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Nortel Multiservice Switch 7400/15000/20000

Network Management Connectivity

NN10600-271

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What's new

The following feature was added to this document:

- Secure shell (Ssh) on Nortel Multiservice Switch 15000 and 20000 (page 8)

Other changes made to this document include the following:

- Updated Configuring the OAM Ethernet port on a CP for remote network management (page 49) with changes to configuration steps.

Attention: To ensure that you are using the most current version of an NTP, check the current NTP list in NN10600-000 *Nortel Multiservice Switch 7400/15000/20000 What's New*.

Secure shell (Ssh) on Nortel Multiservice Switch 15000 and 20000

The following section was updated for this feature:

- Network management connectivity fundamentals (page 98)

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Network management connectivity

Configure network management connectivity to establish a connection between the Nortel Multiservice Switch node and a local operator terminal or Nortel Multiservice Data Manager.

The local operator terminal provides a text interface to a Multiservice Switch node. During a software installation, you must have a local operator terminal to run the StartUp software which connects the node to the network and does basic configuration.

Multiservice Data Manager provides a graphical user interface to a node and is the most common method of managing Multiservice Switch nodes. You must activate the Multiservice Data Manager workstation first, before you run the StartUp software from the local operator terminal and establish a connection between Multiservice Data Manager and the node, or you can connect the Multiservice Data Manager workstation directly to the node.

Prerequisites to network management connectivity

- In some cases, the IP address of the workstation you are using must be on the valid IP address list for the node. For more information, see NN10400-605 *Nortel Multiservice Data Manager Network Security Fundamentals*.

Network management connectivity tasks

This workflow shows you the sequence of tasks and procedures you perform to configure network management connectivity. To link to any task or procedure, go to Network management connectivity task navigation (page 10).

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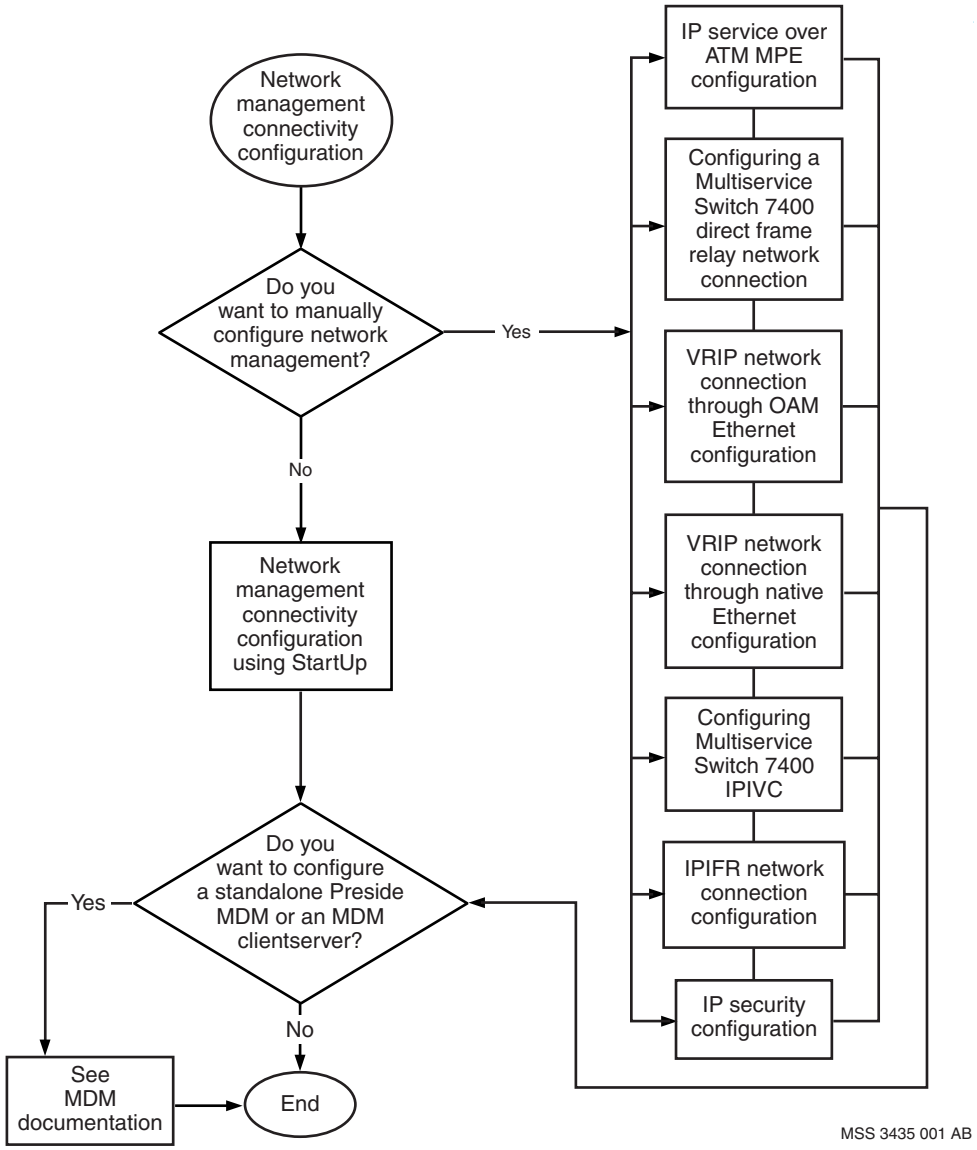
Network management connectivity flow



Network management connectivity task navigation

- Network management connectivity configuration using StartUp (page 12)
- Configuring Multiservice Switch 7400 IPIVC (page 16)
- IPIFR network connection configuration (page 19)
- VRIP network connectivity through native Ethernet configuration (page 30)
- VRIP network connectivity through OAM Ethernet configuration (page 44)
- Configuring a direct frame relay network connection (page 51)

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- IP services over ATM MPE configuration (page 55)
- “IP security configuration”. See NN10400-605 *Nortel Multiservice Data Manager Network Security Fundamentals*.

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Network management connectivity configuration using StartUp

Configure network management connectivity using StartUp to control and monitor your new Nortel Multiservice Switch node.

Connect the Nortel Multiservice Data Manager to the Multiservice Switch node through a local operator terminal. Then run StartUp from the local operator terminal to establish network connectivity. Once you have established network connectivity, then you can use Multiservice Data Manager to manage the node.

Prerequisites to network management connectivity configuration using StartUp

- The local operator terminal you log into must be connected to the V.24 DCE port of your control processor (CP).
- For more information about how to install a local operator terminal for see NN10600-175 *Nortel Multiservice Switch 7400 Hardware Installation, Maintenance, and Upgrade* or NN10600-130 *Nortel Multiservice Switch 15000/20000 Hardware Installation, Maintenance, and Upgrade*.
- For more information on logging in to a local operator terminal when you are not configuring a new node, see NN10600-030 *Nortel Multiservice Switch 7400/15000/20000 Overview*.
- A spare control or function processor(s) must not be physically installed in the shelf. If a spare control or function processor (FP) is configured, unseat it so that it remains in the slot and cabled but does not connect to the backplane. To unlatch and unseat a card, see NN10600-175 *Nortel Multiservice Switch 7400 Hardware Installation, Maintenance, and Upgrade* or NN10600-130 *Nortel Multiservice Switch 15000/20000 Hardware Installation, Maintenance, and Upgrade*.
- A sparing panel must not be connected to the node. For any sparing panel connected to FPs, disconnect its cables at the Main FPs, and leave the cables hanging. The spare FP can remain cabled because it should already have been unseated. To disconnect FP cables, see NN10600-175 *Nortel Multiservice Switch 7400 Hardware Installation, Maintenance, and*

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Upgrade or NN10600-130 *Nortel Multiservice Switch 15000/20000 Hardware Installation, Maintenance, and Upgrade*.

- For 32-port multi-service access (MSA32) sparing panels, the FP cables can remain connected.
- The Nortel Multiservice Data Manager workstation that you plan to connect to the node must be active and functioning.
- Know what type of link you plan to use to connect Multiservice Data Manager to the Nortel Multiservice Switch node. Understand the resulting network topology. For more information on the types of links and possible network topologies, see Multiservice Switch network topologies (page 144).
- Know which version of the base software you need to load onto the node.

Network management connectivity configuration using StartUp procedures

- Logging in to a local operator terminal (page 14)
- Quitting StartUp (page 15)

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Logging in to a local operator terminal

Log in to a local operator terminal to run the StartUp utility when you are configuring a new node.

When you connect to a new node, no network security has been configured, so you can use any userid and password combination.

From the time you log in to the node until you run StartUp, alarms will appear on the screen. Many of these alarms are normal since the node is not configured. There can, however, be other alarms that indicate problems. The alarms that appear on-screen scroll by very quickly and can be difficult to read. To print a copy of the alarms, perform a screen dump to your local terminal's printer.

Procedure steps

Step	Action
1	Enter a userid.
2	Enter a password.
3	Run StartUp.

--End--

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Quitting StartUp

Quit StartUp and return to the local operator terminal at any time.

Procedure steps

Step	Action
1	Type `quit`.
	--End--

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Configuring Multiservice Switch 7400 IPIVC

Configure Nortel Multiservice Switch 7400 IPIVC to provide an X.25 connection between a management device and a node over a virtual circuit (VC).

Prerequisites

- For conceptual information, refer to Configuring IP interface over virtual circuit for Multiservice Switch 7400 nodes (page 103).

Procedure steps

Step	Action
1	If you have not already done so using the StartUp utility, add the Ipivc component. **`add Ipivc`**
2	Set the IP address of the IPIVC interface. **`set Ipivc ipAddress <address1>`**
3	Set the data network address (DNA) of the IPIVC interface. **`set Ipivc Dna dataNetworkAddress <address2>`**
4	Set the numbering plan indicator (NPI) of the DNA. **`set Ipivc Dna npi <plan>`**
5	Set the CUG type. **`set Ipivc Dna Cug type <cugtype>`**
6	Set the data network code ID (DNIC) of the CUG. **`set Ipivc Dna Cug dnic <dnic>`**
7	Set the CUG interlock code. **`set Ipivc Dna Cug interlockCode <code>`**
8	Add a DefaultRoute component to represent the default route.

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```
add Ipivc Dr
```

9 Set the remote IP address for the default route.

```
set Ipivc Dr callingIpAddress <address3>
```

10 Set the remote DNA for the default route.

```
set Ipivc Dr callingDataNetworkAddress <address4>
```

11 Set the remote numbering plan indicator (NPI) for the default route.

```
set Ipivc Dr callingNumberingPlanIndicator <plan>
```

--End--

Variable definitions

Variable	Value
<address1>	is a unique IP address for the IPIVC interface. The IP address cannot be the same as the IP address of IPIVC interface on other nodes or the IP address of a remote device.
<address2>	is a unique DNA in the network (up to 14 digits long).
<address3>	is the IP address of the remote device (where the X.25 call originated). This IP address must be unique.
<address4>	is the DNA of the remote device (up to 14 digits long). This DNA cannot be the same as the DNA of the IPIVC.
<code>	is the interlock code of a national or international CUG call (any number between 0 and 65535). The code must be the same as the code assigned to the group of Nortel Multiservice Data Manager workstations authorized to access the node.
<cugtype>	is either national or international. International CUGs are usually set for DTEs that have an X.75 gateway between them. National CUGs are usually set for DTEs that don't have an X.75 Gateway between them.
<dnic>	is a four-digit binary coded decimal identifier. National CUGs do no use DNICs, so you set the attribute to 0000 for a national CUG. For an international CUG, set the DNIC to the internationally assigned DNIC for the CUG.
<plan>	is either x121 or e164.

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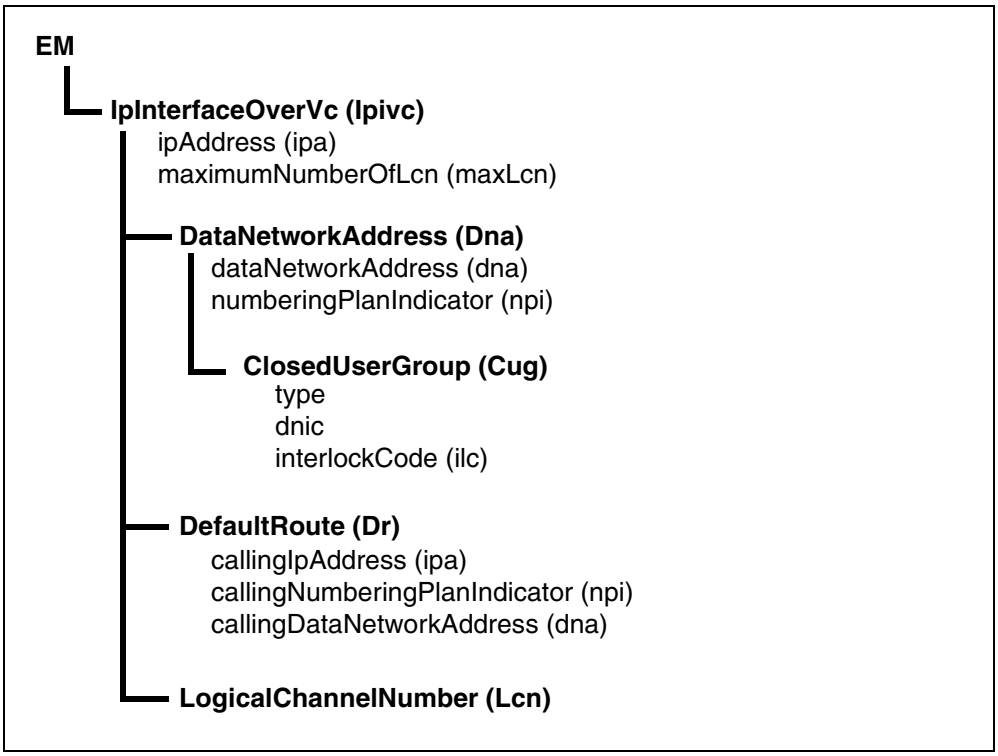
Procedure job aid

Multiservice Switch 7400 IPIVC component hierarchy



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IPIFR network connection configuration

Configure an IPIFR network connection to manually configure the IP interface over frame relay (IPIFR) to connect management devices to Nortel Multiservice Switch nodes using frame relay permanent virtual circuits (PVC).

Prerequisites to IPIFR network connection configuration

CAUTION

CP Ethernet port can interfere with IPIFR routing

If you configure the Ethernet port on the CP, it can interfere with IPIFR routing.

If the CP Ethernet port is in the same IP network as IPIFR, then the Ethernet interface must have the same subnet mask. In addition, the direct IP route associated with the Ethernet interface does not work if provisioned as a static route under IPIFR.

- For conceptual information, refer to Configuring IP interface over frame relay (page 106).

IPIFR network connection configuration procedures

This task flow shows you the sequence of procedures you perform to configure an IPIFR network connection. To link to any task or procedure, go to IPIFR network connection configuration procedure navigation (page 20).

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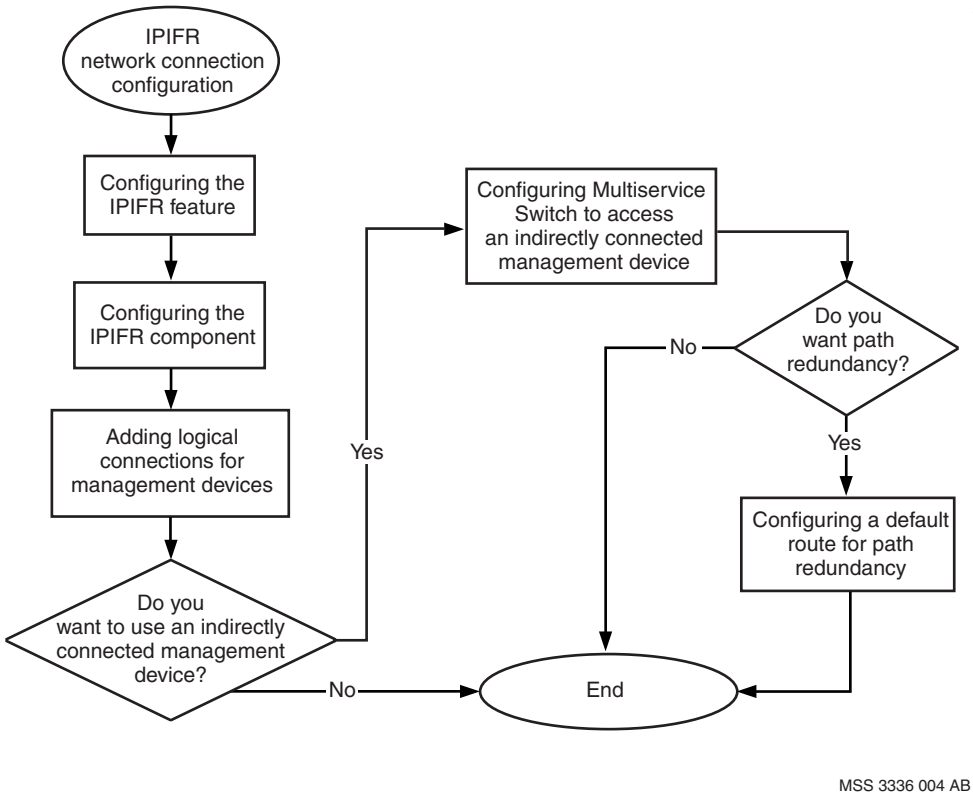
IPIFR network connection configuration task flow



IPIFR network connection configuration procedure navigation

- Configuring the IPIFR feature (page 21)
- Configuring the IPIFR component (page 22)
- Adding logical connections for management devices (page 24)
- Configuring nodes to access an indirectly connected management device (page 26)
- Configuring a default route for path redundancy (page 28)

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Configuring the IPIFR feature

Configure the IPIFR feature to add IPIFR to the feature list of the CP logical processor type.

Prerequisites

- Unless some other management connection exists, configure IPIFR using a local terminal directly connected to the Nortel Multiservice Switch node.

Procedure steps

Step	Action
1	Add the IPIFR feature to the feature list of the CP logical processor type. **`set Sw Lpt/CP featureList ipiFr`**
	--End--

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Configuring the IPIFR component

Configure the IPIFR component to add the IPIFR component and create the *DataNetworkAddress* (*Dna*) subcomponent.

Prerequisites

If you added the IPIFR component during startup, it is not necessary to perform this procedure.

- You must add the module-wide virtual-circuit system and set the network ID code before you can provision the initial IPIFR. For information on setting these values, see NN10400-605 *Nortel Multiservice Data Manager Network Security Fundamentals*.

Procedure steps

Step	Action
1	If you have not already done so using the StartUp utility, add the *IpiFr* component. **`add IpiFr`**
2	Set the IP address of the IPIFR interface. **`set IpiFr ipAddress <address1>`**
3	Set the subnetMask attribute. **`set IpiFr subnetMask <address2>`**
4	Add the DNA to the IPIFR. **`add IpiFr Dna`**
5	Set the data network address (DNA) of the IPIFR interface. **`set IpiFr Dna dataNetworkAddress <address3>`**
6	Set the *numberingPlanIndicator* (npi) attribute. **`set IpiFr Dna npi <plan>`**

--End--

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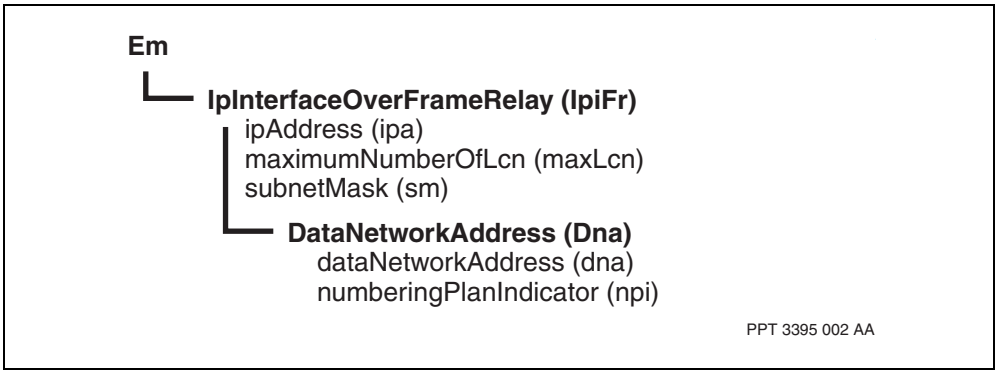
Variable definitions

Variable	Value
<address1>	is a unique IP address for the IPIFR. The IP address cannot be the same as the IP address of an IPIFR interface on other nodes or the IP address of a remote device.
<address2>	is the subnetwork mask.
<address3>	is a unique DNA in the network (up to 15 digits long).
<plan>	is either e164 or x121 (packet-switched data networks use x121).

Procedure job aid

IPIFR component hierarchy



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Adding logical connections for management devices

Add logical connections for management devices to directly connect each management device you want IPIFR to access.

Prerequisites

- If you have already added the initial LCN during startup, it is not necessary to perform this procedure.

Procedure steps

Step	Action
1	Add the *Lcn* subcomponent to the IPIFR. **`add IpiFr Lcn/<number>`**

CAUTION
IPIFR provisioning rules
IPIFR does not support inverseARP or ARP.

Set the *remoteIpAddress* attribute if you are connecting to an IP-routing-capable device.

2	Set the *remoteIpAddress* attribute (effectively the static ARP entry). **`set IpiFr Lcn/<number> remoteIpAddress <address1>`**
3	Set the remote data network address (DNA) for the *DirectCall* component. **`set IpiFr Lcn/<number> DirectCall remoteDna <address2>`**
4	Set the remote data link connection identifier (DLCI) for the *DirectCall* component. (Leave the *type* attribute set to its default value permanentSlave.) **`set IpiFr Lcn/<number> DirectCall remoteDlci <DLCI>`**

--End--

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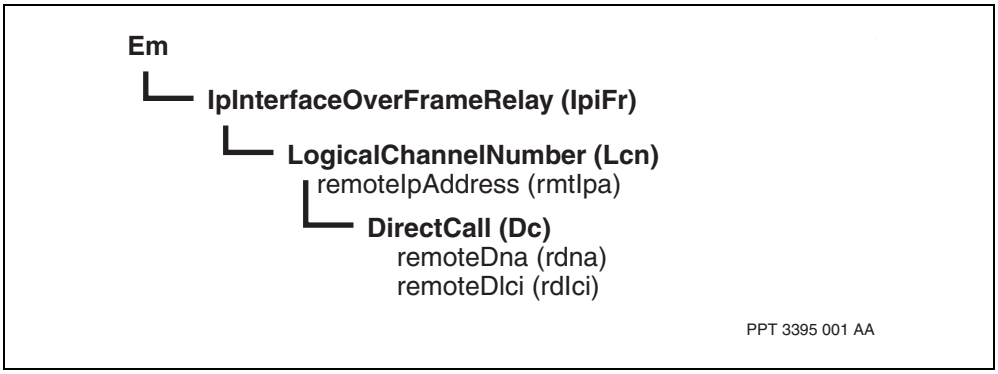
Variable definitions

Variable	Value
<address1>	is the IP address of the management device or IP-routing-capable device connected to this LCN interface.
<address2>	is the specified DNA of the remote-end link (the DNA of the FRUNI on the edge node).
<DLCI>	is the DLCI of the remote-end link (the DLCI of the FRUNI on the edge Multiservice Switch 7400 node).
<number>	is an instance number for the logical channel (between 16 and 39).

Procedure job aid

Logical connections for management devices component hierarchy



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Configuring nodes to access an indirectly connected management device

Configure Nortel Multiservice Switch nodes to access an indirectly connected management device by configuring a static route using a directly connected IP-routing-capable device as a gateway.

Prerequisites

- To ensure proper address resolution, make sure you have set *remoteIpAddress* for the *Lcn* component of IPIFR.
- For more information on using static routes, see Routing to indirectly connected devices using static routes (page 137).
- This procedure shows you how to configure both Multiservice Switch 1 and Multiservice Switch 2 to access the indirectly connected MDs as illustrated in the figure Example of indirectly connected management devices (page 27). Change the values to those appropriate for your own network.

  The figure illustrates the connections between two edge nodes, two directly connected management devices (MD 1 and 2), and two indirectly connected managements devices (MD 3 and 4). Once you configure the directly connected devices, you can establish access to the indirectly connected devices through the IP-routing-capable MD 1 (it is running, for example, and IP routing application). Since both MD 3 and MD 4 are on the same subnetwork, you can configure a static route to reach both of them.

Procedure steps

Step	Action
1	On Multiservice Switch 1, add a static route to the 1.2.0.0 network. **`add IpiFr Sr/1.2.0.0`**
2	On Multiservice Switch 1, set the gateway IP address (next hop) to the IP address of MD 1 (1.2.3.4). **`set IpiFr Sr/1.2.0.0 gatewayIpAddress 1.2.3.4`**
3	Repeat above steps on Multiservice Switch 2.

--End--

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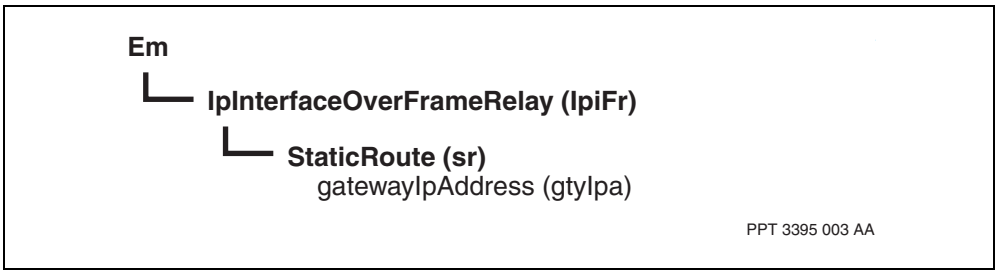
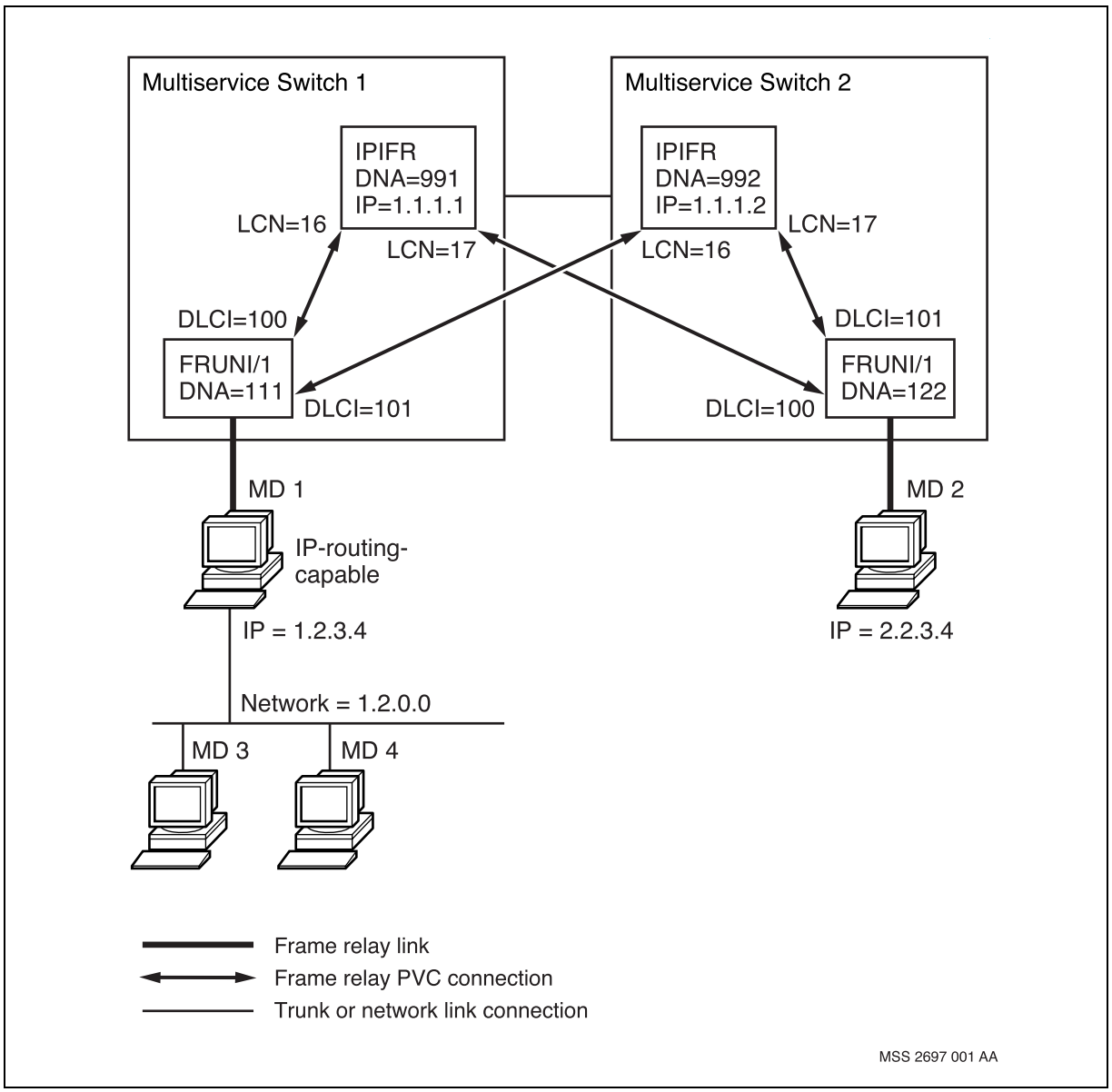
Procedure job aid

Indirectly connected management device component hierarchy



Example of indirectly connected management devices



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Configuring a default route for path redundancy

Configure a default route for path redundancy if you have indirectly connected devices on multiple LANs that interconnect.

Prerequisites

- To ensure proper address resolution, make sure you have set *remoteIpAddress* for the *Lcn* component of IPIFR.
- For more information on using the default for path redundancy, see Routing to indirectly connected devices using static routes (page 137).
- This procedure shows you how to configure a default route for path redundancy on both Multiservice Switch 1 and Multiservice Switch 2 as illustrated in the figure Example of indirectly connected management devices (page 27). Change the values to those appropriate for your own network.

  The figure illustrates the connections between two edge nodes, two directly connected management devices (MD 1 and 2), and two indirectly connected management devices (MD 3 and 4). To reach this configuration, you must first set up the direct connections on both edge nodes.

  Because both MD 1 and MD 2 are IP-routing-capable and their subnetworks interconnect using IP-routing-capable devices, you can configure a default route to MD 3 and 4 through MD 1 and a backup default route through MD 2. This configuration allows IPIFR connections to MD 3 and 4 even if the link to MD 1 fails.

Procedure steps

Step	Action
1	On Multiservice Switch 1, add a default route (0.0.0.0). **`add IpiFr Sr/0.0.0.0`**
2	On Multiservice Switch 1, set the gateway IP address (next hop) of the default route to the IP address of MD 1 (1.2.3.4). **`set IpiFr Sr/0.0.0.0 gatewayIpAddress 1.2.3.4`**
3	Clear all old values for the *backupGatewayIpAddress* attribute. **`set IpiFr Sr/0.0.0.0 backupGatewayIpAddress !`**
4	On Multiservice Switch 1, set the backup gateway IP address (next hop) of the default route to the IP address of MD 2 (2.2.3.4) **`set IpiFr Sr/0.0.0.0 backupGatewayIpAddress <index> 2.2.3.4`**

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5 If the network has additional backup routes, repeat step 4 for the IP address of those gateways. Increment by 1 the index for each subsequent backup gateway IP address.

6 Repeat steps step 1 through step 5 on Multiservice Switch 2.

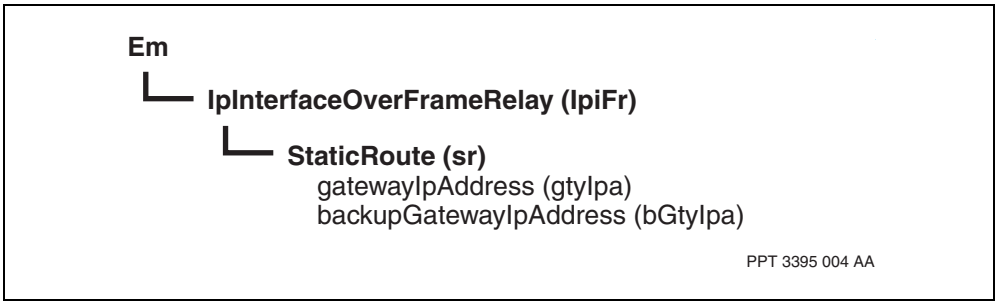
--End--

Variable definitions

Variable	Value
<index>	is the index number of the backup gateway IP address (1 to 23). The *backupGatewayIpAddress* attribute accepts an indexed list of up to 23 gateway IP addresses. The index number typically begins at 1, and defines the order in which the node attempts a connection through the backup gateways in the event of route failure.

Procedure job aid

Default route for path redundancy component hierarchy



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VRIP network connectivity through native Ethernet configuration

Configure VRIP network connectivity through native Ethernet to manually configure a port on Nortel Multiservice Switch Ethernet FP as a standard Ethernet protocol port to connect a management device directly to a Multiservice Switch network with IP services only.

Prerequisites to VRIP connectivity through native Ethernet configuration

- For conceptual information, refer to Configuring IP services networking through Ethernet (page 112).

VRIP connectivity through native Ethernet configuration procedures

This task flow shows you the sequence of tasks and procedures you perform to set up VRIP connectivity through native Ethernet configuration. To link to any task or procedure, go to VRIP network connectivity through native Ethernet configuration procedure navigation (page 31).

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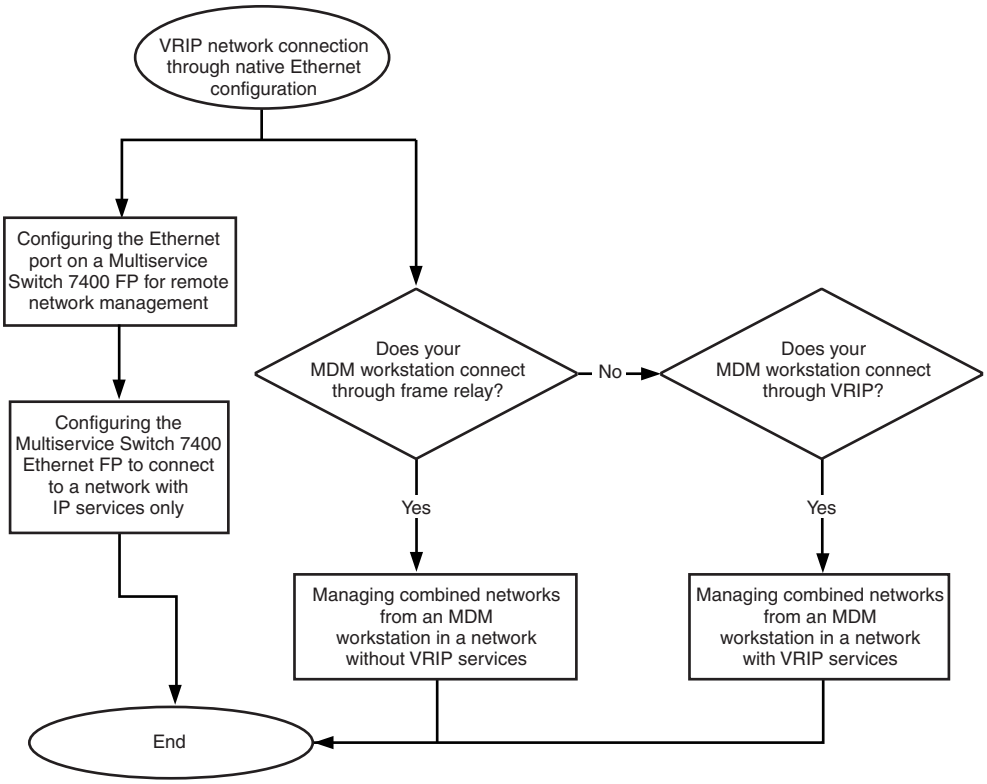
VRIP connectivity through native Ethernet configuration procedures



VRIP network connectivity through native Ethernet configuration procedure navigation

- Configuring an Ethernet port for remote network management (page 32)
- Configuring an Ethernet FP to connect to a network with IP services only (page 34)
- Managing combined networks from a Multiservice Data Manager workstation in a network without VRIP services (page 37)
- Managing combined networks from a Multiservice Data Manager workstation in a network with VRIP services (page 40)

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Configuring an Ethernet port for remote network management

Configure the Ethernet port on a Nortel Multiservice Switch 7400 node for remote network management as a standard Ethernet protocol port to connect a management device directly to a Multiservice Switch network with IP services only.

Prerequisites

- The local Multiservice Switch 7400 node must be connected to the remote node using IP.

Procedure steps

Step	Action
1	Add the routing information protocol (RIP) under the *Ip* subcomponent. **`add VirtualRouter/<vr_instance> Ip Rip`**
2	Add a RIP interface under the *IpLogicalInterface* component. **`add VirtualRouter/<vr_instance> ProtocolPort/ <Pp_instance> IpPort IpLogicalInterface/<ipAddress> RipInterface`**

--End--

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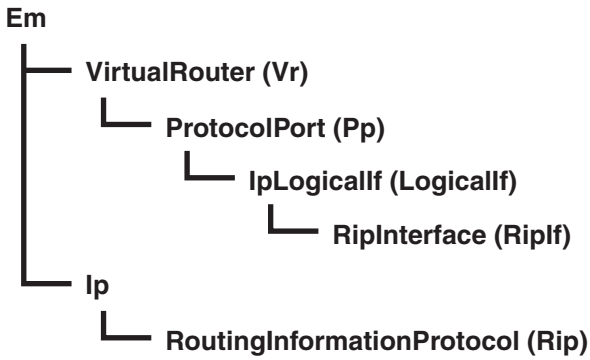
Variable definitions

Variable	Value
<ipAddress>	is the IP address of the Ethernet port.
<Pp_instance>	is an instance of the *ProtocolPort* subcomponent.
<vr_instance>	is an instance of the *VirtualRouter* component

Procedure job aid

Configuring an Ethernet port for remote network management component hierarchy



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Configuring an Ethernet FP to connect to a network with IP services only

Configure the Nortel Multiservice Switch 7400 Ethernet FP to connect to a network with IP services only, by configuring a port on a Multiservice Switch Ethernet FP as a standard Ethernet protocol port.

Prerequisites

CAUTION

IP services provisioning rule

All IP services FPs in a node must be provisioned with the same combination of IP and SRES features, whether or not each FP has a physical port associated with those features. Failure to follow this rule results in a software alarm “Potential error in feature list provisioning” and can cause packets to be lost or misrouted. This restriction does not apply to the WAN features X25 DTE, PPP or frame relay DTE.

For example, if Lp/1 has an associated sw lpt/xx feature list provisioned with IP, and we add Lp/2 which needs to support just IP, then Lp/2 must have IP provisioned. If Lp/3 which needs to support just SRES is added, then Lp/1, Lp/2 and Lp/3 must have IP and SRES provisioned.

- A network with IP services only treats management traffic as normal data traffic. Since the management traffic is IP-based, IP routing must be provisioned or already running on each virtual router.

Procedure steps

Step	Action
1	Provision a virtual router with an IP port on Multiservice Switch 1. **add Vr/<vr_instance>** **set Vr/<vr_instance> vrp lp/<Lp_instance>** **add Vr/<vr_instance> Pp/<Pp_instance>** **add Vr/<vr_instance> Pp/<Pp_instance> IpPort**
2	Provision the IP addresses. **add Vr/<vr_instance> Pp/<Pp_instance> IpPort LogicalIf/ <ip_address>** **set Vr/<vr_instance> Pp/<Pp_instance> IpPort LogicalIf/ <ip_address> netMask <ip_address>, broadcastAddress <ip_address>**

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3 Provision an Ethernet port on Multiservice Switch 1.

