Call Agent Basics

What's new for SN08

June 2005, Standard 05.02

The following changes were made in this release:

- A description is added for Feature A00008431, System Mastership Support for CS2000 - Compact Geographic Survivability Configuration. For more information about Geographic Survivability, refer to CS 2000 - Compact overview in *Call Agent Basics*, NN10023-111.
- The following hardware changes were made in this release:
  - The NTRX51KE OAME frame can be converted to an NTRX51LA COAM frame. The conversion takes place at installation. For details, refer to the procedure *NTRX51KE OAME to NTRX51LA COAM Conversion* in Installation Manual 0000007-74-0135.
  - Call Control Frame NTRX51TA is modified to support Session Server for configurations with less optional equipment and therefore extra space in the frame. A new breaker interface at the top of each frame provides power distribution to support the Session Server.
  - New Gateway Controller (GWC) card MCG MCPN905-240 replaces MCPN750 (still supported).
  - The Compact Universal Signaling Point (USPc) uses new card MCPN905-220
  - The Core and Billing Manager (CBM) becomes a high availability configuration using two Sun Netra 240 servers in the COAM frame. *(CBM is not supported on the Sun Netra T1400 hardware.)*

March 2005, Preliminary 05.01

The following product brand name changes were made to products referenced in this document:

- Succession is now Carrier Voice over IP
- Passport 8600 is now Ethernet Routing Switch 8600
- Nortel Packet Voice Gateway (PVG) is now Nortel Media Gateway (MG) 7480, 15000 and 20000. This document references Nortel Media Gateway 15000.

Contents

CS 2000 - Compact overview

The Call Agent is the key component in the Communication Server 2000 - Compact (CS 2000 - Compact). This is where the Call Processing engine resides, along with Nortel's vast service and feature set. Two SAM21 shelves house Call Agent cards as well as Gateway Controller cards (GWC). SS7 signaling can be provided by a pair of Universal Signaling Point (USP) - Compact cards in the SAM21 shelves, or a USP deployed in a separate frame.

Use of GWCs provides flexibility when selecting media gateways such as Nortel Media Gateway (MG) 15000 based on the Multiservice Switch 15000 (MSS 15000) for trunking, Nortel Media Gateway 9000 (MG 9000) for line access, or a number of small analog station gateways (Mediatrix 1124, for example) for line access. GWCs use standards compliant H.248, MGCP, NCS, H.323, SIP-T, and TGCP protocols to allow a broad choice of media gateway devices.

Specific gateways and feature set are determined by the Nortel solution purchased and customer needs. The CS 2000 - Compact is available in the following solutions:

- **Universal Access - IP** — local service access and wireline access
- **Integrated Access Wireline/Integrated Access Cable** — telephone service through cable modem or derived lines device
- **Packet Trunking - IP** — local tandem trunking and toll service access

In addition, the CS 2000 - Compact is available in the Enterprise market as the CS 2100 - Compact with the features available in the Enterprise marketplace. The CS 2000 - Compact is used in the Chinese market as a DMS core replacement. The CS 2000 - Compact is available with AC powered components, if NEBS certification of frame configurations is not required for deployment.

Packet network connectivity

The CS 2000 - Compact requires connectivity for call signaling, OAM&P, and in some configurations, bearer path. Two Nortel Ethernet Routing Switch 8600 (ERS 8600) routers provide this Communications Server Local Area Network (CS LAN) connectivity. Each Call Agent card has two Ethernet 10/100 BaseT links, and one link is connected to each CS LAN router. Each card in the SAM21 shelf connects directly to the CS LAN. Cards and equipment with two Ethernet interfaces have two connections, one to each CS LAN router.

OAM&P strategy

CS2000 Management Tools (CMT)/ Integrated Element Management System (Integrated EMS The CMT/IEMS runs on the Server Platform Foundation Software (SPFS) in the Sun Netra hardware. The CMT and IEMS loads can be either combined on the same SPFS servers or on separate servers.

The user interfaces to the Call Agent provide the following functions:

- CS 2000 SAM21 Manager client

  This graphical user interface provides access to platform OAM&P such as platform software load, platform diagnostics, and platform upgrade. Hardware provisioning is also completed through this interface.

- Call Agent Manager

  This menu driven console application provides access to platform alarms, platform performance monitoring, platform logs, platform connectivity, platform patching, and the primary interface for platform functions such as cold Switch of Activity (SWACT), Routine Exercise Test (RExTst), jamming, and synchronization of the call processing application. Access to this interface is provided by a telnet session to the CS 2000 Core Manager or Core and Billing Manager (CBM) and logging in as user “core0usr” or “core1usr.” The CS 2000 Core Manager or CBM forwards valid logins to these accounts to the Call Agent cards.

- MAP

  The MAP is a menu driven console application that provides access to all call processing functions on the Call Agent. Some of the key areas are alarms, logs, and performance monitoring. Once the Call Agent boots and mounts the NFS file system from the STORM units, maintenance and interaction with the file system is completed through this interface. This interface is accessed by telnetting to the CS 2000 Core Manager or CBM and logging in as user “cmusr.” The CS 2000 Core Manager or CBM forwards a valid login to the call processing application.

Interfaces

The following list indicates the physical interfaces for the Call Agent. The Call Agent Manager handles all maintenance and fault reporting for these interfaces.

- Fast Ethernet 100 BaseT

  Each Call Agent has two Ethernet interfaces. The physical connection is made on the rear transition module in each of the SAM21 shelves and is labelled NET1 and NET2. These Ethernet connections terminate to the two routers that are part of the Communication Server Local Area Network (CS LAN).

- fiber channel

  Each Call Agent has a fiber channel interface on the faceplate of the card. These two interfaces are connected with fiber. The Call Agent uses this interface to copy data between the two Call Agents and maintain synchronization of the call processing application. In the SN05 release, the fiber channel connection was enhanced to provide a backup link (BLnk) for messaging between the two Call Agent cards. The BLnk replaces the serial link used in the SN04 release.

Maintenance and fault monitoring of the Ethernet links and the fiber channel interface is completed through the Call Agent Manager.

File system

For the CS 2000 - Compact, file system storage is provided by two STORage Manager (STORM) units. File system storage is used for the following items:

- billing recording, SBA billing backup
- software load management, AUTODUMP, ITOCCI, PMLOADs
- software patches
- logs, operational measurements, and journal file
- file and volume management tools, DISKUT and DISKADM

The Call Agent cards access files stored on STORM units with the Network File System (NFS) protocol. The Call Agents store files in volumes. Each of these volumes is actually a directory on a STORM unit. Each STORM unit manages the data stored to it with Logical Volume Management (LVM) software so that storage size can be increased while data access remains online. The data stored to a STORM unit is mirrored on the two internal disks in the STORM unit.

Geographic Survivability

Geographic Survivability allows services to continue in the event of a catastrophic loss of a call server site caused by a natural or man-made disaster. The components of the system are geographically distributed between two locations. In the configuration the nodes are connected over a fault-tolerant optical network that spans the distance between the two sites.

