Nortel Multiservice Switch 7400

Operations: Bit Transparent Data Service

NN10600-775

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What’s new

There were no new features added to this document.

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*.

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Bit Transparent Data Service configuration

Configure Bit Transparent Data Service (BTDS) using the default settings provided with the package, or provision it to meet your specific requirements. The default settings are designed to provide a connection made up of the least number of hops across the network.

Prerequisites to Bit Transparent Data Service configuration

- The Path Oriented Routing System (PORS) and BTDS have been installed according to the instructions in NN10600-270 *Nortel Multiservice Switch 7400/15000/20000 Software Installation*.
- The version of your routing software contains PORS. BTDS will not run without PORS. Refer to NN10600-435 *Nortel Multiservice Switch 7400/15000/20000 Operations: Path-Oriented Routing System* for PORS provisioning information.
- The logical processor type for trunks has PORS software in its feature list. Refer to NN10600-435 *Nortel Multiservice Switch 7400/15000/20000 Operations: Path-Oriented Routing System*.
- All nodes in the network that are candidates for BTDS traffic are running the latest software and have the *Trunk PathAdmin* component added to the view.
- Network clock synchronization has been provisioned. Before beginning the provisioning process, map out how you want the master clocking signal to be distributed through the network. See NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures* for information on how to structure the delivery of the clocking signal and how to configure network clock synchronization.

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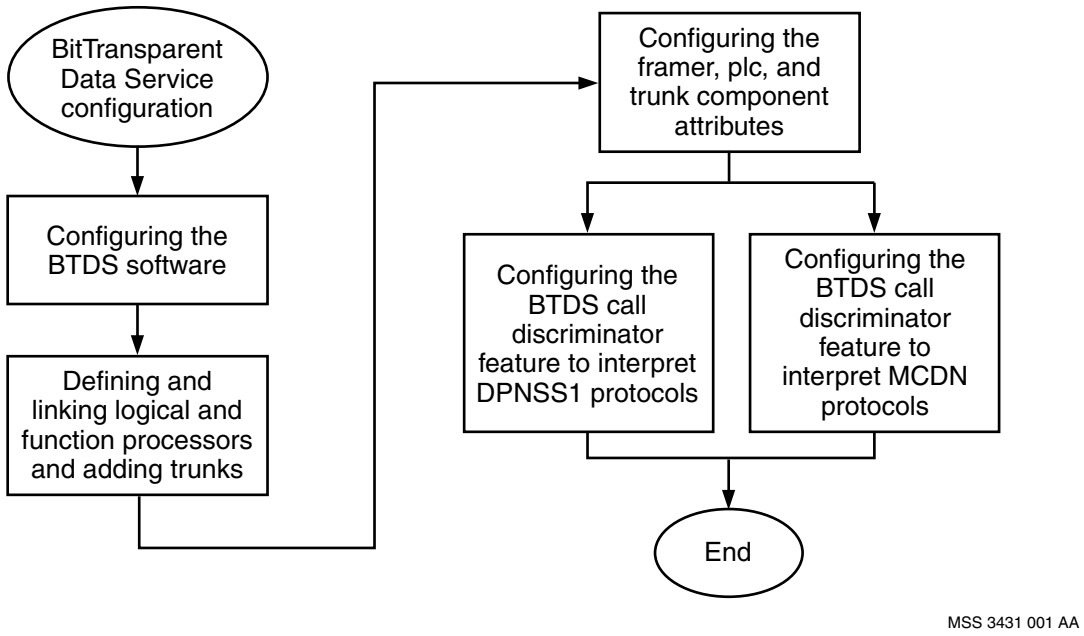
Bit Transparent Data Service configuration procedures

This task flow shows you the sequence of procedures you perform to configure BTDS. To link to any procedure, go to Bit Transparent Data Service procedure navigation (page 8).

Bit Transparent Data Service configuration procedures



Bit Transparent Data Service procedure navigation

- Configuring the BTDS software (page 9)
- Defining and linking logical processors and adding trunks (page 10)
- Configuring the attributes of the Framer, Plc, and Trunk components (page 13)
- Configuring the BTDS call discriminator feature to interpret DPNSS1 protocols (page 17)
- Configuring the BTDS call discriminator feature to interpret MCDN protocols (page 19)

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Configuring the BTDS software

Configure BTDS software on the two Nortel Multiservice Switch nodes that will run the Bit Transparent Data Service.

Procedure steps

Step	Action
1	Define an instance of the lpt attribute. **`add software lpt/<name>`**
2	Set the *featureList* attribute to vtds to add the BTDS software. **`set software lpt/<name> featureList vtds`**
3	Repeat step 1 and step 2 to configure BTDS software on the remote end node.

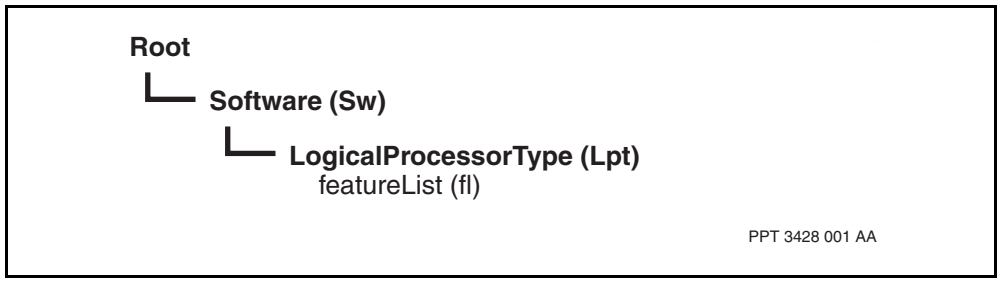
--End--

Variable definitions

Variable	Value
<name>	is the name of the Lpt component, up to 25 ASCII characters. To help simplify provisioning, use a descriptive word when naming an *Lpt* component, such as TDS.

Procedure job aid

BTDS software component hierarchy



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Defining and linking logical processors and adding trunks

Define logical processors (LP) and link them to the configured BTDS software, then add trunks.

Procedure steps

Step	Action
1	Add logical processors. **add lp/<lp_number>**
2	Link the LPs to the configured BTDS software. **set lp/<lp_number> lpt software lpt/<name>**
3	Propagate the new settings throughout the module. **activate prov**
4	Define the Bit Transparent Data Service instance. **add btds/<btds_number>**
5	Define the *interfaceName* attribute to link the Framer component to the hardware. **set btds/<btds_number> framer interfaceName lp/<lp_number> <port_type>/<port_number>**
6	Define the *Plc* component's *remoteName* attribute. **set btds/<btds_number> plc remoteName <remote_name>**
7	Add a *Trunk* component instance, if necessary. **add trunk/<trunk_number>**
8	Add the *PathAdmin* component. **add trunk/<trunk_number> pathAdmin**
9	Set up the interrupting trunk feature. **set trunk/<trunk_number> unack framer framingType interrupting**
10	Repeat step 1 through step 9 to define and link logical processors and to add trunks to the other end of the connection.

--End--

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Variable definitions

Variable	Value
<btds_number>	is the instance number of the Btds component. You can assign any value in the range as long as it does not exist anywhere else on the node.
<lp_number>	is the logical processor value that you assigned when you provisioned the card.
<name>	is the name you assigned to the BTDS software (for example, TDS).
<port_number>	is the port number you assigned when you provisioned the port.
<port_type>	is the port type, X21 (for a V.11 port) or V35 (for a V.35 port).
<remote_name>	is the PLC's remote end-point's address; the name of the other end of the connection. End points are identified using a node name and a service name. For a connection to be established, remote names between end points must be consistent. The value for the *remoteName* attribute must match the node and service name exactly (not case-sensitive), or a connection will not be made, even if the source and destination FPs share compatible provisioning data. If you do not specify a value for the *remoteName* attribute, the *Btds Plc* component accepts connection requests from any remote *Btds Plc* component. However, with no value specified for the *remoteName* attribute, the *Btds Plc* component cannot originate a connection request and the connection establishment process is slower.
<trunk_number>	is the instance number of the Trunk component. See NN10600-420 *Nortel Multiservice Switch 7400/15000/20000 Operations: Trunking* for more information about adding a trunk.

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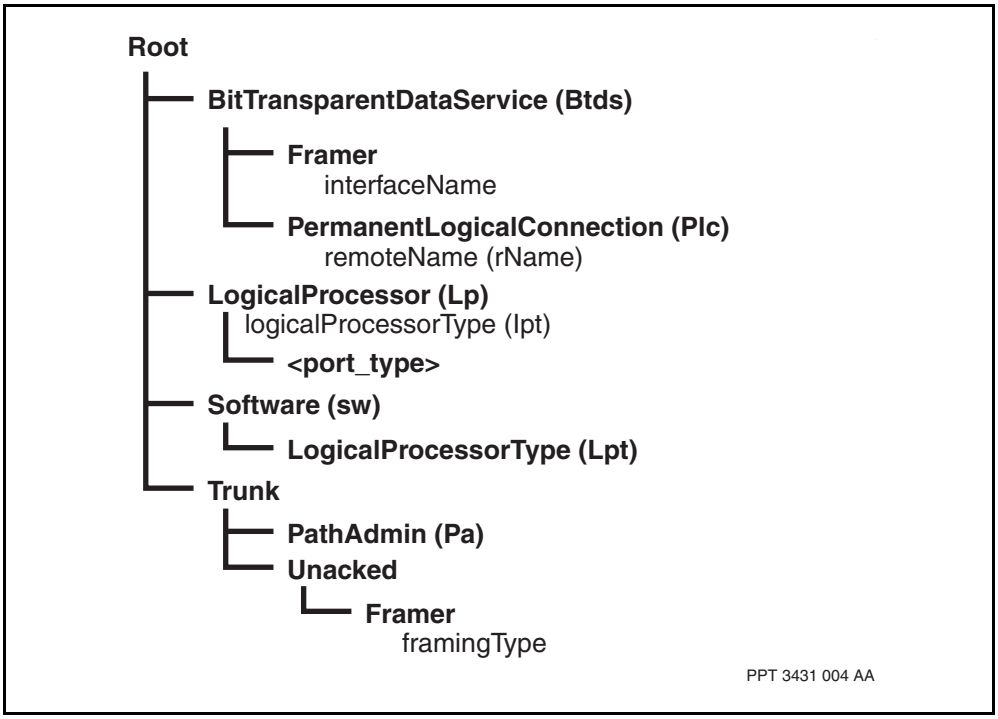
Procedure job aid

Logical processors and trunks component hierarchy



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Configuring the attributes of the Framer, Plc, and Trunk components

Specify the parameters that PORS uses in creating the connection by configuring the attributes of the *Framer*, *Plc*, and *Trunk* components.

In some cases, changes to the attributes under the *Plc* component require accompanying changes to the attributes under the *Trunk* component in order to work.

Prerequisites

- Ensure that you understand how the parameters that you enter will affect your network. For explanations of what these attributes do, see NN10600-060 *Nortel Multiservice Switch 7400/15000/20000 Component Reference*.

Procedure steps

Step	Action
1	Define values for the attributes that you want to change for the *Framer* component. You can change some or all of the attributes. **set btds/<btds_number> framer <framer_attribute> <framer_attribute_value>**
2	Define values for the attributes that you want to change for the *Plc* component. **set btds/<btds_number> plc <plc_attribute> <plc_attribute_value>**
3	Define values for the *Trunk* component attributes. **set trunk/<trunk_number> unack framer <unacked_framer_attribute> <unacked_framer_attribute_value>**
4	Define values for *Trunk PathAdmin* component's attributes. **set trunk/<trunk_number> pathAdmin <trunk_attribute> <trunk_attribute_value>**
5	Repeat step 1 through step 4 to configure the attributes of the *Framer*, *Plc*, and *Trunk* components at the other end of the connection.

--End--

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Variable definitions

Variable	Value
<btds_number>	is the instance number of the *Btds* component.
<framer_attribute>	is a provisionable attribute of the *Framer* component.
<framer_attribute_value>	is the value of the *Framer* component's provisionable attribute. To use the SPO-mux or SPO-map mode of transport, set the *btdsCellSize* attribute to 44 bytes. To use the AAL5 mode, set the *btdsCellSize* attribute to 84 bytes. DS1, E1, V.11, and V.35 FPs support the larger BTDS cell size of 84 bytes. If you are using fewer than four timeslots (256 Kbps) on a DS1 or E1 FP, set the *btdsCellSize* attribute to the default value of 44 bytes. If you are using more than three timeslots, set the *btdsCellSize* attribute to the larger BTDS cell size of 84 bytes. If you are setting up a BTDS connection between a voice and MVP-E FP, refer to Voice and MVP-E function processor interworking restrictions (page 87) before defining values for the preceding attributes.
<plc_attribute>	is a provisionable attributes of the *Plc* component.
<plc_attribute_value>	is the value of the *Plc* component's provisionable attribute. Set the values for the *requiredTxBandwidth* and *requiredRxBandwidth* attributes to reflect the amount of data that will be sent into the network. Set the *pathType* attribute to manual or forced.
<trunk_attribute>	is a provisionable attributes of the *Trunk* component.
<trunk_attribute_value>	is the value of the Trunk component's provisionable attribute.
<trunk_number>	is the instance number of the trunk.
<unacked_framer_attribute>	is a provisionable attributes of the *Unacked Framer* component.
<unacked_framer_attribute_value>	is the value of the *Unacked Framer* component's provisionable attribute.

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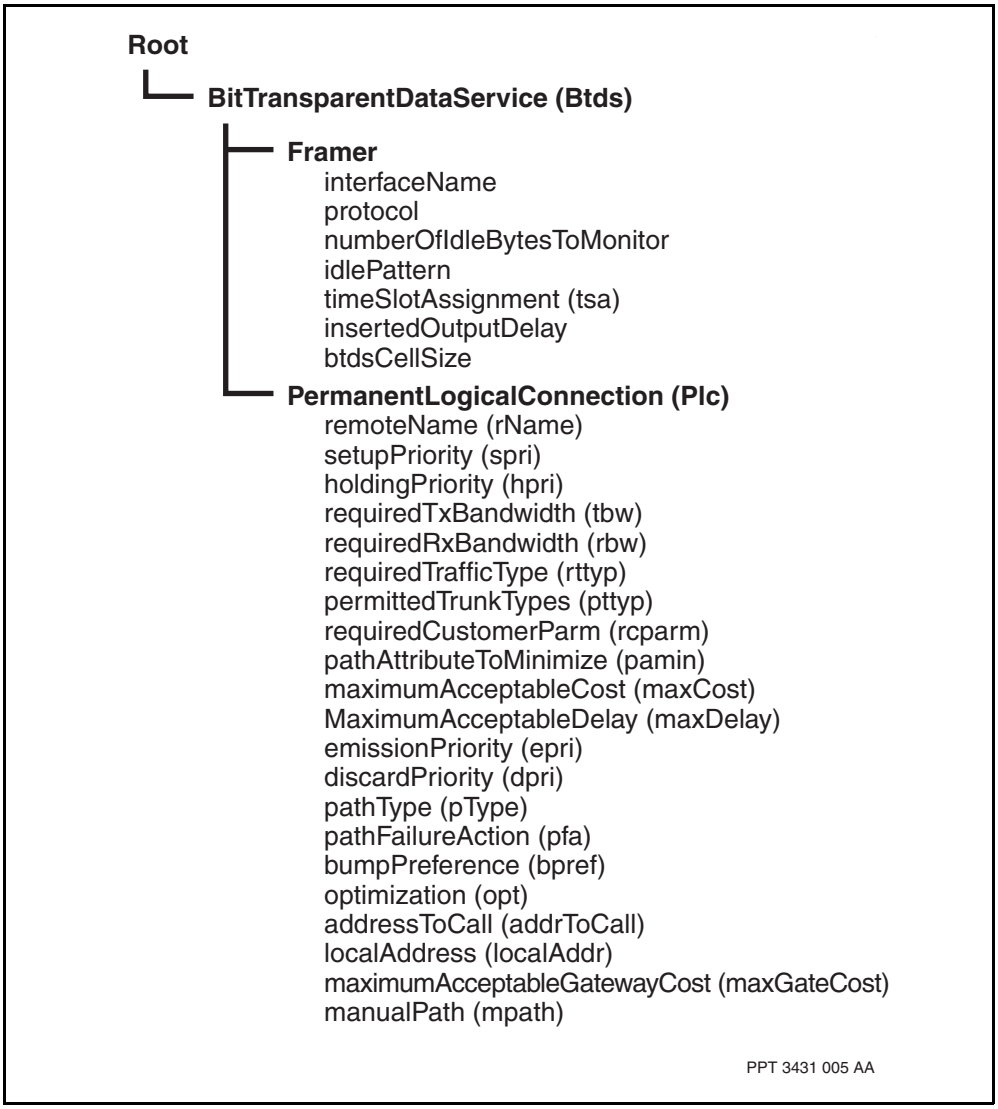
Procedure job aid

Framer and Plc components attributes component hierarchy



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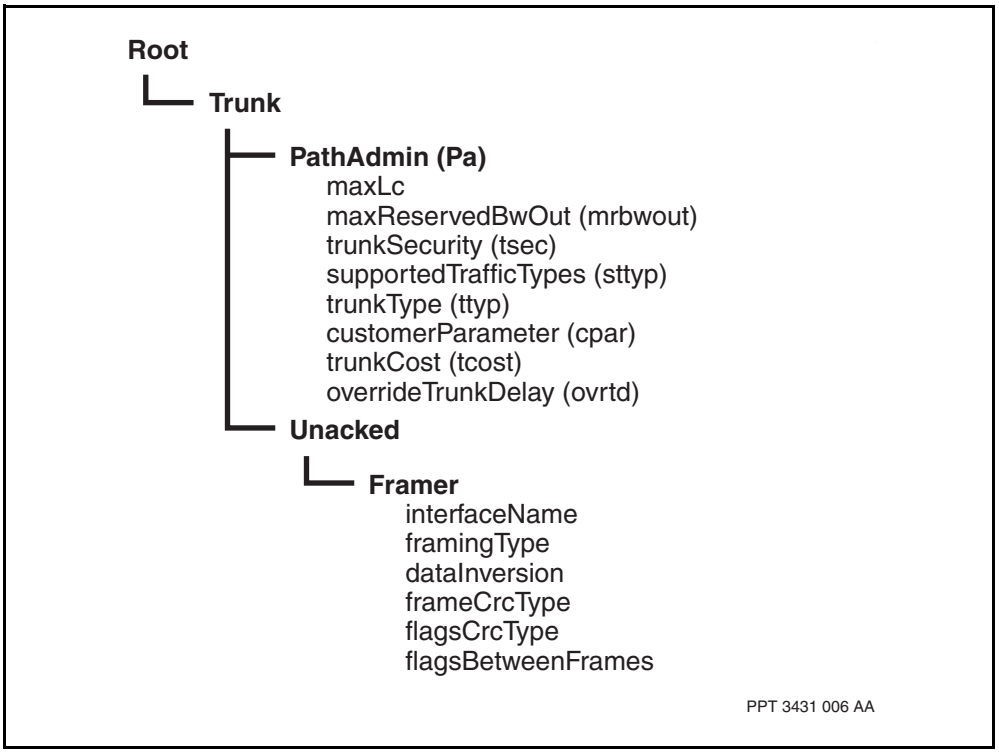
Trunk component attributes component hierarchy



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Configuring the BTDS call discriminator feature to interpret DPNSS1 protocols

Configure the call discriminator feature on Voice Transport connections between voice FPs that use the DPNSS1 protocol.

