Dialogic

Dialogic® Converged Services Platform Release 8.4.1 Engineering Release 3

Hardware Installation and Maintenance Guide

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www.dialogic.com

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(i) repair, replace or correct the same at its manufacturing or repair facility or

(ii) if Dialogic determines that it is unable or impractical to repair, replace or correct the product or software, provide a refund or credit not to exceed the original purchase price or license fee.

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a) Dialogic's assistance in diagnostic efforts;

b) access to Dialogic's Technical Support web sites, databases or tools;

c) product integration testing;

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e) product documentation updates.

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About this Publication

Purpose

This documentation provides guidelines for using the Dialogic® CSP.

Safety Labels

The following Safety labels may appear in this information product to alert customers to avoidable hazards. The following are in the order of priority:

DANGER

Danger indicates the presence of a hazard that will cause death or severe personal injury if the hazard is not avoided.

WARNING

Warning indicates the presence of a hazard that can cause death or severe personal injury if the hazard is not avoided.

CAUTION

Caution indicates the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided. Caution can also indicate the possibility of data loss, loss of service, or that an application will fail.

Conventions used

This information product uses the text conventions explained below. In addition, hexadecimal numbers are preceded by a zero and small “x.” For example, the decimal number 15 is represented in hexadecimal as 0x0F.

Convention	Description
. . .	A horizontal ellipsis in an API message indicates fields of variable length.
:	A vertical ellipsis in an API message indicates that a block of information is repeated or is variable.
n	The letter *n* is a generic placeholder for a number.
`Sans serif mono space`	Indicates a command name, option, input, output, non-GUI error, and system messages.
`Sans serif monospace italic`	Indicates a parameter name in an input message. Example: `move *.dot a: c:` *`-s`* The *`-s`* is the parameter.
Serif italic	Indicates the name of a book, chapter, path, file, or API message. Example: *`UserDirectory/Config.exe`*
Boldface	Indicates keyboard keys, key combinations, and command buttons Example: **Ctrl+Alt+Del**
Sans serif boldface	Identifies text that is part of a graphical user interface (GUI). Example: Go to the **Configuration** menu and select **Card**->**Span Configuration**

Contents

A Industry Compliance

1 CSP 2040 Chassis Reference

Purpose This chapter provides reference information for the CSP 2040 chassis.

Introduction

Overview

The CSP 2040 is a versatile 1,024 port non-blocking programmable switch that combines reliability, scalability, and performance in a low-cost, compact, mid-range environment.The CSP 2040 delivers exceptional cost-effectiveness in a wide range of applications from entry-level enhanced service platforms to distributed wireless nodes.

Features

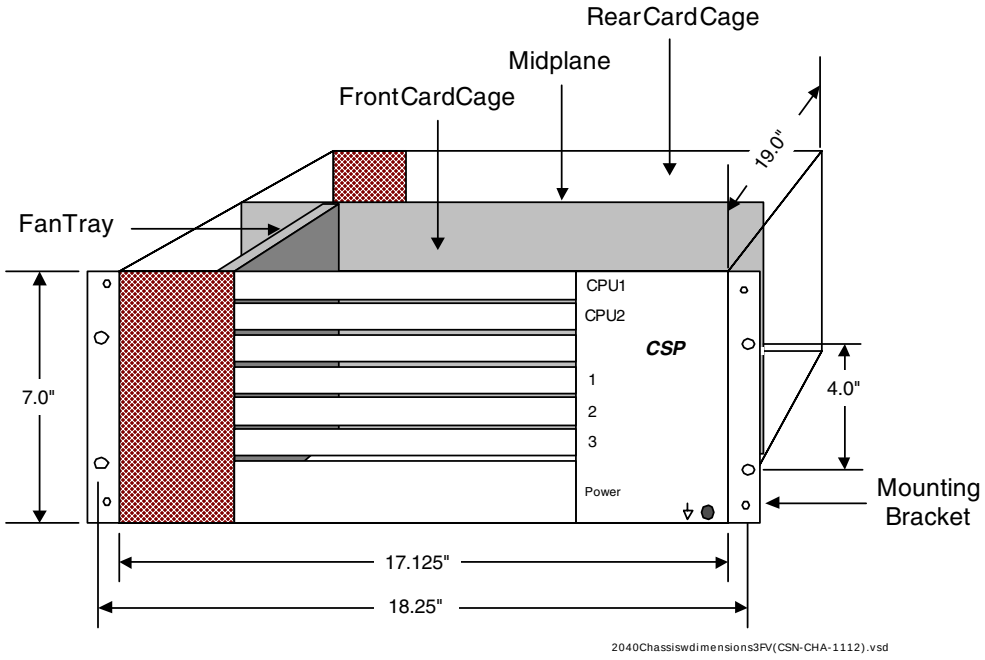
Features of the CSP 2040 include the following:

- Compact, powerful, flexible 1,024 port switch
  - PC-sized footprint
  - Space-saving, midplane seven slot chassis
  - DS3, T1, E1, and J1 and analog network interfaces
  - SS7 and ISDN signaling packet engines
  - DSP features
- Reliability and fault tolerance
  - 1+1 Redundant matrices
  - 1+1 Redundant power supplies
  - 1+1 Redundant ISDN and SS7
  - N+1 Redundant network interfaces
  - Hot-swappable line, resource, and CSP Matrix Series 3 Cards
  - Automatic fault isolation and switchover
- High performance, scalable switching
- Open, programmable architecture
  - High-level application programming interface (API)
  - Exclusive Programmable Protocol Language (PPL)

Chassis Views

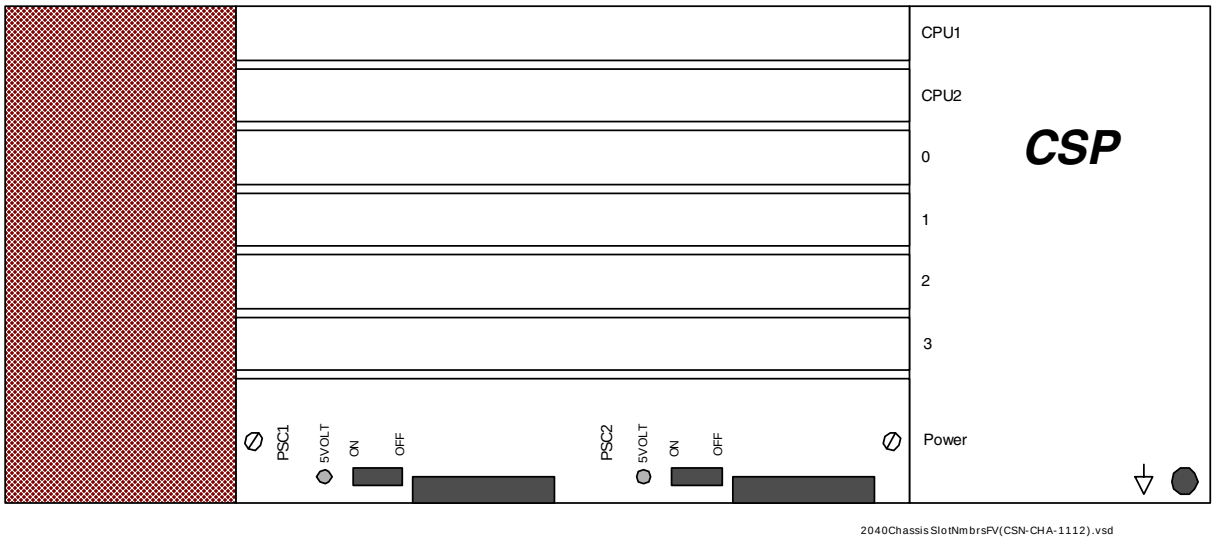
Dimensions The next figure shows a diagram of the CSP 2040 chassis with dimensions.

Figure 1-1 Chassis Diagram



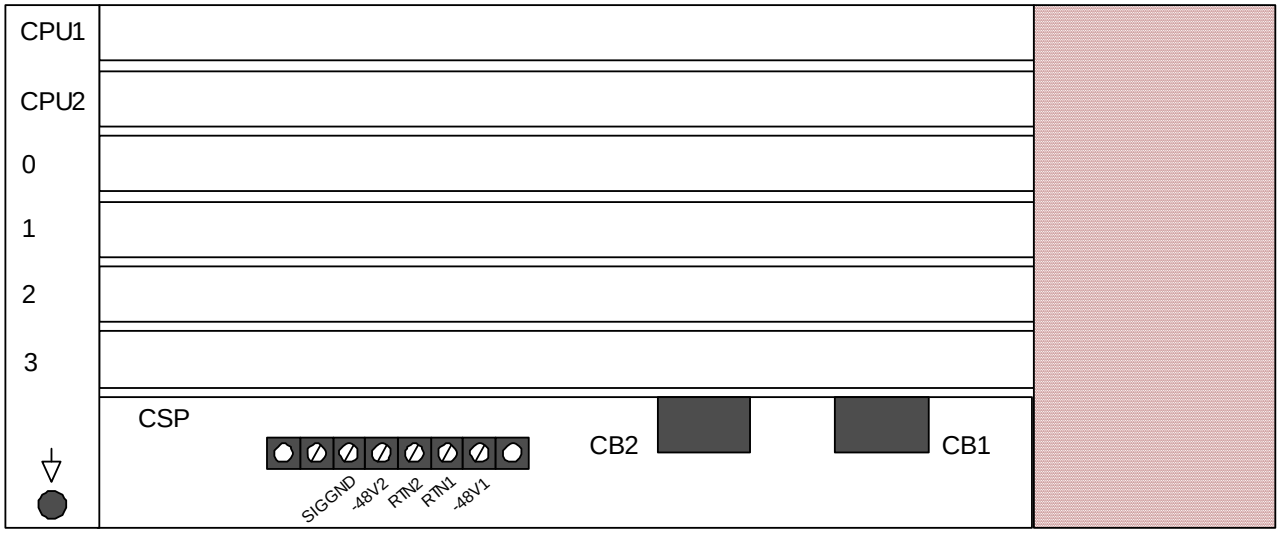
Front of Chassis The next figure shows the front of the CSP 2040 chassis.

Figure 1-2 Front of Chassis



Rear of Chassis Figure 1-3 shows the rear of the CSP 2040 chassis.

Figure 1-3 Rear of Chassis



EXS1000ChassisSlotNmbrsRV121099(CSN-SHA-1100).vsd

Physical Specifications

Specifications

The table below lists physical specifications for the CSP 2040.

Characteristic	Specifications
Physical Dimensions	17.8 cm (7.0") [H] x 43.5 cm (17.125") [W] x 48.2 cm (19.0") [D]
Weight	18.2 kg (40 lb) max
Power Requirements	–48V DC 10.0 Amps
Input Voltage Range	–40V DC to –60V DC
Heat Dissipation	1,025 BTUs/hr

Environmental Specifications

Specifications

The table below lists environmental specifications for the CSP 2040.

Characteristic	Specifications
Temperature - Storage	–40°C to + 70°C (–40°F to 158°F)
Temperature - Operating	0°C to 50°C (32°F to 122°F)
Temperature Shock - Storage	–40°C to +70°C to –40°C (–40°F to 158°F to –40°F) @ 5°/minute
Temperature Shock - Operational	0° to 50° to 0°C (32°F to 122°F to 32°F) at 10°C/hour
Humidity - Operating	5 to 85%
Altitude	Up to 4000 m (13,123 ft.)

Important! Elevated operating ambient conditions may occur in an enclosed equipment rack. If this unit is installed in a closed or multi-unit rack assembly, the operating ambient temperature may be greater than the room ambience.

2 CSP 2090/CSP 2110 Chassis Reference

Purpose This chapter provides reference information for the CSP 2090 and CSP 2110 chassis.

Introduction

Overview

The CSP 2090 and CSP 2110 are both non-blocking 2000-plus port switches, uniquely designed to meet the demands of contemporary telecommunications by delivering high-performance, fault tolerant switching in a compact microprocessor-based design. A typical mid-range configuration consists of: a 2,048 port CSP Matrix Series 3 Card residing in a 20 slot chassis, a fully configurable combination of line and services cards, and a host interface.

The CSP 2090 and CSP 2110 support common channel signaling packet engines for both ISDN and SS7 communications. Line protocol cards include E1, T1, DS3, and J1 services. Standard and custom tone generation and reception, precise call analysis, conferencing and voice recorded announcements are provided through an advanced Digital Signal Processing (DSP) unit available for the CSP. The CSP communicates with the host application using Ethernet links.

The CSP 2090 and CSP 2110 can operate as either a stand-alone switch, or as a node in a larger system, supporting scalability to over 30,000 non-blocking ports.

Features

Features of the CSP 2090 and CSP 2110 include the following:

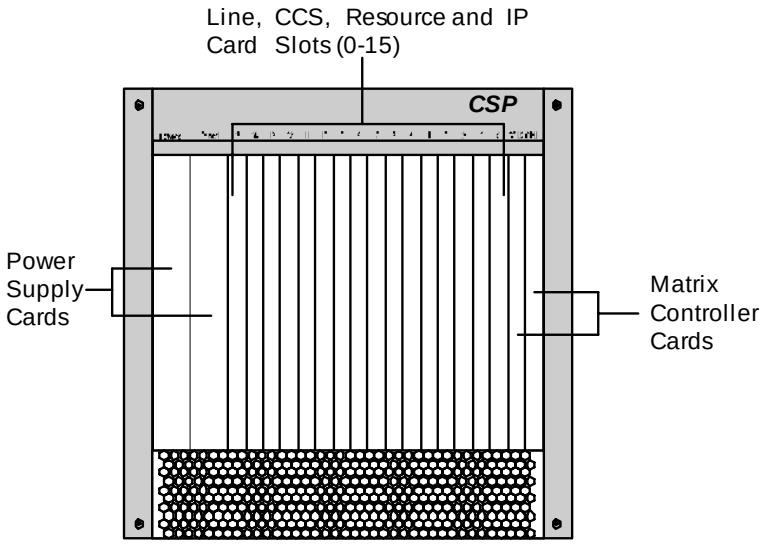
- Compact, powerful, flexible 2,048 port switch
  - Midplane 20-slot chassis
  - DS3, T1, E1, and J1 and analog network interfaces
  - SS7 and ISDN signaling packet engines
  - DSP features
- Reliability and fault tolerance
  - 1+1 Redundant matrices
  - 1+1 Redundant power supplies
  - 1+1 Redundant ISDN and SS7
  - N+1 Redundant network interfaces
  - Hot-swappable line, resource, and matrix controller cards
  - Automatic fault isolation and switchover
- High performance, scalable switching
- Open, programmable architecture
  - High level application programming interface (API) Exclusive
  - Programmable Protocol Language (PPL)

Chassis Views

CSP 2090 Front of Chassis

The next figure shows the front of the CSP 2090 chassis.

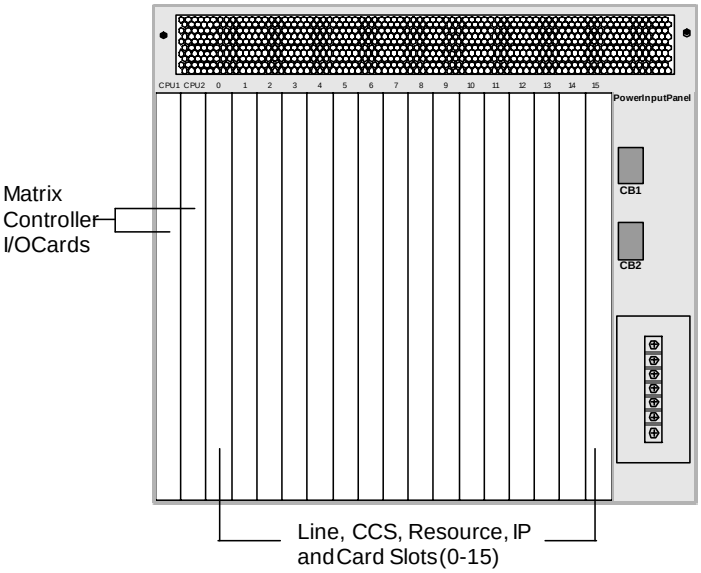
Figure 2-1 Front of Chassis



CSP 2090 Rear of Chassis

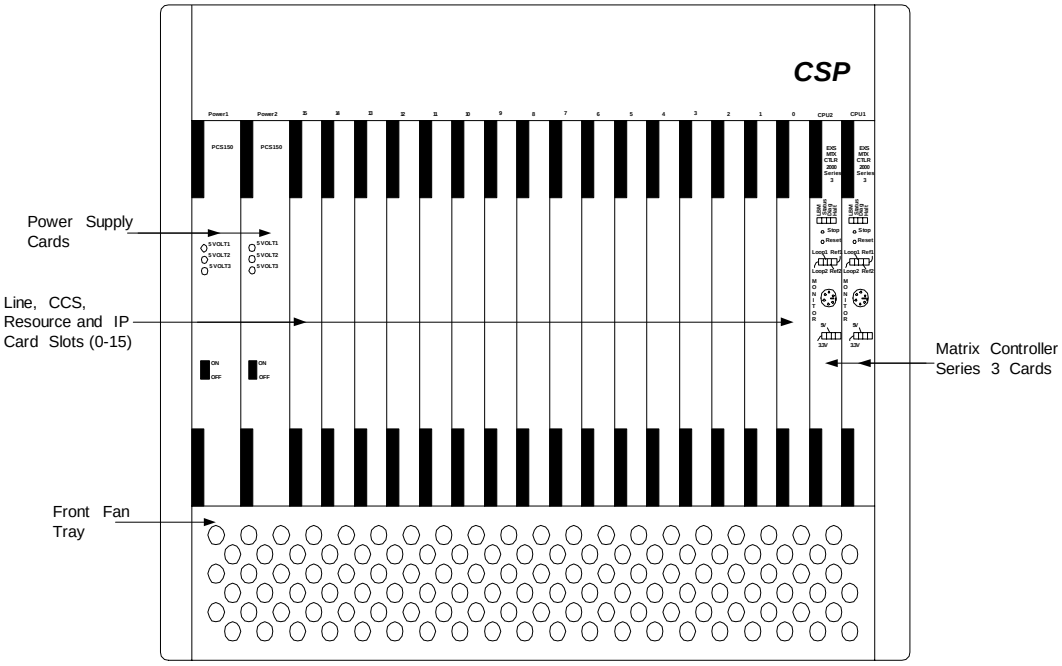
The next figure shows the rear of the CSP 2090 chassis.

Figure 2-2 Rear of Chassis



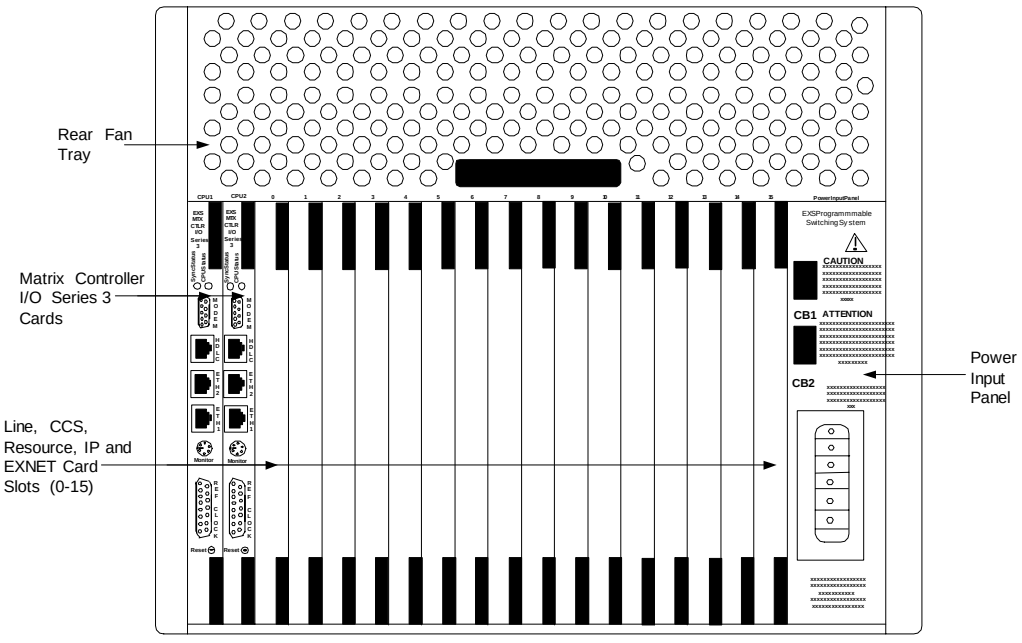
CSP 2110 Front of Chassis The next figure shows the front of the CSP 2110 chassis.

Figure 2-3 Front of Chassis



CSP 2110 Rear of Chassis The next figure shows the rear of the CSP 2110 chassis.

Figure 2-4 Rear of Chassis



Physical Specifications

CSP 2090 Specifications

The table below lists the physical specifications for the CSP 2090.

Characteristic	Specifications
Physical Dimensions	39.9 cm (15.7") [H] x 43.8 cm (17.25") [W] x 48.6 cm (19.125") [D]
Weight	29.5 kg (65 lb) (empty chassis with fan trays and blockout cards installed) 45.5 kg (100 lb) (loaded chassis)
Power Rating	–48 V DC, 25 A (maximum)
Input Voltage Range	–40 V DC to –60 V DC
Heat Dissipation	2,400 BTUs/hr

CSP 2110 Specifications

The table below lists the physical specifications for the CSP 2110.

Characteristic	Specifications
Physical Dimensions	48.9 cm (19.25") [H] x 43.8 cm (17.25") [W] x 48.6 cm (19.125") [D]
Weight	34 kg (75 lb) (empty chassis with fan trays and blockout cards installed) 50 kg (110 lb) (loaded chassis)
Power Rating	–48 V DC, 25 A (maximum)
Input Voltage Range	–40 V DC to –60 V DC
Heat Dissipation	2,476 BTUs/hr

Environmental Specifications

Specifications

The table below lists the environmental specifications for the CSP 2090 and CSP 2110 chassis.

Characteristic	Specifications
Temperature - Storage	–40°C to + 70°C (–40°F to 158°F)
Temperature - Operating	0°C to 50°C (32°F to 122°F)
Temperature Shock - Storage	–40°C to +70°C to –40°C (–40°F to 158°F to –40°F) @ 5°/minute
Temperature Shock - Operational	0° to 50° to 0°C (32°F to 122°F to 32°F) at 10°C/hour
Humidity - Operating	5 to 85%
Altitude	Up to 4000 m (13,123 ft)

Important! Elevated operating ambient conditions may occur in an enclosed equipment rack. If this unit is installed in a closed or multi-unit rack assembly, the operating ambient temperature may be greater than the room ambience.

3 CSP Chassis Installation

Purpose This chapter provides reference and procedural information for installing the CSP 2040, CSP 2090, and CSP 2110 chassis.

Installation Summary

Overview Below is a summary of the steps for installing the CSP.

1 Review the hardware requirements and compatibility information.

2 Review the guidelines, options, and requirements specified in *Pre-Installation Considerations* below.

3 Review the power to ground requirements in the following Telcordia document: *Isolated Ground Planes Definition and Application To Telephone Central Offices*, TR-NWT-000295

CAUTION

Proper grounding is vitally important. See Guidelines for Wiring and Grounding below for the chassis you are using.

4 See chapters in this book for information on the following:

- Rack mount the CSP 2040, CSP 2090, or CSP 2110.
- Connect the external power module and ground cables.
- Connect line I/O card cables.
- Connect the CSP 2040, CSP 2090, or CSP 2110 to the host computer.

5 If you are installing a CSP, see *Chapter 5, Building a Multi-Node System.*

Hardware Requirements

Dialogic-Supplied Equipment

The following table lists the equipment that you must purchase from Dialogic for the Converged Services Platform (CSP).

Dialogic-Supplied Equipment
CSP Matrix Series 3 card
CSP Matrix Series 3 I/O
System cards and I/O cards
Power Supply card
For multi-node systems: EXNET-ONE card for each node on the ring EXNET® Ring Fiber-optic cable

Customer-Supplied Equipment

The following table lists the equipment that you must supply for the Converged Services Platform (CSP).

Customer-Supplied Equipment
A host computer to monitor and control the CSP over an Ethernet connection (10Base-T or 100Base-T), and other associated hardware. **Multi-node systems require Ethernet connectivity to the host.**
19-inch or 23-inch rack and screws
CSP 2090 and CSP 2110 10 gauge wire (green, blue, and white) CSP 2040 14 gauge wire (green, blue, and white)
#10 solderless crimp ring terminals
#10 solderless crimp fork terminals
External power source: CSP 2090: 20 amps @ -48 V DC CSP 2110: 25 amps @ -48 V DC CSP 2040: 10 amps @ -48 V DC
I/O card cables, including cables for line cards

Pre-Installation Considerations

Installation Location Requirements

The CSP must be installed in a restricted area, such as a dedicated equipment room or data closet.

Environmental Requirements

The temperature, humidity, and altitude of the site must fall within the specifications listed in the Environmental Specifications section for the respective chassis. In general, a typical office environment satisfies these conditions. A temperature-controlled environment is preferable. See the *Environmental Specifications* for the chassis you are using.

Space Requirements

You must allow 0.334 m (1.1 ft.) of space in front of and behind the switch to ensure proper ventilation. Avoid putting the switch inside a cabinet with closed doors unless you can provide sufficient ventilation inside the cabinet. In addition, be sure to allow sufficient space for performing maintenance tasks such as removing fan trays and cards.

CAUTION

When installing the chassis do not block the exhaust fan at the rear of the chassis. This will cause the unit to overheat.

Rack-Mounting Options

The CSP chassis can be mounted in either a 19-inch or 23-inch rack. The mounting brackets on the switch adjust to accommodate either width. The mounting brackets can also be mounted at either the front or the middle of a CSP 2090 and CSP 2110 chassis. The CSP 2040 can only be mounted from the front.

CAUTION

When mounting the equipment in the rack, ensure that it does not pose a hazardous condition due to uneven mechanical loading.

Redundant Power Option

You can have a redundant configuration with two power sources, where one serves as a backup to the other, assuming that you have two power supply cards installed. In this configuration, the power cards operate in load-sharing mode.

Uninterruptible Power Supply Option

If your site has frequent power interruptions, consider using an Uninterruptible Power Supply (UPS) for your host PC. You can prevent downtime by running your application on a PC that receives its AC power from batteries during a power failure. In the Telco environment, Dialogic recommends a DC power system that includes battery backup to ensure continuous service during a commercial power failure.

Guidelines for Wiring and Grounding

Proper wiring and grounding of the chassis is extremely important. Follow the guidelines below.

Wiring

Wire each chassis directly to the –48 V fused power source.

CAUTION

Do not daisy-chain two or more chassis. Do not wire chassis directly to other equipment or to a common bus bar. Most feeders from the -48 V to frames are limited to about 20 A, whereas load distributions support several hundred amperes. Direct wiring to the fused power source eliminates the coupling mechanism, which appears as impedance in the power distribution system. If impedance is not controlled, transient voltages will cause temporary or permanent malfunctions.

Grounding

Connect your chassis to a true earth ground.

CAUTION

Connect the chassis to true earth ground to maintain signaling integrity and to prevent electrical shock. Do not allow the signal ground to float, and never connect a -48 V to a ground.

For More Information

Review the grounding specifications in the following Telcordia document: *Isolated Ground Planes Definition and Application To Telephone Central Offices*, TR-NWT-000295.

Electromagnetic Interference

Electromagnetic Interference (EMI) is a type of radiation that can hinder your system. Keep the following in mind when selecting cables:

- Shielded cable prevents outside electrical interference and drains off current induced by lightning.
- Twisted wire reduces induction, and thus interference, from one wire to the other. Varying the length of twists reduces the potential for signal interference between pairs.
- Twisted pair wiring is available in various thicknesses. Thicker cable covers longer distances and provides better sound quality but it is more expensive.

Channel Service Units

A Channel Service Unit (CSU) connects a digital phone line (T1, E1, J1) from the phone company to a digital communications device. CSUs are required between line cards and the network to provide necessary linking capabilities such as:

- Line conditioning for long haul transmissions
- Remote loopback
- Equalization
- Regeneration and monitoring of digital signals
- Digital circuit testing
- Protection from outside lines

Surge Protection

Dialogic recommends installing a surge protector between your call processing system and the power outlet. If a high voltage surge occurs on the power line, this device protects your system by sending the overload to ground.

Electrostatic Discharge Protection

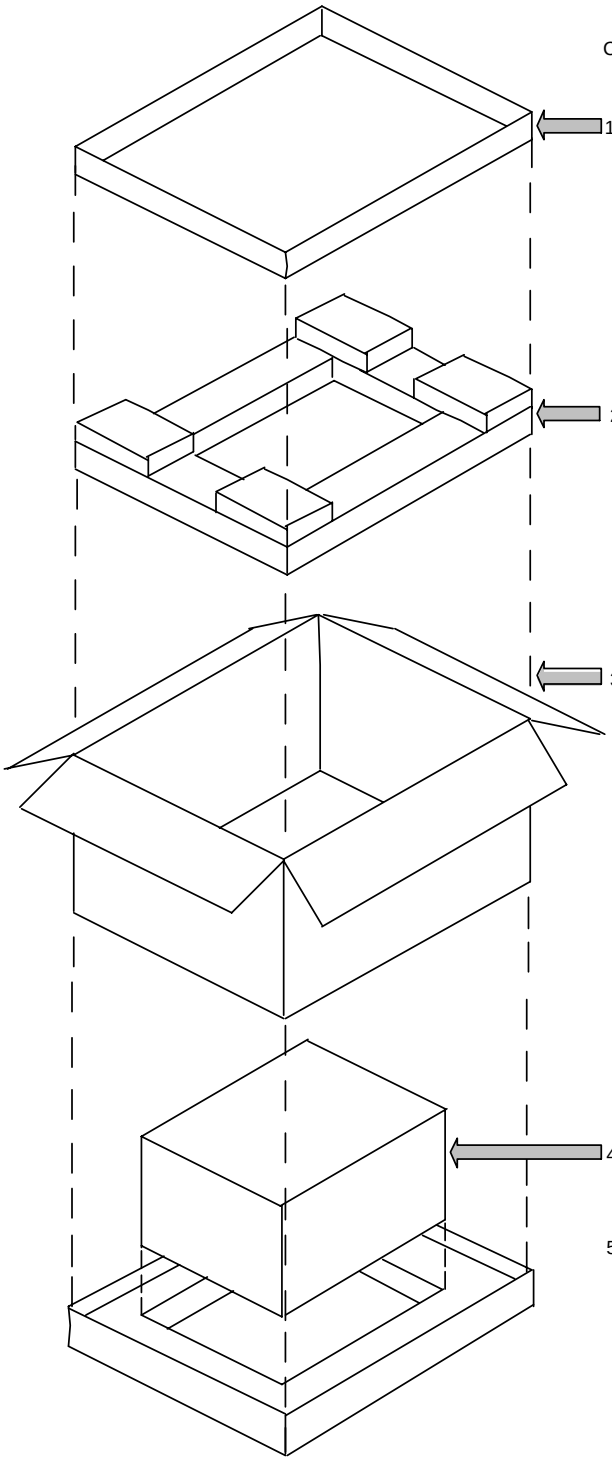
Electrostatic Discharge Protection (EDP) must always be used. Electrostatic Discharge (ESD) protective straps, shoes, or mats must be used when working with CSP components.