In steady state, each split component of a 1+1 redundant pair maintains communication with its mate in the other site. The pair decide and negotiate activity between the two components using their existing mastership algorithm. An enhanced mastership algorithm is provided for Geographic Survivability for use primarily in disaster scenarios when an entire site or substantial portions of it are lost. The algorithm detects what portions of the system are still active and reconfigures the system in a optimal mode to maintain services with remaining in-service components.

For CS2000 - Compact, Geographic Survivability allows:

- support up to 75 cable miles (120 cable km) between sites
- 99.999% availability be maintained
- failover in around 30 seconds, with stable calls and billing maintained
- SN08 hardware baseline

The following components are survivable across the two CS2000 - Compact sites:

- ERS8600
- Services Application Module 21 (SAM21)
- Call Agent
- Gateway Controller (GWC)
- Centrex IP Client Manager (CICM) gateway
- CICM Manager
- Media Server 2010 (MS2010). The number of units must be distributed evenly between sites. Media servers share the load and a sufficient quantity are deployed at each site to cover the engineered capacity requirements in the event of a full site loss.
- USP- Compact
- Client PC. One PC is required at each site.
- Contivity. One unit is required at each site.

The CMT and IEMS high availability servers are located in Site A. The CBM high availability server pair is located in Site B. Standby server units are installed in the opposite site and can be recovered manually in the case of an extended site outage.

Session Servers, Policy Controllers, MG 9000 Manager and RTP Media Portal Manager can be provisioned with server pairs located at the same site.

The configuration supports the same gateways as a non-distributed CS2000 - Compact. Gateways are single units and not geographically survivable. The location of these nodes and how they are connected to the network impacts whether they survive a particular failure. The configuration supports RTP Medial Portals similarly to gateways. The portals can be located on an IP network accessible from both sites of a CS2000 - Compact.

For more information about Geographic Survivability, refer to *Carrier VoIP Disaster Recovery Procedures*, NN10450-900. For offices configured with Message Controllers, refer to *Geographic Survivability Planning Guide*, 555-4031-901. Configurations with MCs are supported only in Enterprise (CS2100) solutions.

For information about alarm and log changes and system behavior during fault scenarios for Geographic Survivability, refer to *Call Agent Fault Management*, NN10087-911.

Restrictions

Use of a third-party CS LAN is allowed. However, certain failure scenarios can result in additional call failures and extended recovery times. When An ERS 8600 is used for the CS LAN, the Call Agent can direct the ERS 8600 to disable OSPF on the inactive site to improve the call completion rate. For more information on failure scenarios, refer to *Call Agent Fault Management*, NN10087-911.

Both members of the following component pairs must be located at the same site, that is at either one of the two sites where the core components are located:

- CMS/IEMS. The CMT/IEMS is supported in a high-availability (HA) configuration on Site A. A standby is supported on Site B.
- CBM. The CBM is supported in an HA configuration on site B. A standby is supported on site A.
- Session Servers - SIP Trunking (SS-T) and SIP Lines (SS-L)
- Policy Controller

- Media Gateway 9000 (MG 9000) Manager
- RTP Media Portal Manager
- TDM components of TDM hybrid configurations will not be geographically split

The Geographic Survivability configuration does not support:

- Storage Management compact PCI (STORM cPCI) card and the DotHill RAID combination
- Universal Audio Server (UAS)
- SuperNode Data Manager (SDM)
- CMT/IEMS on Netra T1400
- Multimedia Communication Server (MCS)
- sites spanning multiple time zones
- in-service conversion from a configuration without Geographic Survivability to a configuration with Geographic Survivability

CS 2000 - Compact hardware

The Call Agent hardware is a Single Board Computer (SBC) based on commercially available Compact PCI (cPCI) technology that resides in a Services Application Module 21 (SAM21) shelf. Two Call Agent cards and two SAM21 shelves are required for redundancy. Each Call Agent card resides in its own SAM21 shelf.

The CS 2000 - Compact product hardware is housed in one Call Control Frame (CCF) and one frame for element management, an OAME or COAM frame. All frames are PTE2000 based and are 7 feet high x 2 feet wide x 2 feet deep with front and rear vented doors and optional side panels. A third extension frame, SAMF, NTRX51HA, is available for added port capacity. The SAMF frame is capable of containing two SAM21 shelves and six Audiocodes Media Servers.

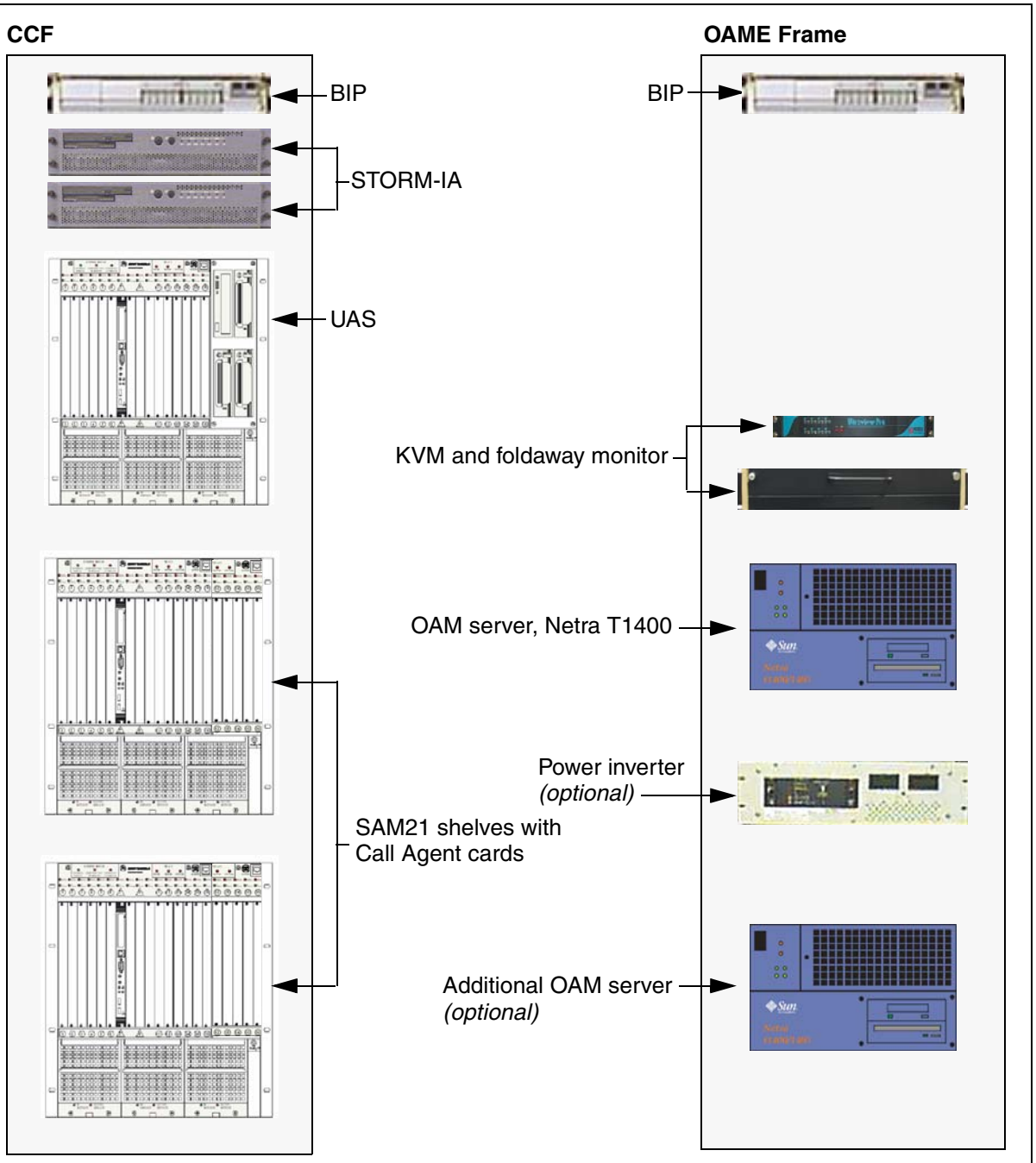
When deployed in an AC powered configuration, the CS 2000 - Compact components are shipped loose to be installed in existing 19 inch frames at the customer site. The PEC for the AC version is NTRX51NZ.

