Nortel Networks Multiservice Switch

7400/15000/20000

Operations: Trace System

NN10600-510

Nortel Networks Multiservice Switch 7400/15000/20000

Operations: Trace System

Publication: NN10600-510
Document status: Standard
Document version: 6.1S1
Document date: August 2004

Copyright © 2004 Nortel Networks.
All Rights Reserved.

Printed in Canada

NORTEL NETWORKS, the globemark design, the NORTEL NETWORKS corporate logo, DPN, and PASSPORT are trademarks of Nortel Networks. NexusTRACE is a trademark of Nexus Telecom AG. UNIX is licensed exclusively through X/Open Company Ltd. VT100 is a trademark of Digital Equipment.

Publication history

August 2004

6.1S1 Standard
General availability. Contains information on Nortel Networks Multiservice Switch 7400, 15000, and 20000 for the PCR6.1 release.

Contents

List of figures

List of tables

About this document

This document explains the interface protocol, provisioning, operating and troubleshooting procedures of the Nortel Networks Multiservice Switch Trace System.

The following topics are discussed in this section:

Who should read this document and why

This document is intended for personnel responsible for Nortel Networks Multiservice Switch network operations and troubleshooting.

What you need to know

In order to understand the contents of this document Nortel Networks recommend that you know general provisioning and operating procedures for Multiservice Switch products. You also need some knowledge of the access service to which you are applying the PTS.

How this document is organized

This document contains the following sections:

- "Provisioning the Trace System" (page 17) consists of provisioning procedures you need to configure the system.
- "Monitoring Service Trace sessions" (page 37) consists of operating procedures.
- "Troubleshooting" (page 45) describes how to solve problems that can occur. The section includes information about Nortel Networks Multiservice Switch alarms.
- "Understanding the Trace System" (page 57) describes the system, what it does, and the benefits of using the software. This section also includes a description of the interface protocol.

What's new in this document

There were no new features added to this document.

Other changes made to this document include the following:

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

Text conventions

This document uses the following text conventions:

- `nonproportional spaced plain type`

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

- **`nonproportional spaced bold type`**

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

- *italics*

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

  Words that appear in italics in text are for naming.

- [optional_parameter]

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

- <general_term>

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

- UPPERCASE, lowercase

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

- |

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

- ...

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

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

Related documents

See the following documents for information related to the Nortel Networks Multiservice Switch Trace System:

- NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview*
- NN10600-520 *Nortel Networks Multiservice Switch 7400/15000/20000 Fault and Performance Management: Troubleshooting*
- NN10600-900 *Nortel Networks Multiservice Switch 7400/15000/20000 Frame Relay Technology Fundamentals*
- NN10600-901 *Nortel Networks Multiservice Switch 7400/15000/20000 Frame Relay Configuration Management*
- NN10600-715 *Nortel Networks Multiservice Switch 7400/15000/20000 ATM Fault and Performance Management*
- NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*
- NN10600-500 *Nortel Networks Multiservice Switch 6400/7400/15000/20000 Alarms Reference*

How to get more help

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

Chapter 1
Provisioning the Trace System

You must provision the Trace System (TS) components on each Nortel Networks Multiservice Switch module that supports a trace. Provision the first *ServiceTrace* component directly from Root and use it to provision the trace manager with the receiver list. Provision the second *ServiceTrace* component directly under the service that supports TS.

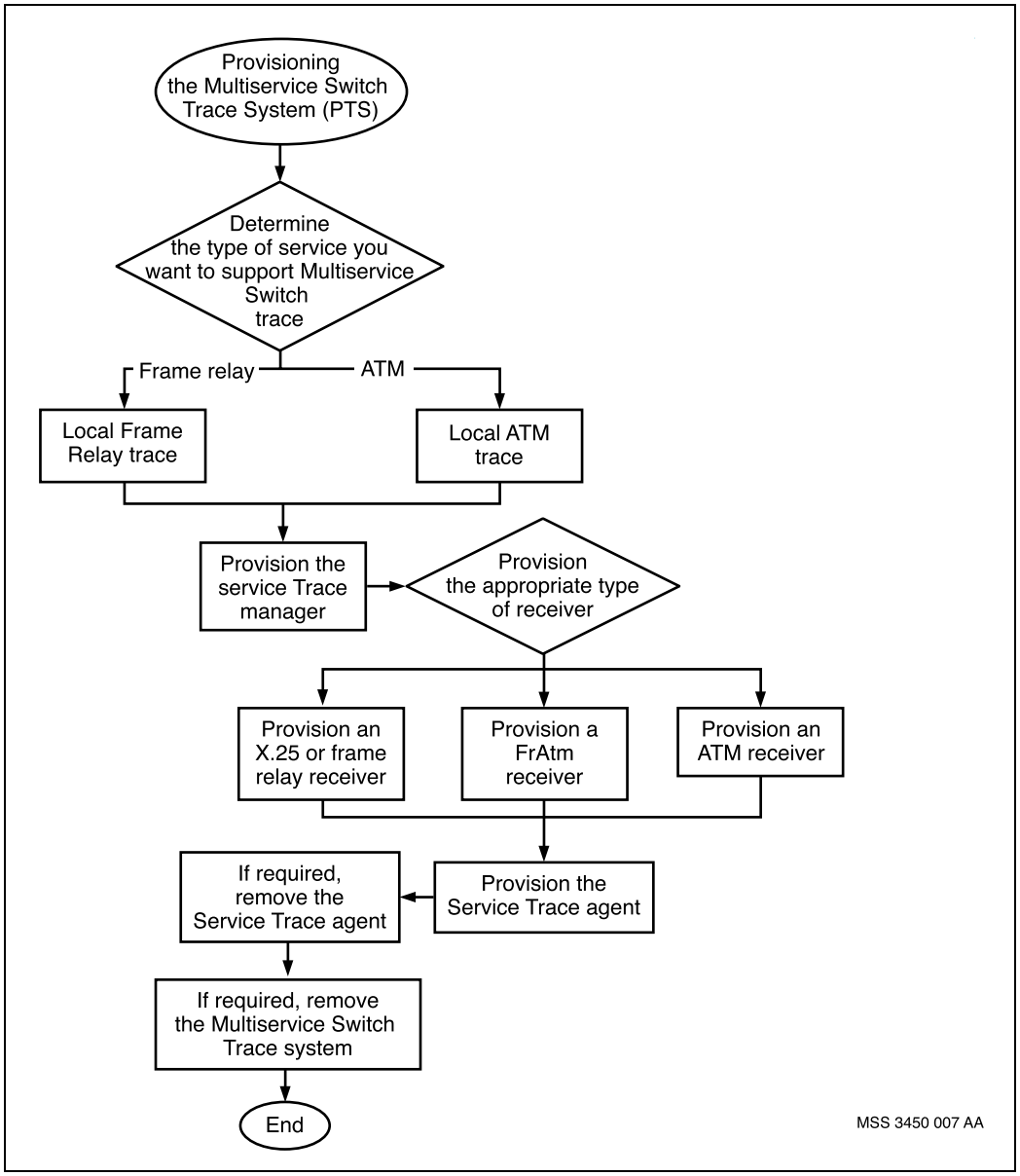
Prerequisites to provisioning the Trace System

- If you are unfamiliar with Trace System, see "Understanding the Trace System" (page 57).

Provisioning the Trace System task flow

This task flow shows you the sequence of procedures you perform to provision the Trace System. To link to any procedure, go to "Task flow navigation" (page 19).

Figure 1
Provisioning the trace system task flow



Task flow navigation

- "Load Frame Relay trace" (page 20)
- "Load ATM trace" (page 22)
- "Provision the trace manager" (page 24)
- "Provision an X.25 or frame relay receiver" (page 25)
- "Provision a FrAtm receiver" (page 27)
- "Provision an ATM receiver" (page 29)
- "Provision the trace agent" (page 31)
- "Remove the trace agent" (page 33)
- "Remove the Trace System" (page 34)

Load Frame Relay trace

If you are planning to use trace for Frame Relay services, load the appropriate software.

Prerequisites

- The base software must be installed as described in NN10600-270 *Nortel Networks Multiservice Switch 7400/15000/20000 Software Installation*. The software is named ServiceTrace.

Procedure steps

1 Enter provisioning mode.

```
start prov
```

2 Include the appropriate trace feature on the logical processor type (lpt) feature list for all required services.

```
set sw lpt/<lpt> fl frameRelayUniTrace
```

```
set sw lpt/<lpt> fl frameRelayNniTrace
```

3 Include the appropriate receiver feature on the logical processor type (lpt) feature list for all required services.

```
set sw lpt/<lpt> fl x25TraceRcvr
```

or

```
set sw lpt/<lpt> fl frTraceRcvr
```

or

```
set sw lpt/<lpt> fl atmTraceRcvr
```

Note: It is recommended that you load only one receiver on an FP.

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

```
check prov
```

Correct any errors, and then verify the provisioning changes again.

5 Optionally, save the provisioning changes.

```
save prov
```

6 If you want these changes to take effect immediately, activate and commit the provisioning changes.

```
activate prov
```

```
confirm prov
```

```
commit prov
```

For more information on this step, see NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview*.

7 Exit provisioning mode.

```
end prov
```

Load ATM trace

If you are planning on use trace for ATM services, load the appropriate software.

Prerequisites

- The base software must be installed as described in NN10600-270 *Nortel Networks Multiservice Switch 7400/15000/20000 Software Installation*. The software is named ServiceTrace.

Procedure steps

1. Enter provisioning mode.

   ```
   start prov
   ```

2. Include the appropriate ATM trace features on the logical processor type (lpt) feature list for ATM services.

   ```
   set sw lpt/<lpt> fl atmUniTrace atmIispTrace
   atmPnniTrace atmAiniTrace
   ```

3. Include the appropriate receiver feature on the logical processor type (lpt) feature list for all required services.

   ```
   set sw lpt/<lpt> fl atmTraceRcvr
   ```

   or

   ```
   set sw lpt/<lpt> fl frAtmTraceRcvr
   ```

   Note: It is recommended that you load only one receiver on an FP.

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

   ```
   check prov
   ```

   Correct any errors, and then verify the provisioning changes again.

5. Optionally, save the provisioning changes.

   ```
   save prov
   ```

6 If you want these changes to take effect immediately, activate and commit the provisioning changes.

```
activate prov
```

```
confirm prov
```

```
commit prov
```

For more information on this step, see NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview*.

