The ATM Forum
Technical Committee

Interoperability Test for PNNI
Version 1.0

AF-TEST-CSRA-0111.000

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1 Introduction

This document provides an interoperability abstract test suite for
the Private Network-Network Interface Specification version 1.0
(PNNI v1.0)[1], including the Errata [3]. It belongs to a set of
test documents supplied by the ATM Forum that cover the testing
areas of conformance, performance, and interoperability testing.
The document, "Introduction to ATM Forum Test Specification" [2]
provides an introduction to the different testing areas and should
be consulted prior to using this test suite.

1.1 Scope

This document provides an interoperability abstract test suite for
the PNNI v1.0, including the Errata [3]. It includes sample test
cases that address interoperability in two major areas. These
major areas are routing and signalling. Within these major areas
there are a number of smaller areas. These smaller areas are
based on the protocol separation and the functionality of
switching system subsets (see Annex G of PNNI v1.0). Terms (e.g.,
SS_M, SS_B, SS_N, and SS_P) referring to these switching system
subsets are described in the Protocol Implementation Conformance
Statement (PICS) Proforma for PNNI v1.0 [3].

Note:It is assumed that PNNI conformance testing has been
completed on both SUTs before these tests are executed.

Routing
- procedures for neighbor discovery (i.e., Hello Protocol)
-- within the same peer group (SS_M)
-- between two peer groups (SS_B)
- procedures for exchanging routing information (i.e., Database
Synchronization)
-- lowest level (SS_M)
-- higher level (SS_P)
- procedures for flooding (SS_M)
- procedures for electing a peer group leader (i.e., Peer Group
Leader Election)
-- this node is not capable of becoming a PGL (SS_M)
-- this node is capable of becoming a PGL (SS_P)
- procedures for PGL and Border node interactions
- procedures for higher layer neighbor discovery (i.e., SVCC-based
RCC Hello protocol) (SS_N and SS_P)
- procedures for Logical Group Node (LGN) (SS_N and SS_P)

Signaling

- procedures for point-to-point calls (SS_M)
- procedures for point-to-multipoint calls (SS_M)

Under many of the above general headings are other subdivisions.
The details are specified in their respective sections.

There are two protocol stacks to be tested. Figure 1 shows the
protocol stack for the PNNI routing as described in PNNI v1.0

```
┌─────────────────────────────────────────────────┐
│                                                  │
│            PNNI Routing                          │
│                                                  │
│                                                  │
│   Common Part Convergence Sublayer (CPCS) /      │
│   ATM Adaptation Layer (AAL) Type                │
│   5                                              │
│                                                  │
│                                                  │
│                                                  │
│            ATM Layer                             │
│                                                  │
│                                                  │
│            Physical Layer                        │
│                                                  │
└─────────────────────────────────────────────────┘
```
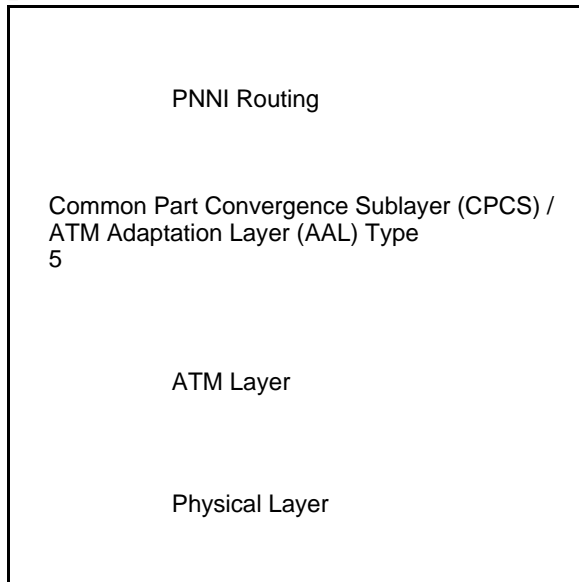
Figure 1: Protocol Stack for PNNI Routing

section 5.5 and 5.5.1. The protocol stack for PNNI signaling is
shown in PNNI v1.0 figure 6-2, PNNI Control Plane.

1.2 References

[1]   Private Network-Network Interface Specification Version 1.0,
      af-pnni-0055.000, March 1996

[2]   Introduction to ATM Forum Test Specification, af-test-
      0022.000, November 1994

[3]   Private Network-Network Interface (PNNI) Version 1.0 Errata
      and Protocol Implementation Conformance Statement (PICS)
      Proforma, May 1997

1.3 Abbreviations

```
AMS   Audiovisual Multimedia Services
ATD   ATM Traffic Descriptor
ATM   Asynchronous Transfer Mode
ATS   Abstract Test Suite
CBR   Constant Bit Rate
CES   Circuit Emulation Services
DS    Database Sequence
DTL   Designated Transit List
FUNI  Frame based User Network Interface
IE    Information Element
ILMI  Integrated Local Management Interface
IUT   Implementation Under Test
LGN   Logical Group Node
LT    Lower Tester
OAM   Operations and Maintenance
PCO   Point of Control and Observation
PGL   Peer Group Leader
PNNI  Private Network Network Interface
PO    Point of Observation
PTSE  PNNI Topology State Element
PTSP  PNNI Topology State Packet
QoS   Quality of Service
RCC   Routing Control Channel
SUT   System Under Test
SVC   Switched Virtual Circuit
SVC   Switched Virtual Connection
SVCC  Switched Virtual Channel Connection
UNI   User-Network Interface
UT    Upper Tester
VBR   Variable Bit Rate
VCI   Virtual Channel Identifier
VPI   Virtual Path Identifier
```

2 Test Realization

The realization of each test case within this test suite shall be
the responsibility of the test laboratory. The test realization
shall adhere to the following condition:
    – the realization of a test case shall meet all of the
    requirements and objectives of the test case as specified in
    the test purpose of each test case.

3 Interoperability Test Case Information

There are two main parts to these tests. The first is the
physical configurations used for interoperability testing. The
second is an explanation of the individual test case layout (i.e.
components).

3.1 Test Configurations

The generic test set-up for the interoperability test of two ATM
switches/implementations (the SUTs) running PNNI v1.0 (including
Errata) is shown in Figure 2. Monitor point D is for
interoperability testing/verification. Monitor (possibly control)
points A and C are shown, when necessary, to indicate other
information (e.g. input needed to create event at Monitor point
D).

In the test configurations shown on the following pages, only the
relevant components are shown. Other parts of the configuration
are needed, but are for reasons of clarity omitted. Not all of
the monitoring points shown are required for each test.
Observations at Monitor point D are part of the pass/fail criteria
(i.e. verdict); others observations at other monitor points may be
needed. Each test clearly states when observations at monitor
points other than D, are part of the pass/fail criteria and when
the observations are for trouble isolation
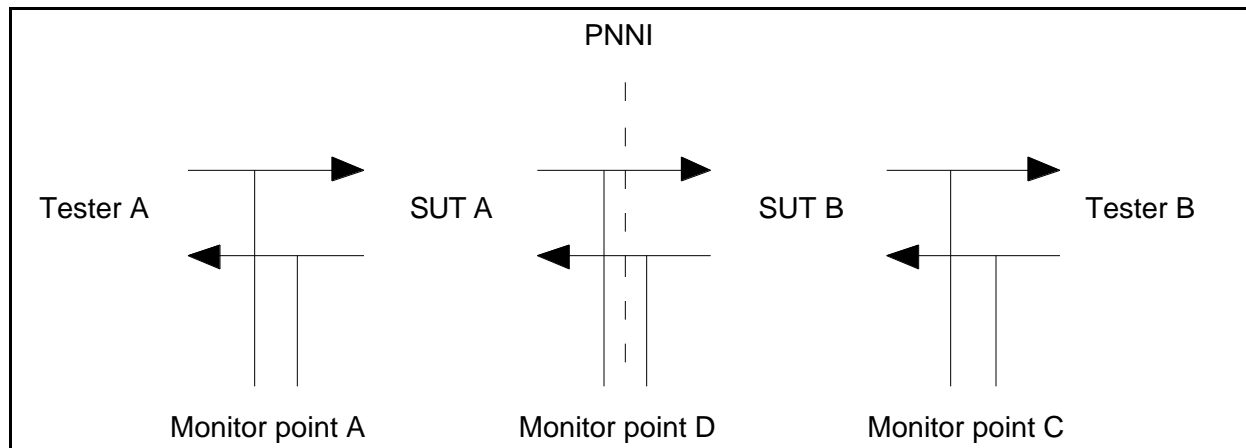
Figure 2:   **Generic PNNI Test Configuration**

(i.e. information).

Note 1: Monitor points may be included in the tester. A single
tester may suffice for all tests, provided the tester has enough
ports, capabilities, and functions.

NOTE 2: As mentioned earlier the testers and monitors shown in the
reference configurations may be part of one physical device. On
the other hand a tester(s) may be realized as a system of devices
(in order to create the environment necessary to carry-out the
test), not just as one physical device.

NOTE 3:   SUTs may be of the same or different types/manufacturer.
SUTs may also be a tester. When the SUT is a tester, these tests
are testing the tester's implementation of the PNNI protocol for
interoperability with another SUT and not acting as a Tester in
the context of these tests. However, when the tests are used for
testing single vendor implementation, it does not imply
interoperability with other vendors equipment.

NOTE 4:   It is assumed that the tester, acting as an SUT, must
pass these interoperibility tests before operability testing can
be performed.
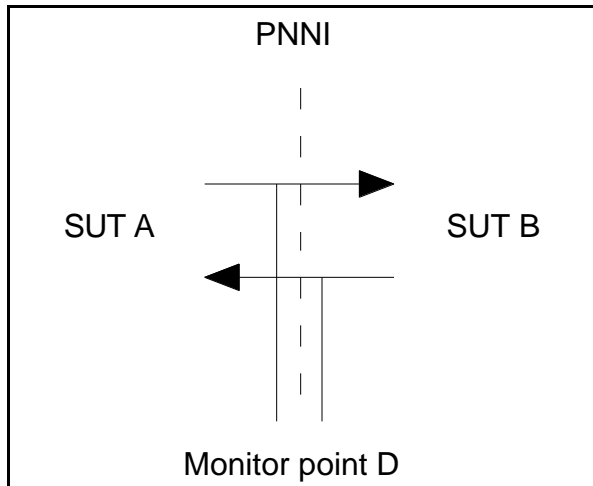
Figure 3:   Test Configuration #1

Test configuration #1 represents the case where two SUTs (e.g.,
ATM switches (PNNI capable)) are connected. The main concern here
is that there are some functions that are not externally
controllable and therefore monitoring the link between the two
SUTs is the only way that interoperability testing can be done.
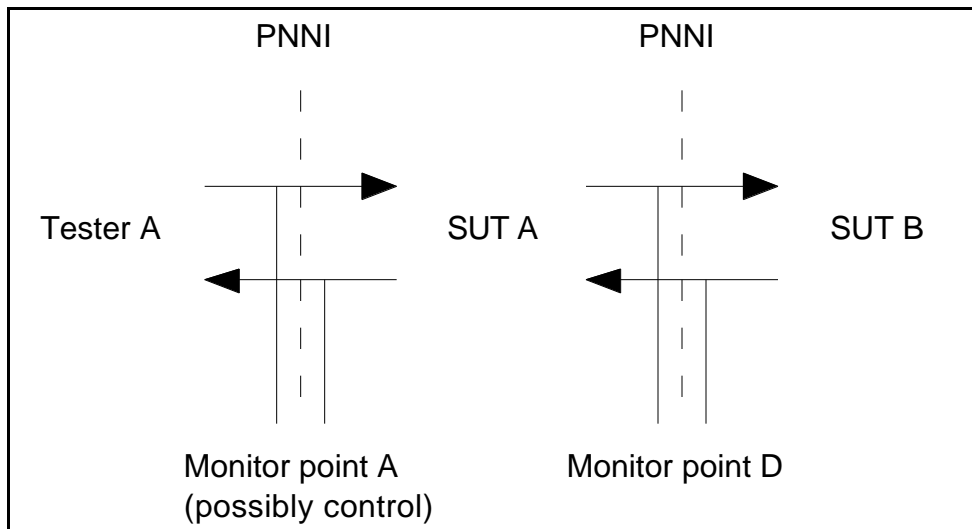
Figure 4:   Test Configuration #2

Test configuration #2 represents the case where at least one of
the SUTs needs to have external influence in order for an event to
be observed at Monitor point D. This external influence may be
controlled by a single tester.
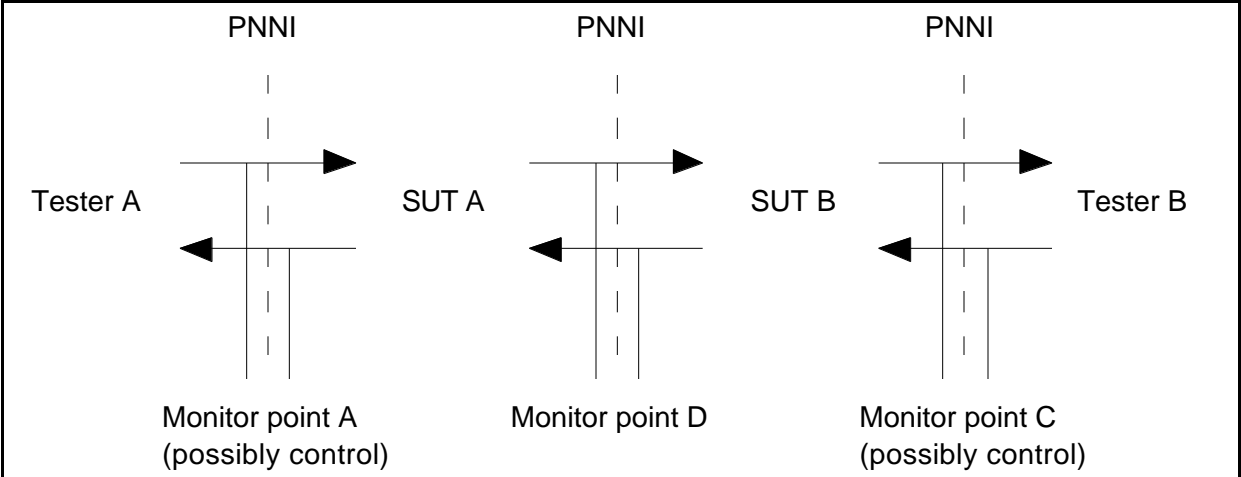
Figure 5: **Test Configuration #3a**
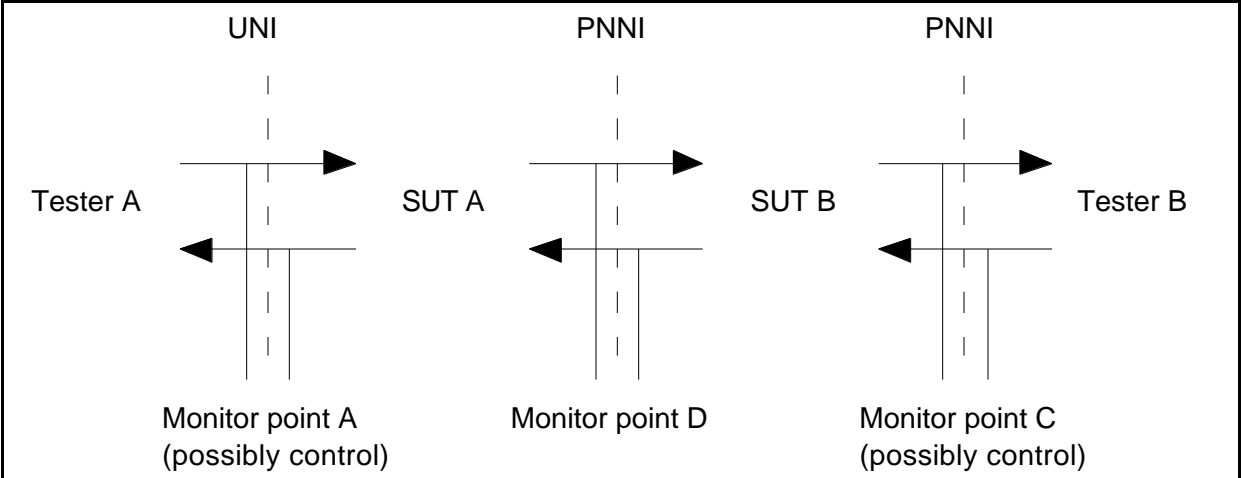
Figure 6: **Test Configuration #3b**
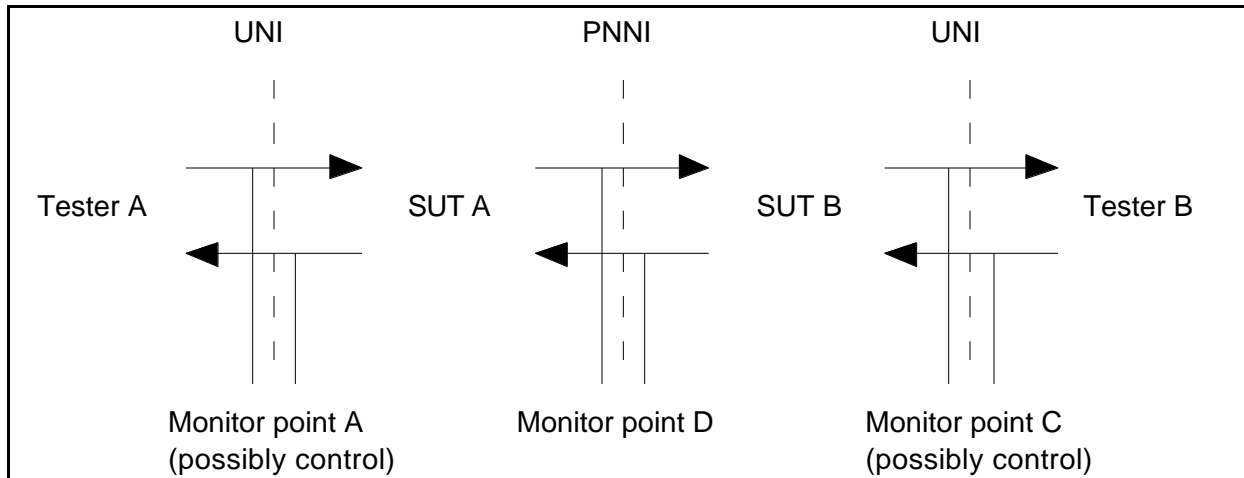
Figure 7: **Test Configuration #3c**

Test configurations #3(a-c) represent the case where external
influence is needed from both sides of the two SUTs (i.e.
switches) that are connected. The three test configuration show
the different combinations of the two interfaces (i.e. PNNI or
UNI) at monitor points A and C.
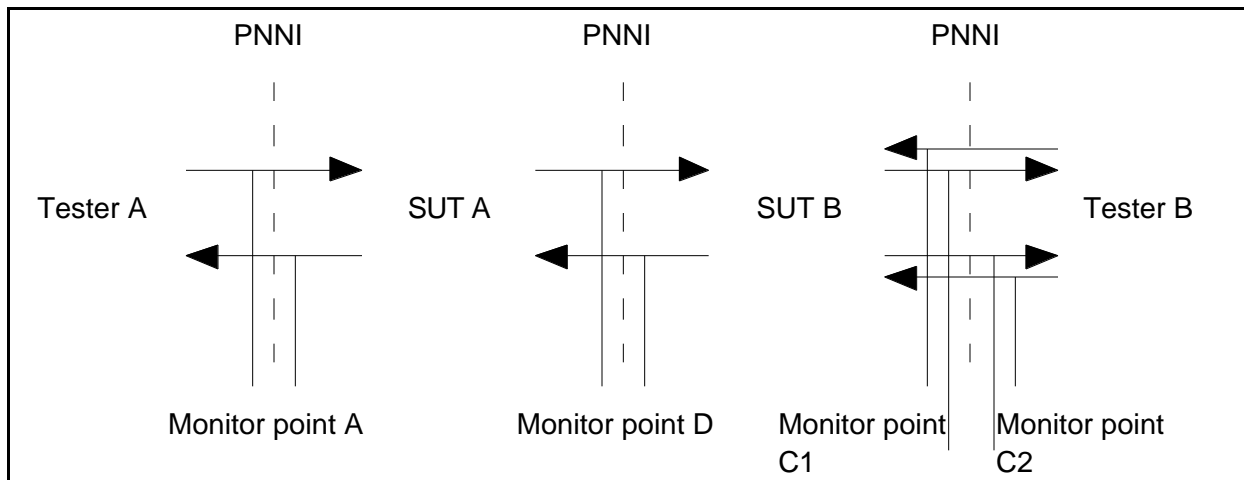
Figure 8: **Test Configuration #4a**
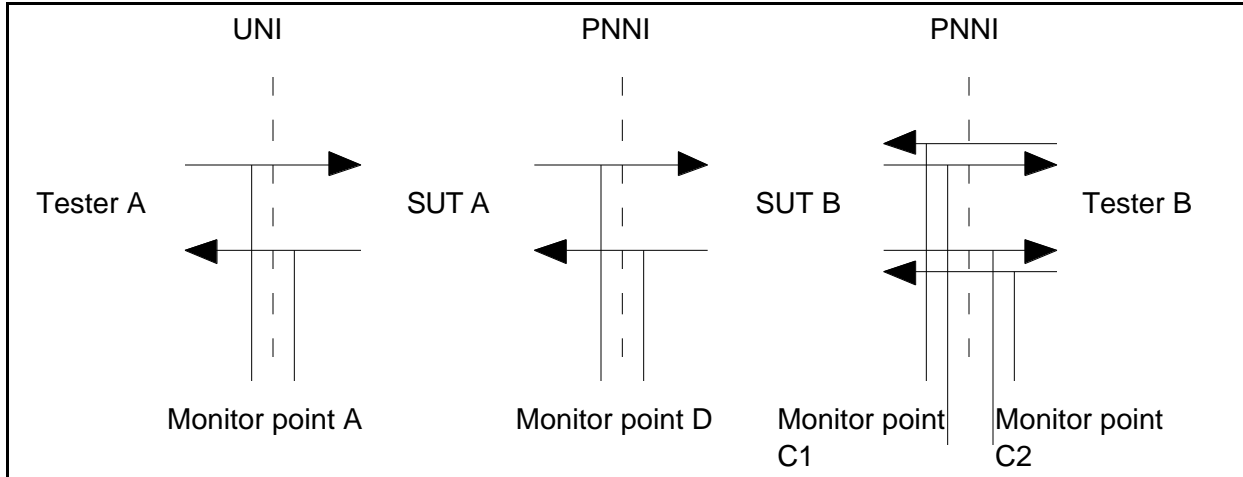
Figure 9:   Test Configuration #4b

Test configurations #4(a-b) represent the case where external
influence is needed from both sides of the two SUTs (i.e.
switches) that are connected. The two test configurations show
the different combinations of the two interfaces (i.e. PNNI or
UNI) at monitor point C. These two test configuration are similar
to those of test configuration #3, but with the addition of
another physical connection between SUT B and Tester B.
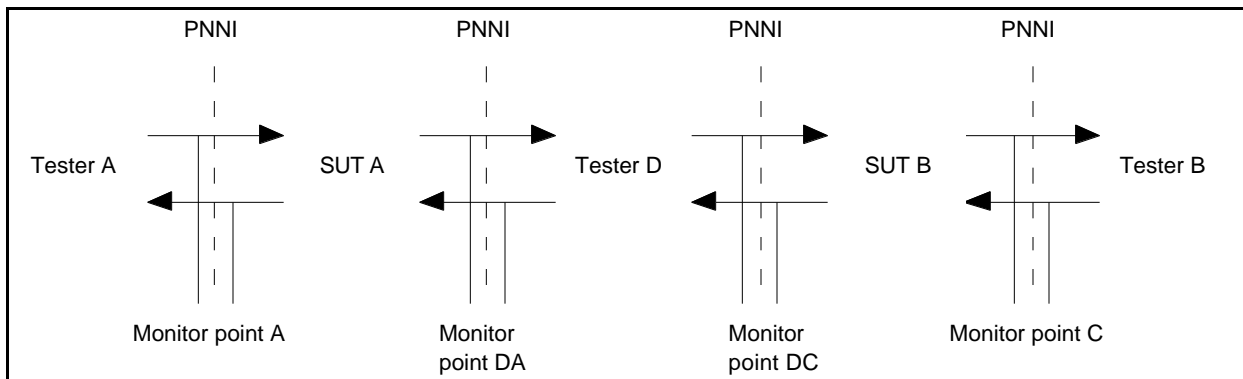
Figure 10:   Test Configuration #5

Test configuration #5 represents the case where end-to-end
interoperability is being tested between SUT A and SUT B. SUT A
and SUT B are not physically connected to each other, but are
logically connected to each other through an intervening node(s)
(i.e. Tester D). In this case Monitor points DA and DC will
observe the same information for testing and verification
purposes, however the connection on which this information is
observed may be different.

> For example, SUT A and SUT B are both Peer Group Leaders of
> different peer groups, which have a common higher level peer
> group. Therefore, an SVC based RCC must be established

between them. The VPI/VCI of the SVC at Monitor point DA may
be different than the VPI/VCI of the SVC at Monitor point DC.
However, the PNNI information exchanged over this SVC will be
the same.

Under test configurations #2, #3, #4, and #5 there are subclasses
that represent internal reference configurations (e.g., specific
PNNI features and functions) that the testers must operate (if a
real network is not used). An example of specific PNNI features
and functions is when the tester must supply the information
necessary (PTSEs) to make the tester appear to be another PNNI
network (i.e., Peer group) with a Peer Group Leader.

