NORTEL NETWORKS

Nortel Networks Multiservice Switch 7400

Operations: MPANL

NN10600-745

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Operations: MPANL

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General availability. Contains information on Nortel Networks Multiservice Switch 7400 for the PCR6.1 release.

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About this document

NN10600-745 *Nortel Networks Multiservice Switch 7400 Operations: MPANL* provides background and procedures to provision and support Passport 4400 network links to Nortel Networks Multiservice Switch nodes.

Who should read this guide

Use this document if you perform the following tasks on the network links connecting Multiservice Switch 7400 and Passport 4400:

- engineering
- installing and configuring
- provisioning
- operating and maintaining, or
- troubleshooting

How this guide is organized

The NN10600-745 *Nortel Networks Multiservice Switch 7400 Operations: MPANL* is organized as follows:

- "MPANL overview" (page 37) introduces MPANL features and capabilities.
- "The MPANL protocol" (page 43) describes the MPANL protocol as background to the provisioning and operations procedures.
- "MPANL configuration" (page 17) describes prerequisites for provisioning MPANL and MPANL components, and instructions for provisioning MPANL using the component administration system (CAS).

- "Monitoring procedures for MPANL" (page 61) describes MPANL operational attributes and shows how to use them to monitor MPANL operations.
- "Troubleshooting MPANL" (page 69) provides information and references to other material for troubleshooting MPANL.

What's new in this document

There were no new features added to this document.

Other changes made to this document include the following:

- The terms Passport and PVG have been rebranded in conjunction with the new Nortel Networks' brand simplified naming format. Passport is now referred to as the Nortel Networks Multiservice Switch, and PVG is now Media Gateway 7480/15000. For more information on the product rebranding, refer to NN10600-000 *Nortel Networks Multiservice Switch 7400/15000/20000 What's New in PCR6.1*.

What you need to know

You need to have a basic understanding of the following:

- the features and operational capabilities of Passport 4400 series of access devices

  See 800-1952-20, *Passport 4400 Operator's Manual*.

- how to provision and monitor ports

  See NN10600-170 *Nortel Networks Multiservice Switch 7400 Hardware Description* and NN10600-175 *Nortel Networks Multiservice Switch 7400 Hardware Installation, Maintenance, and Upgrade*.

- how to provision and monitor a Nortel Networks Multiservice Switch node using the command line interface or Preside Multiservice Data Manager architect.

Conventions

There are a number of documentation conventions you should know about.

- `nonproportional spaced plain type`

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

- `nonproportional spaced bold type`

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

- *italics*

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

  Words that appear in italics in text are for naming.

- `[optional_parameter]`

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

- `<general_term>`

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

- UPPERCASE, lowercase

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

- |

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

- ...

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

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

Related documents

The following documents provide additional information

- 800-1952-20, *Passport 4400 Operator's Manual*
- NN10600-765 *Nortel Networks Multiservice Switch 7400 Operations: Remote Server Agent*
- NN10600-755 *Nortel Networks Multiservice Switch 7400 Operations: Voice Networking*
- NN10600-410 *Nortel Networks Multiservice Switch 7400/15000/20000 Operations: Call Redirection Server*

For the complete list of documents contained in the Multiservice Switch documentation library, see NN10600-001 *Nortel Networks Multiservice Switch 7400/15000/20000 Basics: Customer Documentation*.

Chapter 1
MPANL configuration

Configure Multiservice Passport access network links (MPANL) to provide internal node services that support the connection of Passport 4400 access units to Nortel Networks Multiservice Switch 7400 nodes.

Prerequisites to MPANL configuration

- To provision and support MPANL on Nortel Networks nodes, you must understand Passport 4400 access unit capabilities and MPANL components. See 800-1952-20, *Passport 4400 Operator's Manual* for more information.
- See "MPANL configuration additional information" (page 33) for information about provisionable components and attributes. See NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*, for complete information on MPANL and MPANL-related components and attributes.
- Before provisioning MPANL, use the procedures in NN10600-270 *Nortel Networks Multiservice Switch 7400/15000/20000 Software Installation* to install the software required for MPANL. The software is named frameRelay.
- Both dedicated and ISDN link types require MPANL's *Framer* subcomponent. The *Framer* subcomponent is mutually exclusive from the *FrMuxSetup*. The *FrMuxSetup* component connects to the framing services provided by *FrMux*, which MPANL requires. The *Framer* subcomponent provides this function for non-frame relay link types. The

Framer subcomponent under the *DataSignallingChannel* component operates at a lower OSI level than the framing service required by MPANL.

- Voice interworking between Passport 4400 access units using MPANL requires the specific systems and components shown in "Multiservice Switch 7400 systems needed to support MPANL voice" (page 18). MPANL requires these elements, even though they operate independently of MPANL.

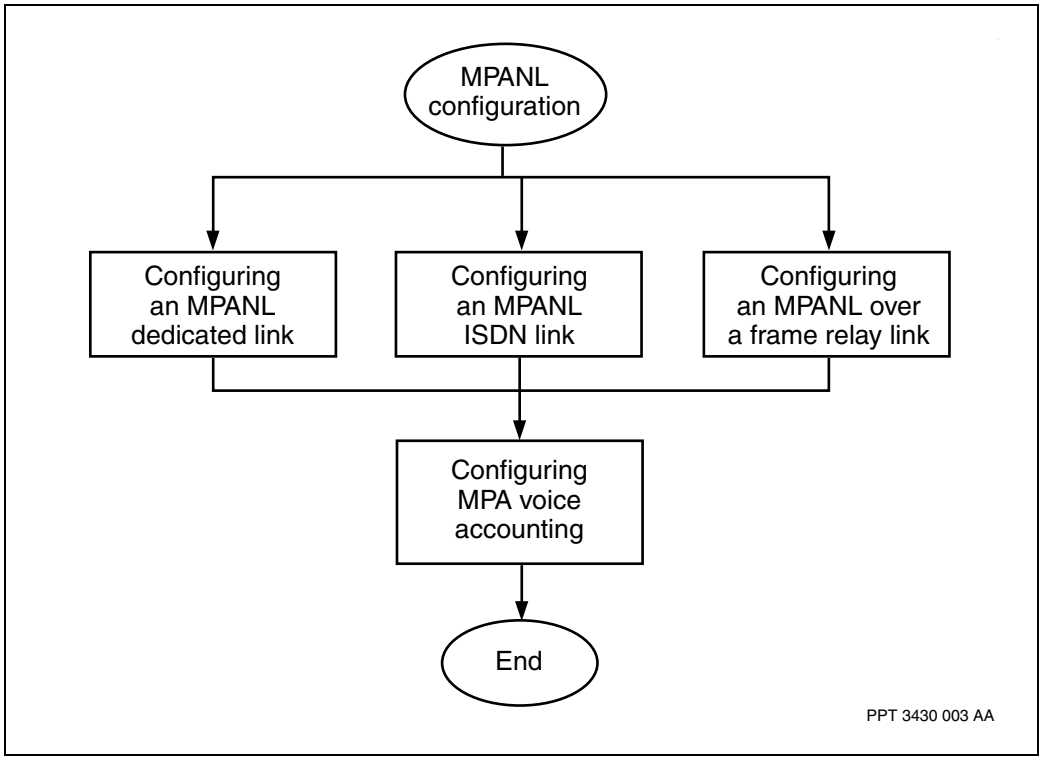
Table 1
Multiservice Switch 7400 systems needed to support MPANL voice

Feature/service	Document
Path-oriented routing system (PORS)	NN10600-750 *Nortel Networks Multiservice Switch 7400 Operations: Voice Transport*
	NN10600-435 *Nortel Networks Multiservice Switch 7400/15000/20000 Operations: Path-Oriented Routing System*
RSA and VNCS	NN10600-765 *Nortel Networks Multiservice Switch 7400 Operations: Remote Server Agent*
Voice routing and networking	NN10600-755 *Nortel Networks Multiservice Switch 7400 Operations: Voice Networking*

MPANL configuration procedures

This taskflow shows you the sequence of procedures you perform to configure MPANL. To link to any procedure, go to "MPANL configuration task navigation" (page 19)

Figure 1
MPANL configuration procedures



MPANL configuration task navigation

- “Configuring an MPANL dedicated link” (page 20)
- “Configuring an MPANL ISDN link” (page 23)
- “Configuring an MPANL over a frame relay link” (page 27)
- “Configuring MPA voice accounting” (page 31)

Configuring an MPANL dedicated link

Configure an MPANL dedicated link to identify the interface card for a dedicated link and attach an MPANL.

Prerequisites

- Perform this procedure in provisioning mode.

Procedure steps

1. Set the card type for the Function Processor (FP) in the Nortel Networks Multiservice Switch node.

   ```
   set shelf card/<m> cardType <card>
   ```

2. Add a logical processor type (lpt) and set its feature list. MPANL_DED is used as the variable to indicate the link type of the this MPANL instance.

   ```
   add sw lpt/MPANL_DED
   ```

   ```
   set sw lpt/MPANL_DED featureList mpaNetworkLink
   frameRelayMmtc
   ```

3. Add the logical processor. It is conventional to give it the same logical processor number as the FP to which it attaches.

   ```
   add lp/<n>
   ```

   ```
   set lp/<n> maincard sh card/<m>
   ```

   ```
   set lp/<n> logicalprocessortype sw lpt/MPANL_DED
   ```

4. Add a port to the logical processor. For V11, V35 and CFP1 card types, enter

   ```
   add lp/<n> <port>/<p>
   ```

   For DS1, DS1C, E1, E1C and eight port DS1 card types, enter

   ```
   add lp/<n> <port>/<p>
   ```

   ```
   add lp/<n> <port>/<p> chan/<c>
   ```

   ```
   set lp/<n> <port>/<p> chan/<c> timeslots <timeslot1>
   [<timeslot2>]... [<timeslotn>]
   ```

   The system automatically adds Channel 0. You must explicitly add other channels.

5. If necessary set the linkmode of the MPANL to DCE.

   ```
   set lp/<n> <port>/<p> linkmode dce
   ```

6 Add a dedicated MPANL service for the slot. Choose a service number that is consistent with numbering used in other elements. Your choice of a numbering scheme is conventional only, not enforced. The *framer* component is a distinctive element required for MPANL links that do not employ frame relay.

```
add mpanl/<np>

add mpanl/<np> framer

set mpanl/<np> framer interfaceName lp/<n> <port>/<p>
```

7 Complete the provisioning session.

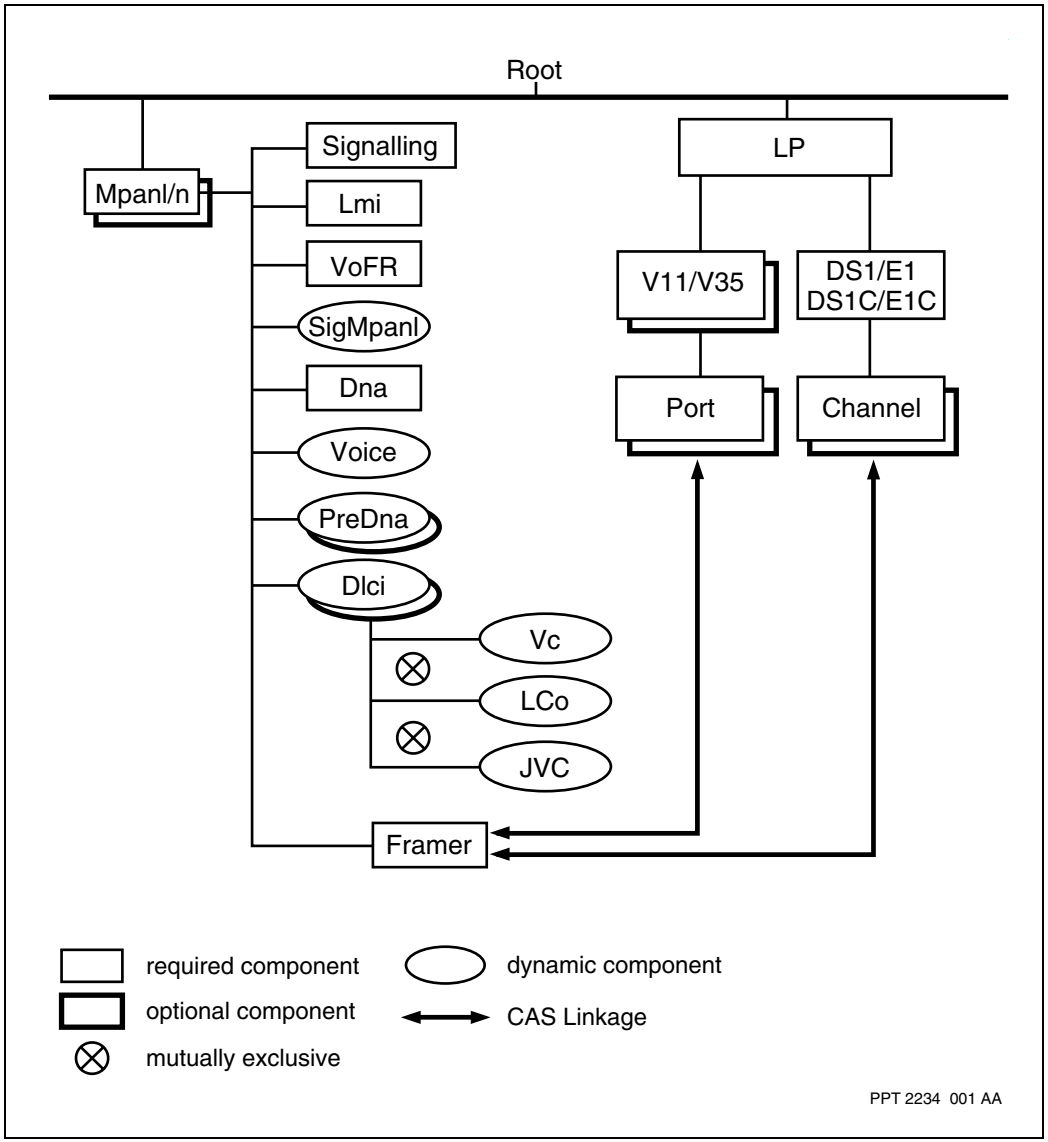
```
check prov

activate prov

confirm prov

save prov

end prov
```