```
add Lp/<Lp_instance> Enet/<Enet_instance>
```

4 Provision a LAN application.

```
add La/<La_instance>
```

```
set La/<La_instance> Framer interfaceName Lp/
<Lp_instance> Enet/<Enet_instance>
```

5 Link the Ethernet port to the virtual router.

```
set Vr/<vr_instance> Pp/<Pp_instance> linkToMedia La/
<La_instance>
```

6 Activate and commit the changes, and then on the Nortel Multiservice Data Manager workstation, use the passport.config program to add the IP address of the protocol port (which manages the node) to the file /opt/MagellanNMS/cfg/HGDS.cfg. See 241-6001-303 *Nortel Multiservice Data Manager Administration*.

--End--

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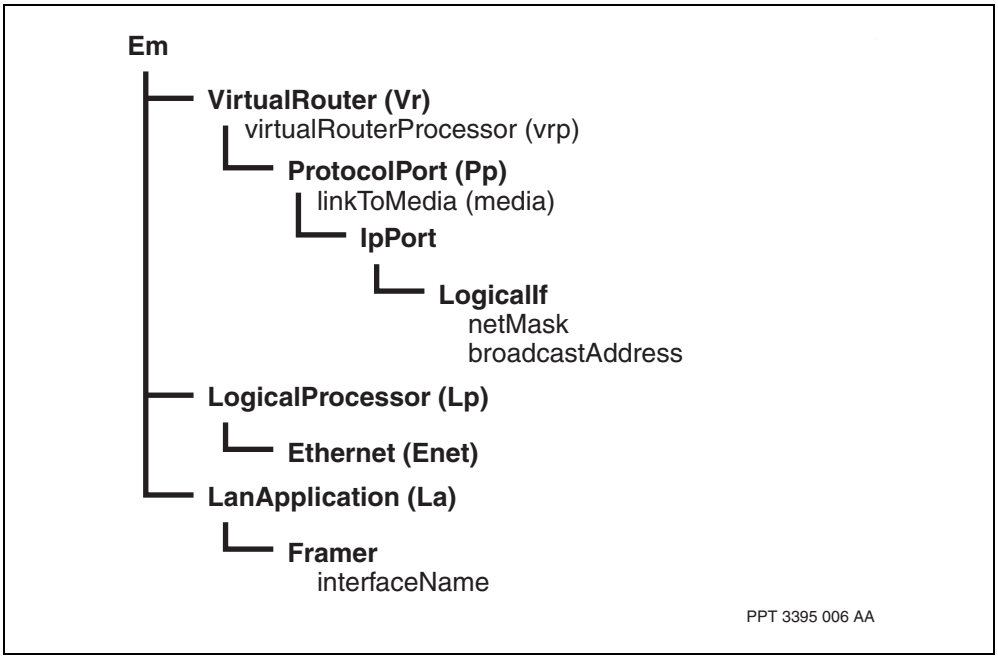
Variable definitions

Variable	Value
<Enet_instance>	is an instance of the *Enet subcomponent*.
<ipAddress>	is a value for the IP address.
<La_instance>	is an instance of the *La* component.
<Lp_instance>	is an instance of the *Lp* component.
<Pp_instance>	is an instance of the *ProtocolPort* subcomponent.
<vr_instance>	is an instance of the *VirtualRouter* component

Procedure job aid

Configuring an Ethernet FP to connect to a network with IP services only component hierarchy



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Managing combined networks from a Multiservice Data Manager workstation in a network without VRIP services

Manage combined networks from a Nortel Multiservice Data Manager workstation in a network without VRIP services to connected to and manage a network without IP services and also to manage a network with IP services.

This procedure shows how to configure the network shown in the figure Connection between a network with IP services only and a Multiservice Data Manager workstation on a network without IP services (page 39) so that the workstation 2 can manage Multiservice Switch 1, 2, 3, and 4.

In this scenario the network without IP services looks like a WAN to the workstation, providing connectivity to the network with IP services only.

Prerequisites

- To provision the connections between Multiservice Data Manager workstation 2 and each node in the network without IP services, see IPIFR network connection configuration (page 19).

Procedure steps

Step	Action
1	Provision the VC labeled “c” between Multiservice Switch nodes 3 and 4 (that is, the WAN connection through the network without IP services). In the FRUNI to FRUNI VC setup, define one side (it does not matter which one) as a slave and the other side as a master.
2	Add a *FrDte* component, a protocol port and a remote group on Multiservice Switch 2 to be used for connectivity to the Multiservice Switch 7400 nodes without IP services. See NN10600-801 *Nortel Multiservice Switch 7400/ 15000/20000 IP Configuration Management* for provisioning details. The IP address of the workstation must be in the same subnet as the FR DTE protocol port.
3	Provision a *StaticDlci* component under the *FrDte* component on Multiservice Switch 2 for the workstation. The static DLCI number under the FR DTE must match the corresponding DLCI number under the FRUNI on Multiservice Switch 7400 3.
4	Provision a static ARP table entry to map the workstation’s IP address to the static DLCI that is associated with the VC labelled “c”. **add Vr/1 ip arp hostEntry/<Multiservice Data Manager 2 IP address>** **set Vr/1 ip arp hostEntry/<Multiservice Data Manager 2 IP address> permanent <dlci>**

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5 On the workstation, use the passport.frconfig program to provision a new DLCI for the VC labeled “c” to file /opt/MagellanNMS/cfg/HGDS.cfg. See 241-6001-303 *Nortel Multiservice Data Manager Administration*.

6 Provision the routing table for workstation 2 to forward traffic destined for Multiservice Switch nodes 1 and 2 out the frame relay port of Multiservice Switch 7400 node 3 (through the DLCI that is associated with the VC labelled “c”).

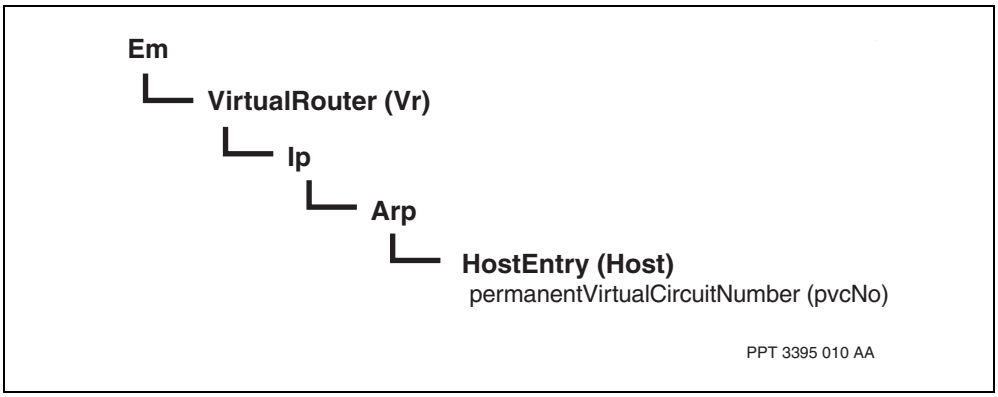
--End--

Variable definitions

Variable	Value
<dlci>	is a static DLCI associated with the VC labelled “c”.
<Multiservice Data Manager 2 IP address>	is the IP address of Multiservice Data Manager 2.

Procedure job aid

Combined networks from a Multiservice Data Manager workstation in a network without VRIP services component hierarchy



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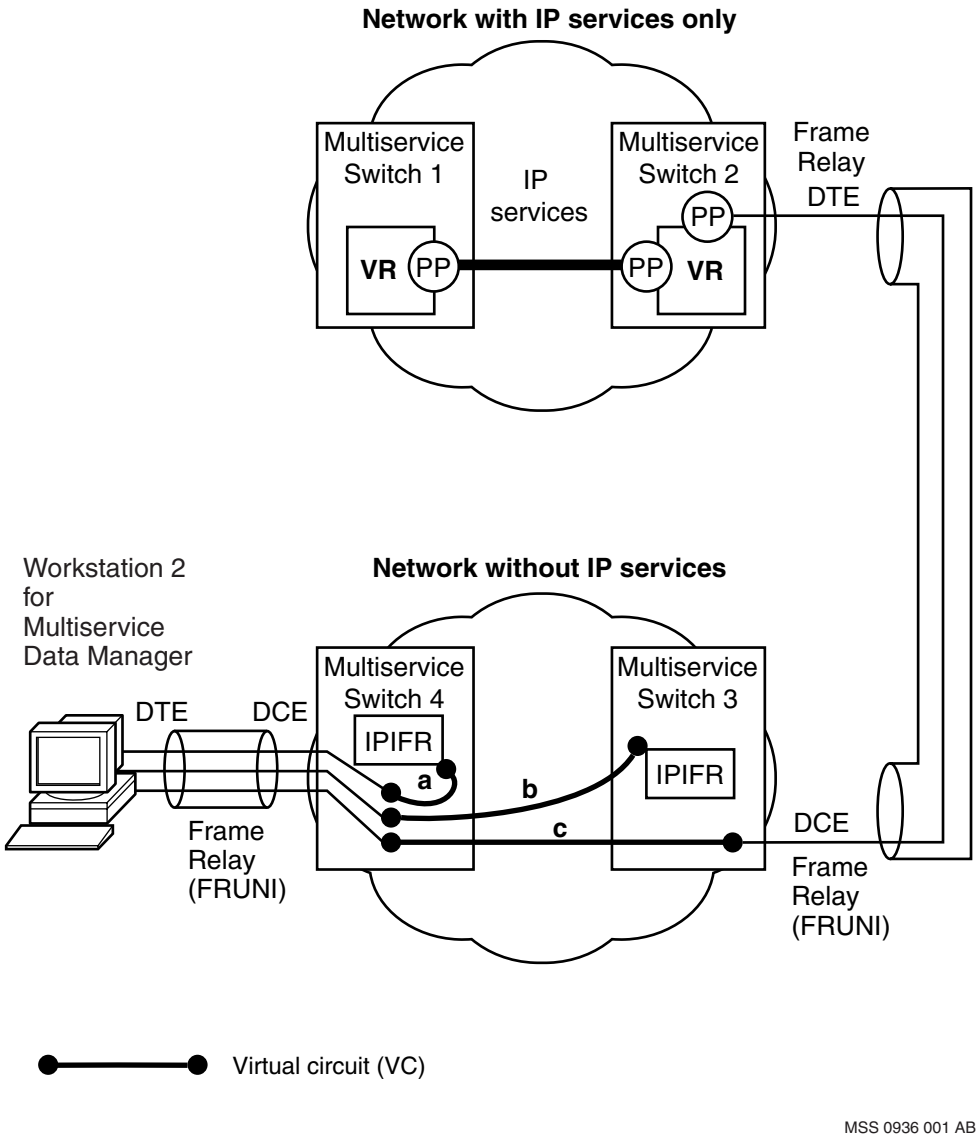
Connection between a network with IP services only and a Multiservice Data Manager workstation on a network without IP services



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Managing combined networks from a Multiservice Data Manager workstation in a network with VRIP services

Manage combined networks from Nortel Multiservice Data Manager workstation in a network with VRIP services to connected to and manage a network with IP services and also to manage a network without IP services.

This section describes how to create the example configuration shown in the figure Connection between a Multiservice Data Manager workstation on a network with IP services only and a network without IP services (page 43).

The nodes without IP services can be managed only through IPIFR. IPIFR supports an indirect connection between a Multiservice Data Manager workstation and IPIFR through an IP-routing-capable device. In this scenario, the IP-routing-capable device is the Multiservice Switch 2 node's IP router, VR IP.

Prerequisites

Attention: The IP addresses to be used must all be from the same IP subnet since the frame relay connections appear as a single network.

- Provision Multiservice Data Manager workstation 1 to manage the network with IP services by provisioning an Ethernet connection to the adjacent Nortel Multiservice Switch 7400 node, as described in Configuring an Ethernet FP to connect to a network with IP services only (page 34).

Multiservice Switch 2 requires

- a virtual router
- an FR DTE protocol port on the virtual router
- (optionally) the disabling of ARP and routing protocols on the FR DTE protocol port. This condition is not necessary if the *remoteIpAddress* attribute (that is, static ARP) of the IPIFR LCN is provisioned.
- physical connectivity to the FRUNI on Multiservice Switch 3
- multiple static DLCIs (one for each node without IP services)
- static ARP table entries to associate the remote IPIFR's IP address with the appropriate static DLCI
- linkage of the static DLCI into the *RemoteGroup* component (under the *FrDte* component)
- linkage of the *RemoteGroup* component to the protocol port

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Multiservice Switch 3 requires

- a FRUNI physically connected to the FR DTE on Multiservice Switch 2
- DLCIs for the IPIFRs of each node without IP services (Multiservice Switch nodes 3 and 4) where the DLCI number matches that of the FR DTE's static DLCI

Multiservice Switch 3 and Multiservice Switch 4 require

- an IPIFR to connect with the FRUNI in Multiservice Switch 3
- the IP address and subnetwork mask of the IPIFR to be in the same subnetwork as that of the FR DTE protocol port in Multiservice Switch 2
- provision the logical channel number and remote IP address of the IPIFR
- an IPIFR static Route to Multiservice Data Manager 1, referencing Multiservice Switch 2's FR DTE logical interface in the *gatewayIpAddress* attribute

Procedure steps

Step	Action
1	Provision a *FrUni* component on Multiservice Switch 3. Provision VCs d and e from the FRUNI on Multiservice Switch 3 to the IPIFR service on Multiservice Switch 4 and Multiservice Switch 3 respectively. See IPIFR network connection configuration (page 19) for additional information.
2	Add a *FrDte* component, a protocol port, and a remote group on Multiservice Switch 2 to be used for connectivity to nodes that do not have IP services. See NN10600-801 *Nortel Multiservice Switch 7400/15000/20000 IP Configuration Management* for provisioning details.
3	If the *remoteIpAddress* attribute of the IPIFR LCN is not provisioned, disable inverse-arp and ensure that no routing protocols (for example, RIP or OSPF) are running on the FR DTE protocol port. **set Vr/<vr_instance> Pp/FrDte6070000 IpPort arpStatus disabled**
4	Provision a *StaticDlci* component under the *FrDte* component on Multiservice Switch 2 for each of the IPIFRs that will be managed. The static DLCI number under the *FrDte* component must match the corresponding DLCI number under the *FrUni* component on Multiservice Switch 3.
5	Add static ARP table entries on Multiservice Switch 2 to map each IP address of the IPIFR to the corresponding StaticDlci number for each node without IP services. **add Vr/<vr_instance> ip arp hostentry/<ipifr ipaddress>**

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```
set Vr/<vr_instance> ip arp hostentry/<ipifr ipaddress>
permanentVirtualCircuitNumber <DlciNumber>
```

6 Configure an IPIFR static route using the address of Multiservice Provider Edge 1 and the IP address of the adjacent node in the network with IP services (Multiservice Switch 2). See the procedure Configuring nodes to access an indirectly connected management device (page 26).

7 Alternatively, configure an IPIFR default route (for routing to Multiservice Data Manager. See Configuring a default route for path redundancy (page 28).

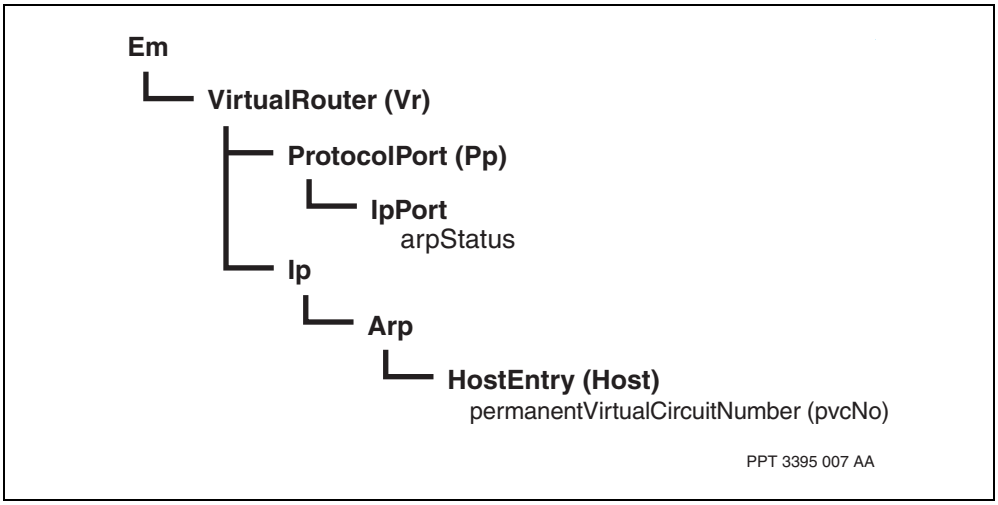
--End--

Variable definitions

Variable	Value
<DlciNumber>	is a static DLCI number for the node.
<ipifr ipaddress>	is the IP address of the IPIFR.
<vr_instance>	is an instance value of the *VirtualRouter* component.

Procedure job aid

Managing combined networks from a Multiservice Data Manager workstation in a network with VRIP services component hierarchy



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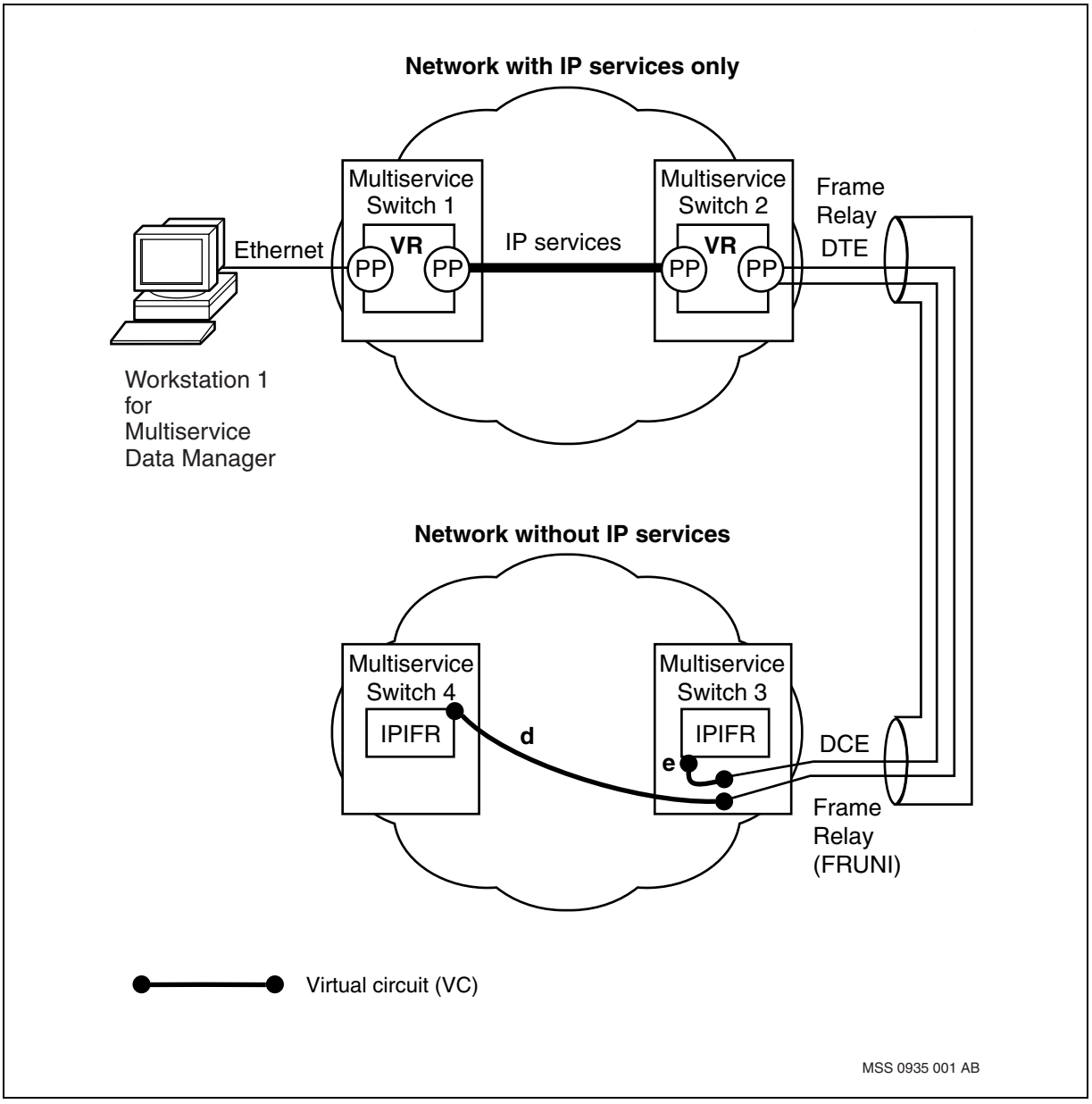
Connection between a Multiservice Data Manager workstation on a network with IP services only and a network without IP services



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VRIP network connectivity through OAM Ethernet configuration

Instead of using StartUp, manually configure the OAM Ethernet port on the CP to connect to a Nortel Multiservice Switch network.

Prerequisites to VRIP network connectivity through OAM Ethernet configuration

- For conceptual information, see Configuring IP services networking through Ethernet (page 112).
- For more information on the OAM Ethernet port, see NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures*.

VRIP network connectivity through OAM Ethernet configuration procedures

This task flow shows you the sequence of tasks and procedures you perform to configure VRIP network connectivity through OAM Ethernet. To link to any task or procedure, go to VRIP network connectivity through OAM Ethernet configuration procedure navigation (page 45).

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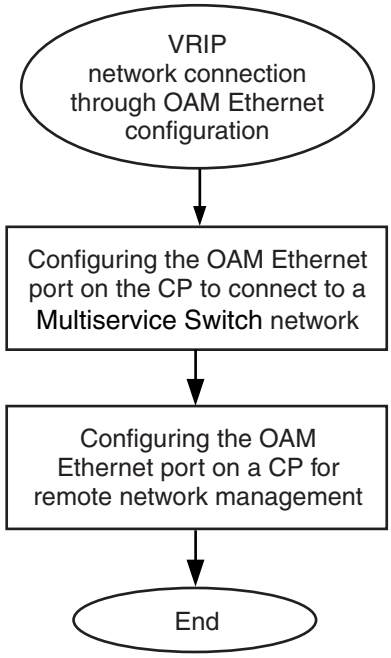
VRIP network connectivity through OAM Ethernet configuration procedures



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VRIP network connectivity through OAM Ethernet configuration procedure navigation

- Configuring the OAM Ethernet port on the CP to connect to the network (page 46)
- Configuring the OAM Ethernet port on a CP for remote network management (page 49)

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Configuring the OAM Ethernet port on the CP to connect to the network

Manually configure the OAM Ethernet port on the CP to connect to a Nortel Multiservice Switch network.

Prerequisites

- The oamEnet and ip features must be part of the software application version list. For more information on adding features to the application version list, see NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures*.

Procedure steps

Step	Action
1	Add the *oamEnet* and *ip* features to the feature list of the control processor. **set Software LogicalProcessorType/CP featureList oamEnet ip**
2	Check and activate the feature list configuration by entering the following commands. **check prov** **activate prov**
3	Add the *OamEthernet* component to the control processor's logical processor. **add LogicalProcessor/0 oamEnet/0**
4	If you want to gather and report extended statistics, enable the *extendedStatistics* attribute. **set LogicalProcessor/0 oamEnet/0 extendedStatistics enabled**
5	Create a LAN media application by adding a *LanApplication* component. **add LanApplication/0**
6	Associate the LAN media application with the OAM Ethernet port by setting the *interfaceName* attribute of the *Framer* subcomponent to the *OamEthernet* component. **set LanApplication/0 Framer interfaceName LogicalProcessor/0 oamEnet/0**
7	If you do not want the OAM Ethernet port to use the port on the spare control processor when the test process detects a hardware or link failure, disable the *switchoverOnFailure* attribute. **set LogicalProcessor/0 oamEnet/0 switchoverOnFailure disabled**

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8 Add a virtual router.

```
add VirtualRouter/0
```

9 Specify where the virtual router resides.

```
set VirtualRouter/0 vrp/<vr_lp>
```

10 Enable IP under the *VirtualRouter* component.

```
add VirtualRouter/0 Ip
```

11 Add a protocol port under the *VirtualRouter* component.

```
add VirtualRouter/0 ProtocolPort/oam0
```

12 Map the *LanApplication* component to the *ProtocolPort* component by setting the *linkToProtocolPort* attribute.

```
set LanApplication/0 linkToProtocolPort
VirtualRouter/0 ProtocolPort/oam0
```

13 Enable IP under the *ProtocolPort* component.

```
add VirtualRouter/0 ProtocolPort/oam0 IpPort
```

14 Add a logical IP interface under the *IpPort* component.

```
add VirtualRouter/0 ProtocolPort/oam0 IpPort
IpLogicalInterface/<ipAddress>
```

15 Set the *netmask* attribute of the *IpLogicalInterface* component to an appropriate IP address.

```
set VirtualRouter/0 ProtocolPort/oam0 IpPort
IpLogicalInterface/<ipAddress> netmask <netmaskAddress>
```

16 Set the *broadcastAddress* attribute of the *IpLogicalInterface* component to an appropriate IP address.

```
set VirtualRouter/0 ProtocolPort/oam0 IpPort
IpLogicalInterface/<ipAddress> broadcastAddress
<broadcastAddress>
```

--End--

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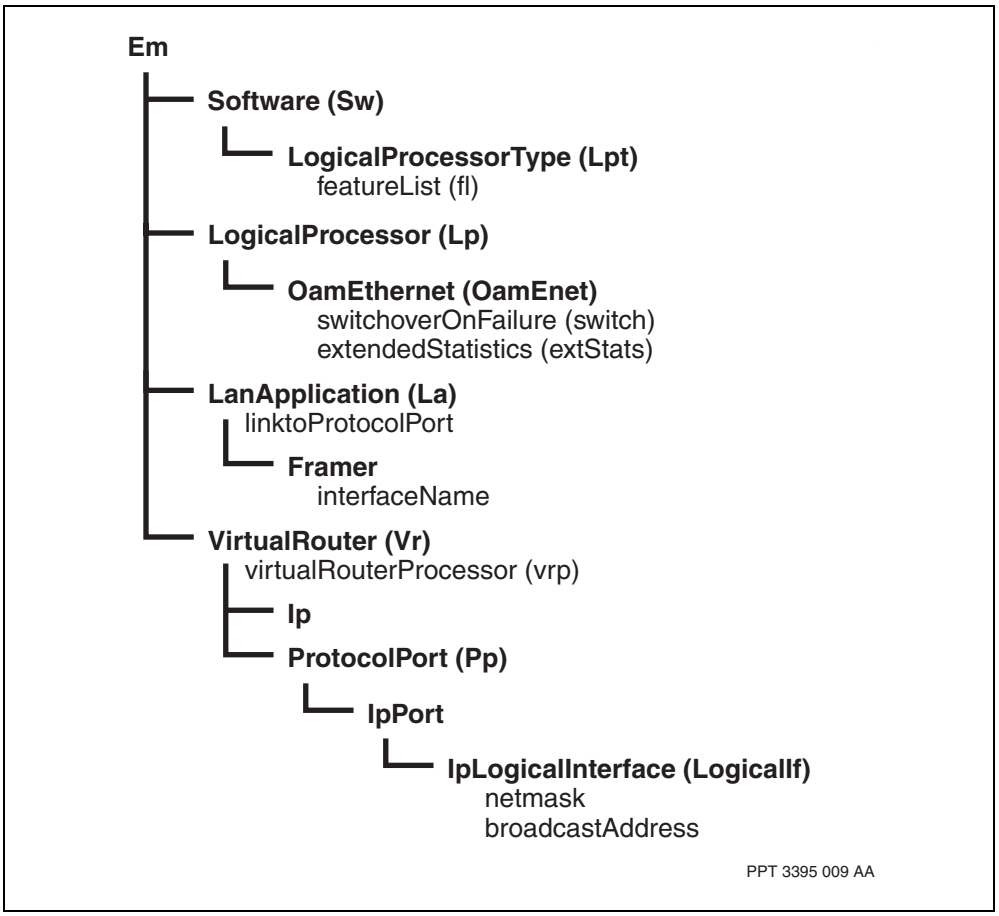
Variable definitions

Variable	Value
<broadcastAddress>	is the broadcast address.
<ipAddress>	is the IP address of the OAM Ethernet port.
<netmaskAddress>	is the netmask address.
<vr_lp>	is the instance value of the logical processor that is linked to the shelf card on which the virtual router resides.

Procedure job aid

Configuring the OAM Ethernet port on the CP to connect to a network component hierarchy



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Configuring the OAM Ethernet port on a CP for remote network management

Configure the OAM Ethernet port on a CP for remote network management using static routes under the virtual router.

Prerequisites

- The local Nortel Multiservice Switch 7400 node must be connected to the remote node using IP.

Procedure steps

Step	Action
1	Add the open shortest path first (OSPF) under the *Ip* component, if you are configuring this interface as an OSPF passive interface. **add VirtualRouter/<vr_name> Ip Ospf**
2	Configure OSPF for this virtual router. For information on VR OSPF configuration, see NN10600-801 *Nortel Multiservice Switch 7400/15000/20000 IP Configuration Management*.
3	Specify the IP address of the OSPF instance to identify it in the AS. **set Vr/<vr_name> Ip Ospf routerId <x.x.x.x>**
4	Add the *AreaEntry* subcomponent. **add Vr/<vr_name> Ip Ospf AreaEntry/<area_id>**
5	Add the *OspfIf* component to each IP logical interface that is taking part in the OSPF process. **add Vr/<vr_name> ProtocolPort/<pp_name> IpPort LogicalIf/<ipAddress> OspfIf**
6	Set the OSPF interface type to passive for the OAMEnet interface. **set Vr/<vr_name> ProtocolPort/<pp_name> IpPort LogicalIf/<ipAddress> OspfIf ifType passive** For setting up the other OSPF interfaces, refer to NN10600-801 *Nortel Multiservice Switch 7400/15000/20000 IP Configuration Management*.

Attention: For supported configurations on the OAM Ethernet port, see NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures*.

--End--

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Variable definitions

Variable	Value
<area_id>	is the instance of the *AreaEntry* component.
<ipAddress>	is the IP address of the OAM Ethernet port.
<pp_name>	is the instance of the *ProtocolPort* component.
<vr_name>	is the instance of the *VirtualRouter* component.

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Configuring a direct frame relay network connection

Configure a Nortel Multiservice Switch 7400 direct frame relay network connection so the edge node can communicate with the physically connected device. An edge node is a node that has a direct physical connection to a management device or an IP-routing-capable device.

Prerequisites

- Ensure that the frame relay UNI feature is configured and activated on the logical processor that connects to the management device.
- For information on the values for the *Lmi* component, see NN10600-900 *Nortel Multiservice Switch 7400/15000/20000 Frame Relay Technology Fundamentals*.
- See Configuring a node to access a directly connected management device (page 108) for additional information about direct frame relay network connections.

Procedure steps

Step	Action
1	Add the *FrUni* component that will connect to the IPIFR. **`add FrUni/<fruniNumber>`**
2	Link the *Framer* component to the logical processor. **`set FrUni/<fruniNumber> Framer interfaceName Lp/<lpNumber> <port>/<portNumber>`**
3	Set the numbering plan indicator. **`set FrUni/<fruniNumber> Dna npi <plan>`**
4	Set the data network address (DNA) of the FrUni interface. **`set FrUni/<fruniNumber> Dna dataNetworkAddress <address1>`**

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5 Set the default priority to high.

```
set FrUni/<fruniNumber> Dna outDefaultPriority High
```

6 Set the default transfer priority to delay.

```
set FrUni/<fruniNumber> Dna defaultTransferPriority 10
```

7 Set the procedures attribute of the *LocalManagementInterface* (*Lmi*) component.

```
set FrUni/<fruniNumber> Lmi proc <type>
```

8 Set the remainder of the attributes for the *Lmi* component. The default values for the attributes in this step are for the purpose of illustration.

```
set FrUni/<fruniNumber> Lmi asyncStatusReport off
set FrUni/<fruniNumber> Lmi errorEventThreshold 3
set FrUni/<fruniNumber> Lmi eventCount 4
set FrUni/<fruniNumber> Lmi checkPointTimer 15
set FrUni/<fruniNumber> Lmi messageCountTimer 20
set FrUni/<fruniNumber> Lmi pvcAlarmsReporting external
```

9 Add the frame relay *DataLinkConnectionIdentifier* (*Dlci*) component:

```
add FrUni/<fruniNumber> Dlci/<dlciNumber>
```

10 Set the rate enforcement to off.

```
set FrUni/<fruniNumber> Dlci/<dlciNumber> Sp
rateEnforcement off
```

11 Set the maximum frame size to 1600.

```
set Fruni/<fruniNumber> Dlci/<dlciNumber> Sp
maximumFrameSize 1600
```

12 Set the attributes for the *DirectCall* (*Dc*) component.

```
set FrUni/<fruniNumber> Dlci/<dlciNumber> Dc remoteDlci
<remoteDLCI>
set FrUni/<fruniNumber> Dlci/<dlciNumber> Dc type
permanentMaster
set FrUni/<fruniNumber> Dlci/<dlciNumber> Dc remoteDna
<address2>
```

13 Repeat step 9 to step 12 for each DLCI to each internal Multiservice Switch node.

14 To suppress accounting records generation for all *Dlci* components provisioned on the frame relay service port.

```
set FrUni/<fruniNumber> Dna accountCollection ~bill
```

15 To suppress accounting records generation on the frame relay service *Dlci* component which is originating the call to IPIFR, set the *accounting* attribute to off.

