



# Communication Server 2000 Basics

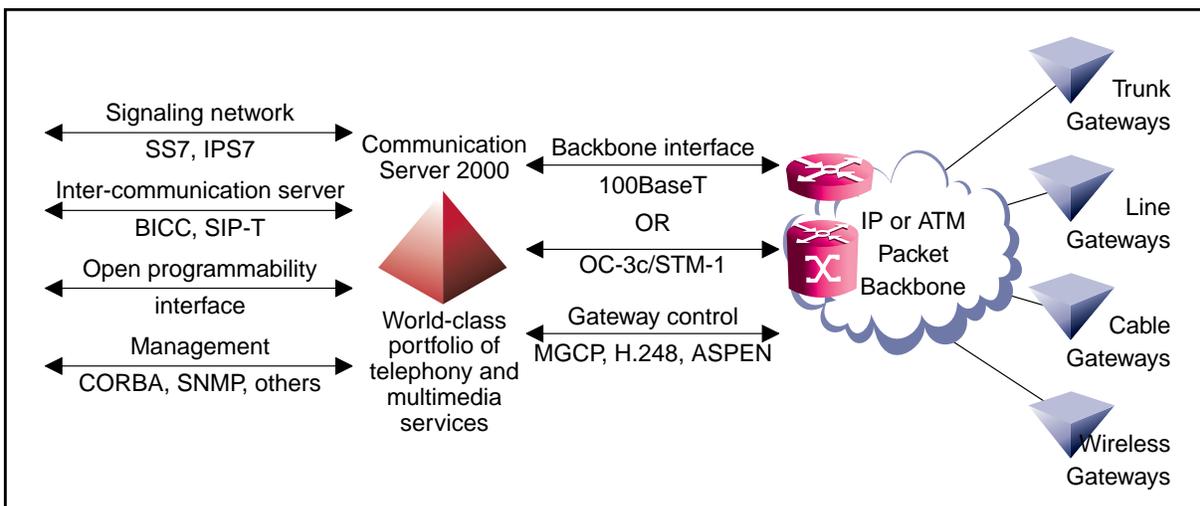
This document provides an overview of the Nortel Communication Server 2000 (CS 2000).

The CS 2000 product is a member of the Carrier VoIP portfolio of network elements. Within this portfolio, CS 2000 acts as a media gateway controller and signaling gateway to support next generation networks (NGN). CS 2000 operates in a multi-vendor network architecture that decouples services from connectivity. This architecture is feature-rich, transport-efficient, and scalable.

## Functional description

CS 2000 enables service providers to offer their residential and business customers a comprehensive set of telephony services that use packet networks. These services include a call processing engine and feature set that provide complete equivalence with class 3 through class 5 central office digital switches. CS 2000 supports the migration from circuit switched to packet networks (referred to as evergreen) as well as the deployment of new packet telephony networks (referred to as greenfield).

## Communication Server 2000 network role



### Product description

The CS 2000 is a composite product that includes principal and auxiliary components.

The principal components provide the media gateway controller and signaling gateway functionality that characterize a communication server. The principal components of the CS 2000 are

- the extended architecture core (XA-Core)
- the message switch (MS)
- the fiberized link peripheral processor (FLPP), which contains CCS7 link interface units (LIU7)
- the gateway controller (GWC)

**Note:** There is one case in which the CS 2000 does not include a GWC. That is the case in which the CS 2000 is used in a PT-AAL1 solution. In the PT-AAL1 solution the CS 2000 interworks with the Nortel Media Gateway 4000 (MG 4000), and the MG 4000 provides the gateway-controller-like functionality. For information on the PT-AAL1 solution and on the MG 4000 as used in that solution, see *UA-AAL1 Solution-level Basics*, NN10443-100.

Auxiliary components provide support functions like power distribution and cooling. The auxiliary components of the CS 2000 are the cabinets housing the principal components and the power supplies that support the principal components.

## Functionality of the CS 2000

The following sections briefly describe the functionality provided by the CS 2000.

### Media gateway controller functionality

The extended architecture core (XA-Core) and gateway controller (GWC) act as the media gateway controller. The XA-Core and GWC allow the CS 2000 to control the media gateways (MG) used to set up and teardown bearer path connections across the packet network. In this way CS 2000 provides translations and routing control for the entire network.

### Signaling gateway functionality

The CCS7 link interface unit (LIU7) provides the signaling gateway functionality. The LIU7 connects the CCS7 signaling network to the XA-Core through the message switch using DS-512 connections. (The LIU7 is housed in the fiberized link peripheral processor (FLPP)).

There is an alternative way in which the CS 2000 can provide signaling gateway functionality. The CS 2000 can work with the universal signaling point (USP) to provide signaling gateway functionality.

**Note:** A CS 2000 employs either the USP or the LIU7, but never both, to provide signaling gateway functionality.

### Interworking functionality

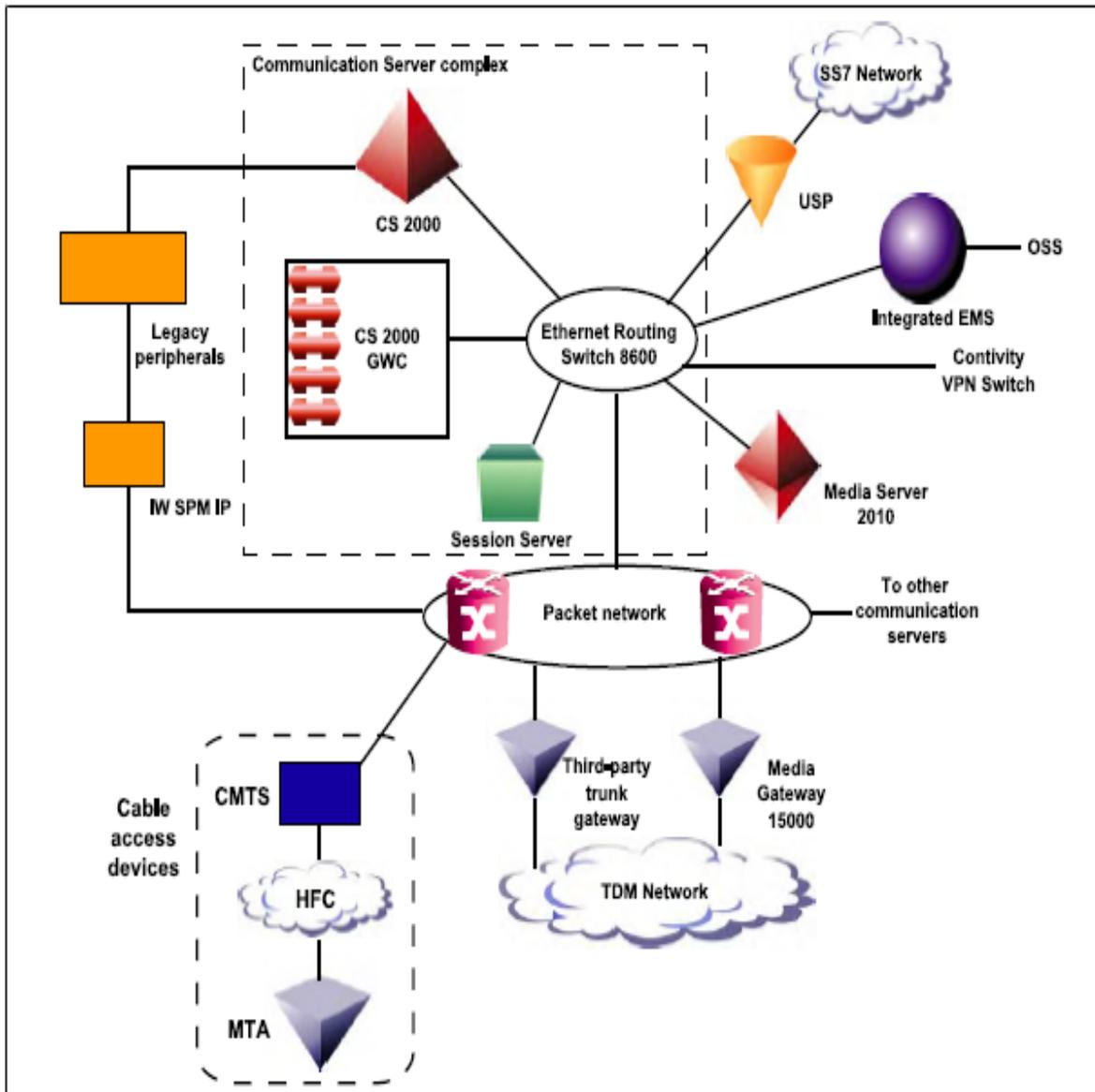
The CS 2000 also interworks with selected time division multiplex core (TDM-Core) components to provide centralized call control between the packet-switched network and the public switched telephone network (PSTN).

## Roles of the CS 2000 as used in various solutions

The following figures show the network roles of the CS 2000 as used in various Carrier VoIP solutions. Each figure shows the set of systems and network components that the CS 2000 interworks with in the solution.

The following figure shows the CS 2000 as used in the Integrated packet access solution – cable media (IAC).