Variable definitions

Variable	Definition
<m>	is the slot number for the FP
<n>	can be between 1 and 15 inclusive.
<p>.	is the number of the port
<port>	is DS1, E1, V11, or V35

Procedure job aid

Figure 2
Configuring an MPANL dedicated link component hierarchy



Configuring an MPANL ISDN link

Configure an MPANL ISDN link to identify the interface card for an ISDN link and attach an MPANL.

Prerequisites

- For MPANL over ISDN, you must provision the *DataSignallingChannel* component at the CAS root before linking MPANL components to them. Refer to NN10600-901 *Nortel Networks Multiservice Switch 7400/ 15000/20000 Frame Relay Configuration Management* for instructions on provisioning the *DataSignallingChannel* component.
- You must provision the *DataSignallingChannel* component and the associated MPANL components on the same PRI interface.
- Perform this procedure in provisioning mode.

Procedure steps

1 Set the card type for the function processor (FP) in the Nortel Networks Multiservice Switch node.

```
set shelf card/<m> cardType <card>
```

2 Add a logical processor type (lpt) and set its feature list. MPANL_ISDN is used as the variable to indicate the link type of the this MPANL instance.

```
add sw lpt/MPANL_ISDN
```

```
set sw lpt/MPANL_ISDN featureList mpaNetworkLink
frameRelayIsdn etsi frameRelayMmtc frameRelayUniPvcSvc
```

Etsi identifies an ISDN variant that depends on the locale in which you are provisioning MPANL. See “MPANL link types and function processors” (page 40) for a list of currently supported variants.

3 Add the logical processor. It is conventional to give it the same logical processor number as the card number of the FP to which it attaches.

```
add lp/<n>
```

```
set lp/<n> maincard sh card/<m>
```

```
set lp/<n> logicalprocessortype sw lpt/MPANL_ISDN
```

4 Add a port to the logical processor.

```
add lp/<n> <port>/<p>

add lp/<n> <port>/<p> chan/<c>

set lp/<n> <port>/<p> chan/<c> timeslots <timeslot1>
[<timeslot2>]... [<timeslotn>]
```

The system automatically adds Channel 0. You must explicitly add other channels.

5 If necessary set the linkmode of the MPANL to DCE.

```
set lp/<n> <port>/<p> linkmode dce
```

6 Add an ISDN MPANL service for the slot. Choose a service number that is consistent with numbering used in other elements. Your choice of a numbering scheme is conventional only, not enforced. The framer component is a distinctive element required for MPANL links that do not employ frame relay.

```
add mpanl/<np>

add mpanl/<np> framer

set mpanl/<np> framer interfaceName lp/<n> <port>/<p>
chan/<c>

add mpanl/<np> isdn
```

7 Complete the MPANL provisioning session.

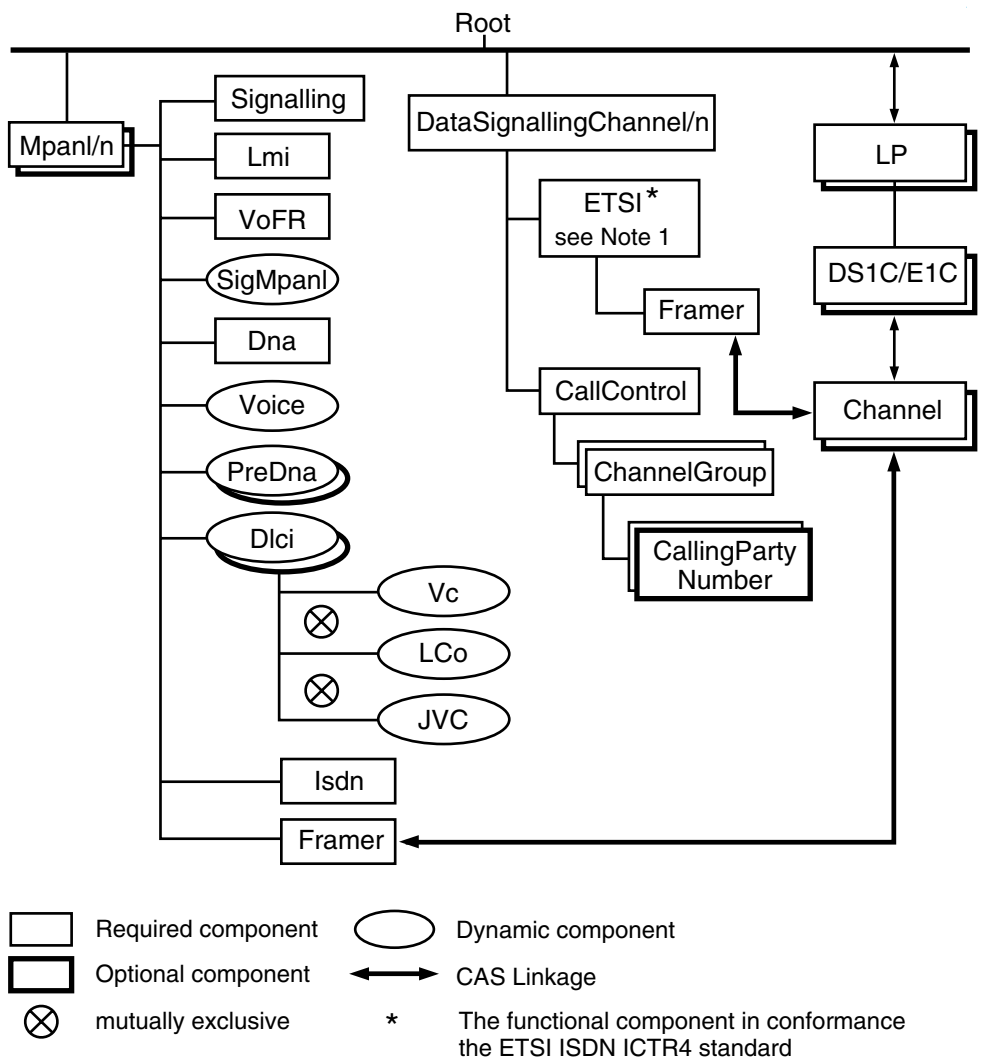
```
check prov

activate prov

confirm prov

save prov

end prov
```

Variable definitions

Variable	Definition
<c>	The channel number <c> must not be the channel number assigned to the D-channel which is reserved for the *DataSignallingChannel* component. The timeslot assigned to the D-channel is dependent on the ISDN variant. See NN10600-900 *Nortel Networks Multiservice Switch 7400/ 15000/20000 Frame Relay Technology Fundamentals* for timeslot assignment.
<m>	is the slot number for the FP
<n>	can be between 1 and 15 inclusive. Choose the logical processor type MPANL_ISDN to be consistent with the previous step.
<p>	is the number of the port
<port>	is DS1 or E1

Procedure job aid

Figure 3
Configuring an MPANL ISDN link component hierarchy



Note 1: Although the ETSI component is shown, other ISDN variants can be used instead. See chapter 1, Overview, for a table listing supported variants.

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Configuring an MPANL over a frame relay link

Configure an MPANL over a frame relay link to identify the interface card for an ISDN link and attach an MPANL.

Prerequisites

- You must provision the *FrMux* component and the associated MPANL components on the same FP. The MPANL service uses *FrMux* whenever frame relay is involved, even if you configure MPANL as a single channel on a public frame relay link.
- Perform this procedure in provisioning mode.

Procedure steps

1. Set the card type for the function processor (FP) in the Nortel Networks Multiservice Switch node.

   ```
   set shelf card/<m> cardType <card>
   ```

2. Add a new logical processor type (lpt) and set its feature list. MPANL_MUX is used as a variable to indicate the link type of the this MPANL instance.

   ```
   add sw lpt/MPANL_MUX
   ```

   ```
   set sw lpt/MPANL_MUX featureList mpaNetworkLink
   frameRelayMux frameRelayMmtc
   ```

3. Add the logical processor. It is conventional to give it the same logical processor number as the card number of the FP to which it attaches.

   ```
   add lp/<n>
   ```

   ```
   set lp/<n> maincard sh card/<m>
   ```

   ```
   set lp/<n> logicalprocessortype sw lpt/MPANL_MUX
   ```

4 Add a port to the logical processor. For V11, V35 and CFP1 card types, enter

```
add lp/<n> <port>/<p>
```

For DS1, DS1C, E1, E1C and eight port DS1 card types, enter:

```
add lp/<n> <port>/<p>

add lp/<n> <port>/<p> chan/<c>

set lp/<n> <port>/<p> chan/<c> timeslots <timeslot1>
[<timeslot2>]... [<timeslotn>]
```

The system automatically adds Channel 0. You must explicitly add other channels.

5 If necessary set the linkmode of the MPANL to DCE.

```
set lp/<n> <port>/<p> linkmode dce
```

6 Create a *FrMux* component

```
add FrMux/<np>
```

7 Link the *FrMux Framer* to the support hardware channel.

```
set FrMux/<np> framer interfacename lp/<n> <port>/<p>
chan/<c>
```

8 Create a *DataLinkConnectionIdentifier* component.

```
add FrMux/<np> DataLinkConnectionIdentifier/<np>
```

9 Add a tunneling MPANL service for the card slot.

```
add mpanl/<np>

add mpanl/<np> FrMuxSetup

set mpanl/<np> FrMuxSetup PvcSetup dlciName FrMux/<np>
DataLinkConnectionIdentifier/<np> ApplicationInfo
```

