal Disk Drives

Product Number	Capacity
4604	4.2 gigabytes (7,200 rpm)
4608	8.8 gigabytes (7,200 rpm)
4609	8.8 gigabytes (10,000 rpm)
4618	18 gigabytes (7,200 rpm)
4619	18 gigabytes (15,000 rpm)
4636	36 gigabytes (7,200 rpm)
4637	36 gigabytes (10,000 rpm)

Product Number	Capacity
4638	36 gigabytes (15,000 rpm)
4672	72 gigabytes (15,000 rpm)
46144	144 gigabytes (15,000 rpm)

External Disk Drives

Product Number	Capacity
4560	2 gigabytes
4570	4 gigabytes
4580	8 gigabytes
4590	18 gigabytes

Tape Libraries

Tape Library	Supported Tape Drives
4400	9490
9310	9490, 9840 and CT9841F-4
9710	5155, 5159, and 9840
L700	9840 and CT9841F-1
SL500	N1522A

Tape Drives

5142 digital audio tape (DAT) drive
515x digital linear tape (DLT) drive
517x open-reel tape subsystem
5190 cartridge tape drive
5190 ACL cartridge tape drive
5194 cartridge tape drive
5194 ACL cartridge tape drive
5242 DAT 72 tape drive
5242ACL DAT 72 tape drive
5257 tape drive (in tape enclosure)
5257ACL tape drive (in tape enclosure with automatic cartridge loader)
5258 tabletop tape drive
5259 tape drive (in an L700 tape library)
9490 tape drive for a cartridge system
9490 stand-alone tape drive
9490 tape drive with ACL
9840 cartridge tape drive
CT9841FC-1: 9840C tape drive for the CLT 700 and CLT700 M tape libraries
CT9841FC-4: 9840C tape drive for the 9310 tape library
M8201 Router, T1200, Fibre Channel to SCSI
N1522A mid-range tape drive
N1524A ACL tape drive
VT5801 Virtual Tape Solution: Tributary Systems Inc. 2U
VT5901 Virtual Tape Solution: Tape Labs Inc. 2U
VT5902 Virtual Tape Solution: Tape Labs Inc. 7U
VT5900-A Virtual Tape Solution: Tape Labs Inc. 7U. (Replaces VT5902)
VT5900-B Virtual Tape Solution: Tape Labs Inc. 2U (3.5-inch chassis)
VT5900-C Virtual Tape Solution: Tape Labs Inc. 2U (3.5-inch chassis)

Printers

The following printer models are supported for use with NonStop S-series servers. Contact your HP representative for more information on recommended printers.

5524 serial 780 cps printer

5525 line matrix, 800 lpm printer

5526 line matrix, 800 lpm printer

5527 line matrix, 800 lpm printer

5528 line matrix, 800 lpm printer

5529 line matrix, 1400 lpm printer

5531 line matrix, 1000 lpm printer

5532 line matrix, 1500 lpm printer

5565 line printer, Kanji, 330 lpm

5566 serial printer, Kanji, 520 cps

5567 line printer, Kanji

Maximum Number of Enclosures for Each RVU

These are the maximum numbers of processor and I/O enclosures supported for each Nonstop S-series server and RVU:

RVU	Server	Tetra 8 Enclosures			Tetra 16 Enclosures		
		Processor	I/O	IOAM	Processor	I/O	IOAM
G02.00	S7000	2	0		2	0	
	S70000	4	4		4	4	
G03.00 to G06.01	S7000	4	8		8	16	
	S70000	4	8		8	24	
G06.03	S7000	4	8		8	16	
	S70000	4	8		8	36	
G06.04 to G06.25	S7000	4	8		8	16	
	S7400	4	8		8	16	
	S7600	4	8		8	16	
	S7800	4	8		8	16	
	S70000	4	8		8	36	
	S72000	4	8		8	36	
	S74000	4	8		8	36	
	S76000	4	8	2*	8	36	5*
	S78000	4	8	2*	8	36	5*
	S86000	4	8	2*	8	36	5*
	S88000	4	8	2*	8	36	5*

* For each IOAM enclosure added to a system, subtract four I/O enclosures to determine the maximum number of enclosures in a system.

Note. I/O adapter module (IOAM) enclosures are supported by NonStop S76000 and later NonStop S-series systems and can coexist in the same system with I/O enclosures.

Note. Information about the NonStop S74, S76, S700, S740 and S760 (two-processor) servers is not included in this table. For information about these systems, contact your HP representative.

Modular Power Information

This appendix provides information about topics:

[Modular Cabinet Input Power](#)

[IOAM Enclosure Power Requirements](#)

[UPS Power Requirements](#)

[Power Distribution Unit Wiring](#)

△ **Caution.** The information in this section is for your guidance in planning the total power and cooling requirements for your site. For complete information, consult the appropriate site preparation or hardware manuals from HP or the original equipment manufacturer site.