## CS 2000 in the IAC solution

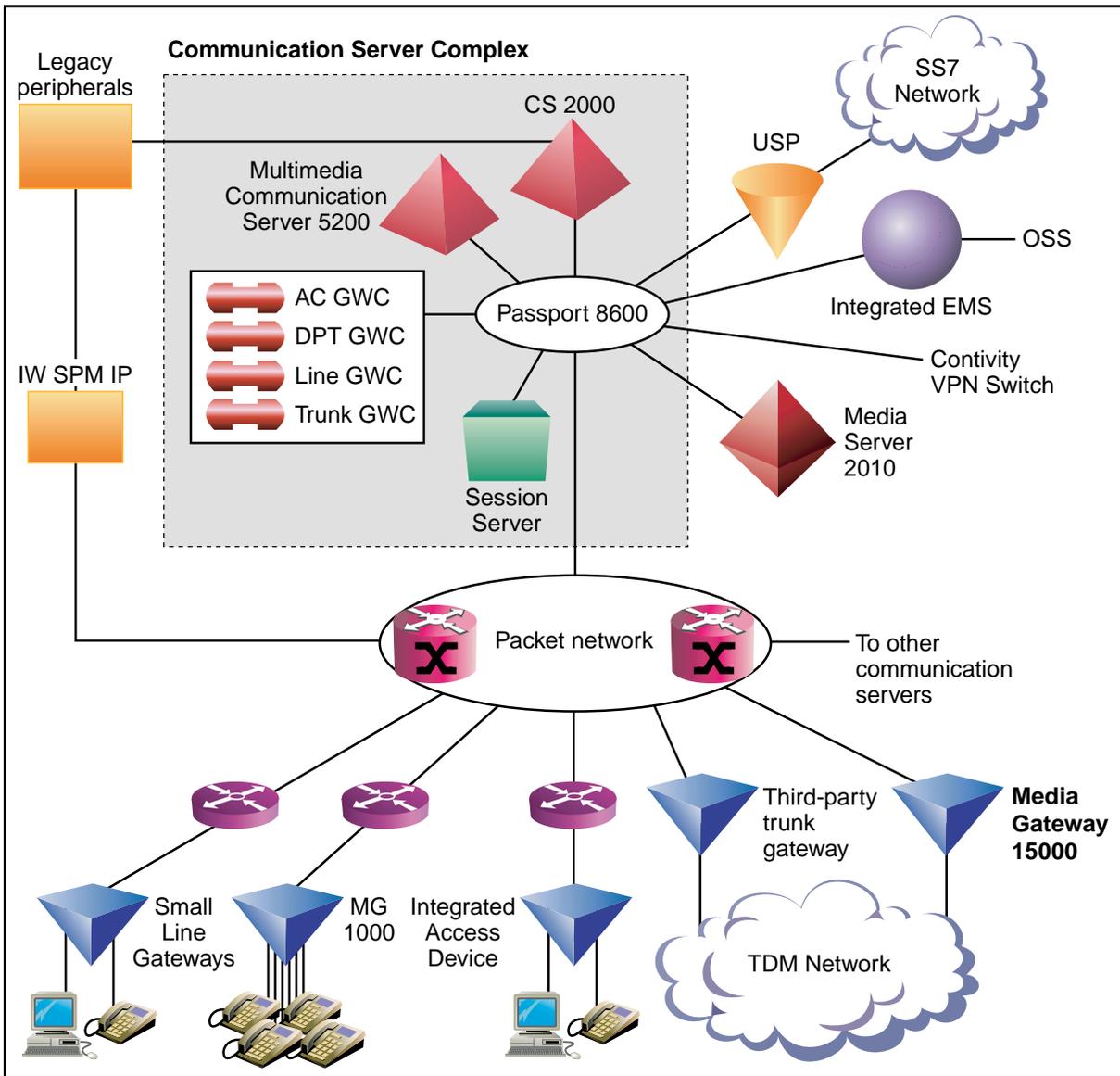


**Note 1:** In the figure, the term “Communication server complex” refers to the CS 2000 and the components and systems with which the CS 2000 interworks most closely. For a list of the components and systems, see [Communication within the CS 2000 complex](#).

**Note 2:** For information about the IAC solution, and about the interworking components and the protocols shown in the figure, see *Integrated Access Cable Solution-level Basics (IAC)*, NN10444-100.

The following figure shows the CS 2000 as used in the Integrated packet access solution (wireline) (IAW).

**CS 2000 in the IAW solution**

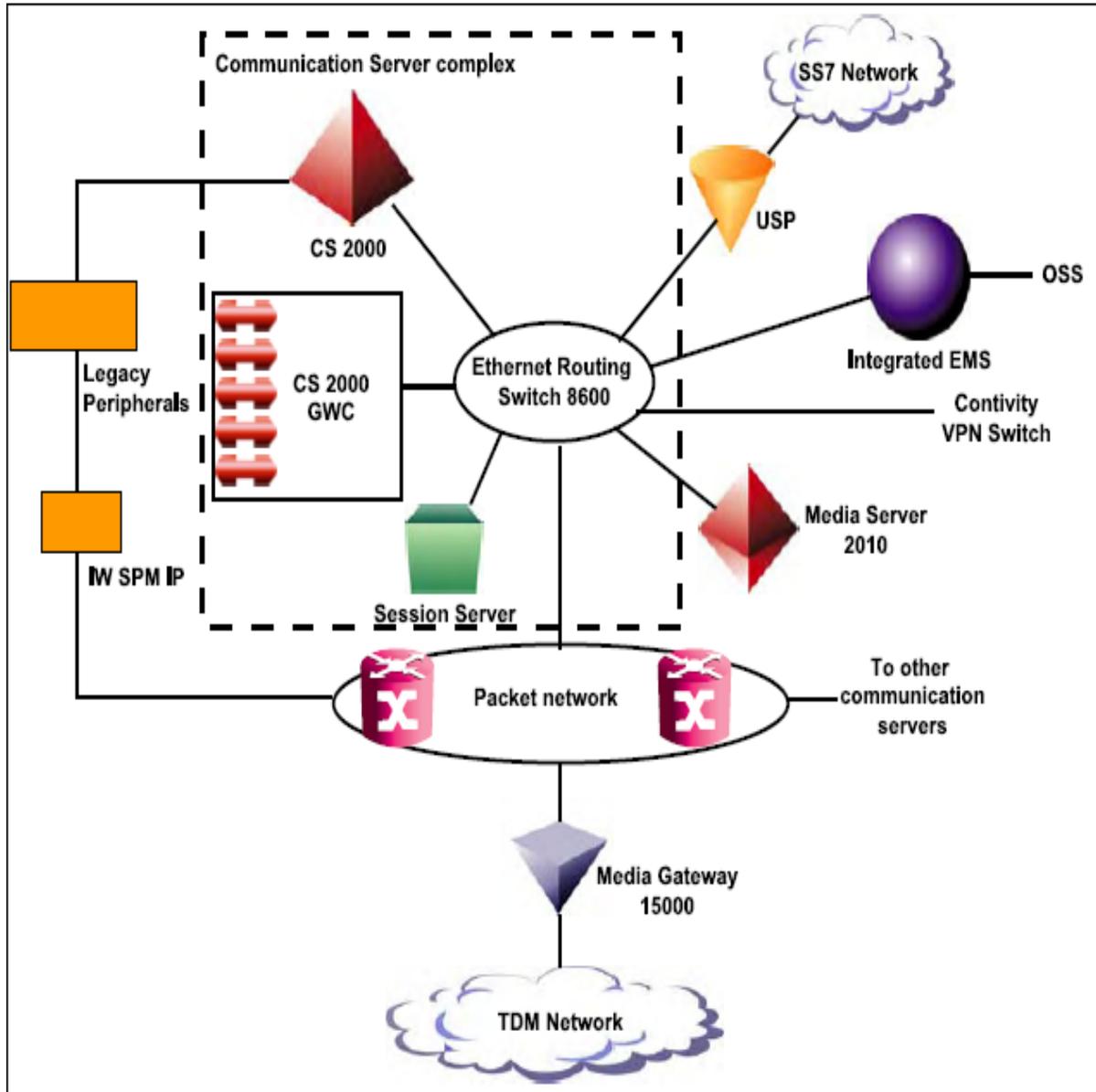


**Note 1:** In the figure, the term “Communication server complex” refers to the CS 2000 and the components and systems with which the CS 2000 interworks most closely. For a list of the components and systems, see [Communication within the CS 2000 complex](#).

**Note 2:** For information about the IAW solution, and about the interworking components and the protocols shown in the figure, see *Integrated Access Wireline Solution-level Basics (IAW)*, NN10445-100.

The following figure shows the CS 2000 as used in the full featured Nortel packet trunking solution for internet protocol based services (PT-IP).