10 Complete the provisioning session.

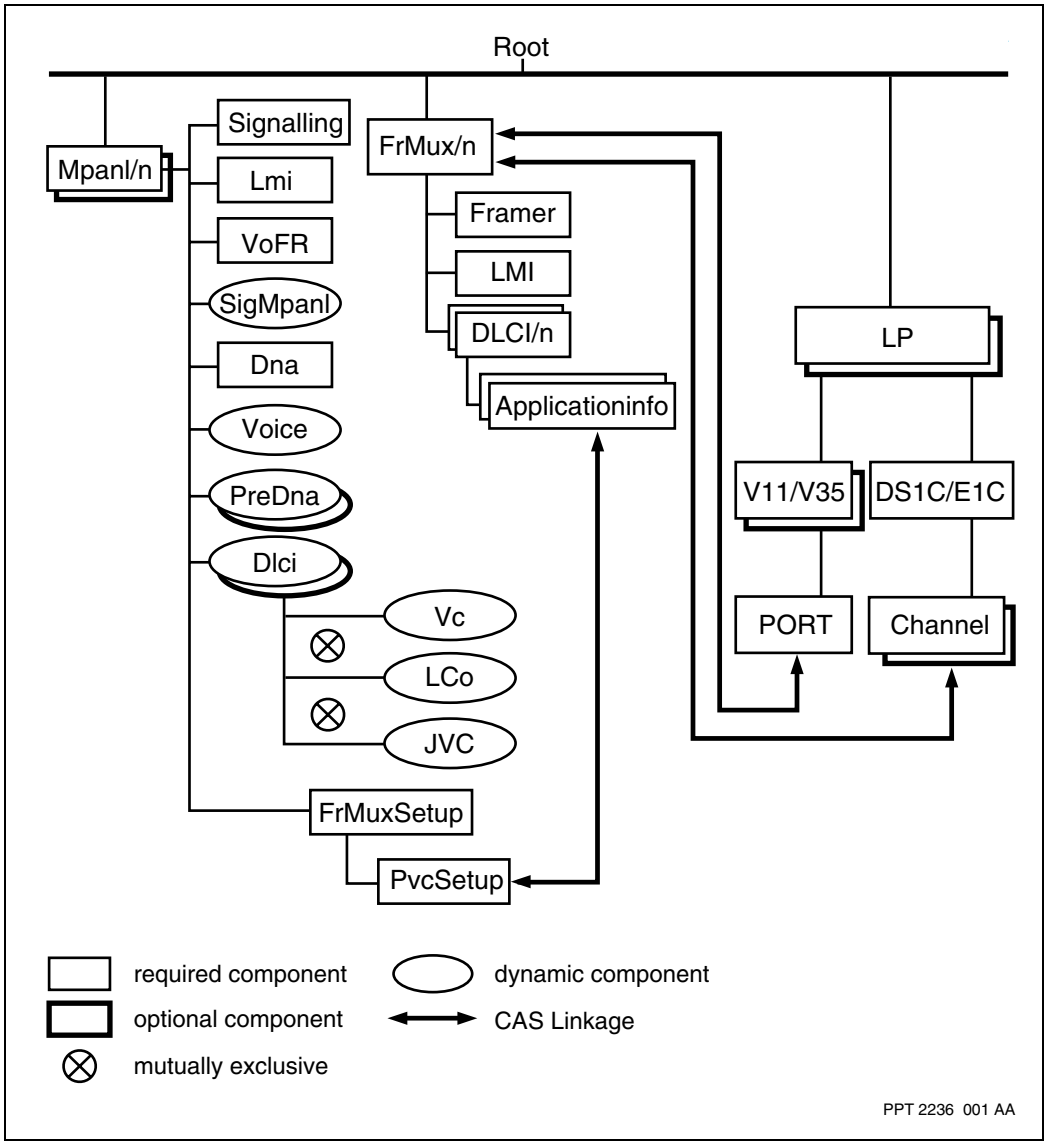
```
check prov

activate prov

confirm prov

save prov

end prov
```

Variable definitions

Variable	Definition
<m>	is the slot number for the FP
<port>	is DS1, E1,V11, or V35
<p>	is the port number

Procedure job aid

Figure 4
Configuring MPANL over a frame relay link component hierarchy



Configuring MPA voice accounting

Configure MPA voice accounting to enable accounting for a particular MPANL interface.

Prerequisites

- Changes to the provisioned attributes take effect as follows:
  - — changes to the *accountCollection* attribute affect only new calls that set up after the change-existing calls are unaffected
  - — changes to all other attributes affect all current and new calls
- If accounting is suppressed by removing all reasons for the *accountCollection* attribute or by setting the *accountingOptions* attribute to suppressTerminatingEndRecords, then accounting ceases for all calls currently in progress on the MPANL. Further, no final accounting record is generated for any of these in progress calls at the time the provisioning is activated or when the calls terminate. Also, no further intermediate records, such as TODA change or 12-hour records, are generated for these calls.
- Whenever you change the setting of the *accountCollection* attribute, the MPANL is disrupted and all active calls are terminated. If accounting was on before the attribute value change, the system generates accounting records with an end time that equals the time of the provisioning change.
- To configure data collection on the Nortel Networks Multiservice Switch 7400 node, you must set up agents, collectors, and spoolers. For details on configuring the data collection system (DCS) and for setting up a time-of-day accounting schedule, see NN10600-561 *Nortel Networks Multiservice Switch 7400/15000/20000 Data Management* and NN10600-560 *Nortel Networks Multiservice Switch 7400/15000/20000 Accounting*.
- Perform this procedure in provisioning mode.

Procedure steps

1 Identify the reason for generating accounting records.

```
set Mpanl/<n> Voice MpaVoiceAccounting
accountCollection <collect_type>
```

2 Define the accounting class.

```
set Mpanl/<n> Voice MpaVoiceAccounting accountClass
<acl_value>
```

3 Define a value that identifies the accounting record.

```
set Mpanl/<n> Voice MpaVoiceAccounting serviceExchange
<sre_value>
```

4 Optionally, define how many trailing digits to suppress in the accounting record.

```
set Mpanl/<n> Voice MpaVoiceAccounting
digitsSuppressed (<no_of_digits>
```

5 Optionally, suppress generation of accounting records at the destination node.

```
set Mpanl/<n> Voice MpaVoiceAccounting
accountingOptions suppressTerminatingEndRecords
```

Variable definitions

Variable	Definition
<acl_value>	is a digit between 0 and 255. The default value is 0.
<collect_type>	is one or more of bill, test, study, or audit. There is no default value. That is, if you do not set this attribute, accounting is suppressed.
<n>	is the instance of MPANL
<no_of_digits>	is a digit between 0 and 8. The default value is 0.
<sre_value>	is a digit between 0 and 255. The default value is 0. This value is arbitrarily selected by the operator.

MPANL configuration additional information

See the following sections for additional information about MPANL components and attributes:

- "Provisionable attributes affected by MPANL" (page 33)
- "MPANL accounting attributes" (page 34)
- "MPA voice accounting attributes" (page 34)
- "Configuring PORS for MPANL" (page 35)
- "Configuring SPVC for MPANL" (page 36)

Provisionable attributes affected by MPANL

"MPANL-specific attribute settings" (page 33) lists provisionable attributes that require MPANL-specific settings. See

Table 2
MPANL-specific attribute settings

Component attribute	Values	Description
DataNetworkAddress (Dna)		
• t320	0 to 255 seconds (default = 60)	Specifies the waiting period before a silent B-channel disconnects and is available. For MPANL, set this value to 0 (zero).
Signaling (Sig)		
• defaultAccounting (defAcc)	off or on (default = on)	Specifies whether accounting data collection is on or off for this Dlci. Unless MPANL DLCI accounting is necessary, set this value to off. AccountCollection requires a non-zero value for accounting to generate. See "MPANL accounting attributes in the Dna subcomponent" (page 34).

MPANL accounting attributes

"MPANL accounting attributes in the Dna subcomponent" (page 34) lists accounting attributes you can provision for data calls using the MPANL service.

Table 3
MPANL accounting attributes in the Dna subcomponent

Attribute name	Values	Description
accountClass	0 to 255 (default = 0)	This attribute specifies the accounting class reserved for network operations usage. The accounting record in the local and remote service type attributes lists the assigned value. The network operator decides whether or not or how to use this attribute.
accountCollection	bill, test, study, audit, or force (default = bill)	This attribute indicates the reasons the network collects accounting records. Force, the last of the possible values, indicates that the system must collect accounting records irrespective of other collection reasons. there is no Accounting record generation when none of these reasons is set.
serviceExchange	0 to 255 (default = 0)	This attribute contains an arbitrary number, entered by the network operator. The accounting record includes this number.
egressAccounting	off or on (default = off)	This attribute specifies if egress accounting is enabled on this particular MPANL interface. If you disable egress accounting the system collects only segment counts and excludes MPANL-specific data in accounting records. If you enable egress accounting the accounting records for MPANL contain MPANL-specific data (counts, provisioned values and effective TIR EIR).

MPA voice accounting attributes

"MPA voice accounting attributes under the Voice MpaVoiceAccounting component" (page 35) lists accounting attributes you can provision for the MPA voice accounting for voice calls over SVCs.

Table 4
MPA voice accounting attributes under the Voice MpaVoiceAccounting component

Attribute name	Values	Description
accountClass	0 to 255 (default = 0)	This attribute specifies the accounting class reserved for network operations usage. The accounting record in the local and remote service type attributes lists the assigned value. The network operator decides whether or not or how to use this attribute.
accountCollection	bill, test, study, audit (no default)	This attribute indicates the reasons the network collects accounting records. The system does not generate accounting records when no value is set.
serviceExchange	0 to 255 (default = 0)	This attribute contains an arbitrary number, entered by the network operator. The accounting record includes this number.
digitsSuppressed	0 to 8 (default = 0)	This attribute defines the number of trailing digits that the accounting sub-system suppresses in the called number in the accounting records. These trailing digits are replaced with an “X”. This option satisfies privacy requirements where required.
accounting-Options	suppress-TerminatingEnd-Records No value indicates that the option is not used.	This optional attribute defines settings for the voice networking accounting system. The suppressTerminatingEndRecords value this option suppresses the generation of accounting records at the destination switch. This value reduces the volume of accounting data and has local significance only since it suppresses the generation of accounting records only for calls received by the destination.

Configuring PORS for MPANL

The software for running PORS is part of the MPANL software and is downloaded onto the FP with provisioned MPANL services. No MPANL provisioning is necessary to establish a PORS call.

To setup PORS connections over Nortel Networks Multiservice Switch trunks, you must

- add the PORS trunk feature to a trunk sw/lpt

- add the *PathAdmin* subcomponent to a Multiservice Switch trunk

The presence of a PORS IE in a call setup message causes MPANL to establish the connection over PORS. MPANL sets the default transfer priority for a PORS connection to TP11.

Configuring SPVC for MPANL

No provisioning is necessary for SPVC calls at the MPANL service, but the PVC end points of an SPVC do require provisioning. One end point must be assigned as the master and the other end as the slave. Although there is no restriction as to which end is which, we recommend that a Passport 4400 unit be the master end. Note that

- The maximum payload restriction of 4096 octets in SPVCs needs to be reflected when provisioning Nortel Networks Multiservice Switch frame relay services that support SPVCs.
- The MPANL SPVCs do not support the Ignore eight-bit feature of Multiservice Switch frame relay.

For information on provisioning the PVC end points of an SPVC refer to

- NN10600-901 *Nortel Networks Multiservice Switch 7400/15000/20000 Frame Relay Configuration Management*
- 800-1952-20, *Passport 4400 Operator's Manual*

Chapter 2
MPANL overview

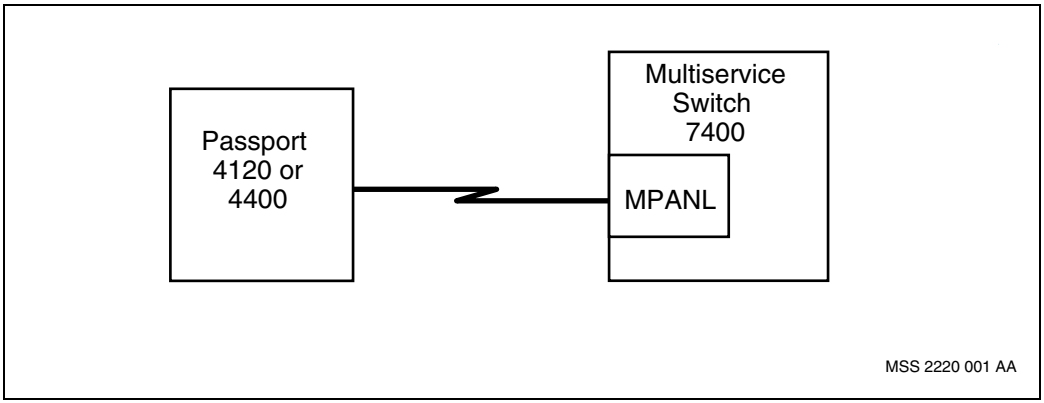
Multiservice Passport access network links (MPANL) provides internal node services that support the connection of Passport 4400 access units to Nortel Networks Multiservice Switch 7400 nodes.

The following sections provide an overview of MPANL and its applications:

MPANL

Multiservice Passport access network links (MPANL) is an internal node service consisting of software components that implement a proprietary protocol. "MPANL is a Multiservice Switch service" (page 38) illustrates the arrangement. You configure MPANL on Nortel Networks Multiservice Switch 7400 nodes using CAS.