CAUTION

Electrostatic discharge from your body can damage integrated circuits.

Unpack CSP Chassis

Overview See the illustration below on how to unpack a CSP Chassis.



Complete the following steps:

1. Open top flaps of the shipping box and remove top tray.

   Tray Contents:
   - Cables
   - Manuals and software
   - Host option: keyboard, VGA box with mouse
   - Ring voltage generator

2. Remove the foam inserts.

   NOTE:
   Save the box and all packing materials in case you need to ship the chassis in the future. You must use the original shipping container to return the chassis to us. Otherwise, you may be charged for any shipping damage.

3. Remove the box.

   CAUTION:
   Before handling the chassis, ensure you are wearing an electrostatic discharge (ESD) wrist strap or ESD shoes to protect static-sensitive components.

   WARNING:
   An empty 2090 or 2110 with fan trays installed weighs approximately 34 kg (75 lbs).

   An empty 2040 with fan tray weighs approximately 18 kg (40 lbs).

4. With another person helping you, remove the chassis from the foam and from its anti-static bag.

5. Check the contents against the packing slip to ensure that you have all the parts. For assistance, refer to the enclosed document *Understanding Your Packing Slip*.

   If any parts are damaged or missing, call your Excel sales representative.

Rack Mounting

CSP 2090 and CSP 2110

You can either front-mount or mid-mount both the CSP 2090 and CSP 2110 (Figure 3-1). You can mount both in either a 48.2 cm (19-inch) rack or a 58.4 cm (23-inch) rack. The mounting brackets are reversible to accommodate either size. Use standard 10/32 mounting hardware to fasten the brackets to the sides of the chassis. (Figure 3-2)

Mounting Guidelines

When mounting the chassis, follow these guidelines:

- Mount the chassis with another person helping you. The average weight of both the CSP 2090 and CSP 2110 base units is approximately 34 kg (75 lb).
- Do not obstruct the vents of the front or rear fan tray.
- Allow sufficient room to slide the fan trays out. The depth of each tray, including handles, is specified below.

Table 3-1 Fan Tray Depths

Fan Tray	CSP 2090	CSP 2110
Front	31.7 cm (12.5”)	31.7 cm (12.5”)
Rear	21.0 cm (8.25”)	21.0 cm (8.25”)

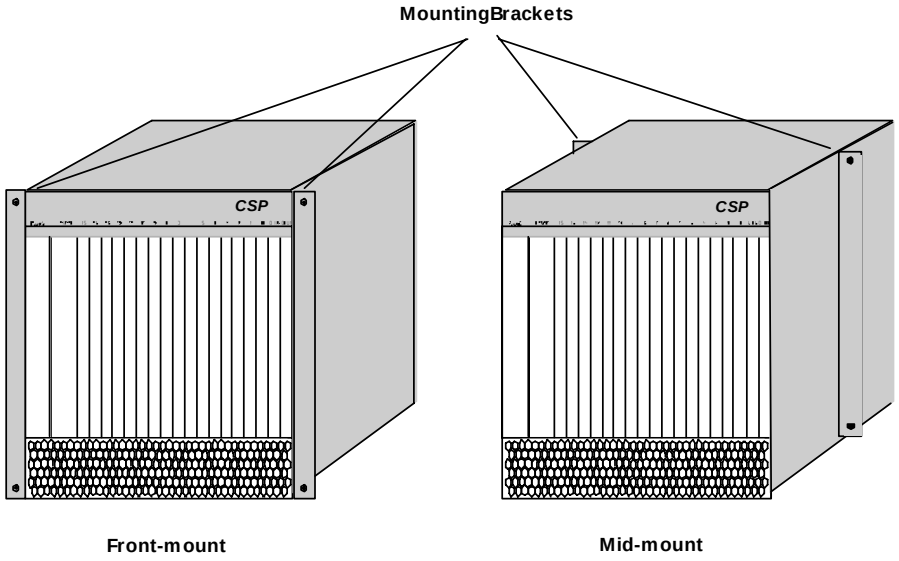
CAUTION

Avoid touching integrated circuit areas as static charges can damage circuits.

Mounting Bracket Diagram

The following illustration shows the possible locations of the mounting brackets on a CSP 2090 and CSP 2110 (Figure 3-1).

Figure 3-1 CSP 2090 and CSP 2110 Mounting Bracket Options



Mounting Dimensions Figure 3-2 provides CSP 2090 chassis mounting information.

Figure 3-2 Mounting on 19-Inch and 23-Inch Racks

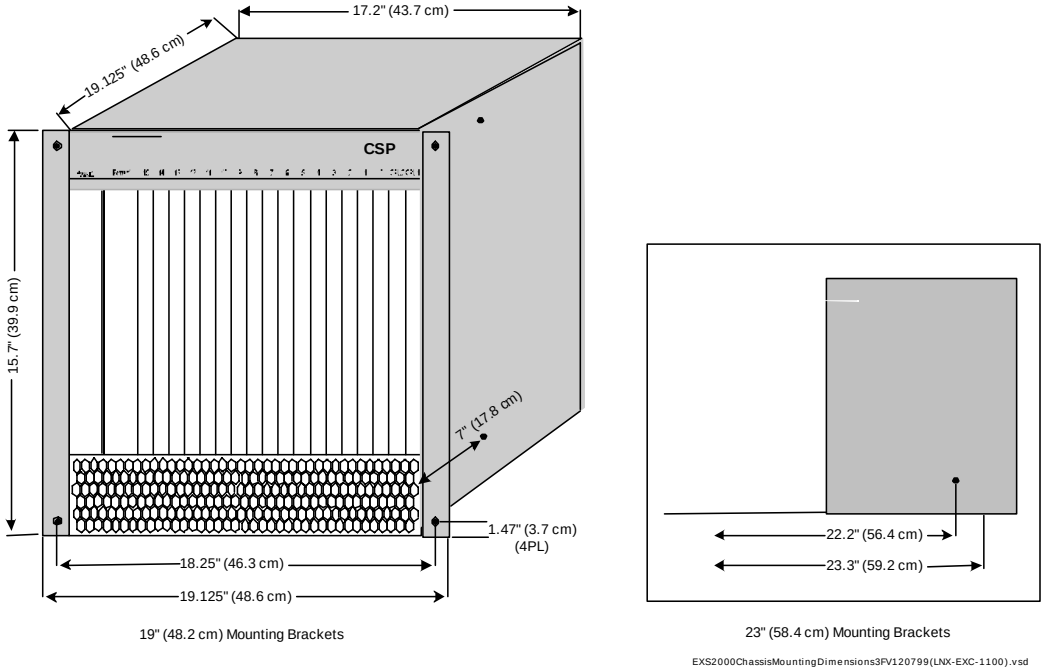


Figure 3-3, Figure 3-4, and Figure 3-5 illustrate CSP 2110 chassis mounting information.

Figure 3-3 Mounting on 19-Inch Racks

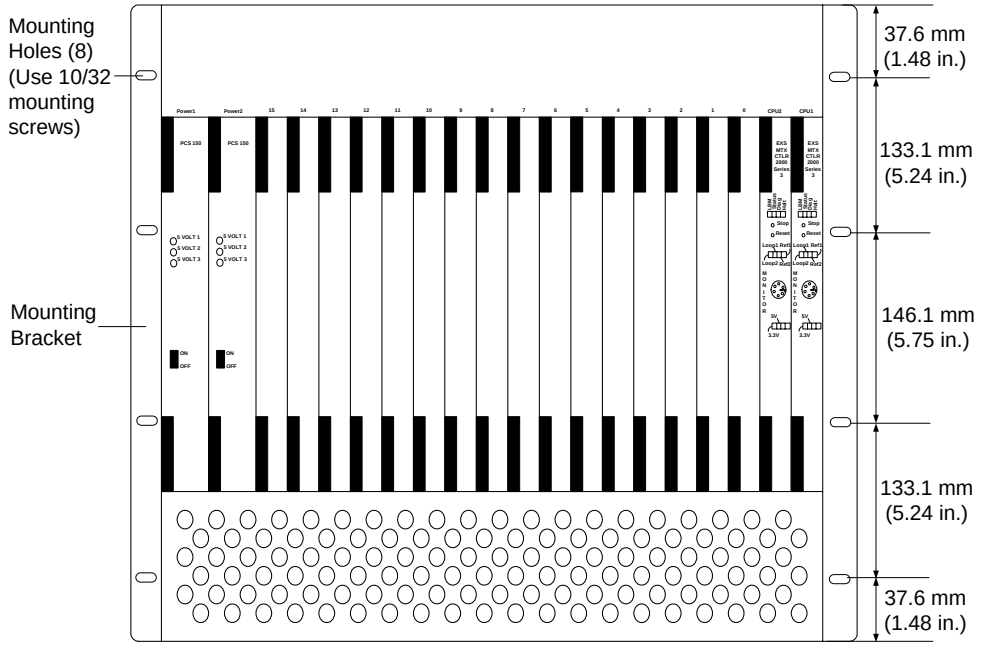


Figure 3-4 Mounting on 23-Inch Racks

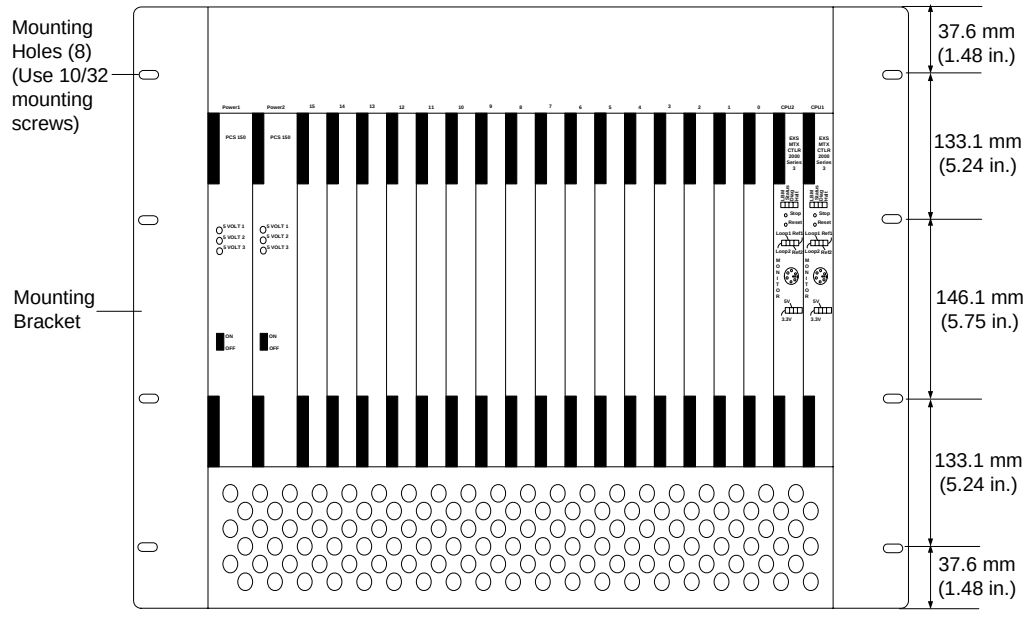
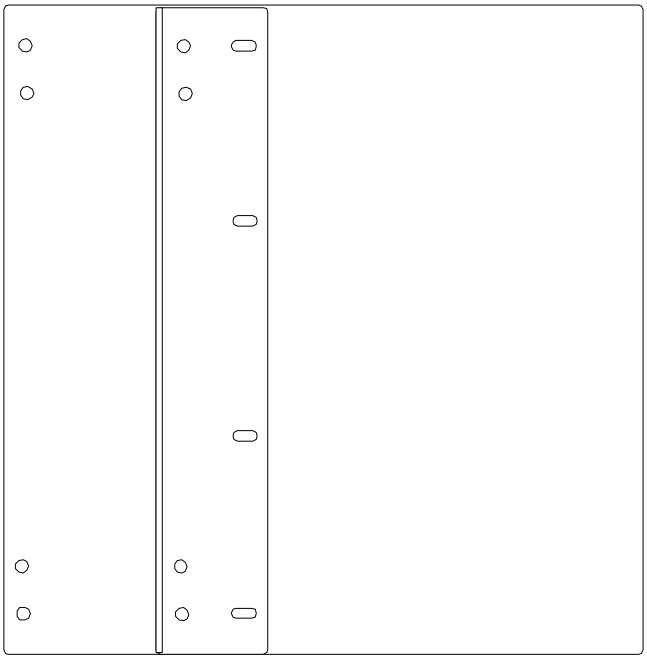


Figure 3-5 Mid-Mounting on 19-Inch Rack



CSP 2040

The CSP 2040 is a front-mount chassis. You can mount the CSP 2040 in either a 19-inch rack (Figure 3-6) or a 23-inch rack (Figure 3-7). The CSP 2040 mounting brackets are reversible to accommodate either size. Use standard 10/32 mounting hardware to fasten the brackets to the sides of the chassis.

Mounting Guidelines

When mounting the chassis, follow these guidelines:

- Mount the chassis with another person helping you. The average weight of the CSP 2040 Chassis is approximately 40 pounds.
- Do not obstruct the vents of the front fan tray.
- Allow sufficient room to slide the fan tray out.

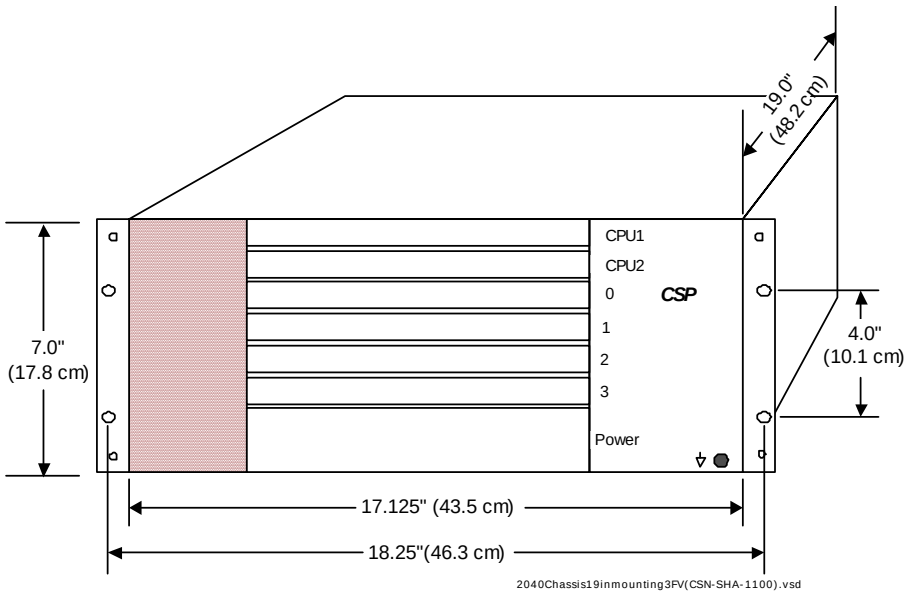
CAUTION

Avoid touching integrated circuit areas as static charge can damage circuits.

19 Inch Mounting Option

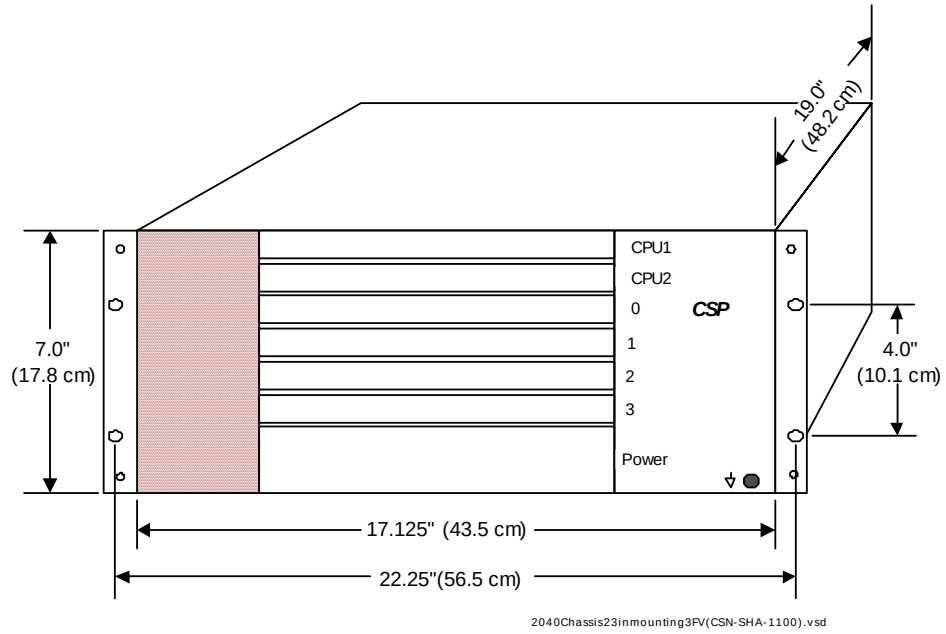
Below is a diagram illustrating the dimensions of a CSP 2040 Chassis set to the 19-inch mounting option.

Figure 3-6 Dimensions for 19-Inch Rack



23 Inch Mounting Option Below is a diagram illustrating the dimensions of a CSP 2040 Chassis set to the 23-inch mounting option.

Figure 3-7 Dimensions for 23-Inch Rack

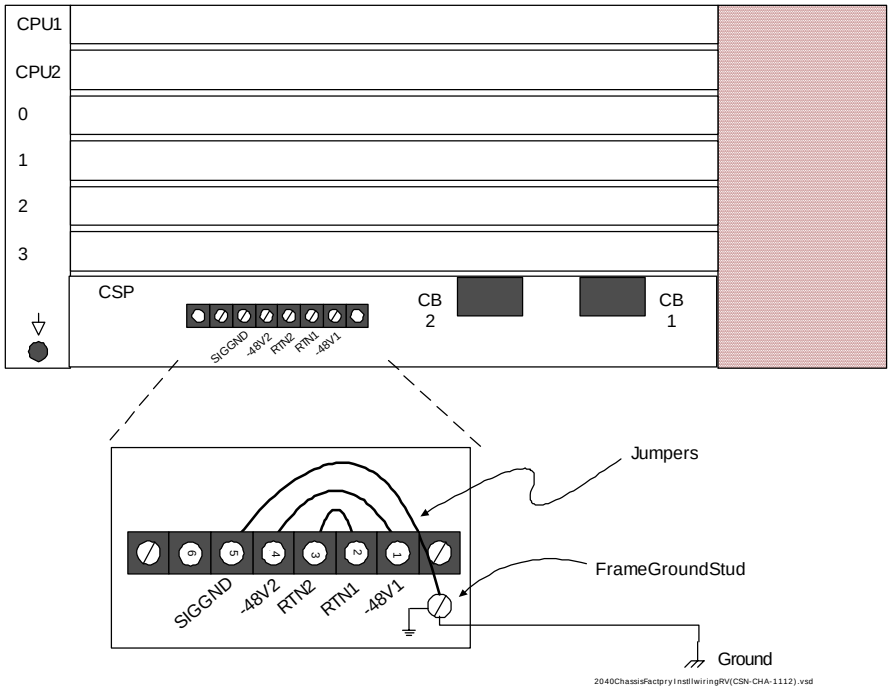


Powering CSP 2040

Overview

You connect the external power source to the chassis at the terminal block (Figure 3-8) on the Power Input Panel. The factory-installed wiring configuration enables you to connect a single power source to the chassis without adjusting the jumpers.

Figure 3-8 Terminal Block – Factory-Installed Wiring



Power Requirements

A CSP 2040 with a DC chassis requires the following level of voltage and current to operate.

Nominal Voltage	Amperage	Input Voltage Range
–48 V DC	10 A	–40 V DC to –60 V DC

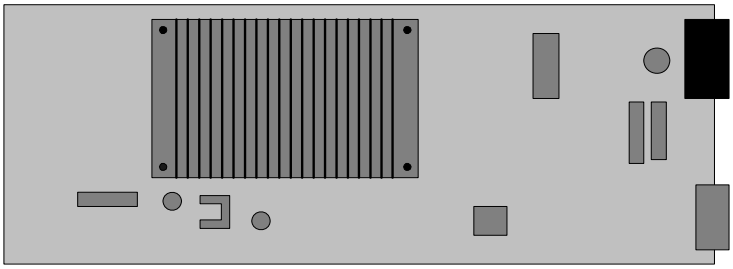
The following components are required to power the CSP 2040 chassis:

- External power source of 10 A @ –48 V DC, which is not included with the CSP 2040
- PSC-60 Power Supply Card(s)

PSC-60 Power Supply Card

The PSC-60 Power Supply card is shown in Figure 3-9.

Figure 3-9 PSC-60 Power Supply Card



PSC-60 Power Supply Card TV 120198 (CSN-PSC-1000).vsd

Power Card Information

The card has one power module that carries the system power load. The power card imposes a current load limit on the chassis. Therefore, not all configurations can be used in the chassis. The chassis can draw a maximum of 60 A @ 5V.

Circuit breaker switches on the Power Input Panel (Figure 3-8) control input power to the Power Supply cards.

- Circuit breaker CB1 controls the Power Supply card in the PSC1 slot.
- Circuit breaker CB2 controls the Power Supply card in the PSC2 slot.

The two Power Supply card slots are covered by a panel that attaches to the chassis but not to the Power Supply cards.

The slot cover panel provides access to the LED and power switch on the front panel of each Power Supply card. During normal operation, the LED is **ON**. If the card's power module fails, the LED blinks.

Redundancy Options

You can install a second Power Supply card for redundancy. In a redundant configuration, the power modules on both cards share the system power load. For a fully loaded system to run properly, one of the modules must be operational.

The chassis supports the following configuration options:

- 1 power source, 1 Power Supply card
- 1 power source, 2 Power Supply cards
- 2 power sources, 2 Power Supply cards

Limitations

You must install Power Supply cards in the slots labeled PSC1 and PSC2 on the front of the chassis.

For More Information

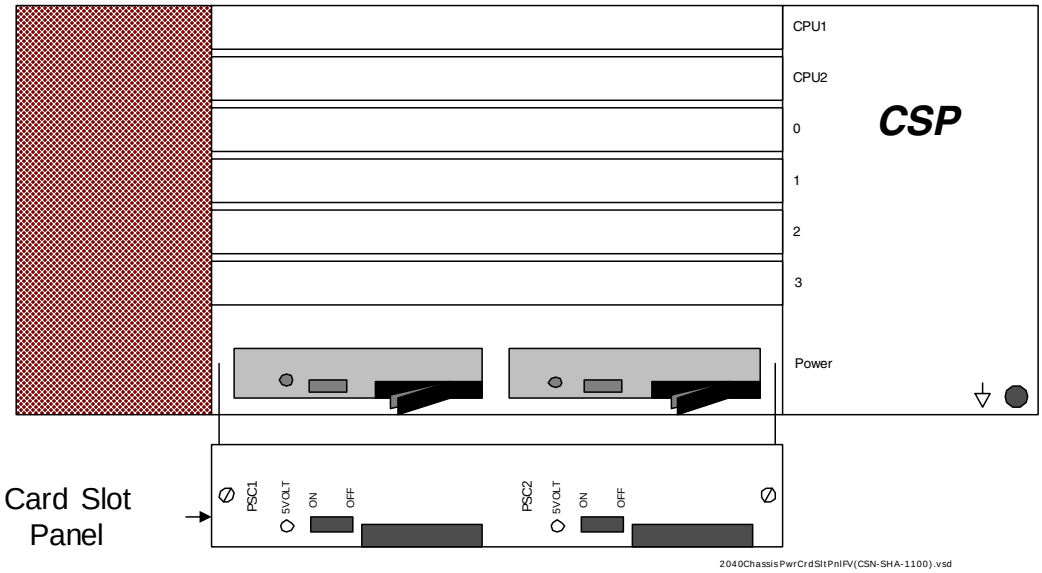
For more information about the PSC-60 Power Supply card, refer to the *PSC-60 Hardware Product Description*.

Installing a Redundant Power Supply Card

You can add a second Power Supply card to provide power card redundancy in case one of the Power Supply cards fails, an external power source fails, or both fail.

The two Power Supply card slots, PSC1 and PCS2, are covered by a card slot panel (Figure 3-10) that attaches to the front of the chassis. This panel is not attached to the installed Power Supply cards. It covers their front panels but provides access to their LEDs and power switches.

Figure 3-10 Panel for the PSC1 and PSC2 Card Slots



Before installing a redundant Power Supply card, make sure that the power jumpers are connected properly for your power source configuration (single or redundant).

To install a redundant Power Supply card, complete these steps:

1 Press the power switch on the front panel of the redundant card to the **OFF** position.

2 Press the circuit breaker associated with the redundant card to the **OFF** position on the power input panel.

3 Remove the front panel from the Power Supply card slots.

4 Insert the redundant card into the unoccupied slot and replace the front panel.

5 Press the circuit breaker on the redundant Power Supply card to the **ON** position.

6 Press the power switch on the redundant Power Supply card to the **ON** position.

Grounding

Connect your chassis to a true earth ground. The grounding harness has a 1-hole connector and a 2-hole connector.

- A chassis comes with 8 gauge green/yellow wire for earth ground.
- Attached is the 1-hole grounding lug end to the ground (GND) terminal on the rear of the chassis.
- Attach the 2-hole grounding lug end to either a grounding point on the mounting rack or the building ground point.

WARNING

You must connect your chassis to a true earth ground to maintain signaling integrity and to prevent electrical shock. Do not allow the signal ground to float and never connect a -48 Vdc to ground.

Wiring

The following hardware is required for connecting a power source to the chassis:

- 14 gauge wire - green for frame ground and signal ground, blue for –48 V, white for –48 V Return
- #10 solderless crimp fork terminals for wiring the power source to the terminal block
- #10 solderless crimp ring terminal for attaching the frame ground wire to the frame ground stud

Wire each chassis directly to the –48 V fused power source.

CAUTION

Do not daisy-chain two or more chassis. Do not wire chassis directly to other equipment or to a common bus bar.

Most feeders from the -48 V to frames are limited to about 20 A, whereas load distributions support several hundred amperes. Direct wiring to the fused power source eliminates the coupling mechanism, which appears as impedance in the power distribution system. If impedance is not controlled, transient voltages will cause temporary or permanent malfunctions.

Connecting a Single Power Source

Complete the following steps to connect a single external power source to a CSP 2040 chassis.

Preparation

Always make sure to perform these tasks before you wire the power supply of your CSP.

1 Press the power switches on the Power Supply Card(s) to the **OFF** position.

2 Press both circuit breakers on the Power Input Panel to the **OFF** position.

3 Turn the existing external power source **OFF** and disconnect it from its power supply.

Connecting

Follow these steps to connect your CSP 2040 to a single, external power source.

WARNING

*Failure to turn the power **OFF** at the source may result in electrical shock.*

1 Confirm the -48 V DC power source is turned **OFF**.

2 Remove the terminal block cover from the Power Input Panel.

3 Connect power source wiring (Figure 3-11).

- Leave the factory-installed power jumpers in place.
- Attach the power source wires (fitted with solderless crimp terminals) to the terminal block:

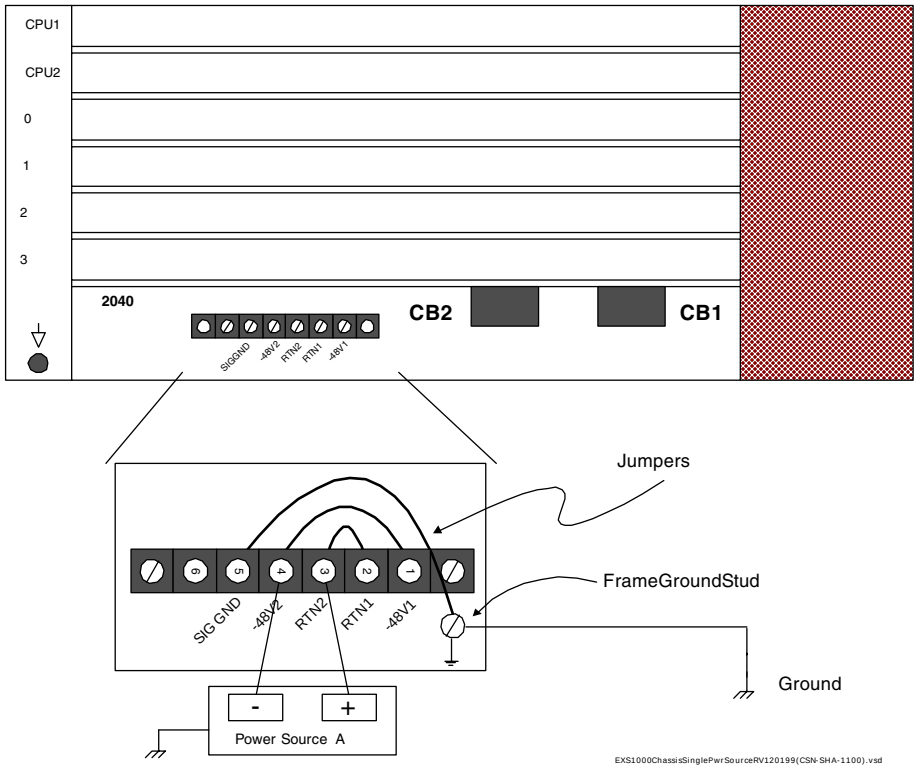
Negative supply voltage	–48V2
Positive supply voltage	RTN2

4 Replace the terminal block cover.

5 Turn **ON** all power to the CSP 2040 as follows:

- Reconnect the external power sources and turn them **ON**.
- Press the circuit breakers to the **ON** position.
- Turn the Power Supply cards **ON**.

Figure 3-11 Single Power Source Wiring



Connecting a Redundant Power Source

If you have a redundant Power Supply card installed, you can add a second power source to the chassis for redundancy.

Preparation

Always make sure to perform these tasks before you wire the power supply of your CSP.

- Press the power switches on the Power Supply card(s) to the **OFF** position.
- Press both circuit breakers on the Power Input Panel to the **OFF** position.
- Turn the existing external power source **OFF** and disconnect it from its power supply.

