



Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks

# Product and Technology Basics

PT-AAL1/UA-AAL1/UA-IP

NN10028-111





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in Carrier Voice over IP Networks

## **Product and Technology Basics**

PT-AAL1/UA-AAL1/UA-IP

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## About this document

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This document provides a high-level overview of three solutions in Nortel's Carrier Voice over IP Networks portfolio:

- Packet Trunking - AAL1 (PT-AAL1)
- Universal Access - AAL1 (UA-AAL1)
- Universal Access - IP (UA-IP)

It also provides an overview of three of the components within these solutions:

- Nortel Multiservice Switch 15000
- Media Gateway 15000
- Nortel Multiservice Data Manager (used to manage network elements)

The following topics are discussed in this section:

- "Who should read this document and why" (page 14)
- "What you need to know" (page 14)
- "How this document is organized" (page 14)
- "What's new in this document" (page 15)
- "Text conventions" (page 16)
- "Related documents" (page 18)
- "How to get more help" (page 20)

## Who should read this document and why

This document is intended for people who want to learn about and understand the purpose and function of Nortel Multiservice Switch 15000 equipment, Nortel Media Gateway 15000 equipment and Nortel Multiservice Data Manager servers within the Carrier Voice over IP Networks' PT-AAL1, UA-AAL1 and UA-IP solutions.

## What you need to know

Before you read this document, it would be helpful to have a general understanding of the concept of the Carrier Voice over IP portfolio, the solutions within that portfolio, and the role that ATM and IP switches can play in these solutions. For more information, see:

- NN10441-100 *PT-AAL2 Solution-level Basics*
- NN10442-100 *Packet Trunking/Packet Transit - IP Solution-level Basics (PT-IP)*
- NN10443-100 *UA-AAL1 Solution-level Basics*
- NN10446-100 *Universal Access - IP Solution-level Basics (UA-IP)*

Some familiarity with the operating principles of Nortel Multiservice Switch systems, Media Gateway 15000 systems, ATM and IP is also beneficial. For more information, see:

- NN10600-030 *Nortel Multiservice Switch 7400/15000/20000 Overview*
- NN10600-780 *Nortel Media Gateway 7480/15000 Technology Fundamentals*
- NN10600-700 *Nortel Multiservice Switch 7400/15000/20000 ATM Technology Fundamentals*
- NN10600-800 *Nortel Multiservice Switch 7400/15000/20000 IP Technology Fundamentals*

You should also have some familiarity with the operating principles of the Multiservice Data Manager toolset. For more information, see 241-6001-801 *Nortel Multiservice Data Manager Overview*.

## How this document is organized

This document begins with a summary of what has changed in the Nortel Multiservice Switch for Carrier Voice over IP documentation suite. The document then presents a high level description of three of the solutions within the portfolio: Packet-Trunking - AAL1 (PT-AAL1), Universal Access - AAL1 (UA-AAL1) and Universal Access - IP (UA-IP). It also includes detailed descriptions of the Multiservice Switch 15000 and Media Gateway 15000 network elements, and Nortel Multiservice Data Manager (MDM) software that manages network elements within these solutions. Finally, the document describes how elements are managed within the solutions and how calls progress through a Carrier Voice over IP network.

This document contains the following sections:

- “What’s new in Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager for Carrier Voice over IP Networks documentation” (page 23)
- “Overview of the solutions and components within the Carrier Voice over IP portfolio” (page 33)
- “Multiservice Switch 15000 and Media Gateway 15000 hardware overview” (page 57)
- “Sun Fire™ V480 / V240 server hardware and software” (page 79)
- “Multiservice Switch 15000 and Media Gateway 15000 software overview” (page 89)
- “Multiservice Data Manager software overview” (page 97)
- “OAM tasks and access for managing Multiservice Switch 15000 and Media Gateway 15000 nodes” (page 105)
- “Call progressions through Multiservice Switch 15000 nodes” (page 117)

## What’s new in this document

The following features were added to this document:

- “Solaris 9 Upgrade for MDM workstations” (page 24)
- “Succession IP Software Migration (SISM)” (page 24)

- “InterNode Emergency Stand Alone (ESA) for MG9000” (page 24)
- “Auto-patching of MSS15000 and MG15000” (page 25)
- “NTHR16EA Fabric card for MSS15000 and MG15000” (page 25)
- “Recurring Fan Alarm and Fabric Temperature Alarm Enhancements for MSS15000 and MG15000” (page 25)
- “Nodal Provisioning (NP) Template Audit for MSS15000 and MG15000” (page 26)
- “Multiservice Data Manager Operator Client” (page 26)
- “New security features” (page 26)
- “Security audit logs (all solutions)” (page 26)
- “NP Templates for IPSec on call control connections on switched Media Gateway 15000” (page 29)

*Note:* For descriptions of the features listed above, see “What’s new in Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager for Carrier Voice over IP Networks documentation” (page 23).

## Branding changes

The term Succession has been rebranded Carrier Voice over IP Networks (CVoIP).

The term Preside Multiservice Data Manager (Preside MDM) has been rebranded to Multiservice Data Manager (MDM) in conjunction with the new Nortel brand simplified naming format.

Passport 8600 (PP8600) has been rebranded to Ethernet Routing Switch 8600 (ERS 8600).

For more information on the Multiservice Data Manager product rebranding, refer to 241-6001-001 What's New in MDM Documentation.

## Text conventions

This document uses the following text conventions:

- `nonproportional spaced plain type`

Nonproportional spaced plain type represents system generated text or text that appears on your screen.

- **nonproportional spaced bold type**

Nonproportional spaced bold type represents words that you should type or that you should select on the screen.

- *italics*

Statements that appear in italics in a procedure explain the results of a particular step and appear immediately following the step.

Words that appear in italics in text are for naming.

- `[optional_parameter]`

Words in square brackets represent optional parameters. The command can be entered with or without the words in the square brackets.

- `<general_term>`

Words in angle brackets represent variables which are to be replaced with specific values.

- UPPERCASE, lowercase

In Nortel Multiservice Data Manager, uppercase and lowercase letters that appear in UNIX commands and parameters must be matched exactly. The system matches upper and lowercase characters differently.

- UPPERCASE, lowercase

Nortel Multiservice Switch system commands are not case-sensitive and do not have to match commands and parameters exactly as shown in this document, with the exception of string options values (for example, file and directory names) and string attribute values.

- |

This symbol separates items from which you may select one; for example, ON/OFF indicates that you may specify ON or OFF. If you do not make a choice, a default ON is assumed.

- ...

Three dots in a command indicate that the parameter may be repeated more than once in succession.

The term absolute pathname refers to the full specification of a path starting from the root directory. Absolute pathnames always begin with the slash (/) symbol. A relative pathname takes the current directory as its starting point, and starts with any alphanumeric character (other than /).

## Related documents

The following documents comprise the Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks documentation suite:

- NN10028-111 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Product and Technology Basics PT-AAL1/UA-AAL1/UA-IP*
- NN10185-461 *Upgrading Nortel Multiservice Data Manager in Carrier Voice over IP Networks*
- NN10070-461 *Upgrading Nortel Multiservice Switch 15000 in Carrier Voice over IP Networks PT-AAL1/UA-AAL1*
- NN10419-461 *Upgrading Nortel Multiservice Switch 15000 and Media Gateway 15000/20000 in Carrier Voice over IP Networks*
- NN10092-911 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Fault Management Overview PT-AAL1/UA-AAL1/UA-IP*
- NN10198-912 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Fault Management Troubleshooting PT-AAL1/UA-AAL1/UA-IP*

- NN10254-913 *Nortel Multiservice Switch 15000 in Carrier Voice over IP Networks Replacing an OC-3/STM-1 FP (PT-AAL1/UA-AAL1)*
- NN10114-511 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Overview PT-AAL1/UA-AAL1/UA-IP*
- NN10225-512 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Attribute Summary PT-AAL1/UA-AAL1/UA-IP*
- NN10158-711 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Performance PT-AAL1/UA-AAL1/UA-IP*
- NN10180-611 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Security and Administration PT-AAL1/UA-AAL1/UA-IP*
- NN10180-612 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier VoIP Networks Security and Administration - Securing Network Elements*

You can also refer to the following documents for related information:

- NN10600-700 *Nortel Multiservice Switch 7400/15000/20000 ATM Technology Fundamentals*, NN10441-100 *PT-AAL2 Solution-level Basics*, and NN10443-100 *UA-AAL1 Solution-level Basics*.

These documents contain additional overview information related to the Packet Trunking - AAL1 and Universal Access - AAL1 solutions.

- NN10600-800 *Nortel Multiservice Switch 7400/15000/20000 IP Technology Fundamentals* and NN10446-100 *Universal Access - IP Solution-level Basics (UA-IP)*

These documents contain additional overview information related to the Universal Access - IP solution.

- NN10600-030 *Nortel Multiservice Switch 7400/15000/20000 Overview*

This document contains more information about Nortel Multiservice Switch 15000 hardware and software.

- NN10600-780 *Nortel Media Gateway 7480/15000 Technology Fundamentals*

This document contains more information about the Nortel Media Gateway 15000.

- 241-6001-801 *Nortel Multiservice Data Manager Overview*

This document contains more information about Nortel Multiservice Data Manager software.

- NN10600-272 *Nortel Multiservice Switch 7400/15000/20000 Upgrading Software*

- NN10600-605 *Nortel Multiservice Data Manager Network Security Fundamentals*

NN10600-606 *Nortel Multiservice Data Manager Network Security: User Access Configuration*

NN10600-607 *Nortel Multiservice Data Manager Network Security: Secure Communications Configuration*

These documents contain more information about Nortel Multiservice Data Manager security features.

- NN10600-601 *Nortel Multiservice Switch 7400/15000/20000 Security Management*

This document contains more information about Nortel Multiservice Switch security features.

The following documents contain more information about Nortel Multiservice Switch 15000 and Nortel Multiservice Data Manager software.

- 241-6001-303 *Nortel Multiservice Data Manager Customization and Administration*
- NN10400-300 *Nortel Multiservice Data Manager Administration Tools*
- NN10400-305 *Nortel Multiservice Data Manager Administration Fundamentals*

## How to get more help

For information on training, problem reporting, and technical support, see “Nortel support services” section in NN10600-030 *Nortel Multiservice Switch 7400/15000/20000 Overview*.



## Chapter 1

# What's new in Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager for Carrier Voice over IP Networks documentation

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Refer to the following sections for more information about recent changes in the Multiservice Switch for Carrier Voice over IP Networks documentation suite for SN08:

- “New features in SN08” (page 23)
- “Changes to the documentation suite” (page 30)

## New features in SN08

This section lists the new features in the SN08 release that have impacted the documentation suite. This section also provides a description of each feature and explains how it impacts the product and the user.

To find which feature information has been added into a document, refer to the “What’s new in this document” section of that document. That section provides cross-references that lead you directly to the new information.

See the following sections for the descriptions of the new features.

- “Solaris 9 Upgrade for MDM workstations” (page 24)
- “Succession IP Software Migration (SISM)” (page 24)
- “InterNode Emergency Stand Alone (ESA) for MG9000” (page 24)
- “Auto-patching of MSS15000 and MG15000” (page 25)

- “NTHR16EA Fabric card for MSS15000 and MG15000” (page 25)
- “Recurring Fan Alarm and Fabric Temperature Alarm Enhancements for MSS15000 and MG15000” (page 25)
- “Nodal Provisioning (NP) Template Audit for MSS15000 and MG15000” (page 26)
- “Multiservice Data Manager Operator Client” (page 26)
- “New security features” (page 26)
- “NP Templates for IPSec on call control connections on switched Media Gateway 15000” (page 29)
- “Standardized configurations and nodal provisioning (NP) templates for Multiservice Switch 15000 and Media Gateway 15000 in the PT-AAL2 solution” (page 30)

## **Solaris 9 Upgrade for MDM workstations**

Solaris version 9 is the current operating system shipped on the Sun platform. MDMs must be upgraded to Solaris 9 on all MDM workstations in all Carrier Voice over IP solutions. Both releases targeted for upgrade in SN08 (SN06 and SN07) are currently running Solaris 8. You will use Live Upgrade to upgrade to Solaris 9 from Solaris 6, 7, or 8.

## **Succession IP Software Migration (SISM)**

A software migration on Multiservice Switch 15000 and Media Gateway 15000 nodes can be performed using the command console or the MDM GUI tool called Succession IP Software Migration (SISM) tool. SISM automates the HSM process. Using the SISM tool reduces the chance of errors and increases the speed and efficiency of the software migration.

## **InterNode Emergency Stand Alone (ESA) for MG9000**

The MG9000 inter-node Emergency Stand Alone (ESA) feature allows MG9000 line gateways to setup calls within a designated community of interest (COI) when communication with the CS2000 call server is unavailable. ESA now uses IP to set up calls between a set of MG9000s. MSS15000 provides the inter-MG9000 communication through the Virtual Router to route IP-based ESA signaling between MG9000 gateways.

## **Auto-patching of MSS15000 and MG15000**

The auto-patching of MSS15000/MG15000 nodes feature allows the system to download and apply eligible non-disruptive patches from your MDM Software Delivery Server (SDS) to each of your switches, automatically. The eligible patches are downloaded and applied to the Software patchList using a script that is triggered to run at a scheduled time from the MDM Server. Only non-disruptive patches are eligible for auto-patching.

## **NTHR16EA Fabric card for MSS15000 and MG15000**

The NTHR16EA version of the fabric card for the MSS15000/MG15000 platforms is introduced. The new fabric card, which utilizes Prizma-EP technology, is functionally equivalent to the existing fabric card. The NTHR16EA fabric card is backwards compatible with previous releases (back to SN06).

## **Recurring Fan Alarm and Fabric Temperature Alarm Enhancements for MSS15000 and MG15000**

### **Recurring fan alarm**

Formerly, when a CP switchover (CPSO) occurred while the recurring fan alarm 7012 0051 was active, the alarm would restart its repetition cycle as a MAJOR alarm. The alarm now retains the correct state across a CPSO.

### **Fabric temperature**

Formerly, when fabric temperature rose above 65 degrees celsius, a MAJOR high fabric temperature alarm 7002 0003 was raised.

- The severity of this alarm has been changed from MAJOR to CRITICAL.
- The threshold temperature for this alarm has been reduced to 55 degrees celsius.

A new Multiservice Switch 15000 / Media Gateway 15000 SET/CLEAR fabric temperature alarm code 7002 0004 has been added to provide warning of a potential high fabric temperature situation.

- The severity of this alarm code is CRITICAL.

- The alarm code is generated if there is an outstanding recurring fan alarm 7012 0051 on the shelf and the fabric temperature has risen by more than three degrees celsius since the initial fan failure.

## **Nodal Provisioning (NP) Template Audit for MSS15000 and MG15000**

The NP Template Audit can help locate problems with configuration data on the Multiservice Switch 15000 and Media Gateway 15000 nodes. When an NP template is used, the NP server generates security audit logs that capture all information related to the template and the node. The configuration audit tool can be used subsequently to display the differences between the on-switch provisioned data and the user input data in the NP template.

## **Multiservice Data Manager Operator Client**

The Operator Client application permits the controlled access of the operator to the Operator Client tools that have been configured for the user from the MDM Toolset. The Operator Client desktop runs on either a Solaris workstation or on a PC that runs Windows 2000 or XP. With central AAA and the Operator Client application, access to Multiservice Data Manager (MDM) surveillance and configuration tools, and to the capabilities within these tools, is restricted. The tools are downloaded to the operator's desktop and run locally, thus off-loading the MDM server. The MDM Admin Server for VoA networks provides the point of user access administration and the Integrated EMS provides the point of user access administration for VoIP networks. This feature is optional for VoA networks but required for VoIP networks.

## **New security features**

New security features and procedures have been provided in the following areas.

### **Security audit logs (all solutions)**

Security audit logs are generated by MDM applications and MSS15000/ MG15000 nodes to help monitor and audit configuration changes to the network elements and detect security issues such as unauthorized node access or configuration changes.

The Multiservice Data Manager Security Audit Log Collector (SALC) server provides real-time collection of security audit logs from MSS15000/MG15000 nodes and the MDM workstation. This is done for local storage and for forwarding to another management system through UNIX's standard syslog process or through Nortel's internal custlog format. Multiple SALC servers can be run on an MDM workstation to handle security audit log feeds from different MSS15000/MG15000 groups. An MSS15000/MG15000 node can send security audit log feeds to multiple MDM workstations in real-time.

The security audit logs can be converted into custlog V2 format for delivery to a higher level element manager such as CS2000 Core Manager or Integrated EMS (that has been upgraded to SN08) where they can be integrated into the SCC2 feed to the OSS. The security audit logs can also be written to a file on the MDM workstation for access by the Log Browser tool.

### **Central authentication, authorization and accounting (AAA) through the MDM Admin Server (VoA solutions only)**

MDM central AAA provides management of the MSS15000/MG15000 and MDM users through a unified interface. MDM maintains a central repository of user information, and handles validation of userids and passwords (authentication), assignment of MDM and MSS15000/MG15000 user access privileges through the use of policies and roles to validated users (authorization), and general administration of userids, passwords, roles and policies. Managing user access privileges is simplified by mapping job functions and access privileges into policies that are assigned to roles and then associating userids to those roles. The RADIUS interface is used to transmit login requests and access privilege information between the MDM workstation and the MSS15000/MG15000 node.

This feature is optional for VoA networks and is installed when the Operator Client feature's Security server and JWS is selected during the MDM installation procedure.

### **Central authentication, authorization and accounting (AAA) through Integrated EMS (VoIP solutions only)**

Integrated EMS central AAA provides management of the MSS15000/MG15000 and MDM users in a central office through a unified interface. Integrated EMS maintains a central repository of user information, and handles validation of userids and passwords (authentication), assignment of

MDM and MSS15000/MG15000 user access privileges through the use of groups and scopes to validated users (authorization), and general administration of userids, passwords, groups and scopes. Managing user access privileges is simplified by mapping job functions and access privileges onto groups and then associating userids to those groups. On the MDM workstation, PAM\_RADIUS and PAM\_NSSwitch interfaces are used to exchange login requests and access privilege information with the Integrated EMS. On MSS15000/MG15000 nodes, a RADIUS interface is used for this purpose.

This feature is required for VoIP networks and is installed when the Operator Client feature is installed by selecting the JWS option and not selecting the Security package option.

### **Communications security (VoIP solutions only)**

The Secure Shell (SSH) protocol is used to authenticate and encrypt management data transmitted between MDM workstations and the Integrated EMS, and between remote operator desktops running the MDM Toolset and MDM workstations. The SSH software is installed on the MDM workstation as part of the Solaris 9 upgrade.

IP Security (IPSec) protocols are used to authenticate and encrypt management data transmitted between MDM workstations, and between an MDM workstation and an MSS15000/MG15000 node. IPSec software for the MDM workstation is installed as part of the Solaris 9 upgrade. IPSec encryption software for the MDM workstation must be installed separately. IPSec software for the MSS15000/MG15000 is included in the SN08 software installation.

### **MDM and MSS15000/MG15000 platform security (VoIP solutions only)**

Platform security procedures improve the resistance of the MDM and MSS15000/MG15000 operating systems and MDM applications to unauthorized access through the IP network. This includes:

- removing unused userids and system functions
- enforcing timeouts of idle user sessions
- restricting access to functions providing IP address information

- restricting the remote users that can access the workstation or node
- enforcing good password policies

### **IPSec for Media Gateway 15000 control connection traffic (VoIP solutions only)**

IP Security (IPSec) protocols are used to secure the H.248 call control connection between the Communication Server 2000 (CS2000) and the Media Gateway 15000 using VSP3-o FPs.

### **NP Templates for IPSec on call control connections on switched Media Gateway 15000**

Two templates are available to configure IPSec protection on H.248 connections between the MG15000 and the Media Gateway Controller. The Ctrl/mg sub-component of the Nsta component now has a SecurityPolicyDatabase (spd) component for the implementation of IPSec security protection on H.248 connections between the MG15000 and the Media Gateway Controller. The spd component and its policies are configured using the following templates:

- *IF-MGC-IPSEC-2pOC3ChSmIrVsp3-o*

For the implementation of IPSec security protection this template is used to configure the Ctrl/mg sub-component of the Nsta component with the SecurityPolicyDatabase (spd) component attributes.

- *IF-MGC-IPSEC-ping-2pOC3ChSmIrVsp3-o*

For the implementation of IPSec security protection this template is used to configure policy components for the Ctrl/mg component that allow ICMP pings to be sent and received on 2pOC3ChSmIrVsp3 FPs.

Refer to NN10225-512, Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager Configuration Attribute Summary PT-AAL1/UA-AAL1/UA-IP for the attributes required to configure the components in these templates.

## **Standardized configurations and nodal provisioning (NP) templates for Multiservice Switch 15000 and Media Gateway 15000 in the PT-AAL2 solution**

Standard configurations are defined for Multiservice Switch 15000 and Media Gateway 15000 equipment in the PT-AAL2 solution, and supported through nodal provisioning (NP) templates.

Nodal Provisioning (NP) templates simplify the initial commissioning in a PT-AAL2 solution and minimize operator error in applying Multiservice Switch 15000 and Media Gateway 15000 equipment attributes.

## **Changes to the documentation suite**

This section describes the following changes to the Multiservice Switch for Carrier Voice over IP Networks documentation suite for the SN08 release:

- “Branding changes” (page 30)
- “New documents” (page 31)
- “Other updates and changes” (page 31)

### **Branding changes**

The following changes were made to the documentation suite:

- The term *Preside Multiservice Data Manager* (Preside MDM) has been rebranded to *Multiservice Data Manager* (MDM) in conjunction with the new Nortel brand simplified naming format.

For more information on the Multiservice Data Manager product rebranding, refer to 241-6001-000 *Nortel Multiservice Data Manager Using the Documentation*.

- Passport 8600 (PP8600) has been rebranded to Ethernet Routing Switch 8600 (ERS 8600).
- Succession Networks has been rebranded as Carrier Voice over IP Networks.
- The term Nortel Networks has been changed to Nortel.

## **New documents**

The following document was added to the Multiservice Switch for Carrier Voice over IP Networks documentation suite:

- NN10180-612 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier VoIP Networks Security and Administration - Securing Network Elements.*

This new document describes how to activate the new security features in a VoIP network.

## **Other updates and changes**

See “Related documents” (page 18) for a list of the NTPs in this suite that have been updated with technical information for the SN08 release.

Documents are frequently updated with changes that are not specific to a feature. To determine the other changes made in a particular document, read the section called “What’s new in this document” in that document.



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## Chapter 2

# Overview of the solutions and components within the Carrier Voice over IP portfolio

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The Nortel Carrier Voice over IP portfolio is a set of solutions designed to provide carriers with an evolutionary path from circuit-switching networks to packet networks. This portfolio connects multiple nodes that deliver both voice and data traffic over one network and provides for increased switching capacity because of the increased bandwidth and the off-loading of real time processing from the Communication Server 2000. In addition, it implements distributed switching because switching does not occur at one central location but is distributed to other nodes. As a result, the Carrier Voice over IP portfolio allows customers to take advantage of the cost-effectiveness and open standards of packet networks without sacrificing the value of traditional telephony.

Three solutions within this portfolio are:

- Packet Trunking - AAL1 (PT-AAL1), described in “What is the Packet Trunking - AAL1 solution?” (page 34)
- Universal Access - AAL1 (UA-AAL1), described in “What is the Universal Access - AAL1 solution?” (page 37)
- Universal Access - IP (UA-IP), described in “What is the Universal Access - IP solution?” (page 40)

For more information on the components within these solutions, see “What are the components in the Carrier Voice over IP Networks portfolio?” (page 43).

