Communication Server 2100

Geographic Survivability Planning Guide

555-4031-901

Document status: Standard
Document version: 04.02
Document date: 20 October 2006

The information in this document is sourced in Canada, the United States of America, and the United Kingdom.

Contents

New in this release

The following sections detail what's new in the *Communication Server 2100 Geographic Survivability Planning Guide* (555-4031-901) for release 9.0 (SE09).

Features

See the following section for information about feature changes:

- "GbE interface for Compact Call Agent interconnect" (page 5)

GbE interface for Compact Call Agent interconnect

This release introduces the Gigabit Ethernet (GbE) interface for data synchronization or sparing for MCPN905-based Compact Call Agent (CCA) cards. This CCA interconnect feature affects the following sections:

- "GbE interface for Compact Call Agent interconnect" (page 17)
- "Operating parameters" (page 20)

About this document

Purpose and audience

This document describes how the Nortel Communication Server 2100 (CS 2100) can be distributed in buildings at separate locations. Geographic survivability ensures that call processing continues in the event that a disaster impacts one of the buildings. This document's audience is service provisioning, administrative and network management personnel.

How to check the version and issue of this document

The version and issue of the document are indicated by numbers (for example, 01.01).

The first two digits indicate the version. The version number increases each time the document is updated to support a new software release. For example, the first release of a document is 01.01. In the next software release cycle, the first release of the same document is 02.01.

The second two digits indicate the issue. The issue number increases each time the document is revised but re-released in the same software release cycle. For example, the second release of a document in the same software release cycle is 01.02.

ATTENTION

FOR MORE INFORMATION

To determine whether you have the latest version of this document and how documentation for your product is organized, check the release information in the *Communication Server 2100 Master Index of Publications* (555-4031-001).

References in this document

This guide references the following documents for additional information:

- *Communication Server 2100 Application Planning Guide* (555-4001-108)
- *Communication Server 2100 Product Guide* (555-4031-806)
- *Packet Trunk-IP Engineering Guidelines System Engineering Bulletin*, SEB-02-10-001

Solution overview

Description

The Geographic Survivability for Communication Server 2100 solution provides geographic survivability by distributing the redundancy of the Nortel Communication Server 2100 (CS 2100) architecture in different physical locations. This redundant configuration ensures continued operation in the event that the building in which the Communication Server 2100 resides is damaged. To achieve full geographic survivability, the configuration uses Storage Area Network (SAN) communication architecture used within the Communication Server 2100 and uses transport equipment to provide location redundancy on top of traditional redundancy (for example, power and shelf) built into the architecture.

Customers can install each Communication Server in buildings up to 120 kilometers (74.5 miles) apart. In the event of a disaster destroying one of the sites, the second Communication Server takes over call processing to ensure full service and operations. In each location, the maximum distance between the Call Agent and the first optical element is 300 meters (984 feet). That is, between the fiber channel interface on the faceplate of the Call Agent card and the GbE/FC Subrate Multiplexer (GFSRM) circuit pack.

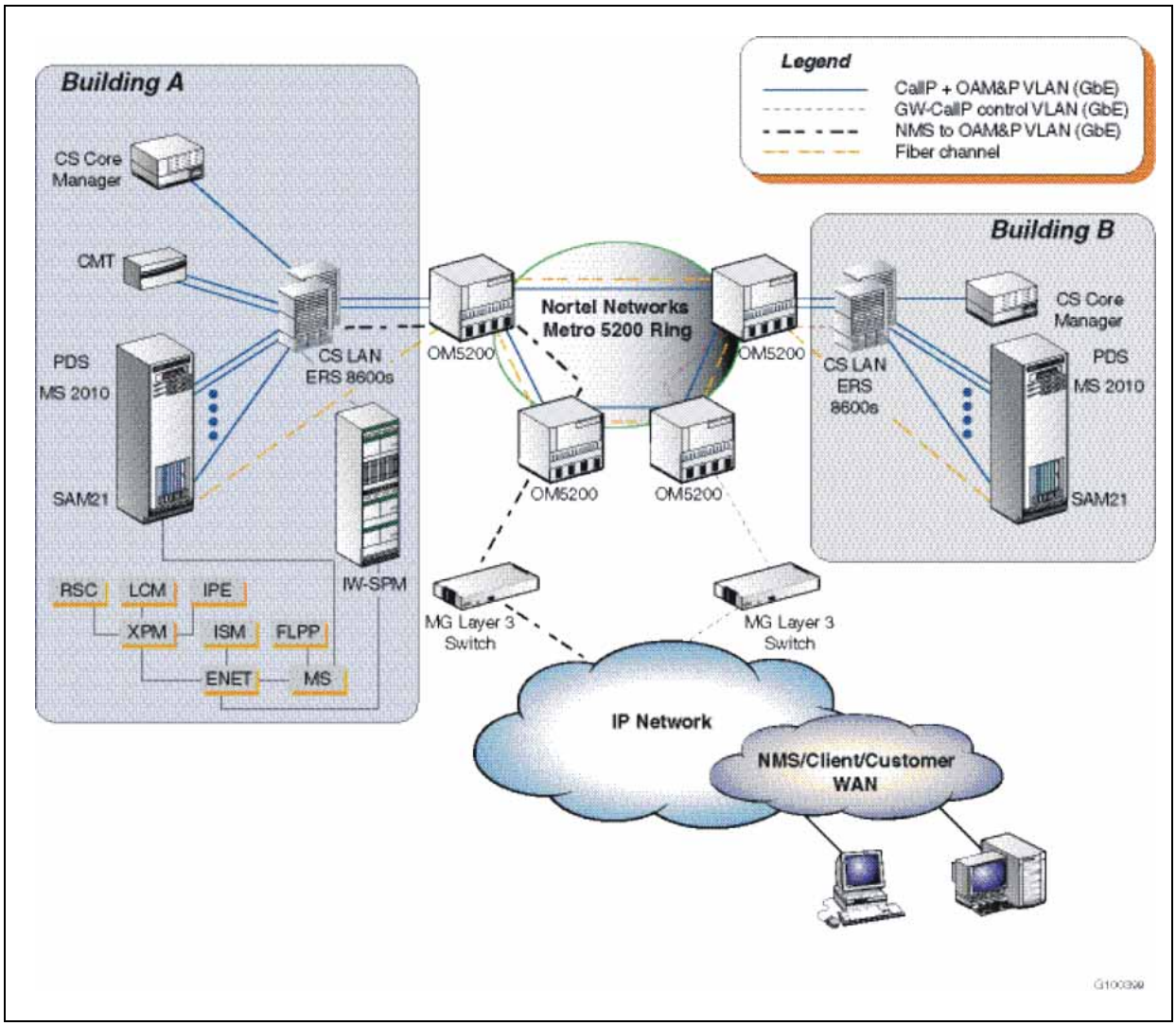
> ***Note 1:*** This functionality does not apply to XA-Core based Communication Server 2100 systems.
>
> ***Note 2:*** With the optional Gigabit Ethernet (GbE) interface for the Compact Call Agent (CCA) interconnect between MCPN905-based cards, the maximum distance between the Call Agent and the Ethernet Routing Switch 8600 (ERS 8600) is 100 meters (328 feet); the total maximum separation between Communication Servers remains 120 kilometers (74.5 miles).

This configuration uses a Dense Wave Division Multiplexing (DWDM) ring to connect the distributed locations (SONET is also supported for Greenfield systems only - it does not apply to hybrid configurations). With the two halves of the Communication Server separated, one in Building A and the second in Building B, when a disaster impacts either building, a Unidirectional Path-Switched Ring (UPSR) maintains service from the

gateways on the edges of the ring. The Communication Server performs a warm Switch Activity (SWACT) if necessary between the two geographically dispersed halves maintaining full operation in a non-redundant mode. This is the only impact that this feature has on the Communication Server halves.

To provide additional protection from service degradation during a disaster, the Gateway Controllers and element management systems are separated geographically. "Geographic survivability network configuration" (page 10) shows an example of the geographic survivability configuration of the CS 2100.

Geographic survivability network configuration



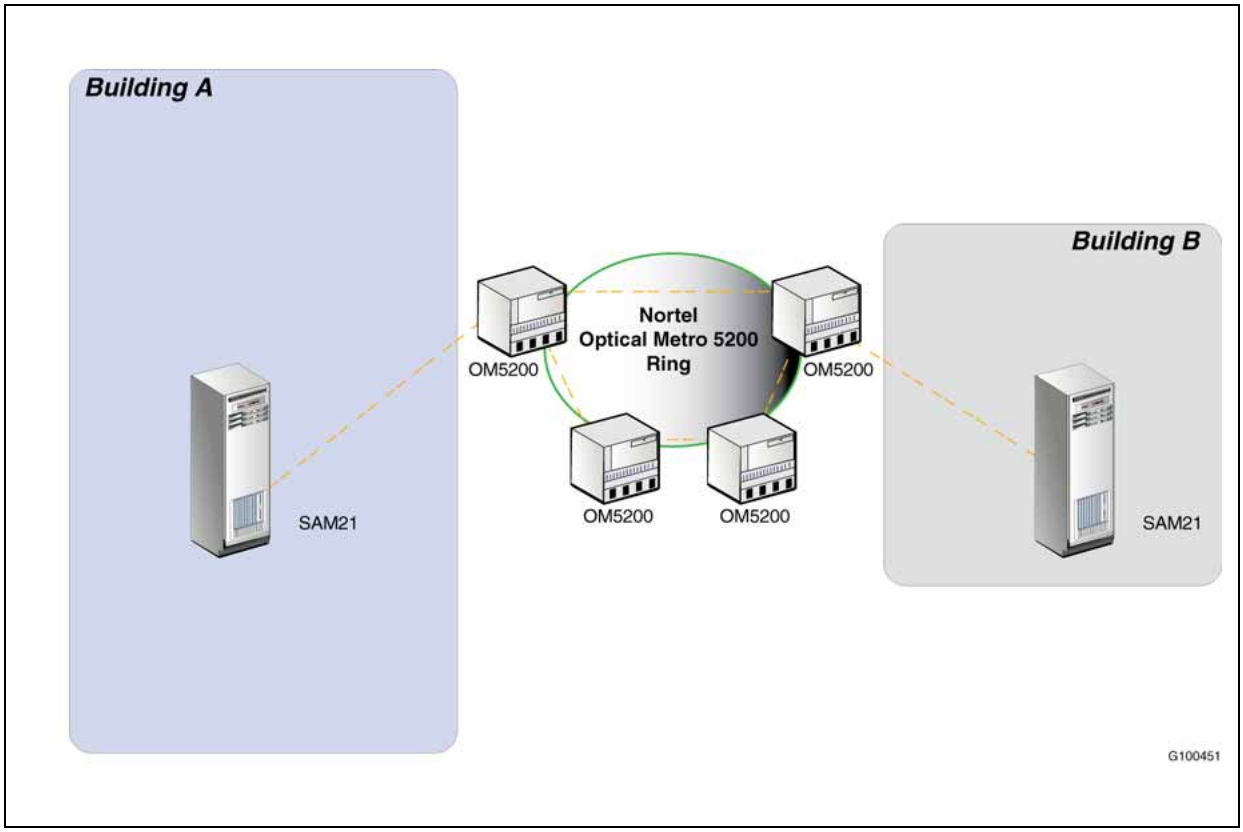
Note 1: The IP Client Manager (IPCM) can be geographically split in the SAM21.