### CS 2000 in the PT-IP solution

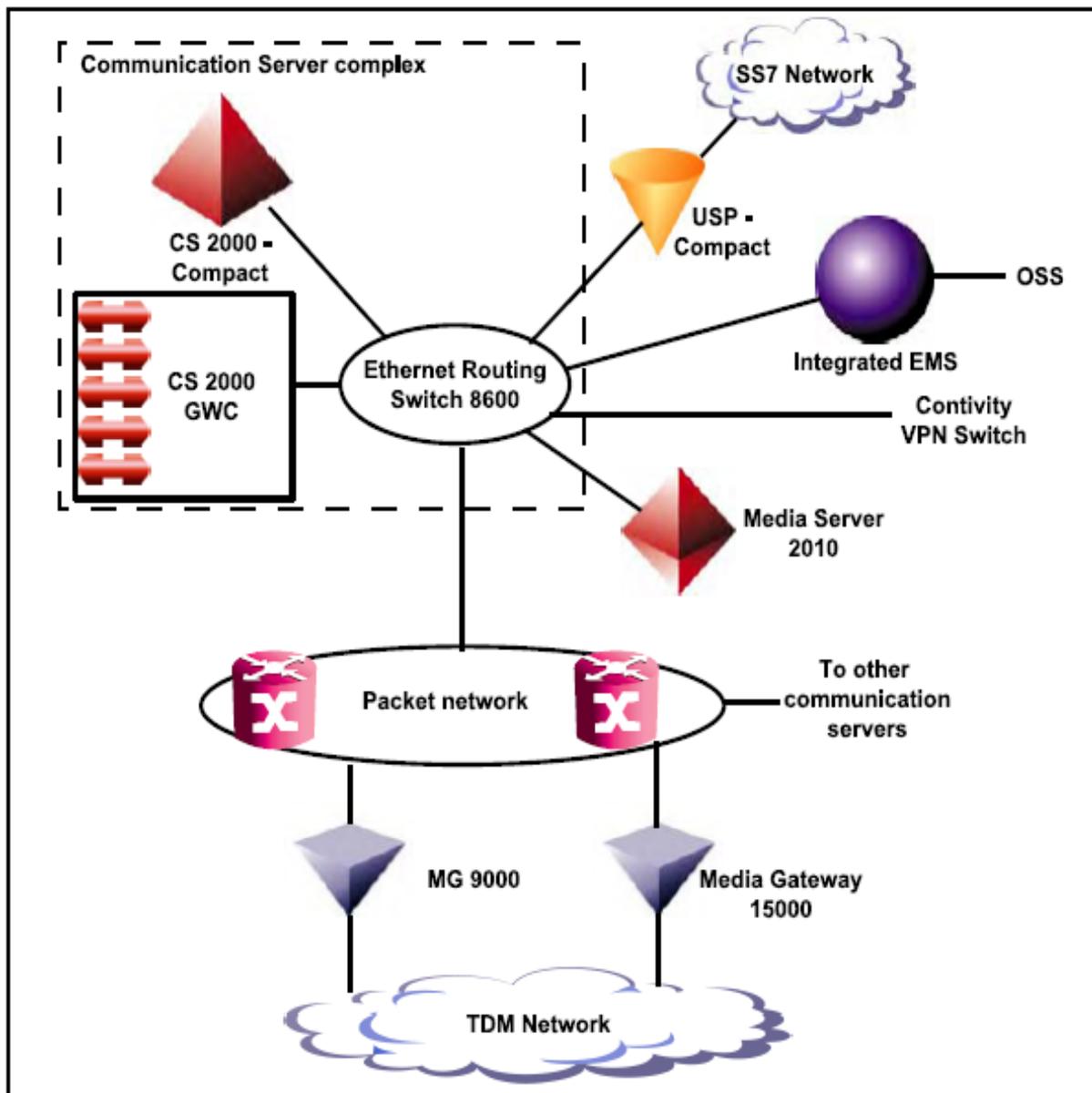


**Note 1:** In the figure, the term “Communication server complex” refers to the CS 2000 and the components and systems with which the CS 2000 interworks most closely. For a list of the components and systems, see [Communication within the CS 2000 complex](#).

**Note 2:** For information about the PT-IP solution, and about the interworking components and the protocols shown in the figure, see *Packet Trunking/Packet Transit - IP Solution-level Basics (PT-IP)*, NN10442-100.

The following figure shows the CS 2000 as used in the wireline universal packet access solution (UA-IP) from Nortel.

### CS 2000 in the UA-IP solution

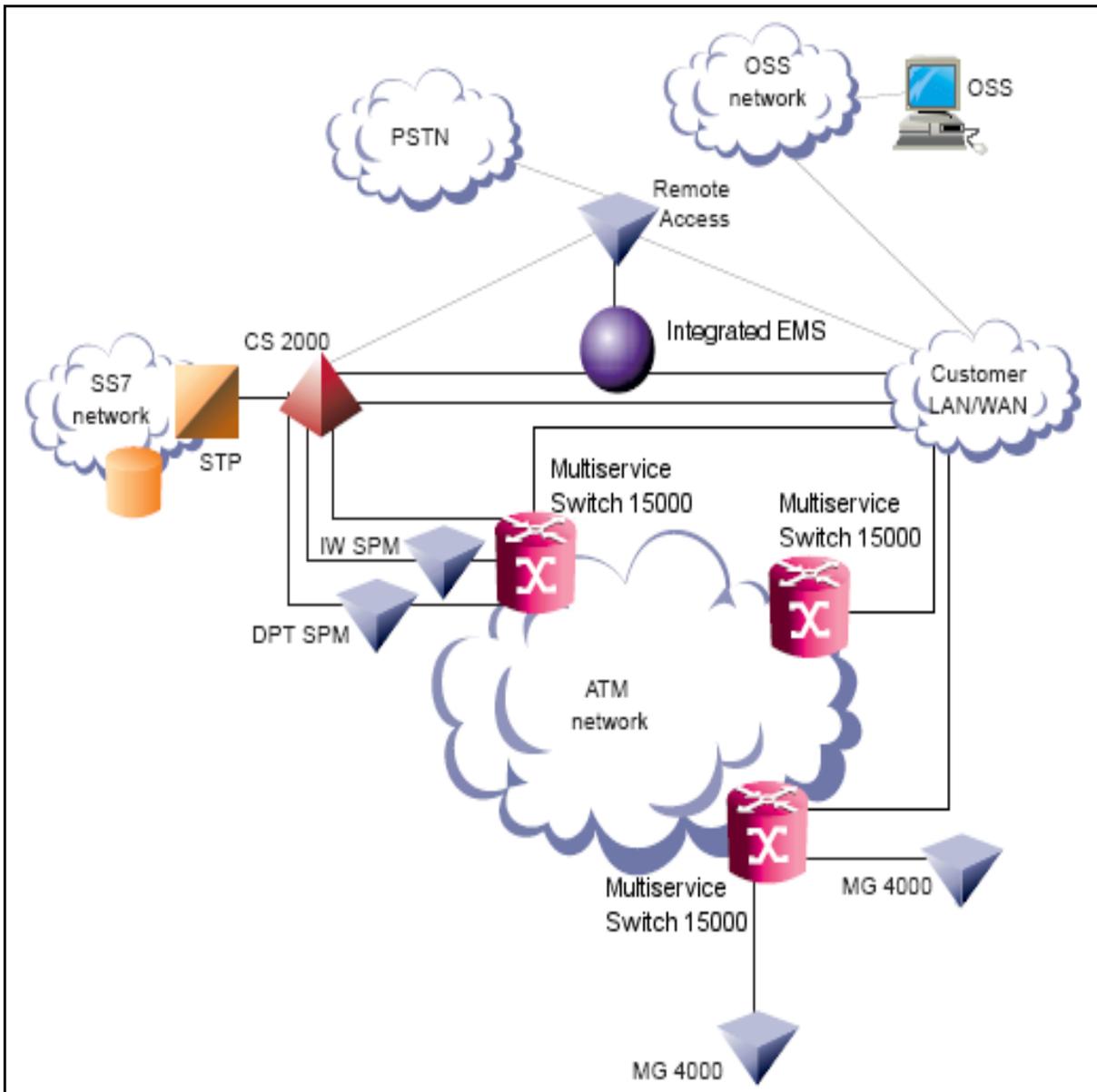


**Note 1:** In the figure, the term “Communication server complex” refers to the CS 2000 and the components and systems with which the CS 2000 interworks most closely. For a list of the components and systems, see [Communication within the CS 2000 complex](#).

**Note 2:** For information about the UA-IP solution, and about the interworking components and the protocols shown in the figure, see *Universal Access - IP Solution-level Basics (UA-IP)*, N10446-100.

The following figure shows the CS 2000 as used in the full featured Nortel packet trunking transit solution for constant bit rate ATM services (PT-AAL1).