Connecting

To add a redundant power source, complete the following steps:

WARNING

*Failure to turn the power **OFF** at the source may result in electrical shock.*

1 Confirm the -48 V DC power source is turned **OFF**.

2 Remove the terminal block cover from the Power Input Panel.

3 Connect the wiring (Figure 3-12).

- Remove the factory-installed power jumpers.
- Attach the wires from Power Source B (fitted with solderless crimp terminals) to the terminal block:

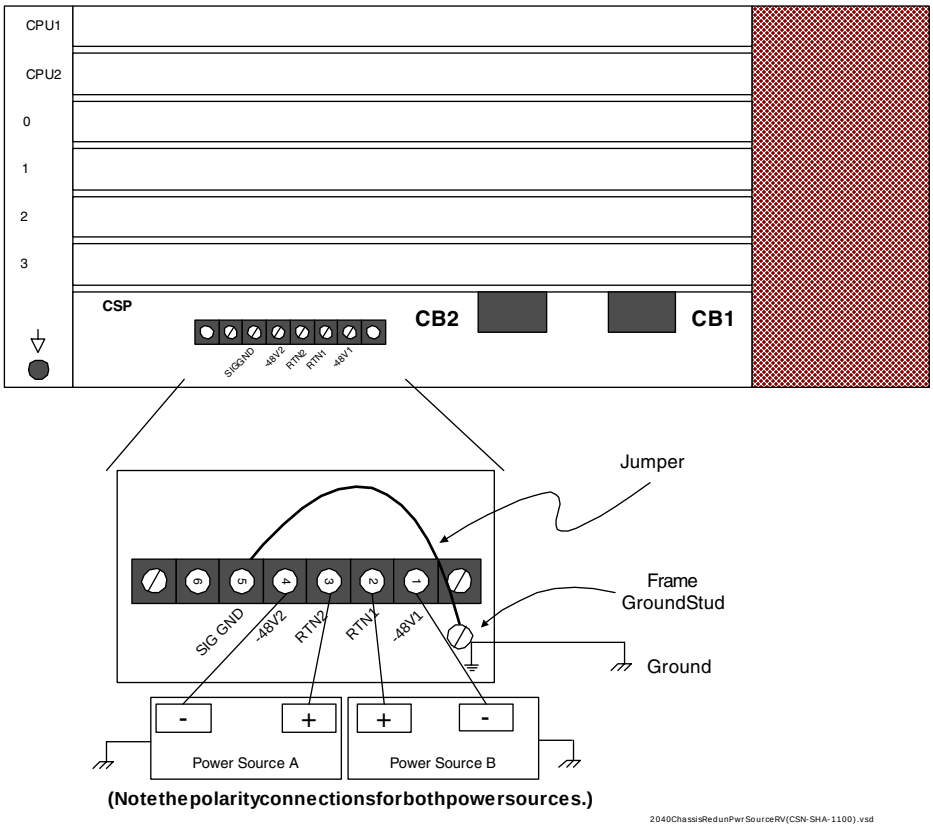
Negative supply voltage	–48V1
Positive supply voltage	RTN1

4 Replace the terminal block cover.

5 Re-connect and turn **ON** all power to the CSP 2040 as follows:

- Reconnect the external power sources and turn them **ON**.
- Press the circuit breakers to the **ON** position.
- Turn the Power Supply cards **ON**.

Figure 3-12 Redundant Power Source Wiring



Separating Signal and Frame Ground Wiring

The factory installed wiring configuration joins the signal and frame grounds.

Preparation

Always make sure to perform these tasks before you wire the power supply of your CSP.

- Press the power switches on the Power Supply card(s) to the **OFF** position.
- Press both circuit breakers on the Power Input Panel to the **OFF** position.
- Turn the existing external power source **OFF** and disconnect it from its power supply.

Connecting

If you require separate signal ground and frame ground wiring to maintain signal integrity, complete the following steps:

WARNING

*Failure to turn the power **OFF** at the source may result in electrical shock.*

1 Confirm the -48 V DC power source is turned **OFF**.

2 Remove the terminal block cover from the Power Input Panel.

3 Remove the factory-installed ground jumper connecting the SIG GND to the frame ground stud (Figure 3-8).

4 Attach the signal ground wire (with #10 solderless crimp fork terminal) to SIG GND on the terminal block (Figure 3-13).

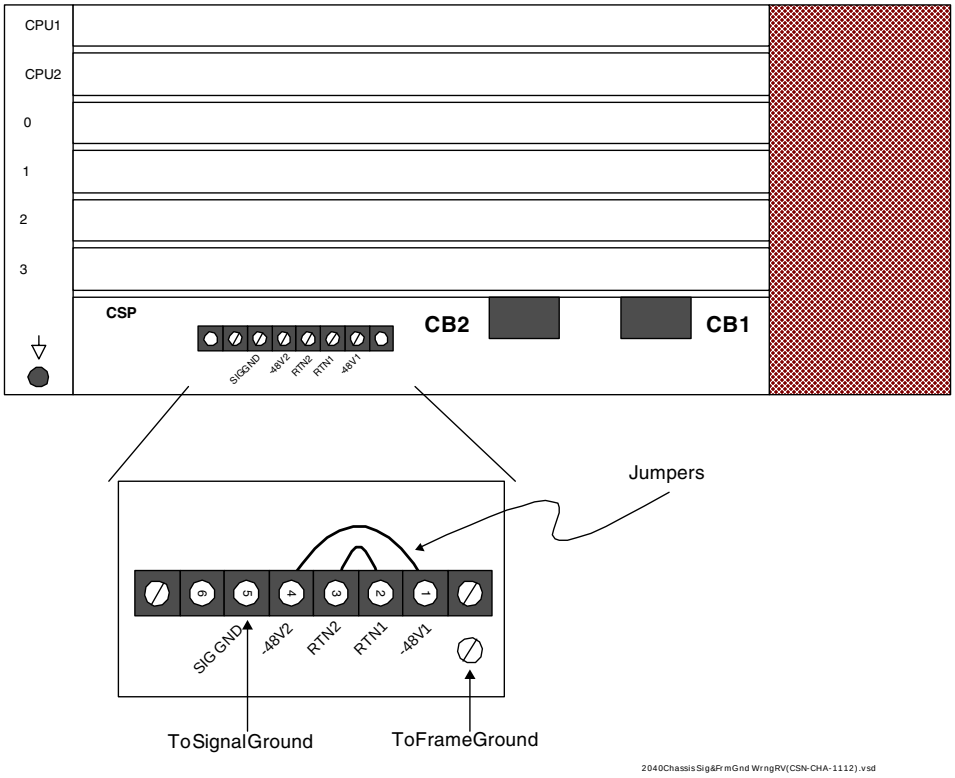
5 Attach the frame ground wire (with #10 solderless ring terminal) to the frame ground stud (Figure 3-13).

6 Replace the terminal block cover.

7 Reconnect the power as follows:

- Reconnect the external power sources and turn them **ON**.
- Press the circuit breaker to the **ON** position.
- Turn the Power Supply cards **ON**.

Figure 3-13 Separate Signal and Frame Ground Wiring



Powering CSP 2090 and CSP 2110

Overview

This section describes the power requirements for both the CSP 2090 and CSP 2110 chassis. This section also shows different ways to wire power to the chassis.

DC Power Requirements

The CSP 2090 and CSP 2110 with a DC chassis requires the following level of voltage and current.

Nominal Voltage	Amperage	Input Voltage Range
–48 V DC	25 A*	–40 V DC to –60 V DC

Important! The -48V DC Returns 1 and 2 (RTN1 and RTN2) are connected internally on the midplane. The -48V1 and -48V2 input voltages are electrically isolated. * The CSP 2090 chassis requires only a 20 AMP source.

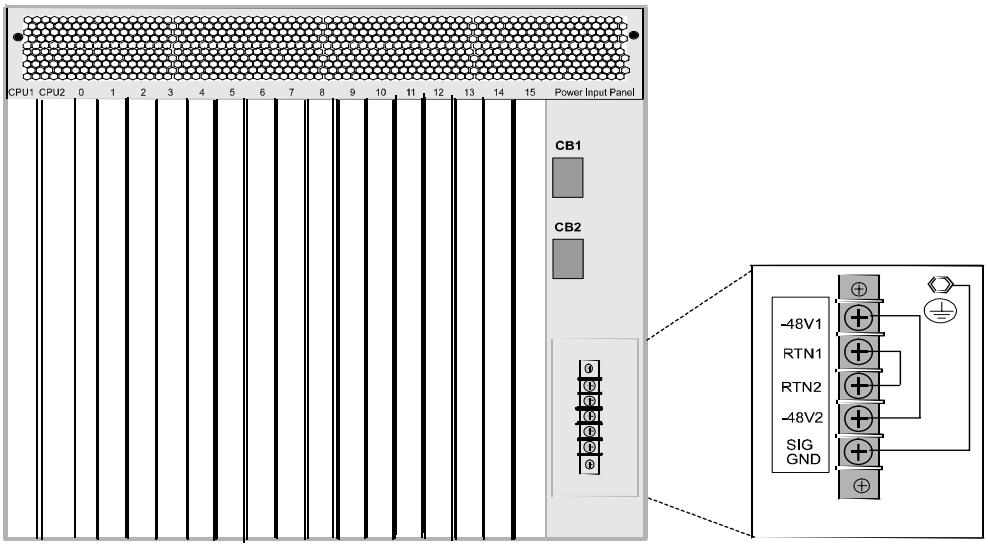
The following components are required to power the CSP 2090 and CSP 2110 chassis:

- External power source as indicated above, which is not included
- PSC-150 Power Supply card(s)

Terminal Block Location

You connect the external power source to the chassis at the terminal block (Figure 3-14) on the Power Input Panel.

Figure 3-14 Terminal Block on the Power Input Panel

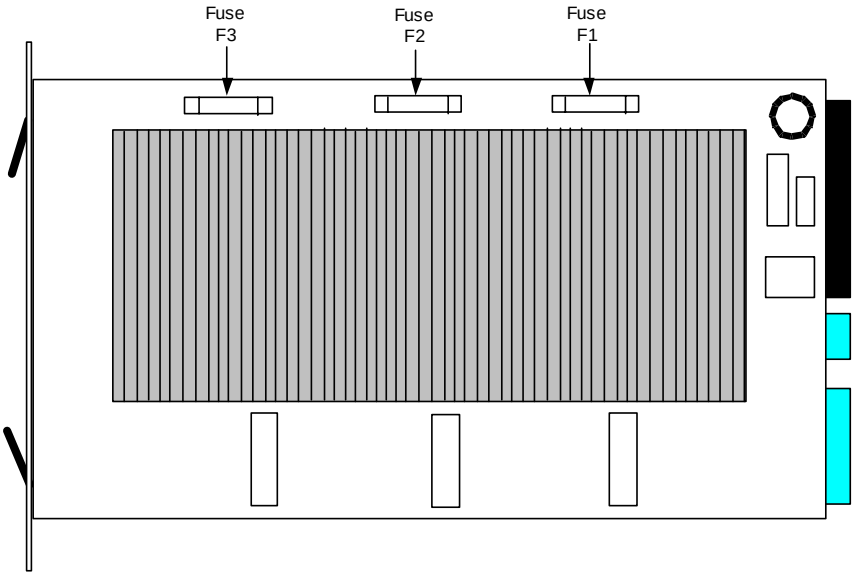


EXS 2000 Chassis Terminal Block RV 121099 (LNX-EXC-1100).vsd

PSC-150 Power Supply Card

The PSC-150 Power Supply card is shown in Figure 3-15.

Figure 3-15 PSC-150 Power Supply Card



Power Card Information

Each card has three power modules that share the system power load. A fully loaded CSP 2090 and CSP 2110 require all three modules.

Circuit breaker switches on the Power Input Panel (Figure 3-18) control input power to the Power Supply cards.

- Circuit breaker CB1 controls the Power Supply card in the Power1 slot.
- Circuit breaker CB2 controls the Power Supply card in the Power2 slot.

Important! Ensure circuit breaker CB2 is OFF during non-redundant operation.

Redundancy Options

To make the power system redundant, you can add a second power source and a second Power Supply card. In a redundant configuration, the six modules on the two cards share the power load. For a fully loaded system to run properly, any three of the modules must be operational.

The chassis supports the following configuration options:

- 1 power source, 1 Power Supply card
- 1 power source, 2 Power Supply cards
- 2 power sources, 2 Power Supply cards

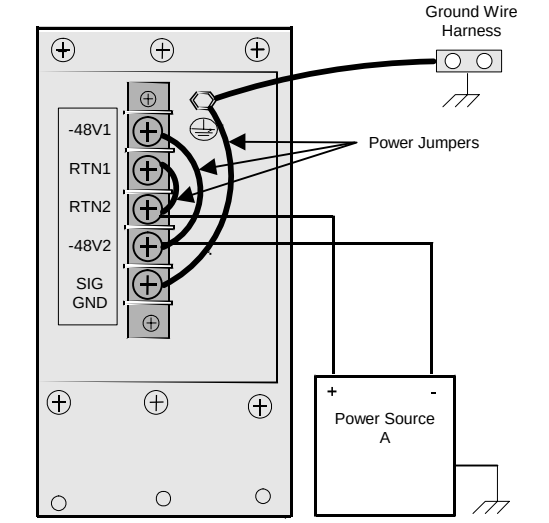
For More Information

For more information about the PSC-150 Power Supply card, refer to the *PSC-150 Hardware Product Description*.

Installing a Redundant Power Supply Card

You can add a second Power Supply card to use as a backup in case the primary Power Supply card fails. If you are using a single external power source and you are installing a redundant Power Supply card, make sure the power jumpers are installed as shown in Figure 3-16.

Figure 3-16 Jumper Settings for a Single Power Source



XS 2000 Chassis Single PS Redun wiring RV 120198 (LNX-EXC-1100).vsd

Inserting a Power Supply Card

If the power jumpers are not installed, turn **OFF** all power to the system and configure the jumpers as shown.

If the jumpers are properly installed, complete the following steps:

1. Press the power switch on the front panel of the Power Supply card that you are installing to the **OFF** position.

2. Press the circuit breaker corresponding to the empty slot to the **OFF** position on the Power Input Panel.

3. Insert the card into the empty power slot in the front of the chassis.

4. Press the circuit breaker to the **ON** position.

5 Press the switch on the power card up to the **ON** position.

Grounding Connect your chassis to a true earth ground.

WARNING

You must connect your chassis to a true earth ground to maintain signaling integrity and to prevent electrical shock. Do not allow the signal ground to float, and never connect a -48 Vdc to a ground.

The grounding harness has a 1-hole connector and a 2-hole connector.

- Chassis comes with an 8 gauge green/yellow wire for earth ground.
- Attached, is the 1-hole grounding lug end to the ground (GND) terminal on the rear of the chassis.
- Attach the 2-hole grounding lug end to either a grounding point on the mounting rack or a good building ground point.

Wiring Wire each chassis directly to the –48 V fused power source.To connect a power source to the chassis, you need the following:

- 10 gauge wire - green for frame ground and signal ground, blue for –48 V, white for –48 V Return
- #10 solderless crimp fork terminals for wiring the power source to the terminal block
- #10 solderless crimp ring terminal for attaching the frame ground wire to the frame ground stud.

CAUTION

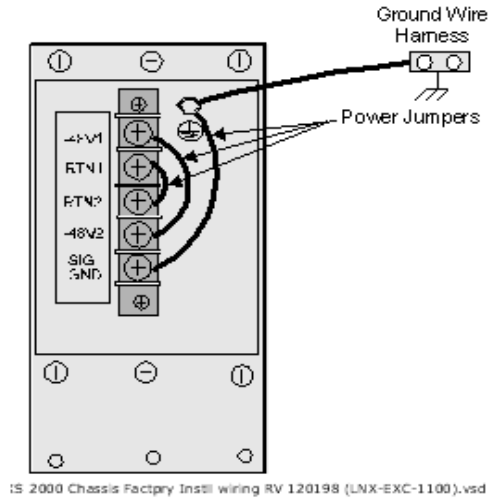
Do not daisy-chain two or more chassis. Do not wire chassis directly to other equipment or to a common bus bar. Most feeders from the -48 V to frames are limited to about 20 A, whereas load distributions support several hundred amperes. Direct wiring to the fused power source eliminates the coupling mechanism, which appears as impedance in the power

distribution system. If impedance is not controlled, transient voltages will cause temporary or permanent malfunctions.

Connecting a Single Power Source

The factory-installed wiring configuration, shown in Figure 3-17, enables you to connect a single power source to the chassis without adjusting the jumpers.

Figure 3-17 Factory-Installed Wiring



Preparation

Always make sure to perform these tasks before you wire the power supply of your CSP.

1 Press the power switches on the Power Supply card(s) to the **OFF** position.

2 Press both circuit breakers on the Power Input Panel to the **OFF** position.

3 Turn the existing external power source **OFF** and disconnect it from its power supply.

Connecting

Complete the following steps to connect a single external power source to the chassis.

1 Confirm the -48 V DC power source to the CSP 2090 or CSP 2110 is **OFF**.

WARNING

*Failure to turn power **OFF** at the source may result in electrical shock.*

2 Remove the terminal block cover from the Power Input Panel.

3 Connect power source wiring as shown in Figure 3-18:

- Leave the factory-installed power jumpers in place.
- Attach the power source wires (fitted with solderless crimp terminals) to the terminal blocks according to the table below.

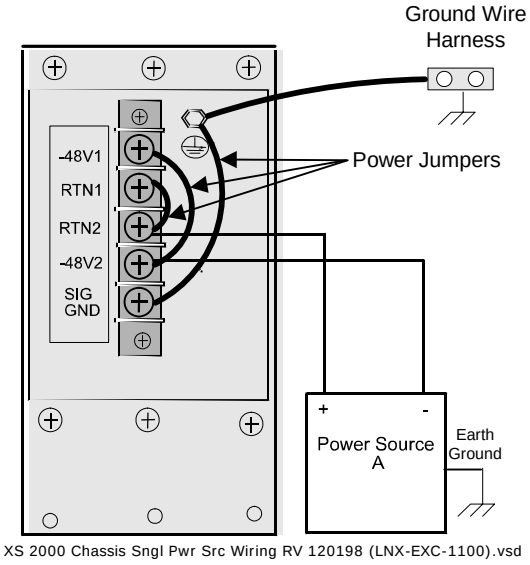
Negative supply voltage	–48V2
Positive supply voltage	RTN2

4 Replace the terminal block cover.

5 Connect and turn **ON** all power to the CSP 2090 or CSP 2110 as follows:

- Reconnect the external power sources and turn them **ON**.
- Press the circuit breakers to the **ON** position.
- Turn the Power Supply cards **ON**.

Figure 3-18 Single Power Source Wiring



Connecting a Redundant Power Source

If you have a redundant power card installed, you can add a second power source to the chassis for redundancy in case the primary power source fails.

Preparation

Always make sure to perform these tasks before you wire the power supply of your CSP.

1 Press the power switches on the Power Supply card(s) to the **OFF** position.

2 Press both circuit breakers on the Power Input Panel to the **OFF** position.

3 Turn the existing external power source **OFF** and disconnect it from its power supply.

Connecting

Complete the following steps to connect a redundant power source to the chassis.

1 Confirm the -48 V DC power source to the CSP 2090 or 2110 is **OFF**.

WARNING

*Failure to turn power **OFF** at the source may result in electrical shock.*

2 Remove the terminal block cover from the Power Input Panel.

3 Connect the wiring as shown in Figure 3-19:

- Remove the factory-installed power jumpers.
- Attach the wires from Power Source B (fitted with solderless crimp terminals) to the terminal block:

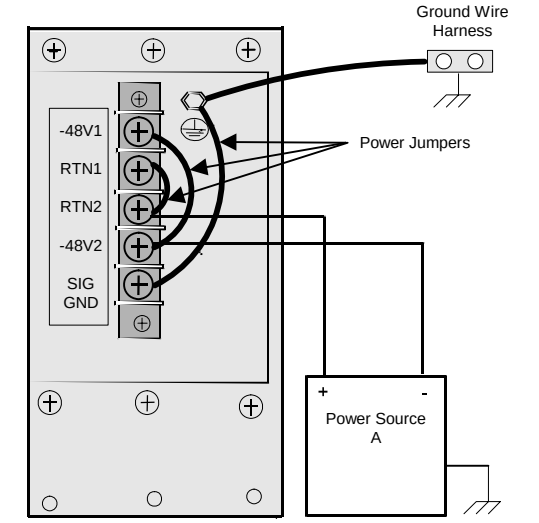
Negative supply voltage	–48V1
Positive supply voltage	RTN1

4 Replace the terminal block cover.

5 Reconnect and turn **ON** the power as follows:

- Reconnect the external power sources and turn **ON**.
- Press the circuit breakers to the **ON** position.
- Turn the Power Supply cards **ON**.

Figure 3-19 Redundant Power Source Wiring



Separating Signal and Frame Ground Wiring

The factory installed wiring configuration joins the signal and frame grounds.

Preparation

Always make sure to perform these tasks before you wire the power supply of your CSP.

1 Press the power switches on the Power Supply card(s) to the **OFF** position.

2 Press both circuit breakers on the Power Input panel to the **OFF** position.

3 Turn the existing external power source **OFF** and disconnect it from its power supply.

Connecting

If you require separate signal ground and frame ground wiring to maintain signal integrity, complete the following steps:

1 Confirm the -48 V DC power source to the CSP 2090 or CSP 2110 is **OFF**.

WARNING

*Failure to turn power **OFF** at the source may result in electrical shock.*

2 Remove the terminal block cover from the Power Input Panel.

3 Remove the factory-installed ground jumper connecting the SIG GND to the frame ground stud (Figure 3-19).

4 Attach the signal ground wire (with #10 solderless crimp fork terminal) to SIG GND on the terminal block (Figure 3-20).

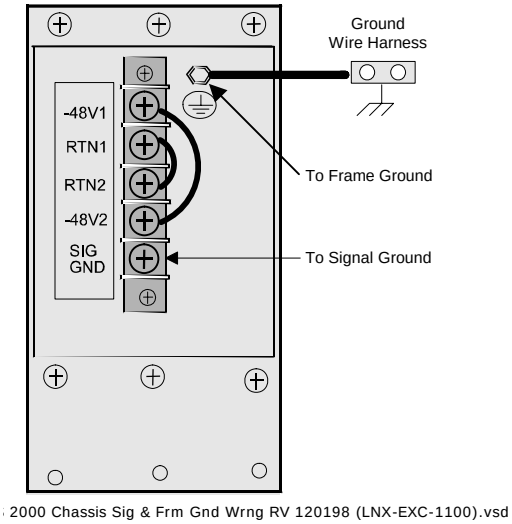
5 Attach the frame ground wire (with #10 solderless ring terminal) to the frame ground stud (Figure 3-20).

6 Replace the terminal block cover.

7 Reconnect and turn **ON** the power as follows:

- Reconnect the external power sources and turn them **ON**.
- Press the circuit breaker to the **ON** position.
- Turn the Power Supply cards **ON**

Figure 3-20 Separate Signal and Frame Ground Wiring



Connecting the CSP to Host

Overview

You must establish a communications link between the CSP switch and a host.

Host Computer Functions

The CSPs require a host computer to perform the following functions:

- Configuration
- Call processing
- Administrative maintenance

Host Computer Requirements

The host requires the following:

- CD-ROM disk drive for downloading the system software after installing the CSP.
- Hard disk drive for storing the system software
- 10Base-T or 100Base-T Ethernet connectivity to a network
- A modem or internet connection is required for dialing into the host from a remote location.
- The host configuration (including RAM, hard disk space, and processor) must be sufficient to support the host application.

Ethernet Cable Specifications

The CSP Matrix I/O Series 3 card communicates with the host through an Ethernet connection over a 10Base-T or 100Base-T (shielded) cable. The table below lists the cable specifications.

Characteristics	10/100Base-T Shielded) CAT 5 or above
Designator	Twisted pair
Segment Length	Recommended maximum 100 m
Cable Type	24 gauge 100-Ohm shielded twisted pair
Connection	8-pin RJ-45

Setting Up an Ethernet Link

To establish an Ethernet link, you must do the following:

Ensure the DIP switches (S1) on the CSP Matrix Series 3 and the CSP Matrix I/O Series 3 cards are set to their default settings.

Refer to the *Hardware Product Descriptions* for DIP switch locations and settings.

Establish an IP Address for the CSP Matrix Series 3 Card.

To establish an IP address, you must do the following:

- If a Reverse Address Resolution Protocol (RARP) or Boot Protocol (BOOTP) server is connected to the network, it issues the IP address automatically when the CSP Matrix Series 3 Card initially boots or resets and requests a server. If a server is not found, you can manually specify the address, which is then stored in the card's Erasable Programmable Read Only Memory (EPROM).

There are two ways to perform this task.

- You can use the RARP or the BOOTP server.
- Or, configure the IP address through the debug terminal.

Connect Debug Terminal

Equipment

- VT100 compatible video terminal.
- A debug cable to connect the video terminal to the CSP CSP Matrix Series 3 card. (See the *Debug Cable Assembly* description in the *Hardware Product Descriptions*.)

Connecting Terminal

1 Plug one end of the debug cable DB-9 connector into the video terminal.

2 Plug the other end (4-Pin Mini DIN) into the Monitor (Debug) connector on the CSP Matrix Series 3 card.

Configure Video Terminal and CSP Matrix Series 3 Card DIP Switches

1 Set the video terminal baud rate to 19200; 8 bits; 1 stop; No parity. No float control.

2 On the CSP Matrix Series 3 card, set DIP switch S1 position 1 to OFF to enable debug mode.

Configure CSP Matrix Series 3 IP Address, Subnet Mask and Gateway Address

To configure the CSP Matrix Series 3 Card IP address using the debug cable:

1. Type “U” (upper case) on the terminal connected to the monitor port (debug) of the CSP Matrix Series 3 card. You will receive the following prompt: “Reset the board to reset the IP address”.

2. Reset the CSP Matrix Series 3 card. The card will reset and display the following prompt: “Enter IP address in dot format” (for example, 199.232.85.254):

3. Enter the IP address and press <**Enter**>. The following prompt will be displayed: “Enter subnet mask in hex format” (for example, FFFFFF00) or press <**Enter**> to accept default 0xFF000000.

4. Enter the subnet mask and press <**Enter**>. The following prompt will be displayed: “Enter Gateway address in hex format”

5. Enter the Gateway address and press <**Enter**>.

6. When the CSP Matrix Series 3 Card resets and becomes active, it will have the configured IP address, subnet mask and Gateway address.

4 Card Installation

Purpose This chapter provides reference and procedural information for installing cards in the CSP 2040, CSP 2090, and CSP 2110 chassis.

Card Installation

Overview

This section provides information on cable requirements, how to install both line and I/O cards into a CSP chassis, card slot locations in the chassis, and card revisions. This section also includes card types and card specific information and cable connections. For detailed information on the cards, refer to the *Hardware Product Descriptions* reference document.

Cable Requirements

The next table lists the cables required for the CSP 2090, CSP 2110 and CSP 2040 I/O cards.

Table 4-1 Required Cables

Card	Cable
CSP Matrix Controller I/O Series 3 card	10/100Base-T (24 gauge. 100 Ohm shielded twisted pair, 8-pin RJ-45 connector)
Redundant T-ONE, E-ONE, J-ONE I/O cards	Requires the same cable used for the corresponding I/O cards, listed below.
T-ONE 100 Ohm I/O card	100-Ohm shielded twisted pair ITU-T G.703 when co-resident with EXNET®
E-ONE 120 Ohm I/O card	120-Ohm shielded twisted pair ITU-T G.703
E-ONE 75 Ohm I/O card	75-Ohm shielded coaxial with BNC connector
J-ONE 110 Ohm I/O card	110-Ohm shielded twisted pair ITU-T G.703

Other Limitations

Be aware of these other cabling limitations:

- The CSP 2090 supports E1 and T1 line lengths up to a maximum of 200 meters.
- To use an external reference clock, you need 100/120 Ohm twisted pair ITU-T G.703.

Ordering Cables

To order a cable from a manufacturer, refer to the Hardware Product Description (HPD) for the specific card's connector pin-out table.

Installing a Card

To install a line card, complete the following steps:

1. Face the front of the chassis.

2. Locate the correct card slots. Remember only CSP Matrix Controller Series 3 cards can go in the CPU 1 and CPU 2 slots and only Power Supply Cards can go in the Power 1 and Power 2 slots.

CAUTION

When securing the card to the chassis, use caution to avoid bending pins on the midplane. Bent pins prevent the connection of the cards to the midplane.

3. Align the card in the card guides. Pull the ejector handles away from the front panel and slide the card into the slot. When the ejector handles touch the card guides, gently push the handles toward the front panel until the card is fully inserted and flush to the chassis.

Installing I/O Cards

To install an I/O card, complete the following steps:

1. Face the back of the chassis.

2. Locate the slot that corresponds to the slot occupied by the appropriate card in the front of the chassis.

3. Remember only CSP Matrix Controller I/O Series 3 cards can go in the CPU 1 and CPU 2 slots.

CAUTION

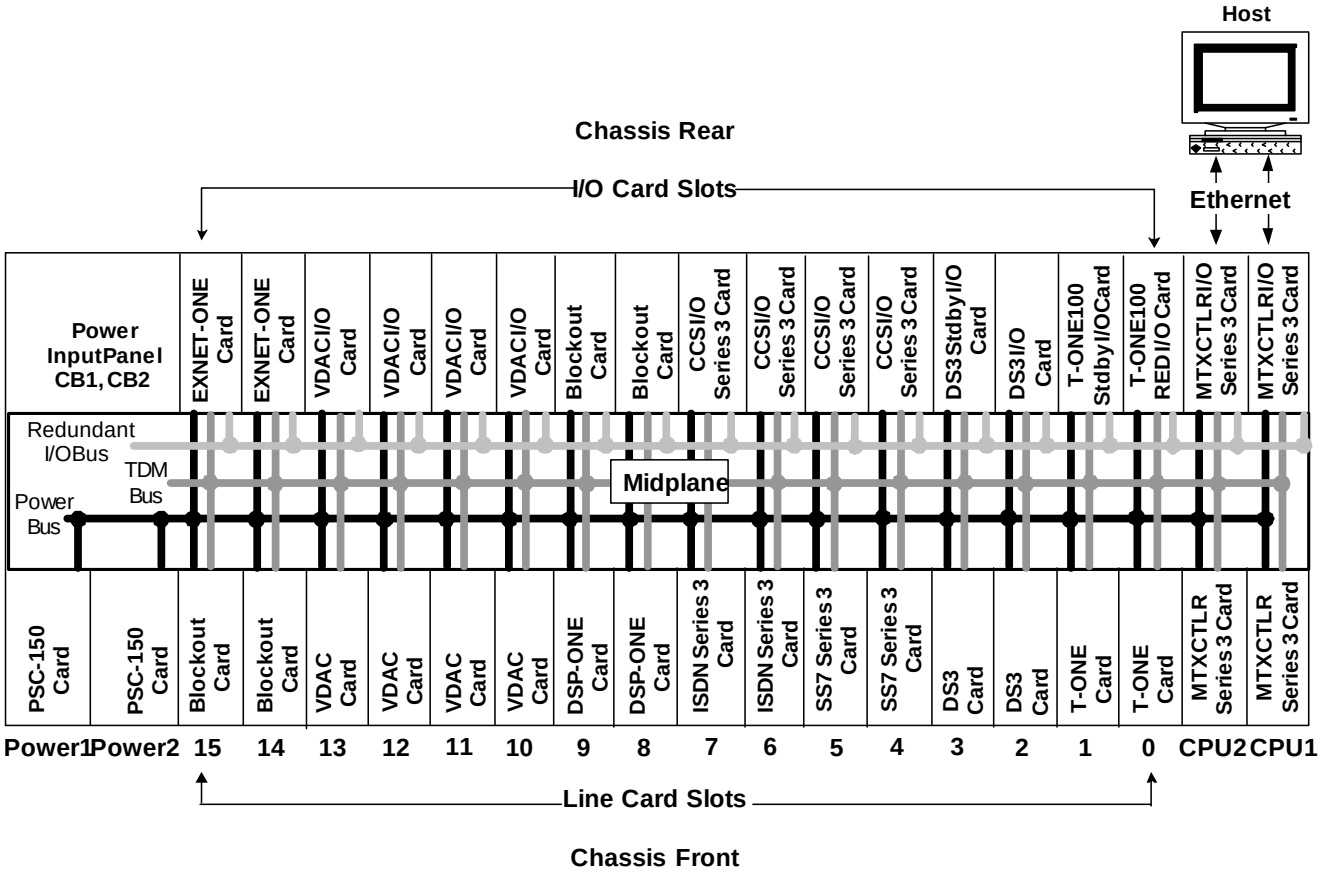
When securing the card to the chassis, use caution to avoid bending pins on the midplane. Bent pins prevent the connection of the cards to the midplane.