Power distribution for DC powered systems is provided by a breaker interface panel (BIP) located at the top of each frame. The BIP distributes A and B power feeds from the customer's power plant to the shelves within the frame. Power distribution for AC powered systems is a customer responsibility though Nortel recommends each component receive two power inputs from separate circuits to improve reliability.

The OAM hardware is located within the OAME or COAM frame. This hardware consists of one Sun Microsystems T1400 in the OAME frame, or a clustered pair of Sun Microsystems Netra 240s in the COAM frame. The CS 2000 Management Tools software is deployed on the platform to provide element management and various provisioning functions critical to the CS 2000 - Compact. OAME optional equipment includes a KVM switch, foldaway monitor, and additional Sun Microsystems servers. COAM optional equipment includes additional Sun Microsystems servers and disk array storage.

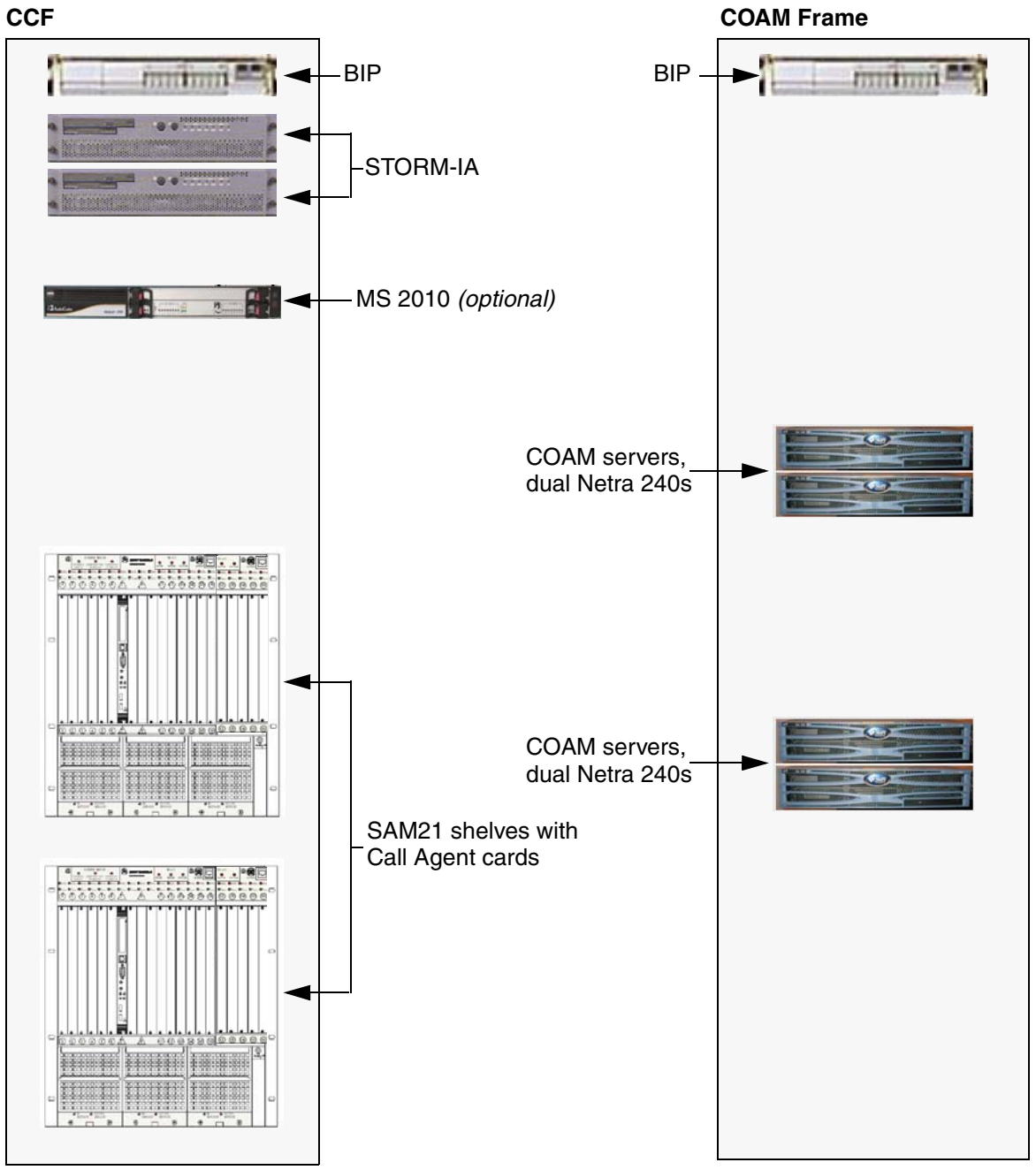
The CS 2000 - Compact is available in the Enterprise market as the CS 2100 - Compact. This configuration is available with two CCFs so that the SAM21 shelves with the Call Agent cards can be distributed geographically, allowing the switch to survive in the event that one of the CCF frames is catastrophically destroyed.