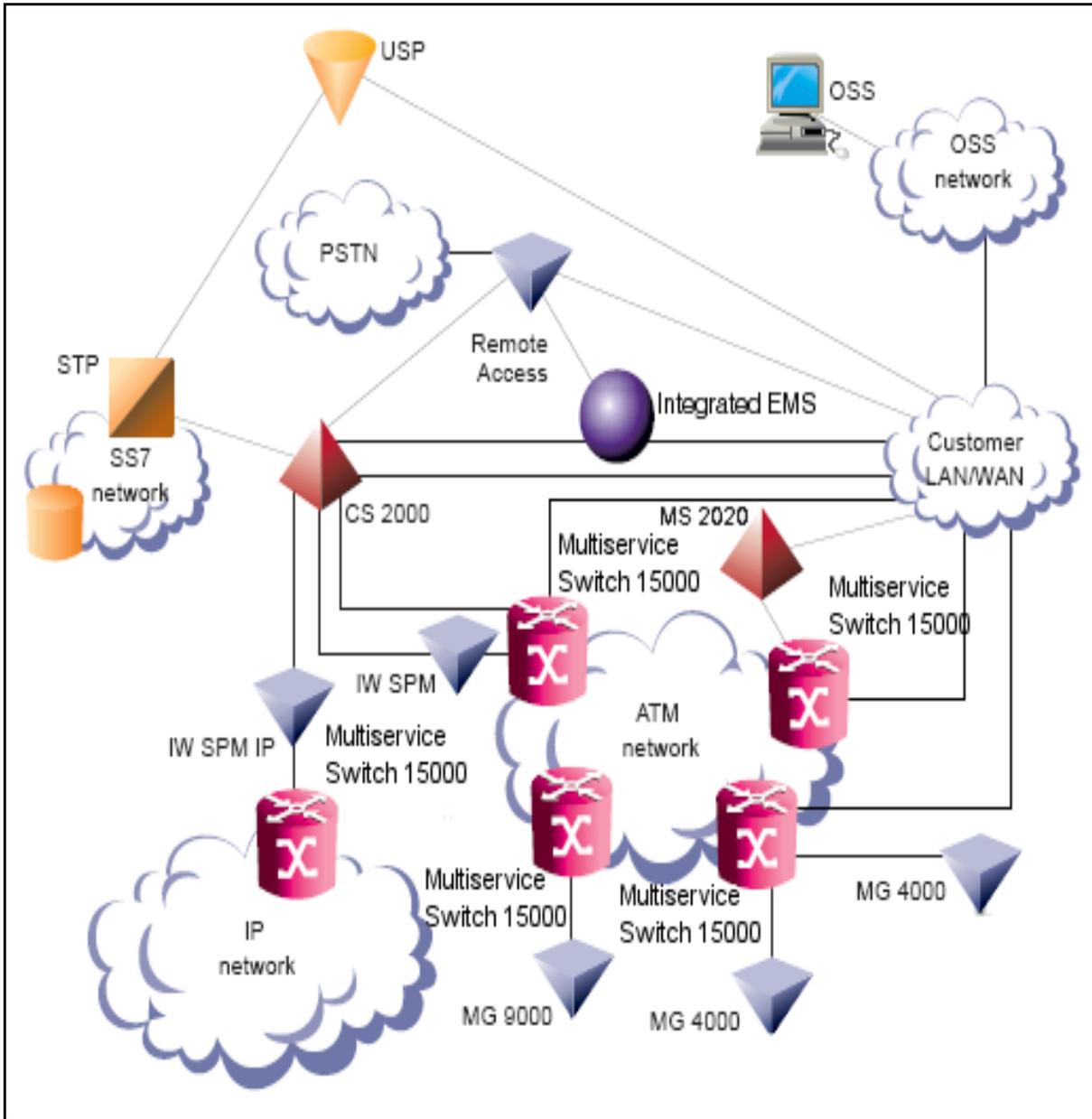
## CS 2000 in the PT-AAL1 solution



**Note:** For information about the PT-AAL1 solution, and about the interworking components and the protocols shown in the figure, see *UA-AAL1 Solution-level Basics*, NN10443-100.

The following figure shows the CS 2000 as used in the wireline universal packet access solution for constant bit rate ATM services (UA-AAL1) from Nortel.

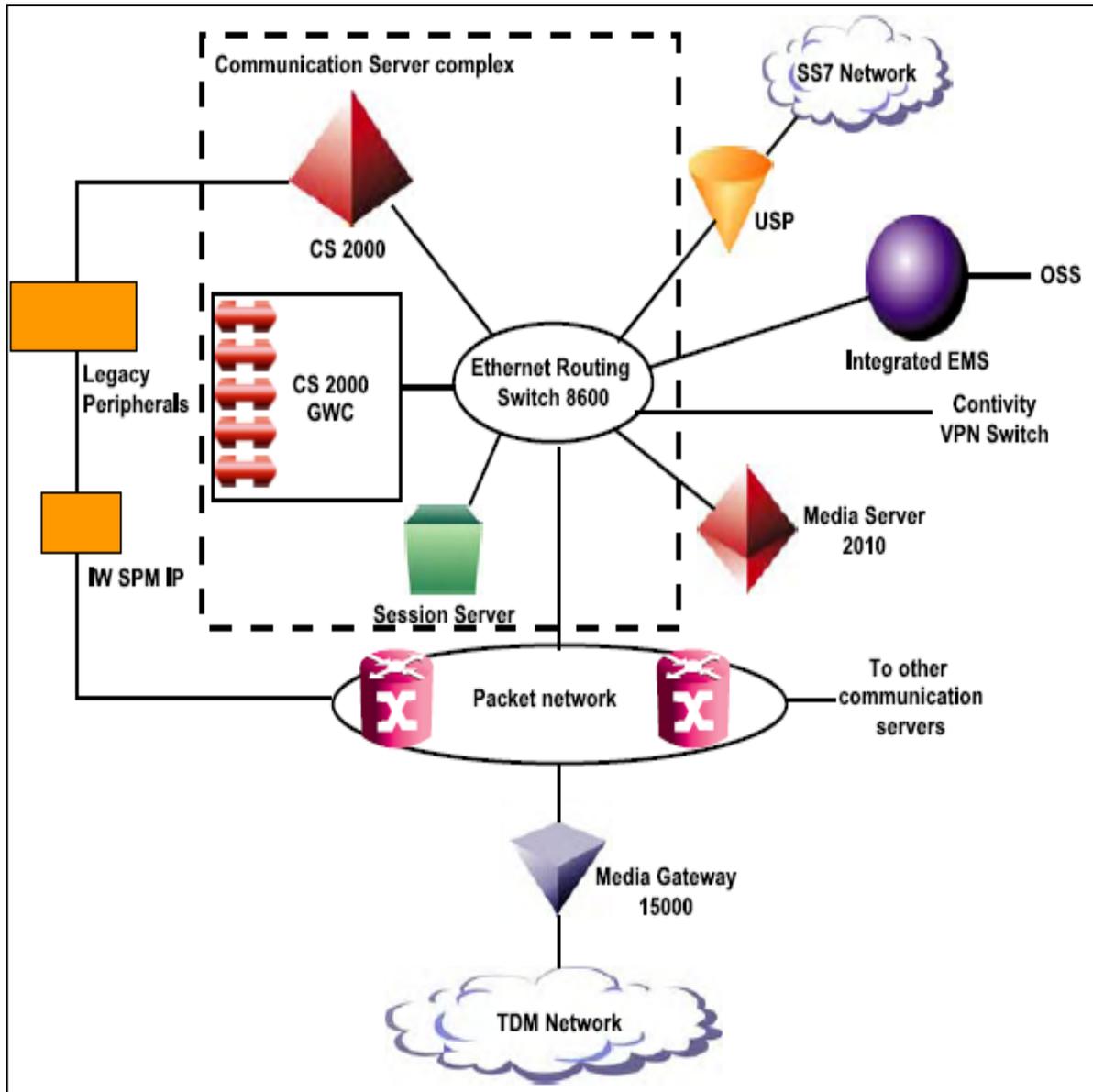
**CS 2000 in the UA-AAL1 solution**



**Note:** For information about the UA-AAL1 solution, and about the interworking components and the protocols shown in the figure, see *UA-AAL1 Solution-level Basics*, NN10443-100.

The following figure shows the CS 2000 as used in the packet trunking transit solution - AAL2 (PT-AAL2).

## CS 2000 in the PT-AAL2 solution



**Note 1:** In the figure, the term “Communication server complex” refers to the CS 2000 and the components and systems with which the CS 2000 interworks most closely. For a list of the components and systems, see [Communication within the CS 2000 complex](#).

**Note 2:** For information about the PT-AAL2 solution, and about the interworking components and the protocols shown in the figure, see *PT-AAL2 Solution-level Basics*, NN10441-100.

### Tri-modal CS 2000

Tri-modal capability for CS 2000 was introduced in SN07.

Tri-modal capability means a single CS 2000 can serve multiple bearer networks, and those bearer networks can be on up to three different types of network fabrics

- ENET. This is the fabric of TDM circuit-switched networks.
- IP. This is the fabric of IP-based packet-switched networks.
- AAL1 or AAL2. These are fabrics of ATM-based packet-switched networks.

For example, a CS 2000 could serve five bearer networks: the ENET, two packet-based bearer networks that use the AAL1 fabric (an ATM fabric), and two packet-based bearer networks that use the IP fabric.

For instructions for configuring a CS 2000 to serve multiple bearer networks, see *CS 2000 Configuration Management*.

### Interworking of CS 2000 with other network components

Here is a list of network components that the CS 2000 interworks with.

- Core and Billing Manager (CBM).
- CS 2000 Core Manager. For information on the CS 2000 Core Manager, see *CS 2000 Core Manager Basics*, NN10018-100.
- Dynamic Packet Trunking Spectrum Peripheral Module (DPT SPM).
- Interworking Spectrum Peripheral Module (IW SPM).
- Interworking Spectrum Peripheral Module ATM (IW SPM ATM)). For information on the IW SPM ATM, see *IW SPM ATM Basics*, NN10014-111.
- Interworking Spectrum Peripheral Module IP (IW SPM IP). For information on the IW SPM IP, see *IW SPM IP Basics*, NN10015-111.
- Nortel Media Gateway 7480/15000.
- Nortel Media Gateway 4000 (MG 4000).
- Nortel Media Gateway 9000 (MG 9000).
- Nortel Media Server 2000. The MS 2010 is used with IP networks; the MS 2020 is used with ATM networks. For information on the MS 2010 and the MS 2020, see *MS 2000 Series Basics*, NN10323-111.
- Session Server. For information on the Session Server, see *Session Server Basics*, NN10333-111.

- Policy Controller. For information on the Policy Controller, see the section titled [Policy Controller](#) in this document.
- Universal Audio Server (UAS). For information on the UAS, see *Universal Audio Server Basics*, NN10010-111
- Nortel Universal Signaling Point (USP).