7 Exit provisioning mode.

```
end prov
```

Provision the trace manager

After you provision one trace manager with its receiver list, you can duplicate the data throughout the network using the Global Data Manager tool available through Nortel Networks Preside Multiservice Data Manager (MDM). See 241-6001-023 *Preside MDM Configuration Management for Passport User Guide* for more details.

Procedure steps

The component file need only contain the following two lines:

```
ServiceTrace
ServiceTrace rcvr/*
```

When you duplicate the data, each module uses the same local DNA to make a direct call to the receiver.

Note: Trace System does not require unique DNAs to establish a direct call to the receiver because it cannot receive incoming calls and the trace calls are not billed.

Provision an X.25 or frame relay receiver

Provision a trace receiver for services using X.25 or frame relay.

Procedure steps

1 Enter provisioning mode.

```
start prov
```

2 Add the *ServiceTrace* component to the module.

```
add ServiceTrace
```

3 Add the list of receivers that you want to accept a trace call.

The receiver string is a user-defined mnemonic that can contain up to a maximum of eight characters.

```
add ServiceTrace Rcvr/<string>
```

Note: You must provision at least one receiver to operate Trace System. The semantic check fails if no receivers are provisioned.

4 Define the type of receiver interface f or either an X.25 interface, type:.

```
add ServiceTrace Rcvr/<string> X25
```

or for a frame relay interface type:

```
add ServiceTrace Rcvr/<string> Fr
```

5 Set the DNA for the local end of the trace call. This example uses a frame relay receiver interface.

```
set ServiceTrace Rcvr/<string> FR Dna dna <local_dna>
```

6 Optionally, set other attributes under the *Dna* component for the trace call, such as packet size or window size.

7 Optionally, add a *Cug* component for the trace call. Do not provision the *Cug* component if you want to place a non-CUG call to the receiver.

```
add ServiceTrace Rcvr/<string> FR Dna Cug
```

8 Optionally, set the attributes under the *Cug* component for the trace call, such as the interlock code. A DNA can only make calls to other DNAs with the same *CUG interlock code*—that is, to *DNAs* within the same CUG.

9 Set the remote receiver *DNA* for the *DirectCall* (*Dc*) component.

```
set ServiceTrace Rcvr/<string> FR Dc remoteDna
<remote_dna>
```

10 Optionally, set other attributes under the *Dc* component for the trace call, such as the *userData* attribute.

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

```
check prov
```

Correct any errors, and then verify the provisioning changes again.

12 Optionally, save the provisioning changes.

```
save prov
```

13 If you want these changes to take effect immediately, activate and commit the provisioning changes.

```
activate prov
```

```
confirm prov
```

```
commit prov
```

For more information on this step, see NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview*.

14 Exit provisioning mode.

```
end prov
```

Provision a FrAtm receiver

Provision a receiver for FrAtm services.

Procedure steps

1 Enter provisioning mode.

```
start prov
```

2 Add the *ServiceTrace* component to the module.

```
add ServiceTrace
```

3 Add the list of receivers that you want to accept a trace call.

The receiver string is a user-defined mnemonic that can contain up to a maximum of eight characters.

```
add ServiceTrace Rcvr/<string>
```

Note: You must provision at least one receiver to operate Trace System. The semantic check fails if no receivers are provisioned.

4 Define the type of receiver interface.

```
add ServiceTrace Rcvr/<string> FrAtm
```

5 Set the FrAtm NSAP address.

```
set ServiceTrace Rcvr/<string> FrAtm addr <NSAP address>
```

6 Specify the minimum DLCI number.

```
set ServiceTrace Rcvr/<string> FrAtm minimumDlci <dlci number>
```

Note: The DLCI number must be between 16 and 1007.

7 Specify the maximum DLCI number.

```
set ServiceTrace Rcvr/<string> FrAtm maximumDlci <dlci number>
```

Note: The *maximumDlci* must be more than or equal to the *minimumDlci*.

8 Set the Service Category for the FrAtm receiver.

```
set ServiceTrace Rcvr/<string> FrAtm service <ServiceCategory>
```

9 Set the Peak Cell Rate for the FrAtm receiver.

```
set ServiceTrace Rcvr/<string> FrAtm pcr <pcr>
```

10 Specify the maximum frame byte size that the remote receiver can process.

```
set ServiceTrace Rcvr/<string> FrAtm len <max frame size>
```

Note: The available maximum frame byte size is *disabled*, 1 to 4000. The default setting is 2000 bytes. If the frame byte size is set to *disabled*, truncation is not possible.

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

```
check prov
```

Correct any errors, and then verify the provisioning changes again.

12 Optionally, save the provisioning changes.

```
save prov
```

13 If you want these changes to take effect immediately, activate and commit the provisioning changes.

```
activate prov
```

```
confirm prov
```

```
commit prov
```

For more information on this step, see NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview*.

14 Exit provisioning mode.

```
end prov
```

Variable definitions

Variable	Value
<ServiceCategory>	is Ubr, NrtVbr, or RtVbr.

Provision an ATM receiver

Provision a receiver for ATM services.

Procedure steps

1 Enter provisioning mode.

```
start prov
```

2 Add the *ServiceTrace* component to the module.

```
add ServiceTrace
```

3 Add the list of receivers that you want to accept a trace call.

The receiver string is a user-defined mnemonic that can contain up to a maximum of eight characters.

```
add ServiceTrace Rcvr/<string>
```

Note: You must provision at least one receiver to operate Trace Ssystem. The semantic check fails if no receivers are provisioned.

4 Define the type of receiver interface

```
add ServiceTrace Rcvr/<string> ATM
```

5 Set the ATM interface NSAP address.

```
set ServiceTrace Rcvr/<string> Atm addr <NSAPaddress>
```

6 Set the Service Category for the Atm receiver.

```
set ServiceTrace Rcvr/<string> Atm service
<ServiceCategory>
```

7 Set the Peak Cell Rate for the Atm receiver.

```
set ServiceTrace Rcvr/<string> Atm pcr <pcr>
```

8 Specify the maximum frame byte size that the remote receiver can process.

```
set ServiceTrace Rcvr/<string> Atm len <max frame size>
```

Note: The available maximum frame byte size is *disabled*, 1 to 4000. The default setting is 2000 bytes. If the frame byte size is set to *disabled*, truncation is not possible.

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

```
check prov
```

Correct any errors, and then verify the provisioning changes again.

10 Optionally, save the provisioning changes.

```
save prov
```

11 If you want these changes to take effect immediately, activate and commit the provisioning changes.

```
activate prov
```

```
confirm prov
```

```
commit prov
```

For more information on this step, see NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview*.

12 Exit provisioning mode.

```
end prov
```

Variable definitions

Variable	Value
<ServiceCategory>	is Ubr, NrtVbr, or RtVbr.

Provision the trace agent

Provision the trace agent by adding the *ServiceTrace* component that resides under the access service component. Your support group can provide you with a script to provision the *ServiceTrace* component. See NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview* for information on contacting your support group.

If you do not want to trace a particular service, do not provision the *ServiceTrace* component under that access service.

Procedure steps

1. Enter provisioning mode.

   ```
   start prov
   ```

2. Add the *ServiceTrace* component to each access service that will support Trace System.

   ```
   add <service> ServiceTrace
   ```

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

   ```
   check prov
   ```

   Correct any errors, and then verify the provisioning changes again.

4. Optionally, save the provisioning changes.

   ```
   save prov
   ```

5. If you want these changes to take effect immediately, activate and commit the provisioning changes.

   ```
   activate prov
   ```

   ```
   confirm prov
   ```

   ```
   commit prov
   ```

   For more information on this step, see NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview*.

6. Exit provisioning mode.

   ```
   end prov
   ```

Variable definitions

Variable	Value
<service>	is FrUni/n, FrNni/n, AtmIf/n [Vpt/m] Uni, AtmIf/n [Vpt/m] Iisp, AtmIf/n [Vpt/m] Pnni, or AtmIf/n [Vpt/m] Aini.

Remove the trace agent

If required, remove the trace agent from a service

Procedure steps

1 Enter provisioning mode.

```
start prov
```

2 Remove the *ServiceTrace* component for each access service that supports Trace System.

```
delete <service> ServiceTrace
```

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

```
check prov
```

Correct any errors, and then verify the provisioning changes again.

4 Optionally, save the provisioning changes.

```
save prov
```

5 If you want these changes to take effect immediately, activate and commit the provisioning changes.

```
activate prov
```

```
confirm prov
```

```
commit prov
```

For more information on this step, see NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview*.

6 Exit provisioning mode.

```
end prov
```

Variable definitions

Variable	Value
<service>	<service> is FrUni/n, FrNni/n, AtmIf/n [Vpt/m] Uni, AtmIf/n [Vpt/m] Iisp, AtmIf/n [Vpt/m] Pnni, or AtmIf/n [Vpt/m] Aini.

Remove the Trace System

If not required, remove the Trace System feature from a module.

Procedure steps

1 Enter provisioning mode.

```
start prov
```

2 Remove the trace feature from the feature list under the *LogicalProcessorType* component for all required services.

```
set sw lpt/<lpt> fl ~frameRelayUniTrace
```

or

```
set sw lpt/<lpt> fl ~frameRelayNniTrace
```

or

```
set sw lpt/<lpt> fl ~atmUniTrace
```

or

```
set sw lpt/<lpt> fl ~atmIispTrace
```

or

```
set sw lpt/<lpt> fl ~atmPnniTrace
```

or

```
set sw lpt/<lpt> fl ~atmAiniTrace
```

3 Remove the receiver feature from the feature list under the *LogicalProcessorType* component for each access service.

```
set sw lpt/<lpt> fl ~x25TraceRcvr
```

or

```
set sw lpt/<lpt> fl ~frTraceRcvr
```

or

```
set sw lpt/<lpt> fl ~atmTraceRcvr
```

or

```
set sw lpt/<lpt> fl ~frAtmTraceRcvr
```

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

```
check prov
```

Correct any errors, and then verify the provisioning changes again.

5 Optionally, save the provisioning changes.

```
save prov
```

6 If you want these changes to take effect immediately, activate and commit the provisioning changes.

```
activate prov
```

```
confirm prov
```

```
commit prov
```

Note: The function processor (FP) reboots once you activate the changes. When you remove the last LPT, the CP reboots.

For more information on this step, see NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview*.