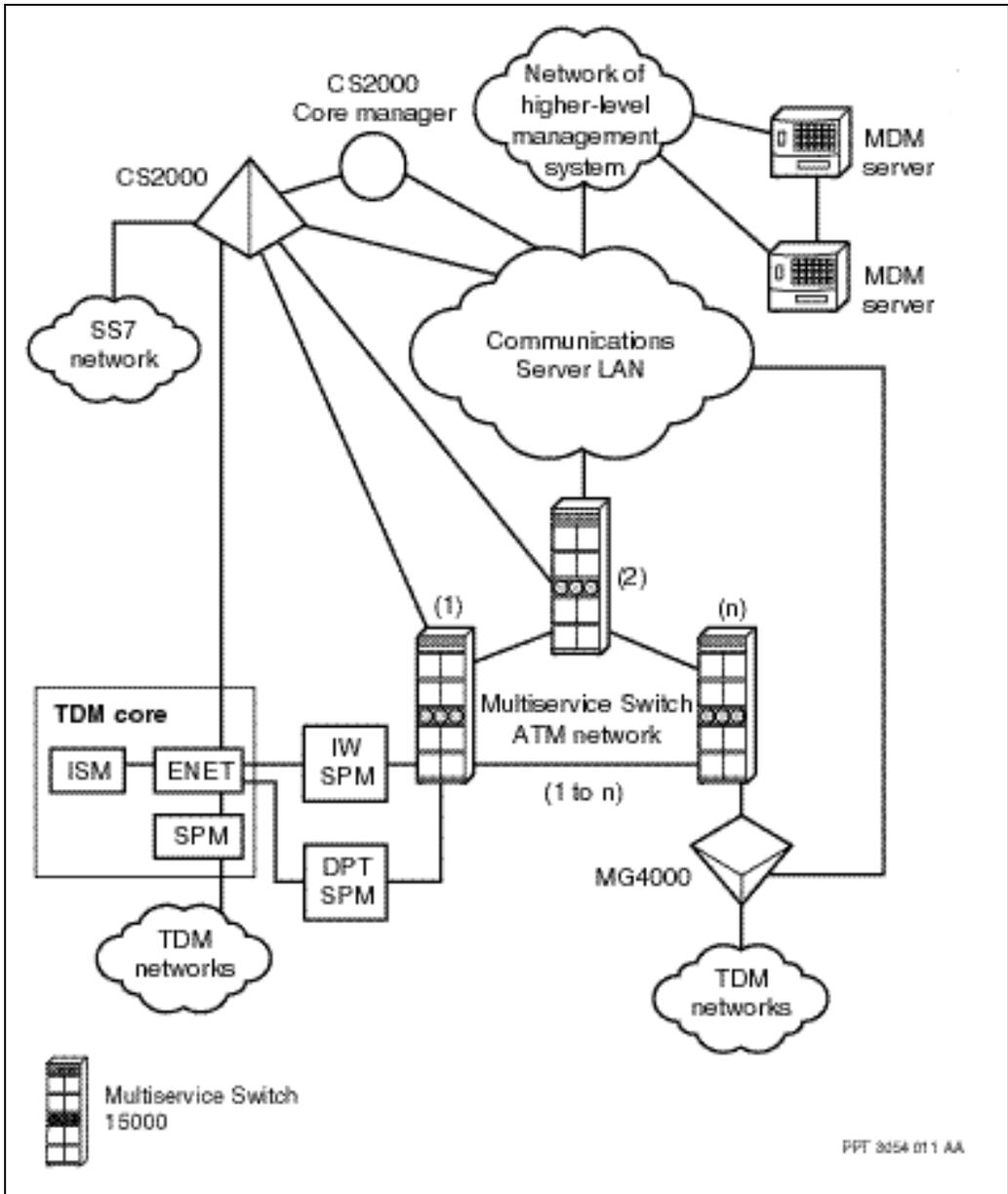
## What is the Packet Trunking - AAL1 solution?

One of the solutions in the Carrier Voice over IP portfolio is the Packet Trunking - AAL1 (PT-AAL1) solution. PT-AAL1 provides a solution for the public switched telephone networks Class 4 tandem office by integrating voice and data networks through asynchronous transfer mode (ATM) broadband switching technology. As a result, voice calls being routed through a PT-AAL1 network can be routed over the ATM fabric instead of through the traditional time division multiplexing (TDM) equipment. Because ATM technology can support many different services on the same unified network, the transmission of calls over this technology facilitates the integration of service providers' voice and data networks. In addition, ATM, when used in conjunction with other equipment, reduces the equipment footprint and increases the Busy Hour Call Attempts (BHCA) throughput when compared to the throughput of the TDM equipment.

Refer to the figure "Packet Trunking - AAL1 solution" (page 35) to review the components involved in this solution. For more information on this solution, see NN10320-100 *ATM Solutions Basics*.

**Note:** This figure does not represent the redundant links between components. For more information about actual connection links and redundancy between links, see NN10114-511 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Overview PT-AAL1/UA-AAL1/UA-IP*.

**Figure 1**  
**Packet Trunking - AAL1 solution**



The PT-AAL1 solution consists of the following components:

- “Communication Server 2000” (page 43)
- “Communications Server LAN” (page 45)
- “CS2000 Core Manager” (page 46)
- “Dynamic Packet Trunking Spectrum Peripheral Module” (page 46)
- “Interworking Spectrum Peripheral Module” (page 46)
- “Multiservice Gateway 4000” (page 50)
- “Multiservice Switch 15000” (page 50)
- “Multiservice Data Manager” (page 51)
- “TDM core” (page 54)

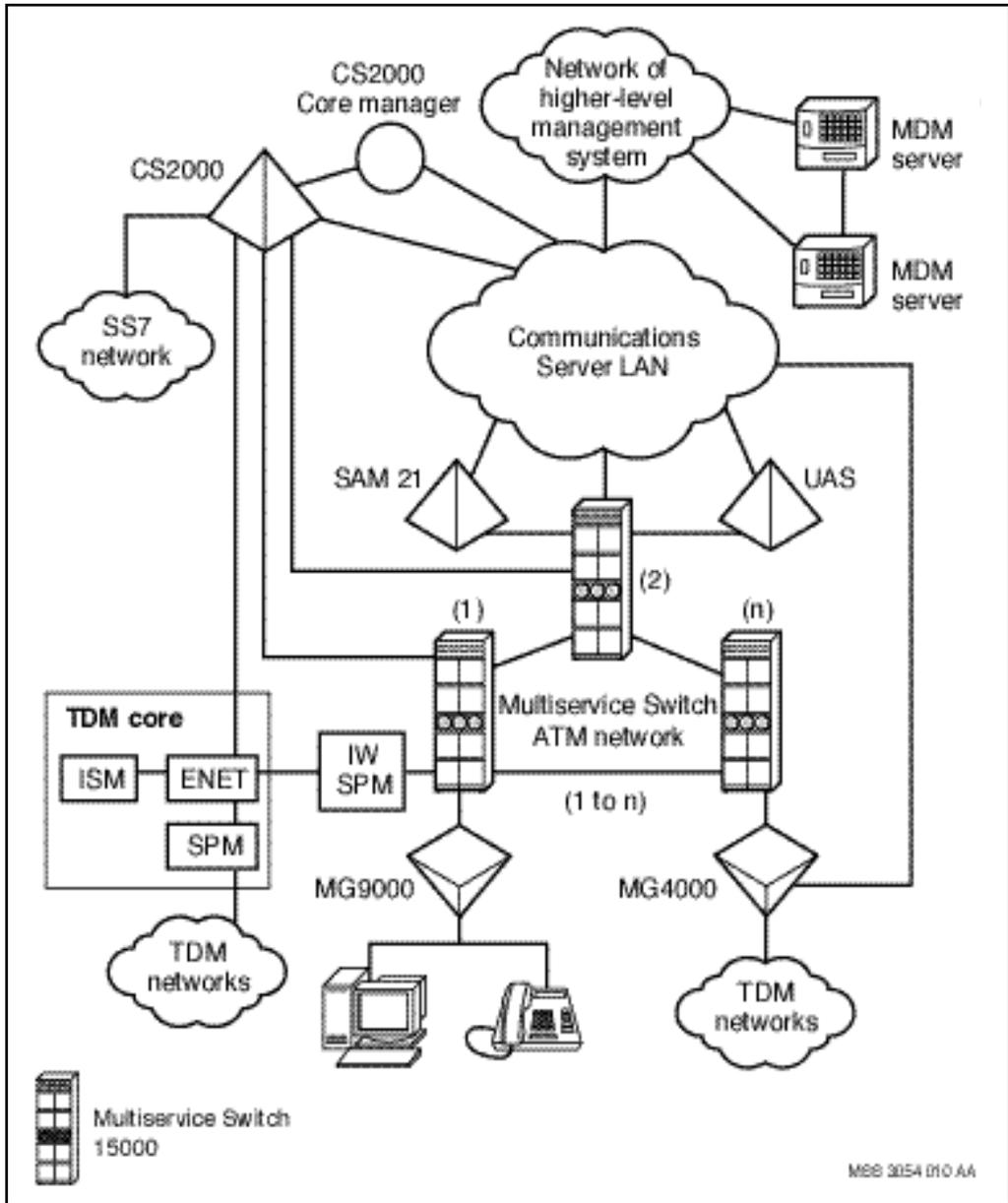
## What is the Universal Access - AAL1 solution?

Another solution in the Carrier Voice over IP portfolio is the Universal Access - AAL1 (UA-AAL1) solution. This solution facilitates a Class 5 end office replacement program by integrating voice and data networks through ATM broadband switching technology. In this solution, the end office is built on a distributed ATM core network that provides end office voice services using UA-AAL1 for voice transmission. It supports interworking with legacy ENET-based line and trunk services and peripherals. Because ATM technology can support many different services on the same unified network, this solution is the first step to evolving a multi-service end office. In addition, ATM, when used in conjunction with other equipment, reduces the equipment footprint and increases the BHCA throughput when compared to the throughput of the TDM equipment.

Refer to the figure “Universal Access - AAL1 solution” (page 38) to review the components involved in this solution and their interconnectivity. For more information on this solution, see NN10320-100 *ATM Solutions Basics*.

**Note:** This figure does not represent the redundant links between components. For more information about actual connection links and redundancy between links, see NN10114-511 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Overview PT-AAL1/UA-AAL1/UA-IP*.

**Figure 2**  
**Universal Access - AAL1 solution**



The UA-AAL1 solution consists of the following components:

- “Communication Server 2000” (page 43)
- “Communications Server LAN” (page 45)
- “CS2000 Core Manager” (page 46)
- “Interworking Spectrum Peripheral Module” (page 46)
- “Media Gateway 9000” (page 48)
- “Multiservice Gateway 4000” (page 50)
- “Multiservice Switch 15000” (page 50)
- “Multiservice Data Manager” (page 51)
- “TDM core” (page 54)
- “Universal Audio Server/MS2020” (page 54)

## What is the Universal Access - IP solution?

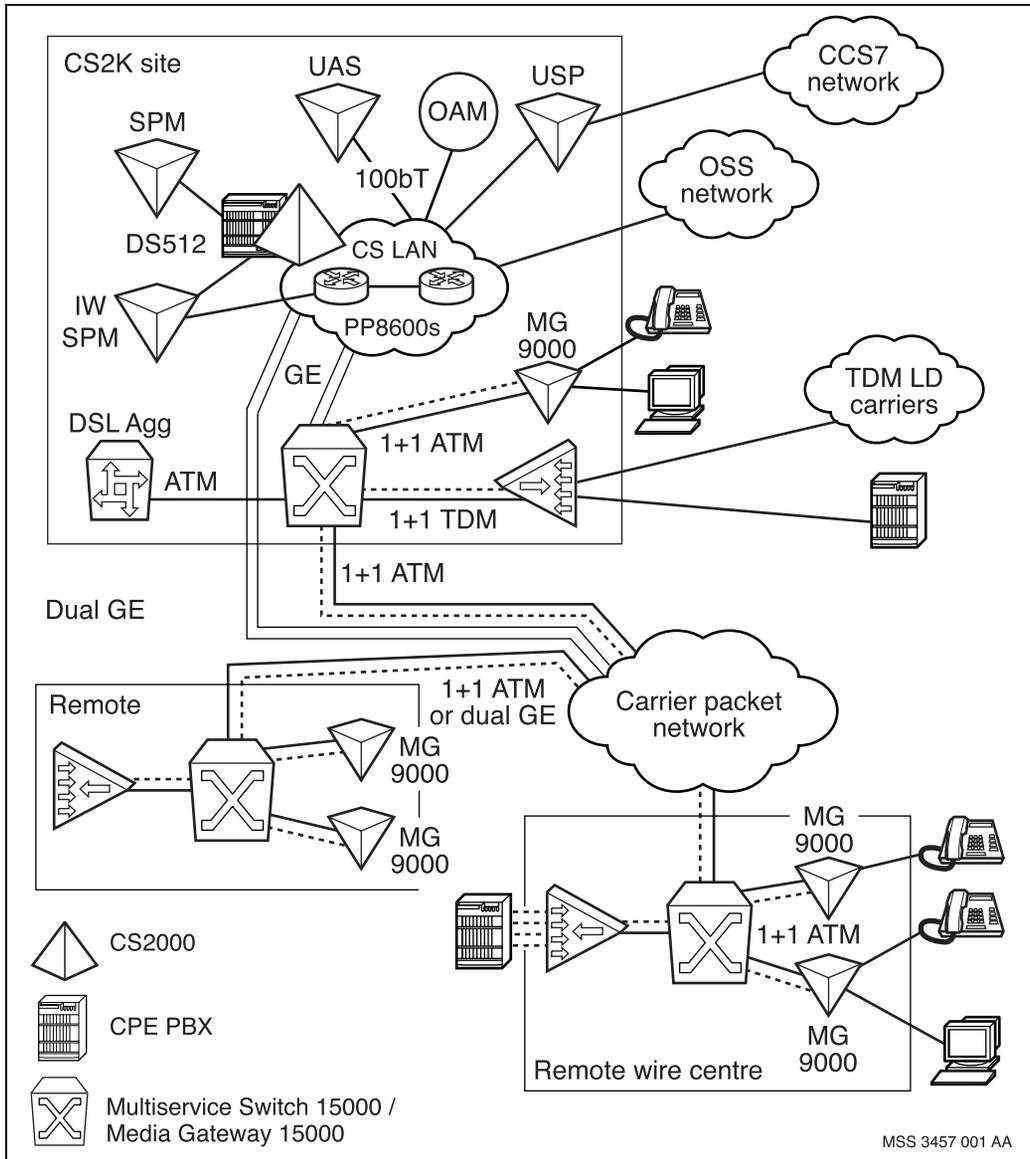
One of the solutions in Carrier Voice over IP portfolio is the Universal Access - IP (UA-IP) solution. UA-IP provides an end-office solution, including plain old telephone service (POTS) and other access services (for example, DSL) that use internet protocol (IP) as the packet technology. A Nortel Multiservice Switch 15000 is the IP aggregation router.

UA-IP technology retains the concept of a PSTN Central Office, while allowing several offices to be collapsed due to higher capacity and distributed architecture. The solution supports evolution to blended services, since wireline, wireless and data connections can all run on the same core network.

Refer to the figure “Universal Access - IP solution” (page 41) to review the components involved in this solution. For more information on this solution, see NN10300-100 *IP Solutions Basics*.

**Note:** This figure does not represent all the redundant links between components. For more information about actual connection links and redundancy between links, see NN10114-511 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Overview PT-AALI/UA-AALI/UA-IP*.

**Figure 3**  
**Universal Access - IP solution**



The UA-IP solution consists of the following components:

- “Communication Server 2000” (page 43)
- “Communications Server LAN” (page 45)
- “CS2000 Core Manager” (page 46)
- “DSL aggregator” (page 46)
- “Interworking Spectrum Peripheral Module” (page 46)
- “Integrated Element Management System” (page 47)
- “Media Gateway 9000” (page 48)
- “Media Gateway 15000” (page 49)
- “Multiservice Gateway 4000” (page 50)
- “Multiservice Switch 15000” (page 50)
- “Multiservice Data Manager” (page 51)
- “Multiservice Data Manager” (page 51)
- “Universal Audio Server/MS2020” (page 54)

## What are the components in the Carrier Voice over IP Networks portfolio?

Refer to the following sections for more information about the components involved in the PT-AAL1, UA-AAL1 and UA-IP solutions:

- “Communication Server 2000” (page 43)
- “Communications Server LAN” (page 45)
- “CS2000 Core Manager” (page 46)
- “DSL aggregator” (page 46)
- “Dynamic Packet Trunking Spectrum Peripheral Module” (page 46)
- “Interworking Spectrum Peripheral Module” (page 46)
- “Integrated Element Management System” (page 47)
- “Media Gateway 9000” (page 48)
- “Media Gateway 15000” (page 49)
- “Multiservice Gateway 4000” (page 50)
- “Multiservice Switch 15000” (page 50)
- “Multiservice Data Manager” (page 51)
- “Sun Fire™ V480 servers” (page 54)
- “TDM core” (page 54)
- “Universal Audio Server/MS2020” (page 54)

### Communication Server 2000

The Communication Server 2000 (CS2000) is the primary network intelligence component for these solutions. It processes all call requests within the network and provides centralized call control between the media gateways (MG4000, MG15000 and MG9000 nodes), the Time Division Multiplexing-based nodes, and the ATM core. It also provides service transaction logic, including translations, routing control, network signaling, and the creation of billing records. In addition, the CS2000 directs access gateways to establish and tear down switched virtual circuits for the delivery of packetized voice and data traffic across the ATM core network.

For more information on the CS2000 in the Packet Trunking - AAL1 (PT-AAL1) solution, see NN10206-111 *Communication Server 2000 Basics*. For more information on the CS2000 in the Universal Access - AAL1 (UA-AAL1) and Universal Access - IP (UA-IP) solutions, see NN10019-111 *Communication Server 2000 Basics*.

The CS2000 is composed of several sub-platforms:

- Extended Architecture Core (XA-Core), which is the computing platform for the CS2000 call processing and service logic. It provides signalling for the Peripheral Processor Virtual Machine (PPVM) network and call feature processing for the voice network.
- Gateway Controller (GWC), which acts as a call processing protocol converter between proprietary XA-Core messages and the open standard H.248 messages used by the MG9000 and MG15000 media gateways.
- Input/Output Module (IOM), which provides communication interfaces, storage media, and data interfaces to the voice messaging systems.
- Integrated Services Module (ISM), which provides conference circuits, Enhanced Digital Recorded Announcement Machine (EDRAM) announcements, and line test, trunk test, and office alarm unit interfaces.
- Link Peripheral Processor or Fiberized Link Peripheral Processor (LPP/FLPP), which serves as the signaling interface to the SS7 network.
- Message Switch (MS), which delivers messages between the XA-Core and the LPP/FLPP, Input/Output Module equipment, the Enhanced Network (ENET), and the CS2000 Core Manager.
- Service Application Module 21 (SAM21), which is the computing platform for the Gateway Controllers (GWCs) required by the MG9000s in the UA-AAL1 solution, and by the MG9000 and MG15000 nodes in the UA-IP solution. In the UA-AAL1 solution only, each SAM21 shelf has two redundant shelf controllers, each of which has a link into the Multiservice Switch 15000 ATM core network. The shelf controllers carry the H.248 Media Gateway Control Protocol to the MG9000 and MG15000 nodes.

For more information, see NN10025-111 *SAM21 Shelf Controller Basics*.

The CS2000-Compact can be used in the UA-IP solution even though it does not support interworking with legacy TDM switches. It can be deployed only in a UA-IP network where such interworking is not required.

The principal components of the CS2000-Compact are:

- two Service Application Module 21 (SAM21) shelves
- one Service Application Module 16 (SAM16) shelf
- a Service Application Module 21 (SAM21), with the gateway controllers (GWCs) required by the MG9000 and MG15000 nodes in the UA-IP solution.

## Communications Server LAN

The Communications Server (CS) LAN provides the backbone for the OAM&P network, and comprises a redundant pair of Ethernet Routing Switch 8600 nodes or (for the PT-AAL1 solution only) customer-supplied equipment.

The CS LAN provides connectivity:

- between the primary components in a solution and their element management platforms (for example, between Multiservice Switch 15000 / Media Gateway 15000 nodes and the Multiservice Data Manager servers)
- among subcomponents of the CS2000 / CS2000-Compact, the Core Packet Network and the media gateways for messaging and call signaling

Physical connectivity is provided either through 100-baseT or Gigabit Ethernet (LX or SX).

Separate virtual local area networks (VLANs) are configured for voice traffic, call processing, OAM&P traffic, OSS access, and for the Gigabit Ethernet links between the redundant pair of Ethernet Routing Switch 8600 nodes.

## **CS2000 Core Manager**

The CS2000 Core Manager is another of the network management tools. It resides on the SuperNode Data Manager (SDM) platform and performs fault management, configuration management, data collection, performance management, and security management for the CS2000s, IW SPMs, and MG4000s.

You can engineer the network so that the CS2000 Core Manager receives Nortel Multiservice Switch log information from Multiservice Data Manager servers, as has been done in the PT-AAL1 solution.

## **DSL aggregator**

A DSL aggregator (such as a Nortel Services Edge Router, formerly known as Nortel Shasta BSN) collects all of the ATM DSL traffic from Media Gateway 9000 nodes and maps it to the appropriate internet service provider (ISP).

The Multiservice Switch 15000 supports DS3 IMA, DS3 clear channel, OC-3c and OC-12c ATM interfaces for the DSL aggregator network interface. Only PVCs, PVPs, SPVCs or SPVPs are supported between the Media Gateway 9000 nodes and the DSL aggregator. SVCs are not supported and no IP forwarding is done by the Multiservice Switch 15000 nodes for DSL traffic.

## **Dynamic Packet Trunking Spectrum Peripheral Module**

The Dynamic Packet Trunking Spectrum Peripheral Module (DPT SPM) is a high-speed platform in the PT-AAL1 solution that allows direct call routing from legacy equipment to the ATM core across a dynamic packet trunk (DPT). A DPT establishes on-demand virtual connections between end offices rather than using permanent connections.

For more information, see NN10016-111 *DPT SPM ATM Basics*.

## **Interworking Spectrum Peripheral Module**

The Interworking Spectrum Peripheral Module (IW SPM) platform provides bearer traffic interconnection between the TDM-core ENET (using DS512 connections) and the ATM core (using OC-3c connections). This bridging capability provides end-to-end connectivity between the digital trunk controller (DTC) or the SPM TDM and the MG4000 trunks or MG9000 lines.

Bridging also provides the MG4000 trunks and MG9000 lines with the ability to connect to ENET-based integrated service modules (ISMs) for tones and digital recorder announcer module (DRAM) based announcements.

The primary functions of the IW SPM include collecting and grooming standard TDM trunk traffic for the ATM core, extending existing trunk services from the original DMS-200 or DMS-250 offices to the TDM trunks terminating at the CS2000, and providing tandem-level announcements to end-users.

For more information, see *NN10014-111 IW SPM ATM Basics*.

## Integrated Element Management System

Integrated EMS is a next generation element management system (EMS) that provides a single point of data integration and network management for the Carrier Voice over IP office.

At the central office level, Integrated EMS:

- provides graphical topology and inventory relationships between network elements and element management systems
- aggregates all fault, security audit logs, and performance data from network elements and element management systems
- provides integrated fault, security audit logs, and performance streams to the Network Management Layer
- provides customer choice of operations support system (OSS) interfaces
- provides extensible markup language (XML) aggregation of comma-separated value (CSV) files for performance
- provides centralized fault, security audit logs, and performance viewer with filtering capabilities
- provides context-sensitive launching of network management interfaces:
- provides enhanced security features by improving the centralization of authentication, authorization, and administration, while also providing interfaces to external security databases

In the UA-IP solution, Integrated EMS acts as a central data collection and authentication, authorization, and accounting (AAA) system at the central office level. The network is engineered to have Integrated EMS receive MSS15000/MG15000 fault, security audit log, performance and security information from Multiservice Data Manager servers.