4 Align the I/O card in the card guides at the top and bottom of the slot. Pull the ejector handles away from the I/O front panel and slide the card into the slot. When the ejector handles touch the card guides, gently push the handles toward the front panel until the card is fully inserted and flush to the chassis.

Sample Card Configuration

Figure 4-1 is an illustration of a sample card configuration in an CSP 2090 or CSP 2110 system.

Figure 4-1 CSP 2090 or CSP 2110 Sample Card Configuration



Card Locations

The Power Supply cards, CSP Matrix Controller Series 3 Cards, line cards, and resource cards slide into the front of the chassis, and the I/O cards slide into the back of the chassis.

Midplane Description

The midplane provides high-speed data transmissions between the various cards. It also distributes power from the Power Supply card slots to the rest of the system.

The midplane provides the following slots:

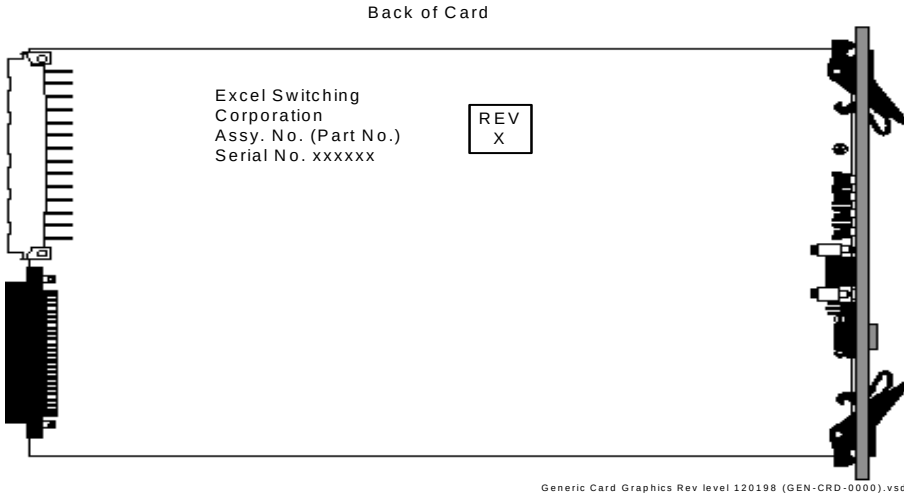
- Two Power Supply Card slots
- Two CSP Matrix Controller Series 3 Card slots and associated I/O slots
- CSP 2090/CSP 2110 – 16 line card slots (line, resource, common channel signaling, IP, and EXNET-ONE card slots, associated I/O slots, and 3 fan tray slots (only 2 are used)
- CSP 2040 – 4 line card slots, associated I/O slots, and 3 fan tray slots (only 1 is used)

Revision Levels

The revision level of a card is specified on the ID label on the back of the card. Figure 4-2 shows how this information is indicated. The exact location of the label on each card varies.

You can also use the *Card Status Query* message to view revision information about a card while it is in operation. See The *API Reference* for more information about the *Card Status Query* message.

Figure 4-2 Identifying the Revision Level



Card Types

Overview

The cards used in the CSP (CSP 2090, CSP 2110 and CSP 2040) chassis are listed by card type below.

> **Important!** Refer to each card's *Hardware Product Description* for specific illustrations, compliance, LED descriptions, switch settings, jumper settings, model numbers, and part numbers.

Power Supply Cards

These are the currently available Power Supply cards.

- PSC-150 Power card (CSP 2090 and CSP 2110)
- PSC-60 Power card (CSP 2040)

CSP Matrix Controller Series 3 Cards

These are the currently available CSP Matrix Controller Series 3 cards.

- CSP Matrix Controller Series 3 card
- CSP Matrix Controller Series 3 I/O card

Line Cards

These are the currently available Line cards.

- DS3 card
- DS3 I/O card
- DS3 Standby I/O card
- E-ONE card
- E-ONE 120 Ohm I/O card
- E-ONE 120 Ohm Redundant I/O card
- E-ONE 120 Ohm Standby I/O card
- E-ONE 75 Ohm I/O card
- E-ONE 75 Ohm Redundant I/O card
- E-ONE 75 Ohm Standby I/O card
- J-ONE card
- J-ONE Redundant I/O card
- J-ONE Standby I/O card
- T-ONE card
- T-ONE 100 Ohm I/O card
- T-ONE 100 Ohm Redundant I/O card

- T-ONE 100 Ohm Standby I/O card

Common Channel Signaling (CCS) Cards

These are the currently available CCS cards.

- CCS I/O card
- CCS I/O Series 3 card
- DASS2/DPNSS card
- ISDN PRI card
- ISDN PRI Redundant I/O card
- ISDN Series 3 card (The CCS I/O Series 3 card is the I/O card for this card.)
- SS7 Multi-Protocol I/O card
- SS7 PQ card (The CCS I/O card is the I/O card for this card.)
- SS7 Series 3 card (The CCS I/O Series 3 card is the I/O card for this card.)

Resource Cards

These are the currently available Resource cards.

- DSP-ONE card
- Subrate Controller card
- DSP Series 2 card
- DSP Series 2 Plus card

EXNET® Cards

These are the currently available EXNET® cards.

- EXNET-ONE card
- EXNET Connect® PCI H.100 card

Internet Protocol (IP) Cards

These are the currently available IP cards.

- IP Signaling Series 3 card (The CCS I/O Series 3 card is the I/O card for this card.)
- VDAC-ONE card
- VDAC I/O card
- IP Network Interface Series 2 card
- Multi-Function Media I/O card
- IP Network Interface Series 3 card

Blockout Cards and Panels

Install blockout cards in unoccupied card slots to improve air flow and cooling. Use blockout cards in any unoccupied slot both in front and rear of the CSP chassis.

Power Supply Cards

Overview For information about installing the Power Supply cards, PSC-150 for the CSP 2090 and CSP 2110 and PSC-60 for the CSP 2040, refer to *Chapter 3, CSP Chassis Installation, PSC-150 Power Supply Card* and *PSC-60 Power Supply Card*, respectively.

CSP CSP Matrix Controller Series 3 Cards

Overview

This section contains information on installing the CSP Matrix Controller Series 3 and CSP Matrix Controller Series 3 I/O Cards.

Important! Before installing CSP Matrix Controller Series 3 and CSP Matrix I/O Series 3 cards, refer to their *Hardware Product Descriptions* to make sure that their DIP switch settings are correct and identical.

Installing a CSP Matrix Controller Series 3 Card

To install a CSP Matrix Controller Series 3 Card, complete the following steps:

1 Face the front of the chassis.

2 Locate the two CSP Matrix Controller Series 3 Card slots CPU1 and CPU2. In the CSP 2090 and CSP 2000 + these are on the right of the chassis. In the CSP 2040, they are at the top. You must insert a CSP Matrix Controller Series 3 Card into one of these slots.

CAUTION

Installing an CSP Matrix Controller Series 3 card into any slot other than the slots labeled CPU1 and CPU2 will damage the system and/or card.

When securing the card to the chassis, use caution to avoid bending pins on the midplane. Bent pins prevent the connection of the cards to the midplane.

3 Align the CSP Matrix Controller Series 3 Card in the card guides. Pull the ejector handles away from the card front panel and slide the card into the slot. When the ejector handles touch the card guides, gently push the handles toward the front panel until the card is fully inserted and flush to the chassis.

Installing a CSP Matrix Controller I/O Series 3 I/O Card

To install an CSP Matrix Controller I/O Series 3 card, complete the following steps:

CAUTION

Installing an CSP Matrix Controller I/O Series 3 card into any slot other than the slots labeled CPU1 and CPU2 will damage the system and/or card. When securing the card to the chassis, use caution to avoid bending pins on the midplane. Bent pins prevent a safe and secure midplane card connection and will adversely affect system operations.

Important! Before removing a CSP Matrix Controller I/O Series 3 card, push the **STOP** button on the front panel of the corresponding CSP Matrix Controller Series 3 or standby CSP Matrix Controller Series 3 card.

1. Face the rear of the chassis.

2. Locate the CSP Matrix Controller I/O Series 3 slot (CPU1 or CPU2) that corresponds to slot occupied by the CSP Matrix Controller I/O card. You must insert the CSP Matrix Controller Series 3 I/O card into one of these slots.

3. Align the CSP Matrix Controller I/O card in the card guides. Pull the ejector handles away from the card front panel and slide the card into the slot. When the ejector handles touch the card guides, gently push the handles toward the front panel until the card is fully inserted and flush to the chassis.

Line and Standby Cards

Overview

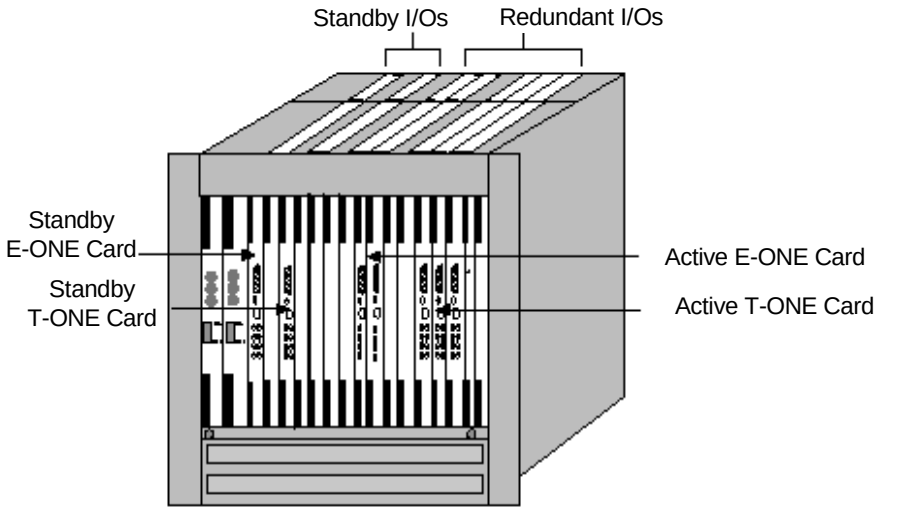
You can install line cards and standby line cards in any slot except the slots designated for the Power Supply Cards (PSC) and CSP Matrix Controller Series 3 cards. Before installing cards, make sure the DIP switches and jumpers are set properly for your configuration. Refer to the card's *Hardware Product Description* for details.

Line Card Redundancy

You must install Redundant I/O and Standby I/O cards in the rear slots that correspond to the slots occupied by the line and standby line cards in the front of the chassis.

Figure 4-3 shows a sample configuration in a CSP 2090 or CSP 2110 chassis.

Figure 4-3 Redundant I/O Installation – CSP 2090 or CSP 2110 Chassis



Installing a Line Card

To install a line card, complete the following steps:

1 Face the front of the chassis. and locate the two CSP Matrix Controller Series 3 Card slots CPU1 and CPU2. In the CSP 2090 and CSP 2110

these are on the right of the chassis. In the CSP 2040, they are at the top. You must not insert the line card into either of these slots.

CAUTION

When securing the card to the chassis, use caution to avoid bending pins on the midplane. Bent pins prevent the connection of the cards to the midplane.

2 Align the line card in the card guides. Pull the ejector handles away from the front panel and slide the card into the slot. When the ejector handles touch the card guides, gently push the handles toward the front panel until the card is fully inserted and flush to the chassis.

Installing Line I/O Cards

Complete the following steps to install an I/O card:

1 Face the back of the chassis and locate the slot that corresponds to the slot occupied by the active or standby line card in the front of the chassis.

CAUTION

Do not install any line I/O cards into the CPU1 and CPU2 CSP Matrix Controller I/O slots. Vcc and digital ground shorts may occur causing possible damage to the card. When securing the card to the chassis, use caution to avoid bending pins on the midplane. Bent pins prevent the connection of the cards to the midplane.

2 Align the I/O card in the card guides at the top and bottom of the slot. Pull the ejector handles away from the I/O front panel and slide the card into the slot. When the ejector handles touch the card guides, gently push the handles toward the front panel until the card is fully inserted and flush to the chassis.

T1/E1 Cable Information and Requirements

The T1/E1 cable information and requirements required to connect the CSP T-ONE or E-ONE I/O cards to the user's on-site equipment is described below.

Ordering T1 Cables from Dialogic

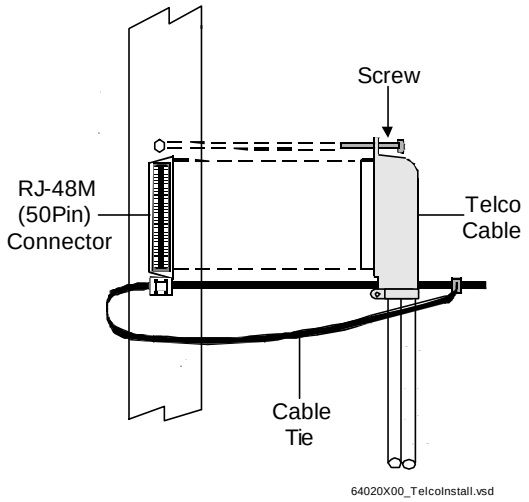
If additional T1 cables are to be ordered from Dialogic, refer to Table 4-2 for T1 cable lengths and the corresponding Dialogic Part Numbers. Refer also to the *Telco Cable Assembly, Hardware Product Description* (HPD) for Dialogic cable Transmit (TX) and Receive (RX) pin pair designations as well as corresponding wire colors.

Table 4-2 Dialogic T1 Cable Lengths and Ordering Numbers

Model Number	Description	Part Number (includes cable tie)
Not Applicable	Telco Cable, 50 ft.	72-0064-00
Not Applicable	Telco Cable, 100 ft.	72-0065-00
Not Applicable	Telco Cable, 150 ft.	72-0066-00
Not Applicable	Telco Cable, 200 ft.	72-0067-00
Not Applicable	Telco Cable, 300 ft.	72-0068-00
Not Applicable	Telco Cable, 400 ft.	72-0069-00
Not Applicable	Telco Cable, 500 ft.	72-0070-00
Not Applicable	Telco Cable, 650 ft.	72-0071-00

Telco Cable Assembly Installation Diagram

Figure 4-4 The Telco cable assembly installation drawing



Ordering T1/E1 Cables from Other Sources

If cables are to be procured from any source other than Dialogic, refer to Table 4-3 for T1 cable requirements and Table 4-4 for E1 cable requirements.

Table 4-3 T1 Cable Requirements

T1	AWG	Impedance	No. of Circuits	Color	Wire Style	Cable Length (max)
T1	22	100 Ohm	8/Connector 16/Card	Beige	Solid	650 ft
T1	24	100 Ohm	8/Connector 16/Card	Beige	Solid	650 ft
T1 Y-Cable	22	100 Ohm	8/Connector 16/Card	Beige	Solid	650 ft
T1 Y-Cable	24	100 Ohm	8/Connector 16/Card	Beige	Solid	650 ft

Table 4-4 E1 Cable Requirements

E1	AWG	Impedance	No. of Circuits	Color	Wire Style	Cable Length (max)
E1	22	120 Ohm	8/Connector 16/Card	Beige	Solid	650 ft
E1	24	120 Ohm	8/Connector 16/Card	Beige	Solid	650 ft
E1 Y-Cable	22	120 Ohm	8/Connector 16/Card	Beige	Solid	650 ft
E1 Y-Cable	24	120 Ohm	8/Connector 16/Card	Beige	Solid	650 ft

Common Channel Signaling (CCS) Cards

Overview

You can install CCS cards in any slot except the slots designated for the Power Supply cards (PSC) and CSP Matrix Controller Series 3 cards. Before installing cards, make sure the DIP switches and jumpers are set properly for your configuration. Refer to the card's *Hardware Product Description* for details.

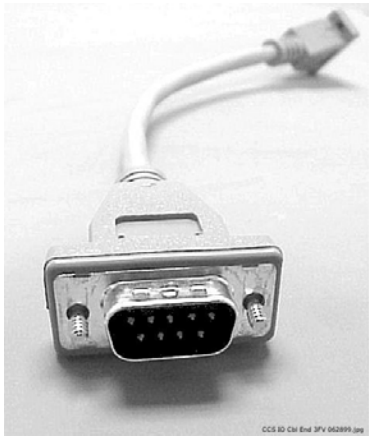
CCS Card Redundancy

You must install Redundant I/O and Standby I/O cards in the rear slots that correspond to the slots occupied by the line and standby line cards in the front of the chassis.

CCS I/O Redundancy Cable

This cable connects two chassis mounted, adjacent CCS I/O cards in redundant applications. The cable has a DB-9 connector on each end (Figure 4-5).

Figure 4-5 CCS I/O Redundancy Cable



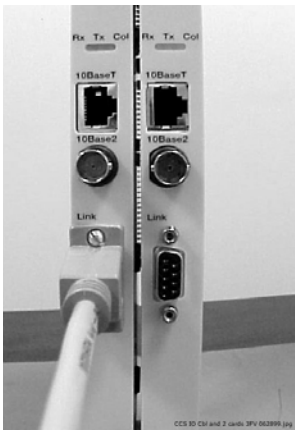
Important! Both CCS I/O cards must be installed in adjacent slots in the rear of the chassis. Both CCS I/O card slots must correspond to their associated SS7 PQ cards installed in the front of the chassis.

Installing the CCS I/O Cable

1 Install the CCS I/O cards in the rear of the CSP chassis.

2 Connect one end of the cable into the DB connector labeled "LINK" on the front panel on one of the CCS I/O cards (Figure 4-6).

Figure 4-6 Adjacent CCS I/O Cards



3 Connect the other end of the cable into the DB connector labeled "LINK" on the front panel the adjacent CCS I/O (Figure 4-7).

Figure 4-7 CCS I/O Cards Cabled Together

Important! If the cable is disconnected from either card, the standby card is reset and, if the cable has not been reconnected, redundancy is disabled.

ISDN PRI Card Redundancy

Two Integrated Services Digital Network Primary Rate (ISDN PRI) cards used with one ISDN PRI Redundant I/O card provide complete redundancy if the active ISDN card fails.

A mirror image of the active card's primary and secondary D channels is copied to the standby card. If the active card fails or you remove it, the standby card takes over and manages call processing. All calls in a connected state are retained while others are purged. If you reset the active card, it switches over to standby.

The redundancy feature enables the switch to process without error once it successfully receives and acknowledges a signaling packet or Message Signal Unit (MSU).

Hardware Requirements

The following hardware is required to implement ISDN redundancy:

- CSP 2090, CSP 2110, or CSP 2040 chassis
- Two ISDN PRI cards
- One ISDN PRI Redundant I/O card

Figure 4-8 shows the top view and Figure 4-9 shows the side view of the ISDN PRI Redundant I/O.

Figure 4-8 ISDN PRI Redundant I/O Card (Top View)

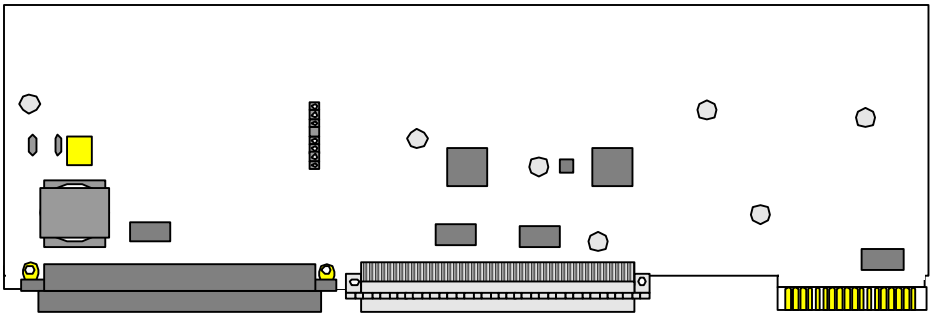
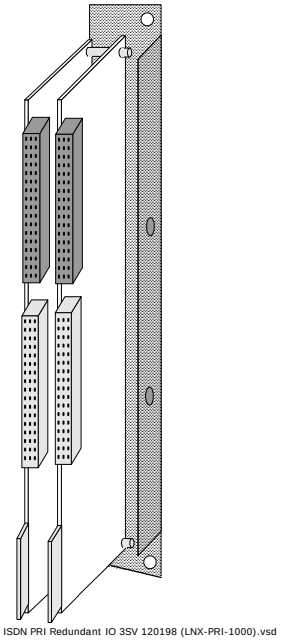


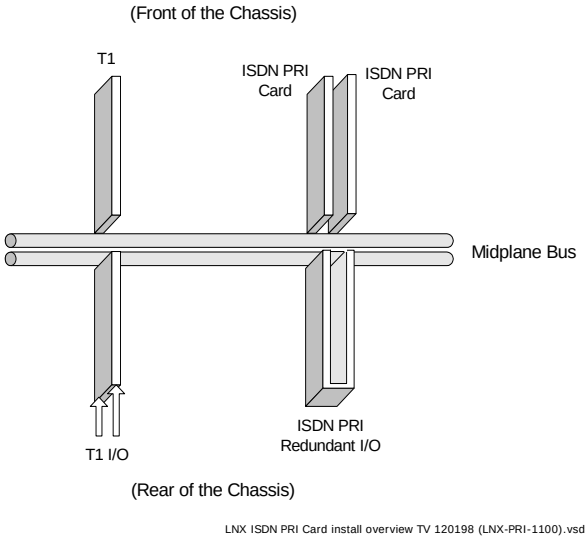
Figure 4-9 ISDN PRI Redundant I/O Card (Side View)



Installing an ISDN PRI Card

You can insert ISDN PRI cards in any adjacent slots in the front of the chassis. You must insert the ISDN PRI Redundant I/O card in the rear I/O slots that correspond to the front slots occupied by the ISDN PRI cards, as shown in Figure 4-10.

Figure 4-10 ISDN Redundancy Installation



DASS2/DPNSS

The Digital Access Signaling System2/Digital Private Network Signaling System (DASS2/DPNSS) card provides D channel packet processing and call control procedures for the CSP 2090, CSP 2110, and CSP 2040. Both variants are similar to European ISDN Primary Rate Interface. They allow simplified Link Access Procedure (Layer 2) and call control of 30 B channels using a D channel on Timeslot 16 (30B + D) over a 64 Kbps interface.

Hardware Requirements

The following hardware is required to implement DASS2/DPNSS:

- CSP 2090, CSP 2110 or CSP 2040 chassis
- CSP Matrix Controller Series 3 card
- E-ONE card

Installing

A single DASS2/DPNSS card can be inserted into any line card slot in the front of the chassis, except for the slots reserved for CSP Matrix Controller Series 3 cards and Power Supply cards.

SS7 PQ, SS7 Series 3,and ISDN Series 3 Redundancy

Read and understand the following Caution.

CAUTION

*Always press the **STOP** button on the SS7 PQ, SS7 Series 3, or ISDN Series 3 line card in a redundant card pair configuration before removing or inserting the corresponding I/O card.*

For example, in a redundant SS7 PQ, SS7 Series 3, or ISDN Series 3 card pair configuration, be aware that the redundant line card may reset when removing or inserting the primary I/O card. If this occurs, the system will lose calls.

Resource Cards

Overview

You can install resource cards in any line card front slot except the slots designated for the Power Supply cards (PSC) and CSP Matrix Controller Series 3 cards. Before installing cards, make sure the DIP switches and jumpers are set properly for your configuration. Refer to the *Hardware Product Description* for details.

EXNET-ONE Card

Overview

The EXNET-ONE card can only be installed in an I/O slot (see *Precautions* below). Before installing the EXNET-ONE card, make sure the DIP switches and jumpers are set properly for your configuration. Refer to the *Hardware Product Description* for details.

EXNET-ONE Card

This card is used to connect multiple EXNET® Nodes (CSP 2090, CSP 2110, and CSP 2040) together over a high-speed optical fiber ring to form a single “virtual” switch. The EXNET-ONE card is capable of switching any port on the local node to any other port on an attached node, and vice-versa.

The EXNET-ONE card can be installed into any CSP 2090, CSP 2110, and CSP 2040 I/O slot which does not have a line card in the corresponding front slot. The EXNET-ONE is an I/O card.

Precautions

Before installing the EXNET-ONE card, please read and understand the following cautionary statements:

- A line card must not be inserted in the slot in front of the EXNET-ONE card.
- The EXNET-ONE card uses the front line card slot for bus resources, identifying itself (Card ID 0x54) as residing in the front line card slot rather than the I/O. This minimizes the amount of host changes needed to support the EXNET-ONE card.
- A blockout card should be installed in the front slot in front of the EXNET-ONE card.
- If a line card is accidently inserted in front of the EXNET-ONE card, the CSP Matrix Controller Series 3 Card sends an *Alarm* (0xB9) API message to the host, indicating that resources are not available to the newly inserted line card. The alarmed card remains out of service until it can be removed from the system. If the chassis is powered up with both an EXNET-ONE and a corresponding line card inserted, the line card is always given precedence.

Installation

To install the EXNET-ONE card, do the following:

1 Allocate an open line card slot as well as the corresponding I/O slot.

2 Put the blockout panel in line card slot.

3 Place the EXNET-ONE card into corresponding I/O slot.

4 Connect the EXNET-ONE card ports (see below).

5 Check EXNET-ONE front panel LED sequence for proper operation (see below).

6 Refer to the API Developer's Guide: Overview for additional data.

EXNET® Fiber Optic Cable

The fiber optic cables are actually two cables paired together and the connectors on the ends are keyed and have rubber collars. Only one end of any individual cable fits into a Transmit (TX) port, thus preventing accidental connections of two TX or two Receive (RX) ports.

The EXNET-ONE card has two fiber optic connectors: EXNET A and EXNET B. You establish the Pulse Code Modulation (PCM) data path between nodes by connecting the EXNET A port on one node to the EXNET B port on the adjacent node. Until the fiber optic cables are installed, keep the protected rubber caps (provided) on the EXNET-ONE card's EXNET A and EXNET B RX and TX ports.

WARNING

Never look into EXNET A and EXNET B ports after the card is installed while the laser beam is active.

Connecting EXNET-ONE Ports

To properly connect an EXNET® port on one node to an EXNET® port on another node, the TX of the first port must be connected to the RX port on the second, and so on. Connect the EXNET A port on one node to the EXNET B port on the second node.

- Connect the EXNET A port on the second node to the EXNET B on the third node, and so on.

- Connect the EXNET A port on the last node in the ring to the EXNET B port on the first node (Figure 4-11).

Establishing A Connection

The Det LEDs on the EXNET-ONE card front panel indicate when a node establishes a connection over the fiber optic cable. Each EXNET A and B port has a Det LED. See Figure 4-11 for EXNET-ONE front panel LED locations and Table 4-5 for LED functionality.

Figure 4-11 Fiber Optic Connections and LEDs

Table 4-5 Status LEDs

LEDs	Status	Description
Det A		Indicates status of EXNET A fiber optic cable connection.
	Red	When Port A receiver does not detect light from an incoming transmit laser.
	Green	When the Port A receiver detects light from an incoming transmit laser.
Det B		Indicates status of EXNET B fiber optic cable connection.
	Red	When Port B receiver does not detect light from an incoming transmit laser.
	Green	When the Port B receiver detects light from an incoming transmit laser.
Stop	Red	When EXNET-ONE has been aborted from the TDM bus.
	Green	When EXNET-ONE is running on the TDM bus.

LEDs	Status	Description
Diag	OFF	EXNET-ONE is idle
	Green	Diagnostic completed successfully
	Red	Diagnostic failed
	Green/Red	Diagnostic running

DS3 I/O and Standby I/O Card Grounding

Description

When interfacing the DS3 I/O and DS3 Standby I/O cards with any electrical equipment, proper wiring and grounding procedures must be followed. Refer to the diagrams below as a grounding reference.

DS3 I/O Card and DS3 Standby I/O Card

For detailed information on the DS3 I/O card and DS3 Standby I/O card, refer to the *associated card Hardware Product Description.*

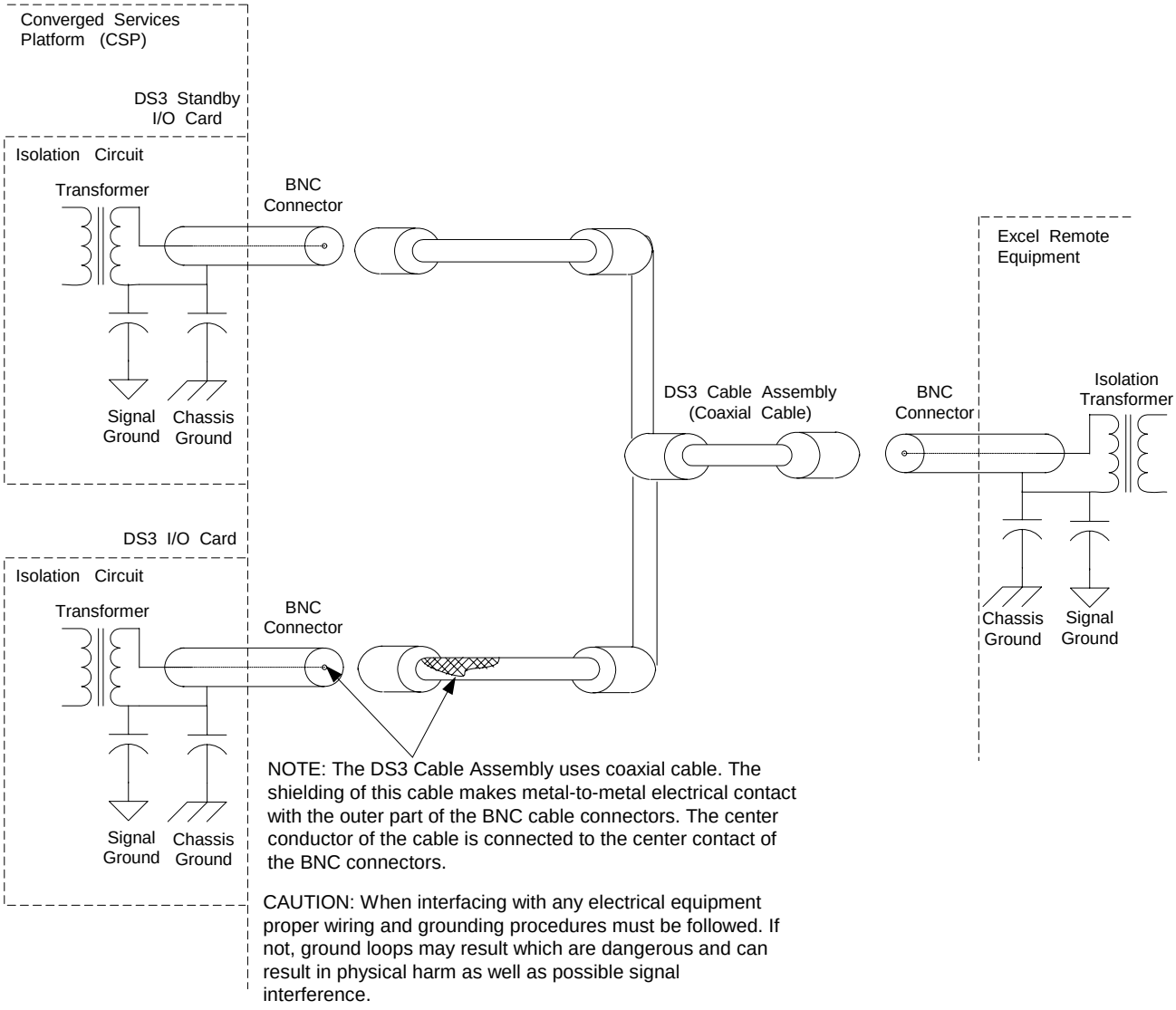
DS3 Cable Assembly

For detailed information on the DS3 Cable Assembly, refer to the *DS3 Cable Assembly, Hardware Product Description.*

CAUTION

Always use the supplied DS3 cable assemblies when connecting the DS3 I/O card and a DS3 Standby I/O card for redundancy or when connecting a DS3 I/O card directly to the network. Using other cables may damage the connectors on the DS3 I/O and Standby I/O cards and cause a failure or intermittent operation.