7 Exit provisioning mode.

```
end prov
```

Chapter 2
Monitoring Service Trace sessions

Monitor service trace sessions to determine whether the sessions are operating with expected parameters.

- "Prerequisites to monitoring trace sessions" (page 37)
- "Monitoring service trace task flow" (page 37)

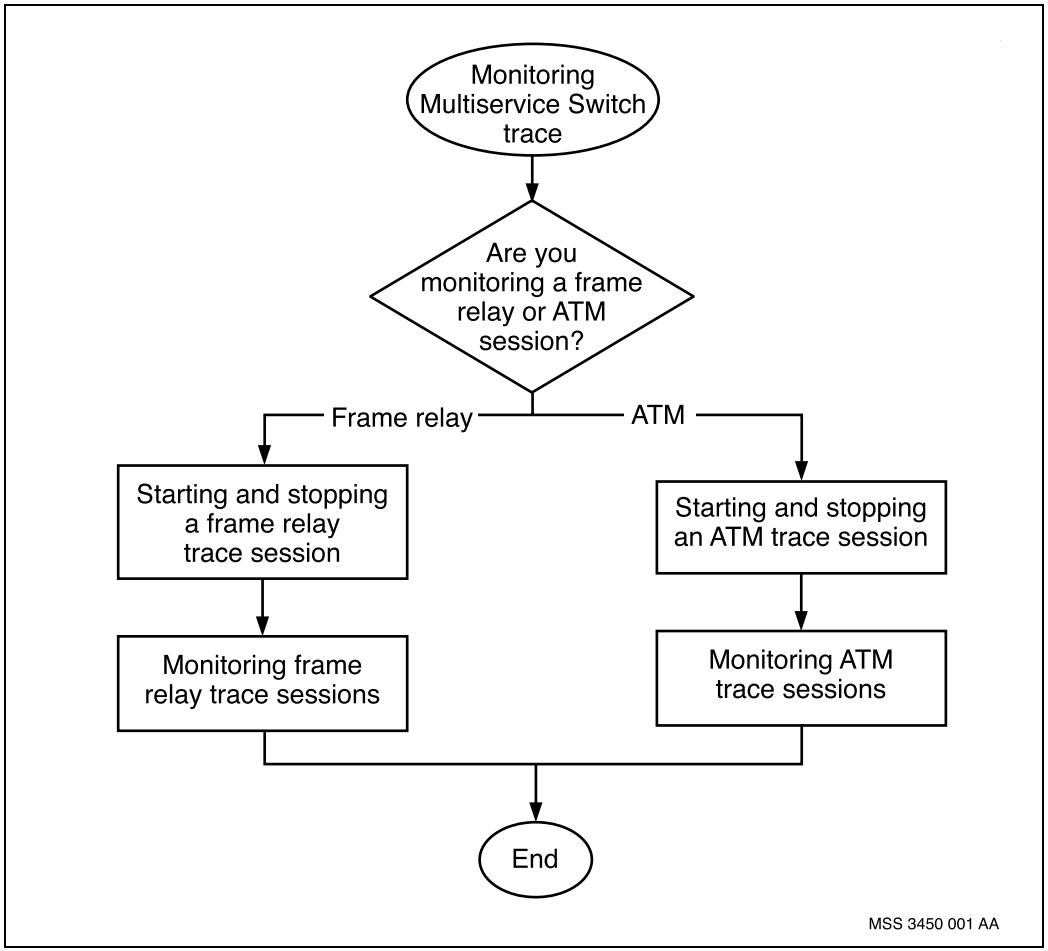
Prerequisites to monitoring trace sessions

- If you are unfamiliar with using Passport trace, see "Understanding the Trace System" (page 57).

Monitoring service trace task flow

This task flow shows you the sequence of procedures you perform to monitor service trace. To link to any procedure, go to "Task flow navigation" (page 38).

Figure 2
Monitoring service trace task flow



Task flow navigation

- “Starting and stopping a frame relay trace session” (page 39)
- “Starting and stopping and ATM trace session” (page 41)
- “Monitoring frame relay trace sessions” (page 42)
- “Monitoring ATM trace sessions” (page 43)

Starting and stopping a frame relay trace session

Start or stop a trace session for frame relay services.

Procedure steps

1 Set the receiver for the traced data.

```
set FrUni/10 ServiceTrace Rcvr <rcvr_string>
```

2 Optionally, set the trace filter options to improve the utilization of bandwidth on the trace VC.

Note: You can add filters before or during a trace session.

- specific DLCI frames

```
set FrUni/10 ServiceTrace Filter dlci 30
```

- only LMI frames

```
set FrUni/10 ServiceTrace Filter type !lmi
```

- direction

```
set FrUni/10 ServiceTrace Filter dir !egress
```

- remove bad frames

```
set FrUni/10 ServiceTrace Filter type ~badFrames
```

- truncate frames

```
set FrUni/10 ServiceTrace Filter len 15
```

Note: When n=*disabled* there is no truncation.

3 Optionally, change the duration of the trace session and the size of the trace queue.

```
set FrUni/10 ServiceTrace duration 5
```

Note: n=0 implies an infinite duration.

```
set FrUni/10 ServiceTrace queue 100
```

4 Start the trace session.

```
start FrUni/10 ServiceTrace
```

5 Stop a trace session.

```
stop FrUni/10 ServiceTrace
```

Variable definitions

Variable	Value
<rcvr_string>	is the name of an X.25, frame relay, or ATM receiver.

Starting and stopping and ATM trace session

Start or stop a trace session for ATM services.

Procedure steps

1 Set the receiver for the traced data.

```
set AtmIf/81 Uni ServiceTrace Rcvr <rcvr_string>
```

2 Optionally, change the duration of the trace session and the size of the trace queue.

```
set AtmIf/81 Uni ServiceTrace duration 5
```

Note: n=0 implies an infinite duration.

```
set AtmIf/81 Uni ServiceTrace queue 100
```

3 Start the trace session.

```
start AtmIf/81 Uni ServiceTrace
```

4 Stop the trace session.

```
stop AtmIf/81 Uni ServiceTrace
```

Variable definitions

Variable	Value
<rcvr_string>	is the name of a FrAtm or ATM receiver.

Monitoring frame relay trace sessions

Monitor trace sessions for frame relay services.

Procedure steps

1. Display all active traces on a module.

   ```
   display ServiceTrace Session/*
   ```

2. List all trace receivers by their mnemonics.

   ```
   list ServiceTrace Rcvr/*
   ```

3. Display a trace session performed on a particular service.

   ```
   display FrUni/10 ServiceTrace
   ```

4. Display the trace filters that are set on a particular service.

   ```
   display FrUni/10 ServiceTrace Filter
   ```

5. Display the connection information about a trace session.

   ```
   display ServiceTrace Session/1 <connection>
   ```

6. Display the provisioning data of a receiver.

   ```
   display -p ServiceTrace Rcvr/receiver1 <rcvr_type>*
   ```

Variable definitions

Variable	Value
<connection>	is an X25 Vc, FR Vc, or Atm AtmConnection.
<rcvr_type>	is X25, FR, or Atm.

Monitoring ATM trace sessions

Monitor trace session for ATM services.

Procedure steps

1. Display the ATM trace session.

   ```
   display AtmIf/81 Uni ServiceTrace
   ```

2. List the type of trace connection, FrAtm or ATM, used in the session.

   ```
   list ServiceTrace Session/2
   ```

3. For a FrAtm connection, display which DLCI is being used by the connection.

   ```
   display ServiceTrace Session/2 FrAtm activeDlci
   ```

4. Find the next hop of a trace connection.

   ```
   display ServiceTrace Session/2 Atm AtmCon nextHop
   ```

   or

   ```
   display ServiceTrace Session/2 FrAtm AtmCon nextHop
   ```

5. Display the operational data of the trace connection, according to the output from step 4.

   ```
   display -o AtmIf/80 Vcc/0.128
   ```

   or

   ```
   display -o AtmIf/80 Vpt/1 Vcc/33
   ```

   or

   ```
   display -o FrAtm/10 Dlci/200 Siwf
   ```

Chapter 3
Troubleshooting

This section contains the following information to help you resolve problems you may encounter when using Nortel Networks Multiservice Switch Trace System (TS).

Alarms

Nortel Networks Multiservice Switch alarms occur in the following instances:

- A message alarm occurs if you remove the CP *ServiceTrace* component while a trace session is active.
- A message alarm occurs that includes the clear cause and diagnostic if the trace VC terminates abnormally.
- A message alarm occurs when the trace queue reaches 50%, 75%, and 100%.
- A message alarm occurs every 60 minutes while a trace session is active. The alarm reminds the operator that the service performance is affected by the trace session.
- A message alarm occurs and the trace session stops if the duration time limit is reached. The default duration is 60 minutes.

- If the trace call to the receiver fails to connect, you receive a clear cause and diagnostic.
- A software alarm occurs if a trace process detects a bad state, function number, or message.

See NN10600-500 *Nortel Networks Multiservice Switch 6400/7400/15000/20000 Alarms Reference* for more information.

Handling problems with an X.25 or frame relay receiver

The following table provides guidelines for troubleshooting an X.25 or frame relay receiver on Trace System.

Table 1
Handling problems with a frame relay receiver

Problems that may occur	Probable causes	Corrective measures
The trace call to the receiver fails to connect. The response to the start command indicates the X.25 clear cause and diagnostic for the failure.	Operator error	Check that the service trace receiver attribute is set to the desired receiver.
	Provisioning error • clear cause 0D	Check that the receiver direct call correctly specifies the remote DNA of the desired receiver.
	• clear cause 0B	Check that the receiver direct call is provisioned in the same closed user group as the X.25 or frame relay port to the receiver.
(Sheet 1 of 3)		

Table 1 (continued)
Handling problems with a frame relay receiver

Problems that may occur	Probable causes	Corrective measures
	• clear cause 03 • clear cause 21	Check that the receiver can either support or negotiate the following facilities: • throughput class = 10 (for X.25 only) • packet size = 2048 • high priority Check that the provisioned receiver interface type correctly specifies the interface of the designated receiver.
	Routing error • clear cause 0D • clear cause 05	Check that the Multiservice Switch module can route calls to the receiver. Check that the path to the receiver is enabled (Multiservice Switch trunks, DPN gateway, network links).
	• clear cause 09	Check that the X.25 or frame relay port to the receiver is enabled.
	Engineering error • clear cause 05	Check that the traced FP message blocks are not congested.
(Sheet 2 of 3)		

Table 1 (continued)
Handling problems with a frame relay receiver

Problems that may occur	Probable causes	Corrective measures
	Receiver error • clear cause 00 • clear cause 11	Consult the table “Frame relay and X.25 diagnostic codes” (page 49) for interpretation of the diagnostic code reported for the failure.
		Check that the desired receiver is operational and listening for an incoming call. Consult receiver-specific documentation.
		Check that the receiver can accommodate error frames.
The trace call to the receiver clears unexpectedly. Alarm 7043 0005 contains the clear cause and diagnostic for the failure.	Routing error • clear cause 0D • clear cause 05	Check that the path to the receiver is enabled (Multiservice Switch trunks, DPN gateway, network links).
	• clear cause 09	Check that the X.25 or frame relay port to the receiver is enabled.
	Engineering error • clear cause 05	Check that the traced FP message blocks are not congested.
	Receiver error • clear cause 00 • clear cause 11	Consult the table “Frame relay and X.25 diagnostic codes” (page 49) for interpretation of the diagnostic code reported for the failure.
		Check that the desired receiver is operational. Consult receiver specific documentation.
The datascope does not display traced data.	Operator error	The link speed is limited to 64K if an RS-232 link connects the datascope to the PC.