Note 2: The Media Server 2010 (MS 2010) can be geographically split in the SAM21.

Note 3: For simplicity purposes, "Geographic survivability network configuration" (page 10) does not show all the network element and data equipment. Nortel recommends that a stateful firewall (such as the Nortel Switched Firewall) and Nortel VPN Router/GSISG boxes be used to provide enhanced security.

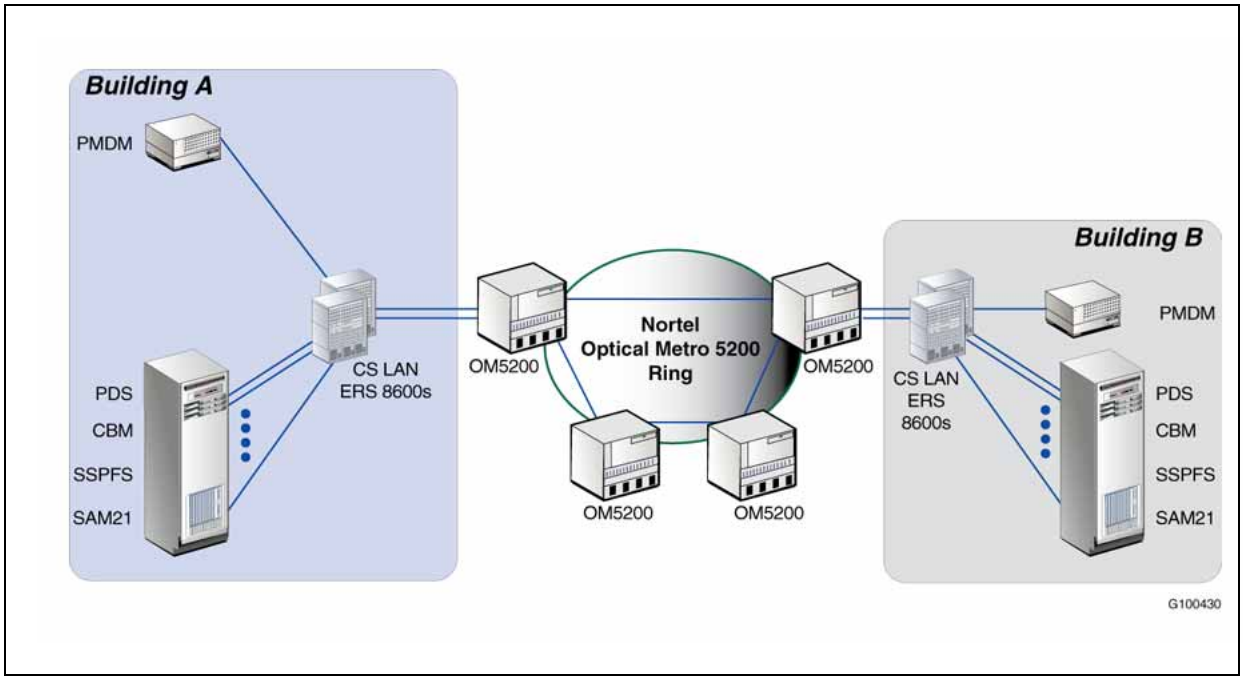
"Fiber channel connectivity" (page 11) through "OSS to OAMP VLAN connectivity" (page 14) break out the connections shown in "Geographic survivability network configuration" (page 10) to provide greater clarity.

Fiber channel connectivity

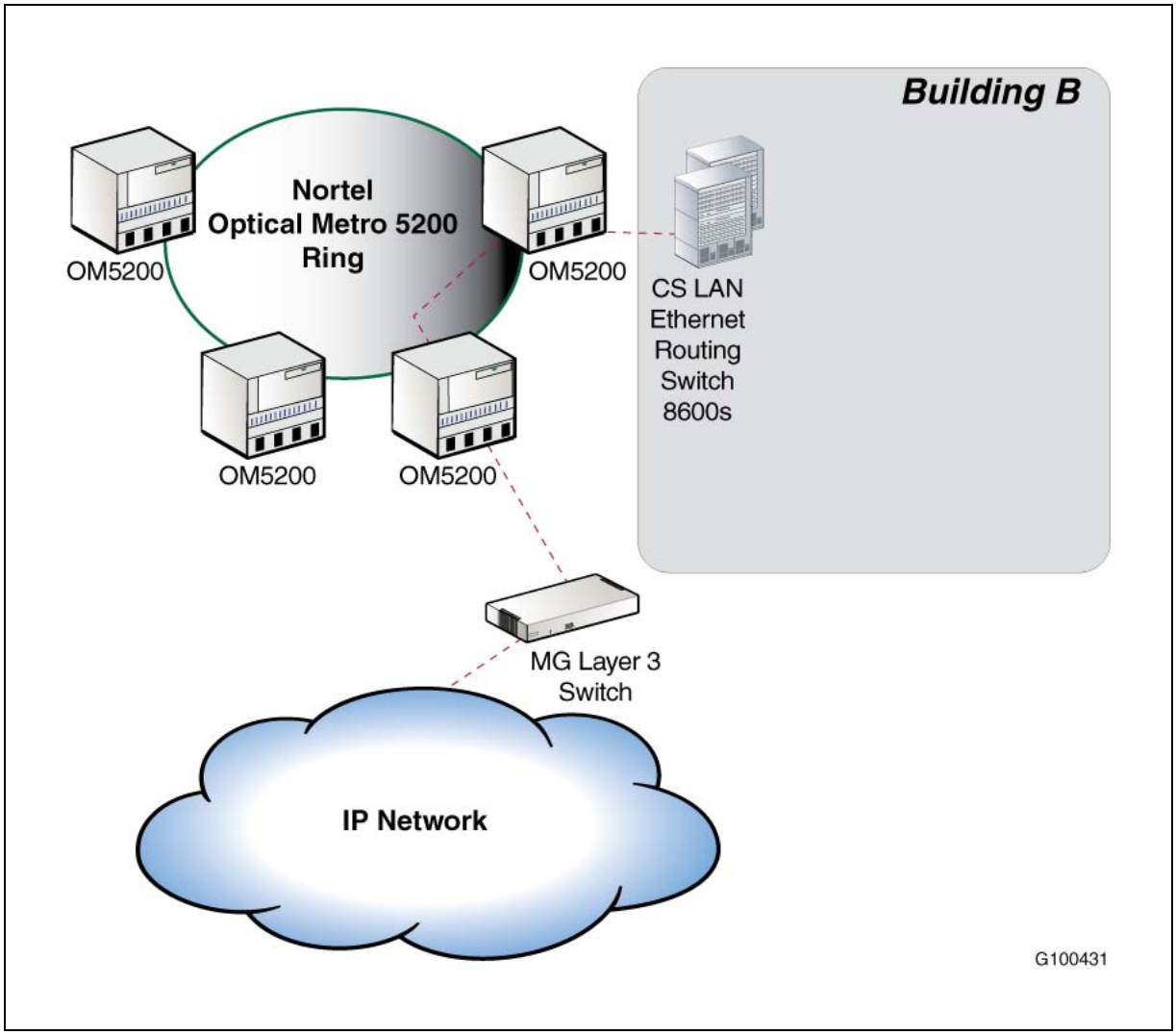


Note: From Release SE09 onward, the CS 2100 solution supports Gigabit Ethernet (GbE) links for data synchronization (sparing) for MCPN905-based Compact Call Agent (CCA) cards. For more information, see "GbE interface for sparing for Compact Call Agents" (page 17).

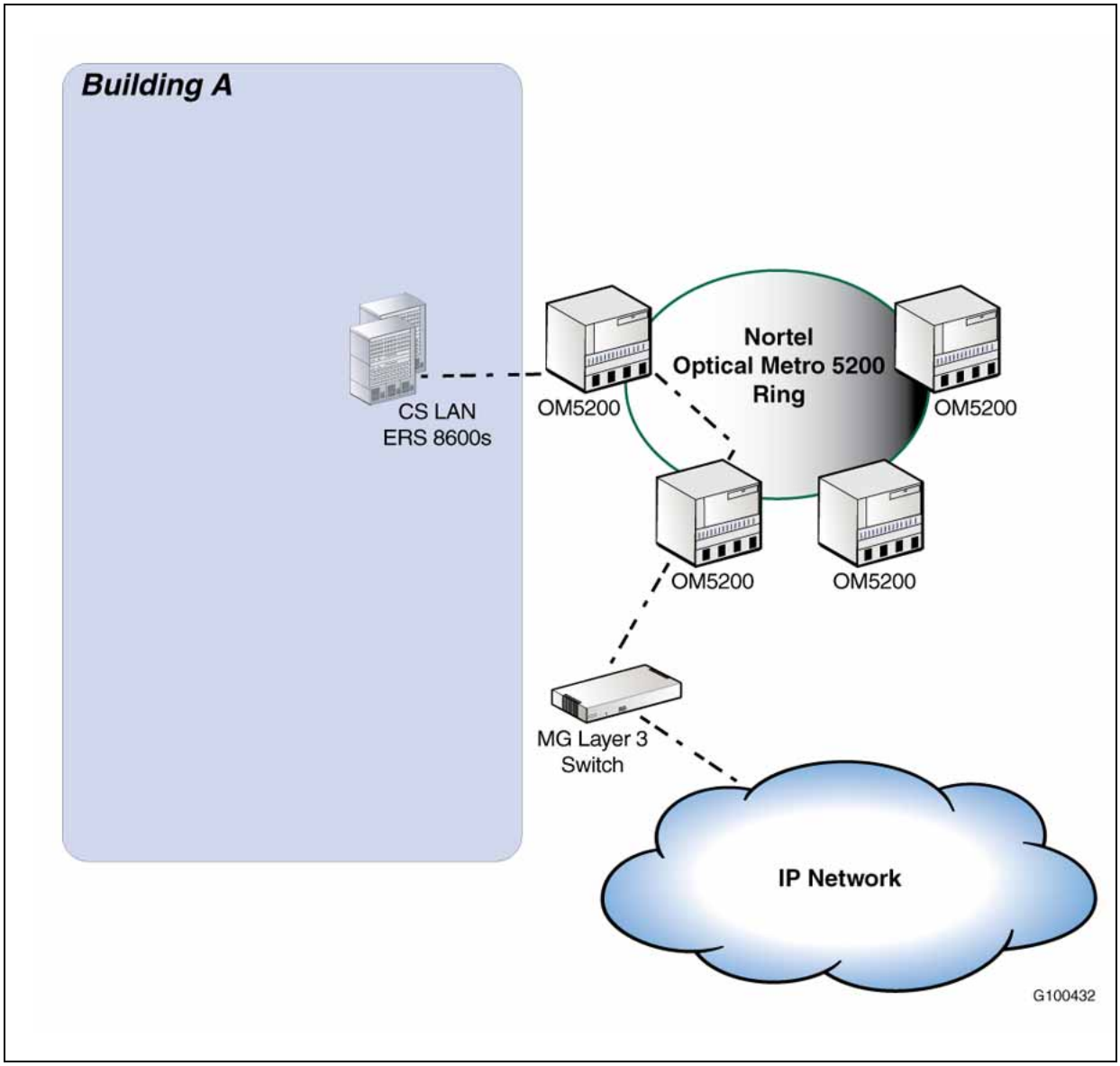
Call processing and OAMP VLAN connectivity



Gateway to call processing control VLAN connectivity



OSS to OAMP VLAN connectivity



LAN architecture

The LAN architecture does not differ significantly from the base CS 2100 platform; however, additional considerations are implemented to reduce the risk of a gateway having visibility to both halves of the Communication Server, while the two halves cannot see each other. If this occurs, the Communication Server is operating in what is termed as a “split brain” scenario. To prevent this from happening, the gateways cannot reside on the same LAN as the Communication Server. As shown in the previous figures, the gateways must reside outside of the Communication Server LAN. If a gateway can see two active call servers, the gateway will not come into service.