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```
set FrUni/<fruniNumber> Dlci/<dlciNumber> Sp accounting
off
```

--End--

Variable definitions

Variable	Value
<address1>	is a unique DNA in the network (up to 15 digits long).
<address2>	is the DNA of the remote-end DNA link (the DNA of the internal Multiservice Switch node's IPIFR).
<dlciNumber>	is the instance number for the *Dlci* component.
<fruniNumber>	is the instance number for the *FrUni* component.
<lpNumber>	is the instance number of the logical processor.
<plan>	is either e164 or x121 Packet-switched data networks use x121.
<port>	is either X21 or V35
<portNumber>	is the instance number of the port that connects to the management device.
<remoteDLCI>	is the LCN at the remote end of the VC (the LCN of the internal Multiservice Switch node's IPIFR).
<type>	is the type of LMI procedure used (none, vendorForum, ansi, itu, or autoConfigure).

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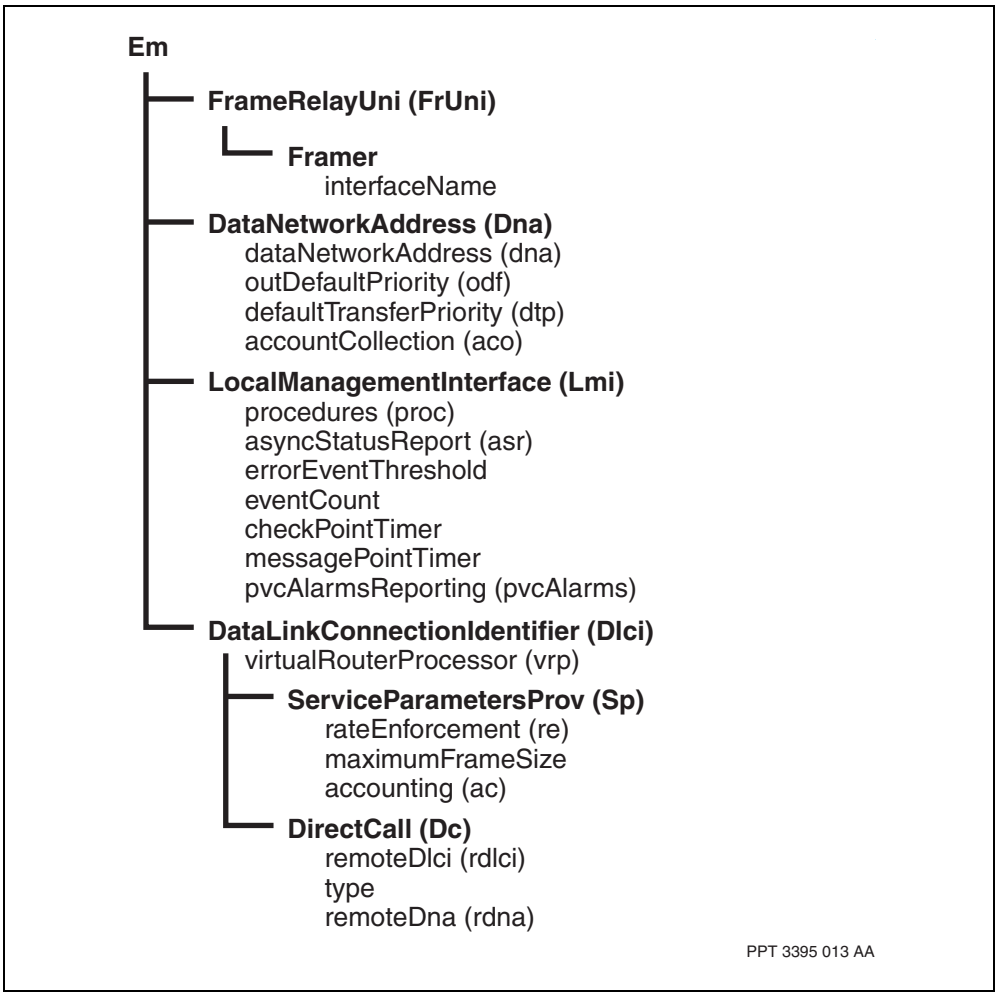
Procedure job aid

Multiservice Switch 7400 direct frame relay network connection component hierarchy



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IP services over ATM MPE configuration

Configure IP services over ATM MPE instead of using StartUp.

Prerequisites to IP services over ATM MPE configuration

- For more details on configuring IP over ATM MPE, see NN10600-801 *Nortel Multiservice Switch 7400/15000/20000 IP Configuration Management*.

IP services over ATM MPE configuration procedures

This task flow shows you the sequence of tasks and procedures you perform to configure IP services over ATM MPE. To link to any task or procedure, go to IP services over ATM MPE configuration procedure navigation (page 56).

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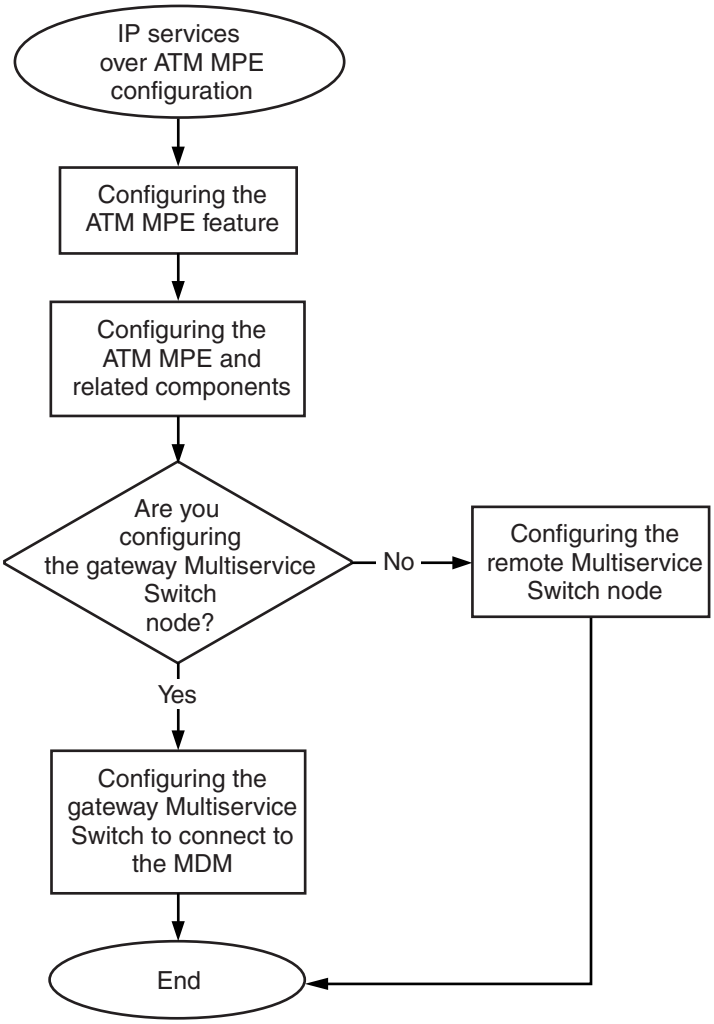
IP services over ATM MPE configuration procedures



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IP services over ATM MPE configuration procedure navigation

- Configuring the ATM MPE feature (page 57)
- Configuring the ATM MPE and related components (page 58)
- Configuring the remote node (page 62)
- Configuring the gateway node to connect to Multiservice Data Manager (page 68)

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Configuring the ATM MPE feature

Configure the ATM MPE feature to create a logical processor type (LPT) for your ATM feature list requirements.

Procedure steps

Step	Action
1	Create a software LPT component. **`add sw lpt/ATMMPE`**
2	Add the ATM MPE and IP features for all Nortel Multiservice Switch nodes, to the software LogicalProcessorType component. **`set sw lpt/ATMMPE featurelist atmMpe ip`**
3	Link the LP to the card. **`set Lp/<number> mainCard Shelf Card/<card>`**
4	Link the LP to a logical processor type. **`set Lp/<number> Lpt Sw Lpt/<name>`**

--End--

Variable definitions

Variable	Value
<card>	is the instance number of the card.
<name>	is the name of the LPT defined for the ATM MPE service.
<number>	is the instance number of the logical processor.

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Configuring the ATM MPE and related components

Configure the ATM MPE and related components to set an ATM MPE interface for IP traffic and an ATM PVC for the ATM MPE interface.

Procedure steps

Step	Action
1	Configure the ATM FP port. If you are configuring an OC-3 ATM FP, define the SONET sub-component for the OC-3 port on the Lp (sts for Nortel Multiservice Switch 15000 and Multiservice Switch 20000 nodes, and path for Multiservice Switch 7400 nodes). **add -s lp/<number> Sonet/<port number> sts/<sts>** or **add -s lp/<number> Sonet/<port number> path/<path>**
2	Create an instance of the ATM MPE service. **add AtmMpe/<atmMpeNumber>**
3	Specify the maximum transmission unit (MTU) size to be used for ATM connections on this interface. **set AtmMpe/<atmMpeNumber> mtu <size>**
4	Specify the encapsulation type to be used for ATM connections on this interface. **set AtmMpe/<atmMpeNumber> encapType <type>**
5	Configure a VCC under an ATM interface. This VCC is directly associated with the ATM MPE service and resides on the same node. **add AtmIf/<atmIfNumber> Vcc/<vc>**
6	Associate the AtmIf attribute interfaceName with the appropriate logical processor port to link the port component to the ATM interface. **set AtmIf/<atmIfNumber> interfaceName lp/<number> sonet/ <port_number> sts/<sts>**
7	Create a nailed-up endpoint (NEP) for the VCC. **add AtmIf/<atmIfNumber> Vcc/<vc> Nep**
8	Set the atmServiceCategory to real time variable bit rate (rtvbr). **set atmif/<atmIfNumber> vcc/<vc> vcd tm atmServiceCategory rtvbr**
9	Link the ATM MPE service to the ATM VCC. **set AtmMpe/<atmMpeNumber> Ac/<conn> atmConnection AtmIf/ <atmIfNumber> Vcc/<vc> Nep**
10	Add a protocol port to the management virtual router.

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```
add Vr/<vr_name> ProtocolPort/<pp_id>
```

11 Add an IpPort component as a subcomponent of the protocol port component to enable IP routing on that port.

```
add Vr/<vr_name> ProtocolPort/<pp_id> IpPort
```

12 Add a LogicalIf component as a subcomponent of the IpPort component. Specify at least one IP address for the protocol port through the Logical interface subcomponent so that IP can function.

```
add Vr/<vr_name> ProtocolPort/<pp_id> IpPort LogicalIf/
<ipAddress>
```

13 Configure a network mask for the protocol port to identify the IP subnet to which the interface belongs.

```
set Vr/<vr_name> ProtocolPort/<pp_id> IpPort LogicalIf/
<ipAddress> netMask <netmask>
```

14 Configure a broadcast address for the protocol port component.

```
set Vr/<vr_name> ProtocolPort/<pp_id> IpPort LogicalIf/
<ipAddress> broadcastAddress <broadcast_address>
```

15 Configure other attributes of the LogicalIf component as necessary. See NN10600-060 *Nortel Multiservice Switch 7400/15000/20000 Component Reference* for more information.

--End--

Variable definitions

Variable	Value
<atmIfNumber>	is the instance number of the ATM interface.
<atmMpeNumber>	is the instance number of the ATM MPE interface.
<broadcast_address>	is the broadcast address of the attached IP network or subnetwork. This address is usually the last or highest (the host address is all ones) address available in the subnet.
<ipAddress>	is the 32-bit IP address assigned to this logical interface.
<number>	is an instance number (usually the slot number of card to which you are linking this LP).
<netmask>	is the network mask to be used with the IP address.
<path>	is the instance number of the path.
<port_number>	is the port number on the ATM FP card that your connection plugs into. For example, a 4pOC3MmATM card has a valid range of 0 to 3.
<pp_id>	is the instance value assigned to the protocol port.

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Variable	Value
<size>	is the size of the largest datagram that can be sent on the interface. The minimum value required for IP is 576 (9180 is generally used for ATM MPE connections).
<sts>	is the instance number of the sts.
<type>	is the encapsulation type defined for ATM connections on the interface. The default value is llcEncap encapsulation.
<vc>	is the instance value of the VCC. If the virtual channel is associated with a VPT, this value is the VCI value. The VCC instance must be the same on the port on the gateway node as configured in the ATM NIC on the workstation.
<vr_name>	is the name assigned to the virtual router.

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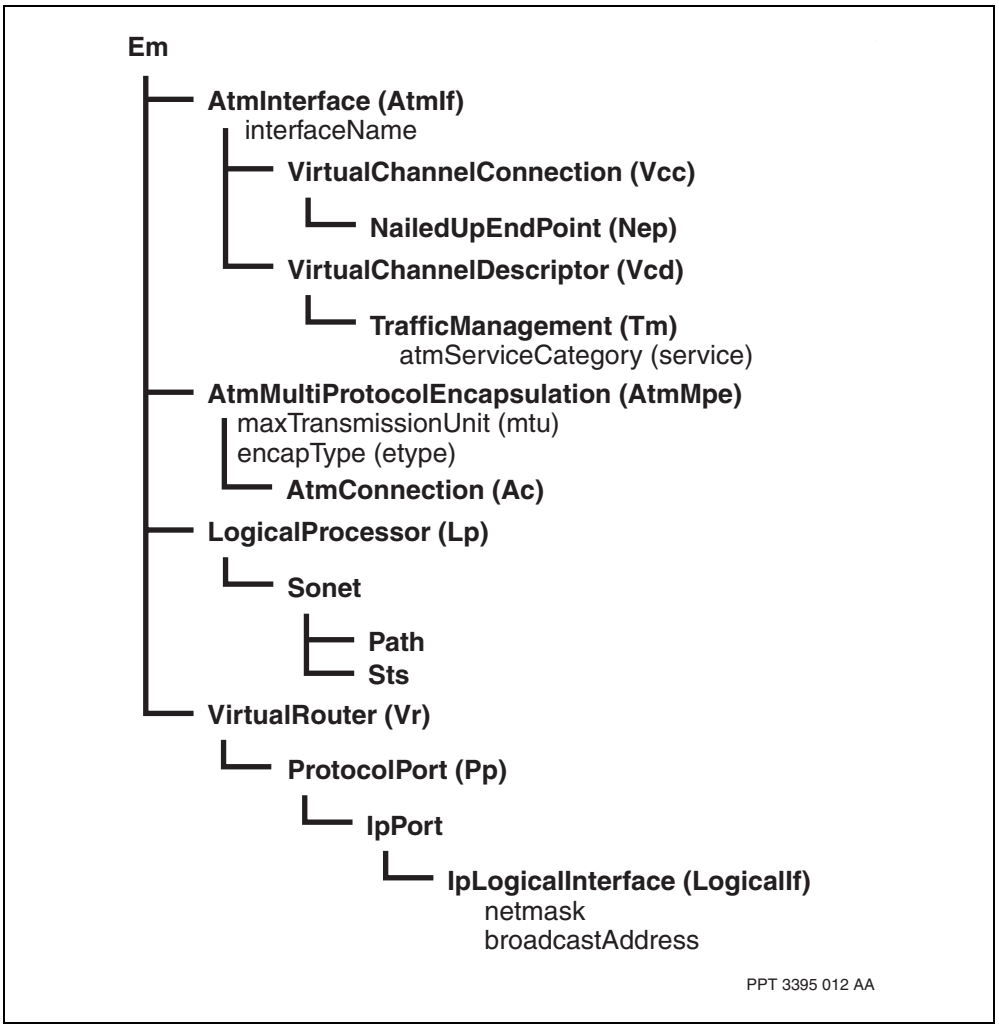
Procedure job aid

ATM MPE and related components component hierarchy



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Configuring the remote node

Configure the remote node to connect, through in-band signalling, to the Nortel Multiservice Data Manager workstation.

Prerequisites

Attention: This procedure shows how to configure the Open Shortest Path First (OSPF) routing protocol for the protocol port that you have linked to the ATM MPE application. See NN10600-801 *Nortel Multiservice Switch 7400/15000/20000 IP Configuration Management* for further details on routing protocols.

- Ensure that you have completed the startup steps (setting the card type, adding LPs, creating LPTs and linking them together) required to configure a remote Nortel Multiservice Switch node.
- Ensure that the outgoing ATM port on the gateway node is on the same ATM card as the ATM port that connects to the Multiservice Data Manager. workstation
- Decide whether to use static routes (if you have only two or three nodes, static routes are acceptable) or a routing protocol.
- See NN10600-801 *Nortel Multiservice Switch 7400/15000/20000 IP Configuration Management* for more details on assigning the ATM MPE application to a protocol port (Pp) on the management virtual router (VR).

Procedure steps

Step	Action
1	Configure a VCC under an ATM interface. This VCC is directly associated with the ATM MPE service and resides on the same node. **add -s AtmIf/<atmIfNumber> Vcc/<vc>**
2	Associate the AtmIf attribute interfaceName with the appropriate logical processor port to link the port component to the ATM interface. **set AtmIf/<atmIfNumber> interfaceName lp/<number> sonet/<port_number> sts/<sts>**
3	Create a nailed-up end point (NEP) for the VCC. **add AtmIf/<atmIfNumber> Vcc/<vc> Nep**
4	Set the atmServiceCategory to real time variable bit rate (rtvbr). **set atmif/<atmIfNumber> vcc/<vc> vcd tm atmServiceCategory rtvbr**
5	Link the ATM MPE service to the ATM VCC.

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```
set AtmMpe/<atmMpeNumber> Ac/<conn> atmConnection AtmIf/
<atmIfNumber> Vcc/<vc> Nep
```

6 Add a protocol port to the management virtual router to manage the node you are currently provisioning.

```
add Vr/<vr_name> ProtocolPort/<pp_id>
```

7 Add an IpPort component as a subcomponent of the protocol port component to enable IP routing on that port.

```
add Vr/<vr_name> ProtocolPort/<pp_id> IpPort
```

8 Add a LogicalIf component as a subcomponent of the IpPort component. Specify at least one IP address for the protocol port through the Logical interface subcomponent so that IP can function.

```
add Vr/<vr_name> ProtocolPort/<pp_id> IpPort LogicalIf/
<ipAddress>
```

9 Configure a network mask for the protocol port to identify the IP subnet to which the interface belongs.

```
set Vr/<vr_name> ProtocolPort/<pp_id> IpPort LogicalIf/
<ipAddress> netMask <netmask>
```

10 Configure a broadcast address for the protocol port component.

```
set Vr/<vr_name> ProtocolPort/<pp_id> IpPort LogicalIf/
<ipAddress> broadcastAddress <broadcast_address>\
```

11 Configure other attributes of the LogicalIf component as necessary. See NN10600-060 *Nortel Multiservice Switch 7400/15000/20000 Component Reference* for more information.

12 Add an Ospf component as a subcomponent of the Ip component.

```
add Vr/<vr_name> Ip Ospf
```

13 Add at least one AreaEntry component as a subcomponent of the Ospf component.

```
add Vr/<vr_name> Ip Ospf AreaEntry/<area_id>
```

14 To enable OSPF on a node, add the OspfIf component to each logical interface that is using in the OSPF process.

```
add Vr/<vr_name> ProtocolPort/<pp_id> IpPort LogicalIf/
<ipAddress> OspfIf
```

15 Add a neighbor component for each OSPF neighbor if the interface type is point-to-multipoint non-broadcast or NBMA.

```
add Vr/<vr_name> ProtocolPort/<pp_id> IpPort LogicalIf/
<ipAddress> Ospfif neighbor/<neighbor_ipAddress>
```

16 Add an Export component to the Ospf component.

```
add Vr/<vr_name> Ip Ospf Export/<export_policy_number>
```


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17 Set the asBdrRtrStatus attribute to enable the OSPF export policy. If you set this attribute to the default value of false, OSPF uses the default export policy, blocking the export of all non-OSPF learned routes.

```
set Vr/<vr_name> Ip Ospf asBdrRtrStatus true
```

--End--

Variable definitions

Variable	Value
<area_id>	is a 32-bit IP address for the OSPF area in which this router is located. 0.0.0.0 is often used for this value and should be used in this case.
<atmIfNumber>	is the instance number of the ATM interface.
<atmMpeNumber>	is the instance number of the ATM MPE interface.
<broadcast_address>	is the broadcast address of the attached IP network or subnetwork. This address is usually the last or highest address available in the subnet. For example, if the subnet is the range from 200.10.10.8 to 200.10.10.15, then the first valid address is 200.10.10.9 and the broadcast address is 200.10.10.15 for this subnet.
<conn>	is the instance number of the AtmConnection component on the ATM MPE interface and specifies the PVC for the static hostEntry.
<export_policy_number>	is the numeric designation assigned to this export policy. The Inband connectivity uses 1 here.
<ipAddress>	is the 32-bit IP address assigned to this logical interface. This is the IP of the outgoing port to the remote node.
<neighbor_ipAddress>	is the 32-bit address assigned to the OSPF neighbor, which is the IP address of the ATM FP port on the other end of the ATM. For broadcast networks, the OSPF neighbors are discovered automatically by the Hello protocol.
<netmask>	is the network mask to be used with the IP address. This subnet must be different than the one between the Multiservice Data Manager workstation and the gateway node.
<number>	is an instance number (usually the slot number of card to which you are linking this LP).
<pp_id>	is the instance value assigned to the protocol port.
<sts>	is the instance number of the sts.

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Variable	Value
<vc>	is the instance value of the VCC (for example, Vcc/0.32). The VCC instance must be the same on the outgoing port on the gateway PP as the VCC instance on the incoming port on the remote node.
<vr_name>	is the name assigned to the virtual router.

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Example of configuring the remote node

Following is an example of how to configure a Nortel Multiservice Switch gateway node for a SunATM NIC on a Nortel Multiservice Data Manager workstation with the following settings:

- IP of ATM NIC card: 200.10.10.1
- IP of Gateway node ATM Port: 200.10.10.2
- Subnet mask of WS to gateway node: 255.255.255.248
- VCI used: 32
- ATM FP Type: 4pOC3MmATM
- Slot of ATM FP on gateway Multiservice Switch node: 8
- Port of fiber connection in ATM FP: 2
- Multiservice Switch Shelf Type: 15000

Procedure steps

Step	Action
1	add -s AtmIf/82 Vcc/0.32
2	set AtmIf/82 interfaceName Lp/8 Sonet/2 sts/0
3	add -s AtmIf/82 Vcc/0.32 Nep
4	set AtmIf/82 Vcc/0.32 vcd tm atmServiceCategory rtvbr
5	set AtmMpe/82 Ac/1 atmConnection AtmIf/82 Vcc/0.32 Nep
6	add Vr/Manag0 ProtocolPort/MPEPP
7	add Vr/Manag0 ProtocolPort/MPEPP IpPort
8	add Vr/Manag0 ProtocolPort/MPEPP IpPort LogicalIf/200.10.10.2
9	set Vr/Manag0 ProtocolPort/MPEPP IpPort LogicalIf/200.10.10.2 netmask 255.255.255.248
10	set Vr/Manag0 ProtocolPort/MPEPP IpPort LogicalIf/200.10.10.2 broadcast 200.10.10.7
11	After saving and activating the changes, test the connection by sending a ping command from the workstation to the node. **`ping -i(200.10.10.1) Vr/Manag0 Ip Icmp`**

--End--

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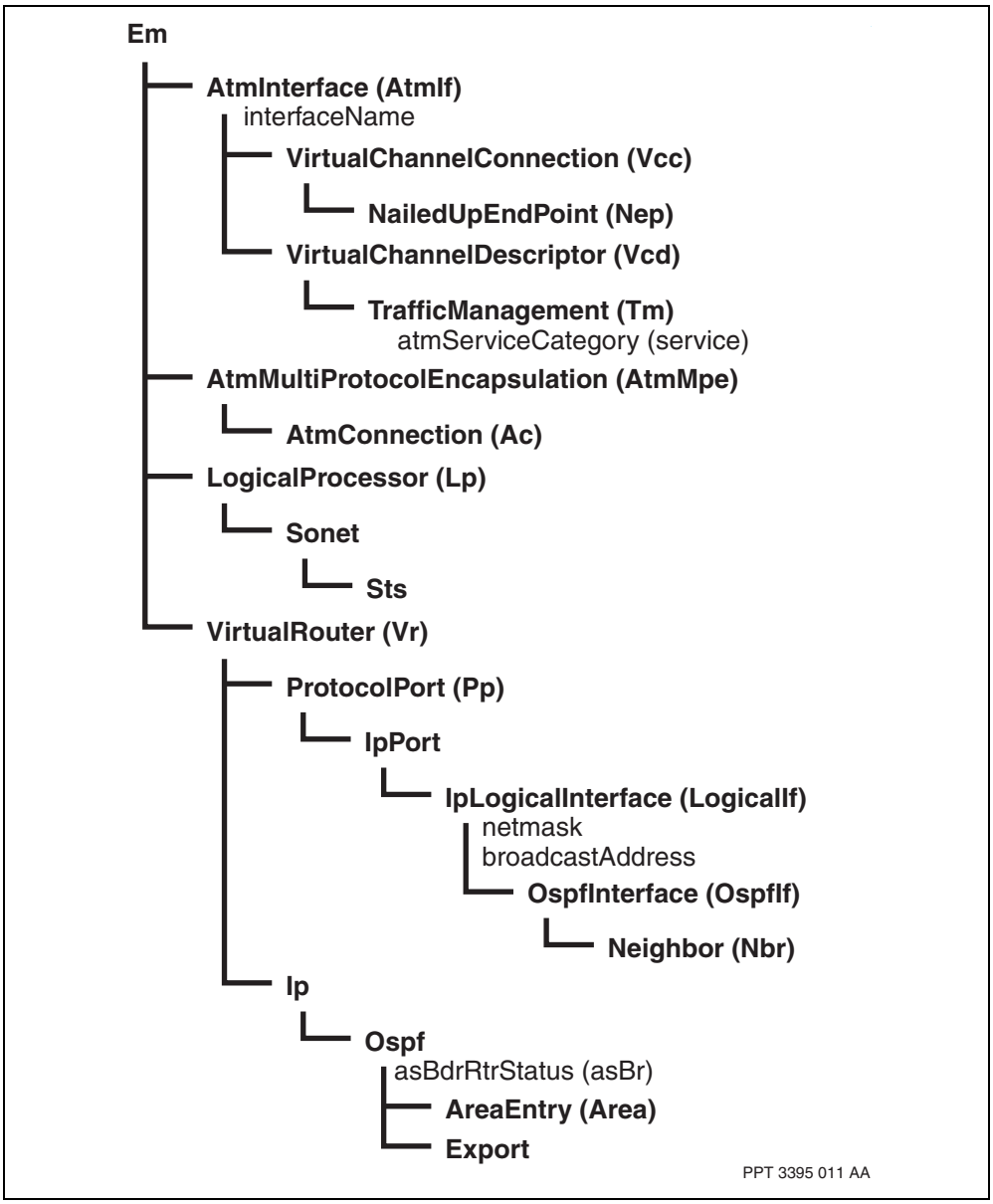
Procedure job aid

Configuring a remote node component hierarchy



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Configuring the gateway node to connect to Multiservice Data Manager

Configure a gateway node to physically connect to a Nortel Multiservice Data Manager workstation.

Prerequisites

- If you are using llcEncap encapsulation, you must decide to either use static ARP entries or to allow for dynamic entries into the routing table.
- If you are using IpVcEncap, static ARP is mandatory.
- If you do not create the static hostEntry component, a DynHost component is automatically created under the Vr/<vr_name> Ip Arp component.

The following information is required before starting to configure the gateway Nortel Multiservice Switch node:

- The IP address of the ATM port for both the outgoing connection from the NIC on the Multiservice Data Manager workstation and the incoming connection on the gateway node. These IP addresses must be in the same subnet.
- The subnet mask that will be used to create the subnet. There will be one subnet from the workstation to the gateway node, and one subnet for each connection from the gateway node to remote nodes.
- The VCC identifier number that will be used to connect the workstation to the nodes. This is called the PVC in the ATM NIC configuration.

Attention: The following information is required only if the SunATM NIC is manually configured.

- The slot and port number on each node that requires an ATM connection.

Procedure steps

Step	Action
1	Create a static ARP entry for IP routing to ensure IP connectivity across the ATM network. **`add Vr/<vr_name> Ip Arp HostEntry/<host_address>`**
2	Specify a PVC entry for the remote host. **`set Vr/<vr_name> Ip Arp HostEntry/<host_address> pvcNo <conn>`**

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3 After you have activated the changes, test the connection by sending a ping command from the workstation to the node.