Modular Cabinet Input Power

Each modular cabinet contains two power distribution units (PDUs) with 14 power receptacles per PDU (28 receptacles total). Input power per each PDU depends on the site location

North America and Japan: 208 V AC PDU Power Cords

- Three-phase delta, four-wire with insulated ground conductor, 60A (or optional 30A) RMS
- AC power cord (two supplied per modular cabinet): length 7 feet (183 centimeters)
- 60A AC power cable plug (one per power cord): four-wire, three-phase
 - HP Product ID: M8950-4
 - HP part number: 527993
 - Manufacturer: Hubbell
 - HP supplied plug manufacturer number: HBL460P9W
 - Required customer-supplied receptacle manufacturer number: HBL460C9W or equivalent receptacle
- 30A AC power cable plug (one per power cord): four-wire, three-phase
 - HP Product ID: not available
 - HP part number: 5541088
 - Manufacturer: Hubbell
 - HP supplied plug manufacturer number: HBL2721
 - Required customer-supplied receptacle manufacturer number: HBL2720 (wall mount receptacle), HBL2723 (connector body for cable), or equivalent receptacle

Europe, Middle East, and Africa: 230/400 V AC PDU Power Cords

- Three-phase wye, five-wire with insulated ground conductor, 63A (or optional 30A) RMS
- AC power cord (two supplied per modular cabinet): length 7 feet (183 centimeters)
- 60A AC power cable plug (one per power cord): five-wire, three-phase, 63A

- HP Product ID: M8950-5
- HP part number: 527995
- Manufacturer: Hubbell
- HP supplied plug manufacturer number: HBL563P6W
- Required customer-supplied receptacle manufacturer number: HBL563C6W or equivalent receptacle
- 30A harmonized AC power cable plug (one per power cord): five-wire, three-phase, 63A
 - HP Product ID: not available
 - HP part number: 429678
 - Manufacturer: Hubbell
 - HP supplied plug manufacturer number: HBL532P6W
 - Required customer-supplied receptacle manufacturer number: HBL532R6W (wall mount receptacle), HBL532C6W (connector body for cable), or equivalent receptacle
- 30A nonharmonized AC power cable plug (one per power cord): five-wire, three-phase, 63A
 - HP Product ID: not available
 - HP part number: 541089
 - Manufacturer: Hubbell
 - HP supplied plug manufacturer number: HBL2811
 - Required customer-supplied receptacle manufacturer number: HBL2810 (wall mount receptacle), HBL2813 (connector body for cable), or equivalent receptacle

Other International: 200 to 250 V AC PDU Power Cords

- Single-phase, three-wire with insulated ground conductor, 63A (or optional 30A) RMS
- AC power cord (two supplied per modular cabinet): length 7 feet (183 centimeters)
- 63A AC power cable plug (one per power cord): three-wire, single-phase, 63A
 - HP Product ID: M8950-3
 - HP part number: 527994
 - Manufacturer: Hubbell
 - HP supplied plug manufacturer number: HBL363P6W
 - Required customer-supplied receptacle manufacturer number: HBL363C6W or equivalent receptacle
- 30A harmonized AC power cable plug (one per power cord): three-wire, single-phase,
 - HP Product ID: not available
 - HP part number: 529229
 - Manufacturer: Hubbell
 - HP supplied plug manufacturer number: HBL332P6W
 - Required customer-supplied receptacle manufacturer numbers: HBL332R6W (wall mount receptacle), HBL332C6W (connector body for cable), or equivalent receptacle

- 30A nonharmonized AC power cable plug (one per power cord): three-wire, single-phase,
 - HP Product ID: not available
 - HP part number: 541087
 - Manufacturer: Hubbell
 - HP supplied plug manufacturer number: HBL2621
 - Required customer-supplied receptacle manufacturer numbers: HBL2620 (wall mount receptacle), HBL2623 (connector body for cable), or equivalent receptacle

Regardless of input power, each PDU supplies single-phase power at 200 to 250 V AC to each of its 14 receptacles and thereby to each enclosure that plugs into a receptacle.

Maximum current requirement for the AC service depends on the number and type of enclosures installed in the modular cabinet.

IOAM Enclosure Power Requirements

Specifications in the following tables assume fully loaded IOAM enclosures.

IOAM Enclosure Power Specifications

Modular Unit	Plugs per Modular Unit	Total Power Consumption (Watts)	Maximum Total AC Current (Amps) per PDU @ 208 V AC	Maximum Total AC Current (Amps) per PDU @ 230 V AC
I/O adapter module (IOAM) Enclosure	4	824	5.3	4.8

IOAM Enclosure Inrush Current Specifications

Item	Peak Inrush Current (Amps) per Component Plug	Average Inrush Current (Amps)
I/O adapter module (IOAM) Enclosure		
0 msec -- 1 msec	100	55
1 msec -- 2 msec	55	33
2 msec -- 10 msec	55	22
10 msec -- 150 msec	25	15

UPS Power Requirements

Specifications in the following tables assume the UPS is integrated in the modular cabinet.