Gateway support

The geographic survivability configuration supports the same gateways as a non-distributed CS 2100. Supported gateways include the following:

Trunk gateways

- Nortel Media Gateway 15000
- Nortel Media Gateway 3000 Series

Line gateways

- Communication Server 2100 IP Client Manager
- Mediatrix 1124 and 1104 Analog Station Gateway

Multiservice gateways

- Nortel Media Gateway 9000

Transport requirements

This section describes the transport requirements for the CS 2100 geographic survivability configuration (see "Geographic survivability transport requirements" (page 16)).

The Communication Sever and call control network have the following characteristics:

- The configuration supports two GbE, and one fiber channel, point-to-point connections between Communication Servers (that is, on the Communication Server LAN).

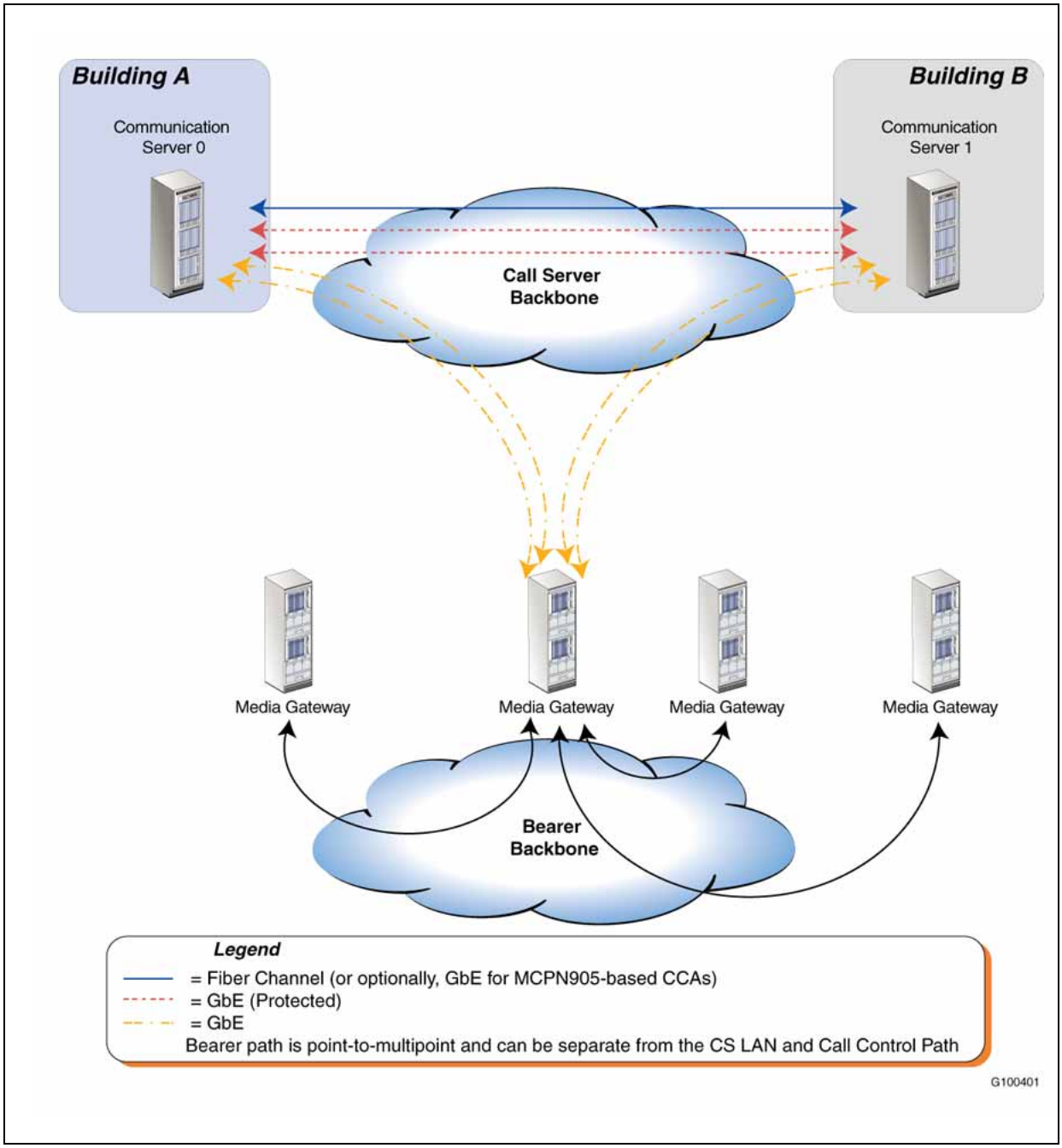
  Note: For MCPN905-based CCAs, the sparing link can be either a Fiber Channel connection or a GbE connection.

- The call control path between the gateway and the Communication Server is point-to-two-points.
- The call control path is over the Communication Server LAN.
- A Gateway cannot communicate with both Communication Servers if both Communication Servers cannot communicate with one another.

The bearer path network has the following characteristic:

- The bearer path is point-to-multipoint and can be separate from the Communication Server LAN and call control path.

Geographic survivability transport requirements



TDM support

A geographically survivable CS 2100 supports Time Division Multiplexing (TDM) interfaces only in non-survivable mode. If a disaster occurs that takes down the building housing the TDM portion of the system, TDM service is lost until that Communication Server half recovers. Therefore, the TDM portion of the switch is not geographically survivable.

Components in the TDM portion of the system can include the following:

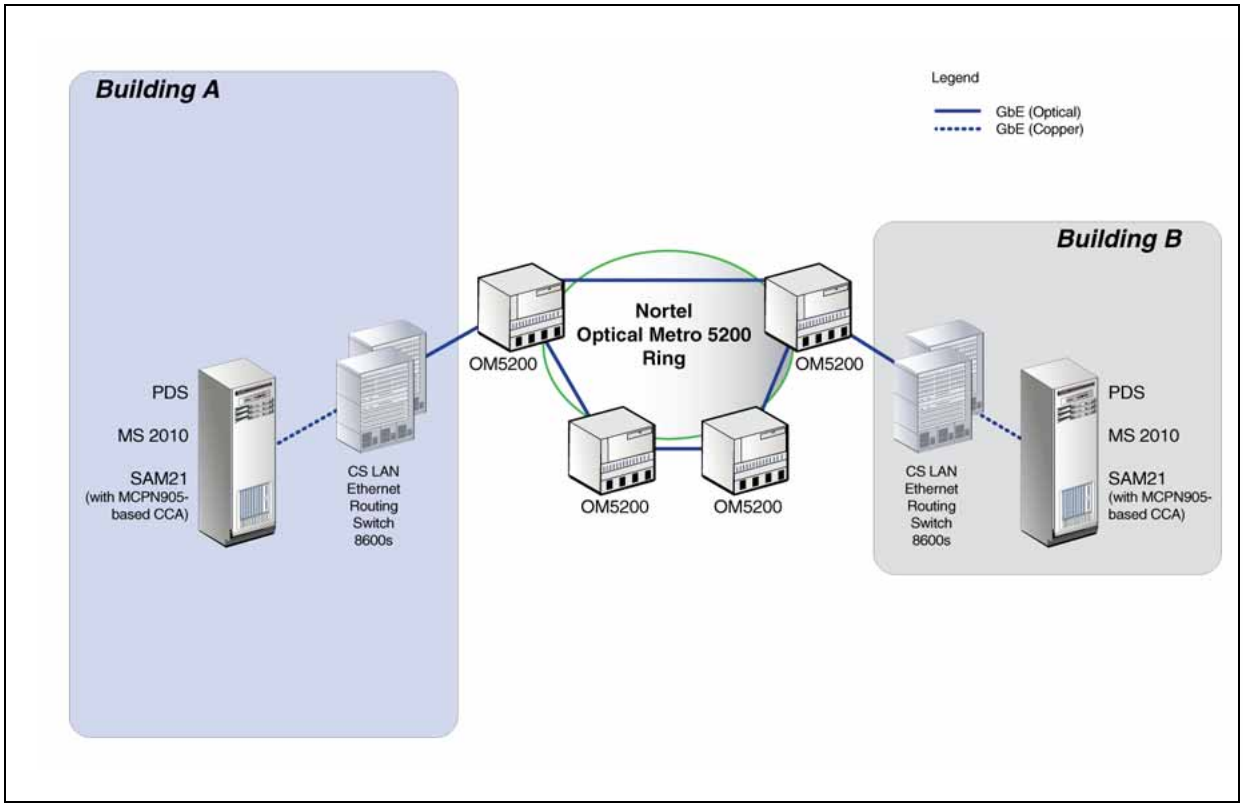
- Message Switch (MS)
- Enhanced Network (ENET)
- Line Trunk Controller (LTC)
- Digital Trunk Controller (DTC)
- Input Output Module (IOM)
- Integrated Services Module (ISM)
- Conference Trunk Module (CTM)
- Digital Trunk Module (DTC)
- Intelligent Peripheral Equipment (IPE)
- Line Concentrating Module (LCM)
- Line Concentrating Module Enhanced (LCME)
- Link Peripheral Processor (LPP)

GbE interface for Compact Call Agent interconnect

Prior to Release SE09, fiber channel (FC) was used for data synchronization or sparing for Compact Call Agent (CCA) cards in the CS 2100 solution. From Release SE09 onward, an optional Gigabit Ethernet (GbE) interface is available for the CCA interconnect between MCPN905-based cards. The CCA uses this interface to copy data between the active and inactive CCA, and to maintain synchronization of the call processing application. For details on the network configuration for the GbE-based CCA interconnect, see "GbE connectivity for MCPN905-based CCA interconnect" (page 18).

Note: MCPN765-based CCA cards support FC, but do not support GbE for the CCA interconnect.

GbE connectivity for MCPN905-based CCA interconnect



The feature provides an in-service method to switch between FC and GbE sparing links as required, using the SAM21 Element Manager GUI. From the Provisioning tab, you can enable or disable the GbE sparing link.

The introduction of the GbE interface for the CCA interconnect causes the following changes in the Maintenance and Administration Position (MAP) interface:

- "Sparing link" or "SL" appears where "fiber channel" or "FC" formerly appeared.

  Note: "Sparing link" or "SL" also appear in custom logs and alarms.