Procedure steps

Step	Action
1	Set the *featureList* attribute to callDiscriminator. **`set software lpt/<name> featureList callDiscriminator`**
2	Define the CCS handler component to specify that DPNSS 1 protocol messages will be handled for the purpose of voice/data call discrimination. **`add btds/<btds_number> Dpnss1`**
3	Define the *Dpnss1* component's *timeslotsX* attribute. Provisioning of the *timeslotsX* attribute must match the provisioning of the timeslots at the PBX which is connected to the voice FP. For example, if timeslots 1, 2, 3, 4 are provisioned X in the PBX, then type the following command: **`set btds/<btds_number> Dpnss1 timeslotsX 1 2 3 4`** This attribute specifies that timeslots 1, 2, 3 and 4 are allocated a priority X or master priority for collision resolution. For consistency of call collision resolution, the *timeslotsX* for the voice FP located at the far end must be different than the *timeslotsX* attribute provisioned at the near end.

--End--

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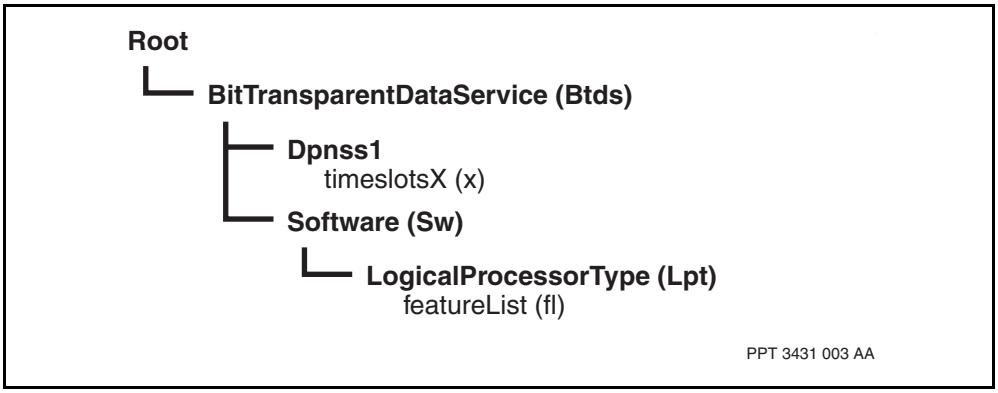
Variable definitions

Variable	Value
<btds_number>	is the instance number of the *Btds* component.
<name>	is the name you assigned to the BTDS software (for example, TDS).

Procedure job aid

BTDS call discriminator DPNSS1 protocols component hierarchy



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Configuring the BTDS call discriminator feature to interpret MCDN protocols

Configure the call discriminator feature on Voice Transport connections between voice FPs that use the MCDN protocol.

Procedure steps

Step	Action
1	Set the *featureList* attribute to callDiscriminator. **`set software lpt/<name> featureList callDiscriminator`**
2	Define the CCS handler component. **`add btds/<btds_number> Mcdn`**
3	Define the *Mcdn* component's *adjPbxSide* attribute. **`set btds/<btds_number> Mcdn adjPbxSide master`** This attribute specifies master priority for call collision resolution. Its value must match the adjacent PBX, the one at the other end of the primary rate interface (PRI). The default setting of this attribute is slave. The corresponding *Mcdn* component, at the other end of the btds connection, should have its *adjPbxSide* attribute set to slave.

--End--

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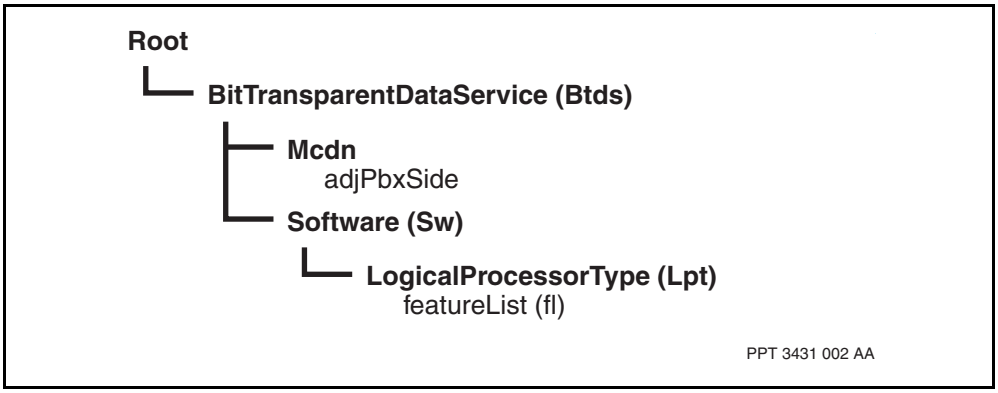
Variable definitions

Variable	Value
<btds_number>	is the instance number of the *Btds* component.
<name>	is the name you assigned to the BTDS software (for example, TDS).

Procedure job aid

BTDS call discriminator MCDN protocols component hierarchy



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Other BTDS configuration

Configure some or all of the network options required to support BTDS.

Prerequisites to other BTDS configuration

- You have read and understood Provisioning notes (page 34). This section contains details about setting certain attributes when performing the configuration described in this chapter.
- You have read and understood Configuring the remoteName attribute (page 86). This section contains important end-to-end negotiation information when performing the configuration described in this chapter.

Navigation

- Configuring a CCS link on a DS1/E1 MVP-E FP (page 22)
- Configuring idle suppression to suppress NRZI-encoded HDLC frames on E1 MVP-E and DS1 MVP-E FPs (page 25)
- Configuring video applications (page 28)
- Configuring video-on-demand servers (page 30)
- Setting the overrideRemoteName attribute (page 32)

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Configuring a CCS link on a DS1/E1 MVP-E FP

Configure a Common Channeling Signalling (CCS) link on a DS1/E1 MVP-E FP.

Attention: TTC2M MVP-E FPs do not support CCS protocols.

Prerequisites

- You have read and understood Voice and MVP-E function processor interworking restrictions (page 87) before proceeding with this procedure.
- The *timeslotAlignment* attribute must be set to unaligned on MVP-E FPs because they do not support frame aligned BTDS. See Voice and MVP-E function processor interworking restrictions (page 87) for more details.

Procedure steps

Step	Action
1	Add the FP to the shelf. **`set shelf card/<card_number> cardType <card>`**
2	Provision a logical processor to run on the FP. **`add lp/<lp_number>`**
3	Link the LP to the FP. **`set lp/<lp_number> mainCard shelf card/<card_number>`**
4	Define the software to be loaded. **`set lp/<lp_number> logicalProcessorType sw lpt/<name>`**
5	Add a port to the FP. **`add lp/<lp_number> <port_type>/<port_number>`**
6	Set the linetype. **`set lp/<lp_number> <port_type>/<port_number> lineType <framing_format>`**
7	Set the *zeroCoding* attribute. **`set lp/<lp_number> <port_type>/<port_number> zeroCoding <zeroCoding_value>`**
8	Set the *raiAlarmType* attribute. **`set lp/<lp_number> <port_type>/<port_number> raiAlarmType <raiAlarmType_value>`**
9	Include the card in network clock synchronization.

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```
set lp/<lp_number> <port_type>/<port_number>
clockingSource module
```

10 Set a timeslot. There is only one timeslot per channel for a Bit Transparent Data Service on a CCS link.

```
set lp/<lp_number> <port_type>/<port_number> chan/
<signaling_channel> timeslots <timeslot_number>
```

11 Define the Bit Transparent Data Service instance.

```
add btds/<btds_number>
```

12 Set the remote name of the BTDS application at the far end of the Nortel Multiservice Switch 7440 network.

```
set btds/<btds_number> plc remoteName <remote_name>
```

13 Set the required bandwidth.

```
set btds/<btds_number> plc requiredRxBandwidth
<requiredRxBandwidth_value>
```

14 Link this BTDS application with the desired timeslot.

```
set btds/<btds_number> framer interfaceName lp/
<lp_number> <port_type>/<port_number> chan/
<signaling_channel>
```

15 To configure idle suppression, set the *protocol* attribute to hdlc. CCS links are all HDLC-based.

```
set btds/<btds_number> framer protocol hdlc
```

16 Repeat step 1 through step 15 to configure the CCS link at the other end of the connection.

--End--

Variable definitions

Variable	Value
<btds_number>	is the instance number of the Btds component.
<card>	is the card type, either 1pDs1Mvpe or 1pE1Mvpe.
<card_number>	is the instance number of the card.
<framing_format>	is the type of framing pattern for the line. The signaling protocol you specify determines what type of framing format to use.
<lp_number>	is the instance number of the LP.
<name>	is the name you assigned to the BTDS software.

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Variable	Value
<port_number>	is the port number you assigned when you provisioned the port.
<port_type>	is the port type, either ds1 (for 1pDs1Mvpe) or e1(for 1pE1Mvpe).
<raiAlarmType_value>	is the value for the method of sending a remote alarm indication (RAI) alarm on the line.
<remote_name>	is the remote end address of the PLC; the name of the other end of the connection.
<requiredRxBandwidth_value>	is the required bandwidth of the PLC. As a general rule, you should set the required bandwidth of the PLC to three times the actual CCS frame rate.
<signaling_channel>	is the channel you assign to carry signaling information.
<timeslot_number>	is the timeslot number.
<zeroCoding_value>	is the value for zero encoding on the line.

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Configuring idle suppression to suppress NRZI-encoded HDLC frames on E1 MVP-E and DS1 MVP-E FPs

Suppress NRZI-encoded HDLC frames on E1 MVP-E and DS1 MVP-E FPs, if required.

NRZI encoding means that a transition only occurs when a zero is encountered. That is, if the pattern 0111 1110 (7E hex) is NRZI encoded, then it would appear on the line as either 0000 0001 or 1111 1110, depending on whether the value on the previous line is a 1 or a 0.

Procedure steps

Step	Action
1	Add the FP to the shelf. **`set shelf card/<card_number> cardType <card>`**
2	Provision a logical processor to run on the FP. **`add lp/<lp_number>`**
3	Link the LP to the FP. **`set lp/<lp_number> mainCard shelf card/<card_number>`**
4	Define the software to be loaded. **`set lp/<lp_number> logicalProcessorType sw lpt/<name>`**
5	Add a port to the FP. **`add lp/<lp_number> <port_type>/<port_number>`**
6	Set the linetype. **`set lp/<lp_number> <port_type>/<port_number> lineType <framing_format>`**
7	Set the *zeroCoding* attribute. **`set lp/<lp_number> <port_type>/<port_number> zeroCoding <zeroCoding_value>`**
8	Set the *raiAlarmType* attribute. **`set lp/<lp_number> <port_type>/<port_number> raiAlarmType <raiAlarmType_value>`**
9	Include the card in network clock synchronization. **`set lp/<lp_number> <port_type>/<port_number> clockingSource module`**
10	Set a timeslot. There is only one timeslot per channel for a Bit Transparent Data Service on a CCS link.

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```
set lp/<lp_number> <port_type>/<port_number> chan/
<signaling_channel> timeslots <timeslot_number>
```

11 Define the Bit Transparent Data Service instance.

```
add btds/<btds_number>
```

12 Set the remote name of the BTDS application at the far end of the Nortel Multiservice Switch 7440 network.

```
set btds/<btds_number> plc remoteName <remote_name>
```

13 Set the required bandwidth.

```
set btds/<btds_number> plc requiredRxBandwidth
<requiredRxBandwidth_value>
```

```
set btds/<btds_number> plc requiredRxBandwidth
<requiredRxBandwidth_value>
```

14 Link this BTDS application with the desired timeslot.

```
set btds/<btds_number> framer interfaceName lp/
<lp_number> <port_type>/<port_number> chan/
<signaling_channel>
```

15 Provision the framer to suppress NRZI-encoded HDLC data.

```
set btds/<btds_number> framer protocol nrziHdlc
```

16 Repeat step 1 through step 15 to configure the other end of the connection.

--End--

Variable definitions

Variable	Value
<btds_number>	is the instance number of the Btds component.
<card>	is the type of FP.
<card_number>	is the instance number of the FP card.
<framing_format>	is the type of framing pattern for the line. The signaling protocol you specify determines what type of framing format to use.
<lp_number>	is the The instance number of the LP.
<name>	is the name you assigned to the BTDS software.
<port_number>	is the port number you assigned when you provisioned the port.
<port_type>	is the type of port.

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Variable	Value
<remote_name>	is the remote end address of the PLC; the name of the other end of the connection.
<requiredRxBandwidth_value>	is the required value for the *requiredRxBandwidth* attribute. It is based on the assumption that the actual data rate will be less than one-third of the provisioned value (that is, 10,000 bits/second).
<requiredTxBandwidth_value>	is the required value for the *requiredTxBandwidth* attribute. It is based on the assumption that the actual data rate will be less than one-third of the provisioned value (that is, 10,000 bits/second).
<signaling_channel>	is the channel you assign to carry signaling information.
<timeslot_number>	is the timeslot number.

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Configuring video applications

Configure a video application where the idle pattern can appear in the data stream (that is, transparent bisynchronous).

Prerequisites

- The *timeslotAlignment* attribute must be set to unaligned on MVP-E FPs because they do not support frame aligned BTDS. See Voice and MVP-E function processor interworking restrictions (page 87) for more details.

Procedure steps

Step	Action
1	Provision a logical processor to run on the FP. **add lp/<lp_number>**
2	Add a port to the FP. **add lp/<lp_number> <port_type>/<port_number>**
3	Set the *linkMode* to dce. **set lp/<lp_number> <port_type>/<port_number> linkMode dce**
4	Include the card in network clock synchronization. **set lp/<lp_number> <port_type>/<port_number> clockingSource module**
5	Define the Bit Transparent Data Service instance. **add btds/<btds_number>**
6	Set the remote name of the BTDS application at the far end of the Nortel Multiservice Switch 7440 network. **set btds/<btds_number> plc remoteName <remote_name>**
7	Set the required bandwidth. **set btds/<btds_number> plc requiredRxBandwidth <requiredRxBandwidth_value>** **set btds/<btds_number> plc requiredRxBandwidth <requiredRxBandwidth_value>**
8	Configure the BTDS for universal idle frame suppression. The BTDS must detect 1000 consecutive frames containing the identical 16-bit data pattern before it suppresses idle frames at the ingress node. **set btds/<btds_number> framer interfaceName lp/ <lp_number> <port_type>/<port_number>** **set btds/<btds_number> framer protocol universal**

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```
set btds/<btds_number> framer numOfIdleBytesToMonitor
1000
```

9 Repeat step 1 through step 8 to configure the other end of the connection.

--End--

Variable definitions

Variable	Value
<btds_number>	is the instance number of the *Btds* component.
<lp_number>	is the instance number of the LP.
<port_number>	is the port number you assigned when you provisioned the port.
<port_type>	is the type of port.
<requiredRxBandwidth_value>	is the required value for the *requiredRxBandwidth* attribute. It is based on the assumption that the actual data rate will be less than one-third of the provisioned value (that is, 10,000 bits/second).
<requiredTxBandwidth_value>	is the required value for the *requiredTxBandwidth* attribute. It is based on the assumption that the actual data rate will be less than one-third of the provisioned value (that is, 10,000 bits/second).

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Configuring video-on-demand servers

Configure video-on-demand servers, if required.

Prerequisites

- Set *linkMode* to dte only if the network surrounding Nortel Multiservice Switch 7440 is synchronized.
- MVP-E FPs do not support the *timeslotAlignment* attribute setting of unaligned. See Voice and MVP-E function processor interworking restrictions (page 87) for more details.

Procedure steps

Step	Action
1	Enter provisioning mode. **start prov**
2	Provision a logical processor to run on the FP. **add lp/<lp_number>**
3	Add a port to the FP. **add lp/<lp_number> <port_type>/<port_number>**
4	Set the timeslot. **set lp/<lp_number> chan/<signaling_channel> timeslots <timeslot_number>**
5	Set the linetype. **set lp/<lp_number> <port_type>/<port_number> lineType <framing_format>**
6	Set the *zeroCoding* attribute. **set lp/<lp_number> <port_type>/<port_number> zeroCoding <zeroCoding_value>**
7	Include the card in network clock synchronization. **set lp/<lp_number> <port_type>/<port_number> clockingSource module**
8	Define the Bit Transparent Data Service instance. **add btds/<btds_number>**
9	Set the remote name of the BTDS application at the far end of the Nortel Multiservice Switch 7440 network. **set btds/<btds_number> plc remoteName <remote_name>**
10	Enable timeslot alignment on the BTDS connection.

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```
set btds/<btds_number> framer interfaceName lp/
<lp_number> <port_type>/<port_number>

set btds/<btds_number> framer timeslotAlignment
frameAligned
```

11 Repeat step 1 to step 10 to configure the other end of the connection.

--End--

Variable definitions

Variable	Value
<btds_number>	is the instance number of the *Btds* component.
<framing_format>	is the type of framing pattern for the line, either D4 or ESF. The signaling protocol you specify determines what type of framing format to use. Use ESF with B8ZS to avoid potential transmission problems if the video signal transmits a long stream of zeroes. For an E1 voice function processor, the lineType attribute should be set to CCS.
<lp_number>	is the instance number of the LP.
<port_number>	is the port number you assigned when you provisioned the port.
<port_type>	is the type of port.
<remote_name>	is the remote end address of the PLC; the name of the other end of the connection.
<signaling_channel>	is the channel you assign to carry signaling information.
<timeslot_number>	is the value used for the timeslots can be any positive number. For example, 1, 2, 3, and so on. The actual number of timeslots provisioned is dependent on the desired bandwidth.
<zeroCoding_value>	is the zero coding value, either AMI or B8ZS

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Setting the overrideRemoteName attribute

Set the *overrideRemoteName* attribute to override the setting for the *remoteName* attribute.