UPS Power Specifications

Modular Unit	Plugs per Modular Unit	Total Power Consumption (Watts)	Maximum Total AC Current (Amps) per PDU @ 208 V AC	Maximum Total AC Current (Amps) per PDU @ 230 V AC
UPS, R5500 XR, 0-1 cycle (operates at 95% efficiency)	2	230	1.1 (estimated maximum)	1.0 (estimated maximum)

UPS Inrush Current Specifications

Item	Peak Inrush Current (Amps) per Component Plug	Average Inrush Current (Amps)
UPS, R5500 XR, 0-1 cycle	250	—

Model R5500 XR UPS

Version	Operating Voltage Settings	Power Out (VA/Watts)	Input Connection
North America and Japan	200/208*, 220, 230, 240	5000/4500	L6-30P
International	220, 230*, 240	6000/5400	IEC-309 32 Amp
	If set at: 200/208	Then: 500/4500	

* Factory default setting

Power Distribution Unit Wiring

Each modular cabinet has two power distribution units (PDUs). The PDUs are installed at the factory with the junction boxes either at the top or bottom, depending on whether the AC power is delivered from above or below.

Additionally, the wires inside the PDU are strapped, within the junction box, to meet the customer's specifications. The orientation of the PDUs and the strapping of the PDU wires are not expected to be changed in the field.

The following wiring diagrams are provided for the installer to balance the load between the phases. It is possible to inadvertently plug modules into a single phase rather than distribute the load across all three phases.

[PDU, Unstrapped](#)

This view shows the inner wiring of a PDU without strapping.

[PDU, Three Phase, Delta
\(North American\)](#)

The delta configuration is typical of North American usage. Input is three phase, 120 VAC, outlet single phase 208 VAC, with ground, and no neutral

[PDU, Three Phase, Wye](#)

The wye configuration has Input of three phase, 250VAC, and outlet of single phase 250 VAC, with ground and neutral

[PDU, Single Phase](#)

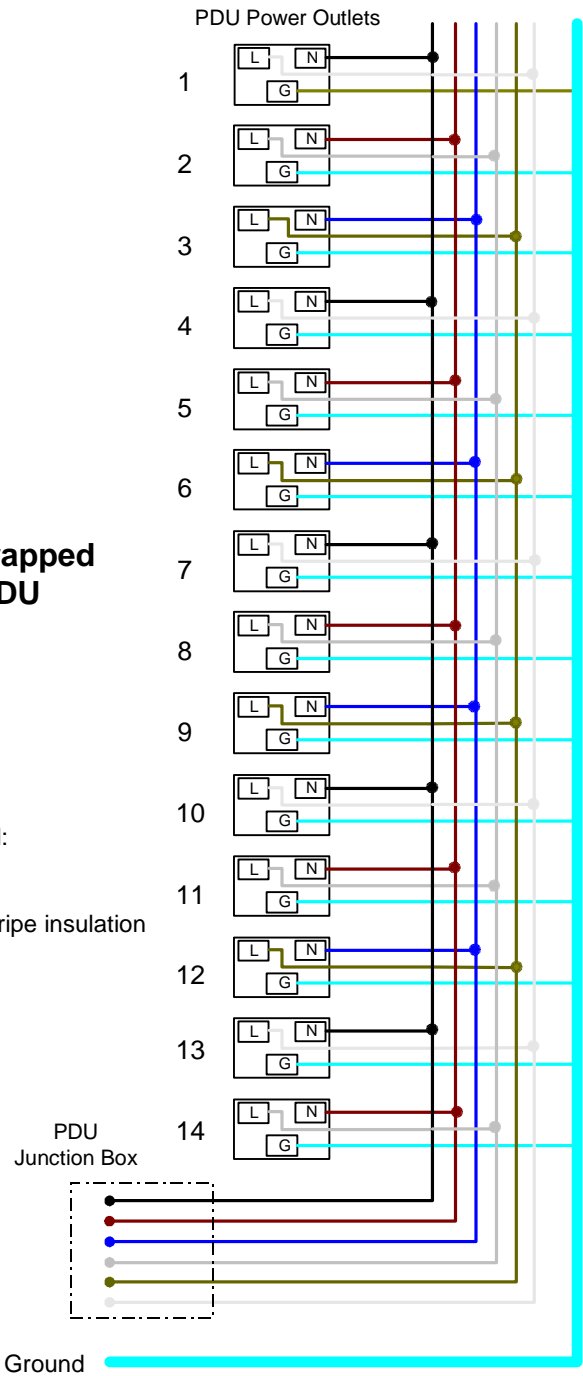
Input, single phase, 250VAC, outlet single phase 250 VAC, with both ground and neutral.