**Note:** All these components will not necessarily be used in every network. Also, some of the network components are used only in certain solutions. For information on interworking network components, see the appropriate solution-level document from the following list:

- *PT-AAL2 Solution-level Basics*, NN10441-100
- *Packet Trunking/Packet Transit - IP Solution-level Basics (PT-IP)*, NN10442-100
- *UA-AAL1 Solution-level Basics*, NN10443-100
- *Integrated Access Cable Solution-level Basics (IAC)*, NN10444-100
- *Integrated Access Wireline Solution-level Basics (IAW)*, NN10445-100
- *Universal Access - IP Solution-level Basics (UA-IP)*, N10446-100

### **Policy Controller**

The Policy Controller is introduced in SN08.

The Policy Controller provides the capability to apply policies during call-processing. The Policy Controller supports the policy of network resource reservation, using virtual connection admission control (VCAC) as the enforcement mechanism. The Policy Controller maintains counts of available resources, and makes connection-admission decisions. When a gateway controller is ready to set up a call, it communicates with the Policy Controller. The Policy Controller tells the gateway controller whether it is possible to set up the call.

### **CS 2000 and intelligent networks**

Intelligent networks separate service logic from call processing logic to improve service management. This technique brings call processing service data together in a single off switch location instead of repeating it at each switch location.

Intelligent networks provide a generic framework for building telephony services by using in-call detection points and off-board database query processing. In this context, the CS 2000 acts as a service switching

point (SSP). CS 2000 connects with intelligent networks through the signaling gateway.

### Benefits provided by CS 2000

CS 2000 provides the following benefits to service providers:

- **Transparent delivery of revenue-generating services.** CS 2000 reaches into a variety of multi-vendor service platforms to deliver profitable services over the packet infrastructure. Such services include custom local area signaling services (CLASS), integrated services digital networks (ISDN) primary rate interface (PRI), ISDN user part (ISUP), virtual private networks (VPN), and intelligent network services such as toll-free 800/900 numbers.
- **Open architecture.** Carrier VoIP solutions use open standards that are compatible with any vendor's non-proprietary standards for end office and local exchange switches, legacy SS7 signaling networks, and carrier-grade ATM and IP platforms.
- **Robust, scalable solution.** The CS 2000 XA-Core is a scalable, multi-processor engine that distributes call processing and system overhead functions across multiple, independent processing elements. This modular core allows service providers to add capacity by adding circuit packs for truly seamless growth.
- **Protects investments in TDM platforms.** Nortel DMS technology, with a minimum core processor configuration of XA-Core Release 1, can be upgraded to a CS 2000. The parallel processors in the XA-Core provide plug-in capacity up to six times greater than the SN70EM.
- **Reduced cost of ownership.** Carrier VoIP solutions provide a flatter architecture based on point-to-point delivery of voice/data traffic using switched virtual circuits (SVC). This architecture supports higher capacity and better economics through packet switching. When fully deployed, the Carrier VoIP solution eliminates the class 4 (tandem/transit switching) layer, with call processing and signaling distributed across the network on one or more CS 2000s.  
  
The reduced equipment counts and advanced technology reduces heating, ventilation, and air conditioning and real estate costs.

## Hardware

The Carrier VoIP portfolio CS 2000 is a composite product that includes principal and auxiliary components. The principal components provide the media gateway controller and signaling gateway functionality that characterize a communication server. Auxiliary components provide support functions like power distribution and cooling.

### Principal components

The following sections contain brief descriptions of the principal components of the CS 2000:

- the extended architecture core (XA-Core)
- the message switch (MS)
- the fiberized link peripheral processor (FLPP), which contains CCS7 link interface units (LIU7)
- the gateway controller (GWC)

### Extended architecture core

The extended architecture core (XA-Core) is the call processing component of the CS 2000 that controls signaling gateway and media gateway functionality.

The Ethernet network between the XA-Core and CS LAN provides 10/100BaseT Ethernet connections with the operations, administration, maintenance, and provisioning (OAM&P) network, and the GWCs.

DS-512 connections with the message switch allow the XA-Core to connect with the signaling gateway, input output module (IOM), TDM-Core enhanced network (ENET), and CS 2000 Core Manager (CS2E).

**Note:** The input output module (IOM) is a multi-link multi-protocol communication board with a disk drive and/or a tape drive on a separate board. The IOM is located in an integrated services module shelf. For information on the IOM, see the *Succession Quick Reference Guide*, NN10262-001.

### Architecture

The XA-Core design is a symmetric, tightly coupled multiprocessor system based on identical processor elements each running the same software load and accessing a single shared memory system. The circuit packs that make up the XA-Core fit into a single shelf on a standard SuperNode cabinet.

The processor element (PE) circuit packs are the computing engines.

Shared memory (SM) circuit packs provide scalable shared memory capacity for global program and data storage. SM circuit packs contain the shared data that is used by the PE circuit packs and by the various types of input/output circuit packs (IOPs, HIOPs, and HCMICs). The SM circuit packs also control data access by the PE circuit packs and by the input/output circuit packs.

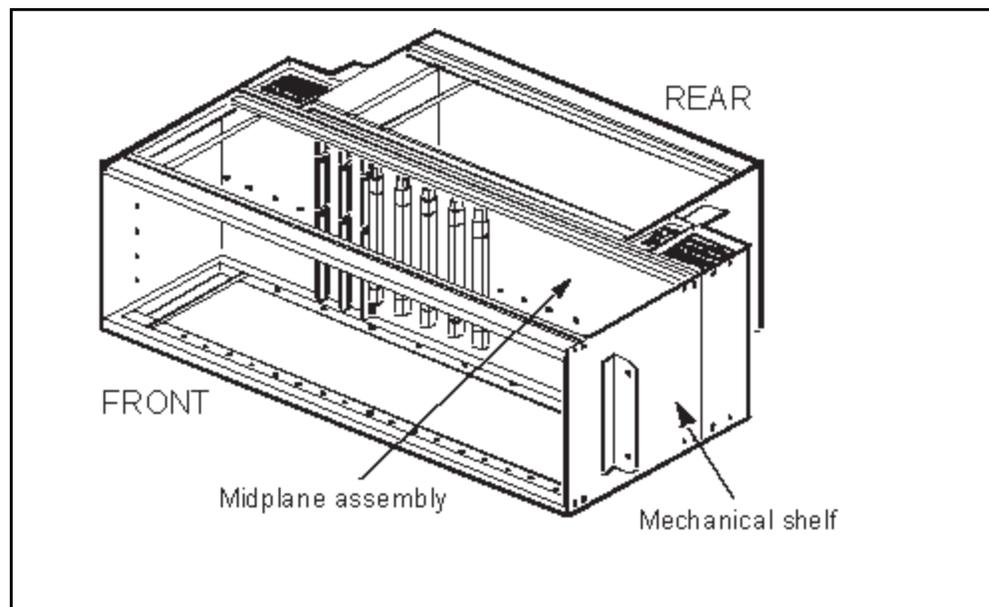
IOPs, HIOPs, and HCMICs are input/output circuit packs.

**Note:** For detailed information on the circuit packs used in the XA-Core shelf, see the *XA-Core Reference Manual*, 297-8991-810.

### Shelf design

The XA-Core shelf has a mid-plane design. There are provisionable slots for circuit packs on the front and rear of the shelf.