(Sheet 3 of 3)

Frame relay and X.25 diagnostic codes

The following table lists frame relay and X.25 diagnostic codes and related descriptions.

Table 2
Frame relay and X.25 diagnostic codes

Diagnostic code (hex)	Diagnostics description
00	NO ADDITIONAL INFORMATION
01	invalid Ps
02	invalid Pr
1X	PACKET TYPE INVALID
20	PACKET NOT ALLOWED
21	unidentifiable packet
22	call on one-way logical channel
23	invalid packet type on a permanent virtual circuit
24	packet on unassigned logical channel
25	reject not subscribed to
26	packet too short
27	packet too long
28	invalid general format identifier
29	restart or registration packet with nonzero in bits 1 to 4 of octet 1, or bits 1 to 8 of octet 2
2A	packet type not compatible with facility
2B	unauthorized interrupt confirmation
2C	unauthorized interrupt
2D	unauthorized reject
30	TIME EXPIRED
31	for incoming call

(Sheet 1 of 5)

Table 2 (continued)
Frame relay and X.25 diagnostic codes

Diagnostic code (hex)	Diagnostics description
32	for clear indication
33	for reset indication
34	for restart indication
40	CALL SET UP, CALL CLEARING OR REGISTRATION PROBLEM
41	facility registration code not allowed
42	facility parameter not allowed
43	invalid called address
44	invalid calling address
45	invalid facility/registration length
46	incoming call barred
47	no logical channel available
48	call collision
49	duplicate facility requested
4A	bad address length
4B	bad facility length
4C	facility not provided when expected
4D	invalid CCITT-specified DTE facility
50	MISCELLANEOUS
51	improper cause code from DTE
52	not aligned octet
53	inconsistent Q bit setting
54	invalid Nui
61	Dnic unsupported
62	Tnic mismatch

(Sheet 2 of 5)

Table 2 (continued)
Frame relay and X.25 diagnostic codes

Diagnostic code (hex)	Diagnostics description
64	bad utility parameter
65	bad utility length
67	M bit error
70	INTERNATIONAL PROBLEM
71	remote network problem
72	international protocol problem
73	international link out of order
74	international link busy
75	transit network facility problem
76	remote network facility problem
77	international routing problem
78	temporary routing problem
79	unknown called Dnic
7A	international link refused
81	frame congestion
82	invalid clear cause
83	incorrect packet size
87	operator terminated
8B	no source address
8C	bad source address
8D	link disconnect
8F	level 3 idle probe timeout
91	destination address supplied for direct call
96	subnet interrupt request error

(Sheet 3 of 5)

Table 2 (continued)
Frame relay and X.25 diagnostic codes

Diagnostic code (hex)	Diagnostics description
97	subnet interrupt confirmation error
98	restricted fast select calls only allowed
99	incompatible pvc
9A	local window negotiation error
9B	mandatory fields in call request absent
9E	incomplete field in clear packet
9F	illegal throughput class
A0	hunt group not updated
A1	hunt group unavailable
A2	hunt group disallowed
A3	hunt group Dna insertion error
A4	hunt group Dna insertion error
A8	utility marker missing
A9	block same service
AA	routing tables unavailable
AB	Nui required
AC	Nui required for fast select calls
B4	call threshold count exceeded
B5	unsuccessful call threshold count exceeded
B8	database unavailable
B9	input / output collision
C0	invalid backup Dna
C1	invalid protocol id
C2	invalid user data

(Sheet 4 of 5)

Table 2 (continued)
Frame relay and X.25 diagnostic codes

Diagnostic code (hex)	Diagnostics description
C3	no RFS signal on dial-out modem
C4	bad dial-out modem
C5	bad CFI frame on dial-out modem
C8	dial-out connection established
C9	dial-out port connecting
F0	higher layer initialized
F9	invalid protocol id in call user data

(Sheet 5 of 5)

Handling problems with an ATM or FrAtm receiver

The following table provides guidelines for troubleshooting an ATM or FrAtm receiver using Trace System.

Table 3
Handling problems with an ATM or FrAtm receiver

Problems that may occur	Probable causes	Corrective measures
The trace call to the receiver fails to connect. The response to the start command indicates the ATM clear cause and diagnostic for the failure.	Operator error	Check that the service trace receiver attribute is set to the desired receiver.
	Provisioning error • clear cause 03	Check that the provisioned calledAddress is set to the correct value for the remote ATM or FrAtm interface.

(Sheet 1 of 4)

Table 3 (continued)
Handling problems with an ATM or FrAtm receiver

Problems that may occur	Probable causes	Corrective measures
		If the serviceCategory is rtVBR or nrtVBR, change it to UBR and try connecting again. If the connection is established this time, the PCR attribute was too big, resulting in the ATM network being unable to find any route that will satisfy the connection request. Restore the old serviceCategory value, reduce the PCR attribute to its proper value, and try connecting again. Check the connectivity of the ATM network.
	• clear cause 11	The called user is busy. Check the setting of the remote ATM or FrAtm interface. There may be insufficient VCC on the remote receiver. When using a FrAtm receiver, check that the provisioned DLCI range for the node matches the settings of the remote FrAtm interface and that all the DLCIs in the FrAtm interface are active and busy.
	• clear cause 12	Connect timeout occurs. Check the remote ATM or FrAtm interface setting. There may be insufficient VCC on the remote receiver. When using a FrAtm receiver, check that the provisioned DLCI range for the node matches the settings of the remote FrAtm interface and that all the DLCIs in the FrAtm interface are active and busy.
(Sheet 2 of 4)		

Table 3 (continued)
Handling problems with an ATM or FrAtm receiver

Problems that may occur	Probable causes	Corrective measures
	• clear cause 15	The called party rejects the call. Check the remote ATM or FrAtm interface setting. There may be insufficient VCC on the remote receiver. When using a FrAtm receiver, check that the provisioned DLCI range for the node matches the settings of the remote FrAtm interface and that all the DLCIs in the FrAtm interface are active and busy.
	• clear cause 2F	Node or network overload occurs. Check the remote ATM or FrAtm interface setting. There may be insufficient VCC on the remote receiver. If the problem persists, report to GTS.
	• clear cause 23	The requested VCC is unavailable. Check the remote ATM or FrAtm interface setting. There may be insufficient VCC on the remote interface.
	• clear cause 1B	Check the remote ATM interface status. With a FrAtm receiver, the A-bit of frame relay PVC is down. Check whether the driver of the frame relay card on the workstation has been started.
(Sheet 3 of 4)		

Table 3 (continued)
Handling problems with an ATM or FrAtm receiver

Problems that may occur	Probable causes	Corrective measures
The trace call to the receiver clears unexpectedly. Alarm 7043 0005 contains the clear cause and diagnostic for the failure.	• clear cause 10	The connection is normally released by the remote trace receiver.
	• clear cause 1B	Check the remote ATM interface status. With a FrAtm receiver, the A-bit of frame relay PVC is down. This would normally be released by the remote trace receiver. The frame relay card driver on the workstation may have been stopped.
(Sheet 4 of 4)		

Note: For all other clear cause values and the meanings of diagnostic codes, see NN10600-715 *Nortel Networks Multiservice Switch 7400/ 15000/20000 ATM Fault and Performance Management*.

Chapter 4
Understanding the Trace System

See the following sections for an overview of the Nortel Networks Multiservice Switch Trace System (TS):

What is the Trace System

The Nortel Networks Multiservice Switch Trace System (TS) is a diagnostic tool that allows you to troubleshoot the network and to view the information from a centralized and remote location, in real time.

TS copies data on the traced port and appends a trace header to the copied data. TS sends the traced data to a remote receiver over a virtual circuit (VC). There are four types of receivers:

- "X.25 receiver" (page 58)
- "Frame relay receiver" (page 59)
- "FrAtm receiver" (page 60)
- "ATM receiver" (page 61)

Multiple trace sessions calling multiple trace receivers can be simultaneously active within the same network, module, and function processor.

TS is a user-controlled tool. The user issues the commands to start and stop the trace session, defines the types of data to trace, and determines the destination for the traced data.

Applications and services are categorized as hot, warm, or cold standby based on their sparing behavior. For Multiservice Switch, TS is categorized as a warm standby application when provisioned on a spare LP. Even though it behaves like a cold standby application, TS does not cause the spare LP to reboot when switchover occurs.