SN06 PTE2000 frame layout



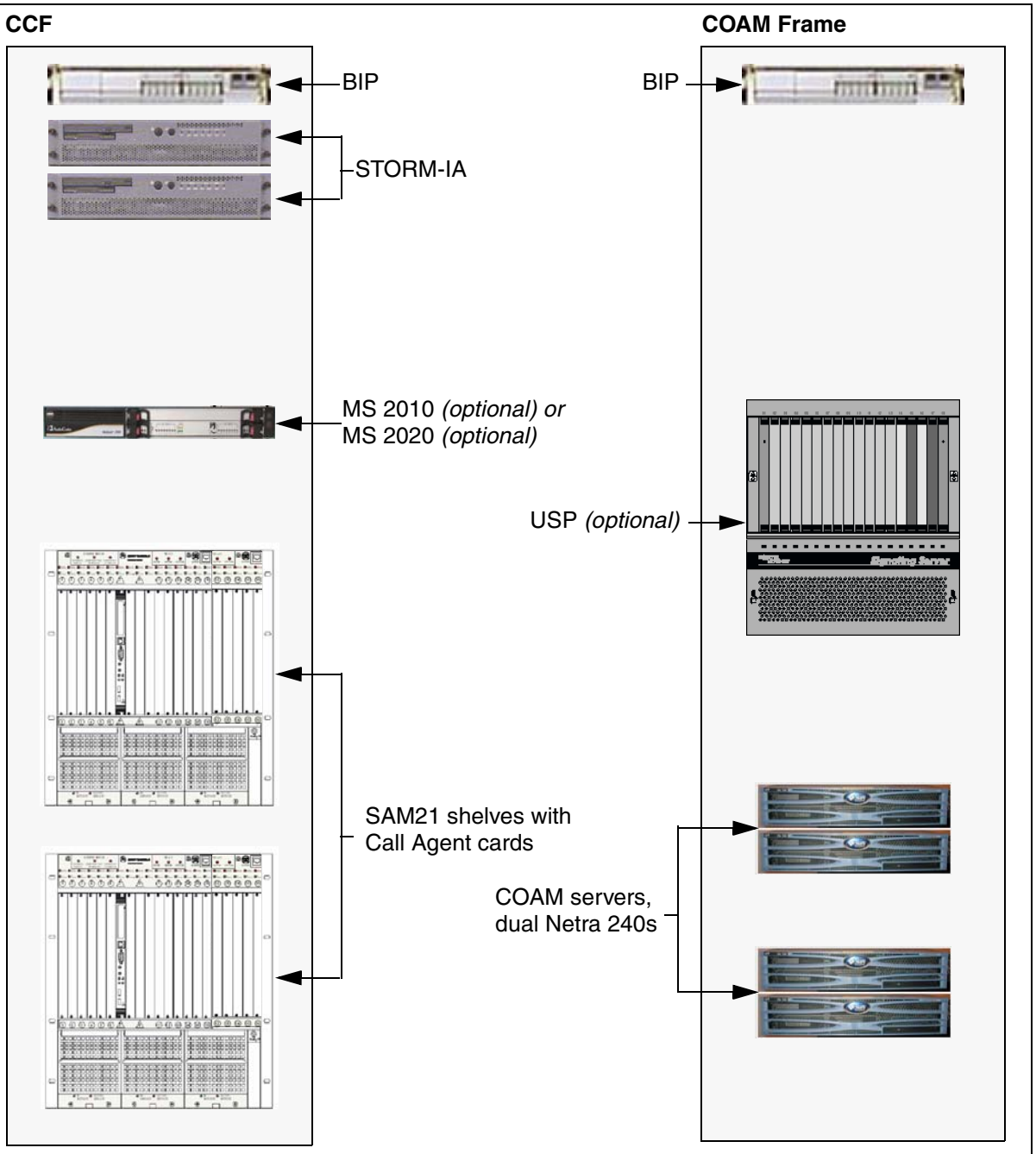
BIP - Breaker Interface Panel
CCF - Call Control Frame
KVM - Keyboard Video Mouse
OAME - Operations, Administration and Maintenance Frame
SAM21 - Services Application Module 21
UAS - Universal Audio Server

SN06.2 PTE2000 frame layout



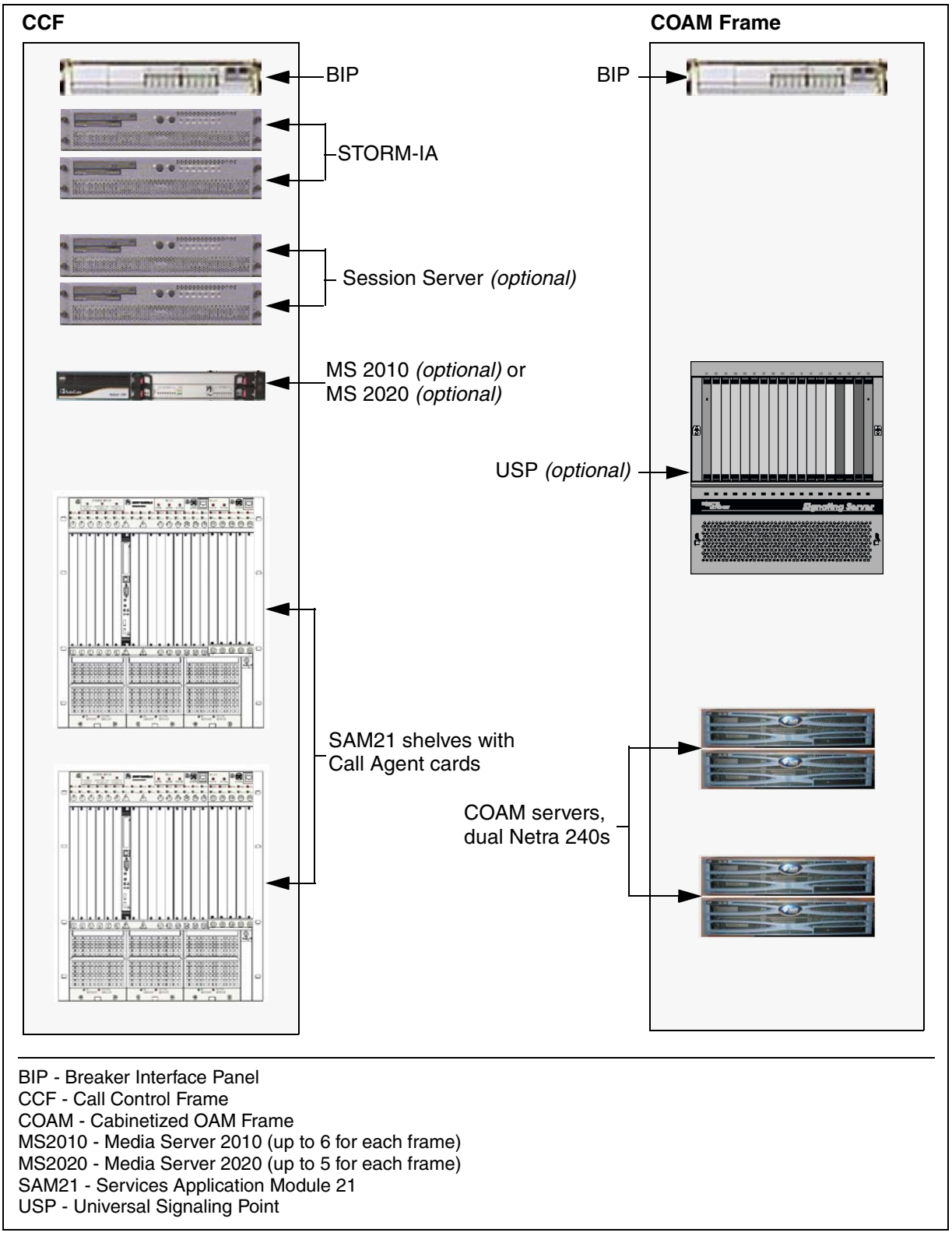
BIP - Breaker Interface Panel
CCF - Call Control Frame
COAM - Cabinetized OAM Frame
MS2010 - Media Server 2010 (up to 6 for each frame)
SAM21 - Services Application Module 21
USP - Universal Signaling Point

SN07 PTE2000 frame layout



BIP - Breaker Interface Panel
CCF - Call Control Frame
COAM - Cabinetized OAM Frame
MS2010 - Media Server 2010 (up to 6 for each frame)
MS2020 - Media Server 2020 (up to 5 for each frame)
SAM21 - Services Application Module 21
USP - Universal Signaling Point

SN08 PTE2000 frame layout



BIP - Breaker Interface Panel
CCF - Call Control Frame
COAM - Cabinetized OAM Frame
MS2010 - Media Server 2010 (up to 6 for each frame)
MS2020 - Media Server 2020 (up to 5 for each frame)
SAM21 - Services Application Module 21
USP - Universal Signaling Point

Call Control Frame hardware

The CS 2000 - Compact is housed in the Call Control Frame (CCF), an OAME or COAM frame, and an optional SAMF frame if additional capacity is needed.