### XA-Core shelf

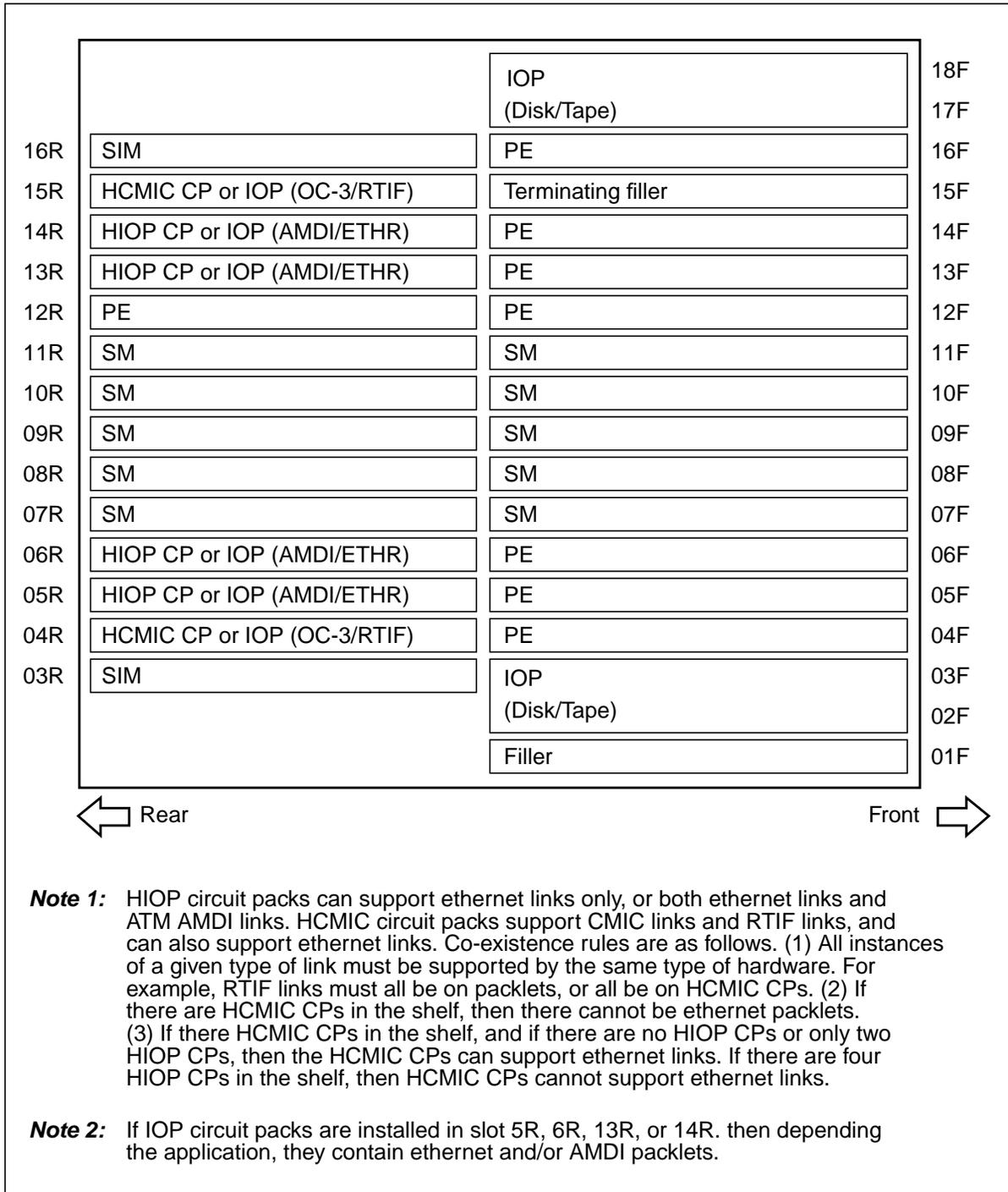


In addition to the provisionable slots, the XA-Core shelf has two slots for shelf interface modules (SIM).

The following figure shows the usage of the slots in the XA-Core shelf. The figure shows which circuit packs can install in each slot. The figure does not try to represent a standard shelf configuration; therefore, your XA-Core shelf may have slots in which circuit packs are not equipped.

**Note:** For detailed information about the equipping rules for the various types of circuit packs, see the hardware descriptions in the *XA-Core Reference Manual*, 297-8991-810.

**XA-Core slot usage**



**Message switch**

The message switch (MS) is a communications bus that provides peer to peer messaging between the distributed CS 2000 components. The

MS is made up of two identical load sharing planes (MS 0 and MS 1). Each MS plane provides a system clock and supports the full internal CS 2000 messaging load.

**Note:** For more information about the message switch, see *Hardware Description Manual*, 297-8991-805.

### **Fiberized link peripheral processor**

The CS 2000 fiberized link peripheral processor (FLPP) includes the following components:

- up to three link interface shelves (LIS) that each support up to 12 slot-mounted CCS7 link interface units (LIU7)
- a link interface module (LIM) that includes two load-sharing local message switches (LMS).
- F-buses that support direct high-speed communication between CCS7 link interface units

The CCS7 link interface units (LIU7) within the FLPP use SR 128 sub-rate fiber links to connect the CS 2000 to the SS7 network. These links provide a V.35 interface to an CCS7 signaling multiplexer. Each interface can support three 64 kbps SS7 links.

FLPPs also support TCP/IP over Ethernet links that comply with IEEE 802.3.

**Note:** For more information about the fiberized link peripheral processor, see *Hardware Description Manual*, 297-8991-805.

### **Gateway controller**

The gateway controller (GWC) acts as a protocol converter to create a bridge between media gateways and the call processing function provided by the CS 2000 XA-Core. To perform this function the GWC converts between proprietary peripheral processing virtual machine (PPVM) messages that the XA-Core uses and the open standard protocols that media gateways use. This conversion makes media gateways appear to the XA-Core like standard TDM call processing, messaging, and control peripherals.

In addition to providing an XA-Core to media gateway interface, GWCs support communication between peer communication servers. This capability handles inter-MGC, networked calls.

### **Hardware platform**

The GWC is based on the Motorola MCPN750 or MCPM905 single board computer (SBC). Two SBCs make up each GWC node. These

SBCs run in hot standby mode with call information exchange to provide carrier grade reliability. The SBC cards plug into the services application module (SAM) CPX8221 compact personal computer interface (cPCI) chassis. This 21-slot chassis is referred to as the SAM21.

The GWC circuit packs host the gateway controller software that, together with the XA-Core, provide the CS 2000 with its media gateway controller (MGC) functionality. Processing capacity is scalable by adding GWC circuit card pairs.

**Note:** For more information about the hardware that supports the GWC, see *Gateway Controller Basics*, NN10189-111.

### **Auxiliary components**

The following sections contain brief descriptions of the auxiliary components of the CS 2000:

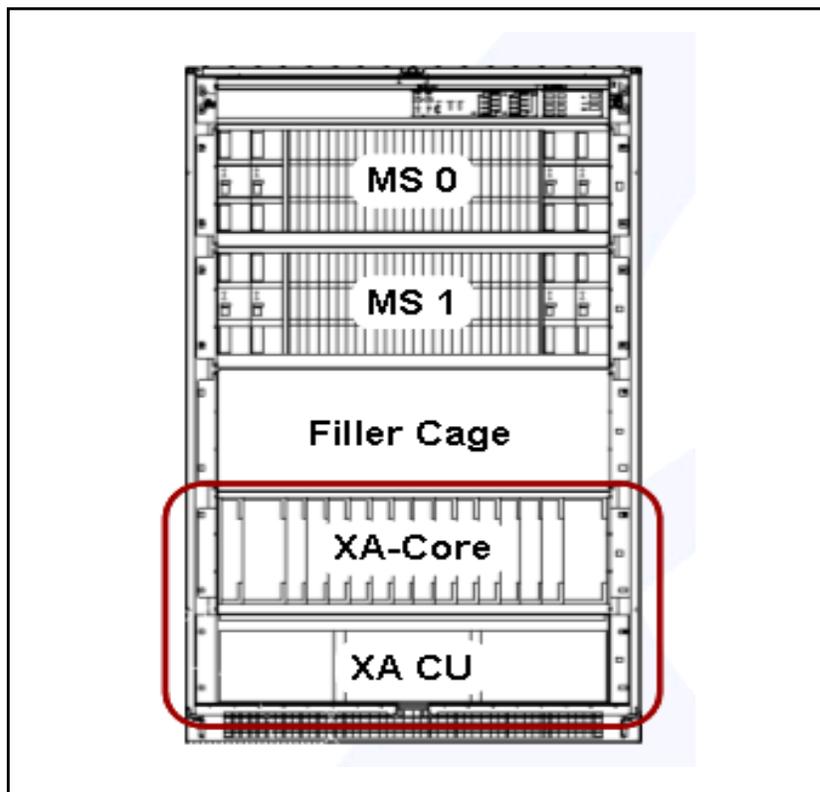
- XA-Core SuperNode cabinet
- cabinetized power distribution center
- cabinetized miscellaneous equipment cabinet
- cabinetized miscellaneous spares storage

#### **XA-Core SuperNode cabinet**

The XA-Core SuperNode cabinet provides the housing for the frame supervisory panel (FSP), two message switch (MS) shelves, one filler shelf, a standard XA-Core shelf, and a high capacity cooling unit (CU).

The following figure shows an XA-Core SuperNode NTLX01AA cabinet configuration.

### XA-Core SuperNode NTLX01AA cabinet configuration



#### **Cabinetized power distribution center**

The cabinetized power distribution center (CPDC) is a single cabinet that distributes power to the cabinets in a lineup. The CPDC provides D.C. power distribution and protection and optional inverted ac power for endguard outlets. The CPDC is the first cabinet in a lineup of a maximum of 11 cabinets.

The CPDC acts as the interface between equipment lineups and the OAU. The office alarm unit (OAU) provides alarm control. The OAU is in the first cabinetized trunk module equipment (CTME).

#### **Cabinetized miscellaneous equipment cabinet**

The cabinetized miscellaneous equipment cabinet (CMIS) performs the same functions as the miscellaneous equipment frame.

The CMIS is provisionable. A customer can select from a list of equipment types. The Frame supervisory panel (FSP) and cooling unit are required at the top and bottom of the CMIS. The FSP and cooling unit are not required when the CMIS functions as an intermediate distribution frame.

**Cabinetized miscellaneous spares storage**

The cabinetized miscellaneous spares storage (CMSS) can be provisioned with shelves and shelf inserts. The shelves and shelf inserts provide storage for circuit packs and a utility tray for technician tools. The CMSS provides framework, hardware, and ground braid assembly.

**Note:** For more information about the auxiliary hardware components, see *Hardware Description Manual*, 297-8991-805.

**Components from the time division multiplex suite**

The principal CS 2000 components interwork with the following time division multiplex core (TDM-Core) components. The following table lists those TDM-Core components.

- enhanced network
- cabinetized integrated services module

The following sections briefly describe those TDM-core components.

**Enhanced network**

The enhanced network (ENET) is a fully duplicated constant bit rate fabric that performs call switching for TDM networks. CS 2000 interworks with an ENET that has two pairs of shelves. The shelves are divided between plane 0 and plane 1.

Empty shelf positions are provisioned with filler panels to improve the efficiency of the forced-air cooling of the cabinet. For the same reason, card filler plates occupy shelf slots that are not in use.

The ENET shelf controls message flow. To control message flow, the shelf concentrates and distributes messages. The ENET shelf allows components to communicate directly with each other and supports the cabinetized integrated services module (CISM).