PDU, Unstrapped

Wire Color Code, North America:
L = line pin, black insulation
N = neutral pin, white insulation
G = ground pin, green insulation

Unstrapped
PDU

Wire Color Code, EU Harmonized:
L = line pin, brown insulation
N = neutral pin, blue insulation
G = ground pin, yellow & green stripe insulation



VST508.vsd

PDU, Three Phase, Delta (North American)

Input, three phase, 120 VAC, outlet single phase 208 VAC, with ground, no neutral.
This configuration provides 208 VAC by using a delta connection.

Wire Color Code, North America:

L = line pin, black insulation

N = neutral pin, white insulation

G = ground pin, green insulation

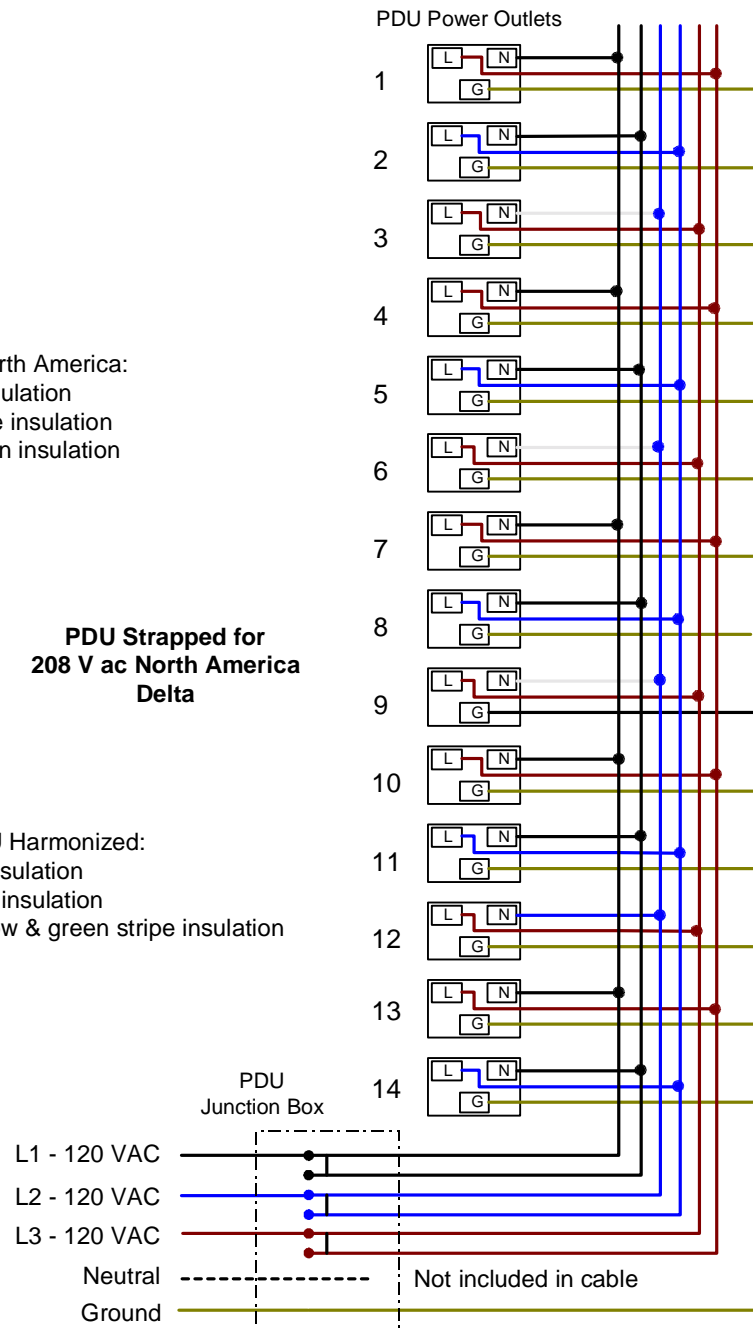
**PDU Strapped for
208 V ac North America
Delta**

Wire Color Code, EU Harmonized:

L = line pin, brown insulation

N = neutral pin, blue insulation

G = ground pin, yellow & green stripe insulation

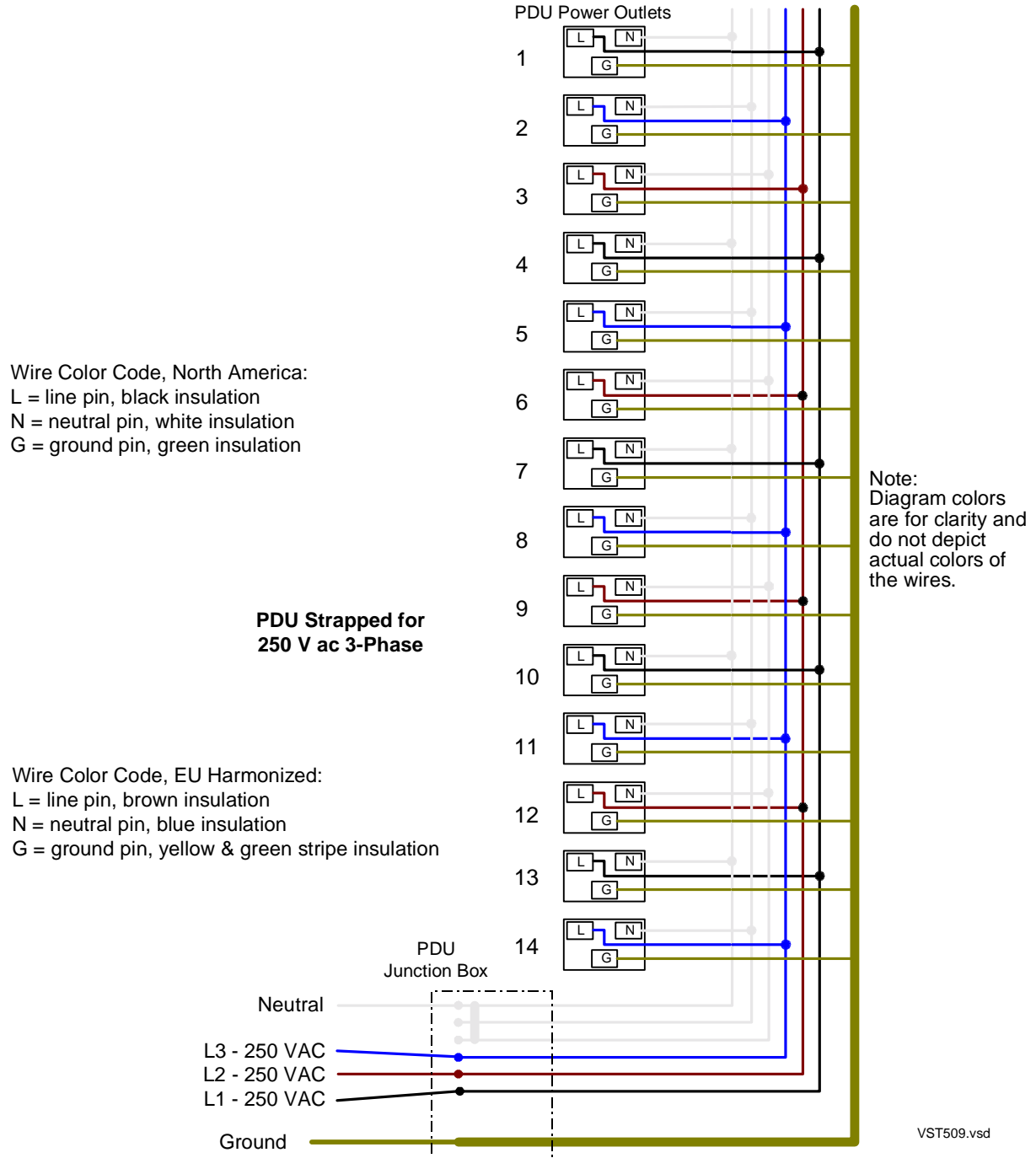


Note:
Diagram colors
are for clarity and
do not depict
actual colors of
the wires.