Figure 5
MPANL is a Multiservice Switch service

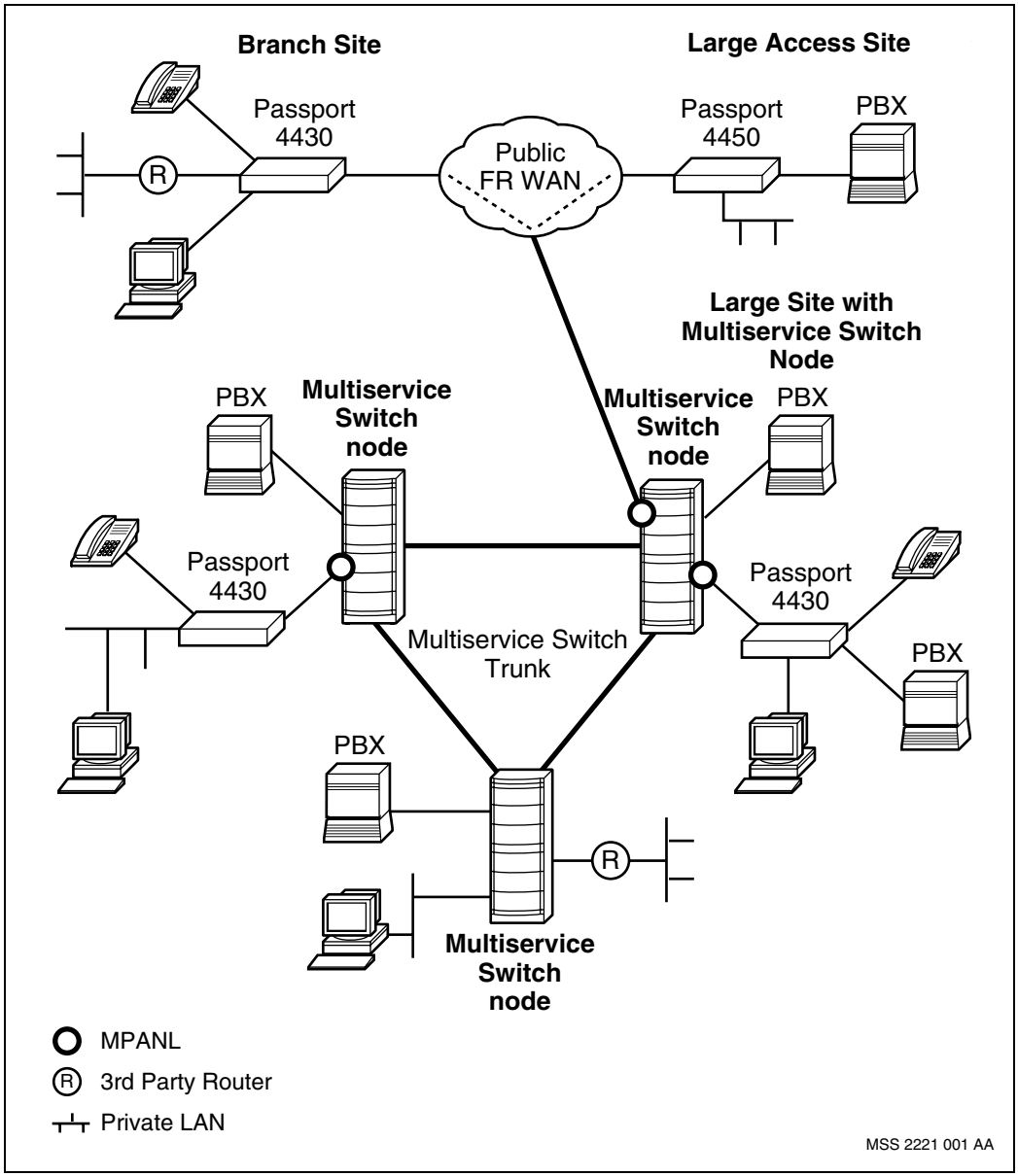


The MPANL protocol

"A network example using Passport 4400 series units" (page 39) shows a Nortel Networks Multiservice Switch network using Passport 4400 units. The MPANL protocol permits users to combine link types and Passport 4400 roles to suit branch office economics and bandwidth requirements.

The MPANL base protocol is adapted from the ITU-T X.36 protocol (frame relay) to support Passport 4400 unit signaling and payload transport on Multiservice Switch nodes. The MPANL service uses this protocol regardless of optional arrangements you chose. You can provision protocol layering features to suit your networking requirements, such as MPANL over frame relay or ISDN. Protocol adaptations ensure that Multiservice Switch networking components deliver quality of service and ease of management.

Figure 6
A network example using Passport 4400 series units



MPANL connection options

MPANL supports the following link types:

- MPANL over a dedicated connection

  The direct connection can be in-house or over public leased lines. The bandwidth potential and provisioning simplicity provide high performance and ease of management.

- MPANL over ISDN

  ISDN is both a convenient main link and backup link option for MPANL. A primary rate interface (PRI) provisioned on Nortel Networks Multiservice Switch nodes communicates with a basic rate interface (BRI) on the supported Passport 4400 access units.

- MPANL over frame relay

  Public frame relay tariffs combined with MPANL's use of frame relay multiplexing provide an economical connection for multiple Passport 4400 units to a Multiservice Switch network.

MPANL-supported function processors

"MPANL link types and function processors" (page 40) lists the function processors (FPs) compatible with each MPANL link type.

Table 5
MPANL link types and function processors

Link type	FPs
direct dedicated connection	V11,V35, DS1C, E1C, four-port DS1, eight-port DS1, E1
dedicated connection using channel bank	four-port DS1/E1, eight-port DS1, four-port DS1C/E1C
ISDN connection	four-port DS1C/E1C
FR tunnelling connection	V11,V35, DS1C, E1C, four-port DS1, eight-port DS1, E1, CFP1

MPANL-supported ISDN variants

"MPANL link types and function processors" (page 40) lists ISDN variants supported by MPANL.

Table 6
ISDN Variants supported for MPANL

MPANL component name	Conformance
etsi	ICTR4
japanIns	INS-Net
ni2	NI-2
nis	NIS-A211-1

MPANL voice support

Passport 4400 access units support high-quality voice on low-speed links shared with application data. The following MPANL features support this capability:

- four-priority egress queues to favor transmission of voice traffic
- large frame fragmentation to prevent excessive delay of voice frames
- small frame packing to optimize bandwidth distillation
- internal path-oriented routing to reduce both the delay of voice frames and the overhead of each frame

MPANL support for switched permanent virtual circuits

MPANL supports end-user permanent virtual circuits (PVCs) by automatically establishing switched virtual circuits (SVCs) between the frame relay PVC DTEs. This arrangement of a PVC supported by an automatic SVC is called a switched permanent virtual circuit (SPVC).

Legacy data module and junctor VC

The legacy data module (LDM) provides branch offices with legacy multi-protocol services in a Passport 4400 unit. The LDM is a Passport 4400 function processor that provides V.24, V.35 and X.21 physical interfaces to support legacy protocols.

The LDM uses general virtual circuit (GVC), a subnet communication protocol for reliable application services in Nortel Networks Multiservice Switch networks. Junctor virtual circuit (JVC) is a VC that extends GVC connectivity from the LDM, across MPANL, to destination modules, whether LDM, DPN, or Multiservice Switch.

Call redirection for MPANL

A call redirection server (CRS) can be used to improve the reliability of Passport 4400 units. A CRS allows backup links to be located on separate nodes from the primary MPANL link. For more information on call redirection, see NN10600-410 *Nortel Networks Multiservice Switch 7400/ 15000/20000 Operations: Call Redirection Server*.

Chapter 3
The MPANL protocol

See the following sections for information on the MPANL protocol:

What is the MPANL protocol?

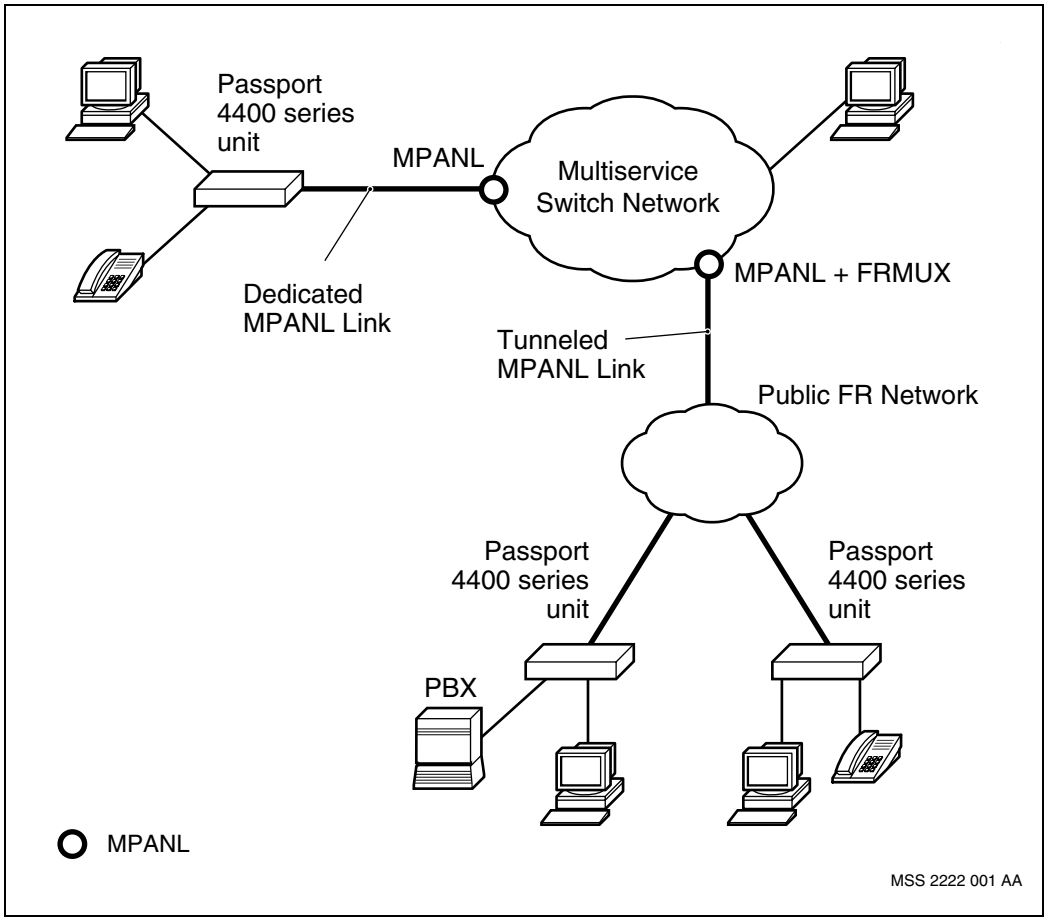
The MPANL service uses its own proprietary protocol adapted from frame relay. The MPANL protocol

- accommodates signaling and payload transport requirements unique to networks using Passport 4400 units
- accommodates a variety of link types to scale link costs to the low-cost Passport 4400 units
- assures high-quality voice service on all link types when it shares bandwidth with application data
- simplifies network provisioning and operations

"MPANL in a Multiservice Switch network" (page 45) shows a general example of a network with Passport 4400 units.

When the MPANL uses public frame relay (MPANL over frame relay), the MPANL protocol is said to be tunnelled into frame relay. Because the MPANL service directly supports frame relay multiplexing/de-multiplexing (FrMux), multiple Passport 4400 units can communicate through a single Nortel Networks Multiservice Switch function processor (FP) port.