- Under Compact Call Agent Maintenance (CCAMTC) in the MAP interface, there is a new command to query the sparing link. The command is **16 QuerySL**. Use this command to determine whether the FC interface or the GbE interface is selected for sparing.

Getting started

Hardware requirements

Geographical Survivability for the Communication Server 2100 (CS 2100) requires the same hardware as non-distributed CS 2100s. In addition, the following components are required to implement this solution:

- The Ethernet Routing Switch 8600 (ERS 8600) is required to support the Virtual Router Redundancy Protocol (VRRP) and Multi-Link Trunk (MLT) in the geographic survivability option.
- A second SAM21 chassis is required for the distributed Communication Server shelf. Optionally, an additional PTE2000 Frame can be used to house the shelf.
- Most customers requiring geographic survivability already have Optical Metro 5200s (OM 5200) or Optical Metro 3500s (OM 3500) for transporting Fiber Channel (FC) and Gigabit Ethernet (GbE) over Dense Wave Division Multiplexing (DWDM). Customers without these OM5200s (or OM 3500s) require them to implement this feature.

Telephone support

The following telephones are supported in the geographic survivability configuration:

- Through the Analog Station Gateway: Analog sets
- Through the IP Client Manager:
  - IP Phone 2001
  - IP Phone 2002
  - IP Phone 2004
  - IP Phone 2007
  - IP Phones 1120E and 1140E
  - IP Softphone 6350
  - IP Audio Conference Phone 2033

Configuration summary

This section describes the unique requirements for setting up a CS 2100 across the dual-building geographic survivable configuration compared to the non-distributed configuration. In particular, the different installation and commissioning changes are summarized.

When setting up the geographic survivable configuration, you must be aware of changes when configuring the following components:

- Cabling and configuring the CS 2100 (see "Provisioning the Communication Server 2100" (page 23))
- Cabling and configuring the Ethernet Routing Switch 8600s (see "Provisioning the CS LAN" (page 27))
- Setting up the Optical Metro 5200 optical ring (see Provisioning the Optical Metro 5200)

In addition, due to the modifications made to the non-survivable configuration, changes have also been made to the Network Engineering Guidelines.

ATTENTION

See the *Packet Trunk-IP Engineering Guidelines System Engineering Bulletin*, SEB-02-10-001 for a detailed engineering guidelines when setting up of the CS 2100 geographic survivable configuration.

Operating parameters

The following limitations apply to the CS 2100 geographically survivable configuration:

- Operations, Administration, Maintenance, and Provisioning (OAMP) is survivable. The OAMP components (for example, CS 2000 Management System [CMT] and Core and Billing Manager [CBM]) can be distributed across the two sites. For example, Site A can have an active CMT and a cold standby CBM, while Site B has a cold standby CMT and an active CBM.
- Billing is partially survivable. If an event destroys the main building, the Call Agent switches to backup billing to disk. Backup billing is guaranteed for eight hours and is dependent on available disk space.
- Signaling System #7 (SS7) is not survivable.
- Some stable calls can be dropped during recovery from an isolated Communication Server scenario.
- Time Division Multiplexing (TDM) equipment is not survivable.
- Defence Switched Network (DSN) currently is not supported.

- "Summary of operating parameters for CCA interconnect" (page 21) summarizes the limitations that apply when FC or GbE is used for the CCA interconnect.

Summary of operating parameters for CCA interconnect

Parameter	FC	GbE
Protocol support	The transport network must support the fiber channel protocol.	The transport network must support the Gigabit Ethernet protocol. See Note 1.
Maximum distance supported between the two Communication Server halves	120 kilometers (74.5 miles).	120 kilometers (74.5 miles).
Maximum call capacity	1.4 million BHCA (for a standard call model of 50 percent line to Integrated Services Digital Network User Part (ISUP), 50 percent ISUP to line, 100 percent billing). See Note 2.	300,000 BHCA (for a standard call model of 50 percent line to Integrated Services Digital Network User Part (ISUP), 50 percent ISUP to line, 100 percent billing). See Note 2.
Maximum distance between the Communication Server half and first optical element	300 meters (984 feet) from CCA to OM 5200.	100 meters (328 feet) from CCA to ERS 8600.
Note 1: GbE-based links are supported only for MCPN905-based CCAs. ***Note 2:*** Extended distances are possible, but result in a lower BHCA.		

Provisioning the Communication Server 2100

Distributing the Communication Server shelves at dual sites

The most obvious difference in the geographic redundancy configuration from the traditional configuration is the separation of the Communication Server shelves into two geographically distributed buildings. It is important that equipment be located at the proper site. The following lists provide an example.

The Communication Server 2100 (CS 2100) components in Building A include the following:

- Service Access Module 21 (SAM21) shelf and cards
- Interworking Spectrum Peripheral Module IP (IW SPM-IP)
- Multiservice Data Manager (MDM)
- Core and Billing Manager
- Server Platform Foundation Software
- Primary Data Storage
- Legacy TDM peripherals (for example, RSC, LCM, IPE, XFM, ISM, FLLP, CNCT, and MS)

  Note: These components do not operate in survivable mode, but are required for TDM interworking for a hybrid CS 2100 in non-survivable mode.

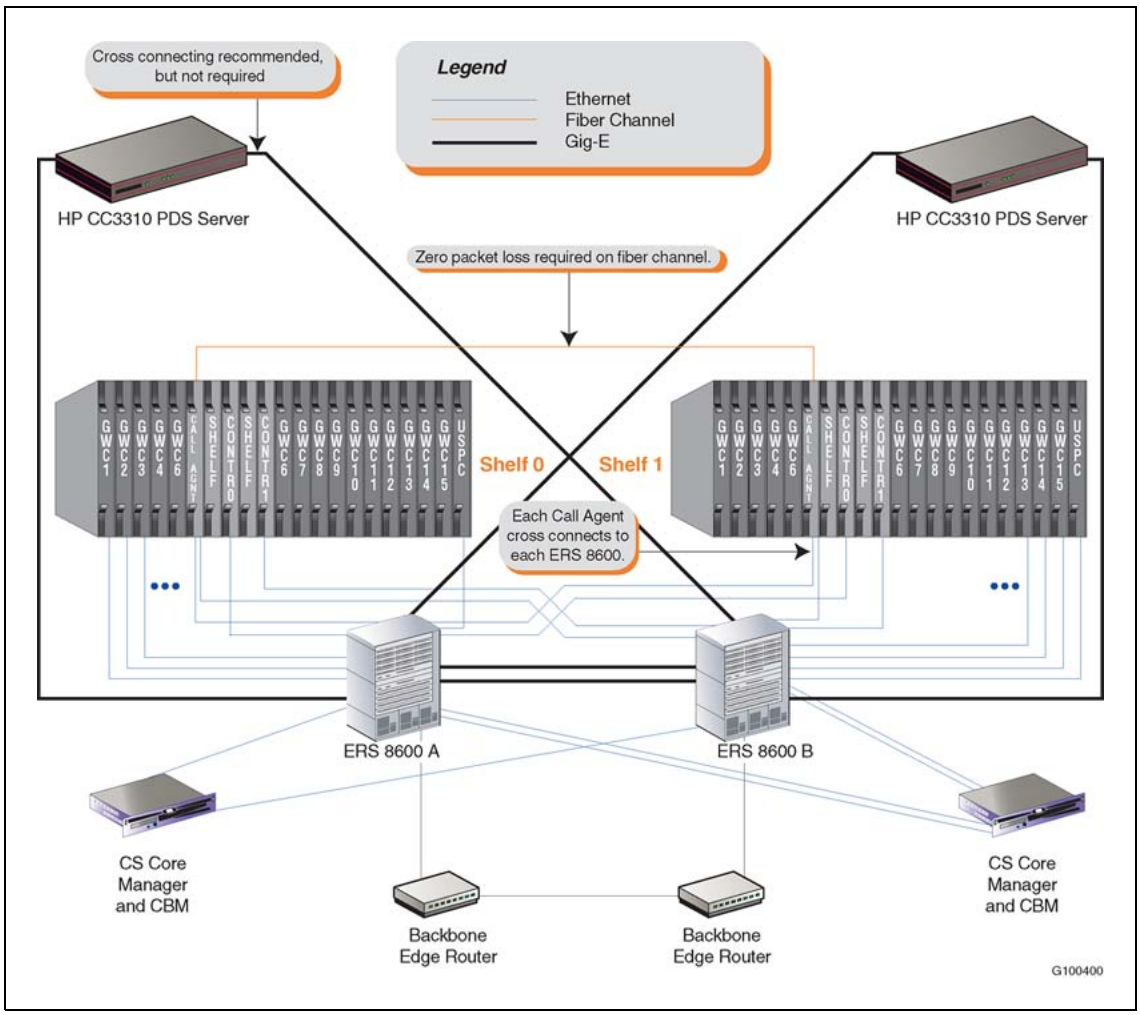
The CS 2100 components in Building B include the following:

- Service Access Module 21 (SAM21) shelf and cards
- Multiservice Data Manager (MDM)
- Core and Billing Manager
- Server Platform Foundation Software
- Primary Data Storage

Physical configuration

This section describes the physical layout of distributed Communication Servers. "Logical connectivity of the two Communication Server shelves" (page 24) shows the card layout of the two separately-located Communication Server halves.

Logical connectivity of the two Communication Server shelves



CallP subnet

Communication Server 2100

The CS 2100 consists of two shelves. In a non-geographically redundant configuration, each shelf houses a Call Agent and Gateway Controllers (GWC). Both the Call Agent and the GWCs have redundant mates in the second shelf.

The Message Controller (MC) cards, normally deployed one per shelf, must reside in the shelf that is in the same location as the Message Switch (MS) equipment. Therefore, for geographic survivability the shelf configuration can be summarized as follows:

SAM21 shelf in Building A

- one Call Agent card
- two MC cards

SAM21 shelf in Building B

- one Call Agent card
- no MC cards

All TDM equipment must be located in Building A, in which the SAM21 shelf with the two MC cards resides.

Gateway Controller configuration

The Gateway Controller (GWC) pair must be configured in the split shelf configuration, with one shelf deployed in each of the two locations.

Interworking Spectrum Peripheral Module

The Interworking Spectrum Peripheral Module (IW SPM-IP) provides IP/TDM interworking. It must be deployed in the same building in which the SAM21 shelf with the two MC cards resides.

OAMP subnet

OAMP components are survivable and are duplicated at each site.

Provisioning steps

With the exception of the items described in this document, much of the CS 2100 configuration for geographic survivability builds on the configuration for a non-distributed CS 2100.

ATTENTION

See the *Communication Server 2100 Product Guide* (555-4001-806) for additional information about the CS 2100.

"Communication Server changes" (page 26) shows the different configuration steps that must be performed when distributing the CS 2100 shelves in dual locations.