3.2 Test Case Layout

Each Test case has the following parts: Test Case ID, Test
Purpose, Reference, Pre-requisite, Test Configuration, Test Set-
up, Test Procedure, Verdict Criteria, and Consequence of Failure*.

Test Case ID:
    This is the test case identifier. Layout is ABBBBCCCDDD.
    The following table provides detailed information.

Test Case Identification Layout and Description		
Positions	Meaning	Current Values
A	Type of test	V=Valid or E=error
BBBB	Section number in this document	See this document
CCC	Abbreviated description of the protocol or part of protocol being tested	H__= Hello, DBS= DataBase Synchronization, FLD= Flooding, PGL= Peer Group Leader Election, BPI= Border Node / PGL Interactions, LGN= Logical Group Node, EST= Call Establishment, REL= Release call, CRK= Crankback, DTL= Designated Transit List, RST= Restart
DDD	Number of the test case within the particular section	See this document

Test Purpose:
    Defines the reason for running the test.
Reference:
    The section from the PNNI v1.0 Specification that supports
    this test case.
Pre-requisite:
    Listed is the information that must be known before the test
    can be run.
Test Configuration:
    Lists which of the test configurations should be used.
Test Set-up:
    Describes the devices and physical connections needed for
    this test.

NOTE: The term connect two devices does not necessarily imply that the systems are on and operational when the physical connection is made. The test being run will determine the situation.

Test Procedure:
>   Lists the steps necessary to carry out this test. Items in parenthesis, "()", mean that the item occurs at either the A or C monitoring point. Items in brackets, "[]", provide necessary information on coding of messages or information elements.

Verdict Criteria:
>   Lists the observations that must occur in order for this test case results to be successful (i.e. satisfy the Test Purpose). Items in parenthesis, "()", mean that the item occurs at either the A or C monitoring point. It is given here as additional information, but is not required for determination of pass or failure of the test case.

Consequence of Failure*:
>   Reason for including this test case as a necessary part of this interoperability test suite.

4   *Note - not all test cases have this, at this time.

4 Interoperability Interface Tests (Routing

4.1 Test Case Index

Test Case ID	Test Purpose
V4301H__001	Verify that the Hello Protocol is running on an operational physical link.
V4301H__002	Verify that a PNNI version number is agreed upon.
V4301H__003	Verify that the Hello sent from both sides contains Hello Interval and Port ID set to non-zero.
V4301H__004	Verify that the first Hello sent from both sides contains Remote node ID and Remote port ID set to zero.
V4301H__005	Verify that after receiving a Hello (2-WayInsideReceived) that the SUT acknowledges the remote identification information.
V4301H__006	Verify that Hello packets are transmitted periodically (i.e. when the Hello Timer expires).
V4301H__007	Verify that after receiving a Hello (1-WayInsideReceived) that the SUT acknowledges the remote identification information.
E4301H__008	Verify that after a physical link failure, when corrected, that the Hello protocol starts over again from the beginning.
V4302H__001	Verify that the Hello Protocol is running on an operational physical link.
V4302H__002	Verify that a PNNI version number is agreed upon.
V4302H__003	Verify that the Hello sent from both sides contains Hello Interval and Port ID set to non-zero.
V4302H__004	Verify that the first Hello sent from both sides contains Remote node ID and Remote port ID set to zero.
V4302H__005	Verify that the SUTs determine that they are in different peer groups.

V4302H__006	Verify that after receiving a Hello (1-WayOutsideReceived) that the SUT acknowledges the remote identification information.
V4302H__007	Verify that after receiving a Hello (2-WayOutsideReceived) that the SUT acknowledges the remote identification information.
V4302H__008	Verify that Hello packets are transmitted periodically (i.e. when the Hello Timer expires).
V4302H__009	Verify that each SUT transmits an Uplink Information Attribute (ULIA) information group (34) containing one or more outgoing resource availability information groups (128) describing all metrics.
E4302H__010	Verify that after a physical link failure, when corrected, that the Hello protocol starts over again from the beginning.
V4303H__001	Verify that the Hello Protocol is running on an operational physical link.
V4303H__002	Verify that a PNNI version number is agreed upon.
V4303H__003	Verify that the Hello sent from both sides contains Hello Interval and Port ID set to non-zero.
V4303H__004	Verify that the first Hello sent from both sides contains Remote node ID and Remote port ID set to zero.
V4303H__005	Verify that the SUTs determine that they are in different peer groups.
V4303H__006	Verify that after receiving a Hello (1-WayOutsideReceived) that the SUT acknowledges the remote identification information.
V4303H__007	Verify that after receiving a Hello (2-WayOutsideReceived) that the SUT acknowledges the remote identification information.
V4303H__008	Verify that Hello packets are transmitted periodically (i.e. when the Hello Timer expires).

V4303H__009	Verify that each SUT transmits an Uplink Information Attribute (ULIA) information group (34) containing one or more outgoing resource availability information groups (128) describing all metrics.
V4303H__010	Verify that two SUTs in different peer groups can agree on a common peer group using outside Hellos, resulting in the advertisement of uplinks by each SUT.
V4303H__011	Verify that when SUT B is in the parent peer group of SUT A, the SUTs can agree on a common peer group using outside Hellos, resulting in the advertisement of an uplink by SUT A and an attempt to establish an SVCC-based RCC from SUT B to the parent LGN of SUT A.
E4303H__012	Verify that after a physical link failure, when corrected, that the Hello protocol starts over again from the beginning.
V4401DBS001	Verify that the DataBase Synchronization protocol commences only after reaching the 2-WayInside state.
V4401DBS002	Verify that the SUTs agree on which SUT is master and which SUT is slave.
V4401DBS003	Verify that the SUTs request the PTSEs that were contained in the Database summary packets.
V4401DBS004	Verify that the SUTs exchange their complete Database summaries.
V4401DBS005	Verify that neither SUT advertises this lower -level link until the neighboring peer state machine is in the Full state.
V4402DBS001	Verify that the DataBase Synchronization protocol commences only after reaching the 2-WayInside state.
V4402DBS002	Verify that the SUTs agree on which SUT is master and which SUT is slave.
V4402DBS003	Verify that the SUTs request the PTSEs that were contained in the Database summary packets.

V4402DBS004	Verify that the SUTs exchange their complete Database summaries.
V4402DBS005	Verify that neither SUT advertises this lower -level link until the neighboring peer state machine is in the Full state.
V4501FLD001	Verify that SUT A floods a PTSE to SUT B.
V4501FLD002	Verify that SUT A does not flood a PTSE with PTSE Remaining Lifetime of ExpiredAge to SUT B
V4601PGL001	Verify that the nodes participate in the Peer group leader elections, when the Non-transit for PGL Election flag is not set.
V4601PGL002	Verify that the nodes continue participating in the Peer group leader elections, when the Non-transit for PGL Election flag is not set. (i.e. PGLInitTimer Expires)
V4601PGL003	Verify that the SUT B participates in the Peer group leader elections, when the Non-transit for PGL Election flag is not set.
V4601PGL004	Verify that the SUT B elects a PGL, when the Non-transit for PGL Election flag is not set. (PGLInitTimer Expires)
V4601PGL005	Verify that SUT B continues to participate in the Peer group leader elections by electing a PGL when a PGL capable device joins the peer group, when the Non-transit for PGL Election flag is not set.
V4602PGL001	Verify that SUT B elects SUT A as Peer Group Leader (Advertise their preferred Peer Group Leader).
V4602PGL002	Verify that SUT A becomes Peer Group Leader.
V4602PGL003	Verify that SUT A elects SUT B as Peer Group Leader.
V4602PGL004	Verify that SUT B becomes Peer Group Leader.

V4602PGL005	Verify that SUT A continues to be PGL when another system is attached that is not PGL capable or has a peer group leadership priority lower than SUT A's.
V4602PGL006	Verify that SUT A stops being Peer Group Leader when a system is attached with higher Peer Group Leadership priority.
V4602PGL007	Verify that SUT B continues to be PGL when another system is attached that is not PGL capable or has a peer group leadership priority lower than SUT B's.
V4602PGL008	Verify that SUT B stops being Peer Group Leader when a system is attached with higher Peer Group Leadership priority.

V4602PGL009	Verify that SUT B elects new Peer Group Leader when a system is attached with Higher Peer Group Leadership priority than SUT's current PGL (i.e. SUT A).
V4602PGL010	Verify that SUT A elects new Peer Group Leader when a system is attached with Higher Peer Group Leadership priority than SUT's current PGL (i.e. SUT B).
V4603PGL001	Verify that SUT A becomes Peer Group Leader based on leadership priority.
V4603PGL002	Verify that SUT A becomes Peer Group Leader based on Node ID.
V4603PGL003	Verify that SUT B elects SUT A as Peer Group Leader based on leadership priority.
V4603PGL004	Verify that SUT B elects SUT A as Peer Group Leader based on Node ID.
V4701BPI001	Verify that two SUTs in the same peer group, one acting as PGL and the other acting as a border node, can communicate and act upon nodal hierarchy information.
V4701BPI002	Verify that two SUTs in the same peer group, one acting as PGL and the other as a border node, can communicate and act upon uplink information.
V4801LGN001	Verify that a PGL (i.e. SUT A) in one peer group initiates a switched virtual channel connection (SVCC) to the PGL (i.e. Tester B) in another peer group.

V4801LGN002	Verify that local PGL (i.e. SUT A) accepts (i.e. sends CALL PROCEEDING message) a switched virtual channel connection (SVCC) from remote PGL (i.e. Tester B).
V4801LGN003	Verify that local PGL (i.e. SUT A) accepts (i.e. sends CONNECT message) a switched virtual channel connection (SVCC) from remote PGL (i.e. Tester B).
V4801LGN004	Verify that a PGL (i.e. SUT A) in one peer group initiates a switched virtual channel connection (SVCC) to the PGL (i.e. SUT B) in another peer group.

V4801LGN005	Verify that remote PGL (i.e. SUT B) accepts (i.e. sends CALL PROCEEDING message) a switched virtual channel connection (SVCC) from local PGL (i.e. SUT A).
V4801LGN006	Verify that remote PGL (i.e. SUT B) accepts (i.e. sends CONNECT message) a switched virtual channel connection (SVCC) from local PGL (i.e. SUT A).
V4801LGN007	Verify that when a new Peer Group Leader (e.g. Tester B emulating a new node) is elected in the same peer group as SUT B, the old Peer Group Leader (i.e. SUT B) releases the RCC to the Peer Group Leader (i.e. SUT A) of another peer group with cause value=53.
E4801LGN008	Verify that after a physical link failure, when corrected, that a PGL (i.e. SUT A) in one peer group initiates a switched virtual channel connection (SVCC) to the PGL (i.e. Tester B) in another peer group.
E4801LGN009	Verify that after a physical link failure, when corrected, that a PGL (i.e. SUT A) in one peer group initiates a switched virtual channel connection (SVCC) to the PGL (i.e. SUT B) in another peer group.
V4802LGN001	Verify that the Hello protocol is running over the SVCC-Based RCC.
V4802LGN002	Verify that the Hello protocol is running over the SVCC-Based RCC and that the LGN learns about the other (remote) LGN.
E4802LGN003	Verify that after a physical link failure, when corrected, that the Hello Protocol is running over the SVCC-Based RCC (2-WayInside).
V4803LGN001	Verify that information is fed down the Hierarchy.

4.2 4.2   *Test Cases Dynamic Behavior*

4.3 *Hello Protocol*

4.3.1 For the Hello Protocol (SS_M)

All tests in this section require both SUTs to be in the same
lowest level peer group.

All tests in this section use Test Configuration #1.
----
1.   Test Case ID: V4301H__001
     Test Purpose: Verify that the Hello Protocol is running on
                     an operational physical link.
     Reference: 5.6
     Pre-requisite: Both SUTs are SS_M and in the same lowest
                     level peer group.
     Test Configuration: #1

     Test Set-up:
     1.   Connect the two SUTs with one physical link.

     Test Procedure:
     1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.

     Verdict Criteria:
          Hello packets shall be observed in both directions on
          the PNNI.

     Consequence of Failure: The PNNI protocol can not operate.

2.   Test Case ID: V4301H__002
     Test Purpose: Verify that a PNNI version number is agreed
                     upon.
     Reference: 5.6.1
     Pre-requisite: Both SUTs are SS_M and in the same lowest
                     level peer group.
     Test Configuration: #1

     Test Set-up:
     1.   Connect the two SUTs with one physical link.

     Test Procedure:
     1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.

2.   Observe Test Case V4301H__001.

Verdict Criteria:
      Observe that the value in the version field in the next
      exchanged Hello packets is the same in both directions,
      is the value between the oldest- and newest-version
      supported field, and is the value the highest common
      value.

Consequence of Failure: The PNNI protocol can not operate
                           unless a single version is agreed
                           to.

3.   Test Case ID: V4301H__003
      Test Purpose: Verify that the Hello sent from both sides
                       contains Hello Interval and Port ID set to
                       non-zero.
      Reference: 5.6.2.3
      Pre-requisite: Both SUTs are SS_M and in the same lowest
                       level peer group.
      Test Configuration: #1

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.

      Verdict Criteria:
            Observe that the value in the Hello Interval field and
            the Port ID field is set to non-zero in the Hello
            packets sent from both SUTs.

      Consequence of Failure: The PNNI protocol can not operate
                                 unless the Hello Interval and Port
                                 ID are set to non-zero.

4.   Test Case ID: V4301H__004
      Test Purpose: Verify that the first Hello sent from both
                       sides contains Remote node ID and Remote port
                       ID set to zero.
      Reference: 5.6.2.1.4 (Hp1), 5.6.2.1.2 (1-WayInside),
                       5.6.2.1.3 (1-WayInsideReceived)

Pre-requisite: Both SUTs are SS_M and in the same lowest
                level peer group.
Test Configuration: #1

Test Set-up:
1.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.

Verdict Criteria:
      The first Hello packet observed from each SUT will have
      the Remote node ID field and Remote port ID field set to
      zero.

Consequence of Failure: The old PNNI information was
                          retained causing the protocol not to
                          operate.

5.   Test Case ID: V4301H__005
      Test Purpose: Verify that after receiving a Hello (2-
                      WayInsideReceived) that the SUT acknowledges
                      the remote identification information.
      Reference: 5.6.2.1.4 (Hp4 and Hp15)
      Pre-requisite: Both SUTs are SS_M and in the same lowest
                      level peer group.
      Test Configuration: #1

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Monitor stores the values contained in the Node Id, Port
            ID, Remote node ID, and Remote port ID fields in the
            first Hello that has the Remote node ID and Remote port
            ID fields set to something other than zero sent by each
            SUT.

      Verdict Criteria:
            Observe that the next Hello sent from SUT A contains in
            the Node ID, Port ID, Remote node ID, and Remote port ID
            fields values that are the same as those stored in Test
            Procedure step #2) as the Remote node ID, Remote port

ID, Node ID and Port ID, respectively in the Hello from
SUT B.
- AND -
    Observe that the next Hello sent from SUT B contains in
    the Node ID, Port ID, Remote node ID, and Remote port ID
    fields values that are the same as those stored in Test
    Procedure step #2) as the Remote node ID, Remote port
    ID, Node ID and Port ID, respectively in the Hello from
    SUT A.

Consequence of Failure: The PNNI protocol can not operate
                           (i.e. not progress to next step).

6.   Test Case ID: V4301H__006
     Test Purpose: Verify that Hello packets are transmitted
                     periodically (i.e. when the Hello Timer
                     expires).
     Reference: 5.6.2.1.4 (Hp15)
     Pre-requisite: Both SUTs are SS_M and in the same lowest
                     level peer group.
     Test Configuration: #1

     Test Set-up:
     1.   Connect the two SUTs with one physical link.

     Test Procedure:
     1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
     2.   Monitor shall set two timers, Ta and Tb, with the value
           observed in the Hello interval field in the last Hello
           packet sent from each SUT, respectively, plus some
           delta.
     3a.   Start the monitor timer (Ta) when the first Hello (2-
           WayInsideReceived) is sent from SUT A.
     3b.   Start a monitor timer (Tb) when the first Hello (2-
           WayInsideReceived) is sent from SUT B.

     Verdict Criteria:
           Observe that before the timer, Ta, expires a Hello is
           sent by SUT A.
     - AND -
           Observe that before the timer, Tb, expires a Hello is
           sent by SUT B.

```
                 Consequence of Failure:    The PNNI protocol information is not
                                            updated and keep alive not working
                                            (system decays and then collapses).




7.    Test Case ID:   V4301H__007
      Test Purpose:   Verify that after receiving a Hello (1-
                      WayInsideReceived) that the SUT acknowledges
                      the remote identification information.
      Reference:      5.6.2.1.4 (Hp2)
      Pre-requisite:  Both SUTs are SS_M and in the same lowest
                      level peer group. (NOTE: This Test Case is a
                      pre-requisite before beginning any of the
                      Database Synchronization interoperability
                      tests)
      Test Configuration:  #1

      Test Set-up:
      1.    Connect the two SUTs with one physical link.

      Test Procedure:
      1.    Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.    Monitor stores the values contained in the Node ID and
            Port ID fields in the first Hello sent by each SUT.

      Verdict Criteria:
            Observe that the next Hello sent from SUT A contains in
            the Remote node ID and Remote port ID fields values that
            are the same as those stored as the Node ID and Port ID,
            respectively in the Hello from SUT B.
      - AND -
            Observe that the next Hello sent from SUT B contains in
            the Remote node ID and Remote port ID fields values that
            are the same as those stored as the Node ID and Port ID,
            respectively in the Hello from SUT A.

      Consequence of Failure:    If this state is not reached, then
                                 the Database Synchronization
                                 protocol can not be initiated.




8.    Test Case ID:   E4301H__008
      Test Purpose:   Verify that after a physical link failure,
                      when corrected, that the Hello protocol starts
```

over again from the beginning (i.e. as if this
were the first time the connection was made).
Reference: 5.6.2.1.4 (Hp1), 5.6.2.3
Pre-requisite: Both SUTs are SS_M and in the same lowest
level peer group.
Test Configuration: #1

Test Set-up:
1.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe at least one Hello (2-WayInsideReceived) sent
from each SUT.
3.   Disconnect/remove the physical link between the two
SUTs. (Note: ILMI procedures may provide another way to
indicate that the link is down. This requires a
different test configuration also)
4.   Reconnect the physical link between the two SUTs using
the same ports.

Verdict Criteria:
The first Hello packet observed from each SUT will have
the Remote node ID field and Remote port ID field set to
zero; and Hello Interval field, Port ID field and Node
ID set to non-zero.

Consequence of Failure: The old PNNI information was
retained causing the protocol not to
operate.

4.3.2 4.3.2   For the Hello Protocol (SS_B)

All tests in this section require both SUTs to be in different
lowest level peer groups.

All tests in this section use Test Configuration #1.

----
1.   Test Case ID: V4302H__001
     Test Purpose: Verify that the Hello Protocol is running on
                     an operational physical link.
     Reference: 5.6
     Pre-requisite: Both SUTs are SS_B and in different lowest
                     level peer groups.
     Test Configuration: #1

     Test Set-up:
     1.   Connect the two SUTs with one physical link.

     Test Procedure:
     1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.

     Verdict Criteria:
          Hello packets shall be observed in both directions on
          the PNNI.

     Consequence of Failure: The PNNI protocol can not operate.

2.   Test Case ID: V4302H__002
     Test Purpose: Verify that a PNNI version number is agreed
                     upon.
     Reference: 5.6.1
     Pre-requisite: Both SUTs are SS_B and in different lowest
                     level peer groups.
     Test Configuration: #1

     Test Set-up:
     1.   Connect the two SUTs with one physical link.

     Test Procedure:
     1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
     2.   Ignore the first Hello Packet from each side, as these
          packets are only the start of the negotiation process
          for the version field value.

Verdict Criteria:
    Observe that the value in the version field in the next
    exchanged Hello packets is the same in both directions,
    is the value between the oldest- and newest-version
    supported field, and is the value the highest common
    value.

Consequence of Failure: The PNNI protocol can not operate
                          unless a single version is agreed
                          to.

3.   Test Case ID: V4302H__003
      Test Purpose: Verify that the Hello sent from both sides
                      contains Hello Interval and Port ID set to
                      non-zero.
      Reference: 5.6.2.3
      Pre-requisite: Both SUTs are SS_B and in different lowest
                      level peer groups.
      Test Configuration: #1

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.

      Verdict Criteria:
          Observe that the value in Hello Interval field and the
          Port ID field is set to non-zero.

      Consequence of Failure: The PNNI protocol can not operate
                                unless the Hello Interval and Port
                                ID are set to non-zero.

4.   Test Case ID: V4302H__004
      Test Purpose: Verify that the first Hello sent from both
                      sides contains Remote node ID and Remote port
                      ID set to zero.
      Reference: 5.6.2.1.4 (Hp1), 5.6.2.1.2 (1-WayOutside),
                      5.6.2.1.3 (1-WayOutsideReceived)
      Pre-requisite: Both SUTs are SS_B and in different lowest
                      level peer groups.
      Test Configuration: #1

Test Set-up:
1.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.

Verdict Criteria:
      The first Hello packet observed from each SUT will have
      the Remote node ID field and Remote port ID field set to
      zero.

Consequence of Failure: The old PNNI information was
                           retained causing the protocol not to
                           operate.

5.   Test Case ID: V4302H__005
      Test Purpose: Verify that the SUTs determine that they are
                      in different peer groups.
      Reference: 5.6.2.1.4 (Hp5)
      Pre-requisite: Both SUTs are SS_B and in different lowest
                      level peer groups.
      Test Configuration: #1

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Observe that one Hello (1-WayOutside) packet is sent
            from each SUT.

      Verdict Criteria:
            Observe that a Nodal hierarchy list information group is
            present in the next Hello packet sent by each SUT.

      Consequence of Failure: If the PNNI Nodal hierarchy
                                 information is not present, then the
                                 routing hierarchy can not be
                                 established.

6.   Test Case ID: V4302H__006

Test Purpose: Verify that after receiving a Hello (1-
                 WayOutsideReceived) that the SUT acknowledges
                 the remote identification information.
Reference: 5.6.2.1.4 (Hp5)
Pre-requisite: Both SUTs are SS_B and in different lowest
                 level peer groups.
Test Configuration: #1

Test Set-up:
1.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Monitor stores the values contained in the Node Id and
      Port ID fields in the first Hello sent by each SUT.

Verdict Criteria:
      Observe that the next Hello sent from SUT A contains in
      the Remote node ID and Remote port ID fields values that
      are the same as those stored as the Node ID and Port ID,
      respectively in the Hello from SUT B.
- AND -
      Observe that the next Hello sent from SUT B contains in
      the Remote node ID and Remote port ID fields values that
      are the same as those stored as the Node ID and Port ID,
      respectively in the Hello from SUT A.

Consequence of Failure: The PNNI protocol can not operate
                          (i.e. progress to next step).

7.   Test Case ID: V4302H__007
      Test Purpose: Verify that after receiving a Hello (2-
                       WayOutsideReceived) that the SUT acknowledges
                       the remote identification information.
      Reference: 5.6.2.1.4 (Hp5)
      Pre-requisite: Both SUTs are SS_B and in different lowest
                       level peer groups.
      Test Configuration: #1

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.

2.   Monitor stores the values contained in the Node Id, Port
     ID, Remote node ID, and Remote port ID fields in the
     first Hello that has the Remote node ID and Remote port
     ID fields set to something other than zero sent by each
     SUT.

Verdict Criteria:
     Observe that the next Hello sent from SUT A contains in
     the Node ID, Port ID, Remote node ID, and Remote port ID
     fields values that are the same as those stored in Test
     Procedure step #2) as the Remote node ID, Remote port
     ID, Node ID and Port ID, respectively in the Hello from
     SUT B.
- AND -
     Observe that the next Hello sent from SUT B contains in
     the Node ID, Port ID, Remote node ID, and Remote port ID
     fields values that are the same as those stored in Test
     Procedure step #2) as the Remote node ID, Remote port
     ID, Node ID and Port ID, respectively in the Hello from
     SUT A.

Consequence of Failure: The PNNI protocol can not operate
                           (i.e. progress to next step).

8.   Test Case ID: V4302H__008
     Test Purpose: Verify that Hello packets are transmitted
                     periodically (i.e. when the Hello Timer
                     expires).
     Reference: 5.6.2.1.4 (Hp15)
     Pre-requisite: Both SUTs are SS_B and in different lowest
                     level peer groups.
     Test Configuration: #1

     Test Set-up:
     1.   Connect the two SUTs with one physical link.

     Test Procedure:
     1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
     2.   Monitor shall set two timers, Ta and Tb, with the value
          observed in the Hello interval field in the last Hello
          packet sent from each SUT, respectively, plus some
          delta.
     3a. Start the monitor timer (Ta) when the first Hello (2-
          WayOutsideReceived) is sent from SUT A.

3b.   Start a monitor timer (Tb) when the first Hello (2-
       WayOutsideReceived) is sent from SUT B.

Verdict Criteria:
       Observe that before the timer, Ta, expires a Hello is
       sent by SUT A.
- AND -
       Observe that before the timer, Tb, expires a Hello is
       sent by SUT B.

Consequence of Failure: The PNNI protocol information is not
                           updated and keep alive not working
                           (system decays and then collapses).