## Media Gateway 9000

The Media Gateway 9000 (MG9000) is a multi-service media gateway in the UA-AAL1 and UA-IP solutions which supports switched lines and Digital Subscriber Line (DSL) service for voice and data services. The MG9000 has OC-3c, STS-1 or DS1-IMA interfaces to the packet core which it uses to carry call control and maintenance messaging to the SAM21 shelf controllers. The internal ATM switching fabric of the MG9000 allows calls that originate and terminate on the same MG9000 to intra-switch. For calls connecting to another gateway in the UA-AAL1 solution, the MG9000 establishes SVCs across the packet core.

In the UA-AAL1 and UA-IP solutions, a 12-port DS3 function processor (FP) can connect to the ATM backbone through an MG9000 interface without requiring an OC-3 infrastructure, but while still meeting carrier-grade bandwidth requirements. Only one DS3 channel is used between the MG9000 and a Multiservice Switch 15000 node. If that channel is lost, the MG9000 will be in ESA until the channel is returned to service.

MG9000 inter-node ESA uses the MSS15000's flat VR with static routing (RFC 1483 AtmMpe) to route ESA signaling between MG9000s in an ESA group. In the UA-AAL1 solution, a new ATM PVC is setup between each MG9000 and the MSS15000 VR to carry ESA IP-traffic. In ESA mode each MG9000 is assigned a separate IP address that is dedicated to the ESA function. InterNodal ESA is supported in both the UA-AAL1 and the UA-IP solutions. It is designed to support a maximum of 15 MG9000 nodes. Refer to NN10114-511 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Overview PT-AAL1/UA-AAL1/UA-IP* for more information.

The MG9000 digitizes voice using G.711 encoding and convert it to packets using the ATM Adaptation Layer 1 (AAL1) protocol. They convert data running across the DSL lines to packets using the ATM Adaptation Layer 5 (AAL5) protocol. The MG9000 supports the plain old telephone system

(POTS), coin, ground start, Meridian Business Set and integrated DSL lines, a broad range of line class codes, and an industry-leading set of end-office residential, business, and network services.

For more information, see NN10011-111 *MG9000 Product and Technology Basics*.

## Media Gateway 15000

In the UA-IP solution, the Media Gateway 15000 is the trunk gateway between the TDM-based network and the IP network. The Media Gateway 15000 equipment is used to trunk calls between MG9000 nodes and the TDM network, or to provide PRI or V5.2 access to large enterprises with their own private branch exchange (PBX) telephone switches.

Call signaling between the Media Gateway 15000 and the gateway controller (GWC) is performed through either H.248 (Megaco) or ASPEN, a Nortel proprietary version of MGCP. The call signaling and all voice traffic are carried by the core packet network.

The Media Gateway 15000 is deployed as pairs of 1+1 VSP FP cards with the Multiservice Switch 15000 FP cards performing the IP aggregation function.

There are two types of VSP cards supported for UA-IP:

- VSP3  
TDM access is provided by a 1+1 pair of 4pOC3 TDM FP cards. The TDM OC-3 interfaces are typically connected through a channel bank to access individual DS1 circuits. Each pair of VSP3 cards supports 2016 DS0 trunks using G.711 with either 10 msec or 20 msec packetization, or 1512 DS0 trunks using G.729a.
- VSP3-o  
This card provides an OC-3 TDM interface (which makes another a pair of slots available), and can generate 2016 voice calls into the network when configured for G.711 or G.729a. The card supports only H.248. In VoIP solutions, IPSec is used to secure the control connection traffic between this card and the Connection Server 2000 (CS2000).

For more information, see NN10600-780 *Nortel Media Gateway 7480/15000 Technology Fundamentals*.

## Multiservice Gateway 4000

The Multi-Service Gateway 4000 (MG4000) is the trunk gateway between the TDM-based network and the ATM core. In the PT-AAL1 solution, the MG4000 collects TDM traffic from the TDM-based high-speed (OC-3) connections and carries it to the OC-3c interfaces in the ATM core. In the UA-AAL1 solution, the MG4000 trunks calls between the MG9000s and the TDM network. In both solutions, two permanent virtual circuit (PVC) connections are configured between a CS2000 and an MG4000 to provide for peripheral processor virtual machine (PPVM) control signalling. In addition, there are peer-to-peer switched virtual circuit (SVC) connections for control traffic.

For more information, see NN10013-111 *MG 4000 Basics*.

## Multiservice Switch 15000

In the PT-AAL1 and UA-AAL1 solutions, the Nortel Multiservice Switch 15000 nodes are an ATM-based switching platform that can be used to build the ATM core of a network. When engineering the ATM core, you can include multiple Multiservice Switch 15000 nodes. The nodes provide the ATM core with general routing and ATM switching as well as connectivity for a variety of services including voice, multimedia, and data. They also offer multiprotocol routing services, intelligent traffic management, full redundancy, scalable high capacity, high-speed access and trunking, exceptional Quality of Service (QoS), SONET/SDH integration, and inverse multiplexing for ATM (IMA).

In the UA-IP solution, the Multiservice Switch 15000 switch is used as the edge router to aggregate the following kinds of MG9000 and MG15000 traffic within an office:

- voice bearer traffic between all intra- and inter-office gateways, and from line and trunk gateways to the universal audio server (UAS)
- voice signaling traffic, from each gateway to its respective gateway controller (GWC)
- management traffic from MG9000 line gateways and in-band managed Multiservice Switch 15000 and Media Gateway 15000 nodes, to their respective element managers

- multi-service traffic (DSL) carried as ATM traffic from MG9000 through the Core packet network to the DSL aggregator

The existing IP Core network is used to carry Dynamic Packet Trunk (DPT) calls between offices.

Multiservice Switch 15000 nodes can be engineered with any number of distributed Multiservice Switch 15000 nodes. The nodes are managed by Nortel Multiservice Data Manager servers that are connected to them through the Communications Server LAN.

For more information see “Multiservice Switch 15000 and Media Gateway 15000 hardware overview” (page 57) and “Multiservice Switch 15000 and Media Gateway 15000 software overview” (page 89).

## **Multiservice Data Manager**

Nortel Multiservice Data Manager (MDM) is one network element management tool used by Carrier Voice over IP Networks. It performs fault management, configuration management, data collection, performance management, and security management for Multiservice Switch 15000 and Media Gateway 15000 nodes. In addition, Multiservice Data Manager servers can be configured to forward the performance management and fault management directly to the OSS, or to the CS2000 Core Manager for aggregation of the fault, security audit log, and performance feeds for PT-AAL1 and UA-AAL1 networks, or to the Integrated EMS for aggregation of the fault, security audit log, and performance feeds for UA-IP networks. In some UA-IP solutions, the performance feeds may be sent to the CS2000 Core Manager for aggregation instead of the Integrated EMS.

For more information, see “Multiservice Data Manager software overview” (page 97).

To access Multiservice Data Manager from the operator desktop using the MDM Toolset user environment, one of the following options may be used:

- Sun Fire™ V480 server running Solaris 9 operating system
- PC with X11 emulation software (Hummingbird Exceed version 6.2 on a PC with a minimum PIII 866 MHz with 256MB RAM)
- X11 terminal

Operator desktops using the MDM Toolset environment connect to a Multiservice Data Manager server using X11 R5 compatible interface software from Sun Microsystems. While Nortel does recommend Hummingbird Exceed X11 emulation software (because this software has been tested and engineered), any other X11 R5 Sun-compatible emulation software should work on a PC acting as a Multiservice Data Manager operator desktop. However, if you are using one of these other software packages, replicate any problems with the Multiservice Data Manager presentation on a Sun system prior to contacting Nortel. By replicating the problem on a Sun system you ensure that it is not the fault of the untested X11 R5 Sun-compatible X11 emulation software.

To access Multiservice Data Manager from the operator desktop using the Operator Client user environment, one of the following options may be used:

- Sun Fire™ V480 server running the Solaris 9 operating system
- PC running Windows 2000 or XP operating systems

When the Operator Client environment is used, the Multiservice Data Manager tools are downloaded from the MDM Admin Server in VoA and from the MDM Server in VoIP and run on the operator desktop.

For more information on accessing the Multiservice Data Manager tools, refer to Summary of MDM and Operator Client tools in NN10180-611 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Security and Administration PT-AAL1/UA-AAL1/UA-IP*.

Two network management approaches, dedicated and centralized, are supported for deploying Multiservice Data Manager servers in your Carrier Voice over IP network. These network management approaches are deployed either during an initial installation of Multiservice Data Manager servers or as part of an in-service migration. In the dedicated network management approach, each office requires a pair of Multiservice Data Manager servers, while in the centralized network management approach a single pair of Multiservice Data Manager servers can manage the Multiservice Switch 15000 and Media Gateway 15000 nodes in several offices. Both dedicated and centralized deployments are supported in PT-AAL1 and UA-AAL1 solutions. UA-IP solutions support the dedicated deployment only.

For task flows showing how to deploy the dedicated and centralized network management approaches, see “Overview of Multiservice Data Manager server configuration” in NN10114-511 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Overview PT-AAL1/UA-AAL1/UA-IP*.

Multiservice Data Manager servers are deployed in pairs to provide redundancy in your management solution in case of failure. There are different configurations for Multiservice Data Manager servers.

- Standalone server, which provides Multiservice Switch 15000 and Media Gateway 15000 node connectivity, higher level element manager or OSS interworking (fault, security audit log, and performance), operator desktop MDM Toolset environment for all fault, configuration, administration, performance and security (FCAPS) services
- A combination of:
  - Server-set server, which provides Multiservice Switch 15000 node connectivity, higher level element manager or OSS interworking (fault and optionally, performance), client-set support (fault, configuration, administration, and security)
  - Client-set server, which provides access to the MDM Toolset environment from the operator desktop (connects to a server-set for Multiservice Switch 15000 node connectivity, optimally to PM server for performance)
- PM server, which provides Multiservice Switch 15000 node connectivity, higher level element manager or OSS interworking (performance), client-set or standalone server for performance management
- MDM Admin Server, which provides Multiservice Switch 15000 and Media Gateway 15000 node connectivity, central AAA, controlled operator access to tools for fault, configuration, some administration, performance and security (FCAPS) services, and user administration tools from the MDM Toolset for all fault, configuration, administration, performance and security (FCAPS) services.
- MDM Server, which provides Multiservice Switch 15000 and Media Gateway 15000 node connectivity, higher level element manager or OSS interworking (fault, security audit log, and performance), interface for

central AAA via Integrated EMS, controlled operator access to tools for fault, configuration, some administration, performance and security (FCAPS) services, and user administration tools from the MDM Toolset for all fault, configuration, administration, performance and security (FCAPS) services.

For more information on MDM server configurations, see “MDM server configurations” (page 98)

### **Sun Fire™ V480 servers**

The Sun Fire™ V480 servers are the certified platforms for Nortel Multiservice Data Manager (MDM) software. Multiservice Data Manager software is installed on redundant servers that communicate through IP connectivity to the Multiservice Switch 15000 and Media Gateway 15000 nodes that they are managing. Sun Fire™ servers must be obtained directly from Sun Microsystems.

Sun Fire™ servers are located in network operations centers (NOCs) for VoA solutions and central offices (CO) for VoIP solutions. It is no longer necessary for both servers running Multiservice Data Manager be co-located in the same NOC.

For more information, see “Sun Fire™ V480 / V240 server hardware and software” (page 79).

### **TDM core**

The Time Division Multiplexing (TDM) core consists of the Enhanced Network (ENET), which is a TDM switched network, and all of its peripheral devices. The ENET provides a TDM switching fabric for access to TDM line, trunk, and service circuit peripherals.

### **Universal Audio Server/MS2020**

The Universal Audio Server (UAS) is a SAM16 shelf-based peripheral used in the UA-AAL1 solution to facilitate the lawful intercept of call content for MG9000-based targets in compliance with the Communications Assistance for Law Enforcement Act (CALEA). Under the direction of H.248 call control messages from the CS2000, targeted MG9000 call content is captured at the UAS and replicated for delivery to law enforcement. The MS2020 shares the same configuration attributes as the UAS.

The UAS provides an OC-3c network interface to the ATM core for AAL1 bearer path connections. In addition, a 100BaseT Ethernet connection to the CS LAN provides a path for H.248 protocol call control messaging with the CS2000 and for SNMP protocol OA&M messaging with the CS2000 Core Manager.

The UAS is also used in the UA-IP solution, where all H.248 signaling and voice traffic is carried through Ethernet interfaces connected to each Ethernet Routing Switch 8600 node in a redundant pair.

For more information, see NN10010-111 *Universal Audio Server Basics*.



## Chapter 3

# Multiservice Switch 15000 and Media Gateway 15000 hardware overview

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The Multiservice Switch 15000 and Media Gateway 15000 network elements share common hardware and software aspects. Hybrid systems can combine these network elements' capabilities. Unless otherwise indicated, the components apply to both network elements.

To review the base hardware components of a Multiservice Switch 15000 node, see “Base hardware components” (page 57). For more specific information about Multiservice Switch 15000 hardware used in the Carrier Voice over IP Network solutions, see “Multiservice Switch 15000 hardware in the PT-AAL1 and UA-AAL1 solutions” (page 74).

### Base hardware components

Nortel Multiservice Switch 15000 nodes are housed in a single frame assembly that is compliant with the network equipment building system (NEBS). This frame assembly contains a breaker interface panel (BIP), up to two Multiservice Switch 15000 shelf assemblies, and cable management guides.

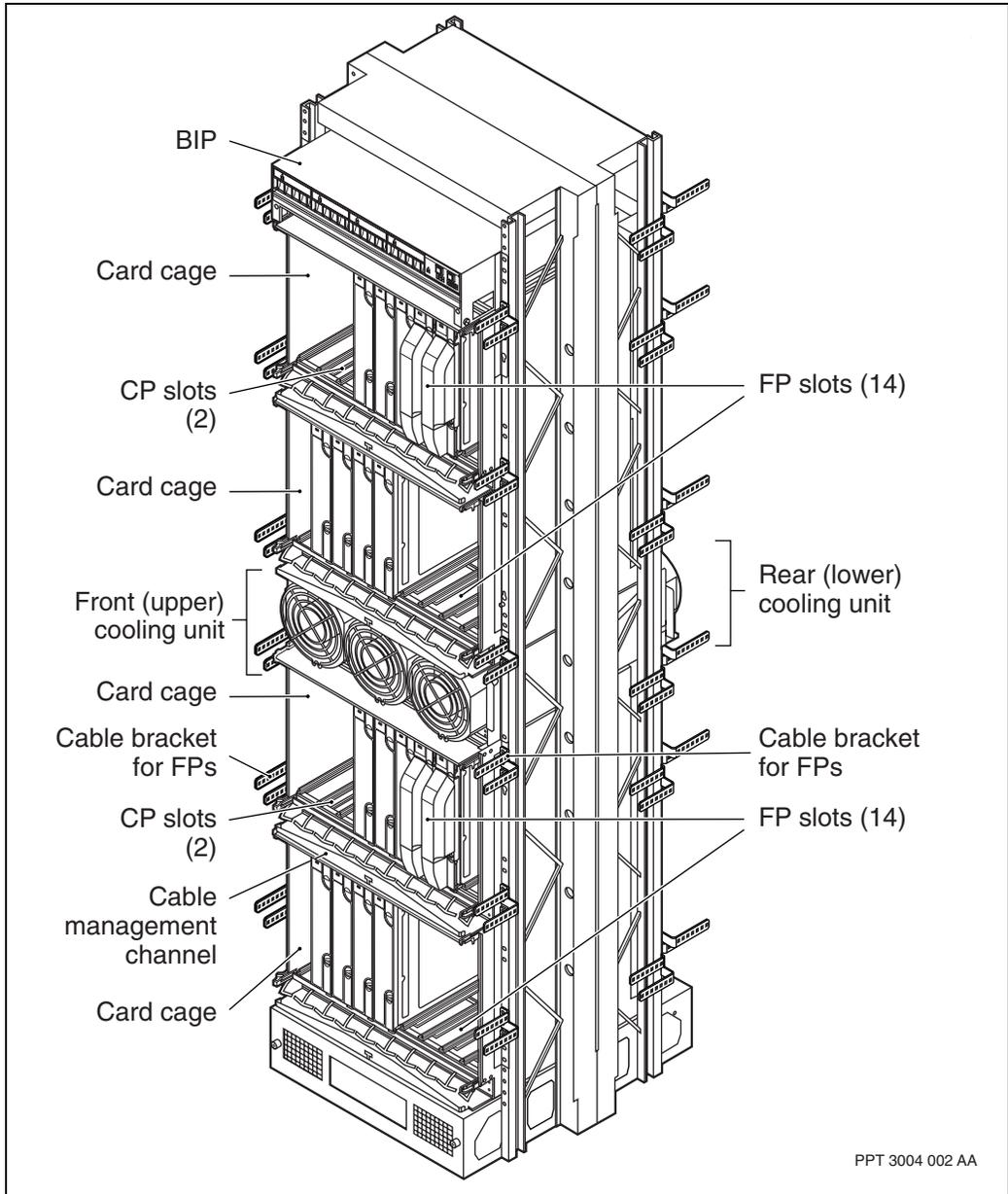
The figure “Multiservice Switch 15000 shelf (front view)” (page 59) displays the front view. The back view of the frame is displayed in the figure “Multiservice Switch 15000 shelf (back view)” (page 60).

For more information on the base hardware, see the following:

- “Shelf assembly” (page 61)

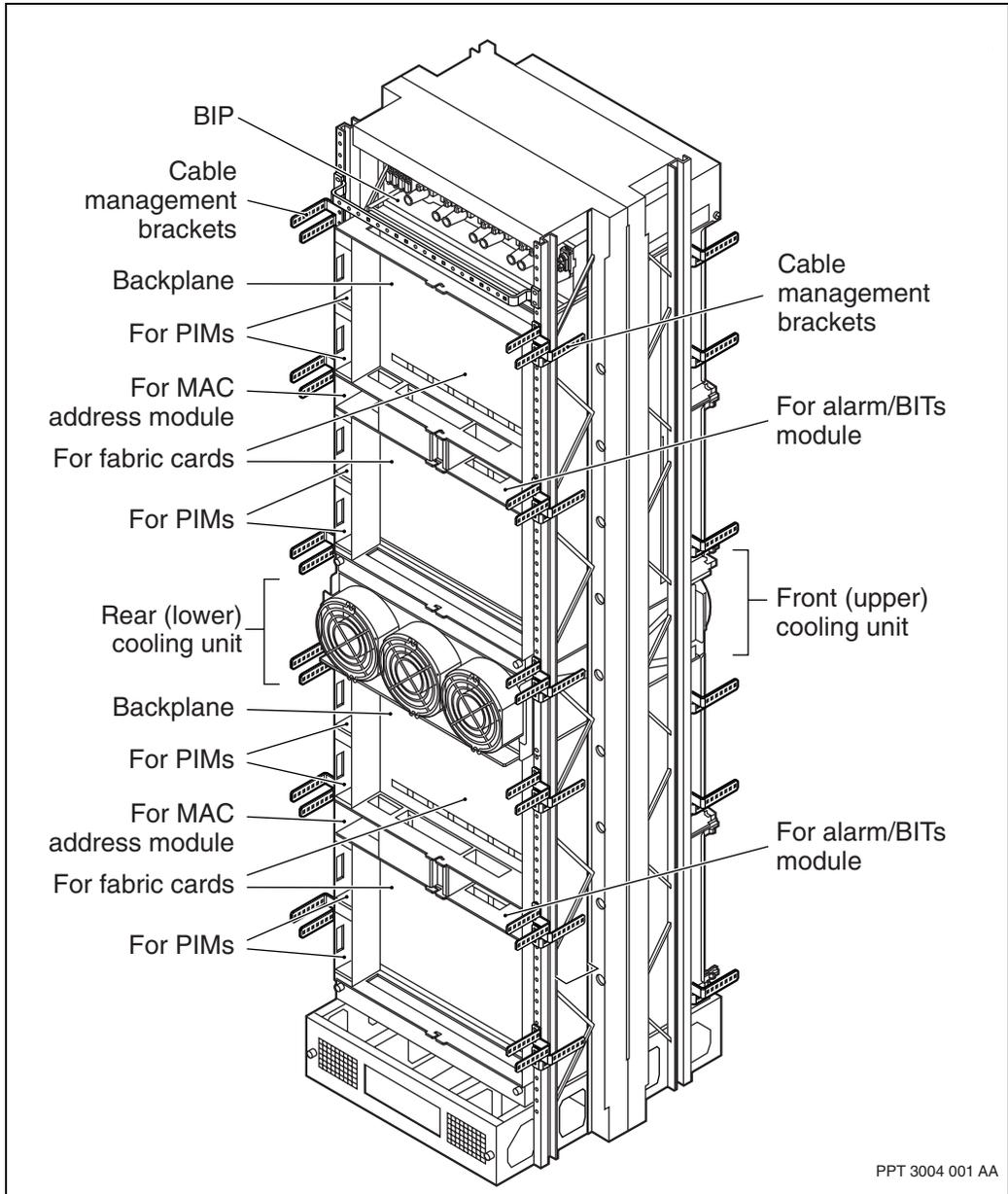
- “Multiservice Switch 15000 control processors” (page 62)
- “Multiservice Switch 15000 function processors” (page 63)
- “4-port DS3 sparing panel NTHR79” (page 66)
- “Breaker interface panel” (page 68)
- “Cable management guides” (page 68)
- “Cooling units” (page 68)
- “Multiplexor” (page 68)

**Figure 4**  
**Multiservice Switch 15000 shelf (front view)**



PPT 3004 002 AA

**Figure 5**  
**Multiservice Switch 15000 shelf (back view)**



## Shelf assembly

Nortel Multiservice Switch 15000 frames support two shelf assemblies: an upper and a lower. Each shelf assembly contains all the components that make up a single Multiservice Switch 15000 shelf.

The shelf assembly components include

- the media access control (MAC) address module

The MAC address module provides the shelf with media access control (MAC) addresses for the control and function processors. The module also communicates the shelf type to the control processors.

- the backplane

The backplane is the point across which all processor cards and fabric cards in a shelf intercommunicate. The backplane provides redundant serial links and power and signal distribution between processor cards and fabric cards.

- the card cages

The shelf is divided into two card cages located one above the other. Each card cage holds a maximum of eight processor cards, which manage the node and provide interfaces for connection to high-speed data networks. There are two types of processor cards in the node: control processors (CP) and function processors (FP).

The CP and FP cards are the processing elements for performing and managing node functions. For more information, see “Multiservice Switch 15000 control processors” (page 62) and “Multiservice Switch 15000 function processors” (page 63).

- power interface modules (PIMs)

Each shelf assembly contains four PIMs: two for A power feeds and two for B power feeds. Each of the power cables from the BIP is connected to one of these PIMs. Each PIM also provides separate power filtering for the portions of the shelf it supports and terminates the shelf clocks and the secondary control bus.

- alarm/BITS module with wire-wrap terminal support

The alarm/BITS module terminates cables carrying alarm signals from the cooling unit and the BIP, as well as cables carrying BITS signals. It passes this information over the shelf backplane to the control processors.

- fabric cards

Fabric cards provide the shelf with two redundant 16x16 switching elements for interconnecting up to 16 processor cards. Both fabrics are used to carry traffic. Under normal circumstances, half the processors that each processor card transmits to and receives from are connected to the upper fabric (usually labeled the X fabric), while the other half of the processors that the processor card transmits to and receives from are connected to the lower fabric (the Y fabric). The fabrics normally loadshare the data traffic, but each is capable of handling full line capacity if one of them fails.

The following versions of the fabric cards are supported in all solutions: NTHR16EA, NTHR16DA, and NTHR16CA.