**Note:** For more information about the ENET, see *Hardware Description Manual*, 297-8991-805.

**Cabinetized integrated services module**

The CISM supports up to four enhanced integrated service module (ISME) shelves and a cooling unit shelf. The modular supervisory panel (MSP) provides power and control for this hardware.

**Note:** For more information about the CISM, see *Hardware Description Manual*, 297-8991-805.

## Software

The name of the software load for the CS 2000 is “PCL (core load).” The following separate software items always accompany the core load.

- PPL (peripheral lineup)
- NRL (commissioning tools)
- MUL (message-switch load)
- SAM21 platform load

**Note:** Included in the SAM21 platform load is the GC080 firmware, which is for the GWC.

- gateway controller load

Firmware loads for components of the XA-Core shelf are distributed separately from the PCL core load. If any new firmware loads are developed for a new software release (for example, for release SN08), those new firmware loads are included on the PM load tape for that software release. For instructions on how to install new firmware loads for components of the XA-Core shelf, see the *XA-Core Maintenance Manual*, 297-8991-510.

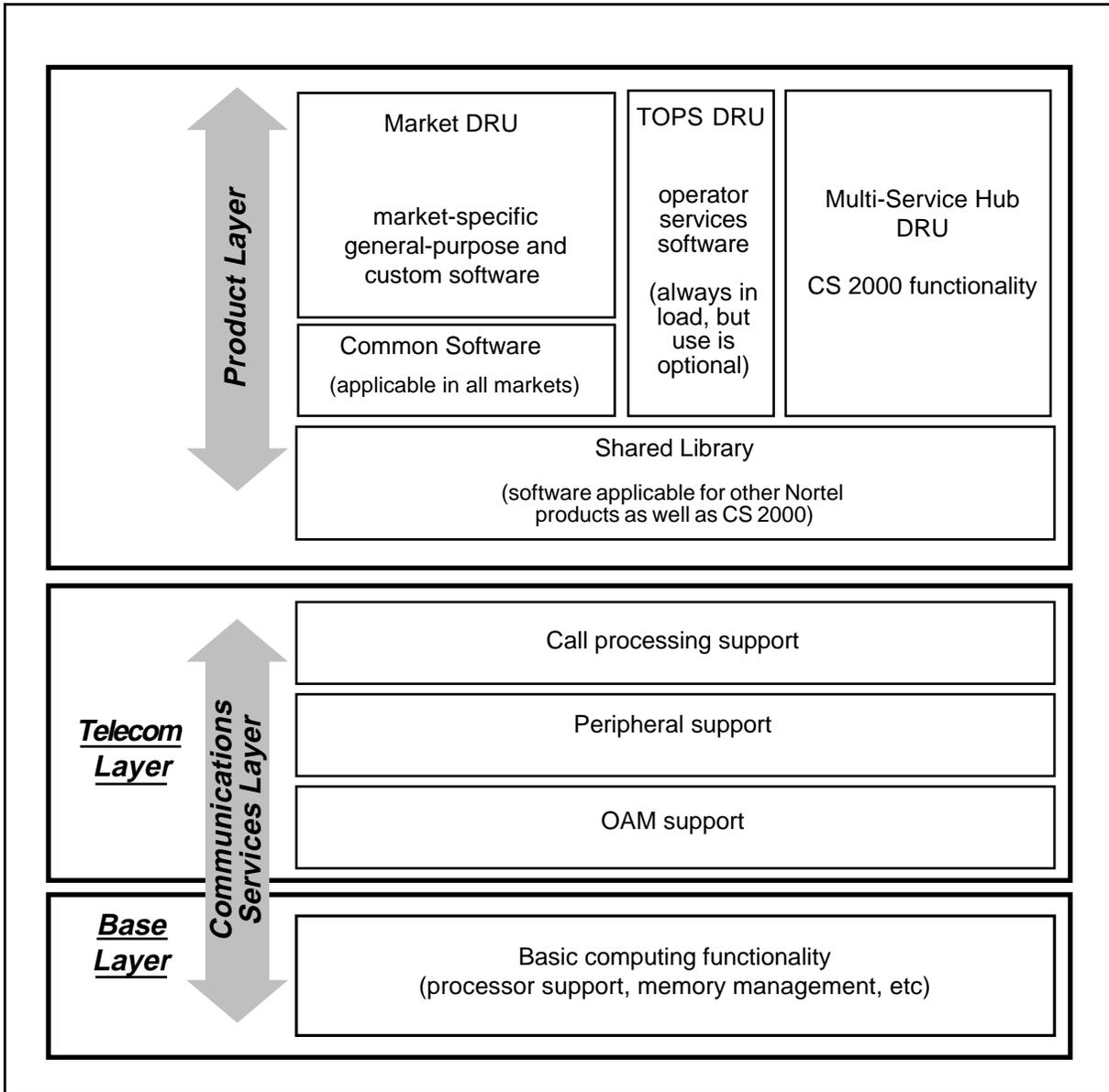
### Layered software structure

Communication Server 2000 (CS 2000) software is a layered product, with a base layer, a telecom layer, and a product layer.

- Base - provides basic computing functions such as processing, memory management and hardware diagnostics.
- Telecom - supports the peripheral types used by CS 2000 and provides call processing support functions such as translations and routing.
- Product - supports call processing applications and services by means of reusable software objects and generic agents. The Product Layer also includes any market-specific software required to customize CS 2000 for use in a particular market.

The following figure shows the layers.

**Computing module (XA-Core) software layers**



**Software ordering**

If you need to order software, please contact Nortel.

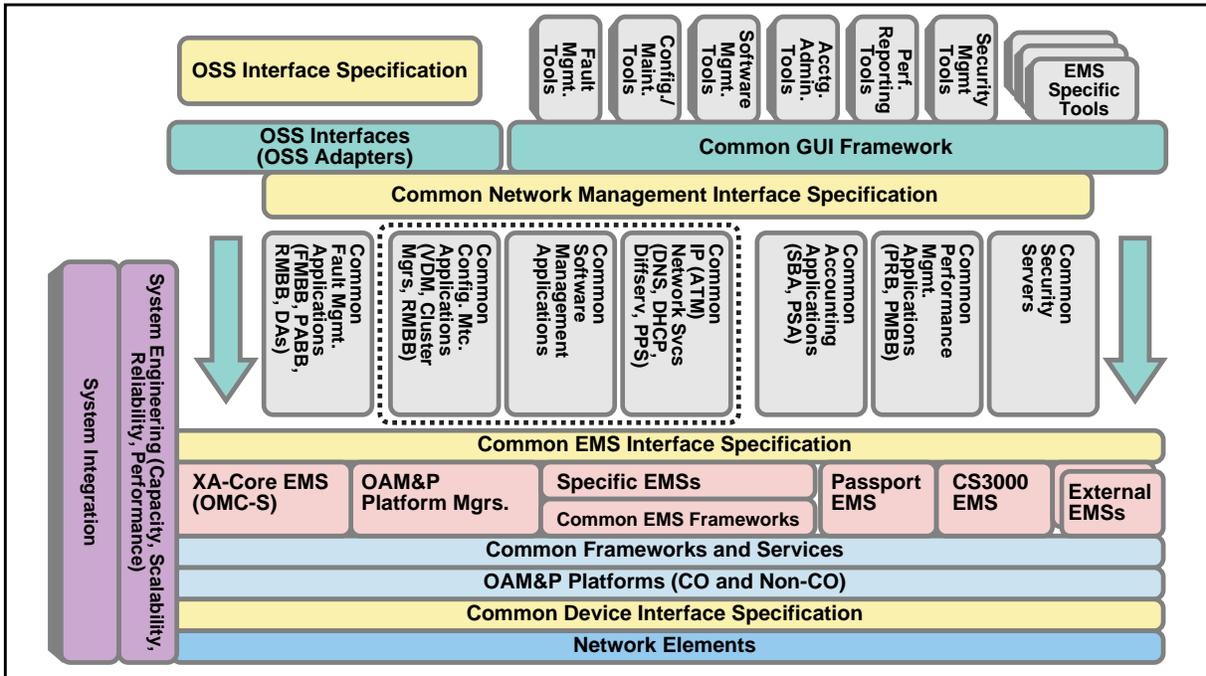
## Operations, administration, maintenance, and provisioning

CS 2000 uses a dedicated operations, administration, maintenance, and provisioning (OAM&P) network for fault, configuration, accounting, performance, and security (FCAPS) management.

## System architecture

The following block diagram shows the OAM&P system architecture.

### OAM&P architecture



OAM&P architecture supports the International Telecommunications Union (ITU) M.3400 specification for the Telecommunications Management Network (TMN) model. The TMN model categorizes all management data exchanges between network elements into one of the following five functional areas:

- fault management and prevention (F)
- configuration and provisioning (C)
- accounting management (A)
- performance and traffic management (P)
- security and administration management (S)

**Note:** The acronym FCAPS represents these five TMN model categories.

## Interfaces

This section identifies the physical interfaces and protocols that are used by the CS 2000, and the user interfaces to the CS 2000.

### Communication within the CS 2000 complex

The CS 2000 complex is composed of the CS 2000 and the components and systems with which the CS 2000 interworks most closely:

- the CS 2000 (including all its principal and auxiliary components)
- components from the time division multiplex suite (TDM-Core components)
- the Communication Server 2000 Core Manager (CS2E)
- the Communication Server 2000 Management Tools
- an IP router such as the Nortel Ethernet Routing Switch 8600 (formerly known as the Passport 8600)
- the Session Server
- the Policy Controller

For communication with those components and systems, the CS 2000 uses a message switch and CS LAN.