```
ping -i(<IP of SunATM NIC>) Vr/<vr_name> Ip Icmp
```

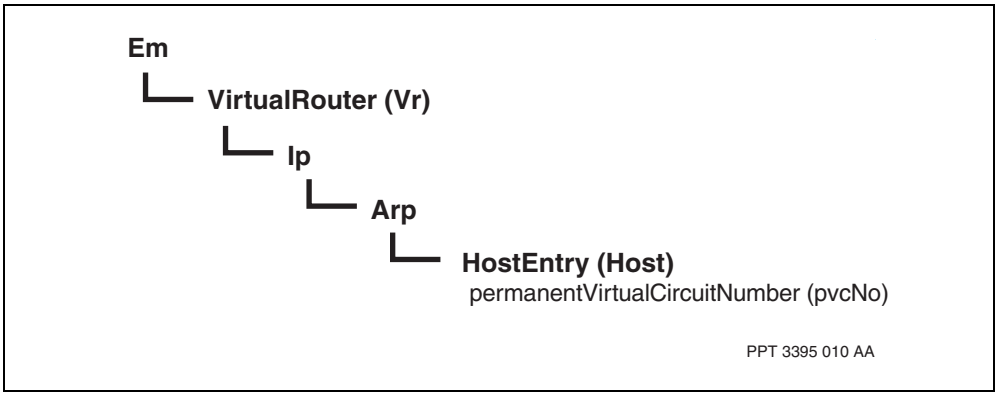
--End--

Variable definitions

Variable	Value
<conn>	is the instance number of the AtmConnection component on the ATM MPE interface and specifies the PVC for the static hostEntry. This PVC number is not the same as the PVC number used to configure the SunATM NIC on the MDM. The PVC number used in configuring the SunATM NIC must match the instance number of the Vcc component under the AtmIf component associated with the physical port that the ATM line is connected to.
<host_address>	is the IP address of the static host being defined. This is the IP of the SunATM NIC on the MDM.
<vr_name>	is the name assigned to the virtual router.

Procedure job aid

Configuring a gateway node to connect to Multiservice Data Manager workstation component hierarchy



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Connecting nodes to the network using StartUp reference

This section provides reference information that you may find useful when connecting Nortel Multiservice Switch nodes to the network using the StartUp utility.

Connecting Multiservice Switch 15000 and Multiservice Switch 20000 nodes using StartUp reference

- Connections using a 4-port DS3 channelized frame relay card (page 70)
- Connections to Multiservice Data Manager using the OAM Ethernet port or through an IP services network over ATM MPE (page 71)

Connections using a 4-port DS3 channelized frame relay card

A 4-port DS3 channelized frame relay FP can be configured to be either channelized or unchannelized. Both configurations for the same FP at the same time is not supported. For more information on 4-port DS3 channelized frame relay FPs, see NN10600-551 *Nortel Multiservice Switch 7400/15000/20000 FP Configuration Reference*.

Attention: Before inserting a PQC12-based FP, ensure that PCR3.0 software is running on the node.

If you choose a timeslot that is currently selected, it becomes de-selected. In this example, if you enter 0 after de-selecting timeslot 24, then you are selecting timeslots 1 through 23 inclusive.

When provisioning timeslots on the 4-port DS3 channelized FP, you can choose a timeslot value of none. This timeslot value allows for the pre-provisioning of a frame relay service, either FrUni, FrNni, or FrAtm, without assigning specific DS0 timeslots to a channel. Once you create a framer component for one of the frame relay services with a timeslot of none provisioned, the channel is in a ready, enabled, idle state and does not transfer

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data thus saving bandwidth. A timeslot value of none cannot be combined with other valid timeslot values (see NN10600-551 *Nortel Multiservice Switch 7400/15000/20000 FP Configuration Reference* for details).

Information for using DS3 links to connect to Multiservice Data Manager through a Multiservice Switch-only network

Item	Values for your installation	Examples of values
DS3 line length (in feet)		300
Will the link supply a local clock?		Y (local)
Framing type		HDLC
Port number		2
Line type		Y (ESF)
Clocking source		Y (local)
Timeslots		1, 3, 4, 6, 12
Ds1 line length (in feet) [This item applies to the 4-port DS3 channelized FP only.]		300
Framing type		HDLC
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public

Connections to Multiservice Data Manager using the OAM Ethernet port or through an IP services network over ATM MPE

You are prompted to enter the IP address of the Nortel Networks Multiservice Data Manager workstation, the encryption key, and the inbound and outbound security parameter index (SPI) values only if IPSec is enabled. If the component *Vr Ip Spd* exists, IPSec is enabled.

Ensure that the encryption key and SPI values you enter are identical to those entered for Multiservice Data Manager. For more information about IPSec, see NN10400-605 *Nortel Multiservice Data Manager Network Security Fundamentals*.

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Connecting Multiservice Switch 7400 nodes using StartUp reference

- Connections through a DPN network (page 73)
- Connections to Multiservice Data Manager through a DPN network using DS3 or E3 links (page 73)
- Connections to Multiservice Data Manager through a DPN network using V.35 or V.11/X.21 links (page 74)
- Connections to Multiservice Data Manager through a DPN network using DS1 links (page 76)
- Connections to Multiservice Data Manager through a DPN network using DS3 ATM links (page 76)
- Connections to Multiservice Data Manager through a DPN network using E3 ATM links (page 77)
- Connections to Multiservice Data Manager through a DPN network using OC-3 ATM links (page 78)
- Connections to Multiservice Data Manager through a DPN network using DS1 ATM and DS1 MSA32 links (page 79)
- Connections to Multiservice Data Manager through a DPN network using E1 ATM and E1 MSA32 links (page 80)
- Connections to Multiservice Data Manager through a DPN network using JT2 ATM links (page 80)
- Connections through a Multiservice Switch network (page 81)
- Connections to Multiservice Data Manager through a Multiservice Switch-only network using DS3 or E3 links (page 82)
- Connections to Multiservice Data Manager through a Multiservice Switch-only network using V.35 or V.11/X.21 links (page 83)
- Connections to Multiservice Data Manager through a Multiservice Switch-only network using E1 links (page 83)
- Connections to Multiservice Data Manager through a Multiservice Switch-only network using DS1 links (page 84)
- Connections to Multiservice Data Manager through a Multiservice Switch-only network using DS3 ATM links (page 85)
- Connections to Multiservice Data Manager through a Multiservice Switch-only network using E3 ATM links (page 85)
- Connections to Multiservice Data Manager through a Multiservice Switch-only network using OC-3 ATM links (page 86)
- Connections to Multiservice Data Manager through a Multiservice Switch-only network using DS1 ATM and DS1 MSA32 links (page 87)

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- Connections to Multiservice Data Manager through a Multiservice Switch-only network using E1 ATM and E1 MSA32 links (page 88)
- Connections to Multiservice Data Manager through a Multiservice Switch-only network using JT2 ATM links (page 89)
- Direct connections from Multiservice Switch 7400 nodes to Multiservice Data Manager using a frame relay PVC (page 90)
- Connections to Multiservice Data Manager through an IP services network over ATM MPE (page 91)
- Connections to Multiservice Data Manager through an IP services network over FR DTE (page 92)
- Connections to Multiservice Data Manager through an IP services network over Ethernet (page 93)
- Connections to Multiservice Data Manager using the OAM Ethernet port (page 93)

Connections through a DPN network

Ensure that you have configured the call server resource module (CSRM) to support the new Nortel Multiservice Switch 7400 node in a connection through a DPN network.

Information for connecting a Multiservice Switch 7400 node to Multiservice Data Manager through a DPN network

Item	Values for your installation	Examples of values
Node IP address		12.34.56.78
DNIC		3021
IPIVC DNA		30210211040000
IPIVC CUG interlock code		32770
Slot number		3

Connections to Multiservice Data Manager through a DPN network using DS3 or E3 links

Before you begin, the network administrator must ensure that the network wide data, line mode IP address, RID, MID, node name, node ID, network administration identifier (NAMS ID), and IP interface over virtual circuit data network address (IPIVC DNA) are unique.

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Information for using DS3 or E3 links to connect a node to Multiservice Data Manager through a DPN network

Item	Values for your installation	Examples of values
Trunk type: Enter 1 for Gateway to a DPN, or 2 for unacknowledged trunk to a node.		1
Line length: Enter the length (in feet for DS3 trunks and in meters for E3 trunks).		300
Clocking source: Will the link supply a local clock?		Y (local)
Framing type (for unacknowledged-type trunk)		HDLC
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public

Connections to Multiservice Data Manager through a DPN network using V.35 or V.11/X.21 links

Information for using V.35 or X.21 links to connect a node to Multiservice Data Manager through a DPN network

Item	Values for your installation	Examples of values
Port number		8
Trunk type: Enter 1 for Gateway to a DPN, or 2 for unacknowledged trunk to a node.		1
Framing type (for unacknowledged-type trunk)		HDLC
Port type: (Is the port DCE?)		Y
Line speed: (for DCE port)		9600
SNMP Network Management		Y
Configure SNMPv1		Y
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Information for using V.35 or X.21 links to connect a node to Multiservice Data Manager through a DPN network (continued)

Item	Values for your installation	Examples of values
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public
(2 of 2)		

Connections to Multiservice Data Manager through a DPN network using E1 links

Information for using E1 links to connect a node to Multiservice Data Manager through a DPN network

Item	Values for your installation	Examples of values
Port number		2
Trunk type: Enter 1 for Gateway to a DPN, or 2 for unacknowledged trunk to a node.		1
Line type		Y (CAS) N (CCS)
Timeslots		1,2,4,6
Clocking source		Y (local) N (module)
Framing type (for unacknowledged-type trunk)		HDLC
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public

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Connections to Multiservice Data Manager through a DPN network using DS1 links

Information for using DS1 links to connect a node to Multiservice Data Manager through a DPN network

Item	Values for your installation	Examples of values
Port number		2
Trunk type: Enter 1 for Gateway to a DPN, or 2 for unacknowledged trunk to a node.		1
Framing type (for unacknowledged-type trunk)		HDLC
Line type (Will the link use ESF)		Y
Timeslots		1,2,4,6
Clocking source		Y (local) N (module)
Line length (in feet)		300
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public

Connections to Multiservice Data Manager through a DPN network using DS3 ATM links

Information for using DS3 ATM links to connect a node to Multiservice Data Manager through a DPN network

Item	Values for your installation	Examples of values
Port number		1
Line length? (in feet)		200
Clocking source		Y (local)
Mapping type		1. (direct mode)

(1 of 2)

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Information for using DS3 ATM links to connect a node to Multiservice Data Manager through a DPN network (continued)

Item	Values for your installation	Examples of values
Scrambling		Y (on)
OAM segment boundary?		Y
ATM VPI		0
ATM VCI		32
ATM PCR		4000
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public
(2 of 2)		

Connections to Multiservice Data Manager through a DPN network using E3 ATM links

Information for using E3 ATM links to connect a node to Multiservice Data Manager through a DPN network

Item	Values for your installation	Examples of values
Port number		0
Line length (in meters)		100
Clocking source		Y (local)
Framing type		1. (g832 type)
Mapping type, if framing type is g751. (otherwise, mapping defaults to direct mode)		1. (direct mode)
Scrambling		Y (on)
Is the node an OAM segment boundary?		Y
ATM VPI		0
ATM VCI		32
(1 of 2)		

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Information for using E3 ATM links to connect a node to Multiservice Data Manager through a DPN network (continued)

Item	Values for your installation	Examples of values
ATM PCR		30000
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public
(2 of 2)		

Connections to Multiservice Data Manager through a DPN network using OC-3 ATM links

Information for using OC-3 links to connect a node to Multiservice Data Manager through a DPN network

Item	Values for your installation	Examples of values
Port number		0
Clocking source		Y (local)
Line type		2. (synchronous digital hierarchy - SDH)
Scrambling		N (off)
Is the node an OAM segment boundary?		Y
ATM VPI		0
ATM VCI		32
ATM PCR		4000
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
(1 of 2)		

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Information for using OC-3 links to connect a node to Multiservice Data Manager through a DPN network

Item	Values for your installation	Examples of values
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public
(2 of 2)		

Connections to Multiservice Data Manager through a DPN network using DS1 ATM and DS1 MSA32 links

Information for using DS1 ATM and MSA32 links to connect a node to Multiservice Data Manager through a DPN network

Item	Values for your installation	Examples of values
Port number		1
Clocking source		no
Line length (feet)		200
Scrambling		Y (on)
Use IMA mode? Required for 8-port ATM FPs and 32-port MSA FPs only.		yes
Use proprietary protocol? Required only for links using IMA mode on 8-port ATM FPs.		no
Is the node an OAM segment boundary?		Y
ATM VPI		0
ATM VCI		32
ATM PCR		3000
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public

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Connections to Multiservice Data Manager through a DPN network using E1 ATM and E1 MSA32 links

Information for using E1 ATM and MSA32 links to connect a node to Multiservice Data Manager through a DPN network

Item	Values for your installation	Examples of values
Port number		3
Line type Required for the 3-port E1 ATM FP only.		Y (CAS) N (CCS)
Clocking source		Y (local)
Scrambling		yes
IMA mode Required for the 8-port ATM and 32-port MSA FPs only.		yes
Proprietary protocol Required only for links using IMA mode on 8-port ATM.		no
Is the node an OAM segment boundary?		Y
ATM VPI		0
ATM VCI		32
ATM PCR		2000
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public

Connections to Multiservice Data Manager through a DPN network using JT2 ATM links

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Information for using JT2 ATM links to connect a node to Multiservice Data Manager through a DPN network

Item	Values for your installation	Examples of values
Port number		0
Line length (in feet)		100
Clocking source		no
Scrambling		yes (on)
Is the node an OAM segment boundary?		Y
ATM VPI		0
ATM VCI		32
ATM PCR		8
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public

Connections through a Multiservice Switch network

In this topology, the Nortel Multiservice Switch 7400 node connects to a Multiservice Switch 15000-only network. The Multiservice Switch 15000-only network must contain a Multiservice Switch 15000 node that connects directly to a Multiservice Data Manager workstation.

- For connections through an existing Multiservice Switch-only network, ensure that you have configured
  - — Multiservice Data Manager to recognize the new node
  - — the call router on the first node
  - — a new DLCI for the FR UNI
  - — all existing nodes so that they recognize the new node
- Before proceeding, ensure that you have added and configured the proper DLCI to the *FrUni* component on the initial Multiservice Switch 7400 node. For information about this procedure and others involving IP interfaces over frame relay (IPIFR), see NN10600-800 *Nortel Multiservice Switch 7400/15000/20000 IP Technology Fundamentals*.

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Information for connecting to Multiservice Data Manager through a Multiservice Switch-only network

Item	Values for your installation	Examples of values
Node IP address		12.34.56.78
DNIC		3021
IPIFR DNA		30210211040000
IPIFR SubnetMask		255.0.0.0
IPIFR *Lcn* component		16
IPIFR *npi* attribute		x121
Remote Multiservice Switch 7400/15000/20000 FR UNI DNA		30210111110030
Remote Frame Relay DLCI		115
Remote Multiservice Switch 7400/15000/20000 FR UNI NPI		x121
Static route (SR) destination IP address (if SR required)		23.45.67.89
Static route gateway IP address (if SR required)		47.12.34.56
Slot number		4

Connections to Multiservice Data Manager through a Multiservice Switch-only network using DS3 or E3 links

Information for using DS3 or E3 links to connect to Multiservice Data Manager through a Multiservice Switch-only network

Item	Values for your installation	Examples of values
Line length (in feet for DS3 and in meters for E3)		300
Clocking source		Y (local)
Framing type		HDLC
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
(1 of 2)		

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Information for using DS3 or E3 links to connect to Multiservice Data Manager through a Multiservice Switch-only network (continued)

Item	Values for your installation	Examples of values
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public
(2 of 2)		

Connections to Multiservice Data Manager through a Multiservice Switch-only network using V.35 or V.11/X.21 links

Information for using V.35 or X.21 links to connect to Multiservice Data Manager through a Multiservice Switch-only network

Item	Values for your installation	Examples of values
Port number		8
Is the port DCE		Y
Line speed (DCE only)		9600
Framing type		HDLC
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public

Connections to Multiservice Data Manager through a Multiservice Switch-only network using E1 links

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Information for using E1 links to connect to Multiservice Data Manager through a Multiservice Switch-only network

Item	Values for your installation	Examples of values
Port number		2
Line type		Y (CAS) N (CCS)
Timeslots		1, 3, 4, 6, 12
Clocking source		Y (local)
Framing type		HDLC
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public

Connections to Multiservice Data Manager through a Multiservice Switch-only network using DS1 links

Information for using DS1 links to connect to Multiservice Data Manager through a Multiservice Switch-only network

Item	Values for your installation	Examples of values
Port number		2
Line type		Y (ESF)
Clocking source		Y (local)
Timeslots		1, 3, 4, 6, 12
Line length (in feet)		300
Framing type		HDLC
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
(1 of 2)		

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Information for using DS1 links to connect to Multiservice Data Manager through a Multiservice Switch-only network (continued)

Item	Values for your installation	Examples of values
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public
(2 of 2)		

Connections to Multiservice Data Manager through a Multiservice Switch-only network using DS3 ATM links

Information for using DS3 ATM links to connect to Multiservice Data Manager through a Multiservice Switch-only network

Item	Values for your installation	Examples of values
Port number		1
Line length (in feet)		200
Clocking source		Y (local)
Mapping type		1 (direct mode)
Cell scrambling		Y (on)
OAM segment boundary		Y
ATM VPI		0
ATM VCI		32
ATM PCR		8
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public

Connections to Multiservice Data Manager through a Multiservice Switch-only network using E3 ATM links

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Information for using E3 ATM links to connect to Multiservice Data Manager through a Multiservice Switch-only network

Item	Values for your installation	Examples of values
Port number		0
Line length (in meters)		100
Clocking source		Y (local)
Framing type		1. (g832 mode)
Mapping type for g751 framing type (otherwise, mapping defaults to direct mode)		1. (direct mode)
Cell scrambling		Y (on)
OAM segment boundary		Y
ATM VPI		0
ATM VCI		32
ATM PCR		8
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public

Connections to Multiservice Data Manager through a Multiservice Switch-only network using OC-3 ATM links

Information for using OC-3 ATM links to connect to Multiservice Data Manager through a Multiservice Switch-only network

Item	Values for your installation	Examples of values
Port number		0
Clocking source		N (line)
Line type		2. (synchronous digital hierarchy - SDH)
(1 of 2)		

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Information for using OC-3 ATM links to connect to Multiservice Data Manager through a Multiservice Switch-only network (continued)

Item	Values for your installation	Examples of values
Cell scrambling		Y (on)
OAM segment boundary		Y
ATM VPI		0
ATM VCI		32
ATM PCR		8
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public
(2 of 2)		

Connections to Multiservice Data Manager through a Multiservice Switch-only network using DS1 ATM and DS1 MSA32 links

Information for using DS1 ATM and DS1 MSA32 links to connect to Multiservice Data Manager through a Multiservice Switch-only network

Item	Values for your installation	Examples of values
Port number		1
Clocking source		no
Line length (in feet)		200
Cell scrambling		yes (on)
IMA mode Required for DS1 8-port ATM and 32-port DS1 FPs only.		yes
Proprietary protocol Required only for links using IMA mode on DS1 8-port FPs.		no
OAM segment boundary		Y
(1 of 2)		

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Information for using DS1 ATM and DS1 MSA32 links to connect to Multiservice Data Manager through a Multiservice Switch-only network (continued)

Item	Values for your installation	Examples of values
ATM VPI		0
ATM VCI		32
ATM PCR		3000
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public
(2 of 2)		

Connections to Multiservice Data Manager through a Multiservice Switch-only network using E1 ATM and E1 MSA32 links

Information for using E1 ATM and MSA32 links to connect to Multiservice Data Manager through a Multiservice Switch-only network

Item	Values for your installation	Examples of values
Port number		3
Line type Required for the 3-port E1 ATM FP only.		yes (CAS) no (CCS)
Clocking source		no (module) yes (line)
Cell scrambling		yes (on)
IMA mode Required for E1 8-port and 32-port MSA FPs only.		yes
Proprietary protocol? Required only for links using IMA mode on E1 8-port ATM FP.		no
OAM segment boundary		Y
(1 of 2)		

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Information for using E1 ATM and MSA32 links to connect to Multiservice Data Manager through a Multiservice Switch-only network (continued)

Item	Values for your installation	Examples of values
ATM VPI		0
ATM VCI		32
ATM PCR		2000
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public
(2 of 2)		

Connections to Multiservice Data Manager through a Multiservice Switch-only network using JT2 ATM links

Information for using JT2 ATM links to connect to Multiservice Data Manager through a Multiservice Switch-only network

Item	Values for your installation	Examples of values
Port number		0
Line length (in feet)		100
Clocking source		no (module) yes (line)
Cell scrambling		yes (on)
OAM segment boundary		Y
ATM VPI		0
ATM VCI		32
ATM PCR		8
SNMP Network Management		Y
Configure SNMPv1		Y
SNMPv1 Manager		47.14.51.245
SNMPv1 Community String		public
(1 of 2)		

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Information for using JT2 ATM links to connect to Multiservice Data Manager through a Multiservice Switch-only network (continued)

Item	Values for your installation	Examples of values
Configure SNMPv2c		Y
SNMPv2c Manager		47.14.51.245
SNMPv2c Community String		public
(2 of 2)		

Direct connections from Multiservice Switch 7400 nodes to Multiservice Data Manager using a frame relay PVC

This topology directly connects the Multiservice Data Manager workstation and the new Nortel Multiservice Switch 7400 node. To achieve a direct connection between ensure that you have configured the workstation to recognize the node as a new node.

Information for connecting directly to Multiservice Data Manager

Item	Values for your installation	Examples of values
Node IP address		47.1.2.3
DNIC		3334
IPIFR DNA		333440001
IPIFR SubnetMask		255.0.0.0
IPIFR *Lcn* component		30
IPIFR *npi* attribute		x121
Multiservice Switch 7400 FR UNI DNA		33340121
Frame relay DLCI		52
Multiservice Switch 7400 FR UNI NPI		e164
Static route (SR) destination IP address (if SR required)		23.45.67.89
Static route gateway IP address (if SR required)		47.12.34.56
Slot number		3
Port type supported by this FP		1 (v11) 2 (v35)
Port number		0
(1 of 2)		

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Information for connecting directly to Multiservice Data Manager (continued)

Item	Values for your installation	Examples of values
Is the port DCE		Y
Line speed (DCE only)		1920000
(2 of 2)		

Connections to Multiservice Data Manager through an IP services network over ATM MPE

If you are using a non-optical FP to connect to a Multiservice Data Manager workstation, do not enter information on line type of scrambling.

You are prompted to enter the IP address of the workstation, the encryption key, and the inbound and outbound security parameter index (SPI) values only if IPSec is enabled. If the component *Vr Ip Spd* exists, IPSec is enabled.

Ensure that the encryption key and SPI values you enter are identical to those entered for Multiservice Data Manager. For more information about IPSec, see NN10400-605 *Nortel Multiservice Data Manager Network Security Fundamentals*.

Information for connecting a node to Multiservice Data Manager through IP over ATM MPE using an OC3 FP

Item	Values for your installation	Examples of values
Software release		BE003A
Node ID		1234
Node name		Boston
NAMS ID		1500
ATM FP slot number		5
ATM port number		0
Scrambling		Yes
Is the node an OAM segment boundary		No
Line type (SONET/SDH)?		sonet
VPI		0
VCI		40
PCR		10000
IP port address		47.208.138.161
(1 of 2)		

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Information for connecting a node to Multiservice Data Manager through IP over ATM MPE using an OC3 FP (continued)

Item	Values for your installation	Examples of values
IP port network mask		255.255.255.0
IP broadcast address		255.255.255.255
Next hop IP address		47.208.138.165
IP address of Multiservice Data Manager workstation		47.206.134.156
Encryption key (8 byte key)		3434343434343434
Inbound SPI		401
Outbound SPI		400
(2 of 2)		

Connections to Multiservice Data Manager through an IP services network over FR DTE

Information for connecting a Multiservice Switch node to Multiservice Data Manager through IP over FR DTE

Item	Values for your installation	Examples of values
Software release		BE003A
Node ID		1234
Node name		Boston
NAMS ID		1500
Slot number		2
Port number		3
Is the port DCE?		Yes
Line speed		19200
IP port address		47.208.138.161
IP port network mask		255.255.255.0
Next hop IP address		47.208.138.165
Static DLCI		16
LMI procedures		ccitt

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Connections to Multiservice Data Manager through an IP services network over Ethernet

Information for connecting a Multiservice Switch node to Multiservice Data Manager through Ethernet

Item	Values for your installation	Examples of values
Software release		BE003A
Node ID		1234
Node name		Boston
NAMS ID		1500
Slot number		4
Port number		1
IP port address		47.208.138.161
IP port network mask		255.255.255.0
IP broadcast address		255.255.255.255
Next hop IP address		47.208.138.165
IP address of Multiservice Data Manager workstation		47.206.134.156
Encryption key (8 byte key)		3434343434343434
Inbound SPI		401
Outbound SPI		400

Connections to Multiservice Data Manager using the OAM Ethernet port

You are prompted to enter the IP address of the Multiservice Data Manager workstation, the encryption key, and the inbound and outbound security parameter index (SPI) values only if IPSec is enabled. If the component *Vr Ip Spd* exists, IPSec is enabled.

Ensure that the encryption key and SPI values you enter are identical to those entered for Multiservice Data Manager. For more information about IPSec, see NN10400-605 *Nortel Multiservice Data Manager Network Security Fundamentals*.

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StartUp fundamentals

After installing and activating Nortel Networks Multiservice Data Manager, you need to connect the workstation to the node so that it can begin managing the node. To assist you, the StartUp software package is installed at the factory before the Nortel Multiservice Switch node is shipped to you. The StartUp software prompts you for information and configures the connection between the node and Multiservice Data Manager. StartUp also performs basic configuration, sets up equipment sparing, and performs card tests. You can easily make your Multiservice Switch node functional by using the StartUp software to connect it to Multiservice Data Manager and configure it with a basic set of features.

For more information on StartUp, refer to the following sections:

- What does StartUp do? (page 94)
- Important things to remember about StartUp (page 95)
- The passport.atmconfig script (page 95)
- Multiservice Data Manager connectivity using StartUp (page 96)

What does StartUp do?

StartUp performs the following functions:

- facilitates the establishment of a link between a Nortel Multiservice Switch node and Multiservice Data Manager. Once this link is created, you can see, manipulate, and finish configuring the node through Multiservice Data Manager.
- helps streamline the process for configuring node by adding default components and configuring default values for various attributes. If these default values do not suit your network configuration, you will need to reconfigure them outside of StartUp. For more information about attribute values, see NN10600-060 *Nortel Multiservice Switch 7400/15000/20000 Component Reference*.
- Resets the control processors to base software.
- Facilitates the configuration of control processor sparing.
- Performs card tests to evaluate the condition of the processor cards

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Attention: Running StartUp at any time other than software installation and commissioning may result in a loss of configuration information and can affect service.

Important things to remember about StartUp

Consider the following items when using StartUp:

- StartUp indicates whenever you make an entry that falls outside of the valid range. StartUp then allows you to correct the entry.
- StartUp advances to the next step only after you make a valid entry.
- To quit StartUp at any time, type *quit*. StartUp then returns you to the local operator terminal prompt. See the procedure Quitting StartUp (page 15) for more information.
- You must perform the options in StartUp in a specific order.
- Running StartUp at any time other than software installation and commissioning will result in a loss of configuration information and can affect service.
- While running StartUp, you will occasionally be prompted to confirm your configuration changes. Complete your changes as prompted. For more information on confirming your changes, see NN10600-030 *Nortel Multiservice Switch 7400/15000/20000 Overview*.

The passport.atmconfig script

While it allows you to add new nodes, the passport.atmconfig script does not allow you to delete a node or move a node to another group. Limitations with configuring the ATM network interface card (NIC) driver software also exist. The driver software must be obtained and configured before running the script.

The passport.atmconfig script can also set up IP routing on a Nortel Multiservice Data Manager workstation and start the ATM connection to the network.

The script

- adds the group, host name, and IP address of the node to the /opt/MagellanNMS/cffg/HGDS.cfg file
- adds information about the ATM interface to the /etc/opt/SUNWconn.atm/aarconfig file and the /etc/opt/SUNWconn.atm atmconfig file
- creates or updates the /etc/opt/SUNWconn.atm/atm.cf file with ATM routing information.

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For more details see 241-6001-303 *Nortel Multiservice Data Manager Administration*.

Multiservice Data Manager connectivity using StartUp

When you run StartUp, the order of the menus presented to you is dependent on the configuration status of your node and the type of connection you want to configure.

If you have an existing node and need to change the workstation connectivity, StartUp begins by displaying the StartUp main menu. If you are connecting a new node, StartUp begins by displaying the StartUp operations menu.

Connecting a Multiservice Switch 7400 node

If you run StartUp on an unconnected node, the node has not been previously configured for Nortel Multiservice Data Manager workstation connectivity. As a result, StartUp begins by displaying all of the possible ways to connect Multiservice Data Manager to your node.

If you are running StartUp on a previously connected node, StartUp begins by asking if you want to change the previously selected method of connectivity. If you say you want to change, StartUp displays all of the possible ways to connect Multiservice Data Manager to your node.

You can connect Multiservice Data Manager to your node is by using one of the following methods:

- an IPIVC or IPIFR connection
- Nortel Multiservice Switch IP services networking through the OAM Ethernet port. For more information see NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures*.

Connecting a Multiservice Switch 15000 or Multiservice Switch 20000 node

Nortel Multiservice Switch 15000 and Multiservice Switch 20000 node applications and services are categorized as hot, warm or cold standby based on their sparing behavior. On these devices, the IPIFR interface is a warm standby feature when provisioned on a spare LP.

During an equipment switchover, the IPIFR connection between a node and Nortel Networks Multiservice Data Manager is dropped and is re-established by the workstation after the switchover is complete. Because it is a warm standby application, the IPIFR connection is re-established more quickly than if it was a cold standby application, but not as quickly as a hot standby application.

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Also, a warm standby application or feature can operate together with a hot standby application or feature on the same FP without affecting the ability of the hot standby application or feature to provide hitless services.

See NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures* for a description of hitless services and hot, warm and cold standby applications and features.

If you run StartUp on an unconnected node, the node has not been previously configured for Multiservice Data Manager connectivity. As a result, StartUp begins by displaying all of the possible ways to connect Multiservice Data Manager to your node.

If you are running StartUp on a previously connected node, StartUp begins by asking if you want to change the previously selected method of connectivity. If you say you want to change, StartUp displays all of the possible ways to connect the Multiservice Data Manager to your node.