Call Control Frame (CCF)	Status
NTRX51FA *(for STORM cPCI)*	Supported
NTRX51TA *(for STORM-IA, MS2010/MS2020 Media Servers and Session Server)*	Shipping baseline
The CS2000 - Compact hardware is located in the CCF. This includes the two STORM-IA and two SAM21 shelves. The SAM21 shelves are equipped with the Call Agent cards, Gateway Controllers (GWC) cards, SAM21 Shelf Controller cards, and optionally USP-Compact (USPc) and Centrex IP Client Manager (CICM) cards. Up to six MS 2010 chassis or five MS 2020 chassis may also reside in the CCF assuming Session Server is not provisioned.	

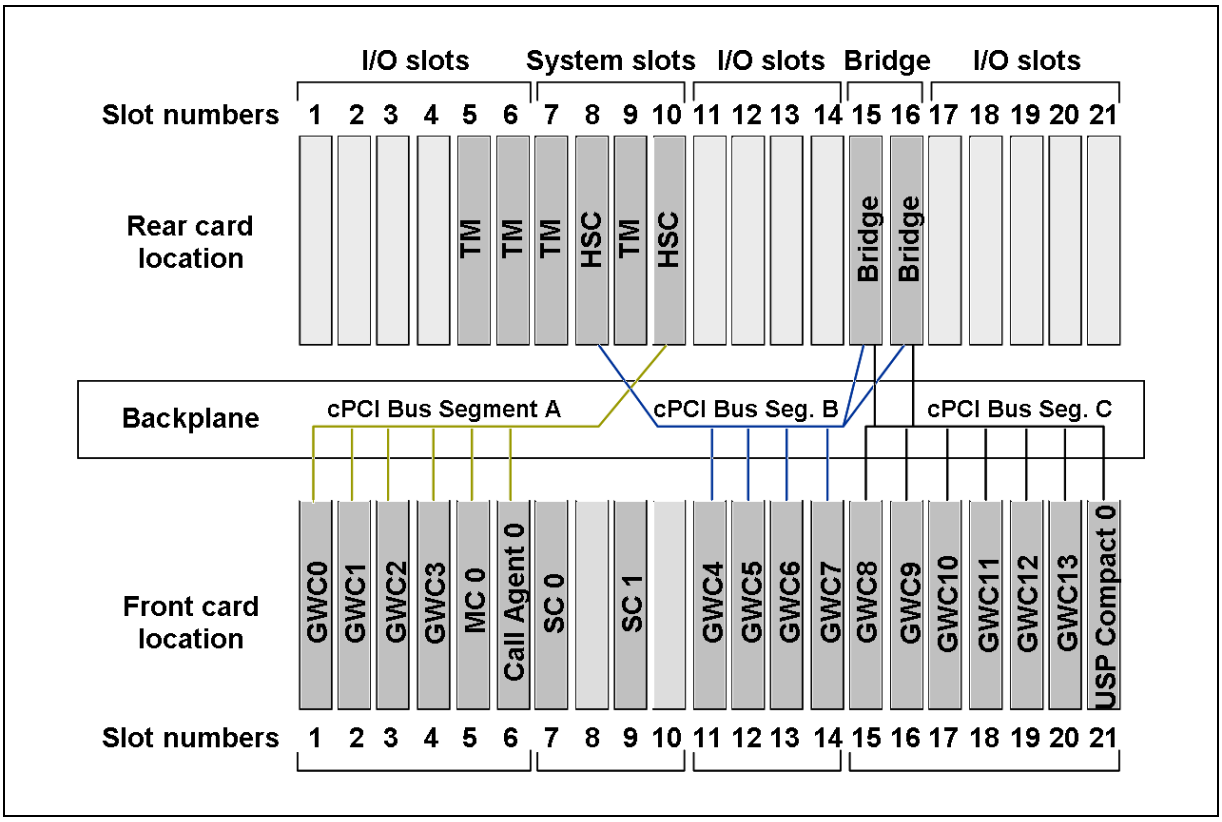
Power distribution shelf, BIP	Status
NTRX51HD	Shipping baseline
The Breaker Interface Panel (BIP) occupies the top position in the frame. The BIP has an alarm module and up to four breaker modules. Locations not occupied by a breaker module require a filler module. The Alarm Module NTRX51HC monitors BIP status and has four inputs to monitor shelf level alarm outputs. Front panel LEDs indicate minor, major, and critical alarms. An array of yellow LEDs provides “Follow Me” visual indicator for operating company personnel. The alarm module also provides connections for gathering lineup alarms. Each Breaker Module has an independent DC input power feed and distributes up to five power feeds to shelves in the frame. Breaker Modules are provided in pairs, one for the "A" power feed and one for the "B" feed. An optional Breaker Interface Module (NTRX51HN) (5,5,5,15,15) (BIM) at the top of each frame supports power distribution to the Session Server.	

STORage Manager (STORM)	Status
NTRX51FM cards, and DotHill RAID chassis *(for STORM cPCI)*	Supported
NTRX51GX, *(for STORM-IA)*	Shipping baseline
NTRX51NE, *(for STORM-IA, AC power)*	Shipping baseline
The STORM-IA application provides persistent data storage. The application runs on a redundant pair of SAM-XTS servers that are installed directly below the BIP. The SAM-XTS is a 2U NEBS-compliant server based on Intel architecture. Each server has a 2+ GHz Pentium 4 Xeon Processor and contains two hot swap SCSI disk drives (72 GB). Connectivity to the STORM-IA is through dual gigabit Ethernet Base-T copper interfaces. Each server is connected to both CS LAN routers/switches, and the servers are also connected to each other over gigabit Ethernet with a pair of NTRX5145 cables.	

SAM21 shelf	Status
NTRX51FX, *(for SAM21 shelf)*	Shipping baseline
NTRX51NA, *(for SAM21 shelf, AC power)*	Shipping baseline
The Nortel SAM21 shelf uses Motorola CPX8221 hardware. An alarm panel is at the top of the shelf, above the card slots. The fan and power supplies are located at the bottom of the shelf, below the card slots.	

Packfill depends on the office configuration and customer needs. Figure SAM21 Shelf slot layout shows packfill for front and rear card locations. The Message Controller in slot 5 is available in some markets that need to support services provided by legacy peripheral modules (PM).