Communication Server changes

Item	Description
Cabling	The fiber channel link between the two Call Agent cards in slot 6 of both SAM21s must go over the optical ring. Connect the fiber channel link from each Call Agent card to an OCI SRM GbE/FC circuit pack in the Optical Metro 5200 paired to each Communication Server. ***Note:*** When GbE is used for sparing for MCPN905-based Compact Call Agent cards, a Gigabit Ethernet cable is required for the point-to-point connection between each Compact Call Agent card and Ethernet Routing Switch 8600.
Card layout	The two Message Controller (MC) cards must reside in the same SAM21 shelf that resides in the building with the Message Switch (MS) equipment (in the previous example, Building A). In standalone configurations, the normal recommendation is to have one MC/Call Agent card pair reside in each SAM21 shelf, but this is not possible for geographic survivability. For survivability, one location has a SAM21 shelf with one Call Agent card and two MC cards, while the second location has SAM21 shelf with a single Call Agent card.
Commissioning	Technicians must perform a manual step during commissioning. After commissioning the Call Agent blades using the SAM21 Element Manager, and after the initial boot, perform the following step on one of the Call Agent cards: From the Core and Billing Manager Telnet to the Call Agent card and run the following command from the Linux prompt: `/usr/admin_bin/setgeoredun` Without running this command, it is not possible to synchronize the Call Agent blades.

Provisioning the CS LAN

Ethernet Routing Switch 8600

The Ethernet Routing Switch 8600 (ERS 8600) is a key component of the geographic survivability Communication Server LAN (CS LAN) configuration. The ERS 8600 delivers Gigabit Ethernet (GbE) performance and Quality of Service (QoS). The ERS 8600 switching architecture distributes call processing tasks and eliminates bottlenecks.

The ERS 8600 switch fabric houses centralized intelligence, including master forwarding tables, management and file system. Silicon hardware at the port level makes packet classification and routing decisions, which results in faster processing than is typically possible in the software-based filtering of legacy routers.

Customer documentation

"Documentation references" (page 27) shows where you can find more detailed information about the ERS 8600.

Documentation references

Document title	Document number
Getting Started Ethernet Routing Switch 8000 Series Software Release 3.7	313189-D Rev 00
Managing Platform Operations and Using Diagnostic Tools Ethernet Routing Switch 8000 Series Software Release 3.7	315545-C Rev 00
Configuring Network Management Ethernet Routing Switch 8000 Series Software Release 3.7	314723-C Rev 00
Configuring QoS and IP Filtering Ethernet Routing Switch 8000 Series Software Release 3.7	316433-C Rev 00
Configuring IP Routing Operations Ethernet Routing Switch 8000 Series Software Release 3.7	314720-D Rev 00
Release Notes for the Ethernet Routing Switch 8000 Series Switch Software Release 3.7	317177-A Rev 00
System Messaging Platform Reference Guide Ethernet Routing Switch 8000 Series Software Release 3.7	315015-C Rev 00

Document title	Document number
Important Information about the 8600 Series Switch Modules	316340-B Rev 00
Configuring and Managing Security Ethernet Routing Switch 8600 Software Release 3.7	314724-C Rev 00

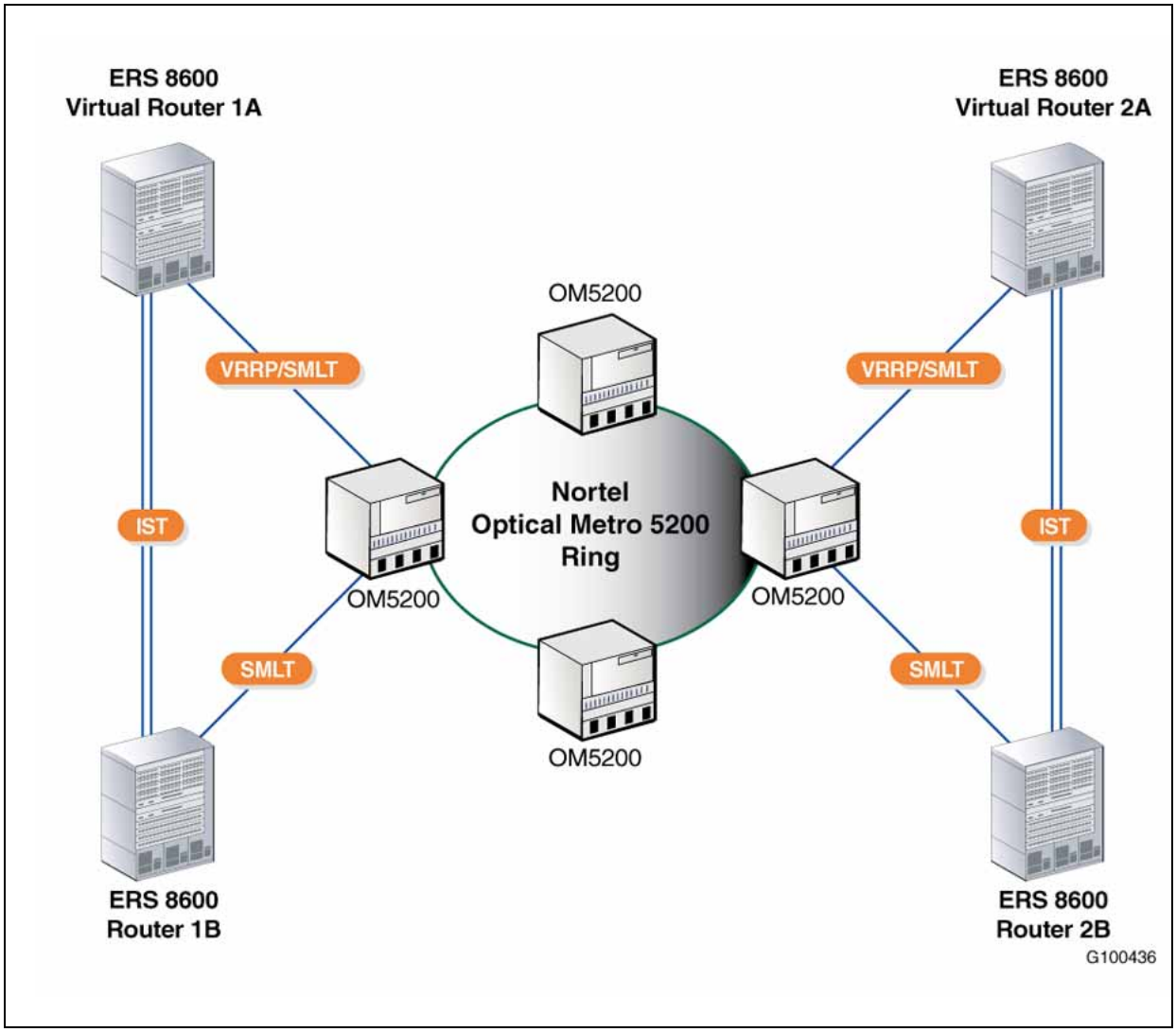
Provisioning steps

The central components of the geographically survivable CS LAN are two ERS 8600s deployed in each geographical location. The locations are interconnected through an optical network.

For load sharing, you must provision one of the ERS 8600s in each geographical location with Virtual Router Redundancy Protocol (VRRP) in dual active mode (that is, enable backup master) versus active-standby mode. This configuration facilitates sharing the network traffic load across the two geographical locations thereby minimizing the use of the optical network between the two locations.

"CS LAN Ethernet Routing Switch 8600 configuration" (page 29) shows the ERS 8600 configuration only. As a hardware baseline, each 8010co chassis must be configured with only one 8691SF/CPU module, along with a minimum of two 8632TXE modules.

CS LAN Ethernet Routing Switch 8600 configuration



Note 1: When GbE is used for the sparing link for MCPN905-based Compact Call Agents, ERS 8600s require an additional 8608 module equipped with a 1000Base-T Gigabit Interface Converter (GBIC).

Note 2: For hybrid sites or sites with gateways located with the call server, two ERS 8600s are used at the call server site; for sites without gateways, a single ERS 8600 is used at each site.

Geographically survivable CS LAN IP address

The number of IP addresses used for the four ERS 8600s is as follows:

- one per chassis for the management interface (that is, Out-of-Band [OOB] OAM subnet)

- one per chassis (physical) for each of the five configured VLANs (minimum) as follows:
  - CS LAN Call Processing (CallP)
  - CS LAN Operations, Administration and Maintenance (OAM)
  - Bearer (Real-time Transport Protocol [RTP])
  - Intra-ERS 8600 (Inter-switch Trunking [IST])
  - Intra-locations (Split Multi-Link Trunking [SMLT])
- one for each VRRP logical IP address per VLAN as follows:
  - CS LAN CallP
  - CS LAN OAM
  - Bearer (RTP)

Therefore, the recommended configuration requires a minimum of 27 IP addresses. From the preceding list, these can be summarized as follows:

- OOB - 4
- CallP - 5
- OAM - 5
- Bearer - 5
- IST - 4
- SMLT - 4

Note: Because the ERS 8600 management interface is routable, Nortel recommends that it be configured with an OOB IP address from a subnet that is not in the ERS 8600s routing table.