## **Multiservice Switch 15000 control processors**

Control processor (CP) cards control overall processing in the node. They connect to the shelf backplane, providing an interface to both fabric modules, while their hard disks store the Nortel Multiservice Switch software, configuration data, and spooled information. Some other functions they perform include sequencing function processor (FP) startup, downloading new software, collecting and maintaining shelf inventory, statistical data, and routing tables, providing system timing, and monitoring alarms and hardware status. As well, through their OAM Ethernet port, they provide an interface and out-of-band connectivity to Nortel Multiservice Data Manager servers.

Within the Carrier Voice over IP portfolio, CP3s are installed in slots 0 and 1 of the Multiservice Switch 15000 shelf. The supported version of CP3, CPeD, provides DS1 BITS timing in conjunction with the DS1-based Alarm/BITS card and a wire-wrap terminal block.

For more information on control processors, see the NN10600-120 *Nortel Multiservice Switch 15000/20000 Hardware Description*.

## Multiservice Switch 15000 function processors

Function processor (FP) cards terminate the physical links and provide the interface ports that connect the network communications facilities and Nortel Multiservice Switch 15000 nodes. FPs support and execute real-time processes that impact service delivery. Up to fourteen FPs can be connected to two fabrics with redundant links enabling distributed and high-capacity scalable call processing. For all FPs, both the line and equipment are spared.

The following FPs are supported in the PT-AAL1 solution:

- NTHR21 (PQC2 technology) or NTHW15 (PQC12 technology), the 4-port OC-3/STM-1 single-mode intermediate reach ATM FP (with software name 4pOC3SmIrAtm)
- NTHW21, the 16-port OC-3/STM-1 ATM FP with MT-RJ connectors (with software name 16pOC3SmIrAtm)
- NTHW31, the 16-port OC-3c/STM-1 ATM FP with LC connectors (with software name 16pOC3SmIrAtm)
- NTHW11, the 4-port OC-12c/STM-4 ATM FP with PQC2 (PQC6v2) technology (with software name 4pOC12SmIrAtm)
- NTHW86, the 4-port OC-12c/STM-4 ATM FP with PQC12 technology (with software name 4pOC12SmIrAtm)

**Note 1:** The 4-port OC-3/STM-1, 4-port OC-12c/STM-4 come in two versions: PQC2 and PQC12. The PQC2-based FPs are not suitable for networks that may want to evolve to multi-services or to nodes configured with PNNI trunks using in-band OAM.

**Note 2:** Both types of 4-port OC-12c/STM-4 FP, NTHW11 and NTHW86, can be deployed in a mixed pair of redundant FPs. The *ipRoutesPoolCapacity* attribute needs to be configured with a value of zero before installing the NTHW11 FP as part of this deployment. For more details on the required configuration for this deployment, see NN10225-512 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Attribute Summary PT-AAL1/UA-AAL1/UA-IP*.

**Note 3:** Both types of 4-port OC-12c/STM-4 FP, NTHW11 and NTHW86, can be deployed in a mixed pair of redundant FPs. The *ipRoutesPoolCapacity* attribute needs to be configured with a value of zero before installing the NTHW11 FP as part of this deployment. For more details on the required configuration for this deployment, see NN10225-512 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Attribute Summary PT-AALI/UA-AALI/UA-IP*.

The following function processor (FP) cards are supported in the UA-AAL1 solution:

- NTHR23, the 12-port DS3 ATM FP (with software name 12pDS3Atm)
- NTHR31, the 4-port DS3 Channelized ATM FP with IMA (with software name 4pDS3ChAtm)
- NTHR21 (PQC2 technology) or NTHW15 (PQC12 technology), the 4-port OC-3/STM-1 single-mode intermediate reach ATM FP (with software name 4pOC3SmIrAtm)
- NTHW21, the 16-port OC-3/STM-1 ATM FP with MT-RJ connectors (with software name 16pOC3SmIrAtm)
- NTHW31, the 16-port OC-3c/STM-1 ATM FP with LC connectors (with software name 16pOC3SmIrAtm)
- NTHW11, the 4-port OC-12c/STM-4 ATM FP with PQC2 (PQC6v2) technology (with software name 4pOC12SmIrAtm)
- NTHW86, the 4-port OC-12c/STM-4 ATM FP with PQC12 technology (with software name 4pOC12SmIrAtm)

**Note 1:** The 4-port OC-3/STM-1 ATM FP have two versions: PQC2 and PQC12. The PQC2-based FP is not suitable for networks that may want to evolve to multi-services or to nodes configured with PNNI trunks using in-band OAM.

**Note 2:** The 16pOC3 FPs are the only FPs that support hitless software migration for unprotected SONET interface pairs.

The following function processor (FP) cards are supported in the UA-IP solution:

- NTHR23, the 12-port DS3 ATM FP (with software name 12pDS3Atm)
- NTHW15, the 4-port OC-3/STM-1 single-mode intermediate reach ATM FP with PQC12 technology (with software name 4pOC3SmIrAtm)
- NTHW86, the 4-port OC-12c/STM-4 ATM FP with PQC12 technology (with software name 4pOC12SmIrAtm)
- NTHW70, the 4-port OC-3 TDM FP (with software name 4pOC3ChSmIr)

**Note:** This FP is specific to the Media Gateway 15000.

- NTHR31, the 4-port DS3 Channelized ATM FP with IMA (with software name 4pDS3ChAtm)
- NTHW49, the 4-port Gigabit Ethernet FP (with software name 4pGe)
- NTHW84, the 2-port Gigabit Ethernet VSP3 FP (with software name 2pGeMmSrVsp3).

**Note:** This FP is specific to the Media Gateway 15000.

- NTHW77, the 2-port optical OC-3 TDM VSP3-o FP (with software name 2pOC3ChSmIrVsp3)

**Note:** This FP is specific to the Media Gateway 15000.

The following function processor (FP) card is supported in the UA-IP solution in order to offer multiservice traffic on the UA-IP Multiservice Switch 15000 ATM core:

- NTHR23, the 12-port DS3 unchannelized ATM FP for DSL ISP handoff (with software name 12pDS3Atm)

For the description of the FPs, see NN10600-120 *Nortel Multiservice Switch 15000/20000 Hardware Description* and for the software configuration of the FPs, see NN10600-551 *Nortel Multiservice Switch 7400/15000/20000 FP Configuration Reference*.

## 4-port DS3 sparing panel NTHR79

In the UA-AAL1 and UA-IP solutions, a one-for-one 4-port DS3 sparing panel is installed. This enables equipment protection:

- between two 4-port DS3 function processors (FPs)
- between two 12-port DS3 FPs, using only ports 0 to 3 by connecting a single panel to P0 (data) and P3 (control)

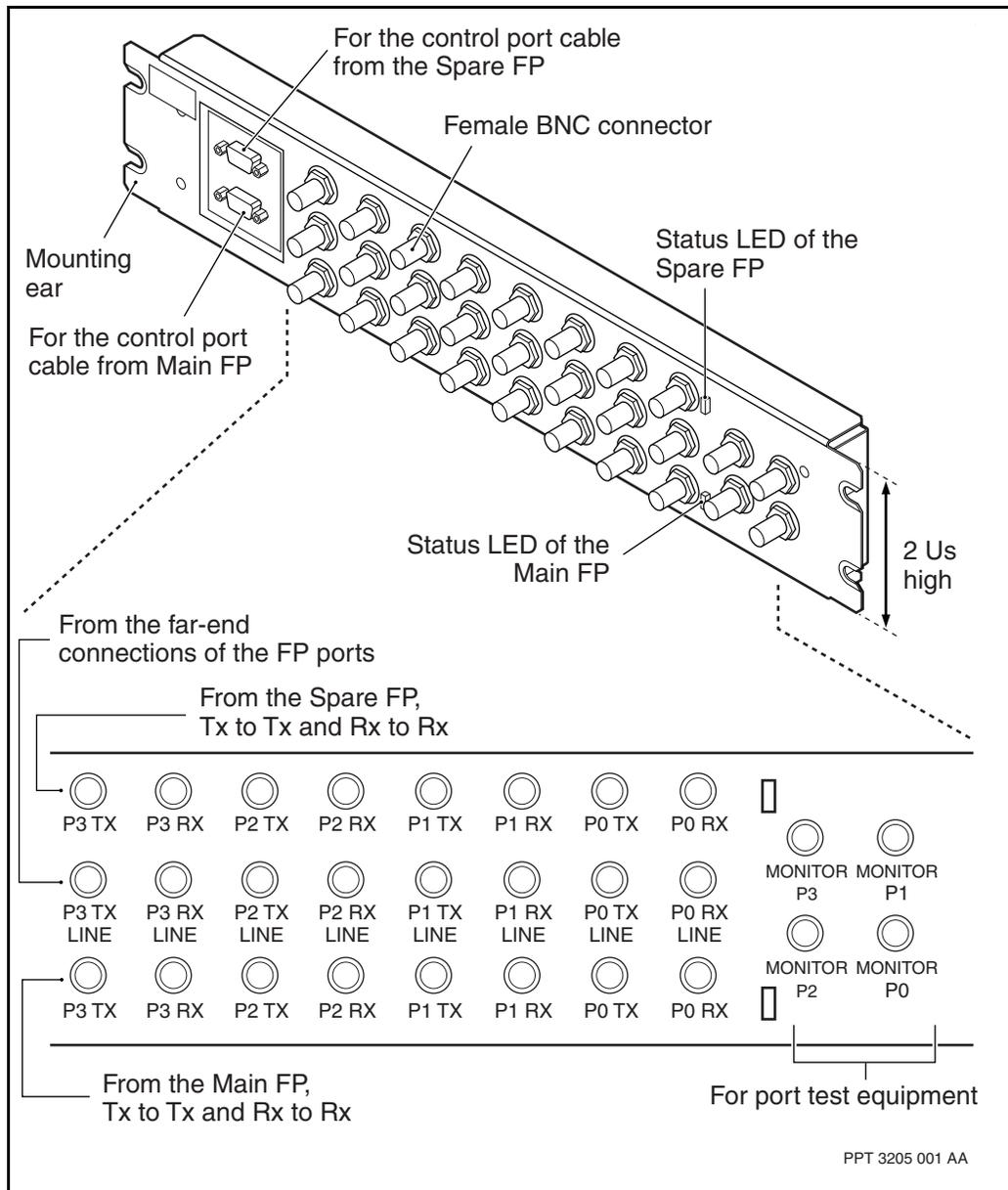
The product engineering code (PEC) of the sparing panel is NTHR79. For a view of its faceplate, see the figure “A 4-port DS3 one-for-one sparing panel NTHR79” (page 67).

The sparing panel transfers traffic between a main DS3 FP and a spare DS3 FP of the same type and compatible vintage. When the main FP connected to a sparing panel fails, the control processor (CP) detects that the FP has failed and instructs the panel to switch the relay contacts from the failed FP to the spare FP. Traffic then switches from the failed FP to the spare.

For information about:

- the behavior and specifications of sparing panels, see the chapter on termination panels in *NN10600-120 Nortel Multiservice Switch 15000/20000 Hardware Description*
- configuring the software to facilitate DS3 equipment protection (sparing), see *NN10600-550 Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures*
- installing the sparing panel and cabling it, see the section on installing a 19-inch sparing panel in the NEBS 2000 frame (NTRU04) in *NN10600-130 Nortel Multiservice Switch 15000/20000 Hardware Installation, Maintenance, and Upgrade*
- replacing the sparing panel or one of its cables, see *NN10600-130 Nortel Multiservice Switch 15000/20000 Hardware Installation, Maintenance, and Upgrade*

**Figure 6**  
**A 4-port DS3 one-for-one sparing panel NTHR79**



## Breaker interface panel

The breaker interface panel (BIP) provides single or dual (redundant) DC power and frame-level alarm indicators to the node. It is in a central location where redundant input dc power feeds are connected and routed to two or four breaker interface modules (BIMs). Power is then distributed from the BIMs to the shelves and cooling units.

## Cable management guides

In the PT-AAL1, UA-AAL1 and UA-IP solutions, Nortel Multiservice Switch 15000 nodes use fiber and shielded twisted pair cables for carrying SONET and Ethernet. In addition, in the UA-AAL1 and UA-IP solutions, coaxial cable is used to carry DS3.

In general, these cables are routed in exclusive bundles on different paths against the frame of the node using specific hardware subassemblies for protecting, routing, and securing cables. Cable routing is located at the front of the shelf, while the wiring trough is located at the bottom of each card cage. Power and alarm cables are cabled at the rear.

## Cooling units

The two cooling units are located in the middle of the frame, between the upper and lower shelf assemblies. The front cooling unit cools the upper shelf assembly, while the back cooling unit cools the lower shelf assembly. Each cooling unit consists of three fans and a cooling unit backplane, and each unit is controlled by temperature sensors located within the shelf assembly.

## Multiplexor

In the UA-AAL1 and UA-IP solutions, the EdgeLink 100 multiplexor is a self-contained broadband multiplexor made by Telco Systems. This multiplexor

- provides multiplexing of up to 28 DS1 channels onto a single DS3 channel
- transmits and receives up to 28 DS1 signals on a DS3 interface using standard M13 or C-bit framing
- offers one-for-one sparing of its M13 multiplexor card

To install an EdgeLink100, refer to Telco Systems' documentation, starting with the document *EdgeLink 100 Digital Multiplexer General Description, section 825-102-001*.

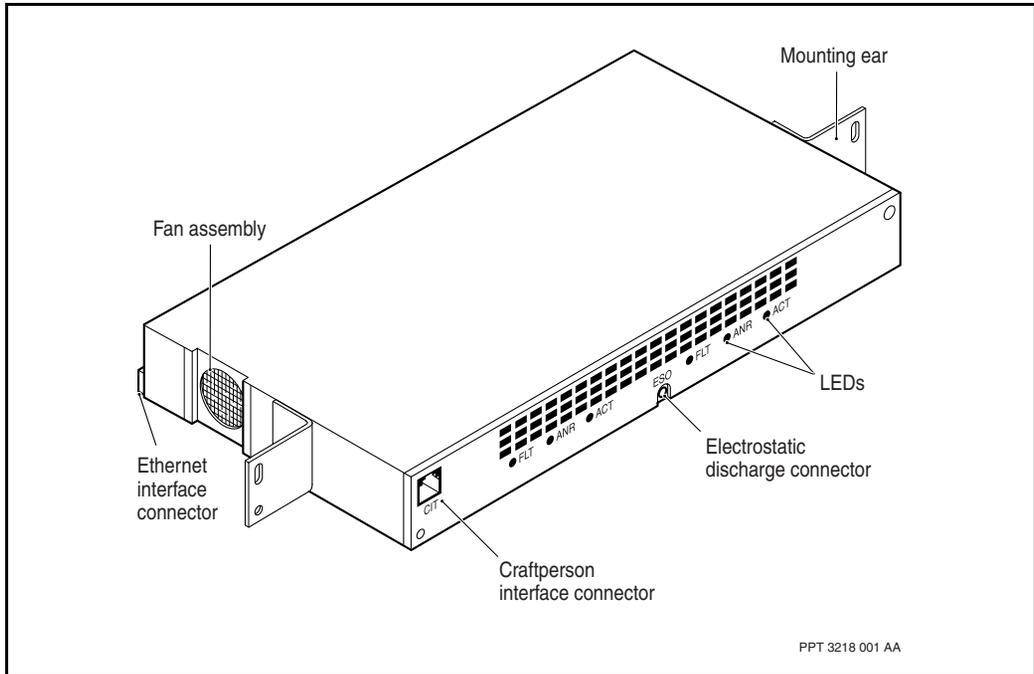
If you have DS-1 IMA interfaces using the Edgelink100 MUX, ensure that you use the Edgelink100 MUX software (R3.3). Contact Telco Systems to get the Edgelink100 MUX software and upgrade procedures:

- <http://www.telco.com/products/Transport/M13Multiplexers/EdgeLink100/>

For more information on connecting Multiservice Switch 15000 node to an EdgeLink 100, see:

- NN10600-130 *Nortel Multiservice Switch 15000/20000 Hardware Installation, Maintenance, and Upgrade*
- NN10114-511 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Overview PT-AAL1/UA-AAL1/UA-IP*

**Figure 7**  
**EdgeLink 100 multiplexor**



## Optional in-band OAM management topology

Two types of OAM management topologies exist: out-of-band OAM and in-band OAM.

An out-of-band topology is generally regarded as the typical management topology. Out-of-band management uses dedicated interfaces for management connectivity access via CP Ethernet links.

In an in-band management topology, a Nortel Multiservice Switch 15000 node can act as an OAM gateway node to other remote nodes for the purpose of sending or receiving OAM data. The key elements of an in-band topology are defined as follows:

- an OAM gateway node

Multiservice Switch 15000 (GW-PP15000) has an out-of-band

connectivity path to Nortel Multiservice Data Manager servers, and is the OAM gateway to a set of “remote” Multiservice Switch 15000 nodes that are managed by way of in-band connectivity.

There are typically two gateways configured for each office for redundancy; one is designated as the preferred gateway and the other is designated as the alternate gateway.

- multiple remote nodes

Remote nodes are managed via in-band connectivity to each other and to the preferred and alternate OAM gateways. Note that where multiple gateways exist for redundancy, one gateway can appear as a remote to another.

In-band connectivity is supported using ATMMPE (ATM Multi-Protocol Encapsulation) to encapsulate the OAM IP traffic over PNNI trunks.

Remote nodes have an in-band connectivity path to Multiservice Data Manager servers, accessible from one or more “gateway” nodes, and possibly by way of one or more “intermediate” nodes, if there is no direct PNNI link from the GW-nodes

- intermediate nodes

An intermediate node is any node, gateway or remote, through which OAM management data must traverse to reach a destination node.

- at least two Multiservice Data Manager servers

Each Multiservice Data Manager server is capable of performing all aspects of element management for the Multiservice Switch network. For example, each node sends alarms to both servers, which are configured for the fault management function

- The chosen server is the server that the operator uses as a launching point for Multiservice Data Manager applications, such as Succession ATM Software Migration (SASM) or Command Console.
- The alternate server is another server that could have been used to perform the same set of tasks, but that wasn't chosen.

The figure “An in-band management topology” (page 73) illustrates a typical in-band OAM topology.



## Multiservice Switch 15000 hardware in the PT-AAL1 and UA-AAL1 solutions

Within both the PT-AAL1 and UA-AAL1 solutions, you can engineer multiple Nortel Multiservice Switch 15000 nodes within the solutions and connect them to various components. Consider the following rules when deciding how to place the Multiservice Switch 15000 hardware for the PT-AAL1 and UA-AAL1 solutions:

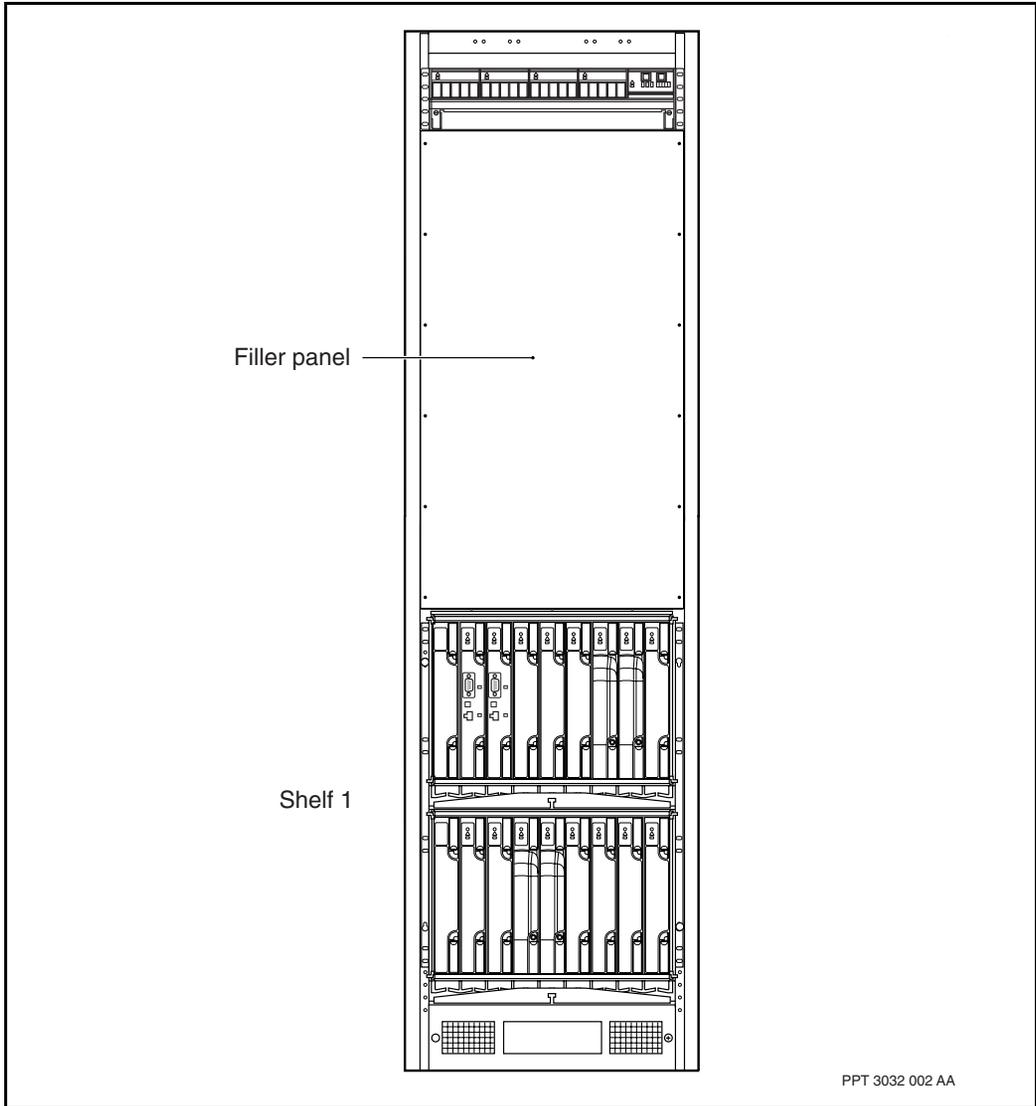
- When only one Multiservice Switch 15000 device is installed, it goes in the lower half of the frame assembly with a filler panel installed in the top half. If two devices are installed, one is in the bottom half of the frame assembly and the other shelf is in the upper half of the frame assembly.

Refer to the figures “Multiservice Switch 15000 equipment installed: single shelf installation (front view)” (page 75) and “Multiservice Switch 15000 equipment installed: dual shelf installation (front view)” (page 76) to see how the equipment is installed.