Figure 7
MPANL in a Multiservice Switch network



MPANL protocol elements

Certain MPANL extensions of ITU-T X.36 are signaled in DLCI-0, others are signaled in DLCI-16. The following extensions are signaled in DLCI-0:

- call setup extension using proprietary MPANL information elements (IEs)
- call setup extension using SPVC IE
- A-bit signaling using Q.933 STATUS message

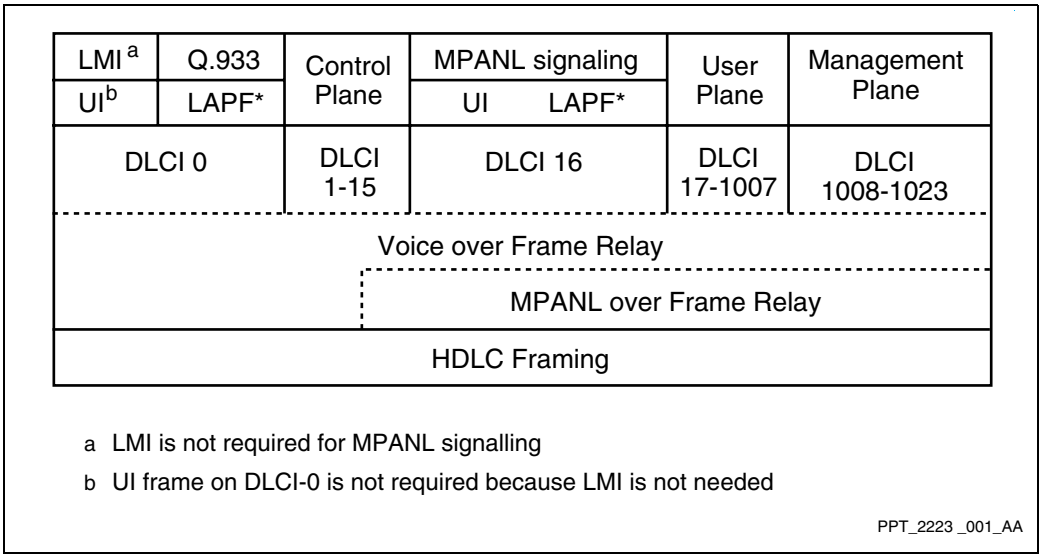
The following MPANL extensions of ITU-T X.36 use DLCI-16 for their signals:

- dynamic exchange of configurational service profile
- reliable out-of-band signaling after call establishment

The MPANL service designates the use of DLCI-16 exclusively for MPANL signaling. MPANL's adaptation of LAPF (link access protocol for frame-mode bearer service) ensures DLCI-16 signaling reliability.

"MPANL protocol stack" (page 46) shows the MPANL protocol stack elements.

Figure 8
MPANL protocol stack



DNA assignment

Prefix data network addressing is a numbering scheme that permits call routing to be work efficiently within a network. The prefix DNA number chosen for each Passport 4400 unit must fit into its network DNA scheme. Passport 4400 units can receive incoming calls only when the node informs the connected Nortel Networks Multiservice Switch node of its prefix DNA.

Passport 4400 units use an MPANL prefix DNA association IE to signal their prefix DNA numbers on DLCI-16. Each MPANL supports up to 100 prefix DNAs.

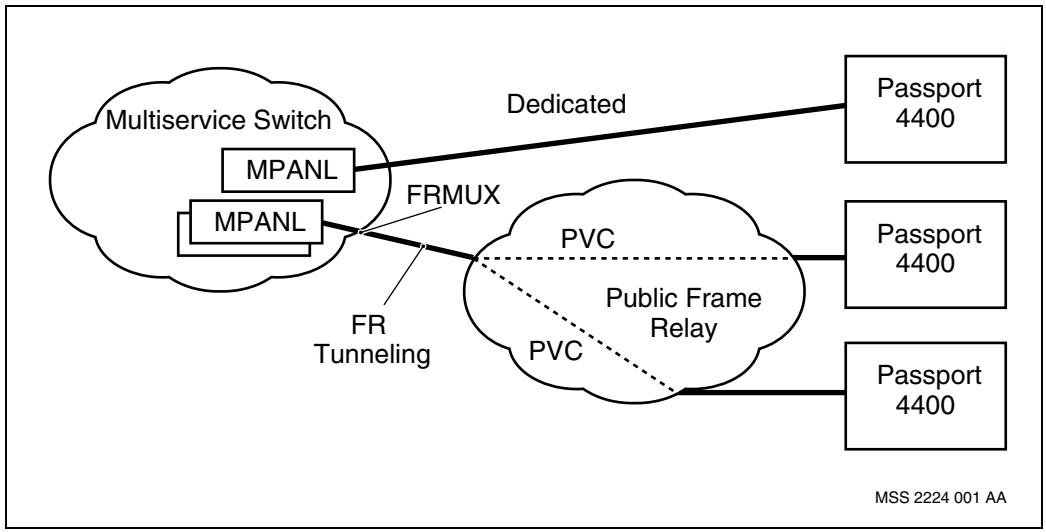
Passport 4400 units directly linked to a Multiservice Switch node register their own prefix DNA and the prefix DNAs of all units linked to the node through it.

MPANL over public frame relay

"MPANL over public frame relay network scenarios" (page 47) shows a Passport 4400 acting as a frame relay access device (FRAD) on a public frame relay network. The frame relay multiplexer/de-multiplexer (FrMux), lets you can connect multiple Passport 4400 units through a single Nortel Networks Multiservice Switch node interface. This arrangement can reduce facility, equipment, and network management costs.

The Multiservice Switch interface and the link protocol adaptations assure high-quality voice communications on links shared with application data. MPANL's traffic-shaping feature ensures that the public frame relay network does not receive data beyond the committed information rate (CIR).

Figure 9
MPANL over public frame relay network scenarios



Local management interface

MPANL supports the user-side procedure for the following local management interface protocols (LMI):

- Vendor Forum
- ANSI T.617 Annex D
- ITU-T Q.933 Annex A.

You can disable the LMI protocol.

Data loss

When congestion occurs in the public frame relay network, frames can be dropped and data lost. Since the network cannot detect dropped frames at the tunneling layer, high-level protocols running over PVC tunneling connections must provide their own recovery mechanisms.

Voice over frame relay

MPANL uses voice over frame relay (VoFr) to handle voice traffic over low-speed links. In dedicated link applications, VoFr operates between the MPANL datapath and the physical link. In multiplexed frame relay applications, VoFr operates between the MPANL datapath and the tunneling function. “Overview of MPANL data path” (page 51) shows VoFr in a multiplexed application.

The VoFr layer creates link frames, which are HDLC frames that cross the MPANL physical link or pass through the tunneling DLCI. The VoFr can carry one or more whole MPANL frames, or fragments of MPANL frames. MPANL frames look like frame relay frames with some DLCIs carrying MPANL-specific information. The VoFr layer dynamically applies priority enforcement, fragmentation, and packing, so link frames counts and sizes do not correspond to those of the transported MPANL frames.

To ensure the continuous passage of delay-sensitive traffic over a frame relay channel, Nortel Networks Multiservice Switch VoFr

- separates incoming data according to its delay-sensitivity using four priority-based queues

- fragments large data (delay-insensitive) frames to prevent voice frame delay
- packs link frames that are smaller than the maximum frame size with multiple voice frames (Undersized link frames can be topped-up with frame fragments for best link utilization.)

Whenever possible, VoFr uses a short cut mode, passing frames directly towards the link. This shortcut prevents queueing and is applied to an arriving frame when:

- there are no frames already queued in either the arriving frame's priority queue or in a higher priority queue
- traffic shaping allows the frame to be sent to the link

When these short cut conditions are not met, VoFr holds arriving frames in a priority-based queue until the traffic shaping function retrieves them. Traffic shaping ensures the traffic load to a Passport 4400 unit does not exceed the bandwidth it specified. See "Traffic shaping" (page 52).

To avoid voice traffic delays, link frame size is limited. This limit must allow voice samples to be transferred without fragmentation. For example, a typical sampling period of 20 milliseconds dictates a frame size around 100 bytes for a 64 kbit/s link (corresponding to a delay of 12.5 milliseconds). Many data frames are larger than this, so fragmentation is necessary. Fragmentation allows higher priority frames to interrupt partially transmitted lower priority ones. The connected Passport 4400 unit selects the maximum link frame size based on the provisioned or calculated information rate.

The packing of multiple voice sample frames into a single larger link frame improves efficiency. When no queued voice frames await transfer, the next eligible data frame is fragmented to fit, then added to the link frame.

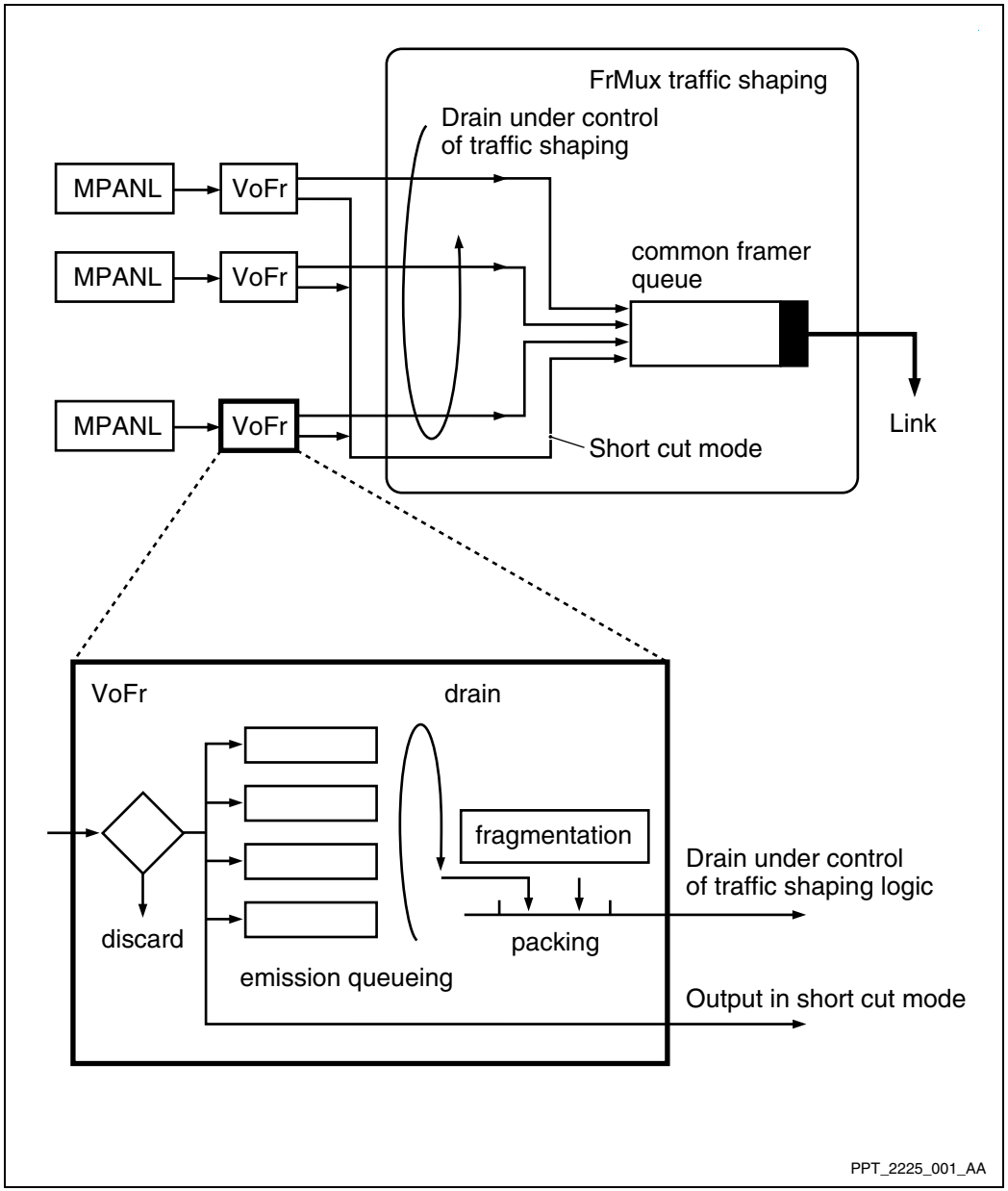
When MPANL initializes, the VoFr layer starts in a restricted operating mode that neither packs nor fragments. In this restricted mode, the maximum frame size on the link defaults to 4100 octets. Fragmentation and packing functions operate only after the connected Passport 4400 unit signals a maximum link frame size (using a *DteReceiverMax FrameSize* IE). Valid link frame sizes

range from 50 to 4100 octets. If the Passport 4400 unit signals a frame size outside of the valid range, the Nortel Networks Multiservice Switch node raises an alarm and substitutes the closest valid value.

The highest emission priority queue must carry only frames that can fit into one link frame. Existing voice sample standards meet this criterion. If frames requiring fragmentation arrive in the highest priority queue (the voice queue), voice quality can degrade.

The VoFr receiver always reassembles fragmented data as it comes, independent of the transmitter's mode of operation.

Figure 10
Overview of MPANL data path



Traffic shaping

The term traffic shaping refers to the limits enforced on egress traffic sent to Passport 4400 units. Traffic shaping operates by counting transmission credits, and refusing passage towards the link if the available credits are exhausted. Traffic shaping applies to egress traffic only. No bandwidth enforcement affects ingress traffic.