Procedure steps

Step	Action
1	Define the Bit Transparent Data Service instance. **add btds/<btds_number>**
2	Add a port to the FP. **add lp/<lp_number> <port_type>/<port_number>**
3	Set a timeslot. **set lp/<lp_number> <port_type>/<port_number> chan/ <signaling_channel> timeslots <timeslot_number>**
4	Include the card in network clock synchronization. **set lp/<lp_number> <port_type>/<port_number> clockingSource module**
5	Set the BTDS framer attribute. **set lp/<lp_number> <port_type>/<port_number> chan/ <signaling_channel> applicationFramerName btds/ <btds_number> framer**
6	Link this BTDS application with the desired timeslot. **set btds/<btds_number> framer interfaceName lp/ <lp_number> <port_type>/<port_number> chan/ <signaling_channel>**
7	Repeat step 1 to step 6 to configure the other end of the connection.
8	Set the *overrideRemoteName* attribute. **set btds/<btds_number> lc overrideRemoteName <override_name>**

--End--

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Variable definitions

Variable	Value
<btds_number>	is the instance number of the *Btds* component.
<lp_number>	is the instance number of the LP.
<override_name>	is an override name for the PLC's remote end-point's address. The setting of the overrideRemoteName overrides the setting for the remoteName attribute.
<port_number>	is the port number you assigned when you provisioned the port.
<port_type>	is the type of port.
<remote_name>	is the remote end address of the PLC; the name of the other end of the connection.
<signaling_channel>	is the channel you assign to carry signaling information.
<timeslot_numbers>	is the timeslot numbers value.

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Provisioning notes

The information below provides details on setting some of the *Framer* component attributes.

Procedure steps

Step	Action
1	Refer to the table Provisioning notes (page 34) for details on setting various attributes under the *Framer* component.

Provisioning notes

Framer component attribute	Details
protocol	You can set the *protocol* attribute to hdlc on voice and MVP-E FPs to configure BTDS to suppress ingress HDLC idle frames. A frame is an HDLC idle frame if each byte is an identical, non-inverted HDLC idle byte. The setting of the *protocol* attribute to hdlc specifies that BTDS suppress ingress idle frames when two or more consecutive frames match the preceding description (up to 88 bytes).
	You can set the *protocol* attribute to nrziHdlc on voice and MVP-E FPs to configure BTDS to suppress ingress non-return to zero inverted (NRZI) HDLC idle frames. A frame is an NRZI-encoded HDLC idle frame if each byte is an identical, NRZI-encoded HDLC idle byte. The setting of the *protocol* attribute to nrziHdlc specifies that BTDS suppress ingress idle frames when two or more consecutive frames match the preceding description (up to 88 bytes).
	You can set the *protocol* attribute to universal on voice and MVP-E FPs to configure BTDS to suppress all ingress idle frames. A frame is a universal idle frame if each 16-bit word is identical. The setting of the *protocol* attribute to universal specifies that BTDS suppress ingress idle frames after a specific number of consecutive frames matches this description (specified under the *numberOfIdleBytesToMonitor* attribute).
numberOfIdleBytesToMonitor	The *numberOfIdleBytesToMonitor* attribute can be set on voice and MVP-E FPs. This attribute is only used when the *protocol* attribute is set to universal. The value of the *numberOfIdleBytesToMonitor* attribute specifies the number of consecutive, identical ingress 16-bit words that must occur before suppressing ingress idle data.Set the value of this attribute to a number higher than the largest frame that can be sent into this service.

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Provisioning notes (continued)

Framer component attribute	Details
idlePattern	The value contained under the *idlePattern* attribute specifies the hexadecimal byte pattern to use to fill an egress frame locally when the BTDS suppresses ingress idle frames at a remote node. The type of idle suppression you configure determines the value to specify under the *idlePattern* attribute. The default value is FF Hex.
insertedOutputDelay	The provisionable range for the *insertedOutputdelay* attribute is from 0 to 50 milliseconds with a default value of 12 milliseconds. To aid the user in choosing the required setting for the *insertedOutputdelay* attribute, the *frmUnderRuns* and *frmLostInNetwork* attributes can be used. If there is an increase in the *frmUnderRuns* and no corresponding increase in *frmLostInNetwork*, then this indicates that the cross network delay is varying. Increasing the value for the *insertedOutputDelay* attribute will compensate for this change. If there is an increase in the *frmLostInNetwork* value with increasing *frmUnderRuns* value, then a potential network problem may exist. It is possible for underruns to occur if the inserted delay time is not large enough to compensate for cross network delay variations.
timeslotAlignment	The Framer attribute *timeslotAlignment* enables or disables timeslot alignment on a BTDS connection. You cannot set *timeslotAlignment* to frameAligned on an MVP-E FP. If frame alignment is not required, then the *timeslotAlignment* attribute should be set to unaligned, because frame alignment does impact performance (due to variable packet lengths used to achieve alignment).
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--End--

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Component monitoring

Use this chapter for information on how the component and attribute monitoring process as it relates to the Bit Transparent Data Service (BTDS).

Navigation

- Monitoring network clock synchronization (page 36)
- BTDS operational attributes (page 36)

Monitoring network clock synchronization

Only list and display apply to the *Network Sync* component. The OSI state will show one of two valid states:

- unlocked, enabled, and busy–the *Network Sync* component is currently synchronized to the *activeReference*, or there are no references currently provisioned and the component is free running.
- unlocked, disabled, and idle–the *Network Sync* component is currently in the process of tracking the *activeReference* and becoming synchronized with the network or none of the provisioned reference ports are valid. For example, the provisioned ports are disabled.

The *clockSyncState* will show three valid states: freeRun, synchronizing, and synchronized. These states are described in NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures*.

The *activeReference* shows which port is currently being tracked. The *standbyReference* shows the port that will be tracked if the *activeReference* fails.

BTDS operational attributes

The following examples display BTDS operational attribute information. the table BTDS operational attributes (page 38), lists BTDS operational attributes. Not included in the table is the *serviceFailureReason* operational attribute, found under each *Btds* component instance.

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To display *Framer* component operational attributes, type the following command:

```
d Btds/<n> Framer
```

```
Btds/<n> Framer
   adminState             = unlocked
   operationalState       = enabled
   usageState             = busy
   frmFromIf              = 16891692
   suppressedFrames       = 0
   frmToIf                = 16891692
   lrcErrors              = 0
   frmLostInNetwork       = 0
   frmUnderRuns           = 0
   frmDumped              = 0
   igChanStatus           = normal
   egChanStatus           = normal
   igCtrlFrames           = 0
   egIdleFillFrameOut     = 0
   egQueueNumberOfFrames  = 4
   egQueueTime            = 30382 usec
   egIdleUnderRunCnt      = 0
   egNormalStateThrldCnt  = 0
   egIdleStateThrldCnt    = 0
   currentCellSize        = 44 bytes
```

To display *LogicalConnection* component operational attributes, type the following command:

```
d Btds/<n> Lco
```

```
Btds/<n> Lco
   state = pathUp
   path = "EM/BaseOne Trk/1 LCh/10"
"EM/BaseTwo testap/1"
   overrideRemoteName =
   end = calling
   costMetric = 128
   delayMetric = 4 ms
   roundTripDelay = 2 ms
   setupPriority = 2
   bumpPreference = bumpWhenNecessary
   holdingPriority = 2
   requiredTxBandwidth = 320000 bit/s
   requiredRxBandwidth = 320000 bit/s
   requiredTrafficType = data
   permittedTrunkTypes = terrestrial satellite tt1 tt2
tt3 ~tt4 ~tt5 ~tt6
   requiredSecurity = 4
   requiredCustomerParameter = 4
   emissionPriority = 1
   discardPriority = 2
```


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```
pathType = normal
retryCount = 2
pathFailureCount = 1
reasonForNoRoute = none
lastTearDownReason = insufficientTxBandwidth
pathFailureAction = reRoutePath
optimization = enabled
pathUpDateTime = 1995-09-22 19:20:02.26
pktsToNetwork = 15165382 packets
bytesToNetwork = 454961460 bytes
pksFromNetwork = 15162886 packets
bytesFromNetwork = 454886580 bytes
```

BTDS operational attributes

OSI state	BTDS framer	BTDS Lco	BTDS Mcdn or BTDS Dpnss1
adminState	frmFromIf	state	timeSlotOpMode
usageState	frmToIf	path **Attention:** Should the network be divided into clusters and/or topology regions, it should be noted that the *path* attribute can only display information about the current cluster or region segment. For example, should a service traverse a cluster or inter-region link, the *path* attribute shall indicate termination at the cluster or region gateway respectively, and not at the service end point.	newVoiceCalls
proceduralStatus	lrcErrors	end	newDataCalls
alarmStatus	frmLostInNetwork	costMetric	voiceToData
unknownStatus	frmUnderRuns	delayMetric	dataToVoice
operationalState	frmDumped	roundTripDelay	callClears
availabilityStatus	adminState	setupPriority	frmProcessed
controlStatus	usageState	holdingPriority	frmInvalid
standbyStatus	operationalState	requiredTxBandwidth	frmFromIf
framesToIf	suppressed Frames	requiredRxBandwidth	aborts
framesFromIf	igChanStatus	requiredTrafficType	crcErrors
discarded FramesToIf	egChanStatus	permittedTrunkTypes	nonOctetErrors

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BTDS operational attributes (continued)

OSI state	BTDS framer	BTDS Lco	BTDS Mcdn or BTDS Dpnss1
discarded FramesFromIf	igCtrlFrames	requiredSecurity	overruns
	egIdleFillFrame Cnt	requiredCustomerParameter	largeFrmErrors
	egQueueNumberOf Frames	emissionPriority	
	egQueueTime	discardPriority	
	egIdleUnderRun Cnt	pathType	
	egNormalStateThrld Cnt	retryCount	
	egIdleStateThrld Cnt	pathFailureCount	
	currentCellSize	lastTearDownReason	
		overrideRemoteName	
		bumpPreference	
		reasonForNoRoute	
		pathFailureAction	
		optimization	
		pathUpDateTime	
		pktsToNetwork	
		bytesToNetwork	
		pktsFromNetwork	
		bytesFromNetwork	

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BTDS related Trunk operational attributes

The following examples display BTDS-related *Trunk* component operational attributes. the table BTDS-related Trunk and PathAdministrator attributes (page 40), lists BTDS *Trunk* and *PathAdministrator* component operational attributes.

To display *Trunk* component operational attributes, type the following command:

```
d Trk/<n>
```


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```
Trk/<n>
   adminState              = unlocked
   operationalState        = enabled
   usageState              = busy
   availabilityStatus      =
   proceduralStatus        =
   controlStatus           =
   alarmStatus             =
   standbyStatus           = notSet
   unknownStatus           = false
   remoteComponentName     = EM/BASEONE TRUNK/0027
   measuredSpeedToIf       = 1918000 bit/s
   measuredRoundTripDelay  = 2 ms
   maxTxUnit               = 32768 byte
   areYouThereModeEntries  = 0
   pktFromIf               = 1465
   trunkPktFromIf          = 1189
   trunkPktToIf            = 1190
   discardUnforward        = 1
   discardTrunkPktFromIf   = 0
   intPktFromIf            = 437087
   discardIntUnforward     = 0
   stagingAttempts         = 1
```

To display *PathAdministrator* component operational attributes, type the following command:

```
d Trk/<n> pa
```

```
Trk/<n> Pa
   state = up
   usedLc = 1
   negotiatedMaxLc     = 4096
   maxReservableBwOut  = 640000 bit/s
   overReservedBwOut   = 0 bit/s
   unreservedBwOut     = 320000 bit/s
   reservedBwOutByHp   = 2 : 320000 bit/s
   attemptCountByHp    = 2 : 10
   failCountByHp       =
   clearCountByHp      = 2 : 9
   bumpCountByHp =
   clashCount     = 0
```

BTDS-related Trunk and PathAdministrator attributes

Trunk	PathAdministrator
adminState	state
operationalState	usedLc
usageState	negotiatedMaxLc

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BTDS-related Trunk and PathAdministrator attributes (continued)

Trunk	PathAdministrator
availabilityStatus	maxReservableBwOut
proceduralStatus	overReservedBwOut
controlStatus	unreservedBwOut
alarmStatus	reservedBwOutByHp
standbyStatus	attemptCountByHp
unknownStatus	failCountByHp
remoteComponentName	clearCountByHp
measuredSpeedToIf	bumpCountByHp
measuredRoundTripDelay	clashCount
maxTxUnit	
pktFromIf	
discardUnforward	
intPktFromIf	
discardIntUnforward	
areYouThereModeEntries	
trunkPktFromIf	
trunkPktToIf	
discardTrunkPktFromIf	
stagingAttempts	

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Troubleshooting

Use this chapter to learn about what steps you can take to solve problems that may occur after you have installed BTDS. Also included are provisioning checklists, which help ensure a successful BTDS setup.

Navigation

- Provisioning checklists (page 42)
- Alarms (page 43)
- Problem solving (page 44)
- Troubleshooting examples (page 49)

Provisioning checklists

Refer to the provisioning checklists in the following sections to avoid having problems establishing a BTDS connection:

- Installation (page 42)
- Network clock synchronization (page 43)
- Provisioning BTDS with default values (page 43)
- Specifying attribute values (page 43)

Installation

Make sure you have done the following:

- Have you installed PORS and BTDS according to the instructions in NN10600-270 *Nortel Multiservice Switch 7400/15000/20000 Software Installation*?
- Do you have the latest software on every Nortel Multiservice Switch 7400 node?
- Have you added *Trunk pathAdmin* to every Multiservice Switch 7400 node that could be a path candidate?

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Network clock synchronization

Make sure you have done the following:

- Have you identified a master clock reference?
- Have you planned and established a tree structure of nodes; each synchronizing their clock signal with the last, branching back to the master reference?
- Have you checked for synchronization loops?

Provisioning BTDS with default values

Make sure you have done the following:

- Have you linked the *Framer* component to the hardware? Did you use the correct logical-processor value and port number? Is the syntax correct?
- Did you use the *remoteName* attribute to identify the other end of the connection? Did you use the exact node name and correct syntax?
- Have you displayed your provisioning and checked it for errors? Have you checked your spelling?
- Have you used the check, save, activate, and confirm commands?
- Have you provisioned both ends of the connection?

Specifying attribute values

Make sure you have done the following:

- Are you sure that the bandwidth is available? (Remember that you are probably sharing the total bandwidth with connectionless routing.)
- Are the attributes under the *Trunk* component provisioned identically at both ends of the connection? If they are not, you will not get a connection.
- Several attributes have provisioning dependencies. See NN10600-060 *Nortel Multiservice Switch 7400/15000/20000 Component Reference* for detailed BTDS component and attribute descriptions and available values.

  For BTDS connection between voice and MVP-E FPs, see Voice and MVP-E function processor interworking restrictions (page 87).

  With the exception of the *remoteName* attributes, the attributes at both ends of a BTDS connection must contain identical provisioning information.

Alarms

Alarms are messages used to indicate faults or failure conditions on the node.

Alarms are generated asynchronously by Nortel Multiservice Switch components. When a component generates an alarm, it does so to signal that it is in need of repair or that it has detected a fault elsewhere on the node.

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Alarms contain a relatively large amount of information, all of which will assist you in the monitoring and surveillance of your network. Because alarms are such an important and integral part of Nortel Multiservice Switch 7400 fault management, they are described separately in NN10600-500 *Nortel Multiservice Switch 6400/7400/15000/20000 Alarms Reference.*

Causes of alarms

As a general rule, you can expect to see an alarm in the following situations:

- degradation/quality-of-service conditions (for example, if a threshold is reached)
- processing errors (for example, protocol violations)
- failures/out-of-service conditions (for example, hardware, or facility failures)
- administrative conditions (for example, the lock command is issued)
- security violations

BTDS-related alarms

The alarms related to BTDS are as follows:

- 7018 0001 to 7018 0004 Path Administrator-related alarms
- 7018 1001 and 7018 1002 LCo-related alarms
- 7019 0001 BTDS-related alarm

Problem solving

Problems with setting up connections may be due to errors or mismatches in setting up the system or provisioning. Use the Provisioning checklists (page 42) to check if there are any steps that you may have forgotten in the process. Remember even simple spelling errors can cause provisioning mismatches. Refer to Handling problems (page 46) for a list of possible problems, their potential causes, and the corrective action that you may take.

In general, you should look for the following:

- Is the path up or down?
- Where does it go down?
- Why did it go down?

The figure Flowchart: an example of troubleshooting using LCo (page 45) may help you to determine the answers to these questions. For component and attribute monitoring information, refer to Component monitoring (page 36).