9.   Test Case ID: V4302H__009
      Test Purpose: Verify that each SUT transmits an Uplink
                      Information Attribute (ULIA) information group
                      (34) containing one or more outgoing resource
                      availability information groups (128)
                      describing all metrics.
      Reference: 5.6.2.1.4 (Hp5 & Hp6), 5.6.2.2, 5.6.2.2.1
      Pre-requisite: Both SUTs are SS_B and in different lowest
                      level peer groups.
      Test Configuration: #1

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Observe that one Hello (1-WayOutside) packet is sent
            from each SUT.

      Verdict Criteria:
            Observe that an Uplink Information Attribute (ULIA)
            information group (34) containing one or more outgoing
            resource availability information groups (128)describing
            all metrics for all supported service categories is
            present in the next Hello packet sent by each SUT.

      Consequence of Failure: If the PNNI protocol information is
                                 not passed, the link can not be
                                 used, since the resources are not
                                 known.

10.   Test Case ID: E4302H__010
       Test Purpose: Verify that after a physical link failure,
                        when corrected, that the Hello protocol starts
                        over again from the beginning.
       Reference: 5.6.2.1.4 (Hp1), 5.6.2.3
       Pre-requisite: Both SUTs are SS_B and in different lowest
                        level peer groups.
       Test Configuration: #1

       Test Set-up:
       1.   Connect the two SUTs with one physical link.

       Test Procedure:
       1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
       2.   Observe at least one Hello (2-WayOutsideReceived) sent
              from each SUT.
       3.   Disconnect/remove the physical link between the two
              SUTs. (Note: ILMI procedures may provide another way to
              indicate that the link is down. This requires a
              different test configuration also)
       4.   Reconnect the two SUTs using the same ports.

       Verdict Criteria:
              The first Hello packet observed from each SUT will have
              the Remote node ID field and Remote port ID field set to
              zero; and Hello Interval field, Port ID field and Node
              ID set to non-zero.

       Consequence of Failure: The old PNNI information was
                                 retained causing the protocol not to
                                 operate.

4.3.3 4.3.3   For the Hello Protocol

All tests in this section require both SUTs to be in different
lowest level peer groups.

----
1.   Test Case ID: V4303H__001
     Test Purpose: Verify that the Hello Protocol is running on
                     an operational physical link.
     Reference: 5.6
     Pre-requisite: Both SUTs are SS_B
                     Arrange the topology state of switches SUT A
                     and SUT B such that:
                     - Tester A and SUT A belong to the same lowest
                     level peer group, with PGL Tester A,
                     - Tester B and SUT B belong to the same lowest
                     level peer group, with PGL Tester B,
                     - Both SUTs and both Testers have the same
                     parent peer group.
     Test Configuration: #3a

     Test Set-up:
     1a. Connect Tester A (PNNI) to SUT A.
     1b. Connect Tester B (PNNI) to SUT B.
     2.   Connect the two SUTs with one physical link.

     Test Procedure:
     1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.

     Verdict Criteria:
          Hello packets shall be observed in both directions on
          the PNNI.

     Consequence of Failure: The PNNI protocol can not operate.

2.   Test Case ID: V4303H__002
     Test Purpose: Verify that a PNNI version number is agreed
                     upon.
     Reference: 5.6.1
     Pre-requisite: Both SUTs are SS_B
                     Arrange the topology state of switches SUT A
                     and SUT B such that:
                     - Tester A and SUT A belong to the same lowest
                     level peer group, with PGL Tester A,

                                    - Tester B and SUT B belong to the same lowest
                                    level peer group, with PGL Tester B,
                                    - Both SUTs and both Testers have the same
                                    parent peer group.
          Test Configuration: #3a

          Test Set-up:
          1a.   Connect Tester A (PNNI) to SUT A.
          1b.   Connect Tester B (PNNI) to SUT B.
          2.   Connect the two SUTs with one physical link.

          Test Procedure:
          1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
          2.   Ignore the first Hello Packet from each side, as these
                packets are only the start of the negotiation process
                for the version field value.

          Verdict Criteria:
                Observe that the value in the version field in the next
                exchanged Hello packets is the same in both directions,
                is the value between the oldest- and newest-version
                supported field, and is the value the highest common
                value.

          Consequence of Failure: The PNNI protocol can not operate
                                    unless a single version is agreed
                                    to.

3.   Test Case ID: V4303H__003
      Test Purpose: Verify that the Hello sent from both sides
                      contains Hello Interval and Port ID set to
                      non-zero.
      Reference: 5.6.2.3
      Pre-requisite: Both SUTs are SS_B
                      Arrange the topology state of switches SUT A
                      and SUT B such that:
                      - Tester A and SUT A belong to the same lowest
                      level peer group, with PGL Tester A,
                      - Tester B and SUT B belong to the same lowest
                      level peer group, with PGL Tester B,
                      - Both SUTs and both Testers have the same
                      parent peer group.
      Test Configuration: #3a

      Test Set-up:

1a. Connect Tester A (PNNI) to SUT A.
1b. Connect Tester B (PNNI) to SUT B.
2.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.

Verdict Criteria:
     Observe that the value in Hello Interval field and the
     Port ID field is set to non-zero.

Consequence of Failure: The PNNI protocol can not operate
                          unless the Hello Interval and Port
                          ID are set to non-zero.

4.   Test Case ID: V4303H__004
     Test Purpose: Verify that the first Hello sent from both
                     sides contains Remote node ID and Remote port
                     ID set to zero.
     Reference: 5.6.2.1.4 (Hp1), 5.6.2.1.2 (1-WayOutside),
                     5.6.2.1.3 (1-WayOutsideReceived)
     Pre-requisite: Both SUTs are SS_B
                     Arrange the topology state of switches SUT A
                     and SUT B such that:
                     - Tester A and SUT A belong to the same lowest
                     level peer group, with PGL Tester A,
                     - Tester B and SUT B belong to the same lowest
                     level peer group, with PGL Tester B,
                     - Both SUTs and both Testers have the same
                     parent peer group.
     Test Configuration: #3a

     Test Set-up:
1a. Connect Tester A (PNNI) to SUT A.
1b. Connect Tester B (PNNI) to SUT B.
2.   Connect the two SUTs with one physical link.

     Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.

     Verdict Criteria:
     The first Hello packet observed from each SUT will have
     the Remote node ID field and Remote port ID field set to
     zero.

```
        Consequence of Failure:   The old PNNI information was
                                  retained causing the protocol not to
                                  operate.



5.   Test Case ID:    V4303H__005
     Test Purpose:    Verify that the SUTs determine that they are
                      in different peer groups.
     Reference:       5.6.2.1.4 (Hp5)
     Pre-requisite:   Both SUTs are SS_B
                      Arrange the topology state of switches SUT A
                      and SUT B such that:
                      - Tester A and SUT A belong to the same lowest
                      level peer group, with PGL Tester A,
                      - Tester B and SUT B belong to the same lowest
                      level peer group, with PGL Tester B,
                      - Both SUTs and both Testers have the same
                      parent peer group.
     Test Configuration:  #3a

     Test Set-up:
     1a.  Connect Tester A (PNNI) to SUT A.
     1b.  Connect Tester B (PNNI) to SUT B.
     2.   Connect the two SUTs with one physical link.

     Test Procedure:
     1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
     2.   Observe that one Hello (1-WayOutside) packet is sent
          from each SUT.

     Verdict Criteria:
          Observe that a Nodal hierarchy list information group is
          present in the next Hello packet sent by each SUT.

     Consequence of Failure:   If the PNNI Nodal hierarchy
                               information is not present, then the
                               routing hierarchy can not be
                               established.



6.   Test Case ID:    V4303H__006
     Test Purpose:    Verify that after receiving a Hello (1-
                      WayOutsideReceived) that the SUT acknowledges
                      the remote identification information.
```

Reference: 5.6.2.1.4 (Hp5)
Pre-requisite: Both SUTs are SS_B
                  Arrange the topology state of switches SUT A
                  and SUT B such that:
                  - Tester A and SUT A belong to the same lowest
                  level peer group, with PGL Tester A,
                  - Tester B and SUT B belong to the same lowest
                  level peer group, with PGL Tester B,
                  - Both SUTs and both Testers have the same
                  parent peer group.
Test Configuration: #3a

Test Set-up:
1a.   Connect Tester A (PNNI) to SUT A.
1b.   Connect Tester B (PNNI) to SUT B.
2.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Monitor stores the values contained in the Node Id and
      Port ID fields in the first Hello sent by each SUT.

Verdict Criteria:
      Observe that the next Hello sent from SUT A contains in
      the Remote node ID and Remote port ID fields values that
      are the same as those stored as the Node ID and Port ID,
      respectively in the Hello from SUT B.
- AND -
      Observe that the next Hello sent from SUT B contains in
      the Remote node ID and Remote port ID fields values that
      are the same as those stored as the Node ID and Port ID,
      respectively in the Hello from SUT A.

Consequence of Failure: The PNNI protocol can not operate
                          (i.e. progress to next step).

7.   Test Case ID: V4303H__007
      Test Purpose: Verify that after receiving a Hello (2-
                      WayOutsideReceived) that the SUT acknowledges
                      the remote identification information.
      Reference: 5.6.2.1.4 (Hp5)
      Pre-requisite: Both SUTs are SS_B
                      Arrange the topology state of switches SUT A
                      and SUT B such that:

                                    - Tester A and SUT A belong to the same lowest
                                    level peer group, with PGL Tester A,
                                    - Tester B and SUT B belong to the same lowest
                                    level peer group, with PGL Tester B,
                                    - Both SUTs and both Testers have the same
                                    parent peer group.
        Test Configuration: #3a

        Test Set-up:
        1a.   Connect Tester A (PNNI) to SUT A.
        1b.   Connect Tester B (PNNI) to SUT B.
        2.   Connect the two SUTs with one physical link.

        Test Procedure:
        1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
        2.   Monitor stores the values contained in the Node Id, Port
              ID, Remote node ID, and Remote port ID fields in the
              first Hello that has the Remote node ID and Remote port
              ID fields set to something other than zero sent by each
              SUT.

        Verdict Criteria:
              Observe that the next Hello sent from SUT A contains in
              the Node ID, Port ID, Remote node ID, and Remote port ID
              fields values that are the same as those stored in Test
              Procedure step #2) as the Remote node ID, Remote port
              ID, Node ID and Port ID, respectively in the Hello from
              SUT B.
        - AND -
              Observe that the next Hello sent from SUT B contains in
              the Node ID, Port ID, Remote node ID, and Remote port ID
              fields values that are the same as those stored in Test
              Procedure step #2) as the Remote node ID, Remote port
              ID, Node ID and Port ID, respectively in the Hello from
              SUT A.

        Consequence of Failure: The PNNI protocol can not operate
                                  (i.e. progress to next step).

8.   Test Case ID: V4303H__008
      Test Purpose: Verify that Hello packets are transmitted
                       periodically (i.e. when the Hello Timer
                       expires).
      Reference: 5.6.2.1.4 (Hp15)

Pre-requisite: Both SUTs are SS_B
                Arrange the topology state of switches SUT A
                and SUT B such that:
                - Tester A and SUT A belong to the same lowest
                level peer group, with PGL Tester A,
                - Tester B and SUT B belong to the same lowest
                level peer group, with PGL Tester B,
                - Both SUTs and both Testers have the same
                parent peer group.
Test Configuration: #3a

Test Set-up:
1a. Connect Tester A (PNNI) to SUT A.
1b. Connect Tester B (PNNI) to SUT B.
2.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Monitor shall set two timers, Ta and Tb, with the value
     observed in the Hello interval field in the last Hello
     packet sent from each SUT, respectively, plus some
     delta.
3a. Start the monitor timer (Ta) when the first Hello (2-
     WayOutsideReceived) is sent from SUT A.
3b. Start a monitor timer (Tb) when the first Hello (2-
     WayOutsideReceived) is sent from SUT B.

Verdict Criteria:
     Observe that before the timer, Ta, expires a Hello is
     sent by SUT A.
- AND -
     Observe that before the timer, Tb, expires a Hello is
     sent by SUT B.

Consequence of Failure: The PNNI protocol information is not
                          updated and keep alive not working
                          (system decays and then collapses).

9.   Test Case ID: V4303H__009
     Test Purpose: Verify that each SUT transmits an Uplink
                     Information Attribute (ULIA) information group
                     (34) containing one or more outgoing resource
                     availability information groups (128)
                     describing all metrics.
     Reference: 5.6.2.1.4 (Hp5 & Hp6), 5.6.2.2, 5.6.2.2.1

Pre-requisite: Both SUTs are SS_B
                Arrange the topology state of switches SUT A
                and SUT B such that:
                - Tester A and SUT A belong to the same lowest
                level peer group, with PGL Tester A,
                - Tester B and SUT B belong to the same lowest
                level peer group, with PGL Tester B,
                - Both SUTs and both Testers have the same
                parent peer group.
Test Configuration: #3a

Test Set-up:
1a.   Connect Tester A (PNNI) to SUT A.
1b.   Connect Tester B (PNNI) to SUT B.
2.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe that one Hello (1-WayOutside) packet is sent
      from each SUT.

Verdict Criteria:
      Observe that an Uplink Information Attribute (ULIA)
      information group (34) containing one or more outgoing
      resource availability information groups (128)describing
      all metrics for all supported service categories is
      present in the next Hello packet sent by each SUT.

Consequence of Failure: If the PNNI protocol information is
                          not passed, the link can not be
                          used, since the resources are not
                          known.

10.   Test Case ID: V4303H__010
      Test Purpose: Verify that two SUTs in different peer groups
                      can agree on a common peer group using outside
                      Hellos, resulting in the advertisement of
                      uplinks by each SUT.
      Reference: 5.6.2.1.3 (CommonHierarchyReceived), 5.6.2.1.4
                      (Hp6 & Hp7), 5.6.2.3
      Pre-requisite: Both SUTs are SS_B
                      Arrange the topology state of switches SUT A
                      and SUT B such that:
                      - Tester A and SUT A belong to the same lowest
                      level peer group, with PGL Tester A,

                              - Tester B and SUT B belong to the same lowest
                              level peer group, with PGL Tester B,
                              - Both SUTs and both Testers have the same
                              parent peer group.
        Test Configuration: #3a

        Test Set-up:
        1a. Connect Tester A (PNNI) to SUT A.
        1b. Connect Tester B (PNNI) to SUT B.
        2.   Connect the two SUTs with one physical link.

        Test Procedure:
        1.   Monitor the PNNI RCCs (VPI/VCI=0/18) between SUT A and
             SUT B, between Tester A and SUT A, and between Tester B
             and SUT B.
        2.   Enable the links between the Testers and the SUTs, and
             let PNNI routing complete in each peer group.
        3.   Enable the link between the two SUTs
        4.   Observe that Hello packets are sent from each SUT to the
             other SUT.

        Verdict Criteria:
             Observe that SUT A sends a PTSE to Tester A including an
             uplink information group describing an uplink from the
             node ID of SUT A to the parent node ID of SUT B. The
             Common Peer Group ID in that uplink information group is
             the parent peer group ID of SUT A and SUT B.
        - AND -
             Observe that SUT B sends a PTSE to Tester B including an
             uplink information group describing an uplink from the
             node ID of SUT B to the parent node ID of SUT A. The
             Common Peer Group ID in that uplink information group is
             the parent peer group ID of SUT A and SUT B.

11. Test Case ID: V4303H__011
     Test Purpose: Verify that when SUT B is in the parent peer
                     group of SUT A, the SUTs can agree on a common
                     peer group using outside Hellos, resulting in
                     the advertisement of an uplink by SUT A and an
                     attempt to establish an SVCC-based RCC from
                     SUT B to the parent LGN of SUT A.
     Reference: 5.5.5, 5.6.2.1.3 (CommonHierarchyReceived),
                     5.6.2.1.4 (Hp6 & Hp7), 5.6.2.3
     Pre-requisite: SUT A is SS_B.

```
                         SUT B is SS_N.
                         Arrange the togology state of switches SUT A
                         and SUT B such that:
                         - Tester A and SUT A belong to the same lowest
                         level peer group, with PGL Tester A,
                         - SUT B's lowest level peer group is the
                         parent peer group of Tester A and SUT A,
                         - SUT B's node ID is larger than the parent
                         node ID of Tester A and SUT A.
Test Configuration:  #2


Test Set-up:
1.    Connect Tester A (PNNI) to SUT A.
2.    Connect the two SUTs with one physical link.


Test Procedure:
1.    Monitor the PNNI RCCs (VPI/VCI=0/18) between SUT A and
      SUT B, and between Tester A and SUT A.  Also monitor the
      PNNI signalling channel (VPI/VCI=0/5) between SUT A and
      SUT B.
2.    Enable the link between Tester A and SUT A, and let PNNI
      routing complete in that peer group.
3.    Enable the link between the two SUTs.
4.    Observe that Hello packets are sent from each SUT to the
      other SUT.


Verdict Criteria:
      Observe that SUT A sends a PTSE to Tester A including an
      uplink information group describing an uplink from the
      node ID of SUT A to the node ID of SUT B.  The Common
      Peer Group ID in that uplink information group is the
      parent peer group ID of SUT A, which is also the peer
      group ID of SUT B.
- AND -
      Observe that SUT B sends a SETUP message to SUT A.  The
      called party address in the SETUP message is the address
      of the parent node of SUT A, as indicated in the nodal
      hierarchy list advertised in SUT A's Hellos.


Consequence of Failure:   The link between the SUTs cannot be
                          used and the hierarchy cannot be
                          established.




12.   Test Case ID:   E4303H__012
```

Test Purpose: Verify that after a physical link failure,
                   when corrected, that the Hello protocol starts
                   over again from the beginning.
Reference: 5.6.2.1.4 (Hp1), 5.6.2.3
Pre-requisite: Both SUTs are SS_B
                   Arrange the topology state of switches SUT A
                   and SUT B such that:
                   - Tester A and SUT A belong to the same lowest
                   level peer group, with PGL Tester A,
                   - Tester B and SUT B belong to the same lowest
                   level peer group, with PGL Tester B,
                   - Both SUTs and both Testers have the same
                   parent peer group.
Test Configuration: #3a

Test Set-up:
1a.   Connect Tester A (PNNI) to SUT A.
1b.   Connect Tester B (PNNI) to SUT B.
2.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe at least one Hello (2-WayOutsideReceived) sent
      from each SUT.
3.   Disconnect/remove the physical link between the two
      SUTs. (Note: ILMI procedures may provide another way to
      indicate that the link is down. This requires a
      different test configuration also)
4.   Reconnect the two SUTs using the same ports.

Verdict Criteria:
      The first Hello packet observed from each SUT will have
      the Remote node ID field and Remote port ID field set to
      zero; and Hello Interval field, Port ID field and Node
      ID set to non-zero.

Consequence of Failure: The old PNNI information was
                           retained causing the protocol not to
                           operate.

4.4 4.4   Database Synchronization Protocol

4.4.1 For the Database Synchronization Protocol (SS_M)

All tests in this section require both SUTs to be in the same
lowest level peer group.

All tests in this section use Test Configuration #1.

Tests in this section should only be run, if the SUTs passed
Test Case V4301H__007.
----
1.   Test Case ID: V4401DBS001
      Test Purpose: Verify that the Database Synchronization
                      protocol commences only after reaching the 2-
                      WayInside state.
      Reference: 5.7
      Pre-requisite: Both SUTs must be in the same lowest level
                      peer group and have passed Test Case
                      V4301H__007.
      Test Configuration: #1

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Observe that no Database summary packets are
            transmitted.
      3.   Observe that Test Case V4301H__007 occurs.

      Verdict Criteria:
            Observe that a Database Summary packet is sent from each
            SUT after reaching Test Procedure step #3 and not
            before.

      Consequence of Failure: The Database Synchronization
                                protocol is operating before the
                                link to the neighbor is active
                                (which is indicated by reaching the
                                2-WayInside state).

2.   Test Case ID: V4401DBS002

Test Purpose: Verify that the SUTs agree on which SUT is
                   master and which SUT is slave.
Reference: 5.7
Pre-requisite: Both SUTs must be in the same lowest level
                   peer group and have passed Test Case
                   V4301H__007.
Test Configuration: #1

Test Set-up:
1.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Store the Node ID for both SUT A and SUT B.
3.   Observe that no Database summary packets are
       transmitted.
4.   Observe that Test Case V4301H__007 occurs.
5.   Observe that one Database summary packet is sent from
       the SUT with the higher node ID from Test Procedure step
       #2 and store the DS sequence number of that Database
       summary packet.
6.   Ignore any Database summary packets sent from the SUT
       with the lower node ID before Test Procedure step #5.

Verdict Criteria:
           Observe that the next Database summary packet sent
           by the SUT with the lower node ID contains the
           Master bit set to zero, the Initialize bit to zero,
           and the DS sequence number set to the value stored
           for the SUT which has the higher node ID from Test
           procedure step 2 and contains some data base
           summaries.
       - OR -
           Ignore the next Database summary packet sent by the
           SUT with the lower node ID, if it contains the
           Master, More and Initialize bits set to one and the
           contents of the packet is empty. Then observe that
           the next Database summary packet sent by the SUT
           with the lower node ID contains the Master bit set
           to zero, the Initialize bit to zero, and the DS
           sequence number set to the value stored for the SUT
           which has the higher node ID from Test procedure
           step 2 and contains some data base summaries.
       - AND -
           Observe that the next Database summary packet sent
           by the SUT with the higher node ID contains the

Master bit set to one, the Initialize bit to zero,
and the DS sequence number set to the value stored
for the SUT with the higher node ID from Test
procedure step 2 incremented by one and contains
some data base summaries.

- OR -

Ignore the next Database summary packet sent by the
SUT with the higher node ID, if it contains the
Master, More and Initialize bits set to one and the
contents of the packet is empty. Then observe that
the next Database summary packet sent by the SUT
with the higher node ID contains the Master bit set
to one, the Initialize bit to zero, and the DS
sequence number set to the value stored for the SUT
with the higher node ID from Test procedure step 2
incremented by one and contains some data base
summaries."

Consequence of Failure: If a master and slave are not agreed
                           to, then the Database
                           Synchronization protocol can not
                           proceed to next step and begin
                           exchanging databases.

3.   Test Case ID: V4401DBS003
     Test Purpose: Verify that the SUTs request the PTSEs that
                      were contained in the Database summary
                      packets.
     Reference: 5.7.7
     Pre-requisite: Both SUTs must be in the same lowest level
                      peer group and have passed Test Case
                      V4401DBS002.
     Test Configuration: #1

     Test Set-up:
     1.   Connect the two SUTs with one physical link.

     Test Procedure:
     1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
     2.   Observe that Test Case V4401DBS002 occurs.
     3.   Store the Nodal PTSE summaries from each database
          summary packet.

     Verdict Criteria:

Observe that each SUT sends a PTSERequest packet for
each Nodal PTSE summaries received from the other SUT.

Consequence of Failure: If the SUT does not request
                          information, then it can not learn
                          about the network to which it is
                          attached and therefore can not
                          create routes for calls.

4.   Test Case ID: V4401DBS004
     Test Purpose: Verify that the SUTs exchange their complete
                     Database summaries.
     Reference: 5.7 & 5.8.2
     Pre-requisite: Both SUTs must be in the same lowest level
                     peer group and have passed Test Case
                     V4401DBS003.
     Test Configuration: #1

     Test Set-up:
     1.   Connect the two SUTs with one physical link.

     Test Procedure:
     1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
     2.   Observe that Test Case V4401DBS003 occurs.
     3.   Store the PTSERequest packets from each SUT.

     Verdict Criteria:
          Observe that each SUT sends one or more PTSP packets
          that contain the PTSEs for each PTSE Requested by the
          other SUT until at least one occurrence of each PTSE is
          found.

     Consequence of Failure: If the SUTs do not send their entire
                               database information, then they can
                               not learn the complete information
                               about each other.

5.   Test Case ID: V4401DBS005
     Test Purpose: Verify that neither SUT advertises this lower
                     -level link until the neighboring peer state
                     machine is in the Full state.
     Reference: 5.7

Pre-requisite: Both SUTs must be in the same lowest level
                peer group and have passed Test Case
                V4401DBS003.
Test Configuration: #1

Test Set-up:
1.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe that Test Case V4401DBS003 occurs.
3.   Store all PTSEs from each SUT.
4.   Observe that this link is not advertised in any of the
      PTSEs.
5.   Observe that Test Case V4401DBS004 occurs.

Verdict Criteria:
      Observe that a PTSE for this link is originated by
      either SUT.
Consequence of Failure: If either SUT advertises the shared
                          link before reaching the Full state,
                          system may become confused since
                          this would indicate that the link
                          already existed, but it just
                          started.

4.4.2 4.4.2   For the Database Synchronization Protocol (SS_P)

All tests in this section use Test Configuration #5.