SAM21 Shelf slot layout



SAM21 Shelf Controller	Status
NTRX51BH	Supported
NTRX51FH	Shipping baseline
NTRX51BK *(Transition Module)*	Shipping baseline

SAM21 Shelf Controller cards are provisioned in slots 7 and 9 of each CPX8221 shelf. Each card has one 10/100 BaseT Ethernet port. The hardware is a Motorola SMM750HA-1352-F board, model number MCP750HA, with a MPC750 366MHz processor and 128 MB RAM, running Linux PowerPC operating system. Two transition modules are provided with each SAM21 shelf.

Gateway Controller (GWC)	Status
NTRX51BL *(MCG MCPN750)*	Shipping baseline
NTRX51DL *(MCPN905-240)*	Shipping baseline

GWC cards are configured in pairs, one active and one standby. On new installations, the cards are split between the two SAM21 shelves to provide cross-shelf sparing. Each GWC card has one 10/100 BaseT Ethernet port.

The MCG MCPN905-240 card has 1.0GHz and 512 MB RAM. The Motorola MCPN750 board, model number MCPN750A, with a 366 MHz processor and 128 MB RAM, is supported in SN08.

The 750- and 905-based cards can coexist in a CS2000 - Compact. However, both GWC cards of a mated pair must be of a consistent hardware type: they cannot be mixed, except as part of the upgrade process.

GWCs are not needed for CS 2000 - Compact offices that use TDM peripherals only.

Call Agent	Status
NTRX51FZ *(1.0 GB RAM)*	Supported
NTRX51GZ *(1.5 GB RAM)*	Shipping baseline
NTRX51FS *(Transition Module)*	Shipping baseline

Two Call Agent cards (NTRX51GZ) are used for redundancy, with only one being active at a time. The cards must be on different shelves. Each Call Agent has two 10/100 BaseT Ethernet ports and a fiber channel interface, providing ATM over OC-3 that is connected directly to the fiber channel interface on the other Call Agent. If the Call Agent is part of an Enterprise CS 2100 with Geographic Survivability, the fiber channel interface is connected to the CS LAN.

The Call Agent card is a Motorola MCPN765 board, with MPC7410 500 MHz processor and 1.5GB RAM, running LinuxPPC operating system (Nortel distribution). Ethernet ports are on the rear Transition Module. The fiber channel interface is provided by a Systran fiber channel PCI Mezzanine Card (PMC). An NTRX51FS transition module is needed for each Call Agent card.

Message Controller	Status
NTRX51GY	Shipping baseline
NTRX51FS *(Transition Module)*	Shipping baseline

Message Controller cards are used in configurations requiring connectivity to legacy peripheral modules (PM). The hardware includes two MC cards (NTRX51GY), and two rear Transition Modules. Each MC is a Motorola MCPN765 board with MPC7410 500 MHz processor, 512 MB RAM, two multi-mode ATM PMCs, and two 10/100 Ethernet ports, running LinuxPPC operating system (Nortel distribution), and using the open source ATM stack. The PMCs are Interphase 4576-500A.

Hardware runs in a diskless standalone design that has no user login capability. However, a login method exists for Nortel field access.

Centrex IP Client Manager and CICM Manager	Status
NTRX51HJ *(Processor Card)*	Shipping baseline
NTRX51HK *(Transition Module)*	Shipping baseline

CICM provides Centrex IP functionality for the Carrier Voice over IP network by exchanging H.248 protocol messages with GWCs. Hardware is a Motorola 5385 card with a 40GB hard drive and a Transition Module.

CICM provides the following functionality:

- parses incoming H.248 messages from GWC
- generates outgoing H.248 messages to GWC
- manages call context, including NULL context
- manages physical, ephemeral, and root terminations, including state
- isolates hardware specific details from the H.248 functionality by providing neutral interfaces
- implements a synchronization mechanism with a peer MG
- provides QoS reporting

Media Server	Status
Universal Audio Server (UAS)	Supported
MS 2010 - NTRX51JF	Shipping baseline: 120 ports, no conferencing, IP
MS 2010 - NTRX51JG	Shipping baseline: 240 ports, no conferencing, IP
MS 2010 - NTRX51JJ	Shipping baseline: 120 ports, conferencing, IP
MS 2010 - NTRX51JK	Shipping baseline: 240 ports, conferencing, IP
MS 2010 - NTRX51JL	Shipping baseline: 240 ports PT-IP solution, no conferencing, IP
MS 2010 - NTRX51NK	Shipping baseline: 120 ports, no conferencing, AC power, IP
MS 2010 - NTRX51NL	Shipping baseline: 240 ports, no conferencing, AC power, IP
MS 2010 - NTRX51NM	Shipping baseline: 120 ports, conferencing, AC power, IP
MS 2010 - NTRX51NN	Shipping baseline: 240 ports, conferencing, AC power, IP
MS 2020 - NTRX51MA	Shipping baseline: 240 ports, no conferencing, ATM
MS 2020 - NTRX51MB	Shipping baseline: 480 ports, no conferencing, ATM
MS 2020 - NTRX51MC	Shipping baseline: 240 ports, conferencing, ATM

Media Server	Status
MS 2020 - NTRX51MD	Shipping baseline: 480 ports, conferencing, ATM

The rackmount chassis that host the Media Server application are 1U 19-inch for MS 2010, and 2U 19-inch for MS 2020. The processing function in the chassis is provided by the Audiocodes IPM-1610 for the MS2010 and TP-6310 for the MS2020. The MS 2010 is available on the NTRX51TA Call Control Frame and for AC powered CS 2000 - Compact, NTRX51NZ. It is not available for NTRX51FA. It replaces the SAM16 UAS IP solution as of SN06.2.

USP - Compact	Status
NTRX51FN *(for T1 interface)*	Shipping baseline
NTRX51FJ *(for E1 interface)*	Shipping baseline
NTRX51TD *(T1 or E1 mode)*	Provisionable Default: T1

The USP - Compact provides a cost effective Signaling Gateway function in a small footprint. One USP - Compact system consists of two USP - Compact cards (MCPN905-220, 866 MHz, 512 MB). The USP - Compact cards can be located on the SAM21 shelf in the CS2000 - Compact, or on different shelves to increase redundancy (recommended).

USP - Compact supports a maximum of 16 links and linksets on the two cards. USP - Compact supports channelized T1/E1 SS7 links (4 or 8 channels per card), and IPS7 connections, but does not support m2pa IP High speed SS7 links, ATM based high speed SS7 links, DS0a SS7 links, or V-35 SS7 links.

OAME/COAM frame hardware

The OAME frame in SN06, or COAM frame in SN06.2 contains the hardware required for element management.

Frame	Status
NTRX51KE *(OAME)*	Supported
NTRX51LA *(COAM)*	Shipping baseline

CS 2000 Management Tools server/Integrated EMS	Status
Sun Microsystems Netra T1400	Supported in NTRX51KE
NTRX51LC - Sun Microsystems Netra 240 with 4 GB RAM	Shipping baseline
With the Netra 240 servers, either two units running in high availability cluster mode or simplex mode can be configured.	
This server runs management application software such as CS 2000 SAM21 Manager, GWC Manager, QOS Collector Application (QCA), Trunk Maintenance Manager (TMM), Line Maintenance Manager (LMM), and OSS configuration gateway (OSSGATE). In SN06.2 configurations this host can also provide the Audio Provisioning Server (APS).	