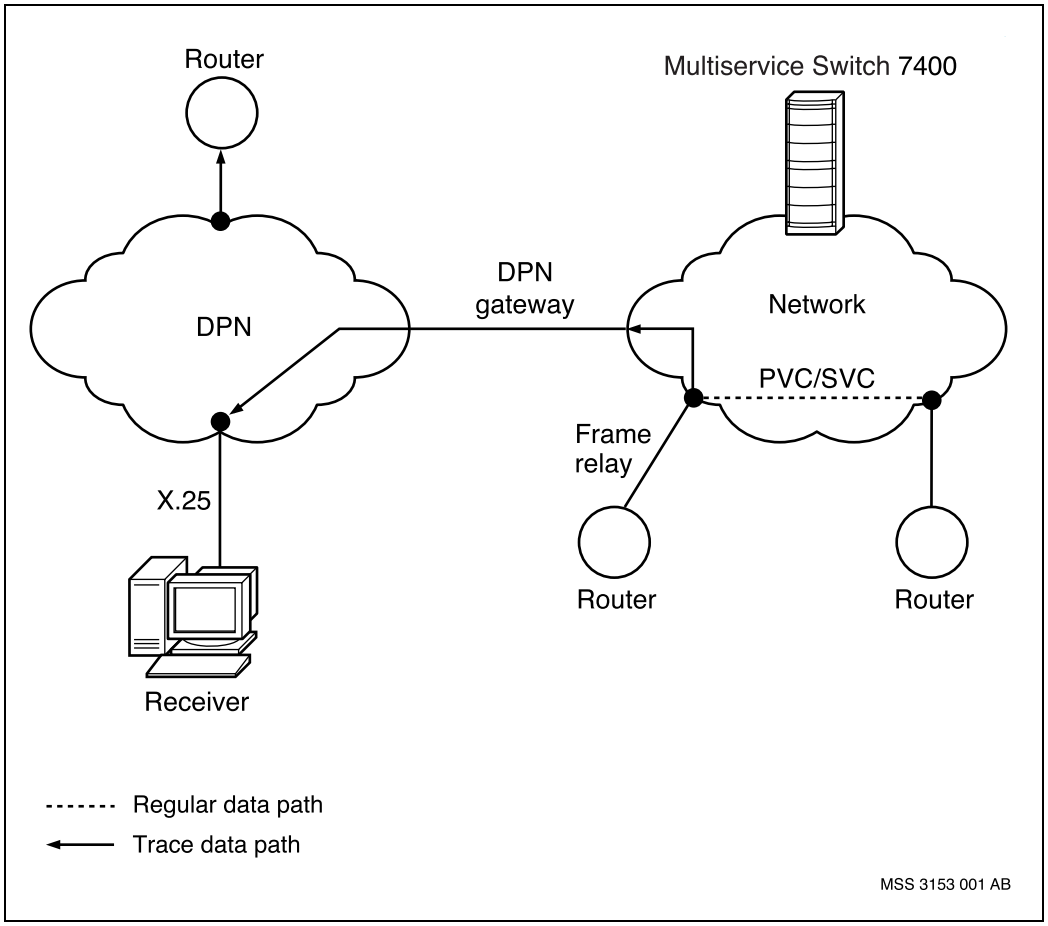
Cold standby features increase service outages during an equipment switchover. During an FP switchover, TS stops tracing data and disconnects from the remote receiver, but all the other services in the same FP are not impacted by TS.

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

X.25 receiver

This receiver can be connected to a DPN module through an X.25 interface on a network with a Nortel Networks Multiservice Switch 7400 series device. The figure "Multiservice Switch 7400 trace data path to an X.25 receiver" (page 59) shows the data path of a trace from a Nortel Networks Multiservice Switch service to an X.25 receiver.

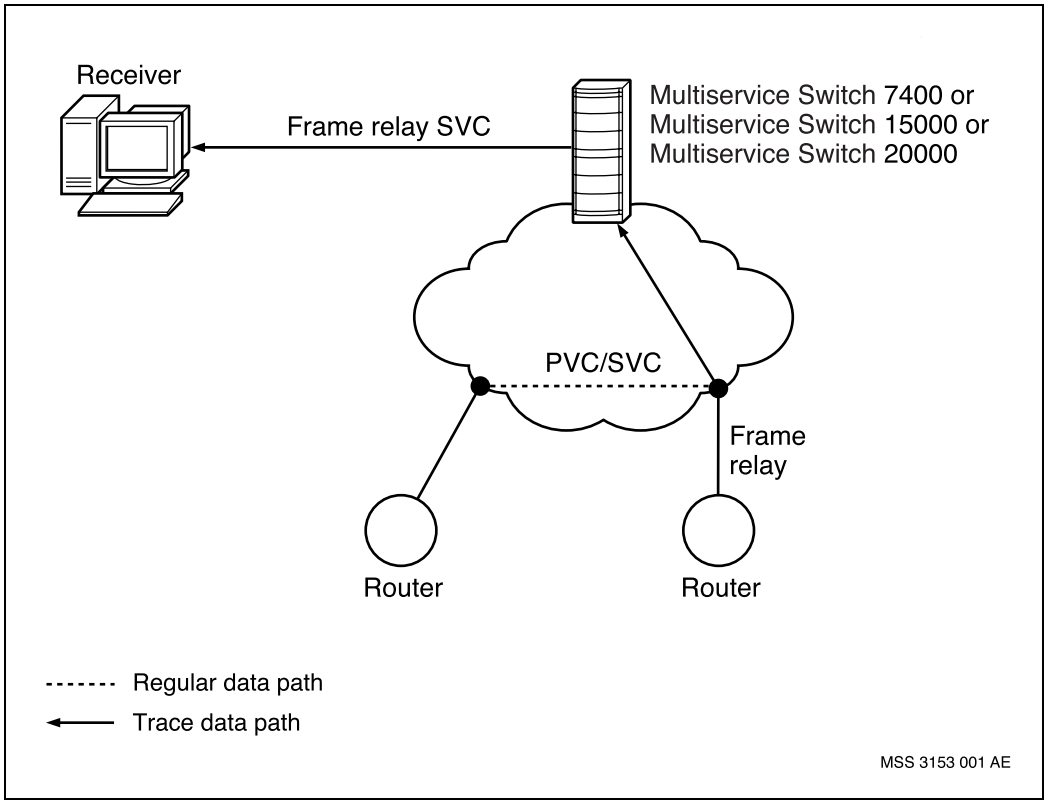
Figure 3
Multiservice Switch 7400 trace data path to an X.25 receiver



Frame relay receiver

This receiver can be connected directly through a frame relay SVC interface. The figure "Multiservice Switch trace data path to a frame relay receiver" (page 60) shows the data path of a trace from a Nortel Networks Multiservice Switch service to a frame relay receiver.

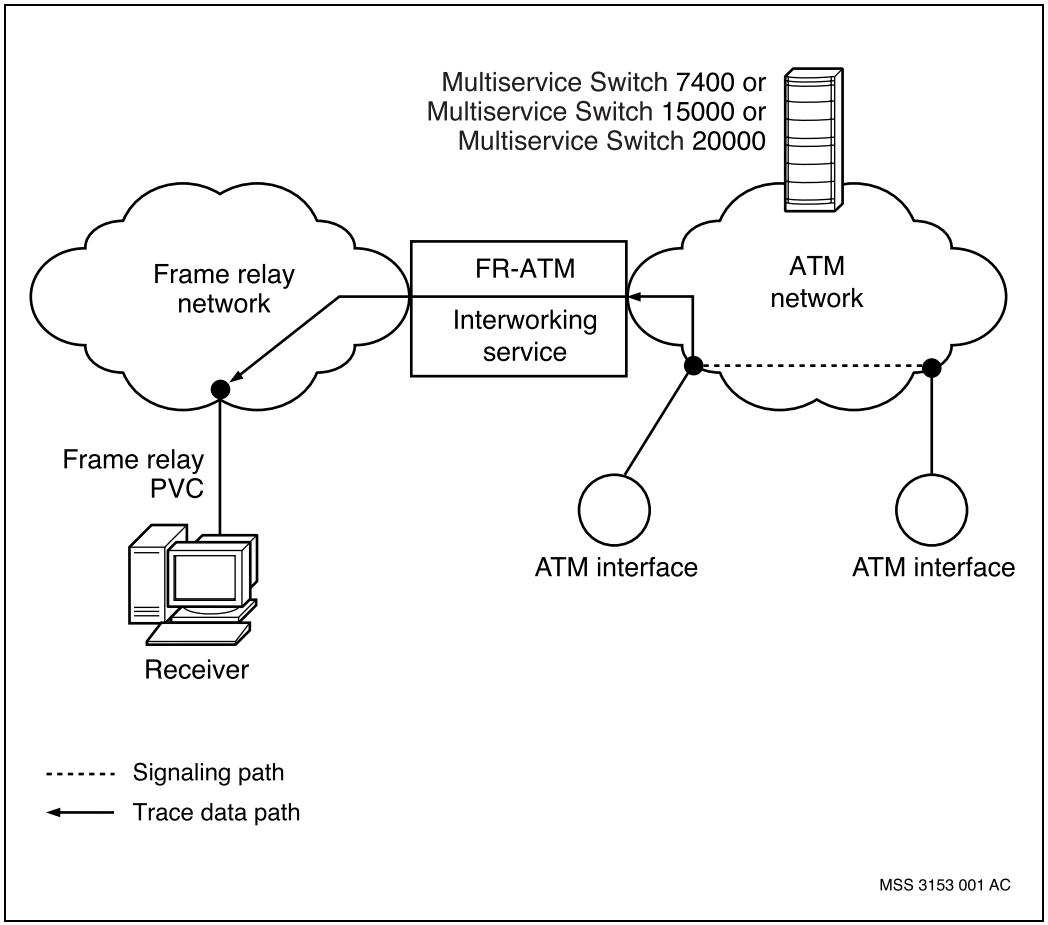
Figure 4
Multiservice Switch trace data path to a frame relay receiver



FrAtm receiver

This receiver can be connected to an existing frame relay network through a frame relay PVC interface. The figure "Multiservice Switch trace data path to a frame relay receiver" (page 60) shows the data path of a trace from a Nortel Networks Multiservice Switch service to a FrAtm receiver.