Tests in this section are carried out over an SVC Based RCC which
is established between the two SUTs. Therefore it is assumed that
for the given configuration, the two SUTs have passed the
necessary tests to ensure this capability. A high level
description of these necessary tests is now described.

i)   Observations at Monitor Points DA and DC should be similar to
      those test cases in section 4.6.2.
      (i.e. for Monitor Point DA, SUT A is SS_P and Tester D is not
      SS_P: V4602PGL001 and V4602PGL002;
      for Monitor Point DC, SUT B is SS_P and Tester D is not SS_P:
      V4602PGL003 and V4602PGL004)
ii)   Followed by observations at Monitor Points DA and DC similar
      to those test cases in section 4.7.1
iii) Followed by the same observations at both Monitor Points DA
      and DC similar to those test cases in section 4.8.1 i) where
      both SUTs are PGL
      (i.e. V4801LGN004, V4801LGN005, and V4801LGN006)
iv)   Followed by the same observations at both Monitor Points DA
      and DC similar to those test cases in section 4.8.2.
      (i.e. V4802LGN001 and V4802LGN002)
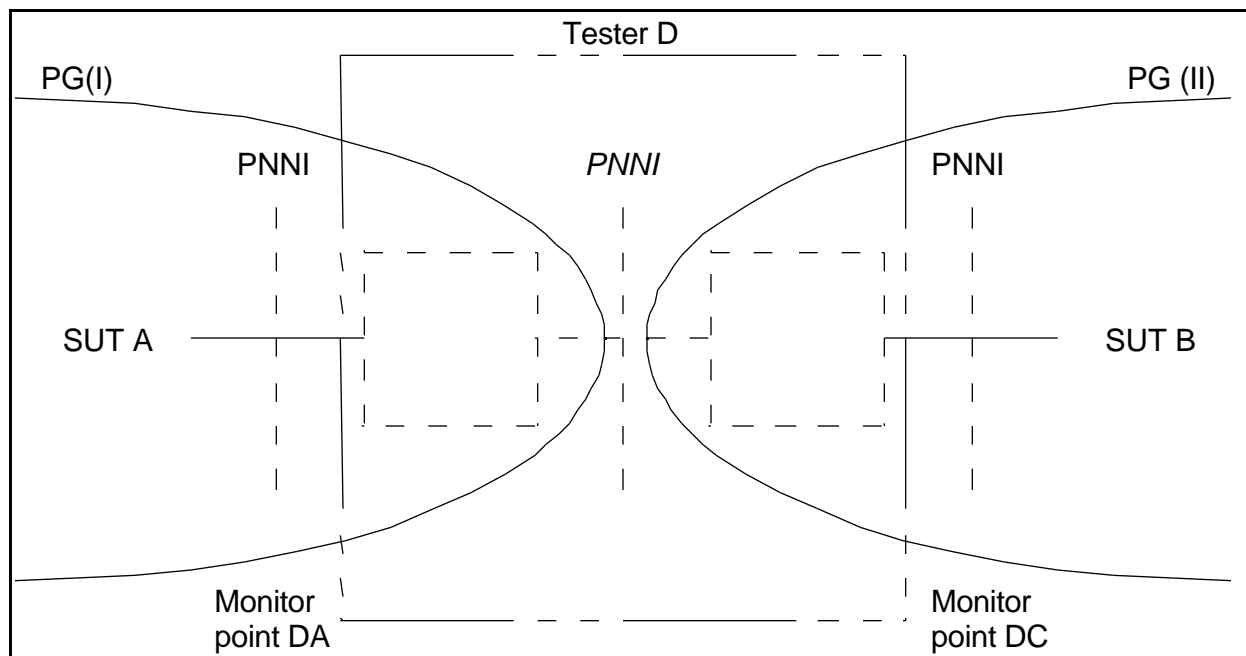
Figure 4.4.2-1

```
     ------------------------------------------------
1.   Test Case ID:   V4402DBS001
     Test Purpose:   Verify that the Database Synchronization
                     protocol commences only after reaching the 2-
                     WayInside state.
     Reference:      5.7
     Pre-requisite:  Both SUTs are SS_P,
                     Arrange the topology state of switches SUT A,
                     SUT B, and Tester D such that:
                     - SUT A and SUT B are in different peer
                     groups,
                     -Tester D has two lowest level nodes, one in
                     SUT A's peer group and one in SUT B's peer
                     group that are logically connected with a PNNI
                     link (see figure 4.4.2-1),
                     - Both SUTs are configured as PGLs with the
                     same parent peer group.
     Test Configuration:  #5

     Test Set-up:
     1.   Connect Tester D (PNNI) to SUT A.
     2.   Connect Tester D (PNNI) to SUT B.

     Test Procedure:
     1.   Monitor the PNNI Signalling channel (VPI/VCI=0/5)
          between SUT A and Tester D and between SUT B and Tester
          D.
     2.   Store the VPI/VCIs in the SETUP messages sent to
          establish the SVCC-based RCC.
     3.   Monitor the PNNI RCC (VPI/VCIs of the SVCC-based RCC)
          between SUT A and SUT B (monitor points DA and DC).
     4.   Observe that no Database summary packets are
          transmitted.
     5.   Observe that Test Case V4802LGN002 occurs.

     Verdict Criteria:
          Observe that a Database Summary packet is sent from each
          SUT after reaching Test Procedure step #5 and not
          before.

     Consequence of Failure:   The Database Synchronization
                               protocol is operating before the
                               link to the neighbor is active
                               (which is indicated by reaching the
                               2-WayInside state).
```

2.   Test Case ID: V4402DBS002
        Test Purpose: Verify that the SUTs agree on which SUT is
                         master and which SUT is slave.
        Reference: 5.7
        Pre-requisite: Both SUTs are SS_P,
                         Arrange the topology state of switches SUT A,
                         SUT B, and Tester D such that:
                         - SUT A and SUT B are in different peer
                         groups,
                         -Tester D has two lowest level nodes, one in
                         SUT A's peer group and one in SUT B's peer
                         group that are logically connected with a PNNI
                         link (see figure 4.4.2-1),
                         - Both SUTs are configured as PGLs with the
                         same parent peer group.
        Test Configuration: #5

        Test Set-up:
        1.   Connect Tester D (PNNI) to SUT A.
        2.   Connect Tester D (PNNI) to SUT B.

        Test Procedure:
        1.   Monitor the PNNI Signalling channel (VPI/VCI=0/5)
                between SUT A and Tester D and between SUT B and Tester
                D.
        2.   Store the VPI/VCIs in the SETUP messages sent to
                establish the SVCC-based RCC.
        3.   Monitor the PNNI RCC (VPI/VCIs of the SVCC-based RCC)
                between SUT A and SUT B (monitor points DA and DC).
        4.   Store the Node ID for both SUT A and SUT B.
        5.   Observe that no Database summary packets are
                transmitted.
        6.   Observe that Test Case V4802LGN002 occurs.
        7.   Observe that one Database summary packet is sent from
                the SUT with the higher node ID from Test Procedure step
                #4 and store the DS sequence number of that Database
                summary packet.
        8.   Ignore any Database summary packets sent from the SUT
                with the lower node ID before Test Procedure step #7.

        Verdict Criteria:
                    Observe that the next Database summary packet sent
                    by the SUT with the lower node ID contains the
                    Master bit set to zero, the Initialize bit to zero,

and the DS sequence number set to the value stored
for the SUT which has the higher node ID from Test
procedure step #4 and contains some data base
summaries.
- OR -
Ignore the next Database summary packet sent by the
SUT with the lower node ID, if it contains the
Master, More and Initialize bits set to one and the
contents of the packet is empty. Then observe that
the next Database summary packet sent by the SUT
with the lower node ID contains the Master bit set
to zero, the Initialize bit to zero, and the DS
sequence number set to the value stored for the SUT
which has the higher node ID from Test procedure
step #4 and contains some data base summaries.
- AND -

Observe that the next Database summary packet sent
by the SUT with the higher node ID contains the
Master bit set to one, the Initialize bit to zero,
and the DS sequence number set to the value stored
for the SUT with the higher node ID from Test
procedure step #4 incremented by one and contains
some data base summaries.
- OR -
Ignore the next Database summary packet sent by the
SUT with the higher node ID, if it contains the
Master, More and Initialize bits set to one and the
contents of the packet is empty. Then observe that
the next Database summary packet sent by the SUT
with the higher node ID contains the Master bit set
to one, the Initialize bit to zero, and the DS
sequence number set to the value stored for the SUT
with the higher node ID from Test procedure step #4
incremented by one and contains some data base
summaries."

Consequence of Failure: If a master and slave are not agreed
                           to, then the Database
                           Synchronization protocol can not
                           proceed to next step and begin
                           exchanging databases.

3.   Test Case ID: V4402DBS003

Test Purpose: Verify that the SUTs request the PTSEs that
                  were contained in the Database summary
                  packets.
Reference: 5.7.7
Pre-requisite: Both SUTs must have passed Test Case
                  V4402DBS002.
                  Both SUTs are SS_P,
                  Arrange the topology state of switches SUT A,
                  SUT B, and Tester D such that:
                  - SUT A and SUT B are in different peer
                  groups,
                  - Tester D has two lowest level nodes, one in
                  SUT A's peer group and one in SUT B's peer
                  group that are logically connected with a PNNI
                  link (see figure 4.4.2-1),
                  - Both SUTs are configured as PGLs with the
                  same parent peer group.
Test Configuration: #5

Test Set-up:
1.   Connect Tester D (PNNI) to SUT A.
2.   Connect Tester D (PNNI) to SUT B.

Test Procedure:
1.   Monitor the PNNI Signalling channel (VPI/VCI=0/5)
      between SUT A and Tester D and between SUT B and Tester
      D.
2.   Store the VPI/VCIs in the SETUP messages sent to
      establish the SVCC-based RCC.
3.   Monitor the PNNI RCC (VPI/VCIs of the SVCC-based RCC)
      between SUT A and SUT B (monitor points DA and DC).
4.   Observe that Test Case V4402DBS002 occurs.
5.   Store the Nodal PTSE summaries from each database
      summary packet.

Verdict Criteria:
      Observe that each SUT sends a PTSERequest packet for
      each Nodal PTSE summaries received from the other SUT.

Consequence of Failure: If the SUT does not request
                           information, then it can not learn
                           about the network to which it is
                           attached and therefore can not
                           create routes for calls.

4.   Test Case ID: V4402DBS004
       Test Purpose: Verify that the SUTs exchange their complete
                        Database summaries.
       Reference: 5.7 & 5.8.2
       Pre-requisite: Both SUTs must have passed Test Case
                        V4402DBS003.
                        Both SUTs are SS_P,
                        Arrange the topology state of switches SUT A,
                        SUT B, and Tester D such that:
                        - SUT A and SUT B are in different peer
                        groups,
                        - Tester D has two lowest level nodes, one in
                        SUT A's peer group and one in SUT B's peer
                        group that are logically connected with a PNNI
                        link (see figure 4.4.2-1),
                        - Both SUTs are configured as PGLs with the
                        same parent peer group.
       Test Configuration: #5

       Test Set-up:
       1.   Connect Tester D (PNNI) to SUT A.
       2.   Connect Tester D (PNNI) to SUT B.

       Test Procedure:
       1.   Monitor the PNNI Signalling channel (VPI/VCI=0/5)
              between SUT A and Tester D and between SUT B and Tester
              D.
       2.   Store the VPI/VCIs in the SETUP messages sent to
              establish the SVCC-based RCC.
       3.   Monitor the PNNI RCC (VPI/VCIs of the SVCC-based RCC)
              between SUT A and SUT B (monitor points DA and DC).
       4.   Observe that Test Case V4402DBS003 occurs.
       5.   Store the PTSERequest packets from each SUT.

       Verdict Criteria:
              Observe that each SUT sends one or more PTSP packets
              that contain the PTSEs for each PTSE Requested by the
              other SUT until at least one occurrence of each PTSE is
              found.

       Consequence of Failure: If the SUTs do not send their entire
                                 database information, then they can
                                 not learn the complete information
                                 about each other.

5.   Test Case ID: V4402DBS005
     Test Purpose: Verify that neither SUT advertises this lower
                      -level link until the neighboring peer state
                      machine is in the Full state.
     Reference: 5.7
     Pre-requisite: Both SUTs must have passed Test Case
                      V4402DBS003.
                      Both SUTs are SS_P,
                      Arrange the topology state of switches SUT A,
                      SUT B, and Tester D such that:
                      - SUT A and SUT B are in different peer
                      groups,
                      - Tester D has two lowest level nodes, one in
                      SUT A's peer group and one in SUT B's peer
                      group that are logically connected with a PNNI
                      link (see figure 4.4.2-1),
                      - Both SUTs are configured as PGLs with the
                      same parent peer group.
     Test Configuration: #5

     Test Set-up:
     1.   Connect Tester D (PNNI) to SUT A.
     2.   Connect Tester D (PNNI) to SUT B.

     Test Procedure:
     1.   Monitor the PNNI Signalling channel (VPI/VCI=0/5)
          between SUT A and Tester D and between SUT B and Tester
          D.
     2.   Store the VPI/VCIs in the SETUP messages sent to
          establish the SVCC-based RCC.
     3.   Monitor the PNNI RCC (VPI/VCIs of the SVCC-based RCC)
          between SUT A and SUT B (monitor points DA and DC).
     4.   Observe that Test Case V4402DBS003 occurs.
     5.   Store all PTSEs from each SUT.
     6.   Observe that this link is not advertised in any of the
          PTSEs.
     7.   Observe that Test Case V4402DBS004 occurs.

     Verdict Criteria:
          Observe that a PTSE for this link is originated by
          either SUT.

     Consequence of Failure: If either SUT advertises the shared
                               link before reaching the Full state,
                               system may become confused since

this would indicate that the link
already existed, but it just
started.

4.5 4.5   Flooding

4.5.1 Flooding

All tests in this section require both SUTs to be in the same
lowest level peer group.

All tests in this section use Test Configuration #2.

Tests in this section should only be run, if the SUTs passed
Test Case V4401DBS004.
----
1.   Test Case ID: V4501FLD001
     Test Purpose: Verify that SUT A floods a PTSE to SUT B
     Reference: 5.8.3.3 (6) (d) (iv)
     Pre-requisite: Both SUTs must be in the same lowest level
                     peer group and have passed Test Case
                     V4401DBS004.
     Test Configuration: #2

     Test Set-up:
     1.   Connect the two SUTs with one physical link.
     2.   Connect Tester A to SUT A using a PNNI interface.

     Test Procedure:
     1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
     2.   Observe that Test Case V4401DBS004 occurs (i.e. Database
          Synchronization in Full state).
     3.   Connect Tester A to SUT A using a PNNI interface.
     4.   Monitor interface A until Hello protocol is in 2-Way
          Inside (similar behavior to Test Case V4301H__007)
     5.   Monitor interface A until Database Synchronization is in
          state Negotiating and the Tester A is ready to send its
          first Database Summary Packet.
     6.   Tester A sends first Database Summary packet containing
          at least one PTSE header.
     7.   Observe a PTSE request from SUT A for this PTSE.
     8.   Send PTSE to SUT A.

     Verdict Criteria:
          Observe that this PTSE is sent (i.e. flooded) from SUT A
          to SUT B with the PTSE Remaining Lifetime decremented by
          one.

Consequence of Failure: New or updated information would not
                           propagate through out the peer
                           group, thus preventing each switch
                           learning about all other nodes in
                           its peer group.

2.   Test Case ID: V4501FLD002
      Test Purpose: Verify that SUT A does not flood a PTSE with
                       PTSE Remaining Lifetime of ExpiredAge to SUT
                       B.
      Reference: 5.8.3.3 (5) (b)
      Pre-requisite: Both SUTs must be in the same lowest level
                       peer group and have passed Test Case
                       V4401DBS004.
      Test Configuration: #2

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   Connect Tester A to SUT A using a PNNI interface.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Observe that Test Case V4401DBS004 occurs (i.e. Database
            Synchronization in Full state).
      3.   Connect Tester A to SUT A using a PNNI interface.
      4.   Monitor interface A until Hello protocol is in 2-Way
            Inside (similar behavior to Test Case V4301H__007)
      5.   Monitor interface A until Database Synchronization is in
            state Full (similar to behavior of Test Case
            V4401DBS004).
      8.   Tester A send a PTSE with Remaining Lifetime set to
            ExpiredAge to SUT A.

      Verdict Criteria:
            Observe that this PTSE is not sent (i.e. flooded) from
            SUT A to SUT B.

**4.6 Consequence of Failure: *Flooding needless information
    (possible congestion).***

4.6   Peer Group Leader Election

4.6.1 For the Peer Group Leader Election (not PGL capable)

All tests in this section require both SUTs to be in the same peer group.

Tests in this section should only be run, if the SUTs passed Test Case V4401DBS004 (i.e. completed Database Synchronization (in FULL state).
----
1.   Test Case ID: V4601PGL001
      Test Purpose: Verify that the nodes participate in the Peer
                      group leader elections, when the Non-transit
                      for PGL Election flag is not set.
      Reference: 5.10.1.1, 5.10.1.1.5, PGLE5
      Pre-requisite: - Both SUTs must be in the same peer group,
                      - Both SUTs have passed Test Case V4401DBS004,
                      and
                      - neither SUT is PGL capable.
      Test Configuration: #1

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Observe that Test Case V4401DBS004 occurs.

      Verdict Criteria:
           Observe that a PTSE is sent from SUT A with its
           leadership priority, "I am leader" bit and the Preferred
           peer group leader node ID set to zero.
      - AND -
           Observe that a PTSE is sent from SUT B with its
           leadership priority, "I am leader" bit and the Preferred
           peer group leader node ID set to zero.

      Consequence of Failure: If these PTSEs are not sent then a
                                PGL can not be elected.

2.   Test Case ID: V4601PGL002
      Test Purpose: Verify that the nodes continue participating
                      in the Peer group leader elections, when the

                         Non-transit for PGL Election flag is not set.
                         (i.e. PGLInitTimer Expires).
        Reference: 5.10.1.1
        Pre-requisite: - Both SUTs must be in the same peer group,
                         - both SUTs have passed Test Case V4601PGL001,
                         and
                         - neither SUT is PGL capable.
        Test Configuration: #1

        Test Set-up:
        1.   Connect the two SUTs with one physical link.

        Test Procedure:
        1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
        2.   Observe that Test Case V4601PGL001 occurs.

        Verdict Criteria:
              Observe that a PTSE is sent from SUT A with its
              leadership priority, "I am leader" bit and the Preferred
              peer group leader node ID set to zero.
        - AND -
              Observe that a PTSE is sent from SUT B with its
              leadership priority, "I am leader" bit and the Preferred
              peer group leader node ID set to zero.

        Consequence of Failure: If these PTSEs are not sent then a
                                  PGL can not be elected.

3.   Test Case ID: V4601PGL003
      Test Purpose: Verify that SUT B participates in the Peer
                       group leader elections, when the Non-transit
                       for PGL Election flag is not set.
      Reference: 5.10.1.1, 5.10.1.1.5, PGLE5
      Pre-requisite: - Both SUTs must be in the same peer group,
                       - both SUTs have passed Test Case V4401DBS004,
                       and
                       - neither SUT is PGL capable.
      Test Configuration: #2

      Test Set-up:
      1.   Connect Tester A (PNNI) and SUT A with one physical
            link.
      2.   After the PNNI between Tester A and SUT A has reached 2-
            Way Inside (Hello), Full (Database Synchronization), and

OperNotPGL (Peer Group Leader Election), then connect
SUT B to SUT A with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe that Test Case V4401DBS004 occurs.

Verdict Criteria:
      Observe that a PTSE is sent from SUT B with its
      leadership priority, "I am leader" bit and the Preferred
      peer group leader node ID set to zero.

Consequence of Failure: If these PTSEs are not sent then a
                           PGL can not be elected.

4.   Test Case ID: V4601PGL004
      Test Purpose: Verify that the SUT B elects a PGL, when the
                       Non-transit for PGL Election flag is not set.
                       (PGLInitTimer Expires).
      Reference: 5.10.1.1, 5.10.1.1.5, PGLE5
      Pre-requisite: - Both SUTs must be in the same peer group,
                       - both SUTs have passed Test Case V4401DBS004,
                       - neither SUT is PGL capable,
                       - Tester A has a non-zero peer group
                       leadership priority.
      Test Configuration: #2

      Test Set-up:
      1.   Connect Tester A (PNNI) and SUT A with one physical
            link.
      2.   After the PNNI between Tester A (is PGL) and SUT A has
            reached 2-Way Inside (Hello), Full (Database
            Synchronization), and SUT A is in OperNotPGL and Tester
            A is in OperPGL (Peer Group Leader Election), then
            connect SUT B to SUT A with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Observe that Tester A is elected PGL by SUT A and Tester
            A accepts.
      3.   Observe that Test Case V4401DBS004 occurs.
      4.   Observe that SUT B sends a PTSE with zero in the
            preferred peer group leader, peer group leadership
            priority, and "I am leader" bits.

Verdict Criteria:
Observe that a PTSE is sent from SUT B with its
leadership priority and "I am leader" bit set to zero
and the Preferred peer group leader node ID is not zero
(i.e. the node ID of the PGL (e.g. that Tester A is
advertising)).

Consequence of Failure: SUT B will not elect a valid PGL and
                           may cause routing problems when
                           processing DTLs in the SETUP
                           message.

5.   Test Case ID: V4601PGL005
      Test Purpose: Verify that SUT B continues to participate in
                       the Peer group leader elections by electing a
                       PGL when a PGL capable device joins the peer
                       group, when the Non-transit for PGL Election
                       flag is not set.
      Reference: 5.10.1.1, 5.10.1.1.5, PGLE4
      Pre-requisite: - Both SUTs must be in the same peer group,
                       - both SUTs have passed Test Case V4601PGL002
                       and Test Case V4501FLD001,
                       - neither SUT is PGL capable, and
                       - Tester A has a non-zero peer group
                       leadership priority.
      Test Configuration: #2

      Test Set-up:
      1.   Connect SUT A and SUT B with one physical link.
      2.   After the PNNI between SUT A and SUT B has reached 2-Way
            Inside (Hello), Full (Database Synchronization), and
            OperNotPGL (Peer Group Leader Election)(i.e. complete
            Test Case V4601PGL002), then connect Tester A to SUT A
            with a PNNI.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Observe that Test Case V4601PGL002 occurs between SUT A
            and SUT B (i.e. at Monitor point D).
      3.   Connect Tester A to SUT A with a PNNI.
      4.   Observe that Test Case V4401DBS004 occurs at monitor
            point A.
      5.   Observe that the information from Tester A (i.e. PGL) is
            flooded to SUT B.

6.   Observe that test case V4601PGL002 occurs at monitor
      point A.

Verdict Criteria:
      Observe that a PTSE is sent across monitor point D (and
      flooded across monitor point A) from SUT B with its
      leadership priority, "I am leader" bit and the Preferred
      peer group leader node ID set to PGL advertised from
      Tester A.

Consequence of Failure: SUT B will not elect a valid PGL and
                          may cause routing problems when
                          processing DTLs in a SETUP message.

4.6.2 6 – 8   Repeat Test Cases 3 – 5 with SUT A and SUT B
      interchanged.

4.6.2For the Peer Group Leader Election (one SUT is PGL
capable)

All tests in this section require both SUTs to be in the same peer
group.

Tests in this section should only be run, if the SUTs passed
Test Case V4401DBS004.
----
1.   Test Case ID: V4602PGL001
      Test Purpose: Verify that SUT B elects SUT A as Peer Group
                       Leader (Advertise their preferred Peer Group
                       Leader).
      Reference: 5.10.1.1, PGLE7
      Pre-requisite: - Both SUTs must be in the same peer group,
                       - both SUTs have passed Test Case V4401DBS004,
                       and
                       - SUT A is SS_P and SUT B is not SS_P.
      Test Configuration: #1

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Observe that Test Case V4401DBS004 occurs.
      3a.   Observe that a PTSE is sent from SUT A with its
            leadership priority set to something other than zero and
            "I am leader" bit and the Preferred peer group leader
            node ID set to zero.
      3b.   Observe that a PTSE is sent from SUT B with its
            leadership priority, "I am leader" bit and the Preferred
            peer group leader node ID set to zero.

      Verdict Criteria:
            1) Observe that a PTSE is sent from SUT B with its
            leadership priority, "I am leader" bit set to zero and
            the Preferred peer group leader node ID set to that of
            SUT A.
            2) Observe that a PTSE is sent from A with its
            leadership priority, "I am leader" bit set to zero and
            the preferred peer group leader node ID set to that of
            SUT A (itself).

      Consequence of Failure: SUT B will not elect a valid PGL and
                                may cause routing problems when

                                    processing DTLs in a SETUP message.
                                    Also SUT A may not get enough votes
                                    to become PGL.

2.   Test Case ID: V4602PGL002
       Test Purpose: Verify that SUT A becomes Peer Group Leader.
       Reference: 5.10.1.1, PGLE8
       Pre-requisite: - Both SUTs must be in the same peer group,
                        - both SUTs have passed Test Case V4401DBS004,
                        and
                        - SUT A is SS_P and SUT B is not SS_P.
       Test Configuration: #1

       Test Set-up:
       1.   Connect the two SUTs with one physical link.

       Test Procedure:
       1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
       2.   Observe that Test Case V4401DBS004 occurs.
       3a.   Observe that a PTSE is sent from SUT A with its
             leadership priority set to something other than zero and
             "I am leader" bit and the Preferred peer group leader
             node ID set to zero.
       3b.   Observe that a PTSE is sent from SUT B with its
             leadership priority, "I am leader" bit and the Preferred
             peer group leader node ID set to zero.
       4a.   Observe that a PTSE is sent from SUT A with its
             leadership priority set to something other than zero,
             the same as observed in step 3a, "I am leader" bit set
             to zero and the Preferred peer group leader node ID set
             to that of SUT A, itself.
       4b.   Observe that a PTSE is sent from SUT B with its
             leadership priority, "I am leader" bit set to zero and
             the Preferred peer group leader node ID set to that of
             SUT A.