In tunneled applications, the Passport 4400 requests individual MPANLs, in turn, to release a specific number of octets corresponding to the available credits. Upon this request, the MPANL *VoFr* component prepares frames according to its protocol and sends them towards the link.

The transmit information rate (TIR) determines the egress traffic from each individual MPANL. Normally, the Passport 4400 signals the TIR during MPANL link initialization. Traffic shaping allows the Passport 4400 unit to choose the MPANL bandwidth independently of the link speed. Traffic shaping also provides the Passport 4400 unit with a dynamic flow control mechanism to limit the amount of traffic from the Nortel Networks Multiservice Switch node.

> ***Note:*** For a tunneled MPANL link, the transmit information rate (TIR) displays as the *committedInformationRate* (*CIR*) operational attribute of the MPANL *FrMuxSetup* component.

The TIR for each MPANL defaults to 16 kbit/s. A Passport 4400 unit can signal (using a DTE receiver bandwidth information element) a new TIR value anytime. For MPANL, the acceptable range of TIR values is 16 kbit/s to 7.68 Mbit/s. The maximum available TIR value depends on the FP involved. If the connected Passport 4400 unit signals a value that is out of bounds, Multiservice Switch issues an alarm and substitutes the closest valid limit value.

Traffic shaping in multiplexed frame relay

Traffic from each MPANL transmits on a public frame relay link in a separate logical channel (tunneling DLCI). The frame relay link's total transmit bandwidth is divided among provisioned instances of MPANL. Traffic shaping ensures that egress traffic conforms to the traffic contract of the

public frame relay network provider, thereby enhancing quality of service. A sum of all TIRs below the frame relay link speed guarantees the individual MPANL TIR.

The FrMux function does not refuse to operate when the sum of current TIRs exceeds the frame relay link speed. However, there is no guarantee that an individual MPANL's bandwidth can be maintained. The oversubscription of TIRs can cause traffic shaping to ignore MPANL priority queues when the common queue is full. You need to weigh the prospective advantages of higher link utilization against the disadvantages of delayed frames when TIRs are oversubscribed. Oversubscription is not recommended. When the aggregate TIR first grows to a value greater than the link speed, the system generates a message alarm.

Traffic shaping ensures minimal buffering in the common framer queue (see "Overview of MPANL data path" (page 51)). If there are too many frames, as with oversubscription of TIRs, FrMux polling stops until the common framer queue shortens. When it is necessary, buffering is concentrated in the MPANL emission priority queues to achieve maximum effect of differentiation of emission priorities.

There is no FrUni/FrNni style rate enforcement or rate adaptation for the ingress traffic.

Traffic shaping in dedicated links

Traffic shaping in dedicated links differs from traffic shaping in multiplexed frame relay (FrMux). When FrMux is involved, it respects the link rate requesting individual MPANL/VoFr instances provide specific counts of octets to contribute to a link frame. The *VoFr* component of each MPANL instance respects the priorities of its own priority queues.

When FrMux is not involved, each VoFr has its own link. The built-in VoFr shaper determines how much of the link bandwidth is available at a given time, based on the signaled TIR. Egress frames are released only when the shaper calculates that they will not overrun the TIR.Path-oriented routing service for MPANL.

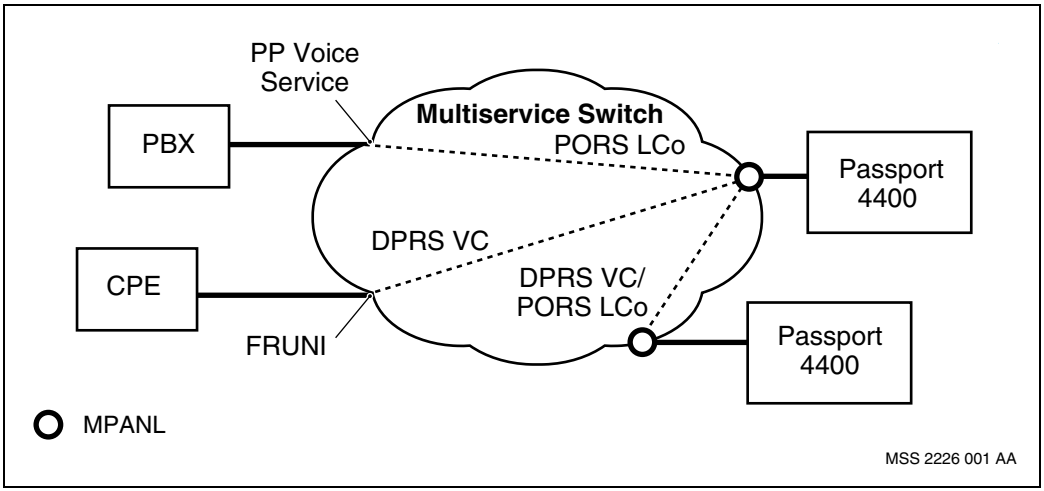
The MPANL service can establish a path-oriented routing service (PORS) connection to another MPANL service or to a Nortel Networks Multiservice Switch voice service in the network. PORS, used for voice only, is an alternative to the dynamic packet routing system (DPRS) that transports data within the Multiservice Switch network. "MPANL in a Multiservice Switch backbone network" (page 54) shows the two routing services in a Multiservice Switch network.

PORS establishes and maintains a transmission path on a trunk-by-trunk basis for a connection across a Multiservice Switch network. This path's transport characteristics allow it to

- preserve packet ordering since all packets follow the same route and cannot be overtaken by others
- support a best effort delivery for forwarding packets (Congestion and transmission facility problems can cause packet loss.)
- prevent packet duplication

PORS carries delay-sensitive traffic types, such as voice, video, HDLC, bit transparent data services, and constant bit rate.

Figure 11
MPANL in a Multiservice Switch backbone network



Traffic and call prioritizing mechanisms

Nortel Networks Multiservice Switch nodes optimize common network facilities sharing by allowing users to define connection priority with respect to

- discarding frames when congestion occurs
- determining which kind of traffic is sensitive to being delayed
- deciding the importance of new path-oriented connections compared to that of existing path-oriented connections

MPANL receives and reacts appropriately to the priority information signaled to it.

Discard priorities

During connection setup, a discard priority of 1 (most important) to 3 (least important) can be signaled to MPANL. The MPANL never discards signaling traffic transmitted on DLCIs 0 and 16.

Congestion can cause the *Dlci* subcomponent of MPANL to discard frames in the transmit direction. The subcomponent discards Traffic with a discard priority of 3 at a lower congestion level than traffic of discard priority 2, and priority 2 traffic at a lower congestion level than discard priority 1 traffic. In the receive direction, data is discarded only to relieve FP memory shortages.

Both DPRS and PORS traffic are subject to discard priority enforcement. See NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview* for more information on discard priorities.

Transfer and emission priorities

Standard frame relay transfer priorities range from 0 (lowest) to 15 (highest). The network operator can map each transfer priority index to routing class of service (RCOS) and emission priority values that are appropriate for the frame relay service. MPANL inherits this mapping from the Nortel Networks Multiservice Switch frame relay service.

MPANL always runs with four emission priorities. The *Dlci* subcomponent of MPANL maintains the current connection's emission priority, as signaled during call setup. Allocation of the available transmission bandwidth to

individual queues is not predetermined. Transfer and emission priorities assign higher priority to the more delay-sensitive traffic. MPANL signaling (transmitted on DLCIs 0 and 16) uses the second highest emission priority. You need to configure the traffic with the highest emission priority with some spare bandwidth to account for MPANL signaling.

Transfer and emission priority enforcement applies to both DPRS and PORS traffic. See NN10600-900 *Nortel Networks Multiservice Switch 7400/15000/20000 Frame Relay Technology Fundamentals* for more information on transfer and emission priorities.

PORS setup and holding priorities

When you setup a new PORS connection, the system compares the setup priority of the connection being established to the holding priorities of the existing connections. This comparison dictates which of the following actions the system takes when it is congested:

- refusing the new connection
- rerouting an existing connection or releasing an existing connection to open bandwidth for the new one

Setup and holding discard priority enforcement applies only to PORS traffic. See NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview* for more information on these priorities.

MPANL support for switched permanent virtual circuits

MPANL SPVCs use an SVC to link two PVC ends through an MPANL interface. Services, including the attached devices on a Passport 4400 unit or Nortel Networks Multiservice Switch/DPN node making use of an SPVC, are unaware of this link. This arrangement is conceptually similar to the ITU-TX.76 Recommendation on SPVCs.

“Passport 4400-to-Passport 4400 SPVC arrangement” (page 57) shows a general arrangement of SPVCs with Passport 4400 units at each end of the circuit. “Passport 4400-to-Multiservice Switch node SPVC arrangement” (page 57) shows a general arrangement of SPVCs with a Passport 4400 unit at one end and a Multiservice Switch node at the other. The PVCs in both these figures can support LAN and frame relay applications.

SPVCs are simple to operate. While conventional PVCs require provisioning at each node in a circuit, SPVCs require provisioning at the end points only. Failure to establish or hold an SPVC connection results in automatic retries based on a timer setting.

Figure 12
Passport 4400-to-Passport 4400 SPVC arrangement

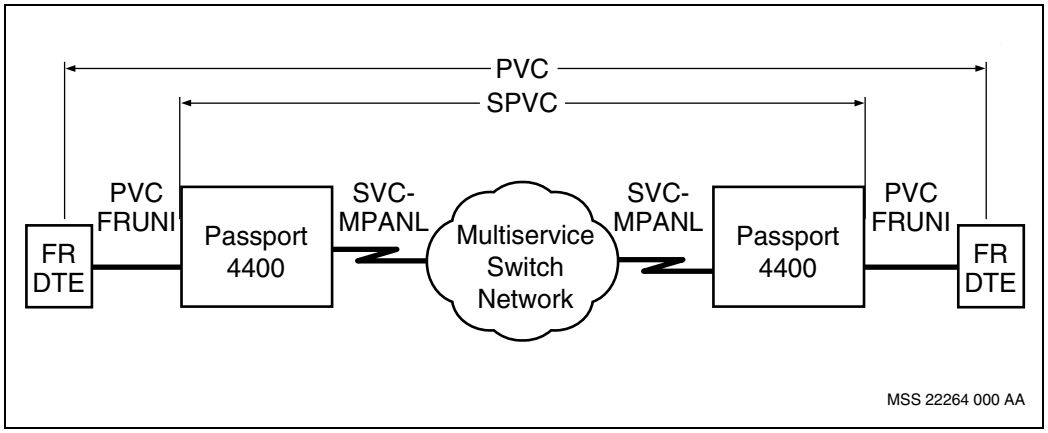
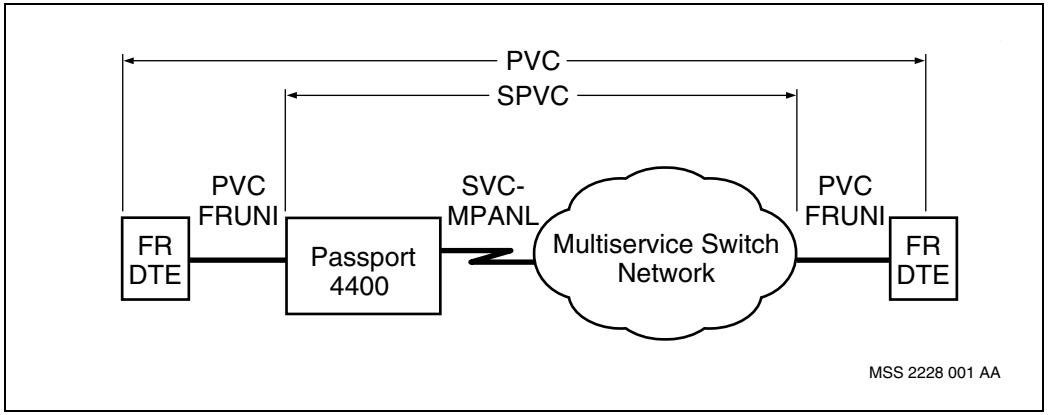


Figure 13
Passport 4400-to-Multiservice Switch node SPVC arrangement



A-bit signaling over SPVCs

Data sent through a VC to a remote end whose LMI is down is carried to the egress side, then discarded. PVC end-to-end exchange of availability statuses, as A-bit signaling, prevents the transfer of data destined to be discarded.