The message switch provides a system bus for peer-to-peer messaging between the XA-Core shelf and the core components from the time-division multiplex suite (TDM-Core). The system bus also connects to the fiberized link peripheral processor (FLPP).

The CS LAN supports Ethernet communication between GWCs and the components and systems listed above. A router, such as the Nortel Ethernet Routing Switch 8600 (formerly known as the Passport 8600), provides the basis for this LAN. The CS LAN also connects the universal signaling point (USP), if the USP is present in the solution.

### CS 2000 physical interfaces

10/100 Base-T Ethernet links run from the XA-Core shelf to the CS LAN. Each Ethernet link connects to a different Nortel Ethernet Routing Switch 8600.

The XA-Core shelf is connected to the each message switch (MS) by dual OC-3 connections. Each MS has several DS512 port interfaces. Two of these DS512 interfaces are used to interface to each FLPP unit. An additional DS512 pair interfaces to the CS 2000 Core Manager (CS2E) on the SDM platform.

### **Protocols supported by the CS 2000**

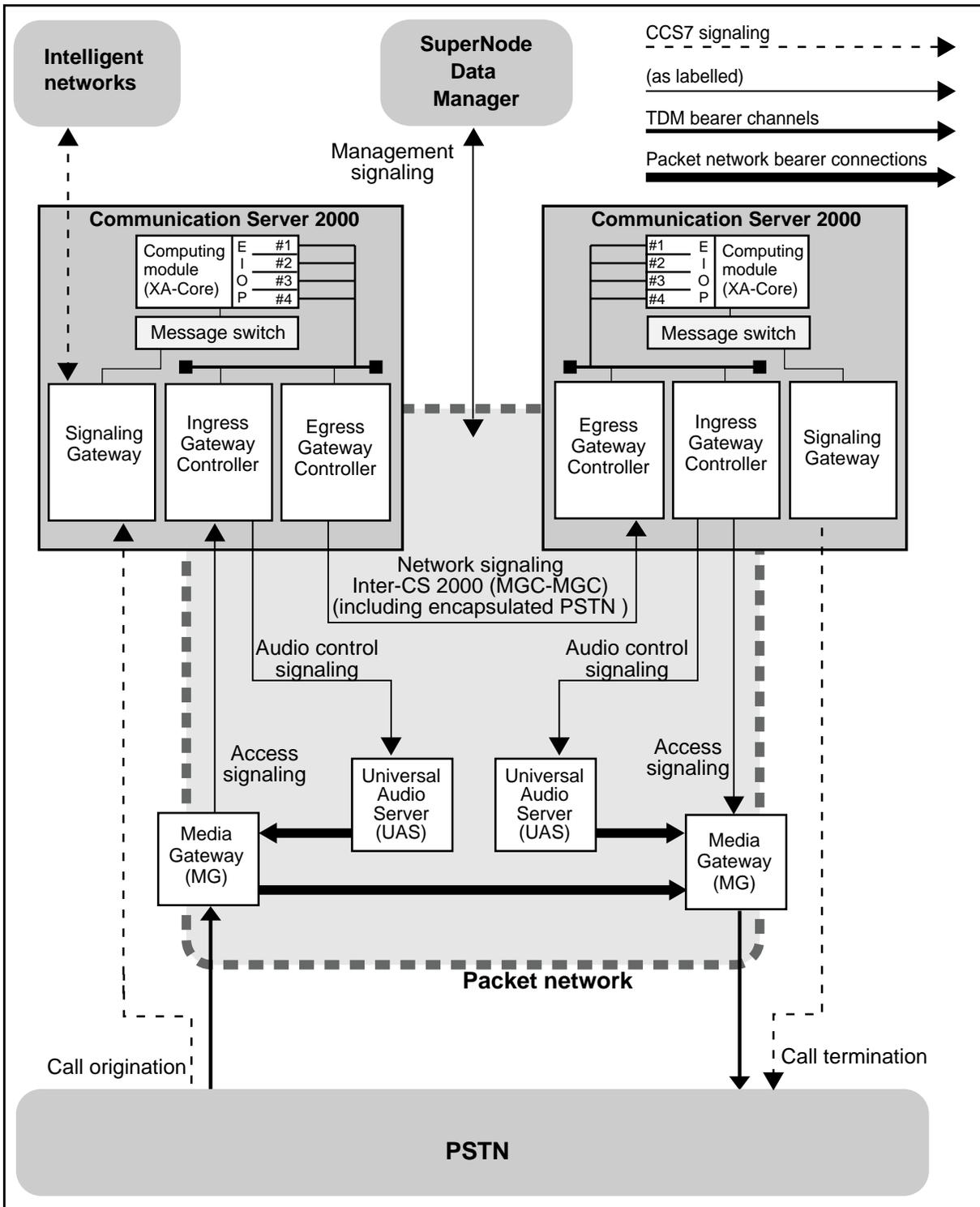
The CS 2000 uses the following protocols.

- ARP (address resolution protocol). This is a low-level protocol within the transmission control protocol/internet protocol (TCP/IP) suite that maps IP addresses to corresponding Ethernet addresses.
- BOOTP. This is an IETF standard protocol. This is of use in the PT-AAL1 solution, in which the CS 2000 interworks to the MG 4000. When an MG 4000 initially powers up, it uses BOOTP to broadcast its MAC address to the CS 2000. The CS 2000 then associates the MAC address with an IP address. The CS 2000 then uses TFTP protocol to send the IP address to the MG 4000, along with the initial build load (IBL) for the MG 4000.
- ICMP (internet control message protocol). This is a network-layer control protocol that provides message packets to report errors and other information relevant to IP packet processing.
- IP (internet protocol). This is a standard describing software that keeps track of the internet's addresses for different nodes.
- PPVM (peripheral processing virtual machine). This is a proprietary Nortel protocol used by the XA-Core to communicate call control information to the GWCs. The GWCs convert these messages to the open-standard protocols that the media gateways use.
- TFTP (trivial file transfer protocol). This is an IETF standard protocol. This is of use in the PT-AAL1 solution, in which the CS 2000 interworks to the MG 4000. TFTP is used to transfer the software load to the common equipment modules (CEMs) within the MG 4000.
- UDP (user datagram protocol). This is a TCP/IP protocol describing how messages reach application programs within a destination computer.

### **Signaling paths to other network elements**

The following figure shows signaling paths between the CS 2000 and other network elements. Arrows indicate the direction of message flows.

### CS 2000 signaling



**Note:** For information about the interworking network elements shown in the figure, and for information about signaling in the network, see the appropriate solution-level document from the following list:

- *PT-AAL2 Solution-level Basics*, NN10441-100
- *Packet Trunking/Packet Transit - IP Solution-level Basics (PT-IP)*, NN10442-100
- *UA-AAL1 Solution-level Basics*, NN10443-100
- *Integrated Access Cable Solution-level Basics (IAC)*, NN10444-100
- *Integrated Access Wireline Solution-level Basics (IAW)*, NN10445-100
- *Universal Access - IP Solution-level Basics (UA-IP)*, N10446-100

### **User Interfaces to the CS 2000**

The following CS 2000 user interfaces support initial software configuration and ongoing software maintenance and upgrading:

- [Maintenance and administration position](#)
- [CS 2000 Core Manager](#)
- [Integrated Element Management System](#)

#### **Maintenance and administration position**

Use the maintenance and administration (MAP) terminal to provision data schema tables that require datafill entries for the CS 2000 configuration. From the MAP command interface (CI) level, use the table editor, which gives you direct access to tables.

#### **CS 2000 Core Manager**

The Communication Server 2000 Core Manager (CS2E) application provides an integrated view for the fault, configuration, and performance management.

**Note:** For information about the CS2E, see *CS 2000 Core Manager Basics*, NN10018-111.

#### **Integrated Element Management System**

The Integrated Element Management System (Integrated EMS) provides a means of accessing the MAP interface and the element manager interfaces to various network elements. The way in which you access the Integrated EMS depends on how it has been configured. One option is to configure it so that it is accessible by way of a web browser.

**Note:** For information on the Integrated EMS, see *Integrated EMS Basics*, NN10329-111.

## Customer support

Nortel provides product support using standard customer service center (CSC) and global product support (GPS) policies and procedures. This support includes:

- [Product and customer support](#)
- [Professional services](#)
- [Training](#)

### Product and customer support

When service provider staff find a problem that they cannot resolve, Nortel regional customer service center provides the next line of support. The Nortel regional customer service center representative opens a customer service report (CSR) to track progress through to problem resolution.

The regional representative, together with the appropriate subject matter specialists from the customer service center, attempt to resolve the problem. If they are unsuccessful, the global prime, or corrective action screener, refers the CSR to the appropriate Nortel global product support group. The global product support group either provides an answer to the problem or develops the appropriate corrective action.

### Professional services

An extensive set of professional services accompanies the Carrier VoIP network product to complement and simplify the activities service providers normally perform. The basic product definition describes the customer responsibilities.

Professional services supplement the engineering, installation, and commissioning services that are part of the base product. The needs of the customer define and determine what these services can include. Services can range from turnkey solutions to programs that assist the customer in performing specific tasks and acquiring the skills they need to operate their Carrier VoIP network product.

### Training

To obtain the most up to date information about training available for Nortel products, including the CS 2000, go to the following URL: <http://nortelnetworks.com>. On the web page, click on the “training” link.