       Verdict Criteria
             Observe that a PTSE is sent from SUT A with its updated
             leadership priority increased by GroupLeaderIncrement,
             "I am leader" bit set to one, and Preferred peer group
             leader node ID set to that of SUT A.

       Consequence of Failure: SUT A does not become PGL, which may
                                 lead to no hierarchy of peer groups.

3.   Test Case ID: V4602PGL003 (similar to #1, except SUT A and
                       SUT B are interchanged)
      Test Purpose: Verify that SUT A elects SUT B as Peer Group
                      Leader.
      Reference: 5.10.1.1, PGLE7
      Pre-requisite: - Both SUTs must be in the same peer group,
                      - both SUTs have passed Test Case V4401DBS004,
                      and
                      - SUT B is SS_P and SUT A is not SS_P.
      Test Configuration: #1

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Observe that Test Case V4401DBS004 occurs.
      3a.   Observe that a PTSE is sent from SUT B with its
            leadership priority set to something other than zero and
            "I am leader" bit and the Preferred peer group leader
            node ID set to zero.
      3b.   Observe that a PTSE is sent from SUT A with its
            leadership priority, "I am leader" bit and the Preferred
            peer group leader node ID set to zero.

      Verdict Criteria:
            Observe that a PTSE is sent from SUT A with its
            leadership priority, "I am leader" bit set to zero and
            the Preferred peer group leader node ID set to that of
            SUT B.

      Consequence of Failure: SUT A will not elect a valid PGL and
                                may cause routing problems when
                                processing DTLs in a SETUP message.
                                Also SUT B may not get enough votes
                                to become PGL.

4.   Test Case ID: V4602PGL004 (similar to #2, except SUT A and
                       SUT B are interchanged)
      Test Purpose: Verify that SUT B becomes Peer Group Leader.
      Reference: 5.10.1.1, PGLE8

Pre-requisite: - Both SUTs must be in the same peer group,
                - both SUTs have passed Test Case V4401DBS004,
                and
                - SUT B is SS_P and SUT A is not SS_P.
Test Configuration: #1

Test Set-up:
1.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe that Test Case V4401DBS004 occurs.
3a.   Observe that a PTSE is sent from SUT B with its
       leadership priority set to something other than zero and
       "I am leader" bit and the Preferred peer group leader
       node ID set to zero.
3b.   Observe that a PTSE is sent from SUT A with its
       leadership priority, "I am leader" bit and the Preferred
       peer group leader node ID set to zero.
4a.   Observe that a PTSE is sent from SUT A with its
       leadership priority, "I am leader" bit set to zero and
       the Preferred peer group leader node ID set to that of
       SUT B.
4b.   Observe that a PTSE is sent from SUT B with its
       leadership priority set to something other than zero,
       the same as observed in step 3a, "I am leader" bit set
       to zero and the Preferred peer group leader node ID set
       to that of SUT B, itself.

Verdict Criteria:
       Observe that a PTSE is sent from SUT B with its updated
       leadership priority increased by GroupLeaderIncrement,
       "I am leader" bit set to one, and preferred peer group
       leader node ID set to that of SUT B.

Consequence of Failure: SUT B does not become PGL, which may
                          lead to no hierarchy of peer groups.

5.   Test Case ID: V4602PGL005
       Test Purpose: Verify that SUT A continues to be PGL when
                       another system is attached that is not PGL
                       capable or has a peer group leadership
                       priority lower than SUT A's.
       Reference: 5.10.1.1

Pre-requisite: - Both SUTs must be in the same peer group,
                - both SUTs have passed Test Case V4602PGL002,
                and
                - SUT A is SS_P and SUT B is not SS_P.
Test Configuration: #2

Test Set-up:
1.   Connect the two SUTs with one physical link.
2.   After the PNNI between SUT A and SUT B has reached 2-
     WayInside (Hello), Full (Database Synchronization), and
     SUT A is in state OperPGL and SUT B is in state
     OperNotPGL (Peer group Leader Election), then connect
     Tester A to SUT A with one physical link using a PNNI.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe that Test Case V4602PGL002 occurs.
3.   Connect Tester A and SUT A with a PNNI and wait until
     the PNNI between Tester A and SUT A has reached 2-Way
     Inside (Hello) and Full (Database Synchronization).
     {Tester can be advertising No PGL or a PGL with a lower
     leadership priority than the one advertised by SUT A}

Verdict Criteria:
     Observe that a PTSE is sent from SUT A with the same
     value as previously advertised (i.e. leadership priority
     set equal to SUT A's initial peer group leadership
     priority + GroupLeaderIncrement, "I am leader" bit set
     to one, and Preferred peer group leader node ID set to
     that of SUT A. (Note: This will take some time (upto
     refresh interval))

Consequence of Failure: Peer group becomes unstable (i.e.
                          PGL changes) when new systems are
                          added.

6.   Test Case ID: V4602PGL006
     Test Purpose: Verify that SUT A stops being Peer Group
                     Leader when a system is attached with higher
                     Peer Group Leadership priority.
     Reference: 5.10.1.1.4 (PGLE6)
     Pre-requisite: - Both SUTs must be in the same peer group,
                     - both SUTs have passed Test Case V4602PGL002,
                     and
                     - SUT A is SS_P and SUT B is not SS_P.

Test Configuration: #2

Test Set-up:
1.   Connect the two SUTs with one physical link.
2.   After the PNNI between SUT A and SUT B has reached 2-
      WayInside (Hello), Full (Database Synchronization), and
      SUT A is OperPGL and SUT B is OperNotPGL (Peer group
      Leader Election), then connect Tester A to SUT A with
      one physical link using a PNNI.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe that Test Case V4602PGL002 occurs.
3.   Connect Tester A and SUT A with a PNNI and wait until
      the PNNI between tester A and SUT A has reached 2-Way
      Inside (Hello) and Full (Database Synchronization).
      {Tester A is advertising a PGL with a higher leadership
      priority (including GroupLeaderIncrement) than the one
      advertised by SUT A}

Verdict Criteria:
      Observe that a new Nodal Information PTSE is sent from
      SUT A with the preferred Peer Group Leader ID field
      updated to the value advertised by Tester A, its
      original leadership priority, and "I am leader" bit set
      to zero.

Consequence of Failure: The new PGL may not be elected or
                           the old configuration may cause
                           routing problems.

7.   Test Case ID: V4602PGL007
      Test Purpose: Verify that SUT B continues to be PGL when
                      another system is attached that is not PGL
                      capable or has a peer group leadership
                      priority lower than SUT B's.
      Reference: 5.10.1.1
      Pre-requisite: - Both SUTs must be in the same peer group,
                      - both SUTs have passed Test Case V4602PGL004,
                      and
                      - SUT B is SS_P and SUT A is not SS_P.
      Test Configuration: #2

      Test Set-up:

1.   Connect the two SUTs with one physical link.
2.   After the PNNI between SUT A and SUT B has reached 2-
      WayInside (Hello), Full (Database Synchronization), and
      SUT B is in state OperPGL and SUT A is in state
      OperNotPGL (Peer group Leader Election), then connect
      Tester A to SUT A with one physical link using a PNNI.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe that Test Case V4602PGL004 occurs.
3.   Connect Tester A and SUT A with a PNNI and wait until
      the PNNI between Tester A and SUT A has reached 2-Way
      Inside (Hello) and Full (Database Synchronization).
      {Tester can be advertising No PGL or a PGL with a lower
      leadership priority than the one advertised by SUT B}

Verdict Criteria:
      Observe that no PTSE is sent from SUT B before the PTSE
      Remaining Lifetime is expired or refreshed at which time
      the PTSE will have the same value as previously
      advertised (i.e. leadership priority set equal to SUT
      B's initial peer group leadership priority +
      GroupLeaderIncrement, "I am leader" bit set to one, and
      Preferred peer group leader node ID set to that of SUT
      B.

Consequence of Failure: Peer group becomes unstable (i.e.
                           PGL changes) when new systems are
                           added.

8.   Test Case ID: V4602PGL008
      Test Purpose: Verify that SUT B stops being Peer Group
                      Leader when a system is attached with higher
                      Peer Group Leadership priority.
      Reference: 5.10.1.1.4 (PGLE6)
      Pre-requisite: - Both SUTs must be in the same peer group,
                      - both SUTs have passed Test Case V4602PGL004,
                      and
                      - SUT B is SS_P and SUT A is not SS_P.
      Test Configuration: #2

      Test Set-up:
1.   Connect the two SUTs with one physical link.

2.   After the PNNI between SUT A and SUT B has reached 2-
      WayInside (Hello), Full (Database Synchronization), and
      SUT B is in state OperPGL and SUT A is in state
      OperNotPGL (Peer group Leader Election), then connect
      Tester A to SUT A with one physical link using a PNNI.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe that Test Case V4602PGL004 occurs.
3.   Connect Tester A and SUT A with a PNNI and wait until
      the PNNI between tester A and SUT A has reached 2-Way
      Inside (Hello) and Full (Database Synchronization).
      {Tester A is advertising a PGL with a higher leadership
      priority (including GroupLeaderIncrement) than the one
      advertised by SUT B}

Verdict Criteria:
      Observe that a new Nodal Information PTSE is sent from
      SUT B with the preferred Peer Group Leader ID field
      updated to the value advertised by Tester A, its
      original leadership priority, and "I am leader" bit set
      to zero.

Consequence of Failure: The new PGL may not be elected or
                          the old configuration may cause
                          routing problems.

9.   Test Case ID: V4602PGL009
      Test Purpose: Verify that SUT B elects new Peer Group Leader
                      when a system is attached with Higher Peer
                      Group Leadership priority than SUT's current
                      PGL (i.e. SUT A).
      Reference: 5.10.1.1.4 (PGLE4 & PGLE7)
      Pre-requisite: - Both SUTs must be in the same peer group,
                      - both SUTs have passed Test Case V4602PGL002,
                      and
                      - SUT A is SS_P and SUT B is not SS_P.
      Test Configuration: #2

      Test Set-up:
1.   Connect the two SUTs with one physical link.
2.   After the PNNI between SUT A and SUT B has reached 2-
      WayInside (Hello), Full (Database Synchronization), and
      SUT A is OperPGL and SUT B is OperNotPGL (Peer group

Leader Election), then connect Tester A to SUT A with
one physical link using a PNNI.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe that Test Case V4602PGL002 occurs.
3.   Connect Tester A and SUT A with a PNNI and wait until
      the PNNI between tester A and SUT A has reached 2-Way
      Inside (Hello) and Full (Database Synchronization).
      {Tester A is advertising a PGL with a higher leadership
      priority (including GroupLeaderIncrement) than the one
      advertised by SUT A}

Verdict Criteria:
      Observe that a new Nodal Information PTSE is sent from
      SUT B with the preferred Peer Group Leader ID field
      updated to the value advertised by Tester A, its
      original leadership priority, and "I am leader" bit set
      to zero.

Consequence of Failure: The new PGL may not be elected or
                           the old configuration may cause
                           routing problems.

10.   Test Case ID: V4602PGL010
      Test Purpose: Verify that SUT A elects new Peer Group Leader
                       when a system is attached with Higher Peer
                       Group Leadership priority than SUT's current
                       PGL (i.e. SUT B).
      Reference: 5.10.1.1.4 (PGLE4 & PGLE7)
      Pre-requisite: - Both SUTs must be in the same peer group,
                       - both SUTs have passed Test Case V4602PGL004,
                       and
                       - SUT B is SS_P and SUT A is not SS_P.
      Test Configuration: #2

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   After the PNNI between SUT A and SUT B has reached 2-
            WayInside (Hello), Full (Database Synchronization), and
            SUT B is in state OperPGL and SUT A is in state
            OperNotPGL (Peer group Leader Election), then connect
            Tester A to SUT A with one physical link using a PNNI.

      Test Procedure:

1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe that Test Case V4602PGL004 occurs.
3.   Connect Tester A and SUT A with a PNNI and wait until
     the PNNI between tester A and SUT A has reached 2-Way
     Inside (Hello) and Full (Database Synchronization).
     {Tester A is advertising a PGL with a higher leadership
     priority (including GroupLeaderIncrement) than the one
     advertised by SUT B}

Verdict Criteria:
     Observe that a new Nodal Information PTSE is sent from
     SUT A with the preferred Peer Group Leader ID field
     updated to the value advertised by Tester A, its
     original leadership priority, and "I am leader" bit set
     to zero.

4.6.3 Consequence of Failure: The new PGL may not be elected or
     the old configuration may cause routing problems.

4.6.3For the Peer Group Leader Election (Both SUTs are PGL capable)

All tests in this section require both SUTs to be SS_P capable.

All tests in this section require both SUTs to be in the same peer group.

All tests in this section use Test Configuration #1.

Tests in this section should only be run, if the SUTs passed Test Case V4401DBS004.
----
1.   Test Case ID: V4603PGL001
      Test Purpose: Verify that SUT A becomes Peer Group Leader
                      based on leadership priority.
      Reference: 5.10.1.1, PGLE8
      Pre-requisite: - Both SUTs must be in the same peer group,
                      - both SUTs have passed Test Case V4401DBS004,
                      - both SUTs are SS_P, and
                      - the peer group leadership priority of SUT A
                      is greater than SUT B's.
      Test Configuration: #1

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Observe that Test Case V4401DBS004 occurs.
      3.   Observe that Test Case V4603PGL004 ocurrs.

      Verdict Criteria:
           Observe that a PTSE is sent from SUT A with its updated
           leadership priority increased by GroupLeaderIncrement,
           "I am leader" bit set to one, and Preferred peer group
           leader node ID set to that of SUT A.

      Consequence of Failure: Leadership within the peer group is
                                unstable.

2.   Test Case ID: V4603PGL002
      Test Purpose: Verify that SUT A becomes Peer Group Leader
                      based on Node ID.
      Reference: 5.10.1.1, PGLE8

Pre-requisite: - Both SUTs must be in the same peer group,
                - both SUTs have passed Test Case V4401DBS004,
                - both SUTs are SS_P, and
                - both SUTs have the same peer group
                leadership priority, but the Node ID of SUT A
                is greater than the Node ID of SUT B.
Test Configuration: #1

Test Set-up:
1.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe that Test Case V4401DBS004 occurs.
3.   Observe that Test Case V4603PGL004 occurs.

Verdict Criteria:
      Observe that a PTSE is sent from SUT A with its updated
      leadership priority increased by GroupLeaderIncrement,
      "I am leader" bit set to one, and Preferred peer group
      leader node ID set to that of SUT A.

Consequence of Failure: The leadership of the peer group is
                          unstable.

3.   Test Case ID: V4603PGL003
      Test Purpose: Verify that SUT B elects SUT A as Peer Group
                      Leader based on leadership priority.
      Reference: 5.10.1.1, PGLE7
      Pre-requisite: - Both SUTs must be in the same peer group,
                      - both SUTs have passed Test Case V4401DBS004,
                      - both SUTs are SS_P, and
                      - the peer group leadership priority of SUT A
                      is greater than SUT B's.
      Test Configuration: #1

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Observe that Test Case V4401DBS004 occurs.
      3a.   Observe that a PTSE is sent from SUT A with its
            leadership priority set to something other than zero and

"I am leader" bit and the Preferred peer group leader
node ID set to zero.
3b.   Observe that a PTSE is sent from SUT B with its
leadership priority set to something other than zero and
"I am leader" bit and the Preferred peer group leader
node ID set to zero.

Verdict Criteria:
Observe that a PTSE is sent from SUT B with its
leadership priority, "I am leader" bit set to zero and
the Preferred peer group leader node ID set to that of
SUT A.

Consequence of Failure: The leadership of the peer group is
unstable and may cause routing
problems later.

4.   Test Case ID: V4603PGL004
Test Purpose: Verify that SUT B elects SUT A as Peer Group
Leader based on Node ID.
Reference: 5.10.1.1, PGLE7
Pre-requisite: - Both SUTs must be in the same peer group,
- both SUTs have passed Test Case V4401DBS004,
- both SUTs are SS_P, and
- both SUTs have the same peer group
leadership priority, but the Node ID of SUT A
is greater than the Node ID of SUT B.
Test Configuration: #1

Test Set-up:
1.   Connect the two SUTs with one physical link.

Test Procedure:
1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
2.   Observe that Test Case V4401DBS004 occurs.
3a.   Observe that a PTSE is sent from SUT A with its
leadership priority set to something other than zero and
"I am leader" bit and the Preferred peer group leader
node ID set to zero.
3b.   Observe that a PTSE is sent from SUT B with its
leadership priority set to something other than zero and
"I am leader" bit and the Preferred peer group leader
node ID set to zero.
4.   Observe that the two leadership priorities observed in
3a and 3b are the same.

Verdict Criteria:
    Observe that a PTSE is sent from SUT B with its
    leadership priority, "I am leader" bit set to zero and
    the Preferred peer group leader node ID set to that of
    SUT A.

Consequence of Failure: The leadership of the peer group is
                                      unstable and may cause routing
                                      problems later.

4.7 5 - 8 Repeat Test Cases 1 - 4 with *SUT A* and *SUT B* interchanged (i.e. *SUT A* and *SUT B* are replaced by *SUT B* and *SUT A* for all occurrences).

4.7   *Border Node / PGL Interactions*

4.7.1 Border Node / PGL Interactions

----
1.   Test Case ID: V4701BPI001
      Test Purpose: Verify that two SUTs in the same peer group,
                      one acting as PGL and the other acting as a
                      border node, can communicate and act upon
                      nodal hierarchy information.
      Reference: 5.10.1.5
      Pre-requisite: SUT A is SS_B
                      SUT B is SS_P
                      Arrange the topology state of switches SUT A
                      and SUT B such that:
                      - SUT A and SUT B belong to the same lowest
                      level peer group, with PGL SUT B,
                      - Tester A is in a different peer group than
                      SUT A, and runs a node in the parent peer
                      group of SUT B.
      Test Configuration: #2

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   Connect Tester A (PNNI) to SUT A.

      Test Procedure:
      1.   Monitor the PNNI RCCs (VPI/VCI=0/18) between SUT A and
            SUT B, and between SUT A and Tester A.
      2.   Enable the link between the two SUTs.
      3.   Observe that SUT B is elected peer group leader. Store
            the next higher level binding information from SUT B's
            nodal information PTSE. Observe that the PTSE is
            acknowledged by SUT A.
      4.   Wait one PTSERxmtInterval.
      5.   Enable the link between SUT A and Tester A.
      6.   Observe that a nodal hierarchy list is included in the
            Hellos sent by SUT A to Tester A. Store the nodal
            hierarchy list.

      Verdict Criteria:
            Observe that the nodal hierarchy list sent by SUT A to
            Tester A includes the node ID, address, and peer group
            ID from SUT B's next higher level binding information.

Consequence of failure: Outside links from SUT A cannot be
                            used and the hierarchy cannot be
                            established.

2.   Test Case ID: V4701BPI002
      Test Purpose: Verify that two SUTs in the same peer group,
                       one acting as PGL and the other as a border
                       node, can communicate and act upon uplink
                       information.
      Reference: 5.6.3.2, 5.10.3.1
      Pre-requisite: - SUT A is SS_B.
                       - SUT B is SS_P.
                       - Arrange the topology state of switches SUT A
                       and SUT B such that:
                       - SUT A and SUT B belong to the same lowest
                       level peer group, with PGL SUT B,
                       - Tester A is in a different peer group than
                       SUT A, and runs a node in the parent peer
                       group of SUT B, with a smaller node ID than
                       the LGN of SUT B.
      Test Configuration: #2

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   Connect Tester A (PNNI) to SUT A.

      Test Procedure:
      1.   Monitor the PNNI RCC (VPI/VCI=0/18) between SUT A and
            SUT B, and the PNNI signalling channel (VPI/VCI=0/5)
            between SUT A and SUT B.
      2.   Enable the link between the two SUTs.
      3.   Observe that SUT B is elected peer group leader.
      4.   Enable the link between SUT A and Tester A.
      5.   Observe that an uplink PTSE is advertised by SUT A to
            SUT B. Store the PTSE.

      Verdict Criteria:
            Observe that a SETUP message is sent from SUT B to SUT A
            with:
                  A BLLI information element indicating that this
                  call is a PNNI RCC [see PNNI 1.0 Section 5.5.4.1.4
                  for details], and
                  the Called party number the same as the "ATM End
                  System Address of Upnode" field from the uplink
                  PTSE advertised by SUT A to SUT B.

***4.8 Consequence of Failure: Outside links from SUT A cannot be
    used and the hierarchy cannot be established.***

4.8   Logical Group Node

4.8.1 Logical Group Node (SVCC-Based RCC establishment)

In order for any of these test cases to be executed either
i) both SUTs must be the PGL in different peer groups and share a
common higher level peer group; or
ii) one SUT must be PGL (local) and the other SUT must be in a
peer group with a PGL (e.g. a Tester)(remote) and share a common
higher level peer group.

The latter configuration (ii) is covered by Test Cases 1 - 3.
The former configuration (i) is covered by Test Cases 4 - 6.
----
1.   Test Case ID: V4801LGN001
      Test Purpose: Verify that a PGL (i.e. SUT A) in one peer
                      group initiates a switched virtual channel
                      connection (SVCC) to the PGL (i.e. Tester B)
                      in another peer group.
      Reference: 5.5.6.3 (A.5), 5.5.4.1 (for SETUP parameters)
      Pre-requisite: - SUT A is SS_P and SS_B and SUT A must be
                      elected as PGL of its peer group.
                      - SUT B is SS_B and not PGL of its peer group,
                      but a PGL must be elected.
                      - The node ID of SUT A is greater than the
                      node ID of the PGL (i.e. Tester B) in the
                      other peer group.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   Configure the Tester B's Node ID to be less than SUT A's
            Node ID (This is to ensure that SUT A establishes the
            SVCC).

      Test Procedure:
      1a.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      1b.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      2a.   Observe that SUT A becomes PGL of its peer group
            (monitor point A).
      2b.   Observe that SUT B elects a PGL (i.e. Tester B) (monitor
            point C).
      3.   Observe that an uplink is advertised from SUT B to SUT A
            (monitor point D).

      Verdict Criteria:

Observe that SUT A sends a SETUP message on VPI/VCI=0/5
over interface D and that the destination address is
that of PGL (i.e. Tester B).

Consequence of Failure: Logical peer groups will not join
                           and allow routing information to be
                           passed between peer group.

2.   Test Case ID: V4801LGN002
      Test Purpose: Verify that local PGL (i.e. SUT A) accepts
                      (i.e. sends CALL PROCEEDING message) a
                      switched virtual channel connection (SVCC)
                      from remote PGL (i.e. Tester B).
      Reference: 5.5.6.3 (A.3), 5.5.4.1.2, 5.5.4.1.10
      Pre-requisite: - SUT A is SS_P and SS_B and SUT A must be
                      elected as PGL of its peer group.
                      - SUT B is SS_B and not PGL of its peer group,
                      but a PGL must be elected.
                      - The node ID of SUT A is less than the node
                      ID of the PGL (i.e. Tester B) in the other
                      peer group.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   Configure the Tester B's Node ID to be greater than SUT
            A's Node ID (This is to ensure that Tester B establishes
            the SVCC).

      Test Procedure:
      1a.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      1b.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      2a.   Observe that SUT A becomes PGL of its peer group
            (monitor point A).
      2b.   Observe that SUT B elects a PGL (i.e. Tester B).
      3.   Observe that an uplink is advertised from SUT B to SUT
            A.
      4.   Remote PGL (i.e. Tester B) sends a SETUP message to SUT
            A through SUT B on VPI/VCI=0/5.

      Verdict Criteria:
            Observe that SUT A sends a CALL PROCEEDING message on
            VPI/VCI=0/5 over interface D in response to the SETUP
            message.

Consequence of Failure: Logical peer groups will not join
                           and allow routing information to be
                           passed between peer group.

3.   Test Case ID: V4801LGN003
      Test Purpose: Verify that local PGL (i.e. SUT A) accepts
                       (i.e. sends CONNECT message) a switched
                       virtual channel connection (SVCC) from remote
                       PGL (i.e. Tester B).
      Reference: 5.5.6.3 (A.3), 5.5.4.2 (for CONNECT
                       parameters)
      Pre-requisite: - SUT A is SS_P and SS_B and SUT A must be
                       elected as PGL of its peer group.
                       - SUT B is SS_B and not PGL of its peer group,
                       but a PGL must be elected.
                       - The node ID of SUT A is less than the node
                       ID of the PGL (i.e. Tester B) in the other
                       peer group.
                       - Must have passed Test Case V4801LGN002.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   Configure the Tester B's Node ID to be greater than SUT
            A's Node ID (This is to ensure that Tester B establishes
            the SVCC).

      Test Procedure:
      1a.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      1b.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      2a.   Observe that SUT A becomes PGL of its peer group
            (monitor point A).
      2b.   Observe that SUT B elects a PGL (i.e. Tester B).
      3.   Observe that an uplink is advertised from SUT B to SUT
            A.
      4.   Remote PGL (i.e. Tester B) sends a SETUP message to SUT
            A through SUT B on VPI/VCI=0/5.
      5.   Observe that SUT A sends a CALL PROCEEDING message on
            VPI/VCI=0/5 over interface D in response to the SETUP
            message.

      Verdict Criteria:
            Observe that SUT A sends a CONNECT message on
            VPI/VCI=0/5 over interface D.

Consequence of Failure: Logical peer groups will not join
                           and allow routing information to be
                           passed between peer group.