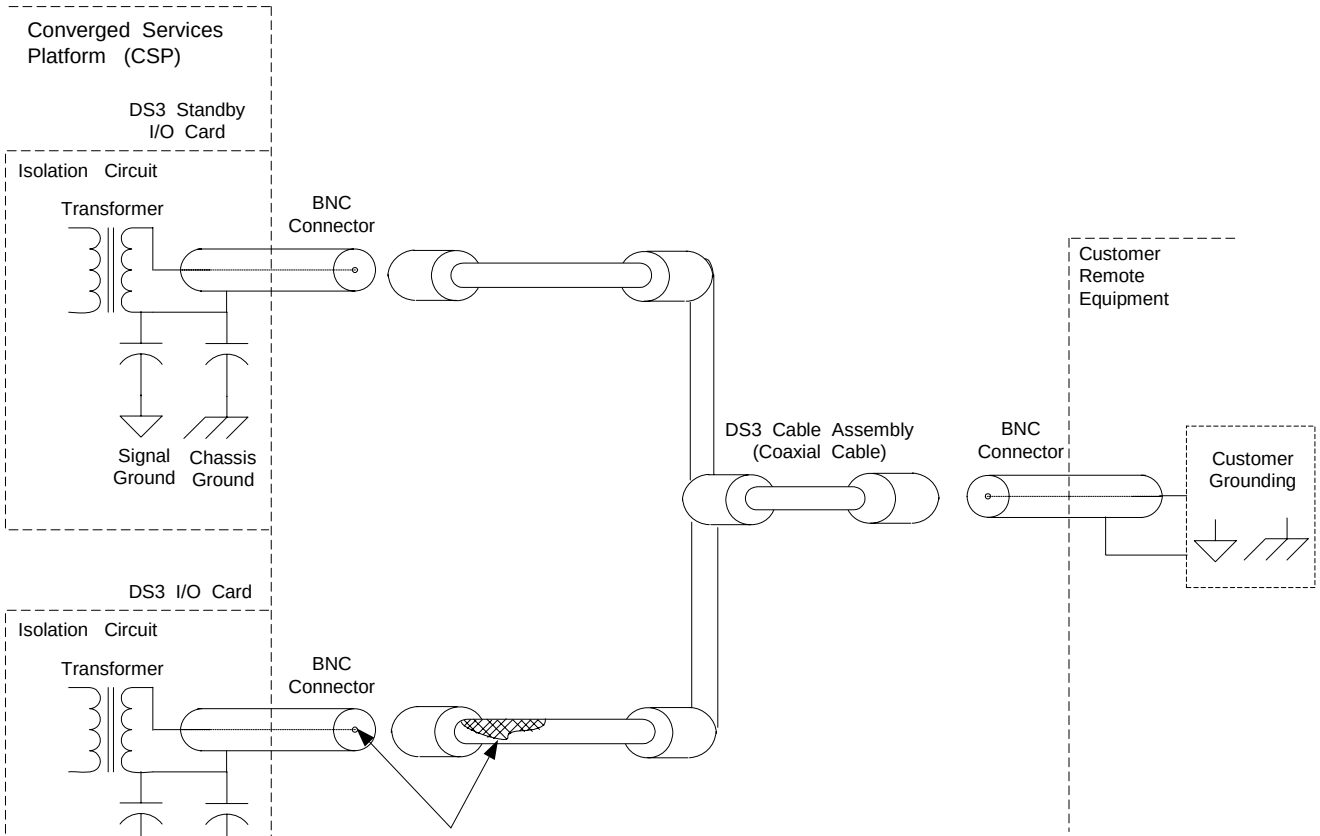
Figure 4-12 CSP to Dialogic Remote Equipment Grounding Diagram



NOTE: The DS3 Cable Assembly uses coaxial cable. The shielding of this cable makes metal-to-metal electrical contact with the outer part of the BNC cable connectors. The center conductor of the cable is connected to the center contact of the BNC connectors.

CAUTION: When interfacing with any electrical equipment proper wiring and grounding procedures must be followed. If not, ground loops may result which are dangerous and can result in physical harm as well as possible signal interference.

Figure 4-13 CSP to Customer Remote Equipment Grounding Diagram



NOTE: The DS3 Cable Assembly uses coaxial cable. The shielding of this cable makes metal-to-metal electrical contact with the outer part of the BNC cable connectors. The center conductor of the cable is connected to the center contact of the BNC connectors.

CAUTION: When interfacing with any electrical equipment proper wiring and grounding procedures must be followed. If not, ground loops may result which are dangerous and can result in physical harm as well as possible signal interference.

EXNET Connect® PCI H.100 Card

Purpose

This section provides information on installing, configuring, and maintaining the EXNET Connect® PCI H.100 card (in this document referred to as the EXNET Connect® card).

Refer to the EXNET Connect® Card PCI H.100 in the *CSP Hardware Product Descriptions* for information on the following:

- DIP switch settings
- Reset and Abort switches
- Status LEDs

Single Card

The EXNET Connect® card is a single card located in the user PC chassis, allowing you to connect the remote CSP nodes to H.100 voice/media processing resources within the voice/media processing unit. The EXNET Connect® becomes a local switching matrix within the PC chassis, switching traffic between the EXNET® ring and the H.100 resources.

The EXNET Connect® card switches remote node data off the EXNET® high-speed fiber optic ring and onto the H.100 bus. This makes the data accessible to any of the voice processing resources in the EXNET Connect® node. In a similar manner, EXNET Connect® card switches local H.100 data onto the EXNET® ring, making this data available to any of the remote CSP nodes. The EXNET Connect® card plugs into any voice processing subsystem with an industry standard PCI slot.

In the SCSA compatibility mode, there are 1024 timeslots available on the H.100 for transmitting and receiving data. The EXNET Connect® card transmits over a maximum of 16 E1 logical spans or 21 T1 spans.

In the full H.100 mode, there are 4096 timeslots available on the H.100 for transmitting and receiving data. The EXNET Connect® card transmits over a maximum of 64 E1 logical spans or 80 T1 spans.

Hardware Requirements

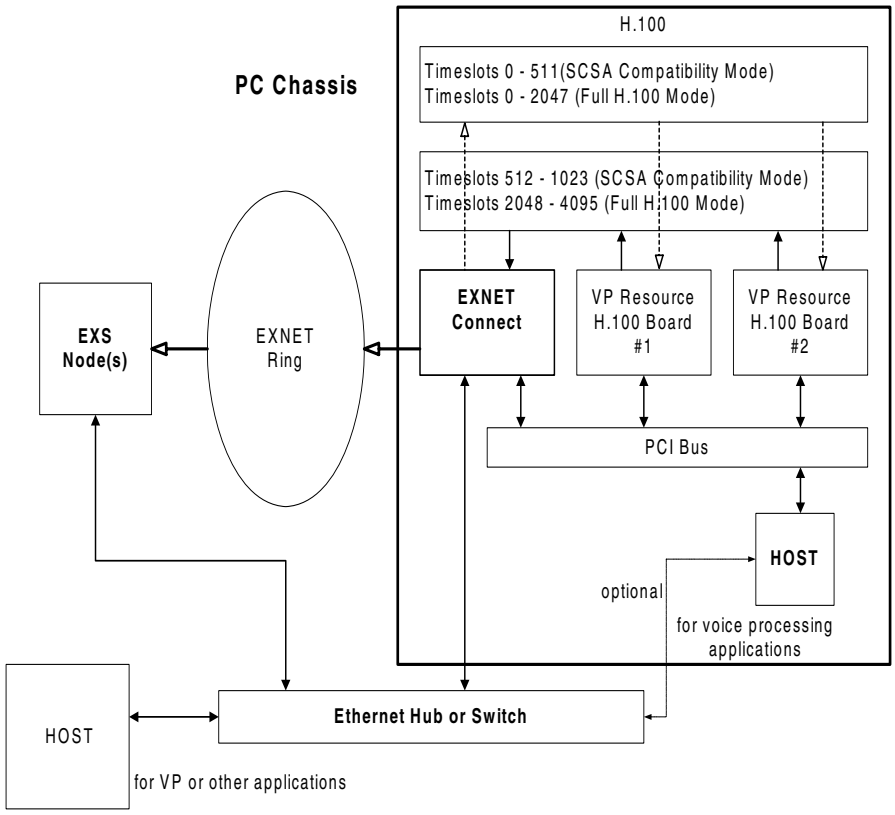
To develop an application using EXNET Connect®, your PC chassis requires the following:

- The PCI H.100 EXNET Connect® card
- Any voice processing cards needed for your application
- At least one CSP node acts as the EXNET® ring master

- Fiber Optic ring
- 10Base-T Ethernet cable

The host manages all timeslot switching configuration. You can use one or more hosts for voice processing and other host-based applications. The voice processing host(s) must be aware of all voice processing resource cards in the host chassis (including EXNET Connect®). It must know about each card in order to configure them at initialization, set up connections, play out prompts, etc.

Figure 4-14 Typical PCI H.100 EXNET Connect® Configuration



Recording Node Information

Before beginning the EXNET Connect® configuration, clearly map the configuration and record important information about the EXNET Connect® node. This information will assist in the initialization and configuration process.

Complete the Node Information Form.

For each node, define and write down the following information:

- Logical Node ID

- Physical Node ID (found in decimal form on the label on the back of the card)
- Host Node Logical Node ID
- Logical Ring IDs/Slot Number
- IP address of the EXNET Connect® card(s)
- Logical Span IDs (the range of Logical Span IDs that you assign node)

WARNING

Electrostatic Discharge (ESD) from your body can damage integrated circuits. Use ESD protective straps, shoes, or mats when installing the PCI H.100 card.

Configuring EXNET Connect® Hardware

Important! Before installing the PCI H.100 card in the PC, make sure all DIP switches have been set to the required positions.

1. Assign the slot number.
2. Establish the host communication method.
3. Install the PCI H.100 card in the PC.
4. Install the Ethernet cable and fiber optic ring.

Assigning a Slot Number

Assign the EXNET Connect® card a unique slot number between 0 and 31 (0x00–0x1F) using DIP Switch S4. The host uses this slot number for subsequent slot-related messages such as span assignments and setting the H.100 master.

Establishing Host Communication

EXNET Connect® is designed to communicate with the voice processing host externally via Ethernet or internally via the PC parallel bus. All CSP internodal communication uses Ethernet; therefore, you must be sure to make all Ethernet connections.

WARNING

Failure to turn power off at the source may result in electrical shock.

Install PCI H.100 Card in PC

1 Remove power from the PC before installing the card.

2 Seat the card into the PC AT Bus connector.

3 Connect the PCI cable to P1 H.100 Bus connector.

Install Ethernet Cable and Fiber Optic Ring

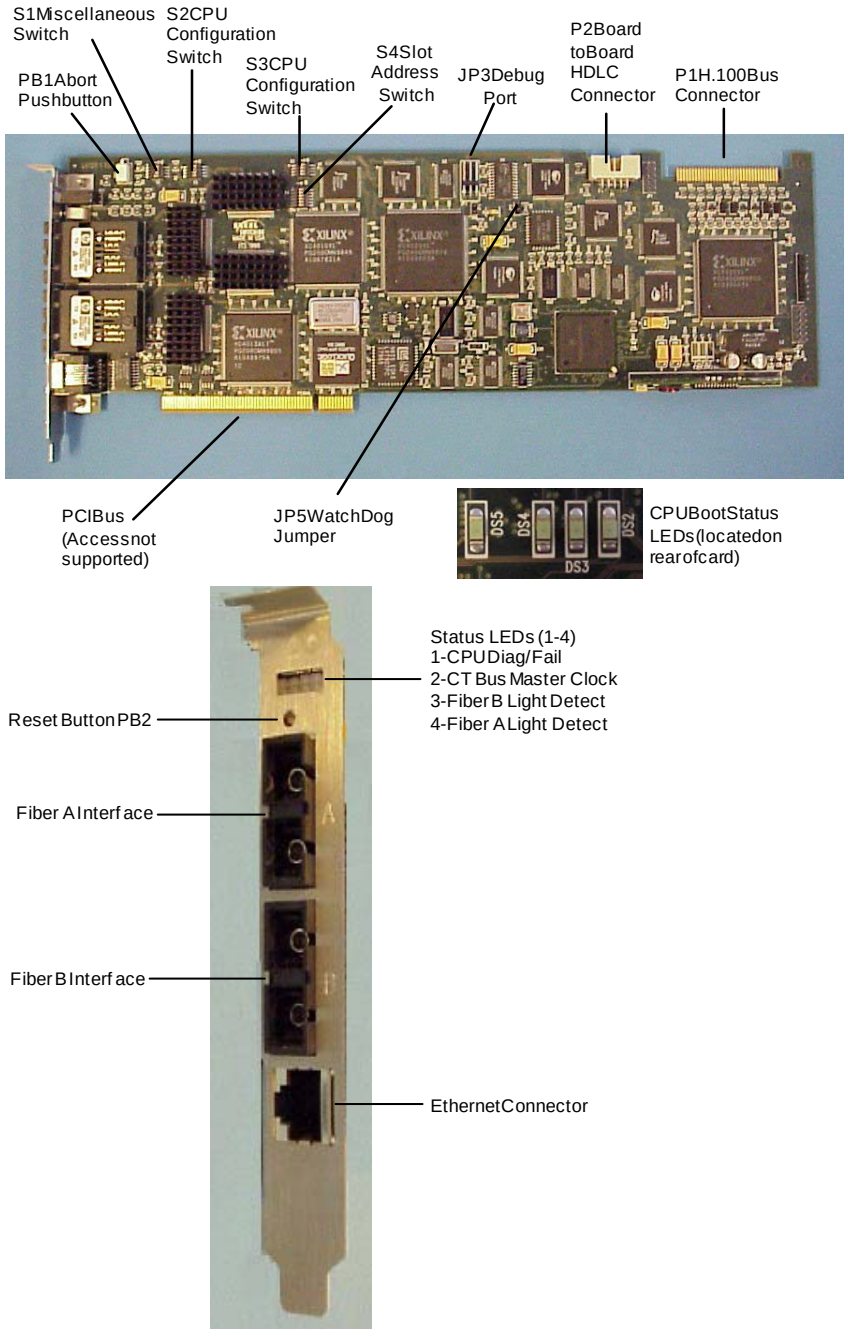
To install the Ethernet 10Base-T cable and fiber optic ring:

1 Make sure the PC is still powered down.

2 Connect the Ethernet cable to the 10Base-T connector as shown and connect the other end to the Ethernet hub.

3 Connect the fiber optic ring connectors to fiber optic interfaces A and B as shown and connect the other ends to the CSP node.

Figure 4-15 EXNET Connect® PCI H.100 Card Configuration



Important! In case of using loopback connectors on the H.100 bus for testing purposes, the wiring schematic of the loopback connector depends on the bus speed. That is, the loopback connector used in case of 4 MHZ bus speed is different from that in case of 8 MHZ bus speed.

5 Building a Multi-Node CSP

Overview

Purpose This chapter provides reference and procedural information for building a multi-node CSP system.

Pre-Installation Considerations

Overview

This section lists information you should review before you begin the installation of your EXNET® multi-node system.

Hardware Requirements

In addition to the hardware required to set up a single-node system, the following hardware is required to set up a CSP system:

- EXNET-ONE card (for each node)
  - Receives packets from the ring addressed to the node and transfers timeslots to the local bus
  - Transmits packets containing local timeslots on to the ring
- Ethernet cable
  - Connects each node to the host
  - Carries host-to-node and node-to-node messaging
- Fiber optic cable (duplex, multi-mode)
  - Carries node-to-node Pulse Code Modulation (PCM) data over the EXNET® ring

Cable Requirements

For a CSP with Host Control messaging, you must supply a 10/100Base-T Ethernet cable interconnecting each node with the host or hosts.

Important! The host and the nodes must be on a private network.

EXNET® Ring

The EXNET® ring is Duplex Zipcord fiber optic cable with the following specifications:

- Multi-mode
- Fiber size: 62.5/125 microns
- Insertion loss: 0.5 dB
- Return loss: not applicable
- Connectors: SC

The EXNET® ring cable is available in the following lengths, as measured from tip to tip:

- 1 meter (3.3 feet)
- 2 meter (6.6 feet)
- 5 meter (16.4 feet)

For cabling guidelines and sample EXNET® network configurations, refer to *Establishing Communication Links* below.

Handling Ring Fiber Optic Cable

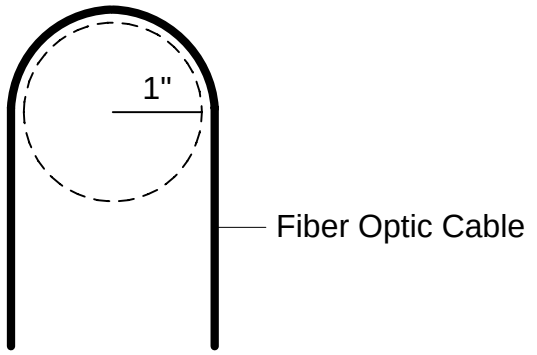
Important! Follow these guidelines closely when handling the ring fiber optic cable:

CAUTION

The fiber optic cable and connectors are fragile, therefore, handle them with care to prevent damage

- Carefully secure the fiber optic cable where it cannot be jostled or stepped on. Loosely bundle it or secure it to the rack by using a tie wrap or a similar mechanism.
- Do not bend the cable beyond a 1-inch radius, as shown in Figure 5-1.

Figure 5-1 Fiber Optic Cable – Bend Radius



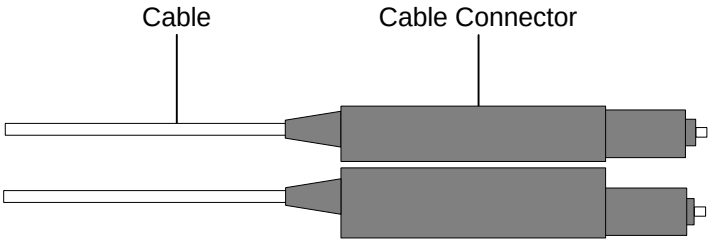
Fiber Optic Cable Bend Radius OV 120898 (xxx-xxx-xxxx).vsd

Handling Fiber Optic Cable Connectors

Important! Follow these guidelines when handling the fiber optic connectors:

- The cable connectors are sensitive. Handle them carefully.
- When inserting the cable into the EXNET-ONE card ports, make sure that the connector remains stable. Applying pressure to the cable can disrupt the positioning of the connector affecting the connection.

Figure 5-2 SC Cable Connector



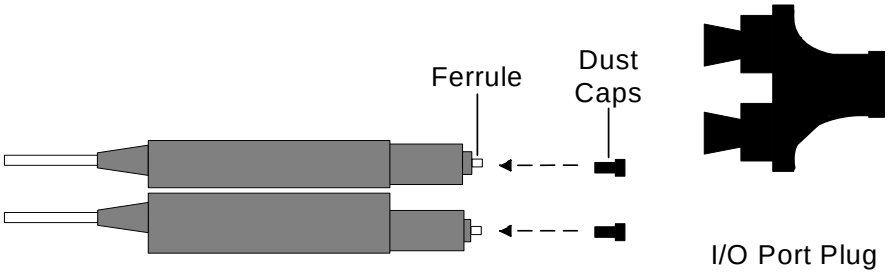
Fiber Optic Cable Part Diagram OV 111599 (xxx-xxx-xxxx).vsd

Ferrules

Important! Follow these guidelines when handling the fiber optic cable's ferrules:

- To avoid transmission problems, make sure that the ferrule remains free of foreign particles. Place the black dust caps on the ends of the cable whenever it is not attached to the EXNET-ONE card and insert the large black plastic plug in the card's I/O ports. (Figure 5-3)
- Gently clean the ferrule by using alcohol and a lint-free cloth.

Figure 5-3 Ferrule



Fiber Optic Cable Ferrules and plug OV 111599 (xxx-xxx-xxxx).vsd

Recording Node Information

Before beginning CSP system configuration, you should clearly map your configuration and record important information about each node. This information assists you in the initialization and configuration process. Complete the *Node Information Form* below.

For each node, define and write down the following information:

- Logical Node ID
- Physical Node ID (found in decimal form on the label on the back of the chassis)
- Host Node Logical Node ID
- Logical Ring IDs/Slot Number
- IP address of the CSP Matrix Controller Series 3 card(s)
- Logical Span IDs (the range of Logical Span IDs that you assign to the node)

Installation

Overview

This section explains how to set up a multi-node CSP. Sample EXNET® configurations in this chapter show the CSP 2090 chassis. The configuration information also applies to the CSP 2110 and CSP 2040 chassis.

Establishing Communication Links

The first step in setting up an CSP system is establishing an Ethernet connection between the host and each node. This link enables you to use the API for host-to-node messaging. The same link is used for node-to-node messaging and for distributed Layer 4 call processing between nodes, which enables the host to manage the entire CSP system as if it were one node.

There are three basic host control configuration options:

- Single Point of Host Control – 1 host, 1 host node
- Multiple Points of Host Control – 1 host, multiple host nodes
- Distributed Host Control – multiple hosts, multiple host nodes

Installation Tips

Following these tips makes your EXNET® installation easier.

- All CSP Matrix Controller Series 3 cards must be on the same LAN and subnet as the host.
- The host and the nodes must be on an isolated network, separate from other CSPs.

CAUTION

Dialogic strongly advises isolating the link between nodes from all other Ethernet traffic, either through a bridge or a separate network. Extraneous traffic will affect system performance.

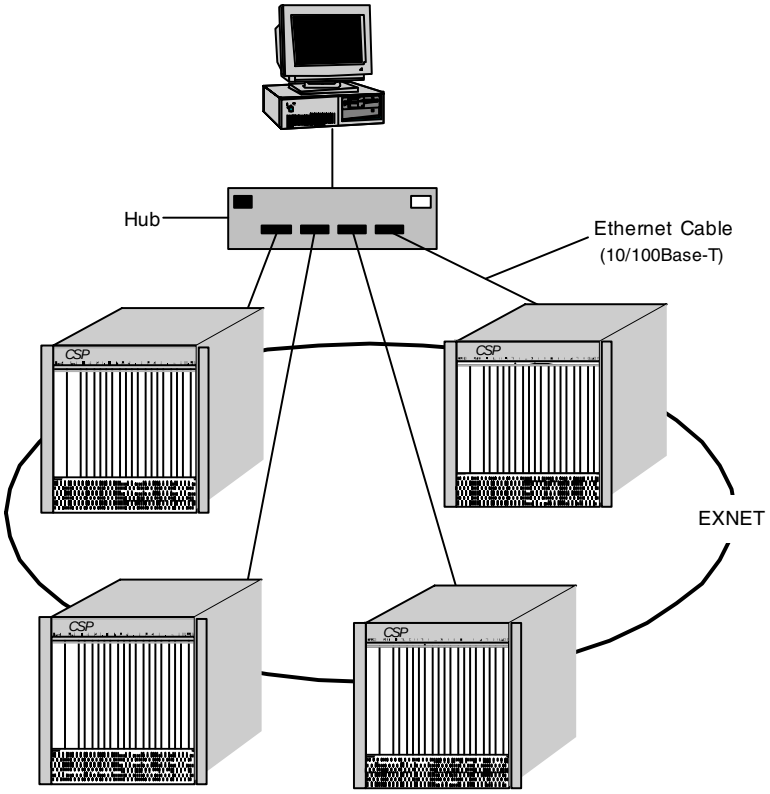
Connecting the Ethernet Cable

You establish the Ethernet connection by using a 10/100Base-T Ethernet cable. You connect the cable at the Ethernet ports on the CSP Matrix Controller I/O Series 3 Card.

Using 10/100Base-T Cable

Figure 5-4 shows a host connected through a hub to four nodes with 10/100Base-T Ethernet cable.

Figure 5-4 Communication Link – 10/100Base-T Ethernet Cable



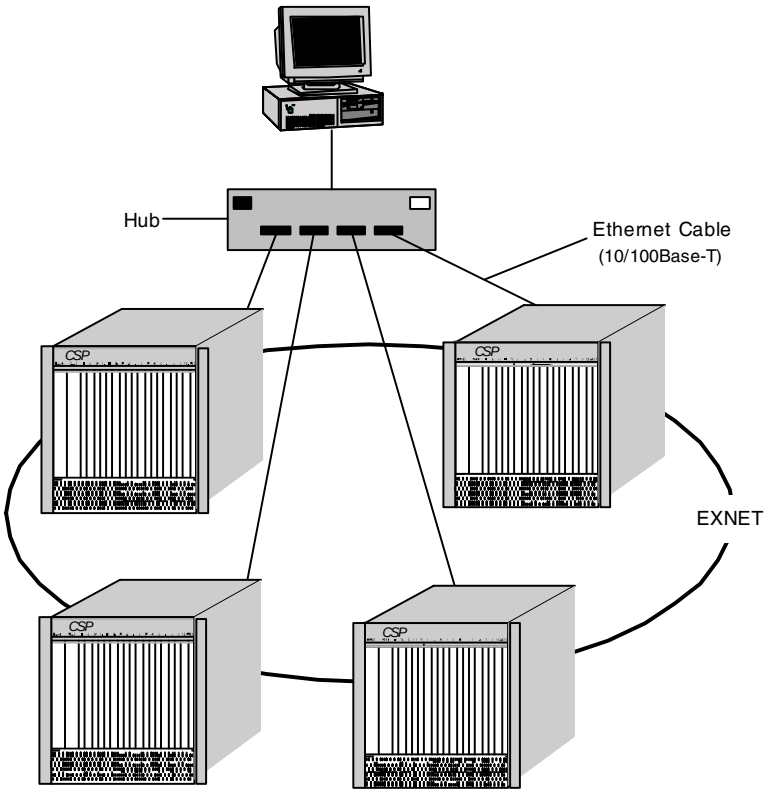
Connecting the Fiber Optic Cable

PCM data is passed between nodes through the EXNET® ring using the EXNET-ONE card. This section covers the physical aspects of the EXNET ring cable and the connection of CSP nodes. The EXNET® ring is a fiber optic cable connected to each node at the EXNET® ports on the EXNET-ONE card.

Diagram of a Ring Configuration

Figure 5-5 shows a logical representation of a ring configuration.

Figure 5-5 EXNET® Ring



Connection Method

The EXNET-ONE card has two fiber optic connectors, labeled EXNET A and EXNET B. You establish the PCM data path between nodes by connecting the EXNET A port on each node to the EXNET B port on an adjacent node. The transmitter port (TX) of each EXNET® port connects to the receiver port (RX) of the other. The connectors on the end of each cable are keyed to prevent the accidental connection of two TX or two RX ports.

WARNING

Nodes communicate by sending a laser beam over the fiber optic cable. Once the EXNET-ONE card is installed and the laser beam is active, do not look into the EXNET® ports. If you install an EXNET-ONE card without the fiber optic cables inserted in

the EXNET® ports, insert the protective plastic plug(s) provided into any unused ports.

Cabling Guidelines

Follow these cabling guidelines for connecting nodes:

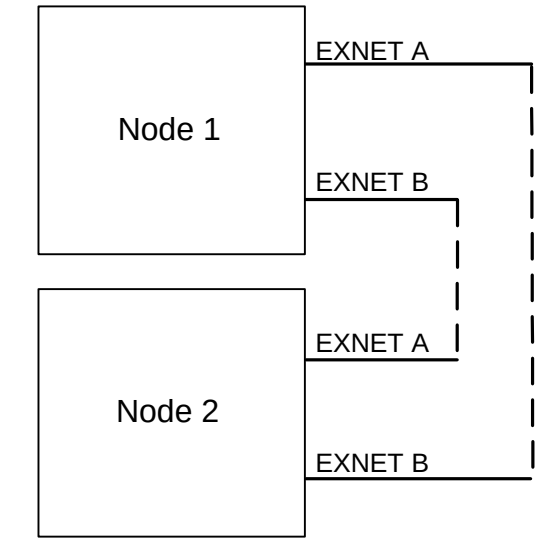
- To connect adjacent nodes on the same rack, use 1 meter (3.3 feet) cable.
- To connect nodes on separate racks, use 2 meter (6.6 feet) cable.
- To connect nodes on racks more than 1 meter (3.3 feet) apart, use 5 meter (16.4 feet) cable or longer.

Sample Configurations

Overview This section shows sample EXNET® configurations. These samples illustrate how to connect the fiber optic cables in various multi-node systems.

Two Nodes Figure 5-6 shows a two-node configuration.