VST511.vsd

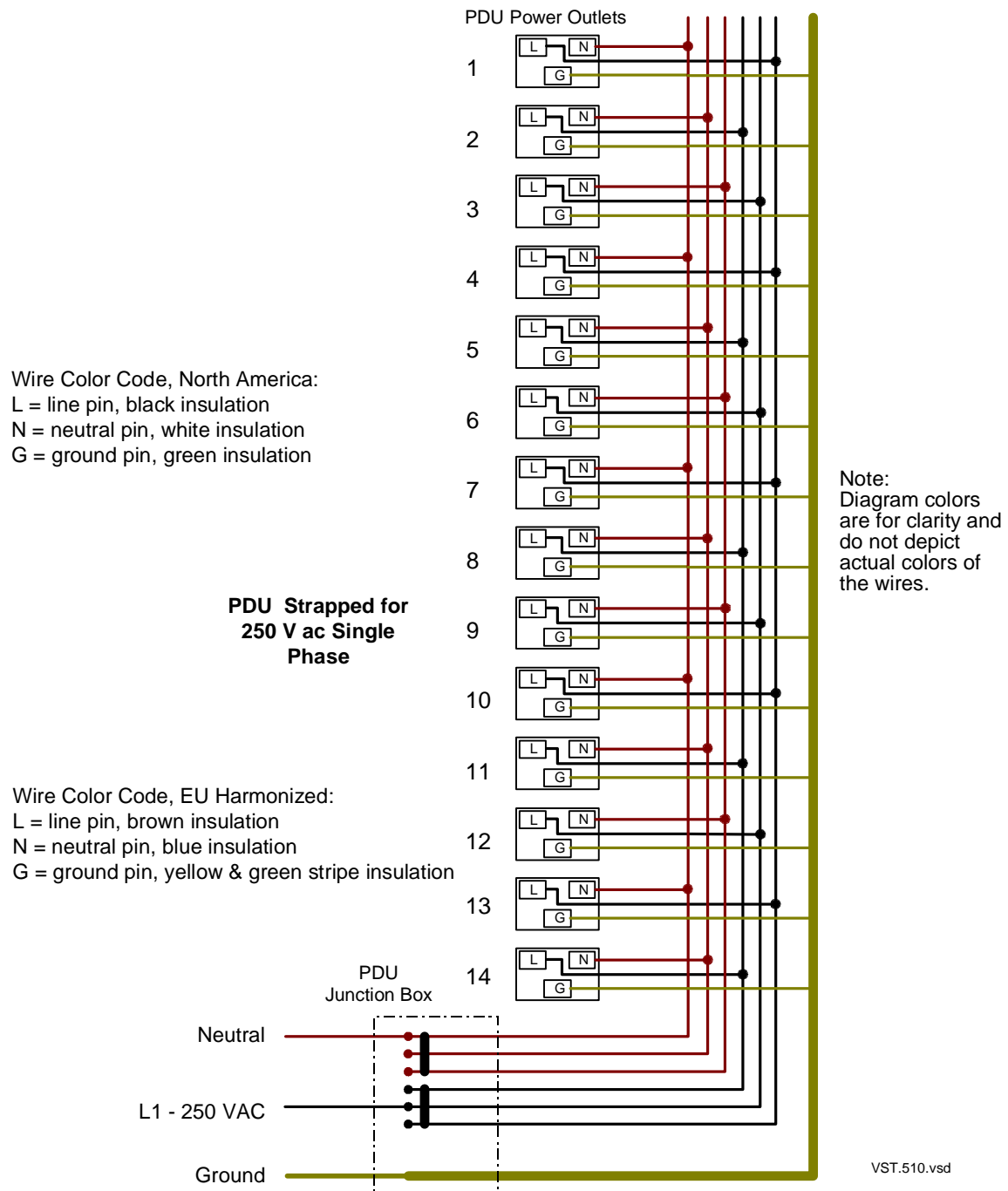
PDU, Three Phase, Wye

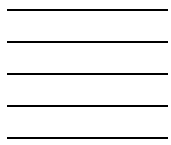
Input, three phase, 250VAC, outlet single phase 250 VAC, with ground and neutral.
This configuration provides 250 VAC by using a wye connection.



PDU, Single Phase

Input, single phase, 250VAC, outlet single phase 250 VAC, with ground and neutral.





Safety and Compliance

This section contains three types of required safety and compliance statements:

- Regulatory compliance
- Waste Electrical and Electronic Equipment (WEEE)
- Safety

Regulatory Compliance Statements

The following regulatory compliance statements apply to the products documented by this manual.

FCC Compliance

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

Any changes or modifications not expressly approved by Hewlett-Packard Computer Corporation could void the user's authority to operate this equipment.

Canadian Compliance

This class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Korea MIC Compliance

A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약 잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Taiwan (BSMI) Compliance

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Japan (VCCI) Compliance

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may occur, in which case the user may be required to take corrective actions.

European Union Notice

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (the equivalent international standards are in parenthesis):

- EN55022 (CISPR 22)—Electromagnetic Interference
- EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11)—Electromagnetic Immunity
- EN61000-3-2 (IEC61000-3-2)—Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3)—Power Line Flicker
- EN60950-1 (IEC60950-1)—Product Safety

Laser Compliance

This product may be provided with an optical storage device (that is, CD or DVD drive) and/or fiber optic transceiver. Each of these devices contains a laser that is classified as a Class 1 Laser Product in accordance with US FDA regulations and the IEC 60825-1. The product does not emit hazardous laser radiation.



WARNING: Use the controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure. To reduce the risk of exposure to hazardous radiation:

- **Do not try to open the module enclosure. There are no user-serviceable components inside.**
 - **Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.**
 - **Allow only HP Authorized Service technicians to repair the module.**
-

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

SAFETY CAUTION

The following icon or caution statements may be placed on equipment to indicate the presence of potentially hazardous conditions:



DUAL POWER CORDS CAUTION:

"THIS UNIT HAS MORE THAN ONE POWER SUPPLY CORD. DISCONNECT ALL POWER SUPPLY CORDS TO COMPLETELY REMOVE POWER FROM THIS UNIT."

"ATTENTION: CET APPAREIL COMPORTE PLUS D'UN CORDON D'ALIMENTATION. DÉBRANCHER TOUS LES CORDONS D'ALIMENTATION AFIN DE COUPER COMPLÈTEMENT L'ALIMENTATION DE CET ÉQUIPEMENT".

DIESES GERÄT HAT MEHR ALS EIN NETZKABEL. VOR DER WARTUNG BITTE ALLE NETZKABEL AUS DER STECKDOSE ZIEHEN.



Any surface or area of the equipment marked with these symbols indicates the presence of electric shock hazards. The enclosed area contains no operator-serviceable parts.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure.