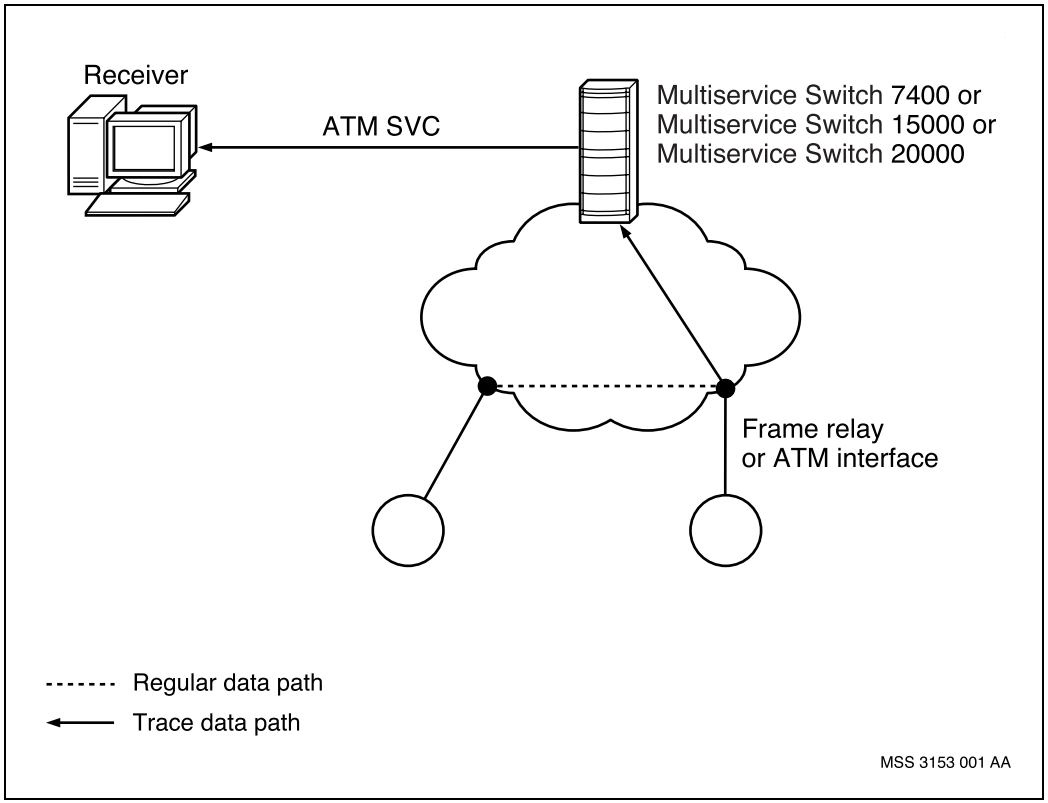
Figure 5
Multiservice Switch trace data path to a FrAtm receiver



ATM receiver

This receiver can be connected through an ATM SVC interface. The figure "Multiservice Switch trace data path to an ATM receiver" (page 62) shows the data path of a trace session from a Nortel Networks Multiservice Switch ATM signaling channel to an ATM receiver.

Figure 6
Multiservice Switch trace data path to an ATM receiver

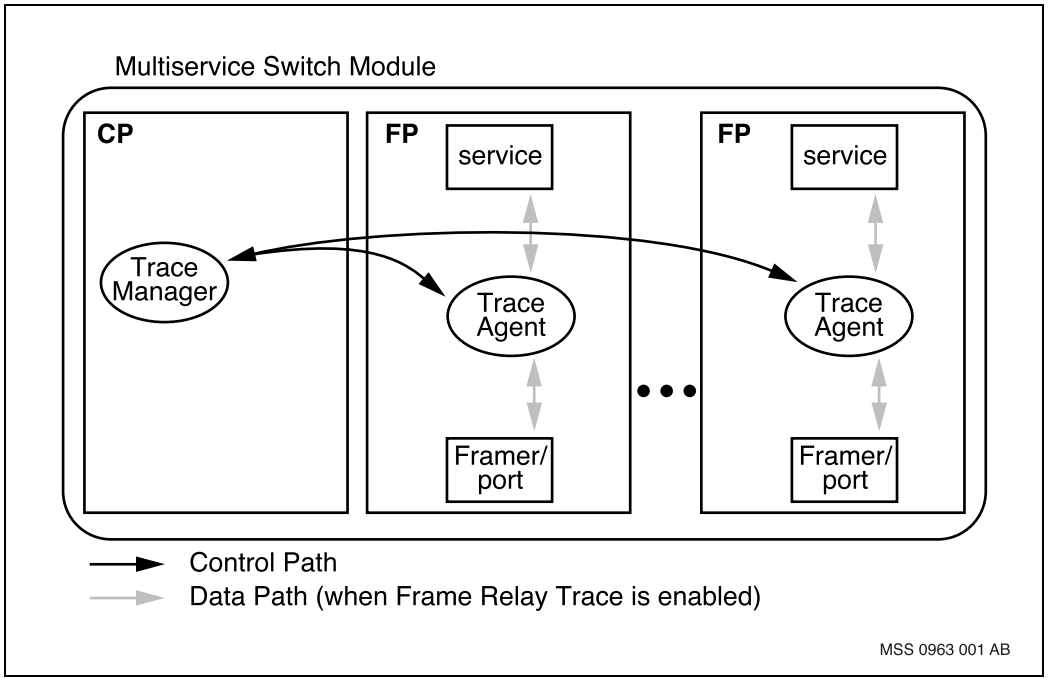


Trace System

Trace System (TS) is composed of two trace components, one that acts as the trace manager and one that acts as a trace agent. The figure, "ServiceTrace components in a Multiservice Switch module" (page 63) shows the interaction between the trace manager, trace agent, and traced service on a Nortel Networks Multiservice Switch module. For more information see:

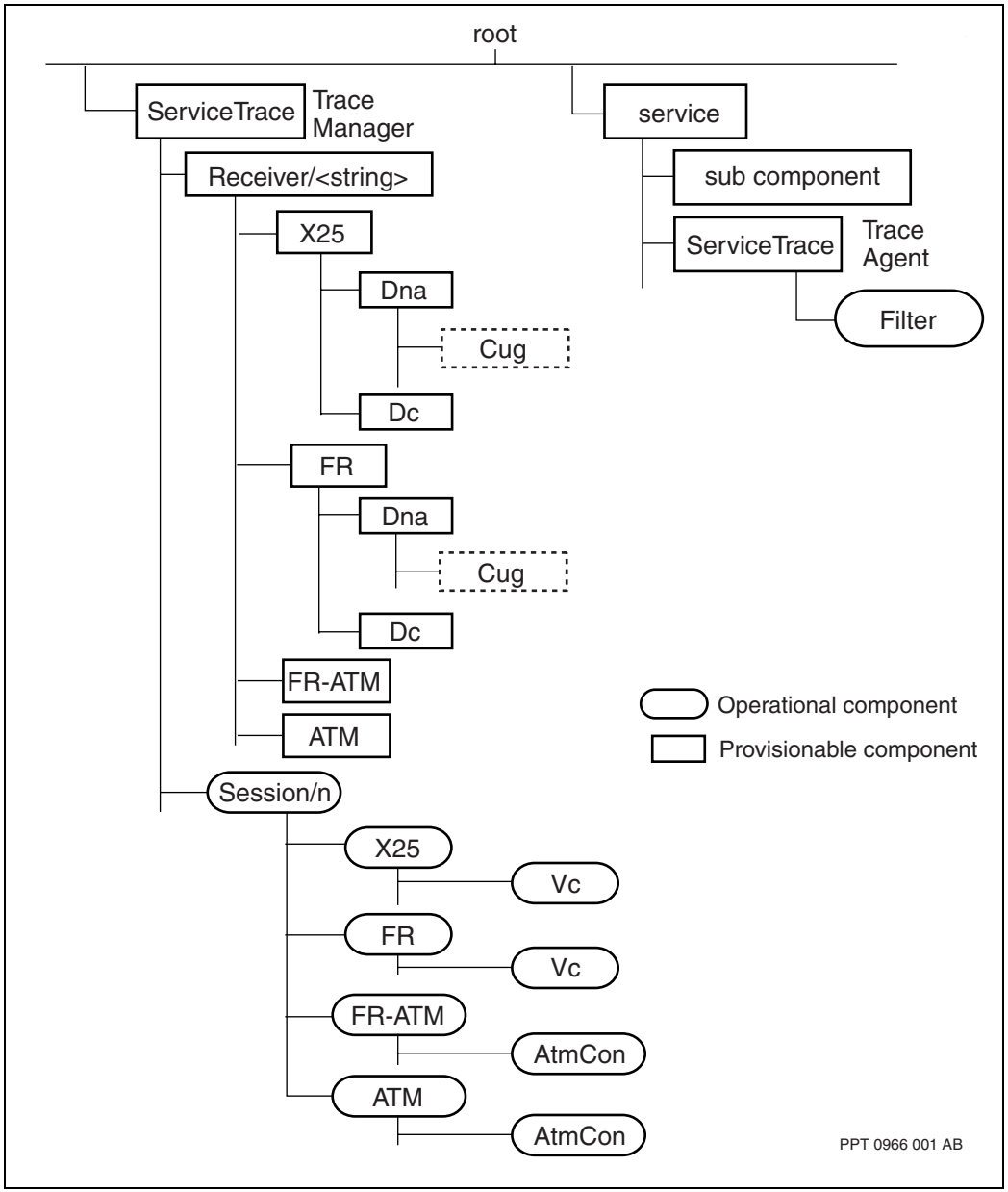
- "Trace manager" (page 65)
- "Trace agent" (page 65)
- "Security" (page 68)
- "Supported services" (page 68)

Figure 7
ServiceTrace components in a Multiservice Switch module



The figure "ServiceTrace component hierarchy" (page 64) identifies the components TS uses. To view the complete component hierarchy and for detailed information on components and attributes, see NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*.

Figure 8
ServiceTrace component hierarchy



Trace manager

The trace manager is the *ServiceTrace* component that is provisioned directly under the Root. It is not associated with a particular service. The trace manager resides on the control processor (CP), and is responsible for the control path between itself and each trace agent associated with it. The trace manager defines the attributes needed to provision the receiver list.

The trace manager contains two subcomponents: the receiver list and the session list. The receiver list is the set of attributes that provides the direct call to the centralized, troubleshooting locations where each receiver resides. The user provisions this list.

The session list is the set of attributes that identifies each currently active trace session. The session list provides a single point of contact for all active traces on the module. This list is an operational component.

When CP switchover occurs, there is no affect on existing trace sessions. The existing trace sessions reregister to the new trace manager, on the new CP, as soon as a switchover is completed. No new trace sessions can be established until the new CP is active.

When FP switchover occurs, all trace sessions on the failed FP stop and the trace manager removes all the data for those sessions. When FP switchover is completed, the trace manager does not reestablish the trace sessions. You must restart the trace session. For information on starting a trace session, see "Monitoring Service Trace sessions" (page 37).

Trace agent

The trace agent is a subcomponent of the access service that Trace System (TS) will trace. Provision the trace agent *ServiceTrace* component under the access service to which it belongs. The trace agent resides on the function processor (FP). You must provision a separate trace agent for each service component on the module that will support TS.