MPANL relays A-bit status information between the SPVC end points. The relayed status is distinct for each traffic direction of a given circuit. If the status is active, the A-bit reason accompanying the status, has no meaning. If the A-bit status is inactive, the A-bit reason can be one of the following:

- remote signaled

  Remote signaled applies only if the end service is an FRS NNI or UNI running User Side LMI protocol, and the service has received an LMI indication from a foreign network indicating that the DLCI is inactive.

- remote LMI error
- remote link down

Legacy data module (LDM) and junctor VC

Legacy application services, such as X.25, ITI and SNA, use a reliable subnet communication protocol called general virtual circuit (GVC). A VC named junctor VC (JVC) extends GVC connectivity across MPANL. Passport 4400 units use the LDM interface to support the legacy protocol connections.

The present MPANL version requires that you terminate the circuit between Nortel Networks Multiservice Switch FPs using a hairpin cable (named for the characteristic shape it forms when plugged into the connector panel). The cable connects a Multiservice Switch frame relay port to an MPANL FRMux port. “Physical arrangement using a legacy data module” (page 59) shows how the cable connects a Multiservice Switch frame relay port to an MPANL FRMux port.

“Logical circuits using a legacy data module” (page 60) shows that a pair of JVCs in conjunction with an MPANL interface constitutes a bridge (the JVC DLCI segment) between two GVC subnets. When two GVCs in different subnets operate over the JVC bridge, they provide a reliable communication

path for their application processes (AP). They do this by concatenating two connectionless subnet VC paths (JVC subnet segments) with a JVC DLCI segment.

The JVC in Multiservice Switch networks provides the functionality to establish and maintain a JVC DLCI segment and to communicate with GVC through a Multiservice Switch subnet. Either a permanent virtual circuit (PVC) or a switched virtual circuit (SVC) can use a JVC DLCI segment. It is transparent to the JVC. GVC characteristics, including restricted fast select (RFS), unrestricted fast select (UFS), and direct call (DC), are also transparent to the JVC. The system encapsulates all subnet packets into MPANL PDUs and transports them over the JVC DLCI segment.

Figure 14
Physical arrangement using a legacy data module

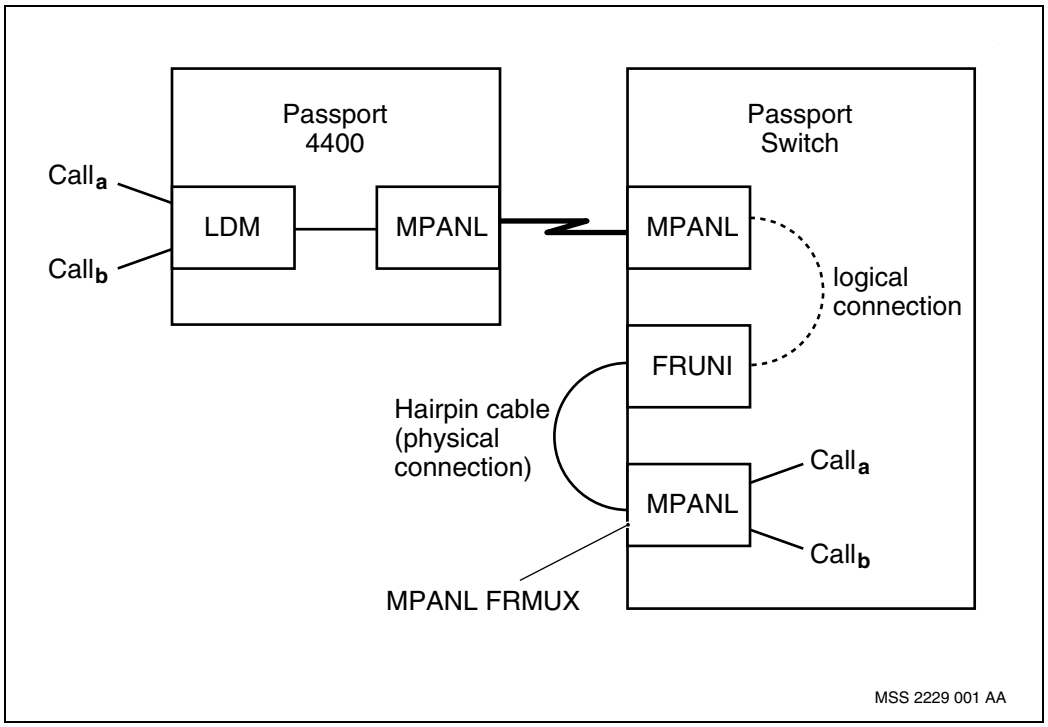
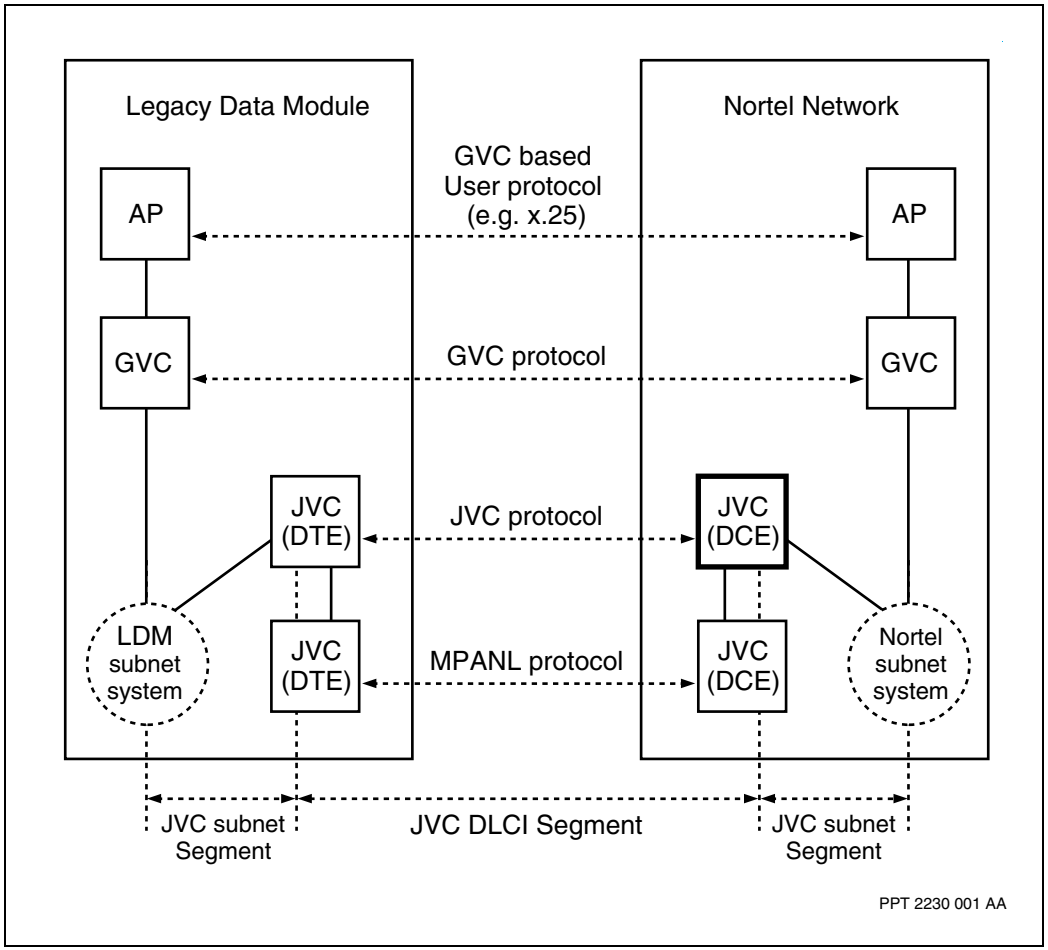


Figure 15
Logical circuits using a legacy data module



Chapter 4
Monitoring procedures for MPANL

This section describes monitoring procedures for Multiservice Passport access network links (MPANL). Monitoring is the process of acquiring and displaying operational parameters and statistics.

MPANL is adapted from existing standards-based and proprietary service components. Specifically, MPANL's main transport protocol is derived from frame relay (ITU-T X.36) which uses a large number of provisionable and operational attributes. Instructions and supporting information in this section, and in "Provisioning MPANL" on page 41, reflect only the differences between MPANL and services that were adapted for MPANL. The comprehensive NN10600-060 *Nortel Networks Multiservice Switch 7400/ 15000/20000 Component Reference*, provides complete information on MPANL components and provisionable and operational attributes.

Use the monitoring procedures in this section with Nortel Networks Multiservice Switch component administration system (CAS) and perform them using a local VT100 terminal or a remote connection (such as telnet).

To monitor MPANL, you need a thorough understanding of the capabilities of Passport 4400 access units and MPANL component capabilities. See 800-1952-20, *Passport 4400 Operator's Manual* and "Provisioning MPANL" on page 41 of this publication for complete information.

For information on how to use the Preside Multiservice Data Manager graphical interface to monitor Multiservice Switch node features and services, see 241-6001-023 *Preside MDM Configuration Management for Passport User Guide*.

This section provides details on the following aspects of MPANL monitoring:

Monitoring services and features on Multiservice Switch nodes

To monitor Nortel Networks Multiservice Switch nodes, you need to use either the list or display command. See NN10600-050 *Nortel Networks Multiservice Switch 7400/15000/20000 Command Reference* for details on how to monitor node services and features. You can find information on

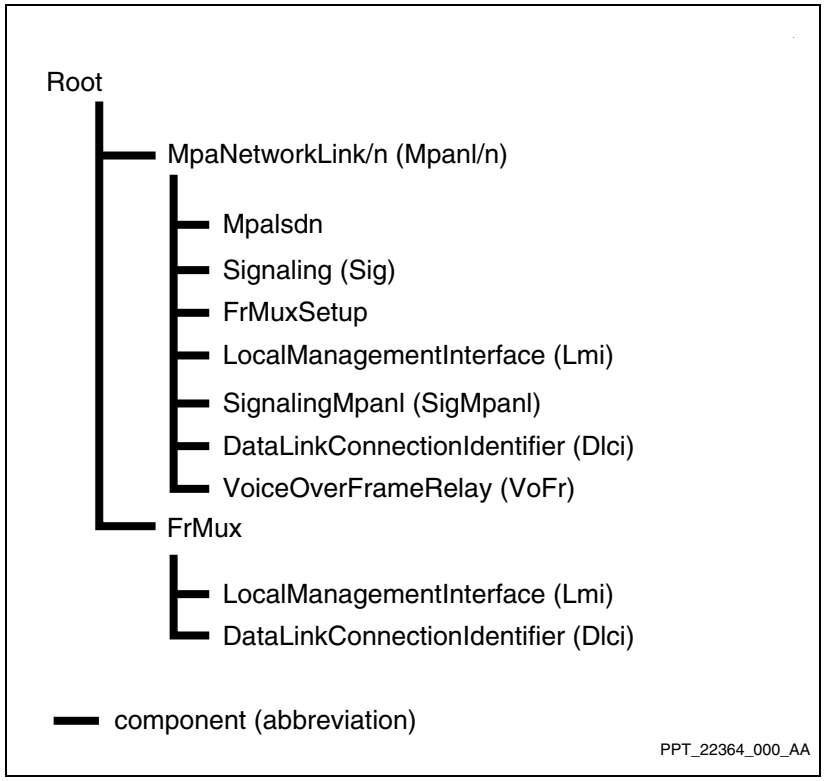
- Multiservice Switch text interface
- operator commands
- node monitoring

MPANL components and operational attributes

"MPANL components that have operational attributes" (page 63) shows Mpanl and FrameRelayMultiplexer (FrMux) components that have operational attributes.

For a listing of all MPANL components and their attributes, see NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*.

Figure 16
MPANL components that have operational attributes



MPANL monitoring procedures

Use the following procedures for monitoring MPANL:

- "Displaying operational attributes" (page 64)
- "Listing prefix data network addresses" (page 64)
- "Measuring round trip delay" (page 64)
- "Listing instances of SPVC DLCIs on MPANL" (page 65)
- "Displaying statistics and operations attributes of SPVC DLCIs" (page 65)
- "Terminating an SPVC" (page 66)

- "Monitoring MPA voice accounting" (page 68)

Displaying operational attributes

1 Display all operational attributes for an single subcomponent.

```
display mpanl/<n> sigmpanl
```

Variable	Definition
<n>	identifies a previously added instance of an MPANL `sigmpanl` is an MPANL subcomponent with operational attributes unique to MPANL.