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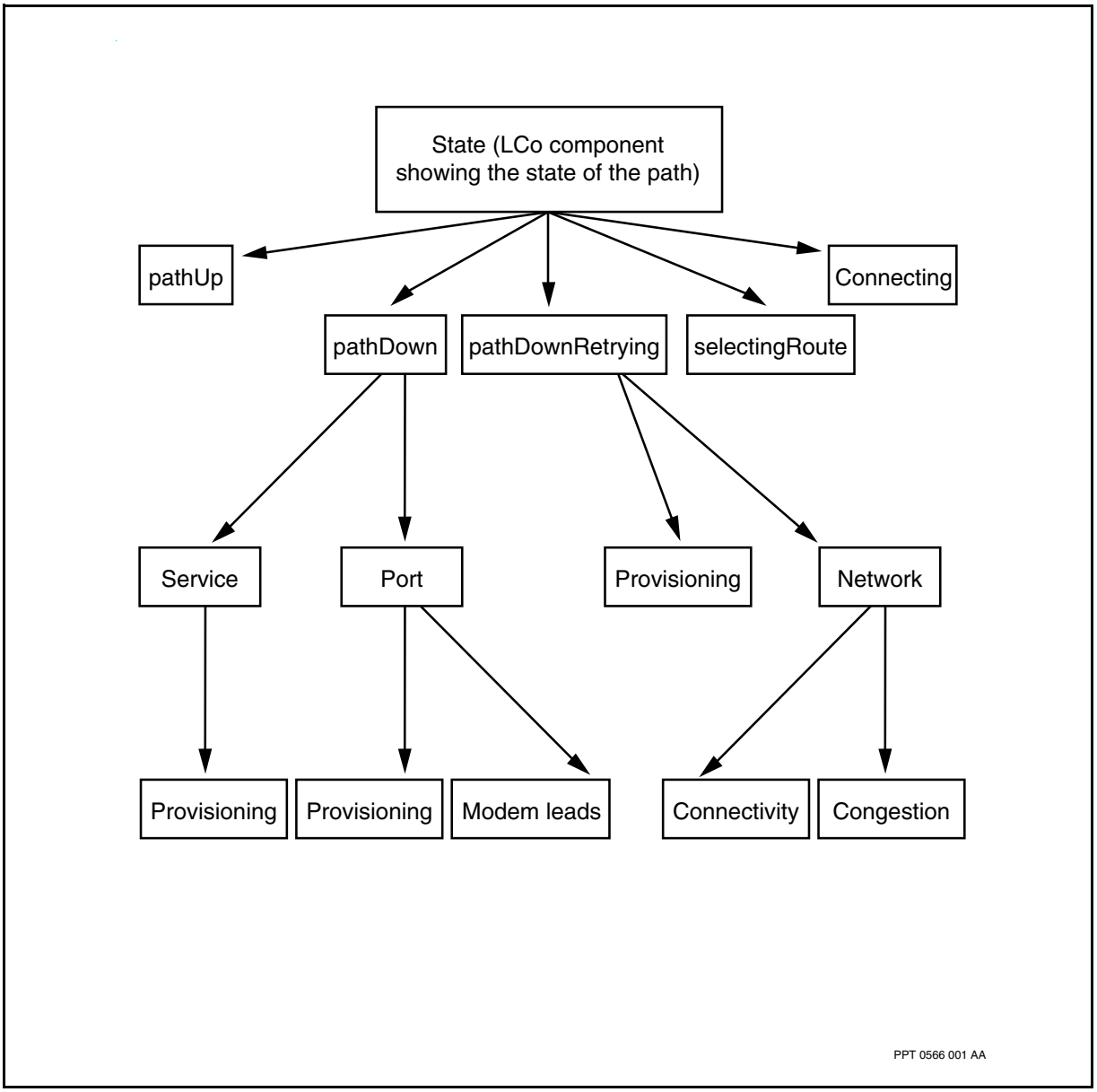
Flowchart: an example of troubleshooting using LCo



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Handling problems

Problems that may occur	Probable causes	Corrective measures
Unable to provision BTDS.	Error in card provisioning.	Check the card. If an orange light is glowing, check the *logicalProcessor* and *logicalProcessorType* attribute settings. Reprovision using correct lp and lpt information. For provisioning information see NN10600-551 *Nortel Multiservice Switch 7400/15000/20000 FP Configuration Reference* and NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures*.
The connection doesn't come up.	Hardware connections.	Check the cable, connections, and pins. See NN10600-175 *Nortel Multiservice Switch 7400 Hardware Installation, Maintenance, and Upgrade*. For a description of an FP, see NN10600-170 *Nortel Multiservice Switch 7400 Hardware Description*. To install an FP, see NN10600-175 *Nortel Multiservice Switch 7400 Hardware Installation, Maintenance, and Upgrade*. To provision an FP, see NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures* and NN10600-551 *Nortel Multiservice Switch 7400/ 15000/20000 FP Configuration Reference*.
	Error in provisioning the service.	Check the service provisioning for both ends of the connection. See Provisioning checklists (page 42). Trunk provisioning information must be identical for both ends and consistent with the PLC provisioning of the connection. Reprovision with correct information.
		If a BTDS connection does not come up, check the *Btds* component's *seviceFailureReason* attribute. For connections between a voice and MVP-E FP, see also Voice and MVP-E function processor interworking restrictions (page 87) for more information.
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Handling problems (continued)

Problems that may occur	Probable causes	Corrective measures
The connection doesn't come up (Continued).	Specified bandwidth is not available.	Check the available bandwidth of Nortel Multiservice Switch trunks in the path. Reprovision using less bandwidth if it is not needed or re-engineer the network to make bandwidth available.
	If *manualPath* attribute has been used, one of the nodes or trunks used may have failed.	Check nodes/trunks for f4ailure. Reprovision using a path that does not include failed nodes or trunks.
	Error in port provisioning.	Check port provisioning. See NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures* for provisioning information.
Attention: For recurring problems with this connection, check the *lastTeardownReason* attribute under the PLC component.		
The PLC is up and running, but no data is being sent.	DCE–DTE is not provisioned properly on the subscriber's end.	Check the subscriber's-end DCE–DTE provisioning.
	User's-end terminal may be experiencing problems.	Check the terminal. Take appropriate action to rectify the problem.
	Access line to Multiservice Switch 7400 may not be transmitting data.	Check the access line. Rectify any problems encountered.
Connection goes down and does not reset.	Under extreme circumstances (such as there being no suitable trunk available) a path may take 1–2 minutes to reroute.	Wait 1–2 minutes and check to see if rerouting has occurred.
Connection goes down and does not reset (Continued).	If the security option is being used, no sufficiently secure trunk may be available.	Check trunk provisioning. Take appropriate action to see that a secure trunk is made available.

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Handling problems (continued)

Problems that may occur	Probable causes	Corrective measures
Unexpected data loss.	Network clock synchronization is not setup properly.	Check that all of the trunks in the path are properly provisioned with network clock synchronization.
	Congestion.	Check bandwidth utilization. Take steps to reduce congestion if the problem continues.
	Poor trunk-error performance.	See NN10600-435 *Nortel Multiservice Switch 7400/15000/20000 Operations: Path-Oriented Routing System*.
Network clock synchronization remains in *coarseAquisition* for more than one minute.	Improper provisioning of the master.	Network clock synchronization may be provisioned for local where module is the proper value. Check and reprovision with correct value.
	Improper provisioning of references.	Carefully verify provisioning of references.
		As a last resort, quickly lock and unlock the port to which network clock synchronization is attempting to sync (where it is in coarse acquisition)
Trunk does not achieve locked state.	Operator did not allow for expected delay.	The trunk may remain in the shutting down state for up to 30 seconds before achieving the locked state.
The BTDS framer operational attribute entitled “frmUnderRuns” is increasing in value and the attribute “frmLostInNetwork” value is not changing.	The cross network delay is varying.	Increase the value for the BTDS framer attribute “insertedOuputDelay”.

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Troubleshooting examples

The following examples represent two possible problems which may occur. The problem in Example 1 represents a route that has failed to come up. The problem in Example 2 represent video equipment connection problems and video picture quality problems.

Example 1

The operator has provisioned a route that has failed to come up. The operator looks at the *reasonForNoRoute* attribute to determine the reason.

```
d btds/<n> lc reasonForNoRoute

reasonForNoRoute          = unknownRemoteNodeName
remoteName                = /NodeR2b
```

The *reasonForNoRoute* attribute indicates that the *remoteName* attribute is unknown. In this case the value of the *remoteName* attribute is also displayed and improper syntax was used when specifying the name of the remote Nortel Multiservice Switch node.

Example 2

An operator finds the following video problem. The logical connection is up on a BTDS connection but the local video equipment cannot connect with the far-end, or the video picture seems to freeze every few seconds.

To locate the problem, the operator can perform the following steps to display the BTDS *Framer* component at both ends of the connection.

```
d btds/601 framer

Btds/601 Framer
   adminState = unlocked
   operationalState = enabled
   usageState       = busy
   frmFromIf        = 5905803
   suppressedFrames = 0
   frmToIf          = 5905803
   lrcErrors        = 0
   frmLostInNetwork = 0
   frmUnderRuns     = 400
   frmDumped        = 0
   igChanStatus = normal
   egChanStatus = normal
   igCtrlFrames = 0
   egIdleFillFrameCnt = 0
   egQueueNumberOfFrames = 3
   egQueueTime = 30382 usec
   egIdleUnderRunCnt = 0
   egNormalStateThrldCnt = 0
```


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```
   egIdleStateThrldCnt = 0
   currentCellSize = 44 bytes

d Btds/604 framer

Btds/604 Framer
   adminState = unlocked
   operationalState = enabled
   usageState       = busy
   frmFromIf        = 5929605
   suppressedFrames = 0
   frmToIf          = 5927677
   lrcErrors        = 0
   frmLostInNetwork = 0
   frmUnderRuns     = 0
   frmDumped        = 400
   igChanStatus = normal
   egChanStatus = normal
   igCtrlFrames = 0
   egIdleFillFrameCnt = 0
   egQueueNumberOfFrames = 3
   egQueueTime = 30382 usec
   egIdleUnderRunCnt = 0
   egNormalStateThrldCnt = 0
   egIdleStateThrldCnt = 0
   currentCellSize = 44 bytes
```

If the *frmUnderRuns* and *frmDumped* attribute counts are increasing on both ends of the connection, then the cause of the video problem is a result of the line speeds at either end of the connection not being synchronized. To find the problem:

- Check that the clock rates at either end of the connection are the same.
- If network clock synchronization is being used:
  - — Check the network synchronization tree to see if it is setup properly.
  - — Check for any outstanding network synchronization alarms.
- If external synchronization is being used:
  - — Check the external network synchronization tree.
  - — If a DS1 or E1, or DS1, E1 or TTC2M MVP-E FP is being used, the *clockingSource* attribute must be set to line.
  - — If V.35 or V.11 FPs (or ports) are being used, the *linkMode* attribute on the end point FPs must be set to DTE.

Display the BTDS *Framer* component at both ends of the connection.

```
d btds/601 framer

Btds/601 Framer
adminState = unlocked
```


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```
   operationalState = enabled
   usageState       = busy
   frmFromIf        = 5905803
   frmToIf          = 5905782
   lrcErrors        = 0
   frmLostInNetwork = 973
   frmUnderRuns     = 0
   frmDumped        = 0

d Btds/604 framer

Btds/604 Framer
   adminState = unlocked
   operationalState = enabled
   usageState       = busy
   frmFromIf        = 5929605
   frmToIf          = 5927677
   lrcErrors        = 0
   frmLostInNetwork = 489
   frmUnderRuns     = 0
   frmDumped        = 0
```

If the *frmLostInNetwork* operational attribute is increasing, then check the following:

- Are any of the Nortel Multiservice Switch trunks that these connections go over in a congestion state? If yes, then the problem may be solved by re-engineering the trunks or by changing some of the PLC parameters for this service.
- Are the trunk facilities operating within specification? If no, then correct facility problems.

Display the E1 or DS1 component, if a voice or MVP-E FP is being used.

```
d lp/5 e1/0

Lp/5 E1/0
   adminState = unlocked
   operationalState = enabled
   usageState       = busy
   availabilityStatus =
   proceduralStatus   =
   controlStatus      =
   alarmStatus        =
   standbyStatus      = notSet
   unknownStatus      = false
   losAlarm           = Off
   rxAisAlarm         = Off
   lofAlarm           = Off
   rxRaiAlarm         = Off
   txAisAlarm         = Off
   txRaiAlarm         = Off
```