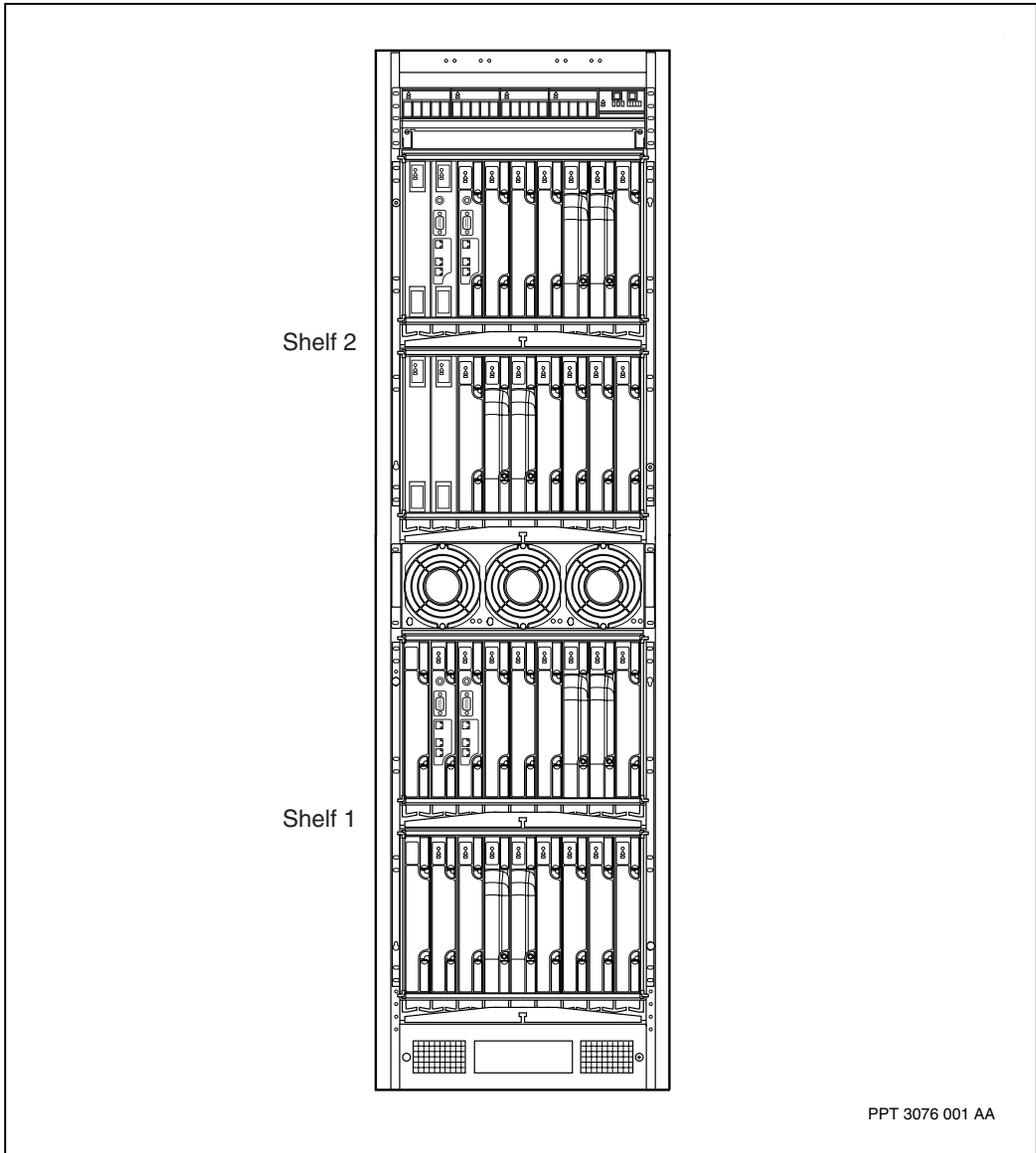
- The CS2000 Core Manager must be co-located with the CS2000.
- At least one Multiservice Switch 15000 node must be co-located with the CS2000 Core Manager, the CS2000, and the ENET.
- In a network using in-band OAM, the node with out-of-band connectivity to Nortel Multiservice Data Manager (MDM) server, which is co-located with the CS2000 does not connect to the CS LAN but rather, connects directly to the IP LAN/WAN.
- The nodes must be connected through the CS LAN to Multiservice Data Manager software servers.
- The Multiservice Data Manager software servers are located in the network operations centers (NOCs).

The figures “Footprint for single shelf installation” (page 77) and “Footprint for a dual shelf installation” (page 78) provide you with the footprints for the installation of Multiservice Switch 15000 nodes and Multiservice Data Manager servers.

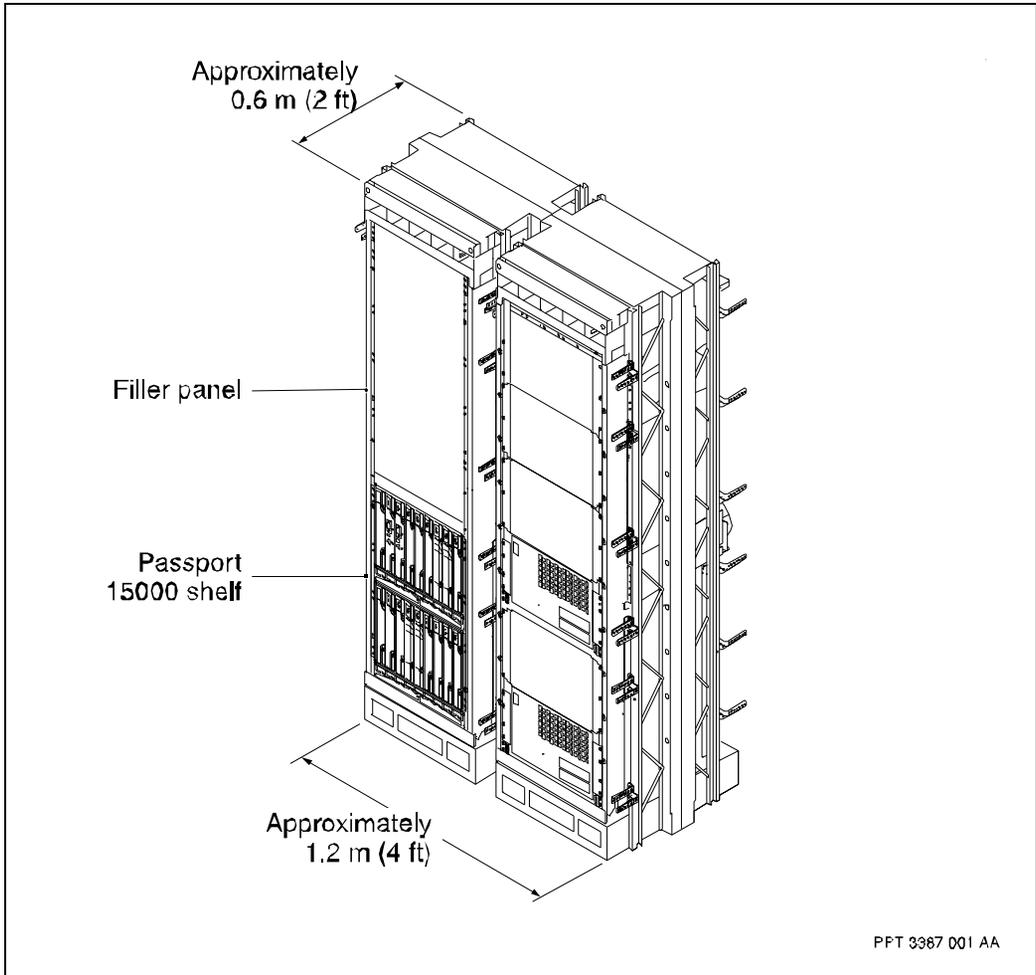
**Figure 9**  
**Multiservice Switch 15000 equipment installed: single shelf installation (front view)**



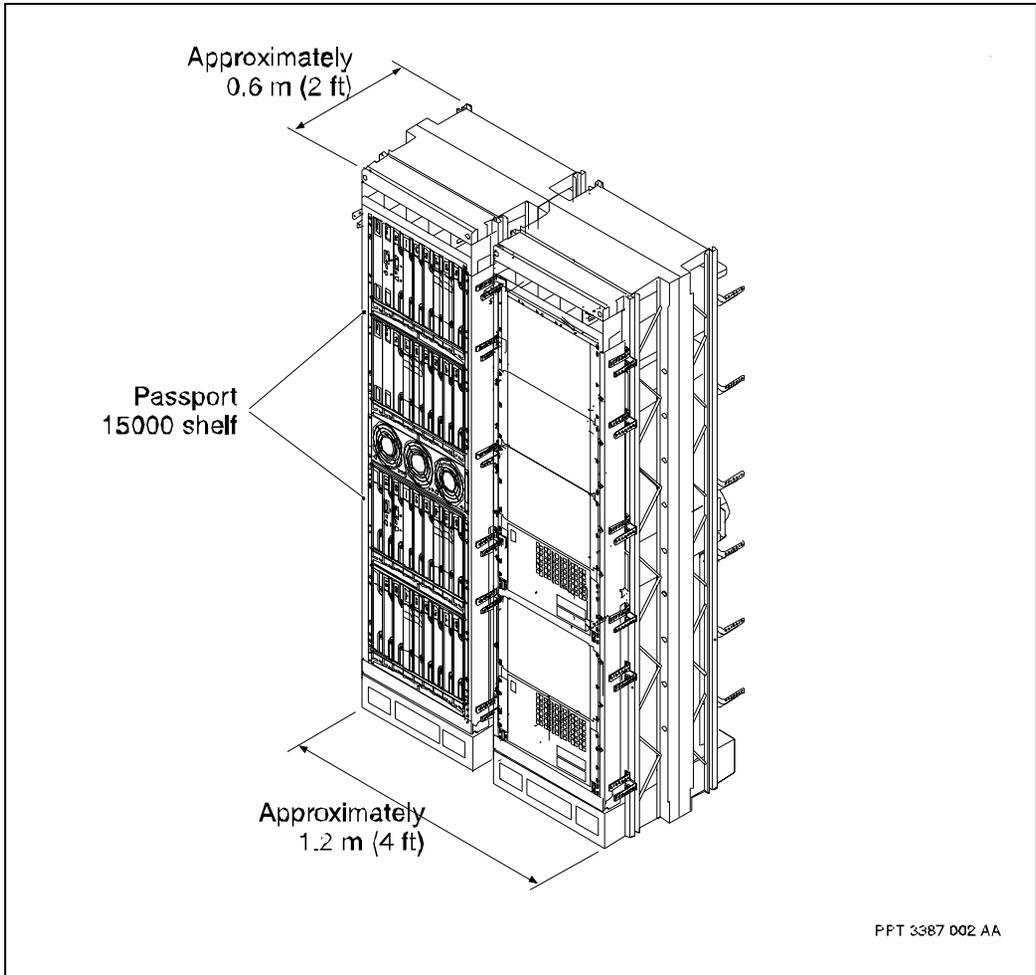
**Figure 10**  
**Multiservice Switch 15000 equipment installed: dual shelf installation (front view)**



**Figure 11**  
**Footprint for single shelf installation**



**Figure 12**  
**Footprint for a dual shelf installation**



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## Chapter 4

# Sun Fire™ V480 / V240 server hardware and software

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The following sections describe hardware, software and disk partitioning requirements for the supported hardware configurations of Nortel Multiservice Data Manager (MDM) for the PT-AAL1, UA-AAL1 and UA-IP solutions described in this document:

- “Solaris operating system” (page 80)
- “MDM standalone/server-set/MDM Admin Server with two 73 GB disks” (page 81)
- “MDM client-set (large)” (page 84)
- “MDM client-set (small using V240 server)” (page 87)

Use this information to determine all hardware and software requirements you need to meet in order to run Multiservice Data Manager software on Sun Fire™ V480 / V240 servers in the PT-AAL1, UA-AAL1 and UA-IP solutions.

**Note:** Sun Fire™ V480 / V240 servers must be obtained directly from Sun Microsystems. For information about specific network configurations, see the Sun and Nortel Development Certified Platforms page (<http://www.sun.com/oem/nortel/>) at the Sun Microsystems website.

## Solaris operating system

Solaris version 9, 09-04 is the current operating system shipped on the Sun platform. All Multiservice Data Manager workstations must be upgraded to Solaris version 9 in all Carrier Voice over IP solutions.

**Note:** The release of this document aligns with the Solaris version 9 (09-04) upgrade information provided by Sun Microsystems Inc. and is subject to change, see <http://sun.com/oem/nortel/> for up to date information.

For information and procedures for the MDM Solaris upgrade, refer to NN10185-461 *Upgrading Nortel Multiservice Data Manager in Carrier Voice over IP Networks*.

## MDM standalone/server-set/MDM Admin Server with two 73 GB disks

### Hardware requirements

For the hardware requirements for Multiservice Data Manager servers with two 73 GB disks configured in the standalone/server-set deployment, see the table, “Hardware requirements for MDM standalone/server-set with two 73 GB disks” (page 81).

**Table 1**

**Hardware requirements for MDM standalone/server-set with two 73 GB disks**

Hardware	Details
Sun product number A37-WTPF2-04GRB	Sun Fire™ V480 Server 2 @ 2*1.05GHz Ultrasparc III Cu Processors with 8 MB Ecache 4 GB memory (16*256 DIMMs) 2 73 GB (10,000 RPM) FC-AL disks <sup>1</sup> 1 DVDROM 2 (N+1 redundant power) supplies 2 10/100/1000Base-T Ethernet ports 1 serial port 2 USB ports 6 PCI slots
Sun product number X311L	localized power cord kit North American/Asian
<p><b>Note 1:</b> Emergency dial up using a modem to access a serial port is an optional configuration and not part of the core solution.</p> <p><b>Note 2:</b> The information in this table is subject to change. For the latest information on Carrier Voice over IP Network configurations including the Sun Fire™ V480 server, see <a href="http://sun.com/oem/nortel/">http://sun.com/oem/nortel/</a>.</p>	

## Software requirements

For the software requirements for Multiservice Data Manager servers with two 73 GB disks configured in the standalone/server-set deployment, see the table, “Software requirements for MDM standalone/server-set with two 73 GB disks” (page 82).

*Note:* Solaris 9 is installed in 64 bit mode.

**Table 2**  
**Software requirements for MDM standalone/server-set with two 73 GB disks**

Software	Details
Sun product number SOLZS-080B9AY9	Solaris 9 (02/02) English only CD media kit
Sun patches (patches can be found on the Sun website at <a href="http://www.sun.com">http://www.sun.com</a> )	Solaris 108528 (latest version)
<b>Note:</b> For a list of Solaris prerequisites, see the Multiservice Data Manager 15.2 Release Supplement.	
Netscape 4.78	The official version can be found on the Sun website at <a href="http://www.sun.com/software/solaris/netscape/getnetscape478.html">http://www.sun.com/software/solaris/netscape/getnetscape478.html</a>
<b>Note:</b> The information in this table is subject to change. For the latest information on Carrier Voice over IP Network configurations including the Sun Fire™ V480 server, see <a href="http://sun.com/oem/nortel/">http://sun.com/oem/nortel/</a> .	

## Partitioning two 73 GB disks for MDM standalone/server-set

When you are partitioning your first disk, use the values in the table, “Disk partitioning for the first 73 GB disk (standalone/server-set)” (page 82).

**Table 3**  
**Disk partitioning for the first 73 GB disk (standalone/server-set)**

Partition	File system	Size
0	/	11 GB (root OS partition)
1	/swap	4.0 GB
(Sheet 1 of 2)		

**Table 3 (Continued)**  
**Disk partitioning for the first 73 GB disk (standalone/server-set)**

Partition	File system	Size
2	/overlap	default
3	/localdisk	49 GB (local user data)
4	/var	8 GB
7	MDDDB State DB Replica (if using mirrored disks)	256 MB
(Sheet 2 of 2)		

When you are partitioning your second disk, use the values in the table, “Disk partitioning for the second 73 GB disk (standalone/server-set when not using disk mirroring)” (page 83).

**Table 4**  
**Disk partitioning for the second 73 GB disk (standalone/server-set when not using disk mirroring)**

Partition	File system	Size
0	/upgrade	11 GB (root OS partition)
1	/swap	4 GB
2	/overlap	default
3	/data	58.0 GB (MagellanNMS and MagellanMDP installation)

## MDM client-set (large)

### Hardware requirements

For the hardware requirements for Multiservice Data Manager servers configured in the Multiservice Data Manager client-set (large) deployment, see the table “Hardware requirements for MDM client-set (large)” (page 84).

**Table 5**  
**Hardware requirements for MDM client-set (large)**

Hardware	Details
Sun product number N32-XUB2-9S-204AV2	Sun Fire™ V240 Server 2 @ 1.0GHz CPU 2 GB memory (4*512 DIMMs) 2 36 GB (10,000 RPM) disks ALOM Remote Manager 3 PCI slots N+1 redundant power supply 4 10/100/1000Base-T Ethernet ports
Sun product number X311L	localized power cord kit North American/Asian
Sun product number X7403A	2 1-GB memory expansion kits
Sun product number X7410A	X-Option - Internal DVD-ROM drive Slimline
<b>Note 1:</b> If you want emergency dial up access to your Multiservice Data Manager server, the PCI card is required and must be purchased directly from Sun Microsystems. Emergency dial up using a modem to access a serial port is an optional configuration and not part of the core solution.	
<b>Note 2:</b> The information in this table is subject to change. For the latest information on Carrier Voice over IP Network configurations including the Sun Fire™ V240 server, see <a href="http://sun.com/oem/nortel/">http://sun.com/oem/nortel/</a> . The information in this table aligns with version AB02 on the Sun website.	

### Software requirements

For the software requirements for Multiservice Data Manager servers configured in the Multiservice Data Manager client-set (large) deployment, see the table “Software requirements for MDM client-set (large)” (page 85).

**Note:** Solaris 9 is installed in 64 bit mode.

**Table 6**  
**Software requirements for MDM client-set (large)**

Software	Details
Sun product number SOLZS-080B9AY9	Solaris 9 (02/02) English only CD media kit
Sun patches (patches can be found on the Sun website at <a href="http://www.sun.com">http://www.sun.com</a> )	Solaris 108528 (latest version)
<b>Note:</b> For a list of Solaris prerequisites, see the Multiservice Data Manager 15.2 Release Supplement.	
Netscape 4.78	The official version can be found on the Sun website at <a href="http://www.sun.com/software/solaris/netscape/getnetscape478.html">http://www.sun.com/software/solaris/netscape/getnetscape478.html</a>
<b>Note:</b> The information in this table is subject to change. For the latest information on Carrier Voice over IP Network configurations including the Sun Fire™ V240 server, see <a href="http://sun.com/oem/nortel/">http://sun.com/oem/nortel/</a> .	

### Partitioning two 36 GB disks for MDM client-set (large)

When you are partitioning your first disk, use the values in the table, “Disk partitioning for the first 36 GB disk (client-set large)” (page 85).

**Table 7**  
**Disk partitioning for the first 36 GB disk (client-set large)**

Partition	File system	Size
0	/	11 GB redundant (root OS partition)
1	/swap	4.0 GB
2	/overlap	default
3	/localdisk	13 GB (local user data)
4	/var	8 GB
7	MDDB State DB Replica (if using mirrored disks)	11 MB

When you are partitioning your second disk, use the values in the table, “Disk partitioning for the second 36 GB disk (client-set large)” (page 86).

**Table 8**  
**Disk partitioning for the second 36 GB disk (client-set large)**

Partition	File system	Size
0	/root	11 GB
1	/swap	4 GB
2	/overlap	default
3	/data	21 GB (MagellanNMS and MagellanMDP installation)

## MDM client-set (small using V240 server)

### Hardware requirements

For the hardware requirements for Multiservice Data Manager servers configured in the Multiservice Data Manager client-set (small) deployment, see the table “Hardware requirements for MDM client-set (small)” (page 87).

**Table 9**  
**Hardware requirements for MDM client-set (small)**

Hardware	Details
Sun product number N32-XUB2-9S-204AV2	Sun Fire™ V240 Server 1*1GHz Ultrasparc III 8 MB Ecache 2GB memory (4*512 DIMMs) 1 * 36GB hard disks ALOM Remote Manager N+1 redundant power supplies 4 10/100/1000 Base-T Ethernet ports
Sun product number X311L	localized power cord kit North American/Asian
PCI card X2156A Serial Async Interface (SAI/P) 3.0	This card provides 8 DB25 serial ports on an external bracket.
<p><b>Note 1:</b> If you want emergency dial up access to your Multiservice Data Manager server, the PCI card is required and must be purchased directly from Sun Microsystems. Emergency dial up using a modem to access a serial port is an optional configuration and not part of the core solution.</p> <p><b>Note 2:</b> The information in this table is subject to change. For the latest information on Carrier Voice over IP Network configurations including the Sun Fire™ V240 server, see <a href="http://sun.com/oem/nortel/">http://sun.com/oem/nortel/</a>. The information in this table aligns with version AB02 on the Sun website.</p>	

### Software requirements

For the software requirements for Multiservice Data Manager servers configured in the Multiservice Data Manager client-set (small) deployment, see the table “Software requirements for MDM client-set (small)” (page 88).

**Note:** Solaris 9 is installed in 64 bit mode.

**Table 10**  
**Software requirements for MDM client-set (small)**

Software	Details
Sun product number SOLZS-080B9AY9	Solaris 9 (02/02) English only CD media kit
Sun patches (patches can be found on the Sun website at <a href="http://www.sun.com">http://www.sun.com</a> )	Solaris 108528 (latest version)
<b>Note:</b> For a list of Solaris prerequisites, see the Multiservice Data Manager 15.2 Release Supplement.	
Netscape 4.78	The official version can be found on the Sun website at <a href="http://www.sun.com/software/solaris/netscape/getnetscape478.html">http://www.sun.com/software/solaris/netscape/getnetscape478.html</a>
<b>Note:</b> The information in this table is subject to change. For the latest information on Carrier Voice over IP Network configurations including the Sun Fire™ V240 server, see <a href="http://sun.com/oem/nortel/">http://sun.com/oem/nortel/</a> .	

### Partitioning the 36 GB disk for MDM client-set (small)

When you are partitioning your disk, use the values in the table, “Disk partitioning for the 36 GB disk (client-set small)” (page 88).

**Table 11**  
**Disk partitioning for the 36 GB disk (client-set small)**

Partition	File system	Size
0	/	11 GB (root OS partition)
1	/swap	4.0 GB
2	/overlap	default
3	/localdisk	13 GB (local user data)
4	/var	8 GB

## Chapter 5

# Multiservice Switch 15000 and Media Gateway 15000 software overview

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The PT-AAL1 and UA-AAL1 solutions use Nortel Multiservice Switch software to manage Multiservice Switch 15000 nodes. This software is divided into several classes:

The PT-AAL1, UA-AAL1 and UA-IP solutions use Nortel Multiservice Switch software to manage Multiservice Switch 15000 and Media Gateway 15000 (MSS/MG15000) nodes. This software is divided into several classes:

- “Multiservice Switch 15000 and Media Gateway 15000 base software” (page 90)
- “Multiservice Switch 15000 ATM networking software” (page 92)
- “Multiservice Switch 15000 and Media Gateway 15000 IP networking software” (page 92)
- “Multiservice Switch 15000 and Media Gateway 15000 access service software” (page 94)

## Multiservice Switch 15000 and Media Gateway 15000 base software

Multiservice Switch 15000 and Media Gateway 15000 base software provides the basic system functions that support the remainder of the software. The base software can be divided into the following systems:

- command processing system

The base software controls and processes commands and enables you to configure the node. Components represent the hardware, software, and services in Multiservice Switch and Media Gateway systems. Network operators and administrators use the base software commands to change the values of these components. Changing the values of these components, their subcomponents, and their attributes modifies the configuration data.

- data collection system

The data collection system collects real-time statistics and data before transferring it for analysis. The data collected by this system includes alarms and state change notifications, performance measurements, and security logs.

- file system

The file system stores all the software and configuration files that run on the node, and stores all the data generated by the node.

- network management interface system

The network management interface system (NMIS) enables you to access a node through a network management application, for example Nortel Multiservice Data Manager (MDM). The NMIS also provides network management access security. Multiservice Switch systems support three types of network management interfaces:

The network management interface system (NMIS) enables you to access a node through a network management application, for example Nortel Multiservice Data Manager (MDM). The NMIS also provides

network management access security. Multiservice Switch 15000 and Media Gateway 15000 systems support the following types of network management interfaces:

- an FMIP interface, which is a Nortel proprietary management information protocol. An FMIP interface operates between Multiservice Switch nodes and Multiservice Data Manager servers.
- a local operator serial interface, which allows an ASCII terminal to act as a local operator or allows emergency access by a terminal.
- an FTP interface, which allows file transfers to and from local disks.
- a RADIUS client interface, which supports authentication of user information with a central AAA service.

- processor control system

The processor control system manages the processor cards. The processor control system sequences system start-up, determines when cards are available for service, loads the appropriate software, monitors cards for problems, and supports processor card sparing.

- software control system

The software control system facilitates the download of software from a distribution site and manages the versions of software, applications, and patches on Multiservice Switch and Media Gateway nodes. After the software is loaded, this system allows you to configure software services and applications on the processor cards.