You can connect Multiservice Data Manager to your node by using one of the following methods:

- an IPIFR connection.
- Multiservice Switch IP services networking through the OAM Ethernet port. For more information see NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures*.
- a channelized DS3 frame relay channelized connection

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Network management connectivity fundamentals

This section contains background information on Nortel Multiservice Data Manager and Nortel Multiservice Switch network management connectivity.

- Multiservice Data Manager connectivity overview (page 98)
- Configuring IP interface over virtual circuit for Multiservice Switch 7400 nodes (page 103)
- Configuring IP interface over frame relay (page 106)
- Upgrading from IPIVC to IPIFR in Multiservice Switch 7400 nodes (page 109)
- Configuring IP services networking through Ethernet (page 112)

Multiservice Data Manager connectivity overview

You can manage Nortel Multiservice Switch nodes using a number of external management devices (MD). For example, you can log into a node from a management workstation using a Telnet or Ssh application. You can also manage your node using Nortel Multiservice Data Manager or a simple network management protocol (SNMP) network management system.

The management devices use management protocols such as Telnet, Ssh, FMIP, and SNMP to communicate with network elements. All management protocols require an Internet protocol (IP) connection from the management device to the node.

Nortel Multiservice Switch 7400 nodes provide the following interface for establishing management IP connections:

- IP interface over frame relay (IPIFR)
- IP services network management through Ethernet
- IP interface over virtual circuit (IPIVC)

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Multiservice Switch 15000 and Multiservice Switch 20000 nodes provide the following interfaces for establishing management IP connections:

- IP interface over frame relay (IPIFR)
- IP services network management through an OAM Ethernet port connection

Each of these interfaces uses one of the following IP components:

- IPIFR component
- virtual router (VR) IP component

The IPIFR component provides a simple IP interface to a node, which does not have IP forwarding capabilities and only supports static IP routing. When using the IPIFR component, the node functions as an IP endstation host.

The VR IP component is an interface to a node that is capable of sophisticated routing and forwarding of IP packets. When using the VR IP component, the node functions as an IP router. IP services management through OAM Ethernet uses the VR IP component.

A node can use either one of the IP subsystems, but not both. For more information see the following:

- Conceptual view of Multiservice Data Manager connectivity (page 99)
- Service and hardware requirements for Multiservice Switch 7400 nodes (page 101)

Conceptual view of Multiservice Data Manager connectivity

The figure Conceptual view of Multiservice Data Manager connectivity (page 101) gives a general overview of Nortel Multiservice Data Manager connectivity. In the figure, management devices (MD) are workstations that run the management applications used to manage network elements. A management site (MS) is a cluster of one or more MDs. Typically, MSs are geographically separated. When you connect management sites together through a wide area network (WAN), they form a management network.

Nortel Multiservice Switch networks consist of edge and internal nodes. Edge nodes have a direct connection to the management network. Multiservice Switch nodes support the following three types of interfaces between the management network and the Multiservice Switch network:

- IPIVC (Multiservice Switch 7400 nodes only)
- IPIFR
- Ethernet

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Typically, you will have between two and five edge nodes in your Multiservice Switch network.

Internal nodes do not directly connect to the management network but connect to an edge node using Multiservice Switch trunks. Typically, internal nodes make up 90% of your network. You establish connections from the management network to the internal nodes through the edge nodes.

Both edge nodes and internal nodes can use the IPI or the VR IP subsystem to establish IP connections to the management network. Use the IPI subsystem (IPIVC for Multiservice Switch 7400 nodes or IPIFR for all Multiservice Switch nodes) on internal nodes unless they are already running the VR IP subsystem to support IP services. The IPI subsystem is easier to configure and requires fewer system resources than the VR IP subsystem.

On an edge node, your choice of IP subsystem depends on your network configuration. Typically, you only use the VR IP subsystem on the edge node when some or all of the Multiservice Switch network support IP services.

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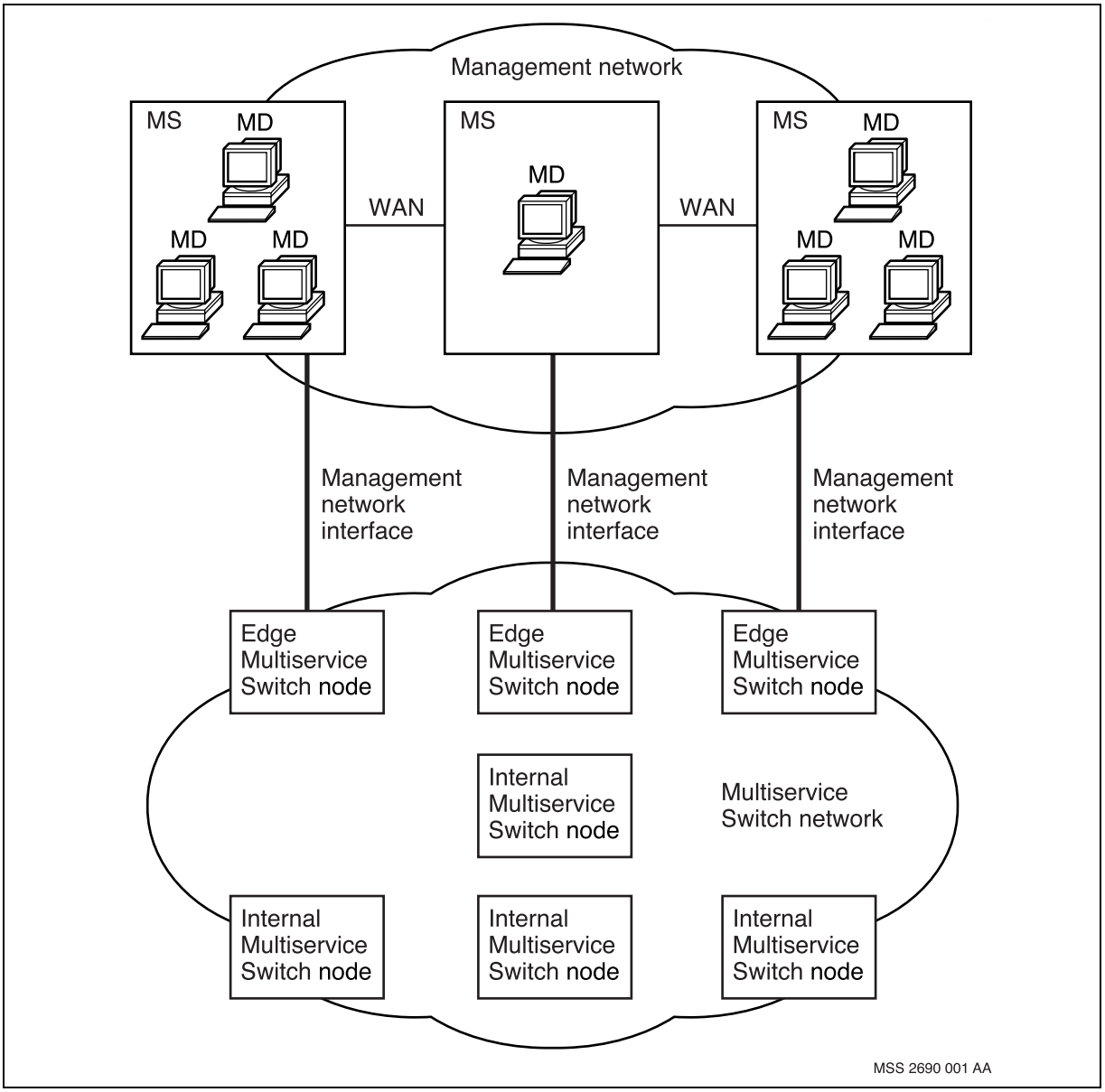
Conceptual view of Multiservice Data Manager connectivity



Service and hardware requirements for Multiservice Switch 7400 nodes

The table Multiservice Data Manager service and hardware requirements for connectivity to Multiservice Switch 7400 nodes (page 102) describes the services you need to run on the control processor (CP) and on a node's function processors (FP) to support various network management configurations.

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Multiservice Data Manager service and hardware requirements for connectivity to Multiservice Switch 7400 nodes

Management network interface	Multiservice Switch network transport media	Node type	Service and hardware requirements	Comments
frame relay	frame relay	IPI edge node	• FP: FrUni port • FP: Trunk port • CP: ipiFr	The Multiservice Switch trunk port also carries other data.
		IPI internal node	• FP: Trunk port • CP: ipiFr	
		VR IP internal node	• FP: FrDte vFramer, FrUni vFramer • FP: Trunk port • CP: VR IP	
X.25	X.25	IPI edge Multiservice Switch 7400	• DPN module • FP: DpnGateway port • FP: Trunk port • CP: ipiVc	Multiservice Switch 7400 trunk port also carries other data.
		IPI internal Multiservice Switch 7400	• FP: Trunk port • CP: ipiVc	
		VR IP internal Multiservice Switch 7400	• DPN module • FP: X25Dte port • CP: VR IP	

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Multiservice Data Manager service and hardware requirements for connectivity to Multiservice Switch 7400 nodes (continued)

Management network interface	Multiservice Switch network transport media	Node type	Service and hardware requirements	Comments
Ethernet	Frame Relay	VR IP edge node	• FP: Ethernet port • FP: FrDte vFramer, FrUni vFramer • FP: Trunk port • CP: VR IP	The Multiservice Switch trunk port also carries other data.
		IPI internal node	• FP: Trunk port • CP: ipiFr	
		VR IP internal node	• FP: FrDte vFramer, FrUni vFramer • FP: Trunk port • CP: VR IP	
Ethernet	ATM	VR IP edge Multiservice Switch 7400	• FP: Ethernet port • FP: AtmMpe, Atmlf port • CP: VR IP	
		VR IP internal Multiservice Switch 7400	• FP: AtmMpe, Atmlf port • CP: VR IP	

(2 of 2)

Configuring IP interface over virtual circuit for Multiservice Switch 7400 nodes

The figure Management access to Multiservice Switch network over X.25 SVCs (page 105) illustrates IPIVC connections. A DPN module (possibly part of a DPN network) provides the X.25 interface to the management device. You can connect the management device directly to the DPN module, or you can connect it indirectly through an Ethernet LAN.

You must first provision IPIVC using an ASCII-based terminal that connects to a Nortel Multiservice Switch node using a local interface. After you have provisioned IPIVC, you can use a management device such as Nortel Multiservice Data Manager to connect to the node. You can use the StartUp

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utility to quickly provision IPIVC. For more information on the StartUp utility, see Network management connectivity configuration using StartUp (page 12) and Network management connectivity fundamentals (page 98).

If you are currently accessing the network through IPIVC, you can migrate to IPIFR without losing X.25 connectivity during the process. See Multiservice Switch 7400 IPIVC to IPIFR upgrade (page 126).

For details on provisioning a port, see NN10600-551 *Nortel Multiservice Switch 7400/15000/20000 FP Configuration Reference* or NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures*. For details on how to provision a DPN Gateway, see NN10600-450 *Nortel Multiservice Switch 7400: Operations: DPN-100 Interworking*.

The default route is a VC that IPIVC uses if the IP route for a given IP address is unknown. You can use the default route to access indirectly connected management devices through and IP-routing-capable device. You can define only one default route.

When you change the remote DNA, IPIVC performs one of the following actions:

- If no VC has been set up using the old remote DNA, the IPIVC replaces the old attribute value of the remote DNA with the new one. IPIVC then checks if a VC exists that is using the new attribute value as the destination DNA. If such a VC exists, this VC is marked as the default VC.
- If a VC exists using the old remote DNA, the IPIVC no longer uses this VC as the default VC. IPIVC then proceeds with the actions described in the first scenario described above.

The creation of the Ipivc component results in the creation of the *DataNetworkAddress* (*Dna*) subcomponent.

After you change the IP address of the IPIVC, all existing X.25 calls using this IPIVC clear.

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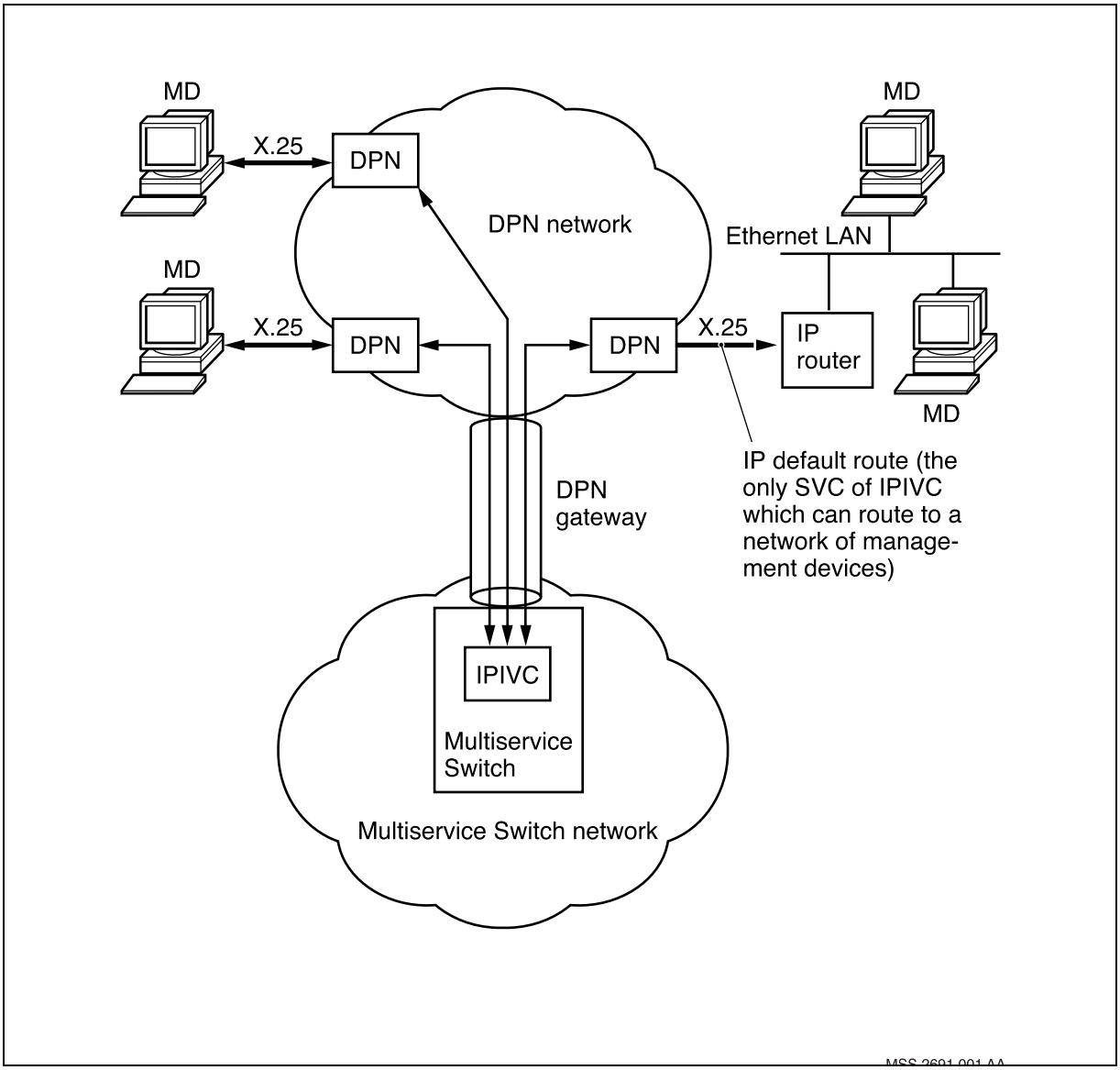
Management access to Multiservice Switch network over X.25 SVCs



IPIVC components and attributes

The *Ipivc* component allows external network management devices to access the node. The *Ipivc* component contains two provisionable attributes: *ipAddress* and *maximumNumberOfLcn*. The IPIVC must have a unique IP address that represents the address of the network interface and a unique DNA for setting up the virtual circuit.

The *DataNetworkAddress* component contains a subset of all attributes that apply to a VC. The *dataNetworkAddress* attribute of the *DataNetworkAddress* component must be unique in the network.

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The *ClosedUserGroup* component contains attributes that define options associated with national or international closed user group (CUG) IDs. The CUG identifies a group of DNAs. The CUG provides security by ensuring that only authorized management devices (with the proper CUG) can access the node. In other words, the management devices that initiate a connection to the node (through the IPIVC) must all be members of the CUG provisioned on the IPIVC.

The *DefaultRoute* component is an optional subcomponent of the *Ipivc* component. The default route is the IP route used when no specific logical connection has been assigned from the node to a given IP address. Nortel Multiservice Switch nodes use the default route to access management devices the connect indirectly to the DPN network through an IP-routing-capable device. The *DefaultRoute* component has two attributes that define the remote end of the default route: *callingIpAddress* and *callingDataNetworkAddress*.

The *LogicalChannelNumber* component is a dynamic subcomponent of the *Ipivc* component which represents the logical connection with the VC. Because IPIVC can support up to 24 VCs, there can be up to 24 instances of the *LogicalChannelNumber* component. The instance value of this component ranges from 16 to 39.

Configuring IP interface over frame relay

You must run IPIFR on every Nortel Multiservice Switch node to which you want to establish management connections using frame relay.

A node can support only one of either IPIFR or IPIVC. The two interfaces cannot simultaneously coexist on a node, except during migration from IPIVC to IPIFR. Multiple management devices can manage the same node only if they all access the node using the same interface, which can be either IPIVC for a Multiservice Switch 7400 node only (DPN X.25) or IPIFR (frame relay) for all Multiservice Switch nodes.

With IPIFR, you can connect management devices to Multiservice Switch 7400 networks directly or indirectly. You can connect management devices to Multiservice Switch 15000 and Multiservice Switch 20000 nodes indirectly only. For more information on the connection options available, refer to IPIFR connection options (page 133).

How you configure IPIFR depends on whether you have directly or indirectly connected management devices. If you have indirectly connected management devices on multiple LANs that are interconnected, you can provision a default route to provide path redundancy.

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When you change the IP address of an IPIFR, all connections to IPIFR are cleared. When you change the subnetwork mask, all connections to the IPIFR are cleared.

IPIFR components and attributes

The *IpiFr* component allows external network management devices to access the node. The *IpiFr* component contains three provisionable attributes: *ipAddress*, *subnetMask*, and *maximumNumberOfLcn*. The IPIFR must have a unique IP address that represents the address of the network interface and a unique DNA for setting up the VC.

The *Dna* component contains a subset of all attributes that apply to all VCs. The *dataNetworkAddress* attribute of each Nortel Multiservice Switch 15000 node must be unique in the network.

The *LogicalChannelNumber* (*Lcn*) component is a subcomponent of the *IpiFr* component that represent the logical channel number (LCN) responsible for the logical connection with the PVC. There can be up to 24 instances of the *Lcn* component under the *IpiFr* component, allowing the IPIFR to support up to 24 VCs. The instance value of the *Lcn* component ranges from 16 to 39. At least one LCN must exist to connect with a management workstation. You can configure additional LCNs to provide redundant access from a node to multiple network management workstations.

The *Lcn* component contains a *remoteIpAddress* attribute that contains the far-end IP address of a frame relay PVC point-to-point IP connection. You can set the *remoteIpAddress* attribute (static ARP) or have IPIFR determine the IP address by inspecting the source address of the first packet received on the LCN. If the LCN connects to an IP-routing-capable device, set the IP address yourself.

The *DirectCall* (*Dc*) component is a subcomponent of the *Lcn* component. The *Dc* component defines a frame relay PVC between IPIFR and the frame relay user-to-network interface (UNI) to which the management device connects. To establish a connection, the frame relay user-to-network interface (*FrUni Dlci* component) must have a corresponding *DirectCall* component provisioned with mirrored information.

The *StaticRoute* (*Sr*) component represents the static IP route to a host, subnetwork, network IP address or default route IP address. The *Sr* component contains two attributes, *gatewayIpAddress* and *backupGatewayIpAddresss*. Backup gateways are only supported for the default route (that is, *StaticRoute*/0.0.0.0).

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The *Route* (*R*) component dynamically represents the active IP routes to destination IP addresses (that is, it represents the routing table). The attributes of the *Route* component report the next hop (*gtyIpAddr*), LCN (*lcnIf*), and type (host, subnetwork, or network) for each destination address.

Configuring a node to access a directly connected management device

To initially provision IPIFR on a Nortel Multiservice Switch 7400 node use the StartUp utility. This utility properly configures the module-wide virtual-circuit system component and sets the network ID. It will also set up one logical connection (represented by a *LogicalChannelNumber* component) between the node and a directly connected management device. See Network management connectivity configuration using StartUp (page 12) for information on using this utility.

You can add access to additional management devices by configuring a logical connection for each management device. On an edge node you must also configure the frame relay user-to-network interface between the directly connected management device and the edge node.

The figure Example of directly connected management devices (page 109) illustrates the connections between two edge nodes and an internal node to directly connected management devices. Each IPIFR and management device has an IP address. The connections between the IPIFR and the management devices are established using frame relay PVCs. The management devices connect to the edge nodes through a frame relay user-to-network interface.

Always use a high default priority when the management device is a Nortel Multiservice Data Manager workstation.

Setting the *procedures* attribute is critical to the proper provisioning of this FRUNI. The *procedures* attribute of the FRUNI service must match the setting for management device's frame relay DTE port.

Always use delay sensitivity when the management device is a Multiservice Data Manager workstation. When the transfer priority is set at 10, the Multiservice Switch trunk queue is set to high priority, the routing metric is set to delay, and the egress queue is set to high.

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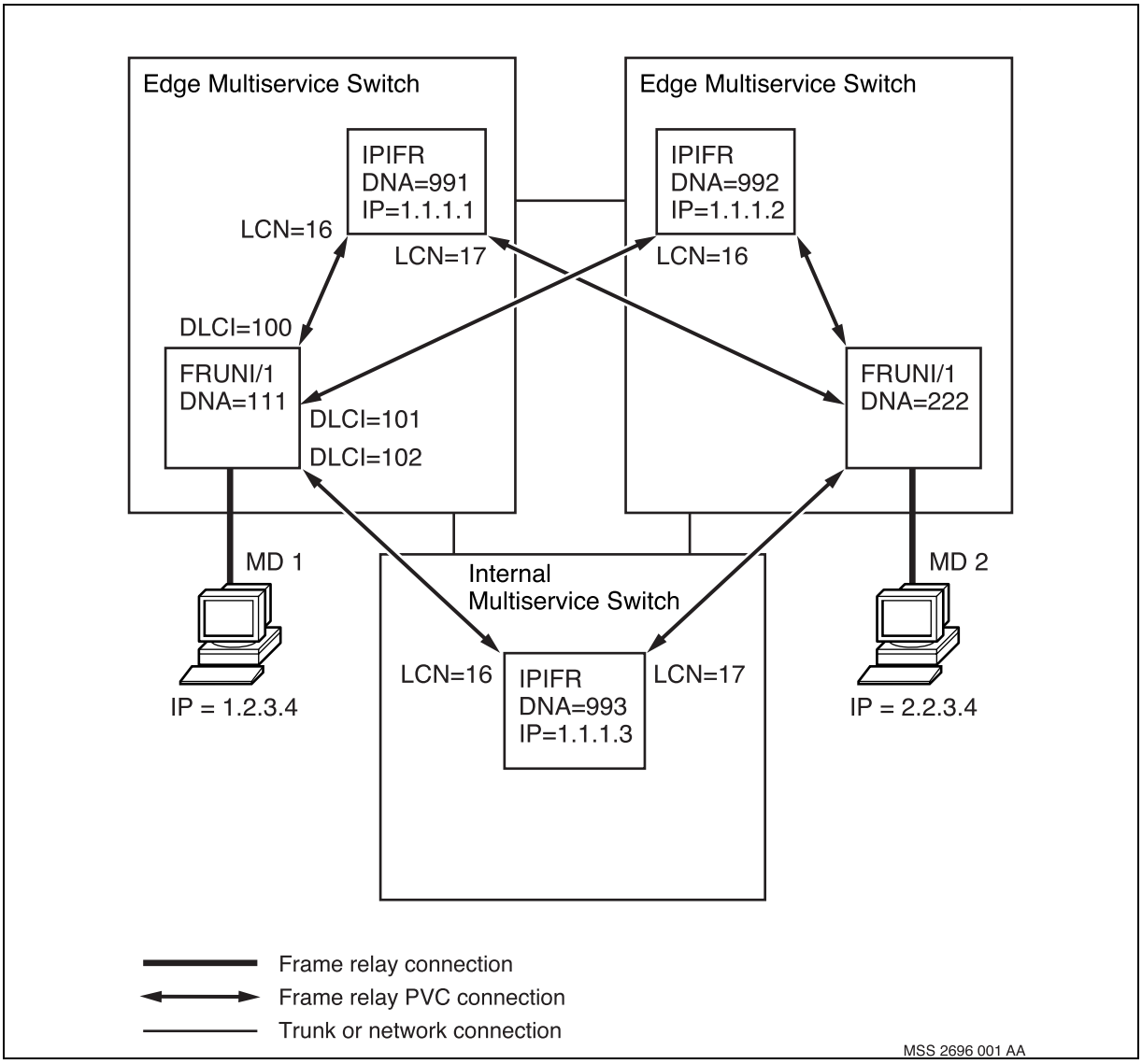
Example of directly connected management devices



Upgrading from IPIVC to IPIFR in Multiservice Switch 7400 nodes

The figure Before upgrading to IPIFR: connection over X.25 (page 110) shows the applicable configurations before upgrading to IPIFR.

There are three types of upgrades:

- upgrading a Nortel Multiservice Data Manager workstation to direct (point-to-point) FR connectivity illustrated in the figure After upgrading to IPIFR: direct connection over FR (page 111).
- upgrading an IP-routing-capable device illustrated in the figure After upgrading to IPIFR: direct connection over FR (page 111).

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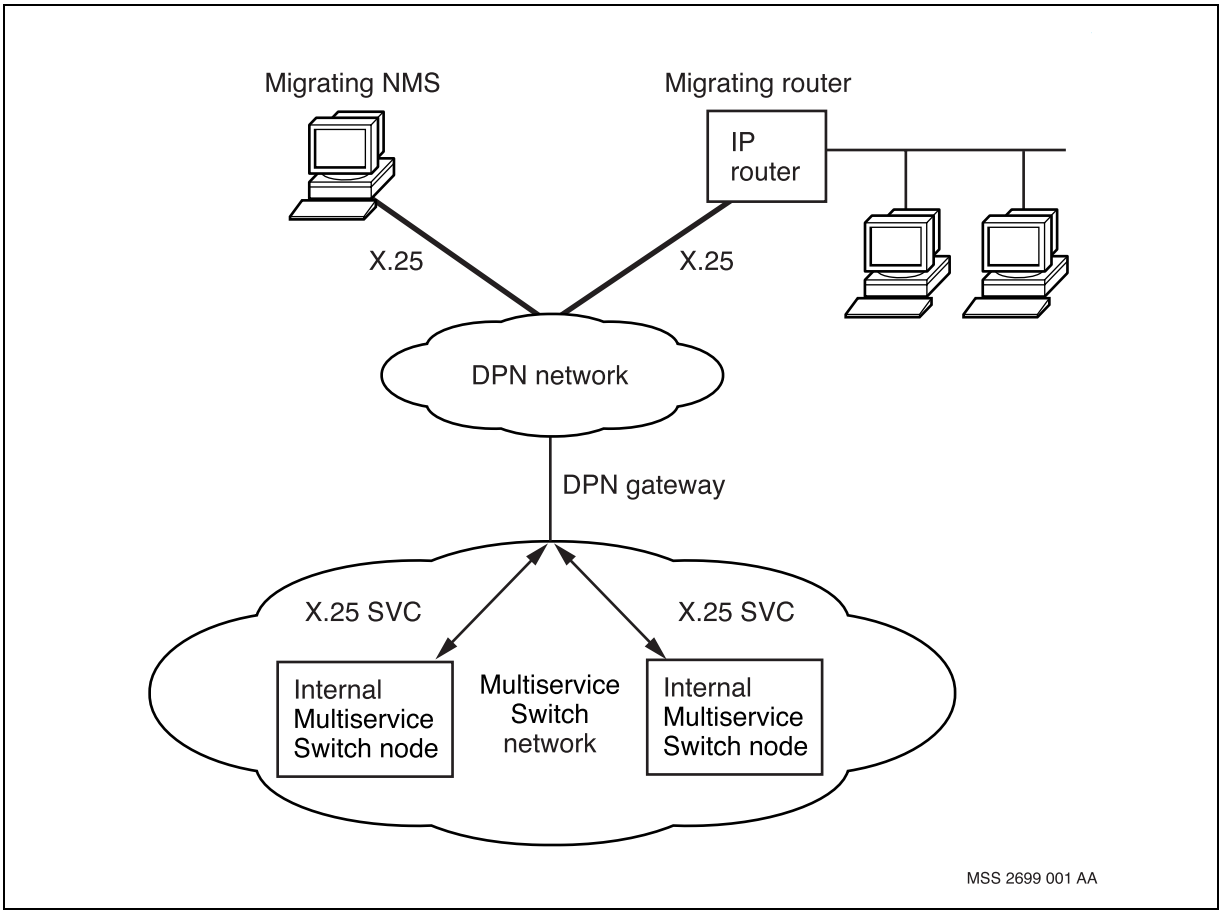
- upgrading a Multiservice Data Manager workstation to indirect FR connectivity through an additional IP-routing-capable device illustrated in the figure After upgrading to IPIFR: indirect connection over FR (page 112).

Before upgrading to IPIFR: connection over X.25



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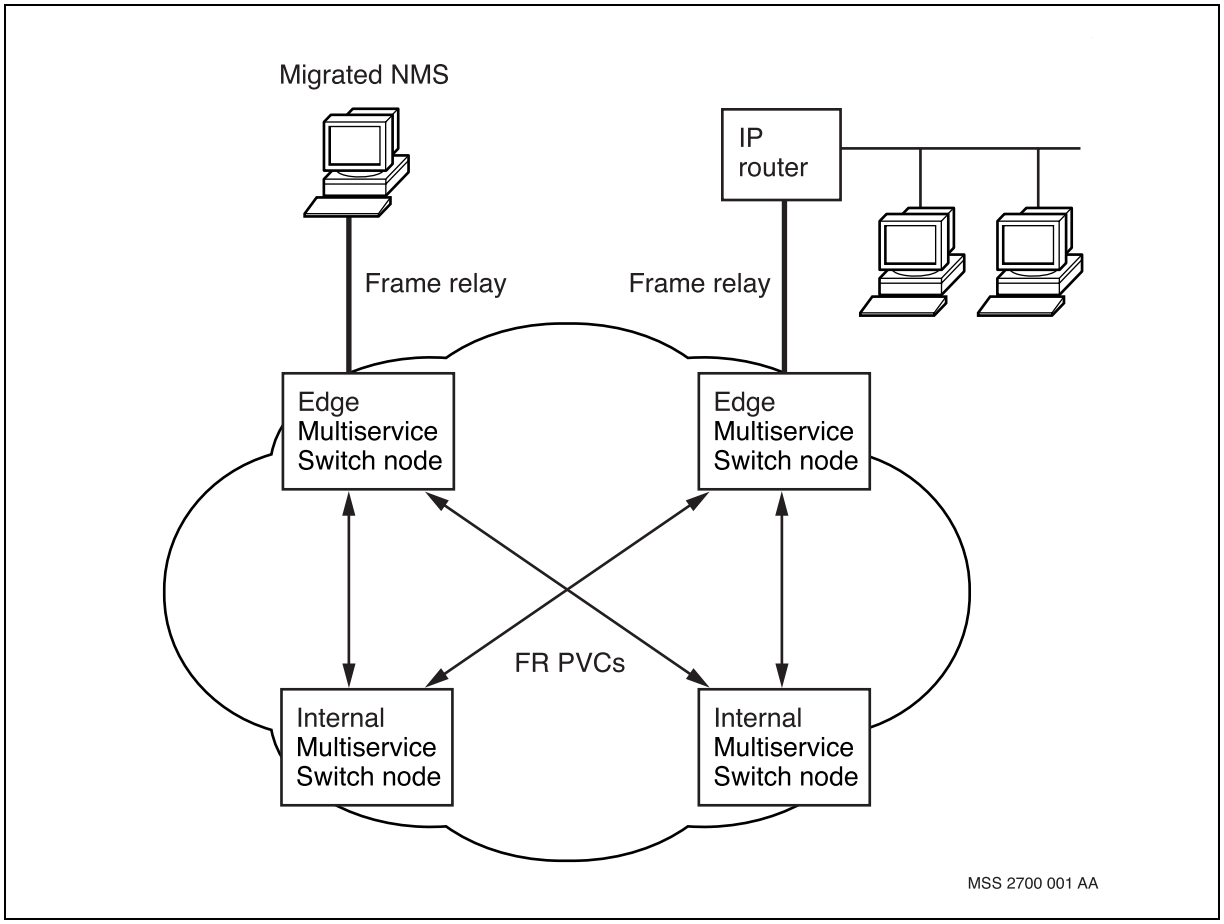
After upgrading to IPIFR: direct connection over FR



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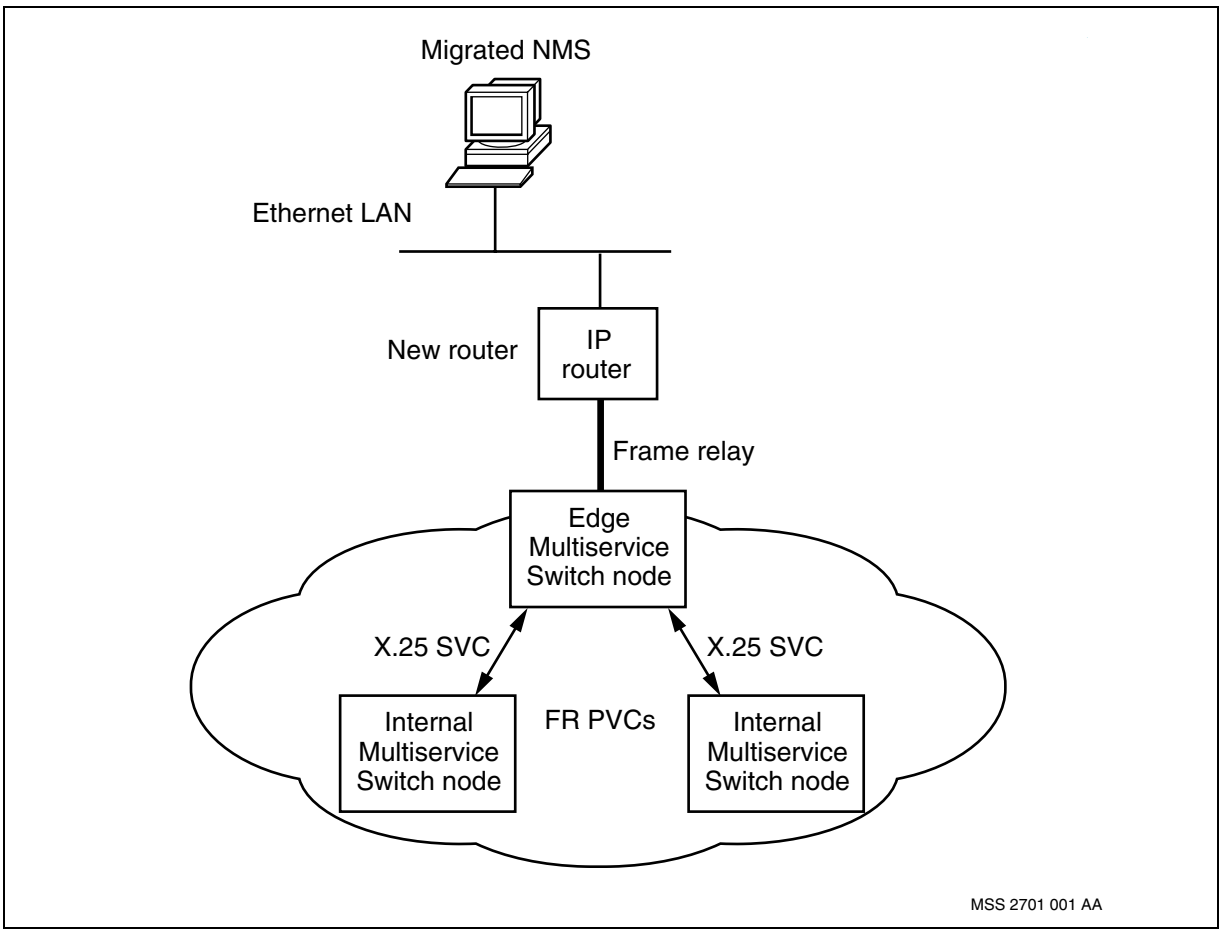
After upgrading to IPIFR: indirect connection over FR



In the post-upgrade figures After upgrading to IPIFR: direct connection over FR (page 111) and After upgrading to IPIFR: indirect connection over FR (page 112), the edge node connects directly to the workstation or the IP-routing-capable device. The internal node connects to the edge node.

Configuring IP services networking through Ethernet

A management device can be directly connected to an IP services network using an Ethernet connection, as shown in Network management Ethernet connection to a network with IP services only (page 114).

As well, a network with IP services only can be connected to a network without IP services. The management devices that were previously managing either network can manage the entire combined network. The figure Connectivity between a network with IP services only to a network without IP services (page 115) illustrates this type of configuration.

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You can then manage the IP services network using SNMP, Telnet, Ssh, FTP, or FMIP applications over the Ethernet connection. See the following documents for a detailed description of IP services networks:

- NN10600-030 *Nortel Multiservice Switch 7400/15000/20000 Overview*
- NN10600-170 *Nortel Multiservice Switch 7400 Hardware Description*
- NN10600-120 *Nortel Multiservice Switch 15000/20000 Hardware Description*
- NN10600-030 *Nortel Multiservice Switch 7400/15000/20000 Overview*
- NN10600-800 *Nortel Multiservice Switch 7400/15000/20000 IP Technology Fundamentals*

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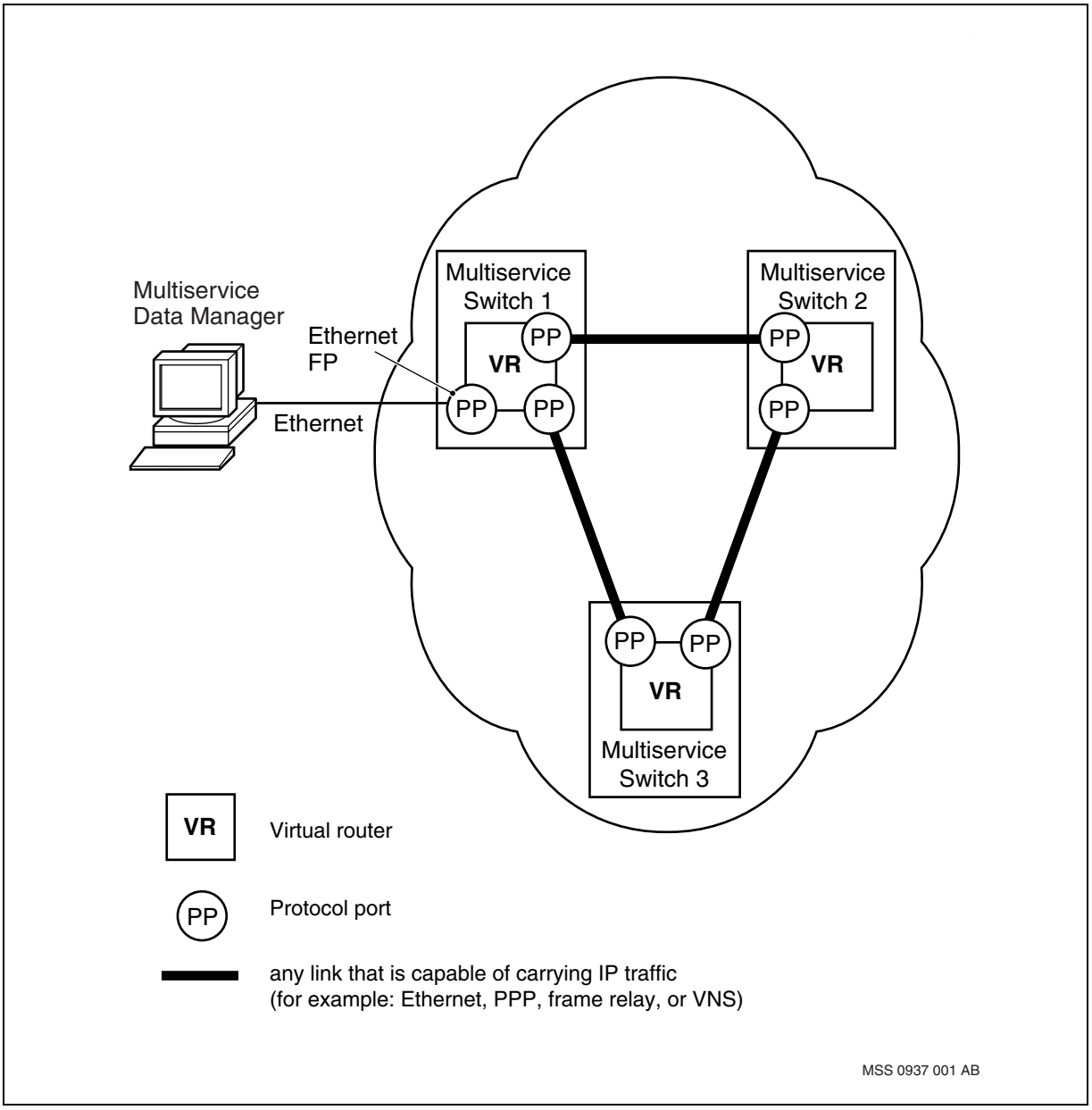
Network management Ethernet connection to a network with IP services only



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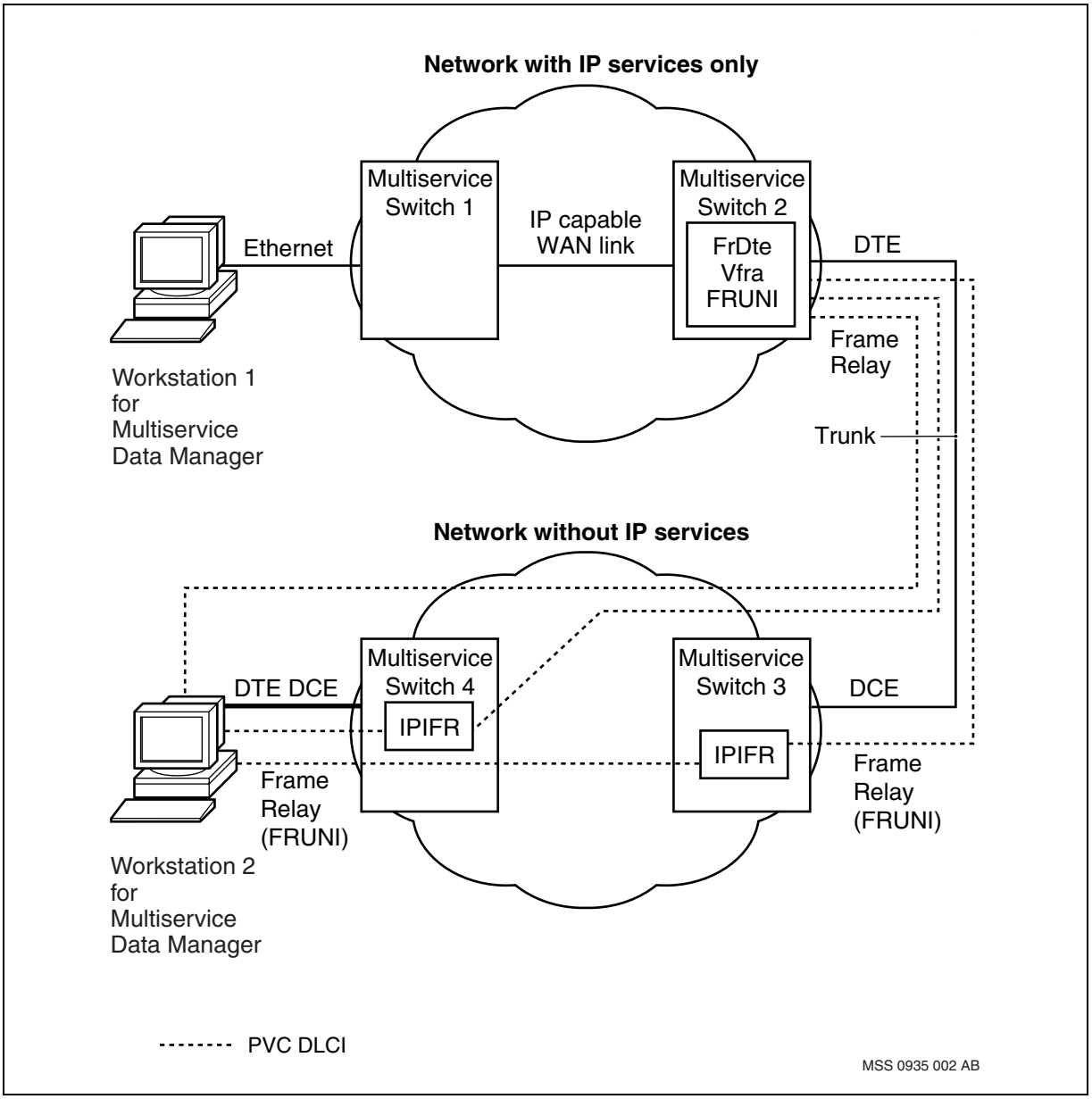
Connectivity between a network with IP services only to a network without IP services



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Troubleshooting Multiservice Switch nodes

See these sections if you have problems with a Nortel Multiservice Switch node:

- Alarms (page 116)
- Handling problems (page 116)
- Resetting shelf configuration programming (page 123)
- Checking for processor card failure (page 124)
- DS1 and E1 StartUp parameters and DPN counterparts for Multiservice Switch 7400 nodes (page 124)

For information on handling symptoms that can occur when installing an OC-48 FP in Nortel Multiservice Switch 15000 and Multiservice Switch 20000 nodes, see the troubleshooting section in NN10600-551 *Nortel Multiservice Switch 7400/15000/20000 FP Configuration Reference*.

Alarms

As you use StartUp, you can encounter fault or failure conditions on the node that raise alarms. Nortel Multiservice Switch 15000 components generate alarms asynchronously. When a component generates an alarm, it does so to signal one of the following conditions:

- The component is in need of repair.
- The component has detected a fault elsewhere on the node.

Alarms contain information that help you monitor and survey your network. For more information, see NN10600-500 *Nortel Multiservice Switch 6400/7400/15000/20000 Alarms Reference*.

Handling problems

This table provides guidelines about how to respond to problems that can occur when you are using StartUp.

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Handling problems

Problems	Probable causes	Corrective measures
You have run option 4, *Configure the node for Multiservice Data Manager connectivity* and the system is not operable.	The shelf configuration does not correspond to configuration you provisioned.	Reset the shelf configuration programming. See Resetting shelf configuration programming (page 123).
There is no network connectivity.	There is a processor card failure.	Verify that the processor has failed. See Checking for processor card failure (page 124)
	The link does not come up.	Verify the configuration data. See NN10600-520 *Nortel Multiservice Switch 7400/15000/20000 Fault and Performance Management: Troubleshooting*. Verify that the physical connection is properly configured and is up. Verify that Multiservice Data Manager is configured with the information needed to establish the FRUNI connections. Verify that Multiservice Data Manager is making the call to the FRUNI. Verify that the node name, IP address and DLCI on the node are those which are provisioned in Multiservice Data Manager.
There is no network connectivity.	The link does not come up.	For V.35 and V.11 links (on a V.11 or V.35 processor) check • V.35 and V.11 DCE/DTE link modes • cable connections • V.35 and V.11 ready *LineState* and data *TransferLineState* are set up correctly
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Handling problems (continued)

Problems	Probable causes	Corrective measures
		For DS1 and E1 links, check • DS1 and E1 channel configurations at both ends match • master and slave clocking is consistent • DS1/E1 and DS3/E3 operational attributes
There is no network connectivity.	The link does not come up.	For DS3 ATM links, check that • the cable connections between the two ports (that is, transmit-to-receive and receive-to-transmit) are good • the mapping type matches on both ends (either direct or plcp) • in the *Cell* subcomponent, the attribute *scrambleCellPayload* is on for both ports that are physically connected • the port is enabled and busy, but the *Vcc* component is disabled. For more information, see the troubleshooting section in NN10600-715 *Nortel Multiservice Switch 7400/ 15000/20000 ATM Fault and Performance Management*. • the *Vcc* component is enabled, but the trunk does not come up. For more information, see the troubleshooting chapter in NN10600-420 *Nortel Multiservice Switch 7400/ 15000/20000 Operations: Trunking*.
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Handling problems (continued)

Problems	Probable causes	Corrective measures
There is no network connectivity.	The link does not come up.	For E3 ATM links, check that • cable connections between the two ports (that is, transmit-to-receive and receive-to-transmit) are good • the mapping type is the same for both ends (direct or plcp) • the framing type is the same for both ends (g751 or g832) • the port is enabled and busy, but the *Vcc* component is disabled. For more information, see the troubleshooting section in NN10600-715 *Nortel Multiservice Switch 7400/ 15000/20000 ATM Fault and Performance Management*. • the *Vcc* component is enabled, but the trunk does not come up. For more information, see the troubleshooting chapter in NN10600-420 *Nortel Multiservice Switch 7400/ 15000/20000 Operations: Trunking*.
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Handling problems (continued)

Problems	Probable causes	Corrective measures
There is no network connectivity.	The link does not come up.	For OC-3 ATM links, check that • the cable connections between the two ports (that is, transmit-to-receive and receive-to-transmit) are good • the same line type is selected at both ends (SONET or SDH) • the port is enabled and busy, but the *Vcc* component is disabled. For more information, see the troubleshooting section in NN10600-715 *Nortel Multiservice Switch 7400/ 15000/20000 ATM Fault and Performance Management*. • the *Vcc* component is enabled, but the trunk does not come up. For more information, see the troubleshooting chapter in NN10600-420 *Nortel Multiservice Switch 7400/ 15000/20000 Operations: Trunking*
IPIVC is not operable.	There are network configuration inconsistencies.	Verify that the new Multiservice Switch 7400 node recognizes the DPN network CSRM. Verify that the DPN network CSRM recognizes the new Multiservice Switch 7400 node. Verify that the IPIVC DNA is associated with the DPN CSRM. Check the prefix for the DNA RID mapping.
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Handling problems (continued)

Problems	Probable causes	Corrective measures
IPIVC is not operable (continued). These troubleshooting procedures require a higher skill level. Only those who are qualified to perform network administration must attempt them.	Multiservice Data Manager IPIVC configuration is noncompliant.	Verify the IPIVC configuration on Multiservice Data Manager (see 241-6001-303 *Nortel Multiservice Data Manager Administration*).
IPIFR is not operable in a direct connection. These troubleshooting procedures require a higher skill level and should only be attempted by those who are qualified to perform network administration.	There are network configuration inconsistencies.	Verify that the FRUNI connection matches the values used for configuration. Verify that the LCN and its *DirectCall* component on the local IPIFR is properly configured and corresponds to the information in the DLCI and its *DirectCall* component on the initial FR UNI. Verify that there are no CSRMs in the Multiservice Switch-only network.
	Multiservice Data Manager IPIFR configuration is non-compliant.	Verify the IPIFR configuration (see 241-6001-303 *Nortel Multiservice Data Manager Administration*).
IPIFR is not operable in a connection through a Multiservice Switch network. These troubleshooting procedures require a higher skill level. Only those who are qualified to perform network administration must attempt them.	There are network configuration inconsistencies.	Verify that the trunk is configured properly and is up. Verify that the DLCI and its *DirectCall* component on the FRUNI for the given connection is properly configured. See NN10600-520 *Nortel Multiservice Switch 7400/15000/ 20000 Fault and Performance Management: Troubleshooting* for details on connections using IPIFR.

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Handling problems (continued)

Problems	Probable causes	Corrective measures
IPIFR is not operable in a connection through a Multiservice Switch network. These troubleshooting procedures require a higher skill level. Only those who are qualified to perform network administration must attempt them.	The *CallRouter* component is not provisioned with the IPIFR prefix.	Provision the IPIFR prefix in the *CallRouter* component on the node with the direct connection to Multiservice Data Manager. See NN10600-405 *Nortel Multiservice Switch 7400/15000/ 20000 Operations: Call Server*.
	Multiservice Data Manager IPIVC configuration is non-compliant.	Verify the IPIVC configuration (see 241-6001-303 *Nortel Multiservice Data Manager Administration*).
ATM MPE link is not up	The node is discarding all the traffic it receives. Traffic will be discarded if the rxFrameDiscard counter under the associated atmif vcc stats is non-zero.	Check the lp eng arc ov protectedPoolCapacity parameter under the Lp that is associated to the ATM FP. This parameter may cause a traffic discard if set greater than 26000. If Lp Eng FCRC PQC Ov is provisioned, make sure ipRoutes is set to a non-zero value, or else traffic will once again be discarded.
Multiservice Data Manager will not authenticate on the node through an ATM MPE link	The ATM MPE link is not provisioned through a Management Virtual Router.	If you have provisioned ATM Inband connectivity to your Multiservice Switch network and cannot authenticate with Multiservice Data Manager on the node, make sure you have linked the ATM MPE service to a protocol port under the management VR and not a non-management VR.
(6 of 7)		

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Handling problems (continued)

Problems	Probable causes	Corrective measures
Cannot ping the node from Multiservice Data Manager.	IPIVC DNA CUG type or DNIC values are the default values.	After the StartUp script is complete, enter the customer-specific values for the Ipivc Dna Cug type and dnic values.
FTP session times out while transferring Management Data Provider (MDP) records.	Frame relay network-to-network interface (NNI) data link connection identifier (DLCI uses default transfer priority	Your node-to-MDP ftp connection can time out when transferring very large amounts of accounting or performance data. If this problem occurs and you cannot complete a successful data transfer, or if you anticipate very large data transfers to your MDP, configure the frame relay NNI DLCI to use a transfer priority (TP) of normal (6).
(7 of 7)		

Resetting shelf configuration programming

Follow this procedure to reset the shelf configuration programming.

1 From the StartUp menu, run option 1, *Reset the node to CP-only software*.

2 From the StartUp menu, run option 2, *Create sw LPTs and load software on FPs*.

3 From the StartUp menu, run option 3, *Perform on-card tests of each card in the node*.

4 From the StartUp menu, run option 4, *Configure the node for Multiservice Data Manager connectivity*.

You have now reset the shelf configuration programming. You can run other options from the main menu or exit StartUp. When you exit, StartUp prompts you to commit the view.

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Checking for processor card failure

Follow this procedure to check for a processor card failure.

1 Verify the status of the operational LEDs of the processor card. See NN10600-520 *Nortel Multiservice Switch 7400/15000/20000 Fault and Performance Management: Troubleshooting* for a description of the card status based on the LED display.

A solid amber LED means that the card is not faulty, but cannot operate. For Nortel Multiservice Switch 7400 series devices, verify that you are using a valid card. See NN10600-170 *Nortel Multiservice Switch 7400 Hardware Description* for a list of processor cards with equivalent valid PECs.

If necessary, replace the card with a valid one.

2 From the StartUp menu, run option 3, *Perform on-card tests of each card in the node*.

3 Power down the node. See NN10600-175 *Nortel Multiservice Switch 7400 Hardware Installation, Maintenance, and Upgrade* or NN10600-130 *Nortel Multiservice Switch 15000/20000 Hardware Installation, Maintenance, and Upgrade*.

4 Power up the node. See NN10600-175 *Nortel Multiservice Switch 7400 Hardware Installation, Maintenance, and Upgrade* or NN10600-130 *Nortel Multiservice Switch 15000/20000 Hardware Installation, Maintenance, and Upgrade*.

5 Remove and carefully reinsert the processor card into the backplane. Ensure that the processor is properly seated. See NN10600-175 *Nortel Multiservice Switch 7400 Hardware Installation, Maintenance, and Upgrade* or NN10600-130 *Nortel Multiservice Switch 15000/20000 Hardware Installation, Maintenance, and Upgrade*.

6 From the StartUp menu, run option 3, *Perform on-card tests of each card in the node*.

If processor card problems persist, replace the processor card and return the failed processor card to Nortel Networks Networks.

DS1 and E1 StartUp parameters and DPN counterparts for Multiservice Switch 7400 nodes

The following table lists DS1 and E1 StartUp parameters and their counterparts under DPN.

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DS1 and E1 StartUp parameters and corresponding DPN counterparts

Trunk type	StartUp attribute	DPN
E1	*lineType*: CCS	frame format: 2_Frame HDB3 *
	lineType: CAS *	frame format: 16_Frame HDB3
DS1 (The DPN frame format is a combination of linetype and zerocoding on StartUp. DPN defaults to E1 type.)	*lineType*: ESF *	frame format: 24_Frame B8ZS 24_Frame B7
	linetype: D4	frame format: 12_Frame B8ZS 12_Frame B7
	zeroCoding: B8ZS * B7 AMI	apply to above
E1 and DS1	*clockingSource*: line * local	clock configuration: slave * master
	dataInversion: off * on	HDLC inversion: no * yes
* represents values that are set as factory defaults.		

Verifying that the file system is synchronized

To synchronize the file system before a software migration, perform the following procedure in operational mode.

1 Synchronize the file system:

```
display FileSystem syncStatus
```

If the shadowed file system is synchronized, then the attribute value for the displayed attribute is *synchronized*.

2 If the shadowed file system is synchronizing, wait until synchronization is complete. If the shadowed file system is unsynchronized, type the following command to start synchronizing:

```
synchronize FileSystem
```


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Multiservice Switch 7400 IPIVC to IPIFR upgrade

Perform a Nortel Multiservice Switch 7400 IPIVC to IPIFR upgrade to convert Nortel Multiservice Data Manager workstations (or IP-routing-capable devices) from IP over X.25 to IP over FR.

The procedures in this section apply only to Multiservice Data Manager workstations and devices that are capable of IP routing (such as IP routers or Multiservice Data Manager workstations running an IP routing daemon). The procedures are not necessary for workstations connected to the IP router through a LAN.

During this process, the non-upgrading workstations manage the Multiservice Switch network through X.25 connections.

- Prerequisites to IPIVC to IPIFR upgrade (page 126)
- IPIVC to IPIFR upgrade task (page 126)

Prerequisites to IPIVC to IPIFR upgrade

CAUTION
IPIFR upgrade rule
To ensure a successful upgrade and to avoid corruption of the routing table, strictly follow the upgrade procedures described in this section.

- For conceptual information, refer to Upgrading from IPIVC to IPIFR in Multiservice Switch 7400 nodes (page 109).

IPIVC to IPIFR upgrade task

Multiservice Switch 7400 IPIVC to IPIFR upgrade task flow (page 127) shows you the sequence of tasks and procedures you perform to complete an IPIVC to IPIFR upgrade. To link to any task or procedure, go to Task navigation (page 127).

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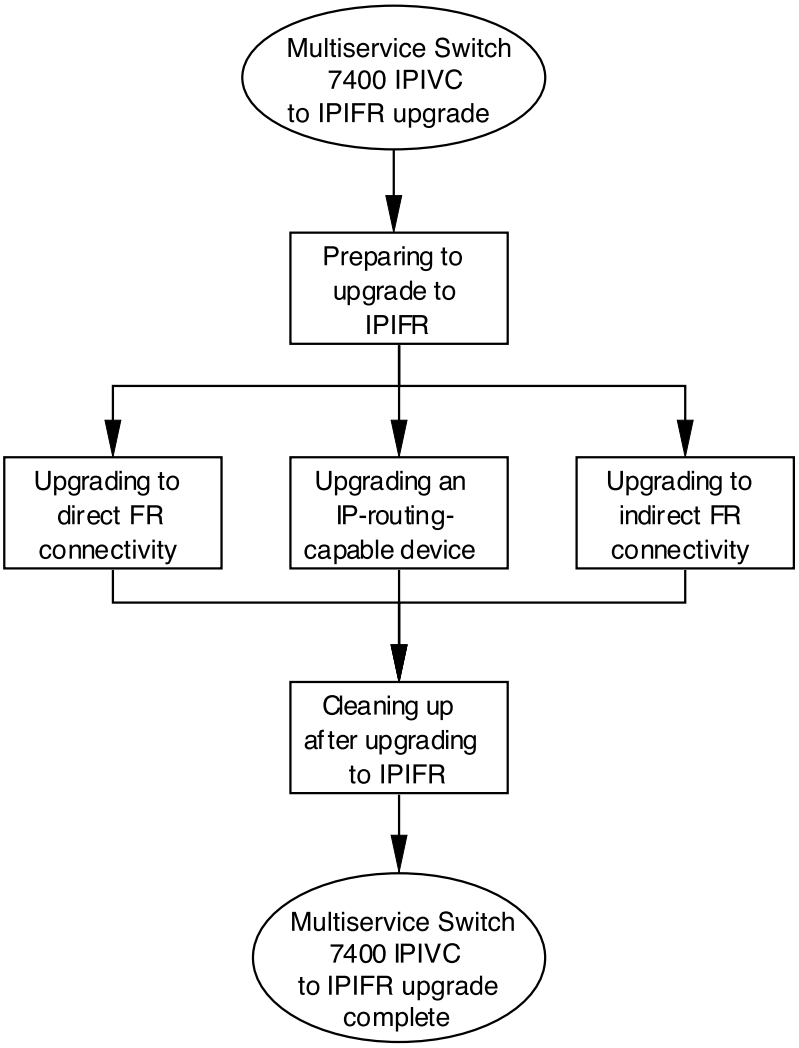
Multiservice Switch 7400 IPIVC to IPIFR upgrade task flow



MSS 3374 001 AA

Task navigation

- Preparing to upgrade to IPIFR (page 128)
- Upgrading to direct FR connectivity (page 129)
- Upgrading an IP-routing-capable device (page 130)
- Upgrading to indirect FR connectivity (page 131)
- Cleaning up after upgrading to IPIFR (page 132)

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Preparing to upgrade to IPIFR

You must prepare the network before you can reconfigure individual Nortel Multiservice Data Manager workstations or the IP-routing-capable device to upgrade them from X.25 to FR.

During the preparation phase, all Multiservice Data Manager workstations continue their control and management activities for the network using X.25 connections.

Procedure steps

Step	Action
1	On the edge nodes, provision a FRUNI service and the DLCIs for connection to the upgrading workstation. See Configuring a direct frame relay network connection (page 51).
2	Provision the IPIFR feature on every node to be managed through the upgrading workstation. See Configuring the IPIFR feature (page 21).
3	Provision the *IpiFr* component and appropriate LCNs on every node to be managed through the upgrading workstation. See Configuring the IPIFR component (page 22) and Adding logical connections for management devices (page 24).
4	On every node, check whether the upgrading IP-routing-capable device is the IP default route currently configured on the node's *IpiVc* component. If it is, you must add the *StaticRoute/0.0.0.0* component to the *IpiFr* component. See Configuring a default route for path redundancy (page 28).The *gatewayIpAddress* attribute in the *StaticRoute/0.0.0.0* component of the *IpiFr* component must be the same as the *callingIpAddress* attribute in the *DefaultRoute* component of the *IpiVc* component.
5	Provision a *StaticRoute* component on the *IpiFr* component for the appropriate subnet of the IP-routing-capable device on every node that indirectly connects to the upgrading workstation. See Configuring nodes to access an indirectly connected management device (page 26).

--End--

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Upgrading to direct FR connectivity

Upgrade to direct FR connectivity to enable a Multiservice Data Manager workstation to access the Nortel Multiservice Switch network through IPIFR.

Procedure steps

Step	Action
1	Shut down the X.25 service on the upgrading Multiservice Data Manager workstation.
2	Disconnect the upgrading workstation from the network by disconnecting the X.25 cable between the workstation and the DPN.
3	On the SunLink X.25 card, unconfigure every node's IP address over X.25.
4	Install the FR software on the workstation according to 241-6001-100 *Nortel Multiservice Data Manager Software Installation and Initial Configuration*.

CAUTION

IPIFR upgrade rule

Ensure that steps step 1 through step 3 have been successfully completed before continuing to step 4. If you do not, the routing table in the node can become corrupted.

5	Configure the workstation with the Multiservice Switch host and group information using the passport.frconfig program according to 241-6001-303 *Nortel Multiservice Data Manager Administration*.
6	Connect the cable from the upgrading workstation to the FRUNI defined for this workstation during the preparation phase.
7	Reboot the workstation.
8	Make sure the FR service is active on the workstation.

--End--

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Upgrading an IP-routing-capable device

Upgrade an IP-routing-capable device to access the Nortel Multiservice Switch network through IPIFR.

Procedure steps

Step	Action
1	Shut down the X.25 service on the IP-routing-capable device.
2	Disconnect the upgrading IP-routing-capable device from the network by disconnecting the X.25 cable between the routing device and the DPN.
3	On the IP-routing-capable device, unconfigure every node's IP address over X.25 according to the manufacturer's instructions.

CAUTION
IPIFR upgrade rule
Ensure that steps step 1 through step 3 have been successfully completed before continuing to step 4. If you do not, the routing table in the node can become corrupted.

4	Configure the IP-routing-capable device for frame relay according to the manufacturer's instructions.
5	Connect the cable from the upgrading IP-routing-capable device to the FRUNI defined for this workstation during the preparation phase.
6	Reboot the IP-routing-capable device.

--End--

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Upgrading to indirect FR connectivity

Upgrade to indirect FR connectivity to enable a Nortel Multiservice Data Manager workstation to access the Nortel Multiservice Switch network through IPIFR while connected through an IP-routing-capable device.

Procedure steps

Step	Action
1	On the IP-routing-capable device, configure every Multiservice Switch 7400 IP address over FR. This step includes installing the FR IP port and provisioning DLCIs. For details, see the documentation provided with the IP-routing-capable device.
2	Connect the cable from the new IP-routing-capable device to the FRUNI defined for this device during the preparation phase.
3	Disconnect each upgrading workstation from the network by disconnecting the X.25 cable between the workstation and the DPN.
4	On the SunLink X.25 card, unconfigure every node's IP address over X.25.
5	Connect the cable from the upgrading workstation to the Ethernet LAN.
6	Reboot each workstation.

--End--

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Cleaning up after upgrading to IPIFR

Clean up after upgrading to IPIFR on all upgrading workstations to remove the *IpiVc* component and IpiVc feature on each Nortel Multiservice Switch 7400 node to reclaim the CP memory used by the IPIVC process.

Prerequisites

CAUTION
CP reboot
The process of removing the IpiVc feature causes the CP to reboot. Nortel Networks recommends that you perform the following procedure during a maintenance window.

Procedure steps

Step	Action
1	Delete the *IpiVc* component. `delete IpiVc`
2	Remove the IPIVC feature from the LPT/CP feature list. `set sw Lpt/CP featureList ~ IpiVc`
3	Display the feature list to ensure that IPIVC has been deleted. `display Sw Lpt/CP featureList`

--End--

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IPIFR connection options

With IPIFR, you can connect management devices to Nortel Multiservice Switch 7400 networks directly or indirectly. You can connect management devices to Multiservice Switch 15000 and Multiservice Switch 20000 nodes indirectly only.

With a direct connection, a management device (MD) connects to an edge node in the Multiservice Switch 7400 network using a frame relay interface. From this physical connection, you can configure a frame relay PVC to each node in the network running IPIFR. Each IPIFR supports a maximum of 24 PVC connections.

With an indirect connection, an MD connects to a node in the Multiservice Switch network through a IP-routing-capable device that has a frame relay interface. For example, the MD can connect to a node through an IP router or a frame relay access device (FRAD). From this physical connection, you configure a frame relay PVC to each node in the network running IPIFR. After you have configured the appropriate static routes, any MD on the same LAN as the IP-routing-capable device can establish TCP/IP connections to nodes running IPIFR.

If your MDs are on a single LAN, then you can set the IP default route to the IP address of the IP-routing-capable device. This configuration allows outgoing IP packets not destined for a directly connected MD to be routed over the frame relay connection to the IP-routing-capable device.

If your MDs are on multiple LANs that each connect to the network through an IP-routing-capable device, then you can set specific static IP routes to the IP-routing-capable devices. You can define host, subnetwork, and network static routes so that IPIFR can exchange packets with many indirectly connected MDs.

For more information on routing to directly and indirectly connected MDs, see the following sections:

- Routing to directly connected devices (page 134)
- Routing to indirectly connected devices using a default route (page 135)

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- Routing to indirectly connected devices using static routes (page 137)
- Providing path redundancy to indirectly connected devices using a default route (page 140)

Routing to directly connected devices

When you have a directly connected management device (MD), Nortel Multiservice Switch devices use a permanent virtual circuit (PVC) to establish a connection between the MD and IPIFR running on the node.

IPIFR views each PVC as a point-to-point IP connection. To configure the point-to-point connection, you must specify the IP address, subnetwork mask, data network address (DNA), and numbering plan for the IPIFR interface. You must also configure a logical channel number (LCN) for each directly connected management device. For the LCN, you must specify the IP address (remote IP address), the DNA (remote DNA), and the DLCI (remote DLCI) of the management device.

You can either provision the remote IP address of the management device or have the Multiservice Switch device dynamically learn the remote IP address by inspecting the source address of the first IP packet received on the PVC.

An advantage to provisioning the remote IP address is that an IP route is established as soon as the node establishes the frame relay PVC. Otherwise, the node cannot establish an IP route until after the directly connected device (an MD or an IP-routing capable device) sends an IP packet to the node on the PVC.

The completed definition of each PVC point-to-point IP link results in an IP routing table entry. The routing table entry is a host route (an IP route to a single IP node) to the MD. The destination IP address is the IP address of the management device. The gateway IP address is the IP address of IPIFR.

The figure Example of directly connected management devices (page 135) illustrates the connection between directly connected MDs to an internal network node running IPIFR. IPIFR uses a frame relay PVC to access each directly connected management device.

The table Example IP routing table for directly connected management devices (page 135) shows the routing table for the connections in the figure.

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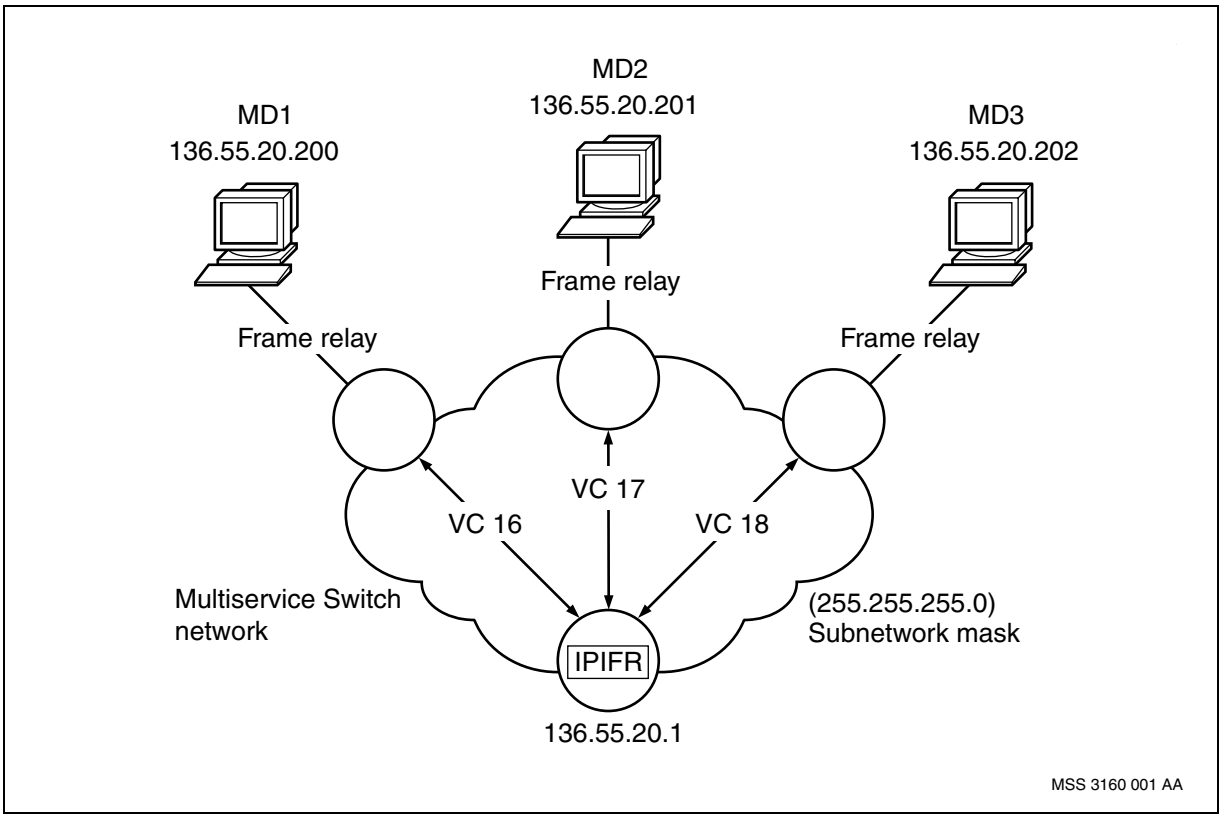
Example IP routing table for directly connected management devices

Destination	Destination IP	Gateway IP	Type	Interface
MD 1	136.55.20.200	136.55.20.1	host	VC 16
MD 2	136.55.20.201	136.55.20.1	host	VC 17
MD 3	136.55.20.202	136.55.20.1	host	VC 18

Example of directly connected management devices



Routing to indirectly connected devices using a default route

IPIFR can use an IP default route to access indirectly connected management devices (MD). Use the default route to access indirectly connected MDs when you have only a single LAN connected to the Nortel Multiservice Switch network using an IP-routing-capable device. If you have multiple LANs connected to the network, use static routes to access the indirectly connected MDs. See Routing to indirectly connected devices using static routes (page 137) for more information.

The default route is the route IPIFR uses when it cannot find a specific host, subnetwork, or network route to a destination IP address. If you have a single IP-routing-capable device connected to your network, you can configure a

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default route to that device by specifying its IP address as first hop (gateway address) of the default route. With this configuration, IPIFR routes all packets that are not destined for directly connected MDs to the IP-routing-capable device.

To use a default route, you must first configure the point-to-point IP connection to the directly connected IP-routing-capable device you want to use as the first hop of the default route. You must create an LCN specifying the IP address (remote IP address), the DNA (remote DNA), and the DLCI (remote DLCI) of the IP-routing-capable device.

The figure Example using default route to indirectly connected management devices (page 137) illustrates an network using a default route to access all the indirectly connected MDs. When the destination IP address is not one of the two directly connected MDs (136.55.20.200 or 136.55.20.201), IPIFR sends IP packets to the default route, which is the IP router. The IP router then forwards the packets to each of the indirectly connected MDs (3, 4, and 5).

The table Example routing table with a default route to indirectly connected management devices (page 136) shows the routing table for the connections in the figure.

Example routing table with a default route to indirectly connected management devices

Destination	Destination IP	Gateway IP	Type	Interface
MD 1	136.55.20.200	136.55.20.1	host	VC16
MD2	136.55.20.201	136.55.20.1	host	VC17
IP Router	136.55.20.202	136.55.20.1	host	VC 18
MD 3, 4, 5	0.0.0.0	136.55.20.202	default	VC 18

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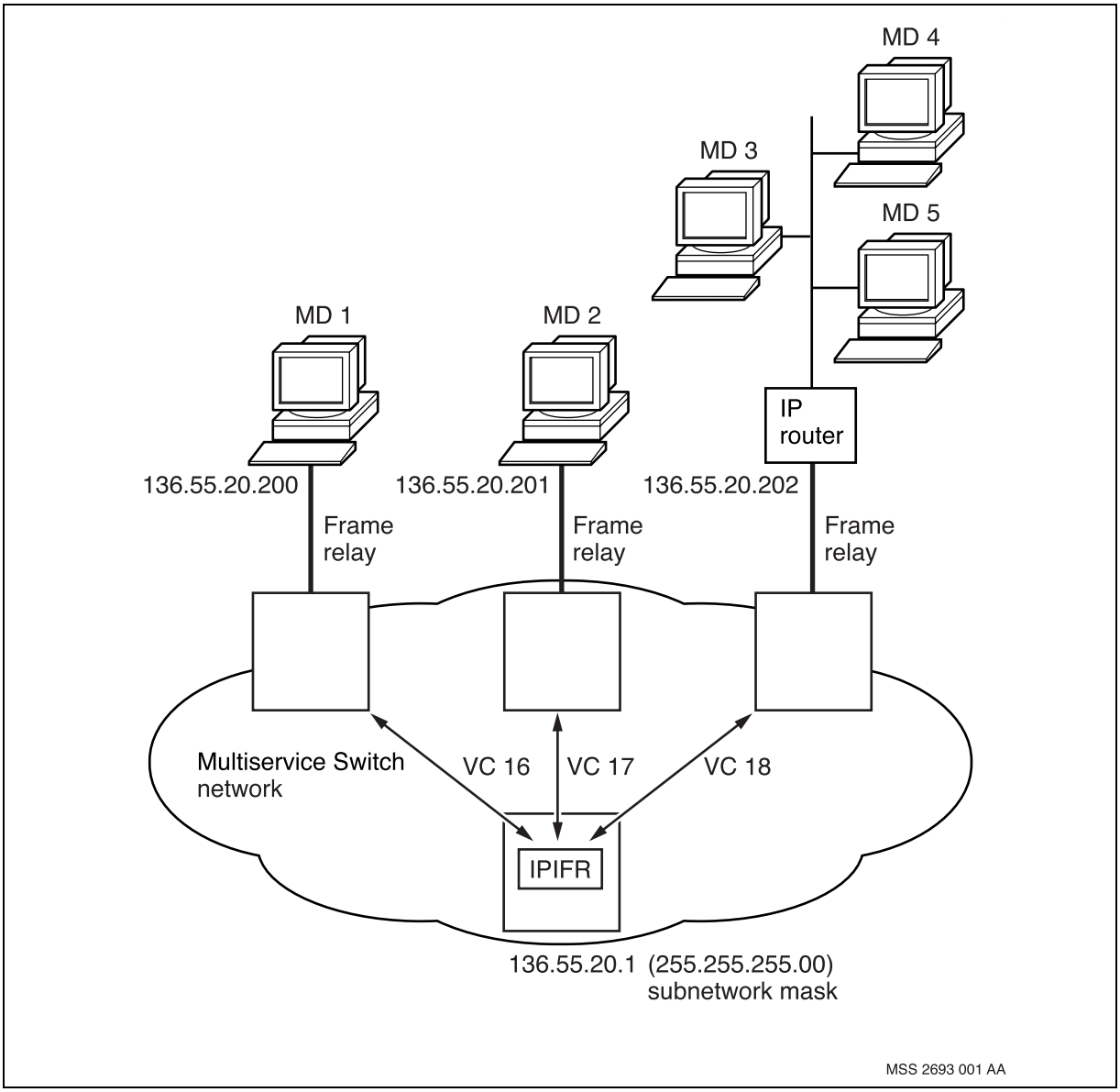
Example using default route to indirectly connected management devices



Routing to indirectly connected devices using static routes

Static IP routes allow IPIFR to access indirectly connected management devices (MD) on multiple LANs. If your indirectly connected MDs are on a single LAN, use a default route to access the MDs on the LAN. See Routing to indirectly connected devices using a default route (page 135)

You can also provide path redundancy by combining static routes with the default route. For more information, see Providing path redundancy to indirectly connected devices using a default route (page 140).

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IPIFR supports three types of static IP routes:

- host routes—IP routes to a single IP node
- subnetwork routes—IP routes to a group of IP nodes determined by the network and subnetwork portions of their IP addresses
- network routes—IP routes to a group of IP nodes determined by the network portion of their IP addresses

Certain limitations apply depending on whether the network to which you are trying to route contains the node (local network) or does not contain the Nortel Multiservice Switch node (remote network). IPIFR does not support subnetwork routes to remote networks. IPIFR also does not support variable-length subnetting. You can only specify a single subnetwork mask for all the VC interfaces managed by IPIFR.

If the local network is divided into subnetworks, you cannot configure network routes to the local network. However, you can configure network routes to remote networks.

You can configure only one static IP route for a particular host, subnetwork, or network, up to a maximum of 50 static IP routes. When you configure a static IP route, you must specify the destination address and the gateway address.

The destination address is the host address of the MD, the MD's subnetwork address, or its network address. The system determines whether the destination address is a host, subnetwork, or network address using the appropriate network mask and, if applicable, the subnetwork mask defined for IPIFR.

The gateway address is the IP address of the host that is the first hop on the route to the MD.

To use static routes, you must first configure the point-to-point IP connections to the directly connected IP-routing-capable devices you want to use for the first hops of the static routes. You must create an LCN for each of IP-routing-capable device, specifying its IP address (remote IP address), DNA (remote DNA), and DLCI (remote DLCI).

The figure Example using static routes to indirectly connected management devices (page 140) illustrates the static routes between indirectly connected MDs to an internal network node running IPIFR.

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IPIFR can reach the directly connected MD 1 using a host route. Since MD 1 is also an IP-routing-capable device (for example, a workstation running an IP routing application) and is part of the same network as the node (136.55.0.0). You can configure a subnetwork route (136.55.25.0) to reach all MDs on the subnetwork using MD 1 as the gateway address (136.55.20.200).

You can configure host and network static routes to MDs on the 47.0.0.0 network using the directly connected IP routers (IP addresses 136.55.20.201 and 136.55.20.202) as gateway addresses. However, since the node is not part of this network, you cannot configure subnetwork static routes. The table Example routing table with static routes to indirectly connected management devices (page 139) shows a routing table for the connections in the figure.

Example routing table with static routes to indirectly connected management devices

Destination	Destination IP	Gateway IP	Type	Interface
MD 1	136.55.20.200	136.55.20.1	host	VC 16
IP Router 1	136.55.20.201	136.55.20.1	host	VC 17
IP Router 2	136.55.20.202	136.55.20.1	host	VC 18
MD 2, 3	136.55.25.0	136.55.20.200	subnetwork	VC 16
MD 4	47.12.5.1	136.55.20.201	host	VC 17
MD 4, 5, 6, 7	47.0.0.0	136.55.20.202	network	VC 18

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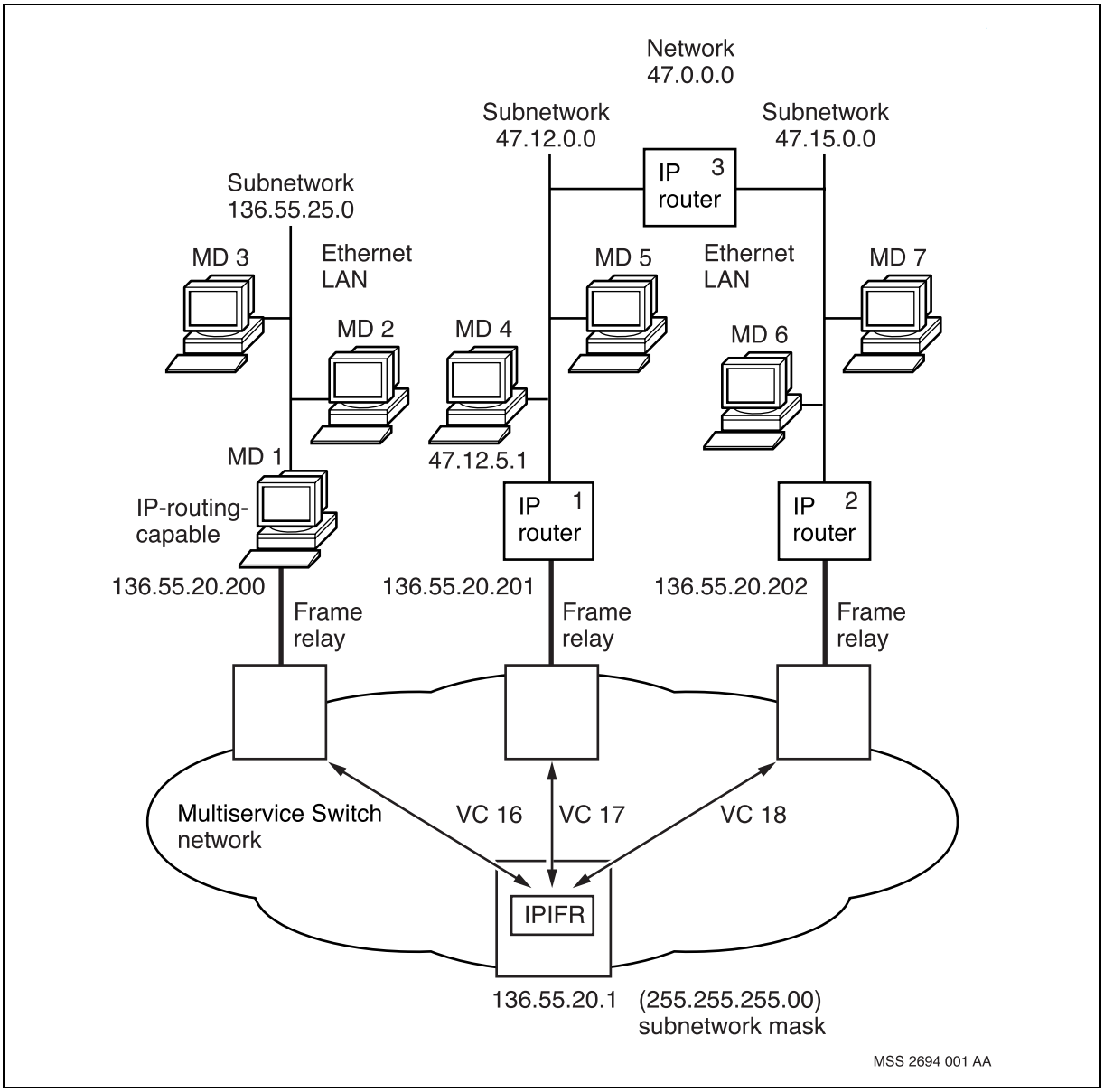
Example using static routes to indirectly connected management devices



Providing path redundancy to indirectly connected devices using a default route

When you have multiple LANs of management devices (MD) connected to your Nortel Multiservice Switch network, use static routes to access the indirectly connected MDs. You can also use a default route to provide path redundancy. The default route is the route IPIFR uses when it cannot find a specific host, subnetwork, or network route to a destination address.

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If the configured static route to an MD is not available (for example, its VC is down), then IPIFR sends IP packets destined for that MD to the default route. If the default route points to an IP-routing-capable device that has IP connectivity and IP reachability to all MDs, then the default route provides an alternate path to the MD. The default route is not always optimum, but it maintains a path between the management device and the network.

IPIFR also supports backups for the default route for even greater path redundancy. You can configure a number of backup gateway addresses. If the primary gateway address for the default route is not available, IPIFR searches through the backup gateway addresses until it finds an available route. IPIFR then uses this backup as the default route. At any given time, there is only one default route. If the primary gateway is later restored, the default route does not automatically return to the provisioned primary gateway. The primary gateway, if available, is used when the backup gateway becomes unavailable.

The figure Example using a default route for path redundancy (page 143) illustrates a network configuration that can use the default route for path redundancy. In this configuration, the management devices are on multiple LANs, but the LANs are all interconnected. You can choose one IP-routing-capable device (probably the most reliable one) for the primary default route, and the others as the backups. In the event of the failure of one of the links to the IP-routing-capable devices, IPIFR can reroute the IP packets to the available default route. This configuration maintains the connection between the management devices and the Multiservice Switch network even when multiple links fail or when the primary default route fails.

The table Example routing table using default route for path redundancy with all links available (page 141) illustrates the routing table for the figure when all links are available. The primary default route is to IP Router 2 (136.55.20.202). IP Router 1 and the IP-routing-capable MD 1 serve as the backups for the default route. If VC 18 fails, the network route to 47.0.0.0 and the default route are unavailable. In this case, IPIFR assigns IP Router 1 (136.55.20.201) as the new default route. Since all the LANs interconnect, all MDs are still reachable through IP Router 1. The table Example routing table using default route for path redundancy with primary default route unavailable (page 142) illustrates the routing table after VC 18 fails.

Example routing table using default route for path redundancy with all links available

Destination	Destination IP	Gateway IP	Type	Interface
MD 1	136.55.20.200	136.55.20.1	host	VC 16
IP Router 1	136.55.20.201	136.55.20.1	host	VC 17
IP Router 2	136.55.20.202	136.55.20.1	host	VC 18

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Example routing table using default route for path redundancy with all links available (continued)

Destination	Destination IP	Gateway IP	Type	Interface
MD 2, 3	136.55.25.0	136.55.20.200	subnetwork	VC 16
MD 4, 5, 6, 7	47.0.0.0	136.55.20.202	network	VC 18
All indirectly connected devices	0.0.0.0	136.55.20.202	default	VC 18

(2 of 2)

Example routing table using default route for path redundancy with primary default route unavailable

Destination	Destination IP	Gateway IP	Type	Interface
MD 1	136.55.20.200	136.55.20.1	host	VC 16
IP Router 1	136.55.20.201	136.55.20.1	host	VC 17
IP Router 2	136.55.20.202	136.55.20.1	host	VC 18
MD 2, 3	136.55.25.0	136.55.20.200	subnetwork	VC 16
All indirectly connected devices	0.0.0.0	136.55.20.201	default	VC 17

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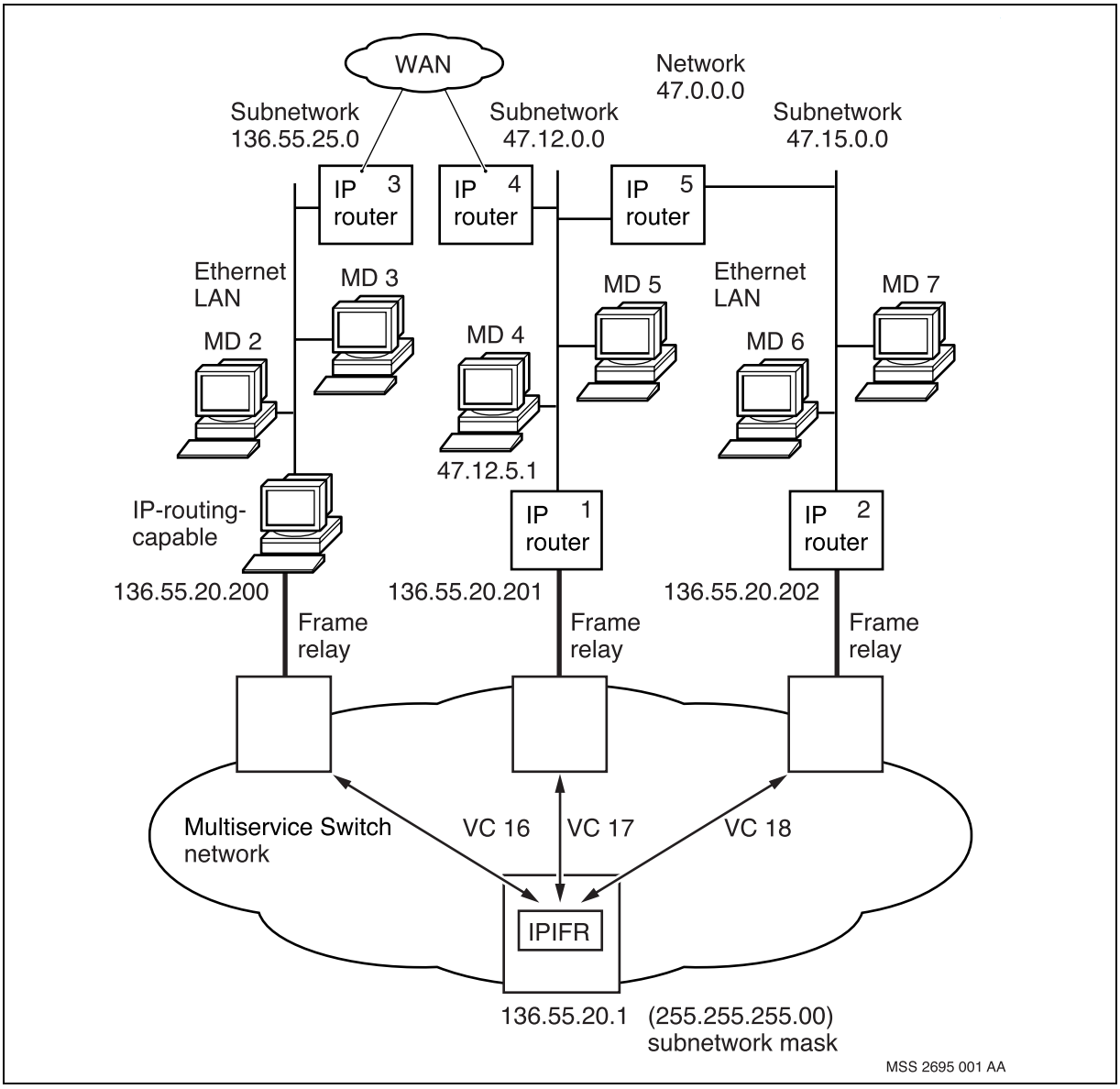
Example using a default route for path redundancy



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Multiservice Switch network topologies

To connect a new Nortel Multiservice Switch node to a Nortel Multiservice Data Manager workstation using StartUp, you must specify the network topology through which the new node will connect to the workstation. The topology you select indicates the type of connectivity you will have.

See the following sections for information about the network topologies into which you can add a Multiservice Switch 7400 node.

- A new Multiservice Switch 7400 node connected to Multiservice Data Manager through a DPN network (page 145)
- A new Multiservice Switch 7400 node connected to Multiservice Data Manager in a Multiservice Switch-only network (page 150)
- A new Multiservice Switch 7400 node connected directly to Multiservice Data Manager (page 154)
- A new Multiservice Switch 7400 node connected to Multiservice Data Manager through IP services networking (page 157)

See the following sections for information about the network topologies into which you can add Multiservice Switch 15000 or Multiservice Switch 20000 nodes.

- A new Multiservice Switch 15000 or Multiservice Switch 20000 node connected to Multiservice Data Manager through an existing network (page 161)
- A new Multiservice Switch 15000 or Multiservice Switch 20000 node connected to Multiservice Data Manager through an OAM Ethernet port (page 162)
- A new Multiservice Switch 15000 or Multiservice Switch 20000 node connected directly to Multiservice Data Manager through a frame relay channelized DS3 connection (page 167)

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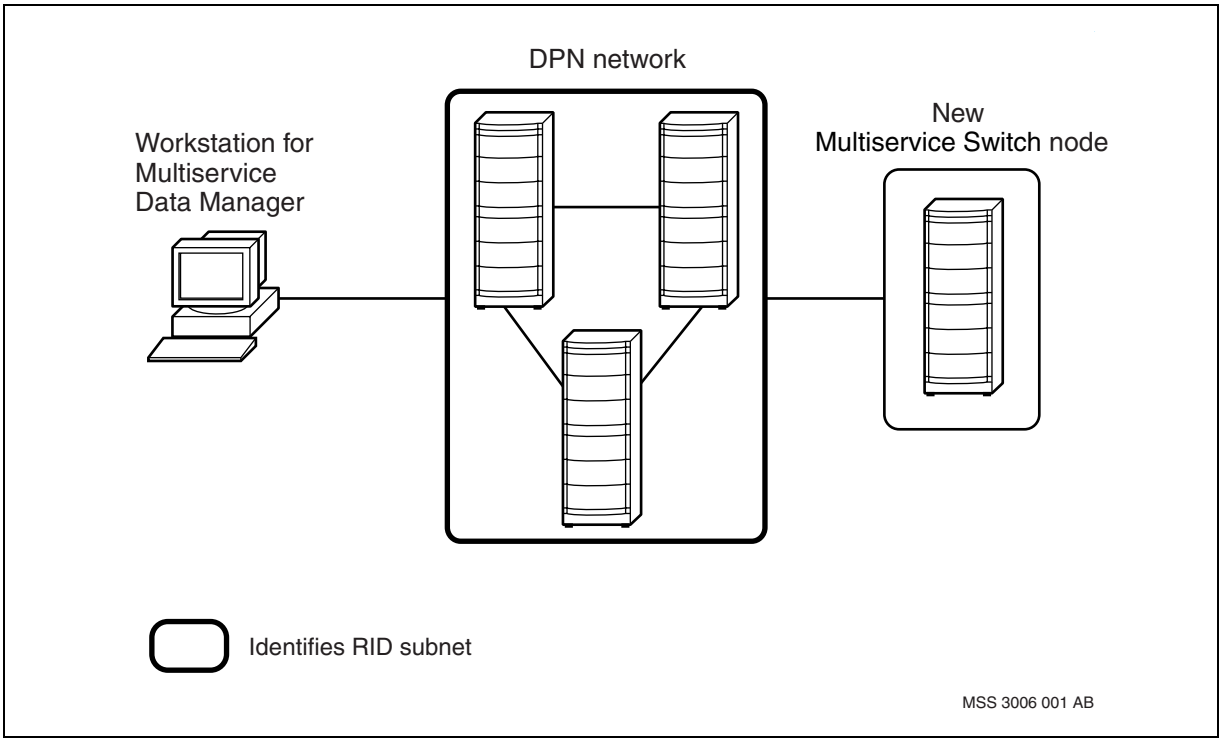
A new Multiservice Switch 7400 node connected to Multiservice Data Manager through a DPN network