4.   Test Case ID: V4801LGN004
      Test Purpose: Verify that a PGL (i.e. SUT A) in one peer
                       group initiates a switched virtual channel
                       connection (SVCC) to the PGL (i.e. SUT B) in
                       another peer group.
      Reference: 5.5.6.3 (A.5), 5.5.4.1 (for SETUP parameters)
      Pre-requisite: - SUT A is SS_P and SS_B and SUT A must be
                       elected as PGL of its peer group.
                       - SUT B is SS_P and SS_B and SUT B must be
                       elected as PGL of its peer group.
                       - The node ID of SUT A is greater than the
                       node ID of the PGL (i.e. SUT B) in the other
                       peer group.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   Configure the SUT B's Node ID to be less than SUT A's
            Node ID (This is to ensure that SUT A initiates the
            SVCC).

      Test Procedure:
      1a.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      1b.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      2a.   Observe that SUT A becomes PGL of its peer group
            (monitor point A).
      2b.   Observe that SUT B becomes PGL of its peer group
            (monitor point C).
      3.   Observe that an uplink is advertised from SUT B to SUT A
            (monitor point D).

      Verdict Criteria:
            Observe that SUT A sends a SETUP message on VPI/VCI=0/5
            over interface D and that the destination address is
            that of PGL (i.e. SUT B).

      Consequence of Failure: Logical peer groups will not join
                                 and allow routing information to be
                                 passed between peer group.

5.   Test Case ID: V4801LGN005
      Test Purpose: Verify that remote PGL (i.e. SUT B) accepts
                       (i.e. sends CALL PROCEEDING message) a
                       switched virtual channel connection (SVCC)
                       from local PGL (i.e. SUT A).
      Reference: 5.5.6.3 (A.3), 5.5.4.1.2, 5.5.4.1.10
      Pre-requisite: - SUT A is SS_P and SS_B and SUT A must be
                       elected as PGL of its peer group.
                       - SUT B is SS_B and SS_B and SUT B must be
                       elected as PGL of its peer group.
                       - The node ID of SUT A is greater than the
                       node ID of the PGL (i.e. SUT B) in the other
                       peer group.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   Configure the SUT B's Node ID to be less than SUT A's
            Node ID (This is to ensure that SUT A initiates the
            SVCC).

      Test Procedure:
      1a.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      1b.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      2a.   Observe that SUT A becomes PGL of its peer group
            (monitor point A).
      2b.   Observe that SUT B becomes PGL of its peer group
            (monitor point C).
      3.   Observe that an uplink is advertised from SUT B to SUT A
            (monitor point D).
      4.   Observe that SUT A sends a SETUP message on VPI/VCI=0/5
            over interface D and that the destination address is
            that of PGL (i.e. SUT B).

      Verdict Criteria:
            Observe that SUT B sends a CALL PROCEEDING message on
            VPI/VCI=0/5 over interface D in response to the SETUP
            message.

      Consequence of Failure: Logical peer groups will not join
                                and allow routing information to be
                                passed between peer group.

6.   Test Case ID: V4801LGN006

Test Purpose: Verify that remote PGL (i.e. SUT B) accepts
                  (i.e. sends CONNECT message) a switched
                  virtual channel connection (SVCC) from local
                  PGL (i.e. SUT A).
Reference: 5.5.6.3 (A.3), 5.5.4.2 (for CONNECT
                  parameters)
Pre-requisite: - SUT A is SS_P and SS_B and SUT A must be
                  elected as PGL of its peer group.
                  - SUT B is SS_P and SS_B and SUT B must be
                  elected as PGL of its peer group.
                  - The node ID of SUT A is greater than the
                  node ID of the PGL (i.e. SUT B) in the other
                  peer group.
                  - Must have passed Test Case V4801LGN005.
Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2.   Configure the SUT B's Node ID to be less than SUT
      A's Node ID (This is to ensure that SUT A initiates the
      SVCC).

Test Procedure:
1a.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
1b.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
2a.   Observe that SUT A becomes PGL of its peer group
      (monitor point A).
2b.   Observe that SUT B becomes PGL of its peer group
      (monitor point C).
3.   Observe that an uplink is advertised from SUT B to SUT A
      (monitor point D).
4.   Observe that SUT A sends a SETUP message on VPI/VCI=0/5
      over interface D and that the destination address is
      that of PGL (i.e. SUT B).
5.   Observe that SUT B sends a CALL PROCEEDING message on
      VPI/VCI=0/5 over interface D in response to the SETUP
      message.

Verdict Criteria:
      Observe that SUT B sends a CONNECT message on
      VPI/VCI=0/5 over interface D.

Consequence of Failure: Logical peer groups will not join
                           and allow routing information to be
                           passed between peer group.

7.   Test Case ID: V4801LGN007
      Test Purpose: Verify that when a new Peer Group Leader (e.g.
                        Tester B emulating a new node) is elected in
                        the same peer group as SUT B, the old Peer
                        Group Leader (i.e. SUT B) releases the RCC to
                        the Peer Group Leader (i.e. SUT A) of another
                        peer group with cause value=53.
      Reference: 5.5.4.3, 5.5.6.3 (C.2)
      Pre-requisite: - SUT A is SS_P and SS_B and SUT A must be
                        elected as PGL of its peer group.
                        - SUT B is SS_P and SS_B and SUT B must be
                        elected as PGL of its peer group.
                        - Must have passed Test Case V4801LGN006.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   Configure the SUT B's Node ID to be less than SUT A's
            Node ID (This is to ensure that SUT A initiates the
            SVCC).

      Test Procedure:
      1a.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      1b.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      2a.   Observe that SUT A becomes PGL of its peer group
            (monitor point A).
      2b.   Observe that SUT B becomes PGL of its peer group
            (monitor point C).
      3.   Observe that an uplink is advertised from SUT B to SUT A
            (monitor point D).
      4.   Observe that SUT A sends a SETUP message on VPI/VCI=0/5
            over interface D and that the destination address is
            that of PGL (i.e. SUT B).
      5.   Observe that SUT B sends a CALL PROCEEDING message on
            VPI/VCI=0/5 over interface D in response to the SETUP
            message.
      6.   Observe that SUT B sends a CONNECT message on
            VPI/VCI=0/5 over interface D.
      7.   Add another node to Tester B (or have Tester B emulate
            the addition of another node) which has a peer group
            leadership priority greater than the initial SUT B's
            leadership priority + GroupLeaderIncrement.

8.   Observe flooding of PTSE with new node's PGLship
    priority greater than (initial SUT B's + increment) from
    Tester B to SUT B (monitor point C).
9.   Observe that SUT B elects the new node (monitor point
    C).

Verdict Criteria:
    Observe that SUT B sends a RELEASE message with cause
    value = 53, on VPI/VCI=0/5 over interface D and that the
    destination address is that of PGL (i.e. SUT A).

Consequence of Failure: One peer group will be represented
                                  by two different Logical Group
                                  Nodes.

8.   Test Case ID: E4801LGN008
    Test Purpose: Verify that after a physical link failure,
                   when corrected, that a PGL (i.e. SUT A) in one
                   peer group initiates a switched virtual
                   channel connection (SVCC) to the PGL (i.e.
                   Tester B) in another peer group.
    Reference: 5.5.6.3 (D.2), 5.5.4.1 (for SETUP parameters)
    Pre-requisite: - SUT A is SS_P and SS_B and SUT A must be
                   elected as PGL of its peer group.
                   - SUT B is SS_B and not PGL of its peer group,
                   but a PGL must be elected.
                   - The node ID of SUT A is greater than the
                   node ID of the PGL (i.e. Tester B) in the
                   other peer group.
    Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2.   Configure the Tester B's Node ID to be less than SUT A's
    Node ID (This is to ensure that SUT A initiates the
    SVCC).

Test Procedure:
1a.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
1b.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
2a.   Observe that SUT A becomes PGL of its peer group
    (monitor point A).
2b.   Observe that SUT B elects a PGL (i.e. Tester B)(monitor
    point C).

3.   Observe that an uplink is advertised from SUT B to SUT A
      (monitor point D).
4.   Observe that SUT A sends a SETUP message on VPI/VCI=0/5
      over interface D and that the destination address is
      that of PGL (i.e. Tester B).
5.   Observe that SUT B sends a CALL PROCEEDING message on
      VPI/VCI=0/5 over interface D in response to the SETUP
      message.
6.   Observe that SUT B sends a CONNECT message on
      VPI/VCI=0/5 over interface D.
7.   Disconnect/remove the physical link between the two
      SUTs.
8.   Reconnect the physical link between the two SUTs using
      the same ports.
Note: Provided that enough time has elasped to declare the
link down by all protocols involved and enough time to
redeclare the link is up by all protocols, once the link is
reestablished.

Verdict Criteria:
      Observe that SUT A sends a SETUP message on VPI/VCI=0/5
      over interface D and that the destination address is
      that of PGL (i.e. Tester B)

Consequence of Failure: The old information was retained
                           causing the protocol not to operate

9.   Test Case ID: E4801LGN009
      Test Purpose: Verify that after a physical link failure,
                       when corrected, that a PGL (i.e. SUT A) in one
                       peer group initiates a switched virtual
                       channel connection (SVCC) to the PGL (i.e. SUT
                       B) in another peer group.
      Reference: 5.5.6.3 (D.2), 5.5.4.1 (for SETUP parameters)
      Pre-requisite: - SUT A is SS_P and SS_B and SUT A must be
                         elected as PGL of its peer group.
                       - SUT B is SS_P and SS_B and SUT B must be
                         elected as PGL of its peer group.
                       - The node ID of SUT A is greater than the
                         node ID of the PGL (i.e. SUT B) in the other
                         peer group.
      Test Configuration: #3a

      Test Set-up:
1.   Connect the two SUTs with one physical link.

2.   Configure the SUT B's Node ID to be less than SUT A's
        Node ID (This is to ensure that SUT A initiates the
        SVCC).

Test Procedure:
1a.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
1b.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
2a.   Observe that SUT A becomes PGL of its peer group
        (monitor point A).
2b.   Observe that SUT B becomes PGL of its peer group
        (monitor point C).
3.   Observe that an uplink is advertised from SUT B to SUT A
        (monitor point D).
4.   Observe that SUT A sends a SETUP message on VPI/VCI=0/5
        over interface D and that the destination address is
        that of PGL (i.e. SUT B).
5.   Observe that SUT B sends a CALL PROCEEDING message on
        VPI/VCI=0/5 over interface D in response to the SETUP
        message.
6.   Observe that SUT B sends a CONNECT message on
        VPI/VCI=0/5 over interface D.
7.   Disconnect/remove the physical link between the two
        SUTs.
8.   Reconnect the physical link between the two SUTs using
        the same ports.
Note: Provided that enough time has elasped to declare the
link down by all protocols involved and enough time to
redeclare the link is up by all protocols, once the link is
reestablished.

Verdict Criteria:
        Observe that SUT A sends a SETUP message on VPI/VCI=0/5
        over interface D and that the destination address is
        that of PGL (i.e. SUT B)

Consequence of Failure: The old information was retained
                           causing the protocol not to operate

4.8.2 4.8.2   Logical Group Node (Hello Protocol)

These tests should only be run after running the appropriate tests
in section 4.8.1 on Logical Group Node (SVCC-Based RCC
establishment). The test written in this section are generic, so
that either of the two configuration in section 4.8.1 can be used.
One LGN is assumed to be SUT A and the other (remote) LGN is
either SUT B or Tester B depending upon which is PGL.
----
1.   Test Case ID: V4802LGN001
      Test Purpose: Verify that the Hello protocol is running over
                      the SVCC-Based RCC.
      Reference: 5.6.3.1
      Pre-requisite: SVCC-Based RCC is established (see Test Cases
                      in section 4.8.1)
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   SVCC-Based RCC is established.

      Test Procedure:
      1a.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      1b.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      2.   Store the VPI/VCI in the SETUP message sent to establish
            the SVCC-Based RCC.
      3.   Monitor the PNNI (VPI/VCI of the SVCC-Based RCC) between
            SUT A and SUT B.

      Verdict Criteria:
            Observe that a Hello packet is sent from LGN to LGN with
            the Port ID field value set to 0xFFFFFFFF, Hello
            Interval field value set to non-zero, Node ID equal to
            that of LGN and Remote Node ID and Remote Port ID set to
            zero (i.e. 1-WayInside).

      Consequence of Failure: If Hello is not observed, then the
                                logical peer groups share routing
                                information between these peer
                                groups. If the Hello has non-zero
                                values for Remote Node ID and Remote
                                Port ID, then old information was
                                used, which could cause routing
                                problems later on.

2.   Test Case ID: V4802LGN002
      Test Purpose: Verify that the Hello protocol is running over
                       the SVCC-Based RCC and that the LGN learns
                       about the other (remote) LGN.
      Reference: 5.6.3.1
      Pre-requisite: SVCC-Based RCC is established (see Test Cases
                       in section 4.8.1)
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   SVCC-Based RCC is established.

      Test Procedure:
      1a.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      1b.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      2.   Store the VPI/VCI in the SETUP message sent to establish
            the SVCC-Based RCC.
      3.   Monitor the PNNI (VPI/VCI of the SVCC-Based RCC) between
            SUT A and SUT B.
      4.   Observe that a Hello packet is sent from LGN to LGN with
            the Port ID field value set to 0xFFFFFFFF, Node ID equal
            to that of LGN and Remote Node ID and Remote Port ID set
            to zero (i.e. 1-WayInside).

      Verdict Criteria:
            Observe that a Hello packet is sent from LGN to LGN with
            the Port ID field value set to 0xFFFFFFFF, Node ID equal
            to that of LGN and Remote Node ID set to Node ID of the
            other (remote LGN) and Remote Port ID set to 0xFFFFFFFF
            (i.e. 2-WayInside).

      Consequence of Failure: If the Hello does not have the
                                correct values for Remote Node ID
                                and Remote Port ID, then the Hello
                                protocol will hang.

3.   Test Case ID: E4802LGN003
      Test Purpose: Verify that after a physical link failure,
                       when corrected, that the Hello Protocol is
                       running over the SVCC-Based RCC (2-WayInside).
      Reference: 5.5.6.3 (D.2), 5.6.3.1 (6)
      Pre-requisite: SVCC-Based RCC is established (see Test Cases
                       in section 4.8.1)

Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2.   SVCC-Based RCC is established.

Test Procedure:
1a.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
1b.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
2.   Store the VPI/VCI in the SETUP message sent to establish
      the SVCC-Based RCC.
3.   Monitor the PNNI (VPI/VCI of the SVCC-Based RCC) between
      SUT A and SUT B.
4.   Observe that SVCC-Based RCC is established.
5.   Observe that one Hello (2-WayInsideReceived) sent from
      each SUT.
6.   Disconnect/remove the physical link between the two
      SUTs.
7.   Reconnect the physical link between the two SUTs using
      the same ports.
Note: Provided that enough time has elasped to declare the
link down by all protocols involved and enough time to
redeclare the link is up by all protocols, once the link is
reestablished.

Verdict Criteria:
      Observe that an SVCC-Based RCC is established, and that
      a Hello packet is sent from LGN to LGN with the Port ID
      field value set to 0xFFFFFFFF, Hello Interval field
      value set to non-zero, Node ID equal to that of LGN and
      Remote Node ID and Remote Port ID set to zero (i.e. 1-
      WayInside).

Consequence of Failure: The old PNNI information was
                          retained causing the protocol not to
                          operate.

4.8.3 4.8.3   Logical Group Node (Feeding Information Down the
      Hierarchy)

----
1.   Test Case ID: V4803LGN001
      Test Purpose: Verify that information is fed down the
                      Hierarchy.
      Reference: 5.10.4
      Pre-requisite: - SUT A is SS_P and SS_B.
                      - SUT A and SUT B are in the same peer group.
                      - Tester A is in a different peer group and
                        PGL.
      Test Configuration: #2

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2.   Connect Tester A (PGL) to SUT A (PGL).
      3.   SVCC-Based RCC is established.

      Test Procedure:
      1.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and SUT B.
      2.   Observe that Test Case V4602PGL002 occurs.
      3.   Connect Tester A to SUT A.
      4.   Monitor the PNNI (VPI/VCI=0/18) between SUT A and Tester
            A.
      5.   Observe that an exchange of information similar to the
            Border node test cases in section 4.3.2 occur at monitor
            point A.
      6.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and Tester
            A.
      7.   Store the VPI/VCI in the SETUP message sent to establish
            the SVCC-Based RCC.
      8.   Monitor the PNNI (VPI/VCI of the SVCC-Based RCC) between
            SUT A and Tester A.
      9.   Store PTSE sent from Tester A (LGN) to SUT A (LGN)
            during Database Synchronization.

      Verdict Criteria:
            Observe that a PTSE (i.e. the PTSE information exchanged
            during the Database Synchronization between LGNs is
            flooded inside the peer group) from SUT A is sent to a
            SUT B.

Consequence of Failure: Outside information is not fed down,
                          which can causes routing problems
                          due to lack of information.

5   5 Interoperability Interface Tests (Signalling)

This section covers the PNNI signalling procedures, both point-to-point and point-to-multipoint.

The point-to-point signalling procedures are covered by multiple sections: Establishment procedures, Release procedures, DTL processing, Crankback procedures, and Restart procedures. Within each of these sections are four sub-sections. The first covers general test cases. The next three sub-sections cover test cases in more detail (e.g. call states and information elements) based on the Test Configuration used.

In the more detailed sections, the following additional information is necessary.

> The Test Case ID has an additional suffix.
> CNI – Connection Identifier information element.
> CON – Connection message.
> ALR – Alerting message.
> ACN – Connect message after an Alerting message.
> TRA – Traffic parameter.
> QoS – Quality of Service.
> BFR – Before call establishment.
> USR – User initiated call clearing.
>
> The Test Procedure requires the following additional information. The first Step includes an initial state notation and the last Step includes a final state notation. This state information is related to the Call States per call on the PNNI or UNI interfaces. This state notation is described below.
>
> #3a : ((s1,s2),(s3,s4)), where s1 and s2 represent call states of the succeeding side and the preceding side of the SUT A, respectively, and s3 and s4 represent call states of the succeeding side and the preceding side of the SUT B, respectively.
> #3b : (s1,(s2,s3)), where s1 represents call state of the preceding side of the SUT A, and s2 and s3 represent call states of the succeeding side and the preceding side of the SUT B, respectively.
> #3c : (s1,s2), where s1 represents call state of the preceding side of the SUT A, and s2 represents call state of the succeeding side of the SUT B.

For example:

> The states ((0,0),(0,0)), (0,(0,0)), and (0,0) represent the null state where no call exists for Test Configuration #3a, 3b, and 3c respectively.
>
> The state ((3,9),(3,6)) can be reached by running Test Case V5202EST014_QOS, unless otherwise specified.
>
> The state ((3,9),(3,9)) can be reached by running Test Case V5202EST001_CNI, unless otherwise specified.
>
> The state ((4,7),(4,7)) can be reached by running Test Case V5202EST006_ALR, unless otherwise specified.
>
> The state ((10,10),(10,10)) can be reached by running Test Case V5202EST005_CON, unless otherwise specified.

#4a and #4b do not use the state notation, since these test configurations have multiple interfaces between SUT B and Tester B; and the path of the call is non-deterministic.

The point-to-multipoint signalling procedures are covered by multiple sections: Initial party establishment, Additional party, and Drop party.

5.1 *Test Case Index*

Test Case ID	Test Purpose
V5201EST001	Verify that SUT A routes a call request through SUT B.
V5201EST002	Verify that SUT B accepts a call request from SUT A.
V5201EST003	Verify that SUT B continues to progress (ALERTING message) a call request from SUT A.
V5201EST004	Verify that SUT B continues to progress (CONNECT message) a call request from SUT A.
V5201EST005	Verify that an SVC is established end-to-end.

V5202EST001_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. - associated signalling 1)
V5202EST002_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. - associated signalling 2)
V5202EST003_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. – non-associated signalling 1)
V5202EST004_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. – non-associated signalling 2)
V5202EST005_CON	To verify that normal call setup can be supported between two switches. (Reception of CONNECT after sending SETUP)
V5202EST006_ALR	To verify that normal call setup can be supported between two switches. (Reception of ALERT after sending SETUP)
V5202EST007_ACN	To verify that normal call setup can be supported between two switches.(Reception of CONNECT after receiving ALERT)
V5202EST008_TRA	To verify two switches, during call/connection establishment, handle tagging parameters correctly when SUT A performs tagging for forward traffic.
V5202EST009_TRA	To verify two switches, during call/connection establishment, handle tagging parameters correctly when SUT B performs tagging for forward traffic.
V5202EST010_TRA	To verify two switches, during call/connection establishment, handle tagging parameters correctly when they receive Tf field coded as Tagging not allowed.
V5202EST011_TRA	To verify two switches, during call/connection acceptance, handle tagging parameters correctly when SUT A performs tagging for forward traffic.

V5202EST012_TRA	To verify two switches, during call/connection acceptance, handle tagging parameters correctly when they had received Tf field coded as Tagging not allowed.
V5202EST013_TRA	To verify two switches, during call/connection establishment, handle backward tagging parameters correctly when none of two switches performs tagging for backward traffic.
V5202EST014_QOS	To verify that both SUTs transfer QoS I.E. if it is included in the received SETUP message.
V5202EST015_QOS	To verify that both SUTs increment values of the QoS parameters during call/connection establishment.
V5221EST001_TRA	To check that the call can be progressed when two switches are able to provide the traffic parameter values specified in the ATD I.E. and Minimum acceptable ATD I.E.
V5221EST002_TRA	To check that the call can be progressed when the second switch is able to provide the traffic parameter values specified in the Minimum acceptable ATD I.E. but cannot support those in the ATD I.E. - Minimum acceptable ATD I.E. remains after negotiation.
V5221EST003_TRA	To check that the call can be progressed when the second switch is able to provide the traffic parameter values specified in the Minimum acceptable ATD I.E. but cannot support those in the ATD I.E. - Minimum acceptable ATD I.E. removes after negotiation.
V5221EST004_TRA	To check that the call can be progressed when the SUT A (first switch) is able to provide the traffic parameter values specified in the Minimum acceptable ATD I.E. but cannot support those in the ATD I.E.
V5221EST005_TRA	To check that the call can be progressed when both SUTs are able to provide the traffic parameter values specified in the ATD I.E. and Alternative ATD I.E.

V5221EST006_TRA	To check that the call can be progressed when SUT B (second switch) is able to provide the traffic parameter values specified in the ATD I.E. but cannot support those in the Alternative ATD I.E.
V5221EST007_TRA	To check that the call can be progressed when SUT B (second switch) is able to provide the traffic parameter values specified in the Alternative ATD I.E. but cannot support those in the ATD I.E.
V5221EST008_TRA	To check that both SUTs progress the CONNECT message with the same ATD I.E. if it is contained in the received CONNECT message.
V5221EST009_TRA	To check that both SUTs progress the CONNECT message with the ATD I.E. of which parameters has been negotiated during call setup. – SUT B (second switch) adds ATD I.E. on the CONNECT message.
V5221EST010_TRA	To check that both SUTs progress the CONNECT message with the ATD I.E. of which parameters has been negotiated during call setup. – SUT A (first switch) adds ATD I.E. on the CONNECT message.
V5221EST011_TRA	To check that, after alerting, two switches progress the CONNECT message with the same ATD I.E. if it is contained in the received CONNECT message.
V5221EST012_TRA	To check that, after alerting, two switches progress the CONNECT message with the ATD I.E. of which parameters has been negotiated during call setup. – SUT B (second switch) adds ATD I.E. on the CONNECT message.
V5221EST013_TRA	To check that, after alerting, two switches progress the CONNECT message with the ATD I.E. of which parameters has been negotiated during call setup. – SUT A (first switch) adds ATD I.E. on the CONNECT message.
V5203EST001_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. – associated signalling 1)

V5203EST002_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. - associated signalling 2)
V5203EST003_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. – non-associated signalling 1)
V5203EST004_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. – non-associated signalling 2)
V5203EST005_CON	To verify that normal call setup can be supported between two switches. (Reception of CONNECT after sending SETUP)
V5203EST006_ALR	To verify that normal call setup can be supported between two switches. (Reception of ALERT after sending SETUP)
V5203EST007_ACN	To verify that normal call setup can be supported between two switches.(Reception of CONNECT after receiving ALERT)
V5203EST008_QOS	To verify that both SUTs transfer QoS I.E. if it is included in the received SETUP message.
V5203EST009_QOS	To verify that the first switch sends SETUP including Extended QoS I.E. when the setup indication includes neither Extended QoS I.E. nor End-to-end transit delay I.E. and ATM service category of the call is CBR, real-time VBR, or non-real-time VBR, and the second switch increments values of the QoS parameters during call/connection establishment.
V5203EST010_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. - associated signalling 1)
V5203EST011_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. - associated signalling 2)

V5203EST012_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. - non-associated signalling 1)
V5203EST013_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. – non-associated signalling 2)
V5203EST014_CON	To verify that normal call setup can be supported between two switches. (Reception of CONNECT after sending SETUP)
V5203EST015_ALR	To verify that normal call setup can be supported between two switches. (Reception of ALERT after sending SETUP)
V5203EST016_ACN	To verify that normal call setup can be supported between two switches.(Reception of CONNECT after receiving ALERT)
V5203EST017_QOS	To verify that the first switch transfers QoS I.E. if it is included in the received SETUP message.
V5203EST018_QOS	To verify that the first switch increments values of the QoS parameters during call/connection establishment.
V5231EST001_TRA	To check that SUT B (second switch) progresses the CONNECT message with the same ATD I.E. if it is contained in the received CONNECT message.