- backplane control system

The backplane control system controls both of the Multiservice Switch 15000 and Media Gateway 15000 fabric cards. The backplane control system provides a fabric component interface that allows users to monitor and maintain the fabric cards. It also controls any operator commands that impact the fabric.

- port management system

The port management system manages the ports and channels on each processor card.

## Multiservice Switch 15000 ATM networking software

Nortel Multiservice Switch 15000 networking software provides the routing capabilities and congestion management necessary for forwarding a packet of information from its source to its destination. Multiservice Switch 15000 nodes support both connectionless and connection-oriented routing. In the PT-AAL1 and UA-AAL1 solutions, Multiservice Switch networking software includes the ATM routing system and private network-to-network interface (PNNI) networking.

The ATM routing system is a connection-oriented system that provides dynamic runtime connection setup between Multiservice Switch 15000 nodes and allows them to interwork with other ATM nodes. In Carrier Voice over IP Networks, Multiservice Switch 15000 ATM routing provides the addressing, signaling, and routing facilities to support permanent virtual connections (PVCs) and switched virtual connections (SVCs). These networking capabilities allow you to set up ATM connections in real time.

For more information on the ATM routing system, see the NN10600-700 *Nortel Multiservice Switch 7400/15000/20000 ATM Technology Fundamentals* and NN10600-702 *Nortel Multiservice Switch 7400/15000/20000 ATM Routing and Signalling Fundamentals*.

## Multiservice Switch 15000 and Media Gateway 15000 IP networking software

Nortel Multiservice Switch 15000 and Media Gateway 15000 Virtual Router (VR) system supports industry-standard IP networking for connectionless networking.

The UA-IP solution supports static routing as well as the dynamic open shortest path first (OSPF) routing protocol. With OSPF, Multiservice Switch 15000 nodes learn dynamically, from neighboring routers, which routes through a network are available. A node therefore adapts to faults elsewhere in the network dynamically, and calculates the most efficient path for all IP packets.

The UA-IP solution also supports hitless OSPF for CP equipment protection. Hitless OSPF allows FP cards to continue forwarding, uninterrupted, over OSPF calculated routes, during any of the following:

- hitless software migration (HSM)
- CP equipment failure (including failure of the OAM Ethernet port or link)
- any maintenance actions resulting in a CP switchover

When provisioned, hitless OSPF for CP equipment protection continuously synchronizes the OSPF routing database of the standby CP with the routing database of the active CP.

Multiservice Switch 15000 and Media Gateway 15000 nodes support protected default routes. Using protected default routes, you can specify two next hops, reachable through two different 4pGE FP cards, as the default route. This allows a node to change packet forwarding from one next hop to the other in under a second if a 4pGE card, a link, or an adjacent router fails.

Multiservice Switch 15000 and Media Gateway 15000 nodes support IP Security (IPSec) protocols for management connections using the OAM Ethernet port. The following aspects of IPSec are supported:

- Encapsulating Security Payload (ESP) protocol, which provides both data authentication and confidentiality
- transport mode, which provides security between the endpoints of the connection
- authentication algorithms MD5 and SHA-1
- AES encryption algorithms
- ctrl/mg component with SecurityPolicyDatabase (SPD) attributes for MG15000 signalling on call connections to MGC

For more information, see NN10600-800 *Nortel Multiservice Switch 7400/15000/20000 IP Technology Fundamentals*

For more information, see NN10600-601 *Nortel Multiservice Switch 7400/15000/20000 Security Management*.

## Multiservice Switch 15000 and Media Gateway 15000 access service software

Nortel Multiservice Switch access service software involves the services supported on Multiservice Switch 15000 and Media Gateway 15000 nodes. For the PT-AAL1 and UA-AAL1 solutions, the supported service is ATM. For more information, see “Multiservice Switch 15000 ATM service overview” (page 94) and “Multiservice Switch 15000 inverse multiplexing for ATM” (page 95).

### Multiservice Switch 15000 ATM service overview

Asynchronous transfer mode (ATM) is a cell-based switching and multiplexing technology that is a general purpose, connection-oriented data transfer mode. Nortel Multiservice Switch 15000 ATM core is interoperable with the bearer services of other public ATM networks.

ATM on Multiservice Switch 15000 nodes support both static and dynamic networking. Static networking uses permanent virtual circuits (PVC) that you provision on a hop-by-hop basis from end-point to end-point. Dynamic networking uses switched virtual circuits (SVC), which are fully dynamic and require no end-point provisioning.

In Carrier Voice over IP Networks, Multiservice Switch 15000 nodes support the following ATM interfaces:

- User-to-network interface (UNI 4.0, user and network side).  
UNI uses an integrated local management interface (ILMI) for dynamic address registration, as well as for link and physical layer status, configuration, and control.

Within the PT-AAL1 and UA-ALL1 solutions, Multiservice Switch UNIs provide dynamic address registration across the interface because of the use of ILMI control procedures. The address formats supported are network service access point (NSAP)-international code designator (ICD) and NSAP-data country code (DCC).

- Private network-to-network interface (PNNI 1.0).  
PNNI supplies the interface among ATM nodes.

The specific ATM service used is Multiservice Switch ATM bearer service. This service provides sequence-preserving, connection-oriented cell transfer between a source and destination with an agreed upon quality of service and throughput. An ATM bearer service connection can be part of a connection that extends into an external ATM core network.

An ATM virtual channel connection (VCC) provides the Multiservice Switch 15000 ATM bearer service between two external ATM users. The external connection can be made with a Multiservice Switch node or an external network.

For more information about ATM on Multiservice Switch 15000 nodes, see one of the following documents:

- NN10600-700 *Nortel Multiservice Switch 7400/15000/20000 ATM Technology Fundamentals*
- NN10600-702 *Nortel Multiservice Switch 7400/15000/20000 ATM Routing and Signalling Fundamentals*
- NN10600-710 *Nortel Multiservice Switch 7400/15000/20000 ATM Configuration Management*
- NN10600-715 *Nortel Multiservice Switch 7400/15000/20000 ATM Fault and Performance Management.*

## **Multiservice Switch 15000 inverse multiplexing for ATM**

In the UA-AAL1 and UA-IP solutions, Nortel Multiservice Switch ATM bearer service includes inverse multiplexing for ATM (IMA). IMA supports the transparent transmission of ATM cells over a combination of multiple DS1 links (an IMA link group), which allows ATM to operate over lower speed connections. The link group uses the inverse multiplexing process to transmit a single stream of ATM layer traffic across multiple links. IMA then combines the traffic back into the original cell sequence at the remote end.

IMA on Multiservice Switch nodes supports the use of synchronized and non-synchronized links within an IMA link group. IMA link groups within a Multiservice Switch network provide access to external ATM networks. IMA is available to both private and public user-to-network (UNI) or private

network-to-network (PNNI) interfaces. Also, Multiservice Switch system's traffic management capabilities apply to ATM connections served by IMA link groups.

IMA provides reliability and robustness of cell traffic. When you remove a link, if there is sufficient bandwidth on the remaining links, no traffic loss will occur. You can remove or add links without removing the link group or the ATM interface served by the IMA link group. If a link fails, Multiservice Switch nodes maintain ATM connections served by the link group at a reduced capacity.

Multiservice Switch software follows the ATM Forum *Inverse Multiplexing for ATM (IMA) Specification*. For more information about IMA, see NN10600-730 *Nortel Multiservice Switch 7400/15000/20000 Operations: Inverse Multiplexing for ATM*.

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## Chapter 6

# Multiservice Data Manager software overview

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Nortel Multiservice Data Manager (MDM) software is a workstation-based network management system that you can use to maintain and monitor a network. The system consists of a set of tools with graphical user interfaces (GUI) that can access data from multiple network elements simultaneously and present the operator with a unified view of the network. This view can either be a hierarchical view of the components in the network or an organizational view in which the network components are grouped by area or function.

Within the PT-AAL1, UA-AAL1 and UA-IP solutions, Multiservice Data Manager provides the network element management for Nortel Multiservice Switch nodes. Within the UA-IP solution, Multiservice Data Manager also provides the network element management for the Media Gateway 15000.

As the element manager, Multiservice Data Manager performs fault management, configuration management, data collection, performance management, and security management for the ATM core. In addition, all of the ATM core's operations, maintenance, administration, and provisioning data is routed through Multiservice Data Manager. Multiservice Data Manager servers can be configured to forward the performance management, fault management and security audit log information to higher level element managers such as Integrated Element Management System and CS2000 Core Manager, or directly to the OSS.

## MDM server configurations

MDM software can be configured in different ways to meet the needs of the size and configuration of the network and the processing capabilities of the workstations. “MDM server types and hosted software” (page 98) shows the different ways in which MDM software processes can be deployed.

**Table 12**  
**MDM server types and hosted software**

MDM server configuration	Software processes
client-set	<ul style="list-style-type: none"> <li>• provides access to the MDM Toolset user environment by means of X11</li> <li>• depends on standalone/server-sets for acquisition of surveillance and network data, and for communication with the MSS15000/MG15000 nodes</li> </ul> <p><b>Note:</b> Client-sets are not used in a VoA solution that uses the Operator Client application. However, you can re-deploy a client-set as an MDM Admin Server. See NN10114-511 <i>Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Overview PT-AAL1/UA-AAL1/UA-IP</i>.</p>
server-set	<ul style="list-style-type: none"> <li>• usually runs without a monitor and keyboard; local access port provided for special needs</li> <li>• provides access to the MDM Toolset user environment in a VoA network by hosting the servers that allow operators to view the surveillance information and network data, and perform provisioning</li> <li>• supports the main server processes for performing surveillance, gathering network data (fault, security, and/or performance), and providing network data to higher level management systems</li> <li>• can be configured to host specific types of server processes according to network needs</li> </ul>
PM server	<ul style="list-style-type: none"> <li>• supports the main server processes for gathering network performance data and providing network performance data to higher level management systems</li> <li>• otherwise operates as a server-set</li> </ul>
(Sheet 1 of 2)	

**Table 12 (Continued)**  
**MDM server types and hosted software**

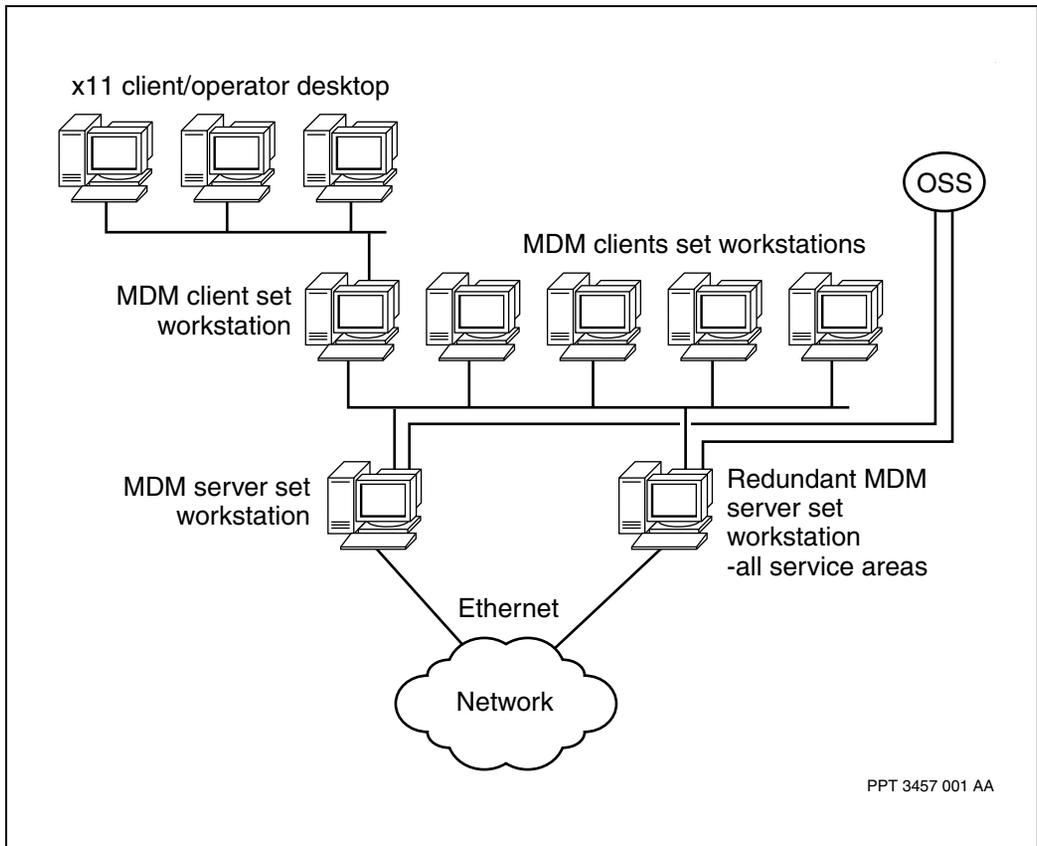
MDM server configuration	Software processes
standalone	<ul style="list-style-type: none"> <li>• provides X11 access from remote operator desktops to the MDM Toolset user environment</li> <li>• supports the main server processes for performing surveillance, gathering network data (fault, security, and/or performance), and providing network data to higher level management systems</li> </ul>
MDM Admin Server (VOA only)	<ul style="list-style-type: none"> <li>• provides web access to Operator Client environment from remote operator desktops and X11 access to MDM Toolset environment</li> <li>• supports the main server processes for performing surveillance, gathering network data (fault, security, and/or performance)</li> <li>• hosts the central AAA service and the Java Web Start (JWS) server for the optional Operator Client user environment</li> </ul>
MDM Server (VoIP only)	<ul style="list-style-type: none"> <li>• provides web access to Operator Client environment from remote operator desktops and X11 access to MDM Toolset environment</li> <li>• supports the main server processes for performing surveillance, gathering network data (fault, security, and/or performance), and providing network data to higher level management systems</li> <li>• provides an interface to the Integrated EMS central AAA service</li> <li>• hosts the Java Web Start (JWS) server for the Operator Client user environment</li> </ul>
(Sheet 2 of 2)	

Deploying Multiservice Data Manager servers in a client-server arrangement provides the following advantages:

- reduces the amount of traffic crossing between your network operation centre, and the location of the Multiservice Data Manager server sets by deploying the GUIs locally to your operator base
- provides redundancy in your network workstations by having multiple client-set sessions running
- maintains the integrity of the server set, ensuring that the performance measures (PMs) and alarms feeds to a higher level element manager are not compromised

The figure “Typical Multiservice Data Manager client-set/server-set configuration” (page 100) shows a configuration with two server set workstations, and several client-set workstations. You must set up the server set workstations as redundant server-set workstations to provide client set workstations with an alternate service source. See NN10185-461 *Upgrading Nortel Multiservice Data Manager in Carrier Voice over IP Networks* for the required migration procedures.

**Figure 13**  
**Typical Multiservice Data Manager client-set/server-set configuration**

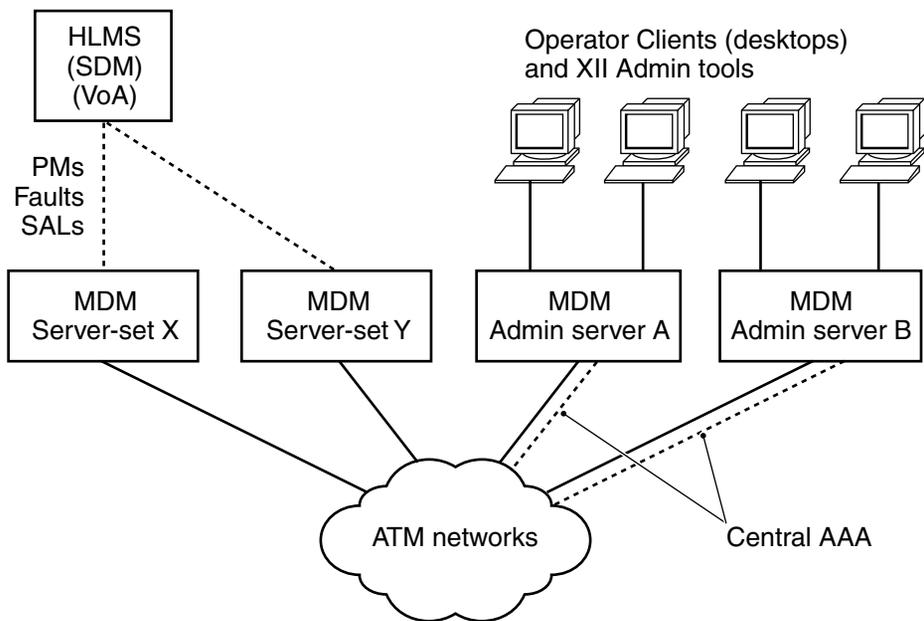


Deploying the Operator Client application on operator desktops has the following advantages:

- reduces the amount of traffic crossing between your network operation centre, and the location of the MDM Admin Servers by running the MDM tools on the operator desktop itself
- reduces the operator desktop processing load on the MDM Admin Servers, allowing the maximum capacity to be available for fault and performance management, node connectivity and higher level element manager or OSS data feeds.
- utilizes a central AAA service which controls the tools that an operator can use, and the actions within each tool that can be performed.

The figure “Typical Multiservice Data Manager VoA configuration using Operator Client” (page 102) shows a configuration using the Operator Client environment for operator desktop access with the MDM Admin Server providing the central AAA service.

**Figure 14**  
**Typical Multiservice Data Manager VoA configuration using Operator Client**

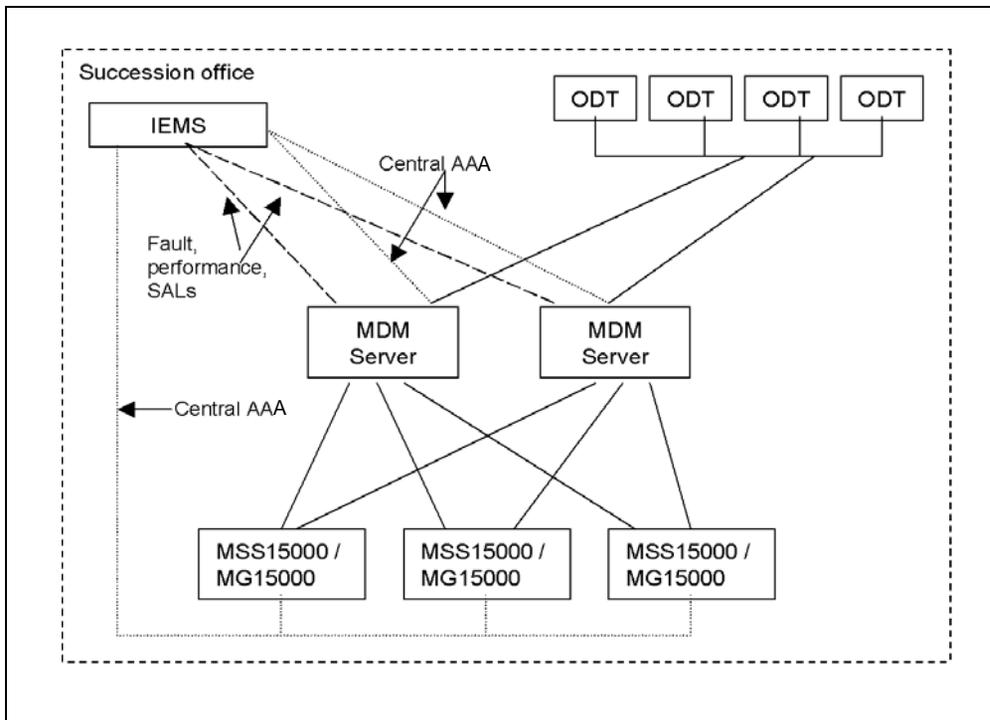


MSS 3603 001 AA

A client-set server can be re-deployed as an MDM Admin Server as part of the SN08 upgrade process. For more information, see NN10185-461 *Upgrading Nortel Multiservice Data Manager in Carrier Voice over IP Networks*.

The figure “Typical Multiservice Data Manager VoIP configuration using Operator Client” (page 103) shows a configuration using the Operator Client environment for operator desktop access with the Integrated EMS providing central AAA service.

**Figure 15**  
**Typical Multiservice Data Manager VoIP configuration using Operator Client**



## Summary of MDM tools

Users can access the MDM software through two user environments:

- MDM Toolset user environment. A GUI interface provides controlled user access to the complete set of MDM fault and performance management, configuration and system administration tools.
- Operator Client user environment. A GUI interface provides user access based on the Principle of Least Privilege (PLP) where an operator's access has been configured in policies and roles to control access to the fault, performance and configuration tools, and the ability to perform specific actions within a tool.

All system administration tasks must be performed using the MDM Toolset environment. Refer to Summary of MDM and Operator Client tools in NN10180-611 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Security and Administration PT-AAL1/UA-AAL1/UA-IP* for a listing of the tools available in each environment.

## Chapter 7

# OAM tasks and access for managing Multiservice Switch 15000 and Media Gateway 15000 nodes

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## OAM tasks and access for managing Multiservice Switch 15000 and Media Gateway 15000 nodes

The management of elements within the PT-AAL1, UA-AAL1 and UA-IP solutions is based upon the International Telecommunications Union (ITU) M.3400 specification Telecommunications Management Network (TMN) model (also known as FCAPS). This model describes the exchange of management data between network elements and consists of five functional areas:

- fault management, which is the process that detects, analyzes, and corrects network faults
- configuration and administration, which involves the configuration and maintenance of Multiservice Switch 15000 and Media Gateway 15000 nodes and their software and services
- accounting, which is the process of collecting accounting data
- performance monitoring, which is the process of planning, monitoring, and adjusting the performance of network devices
- security management, which is the process of controlling user access to network management functions, providing integrity and confidentiality of data transmitted across untrusted network connections, and controlling access to the MDM workstation and MSS15000/MG15000 node platforms.

## Multiservice Data Manager tools organization

Nortel Multiservice Data Manager (MDM) toolset is organized and grouped according to the same model. In addition, multiple tools may be used within each of the functional areas. For more information, refer to Summary of MDM and Operator Client tools in NN10180-611 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Security and Administration PT-AAL1/UA-AAL1/UA-IP* for a listing of the tools available in each environment.

Within the context of the PT-AAL1, UA-AAL1 and UA-IP solutions, note the following about the exchange of management data between Multiservice Switch 15000 nodes, Media Gateway 15000 nodes, Multiservice Data Manager servers, and the OSS:

Within the context of the PT-AAL1, UA-AAL1 and UA-IP solutions, note the following sections about the exchange of management data between Multiservice Switch 15000 nodes, Media Gateway 15000 nodes, Multiservice Data Manager servers, and the higher level element managers.

### Fault management

In these solutions, fault management information is collected on Multiservice Switch 15000 and Media Gateway 15000 nodes. The fault management information collected includes alarms and state change notifications (SCNs). These events can be used for historical analysis, and the key variables can be used by troubleshooting personnel.

You can configure Multiservice Data Manager server to forward fault management information directly to the OSS.

Alarms can be transferred from the Multiservice Data Manager server to a higher level element manager, which can translate them into switch control center 2 (SCC2) formatted logs. SCC2 format is the format typically required by OSS fault applications:

For more information about SCC2-formatted logs, see NN10092-911 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Fault Management Overview PT-AAL1/UA-AAL1/UA-IP*.

You can use the Query Historical Alarms GUI to display the node's historical alarms.

For more information on managing faults on Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager equipment in the PT-AAL1, UA-AAL1 and UA-IP solutions, see NN10198-912 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Fault Management Troubleshooting PT-AAL1/UA-AAL1/UA-IP*.

### **Configuration and administration**

The majority of node configuration occurs during the initial hardware and software installation and commissioning. Additional configuration or changes to the configuration are not recommended. There are two exceptions. The first exception is in the UA-AAL1 and UA-IP solutions, where DSL links are configured on an ongoing basis after initial installation. The second is network growth when new nodes are added.