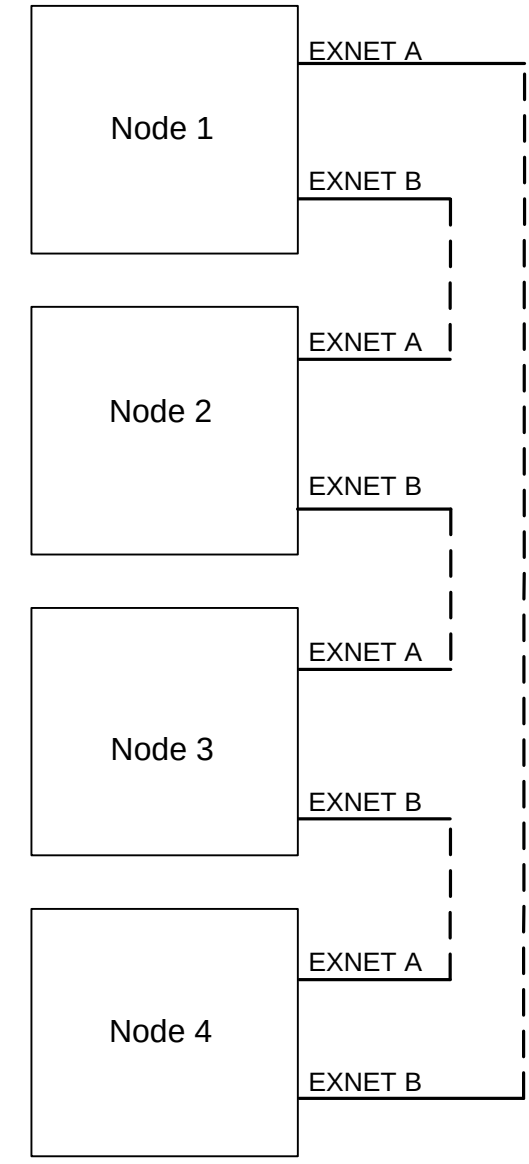
Figure 5-6 Two-Node Configuration



/erview of a EXNET Network 2 Node sys 120498 (OVW-NET-XNET).vsd

Four Nodes Figure 5-7 shows a four-node configuration

Figure 5-7 Four-Node Configuration



erview of a EXNET Network 4 Node sys 120498 (OVW-NET-XNET).vsd

EXNET-ONE LEDs

Overview

This section covers the LEDs on the EXNET-ONE card.

Signal Detect LED

The Signal Detect LED indicates the detection of a signal from the fiber optic cable. During initialization the LED flashes red and then turns green once a signal is detected and an EXNET® connection is established.

> **Important!** The Signal Detect LED indicates only whether a fiber connection to the specific EXNET-ONE card exists, not whether the EXNET® ring is in service.

Allow approximately 10 seconds for the Signal Detect LED to turn green after a signal has been detected. The LED turns red if:

- The cable is damaged or removed from EXNET® port.
- The EXNET® port on the remote end of the cable is placed in loopback mode.

Fault Detect LED

The Fault Detect LED indicates the status of the EXNET® port.

If a signal loss is detected (indicated when the Signal Detect LED turns red), the port is put in loopback mode by the software (if loaded) and the LED turns red.

The Fault Detect LED turns red during power up and initialization. After the ring is configured and brought in service, the LED turns green as each node connects to the ring.

Quick-Reference LED Table

Table 5-1 describes the Signal Detect and Fault Detect LEDs.

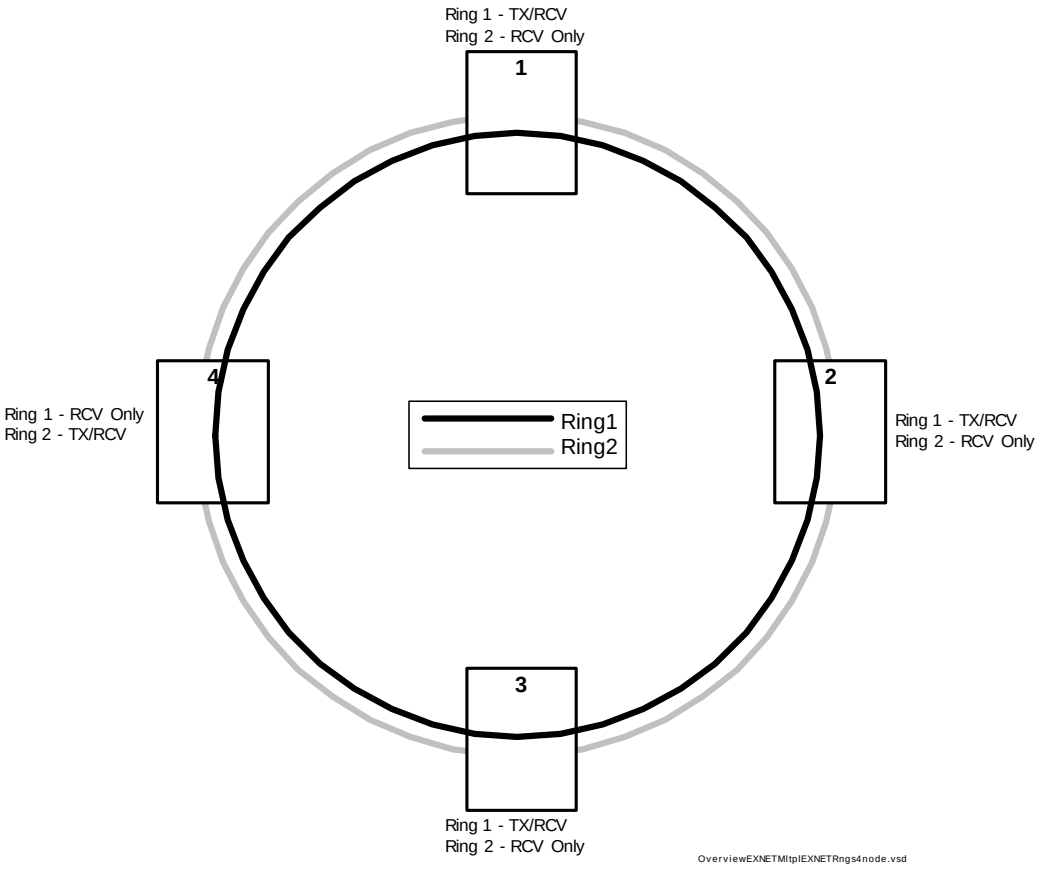
Table 5-1 Signal Detect and Fault Detect LEDs

System Status	LEDs	Color
Before Software Download	Signal Detect	Green
	Fault Detect	Green
After Software Download	Signal Detect	Green
	Fault Detect	Red
After Ring Configuration	Signal Detect	Green
	Fault Detect	Green
Node Fault/Out of Service	Signal Detect	Green
	Fault Detect	Red

Multiple EXNET® Rings

Overview By installing multiple EXNET® rings, you can connect up to 4 nodes in a CSP system. Figure 5-8 shows a sample 4-node configuration of multiple EXNET® rings.

Figure 5-8 Multiple EXNET® Rings



Each node in Figure 5-8 has two EXNET-ONE cards installed, one for Ring 1 and one for Ring 2.

Nodes 1–3 transmit data on Ring 1, while Node 4 transmits data on Ring 2. Nodes 1–3 receive data from Node 4 on Ring 2, while Node 4 receives data from Nodes 1–3 on Ring 1. Nodes can transmit on multiple rings up to the ring capacity (number of nodes supported). You configure the Transmit/Receive Mode of each EXNET-ONE card by using the *EXNET Ring Configure* message.

Configuring the Transmit/Receive Mode of the nodes enables them to transmit on one ring and receive on all rings. As a result, each node can receive data from all other nodes. See the *Developer's Guide: Overview* for information about configuring the Transmit/Receive Mode.

Limitations

The following limitations apply to multiple EXNET® rings:

- If conferencing is configured, you cannot have more than 8 CSP nodes.

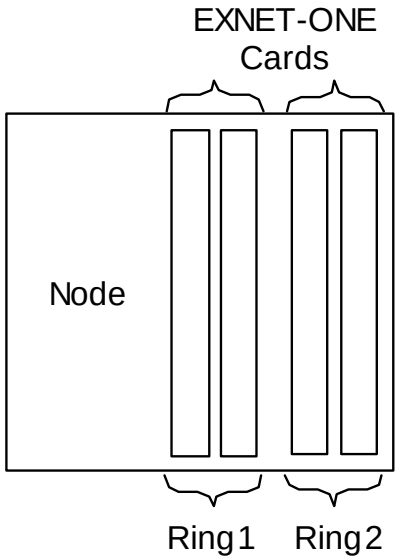
Redundancy

For full redundancy with multiple rings, configure your system as follows:

1. Add two EXNET-ONE cards to each node for a total of four card sets per node.
2. Connect cables as explained in *Connecting the Fiber Optic Cable* above.
3. Configure the Transmit/Receive Mode of each node.

Figure 5-9 shows a node configured for two redundant EXNET® rings.

Figure 5-9 Redundant Multiple EXNET® Rings



EXNET® Fault Recovery and Redundancy

Overview

An EXNET® system is self-healing with hardware failures involving a segment of the EXNET® ring and an EXNET-ONE card. If a failure occurs, a node or ring segment is automatically bypassed as the EXNET® port on the EXNET-ONE card is looped back.

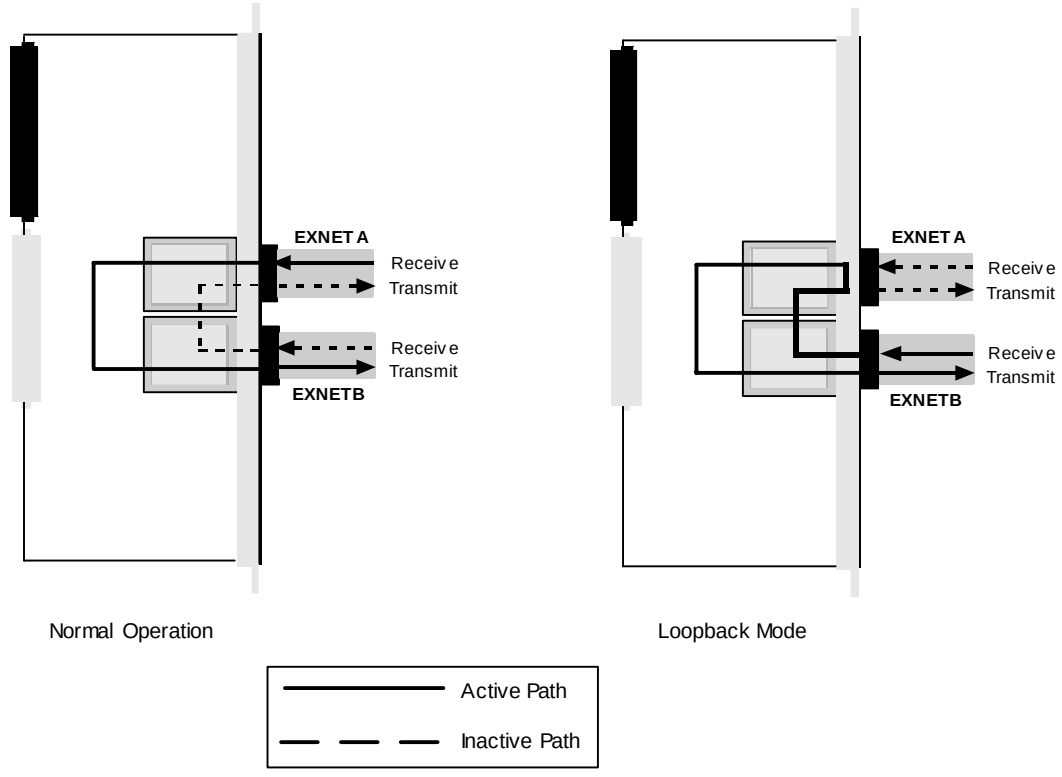
Hardware Requirements

There are no special hardware requirements to enable EXNET® Fault Recovery. Configure the hardware as previously described in this document.

Operation

The EXNET® cable is a fiber optic cable with separate cables for transmitting and receiving. During normal operation, the EXNET-ONE card receives packets from the ring through its EXNET Port A and transmits packets onto the ring through its EXNETPort B. In loopback mode, ring traffic is both received and transmitted through the same EXNET® port. The two modes of operation are shown in Figure 5-10.

Figure 5-10 EXNET-ONE Port Status



Loopback Mode Information

When an EXNET® port is placed in loopback mode, the Fault Detect LEDs turn red and the host receives a *Ring Status Report* message indicating the status (normal or loopback) of both EXNET® ports on the card.

An EXNET® port cannot be placed in loopback mode by the host. To isolate a node from an CSP system, do one of the following:

1. Take the EXNET-ONE card out of service.

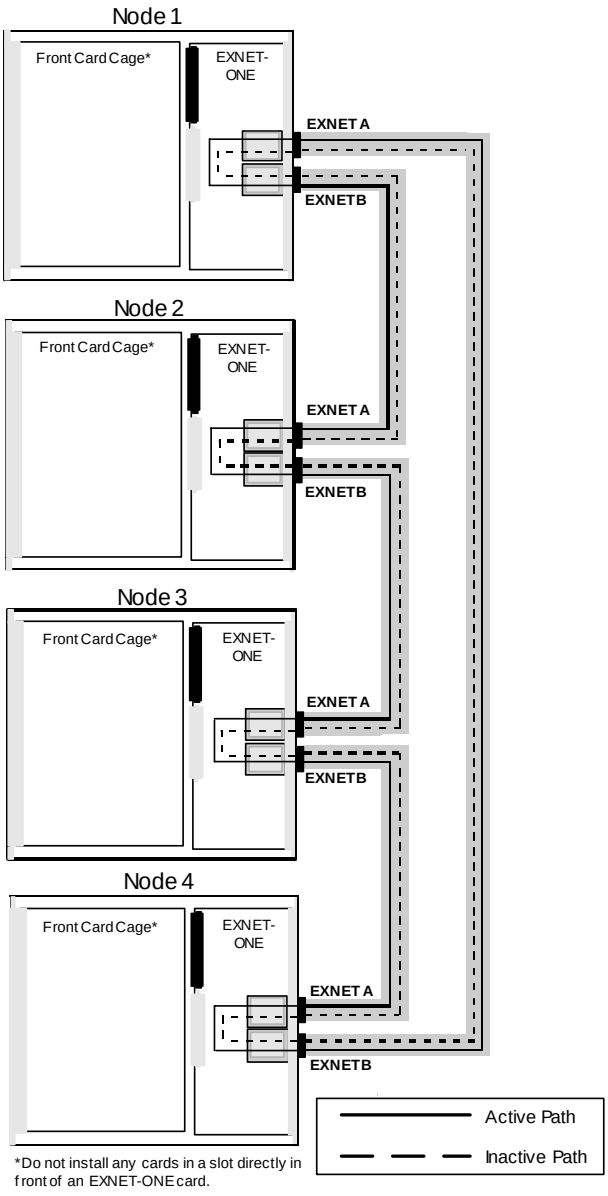
2. Power-down the node.

Normal Operation

Figure 5-11 shows the connection between nodes during normal operation. All nodes are receiving ring traffic on their EXNET A port and transmitting traffic on their EXNET B port.

During normal operation, the Signal Detect and Fault Detect LEDs are green.

Figure 5-11 Normal Ring Operation



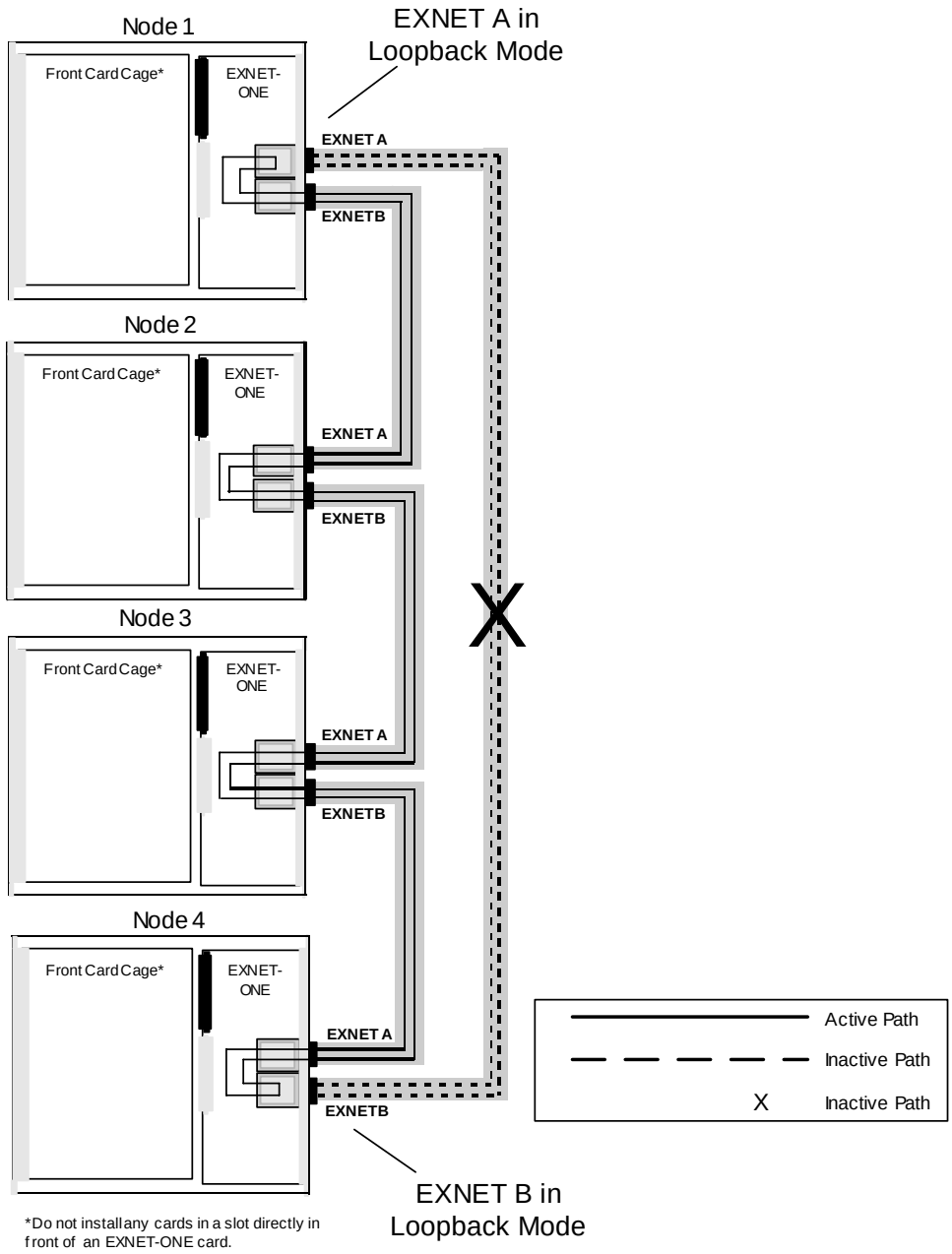
Loopback Mode

Figure 5-12 shows how EXNET® ports on the EXNET-ONE card are put in loopback mode because of a failure in an EXNET® ring segment.

- The EXNET® ports connected to the failed ring segment (Node 1/ EXNET A, Node 4/EXNET B) are placed in loopback mode.
- The traffic on the EXNET-ONE cards is both transmitted and received through one EXNET® port.

- A ring connection is maintained between all nodes, and no calls are dropped.

Figure 5-12 Loopback Mode



Ring Segment Failure

This section describes what happens when a your system experiences a ring segment failure.

Single Ring

Figure 5-13 illustrates the ring connection between nodes after the failure of a ring segment in a single ring configuration.

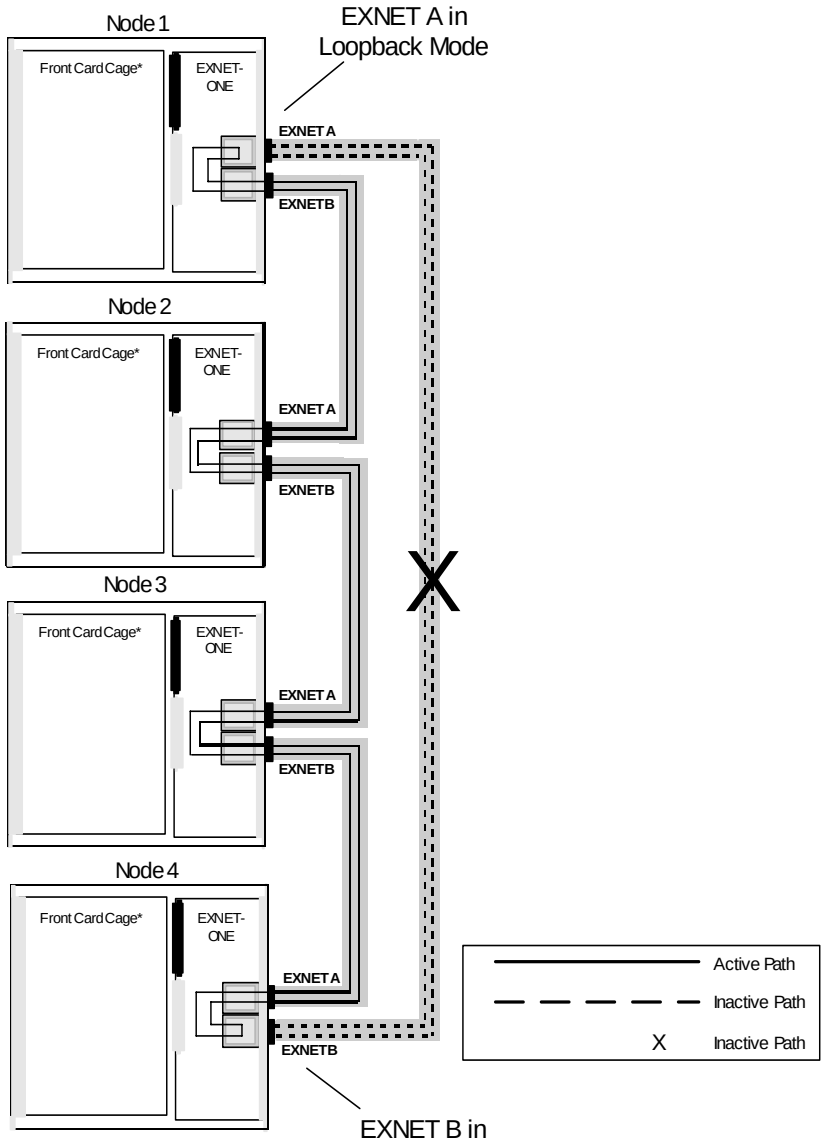
- The node that was connected to the failed segment at its EXNET A port loops back its EXNET A port.
- The node connected to the failed segment at its EXNET B port loops back its EXNET B port.

- A complete ring is maintained between all nodes.The host receives a *Ring Status Report* message from the affected nodes indicating that the affected EXNET® ports are in loopback mode.

Redundant Ring

A redundant EXNET® ring configuration has no effect if an EXNET® ring segment fails on one of the rings. The affected ring self-heals and a complete loop is maintained on both rings.

Figure 5-13 Ring Segment Failure



EXNET-ONE Card Failure

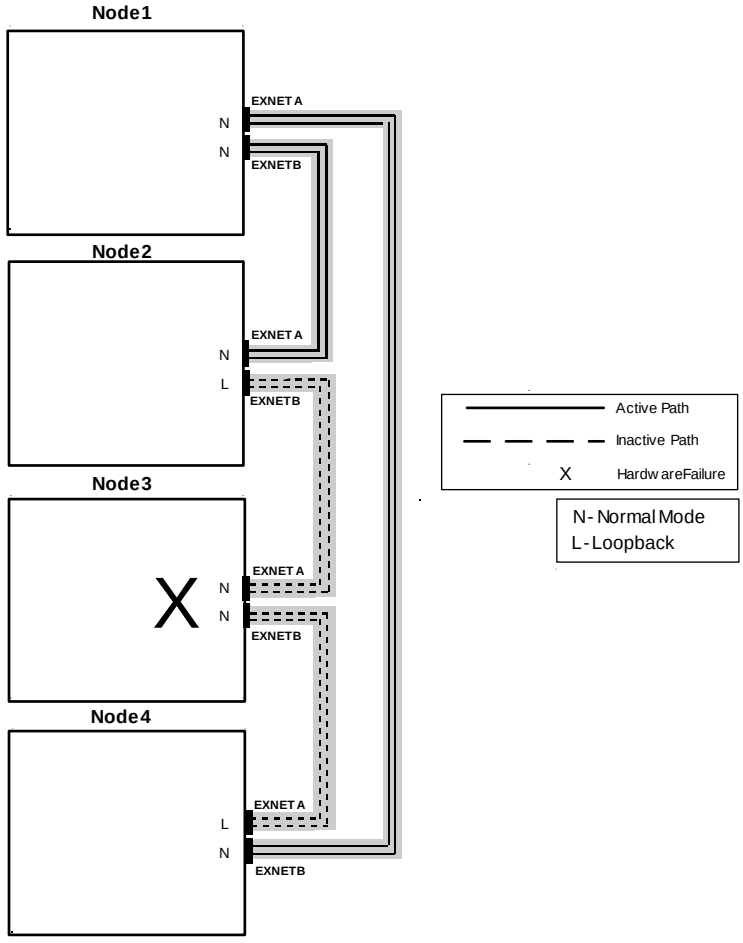
This section describes what happens when your system experiences an EXNET-ONE card failure.

Single Ring

Figure 5-14 shows the ring connection between nodes after the failure of an EXNET-ONE card in a single ring configuration.

- The node that was connected to the failed node's EXNET A port loops back its EXNET B port.
- The node connected to the failed node's EXNET B port loops back its EXNET A port.
- All calls on the failed node connected across the ring are purged.
- A ring connection is maintained between all remaining nodes. The host receives a *Ring Status Report* message from the adjacent nodes indicating that the affected EXNET® ports are in loopback mode.

Figure 5-14 EXNET-ONE Card Failure – Single Ring



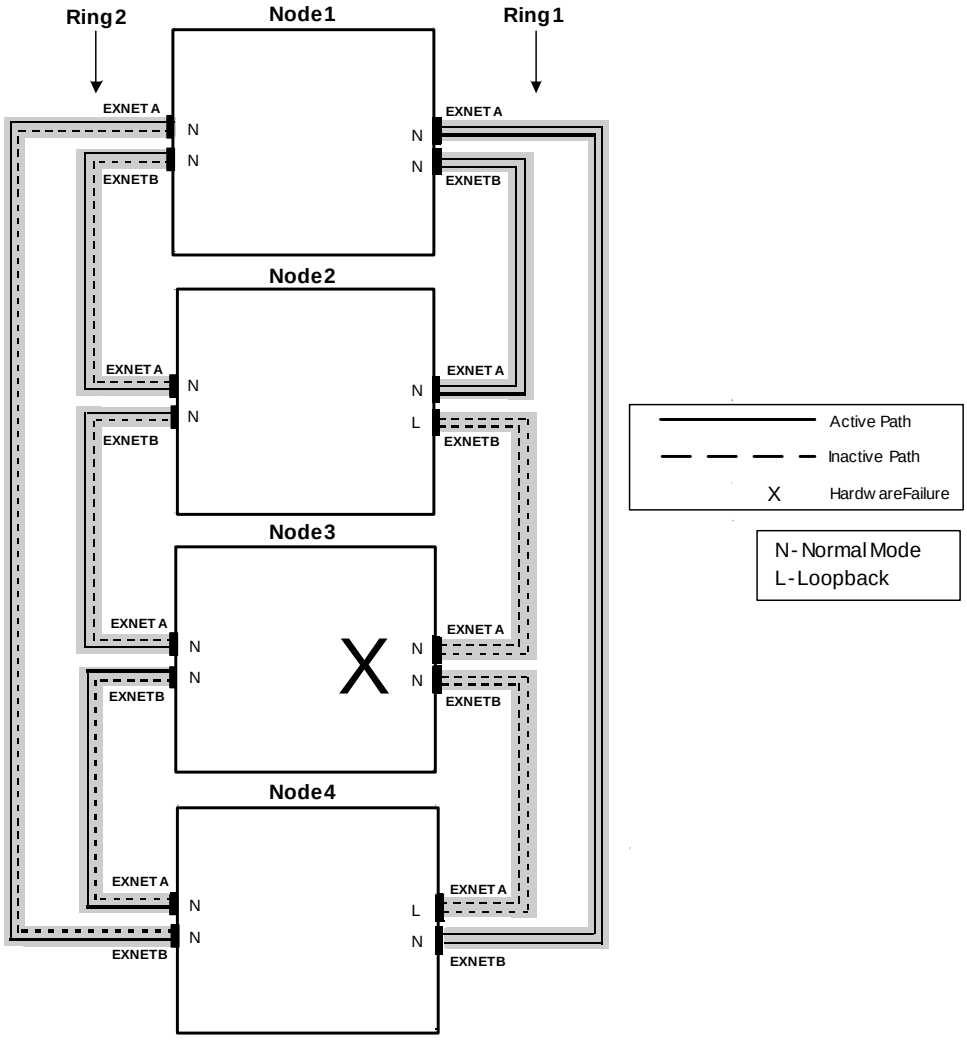
Important! If the EXNET-ONE card is reset, the EXNET® ring resets when the node rejoins the ring.

If the Master Node fails in a non-redundant system, the EXNET® ring resets and all inter-nodal connections are purged. To determine the Master Node, send a *Ring Status Query* to each node.

Redundant Ring

Figure 5-15 shows the ring connection between nodes after the failure of an EXNET-ONE card in a redundant ring configuration.

Figure 5-15 EXNET® Card Failure – Redundant Ring



- The node that was connected to the failed node's EXNET A port (Node 2) loops back its EXNET B port on the affected ring (Ring 1).

- The node that was connected to the failed node's EXNET B port (Node 4) loops back its EXNET A port on the affected ring (Ring 1).
- Traffic to and from Node 3 is routed through Ring 2. Traffic on other nodes is still carried on both rings. The host receives a *Ring Status Report* message from the adjacent nodes indicating that the affected EXNET® ports are in loopback mode.

Important! In this scenario, there is no longer EXNET® Redundancy for Node 3. If the EXNET-ONE card for Ring 2 fails, Node 3 is isolated from the CSP system and all inter-nodal connections involving Node 3 are dropped.

CSP In-Service Upgrades

Adding an EXNET® Ring to Stand-Alone Nodes

You can establish a CSP system with stand-alone nodes by adding EXNET® hardware to each node without affecting existing calls on any nodes.

1. Add the following EXNET® hardware to each node:
   - EXNET-ONE card
   - Fiber optic cable
2. Assign Logical Node IDs to each node by using the *Assign Logical Node ID* message.
3. Configure the EXNET® ring at each node by using the *EXNET Ring Configure* message.
   - Assign a Logical Ring ID to each node.
   - Configure the Transmit/Receive Mode of each node.
   - Configure the number of packets for each ring.
4. Bring the ring in service by using the *Service State Configure* message. This message only needs to be sent to one node to bring the entire ring in service. Calls can now be connected across nodes.

EXNET® Ring Expansion

The EXNET® Ring can be expanded to add a node without service disruption by performing the following procedure.

1. Configure the new node:
   - Establish the Ethernet connection to the host.
   - Download the system software.
   - Re-establish the socket connection.
   - Assign the Logical Node ID.
   - Assign Logical Ring ID of the existing ring to the node using the *EXNET Ring Configure* message.