In this topology, the new Nortel Multiservice Switch 7400 node connects to a Nortel Multiservice Data Manager workstation through an existing DPN network. A Routing Identifier (RID) subnet now includes the new node. The DPN network Call Server Resource Module (CSRM) handles all routing to this subnet. See the figure A new Multiservice Switch 7400 node connected to a Multiservice Data Manager workstation through a DPN network (page 145).

A new Multiservice Switch 7400 node connected to a Multiservice Data Manager workstation through a DPN network



The routing identifier (RID) works with the call server resource module (CSRM) to enable networks to properly route calls. Three configurations exist for networks that use this topology. All three configurations have different requirements with respect to how you provision the node RID and CSRM. See the following sections:

- The first node in a DPN network (page 146)
- A new node with a new RID connected to an existing network (page 147)
- A new node added to an existing RID subnet (page 148)
- Multiservice Data Manager configuration requirements for connecting a new node through a DPN network (page 149)
- Supported function processor cards (page 162)

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See NN10600-450 *Nortel Multiservice Switch 7400: Operations: DPN-100 Interworking* for a complete description of the CSRM and Nortel Multiservice Switch subnets.

Attention: Provision the CSRM on the DPN resource module with the new unique RID assigned to the new node. See NN10600-450 *Nortel Multiservice Switch 7400: Operations: DPN-100 Interworking* for a definition of each information item and the CSRM configuration procedures.

The first node in a DPN network

In this configuration, the new Nortel Multiservice Switch node is the only node in a DPN network. See the figure The first Multiservice Switch node in a DPN network (page 147).

Before you install the new node, ensure that the DPN Call Server Resource Module (CSRM) is installed and operating with the appropriate software. See the delivery information package you received with your Nortel Multiservice Switch software for exact specifications.

For this configuration, you must configure the CSRM with

- the Prefix DNA of the new node
- the RID of the new Multiservice Switch subnet that it will support

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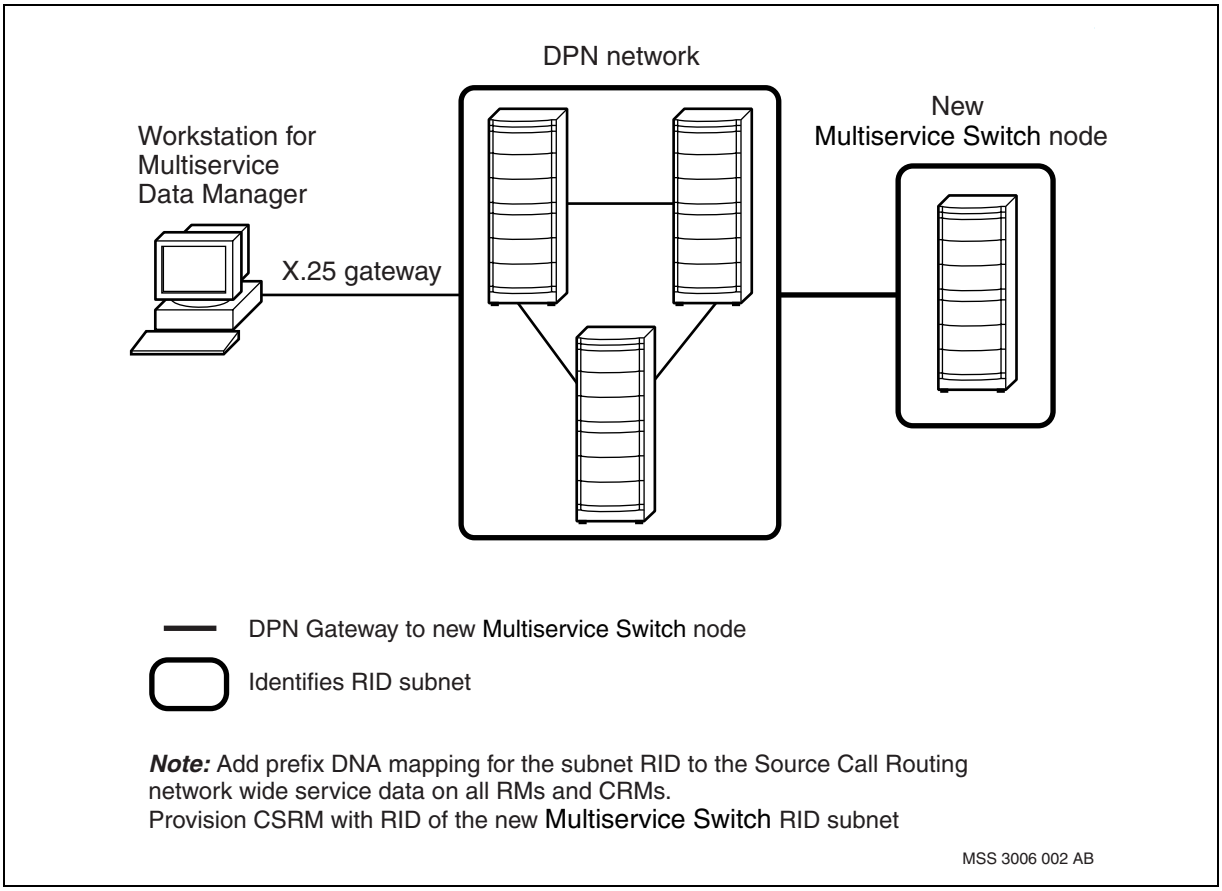
The first Multiservice Switch node in a DPN network



A new node with a new RID connected to an existing network

In this configuration, you connect the new node to an existing node and assign a new RID to the new node. See the figure, A new node added to an existing RID subnet (page 149).

Before you install the node, ensure that the DPN Call Server Resource Module (CSRM) is installed and operating with the appropriate level of software. See the delivery information package you received with your Nortel Multiservice Switch software for exact specifications.

For this configuration, you must configure the CSRM with

- the prefix DNA mapping for the subnet RID to the source call routing network-wide service data on all RMs and CSRMs
- the RID for the new Multiservice Switch subnet that it will support

This configuration supports both frame-cell trunks and Multiservice Switch trunks over ATM, between the new node and the existing node.

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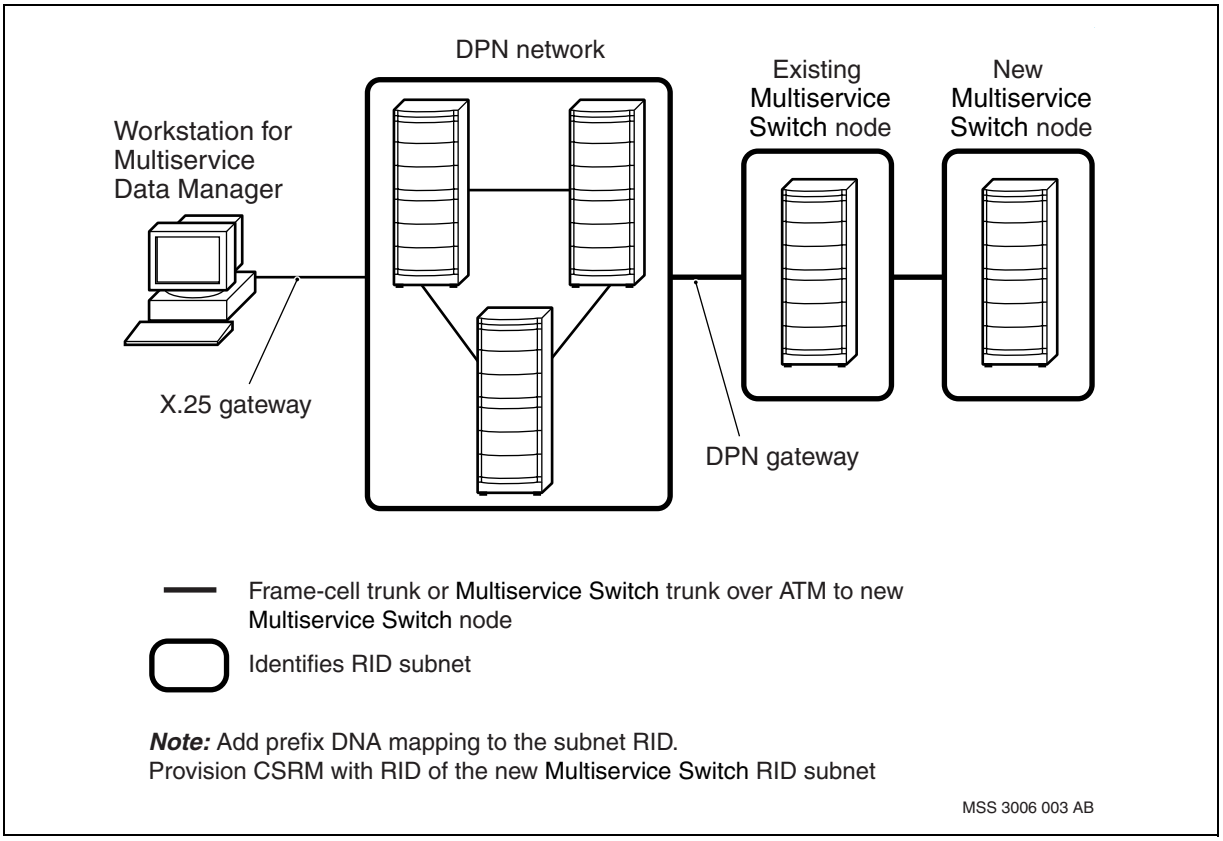
Attention: Calls from the Nortel Multiservice Data Manager workstation and the new node do not occur unless a new DPN gateway is operational between the new node and the CSRM.

A new node with a new RID connected to an existing network



A new node added to an existing RID subnet

In this configuration, you connect the new node to a node in an existing RID subnet. This configuration does not require CSRM or prefix DNA mapping. You must provision the RID on the new node to be the same as the existing node. See the figure, A new node added to an existing RID subnet (page 149).

This configuration supports Nortel Multiservice Switch trunks over ATM between the new node and the existing node.

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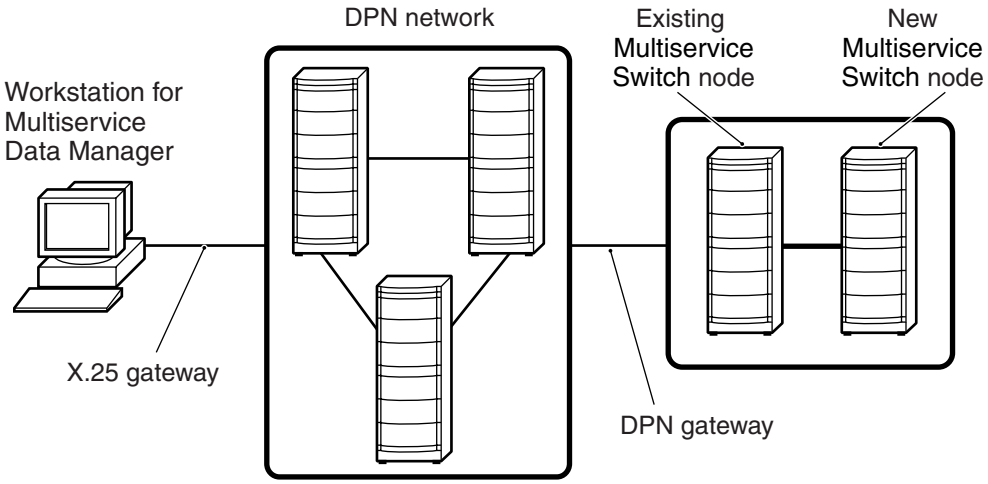
A new node added to an existing RID subnet



Note: Because the new Multiservice Switch 7400 node shares the existing Multiservice Switch node's RID, no user provisioning is required. StartUp provisions this for you.

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Multiservice Data Manager configuration requirements for connecting a new node through a DPN network

To manage your network with Nortel Multiservice Data Manager, the management system must be operating with the appropriate level of software before you install the new Multiservice Switch node. See the delivery information package you received with your Nortel Multiservice Switch software for the exact specification.

You must also configure the Multiservice Data Manager workstation with

- the host name of the new node
- the IP address for the new node
- the local host name or IP address of the Multiservice Data Manager workstation
- the IPIVC DNA for the new node
- the CUG index
- the name of the group of which the new node will belong

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See 241-6001-100 *Nortel Multiservice Data Manager Software Installation and Initial Configuration* for a definition of each information item, and workstation configuration procedures.

Supported function processor links

This table lists the types of function processor links supported by this topology.

Function processor links for this topology

FPs	Multiservice Data Manager connection through DPN		
	DPN Gateway	Frame-cell trunk	Multiservice Switch trunk over ATM
V35	X	X	
V11	X	X	
DS1 (4-port and 8-port)	X	X	
DS1 ATM (3-port and 8-port)			X
E1	X	X	
E1 ATM (3-port and 8-port)			X
JT2 ATM			X
DS3		X	
DS3 ATM			X
E3		X	
E3 ATM			X
OC3 ATM (multimode)			X
OC3 (single-mode)			X

A new Multiservice Switch 7400 node connected to Multiservice Data Manager in a Multiservice Switch-only network

In this topology, a Nortel Multiservice Data Manager workstation connects to a Nortel Multiservice Switch-only network. A virtual channel is created between the existing node and the new node. This virtual channel creates a logical channel between the new node and the workstation. This logical channel permits the new node to emulate the link configuration data on the existing node. You create this new channel using IP over frame relay (IPIFR).

See the figure A new node connected to a Multiservice Data Manager workstation in a Multiservice Switch-only network (page 151).

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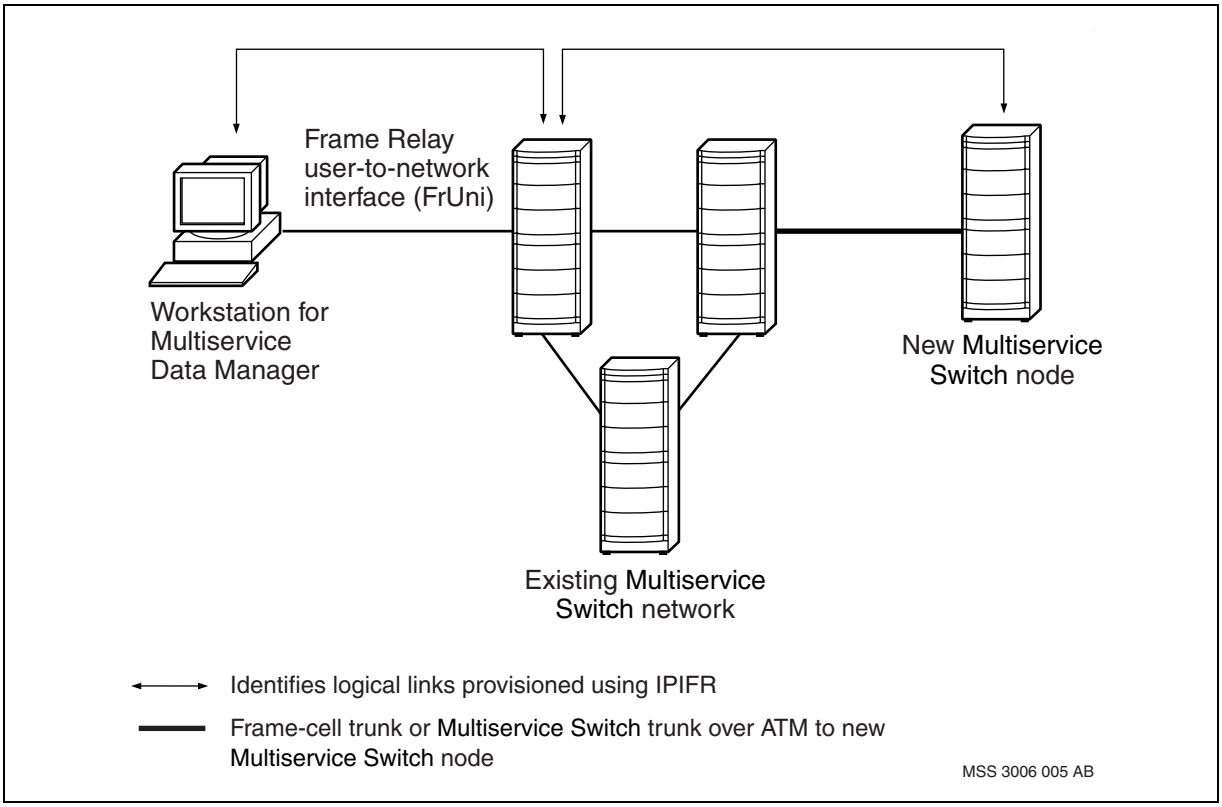
A new node connected to a Multiservice Data Manager workstation in a Multiservice Switch-only network



The routing identifier (RID) works with the Multiservice Switch call server feature to enable Multiservice Switch-only networks to properly route calls. This topology supports two configurations. These configurations require different node RID and call server provisioning on the node. See the following sections:

- A new node with a new RID in an existing network (page 151)
- A new node added to an existing RID subnet (page 152)
- Supported function processor cards (page 162)

For more information about the call server feature, see NN10600-405 *Nortel Multiservice Switch 7400/15000/20000 Operations: Call Server*.

A new node with a new RID in an existing network

In this configuration, the new node connects to an existing node.

To ensure proper call routing, you must

- add prefix DNA mapping to the RID subnets in the call router in order to map to the new node's RID

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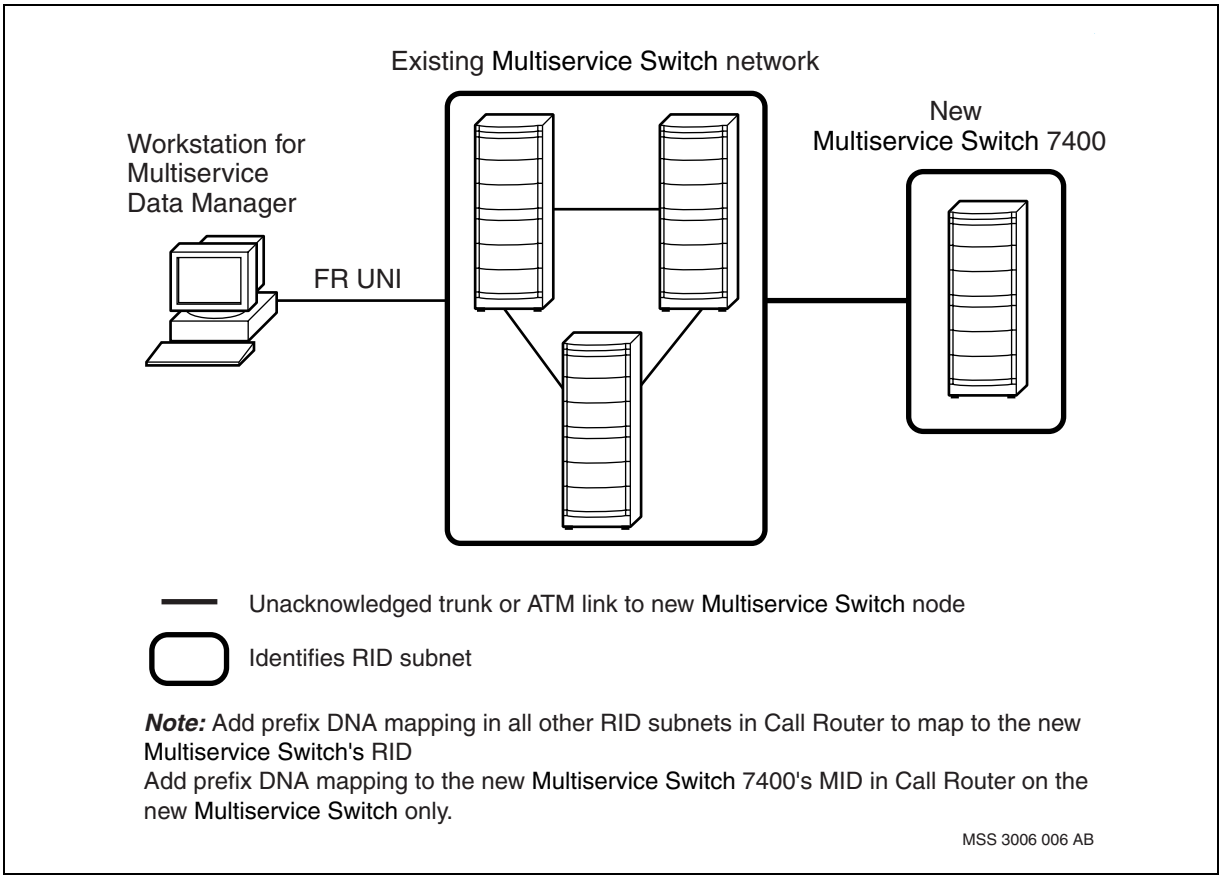
- add prefix DNA mapping to the new node's MID in the call router on the new node only

A new node with a new RID in an existing network



A new node added to an existing RID subnet

In this configuration, you connect the new node to an existing node within the same RID subnet. See the figure, A new node added to an existing RID subnet (page 153).

To ensure proper call routing, you must add prefix DNA mapping to the new node's MID in call router on all other nodes that are in the same RID subnet as the new node.

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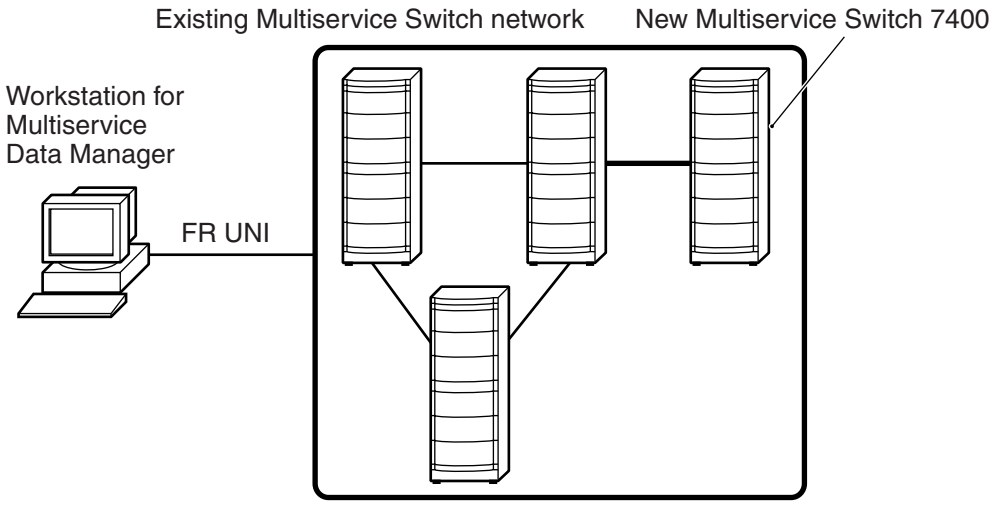
A new node added to an existing RID subnet



Note: Add prefix DNA mappings in the new Multiservice Switch MID in Call Router on all other Multiservice Switches in the same subnet

MSS 3006 007 AB

Supported function processor links

This table lists the types of function processor links supported by this topology.

Function processor links for this topology

FPs	Multiservice Data Manager connection through Multiservice Switch nodes	
	Frame-cell trunk	Multiservice Switch trunk over ATM
V35	X	
V11	X	
DS1 (4-port and 8-port)	X	
DS1 ATM (3-port and 8-port)		X
E1	X	
E1 ATM (3-port and 8-port)		X

(1 of 2)

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Function processor links for this topology (continued)

FPs	Multiservice Data Manager connection through Multiservice Switch nodes	
	Frame-cell trunk	Multiservice Switch trunk over ATM
JT2 ATM		X
DS3	X	
DS3 ATM		X
E3	X	
E3 ATM		X
OC3 ATM (single-mode and multimode)		X

(2 of 2)

A new Multiservice Switch 7400 node connected directly to Multiservice Data Manager

In this topology, the new Nortel Multiservice Switch 7400 node connects directly to a Nortel Multiservice Data Manager workstation. See the figure A new node connected directly to a Multiservice Data Manager workstation (page 155).

For this topology, you must provision the following components:

- *callRouter*
- *FrUni*
- *IPIFR*

A V.35/X.21 connection requires an RS-422 to V.35 interface converter.

For more information, see RID provisioning guidelines for connecting directly to Multiservice Data Manager (page 155)

- Multiservice Data Manager configuration for connections using IPIFR networks (over frame relay) (page 156)
- Supported function processor links (page 156)

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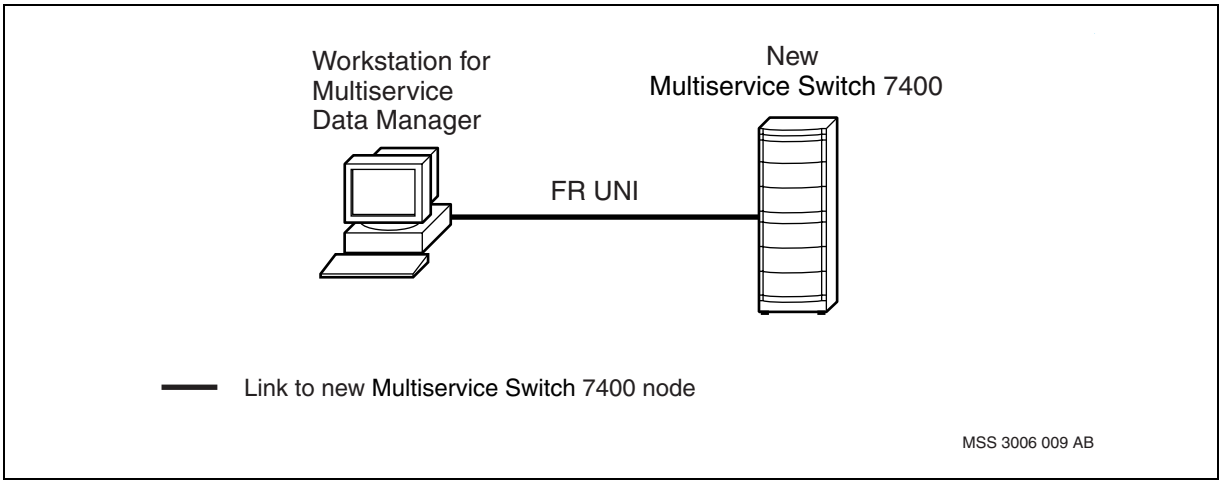
A new node connected directly to a Multiservice Data Manager workstation



RID provisioning guidelines for connecting directly to Multiservice Data Manager

The RID works with the Nortel Multiservice Switch call server feature. Together, they enable Multiservice Switch-only networks to route calls correctly. For networks using this topology, you can add prefix mapping DNA to the node's MID in call router. See the figure A new node added to an existing RID subnet (page 153).

In single-node networks, Multiservice Switch nodes use local call routing so that it automatically routes all calls to the RID to the single node. For more information about the call server feature see NN10600-405 *Nortel Multiservice Switch 7400/15000/20000 Operations: Call Server*.

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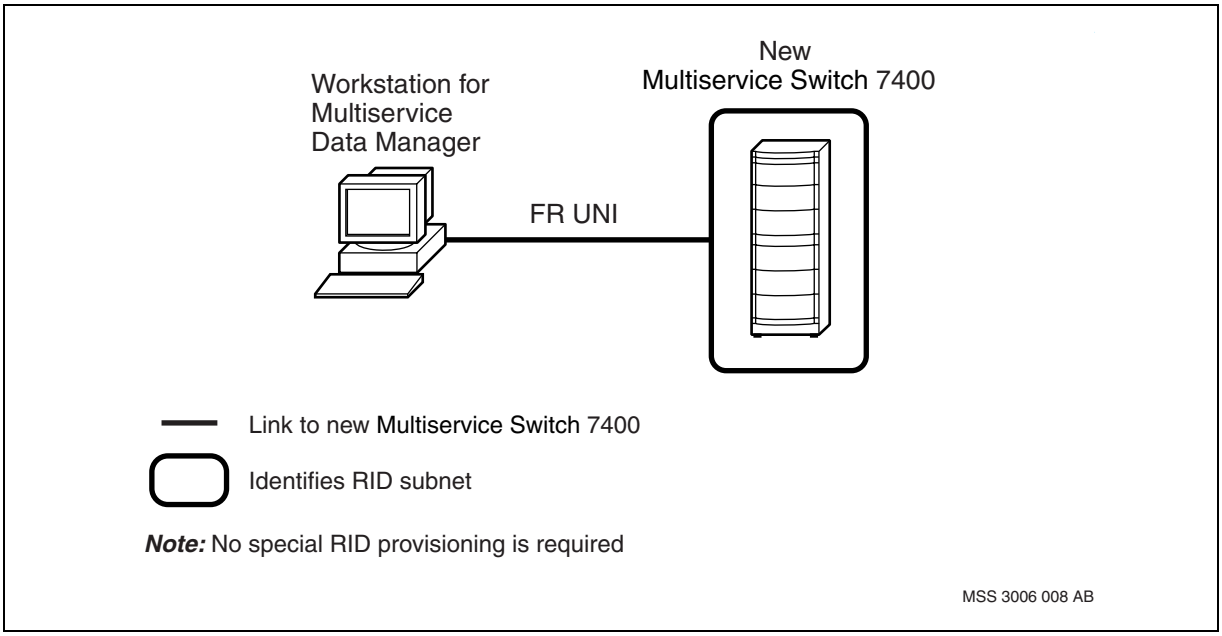
A new node in a single node network with a new RID



Multiservice Data Manager configuration for connections using IPIFR networks (over frame relay)

The Nortel Multiservice Data Managert workstation must use the appropriate level of software before you install the new node. See the delivery information package you received with your Nortel Multiservice Switch software for exact specifications.

You must configure the Multiservice Data Manager workstation with

- the node ID for the new node
- the node name
- the IP address for the new node
- the remote FR UNI DNA
- the remote frame relay FrUni DLCI

For more information about configuring Multiservice Data Manager for a frame relay connection to a Multiservice Switch network, see 241-6001-100 *Nortel Multiservice Data Manager Software Installation and Initial Configuration*.

Supported function processor links

This table lists the types of function processor links supported by this topology.

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Function processor links for this topology

FPs	Direct connection to Multiservice Data Manager workstations
	FR UNI
V35	X
V11	X

A new Multiservice Switch 7400 node connected to Multiservice Data Manager through IP services networking

In this topology, a Nortel Multiservice Data Manager workstation connects to the new Nortel Multiservice Switch node through an IP network. You can configure the link over four media types, ATM MPE, FR DTE, and Ethernet. This topology uses Multiservice Switch IP services networking capability.

This topology supports two configurations:

- StartUp link to Multiservice Data Manager through IP services networking (page 157)
- StartUp same-subnet link to Multiservice Data Manager through IP services networking (page 158)

For more information, see the following:

- Supported function processor links (page 156)
- IP services configuration requirements for connecting a new node through an IP network (page 160)
- Multiservice Data Manager configuration requirements for connecting a new node through an IP network (page 160)

StartUp link to Multiservice Data Manager through IP services networking

In this configuration, you connect the new Nortel Multiservice Switch node to an existing IP router/device in an IP network to which the Nortel Multiservice Data Manager workstation is connected. See the figure StartUp link to a Multiservice Data Manager workstation through IP services networking (page 158).

Attention: The edge router or device must advertise the new subnet to all routers and devices in the IP network. The IP address of the new node is then reachable through the IP network by Multiservice Data Manager.

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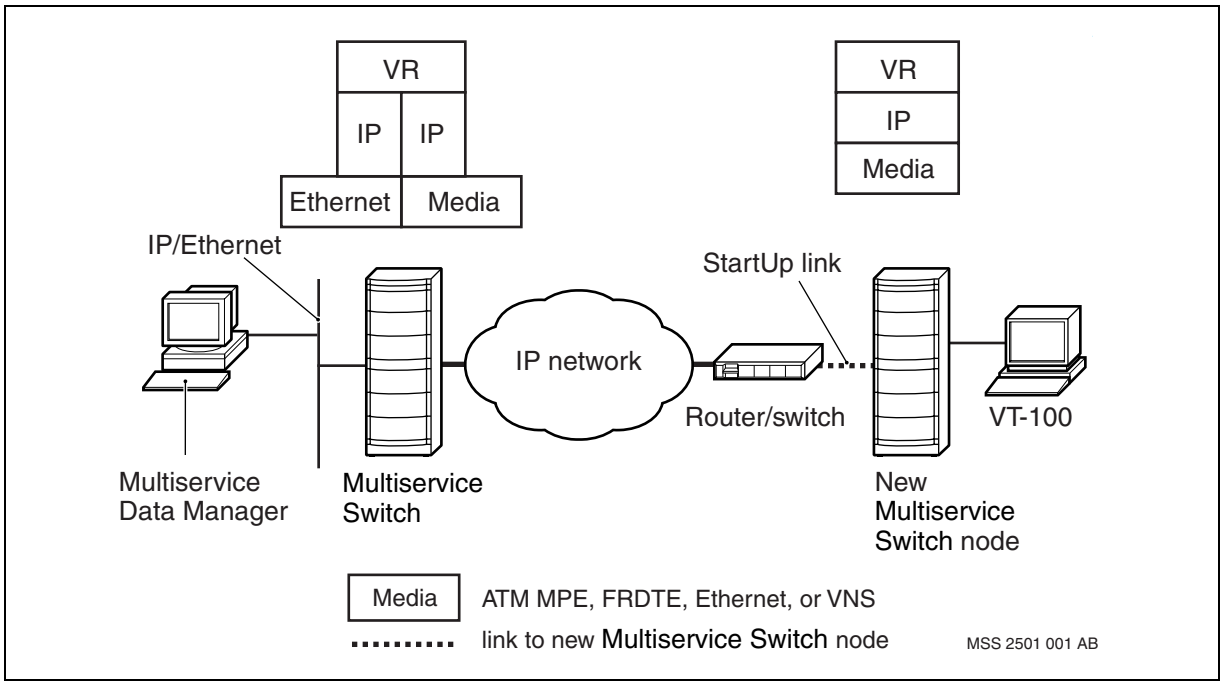
The connection can be any one of the following media types:

- ATM MPE
- FR DTE
- Ethernet

StartUp link to a Multiservice Data Manager workstation through IP services networking



StartUp same-subnet link to Multiservice Data Manager through IP services networking

In this configuration, you connect the new node to a Nortel Multiservice Data Manager workstation on the same IP subnet. See the figure, StartUp same-subnet link to a Multiservice Data Manager workstation through IP services networking (page 159)

The connection is through Ethernet (6-port 10BaseT FP).

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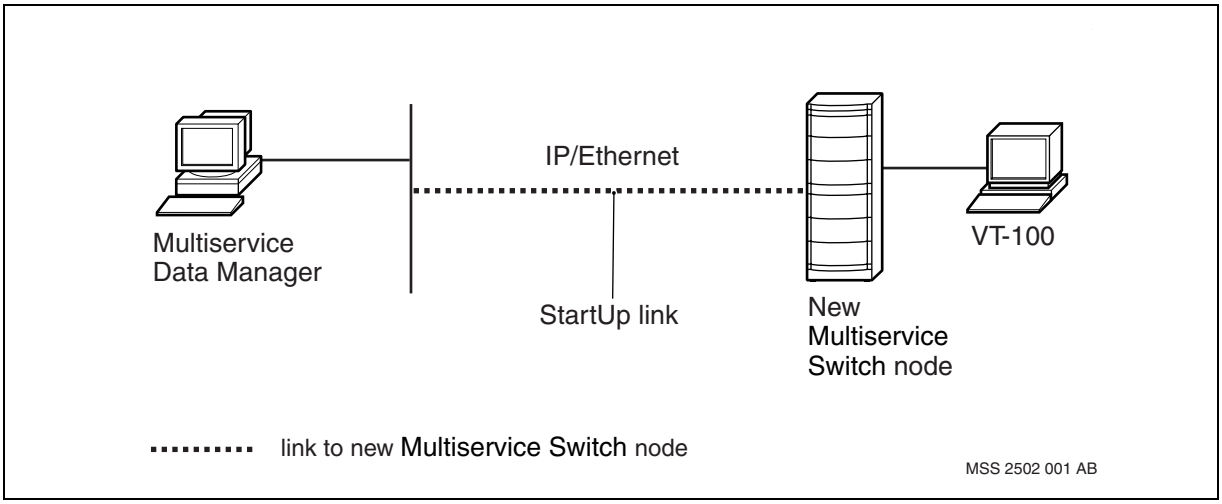
StartUp same-subnet link to a Multiservice Data Manager workstation through IP services networking



Supported function processor links

This table lists the types of function processor links supported by this topology.

Function processor links for this topology

FPs	Connection to Multiservice Data Manager workstation through IP services		
	ATM MPE	FR DTE	Ethernet
V35		X	
V11		X	
DS1		X	
DS1 (8-port)		X	
DS1 ATM (3-port)	X		
DS1 ATM (8-port)	X		
E1		X	
E1 ATM (3-port)	X		
E1 ATM (8-port)	X		
JT2 ATM	X		
DS3		X	
DS3 ATM	X		
E3		X	
E3 ATM	X		

(1 of 2)

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Function processor links for this topology (continued)

FPs	Connection to Multiservice Data Manager workstation through IP services		
	ATM MPE	FR DTE	Ethernet
OC3 ATM (multimode)	X		
OC3 (single-mode)	X		
Ethernet (6-port 10BaseT)			X
HSSI		X	

(2 of 2)

IP services configuration requirements for connecting a new node through an IP network

To configure any of the media types supported by IP, you must configure the following:

1 first virtual router (for example, *Vr/0*)

2 IP protocol port (PP) with one logical interface

3 IP component

4 default IP static route entry

You will need the IP address of the Nortel Multiservice Switch node's logical interface and its network mask.

StartUp provisions a protocol port using instance *mpe/1* (*Vr/0 pp/mpe1*) for ATM MPE media, *frdte/1* for the FR DTE media, and *enet/1* for the Ethernet media.

Multiservice Data Manager configuration requirements for connecting a new node through an IP network

To manage your network through a Multiservice Data Manager workstation, the workstation must be operating with the appropriate level of software before you install the new node. See the delivery information package you received with the Nortel Multiservice Switch software for the exact specification.

You must also configure the Multiservice Data Manager workstation with the following:

- the host name of the new node
- the IP address for the new node
- the local host name or IP address of the workstation
- the name of the group of which the new node will belong

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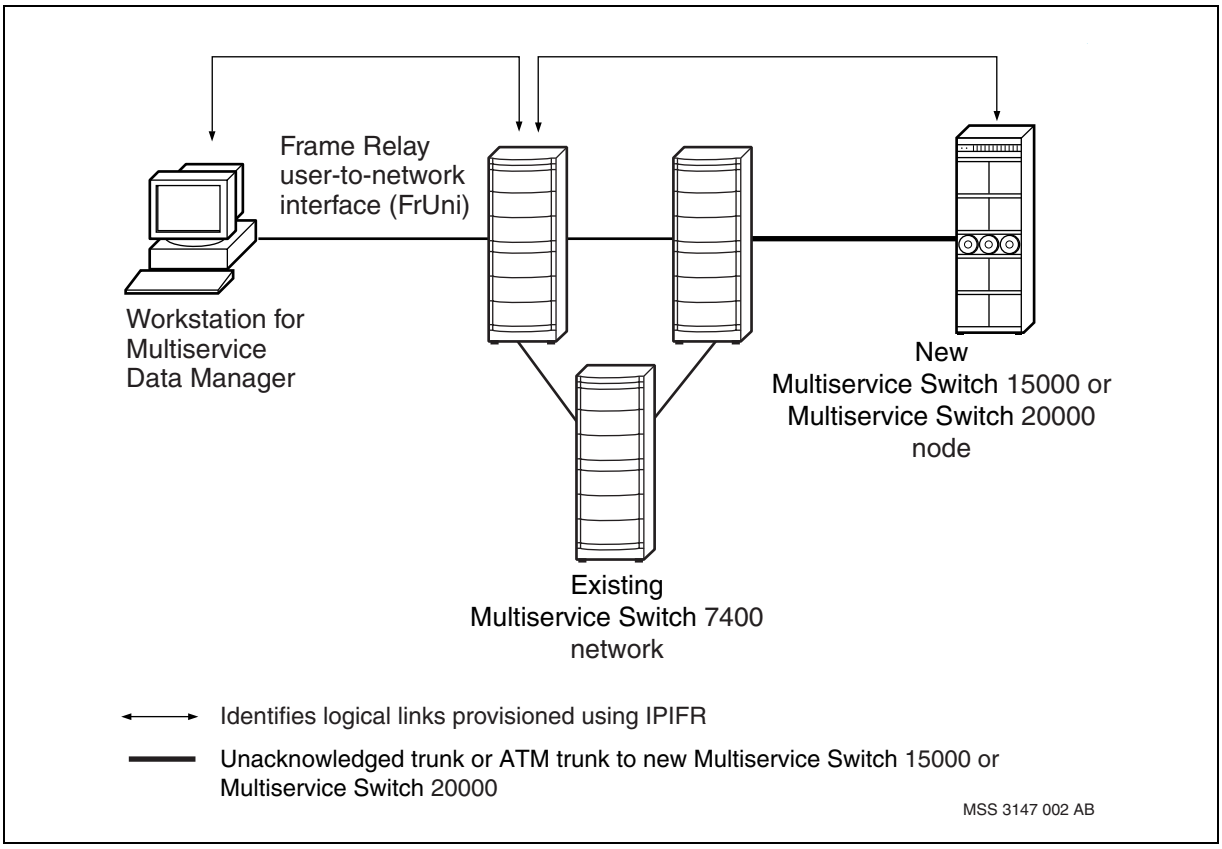
See 241-6001-100 *Nortel Multiservice Data Manager Software Installation and Initial Configuration* for more information and Multiservice Data Manager workstation configuration procedures.

A new Multiservice Switch 15000 or Multiservice Switch 20000 node connected to Multiservice Data Manager through an existing network

When you connect a Nortel Multiservice Switch 15000 or Multiservice Switch 20000 node to a Nortel Multiservice Data Manager workstation through an existing network, you need to create a virtual channel using IP over Frame Relay (IPIFR) between a Multiservice Switch 7400 node and the new node. This virtual channel creates a logical channel between the two nodes, which permits the new node to emulate the link configuration data on the existing node. Because the Multiservice Switch 7400 node is connected to the Multiservice Data Manager workstation, the new Multiservice Switch 15000 or Multiservice Switch 20000 node can contact the workstation using this logical channel.

See the figure A new node connected to a Multiservice Data Manager workstation in a Multiservice Switch-only network (page 161).

A new node connected to a Multiservice Data Manager workstation in a Multiservice Switch-only network



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Supported function processor cards

This table lists the types of function processor cards supported by this topology.

Function processor cards supported by a connection using IPIFR

FPs
12-port DS3
12-port E3
3-port OC-3/STM-1
4-port OC-3/STM-1
16-port OC-3/STM-1
1-port OC-12/STM-4
4-port OC-12/STM-4
1-port OC-48/STM-16
1-port OC-48/STM-16 channelized with APS

A new Multiservice Switch 15000 or Multiservice Switch 20000 node connected to Multiservice Data Manager through an OAM Ethernet port

In this topology, the Nortel Multiservice Data Manager workstation and the new Nortel Multiservice Switch 15000 or Multiservice Switch 20000 node connects to the workstation through the OAM Ethernet port on the control processor. Local network management connectivity is possible through the OAM Ethernet port on all Multiservice Switch nodes. Remote network management connectivity is possible through the OAM Ethernet port only on Multiservice Switch 7400 nodes.

This topology uses the Multiservice Switch IP services capability. For more information on the OAM Ethernet port, see NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures*.

Local network management connectivity through the OAM Ethernet port

You can achieve local network management connectivity by connecting the Ethernet port on the network management device to the OAM Ethernet port on the Nortel Multiservice Switch node in one of three ways:

- Directly to the physical OAM Ethernet port on the node CP
- Indirectly through an Ethernet LAN to the physical OAM Ethernet port on the node CP

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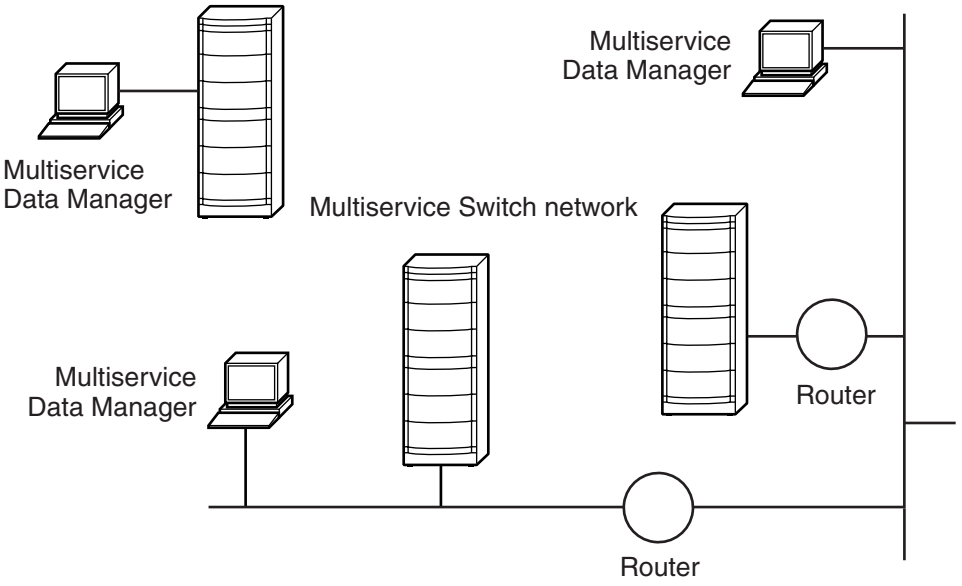
- Indirectly through an Ethernet LAN and any number of IP routers, one of which is connected to the physical OAM Ethernet port on the node CP

See the figure Local network management through the OAM Ethernet port (page 163) for more detail.

Local network management through the OAM Ethernet port



Remote network management connectivity through the OAM Ethernet port

You can achieve remote network management connectivity by connecting the OAM Ethernet port on a remote Nortel Multiservice Switch 15000 or Multiservice Switch 20000 node in one of three ways:

- Directly to an OAM Ethernet port or an Ethernet FP port on a local Multiservice Switch 7400 node. See the figure Remote connectivity to the Multiservice Data Manager workstation using a direct connection (page 164).
- Directly to an OAM Ethernet port on a local Multiservice Switch 15000 or Multiservice Switch 20000 node. See the figure Remote connectivity to a Multiservice Data Manager workstation using a direct connection on a local Multiservice Switch 15000 or Multiservice Switch 20000 node (page 165)
- Indirectly through an Ethernet LAN to an OAM Ethernet port or an Ethernet FP port on a local Multiservice Switch 7400 node. See the figure

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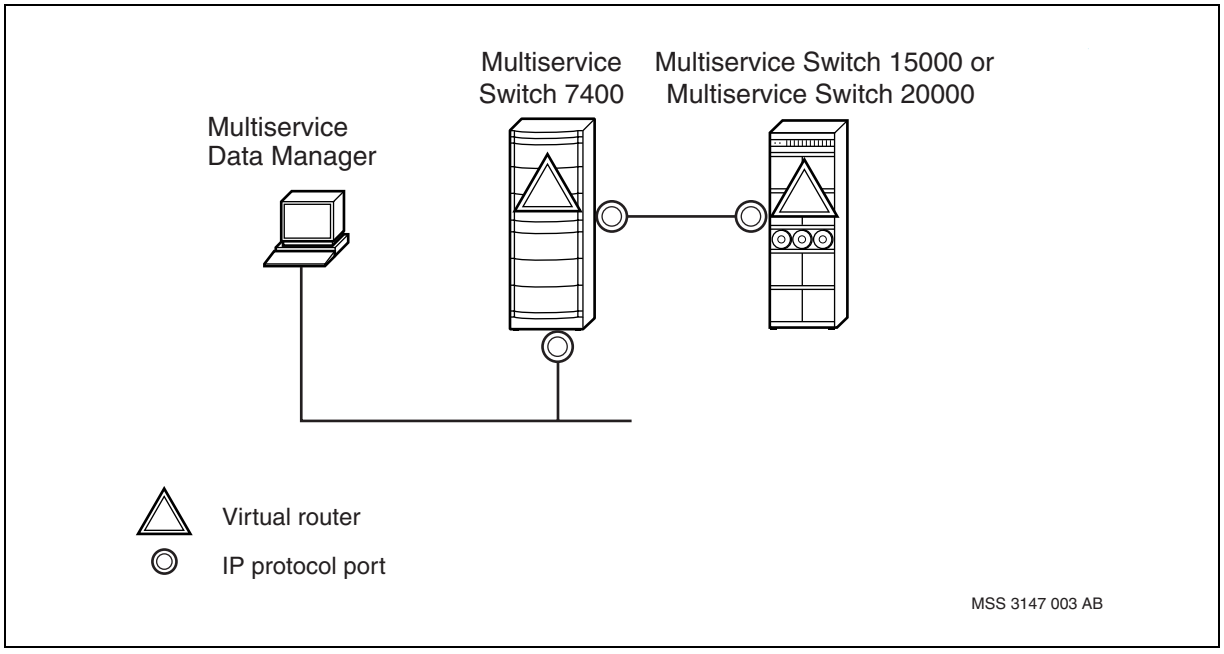
Remote connectivity to a Multiservice Data Manager workstation using an indirect connection (page 166).

- Indirectly through an Ethernet LAN and any number of IP routers to an OAM Ethernet port or an Ethernet FP port on a local Multiservice Switch 7400 node. See the figure Remote connectivity to a Multiservice Data Manager workstation using an indirect connection with a router (page 166).

Remote connectivity to the Multiservice Data Manager workstation using a direct connection



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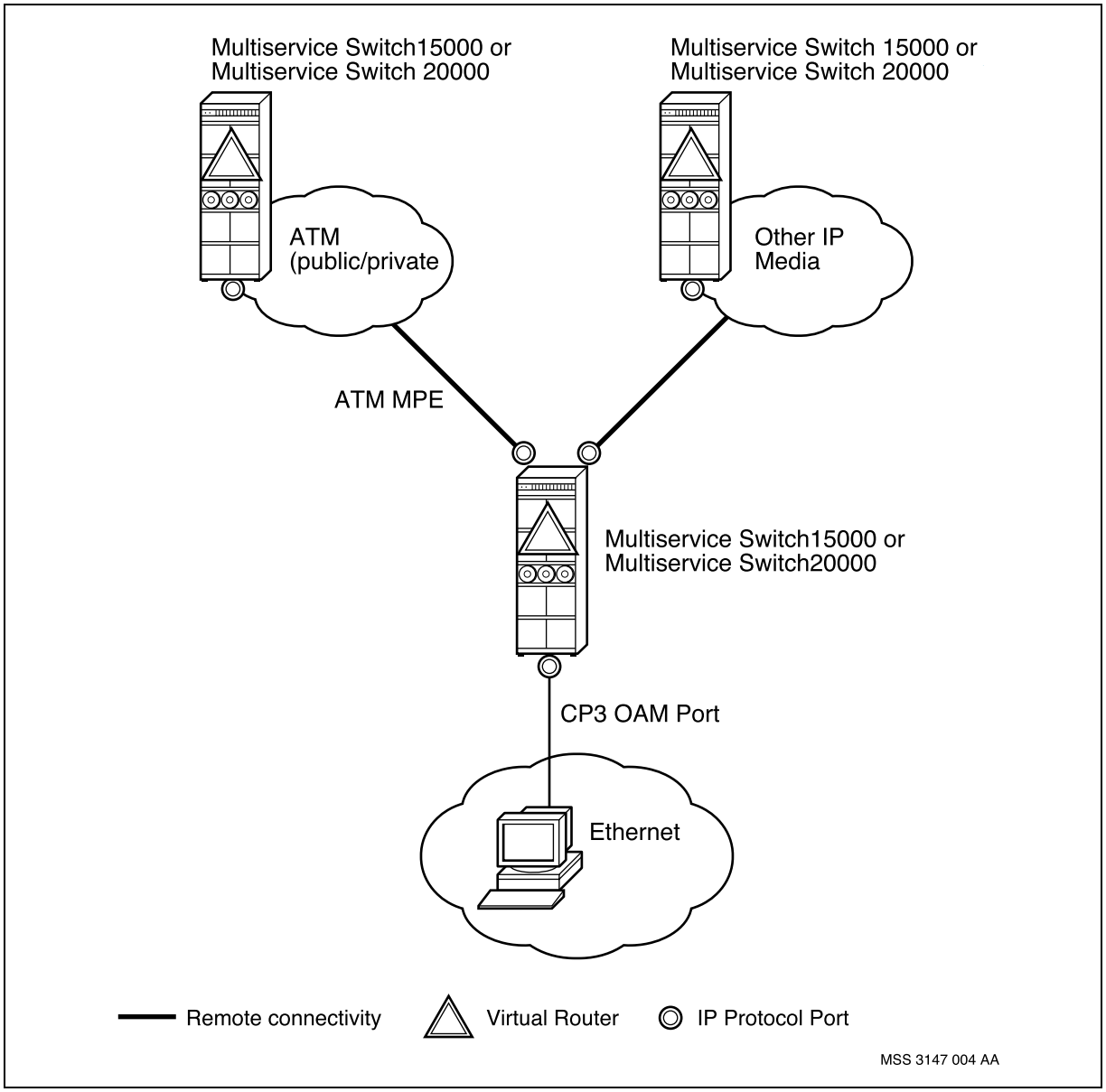
Remote connectivity to a Multiservice Data Manager workstation using a direct connection on a local Multiservice Switch 15000 or Multiservice Switch 20000 node



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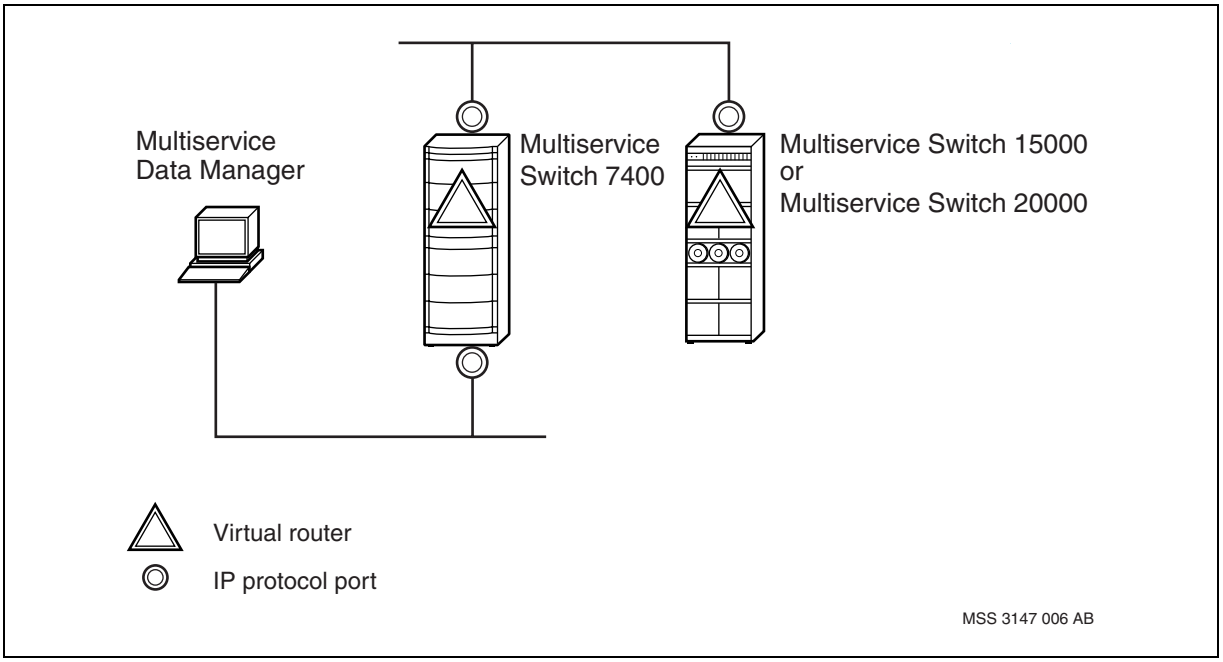
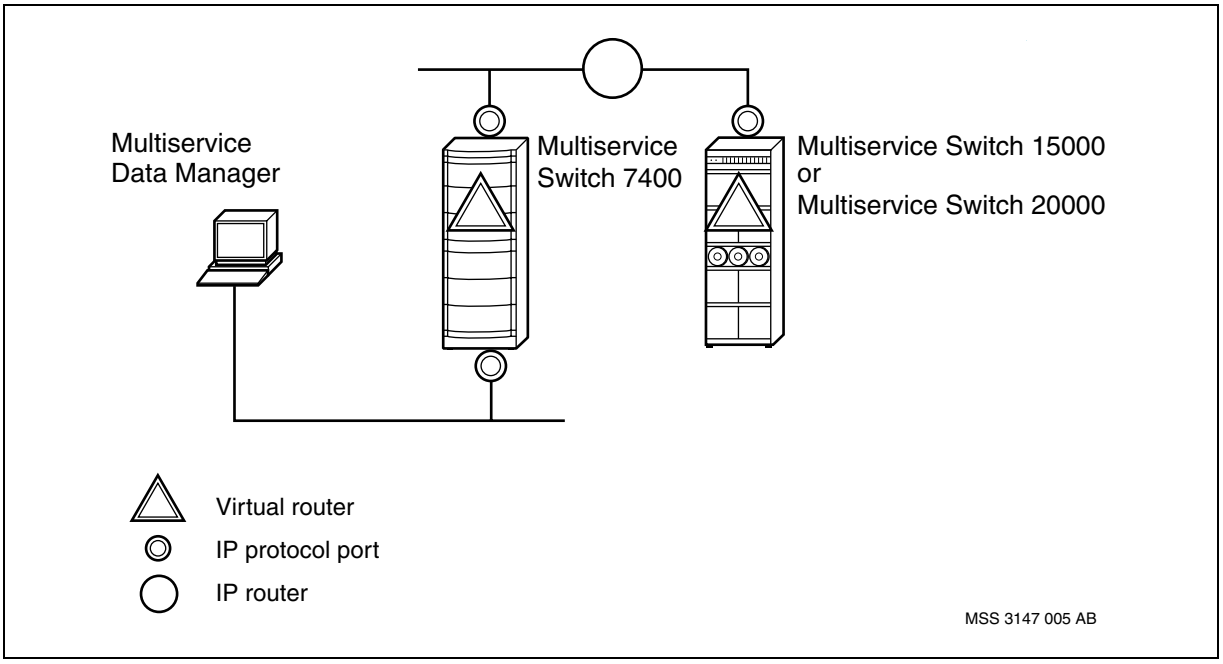
Remote connectivity to a Multiservice Data Manager workstation using an indirect connection



Remote connectivity to a Multiservice Data Manager workstation using an indirect connection with a router



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A new Multiservice Switch 15000 or Multiservice Switch 20000 node connected directly to Multiservice Data Manager through a frame relay channelized DS3 connection

This section describes the connectivity between a Nortel Multiservice Data Manager and a Nortel Multiservice Switch 15000 or Multiservice Switch 20000 node using the 4-port DS3 frame relay channelized functional processor (FP). In this topology, the new node connects directly to the Multiservice Data Manager workstation using a DS3-based frame relay connection.

The 4-port DS3 frame relay FP allows you to connect the workstation directly to the node using a DS0, DS1, or DS3-based frame relay connection. The following network configurations are supported:

- Grooming equipment is used to channelize the V.35 and V.11 interfaces on a workstation at the DS0 or DS1 level onto a DS3 connection. This DS3 connection is attached to the channelized 4-port DS3 frame relay channelized FP on the node. See the figure A new Multiservice Switch 15000 or Multiservice Switch 20000 node connected to a Multiservice Data Manager workstation through a frame relay channelized DS3 connection using channel grooming (page 168).
- Router equipment is used to connect a workstation on an Ethernet LAN with the 4-port DS3 frame relay channelized FP on the node. The connection to the 4-port DS3 frame relay channelized FP is made through a channel on the DS3 interface.

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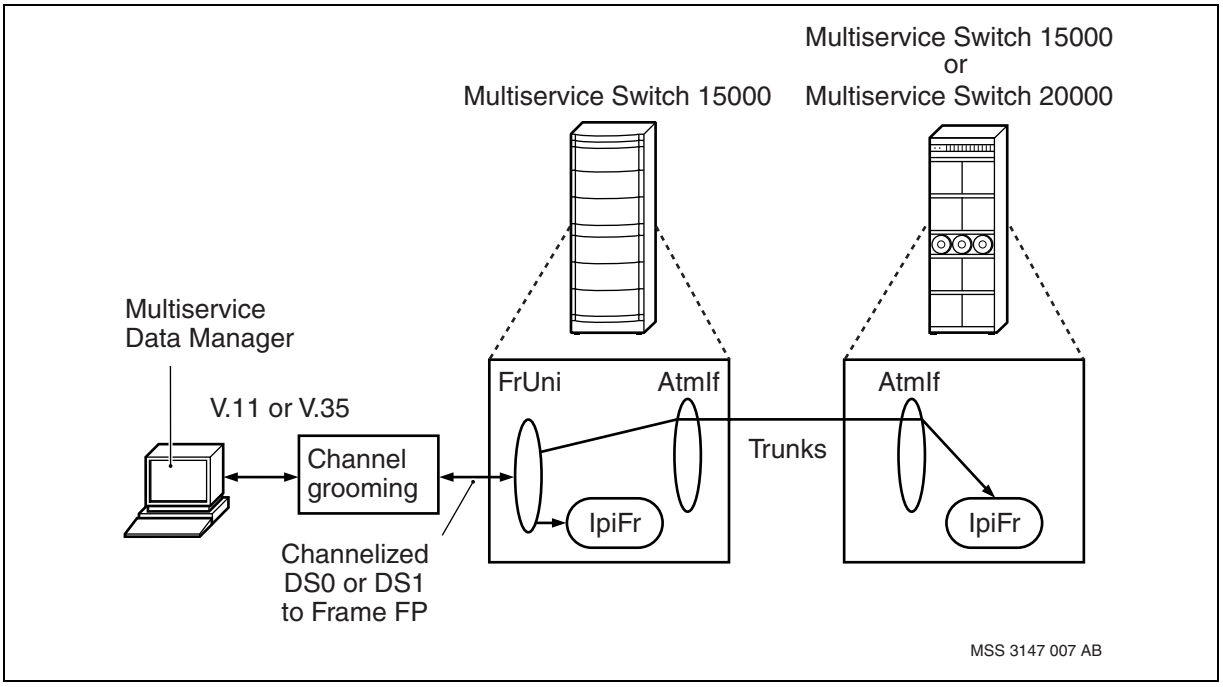
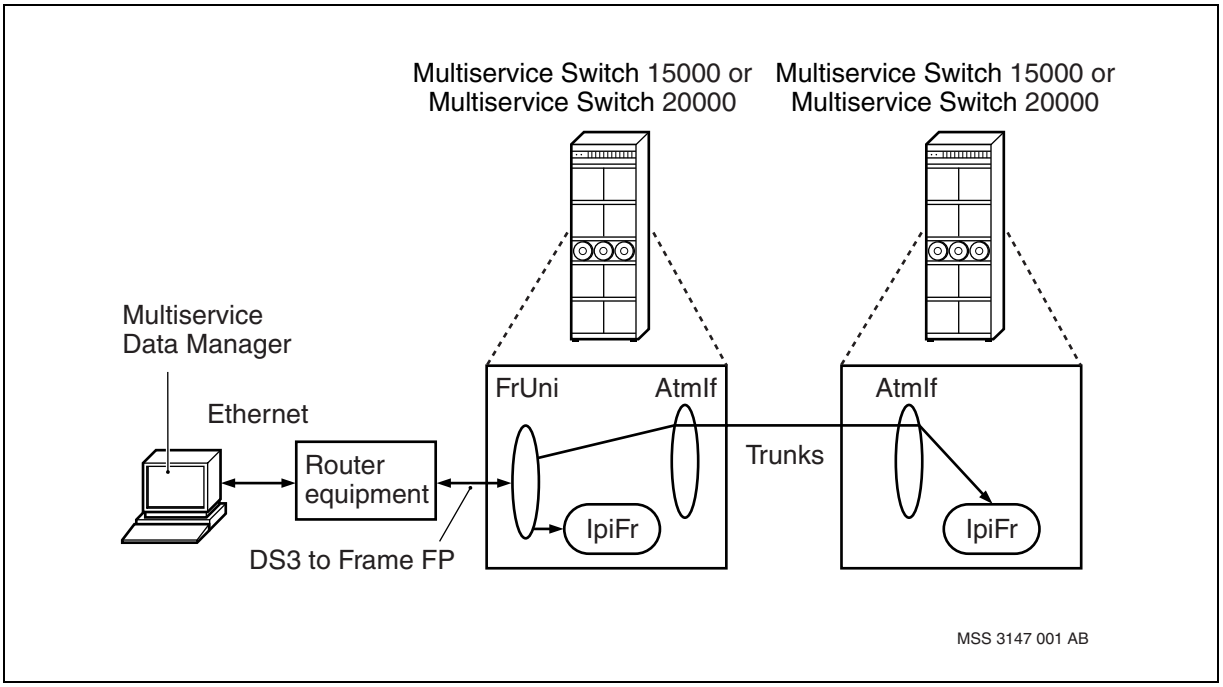
A new Multiservice Switch 15000 or Multiservice Switch 20000 node connected to a Multiservice Data Manager workstation through a frame relay channelized DS3 connection using channel grooming



A new node connected to a Multiservice Data Manager workstation through a frame relay channelized DS3 connection using router equipment



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Procedure conventions

This document uses the following procedure conventions:

- You can enter commands using full component and attribute names, or you can abbreviate them. The commands used in the procedures contain the full component and attribute names in the first instance. In the second instance, the component and attribute names are abbreviated. For more information on abbreviating component and attribute names, see NN10600-060 *Nortel Multiservice Switch 7400/15000/20000 Component Reference*. All component and attribute names are formatted in italics.
- The introduction of every procedure states whether you must perform the procedure in operational mode or provisioning mode. For more information on these modes, see Operational mode (page 169) or Provisioning mode (page 170).
- When you complete a procedure, you can verify your changes and then activate them as the new node configuration. For more information on completing configuration changes and exiting provisioning mode, see Activating configuration changes (page 170).

Operational mode

Procedures contained within this document can either be performed in operational mode or provisioning mode. When you initially log into a node, you are in operational mode. Nortel Multiservice Switch systems use the following command prompt when you are in operational mode:

```
#>
```

where:
is the current command number

In operational mode, you work with operational components and attributes. In operational mode, you can

- list operational components and display operational attributes to determine the current operating parameters for the node
- control the state of parts of the node by locking and unlocking components

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- set certain operational attributes and enter commands to perform diagnostic tests

Provisioning mode

To change from operational mode to provisioning mode, type the following command at the operator prompt:

```
start Prov
```

Only one user can be in provisioning mode at a time. Nortel Multiservice Switch systems use the following command prompt whenever you are in provisioning mode:

```
PROV #>
```

where:

is the current command number

In provisioning mode, you work with the provisionable components and attributes that contain the current and future configurations of the node. You can add and delete components, and display and set provisionable attributes. For information on completing the configuration changes, exiting provisioning mode, and returning to operational mode see Activating configuration changes (page 170).

For information on operational and provisionable attributes, see NN10600-060 *Nortel Multiservice Switch 7400/15000/20000 Component Reference*.

Activating configuration changes

Several procedures in this document ask that you complete the configuration changes. When you complete the configuration changes, you are activating the configuration changes, confirming that you want to activate them, and saving the changes. You are instructed to complete the configuration changes only at the end of procedures that you perform in provisioning mode.

CAUTION

Activating a provisioning view can affect service

Activating a provisioning view can result in a CP reload or restart, causing all services on the node to fail. See NN10600-050 *Nortel Multiservice Switch 7400/15000/20000 Command Reference*, for more information.

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CAUTION
Risk of service failure
When you activate the provisioning changes (see step 3), you have 20 minutes to confirm these changes. If you do not confirm these changes within 20 minutes, the shelf resets and all services on the node fail.

1 Verify that the provisioning changes you have made are acceptable.

```
check Prov
```

Correct any errors and then verify the provisioning changes again.

2 If you want to store the provisioning changes in a file, save the provisioning view.

```
save -f(<filename>) Prov
```

3 If you want these changes as well as other changes made in the edit view to take effect immediately, activate, confirm, and commit the provisioning changes.

```
activate Prov
confirm Prov
commit Prov
```

4 End the provisioning session.

```
end Prov
```


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Nortel Multiservice Switch 7400/15000/20000

Network Management Connectivity

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