Multiservice Switch 15000 and Media Gateway 15000 components remain comparatively static from the perspective of daily operations and maintenance, with a primary focus on the administration and maintenance of the hardware and software. Additional installation and commissioning is required on an incremental basis only.

A Nodal Provisioning (NP) Template Audit capability assists in monitoring configuration changes made to the node components once installation and commissioning is complete. When an NP template is used, the NP server generates security audit logs (SALs) that capture all the information related to the template and the node. The configuration audit tool compares this data to the current on-switch provisioned data and user inputs to identify the differences.

For more information on configuring Multiservice Switch 15000 nodes, Media Gateway 15000 and Multiservice Data Manager servers in the PT-AAL1, UA-AAL1 and UA-IP solutions, see NN10114-511 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Overview PT-AAL1/UA-AAL1/UA-IP* and NN10225-512 *Nortel Multiservice Switch*

*15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Attribute Summary PT-AAL1/UA-AAL1/UA-IP.*

For more information on how to upgrade Multiservice Switch 15000 nodes in a PT-AAL1 or UA-AAL1 solution, see NN10070-461 *Upgrading Nortel Multiservice Switch 15000 in Carrier Voice over IP Networks PT-AAL1/UA-AAL1.*

For more information on how to upgrade Multiservice Switch 15000 and Media Gateway 15000 nodes in a UA-IP solution, see NN10419-461 *Upgrading Nortel Multiservice Switch 15000 and Media Gateway 15000/20000 in Carrier Voice over IP Networks.*

For more information on how to upgrade Multiservice Data Manager servers in any solution, see NN10185-461 *Upgrading Nortel Multiservice Data Manager in Carrier Voice over IP Networks.*

### **Accounting**

In these solutions, accounting activities are not supported on Multiservice Switch 15000 or Media Gateway 15000 nodes.

### **Performance monitoring**

Network traffic management (NTM) statistics are collected from control and function processors on Multiservice Switch 15000 nodes and from VSP cards on Media Gateway 15000 nodes by the data collection system (DCS). This collection occurs at 5-minute intervals using the rtstats (real-time statistics) data stream. Each node forwards the records to Multiservice Data Manager servers where six 5-minute interval data records, are aggregated into a single 30-minute interval data record.

The Multiservice Data Manager Performance Measurement Stream Processor (PMSP) application converts the 5- and 30- minute data records into ASCII CSV-formatted records. These records can be viewed either on-switch using the Multiservice Data Manager Data Viewer tool, if they are required for troubleshooting purposes. You can configure Multiservice Data Manager to forward these records directly to the OSS.

For more information on performance management on Multiservice Switch 15000 nodes and Multiservice Data Manager servers in the PT-AAL1, UA-AAL1 and UA-IP solutions, see NN10158-711 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Performance PT-AAL1/UA-AAL1/UA-IP*.

### **Security management**

Security management is provided in the following areas:

- Local user authentication and authorization

Local user authentication and authorization requires that the User ID, password and access authorization information be resident on the system to be accessed. User IDs are configured on both Multiservice Switch 15000 and Media Gateway 15000 nodes, as well as the Multiservice Data Manager servers.

In PT-AAL1 and UA-AAL1 solutions, you can also install Distributed Computing Environment (DCE) client software to work with Multiservice Data Manager. With this option, Multiservice Data Manager uses DCE security functionality to validate a user's password when they log into Multiservice Data Manager. After a user logs in, the user has full access to all of the Multiservice Data Manager tools that their profile allows. To order this option, contact Nortel Global Professional Services.

In these solutions, user IDs are configured on both Multiservice Switch 15000 and Media Gateway 15000 nodes, as well as the Multiservice Data Manager servers. To log directly into a server, you need the standard Multiservice Data Manager authentication (valid UNIX user ID and password), which provides access to the UNIX platform and allows the user to launch the Multiservice Data Manager toolset. When you access a Multiservice Switch 15000 or Media Gateway 15000 node through a Multiservice Data Manager tool, node

authentication is required in the form of valid user ID and password. These are configured using the Multiservice Data Manager Nodal Provisioning tool.

In Carrier Voice over IP, you can also install Distributed Computing Environment (DCE) client software to work with Multiservice Data Manager. With this option, Multiservice Data Manager uses DCE security functionality to validate a user's password when they log into Multiservice Data Manager. After a user logs in, the user has full access to all of the Multiservice Data Manager tools that their profile allows. To order this option, contact Nortel Global Professional Services.

- Central AAA for the Operator Client user environment

In a central authentication, authorization, and accounting (AAA) configuration, a central repository of user information is used to provide authentication of userids and passwords and authorized access to tools and functions for the Operator Client user environment.

In PT-AAL1 and UA-AAL1 solutions, the MDM Admin Server provides the central AAA service for Operator Client and MSS15000/MG15000 but not the MDM toolset.

In VoIP solutions, Integrated EMS provides the central AAA service for MDM and MSS15000/MG15000 logins.

When requesting login to a Multiservice Data Manager workstation, the centrally defined userids are compared first. If no match is found, then the local userids are compared. At least one local userid with full system access should be maintained on the server in case the central AAA service is unavailable.

When requesting login to a MSS15000/MG15000 node, the local userids are compared first. If no match is found, then the centrally defined userids will be compared. At least one local userid with full system access must be maintained on the node in case the central AAA service is unavailable.

- Secure FTP authentication

This optional feature can be used to encrypt passwords used during FTP communications between MSS15000/MG15000 nodes and MDM servers.

- Secure IP connections for VoIP solutions

Secure Shell (SSH) protocols provide data authentication and data encryption over connections between an MDM workstation and an operator desktop running the MDM Toolset, and over connections between an MDM workstation and the Integrated EMS workstation.

IP Security (IPSec) protocols provide data authentication and data encryption over links between two MDM workstations, and over connections between an MDM workstation and an MSS15000/MG15000 node.

- Controlled platform access

In VoIP solutions, access to the MDM and MSS15000/MG15000 platforms is controlled to reduce the possibility of unauthorized access through the IP network to platform functions

On MDM workstations, this includes hardening the Solaris 9 operating system by removing unused userids, removing or restricting access to operating system functions, restricting login retries, providing password protection on MDM tools where supported, and supporting good password practices.

Platform access for MSS15000/MG15000 nodes is controlled by utilizing the IP Access control feature and enabling timeouts on idle connections.

- Security audit logs

Security audit logs track events on MDM workstations or MSS15000/MG15000 nodes that include, but are not limited to, logins, logouts, configuration changes, commands and permission changes. These logs are used to assist in monitoring configuration changes and detecting security issues such as unauthorized access attempts.

MSS15000/MG15000 nodes log all non-passive commands executed on the node. These events are sent in real time to the MDM SALC server.

The MDM SALC server collects the real-time logs from the nodes and MDM generated logs from the OAMC server. These logs can be sent via the syslog facility to a log host using either syslog format or using the custlog V2 format. The logs can also be stored as files on the MDM server for viewing through the Log Browser tool. In VoA solutions, CS2000 Core Manager can act as the log host. In VoIP solutions, Integrated EMS acts as the log host.

For more information on security on Multiservice Switch 15000, Media Gateway 15000 nodes and Multiservice Data Manager servers, see NN10180-611 *Nortel Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Security and Administration PT-AAL1/UA-AAL1/UA-IP*.

## Types of access to perform OAM tasks

To undertake OAM tasks, users can access Multiservice Data Manager and Nortel Multiservice Switch 15000 nodes in the following ways:

- OSS access, which is the higher-level machine-to-machine access within the architecture of a node.
- craft access, which is human-to-machine interface, which is the subject of the Multiservice Switch for Carrier Voice over IP Network documentation suite.
- emergency access

### **OSS access**

OSS access typically is a machine-to-machine type of interface, which consists of several sub-systems and is used to integrate many functions. OSS access comprises:

- the integration and consolidation of log delivery across the cluster of devices in the Carrier Voice over IP Networks portfolio.

Events and alarms occurring within the cluster are gathered at the CS2000 Core Manager, converted to alarm logs in the NTSTD/SCC2 format, merged into a single stream, and delivered to the customer OSS (log sub-system).

- network surveillance or first alert management through the surveillance of the whole network and the operator notification of potential problems.

An operator uses the element managers of the applicable components to correct the problem.

- the gathering of performance data from devices across the clusters in the Carrier Voice over IP Networks portfolio, and the presentation and delivery of this data to the OSS by the CS2000 Core Manager.

### **Craft access**

Craft access is used for specialized functions that include the following:

- diagnostics
- tests that cannot be automated through another interface (for example, because the tests require tight supervision and frequent and timely interactions with a human operator)
- infrequent activities that lie outside the scope of daily activities and are expensive to integrate (for example, commissioning activities)

The craft access comprises:

- Multiservice Data Manager toolset
- Command Console CLI for Nortel Multiservice Switch 15000 nodes
- Multiservice Data Manager client set
- Multiservice Data Manager server set, if the client set is not available

- Multiservice Switch both the client set and server set are not available

### **Emergency access**

If connectivity between Nortel Multiservice Switch 15000 and Nortel Multiservice Switch 15000 nodes and the Multiservice Data Manager server is severed, emergency access to the node is possible through the command line interface (CLI), which is accessible through the serial ports on the control processors (for example, using a terminal server).

- direct connection to the network element's serial port
- Telnet to the network element

## **OAM tasks and access for managing Ethernet Routing Switch 8600 nodes**

Within the context of the PT-AAL1, UA-AAL1 and UA-IP solutions, please note the following about the exchange of fault management data between Nortel Ethernet Routing Switch 8600 nodes and Nortel Multiservice Data Manager (MDM) servers:

- Ethernet Routing Switch 8600 nodes generate SNMPv2c traps that are sent to Multiservice Data Manager servers. The information in these traps is then presented on the standard Multiservice Data Manager fault applications and northbound interfaces. It can also be forwarded to CS2000 Core Manager for conversion to SCC2 and subsequent forwarding to an OSS. For more information about SCC2-formatted logs, see 241-6003-110 *Preside, Passport 8600 Device Integration Cartridge User Guide*.
- The commands used to managed Ethernet Routing Switch 8600 nodes are issued from the Multiservice Data Manager Command Console tool.
- Ethernet Routing switch 8600 nodes are discovered using the IP Discovery tool on Multiservice Data Manager servers.
- Multiservice Data Manager servers need to be configured to communicate with Ethernet Routing Switch 8600 nodes. For information on how to configure Multiservice Data Manager servers for Ethernet Routing Switch 8600 fault management, see NN10114-511 *Nortel*

*Multiservice Switch 15000, Media Gateway 15000 and Multiservice Data Manager in Carrier Voice over IP Networks Configuration Overview PT-AAL1/UA-AAL1/UA-IP.*



## Chapter 8

# Call progressions through Multiservice Switch 15000 nodes

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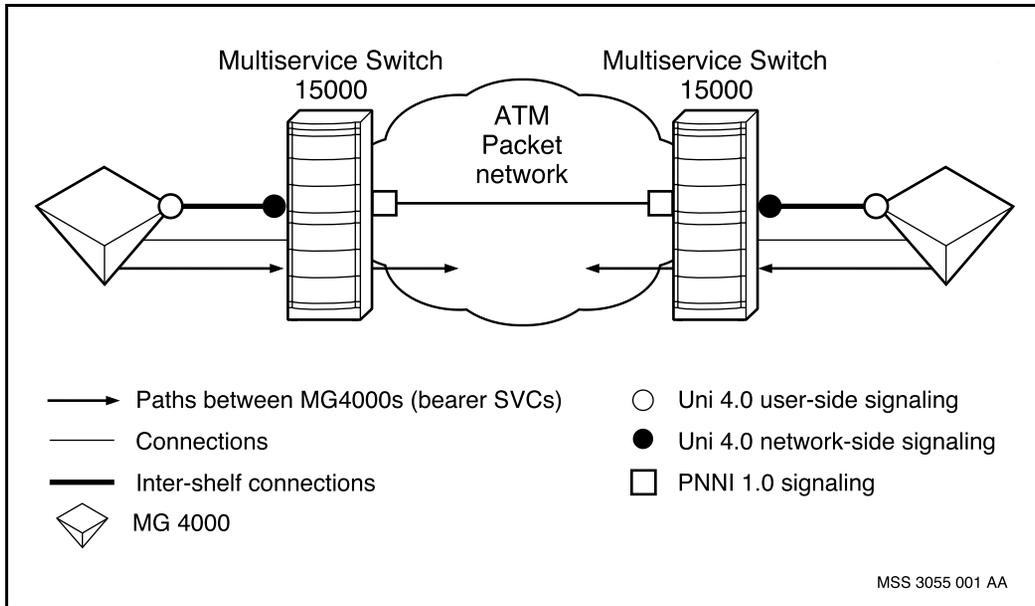
Refer to one of the following sections involving call progressions in the PT-AAL1, UA-AAL1 and UA-IP solutions:

- “Call progression in the PT-AAL1 solution” (page 117)
- “ISUP signaling in the PT-AAL1 solution” (page 121)
- “Call progression in the UA-AAL1 solution” (page 126)
- “Call progression in the UA-IP solution” (page 130)

### Call progression in the PT-AAL1 solution

The figure “Example network: Multiservice Switch base configuration” (page 118) illustrates a configuration in which the terminating nodes are positioned at the network edge, with an MG4000 supported by each node. This configuration is characterized as MG4000s connected to different shelves in different nodes.

**Figure 16**  
**Example network: Multiservice Switch base configuration**



At the originating node, the network directs the call through a backbone link on the Nortel Multiservice Switch 15000 node that supports the MG4000 that originates the call.

A walk-through of a successful call is illustrated in the figure “ATM call walk-through: success path for a base configuration” (page 120). This figure shows call progression of an ATM connection between two MG4000s, where the connection is established from node to node across the ATM backbone. Call progression assumes that the protocol is either UNI 4.0 or PNNI 1.0 as defined by the ATM Forum.

### **Characteristics: Multiservice Switch 15000 base call setup and tear down**

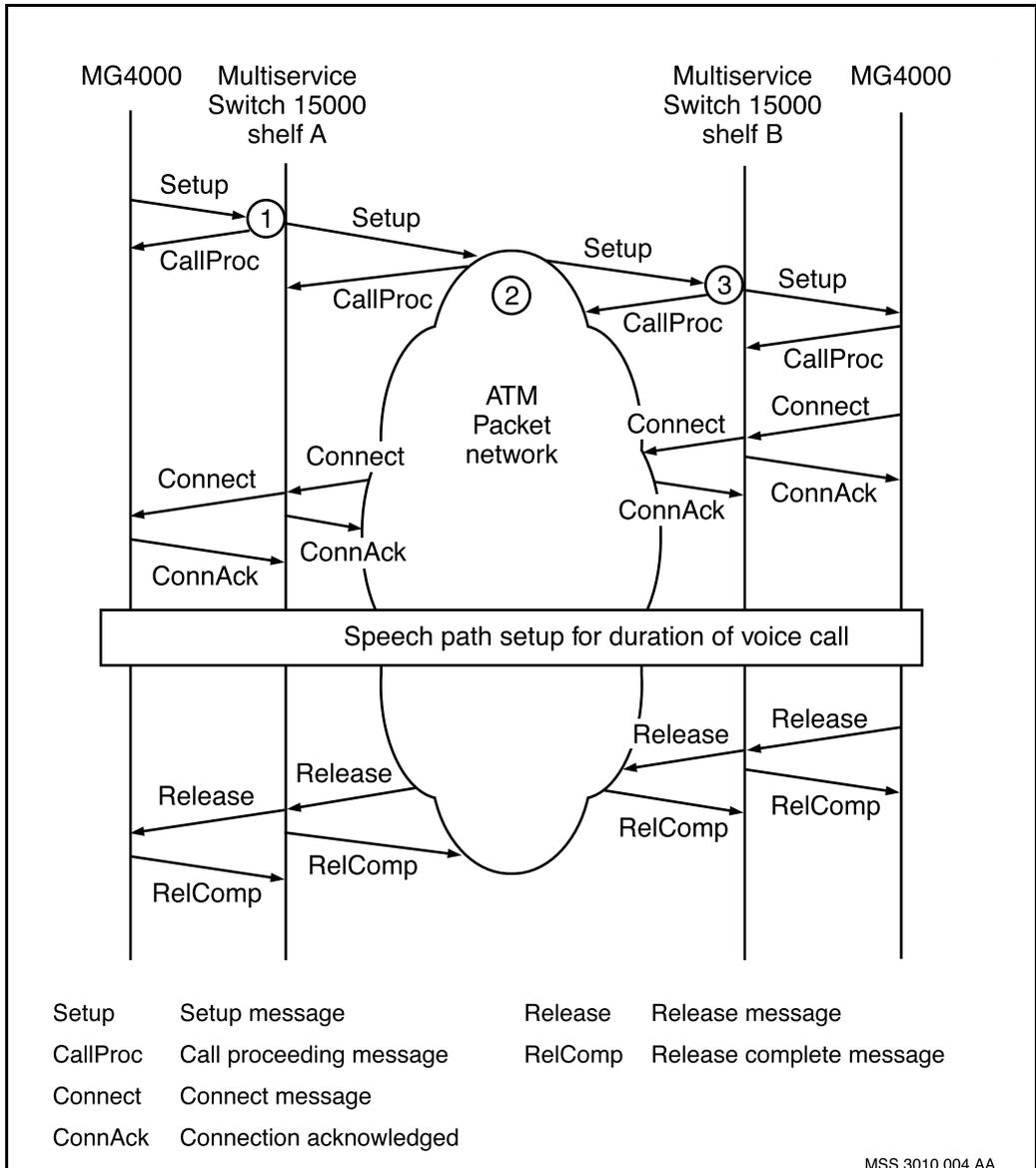
To establish any segment of the connection, the MG4000 or node sends a SETUP message to the adjacent node (or terminating MG4000 at the end point). When the adjacent node or MG4000 receives and correctly parses the SETUP message, and the network-side UNI allocates the VPI.VCI for the

call, the adjacent node or MG4000 replies with a CALL PROCEEDING message. The node or MG4000 has four seconds in which to generate the CALL PROCEEDING message otherwise the originator assumes that the call cannot be completed and clears the SVC.

When the terminating MG4000 accepts the call, it replies with a CONNECT message. This message is sent back through network along the call path. Each node activates the connection when it receives the CONNECT message and acknowledges with a CONNECT ACKNOWLEDGE message.

When the call is released, the MG4000 that originates the release sends a RELEASE message to the adjacent node on the call path. This node releases all resources associated with the call, acknowledges the RELEASE with a RELEASE COMPLETE message and sends a RELEASE message to the next node on the call path. When the terminating MG4000 receives the RELEASE message and returns a RELEASE COMPLETE message, call clearing is complete.

**Figure 17**  
**ATM call walk-through: success path for a base configuration**



Call progression and signaling includes the following events and characteristics:

- 1 Multiservice Switch 15000 shelf A receives a SETUP message and complete PNNI route selection. The route selection process inserts the designated transit list (DTL) when the SETUP message is transmitted onto the selected PNNI link.
- 2 The ATM backbone routes the call to a terminating node based on the DTL, in this example shelf B.
- 3 Multiservice Switch 15000 shelf B matches the called party address in the SETUP message with the MG4000 attached to it.

## **ISUP signaling in the PT-AAL1 solution**

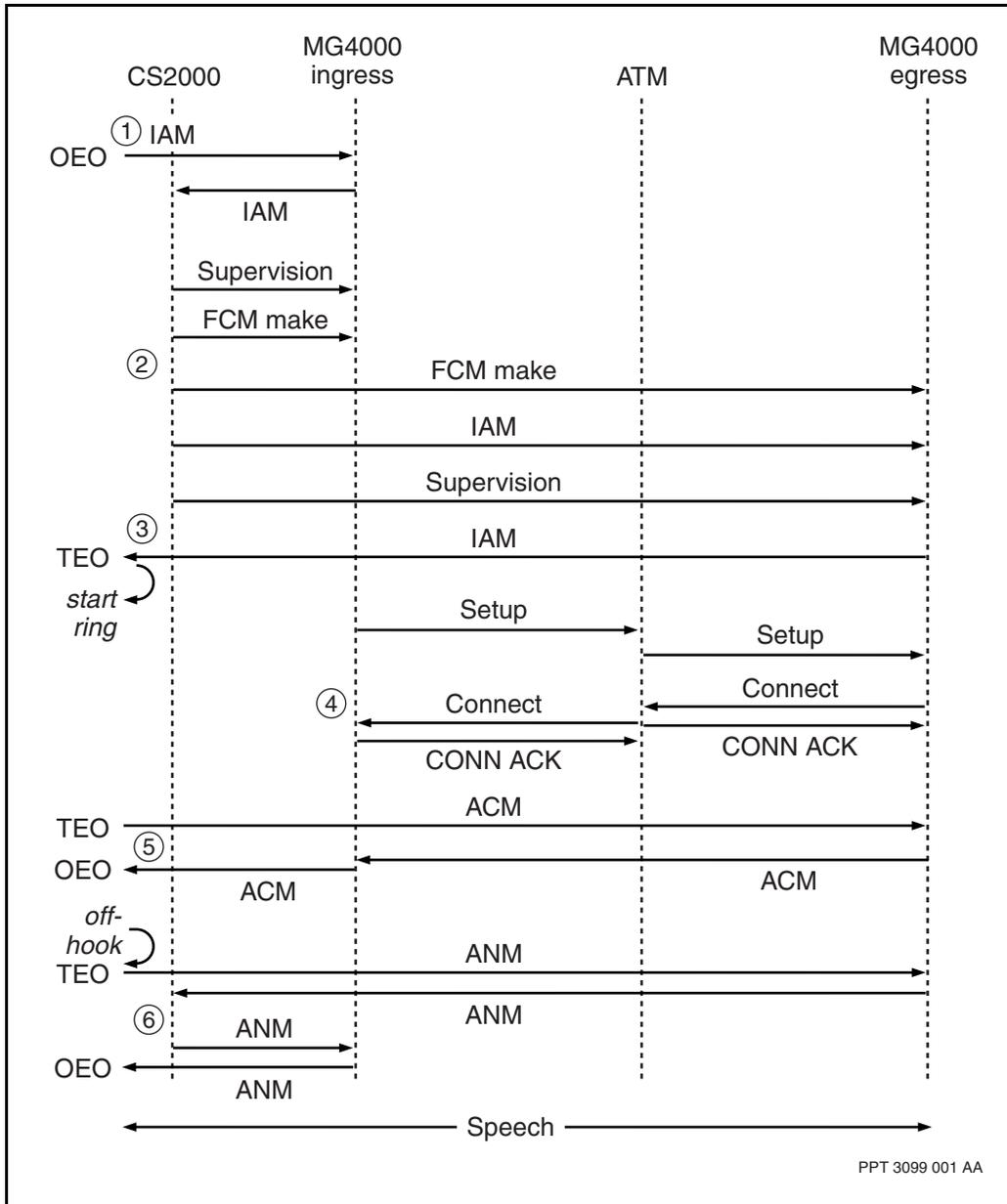
To setup a voice call between two end-offices, both legacy SS7 and ATM signaling are used. The interworking between the two is performed by the MG4000 gateways, under the control of the CS2000 Communication Server. The MG4000 and CS2000 use a proprietary Media Gateway Control Protocol to communicate control information.

The Carrier Voice over IP portfolio supports calls between many different trunk types, including PRI, ISUP, and PTS for calls between offices over an ATM packet network. Interworking is also provided through the IW SPMs so that calls can still use ATM trunks, even if they are brought into the Carrier Voice over IP tandem office on legacy tandem peripherals, such as Spectrum Peripheral Modules (SPMs), connected to the ENET.

### **Intra-Carrier Voice over IP office tandem calls**

The following figure shows an example of an ISUP call between an originating end-office (OEO) and a terminating end-office (TEO). Both end-offices have MG4000 gateways connected to the same Carrier Voice over IP tandem office.