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```
multifrmLofAlarm    = Off
rxMultifrmRaiAlarm  = Off
txMultifrmRaiAlarm  = Off
runningTime         = 12259
errorFreeSec        = 12259
erroredSec          = 0
sevErroredSec       = 0
sevErroredFrmSec    = 0
unavailSec          = 0
bpvErrors           = 0
crcErrors           = 0
frmErrors           = 0
losStateChanges     = 0
slipErrors            = 15
```

If the operational attribute *slipErrors* is increasing, then there is a clock synchronization problem between Multiservice Switch 7400 and the external equipment.

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Bit Transparent Data Service (BTDS) fundamentals

Use this chapter for an overview of the Nortel Multiservice Switch 7440 Bit Transparent Data Service (BTDS).

For fundamentals on network clock synchronization, see NN10600-550 *Nortel Multiservice Switch 7400/15000/20000 Common Configuration Procedures*.

Navigation

- What is the Bit Transparent Data Service? (page 53)
- How does the Bit Transparent Data Service work? (page 53)
- Establishing connections using PORS (page 62)
- Tips for configuring BTDS (page 70)

What is the Bit Transparent Data Service?

The Bit Transparent Data Service (BTDS) provides a means of transmitting any continuous bit-rate data, such as video or Bisync. The data is routed unchanged (transparently) over a synchronous, end-to-end connection. The service is provided through the use of common Nortel Multiservice Switch trunks and without the need for additional customer equipment.

The BTDS requires network clock synchronization and the Path Oriented Routing System (PORS). Network clock synchronization provides network-wide clock synchronization to ensure accurate transmission and reproduction of data throughout the network. PORS provides automatically selected end-to-end paths that allow predictable delay variations, and maintain cell ordering within a selected path. A cell, in this document, refers to a small fixed-size data packet.

How does the Bit Transparent Data Service work?

During a call, the BTDS transfers data between two user devices over a permanent logical connection (PLC). The data stream at the source is formatted into fixed length cells and sent across the network. At the destination, the cells are reformatted into the original data stream.

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One or more Nortel Multiservice Switch trunks are normally provisioned to allow paths forming a connection based on traffic type, security, bandwidth, delay requirements, cost requirements and other attributes. Since a path is pre-provisioned, all cells pertaining to a connection follow the same route to their common destination. Refer to the figure PLCs, LCs and LCNs (page 66), for permanent logical connection, logical channel, and logical channel number definitions.

See the following sections for more information about the BTDS:

- BTDS characteristics (page 54)
- Transparent cell transport (page 55)
- Suppression of idle data (page 55)
- Egress delay control (page 55)
- BTDS efficiency (page 57)
- Frame alignment and non-frame alignment (page 59)
- Call discriminator (page 61)
- Resource management (page 62)

BTDS characteristics

The key characteristics of the BTDS include

- constant bit rate
- bidirectional network-wide synchronous transfer of bit stream by means of fixed-length cells
- transparent cell transport
- suppression of idle frames
- resource management
- provisionable attributes which support the following functionality:
  - BTDS cell size
  - idle pattern
  - protocol support
  - setup, holding, emission, and discard priorities
  - transmit and receive bandwidth
  - route minimization criteria: cost or delay
  - maximum cost or maximum delay values
  - action on path failure
  - egress delay control

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  - frame alignment and non-frame alignment
  - call discriminator
- interfaces supported:
  - V.11, V.35, DS1, E1, 1pDS1V, 1pE1V, DS1 MVP-E, E1 MVP-E, TTC2M MVP-E, and 8pDS1

Attention: For 8pDS1 only PM2 is supported, for up to 4 ports.

- interconnections supported include
  - DS1 to DS1 or E1 to E1
  - V.11 to V.11 or V.35 to V.35
  - V.11 or V.35 to DS1 or E1
  - V.11 to V.35
  - voice function processor (FP) to MVP-E FP (See Voice and MVP-E function processor interworking restrictions (page 87) for more information.)
  - DS1 or 8pDS1 to DS1 or 8pDS1

Transparent cell transport

Data is formed into cells at the source node. Each cell contains the original data and all path information required to reach the destination. All cells are tagged as high priority (by default). The payload portion of each cell is transferred transparently across the network (that is, without being interpreted).

Suppression of idle data

BTDS allows you to suppress idle frames at the ingress side of the Nortel Multiservice Switch 7440 network to help conserve bandwidth in the subnet. BTDS can be provisioned to suppress HDLC-encoded, NRZI-encoded HDLC, or a specific number of identical, repeated idle frames. The *protocol* attribute specifies the ingress frames to be suppressed by the BTDS. For more information about configuring BTDS idle suppression, see Provisioning notes (page 34).

Egress delay control

The egress control capability allows the user to insert a time delay at the egress point of the Nortel Multiservice Switch network. This time delay is used to compensate for variations in cross network delay.

The *btdsCellSize* attribute affects egress time delay. Larger BTDS cell sizes cause longer delays.

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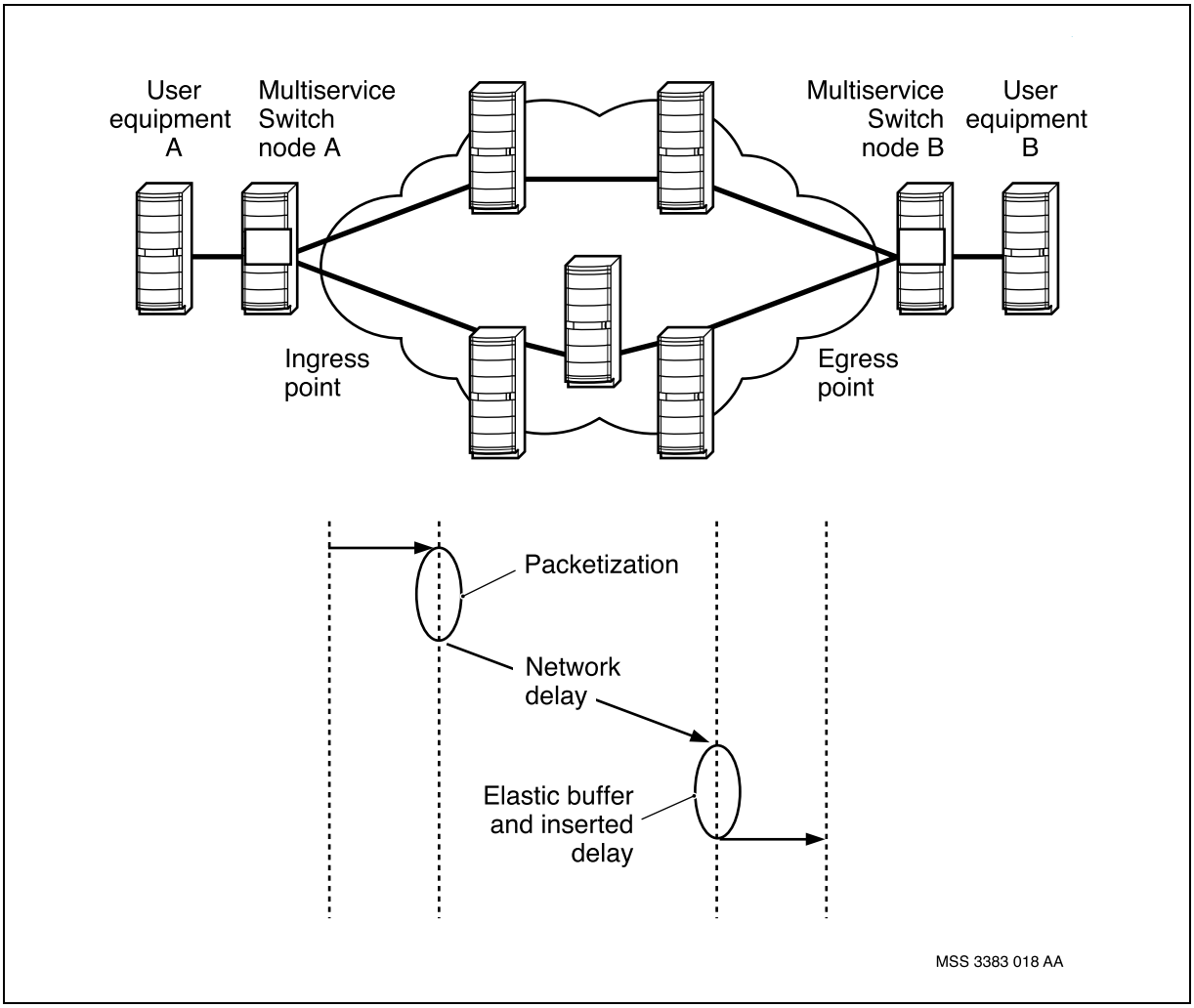
The figure Typical timing delays in a Multiservice Switch network (page 56), depicts the timing delays associated with a sample network. Timing delay can occur at three separate points, the network interface, through the network and at the network egress point. Timing delay at the network interface is a function of the packetization delay. This delay is dependent on the cell size and the line speed. Delay through the network is dependent on the network topology. Delay at the egress point is a function of the elastic buffer and the inserted delay. The elastic buffer is dependent on the installed hardware and is typically 5 cells in length. The setting for the inserted delay is dependent on the provisionable *insertedOutputDelay* attribute. Setting of this attribute allows the user to adjust the inserted delay for specific applications which are delay sensitive. For more information on setting the *insertedOutputDelay* attribute refer to Provisioning notes (page 34).

Typical timing delays in a Multiservice Switch network



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BTDS efficiency

The BTDS cell size can be provisioned to optimize bandwidth on Nortel Multiservice Switch trunks over ATM (formerly known as ATM logical trunks). You can provision a larger cell size to take advantage of the PORS ATM Adaptation Layer 5 (AAL5) transport mode, or the smaller cell size for the PORS short path-oriented multiplexing (SPO-mux) mode or SPO-map mode. See the following sections for more information on cell size:

- Large cell size (page 57)
- Small cell size (page 59)

Large cell size

The larger BTDS cell size provides the following benefits:

- increased BTDS throughput on DS1, E1, V.11, and V.35 FPs
- efficient transportation across frame-cell and Multiservice Switch trunks over ATM

The figure AAL5 PDU carrying 44-byte BTDS cells (page 58), shows 44 byte BTDS cells on AAL5 trunks. The 84-byte BTDS cell size on AAL5 trunks is shown in the figure AAL5 PDU carrying 84-byte BTDS cells (page 59). With an increased BTDS cell size of 84 bytes, BTDS uses the full ATM cell.

Larger BTDS cells cause larger minimum egress delays—as the size of the BTDS cell increases, the time to accumulate the BTDS cell increases. This increase in time directly impacts the minimum egress delay that BTDS can achieve. At higher line speeds, the impact of a larger BTDS cell size on minimum egress queue delay decreases.

When setting up the BTDS efficiency feature, please note the following restrictions:

- increased BTDS cell size is valid only on DS1, E1, V.11, and V.35 FPs
- below 4 timeslots, BTDS cell sizes larger than 44 bytes are not valid. In this case, use the smaller cell size and SPO-mux transport mode.

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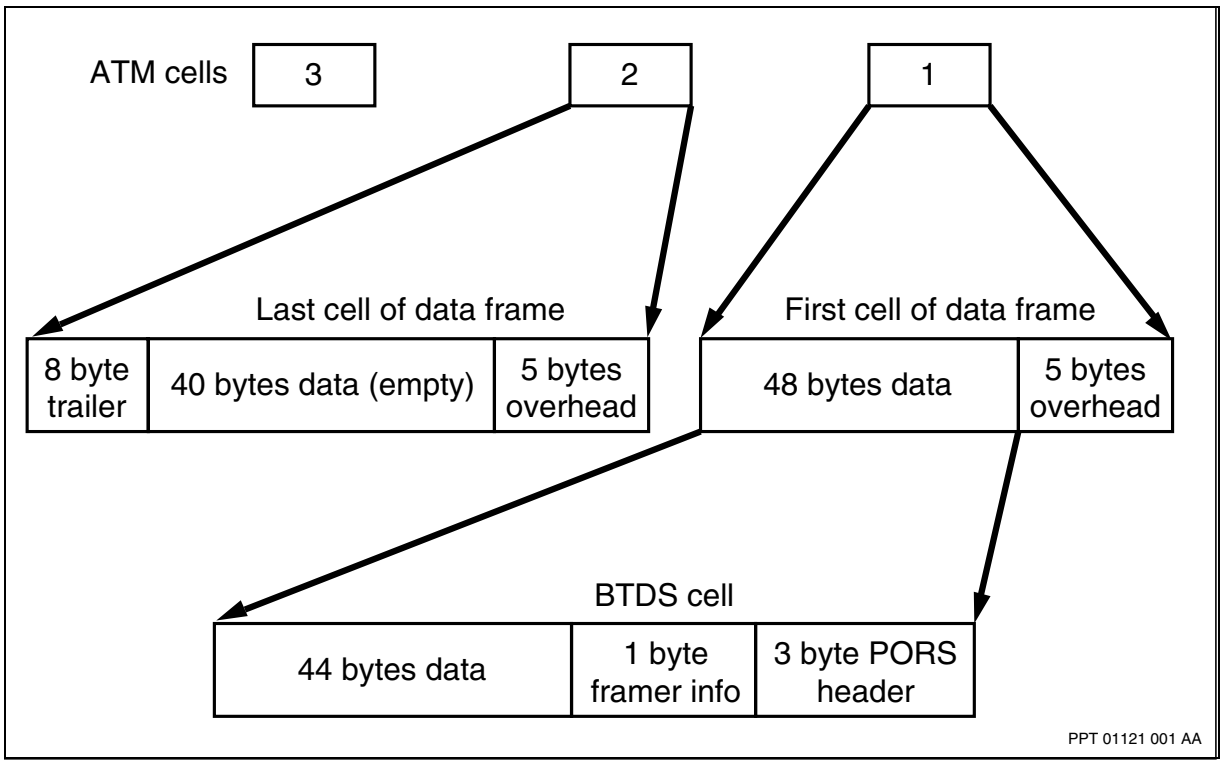
AAL5 PDU carrying 44-byte BTDS cells



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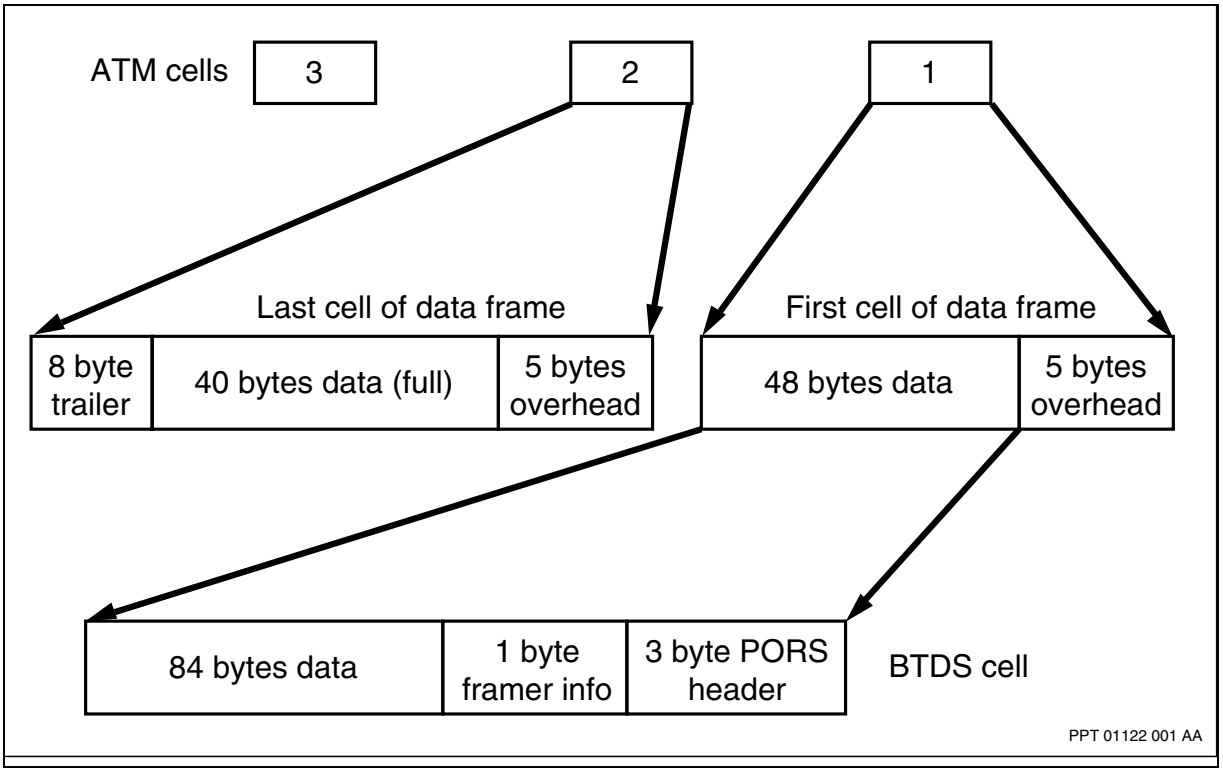
AAL5 PDU carrying 84-byte BTDS cells



Small cell size

With cells of 44 bytes, you can provision the smaller cell size and use the SPO-mux or SPO-map transport mode. (If the connection is using less than four DS1 or E1 timeslots, you must use the smaller cell size.) In SPO-mux or map mode, the 44-byte BTDS cells are packaged with the 3-byte PORS header and the 5-byte overhead, to use 53 bytes. These frames are then transported as pure cells, without the need for AAL5 adaptation.

If the Multiservice Switch trunk over ATM selected through PORS does not support SPO-mux or map mode, the cells are transported using AAL5 adaptation.

For more information on cell transport modes, see NN10600-420 *Nortel Multiservice Switch 7400/15000/20000 Operations: Trunking*.

Frame alignment and non-frame alignment

BTDS supports both frame aligned and non-frame aligned traffic. Frame or timeslot alignment is defined as the preservation of the timeslot positioning within a data stream. Frame alignment is used with customer equipment which is sensitive to the timeslot in which the data is transmitted. The figure Frame aligned or non-frame aligned BTDS in a Multiservice Switch network (page 61) shows the differences between the two types of traffic.

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For non-frame aligned BTDS, data from User Equipment A is sent into the Nortel Multiservice Switch subnet in the following order: 1, 2, 3, through to 22, 23, and 24. Since the timeslot of the transmitted data is not preserved, the data could be sent out of the subnet to User Equipment B in the following order: 23, 24, 1, 2, 3 through to 20, 21, 22. For frame-aligned traffic, the timeslot is preserved. For the scenario shown in the figure Frame aligned or non-frame aligned BTDS in a Multiservice Switch network (page 61), the timeslots within the data stream sent into the subnet by User Equipment A will be preserved. This ensures that the timeslots within the data stream received by User Equipment B will match the timeslots sent by User Equipment A. For the case discussed previously, the order would be 1, 2, 3, through to 22, 23, and 24.

Frame alignment and non-frame alignment is provisioned by the *timeslotAlignment* attribute. Setting of this attribute to *unaligned* ensures the timeslots will not be preserved through the network. Setting the attribute to *frameAligned* ensures that the timeslots will be sent transparently through the Multiservice Switch network unchanged. Details on provisioning the frame-aligned BTDS is contained in Other BTDS configuration (page 21).

Only voice FPs support frame alignment. If frame alignment is enabled on a voice FP, then no other services can be provisioned on that FP, and it cannot interwork with an MVP-E FP.

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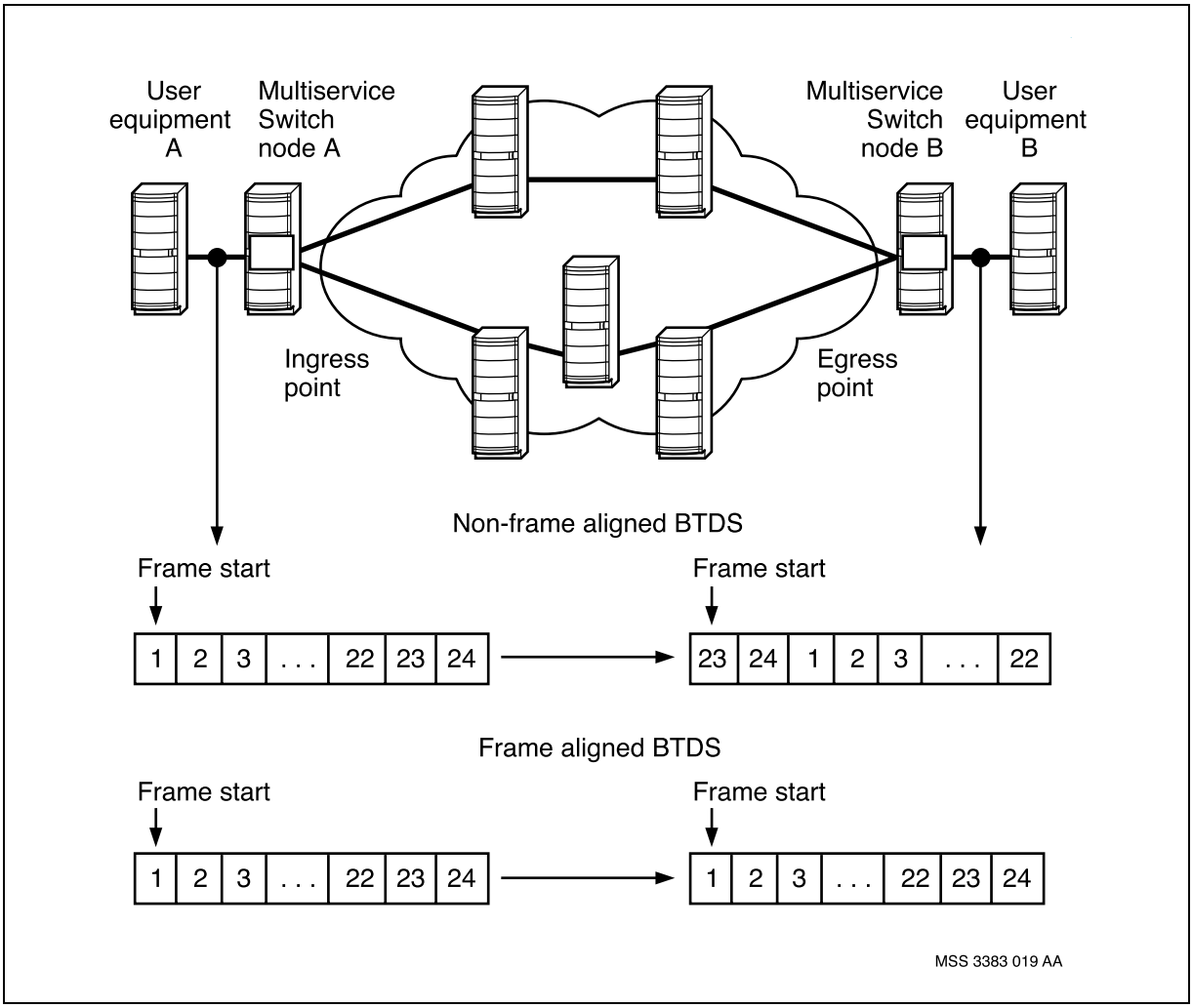
Frame aligned or non-frame aligned BTDS in a Multiservice Switch network



Call discriminator