- Configure Transmit Mode and Number of Packets according to requirements.
- Configure CSP options on the node, if applicable, by using the *EXS Node Configure* message.
- Perform Ring Interface Card (RIC) diagnostics using the entity RIC Diags (0x04) in the *EXNET Ring Configure* message.
- Prepare node for addition to ring with the entity Prepare For Addition (0x05) in the *EXNET Ring Configure* message.

2 Loopback ports on the operational ring. Prior to disconnecting the fiber optic cables on the operational EXNET® ring, send the *EXNET Ring Configure* message with the entity Loop Back Port (0x07) to the operational nodes where the new node will be added. The Logical Node ID of the message is the node where the “A” port is to be looped back. The argument of this message is the Logical Node ID of the node where the “B” port is to be looped back. This forces the two adjacent nodes to loopback their respective I/O ports so that the connection between them is temporarily inactive and the fiber optic cable connection can be provided to the new node.

3 Disconnect fiber optic cable where necessary. Disconnect the fiber optic cable from the operational nodes adjacent to where the new node is to be added.

4 Make the fiber optic connections to the new node as shown in Figure 5-16.

5 Configure Ring for Expansion. Send the *EXNET Ring Configure* message to the adjacent node with the entity Expand Ring (0x06). The Logical Node ID of the message is either adjacent node. This brings the new node into the ring, however, the new node will not yet transmit packets on to the ring.

6 Add the new node. Send the *EXNET Ring Configure* message to the new node with the entity Add Node (0x08). The Logical Node ID of this message is the new node. The new node will now transmit its packets on the ring if so configured. Final verification is performed on

all nodes directly involved in the addition of the new node to the active EXNET® ring:

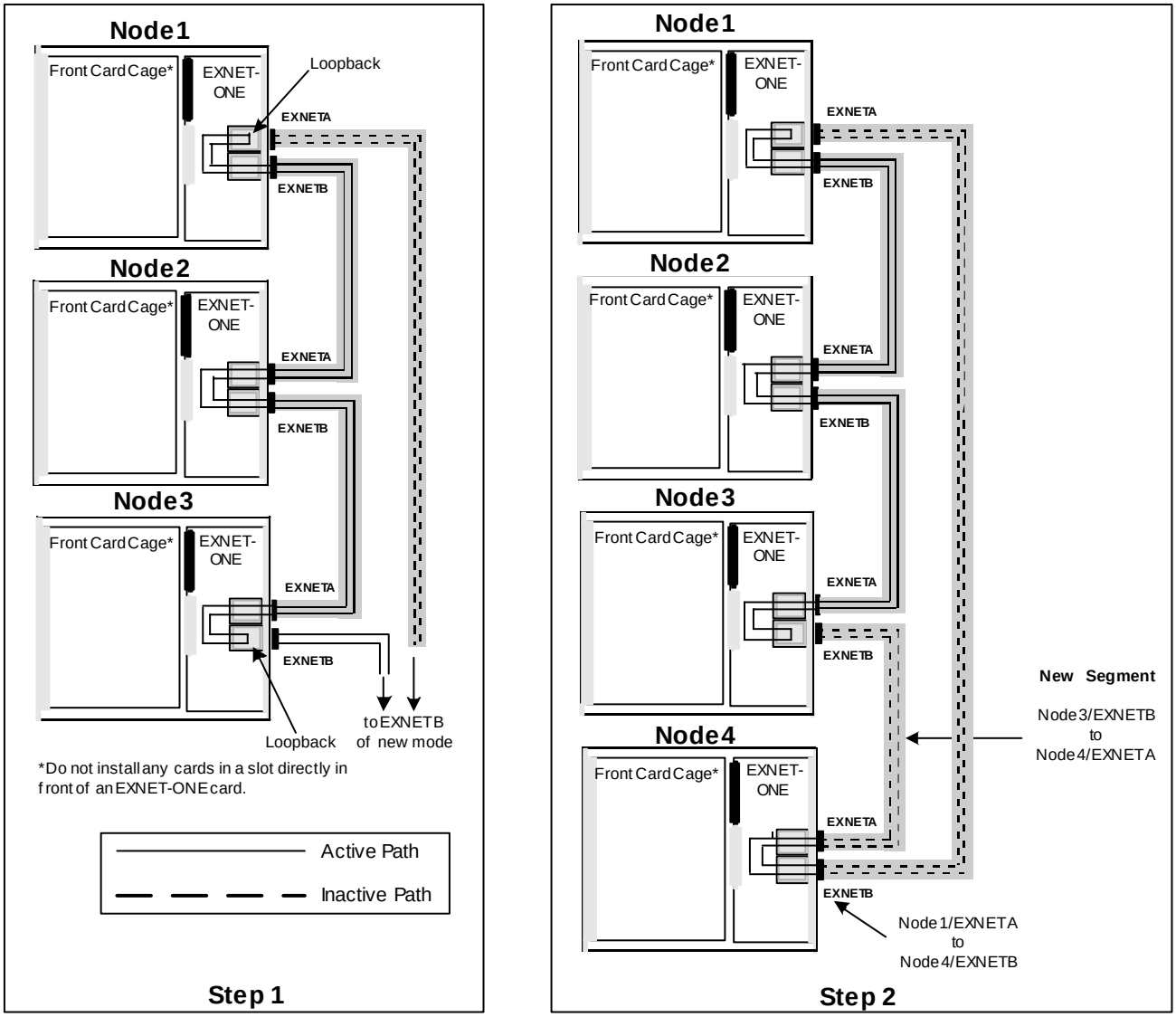
- The EXNET® ring should be in service
- I/O ports which, during the addition became looped back, should be open.
- Both I/O ports of the new node should be open

7 Response to Add Node is sent to the host.

8 Download the appropriate configuration file(s) to configure all required capabilities of the new node.

Diagram The example diagram (Figure 5-16) is for illustrative purposes only and assumes an existing 3-node EXNET® ring configuration, where a new node (Node 4) is added between Nodes 3 and 1. These procedures and the example diagram depicted are applicable to any operational 2-node (or more) EXNET® ring configuration.

Figure 5-16 Adding a Node to an EXNET® Ring



Adding a Redundant EXNET® Ring

Adding a redundant EXNET® ring to a CSP system has no effect on calls in a connected state or in setup. Use the following procedure to add a second EXNET® ring:

1 Add an EXNET-ONE card to each node.

2 Connect the EXNET® cable to each node in the same manner as the active ring.

3 Configure the EXNET® ring by using the *EXNET Ring Configure* message.

4 Assign a unique Logical Ring ID and configure the Transmit/Receive Mode and number of packets.

5 Bring the ring in service by using the *Service State Configure* message.

Adding a Line Card

Adding a line card to a CSP node has no effect on traffic, but has the following consequences:

- Timeslots used for CSP Conferencing may be affected. See *EXS Conferencing* in the *API Developer's Guide: Overview* for more information.
- If an E-ONE card is added to a node configured to transmit three packets, only channels 1–24 are switched onto the EXNET® ring.

Adding a CSP Matrix Controller Series 3 Card

You can add a redundant CSP Matrix Controller Series 3 Card to a node with no effect on local or distributed traffic. In the event of a CSP Matrix Controller Series 3 Card switchover, however, some calls in the process of being established on the node may be dropped.

Passive EXNET® Ring Expansion

Overview

The following procedure allows you to add a node to an existing non-redundant EXNET® ring without loss of connections.

Passive Expansion Procedure

This procedure assumes an existing 3-node EXNET® ring configuration, where a new node (Node 4) is added after Node 3.

1 Configure the new node:

- Establish the Ethernet connection.
- Download the system software.
- Re-establish the socket connection.
- Assign the Logical Node ID.
- Configure CSP options on the node, if applicable, by using the *EXS Node Configure* message.
- Perform ring diagnostics with the Entity of Diagnostics (0x04)
- Configure Transmit Mode and Number of Packets according to requirements.
- Prepare node for addition to ring with the Entity of Prepare Node (0x05)
- Assign Logical Ring ID 1 to the node using the *EXNET Ring Configure* message.

2 Disconnect EXNET® ring where necessary. Disconnect the fiber optic cable from the EXNET B port of the node to which the new node will be adjacent, as shown in Figure 5-17. The system is placed in loopback mode and all connections are maintained.

3 Make the EXNET® connections to the new node as shown in Figure 5-17.

4 Configure the Ring for Expansion. Send the *EXNET Ring Configure* message to Node 3 with the Entity of Expand Ring (0x06). This brings Node 4 into the ring, however, it does not transmit its packets onto the ring.

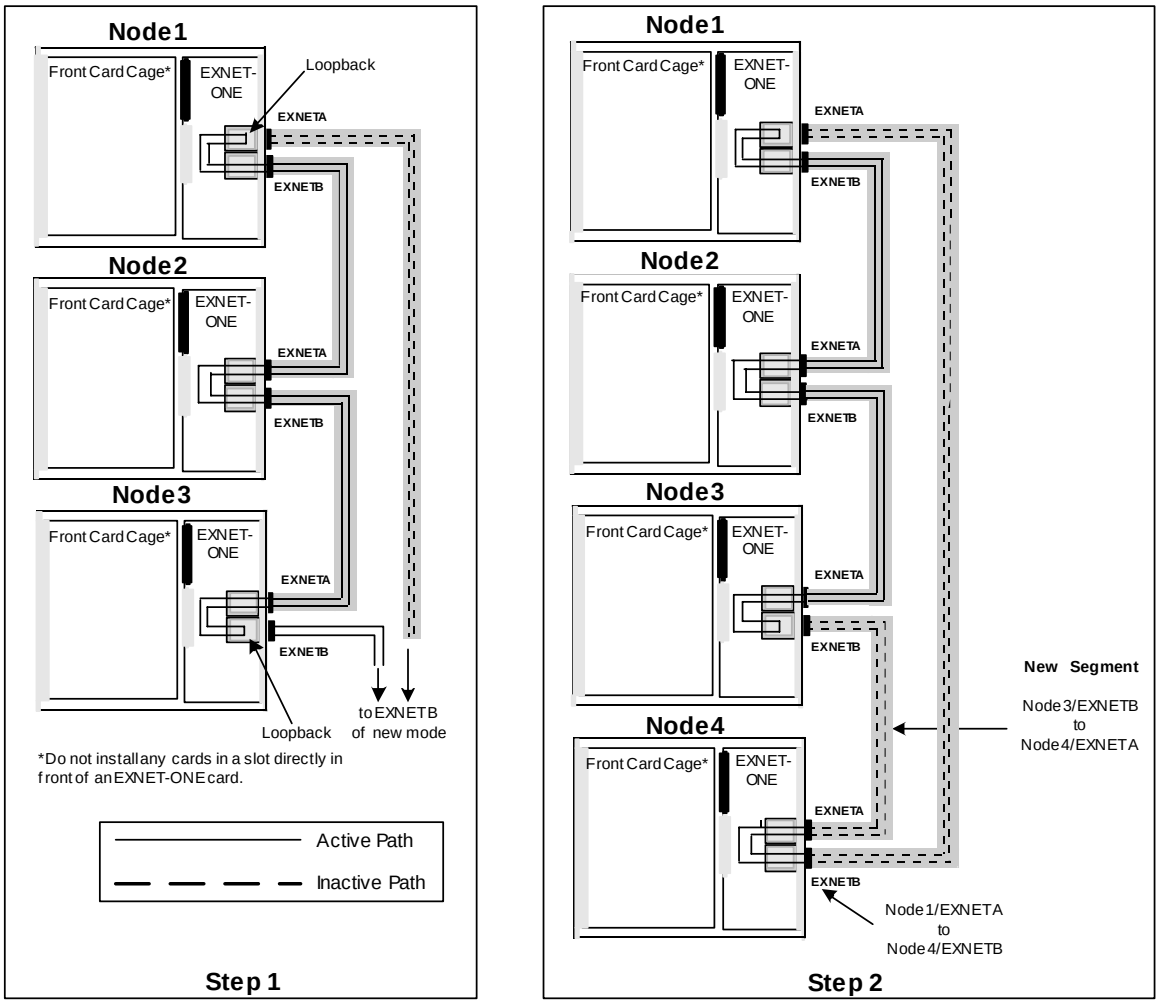
5 Activate Node 4. Send the *EXNET Ring Configure* message to Node 4 with the Entity of Activate Node (0x07). Node 4 will now send its packets on the ring.

Final Verification

Final verification must be performed on all nodes directly involved in the passive addition of the new node to active EXNET® ring:

- The EXNET® ring should be in service.
- The EXNET-ONE card ports which were looped back prior to the reconfiguration should be open.
- Both EXNET-ONE card ports of the new node should be open.

Figure 5-17 Adding A Node to an EXNET® Ring



CSP Host Communication Redundancy

Overview

You can set up host communication redundancy in a CSP system in an application where a redundant local area network (LAN) segment is required to protect against LAN failure. To configure redundancy, you connect switch nodes with two CSP Matrix Controller Series 3 cards to redundant hubs connected to one or more hosts.

Redundant links enable the host to maintain communications to the CSP and to keep running if a single component in the system fails. If a faulty primary link is detected, the host application can switch over its requests to the secondary link.

Sample Topology

Figure 5-18 shows a topology that supports host communication redundancy. In this example, two hubs and four nodes are connected to one or more hosts. All the nodes have dual CSP Matrix Controller Series 3 cards, and all the nodes are on the same physical network. The letters X, Y, Z, and Z' designate points of failure:

- *X* - Ethernet link failure between the host and the CSP

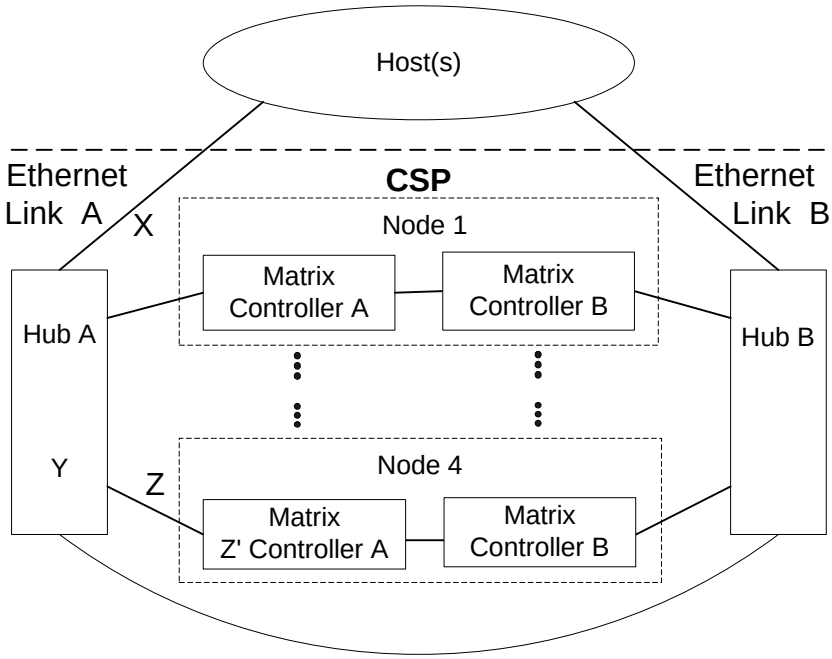
  The cable or host is defective, or the port on either the host or the hub is defective.
- *Y* - Hub failure

  The hub is defective, and all ports and devices directly connected to it are affected. No communication can take place between any of its ports. The standby components (B side) are not affected, and host ports on that side are still connected to each other.
- *Z* - Ethernet link failure between the hub and the CSP Matrix Controller Series 3 card

  The cable is defective, or the port on either the hub or the CSP Matrix Controller Series 3 card is defective.
- *Z'* - Switch CSP Matrix Controller Series 3 card failure

  The CSP Matrix Controller Series 3 card is defective

Figure 5-18 Ethernet Host Communication Redundancy



Failure Detection and Recovery

In the redundant system shown in Figure 5-18, failure detection and recovery occurs as follows:

- If the host detects a failure in one of the Ethernet links between the host and the CSP (as designated by *X* in Figure 5-18), it opens new socket connections to all four *A* CSP Matrix Controller Series 3 cards through Ethernet link *B*. If successful, the recovery is complete and the *A* CSP Matrix Controller Series 3cards are still in control of the switch. If unsuccessful, the host connects to the standby *B* CSP Matrix Controller Series 3 cards of any node to which a connection to the *A* CSP Matrix Controller Series 3 card has failed and causes a switchover on that node only.
- If the host and the *A* CSP Matrix Controller Series 3 cards detect a hub failure (as designated by *Y* in Figure 5-18), the host tries to reconnect to the *A* CSP Matrix Controller Series 3 cards through Hub B. If unsuccessful, the host connects to the *B* CSP Matrix Controller Series 3 cards and requests all four of them to become active. You can minimize the recovery process by connecting half of the CSP Matrix Controller Series 3 cards to Hub A and half to Hub B. In this configuration a hub failure will affect only half of the CSP nodes.

- If the host detects a failure in one of the Ethernet links between the hub and the CSP Matrix Controller Series 3 card *A* in switch node 4 (designated by *Z* in Figure 5-18), it opens a new socket to CSP Matrix Controller Series 3 card *A* through Ethernet link *B*. If unsuccessful, the host connects to CSP Matrix Controller Series 3 card *B* on Switch Node 4 and causes it to become active.
- If the host detects a failure in CSP Matrix Controller Series 3 card *A* in Switch Node 4 (designated by Z' in Figure 5-18), the host tries to connect to CSP Matrix Controller Series 3 card *B* in Switch Node 4 through Ethernet link *B*, but CSP Matrix Controller Series 3 card *B* detects the failure and becomes active, which is indicated by the Poll message sent to the host connected to CSP Matrix Controller Series 3 card B.

General Strategy

In all scenarios, use the following general strategy for the host:

- If a TCP/IP connection to an active switch CSP Matrix Controller Series 3 card is broken, the host should try to reconnect to the original active CSP Matrix Controller Series 3 card (*A*) through the redundant Ethernet link. If that fails, the host should then connect to the standby CSP Matrix Controller Series 3 card (*B*) and cause a switchover.
- If a connection to a standby CSP Matrix Controller Series 3 card is broken, the only recovery needed is to alert Systems Support to restore redundancy on the *B* side.
- A CSP Matrix Controller Series 3 card switchover is caused only by a severe hardware or software fault, or when initiated by the host using the *Become Active* message. The system software never assumes that a switchover is needed based on any problem conditions related to the state of host connections.

You can minimize the disruption of a complete hub failure by using hubs with some built-in level of redundancy. The most useful type to consider is power supply redundancy.

Node Information Form

Overview Use the form below to record important information about each node in a CSP system.

NODE INFORMATION

Logical Node ID: ________________ Physical Node ID: ________________ Host Node - L.N. ID: ______________ Logical Ring ID/Slot # ______________ Logical Ring ID/Slot # ______________ IP Address A: ____________________ IP Address B: ____________________ Logical Span IDs: ________ - ________	Logical Node ID: ________________ Physical Node ID: ________________ Host Node - L.N. ID: ______________ Logical Ring ID/Slot # ______________ Logical Ring ID/Slot # ______________ IP Address A: ____________________ IP Address B: ____________________ Logical Span IDs: ________ - ________
Logical Node ID: ________________ Physical Node ID: ________________ Host Node - L.N. ID: ______________ Logical Ring ID/Slot # ______________ Logical Ring ID/Slot # ______________ IP Address A: ____________________ IP Address B: ____________________ Logical Span IDs: ________ - ________	Logical Node ID: ________________ Physical Node ID: ________________ Host Node - L.N. ID: ______________ Logical Ring ID/Slot # ______________ Logical Ring ID/Slot # ______________ IP Address A: ____________________ IP Address B: ____________________ Logical Span IDs: ________ - ________
Logical Node ID: ________________ Physical Node ID: ________________ Host Node - L.N. ID: ______________ Logical Ring ID/Slot # ______________ Logical Ring ID/Slot # ______________ IP Address A: ____________________ IP Address B: ____________________ Logical Span IDs: ________ - ________	Logical Node ID: ________________ Physical Node ID: ________________ Host Node - L.N. ID: ______________ Logical Ring ID/Slot # ______________ Logical Ring ID/Slot # ______________ IP Address A: ____________________ IP Address B: ____________________ Logical Span IDs: ________ - ________

6 CSP Maintenance

Purpose This chapter provides reference information, removal and replacement procedures, and troubleshooting procedures to maintain CSP 2040, CSP 2090, and CSP 2110 chassis and cards.

CSP 2040 Fan Tray

Replacing the Fan Tray Filter

The CSP 2040 chassis is cooled by two high-speed fans that draw in cool air through the front of the chassis.

To replace the fan tray filter, complete the following steps while referring to Figure 6-1.

WARNING

Do not work with the fan tray while the fans are still rotating. For your safety, pull out the fan tray approximately 1/2-inch and allow the fans to stop. After the fans have stopped, you can slide the fan tray completely out.

CAUTION

Dialogic recommends not running a system for more than 10 minutes without a fan tray installed.

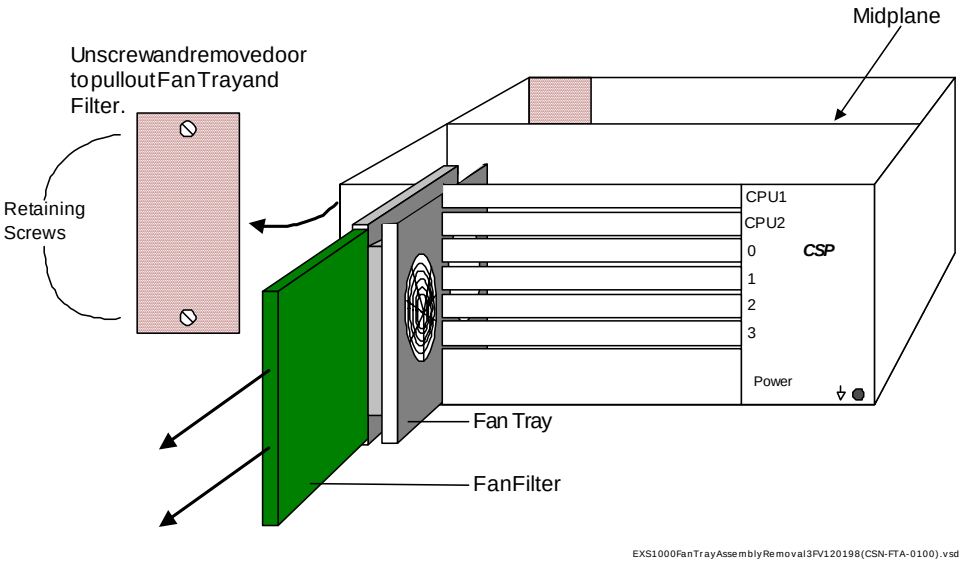
Do not try to clean the filter. A partially cleaned filter installed upside-down contaminates the system. The deterioration of filter matter also contaminates the system.

Important! You do not have to turn the power **OFF** before removing the filter.

1. Loosen the retaining screws on the fan tray door and remove it.
2. Gently pull the fan tray to disengage it from the midplane.
3. Remove the fan tray filter.
4. Replace the dirty filter with a new one.

5 Slide the fan tray into the chassis, replace the fan tray door, and tighten the retaining screw to secure the door to the chassis.

Figure 6-1 CSP 2040 Fan Tray



CSP 2090/CSP 2110 Fan Trays

Overview

The CSP 2090 and CSP 2110 chassis have front (lower) and rear (upper) fan trays.

Replacing the Lower Fan Tray Filter

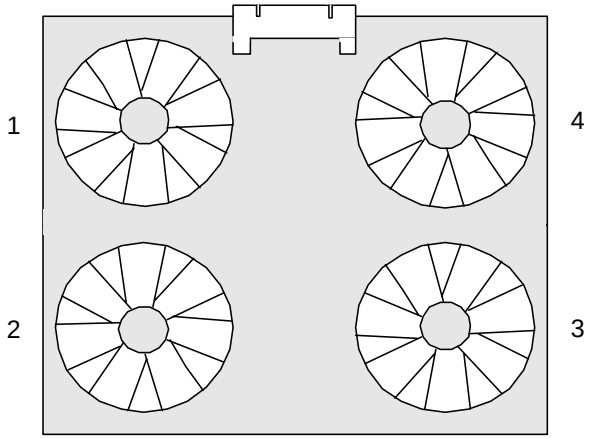
The lower fan tray at the front of the chassis contains four fans that take in air through a vent. The fans in the fan tray are numbered. (Figure 6-2)

Dimensions

The lower fan trays for the CSP 2090 and CSP 2110 have the following dimensions:

Dimensions	CSP 2090	CSP 2110
Height	7.0 cm (2.75”)	5.7 cm (2.25”)
Width	42.5 cm (16.75”)	42.5 cm (16.75”)
Depth	31.7 cm (12.5”)	31.7 cm (12.5”)

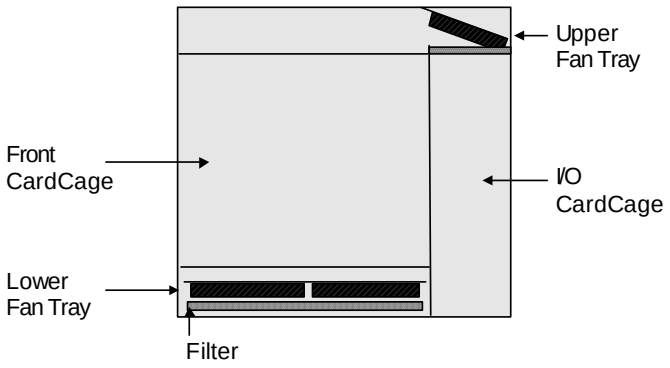
Figure 6-2 Fan Numbering of Installed Lower Fan Tray



Filter Location

A filter is located under the lower fan tray. (Figure 6-3)

Figure 6-3 Fan Trays – Cross-Sectional Side View of Chassis



Filter Maintenance

Dialogic recommends checking this filter monthly to prevent system contamination and overheating caused by particulate accumulation. Replacement schedules will vary, depending on the site.

Changing the Filter

Follow the instructions below to check or replace the lower fan tray filter:

Important! You do not have to turn the power **OFF** before removing the filter.

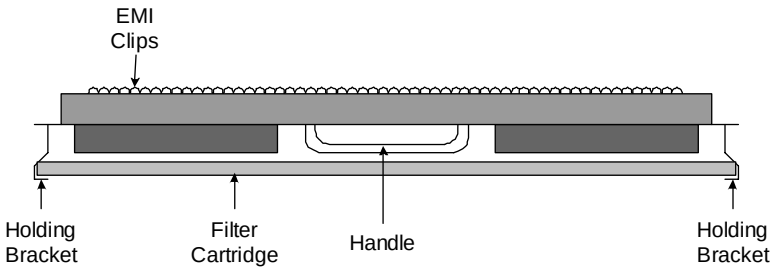
CAUTION

Dialogic recommends not running a system for more than 10 minutes without a fan tray installed.

1 Loosen the two screws at both ends of the fan tray door and remove the fan tray door.

2 Gently pull the handle on the fan tray (Figure 6-4) and slide the fan tray out of the chassis.

Figure 6-4 Front of Lower Fan Tray



3 Remove the filter cartridge from the holding brackets.

4 If the filter is not dirty, insert it back into the holding brackets with the metal grid facing up. Otherwise, replace it with a new filter.

CAUTION

Do not try to clean the filter. A partially cleaned filter that is installed upside-down will contaminate the system. The deterioration of filter matter will also contaminate the system.

5 Slide the fan tray into the chassis, re-install the fan tray door, and tighten the two screws that secure the door to the chassis.

Rear Fan Tray

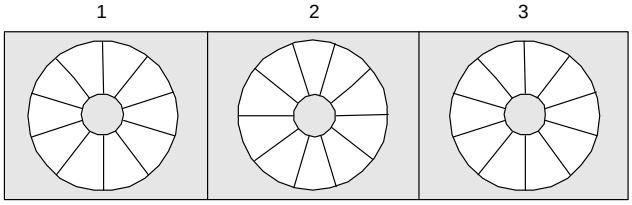
The rear fan tray at the top of the chassis contains three fans that discharge the exhaust from the CSP 2090 and CSP 2110. The fans in the fan tray are numbered. (Figure 6-5)

Rear Fan Tray Dimensions

The rear fan tray has the following dimensions:

Dimensions	CSP 2090	CSP 2110
Height	7.2 cm (2.85”)	11.2cm (4.4”)
Width	43.5 cm (17.0”)	43.5 cm (17.0”)
Depth	21.0 cm (8.25”)	31.7 cm (12.5”)

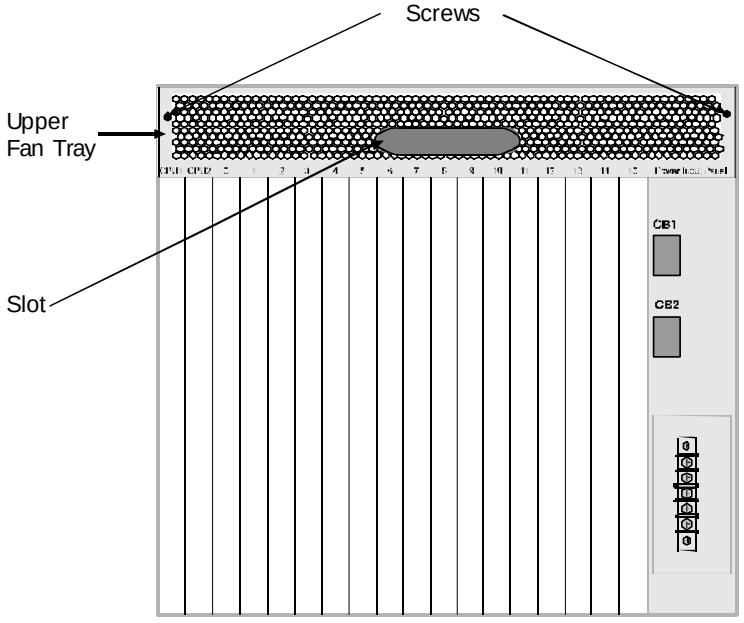
Figure 6-5 Fan Numbering - Overhead of installed Upper Fan Tray



Rear Fan Tray Location

The rear fan tray is located at the top rear of the chassis.(Figure 6-6)

Figure 6-6 Upper Fan Tray at Rear of Chassis



Removing the Rear Fan Tray

This fan tray does not have a filter, so maintenance is unnecessary. If you need to remove the rear fan tray, complete the following steps:

Important! You *do not* have to turn the power **OFF** before removing the fan tray.

1 Loosen the two screws at both ends of the fan tray unit.

2 Reach into the slot in the vent and pull the vent to unseat the tray.

3 Slide the tray out of the chassis.

Hot-Swappable Cards

Overview

Line and service cards are hot swappable, which means you can insert or remove them while the power is **ON** without disrupting system operation.

Important! This procedure does not apply to the power cards.

Hot Swapping Cards

Follow these instructions when you hot swap a card:

1. When replacing an existing card, press the **STOP** button on that card to disable the card's bus driver and prevent interference to other cards.

2. Unscrew the front panel from the chassis and remove the card.

3. Insert the new card into the slot and secure the front panel to the chassis. If you remove a card and do not replace it with another card, you must cover the slot with a Blockout card to ensure proper airflow and operator protection.