DOUBLE POLE FUSING

CAUTION: DOUBLE-POLE /NEUTRAL FUSING.

ATTENTION: DOUBLE POLE/FUSIBLE SUR LE NEUTRE

NOT FOR EXTERNAL USE

CAUTION: NOT FOR EXTERNAL USE. ALL RECEPTACLES ARE FOR INTERNAL USE ONLY.

ATTENTION: NE PAS UTILISER A L'EXTERIEUR DE L'EQUIPEMENT

IMPORTANT: TOUS LES RECIPIENTS SONT DESTINES UNIQUEMENT A UN USAGE INTERNE.

VORSICHT: ALLE STECKDOSEN DIENEN NUR DEM INTERNEN GEBRAUCH.

HIGH LEAKAGE CURRENT

To reduce the risk of electric shock due to high leakage currents, a reliable grounded (earthed) connection should be checked before servicing the power distribution unit (PDU).

Observe the following limits when connecting the product to AC power distribution devices: For PDUs that have attached AC power cords or are directly wired to the building power, the total combined leakage current should not exceed 5 percent of the rated input current for the device.

“HIGH LEAKAGE CURRENT, EARTH CONNECTION ESSENTIAL BEFORE CONNECTING SUPPLY”

“HOHER ABLEITSTROM. VOR INBETRIEBNAHME UNBEDINGT ERDUNGSVERBINDUNG HERSTELLEN”

“COURANT DE FUITE E’LEVE’. RACCORDEMENT A LA TERRE INDISPENSABLE AVANT LE RACCORDEMENT AU RESEAU”

FUSE REPLACEMENT

CAUTION – For continued protection against risk of fire, replace only with same fuse type TCF15, Rated 600V~, 15A. Disconnect power before changing fuses.

Waste Electrical and Electronic Equipment (WEEE)

Information about the Waste Electrical and Electronic Equipment (WEEE) directive is available from the NonStop Technical Library (NTL) home page. Select **Safety and Compliance > Waste Electrical and Electronic Equipment (WEEE)**.

Important Safety Information

You can access information about Safety from the left navigation area of the NTL home page: select **NonStop Computing>Important Safety Information**. A document window containing a binder of safety information, in several languages, appears. In the document window, click a document title to open the safety information in another language. Local HP support can also help direct you to your safety information.

Consumer Safety Statements

Customer Installation and Servicing of Equipment

The following statements pertain to safety issues regarding customer installation and servicing of equipment described in this manual.

- Keep door closed for normal operation.
- The equipment must be installed near the receptacles for the power cords, and the receptacles must be easily accessible to the user.
- Batteries must be disposed of in compliance with local ordinances.

Consignes de sécurité à l'intention du client

Installation et entretien du système par le client

Les consignes de sécurité qui suivent concernent l'installation et l'entretien par le client du système décrit dans le présent manuel.

- Garder la porte fermée pendant le fonctionnement normal du système.
- Installer le système à proximité des prises de courant nécessaires à son branchement. Ces prises doivent être faciles d'accès.
- Jeter les piles usagées conformément au règlement local en vigueur.

Verbraucher-Sicherheitsangaben

Geräteinstallation und -wartung durch den Kunden

Die folgenden Angaben betreffen Sicherheitsfragen in Hinsicht auf die Geräteinstallation und -wartung durch den Kunden, wie sie in diesem Handbuch beschrieben werden.

- Tür für normalen Betrieb geschlossen lassen.
- Die Geräte müssen in der Nähe der Steckdosen für die Netzanschlußkabel installiert werden, und die Steckdosen müssen für den Benutzer leicht zugänglich sein.
- Batterien müssen in Übereinstimmung mit örtlichen Vorschriften beseitigt werden.

Declaraciones sobre la seguridad del consumidor

Instalación y servicio al equipo por el consumidor

Las siguientes declaraciones tienen que ver con aspectos de seguridad relacionados con la instalación y servicio al equipo por el consumidor, y que se describen en este manual.

- Mantenga la puerta cerrada durante la operación normal del equipo.
- El equipo tiene que estar instalado cerca de los receptáculos de los cordones de alimentación eléctrica, y dichos receptáculos tienen que ser de fácil acceso para el usuario.
- Las baterías (pilas) deben desecharse cumpliendo con los reglamentos locales.

Forbrugersikkerhedsmeddelelser

Installation og service af udstyr der udføres af kunden

De følgende meddelelser vedrører sikkerheden angående installation og service af udstyr, der udføres af kunden, som beskrives i denne brugerhåndbog.

- Hold lugen lukket under normal drift.
- Udstyret skal installeres i nærheden af stikkontakterne til netledningerne, og stikkontakterne skal være let tilgængelige for brugeren.
- Batterierne skal kasseres i overensstemmelse med lokale vedtægter.

Veiligheidsinstructies voor de consument

Installatie en onderhoud van apparatuur door de klant

De volgende veiligheidsinstructies betreffen de installatie en het onderhoud door de klant van de in deze handleiding beschreven apparatuur.