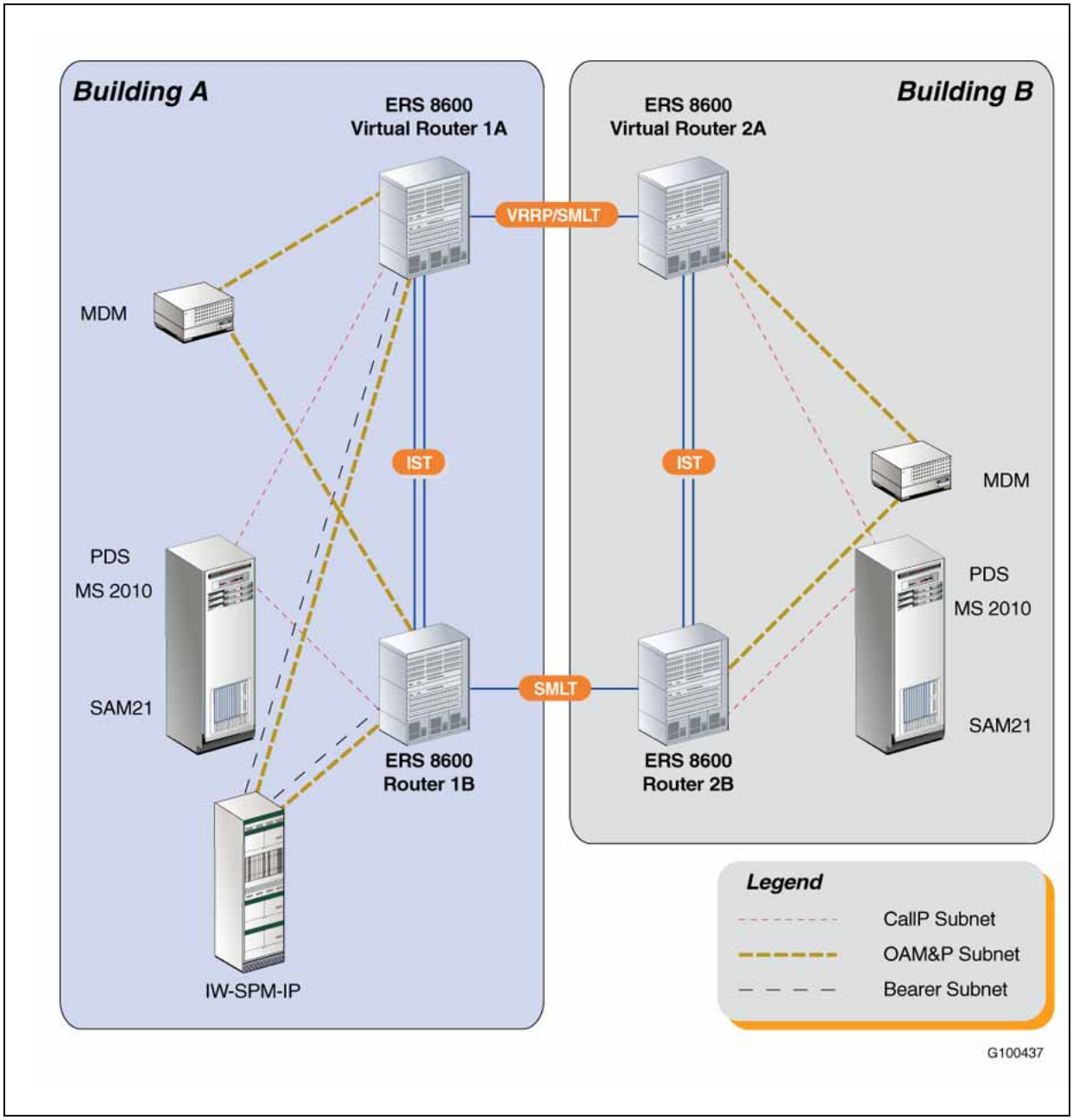
Ethernet Routing Switch 8600 redundancy

In the geographically survivable ERS 8600 configuration, each chassis is installed with a single 8691SF/CPU switching fabric. The inter-switch trunk connection between the two ERS 8600s in each location is a Gigabit Ethernet (GbE) link. You must configure VRRP with default settings between the two ERS 8600s, one in each geographic location. This configuration assigns one ERS 8600 in one geographic location as the network-side and one ERS 8600 at the other location as the user-side. This creates a L2/L3 load-sharing configuration across the two geographic locations (with VRRP backup network-side enabled) and the default gateways for the CS LAN devices are associated with the network-side ERS 8600.

As a result of this configuration, all four ERS 8600s provide L2 functionality, but only one ERS 8600 per location provides an L3 functionality (that is, the ERS 8600 with VRRP configured). At each location, the ERS 8600 providing L2-only functionality depends on the other ERS 8600 in the same location for L3 functionality, or on the L3 ERS 8600 in the other location in the case where the local L3 ERS 8600 is unavailable. The network-side and user-side L3 ERS 8600s share all the switching and routing decisions between the VLANs within the CS LAN and out to the rest of the network, making it a more robust system.

"CS LAN Ethernet Routing Switch 8600 subnet configuration" (page 32) shows how the subnet LANs are connected between the components at the two geographically distributed buildings.

CS LAN Ethernet Routing Switch 8600 subnet configuration



Inter-Switch Trunking

For optimal reliability, you must configure Inter-Switch Trunking (IST) between each pair of ERS 8600s in the same geographic location using Gigabit Ethernet (GbE) ports from multiple modules. IST prevents a single point of failure from disrupting the VRRP messaging, which can potentially cause a massive call processing outage. In addition, you must enable the

802.1Q tagging functionality for the IST to guarantee that the relevant CS LAN subnets, and their corresponding broadcast domains, can span across the two switches. The VRRP functions are based on this assumption.

Finally, you must add the IST group to the CallP, OAM, Bearer and SMLT VLANs on both ERS 8600s. This IST group configuration ensures that on each of these subnets, which span the four ERS 8600 chassis, there is a single broadcast domain across the two chassis at a single location. See "Split Multi-Link Trunking" (page 33) for additional information about extending the subnets across the two locations.

Note: To optimize routing within the CS LAN, you must configure the IST links with a 255.255.255.252 mask and enable Open Shortest Path First (OSPF), thereby creating a routed link between the redundant ERS 8600s.

The IST group must be comprised of a minimum of two GbE interfaces for each ERS 8600 chassis (that is, one GbE interface from each 8632TXE module). The IST group cannot be mixed with 10/100 BaseT or any other media type.

Note: Disable the Spanning Tree Protocol (STP) on each of the ERS 8600s that are in the IST group. This is done to avoid confusion and to provide consistency (by default, the IST functionality overrides the STP setting to disabled).

Split Multi-Link Trunking

For optimal reliability, you must configure Split Multi-Link Trunking (SMLT) between the Ethernet Routing Switch 8600s (ERS 8600) and the optical routers in both geographic locations using Gigabit Ethernet (GbE) ports from multiple modules. Split Multi-Link Trunking prevents a single point of failure from disrupting the VRRP messaging, which can potentially cause a massive call processing outage. You must use the same SMLT ID on all four ERS 8600s. In addition, you must enable the 802.1Q tagging functionality for the SMLT to guarantee that the relevant CS LAN subnets, and their corresponding broadcast domains, can span across the two switches. The VRRP functions are based on this assumption. Finally, you must add the SMLT group to the CallP, OAM, Bearer VLANs on all four ERS 8600s. This SMLT group configuration ensures that on each of these subnets, which span the four ERS 8600 chassis, there is a single broadcast domain across the four chassis of both locations. "CS LAN Ethernet Routing Switch 8600 configuration" (page 29) shows this configuration.

Note: To optimize routing within the CS LAN, you must configure the SMLT links with a 255.255.255.248 mask and enable Open Shortest Path First (OSPF), thereby creating a routed link between the redundant ERS 8600s.

The SMLT group must be comprised of a minimum of four GbE interfaces for each Ethernet Routing Switch 8600 chassis. The SMLT group cannot be mixed with 10/100 BaseT or any other media type.

Note: Disable the Spanning Tree Protocol on each of the ERS 8600s that are in the SMLT group. This is done to avoid confusion and to provide consistency (by default, the SMLT functionality overrides the STP setting to disabled).

OSPF on the IST interfaces

To provide optimal routing and avoid inconsistencies, Nortel recommends creating a VLAN for the interfaces in the IST connecting the two ERS 8600s in the same location. The IST instance must also be added to the VLAN. In addition, OSPF must be enabled on the IST.

This is recommended so that the ERS 8600s co-residing at the same location are neighbors and are adjacent. This VLAN configuration optimizes the route exchange of all local routes.

OSPF on the SMLT interfaces

To provide optimal routing and avoid inconsistencies, Nortel recommends creating a VLAN for the interfaces in the SMLT connecting the four ERS 8600s in both locations. The SMLT instance must also be added to the VLAN. In addition, OSPF must be enabled on the SMLT.

This is recommended so that all four ERS 8600s residing at both locations are neighbors and adjacent. This VLAN configuration optimizes the route exchange of all local routes.

Provisioning the Optical Metro 5200

Optical Metro 5200 ring configuration

The Communication Server 2100 (CS 2100) geographic survivability configuration uses the Optical Metro 5200 (OM 5200) network to carry Gigabit Ethernet (GbE) and Fiber Channel (FC) protocols to maintain Communication Server and gateway connectivity. The gateways must connect to the Communication Server halves through their own OM 5200. The gateway router cannot link directly into the Ethernet Routing Switch 8600s (ERS 8600) as in the non-geographic survivable configuration.

The Fiber Channel from each Call Agent card connects to an Optical Channel Interface (OCI) GbE/FC Subrate Multiplexer (GFSRM) circuit pack on the OM 5200.

The GbE links from the ERS 8600s and gateway routers connect to an OCI GFSRM 1310nm circuit pack on the OM 5200. The OM 5200 requires three GbE links for each Communication Server half. One of these three GbE links from each ERS 8600 to the OM 5200 supports intra CS LAN traffic. Another of these three GbE links from either one of the ERS 8600s to the OM 5200 carries the gateway to CS LAN traffic.

OCI GFSRM card summary

The OCI GFSRM circuit pack has the following characteristics:

- OM5000 OCI-type card with two bi-directional ports:
  - — Aggregate 2 GbE or two FC100/FICON ports to a STS-48/STM-16 signal
  - — Aggregate 1 GbE and one FC100/FICON port to a STS-48/STM-16 signal
- Provides increased density and lower cost per wavelength OM5000 service, while allowing for transport of GbE or FC across a SONET network where the traffic can be groomed, switched and monitored.
- Virtual Concatenation allows the bandwidth to be selected in small increments on demand as follows:

  - — Traditional contiguous concatenation comes in course steps.
  - — Provides cost efficient and flexible transport of "leased line" type services across an Optical Metro DWDM and/or SONET network.

- Supports Framed Mapping to SONET/SDH for GbE and Transparent Mapping to SONET/SDH for Fiber Channel.
- Optical Metro 5000-compatible backplane interface.
- Datapath Diagnostic Loopback Mode.
- Supported on both 5200 and 5100 models as follows:
  - — Interconnect it with FLEX RATE OCLD (through the OCM) on the 5200 shelf.
  - — No OCM cross-connect capability on the 5100 shelf.

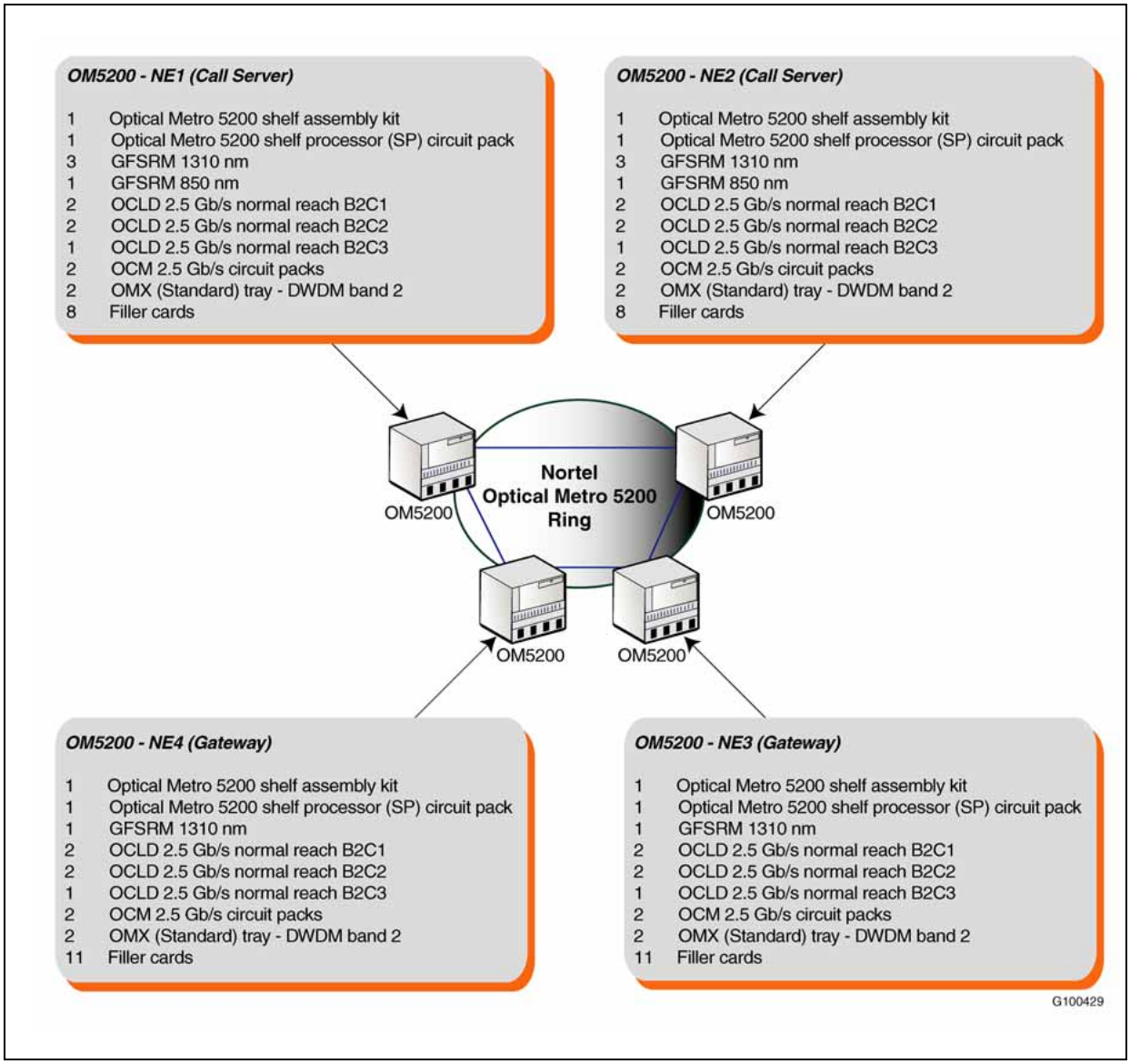
Specifications of the OCI GFSRM circuit pack are as follows:

- two bi-directional ports per card
- NT0H21CC - Enhanced GFSRM, 850nm, 2 Port, (SX) (LC Duplex connectors x2) (multimode [MM]) client-side interfaces
- NT0H21CD - GFSRM 1310nm, 2 Port (LX) (LC Duplex connectors x2) (single mode [SM]) client-side interfaces
- GbE: 1000Base-SX and 1000Base-LX
- Client-side Operational Measurements (for example, frame counts, discard units, etc.)
- Client-side 8B10B PMs (for FC-100/FICON)
- Supports full compliment of section, line and path PMs (B1, B2, B3)
- Maps the signals into Framed Generic Framing Procedure (GFP), which is then carried within a SONET/SDH virtually concatenated or contiguous payload on an OC-48/ STM-16
- Protected or unprotected traffic on the line side

Shelf layouts

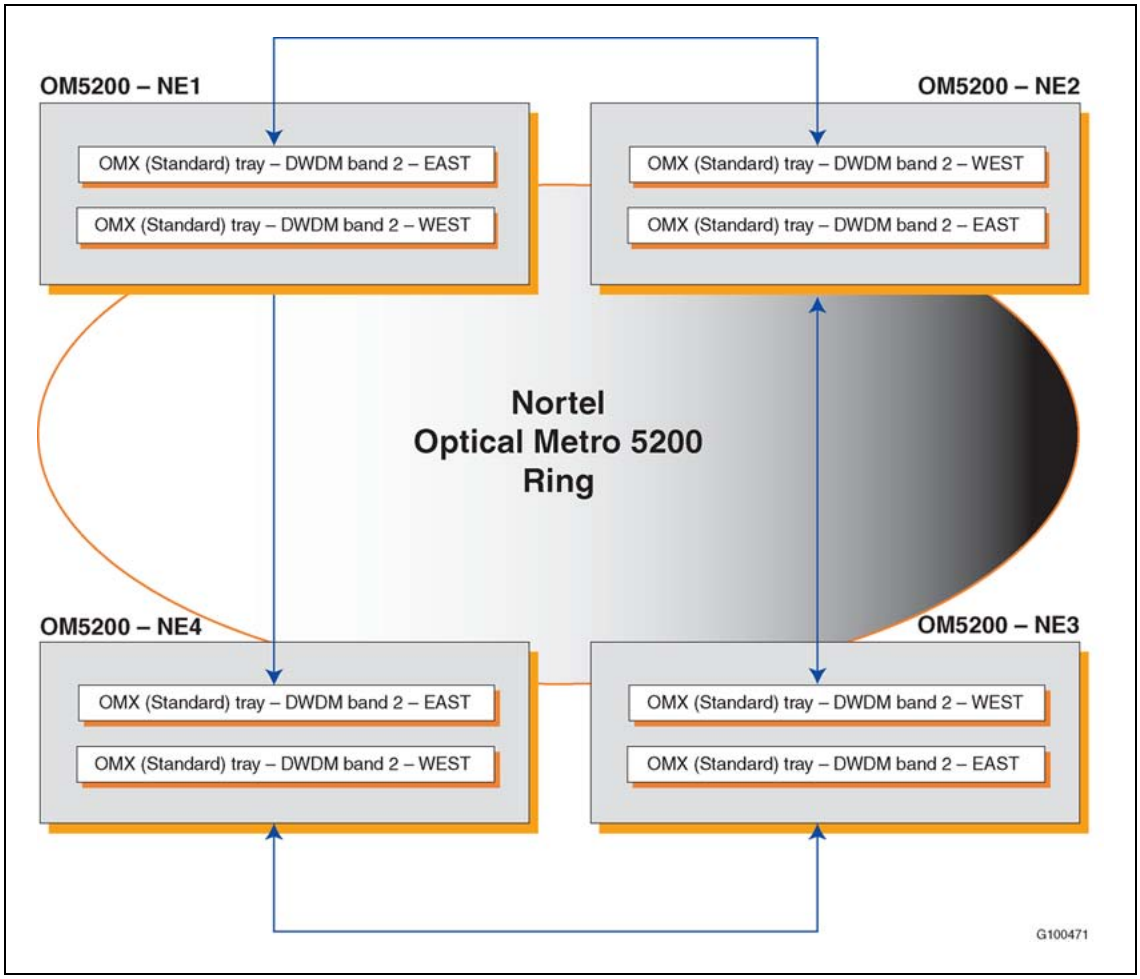
"Optical Metro 5200 card configuration" (page 37) shows the cards required for each Optical Metro 5200 network element of the Nortel Metro 5200 Ring.

Optical Metro 5200 card configuration

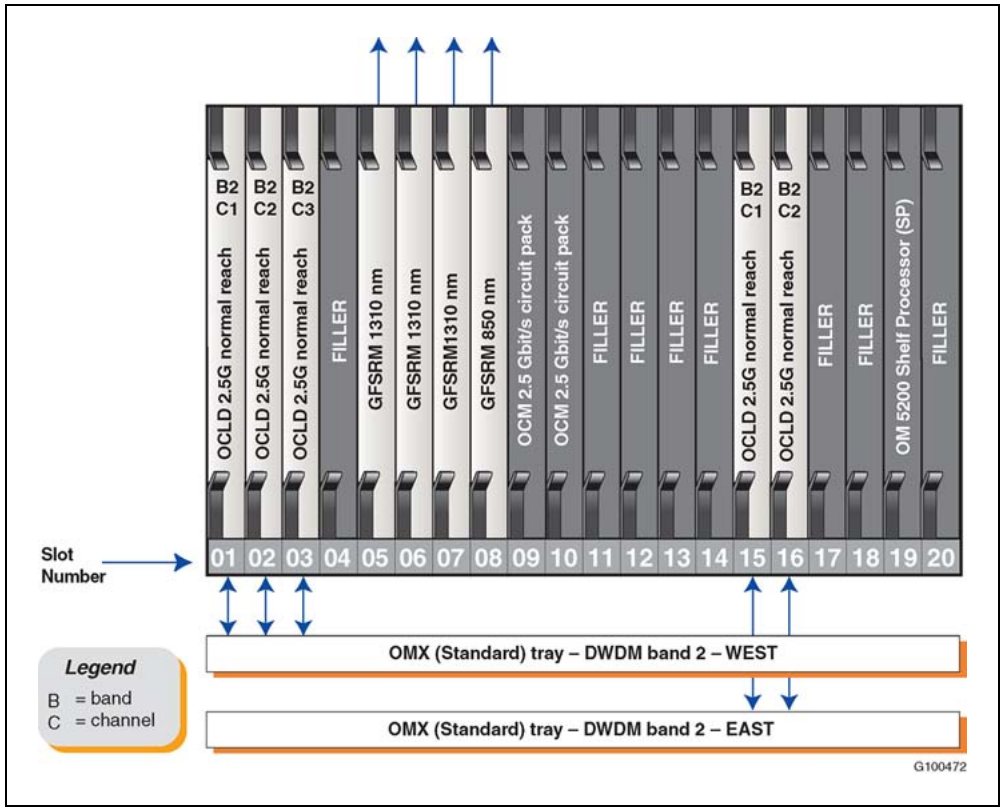


"Optical Metro 5200 ring configuration used in this application" (page 38) presents the OM 5200 ring configuration used in this application. "Shelf layout for OM5200 - NE1" (page 39) to "Shelf layout for OM5200 - NE4" (page 42) show the shelf layout of each OM 5200 Network Element (NE) in the ring. To install, configure, provision, and maintain this OM 5200 ring, see the Optical Metro 5000-series product documentation (for more information, see "Customer documentation" (page 42)).

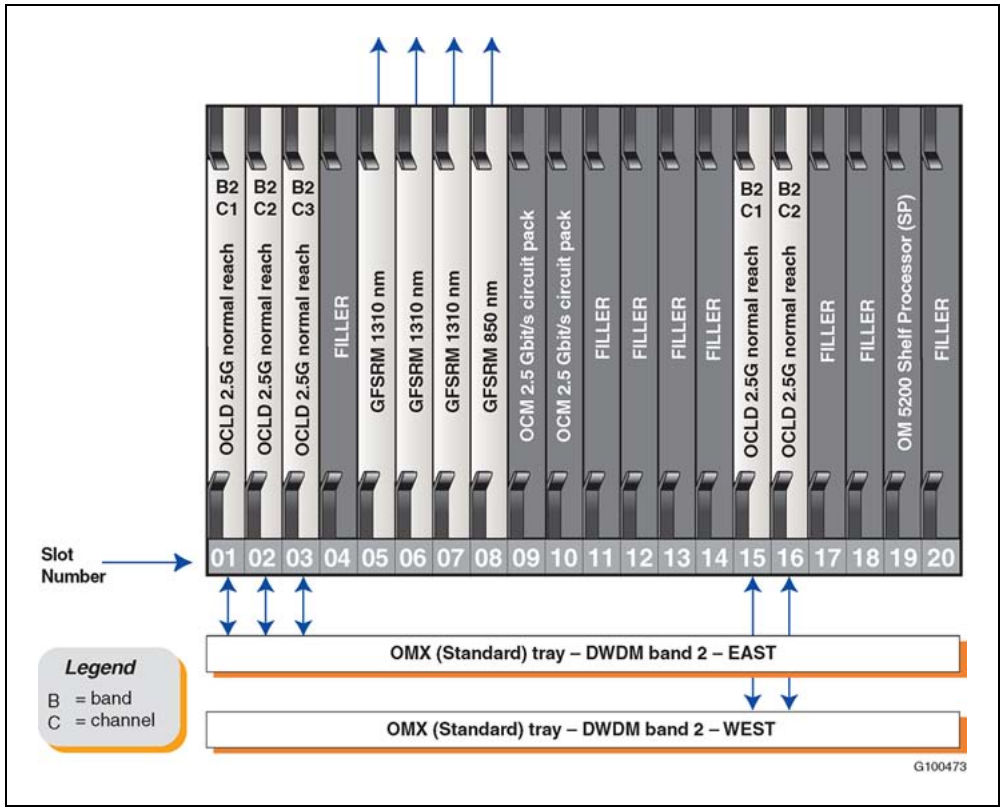
Optical Metro 5200 ring configuration used in this application