Your support group can provide you with a script to provision the *ServiceTrace* component. See NN10600-030 *Nortel Networks Multiservice Switch 7400/15000/20000 Overview* for information on contacting your support group.

The trace agent on a frame relay session is responsible for the actual tracing of the service. The trace agent

1 requests a trace session from the trace manager

2 establishes a call to the receiver

3 dynamically binds itself into the data path

4 filters the data

5 encapsulates the data in a trace header

6 queues it to be transmitted to the receiver

7 unbinds from the service data path when the trace session terminates

Note: If no trace sessions are running, the normal data path flow is unaffected by TS.

All ATM services ONLY support tracing of the signaling channel.

The trace agent also maintains the VC connection to the receiver. It informs the module's trace manager when an operator terminates a trace session or when a session terminates abnormally. This can occur if the receiver terminates the connection.

You can apply filters to narrow the scope of traced data. Filters improve the overall efficiency of traces by decreasing the number of data packets that are traced. This reduction improves the utilization of the trace VC's available bandwidth.

Filters are an operational subcomponent of the trace agent's *ServiceTrace* component and are specific to the service under which the trace agent is provisioned.

All frames passing through the ATM signaling channel are traced and transmitted to the remote receiver directly through the filter. If the frame size is larger than the limitations specified in the receiver data, the frame is truncated.

Receivers

A receiver displays the data frames in a format that is similar to a datascope display.

The receiver must be able to

- decode the information frame and trace data headers
- remove the trace data header from the traced frame
- use the trace data header to display the data to the network operator in a format that is similar to a data analyzer display

An X.25 receiver can be any device that connects to an X.25 line and accepts an incoming trace call.

A frame relay receiver can be any device that can connect to a frame relay SVC interface and accept an incoming trace call without the need for TCP/IP encapsulation of the traced data.

A FrAtm receiver can be any device that can connect to a frame relay PVC interface and accept incoming data.

An ATM receiver can be any device that can terminate the ATM SVC call setup and reassemble the AAL5-encapsulated traced data.

Software compatibility

The Nortel Networks Preside Multiservice Data Manager workstation-based receiver is available with NexusTRACE software developed by Nexus Telecom AG. NexusTRACE is a virtual protocol analyzer that decodes most standard protocols. The workstation receives the data, then decodes and displays it. The data may be stored for further analysis. The header information is displayed along with the traced data. See the NexusTRACE User Manual for more information or visit www.nexus-ag.com.

Note 1: The frame relay trace receiver feature is only supported with V4.0 or later of the NexusTRACE application. See the NexusTRACE User Manual for more information.

Note 2: When the frame relay trace receiver is used, it is possible to experience lock-ups of the trace session in a congested UNIX SunOS environment. If lock-up occurs, the trace session needs to be restarted.

Note 3: The FrAtm or ATM trace receiver feature is only supported with version 7.0 or later of the NexusTRACE application. See the NexusTRACE User Manual for more information.

The trace headers are part of a published, open interface. Customers can develop their own receivers using the information provided in this document.

Security

For security reasons you must provision Trace System (TS) on each Nortel Networks Multiservice Switch module and each line that will support it.

You need to provision TS on the control processor (CP) and the service you want to trace. This prevents a customer who owns a single service, but does not own the module on which it resides, from starting a trace session without the module owner's consent.

Supported services

The following frame relay services support Nortel Networks Multiservice Switch Trace System:

- frame relay UNI
  - PVC
  - SVC
- frame relay NNI
  - PVC
  - SVC

Multiservice Switch frame relay DTE does not support Trace System.

Note: Provision one trace agent component for each frame relay component. You do not need to provision the trace agent for each DLCI.

The following options are available to filter traced frame relay data:

- no filtering (default)

  provides no filtering options. TS traces all frames on the link untruncated, including frames to and from all DLCIs, LMI frames, and error frames.

- specific DLCI frames

  traces only frames that are travelling to or from the specified DLCI

- only LMI frames
- direction

  filter the trace so that only frames going to the link (egress) or frames coming from the link (ingress) are traced

- remove bad frames

  filters error frames out of the data

- truncate frames

  truncates traced frames to improve the bandwidth utilization of the trace VC

The following ATM signaling services support Trace System:

- UNI, IISP, PNNI, and AINI

SNMP management

You can manage Nortel Networks Multiservice Switch Trace System (TS) with SNMP, using a Multiservice Switch Enterprise MIB. TS does not support IF Entry registration.

For more information, see NN10600-300 *Nortel Networks Multiservice Switch 7400/15000/20000 Operations: SNMP*.

Performing trace sessions

For more details on Nortel Networks Multiservice Switch Trace System, see the following sections:

- "Call establishment" (page 70)
- "Tracing data" (page 73)
- "Good and bad frames" (page 76)
- "Data queuing" (page 78)

Call establishment

When you issue a command to start a trace session, the trace agent uses the provisioning data stored in the receiver list to establish a call to the receiver. The trace agent is responsible for maintaining the VC connection associated with the call for the duration of the trace session.

When the call connects, the trace agent sends the information frame to the receiver. The information frame contains the data that allows the receiver to identify the service you are tracing. The information frame always precedes any data Trace System transmits to the receiver.

The figure "Information frame" (page 71) illustrates the location of the fields in the information frame.

> ***Note:*** One bit is reserved in word 2 to differentiate between trace sessions originating from Nortel Networks Multiservice Switch nodes and trace sessions originating from DPN-100 modules. Trace System is compatible with DPN Trace.

See the table "Information frame fields" (page 72) for a detailed explanation of each of the fields in the information frame.

Figure 9
Information frame

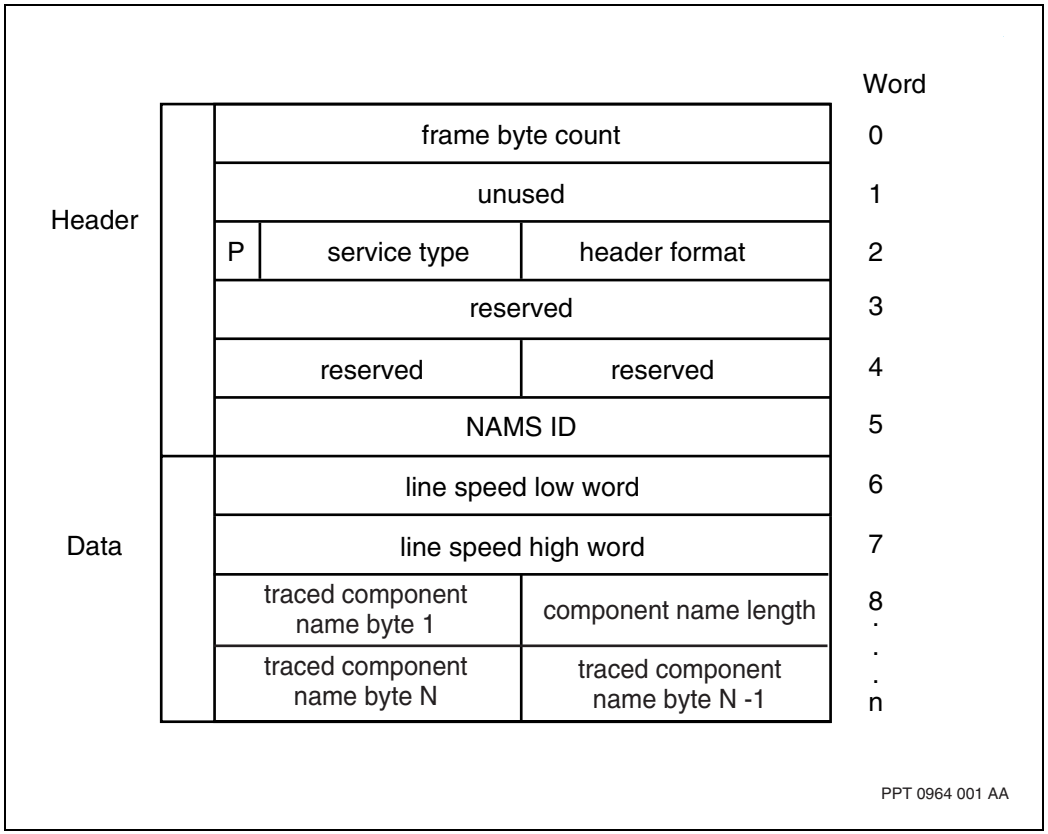


Table 4
Information frame fields

Field name	Description
frame byte count	This field indicates the number of data bytes in the information frame.
P	This field is used to differentiate a Multiservice Switch node originated trace from a DPN-100 originated trace. A value of 1 indicates the trace session is from a Multiservice Switch module. A value of 0 indicates the trace session is from a DPN-100 module.
service type	This field indicates the type of service providing the trace data. See Table 5, “Trace header fields,” (page 74) for service type values.
header format	This field indicates whether or not the trace session includes bad frames. The default value of 1 indicates that the trace session includes bad frames. A value of 0 indicates that TS has filtered bad frames from the traced data.
reserved	The fields in words 3 and 4 are reserved and will be used to provide information about the port interface.
NAMS ID	This field contains the module NAMS ID of the service running TS.
line speed	This field contains the speed of the line you are tracing. The speed is a two word hex value.

(Sheet 1 of 2)

Table 4 (continued)
Information frame fields

Field name	Description
component name length	This field specifies the length of the traced component name. The value is between 0 and 79 and is in the form of, for example, AtmIf/30 Pnni. This field is only available on FR-ATM and ATM receivers.
traced component name	This field specifies the name of the traced component so that the receiver can identify which connection is being traced. This field is only available on FR-ATM and ATM receivers.
(Sheet 2 of 2)	

Tracing data

You can trace frames from the access service once the trace agent sends the information frame to the receiver. The trace agent filters the data and appends a trace header, creating a trace data packet. Each data packet contains only one frame.

The figure "Trace header" (page 74) illustrates the location of the fields in the trace header.

See the table "Trace header fields" (page 74) for an explanation of each of the fields in the trace header.