V5231EST002_TRA	To check that, after alerting, second switch progresses the CONNECT message with the same ATD I.E. if it is contained in the received CONNECT message.
V5231EST003_TRA	To check that the call can be progressed when two switches are able to provide the traffic parameter values specified in the ATD I.E. and Minimum acceptable ATD I.E.
V5231EST004_TRA	To check that the call can be progressed when the second switch is able to provide the traffic parameter values specified in the Minimum acceptable ATD I.E. but cannot support those in the ATD I.E.- Minimum acceptable ATD I.E. remains after negotiation.
V5231EST005_TRA	To check that the call can be progressed when the second switch is able to provide the traffic parameter values specified in the Minimum acceptable ATD I.E. but cannot support those in the ATD I.E. – Minimum acceptable ATD I.E. removes after negotiation.
V5231EST006_TRA	To check that the call can be progressed when the SUT A (first switch) is able to provide the traffic parameter values specified in the Minimum acceptable ATD I.E. but cannot support those in the ATD I.E.
V5231EST007_TRA	To check that the call can be progressed when both SUTs are able to provide the traffic parameter values specified in the ATD I.E. and Alternative ATD I.E.
V5231EST008_TRA	To check that the call can be progressed when SUT B (second switch) is able to provide the traffic parameter values specified in the ATD I.E. but cannot support those in the Alternative ATD I.E.
V5231EST009_TRA	To check that the call can be progressed when SUT B (second switch) is able to provide the traffic parameter values specified in the Alternative ATD I.E. but cannot support those in the ATD I.E.

V5204EST001_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. – associated signalling 1)

V5204EST002_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. - associated signalling 2)
V5204EST003_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. - non-associated signalling 1)
V5204EST004_CNI	To verify that normal call setup can be supported between two switches. (connection identifier I.E. - non-associated signalling 2)
V5204EST005_CON	To verify that normal call setup can be supported between two switches. (Reception of CONNECT after sending SETUP)
V5204EST006_ALR	To verify that normal call setup can be supported between two switches. (Reception of ALERT after sending SETUP)
V5204EST007_ACN	To verify that normal call setup can be supported between two switches.(Reception of CONNECT after receiving ALERT)
V5204EST008_QOS	To verify that the preceding side includes QoS I.E. in the corresponding SETUP message, when the preceding side receives a setup indication that includes a QoS parameter I.E.
V5204EST009_QOS	To verify that the first switch sends SETUP including Extended QoS I.E. when the setup indication includes neither Extended QoS I.E. nor End-to-end transit delay I.E. and ATM service category of the call is CBR, real-time VBR, or non-real-time VBR.
Release	
V5301REL001	Verify that SUT A releases a call request through SUT B.
V5301REL002	Verify that SUT B acknowledges the release call request.
V5301REL003	Verify that the SVC is released.

V5302REL001_BFR	To verify that a call/connection can be released by originating user side before connection is established.

V5302REL002_BFR	To verify that a call/connection can be released by destination user side before connection is established.
V5302REL003_CNI	To verify that a call/connection can be released by a failure of connection identifier assignment.
V5302REL004_DTL	To verify that the release of a call/connection can be relayed when call clearing occurs due to DTL processing failure.
V5302REL005_USR	To verify that a call/connection can be released by originating user side after call/connection completion.
V5302REL006_USR	To verify that a call/connection can be released by destination user side after call/connection completion.
V5303REL001_BFR	To verify that a call/connection can be released by originating user side before connection is established.
V5303REL002_BFR	To verify that a call/connection can be released by destination user side before connection is established.
V5303REL003_CNI	To verify that a call/connection can be released by a failure of connection identifier assignment.
V5303REL004_DTL	To verify that the release of a call/connection can be relayed when call clearing occurs due to DTL processing failure.
V5303REL005_USR	To verify that a call/connection can be released by originating user side after call/connection completion.
V5303REL006_USR	To verify that a call/connection can be released by destination user side after call/connection completion.
V5303REL007_BFR	To verify that a call/connection can be released by originating user side before connection is established.
V5303REL008_BFR	To verify that a call/connection can be released by destination user side before connection is established.

V5303REL009_USR	To verify that a call/connection can be released by originating user side after call/connection completion.

V5303REL010_USR	To verify that a call/connection can be released by destination user side after call/connection completion.
V5304REL001_BFR	To verify that a call/connection can be released by originating user side before connection is established.
V5304REL002_BFR	To verify that a call/connection can be released by destination user side before connection is established.
V5304REL003_USR	To verify that a call/connection can be released by originating user side after call/connection completion.
V5304REL004_USR	To verify that a call/connection can be released by destination user side after call/connection completion.
DTL	
V5401DTL001	To verify that two switches process DTLs correctly during call/connection setup when SUTs are in the same lowest level peer group.
V5401DTL002	To verify that two switches process DTLs correctly during call/connection setup when SUTs are in two different lowest level peer groups.
V5402DTL001	To verify that two switches process DTLs correctly during call/connection setup as an entry border node and as an exit border node of the same peer group.
V5402DTL002	To verify that two switches process DTLs correctly during call/connection setup as an entry border node and as an intermediate node.
V5402DTL003	To verify that two switches process DTLs correctly during call/connection setup as an intermediate node and as an exit border node.
V5402DTL004	To verify that two switches process DTLs correctly during call/connection setup as intermediate nodes.
V5402DTL005	To verify that two switches process DTLs correctly during call/connection setup as an exit border node and as an entry border node of different peer groups.

V5402DTL006	To verify that two switches process DTLs correctly as an intermediate node followed by an entry border node.
V5402DTL007	To verify that two switches process DTLs correctly as an exit border node followed by an intermediate node.
V5403DTL001	To verify that two switches process DTLs correctly during call/connection setup as a DTL originator and as an entry border node of two different lowest level peer groups.
V5403DTL002	To verify that two switches process DTLs correctly during call/connection setup as a DTL originator and as an exit border node of a same lowest level peer group.
V5403DTL003	To verify that two switches process DTLs correctly during call/connection setup as a DTL originator and as an intermediate node of the same lowest level peer group.
V5403DTL004	To verify that two switches process DTLs correctly during call/connection setup as an exit border node and as a DTL terminator of two different lowest level peer groups.
V5403DTL005	To verify that two switches process DTLs correctly during call/connection setup as an entry border node and as a DTL terminator of a same lowest level peer group.
V5403DTL006	To verify that two switches process DTLs correctly during call/connection setup as an intermediate node and as a DTL terminator of a same lowest level peer group.
V5403DTL007	To verify that two switches process DTLs correctly as an originating node that is not an exit border node followed by an entry border node.
V5404DTL001	To verify that two switches process DTLs correctly during call/connection setup as a DTL originator and as a DTL terminator of two different lowest level peer groups.

V5404DTL002	To verify that two switches process DTLs correctly during call/connection setup as a DTL originator and as a DTL terminator of a same lowest level peer group.

Crankback	
V5501CRK001(Failure of V5201EST001)	Verify that SUT B includes a Crankback IE in a RELEASE COMPLETE message.
V5501CRK002(Failure of V5201EST002)	Verify that SUT B includes a Crankback IE in a RELEASE message.
V5502CRK001	To verify two switches, as an entry border node and as an exit border node, perform crankback procedure correctly when there is no alternate route.
V5502CRK002	To verify two switches, as an entry border node and as an intermediate node, perform crankback procedure correctly when there is no alternate route.
V5502CRK003	To verify two switches, as an intermediate node and as an exit border node, perform crankback procedure correctly when there is no alternate route.
V5502CRK004	To verify two switches, as intermediate nodes, perform crankback procedure correctly when there is no alternate route.
V5502CRK005	To verify two switches, as an exit border node and as an entry border node, perform crankback procedure correctly when there is no alternate route.
V5503CRK001	To verify two switches, as a DTL originator and as an exit border node, perform crankback procedure correctly when there is no alternate route.
V5503CRK002	To verify two switches, as a DTL originator and as an exit border node, perform crankback procedure correctly when there is no alternate route.
V5503CRK003	To verify two switches, as DTL originator and as an intermediate node, perform crankback procedure correctly when there is no alternate route.
V5505CRK001	To verify two switches, as an entry border node and as an intermediate node, perform crankback procedure correctly when there is an alternate route and crankback level matches.

V5505CRK002	To verify two switches, as an entry border node and as an intermediate node, relay crankback message correctly when there is an alternate route and crankback level mismatches.
V5505CRK003	To verify two switches, as two intermediate nodes, relay crankback message correctly even when there is an alternate route and crankback level matches.
V5505CRK004	To verify two switches, as an exit border node and as an entry border node, relay crankback message correctly when there is an alternate route and crankback level mismatches for the entry border node.
V5506CRK001	To verify two switches, as a DTL originator and as an intermediate node, perform crankback procedure correctly when there is an alternate route and crankback level matches.
Point to Multipoint	
V5601P2M001	Verify that a SETUP message is sent from SUT A to SUT B with an endpoint reference IE, Broadband bearer capability IE set to point-to-multipoint, and no OAM traffic descriptor IE.
V5601P2M002	Verify that a CALL PROCEEDING message is sent from SUT B to SUT A with an endpoint reference IE.
V5601P2M003	Verify that an ALERTING message is sent from SUT B to SUT A with an endpoint reference IE.
V5601P2M004	Verify that a CONNECT message is sent from SUT B to SUT A with an endpoint reference IE.
V5602P2M001	Verify that an ADD PARTY message is sent from SUT A to SUT B to add another party to the existing point-to-multipoint call.
V5602P2M002	Verify that an ADD PARTY ACKNOWLEDGE message is sent from SUT B to SUT A to acknowledge another party being added to the existing point-to-multipoint call.

V5603P2M001	Verify that a party is dropped by sending a DROP PARTY message.

V5603P2M002	Verify that a party dropped from the call is acknowledged by sending a DROP PARTY ACKNOWLEDGE message.

5.2 5.2   Test Cases Dynamic Behavior (Point-to-Point)

These interoperability test cases cover the dynamic behavior for
point-to-point call/connection control. The values used in the
SETUP messages may be extracted from the PNNI v1.0 specification
for SVCC-Based RCC call/connections or those specified in other
relevant applications (e.g. FUNI, AMS, CES, etc.).

5.2.1 Establishing an SVC (SS_M)

1.   Test Case ID: V5201EST001
      Test Purpose: Verify that SUT A routes a call request
                      through SUT B.
      Reference: 6.5.2.1
      Pre-requisite: PNNI Routing has completed
      Test Configuration: #3c

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (UNI) to SUT B.

      Test Procedure:
      1.   PNNI Routing has completed between SUT A and SUT B.
      2.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      3.   Tester A sends a SETUP message to SUT A.

      Verdict Criteria:
           Observe that a SETUP message is sent from SUT A to SUT
           B. (Also observe that a CALL PROCEEDING message is sent
           from SUT A to Tester A.)

2.   Test Case ID: V5201EST002
      Test Purpose: Verify that SUT B accepts a call request from
                      SUT A.
      Reference: 6.5.2.4
      Pre-requisite: - PNNI Routing has completed and
                      - Test Case V5201EST001 was passed.
      Test Configuration: #3c

      Test Set-up:
      1.   Connect the two SUTs with one physical link.

2a.   Connect Tester A (UNI) to SUT A.
2b.   Connect Tester B (UNI) to SUT B.

Test Procedure:
1.   PNNI Routing has completed between SUT A and SUT B.
2.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
3.   Tester A sends a SETUP message to SUT A.
4.   Observe that a SETUP message is sent from SUT A to SUT
      B. (Also observe that a CALL PROCEEDING message is sent
      from SUT A to Tester A.)

Verdict Criteria:
      Observe that a CALL PROCEEDING message is sent from SUT
      B to SUT A. (Also observe that a SETUP message is sent
      to Tester B from SUT B.)

3.   Test Case ID: V5201EST003
      Test Purpose: Verify that SUT B continues to progress
                      (ALERTING message) a call request from SUT A.
      Reference: 6.5.2.5
      Pre-requisite: - PNNI Routing has completed and
                     - Test Case V5201EST002 was passed.
      Test Configuration: #3c

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (UNI) to SUT B.

      Test Procedure:
      1.   PNNI Routing has completed between SUT A and SUT B.
      2.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      3.   Tester A sends a SETUP message to SUT A.
      4.   Observe that a SETUP message is sent from SUT A to SUT
            B. (Also observe that SUT A sends a CALL PROCEEDING
            message to Tester A)
      5.   Observe that a CALL PROCEEDING message is sent from SUT
            B to SUT A.
      6.   Observe that a SETUP message is sent to Tester B from
            SUT B.
      7.   Tester B sends a CALL PROCEEDING message to SUT B.
      8.   Tester B sends an ALERTING message to SUT B.

      Verdict Criteria:

Observe that an ALERTING message is sent from SUT B to
SUT A. (Also observe that an ALERTING message is sent to
Tester A from SUT A.)

4.   Test Case ID: V5201EST004
      Test Purpose: Verify that SUT B continues to progress
                      (CONNECT message) a call request from SUT A.
      Reference: 6.5.2.6
      Pre-requisite: - PNNI Routing has completed and
                     - Test Case V5201EST002 was passed.
      Test Configuration: #3c

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (UNI) to SUT B.

      Test Procedure:
      1.   PNNI Routing has completed between SUT A and SUT B.
      2.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      3.   Tester A sends a SETUP message to SUT A.
      4.   Observe that a SETUP message is sent from SUT A to SUT
            B. (Also observe that SUT A sends a CALL PROCEEDING
            message to Tester A)
      5.   Observe that a CALL PROCEEDING message is sent from SUT
            B to SUT A.
      6.   Observe that a SETUP message is sent to Tester B from
            SUT B.
      7.   Tester B sends a CALL PROCEEDING message to SUT B.
      8.   Tester B sends a CONNECT message to SUT B.

      Verdict Criteria:
            Observe that a CONNECT message is sent from SUT B to SUT
            A. (Also observe that a CONNECT message is sent from SUT
            A to Tester A.)

5.   Test Case ID: V5201EST005
      Test Purpose: Verify that an SVC is established end-to-end.
      Reference: 6.5.2.2, 6.5.2.6
      Pre-requisite: - PNNI Routing has completed and
                     - Test Case V5201EST004 was passed.
      Test Configuration: #3c

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a. Connect Tester A (UNI) to SUT A.
2b. Connect Tester B (UNI) to SUT B.

Test Procedure:
1.   PNNI Routing has completed between SUT A and SUT B.
2.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
3.   Tester A sends a SETUP message to SUT A.
4.   Observe that a SETUP message is sent from SUT A to SUT
     B. (Also observe that SUT A sends a CALL PROCEEDING
     message to Tester A)
5.   Observe that a CALL PROCEEDING message is sent from SUT
     B to SUT A.
6.   Store the VPI/VCI contained in the SETUP or CALL
     PROCEEDING (correct message based on Node IDs of SUT A
     and SUT B).
7.   Observe that a SETUP message is sent to Tester B from
     SUT B.
8.   Tester B sends a CALL PROCEEDING message to SUT B.
9.   Tester B sends a CONNECT message to SUT B.
10. Observe that a CONNECT message is sent from SUT B to SUT
     A.
11. Observe that a CONNECT message is sent to Tester A from
     SUT A.
12. Have Tester A send a user data ATM cell using the
     VPI/VCI for the call on interface A (UNI).

Verdict Criteria:
     Observe that the user data ATM cell is passed over the
     VPI/VCI for interface D. (Also that the user data ATM
     cell is passed over the VPI/VCI for interface C.)

     Note: This test can be expanded for the purposes of
     verifying whether the connection satisfies the type
     (e.g. data rate, QoS, VBR, CBR, etc.) of SVC that was
     established. However, further testing of the data plane
     is beyond the scope of this document.

6-10   Repeat Test cases 1 - 5 with the call initiated in the
         other direction. (i.e. Tester B to Tester A)

11-15   Repeat Test Cases 1-5 with Test Configuration: #3a.

16-20   Repeat Test Cases 11-15 with Test Configuration: #3a and
           with the call initiated in the other direction (i.e.
           Tester B to Tester A)

5.2.2 5.2.2   Establishing an SVC (SS_M) Detailed for Test
       Configuration #3a

1.   Test Case ID: V5202EST001_CNI
      Test Purpose: To verify that normal call setup can be
                      supported between two switches. (connection
                      identifier I.E. - associated signalling 1)
      Reference: 6.5.2.2.1
      Pre-requisite: - Signalling between SUT A and SUT B is
                      configured as associated signalling(i.e.,
                      (VPCI,VCI) = (non-zero,5)).
                      - SUT A has a higher node ID than SUT B.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((0,0),(0,0)).
      2.   Tester A sends SETUP to SUT A.
      3.   Observe SUT A sends a SETUP message to SUT B. (Also
            observe that SUT A sends a CALL PROCEEDING message to
            Tester A.)
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B.)
      5.   Tester B sends a CALL PROCEEDING message to SUT B.
      6.   The final state is ((3,9),(3,9)).

      Verdict Criteria:
            Observe that SUT A sends a SETUP message with a
            Connection identifier I.E., whose VP associated
            signalling field is coded as "VP associated signalling"
            and the Preferred/exclusive field is coded as "Exclusive
            VPCI; exclusive VCI".
      - AND -
            Observe that SUT B sends a CALL PROCEEDING message with
            the same Connection identifier I.E. as received in the
            SETUP message.

2.   Test Case ID: V5202EST002_CNI

Test Purpose: To verify that normal call setup can be
                   supported between two switches. (connection
                   identifier I.E. - associated signalling 2)
Reference: 6.5.2.2.1
Pre-requisite: - Signalling between SUT A and SUT B is
                   configured as associated signalling(i.e.,
                   (VPCI,VCI) = (non-zero,5)).
                   - SUT A has a lower node ID than SUT B.
Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP to SUT A.
3.   Observe that SUT A sends a SETUP message to SUT B.
      (Also observe that SUT A sends a CALL PROCEEDING message
      to Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B).
5.   Tester B sends a CALL PROCEEDING message to SUT B.
6.   The final state is ((3,9),(3,9)).

Verdict Criteria:
      Observe that SUT A sends a SETUP message with a
      Connection identifier I.E., whose VP associated
      signalling field is coded as "VP associated signalling"
      and the Preferred/exclusive field is coded as "Exclusive
      VPCI; any VCI".
- AND -
      Observe that SUT B sends a CALL PROCEEDING message with
      a Connection identifier I.E., whose VP associated
      signalling field is coded as "VP associated signalling"
      and the Preferred/exclusive field is coded as "Exclusive
      VPCI; exclusive VCI".

3.   Test Case ID: V5202EST003_CNI
      Test Purpose: To verify that normal call setup can be
                      supported between two switches. (connection
                      identifier I.E. – non-associated signalling 1)

Reference: 6.5.2.2.2.1
Pre-requisite: - Signalling between SUT A and SUT B is
                 configured as non-associated signalling(i.e.,
                 (VPCI,VCI) = (0,5)).
                 - SUT A has a higher node ID than SUT B.
Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a. Connect Tester A (PNNI) to SUT A.
2b. Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP message to SUT A.
3.   Observe that SUT A sends a SETUP message to SUT B.
     (Also observe that SUT A sends a CALL PROCEEDING message
     to Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
     SUT A. (Also observe that SUT B sends a SETUP message
     to Tester B.)
5.   Tester B sends a CALL PROCEEDING message to SUT B.
6.   The final state is ((3,9),(3,9)).

Verdict Criteria:
     Observe that SUT A sends a SETUP message with a
     Connection identifier I.E., whose VP associated
     signalling field is coded as "explicit indication of
     VPCI" and the Preferred/exclusive field is coded as
     "Exclusive VPCI; exclusive VCI".
- AND -
     Observe that SUT B sends a CALL PROCEEDING message with
     the same Connection identifier I.E. as received in the
     SETUP message.

4.   Test Case ID: V5202EST004_CNI
     Test Purpose: To verify that normal call setup can be
                     supported between two switches. (connection
                     identifier I.E. – non-associated signalling 2)
     Reference: 6.5.2.2.2.1
     Pre-requisite: - Signalling between SUT A and SUT B is
                     configured as non-associated signalling(i.e.,
                     (VPCI,VCI) = (0,5)).
                     - SUT A has a lower node ID than SUT B.

Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP message to SUT A.
3.   Observe that SUT A sends a SETUP message to SUT B.
      (Also observe that SUT A sends a CALL PROCEEDING message
      to Tester A.
4.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)
5.   Tester B sends a CALL PROCEEDING message to SUT B.
6.   The final state is ((3,9),(3,9)).

Verdict Criteria:
      Observe that SUT A sends a SETUP message without
      Connection identifier I.E., or with a Connection
      identifier I.E. whose VP associated signalling field is
      coded as "explicit indication of VPCI" and the
      Preferred/exclusive field is coded as "Exclusive VPCI;
      any VCI".
- AND -
      Observe that SUT B sends a CALL PROCEEDING message with
      a Connection identifier I.E., whose VP associated
      signalling field is coded as "explicit indication of
      VPCI" and the Preferred/exclusive field is coded as
      "Exclusive VPCI; exclusive VCI".

5.   Test Case ID: V5202EST005_CON
      Test Purpose: To verify that normal call setup can be
                      supported between two switches. (Reception of
                      CONNECT after sending SETUP)
      Reference: 6.5.2.6
      Pre-requisite:
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

        Test Procedure:
        1.   The initial state is ((3,9),(3,9)).
        2.   Tester B sends a CONNECT message to SUT B.
        3.   Observe that SUT B sends a CONNECT message to SUT A.
              (Also observe that SUT A sends a CONNECT message to
              Tester A.)
        4.   The final state is ((10,10),(10,10)).

        Verdict Criteria:
              Observe that SUT B sends a CONNECT message to SUT A.
              (Also observe that SUT A sends a CONNECT message to
              Tester A.)

6.   Test Case ID: V5202EST006_ALR
        Test Purpose: To verify that normal call setup can be
                        supported between two switches. (Reception of
                        ALERT after sending SETUP)
        Reference: 6.5.2.6
        Pre-requisite:
        Test Configuration: #3a

        Test Set-up:
        1.   Connect the two SUTs with one physical link.
        2a.   Connect Tester A (PNNI) to SUT A.
        2b.   Connect Tester B (PNNI) to SUT B.

        Test Procedure:
        1.   The initial state is ((3,9),(3,9)).
        2.   Tester B sends an ALERTING message to SUT B.
        3.   Observe that SUT B sends an ALERTING message to SUT A.
              (Also observe that SUT A sends an ALERTING message to
              Tester A.)
        4.   The final state is ((4,7),(4,7)).

        Verdict Criteria:
              Observe that SUT B sends an ALERTING message to SUT A.
              (Also observe that SUT A sends an ALERTING message to
              Tester A.)

7.   Test Case ID: V5202EST007_ACN
        Test Purpose: To verify that normal call setup can be
                        supported between two switches.(Reception of
                        CONNECT after receiving ALERT)

```
        Reference:       6.5.2.6
        Pre-requisite:
        Test Configuration: #3a


        Test Set-up:
        1.    Connect the two SUTs with one physical link.
        2a.   Connect Tester A (PNNI) to SUT A.
        2b.   Connect Tester B (PNNI) to SUT B.


        Test Procedure:
        1.    The initial state is ((4,7),(4,7)).
        2.    Tester B sends a CONNECT message to SUT B.
        3.    Observe that SUT B sends a CONNECT message to SUT A.
              (Also observe that SUT A sends a CONNECT message to
              Tester A.)
        4.    The final state is ((10,10),(10,10)).


        Verdict Criteria:
              Observe that SUT B sends a CONNECT to SUT A.
              (Also observe that SUT A sends a CONNECT message to
              Tester A.)



8.      Test Case ID:    V5202EST008_TRA
        Test Purpose:    To verify two switches, during call/connection
                         establishment, handle tagging parameters
                         correctly when SUT A performs tagging for
                         forward traffic.
        Reference:       6.5.2.3.3, 6.4.5.9
        Pre-requisite:   - SUT A performs tagging for forward traffics
                         when it receives Tf field coded as "Tagging
                         requested."
                         - The SUTs must be configurable
                         administratively with respect to enabling or
                         disabling tagging.  Note that this feature is
                         not required by the PNNI v1.0 Specification or
                         by the related PICS.  Inability to perform
                         this function and hence this test does not
                         necessarily mean that a SUT is non-compliant
                         with respect to tagging.
        Test Configuration: #3a


        Test Set-up:
        1.    Connect the two SUTs with one physical link.
        2a.   Connect Tester A (PNNI) to SUT A.
        2b.   Connect Tester B (PNNI) to SUT B.
```

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP message to SUT A.
      [The SETUP message contains ATD I.E. whose Tf field is
      coded as "Tagging requested."]
3.   Observe that SUT A sends a SETUP message to SUT B.
      (Also observe that SUT A sends a CALL PROCEEDING message
      to Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)
5.   The final state is ((3,9),(3,6)).

Verdict Criteria:
      Observe that SUT A sends a SETUP message to SUT B that
      contains ATD I.E. whose Tf field is coded as "Tagging
      not allowed."
- AND -
      Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B that contains ATD I.E. whose Tf field is
      coded as "Tagging not allowed.")