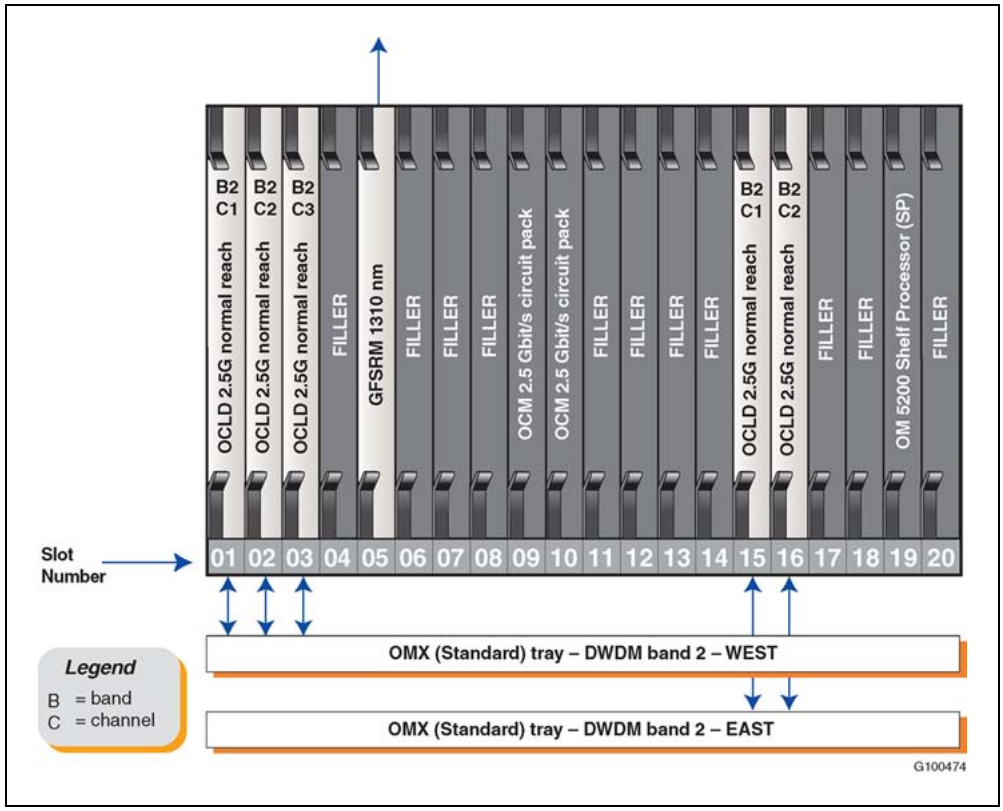
Shelf layout for OM5200 - NE1



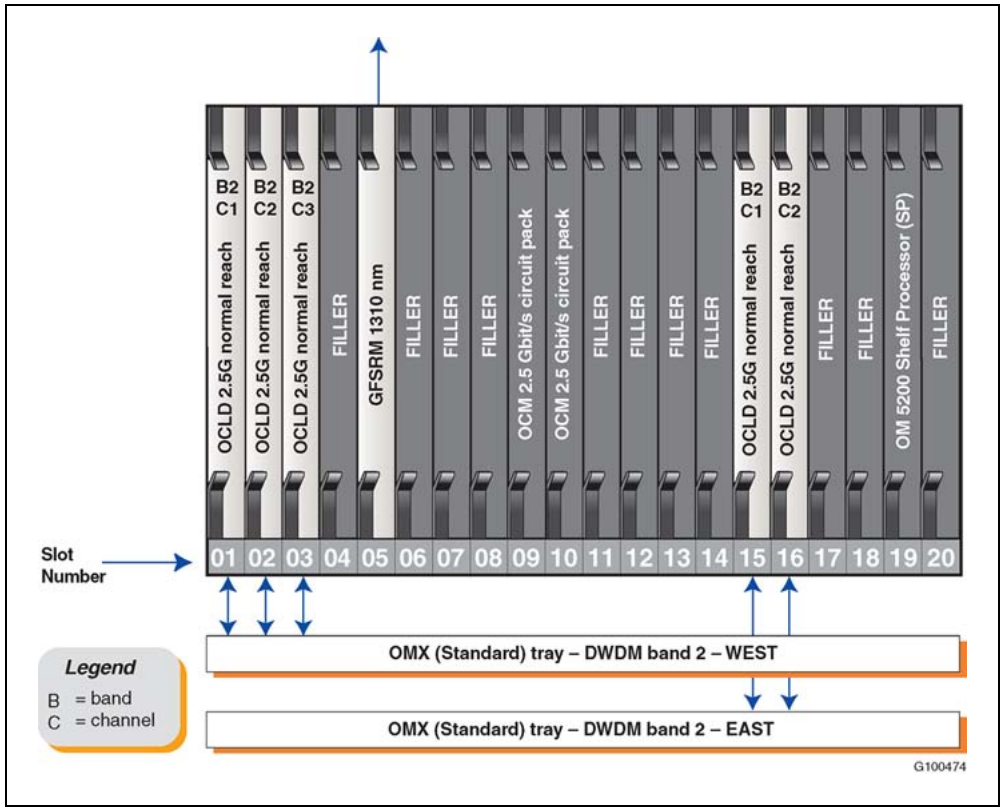
Shelf layout for OM5200 - NE2



Shelf layout for OM5200 - NE3



Shelf layout for OM5200 - NE4



Customer documentation

The Optical Metro 5200 (OM 5200) information is provided in the Optical Metro 5000-series Multiservice Platform Nortel Technical Publications (NTP). These NTPs contain descriptive information and procedures including system, software, and hardware descriptions, technical specifications, ordering information, and TL1 user information. These NTPs also contain all procedures required to install, provision and maintain an OM 5200 network.

"Optical Metro 5000-series Multiservice Platform references" (page 42) shows where you can find more detailed information about the OM 5200.

Note: The CS 2100 geographic survivability configuration also supports the Optical Metro 3500 (OM 3500). For more information, see *About the Optical Metro 3500 NTP Library*, 323-1059-090.

Optical Metro 5000-series Multiservice Platform references

Document title	Document number
Planning a Network	

Document title	Document number
Network Planning and Link Engineering	323-1701-110 (three volumes)
Software and User Interface	323-1701-101
Hardware Description	323-1701-102 (two volumes)
Technical Specifications	323-1701-180
Installing, Commissioning and Testing a Network	
Installing Optical Metro 5200 Shelves and Components	323-1701-201 (two volumes)
Commissioning Procedures	323-1701-220
Connection Procedures	323-1701-221 (two volumes)
Testing and Equalization Procedures	323-1701-222
Managing, Provisioning and Testing a Network	
Provisioning and Operating Procedures	323-1701-310 (two volumes)
Customer Acceptance Testing Procedures	323-1701-330
TL1 Interface	323-1701-190 (four volumes)
Maintaining and Troubleshooting a Network	
Trouble Clearing and Alarm Reference Guide	323-1701-542 (four volumes)
Maintenance and Replacement Procedures	323-1701-546
Release 8.0 Planning Guide	NTY410AK

List of terms

ASCII
American Standard Code for Information Interchange

ASG
Analog Station Gateway

ATM
Asynchronous Transport Mode

BHCA
Busy Hour Call Attempts

CA
Call Agent

CallP
Call Processing

CCA
Compact Call Agent

CLAN
Customer Local Area Network

CMIC
Computer Module Interface Card

CMT
CS 2000 Management Tools

CNCT
Connect

cPCI
compact Peripheral Component Interconnect

CPU
Central Processing Unit

CS
Communication Server

CS 2100
Communication Server 2100

CS LAN
Communication Server LAN

DS1
Digital Signaling Level 1

DS3
Digital Signaling Level 3

DSP
Digital Signaling Processor

DTMF
Dual-tone Multifrequency

DWDM
Dense Wave Division Multiplexing

ECAN
Echo Cancellation

EM
Element Manager

ERS 8600
Ethernet Routing Switch 8600

FC
Fiber Channel

FLPP
Fiber Link Peripheral Processor

GbE
Gigabit Ethernet

GEM
Gigabit Ethernet Resource Module

GFP
Generic Framing Procedure

GFSRM
GbE/FC Subrate Multiplexer

GWC
Gateway Controller

IPCM
IP Client Manager

IP
Internet Protocol

IPDR
Internet Protocol Detail Recording

IPE
Intelligent Peripheral Equipment

IPSec
Internet Protocol Security

ISDN
Integrated Services Digital Network

ISM
Integrated Services Module

IST
Inter-Switch Trunking

ISUP
Integrated Service Digital Network User Part

IW SPM-IP
Interworking Spectrum Peripheral Module Internet Protocol

LAN
Local Area Network

L2
Layer 2

L3
Layer 3

LCM
Line Concentrating Module

MAP
Maintenance and Administration Position

MC
Message Controller

MDM
Multiservice Data Manager

MM
multimode

MS
Message Switch

MS 2010
Media Server 2010

NE
Network Element

nm
nanometer (one billionth of a meter)

NMS
Network Management System

OAM
Operation, Administration, and Maintenance

OCI
Optical Channel Interface

OCLD
Optical Channel Laser and Detector

OCM
Optical Channel Manager

OM
Operational Measurement

OM5200
Optical Metro 5200

OMX
Optical Multiplexer

OOB
Out-of-Band

OSPF
Open Shortest Path First

OSS
Operations Support System

PBX
Private Branch Exchange

PC
Personal Computer

PCI
Peripheral Component Interconnect

PDS
Primary Data Storage

PDTC
PCM-30 Digital Trunk Controller

POTS
Plain Old Telephone Service

PRI
Primary Rate Interface

PSTN
Public Switched Telephone Network

QoS
Quality of Service

RSC
Remote Switching Center

RTP
Real-time Transport Protocol

SAM21
Service Application Module 21

SAM21 EM
SAM21 Element Manager

SAN
Storage Area Network

SC
Shelf Controller

SM
single mode

SMLT
Split Multi-Link Trunking

SNMP
Simple Network Management Protocol

SONET
Synchronous Optical Network

SP
Shelf Processor

SPFS
Server Platform Foundation Software

SS7
Signaling System #7

STORM
Structure-Oriented Resilient Multicast

STP
Spanning Tree Protocol

SWACT
Switch Activity

TDM
Time Division Multiplexing

UA
User Agent

UPSR
Unidirectional Path-Switched Ring

VLAN
Virtual LAN

VoIP
Voice over Internet Protocol

VPN
Virtual Private Network

VRRP
Virtual Router Redundancy Protocol

XA-Core
Extended Architecture Core

XPM
Extended Peripheral Module

Communication Server 2100

Geographic Survivability Planning Guide

Publication: 555-4031-901
Document status: Standard
Document version: 04.02
Document date: 20 October 2006

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