Only voice function processors (FPs) support the call discriminator capability. The call discriminator capability allows a Nortel Multiservice Switch node to differentiate from either a voice or data call received from a PBX and to automatically alter the operational mode of the voice service depending on the type of call. The node is able to dynamically determine the call type (either data or voice) by handling CCS messages based on Digital Private Network Signalling System No 1 protocol (DPNSS 1) and Meridian 1 ISDN Primary Rate Interface protocol (MCDN). This capability is also described in NN10600-750 *Nortel Multiservice Switch 7400 Operations: Voice Transport*. Provisioning of this capability is handled by the BTDS subcomponents, *Dpnss1* or *Mcdn*. For more information on provisioning this capability, refer to Configuring the BTDS call discriminator feature to interpret DPNSS1 protocols (page 17) and Configuring the BTDS call discriminator feature to interpret MCDN protocols (page 19).

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Resource management

To provide BTDS, each end-point BTDS application provides the following major functions:

- handling of service provisioning data and commands
- creation and management of service resources, such as components and processes to:
  - establish the end-to-end path during the existence of the service
  - handle operator requests to monitor the service (for example, trace the path, or collect statistics on performance characteristics)
  - aid in managing congestion
  - aid with alarm and log duties

Establishing connections using PORS

The Path Oriented Routing System (PORS) sets up a permanent connection between two ends of a network path. The connection is called permanent since it is established with a fixed path (determined by the resources available at call setup) and, barring network difficulties, remains in place until removed. Once the path has been provisioned, the BTDS user may regard it as an end-point to end-point wire.

When the path is provisioned on a node, you will need to provide an instance value under the *Btds* component for each end of the connection (both nodes are provisioned). To complete the connection, the node and instance of the opposite end of the connection are identified in each provisioning session. Path establishment is automatic. For more information about components see NN10600-060 *Nortel Multiservice Switch 7400/15000/20000 Component Reference*.

See the following sections for more information about PORS connections:

- Establishing a path (page 62)
- Using the default PORS attribute values (page 64)
- Creating the path (page 64)
- Path bumping (page 65)
- Optimizing paths (page 65)
- Recovering from path establishment failure (page 66)
- Multiservice Switch trunk bandwidth allocation (page 66)

Establishing a path

The figure Path and path description (page 63) shows a path across a six-node network and illustrates some of the terms used in this section.

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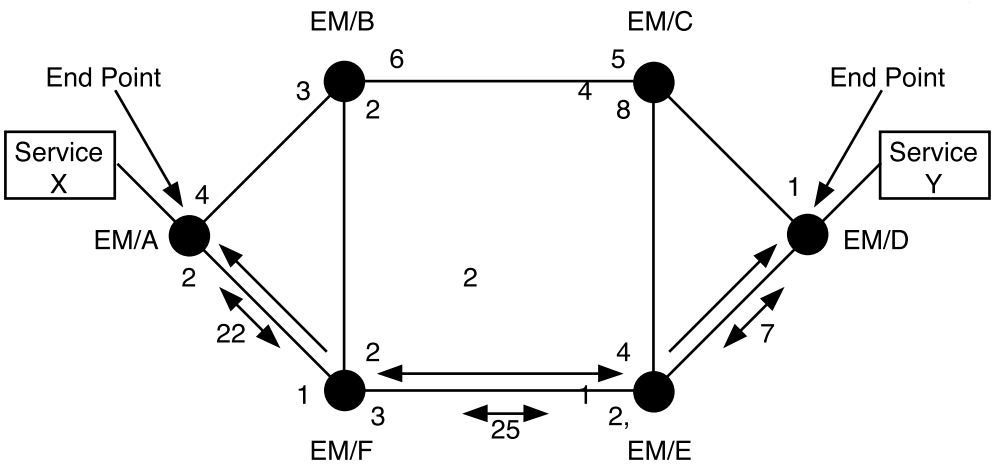
Provisioning data should either be identical at both ends of the connection (for example, some Framer attribute values) or must point to the exact identifier of the other end of the connection (PLC component's *remoteName* attribute). If the other end's name is not correct, no path will be established. This also applies to end-to-end negotiation between voice and MVP-E function processors. See Voice and MVP-E function processor interworking restrictions (page 87) for more information.

Path and path description



Legend:

2 = Trunk instance

25 = LCh - Logical Channel Number

= Node

Path Description = EM/A Service/X, Em/A Trunk/2 LCH/22, EM/F Trunk/3 LCh/25, EM/E Trunk/1 LCh/7, EM/D Service/Y

Note: By convention, outbound trunk names are used to describe paths and routes. EM refers to Multiservice Switch-node enterprise module.

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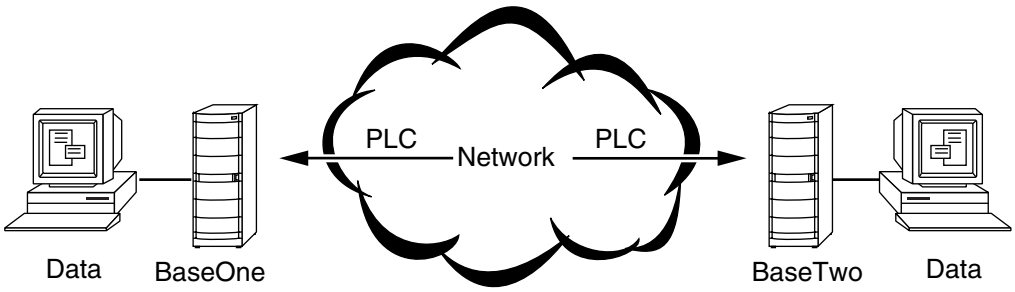
Multiservice Switch 7440 path across the network



Legend:

PLC = Permanent Logical Connection

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Using the default PORS attribute values

BTDS comes with a set of default values for most of the attributes associated with the service. The default values are designed to set up a Permanent Logical Connection (PLC) using the optimal route across the network.

In many networks the default values are sufficient; however, you can choose how PORS selects a route. Attributes that influence selection are explained in Establishing connections—route selection (page 73).

Creating the path

A path is established on a hop-by-hop basis. A set-up packet is sent down the route chosen by the Route Selector (RS). As the packet follows the route it uses all of the Nortel Multiservice Switch trunks that will be necessary for the path. At each point along the route, the following actions are triggered:

- creation of the Logical Channel (LC) components on all the trunks
- allocation of the Logical Channel Numbers (LCNs) to be used on each trunk
- verification of bandwidth availability
- reservation of bandwidth

When the path-setup packet reaches the destination end point, a path-setup confirmation packet is returned to the source. This enables the path for data transfer.

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Path bumping

Path bumping is the forced rerouting of an existing path by a new higher priority path of another logical connection. Bumping happens when there is not enough bandwidth in the network to establish a new path. The rerouting can in turn cause bumping of other paths. It may happen that a bumped path cannot be re-instantiated if the network is heavily loaded.

Optimizing paths

Over time, a PORS connection may end up on a less than optimal path due to link failures, node software upgrades, Nortel Multiservice Switch trunks being locked, or other possible scenarios. Path optimization periodically attempts to move the PORS connection back to a more optimal path. The first step of the optimization process begins when the routing system determines the best available path and compares it with the path currently used by the connection. If this new path provides better metrics, the connection is moved to the new path and the original path is released.

If the new path does not provide better metrics, path optimization will then attempt to balance the PORS load on the link groups used to carry the path. This process involves moving the connection (which is being optimized) to a new path established on a different link in the link group. This will only occur if it contributes to re-balancing the load on the link groups.

The optimization process is administered by PORS Connection Control which resides on each Multiservice Switch node in the network. For more information on path optimization, refer to 241-6401-435 *Passport 6400 Path-Oriented Routing System Guide*.

Path optimization is an optional feature. To activate it on a node, this feature must be provisioned. Enter the provisioning mode and type the command “add rtg pors” to activate this feature on a node.

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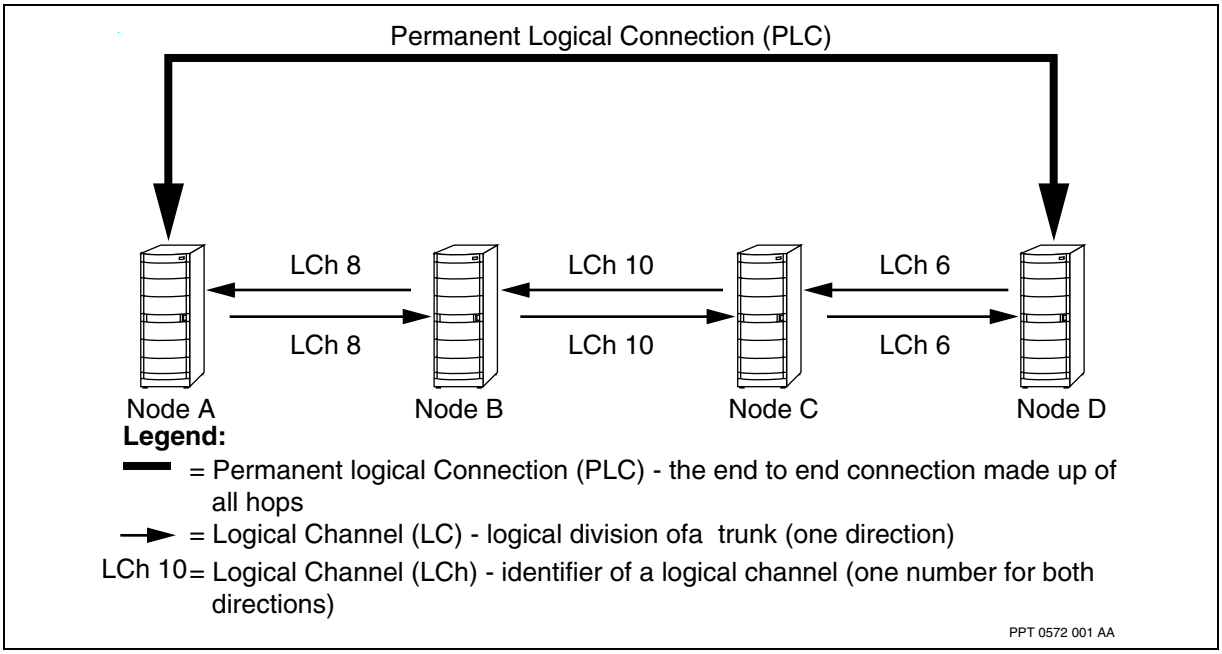
PLCs, LCs and LCNs



Recovering from path establishment failure

The selected path can fail to establish under the following conditions:

- There is not enough bandwidth available.
- There is a failure (node, FP, or Nortel Multiservice Switch trunk) along the chosen route.
- A Multiservice Switch trunk has reached the maximum number of paths (logical channels) that it can support (*maxLc*).

In the case of a failure, a path-setup failure packet is returned from the point of failure back to the source end point. The end point reports the failure reason to the RS and requests a new route. If another route is not available even with bumping, RS informs the end point that the path cannot be set up. If another route is selected by RS, the end point starts the path-setup procedure again.

Multiservice Switch trunk bandwidth allocation

The following sections list provisionable parameters provided by a PLC or Trunk Path Administrator that allow different policies of bandwidth allocation to be enforced:

- Reserving bandwidth (page 67)
- MaxLc (page 67)
- MaxReservedBwOut (page 67)
- Specifying setup and holding priorities (path bumping) (page 68)

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- Specifying emission and discard priorities (page 69)
- Using the interrupt queue (page 69)
- Specifying that a path terminate and not reroute (page 70)

Actual ranges of values or specific parameters that may be used with the attributes in the following sections are listed in NN10600-060 *Nortel Multiservice Switch 7400/15000/20000 Component Reference*.

Reserving bandwidth

Bandwidth on a Nortel Multiservice Switch trunk is shared between connectionless and connection-oriented traffic. Bandwidth that is unused by one traffic type can be used by the other. PORS reserves bandwidth in both directions on each Multiservice Switch trunk in the path. This reservation is not enforced by PORS but is used to determine the number and size of the paths that can be set up on a given trunk. Bandwidth is expressed in bit/s in each direction. Path instantiation on a trunk is delimited by Trunk Path Administrator-provisionable attributes *maxLc* and *MaxReservedBwOut*. Use the *requiredRxBandwidth* and *requiredTxBandwidth* attributes under the PLC component to reserve bandwidth for a path.

When the BTDS Framer attribute *protocol* is set to any value other than *none*, the *requiredRxBandwidth* and *requiredTxBandwidth* attribute should be set to 3 or 4 times the actual data rate. For example, if the actual line rate is 64,000 bit/s, but the offered data rate is 2400 bit/s, the *requiredRxBandwidth* and the *requiredTxBandwidth* attribute should be set to 9600 bit/s.

MaxLc

This is the limit on the number of individual Logical Channels (or paths) that traverse this Multiservice Switch trunk. When this number is reached, no new paths can be established over this trunk until some existing paths clear.

MaxReservedBwOut

This is the percentage of total Multiservice Switch trunk bandwidth which PORS can allocate among individual Logical Channels. Once this percentage is reached, the trunk has no more reservable bandwidth. No paths can establish over this trunk until some existing paths clear.

For example, on a DS-1 trunk using all timeslots at 1.536 Mbit/s, a value of 65% for this trunk attribute makes this trunk capacity appear to be 0.9984 Mbit/s for path-oriented routing. Connectionless traffic can use the remaining 0.5376 Mbit/s. Hence PORS never reserves more than 0.9984 Mbit/s of this trunk.

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The Path Oriented Routing System allows bandwidth reservation to be less than the peak bandwidth requirements. However, to take advantage of the statistical nature of traffic patterns in networks, it is recommended that BTDS bandwidth requirements be matched to the bandwidth consumption since BTDS is a constant bit rate service.

As a general rule, specify 115% of the load offered by the application. For example, if video equipment connected to BTDS uses a 384 kbit/s interface, specify 440 kbit/s as the required bandwidth.

Specifying setup and holding priorities (path bumping)

All PLCs in PORS have setup and holding priorities assigned to them. If a route with sufficient unreserved bandwidth cannot be found for a PLC, existing paths may be moved elsewhere to free bandwidth. This process is called path bumping. Existing path-holding priorities and new path-setup priorities are compared to determine when a new path may bump an existing path. An attempt is made to reroute a path which has been bumped.