Billing Manager	Status
SuperNode Data Manager (SDM)	Shipping baseline until manufacture-discontinued. Not supported for configurations with Geographic Survivability

Billing Manager	Status
Core and Billing Manager (CBM)	Shipping baseline after SDM is manufacture -discontinued

For SN07 the Core and Billing Manager (CBM) replaced the SuperNode Data Manager (SDM) as the billing and core management system for the CS 2000 - Compact.

In SN08, the CBM is setup in a high availability configuration using two Sun Microsystems Netra 240 servers in the COAM frame. The CBM software consists of the CSEN application load. CBM is *not* supported on the T1400 hardware.

KVM switch and foldaway monitor	Status
	Supported, no longer shipped

The Keyboard Video Mouse (KVM) switch and one foldaway monitor were provided as part of the SAM16 based Universal Audio Server (UAS). The functionality provided by the UAS is now provided by the Media Server 2000 series.

Power inverter	Status
	Supported, no longer shipped

The inverter was required to provide AC power to the KVM.

SAMF frame

The SAMF is an optional frame.

Frame	Status
NTRX51HA	Shipping baseline
Optional SAMF frames are available for added port capacity. Each SAMF can support up to two SAM21 shelves, or two SAM21 shelves, six MS 2010s or five MS2020s. Two Session Server chassis are always provisionable in the SAMF frame, regardless of the number of SAM21 shelves or media servers. Two SAM21 shelves in the SAMF can support up to 16 GWC pairs. The GWC units are split across shelves for extra reliability. CICM application cards can be provisioned in the SAM21 shelves. Up to 15 CICM cards can be provisioned in each SAM21 shelf. Each CICM card requires an NTRX51HM transition module. CICM cards cannot be provisioned in slots 15 or 16 because those slots do not support transition modules.	

Environmental specifications

This section identifies the power requirements, environmental tolerances, and regulatory compliance information.

Power requirements

The following table lists power requirements for the CCF and SAMF.

Power requirements for CCF and SAMF

Frame	Equipment	Current draw at -48 VDC (nominal)	Current draw at -41.5 VDC (maximum draw)
CCF (NTRX51TA)	Standard configuration: two SAM21 shelves, two STORM-IA, two Call Agent cards, Session Server	18 Amps	21 Amps
	GWC (NTRX51BL)	Add 0.75 Amps for each GWC pair	Add 0.9 Amps for each GWC pair
	GWC (NTRX51DL)	Add 1.3 Amps for each GWC pair	Add 1.5 Amps per GWC pair

Power requirements for CCF and SAMF

Frame	Equipment	Current draw at -48 VDC (nominal)	Current draw at -41.5 VDC (maximum draw)
	USP - Compact (NTRX51FJ/FN)	Add 0.9 Amps for each pair	Add 1.0 Amp for each pair
	CICM (NTRX51HJ) and CICM Manager (NTRX51HK)	Add 1.2 Amps for each CICM or CICM Manager pair	Add 1.4 Amps for each CICM or CICM Manager pair
	Message Controller (NTRX51GY/FS)	Add 1.6 Amps for each pair	Add 1.8 Amps for each pair
	MS 2010 chassis (NTRX51JF/JG/JJ/JK/JL)	Add 0.9 Amps for each chassis	Add 1.0 Amp for each chassis
	MS2020 chassis (NTRX51MA/MB/MC/MD	Add 2.0 Amps for each chassis	Add 3.5 Amps for each chassis
SAMF (NTRX51HA)	SAM21 shelf (NTRX51FV)	Add 3.5 Amps for each SAM21 shelf	Add 4.1 Amps for each SAM21 shelf
	GWC (NTRX51BL)	Add 0.75 Amps for each GWC pair	Add 0.9 Amps for each GWC pair
	GWC (NTRX51DL)	Add 1.3 Amps for each GWC pair	Add 1.5 Amps per GWC pair
	CICM (NTRX51HJ) and CICM Manager (NTRX51HK)	Add 1.2 Amps for each CICM or CICM Manager pair	Add 1.4 Amps for each CICM or CICM Manager pair
	MS 2010 chassis (NTRX51JF/JG/JJ/JK/JL)	Add 0.9 Amps for each chassis	Add 1.0 Amp for each chassis
	MS 2020 chassis (NTRX51MA/MB/MC/MD	Add 2.0 Amps for each chassis	Add 3.5 Amps for each chassis
	Session Server (NTRX51HX)	Add 3.0 Amps for each chassis	Add 3.5 Amps for each chassis

The following table lists power requirements for COAM frames.

Power requirements for COAM frames

Equipment	Voltage range	Typical current (Amps)	Comment
Frame level	-40 to -57 VDC	14.5 A at -48 VDC (700 watts) for two Netras and Inverter	Four feeds rated at 68 A
Sun Microsystems Netra 240	-36 to -72 VDC	6.0 A at -48 VDC (300 watts)	20-amp breaker
KVM switch	120 VAC	0.2 A at 120 VAC	Inverter powered
Foldaway monitor	120 VAC	0.2 A at 120 VAC	Inverter powered
Inverter	-48 VDC	2.5 A at -48 VDC	20-amp breaker
BPS2000	-40 to -57 VDC	2.0 A at -48 VDC	5-amp breaker

For best AC power redundancy, Nortel recommends a minimum of twelve 15-Amp circuit breakers dedicated to the CS 2000 - Compact. Each circuit breaker should provide power to a single duplex receptacle, for a total of 24 plug in locations. A 15-foot power cable is provided for each power input. Because the cables are 15 feet, receptacles must be within three feet of the frame. Follow the connection strategy below:

AC power circuit and outlet strategy

Equipment	Circuit breaker	Outlet
SAM21 0-A	0	0-0
SAM21 1-A	1	1-0
STORM 0-A	2	2-0
STORM 0-B	3	3-0
STORM 1-A	2	2-1
STORM 1-B	3	3-1
Session Server 0-A	4	4-0

AC power circuit and outlet strategy

Equipment	Circuit breaker	Outlet
Session Server 0-B	5	5-0
Session Server 1-A	4	4-1
Session Server 1-B	5	5-1
Media Server 2010 0-A	6	6-0
Media Server 2010 0-B	7	7-0
Media Server 2010 1-A	6	6-1
Media Server 2010 1-B	7	7-1
CBM 0-A	8	8-0
CBM 0-B	9	9-0
CBM 1-A	8	8-1
CBM 1-B	9	9-1
CMTT 0-A	10	10-0
CMTT 0-B	11	11-0
CMTT 1-A	10	10-1
CMTT 1-B	11	11-1
Miscellaneous	12	As required

Power requirements for AC powered equipment

Equipment	Voltage range	Typical current (Amps)	Comment
SAM21 shelf, NTRX51NZ	90-260 V AC, 47-63 Hz	1.8 A at 115 VAC	no cards inserted
		2.02 A at 115 VAC	two SAM21 Shelf Controllers inserted
		2.39 A at 115 VAC	one Message Controller and two SAM21 Shelf Controllers inserted