WARNING

If you remove a blockout panel or a card, it exposes you to live electrical components and possible injury.

CAUTION

*Always press the **STOP** button on the SS7 PQ, SS7 Series 3, or ISDN Series 3 line card in a redundant card pair configuration before removing or inserting the corresponding I/O card. For example, in a redundant SS7 PQ, SS7 Series 3, or ISDN Series 3 card pair configuration, be aware that the redundant line card may reset when removing or inserting the primary I/O card. If this occurs, the system will lose calls.*

Maintaining Spare Cards

Overview

Dialogic recommends maintaining an inventory of spare cards. Keep one spare for every five like units. Keep additional spares for the CSP Matrix Controller Series 3 and CSP Matrix Controller Series 3 I/O cards.

Refer to the *Hardware Product Descriptions (HPDs)* for card model numbers.

Replacing RAM Backup Battery

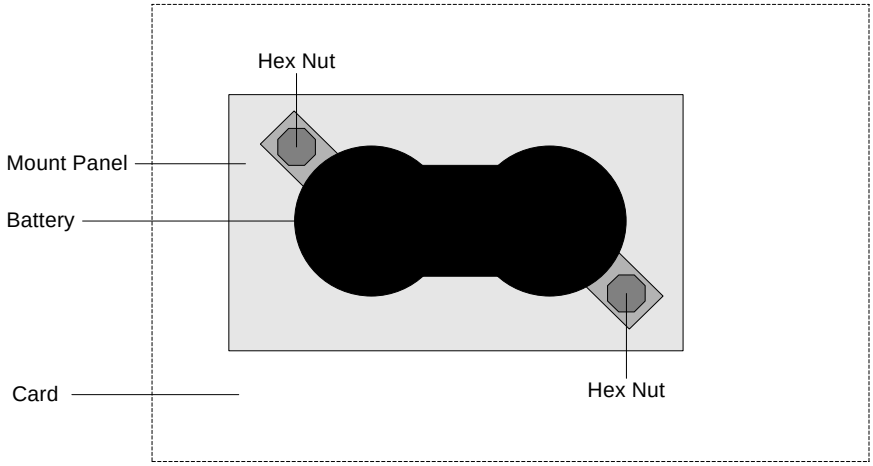
Overview

Some of the system cards have a Nickel Hydride battery for RAM Backup.The battery has a life-expectancy of approximately 5 years. A charged battery will have a voltage reading of 3.6 volts.

> **Important!** Line cards (E1, T1, J1) do not use this battery. The CSP Matrix Controller Series 3 card automatically downloads system software to line cards if their RAM is lost.

Below is a top view of the battery attached to a card.

Figure 6-7 Top View of a RAM Backup Battery Attached to a Card



Pre-installation Considerations

Please note the following considerations before beginning battery installation:

- A 3/16-inch hex socket wrench is required for installation.
- Leave the battery in its protective bag until you are ready to begin the installation procedure.
- The polarity of batteries varies among cards. Note the polarity of the battery that you are replacing and be sure to install the new battery with the same polarity.
- The battery is attached to the card by two hex nuts at opposite corners. Cards shipped before February 1, 1998 may have a Mount Panel between the battery and the card.

- Always use ESD protective straps, shoes, or mats when replacing battery modules.

CAUTION

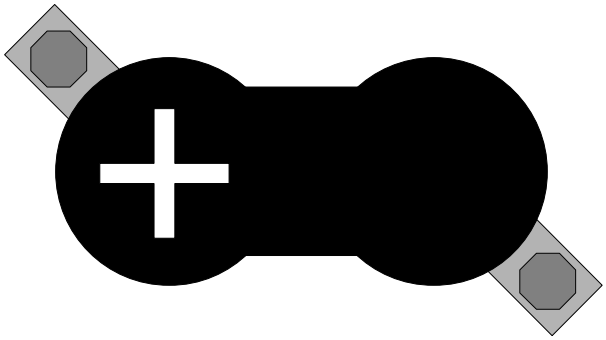
Electrostatic discharge from your body can damage integrated circuits.

Installation Procedure Follow these instructions to replace the battery:

1 Remove the card from the chassis.

2 Locate the battery installed on the card. Before removing the battery, note the polarity. The positive end of the battery is indicated by a + symbol, as shown in Figure 6-8.

Figure 6-8 Polarity Indication



Generic Card Graphics Battery Polarity 120898 (GEN-CRD-0000).vsd

3 Unscrew the two hex nuts holding the battery to the card and remove the battery. If the card has a Mount Panel between the battery and the card, the Mount Panel must remain installed on the card when you install the new battery. See Figure 6-7.

Important! The battery may contain hazardous materials. You must recycle or dispose of the battery according to applicable local regulations

4 Align the new battery on the card.

CAUTION

Make sure that the polarity of the new battery matches that of the removed battery or the battery will not charge properly and damage to the card may occur.

5 Secure the new battery to the card by replacing and securing the two hex nuts.

6 If the card has a Mount Panel, it must remain installed on the card when you install the new battery. If the card does not have a Mount Panel, attach the battery directly to the card.

7 Power-cycle the card.

- Re-install the card into the chassis.
- After a minimum of 10 seconds, remove the card.
- Re-install the card.

If a card is removed from the chassis for 12 hours or more, the battery will require 48 hours of continuous operation to be fully re-charged.

Troubleshooting

Overview

This chapter contains a troubleshooting table to help you diagnose and resolve hardware issues that could occur during CSP installation.

The table is organized into three sections:

- Power
- Cooling
- Card LED Indicators

The information in each section is organized as follows:

- Problem or Symptom
- Cause or Description
- Corrective Action

This section addresses only the most common issues. If you are unable to solve a problem, record all the information pertaining to your system configuration, including:

- A description of the symptoms and any corrective action already taken
- A map of the type and location of each card in the chassis (include revision levels)
- Whether you are using a single power source or redundant power sources
- The grounding method
- LAN topology
- The version of System Software used with the CSP
- A trace of messaging between the host and the CSP

After you record this information, please contact Dialogic Technical Support.

Power		
Problem or Symptom	**Cause or Description**	**Corrective Action**
The CSP does not power up.	The circuit breakers at the rear of the chassis are switched OFF.	Switch the circuit breakers ON.
	The ON/OFF switch on the Power Supply card is not ON.	Turn the ON/OFF switch on the Power Supply card ON.
	The power source is not plugged in or is not operating.	Check the power source for proper output. Replace it if necessary.
	The Power Supply card is not seated or inserted properly.	Remove the Power Supply card and re-insert it by making sure that it is properly aligned and seated in the bus.
	The pins on the midplane are bent.	Replace the chassis.
	The –48 V DC power source is not connected properly to the Power Input Panel at the rear of the chassis.	Review the section about powering the CSP in the *CSP Chassis Installation* chapter and make sure that the source is connected properly. If necessary, rewire the connections.
	A wire from the power source to the terminal block is faulty.	Test the wire and replace it, if necessary.
The CSP powers up, but some of the three LED indicators on the Power Supply card are flashing.	A fuse on the Power Supply card is blown.	Replace the Power Supply card.
	With a redundant system, the problem may be caused by any of the following: 1. A circuit breaker is not ON. 2. A wire from a power source to the terminal block is faulty. 3. A power source is defective.	1. Make sure that all the circuit breakers are on. 2. Make sure that the wires from the power sources to the terminal block are functioning. Replace any faulty wires. 3. Make sure that the power sources are functioning and replace a defective source.

Power		
Problem or Symptom	**Cause or Description**	**Corrective Action**
The CSP powers up, but all three LED indicators on the Power Supply card are flashing.	The wiring on the Power Input Panel at the rear of the chassis is incorrect.	Check the wiring on the Power Input Panel. Refer to the section about powering the CSP in the *CSP Chassis Installation* chapter.
	The power switch on the Power Supply card is defective.	Replace the Power Supply card.
The CSP powers up, but then shuts down.	A circuit breaker has been tripped.	Remove all cards except a Power Supply card from the chassis, reset the circuit breaker, and try to power up the CSP again. If the circuit breaker is tripped, check the wiring. Refer to the section about powering the CSP in the *CSP Chassis Installation* chapter. If the circuit breaker is not tripped, plug in the cards one at a time until you find the faulty card.
	The thermal switch has shut down the CSP because of overheating.	Make sure that you meet the requirements listed in *Pre-“Installation Considerations* in the appropriate chapter.
	The power source failed or does not provide the required level of voltage and current (–48 V DC/ 25 A).	Test the power source to make sure that it’s functioning at the required levels. If the power source is faulty, repair or replace it.

Cooling		
Problem or Symptom	**Cause or Description**	**Corrective Action**
The CSP powers up, but the fans do not.	The fan tray is not seated properly. you must supply sufficient force to seat the tray in the chassis.	Reseat the fan tray by using sufficient force.
	The fan tray is defective.	Replace the fan tray.

Card LED Indicators		
Problem or Symptom	**Cause or Description**	**Corrective Action**
When you power up the CSP, the LED indicators on the CSP Matrix Controller Series 3 card do not light up.	The CSP Matrix Controller Series 3 card is not seated properly.	Reset the card. If the LED indicators do not light up, reseat the card.
	The CSP Matrix Controller Series 3 card is defective.	Replace the CSP Matrix Controller Series 3 card.
When you power up the CSP, a card's Halt LED indicator is red.	The card could be defective if the Halt LED indicators on other cards are green.	Reseat and reset the card. If the Halt LED indicator is still red, call Dialogic Technical Support.
When you power up the CSP, a card's LED indicators do not light up.	The card is not seated properly.	Reseat the card.
	The card is in the wrong slot. For example, the CSP Matrix Controller Series 3 card is in a line card slot or a service card slot; or a line card or service card is in an CSP Matrix Controller Series 3 card slot.	Make sure that the card is in the right slot. Refer to the *Card Installation* chapter.
The card does not seat properly.	The card is not properly aligned.	Make sure that the card is properly aligned when you slide it into the chassis.
	The card is in the wrong slot. For example, the CSP Matrix Controller Series 3 card is in a line card slot or a service card slot; a line card or service card is in an CSP Matrix Controller Series 3 card slot.	Make sure that the card is in the right slot. Refer to the *Card Installation* chapter.
	The pins on the midplane are bent.	Turn OFF the power to the CSP and try to straighten the bent pins. If you cannot straighten the pins, replace the chassis.

Card LED Indicators		
Problem or Symptom	**Cause or Description**	**Corrective Action**
The clock source LED indicators on the CSP Matrix Controller Series 3 Card are blinking green indicating there is no clock source.	For External Clock Source The Reference Clock port on the CSP Matrix Controller I/O Series 3 card is not connected to an external reference clock.	Refer to the CSP Matrix Controller I/O Series 3 card, reference clock information in the Hardware Product Description (HPD) guide.
	For Loop Timing The 25-pair connectors on the E-ONE/T-ONE card are not connected, so that E-ONE/T-ONE span loop timing is not provided. The E-ONE/T-ONE card is not configured for loop timing.	Refer to the E-ONE/T-ONE card, 25-pair connector information in the Hardware Product Description (HPD) guide. Refer to the *Developer's Guide: Overview* to configure loop timing.
The Signal Detect LED indicator on the EXNET-ONE card stays red for longer than 10 seconds after you power up the CSP.	The fiber optic cable is not installed.	Install the fiber optic cable.
	The fiber optic cable is not seated properly.	Firmly press the fiber optic cable connector into the socket on the EXNET-ONE card.
	The fiber optic cable is damaged.	Replace the fiber optic cable.
	No corresponding EXNET-ONE card is installed.	Install the EXNET-ONE card.

A Industry Compliance

Purpose This appendix provides industry compliance information which includes all relevant regulations from the following standards organizations and governing bodies.

US Compliance Summary

Overview

This section identifies the United States compliance on the CSP 2090, CSP 2110 and CSP 2040 chassis with all line cards and I/Os.

Emissions

FCC Part 15, Class A

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

Emissions test were performed with shielded I/O cables.

Safety

CSA 60950-1-3, CB Scheme IEC 60950-1

This equipment has been tested for applications where the Dialogic product is behind the CSU.

Telecommunications

FCC Part 68

The T-ONE and ISDN PRI interfaces comply with FCC rules, Part 68. Refer to *FCC Regulatory Compliance Notices.*

FCC Regulatory Compliance Notices

Overview

This section identifies the United States Federal Communications Commission compliance notices.

Federal Communications Commission Part 68 Requirements

This equipment complies with FCC rules, Part 68. On the back of this equipment is a label that contains, among other things, the FCC Registration Number. When you are ready to install this unit, contact your local telephone company and supply them with the following information:

Standard Jack(s) for connection to the network: RJ-21X

Service Order Code(s): 6.OF

Facility Interface Code(s) (FIC): 04DU9-BN, DN, 1KN, 1SN

FCC ID#: 1RHUSA-73272-PF-N

Should this equipment cause harm to the telephone network, the telephone company shall, where practicable, notify the customer that temporary discontinuance of service may be required; however, where prior or written notice is not practicable, the telephone company may discontinue service forthwith, if such action is reasonable in the circumstances. You will be informed of your right to file a complaint with the FCC.

The telephone company may make changes in its communications facilities, equipment, operation procedures, where such action is reasonable, required in the operation of its business, and is not inconsistent with the rules and regulations of the Federal Communications Commission. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

Do not attempt to repair or modify this equipment. If defective, return it to the person from whom it was purchased who will in turn arrange to return it or to have it repaired by the manufacturer of his authorized agent. The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning. If trouble is experienced, disconnect this equipment from the telephone line to

determine if it is causing the malfunction. If equipment is determined to be malfunctioning, its use shall be discontinued until the problem has been corrected.

Affidavit Requirements for Connection to Digital Services

- An affidavit is required to be given the telephone company whenever digital terminal equipment without encoded analog content and billing protection is used to transmit digital signals containing encoded analog content which are intended for eventual conversion into voice band analog signals and retransmitted on the network.
- The affidavit shall affirm that either no encoded analog content or billing information is being transmitted or that the output of the device meets Part 68 encoded analog content or billing protection specifications.
- End user/customer will be responsible to file an affidavit with the CPE to a 1.544 Mbps or subrate digital services.
- Until such time as subrate digital terminal equipment is registered for voice applications, the affidavit requirement for subrate services is waived.

Affidavit for Connection of Customer Premises Equipment to 1.544 MBPS and/or Subrate Digital Services

For the work to be performed in the certified territory of

_____ (Telco Name)

State of _____

County of _____

I, _____ (name)

_____ (business address)

_____ (telephone number) being duly sworn, state:

I have responsibility for the operation and maintenance of the terminal equipment to be connected to 1.544 Mbps and/or _____ subrate digital services. The terminal equipment to be connected complies with Part 68 of the FCC rules except for the encoded analog content and billing protection specifications. With respect to encoded analog content and billing protection:

( ) I attest that all operations associated with the establishment, maintenance, and adjustment of the digital CPE with respect to analog content and encoded billing protection information continuously complies with Part 68 of the FCC Rules and Regulations.

( ) The digital CPE does not transmit digital signals containing encoded analog content or billing information which is intended to be decoded within the telecommunications network.

( ) The encoded analog content and billing protection is factory set and is not under the control of the customer.

I attest that the operator(s)/maintainer(s) of the digital CPE responsible for the establishment, maintenance, and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully having completed one of the following: (Check appropriate blocks)

( ) A. A training course provided by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) B. A training course provided by the customer or authorized representative, using training materials and instructions provided by the manufacturer/grantee of the equipment used to encode analog singles; or

( ) C. An independent training course (e.g., trade school or technical institution) recognized by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) D. In lieu of the preceding training requirements, the operator(s)/ maintainer(s) is (are) under the control of a supervisor trained in accordance with _____ (circle one) above.

I agree to provide _____ (Telco's name) with proper documentation to demonstrate compliance with the information as provided in the preceding paragraph, is so requested.

_____ Signature

_____ Title

_____ Date

Subscribed and sworn to before me

This day of _____, 19___

_____

Notary Public

My commission expires: _____

Canadian Compliance Summary

Overview This section identifies the Canadian compliance on the CSP 2090, CSP 2110 and CSP 2040 chassis with all line cards and I/Os.

Emissions ICES-003

Emissions tests were performed with shielded I/O cables.

Safety CSA 60950-1-3

This equipment has been tested for applications where the Dialogic product is behind the CSU.

Telecommunications IC CS03

The T-ONE and ISDN PRI interfaces comply with FCC rules, Part 68. Refer to *IC Regulatory Compliance Notices.*

IC Regulatory Compliance Notices

CDC Class A

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la Class A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le Ministere des Communications du Canada.

Notice: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop, which is used by the device to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100.

NEBS Compliance

Overview

Network Equipment Building System (NEBS), Level 3

The CSP 2090, CSP 2110 and CSP 2040 chassis with line cards and I/Os have been tested and found to comply with all applicable NEBS criteria listed in GR-1089-CORE and GR-63-CORE. Refer to Dialogic personnel for exact board listings. These criteria include the following:

- System-level electrostatic discharge (ESD)
- Electromagnetic interference (EMI)
- Radiated emissions
- Conducted emissions
- Radiated immunity
- Conducted immunity
- Intrabuilding lighting
- Electrical safety
- Bonding and grounding
- Thermal
- Fire resistance
- Earthquake and office vibration (ZONE 4)
- Transportation and handling
- Airborne Contaminants
- Short Circuit Test

European Compliance Summary

CE Mark Certification

Refer to European Declarations of Conformity for the specific chassis and cards that have passed the CE Mark Certification process.

R & TTE Directive

Emissions

- EN55022:1998/A1:2000/A2:2003
- EN55024:1998/A1:2001/A2:2003
- EN 300386:2001 Rev 1.3.3
- Emissions tests were performed with shielded I/O cables.

Safety

- EN60950-1, CB Scheme IEC 60950-1
- This equipment has been tested for applications where the Dialogic product is behind the CSU.

Telecommunications

CTR 12 Compliant, TBR12, TBR13

- E-ONE 120 Ohm LC, E-ONE 120 Ohm I/O, E-ONE 120 Ohm Redundant I/O, E-ONE 120 Ohm Standby I/O

CTR 4 Compliant, TBR4

- ISDN PRI package includes the E-ONE 120 Ohm interfaces.

NTR 11 Compliant

- DPNSS/DASS2 package includes the E-ONE 75 Ohm interfaces.

NTR 4 Compliant

- E-ONE 75 Ohm LC, E-ONE 75 Ohm I/O, E-ONE 75 Ohm Redundant I/O, E-ONE 75 Ohm Standby I/O

Switzerland Compliance

Overview

The Swiss body, Bundesamt für Kommunikation (BAKOM) now accepts products which comply with the R & TTE Directive and all applicable directives. The following are applicable interfaces: CSP 2090, CSP 2110, and CSP 2040 chassis.

- ISDN PRI
- E-ONE 120 Ohm

Japanese Compliance

Overview The Japan Approvals Institute for Telecommunications Equipment (JATE) has certified the CSP 2090, CSP 2110, and CSP 2040 chassis with the following cards for connection to the network:

- ISDN PRI
- T-ONE LC, T-ONE I/O, T-ONE Redundant I/O, T-ONE Standby I/O

Important! Only the cards above are approved to connect to the Japan Telecommunications Network.

Australian Compliance

Overview The Australian Communication Authority has certified the CSP 2090, CSP 2110, and CSP 2040 chassis with the following cards for connection to the network:

- ISDN PRI package includes the E-ONE 120 Ohm interfaces.

WARNING

Components must be installed by service personnel as defined by AS/NZS 3260 Clause 1.2.14.3 Service Personnel. Incorrect connection of connected equipment to the General Purpose Outlet could have hazardous results.

Hong Kong Compliance

Overview

The Office of the Telecommunications Authority, OFTA, has certified the CSP 2090, CSP 2110 and CSP 2040 chassis.

The telecommunications standard HKTA 2015 (August issue, August 1, 1996) has been met using the ISDN PRI 32 line card.

The customer software application that can effect the length of information elements, at Layer 3, must be set to a length in octets in order to comply with HKTA 2015 approval.

Taiwan Compliance

Overview The Directorate General of Telecommunications. DGT, has certified the ISDN PRI 32 line card in the CSP 2090, CSP 2110, and CSP 2040 chassis.

Mexican Compliance

Normalizacion y Certificacion Electronica, NYCE, has safety certified the CSP 2090, CSP 2110, and CSP 2040 chassis.

Comision Federal de Telecomunicaciones, COFETEL, has telecommunication certified the CSP 2090, CSP 2110, and CSP 2040 chassis.

- ISDN PRI
- E-ONE 120 Ohm
- E-ONE 75 Ohm

European Declarations of Conformity

Overview In this section, you can find the European Declarations of Conformity. Refer to the Dialogic salesperson for the latest copies.

CE Declarations These are the Declarations of Conformity for CE.

Dialogic

Declaration of Conformity

No: D0080
Revision 01

The equipment described below is declared to be in conformity with the following applicable national and international standards. The conformity is valid ONLY when the equipment is used in a manner consistent with the manufacturer's recommendations and the reference documents.

Models: 2040, 2090 AND 2110*, (CSP Nomenclature) *Not Sold in Europe.

Associated Boards used in the Models above except where noted:
PSC 60 (Model 2040 Only), PSC 160 (Models 2090, 2110 Only), Exnet One I/O, Exnet Connect cPCI/H.110/ISA/MVIP, Exnet Controller, Exnet I/O, Ex Cpu 1000/2000, Ex Cpu I/O, Call Ctl. Series 3, Call Ctl. Series 3 I/O, MFDSP, SCS Cpu, SCS Cpu I/O, ISDN Pri 32, ISDN BRI, ISDN PRI Redundant I/O, ISDN Series 3, CCS Series 3 I/O, T-One (2-16 Spans), T-One I/O, T-One Redundant I/O, T-One Standby I/O, J-One (2-16 Spans), J-One Redundant I/O, J-One Standby I/O, DSP One, Vdac, Vdac I/O (2, 8 and 10 Ports), E-One (2-16 Spans), E-One 120 ohm I/O, E-One 120 ohm Redundant I/O, E-One 120 ohm Standby I/O, E-One 75 ohm I/O, E-One 75 ohm Redundant I/O, E-One 75 ohm Standby I/O, EXS Vdac Series 2, DSP Series 2, EXS Vdac Series 2 I/O, Media I/O, SS7, SS7 Redundant I/O, EXS SS7, Sip Device Server Series 2, SS7 HP I/O, SS7 PQ, CCS I/O, LSS I/O, SS7 MP I/O, SS7 Series 3, EXS SS7 I/O, SDS SS7 Series 2/3, EXS IP Call Server, EXS Series 3, EXS SS7 I/O, DS3, DS3 I/O, DS3 Redundant I/O, DS3 Standby I/O, DPNSS/DASS 2, Subrate Ctl., Media I/O Plus, IPN 3, Series 4 DSP 2 Plus, AIC (T1 and E1, NO Network Connections / ITE Product)

Document No / Edition /Date	Title
IEC 60950-1:2001, 1st Edition	Safety of Information Technology Equipment CB Certificate CA6079
CSA60950-1-03, UL 60950-1, 1st Edition (2003)	Safety of Information Technology Equipment
EN 60950-1: 2001, 1st Edition	Safety of Information Technology Equipment
AS/NZS 60950.1:2003	Safety of Information Technology Equipment
FCC, 47 CFR Part 15, Class A digital device	Radio Frequency Devices - Subpart B - Unintentional Radiators
ICES-003 Issue 4 - Feb 2004, Class A	Interference-Causing Equipment Standards - Digital Apparatus
EN 300386:2001 V1.3.3	Telecommunication Network Equipment; EMC
EN 55022:1998/A1:2000/A2:2003, Class A Limit	Information Technology Equipment - Radio Disturbance Characteristics
EN 55024: 1998/A1:2001/A2:2003	Information Technology Equipment - Immunity Characteristics
CISPR 22 Class A Limit	Information Technology Equipment - Radio Disturbance Characteristics
FCC Part 68, TIA-968-A	Technical Requirements for Connection of Terminal Equipment to the Telephone Network
CS-03 Issue 8	Specification for Terminal Equipment, Terminal Systems, Network Protection Devices, Connection Arrangements
TBR 4: 1995/A1:1997	Attachment requirements for terminal equipment to connect to an ISDN using ISDN primary rate access
TBR 12: 1993/A1:1996	2048 kbit/s Digital Unstructured Leased Lines
TBR 13: 1996	2048 kbit/s Digital Structured Leased Lines
NTR 4: PD7024	Essential requirements for terminal equipment intended for connection to unstructured digital leased circuits (75ohms)
AS/ACIF S038:2001	Requirements for ISDN Primary Rate Access Interface

Additional information:	
Australia test reports	Curtis-Straus Report # SFU048-1, dated Feb. 1, 2005 for AS/NZS 60950.1:2003
	Curtis-Straus Report # TBU471-2, dated Dec. 7, 2001 for S038:2001
	Curtis-Straus Report # EH1029-1, dated Aug. 28, 2007 for AS/NZS CISPR 22:2002 Class A

Regions:

European Economic Area (EEA): Dialogic Corporation (address below) declares the equipment in compliance with the essential requirements of EC Council Directives : 1999/5/EC - R&TTE : 2006/95/EC - Safety/LVD : 2004/108/EC – EMC
USA: Dialogic Corporation (address below) make this SDoC as Responsible Party for equipment registered with ACTA as number : US: 1RHUSA73272-PF-N
Canada : Dialogic Corporation (address below) is the Declaring Party for equipment registered with Industry Canada as number : IC: 8856 E2000
Australia: Supplier Code N964 [Dialogic Pty Ltd. Level 12, 1 Pacific Highway North Sydney NSW 2060] ACN: 064 824 899
Any other region where the Regulatory Requirements are satisfied by compliance to the standards declared above.

This Declaration of Conformity is issued by **Dialogic Corporation**, which is solely responsible for the declared compliance.

Company Address:	**Authorized signature, name and function:**
Dialogic Corporation 9800 Cavendish 5th floor Montreal, Quebec Canada, H4M 2V9	Gaetan Hogue - Approvals Manager Date: 1, February, 2008

Dialogic Distribution Limited, our location in Europe operates from:
Unit 4034 Kingswood Avenue Citywest Business Campus, Saggart, Co. Dublin, Ireland.

Copies of this Declaration of Conformity may be downloaded at http://www.dialogic.com/declarations

RoHS Declaration of Compliance

European Union

Below is the European Union (EU) Restriction of the Use of Certain Hazardous Substances (RoHS) Declaration of Conformity. Refer to the Dialogic salesperson for the latest copies.

cantata TECHNOLOGY

RoHS DECLARATION OF COMPLIANCE

European Union Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, Directive 2002/95/EC (RoHS)
in accordance with ISO/IEC 17050-1:2004

Cantata Technology certifies that our electrical and electronics products to be placed on the market for use in the European Union on or after July 1, 2006 have been designed and sourced to comply with the requirements of the **RoHS Directive 2002/95/EC** issued January 27, 2003. The following table lists the restricted materials and their respective allowable limits:

RoHS Restricted Substance	Allowable Limit
Cadmium and its compounds	100 ppm (0.01 weight %)
Mercury and its compounds	1000 ppm (0.1 weight %)
Hexavalent chromium and its compounds	1000 ppm (0.1 weight %)
Lead and its compounds *	1000 ppm (0.1 weight %)
Polybrominated biphenyls (PBB)	1000 ppm (0.1 weight %)
Polybrominated diphenyl ethers (PBDE)	1000 ppm (0.1 weight %)

Cantata has worked closely with our supply chain to review and assure that all components, assemblies, and materials used in our products are RoHS compliant as outlined above.

The product families Cantata has engineered to meet the RoHS Directive are:

TR1034 family	CSP family **
Trufax family	MSP family
TR1000 family	IMG family
Media Server family	

* The Cantata product families listed below continue to contain lead and its compounds per Annex Article 7 of the RoHS Directive. These products are intended for use only in the defined applications listed in the directive (as servers or as network infrastructure equipment for switching, signaling, transmission as well as network management for telecommunication):

CSP family	IMG family
MSP family	Media Server family

For clarity with our customers, RoHS compliant products have been assigned new part and model numbers to avoid any confusion with the non-RoHS versions. If you require RoHS compliant products, please contact your Cantata Account Manager as you place orders for delivery after July 1, 2006 for the appropriate part or model number to order.

** Excluding CSP 2110

Cantata Technology, Inc. 410 First Avenue, Needham, MA 02494 Phone: 781.449.4100 Fax: 781.449.9009 www.cantata.com

China

This section provides the China Restriction of the Use of Certain Hazardous Substances (RoHS) Declaration of Conformity and the Restriction of Hazardous Substance Table. Refer to the Dialogic salesperson for the latest copies.

Dialogic

对中国电子信息产品污染控制管理办法的认证

Compliance to China ROHS Requirements

以下是坎塔塔公司科技公司对于中国电子信息产品污染控制管理标准认证的声明：

This Dialogic 公司 statement addresses the position and compliance to the China ROHS standards below:

1. 中国电子信息产品中有毒有害物质的限量要求 – 标准#SJ/T 11363-2006.
   China ROHS Limits – Standard # SJ/T 11363-2006.

   所有列入电子信息产品污染重点管理目录中的产品都记录在所有产品用户手册中。
   All product HST (Hazardous Substance Tables) are documented within the users manual for all products.

2. 中国电子信息产品污染控制标识要求– 标准#SJ/T 11364-2006.
   China ROHS Markings – Standard # SJ/T 11364-2006.

所有被要求标明环保使用期限的产品将会贴上'环保使用期限"标签。这表明此产品环境质量安全的期限自出厂日期始最少为 25 年。

All applicable products will have applied to them the "Safe Use Period" label. This demonstrates that the product is safe from potential hazards for a minimum of 25 years from the date of manufacture.

3. 中国电子信息产品包装回收标识 -标准#GB 18455-2001.
   China ROHS Packaging Recycling Marks – Standard # GB 18455-2001.

   所有坎塔塔科技公司的产品包装将会有#GB 18455-2001 标准所要求的标志。
   All Dialogic 公司 packaging will have the appropriate marking per standard GB 18455-2001 above.

China - Restriction of Hazardous Substance Table

Dialogic

电子信息产品污染控制表格

Restriction of Hazardous Substance Table (HST)

型号 2040, 2090, 2110 Model 2040, 2090, 2110		O = 在 RoHS 限制之内 O = Within ROHS concentration limits for this substance				
		X = 不在 RoHS 限制之内 X = Exceeds ROHS concentration limits for this substance				
产品	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
Part	Lead	Mercury	Cadmium	Chromium	PolyBrom	PolyBrom
	(Pb)	(Hg)	(Cd)	(Cr)	(PBB)	(PBDE)
所有（金属） All (Metals)	O	O	O	O	O	O
电路板 Circuit Boards	X	O	O	O	O	O
聚合物件 Polymer Parts	O	O	O	O	O	O
电线和电缆 Wiring and Cables	O	O	O	O	O	O
其他部分 Components	X	O	X	O	O	O