Setup and holding priorities accommodate scenarios where customers would like to determine which paths are allocated bandwidth at setup time (setup), but once set up, the paths have to remain (holding) to minimize disruption. For example, if a network is carrying video through BTDS, voice through the voice service, and data through HTDS, and the user considers video to be the highest priority, data to be next, and voice to be the lowest, one way of accommodating such a requirement is as follows:

The values listed in the table Example setup and holding priorities (page 68), provide example settings only and are not the default settings.

Example setup and holding priorities

Traffic type	Setup priority	Holding priority
Data	Medium	Medium
Voice	Low	High
Video	High	High

The *setupPriority* and *holdingPriority* attributes of the PLC component specify these priorities. A high holding-priority path will not be moved by a lower setup-priority path. Conversely, a high setup-priority path may bump lower holding-priority paths.

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Each priority may have one of five values, ranging from zero (0) to four (4), where 0 is the most important path and has the highest priority, and 4 is the least important and has the lowest priority. A new path can bump an existing path only if the new path's *setupPriority* is greater (that is, higher priority) than the existing path's *holdingPriority*.

Setup and holding priority have a default setting of medium (2). PLCs of more, or of less, importance than the default can be reassigned other values.

For more details on path bumping, see NN10600-435 *Nortel Multiservice Switch 7400/15000/20000 Operations: Path-Oriented Routing System*.

Specifying emission and discard priorities

Emission priority is a measure of how urgently a cell will be emitted to the Multiservice Switch trunk. The more urgent the emission priority the sooner the cell is sent to the trunk. Emission and discard priorities are set independently. Some transmissions, voice for example, need a high emission priority but do not need a high discard priority since discarded cells have a low impact on service quality.

The *emissionPriority* and *discardPriority* attributes of the PLC component affect all cells on a particular path. Emission priority reflects the urgency that a cell reach its destination as quickly as possible, while discard priority reflects the importance put on a cell reaching its destination.

These attributes are relative to other traffic values for other transmissions. For example, setting all traffic using a particular Multiservice Switch trunk to the highest emission priority would not accomplish anything since data would all have to wait the same average time before emission to trunk.

Emission and discard priorities can have far-reaching implications for congestion management in your network. Do not adjust these values until you have considered all of the implications for network traffic.

Using the interrupt queue

Highest emission-priority BTDS cells can be sent through the interrupt queue quickly. Short, uniform BTDS cells from the interrupt queue are placed in the data stream ahead of longer, less urgent frames. The *framingType* attribute of the *Framer sub*component, under *Trunk Unack component*, can be set to allow the use of the interrupt queue. When the *framingType* attribute is set to *interrupt*, the interrupt queue is activated. When the *framingType* attribute is set to *hdlc*, the interrupt queue is deactivated.

Attention: Trunk components should be set to the same value on both ends of the connection. Failure to do so can result in a failure to obtain a path.

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BTDS transmissions can use the Multiservice Switch trunk without the interrupt queue but the quality of service will be reduced.

Specifying that a path terminate and not reroute

Some applications using BTDS may not tolerate the delays caused by rerouting. To cause a path to terminate instead of rerouting, set the *pathFailureAction* attribute of the PLC component to the required value. The default setting is reroutepath.

Tips for configuring BTDS

The following sections contain a set of general guidelines for using BTDS with other types of traffic:

- Emission and discard priority (page 70)
- Other bandwidth considerations (page 71)

Emission and discard priority

BTDS uses a strict priority system—higher emission-priority cells get the necessary amount of bandwidth faster. For this reason, too much high priority traffic will restrict the flow of low priority traffic. As a general rule, the amount of frame-cell trunks interrupting mode (highest priority) traffic should not be greater than 80% (limit *maxReservedBwOut* attribute to 80% or less).

In general, BTDS traffic should be setup as described in the figure Emission and discard priority setup for BTDS traffic (page 71). When using video, you should setup BTDS and other traffic as shown in the figure Emission and discard priority setup for BTDS video traffic (page 71). Make sure to account for loads that are not immediately apparent, such as burstiness and control traffic, when determining the amount of BTDS traffic.

The term highest discard priority means last to be discarded. Highest emission priority means first to be emitted.

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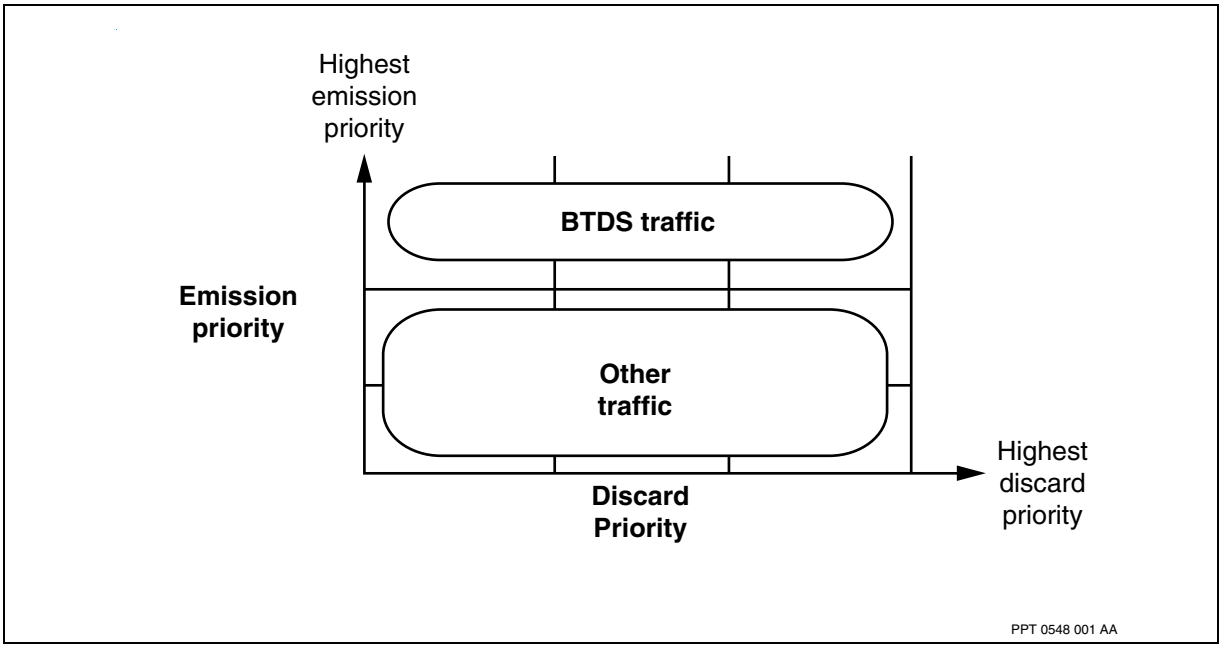
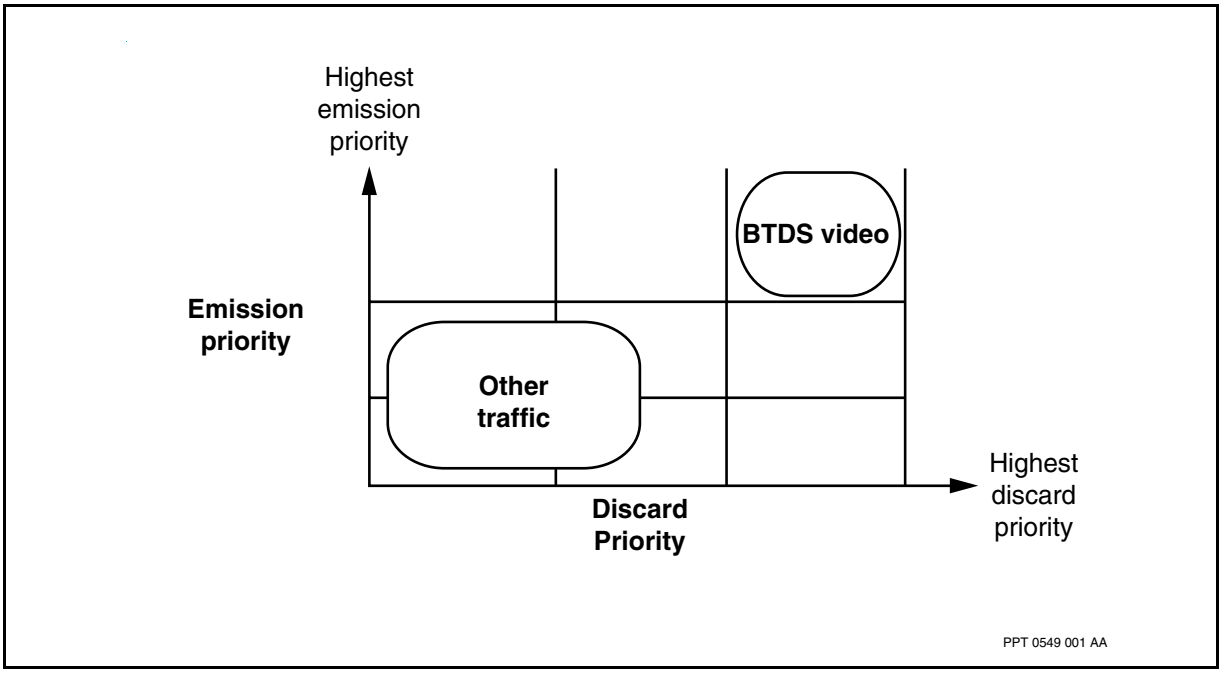
Emission and discard priority setup for BTDS traffic



Emission and discard priority setup for BTDS video traffic



Other bandwidth considerations

When considering running BTDS over a pre-existing Nortel Multiservice Switch trunk,

- determine the usual bandwidth used by the pre-existing traffic

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- account for burstiness and control traffic
- estimate the amount of bandwidth needed by the BTDS traffic
- be sure that the combined bandwidth is available
- always try to run video over high-speed links
- always consider BTDS bandwidth to be in constant use

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Establishing connections—route selection

Use this chapter to learn about the route selection criteria to consider when provisioning your network. You can use this criteria to tailor the path that PORS selects to meet your requirements. This can be done during the initial provisioning session or at a later date should you wish to fine-tune your network resources.

Avoid unnecessary restrictions when provisioning a path. The more restrictions you add, the greater your chance of causing conflicts that will not allow a connection. For example, your restrictions from the security option may require a path that conflicts with the path needed by the general parameters that you have used or that may not support the type of traffic that you want to use. In cases like these, PORS will not be able to set up a connection.

Navigation

- Selecting paths (page 73)
- Restricting traffic (page 76)
- Restricting paths (page 77)
- Provisionable path and related Trunk attributes (page 81)

Selecting paths

This section provides details on the following topics:

- Minimization criteria—cost and delay (page 73)
- Specifying a maximum cost for a path (page 75)
- Specifying a maximum delay for a path (page 76)

Minimization criteria—cost and delay

PORS can select a path based on either the lowest cost or lowest delay. Cost and delay cannot both be minimized at the same time. The *pathAttributeToMinimize* attribute under the *PLC* component is used to specify cost or delay.

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The routing system computes a minimum path from the values that you have assigned to the Nortel Multiservice Switch trunks (cost) or from delay values that are associated with each Multiservice Switch trunk. This is shown in the figure Path for cost or delay using trunkAttributeToMinimize (page 75).

To assign a cost to a trunk use the *trunkCost* attribute under the *Trunk Path Administrator* component.

Cost can be an actual monetary value or any unit that you want to use, although the same parameter must be used consistently across the network (for example you could not mix cost and some other parameter). If default values are used, cost represents the hop count. Thus the number of hops across the network is minimized.

If you use a parameter for cost that reflects, in some manner, the actual cost of facilities, high-cost facilities will receive less use and reduce the cost of operating the network. This is the recommended method of using this option.

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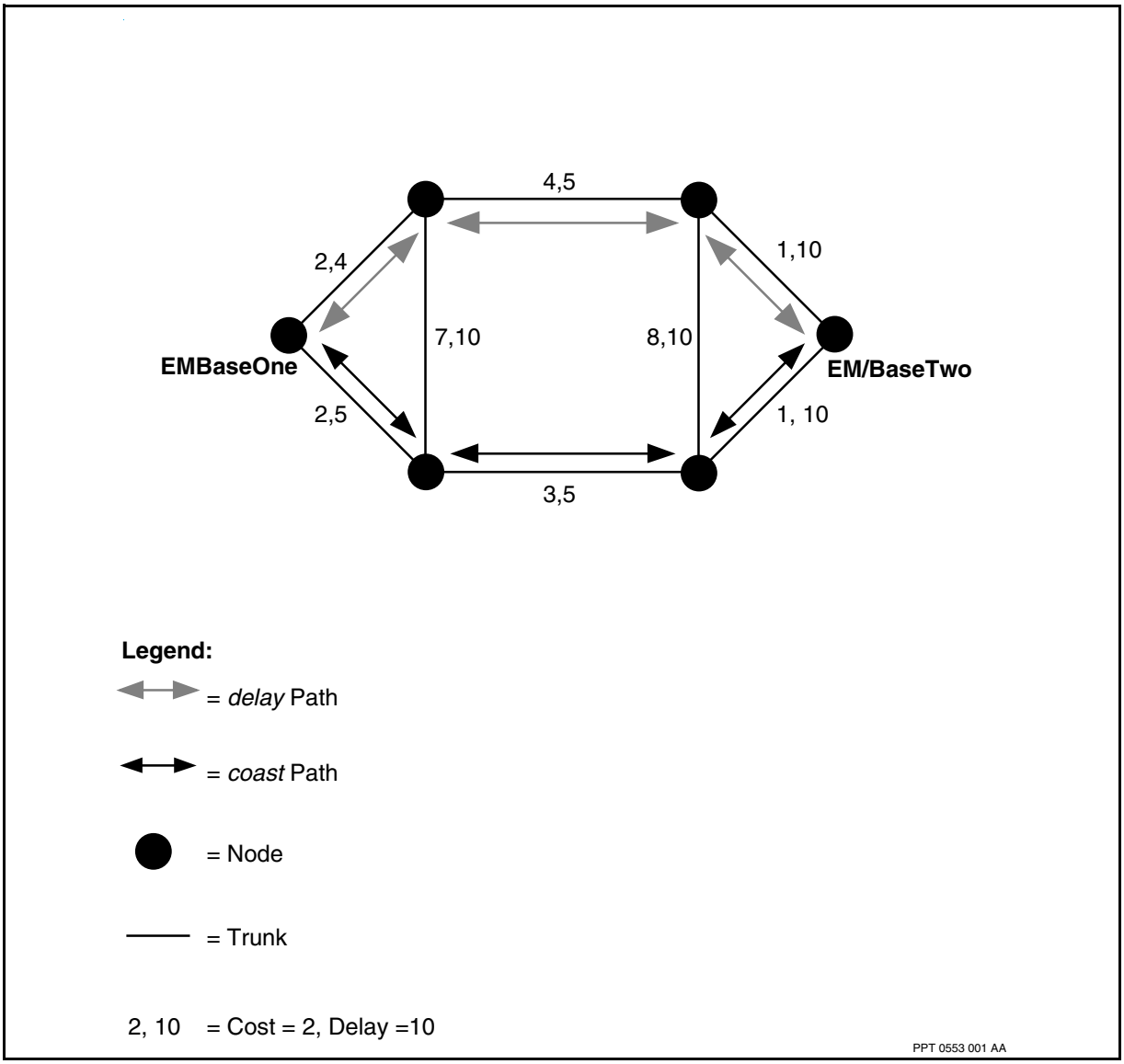
Path for cost or delay using trunkAttributeToMinimize



Specifying a maximum cost for a path

Providers of network services may wish to restrict some parameters for a particular circuit. This can only be done if all the Nortel Multiservice Switch trunks have identical cost.

To specify the maximum total cost value of a path you can use the *maximumAcceptableCost* attribute under the *PLC* component. Although this value is called cost, you may use cost to mean any parameter. For example, this may be the geographic distance, hop count, or real dollar value.

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The sum of the *trunkCost*-attribute values of all Multiservice Switch trunks used in the path will be less than or equal to the value specified by *maximumAcceptableCost* attribute.

Specifying a maximum delay for a path

Nortel Multiservice Switch trunk delay in PORS is measured for a 512-byte packet in one direction at the time of trunk staging. Over time, this measured delay may change to reflect the updated operating delay but will not affect existing paths unless a trunk restages.

To specify the maximum delay value of a path, use the *maximumAcceptableDelay* attribute under the *PLC* component. The sum of the delay values associated with all Multiservice Switch trunks used in the path will be less than or equal to the value specified by the *maximumAcceptableDelay* attribute.

Attention: This parameter should be used when large delays are unacceptable for the service (for example for interactive data and voice).

Restricting traffic

This section contains information on the following topics:

- Restricting certain types of traffic to specific trunks (page 76)
- Restricting traffic to certain types of trunks (page 77)

Restricting certain types of traffic to specific trunks

PORS allows you to specify which types of traffic are carried on a given Nortel Multiservice Switch trunk.

Use the *supportedTrafficTypes* attribute, under the *Trunk Path Administrator* component, to create an individual list of traffic types for each Multiservice Switch trunk in your network (data, voice, and video for example).

Use the *requiredTrafficType* attribute to specify which traffic type is required by the service.

PORS matches a service's *requiredTrafficType* to a trunk's *supportedTrafficTypes*. In other words, a service's *requiredTrafficType* must be included in a trunk's *supportedTrafficTypes* list or the trunk is not selected for the path. For example, if the service's *requiredTrafficType* is data, only Multiservice Switch trunks with *supportedTrafficTypes* that include data are selected for the path.

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As another example, consider two services (HTDS/10 and BTDS/20) running on two Multiservice Switch trunks over ATM: ATM trk/110 for variable bit rate (VBR) data and ATM trk/111 for constant bit rate (CBR) data. To guard against losing frames, provision: HTDS/10 to only use ATM trk/110 (the VBR trunk) and BTDS/20 to only use ATM trk/111 (the CBR trunk). The provisioning required to accomplish this would include the following steps:

```
set htds/10 plc requiredTrafficType data

set btds/20 plc requiredTrafficType video

set trk/110 pa supportedTrafficTypes data ~video

set trk/111 pa supportedTrafficTypes video ~data
```

In this example, video data from the BTDS/20 service is forced onto ATM trk/111 (set up for CBR data) and cannot be routed onto ATM trk/110 (set up for VBR data).

Restricting traffic to certain types of trunks

You may want to create an indicator of the type of Nortel Multiservice Switch trunk that various traffic types use. Terrestrial or satellite links are examples of Multiservice Switch trunking facilities. The *trunkType* attribute, under the *Trunk* component, allows you to do this for up to eight different types of trunks.

The *permittedTrunkTypes* attribute under the *PLC* component allows a set of possible trunk types to be specified for a route. Only Multiservice Switch trunks with *trunkType* attributes that are found in the *permittedTrunkTypes* list are used to create the path.

Restricting paths

This section provides details on the following topics:

- Security (page 77)
- Defining general parameters to restrict paths (page 79)
- Specifying a path manually (page 80)

Security

PORS allows you to define varying security levels for the Nortel Multiservice Switch trunks of the network. This option could be used to prevent sensitive data from traveling over certain trunks, for example.

PORS has an option that allows you to specify the minimum security level of a path. To do this, provision a security value for the Multiservice Switch trunks in your Multiservice Switch network using the *trunkSecurity* attribute under the Trunk Path Administrator component. When you provision the connection, enter a value for the *requiredSecurity* attribute under the *PLC* component.

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The connection will only use Multiservice Switch trunks that have been assigned security values of an equal or higher level than that of the connection. This is illustrated in the example in the figure Path determined using a requiredSecurity value of 4 (page 79) (a lower number represents a higher security level).

The default value for security is mid-range so that the network administrator can add security with minimal provisioning.

Over-use of this option can reduce its usefulness. This option can also reduce the number of recovery paths available to high security routes should an outage occur.

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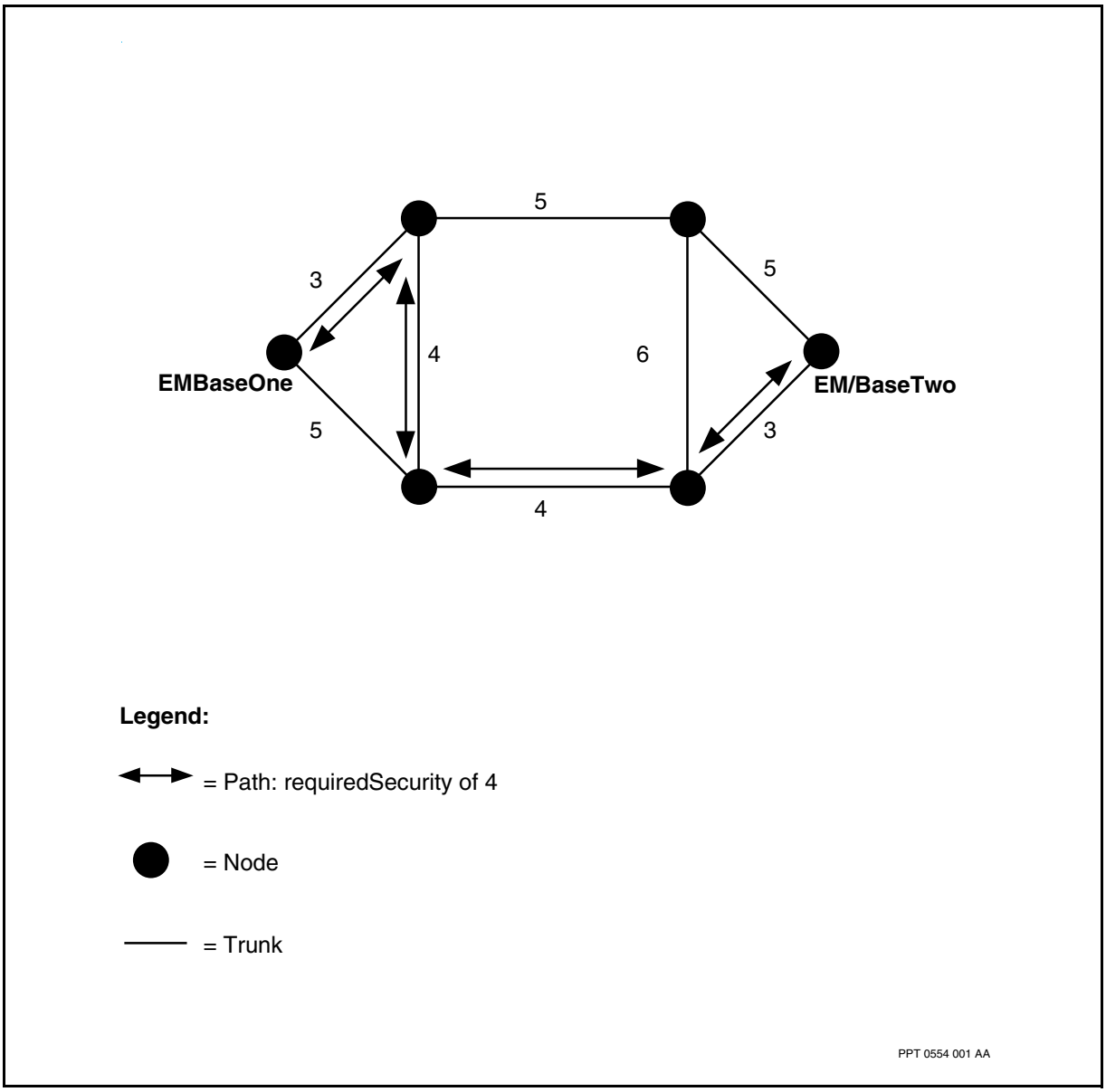
Path determined using a requiredSecurity value of 4



Defining general parameters to restrict paths

It may be convenient to be able to restrict certain classes of paths to certain Nortel Multiservice Switch trunks. Most of the commonly used qualifiers are represented in security and traffic type. This is an additional option, to be used for any function that you deem appropriate.

PORS allows you to restrict certain paths to certain Multiservice Switch trunks. This is done in a similar manner to the way that security is provisioned. Values are assigned to various trunks in the network using the

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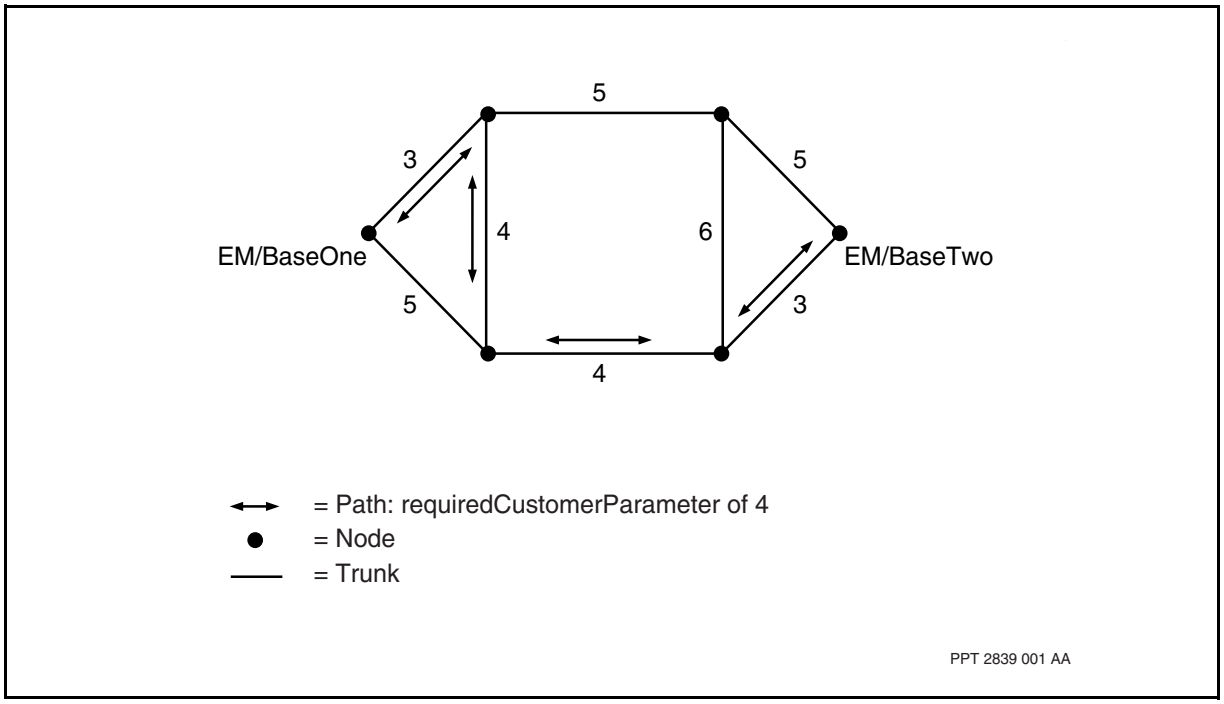
customerParameter attribute under the *Trunk Path Administrator* component. When the PLC is provisioned, it can be assigned a value using the *requiredCustomerParameter* attribute.

PORS will assign the path to trunks that have an equal or lower number associated with them. This is illustrated in the example shown in the figure Path using a requiredCustomerParameter of 4 (page 80).

All restrictions are applied simultaneously during route selection. Over-restricting Multiservice Switch trunks and PLC may result in no route being selected, where different trunks would be rejected for different reasons.

Path using a requiredCustomerParameter of 4



Specifying a path manually

PORS is designed to select an appropriate route automatically. In an exceptional case, however, you may wish to define the set of Nortel Multiservice Switch trunks that are to be used.

The route can be defined at both end points. The two routes do not have to use the same set of Multiservice Switch trunks. If different routes are defined at each end, PORS does not guarantee which one will be used.

Defining different routes at both end points has an advantage. This simple provisioning provides a backup route for manual path in case of a failure impacting the route in use.

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If you want to override the automatic selection of a path and specify the trunks manually, use the *manualPath* attribute of the PLC component. Enter the outbound sequence of trunk component names for the path that you want.

The path must satisfy the characteristics specified in the other PLC attributes, including bandwidth requirements.

Provisionable path and related Trunk attributes

The table Provisionable path and related Trunk attributes (page 81) summarizes information about the attributes discussed in this chapter.

Provisionable path and related Trunk attributes

Path requirement attribute	Trunk attribute	Trunk is candidate for route if...
pathAttributeToMinimize (value = cost or delay)	**trunkCost, trunkDelay**	**trunkCost** less than **maximumAcceptableCost** **trunkDelay** less than **maximumAcceptableDelay**
maximumAcceptableCost (value = number)	**trunkCost** (value = number)	
maximumAcceptableDelay (value = number of milliseconds)	**trunk delay metric** (Metric in milliseconds: not provisionable)	
requiredTrafficType value = one of eight traffic types (0 to 7) (voice, data, video, 3, 4, 5, 6, or 7)	**supportedTrafficTypes** (value = list of up to eight traffic types)	**requiredTrafficType** is element of **supportedTrafficTypes**
permittedTrunkTypes (value = list of up to eight trunk types)	**trunkType** value = one of 0 to 7 (terr, sat, 2, 3, 4, 5, 6, or 7)	**trunkType** is element of **permittedTrunkTypes**
requiredSecurity (value = number)	**trunkSecurity** (value = number)	**trunkSecurity** is less than or equal to **requiredSecurity**
requiredCustomerParameter (value = number)	**trunkCustomerParameter** (value = number)	**trunkCustomerParameter** is less than or equal to **requiredCustomerParameter**
manualPath (value = list of trunk component IDs)	Trunk component name for example: EM/NODER9 trunk/202	trunk component name is one of manualPath

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BTDS implementation guidelines

Use this chapter to learn about engineering aspects that affect the Bit Transparent Data Service (BTDS) and illustrates their effect on the operating characteristics of this service.

For information on BTDS connections between voice and MVP-E FPs, see Voice and MVP-E function processor interworking restrictions (page 87).

Navigation

- BTDS capabilities (page 82)
- BTDS interconnection information and requirements (page 83)
- BTDS end-to-end negotiation requirements (page 86)

BTDS capabilities

BTDS supports the following capabilities:

- up to eight Bit Transparent Data Service interfaces (ports) using V.35 function processor (FP) physical connections with speeds of 9.6 kbit/s up to 2 Mbit/s for each interface.
- up to eight Bit Transparent Data Service interfaces using V.11 FP physical connections with speeds of 9.6 kbit/s up to 2 Mbit/s for each interface. There is a maximum combined throughput for the eight interfaces of the V.11 FP.
- up to four Bit Transparent Data Service interfaces using DS1, 8pDS1 or E1 FPs in single-link mode.
- up to eight Bit Transparent Data Service interfaces using DS1, 8pSD1 or E1 FPs in fractional mode. In fractional mode (ports 1 and 3 only), one primary rate interface can have one to four fractions associated with it. Also, there is a maximum combined throughput for the four interfaces of the DS1, 8pDS1 or E1 FP.
- for non-frame aligned BTDS, up to twenty-four Bit Transparent Data Service interfaces can be defined for a DS1 MVP-E FP and thirty-one for an E1 MVP-E FP.

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For more information on function processors, see NN10600-170 *Nortel Multiservice Switch 7400 Hardware Description*. See the Release Notes for actual combinations of speeds currently supported.

BTDS interconnection information and requirements

To successfully establish a BTDS connection between two FPs, both ends must share compatible provisioning information. A BTDS connection attempt succeeds when the FPs determine that they share compatible provisioning data.

You cannot provision either the *Mcdn* or *Dpnss1* call discriminator sub-components on MVP-E FPs. As well, speeds at both ends of a BTDS connection must be the same.

Either internal or external synchronization may be used. With internal synchronization, the *clockingSource* attribute should be set to module for all types of FPs. For V.11 and V.35, the ports must be set to DCE. Internal synchronization facilitates fault tracing. If external synchronization is used, the clocking source should be set to *line* for DS1 and E1, and DS1 MVP-E and E1 MVP-E FPs. For V.11 and V.35 FPs, the ports must be set to DTE.

Source and destination function processors (terminating FPs or access-point FPs) can be of the same type (V.11 to V.11, for example) or different (V.35 to E1).The table Supported BTDS interconnections (page 86) describes the supported BTDS interconnections:

The following sections contain requirements for all possible interconnections:

- V.11 to V.11 or V.35 to V.35 (page 84)
- DS1 or 8pDS1 to DS1or 8pDS1 (page 84)
- E1 to E1 (page 84)
- V.11 or V.35 to DS1, 8pDS1 or E1 (page 84)
- V.11 to V.35 (page 85)
- V.11 or V.35 to voice or MVP-E FP (page 85)
- DS1, 8pDS1 or E1 to DS1 or MVP-E FP (page 85)
- DS1 MVP-E to DS1 MVP-E (page 85)
- E1 MVP-E to E1 MVP-E (page 85)
- TTC2M MVP-E to TTC2M MVP-E (page 85)

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V.11 to V.11 or V.35 to V.35

The S (V.11) and REST (V.35) clock values must be supported by V.11 or V.35. For values of generated clock rates see NN10600-170 *Nortel Multiservice Switch 7400 Hardware Description*. Examples of clock rates are: 9.6, 19.2, 32, 48, 56, 64, 112, 128, 168, 192, 224, 256, 320, 336, 384, 448, 512, 640, 672, 768, 960, 1280, 1344, 1536, and 1920 kHz.

DS1 or 8pDS1 to DS1or 8pDS1

In fractional (multi-channel) mode, each port supports up to four fractions:

- Each channel can contain 1 to 24 timeslots in increments of one timeslot at a rate of 56 kbit/s or 64 kbit/s for each timeslot.
- The total number of timeslots for each port is 24

In single-channel mode, each port supports a single channel:

- Each channel can contain 1 to 24 timeslots in increments of one timeslot at a rate of 56 kbit/s or 64 kbit/s for each timeslot.

Attention: Applies to any combination of DS1 and/or 8pDS1 ports.

E1 to E1

In fractional (multi-channel) mode, each port supports up to four fractions:

- Each channel can contain 1 to 31 timeslots in increments of one timeslot at a rate of 64 kbit/s for each timeslot.
- The total number of timeslots for each port is 31.

In single-channel mode, each port supports a single channel:

- Each channel can contain 1 to 31 timeslots in increments of one timeslot at a rate of 64 kbit/s for each timeslot.

V.11 or V.35 to DS1, 8pDS1 or E1

For these interconnections

- Both ends must be operating in Bit Transparent Data Service mode.
- Line status leads must be terminated locally (V.11 and V.35).
- Channel selections are 1, 2, 3, 4, 6, 8, 12, or 24 for DS1 interfaces operating at a timeslot rate of 56 kbit/s.
- Channel selections are 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 15, 20, 21, or 24 for DS1 interfaces operating at a timeslot rate of 64 kbit/s.
- Channel selections are 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 15, 20, 21, 24, or 31 for E1 operating at a timeslot rate of 64 kbit/s.

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V.11 to V.35

Both ends must be operating in Bit Transparent Data Service mode. As well, line status leads must be terminated locally.

V.11 or V.35 to voice or MVP-E FP

There is a limit of 1*64 kbit/s channel for a DS1/E1/TTC2M MVP-E FP.

DS1, 8pDS1 or E1 to DS1 or MVP-E FP

There is a limit of 1*64 kbit/s channel for a DS1 MVP-E or E1 MVP-E FP.

When you create a BTDS connection between a DS1 MVP-E FP and a DS1 FP, you must set the *zeroCoding* attribute to b8zs.

DS1 MVP-E to DS1 MVP-E

For non-frame aligned BTDS, there is a limit on the number of n*64 kbit/s channels, where n has the value of 1 for a DS1 MVP-E FP.

The DS1 MVP-E FP does not support frame-aligned BTDS

BTDS supports interworking connections between voice and MVP-E FPs. See Voice and MVP-E function processor interworking restrictions (page 87) for more information.

E1 MVP-E to E1 MVP-E

For non-frame aligned BTDS, there is a limit on the number of n*64 kbit/s channels, where n has the value of 1 for an E1 MVP-E FP.

The E1 MVP-E FP does not support frame-aligned BTDS.

BTDS supports interworking connections between voice and MVP-E FPs. See Voice and MVP-E function processor interworking restrictions (page 87) for more information.

TTC2M MVP-E to TTC2M MVP-E

For non-frame aligned BTDS, there is a limit on the number of n*64 kbit/s channels, where n has the value of 1 for a TTC2M MVP-E FP.

The TTC2M MVP-E FP does not support frame-aligned BTDS.

BTDS supports interworking connections between voice and MVP-E FPs. See Voice and MVP-E function processor interworking restrictions (page 87) for more information.

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Supported BTDS interconnections

	FP type							
FP type	E1	DS1	V.11	V.35	E1 MVP-E	DS1 MVP-E	TTC2M MVP-E	8p DS1
E1	X		X	X	X	X	X	
DS1		X	X	X	X	X	X	X
V.11	X	X	X	X	X	X	X	X
V.35	X	X	X	X	X	X	X	X
E1 MVP-E			X	X	X			X
DS1 MVP-E			X	X		X		X
TTC2M MVP-E			X	X			X	X
8p DS1		X	X	X	X	X	X	X

BTDS end-to-end negotiation requirements

When you attempt to establish a BTDS connection between two FPs running Nortel Multiservice Switch R5.1 software, end-to-end negotiation occurs. During end-to-end negotiation, the source and destination FPs exchange provisioning information. A BTDS connection attempt succeeds when the FPs verify that they share compatible provisioning data.

In some cases, the end-to-end negotiation process causes an FP to modify specific provisioned values (see Voice and MVP-E function processor interworking restrictions (page 87)). If the end-to-end negotiation process reveals mismatched provisioning data, the connection request is rejected. The operational attribute *serviceFailureReason* contains the reason the connection failed. For example, if one end uses frame-aligned timeslots and the other end uses unaligned, the connection fails and *serviceFailureReason* attribute contains the compatibility error mismatchedTimeSlotAlignment. For more information about failed connection requests, see Configuring the remoteName attribute (page 86).

Configuring the remoteName attribute

The *Btds PermanentLogicalConnection* (*Plc*) component's *remoteName* attribute has an important role in the end-to-end negotiation process. If the *Btds Plc* component's *remoteName* attribute is set incorrectly (for example, because of improper syntax), a connection request is rejected even if the source and destination FPs share compatible provisioning data. Alternately, if you do not specify a value for the *remoteName* attribute, the *Btds Plc* component accepts connection requests from any remote *Btds Plc* component. However, with no value specified for the *remoteName* attribute, the *Btds Plc* component cannot originate a connection request and the

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connection establishment process is slower. See NN10600-060 *Nortel Multiservice Switch 7400/15000/20000 Component Reference* for more information about setting the *remoteName* attribute.

Voice and MVP-E function processor interworking restrictions

For BTDS connections between voice and multipurpose voice platform enhanced echo cancellation (MVP-E) function processors (FPs), interworking comprises specific BTDS features.

To establish BTDS connections between voice and MVP-E FPs, ensure that you

- set the *Btds* component's *timeSlotAlignment* attribute to unaligned on both FPs

  MVP-E FPs do not support frame-aligned BTDS. If you set the *timeSlotAlignment* attribute to frameAligned on a voice FP, the BTDS connection attempt fails during end-to-end negotiation. If the BTDS connection fails for this reason, the operational attribute *serviceFailureReason* contains the value mismatchedTimeSlotAlignment.

- do not provision either the *Mcdn* or *Dpnss1* call discriminator sub-components

  MVP-E FPs do not support the voice/data call discrimination feature. You cannot provision either *Mcdn* or *Dpnss1* call discriminator sub-components on an MVP-E FP.

  Also, end-to-end negotiation rejects a connection attempt between an MVP-E FP and a voice FP provisioned with one of the call discriminator sub-components. If the BTDS connection fails for this reason, the operational attribute *serviceFailureReason* contains the value mismatchedCallDiscrimination.

- establish connections with voice FPs running Nortel Multiservice Switch R5.0 or greater software

  An MVP-E FP cannot establish a BTDS connection with a voice FP running Multiservice Switch pre-R5.0 software. As well, end-to-end negotiation only occurs between FPs—either MVP-E FPs, voice FPs, or both—running Multiservice Switch R5.1 software.

- install Multiservice Switch R5.1 software first before you reprovision the *cardType* attribute when migrating BTDS from voice to MVP-E FPs.

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Nortel Multiservice Switch 7400

Operations: Bit Transparent Data Service

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