Power requirements for AC powered equipment

Equipment	Voltage range	Typical current (Amps)	Comment
		0.13 A at 115 VAC	Add 0.13 A for each GWC card inserted.
		TBD A at 115 VAC	Add *TBD A* for each MCPN905 GWC card
		0.26 A at 115 VAC	Add 0.26 A for each USP - Compact inserted.
		TBD A at 115 VAC	Add *TBD A* for each USPc MCPN905-220.
		4.53 A at 115 VAC	fully loaded shelf, two SAM21 Shelf Controllers, one Call Agent, one Message Controller, one USP - Compact, and 14 GWCs
		4.53 A at 115 VAC	fully loaded shelf, two SAM21 Shelf Controllers, one Call Agent (MCPN905-270), one Message Controller, one USP - Compact (MCPN905-220), and 14 GWCs (MCPN905-240)
COAM server, Sun Microsystems Netra 240	90-260 VAC, 47-63 Hz	3 A at 115 VAC	3 A for each COAM server (very minor difference between CMTT and CBM)
SAM-XTS - STORM-IA and Session Server	100-127 VAC, 60 Hz, or 200-240 VAC, 50 Hz	2.5 A at 115 VAC	2.5 A for each chassis
Media Server 2010	90-260 VAC, 47-63 Hz	0.75 A at 115 VAC	0.75 A for each MS 2010

Environmental tolerances

The environmental specifications for each of the PTE 2000 based frames:

- temperature and humidity
  - — during storage and transportation

    temperature: -40 degrees Celsius to +70 degrees Celsius

    humidity: maximum 95% at 40 degrees Celsius
  - — installed and operational

    temperature: +5 degrees Celsius to +40 degrees Celsius

    short term temperature: -5 degrees Celsius to +50 degrees Celsius for less than 96 hours

    humidity: 5 to 85%

    short term humidity: 5 to 90%, not to exceed 0.024 kg water/kg of dry air
- altitude

  installed and operational: -60 m (-197 ft.) to+1800 m (5905 ft.) above sea level
- earthquake

  Each frame meets Telcordia Earthquake Zone 4 requirements when installed with appropriate frame anchor kits.
- acoustic

  Each frame meets the Verizon NEBS checklist, SIT.NEBS.TE.NPI.2002.010, limit of 75 dB(A). In addition, the COAM frame meets the GR-63 Core requirement of 60 dB(A).

Regulatory compliance

Electromagnetic Compatibility (EMC)

The CS 2000 - Compact is tested and complies with the following EMC requirements described in the *CMAC Electromagnetic Compatibility Test Plan*, R0000698-TP-EMC-NEBS-01-01:

- radiated emissions
- conducted emissions
- conducted immunity
- radiated immunity
- surge/voltage transients
- electrical fast transient burst

- ESD
- HF voltage dips and sags
- LF voltage dips and sags

The tests cover compliance to Verizon NEBS, AT&T NEDS, and SBC requirements.

Product safety

The CS 2000 - Compact complies with the following product safety requirements:

- UL 60950
- EN 60950
- GR-1809-CORE Electrical Safety
- CSA C22.2 No. 60950

CS 2000 - Compact software

Call Agent software is divided into three layers:

- platform (non call processing)

  A Linux operating system and maintenance software image is stored on the CS 2000 Core Manager or CBM and loaded by the Call Agent when the Call Agent boots. The software release is available with the **QryLd** command at the Call Agent Manager. Refer to *Call Agent Performance Management*, NN10153-711 for more information.

- virtual machine

  Peel is a Nortel-developed application. This application provides a Protel Environment Emulation Layer (PEEL) that acts as a virtual machine for the call processing application. This software is delivered as part of the platform software.

- call processing application

  Call processing is provided by a Nortel-developed core image that operates in the virtual machine. This software is patchable with the Post-Release Software Manager (PRSM) tool available at the Command Interpreter (CI) level of the MAP. The software version is available from the CI with the **IMAGENAME** command.

Operations, Administration, and Maintenance (OAM) of the Call Agent is provided through the Call Agent Manager.

Call Agent Manager

```
 CallAgent      SYS      CON      APPL             Unit: 0
    .            .        .        .

Sys                        Jam:  Link0:  Link1: BLnk: FC: Appl:
 0 Quit      Unit0  Act    no    . Act   . Inact  .    .   insync .
 2 QryCPU    Unit1  Inact  no    . Act   . Inact  .    .   insync .
 3 QryDsk
 4 QryMem
 5 QryZmb
 6 QryNFS
 7 QryLd
 8 QryNTP
 9 QryCpUtl
10
11
12
13 LogQuery
14 Alarm
15 QueryIP
16
17 Help
18 Refresh
  mtc
Time  07:40  >
```

(Software applications and version information)

```
System load report retrieved on Tue May 20 07:40:23 2004:

     Ramdisk: ncgl_cca_image_5.15.1.0
       Linux: 2.4.22 #1 Wed Apr 19 03:03:29 EDT 2004
        Peel: 6.4.48
 Maintenance: 5.0.48
```

Fault management of the call processing application is available at the MAP.

CI level of the MAP

```
2002/08/07 21:22 OFC_CLLI
>IMAGENAME
PPC_3PC_CORE BCS 55 CE built on 2004-APR-12 at 16:51:00 using
csnn07ce
PRODUCT: SNNCSC.007
LOAD: SNC00.007
LAYER: BAS.21.0.CE
LAYER: TL.20.0.CE
LAYER: SHR.20.0.AA
LAYER: CCM.20.0.CE
LAYER: CNA.20.0.CE
LAYER: UCS.20.0.CE
LAYER: TOPSC.20.0.CE
LAYER: CNATOPS.20.0.CE
LAYER: BCTOPS.20.0.CE
LAYER: MSH.20.0.CE
LAYER: SNNCSH.07.0.CE
```

MAPCI level of the MAP

```
MAPCI
 0 Quit
 2 Mtc
 3 SASelect
 4 NWM
 5 CPSys
 6 IBNMEAS
 7
 8 FPE
 9 TESTTOOL
10
11
12
13
14
15
16
17
18
  USERNAME
Time  18:42  >
```

Upgrade and patch system

The platform software is patchable, with the exception of the Linux kernel. Maintenance release (MR) software is delivered by electronic transfer or CDROM. Platform patches are delivered to the electronic dropbox or CS 2000 Core Manager through regional patch selector (RPS). If the office uses a CBM instead of a CS 2000 Core Manager, the patches are delivered to the CBM.

Platform MRs are reprovisioned from the CS 2000 SAM21 Manager client application. A Lock and Unlock request loads the new software. If a firmware upgrade is delivered with the SAM21 platform software load and the FW flash enable checkbox is checked at the Card View window of the CS 2000 SAM21 Manager client, the upgrade firmware is applied during the unlock request. Platform patches are applied through the Call Agent Manager. Refer to the *Upgrading the Call Agent*, NN10065-461 information about platform software patching and the platform software upgrade procedure.

The call processing application software is patchable. This software is patchable through the PRSM in the PRSM level of the MAP. The application is upgraded through Product Computing Module Loads (PCL). Refer to the *Upgrading the Call Agent*, NN10065-461 for information about upgrading the call processing application software. Refer to the *Post-Release Software Manager Reference Manual*, 297-8991-540 for information about call processing application patching.

If a customer prefers having Nortel Software Delivery personnel perform upgrades, contact your account representative and discuss what software services are available in your market.