Listing prefix data network addresses

The *PrefixDataNetworkAddress* (*PrefixDna*) is a dynamic subcomponent of MPANL. It contains a prefix DNA of this interface, obtained from a DNA prefix association SAP-0 command sent by the linked Passport 4400 units.

1 To display a table of all *PrefixDna* subcomponents enter

```
list mpanl/* prefixDna/*
```

2 To display the *PrefixDna* subcomponents of a single MPANL enter

```
list mpanl/<n> prefixDna/*
```

When an MPANL supports multiple Passport 4400 units, the listing includes all instances of prefix DNAs.

Variable	Definition
<n>	identifies the instance of MPANL

Measuring round trip delay

Round trip delay (RTD) measurements are available for instances of MPANL over a frame relay network or dedicated line. RTD measurements are not available for Passport 4120.

1 Display the round trip delay, measured in milliseconds (msec).

```
display mpanl/<n> RoundTripDelay
```

A displayed value of 0 indicates a RTD measurement could not be made.

Variable	Definition
<n>	identifies the instance of MPANL

Monitoring SPVCs

An SPVC DLCI exists at the MPANL interface for the duration of an SPVC call. You can use the SPVC DLCI operational attributes and statistics to troubleshoot connection problems if the call is still active.

Listing instances of SPVC DLCIs on MPANL

1 To list all instances of SPVC and SVC DLCIs on all instances of MPANL enter

```
list mpanl/* DataLinkConnectionIdentifier/*
```

2 To list all instances SPVC and SVC DLCIs on a single instance of MPANL enter

```
list mpanl/<n> DataLinkConnectionIdentifier/*
```

Variable	Definition
<n>	identifies the instance of MPANL

Displaying statistics and operations attributes of SPVC DLCIs

1 To query the statistics and operational attributes for individual SPVC DLCIs enter

```
display mpanl/<n> DataLinkConnectionIdentifier/<m>
```

2 To identify an MPANL call as either SVC or SPVC, and the SPVC call end points enter

```
display mpanl/<n> DataLinkConnectionIdentifier/<m> Vc
```

3 To determine the MPANL DLCI for an SPVC connection between two Passport 4400 units, enter

```
display mpanl/<n> DataLinkConnectionIdentifier/* vc
calledDna, calledLcn, callingDna, callingLcn
```

4 If the MPANL used by a particular Passport 4400 unit can be identified, the MPANL DLCI used for an SPVC call can be identified by displaying each DLCI Vc callData at the MPANL until a match with the SPVC end point DNAs and DLCIs is found. To query the DLCI Vc callData enter

display mpanl/<n> DataLinkConnectionIdentifier/<m> Vc callData

Once you identify an MPANL DLCI for a given SPVC, display the *DLCI Vc callData* operational attribute group to obtain information on the calling and called party DNAs and DLCIs.

Variable	Definition
calledDna and callingDna	correspond to the DNAs of called and calling Passport 4400 units
calledLcn and callingLcn	correspond to the provisioned PVC DLCIs on the called and calling Passport 4400 units
<n>	identifies the instance of MPANL
<m>	identifies the instance of DLCI

Terminating an SPVC

1 Terminate an SPVC.

clear mpanl/<n> DataLinkConnectionIdentifier/<m>

Variable	Definition
<n>	identifies the instance of MPANL
<m>	identifies the instance of DLCI

Congestion notifications

Both Nortel Networks Multiservice Switch and public frame relay networks can set congestion notifications, forward explicit congestion notification (FECN) and backward explicit congestion notification (BECN), on frames travelling on those networks. Frame relay headers carry congestion notifiers as follows:

- The tunnelling FR header carries notifications set by sepulchre network.
- The VoFr header (when VoFr is enabled) carries notifications set by Multiservice Switch nodes.

Public frame relay congestion notifications do not map into Multiservice Switch node congestion notifications. However, the user has available the tallied FECNs and BECNs received on the tunnelling PVC.

Quality of service

Two aspects of MPANL over frame relay assist in maintaining the quality of service (QoS):

- managing frame relay congestion notification statistics

  Packets arriving at MPANL from the public frame relay network can contain FECN and BECN congestion notifications set in the tunnelling FR header. Both notifications indicate congestion developing inside the public frame relay network: FECN in the link to MPANL direction, and BECN in the MPANL to link direction. Use the following attributes to show the received FECN and BECN counts:

  — *fecnFrmFromIf*

  — *becnFrmFromIf*

- managing discard eligible frames and byte statistics

  You can mark packets arriving from the public frame relay network as discard eligible (DE). Receiving the DE-bit on traffic from the public network always indicates difficulties in the public frame relay network (Passport 4400 does not set the DE-bit on traffic sent to the public frame relay remote). Use the following attributes to view the counts of packets and bytes received with the DE-bit set:

— *deFrmFromIf*

— *deBytesFromIf*

Monitoring MPA voice accounting

The display command can be used to show the values of the MPA voice accounting attributes.

1 To list all provisioned values, use the following display command.

```
>display -p Mpanl/<n> Voice MpaVoiceAccounting
```

2 To check the accounting state of a specific MPANL voice SVC, use the following display command.

```
display Mpanl/<n> Dlci/<m> accounting
```

Variable	Definition
<n>	identifies the instance of MPANL
<m>	is the DLCI for the SVC

Chapter 5
Troubleshooting MPANL

See the following sections for information on troubleshooting the Multiservice Passport access network link (MPANL):

Multiservice Switch alarms

Nortel Networks Multiservice Switch components asynchronously generate on-switch alarms that display on the user interface. These alarms indicate faults or failure conditions on a Multiservice Switch node. When an alarm occurs, it indicates that a component needs to be serviced or that is has detected a fault elsewhere on the node. Alarm text descriptions contain information to assist you in monitoring and troubleshooting the Multiservice Switch network. Alarms specifically indicate one of the following conditions:

- degradation/quality-of-service conditions (for example, when a threshold is reached)
- processing error (for example, protocol violations and software errors)
- failures/out-of-service conditions (for example, hardware failures)
- administrative conditions (for example, issuing the lock command)
- security violations

You can use either a VT100 or Preside Multiservice Data Manager terminal as your interface. For information on Preside Multiservice Data Manager tools, see 241-6001-023 *Preside MDM Configuration Management for Passport User Guide*.

For complete information on Multiservice Switch alarms, see NN10600-500 *Nortel Networks Multiservice Switch 6400/7400/15000/20000 Alarms Reference*.

Diagnostic procedures

"Resolving MPANL problems" (page 70) describes how to identify and solve MPANL problems, and Passport 4400 access unit problems that surface as MPANL problems.

Table 7
Resolving MPANL problems

Problems that can occur	Probable causes	Corrective measures
With MPANL over public frame relay, not all traffic from the connected Passport 4400 unit arrives at the Multiservice Switch node.	The public frame relay PVC subscribed CIR is insufficient to carry the offered load from the connected Passport 4400 unit.	If the CIR is not the same as the line speed, increase the CIR subscription to be sufficient for the given load. If it is uneconomical to increase the CIR, change the EIR to be the line speed minus the CIR.
	The public frame relay PVC is encountering temporary congestion.	Determine the public frame relay congestion using BECN/ FECN frames from the link found in the frMux/n dlci/n statistics. If congestion occurs frequently, upgrade the QoS subscription with the public provider.
(Sheet 1 of 5)		

Table 7 (continued)
Resolving MPANL problems

Problems that can occur	Probable causes	Corrective measures
Calls are not arriving at the MPANL interface. Display of *prefixDna*/* attributes at the MPANL interface does not indicate an obvious problem.	The connected Passport 4400 unit has been configured with a secondary MPANL connection to the Multiservice Switch node. It is possible the link not passing calls did not have its prefix DNA dissociated before the other link was enabled with the same prefix DNA.	At the connected Passport 4400 unit, determine if it is configured with multiple links to the Multiservice Switch node. If two links are associated to the same prefix DNA, it is possible there is a software fault. Contact your support organization for assistance.
	Another Passport 4400 unit has been configured for the same prefix DNA.	Inspect the configurations of each Passport 4400 unit connected to the Multiservice Switch node. Ensure that no two Passport 4400 units are configured with the same prefix DNA.
Traffic to a connected Passport 4400 unit is less than expected, while traffic from the unit is normal.	The Passport 4400 unit has not signalled a *dteReceiverBW* value to replace the default 16 kbps value.	Configure the Passport 4400 unit to signal the correct bandwidth value.
	The value of *dteReceiverBW* has been improperly configured on the Passport 4400 unit.	Change the Passport 4400 unit configuration to use more bandwidth.
The traffic from a Passport 4400 unit to Multiservice Switch node undergoes fragmentation and packing, while traffic from the node to the unit does not.	The value of *dteReceiverFSize* has not been signaled by the Passport 4400 unit.	Determine why the Passport 4400 unit has not signaled its frame size parameter and correct the error.

(Sheet 2 of 5)

Table 7 (continued)
Resolving MPANL problems

Problems that can occur	Probable causes	Corrective measures
MPANL DLCIs suddenly fail to work.	The Q.933 layer view is out-of-sync between the MPANL DTE and DCE.	Determine the count of SVC DLCIs on the Passport 4400 unit and the Multiservice Switch node. The counts likely do not match. Lock the interface. Wait a minute or two. Unlock the interface. If the DLCI counts do match, examine the detailed DLCI operational attributes for correct calling/called DNA information. Correct detail mismatches.
A connected Passport 4400 unit no longer receives any calls.	The MPANL signaling layer view is out-of-sync between MPANL DTE and DCE.	Determine if the Passport 4400 unit has detected any DLCI-16 LAPF failures that cause the MPANL signaling layer to restart. Determine the same at the Multiservice Switch node side. A signaling out-of-sync is verified if either of the above is determined. Lock the interface. Wait a minute or two. Unlock the interface.
In MPANL over frame relay applications, layer 1 comes up at each end but end-to-end connection cannot be established.	Link speeds at the public frame relay and the Multiservice Switch node do not match.	Verify speed settings at the end points and configure correctly.
	LMI protocols do not match.	Confirm LMI protocols at each end and configure the end points with the same LMI protocol.

(Sheet 3 of 5)

Table 7 (continued)
Resolving MPANL problems

Problems that can occur	Probable causes	Corrective measures
In MPANL over dedicated link applications, layer 1 comes up at each end but end-to-end connection cannot be established.	Link speed mismatch causes layer 2 (LAPF) to fail to come up.	Verify speed settings at the end points and configure correctly.
On MPANL over ISDN, the link spontaneously comes up and goes down every minute or two.	The *t320* attribute of the *MpaIsdn* component defaults to 60 seconds (for the B-channel on links used for interactive sessions).	Set *t320* attribute of *MpaIsdn* to 0 (zero) to prevent the B-channel from shutting down during periodic inactivity.
SPVC call does not come up	The CSRM is not operational or is unreachable.	Check for connectivity with the CSRM. Check that all the nodes directly connected to the CSRM are reachable from all other nodes.
	In a Multiservice Switch node-only network, the call router (CR) is not provisioned with the slave's prefix.	Provision the CR with the slave's prefix. For details, refer to NN10600-405 *Nortel Networks Multiservice Switch 7400/15000/20000 Operations: Call Server*.
	DNA prefix of the local or remote Passport 4400 unit is not properly registered.	Correct provisioning at the Passport 4400 unit and ensure that its DNA is properly registered with the attached MPANL service.

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Table 7 (continued)
Resolving MPANL problems

Problems that can occur	Probable causes	Corrective measures
	Incorrect provisioning data at the SPVC end points.	Verify that the remote DNA, remote DLCI, and master/slave type are properly provisioned at each end. If one side is the master end, then the other end must be the slave end.
The SPVC call is up but data is not getting through for a given traffic direction.	A-bit is inactive for the given traffic direction.	Identify the MPANL used for the SPVC through the known network topology. The following operator command shows all SVC and SPVC DLCIs that exist for the MPANL service: list *MpaNetworkLink/n DataLinkConnectionIdentifier/** Individual DLCI call data displays for each DLCI until the correct DLCI is found given the VC type and the calling DNAs and DLCIs: display *MpaNetworkLink/n DataLinkConnectionIdentifier/n Vc CallData* The A-bit status and discard reason in the DLCI status can identify the cause of the data discard. Correct the cause indicated by the A-bit reason.
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