Figure 10
Trace header

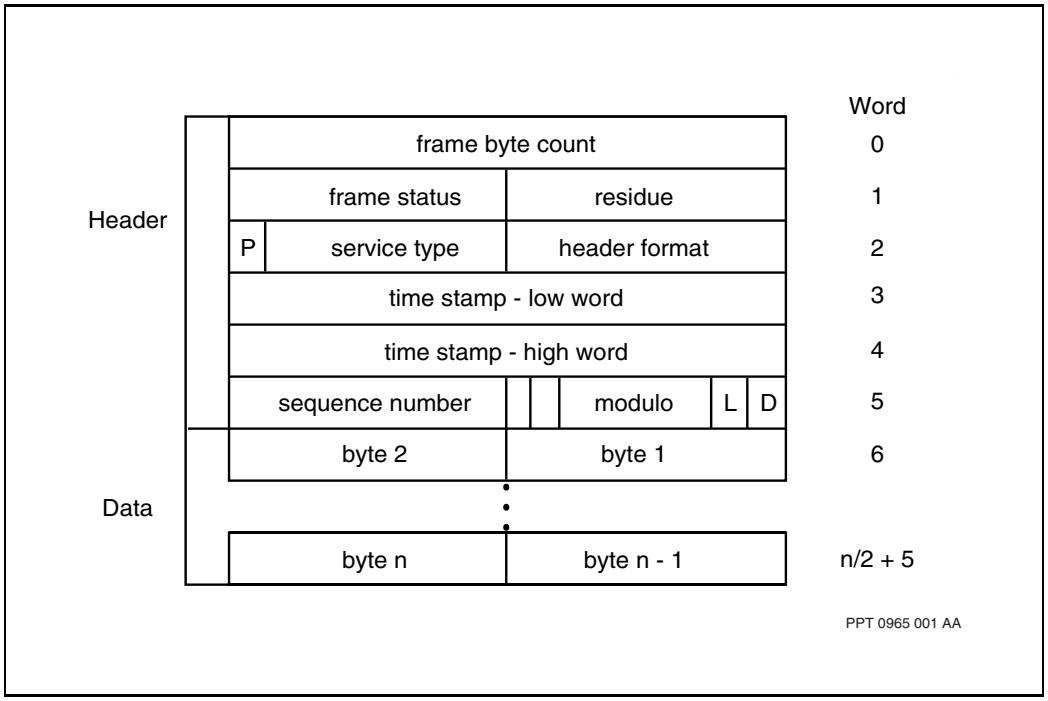


Table 5
Trace header fields

Field name	Description
Frame byte count	This field indicates the actual number of bytes in the trace data packet, excluding the header, before truncation. This field can contain the value zero if TS traces a bad frame and cannot retrieve the actual frame data.
Frame status	This field indicates the type of data TS is tracing. The table “Possible status field events and values” (page 77) lists valid frame status values.
Residue	This field contains the total number of bits and the residue number of bits in the frame.

(Sheet 1 of 3)

Table 5 (continued)
Trace header fields

Field name	Description	
P	This field indicates the source of the trace session. A value of 1 indicates the trace session is from a Multiservice Switch module. A value of 0 indicates the trace session is from a DPN module.	
Service Type	This field indicates the type of service providing the trace data.	
	Values	Description
	H.17	Frame relay
	H.1C	ATM signaling/UNI 3.0
	H.1D	ATM signaling/UNI 3.1
	H.1E	ATM signaling/UNI 4.0
	H.1F	ATM signaling/IISP 1.0 ver UNI 3.0
	H.20	ATM signaling/IISP 1.0 ver UNI 3.1
	H.21	ATM signaling/PNNI 1.0
	H.22	ATM signaling/AINI 1.0
Header format	This field indicates the type of header layout.	
Time stamp	This field contains the time the port running the trace sent or received the event. This two-word value is a 10 milliseconds resolution of the length of time the FP is operational.	
Sequence number	This field contains an 8-bit sequence number and is used by frame relay trace receivers to detect lost frames. X.25 trace receivers can ignore this field since an X.25 connection is reliable.	
Modulo	This field is a four-bit field indicating the frame modulo of the service that is running the trace. The TS receiver uses this field to decode the level 3 data.	
	Field value	Frame modulo
	0	modulo 8
(Sheet 2 of 3)		

Table 5 (continued)
Trace header fields

Field name	Description
	1 modulo 128 single octet control field
	2 modulo 128 double octet control field
L (lost bit)	This field indicates whether trace data packets have been discarded or not. A field value of 1 indicates that trace data packets have been discarded before being sent to the receiver; otherwise, the field value is 0, which indicates that no trace data frames have been discarded. See “Data queuing” (page 78).
D (direction bit)	This field indicates the direction of the event from the service’s perspective. A field value of 0 means the service received the event. A field value of 1 means the service sent the event.
Byte 1 to byte *n*	This field contains the data bytes of the TS data packet.
(Sheet 3 of 3)	

Good and bad frames

The header’s frame status field identifies good and bad frames. The table “Possible status field events and values” (page 77) identifies the frame status value for different trace events. For more information see the following sections:

- “Good frames” (page 77)
- “Bad frames” (page 77)

The following table lists the possible event types and frame status values that appear in the status field of the trace header.

Values for both the Nortel Networks Multiservice Switch Trace System and DPN-100 Trace are included in the table.

Table 6
Possible status field events and values

Traced event	Frame status value
good data frame	H.00
frame underruns	H.01 (DPN only)
modem status change	H.02 (DPN only)
frame non octet aligned	H.03 (Multiservice Switch only)
frame too long	H.04 (Multiservice Switch only)
frame repeated	H.05 (Multiservice Switch only)
frame skipped	H.06 (Multiservice Switch only)
frame abort	H.10
frame overrun	H.20
frame CRC error	H.40
frame card error	H.80 (DPN only)

Good frames

Trace System (TS) traces good frames without the frame cyclic redundancy check (CRC) bytes because the hardware removes the CRC. TS does not trace flags between frames. TS traces the transmit frame before the frame goes out to the link.

Bad frames

Where possible, TS traces a partial or complete bad frame. In certain situations, data is not available to trace. In these situations, the frame status field indicates the type of error, and the frame byte count field contains a value of zero. TS does not trace frame underruns since it traces transmit frames before the frame goes out to the link.

> ***Note:*** ATM signaling trace cannot generate bad frames, so H.00 is the only possible value for this field. During an ATM signaling trace, all received signaling frames are reassembled in the AAL5 layer. If the transmitted frames are damaged, they cannot be reassembled, and will be discarded.

Data queuing

The formatted trace data packets are queued on the service FP until the VC sends them to the trace receiver.

The system sends a message alarm when the queue reaches 50%, 75%, and 100%. If the queue becomes full (reaches 100%), Trace System discards the trace data packets and the sets the lost bit on the last packet in the queue. When the queue recovers to 75%, the trace data packets are queued again and the lost bit clears. As a result, the lost bit indicates the point at which a gap occurs in the traced data.

You can specify the queue for trace data in increments of kbytes, up to a maximum of 100 kbytes. The default queue length is 20 kbytes.

To guarantee that no traced data is lost, the bandwidth for the trace VC must be equal to the sum of the bandwidth the traced line uses in both the transmit and the receive directions.

System capabilities and limitations

The capabilities and limitations of Trace System (TS) include the following:

- You can specify the congestion level threshold at which point trace data is discarded.
- For security purposes, you provision TS on each module and line that supports it.
- TS supports multiple active sessions operating on a module. A maximum of 50 active trace sessions can run simultaneously on a module. Among these, a maximum of 5 ATM or FR-ATM trace connections are permitted per shelf.
- For X.25 and frame relay, the trace direct call to the receiver supports closed user groups (Cug) and user data. See NN10600-900 *Nortel Networks Multiservice Switch 7400/15000/20000 Frame Relay Technology Fundamentals* for information about closed user groups.
- You can specify the queues for trace data up to a maximum of 100 kbytes.
- The amount of data that TS traces is limited by the speed of the path to the receiver, the performance of the receiver, and the size of the trace agent queue.

- When the FP is running at 100% utilization, expect the performance of all applications on the FP to degrade even if the trace is enabled on one application only.
- TS does not trace cyclic redundancy check (CRC) bytes. TS flags a frame with a bad CRC as a bad frame.
- TS does not trace underruns, flags between frames and modem status changes.
- If you unload TS from an FP the FP will reboot. The last FP to unload TS causes the control processor (CP) to reboot. During an FP reboot, active trace sessions on the affected FP and the trace session's operational data are lost.

System recommendations

Use the following recommendations to optimize network performance while using Trace System (TS):

> ***Note:*** If you exceed these recommendations, the FP may become message-block congested or the CPU may exceed 100% utilization when TS is enabled. When this happens, a trace session can stop unexpectedly or fail to establish. If you use the following recommendations, there is no guarantee that you will not lose traced data.

- Perform one trace session on each FP if the traced port has a frame throughput greater than 500 frames per second.
- Make sure the frame throughput of each port does not exceed 100 frames per second if you are simultaneously tracing all ports on an FP.
- Truncate traced frames by filtering if possible. This reduces the volume of traced frames the network needs to transport to the receiver.
- Truncate all frames larger than 256 bytes (excluding ATM signaling trace).
- Do not perform trace sessions on an FP if its CPU utilization is greater than 75%, and the port that you are tracing has a throughput of more than 500 frames per second.
- Do not perform trace sessions on an FP that consistently uses more than 300 kbytes of shared message blocks with a 512 kbyte maximum.

End-to-end system performance

Frame relay service

The end-to-end throughput of Trace System varies, depending on

- the available bandwidth for the traffic
- the subnet windowing mechanism
- the processing power of the receiver

The estimated end-to-end throughput of the trace VC terminating on an X.25 line is

- 200 frames per second with no loss of trace data
- 5000 frames per second with loss of trace data

The estimated end-to-end throughput of the trace VC terminating on a frame relay interface is

- 500 frames per second with no loss of trace data
- 7000 frames per second with loss of trace data

ATM signaling service

The end-to-end throughput of the ATM service on Trace System depends on the available PCR and service category for the traffic, the processing power of the FP, and the type and processing power of the receiver. There is normally no loss of signaling trace data due to the low traffic volume on the signaling channel.

Nortel Networks Multiservice Switch 7400/15000/20000

Operations: Trace System

Release Release 6.1

Copyright © 2004 Nortel Networks.
All Rights Reserved.

NORTEL NETWORKS, the globemark design, the NORTEL NETWORKS corporate logo, DPN and PASSPORT are trademarks of Nortel Networks. NexusTRACE is a trademark of Nexus Telecom AG. UNIX is licensed exclusively through X/Open Company Ltd. VT100 is a trademark of Digital Equipment.

Publication: NN10600-510
Document status: Standard
Document version: 6.1S1
Document date: August 2004
Printed in Canada

NORTEL NETWORKS