- Houd bij normaal bedrijf de deur gesloten.
- De apparatuur moet nabij contactdozen voor stroomkabels worden geïnstalleerd en de contactdozen moeten voor de gebruiker gemakkelijk bereikbaar zijn.
- Batterijen moeten overeenkomstig de plaatselijke voorschriften worden weggegooid.

Käyttöturvaa koskevia huomautuksia

Asiakkaan suorittama laiteasennus ja huolto

Seuraavat huomautukset koskevat turvallisuuskohdista, jotka asiakkaan täytyy ottaa huomioon tässä käsikirjassa kuvattuja laiteasennuksia ja huoltotoimenpiteitä suoritettaessa.

- Kansi täytyy pitää suljettuna normaalin käytön aikana.
- Laitteisto täytyy asentaa lähelle virtapistokkeita, ja pistokkeiden tulee olla helposti käytettävissä.
- Paristot täytyy hävittää paikallisten säädösten mukaisesti.

Misure precauzionali per i clienti

Installazione e manutenzione del sistema da parte del cliente

Le seguenti misure precauzionali riguardano l'installazione e la manutenzione da parte del cliente del sistema descritto nel presente manuale.

- Mantenere la porta chiusa durante il funzionamento normale del sistema.
- Il sistema deve essere installato vicino alle prese di corrente che saranno usate per il collegamento alla rete. Tali prese devono essere facilmente accessibili.
- Lo smaltimento delle batterie usate deve essere effettuato secondo la normativa locale.

Informações de segurança para os consumidores

Instalação e manutenção do equipamento pelo cliente

As seguintes informações referem-se a questões de segurança relacionadas à instalação e manutenção, pelo cliente, do equipamento descrito neste manual.

- Para garantir o funcionamento normal, mantenha a porta fechada.
- O equipamento deve ser instalado próximo das tomadas, e o utilizador deve ter acesso fácil às tomadas.
- As pilhas usadas devem ser descartadas de acordo com as leis locais.

Meddelanden beträffande konsumentssäkerhet

Kundutförd installation och service

De följande meddelandena beskriver säkerhetsföreskrifter för kundutförd installation och service av utrustning som beskrivs i denna manual:

- Dörren skall vara stängd under normal drift.
- Batterier måste kasseras i enlighet med lokala förordningar.
- Utrustningen bör monteras nära eluttag för nätsladdar. Nätsladdarna måste vara lättillgängliga.

機器のカスタマー・インストレーションおよび保守

次の記述は、このマニュアルに述べられた機器のカスタマー・インストレーションおよび保守に関する安全性の問題に適合するものです。

通常のオペレーションではドアを閉める。

機器は電源コードのコンセントの近くに設置する。コンセントは、ユーザーが使いやすい場所にあること。

バッテリーは定められた法規に適合するものであること。

用户安全使用说明

用户安装及使用

下列内容是手册中有关用户安装使用时的安全注意事项：

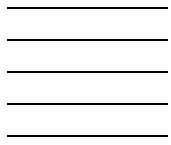
- 正常运行时请将门保持关闭。
- 设备电源线应与插座靠近，客户应容易接近插座。
- 处理旧电池应符合当地法令。

Οδηγίες ασφαλείας του καταναλωτή

Εγκατάσταση και συντήρηση του εξοπλισμού από τον πελάτη

Οι παρακάτω οδηγίες αφορούν την ασφάλεια του πελάτη σχετικά με την εγκατάσταση και συντήρηση του εξοπλισμού του από τον ίδιο όπως αναφέρεται στο εγχειρίδιο.

- Η πόρτα πρέπει να είναι κλειστή για την κανονική λειτουργία του.
 - Η εγκατάσταση πρέπει να γίνεται κοντά στην υποδοχή του καλωδίου τροφοδοσίας, και ο χρήστης πρέπει να έχει εύκολη πρόσβαση σε αυτές τις υποδοχές.
 - Οι μπαταρίες πρέπει να αχρηστεύονται σύμφωνα με τους τοπικούς κανονισμούς.
-



Glossary

For a glossary of NonStop S-series terms, see the *NonStop System Glossary* in the NonStop Technical Library (NTL).

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See also ServerNet adapters

See ATM3SA ServerNet adapter

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See Ethernet 4 ServerNet adapter (E4SA)

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See Token-Ring ServerNet adapter (TRSA)

3863 Fast Ethernet ServerNet adapter (FESA)

See Fast Ethernet ServerNet adapter (FESA)

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See Gigabit Ethernet ServerNet adapter (GESA)

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See Gigabit Ethernet ServerNet adapter (GESA-C)

3865 Gigabit Ethernet ServerNet adapter (GESA-F)

See Gigabit Ethernet ServerNet adapter (GESA-F)

3880 ServerNet wide area network (SWAN) concentrator

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See SWAN concentrator

3890 ES connect IBM ESCON channel controller

5142 digital audio tape (DAT) drive

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