**Figure 18**  
**Call walk-through for an intra-CVoIP ISUP call**



The call is established using the following signaling:

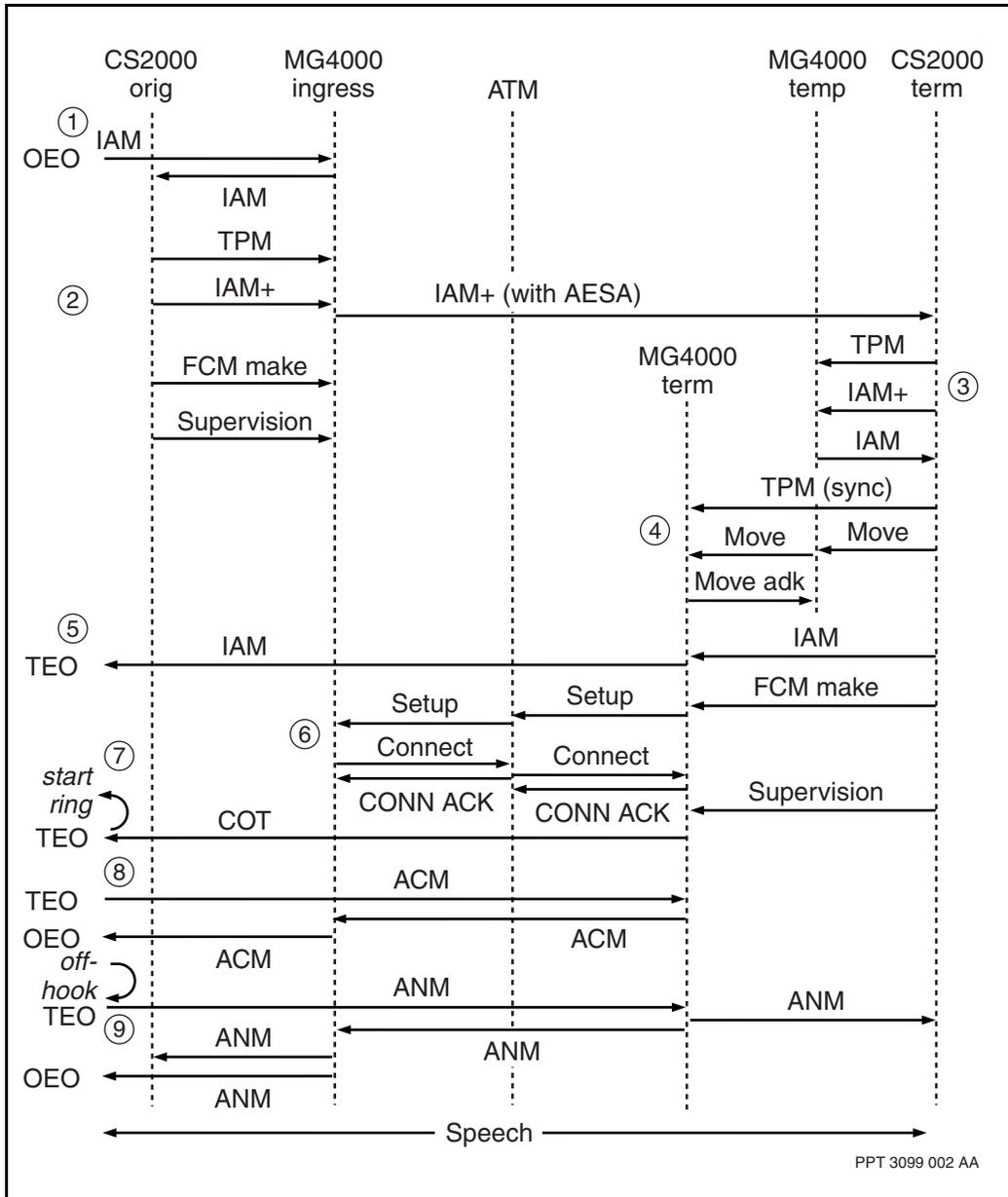
- 1 The IAM message is received from the OEO and is sent to the ingress MG4000, which in turn reports it to the CS2000. The CS2000 translates the incoming digits in the IAM message and selects the outgoing trunk and egress MG4000.
- 2 The CS2000 sends a Fabric Control Message (FCM) and supervision messages to the MG4000s, and forwards the IAM message to the egress MG4000.
- 3 The egress MG4000 sends the IAM message to the TEO, which will start ringing the called party's telephone.
- 4 A Q.2931 SETUP message is sent from the ingress MG4000 across the ATM core network to the egress MG4000. The two nodes complete the necessary Q.2931 signaling and establish an AAL1 bearer path between them.
- 5 The ACM message is sent by the TEO to the egress MG4000, which passes the ACM message to the ingress MG4000 by using the AAL5 peer connection between the two nodes. The ingress MG4000 sends the ACM message back to the OEO.
- 6 The ANM message is sent by TEO to the egress MG4000, which then sends the ANM message to the CS2000. The CS2000 marks the call as answered and begins billing the call. The CS2000 sends the ANM message to the ingress MG4000 which then sends the ANM message to the OEO.

### **Inter-Carrier Voice over IP office tandem calls**

Calls through a Carrier Voice over IP network can also take place between an originating end-office (OEO) and a terminating end-office (TEO) connected to different CVoIP tandem offices.

The following figure show an example of a Dynamic Packet Trunk (DPT) call, where two CVoIP tandem offices use an ATM trunk to place a call between them. The offices use the Bearer Independent Call Control (BICC) extension to ISUP for signaling. BICC includes extra information, such as an ATM End System Address (AESAs) in the IAM message, required to establish an ATM call between the two MG4000s.

**Figure 19**  
**Call walk-through for an inter-CVoIP ISUP call using a dynamic packet trunk (DPT)**



The call is established using the following signaling:

- 1 The IAM message is received from the OEO through the SS7 network and is sent to the MG4000 with the incoming TDM trunk. The ingress MG4000 forwards the IAM message to the CS2000 for digits translations and routing.
- 2 The CS2000 translates the incoming digits and determines that the outgoing trunk is DPT. The CS2000 sends a Trunk Profile Message (TPM) to the ingress MG4000. The TPM message provides the MG4000 with DPT setup information. The MG4000 adds the BICC parameters to the IAM message plus AESA, BNC\_ID, and ATM Trunk Information (ATI) and sends it through the SS7 network to the terminating CS2000.
- 3 Trunk selection on the CS2000 randomly picks a DPT. The CS2000 then sends a TPM message to a temporary MG4000 that corresponds to the selected DPT. The temporary MG4000 returns an IAM message to the CS2000 to start normal call processing.
- 4 After route selection is done, it is determined that the terminating TDM trunk is on a different MG4000 than the one picked at random. A new DPT is picked on the correct terminating MG4000 and the TPM message is forwarded to it. The CS2000 sends a Move message to the temporary MG4000 to tell it to move the context of the call to the correct terminating MG4000.
- 5 The CS2000 sends an asynchronous IAM message to the terminating MG4000. The terminating MG4000 sends the IAM message to the TEO. This IAM message informs the TEO to delay ringing until a COT message is received.
- 6 The terminating MG4000 initiates the ATM AAL1 call setup to the MG4000 in the originating office by sending a Q.2931 SETUP message. The two nodes complete the Q.2931 signaling and an AAL1 bearer path is created between the two nodes.
- 7 The terminating MG4000 sends a COT message to the TEO to inform it that the bearer path has been successfully established and tested. The TEO can start ringing the called party's telephone.
- 8 The TEO returns an ACM message to the terminating MG4000. The terminating MG4000 then makes its time-switch connection and forwards the ACM message through the SS7 network to the originating MG4000. The originating MG4000 make its time-switch connection and forwards the ACM message to the OEO.

- 9 The terminating MG4000 receives an ANM message from the TEO and forwards it to the CS2000 for billing, and to the originating MG4000. The originating MG4000 forwards the ANM message to the CS2000 for billing and to the OEO.

## **Call progression in the UA-AAL1 solution**

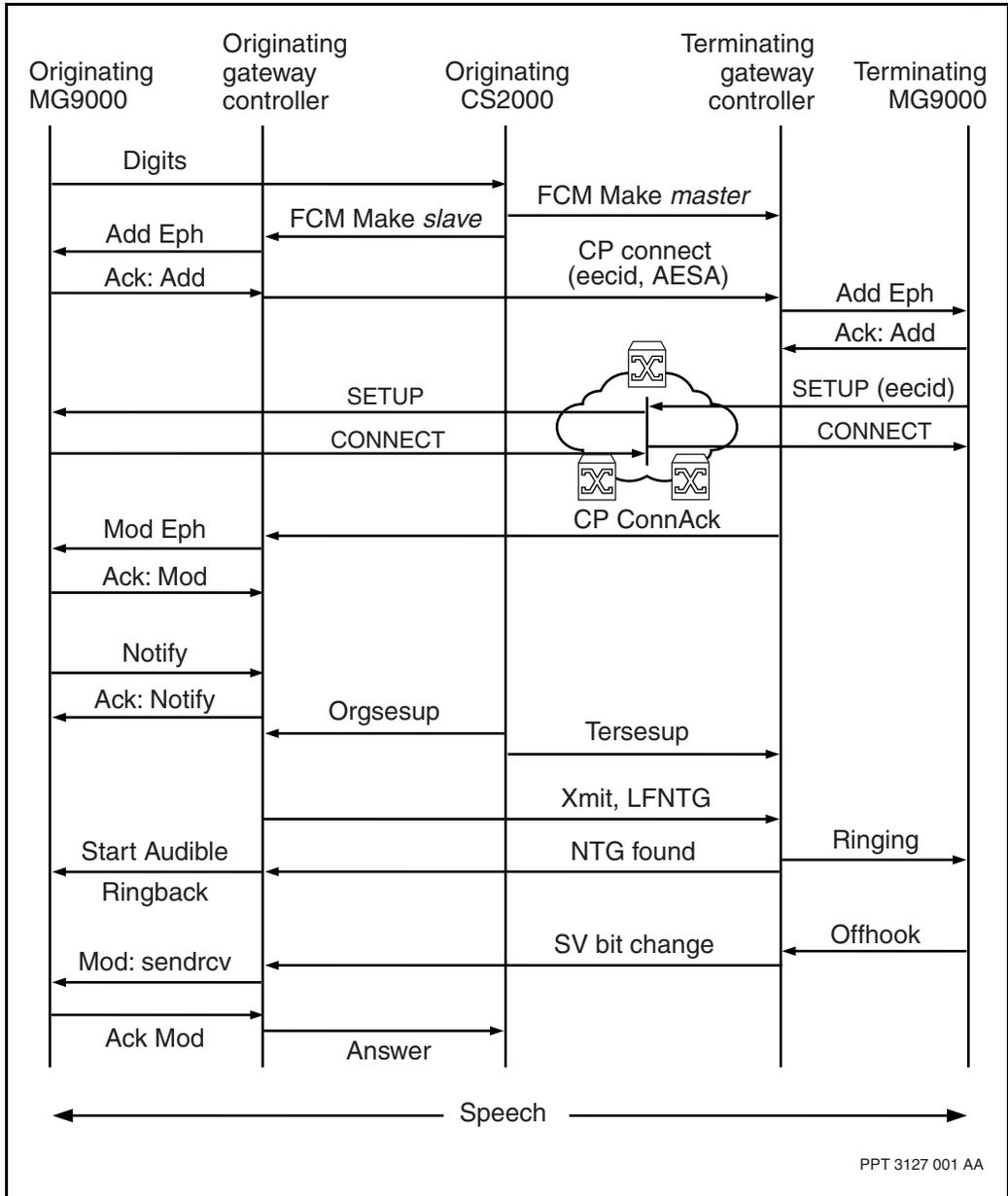
Refer to the following for information about how calls progress through Nortel Multiservice Switch 15000 nodes within the UA-AAL1 solution:

- “Intra-Carrier Voice over IP end office calls” (page 126)
- “Carrier Voice over IP end office trunk calls” (page 128)

### **Intra-Carrier Voice over IP end office calls**

The following figure shows an example of a basic POTS to POTS call between two MG9000s in the same end office.

**Figure 20**  
**ATM call walk-through: UA-AAL1 intra-CVoIP end office call**



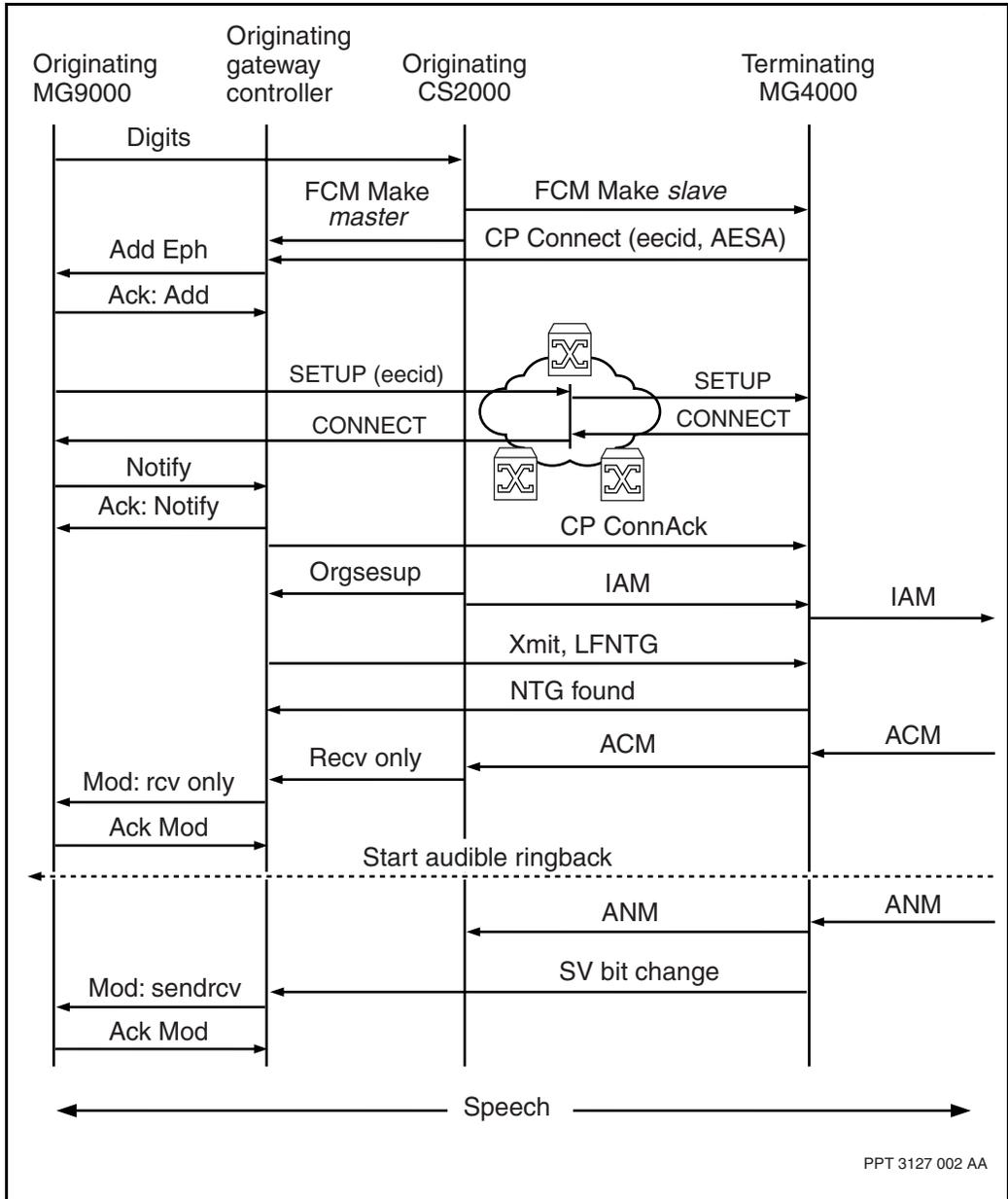
Call progression and signaling includes the following events and characteristics:

- 1 The originating MG9000 provides the dial tone and collects digits. Digits are sent to the gateway controller (GWC) controlling the originating MG9000. This GWC then forwards them to the CS2000 for translation and routing.
- 2 The CS2000 sends a Fabric Control Message (FCM) to the GWC controlling the originating MG9000 and the GWC controlling the terminating MG9000. The originating GWC translates this into an H.248 “add ephemeral” message and sends it to the MG9000s. The originating GWC also forwards the originating MG9000’s AESA and call correlation information to the terminating GWC.
- 3 An ATM Setup message is sent from the terminating MG9000 across the ATM core network to the originating MG9000. The two nodes complete the necessary ATM signalling and establish an AAL1 bearer path between them.
- 4 The terminating MG9000 notifies its GWC of the successful completion of the “add ephemeral” message. The terminating GWC then notifies the originating GWC through a “mod ephemeral” message.
- 5 With the two GWCs synchronized, ringing is initiated on the terminating line and audible ringback is played on the originating line.
- 6 When the called party goes off-hook, the terminating MG9000 notifies its GWC, who notifies the originating GWC. The originating GWC then notifies the originating MG9000. Once two-way speech is enabled, the CS2000 is notified.

### **Carrier Voice over IP end office trunk calls**

The following figure shows an example of a basic POTS trunk call to an MG4000 trunk gateway in the same end office.

**Figure 21**  
**ATM call walk-through: CVoIP end office trunk call**



PPT 3127 002 AA

Call progression and signaling includes the following events and characteristics:

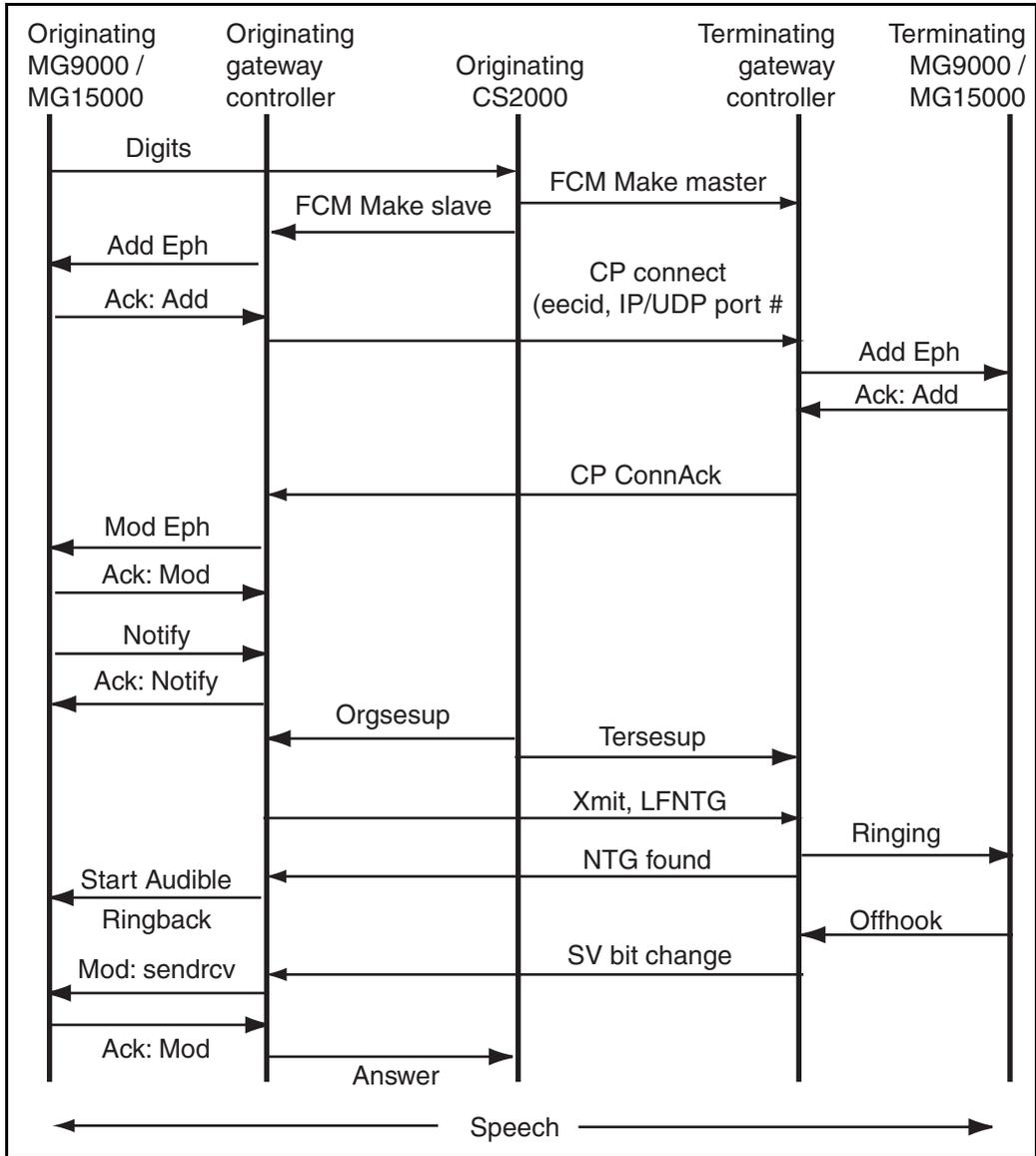
- 1 The originating MG9000 provides the dial tone and collects digits. Digits are sent to the gateway controller (GWC), who forwards them to the CS2000 for translation and routing.
- 2 The CS2000 sends a Fabric Control Message (FCM) to the GWC controlling the originating MG9000 and the connection broker in the MG4000. The MG4000 acts as a slave and forwards its AESA to the GWC in the CP connect message. The GWC translates this into H.248 “add ephemeral” message and sends it to the MG9000.
- 3 An ATM Setup message is sent from the master MG9000 across the ATM core network to the MG4000. The two nodes complete the necessary ATM signalling and establish an AAL1 bearer path between them.
- 4 The terminating MG9000 notifies its GWC of the successful completion of the ATM SVC establishment. The GWC then acknowledges the CP Connect message. In parallel, the CS2000 initiates supervision, sending out the IAM message to the terminating the end office or to the tandem node. The CS2000 also checks integrity on the speech path.
- 5 When the ACM message is received from the terminating end office or from the tandem node, a “mod ephemeral” message is sent to cut through the ringing from the terminating node.
- 6 When the called party goes off-hook, an ANM message is received from the terminating office and the MG4000 sends the supervision message to the GWC telling it to initiate two-way speech path.

## **Call progression in the UA-IP solution**

### **Intra-office signaling traffic from gateway to gateway controller**

The following figure illustrates the basic call setup for a trunked call between two MG9000 nodes.

**Figure 22**  
**IP call walk-through: UA-IP intra-CVoIP end office call**



Call progression and signaling includes the following events and characteristics:

- 1 The originating MG9000/MSS15000 gateway provides the dial tone and collects digits. Digits are sent to the gateway controller (GWC) of the originating MG9000. This GWC then forwards the digits to the CS2000 for translation and routing.
- 2 The CS2000 sends a Fabric Control Message (FCM) to the GWC controlling the originating MG9000 and the GWC controlling the terminating MG9000. The originating GWC translates this into an H.248 “add ephemeral” message and sends it to the MG9000/MSS15000. The originating GWC also forwards the originating MG9000’s IDP/UDP port number and call correlation information to the terminating GWC.
- 3 The terminating MG9000 notifies its GWC of the successful completion of the “add ephemeral” message. The terminating GWC then notifies the originating GWC through a “mod ephemeral” message.
- 4 With the two GWCs synchronized, ringing is initiated on the terminating line and audible ringback is played on the originating line.
- 5 When the called party goes off-hook, the terminating MG9000 notifies its GWC, who notifies the originating GWC. The originating GWC then notifies the originating MG9000. Once two-way speech is enabled, the CS2000 is notified.



Nortel Multiservice Switch 15000, Media Gateway  
15000 and Multiservice Data Manager in Carrier Voice  
over IP Networks

## Product and Technology Basics

PT-AAL1/UA-AAL1/UA-IP

(I)SN08 and up

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