9.   Test Case ID: V5202EST009_TRA
      Test Purpose: To verify two switches, during call/connection
                       establishment, handle tagging parameters
                       correctly when SUT B performs tagging for
                       forward traffic.
      Reference: 6.5.2.3.3, 6.4.5.9
      Pre-requisite: - SUT A does not perform tagging for forward
                       traffics when it receives Tf field coded as
                       "Tagging requested," and
                       - SUT B performs tagging for forward traffics
                       when it receives Tf field coded as "Tagging
                       requested."
                       - The SUTs must be configurable
                       administratively with respect to enabling or
                       disabling tagging. Note that this feature is
                       not required by the PNNI v1.0 Specification or
                       by the related PICS. Inability to perform
                       this function and hence this test does not
                       necessarily mean that a SUT is non-compliant
                       with respect to tagging.

Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP message to SUT A.
      [The SETUP message contains ATD I.E. whose Tf field is
      coded as "Tagging requested."]
3.   Observe that SUT A sends a SETUP message to SUT B.
      (Also observe that SUT A sends a CALL PROCEEDING message
      to Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)
5.   The final state is ((3,9),(3,6)).

Verdict Criteria:
      Observe that SUT A sends a SETUP message to SUT B.
- AND -
      Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B that contains ATD I.E. whose Tf field is
      coded as "Tagging not allowed.")

10.   Test Case ID: V5202EST010_TRA
      Test Purpose: To verify two switches, during call/connection
                      establishment, handle tagging parameters
                      correctly when they receive Tf field coded as
                      Tagging not allowed.
      Reference: 6.5.2.3.3, 6.4.5.9
      Pre-requisite: - The SUTs must be configurable
                      administratively with respect to enabling or
                      disabling tagging. Note that this feature is
                      not required by the PNNI v1.0 Specification or
                      by the related PICS. Inability to perform
                      this function and hence this test does not
                      necessarily mean that a SUT is non-compliant
                      with respect to tagging.
      Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP message to SUT A.
      [The SETUP message contains ATD I.E. whose Tf field is
      coded as "Tagging not allowed."]
3.   Observe that SUT A sends a SETUP message to SUT B.
      (Also observe that SUT A sends a CALL PROCEEDING message
      to Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)
5.   The final state is ((3,9),(3,6)).

Verdict Criteria:
      Observe that SUT A sends a SETUP message to SUT B that
      contains ATD I.E. whose Tf field is coded as "Tagging
      not allowed."
- AND -
      Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B that contains ATD I.E. whose Tf field is
      coded as "Tagging not allowed.")

11.   Test Case ID: V5202EST011_TRA
      Test Purpose: To verify two switches, during call/connection
                       acceptance, handle tagging parameters
                       correctly when SUT A performs tagging for
                       forward traffic.
      Reference: 6.5.2.6.1, 6.4.5.9
      Pre-requisite: - SUT A performs tagging for forward traffics
                       when it receives Tf field coded as "Tagging
                       requested."
                       - The SUTs must be configurable
                       administratively with respect to enabling or
                       disabling tagging. Note that this feature is
                       not required by the PNNI v1.0 Specification or
                       by the related PICS. Inability to perform
                       this function and hence this test does not
                       necessarily mean that a SUT is non-compliant
                       with respect to tagging.

Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((3,9),(3,6)). {Note: Use Test
      Case V5202EST008_TRA to reach this state.}
2.   Tester B sends a CALL PROCEEDING message to SUT B.
3.   Tester B sends a CONNECT message to SUT B.
      [The CONNECT message from Tester B contains an ATD I.E.
      whose Tf field is coded as "Tagging not applied."]
4.   Observe that SUT B sends a CONNECT message to SUT A.
      (Also observe that SUT A sends a CONNECT message to
      Tester A.)
5.   The final state is ((10,10),(10,10)).

Verdict Criteria:
      Observe that SUT B sends a CONNECT message to SUT A that
      contains ATD I.E. whose Tf field is coded as "Tagging
      not applied."
- AND -
      Observe that SUT A sends a CONNECT message to Tester A
      that contains ATD I.E. whose Tf field is coded as
      "Tagging applied.")

12.   Test Case ID: V5202EST012_TRA
      Test Purpose: To verify two switches, during call/connection
                      acceptance, handle tagging parameters
                      correctly when they had received Tf field
                      coded as Tagging not allowed.
      Reference: 6.5.2.6.1, 6.4.5.9
      Pre-requisite: - The SUTs must be configurable
                      administratively with respect to enabling or
                      disabling tagging. Note that this feature is
                      not required by the PNNI v1.0 Specification or
                      by the related PICS. Inability to perform
                      this function and hence this test does not
                      necessarily mean that a SUT is non-compliant
                      with respect to tagging.
      Test Configuration: #3a

      Test Set-up:

1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((3,9),(3,6)). {Note: Use Test
      Case V5202EST010_TRA to reach this state.}
2.   Tester B sends a CALL PROCEEDING message to SUT B.
3.   Tester B sends a CONNECT message to SUT B.
      [The CONNECT message from Tester B contains an ATD I.E.
      whose Tf field is coded as "Tagging not applied."]
4.   Observe that SUT B sends a CONNECT message to SUT A.
      (Also observe that SUT A sends a CONNECT message to
      Tester A.
5.   The final state is ((10,10),(10,10)).

Verdict Criteria:
      Observe that SUT B sends a CONNECT message to SUT A that
      contains ATD I.E. whose Tf field is coded as "Tagging
      not applied."
- AND -
      (Observe that SUT A sends a CONNECT message to Tester A
      that contains ATD I.E. whose Tf field is coded as
      "Tagging not applied.")

13.   Test Case ID: V5202EST013_TRA
      Test Purpose: To verify two switches, during call/connection
                       establishment, handle backward tagging
                       parameters correctly when none of two switches
                       performs tagging for backward traffic.
      Reference: 6.5.2.3.3, 6.4.5.9
      Pre-requisite: - Neither switch performs tagging for backward
                       traffics when it receives Tb field coded as
                       "Tagging not supported."
                       - The SUTs must be configurable
                       administratively with respect to enabling or
                       disabling tagging. Note that this feature is
                       not required by the PNNI v1.0 Specification or
                       by the related PICS. Inability to perform
                       this function and hence this test does not
                       necessarily mean that a SUT is non-compliant
                       with respect to tagging.
      Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP message to SUT A.
      [The SETUP message contains ATD I.E. whose Tb field is
      coded as "Tagging not supported."]
3.   Observe that SUT A sends a SETUP message to SUT B.
      (Also observe that SUT A sends a CALL PROCEEDING message
      to Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)
5.   The final state is ((3,9),(3,6)).

Verdict Criteria:
      Observe that SUT A sends a SETUP message to SUT B that
      contains ATD I.E. whose Tb field is coded as "Tagging
      not supported."
- AND -
      Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B that contains ATD I.E. whose Tb field is
      coded as "Tagging not supported.")

14.   Test Case ID: V5202EST014_QOS
      Test Purpose: To verify that both SUTs transfer QoS I.E. if
                      it is included in the received SETUP message.
      Reference: 6.5.2.3.5
      Pre-requisite:
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((0,0),(0,0)).
      2.   Tester A sends a SETUP message to SUT A.
            [The SETUP message contains QoS I.E.]

3.   Observe that SUT A sends a SETUP message to SUT B.
     (Also observe that SUT A sends a CALL PROCEEDING message
     to Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
     SUT A. (Also observe that SUT B sends a SETUP message
     to Tester B.)
5.   The final state is ((3,9),(3,6)).

Verdict Criteria:
     Observe that SUT A sends a SETUP message to SUT B that
     includes the QoS I.E. (Also observe that SUT B sends a
     SETUP message to Tester B that includes the QoS I.E.)

15.   Test Case ID: V5202EST015_QOS
      Test Purpose: To verify that both SUTs increment values of
                       the QoS parameters during call/connection
                       establishment.
      Reference: 6.5.2.3.5
      Pre-requisite:
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a. Connect Tester A (PNNI) to SUT A.
      2b. Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((0,0),(0,0)).
      2.   Tester A sends a SETUP message to SUT A.
           [The SETUP message contains Extended QoS I.E. and   End-
           to-end transit delay I.E.]
      3.   Observe that SUT A sends a SETUP message to SUT B.
           (Also observe that SUT A sends a CALL PROCEEDING message
           to Tester A.)
      4.   Observe that SUT B sends a CALL PROCEEDING message to
           SUT A. (Also observe that SUT B sends a SETUP message
           to Tester B.)
      5.   The final state is ((3,9),(3,6)).

      Verdict Criteria:
           Using both SETUP messages received by and sent from SUT
           A, check that SUT A incremented the cumulative forward
           and backward values of individual QoS parameters
           included in Extended QoS I.E. and End-to-end transit
           delay I.E.

– AND –
Using both SETUP messages received by and sent from SUT
B, check that SUT B incremented the cumulative forward
and backward values of individual QoS parameters
included in Extended QoS I.E. and End-to-end transit
delay I.E.

16-30   Repeat Test cases 1 – 15 with the call initiated in the
other direction. Tester A, SUT A, SUT B, and Tester B
are exchanged with Tester B, SUT B, SUT A, and Tester A;
and the state notation is changed from ((s1,s2),(s3,s4))
to ((s4,s3),(s2,s1)).

5.2.2.1 5.2.2.1 Optional tests for Establishment: Negotiation of ATM traffic descriptors (OPT_5)

These tests are to be executed only if the implementation supports the optional procedures for Negotiation of ATM traffic descriptors as stated in Annex G #37 of the PNNI v1.0 specification.

1.   Test Case ID: V5221EST001_TRA
      Test Purpose: To check that the call can be progressed when
                       two switches are able to provide the traffic
                       parameter values specified in the ATD I.E. and
                       Minimum acceptable ATD I.E.
      Reference: 6.5.2.3.4
      Pre-requisite:
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((0,0),(0,0)).
      2.   Tester A sends a SETUP to SUT A.
            [The SETUP message contains ATD I.E. and Minimum
            acceptable ATD I.E. such that,
            * Both SUT A and SUT B are able to provide the traffic
            parameter values specified in the ATD I.E.]
      3.   Observe that SUT A sends a SETUP message to SUT B.
            (Also observe that SUT A sends a CALL PROCEEDING message
            to Tester A.)
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B.
      5.   The final state is ((3,9),(3,6)).

      Verdict Criteria:
            Observe that SUT A sends a SETUP message with the same
            ATD I.E. and the same Minimum acceptable ATD I.E. which
            were sent by Tester A.
      – AND –
            Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            with the same ATD I.E. and the same Minimum acceptable
            ATD I.E. which are sent by Tester A.)

2.   Test Case ID: V5221EST002_TRA
       Test Purpose: To check that the call can be progressed when
                         the second switch is able to provide the
                         traffic parameter values specified in the
                         Minimum acceptable ATD I.E. but cannot support
                         those in the ATD I.E. - Minimum acceptable ATD
                         I.E. remains after negotiation.
       Reference: 6.5.2.3.4
       Pre-requisite:
       Test Configuration: #3a

       Test Set-up:
       1.   Connect the two SUTs with one physical link.
       2a.   Connect Tester A (PNNI) to SUT A.
       2b.   Connect Tester B (PNNI) to SUT B.

       Test Procedure:
       1.   The initial state is ((0,0),(0,0)).
       2.   Tester A sends a SETUP message to SUT A.
              [The SETUP message contains ATD I.E. and Minimum
              Acceptable ATD I.E. such that,
              * SUT A is able to provide the traffic parameter values
              specified in the ATD I.E.
              * SUT B is not able to provide some traffic parameter
              values specified in the ATD I.E. but able to provide the
              traffic parameter values specified in the Minimum
              acceptable ATD I.E. Let the negotiated ATD I.E. has at
              least one traffic parameter value larger than Minimum
              acceptable ATD I.E.]
       3.   Observe that SUT A sends a SETUP message to SUT B.
              (Also observe that SUT A sends a CALL PROCEEDING message
              to Tester A.)
       4.   Observe that SUT B sends a CALL PROCEEDING message to
              SUT A. (Also observe that SUT B sends a SETUP message
              to Tester B.)
       5.   The final state is ((3,9),(3,6)).

       Verdict Criteria:
              Observe that SUT A sends a SETUP message with the same
              ATD I.E. and the same Minimum acceptable ATD I.E. as
              received.
       - AND -
              Observe that SUT B sends a CALL PROCEEDING message to
              SUT A. (Also observe that SUT B sends a SETUP message

to Tester B with the modified ATD I.E. and the same
Minimum acceptable ATD I.E. sent by Tester A.)

3.   Test Case ID: V5221EST003_TRA
      Test Purpose: To check that the call can be progressed when
                       the second switch is able to provide the
                       traffic parameter values specified in the
                       Minimum acceptable ATD I.E. but cannot support
                       those in the ATD I.E. – Minimum acceptable ATD
                       I.E. removes after negotiation.
      Reference: 6.5.2.3.4
      Pre-requisite:
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((0,0),(0,0)).
      2.   Tester A sends a SETUP message to SUT A.
            [The SETUP message contains ATD I.E. and Minimum
            Acceptable ATD I.E. such that,
            * SUT A is able to provide the traffic parameter values
            specified in the ATD I.E.
            * SUT B is not able to provide some traffic parameter
            values specified in the ATD I.E. but able to just
            exactly provide the traffic parameter values specified
            in the Minimum acceptable ATD I.E.]
      3.   Observe that SUT A sends a SETUP message to SUT B.
            (Also observe that SUT A sends a CALL PROCEEDING message
            to Tester A.)
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP to Tester
            B.)
      5.   The final state is ((3,9),(3,6)).

      Verdict Criteria:
            Observe that SUT A sends a SETUP message with the same
            ATD I.E. and the same Minimum acceptable ATD I.E. as
            received.
      – AND –

Observe that SUT B sends a CALL PROCEEDING message to
SUT A. (Also observe that SUT B sends a SETUP message
without the Minimum acceptable ATD I.E. Check that
contents of the ATD I.E. are modified according to the
Minimum acceptable ATD I.E.)

4.   Test Case ID: V5221EST004_TRA
      Test Purpose: To check that the call can be progressed when
                       the SUT A (first switch) is able to provide
                       the traffic parameter values specified in the
                       Minimum acceptable ATD I.E. but cannot support
                       those in the ATD I.E.
      Reference: 6.5.2.3.4
      Pre-requisite:
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((0,0),(0,0)).
      2.   Tester A sends a SETUP to SUT A.
            [The SETUP message contains ATD I.E. and Minimum
            Acceptable ATD I.E. such that,
            * SUT A is not able to provide some traffic parameter
            values specified in the ATD I.E. but able to provide the
            traffic parameter values specified in the Minimum
            acceptable ATD I.E. Let the modified ATD I.E. has at
            least one traffic parameter value larger than Minimum
            acceptable ATD I.E.
            * SUT B is able to provide the traffic parameter values
            specified in the ATD I.E.]
      3.   Observe that SUT A sends a SETUP to SUT B. (Also
            observe that SUT A sends a CALL PROCEEDING message to
            Tester A.)
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            Tester B.)
      5.   The final state is ((3,9),(3,6)).

      Verdict Criteria:

       Observe that SUT A sends a SETUP message to SUT B with
       the modified ATD I.E. and the same Minimum acceptable
       ATD I.E. sent by Tester A.

- AND -

       Observe that SUT B sends a CALL PROCEEDING message to
       SUT A. (Also observe that SUT B sends a SETUP message
       with the same ATD I.E. and the same Minimum acceptable
       ATD I.E. as received to Tester B.)

5.   Test Case ID: V5221EST005_TRA
     Test Purpose: To check that the call can be progressed when
                        both SUTs are able to provide the traffic
                        parameter values specified in the ATD I.E. and
                        Alternative ATD I.E.
     Reference: 6.5.2.3.4
     Pre-requisite:
     Test Configuration: #3a

     Test Set-up:
     1.   Connect the two SUTs with one physical link.
     2a.   Connect Tester A (PNNI) to SUT A.
     2b.   Connect Tester B (PNNI) to SUT B.

     Test Procedure:
     1.   The initial state is ((0,0),(0,0)).
     2.   Tester A sends a SETUP message to SUT A.
         [The SETUP message contains ATD I.E. and Alternative ATD
         I.E. such that,
         * Both SUT A and SUT B are able to provide the traffic
         parameter values specified in the ATD I.E. and
         Alternative ATD I.E.]
     3.   Observe that SUT A sends a SETUP to SUT B. (Also
         observe that SUT A sends a CALL PROCEEDING message to
         Tester A.)
     4.   Observe that SUT B sends a CALL PROCEEDING message to
         SUT A. (Also observe that SUT B sends a SETUP message
         to Tester B.)
     5.   The final state is ((3,9),(3,6)).

     Verdict Criteria:
         Observe that SUT A sends a SETUP message to SUT B with
         the same ATD I.E. and the same Alternative ATD I.E. as
         received from Tester A.
     - AND -

Observe that SUT B sends a CALL PROCEEDING message to
SUT A. (Also observe that SUT B sends a SETUP message
with the same ATD I.E. and the same Alternative ATD I.E.
as received to Tester B.)

6.   Test Case ID: V5221EST006_TRA
      Test Purpose: To check that the call can be progressed when
                       SUT B (second switch) is able to provide the
                       traffic parameter values specified in the ATD
                       I.E. but cannot support those in the
                       Alternative ATD I.E.
      Reference: 6.5.2.3.4
      Pre-requisite:
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((0,0),(0,0)).
      2.   Tester A sends a SETUP message to SUT A.
            [The SETUP message contains ATD I.E. and Alternative ATD
            I.E. such that,
            * SUT A is able to provide the traffic parameter values
            specified in the ATD I.E. and Alternative ATD I.E.
            * SUT B is able to provide traffic parameter values
            specified in the ATD I.E. but not able to provide
            traffic parameter values specified in the Alternative
            ATD I.E.]
      3.   Observe that SUT A sends a SETUP message to SUT B.
            (Also observe that SUT A sends a CALL PROCEEDING message
            to Tester A.)
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B.
      5.   The final state is ((3,9),(3,6)).

      Verdict Criteria:
            Observe that SUT A sends a SETUP message to SUT B with
            the same ATD I.E. and the same Alternative ATD I.E. as
            received from Tester A.
      – AND –

Observe that SUT B sends a CALL PROCEEDING message to
SUT A. (Also observe that SUT B sends a SETUP message
to Tester B with the same ATD I.E. as received but
without the Alternative ATD I.E.)

7.   Test Case ID: V5221EST007_TRA
      Test Purpose: To check that the call can be progressed when
                       SUT B (second switch) is able to provide the
                       traffic parameter values specified in the
                       Alternative ATD I.E. but cannot support those
                       in the ATD I.E.
      Reference: 6.5.2.3.4
      Pre-requisite:
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((0,0),(0,0)).
      2.   Tester A sends a SETUP message to SUT A.
            [The SETUP message contains ATD I.E. and Alternative ATD
            I.E. such that,
            * SUT A is able to provide the traffic parameter values
            specified in the ATD I.E. and Alternative ATD I.E.
            * SUT B is able to provide traffic parameter values
            specified in the Alternative ATD I.E. but not able to
            provide traffic parameter values specified in the ATD
            I.E.]
      3.   Observe that SUT A sends a SETUP message to SUT B.
            (Also observe that SUT A sends a CALL PROCEEDING message
            to SUT A.)
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B.)
      5.   The final state is ((3,9),(3,6)).

      Verdict Criteria:
            Observe that SUT A sends a SETUP message with the same
            ATD I.E. and the same Alternative ATD I.E. as received
            from Tester A.
      - AND -

> Observe that SUT B sends CALL_PROC to SUT A. (Also
> observe that SUT B sends a SETUP message to Tester B
> without Alternative ATD I.E. Check that contents of the
> ATD I.E. are same with the received Alternative ATD
> I.E.)

8.   Test Case ID: V5221EST008_TRA
      Test Purpose: To check that both SUTs progress the CONNECT
                       message with the same ATD I.E. if it is
                       contained in the received CONNECT message.
      Reference: 6.5.2.6.2
      Pre-requisite:
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((3,9),(3,6)).
      2.   Tester B sends a CALL PROCEEDING message to SUT B.
      3.   Tester B sends a CONNECT message to SUT B.
            [The CONNECT message from Tester B contains the same ATD
            I.E. as received in the SETUP message.]
      4.   Observe that SUT B sends a CONNECT message to SUT A.
            (Also observe that SUT A sends a CONNECT message to
            Tester A.)
      5.   The final state is ((10,10),(10,10)).

      Verdict Criteria:
            Observe that SUT B sends a CONNECT message with the same
            ATD I.E. as received with the exception of the Traffic
            Management Options. (Also observe that SUT A sends
            CONNECT message to Tester A with the same ATD I.E. as
            received with the exception of the Traffic Management
            Options.)

9.   Test Case ID: V5221EST009_TRA
      Test Purpose: To check that both SUTs progress the CONNECT
                       message with the ATD I.E. of which parameters
                       has been negotiated during call setup. - SUT B

                          (second switch) adds ATD I.E. on the CONNECT
                          message.
            Reference: 6.5.2.6.2
            Pre-requisite: Must have passed Test Case V5221EST002_TRA.
            Test Configuration: #3a

            Test Set-up:
            1.   Connect the two SUTs with one physical link.
            2a.   Connect Tester A (PNNI) to SUT A.
            2b.   Connect Tester B (PNNI) to SUT B.

            Test Procedure:
            1.   The initial state is ((3,9),(3,6)). {Note: Use Test
                  Case V5221EST002_TRA to reach this state.}
            2.   Tester B sends a CALL PROCEEDING message to SUT B.
            3.   Tester B sends a CONNECT message to SUT B.
                  [The CONNECT message from Tester B contains no ATD I.E.]
            4.   Observe that SUT B sends a CONNECT message to SUT A.
                  (Also observe that SUT A sends a CONNECT message to
                  Tester A.
            5.   The final state is ((10,10),(10,10)).

            Verdict Criteria:
                  Observe that SUT B sends a CONNECT message with the ATD
                  I.E. which are the same as those of the SETUP message
                  sent by SUT B to Tester B with the exception of the
                  Traffic Management Options. (Also observe that SUT A
                  sends a CONNECT message to Tester A.)

10.   Test Case ID: V5221EST010_TRA
      Test Purpose: To check that both SUTs progress the CONNECT
                       message with the ATD I.E. of which parameters
                       has been negotiated during call setup. - SUT A
                       (first switch) adds ATD I.E. on the CONNECT
                       message.
      Reference: 6.5.2.6.2
      Pre-requisite: Must have passed Test Case V5221EST004_TRA.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:

1.   The initial state is ((3,9),(3,6)). {Note: Use Test
     Case V5221EST004_TRA to reach this state.}
2.   Tester B sends a CALL PROCEEDING message to SUT B.
     [The CONNECT message from Tester B contains no ATD I.E.]
3.   Observe that SUT B sends a CONNECT message to SUT A.
     (Also observe that SUT A sends a CONNECT message to
     Tester A.
4.   The final state is ((10,10),(10,10)).

Verdict Criteria:
     Observe that SUT A sends a CONNECT message to Tester A
     with an ATD I.E. of which contents are same with those
     of the SETUP message sent by SUT B with the exception of
     the Traffic Management Options.

11. Test Case ID: V5221EST011_TRA
     Test Purpose: To check that, after alerting, two switches
                     progress the CONNECT message with the same ATD
                     I.E. if it is contained in the received
                     CONNECT message.
     Reference: 6.5.2.6.2
     Pre-requisite:
     Test Configuration: #3a

     Test Set-up:
1.   Connect the two SUTs with one physical link.
2a. Connect Tester A (PNNI) to SUT A.
2b. Connect Tester B (PNNI) to SUT B.

     Test Procedure:
1.   The initial state is ((3,9),(3,6)).
2.   Tester B sends a CALL PROCEEDING message to SUT B.
3.   Tester B sends an ALERTING message to SUT B.
4.   Observe that SUT B sends an ALERTING message to SUT A.
     (Also observe that SUT A sends an ALERTING message to
     Tester A.)
5.   Tester B sends a CONNECT message to SUT B.
     [The CONNECT message from Tester B contains the same ATD
     I.E. as received in the SETUP message.]
6.   Observe that SUT B sends a CONNECT message to SUT A.
     (Also observe that SUT A sends a CONNECT message to
     Tester A.)
7.   The final state is ((10,10),(10,10)).

Verdict Criteria:
    Observe that SUT B sends a CONNECT message with the same
    ATD I.E. as received. (Also observe that SUT A sends a
    CONNECT message to Tester A.)

12.   Test Case ID: V5221EST012_TRA
    Test Purpose: To check that, after alerting, two switches
                     progress the CONNECT message with the ATD I.E.
                     of which parameters has been negotiated during
                     call setup. - SUT B (second switch) adds ATD
                     I.E. on the CONNECT message.
    Reference: 6.5.2.6.2
    Pre-requisite: Must have passed Test Case V5221EST002_TRA.
    Test Configuration: #3a

    Test Set-up:
    1.   Connect the two SUTs with one physical link.
    2a. Connect Tester A (PNNI) to SUT A.
    2b. Connect Tester B (PNNI) to SUT B.

    Test Procedure:
    1.   The initial state is ((3,9),(3,6)). {Note: Use Test
         Case V5221EST002_TRA to reach this state.}
    2.   Tester B sends a CALL PROCEEDING message to SUT B.
    3.   Tester B sends an ALERTING message to SUT B.
    4.   Observe that SUT B sends an ALERTING message to SUT A.
         (Also observe that SUT A sends an ALERTING message to
         Tester A.)
    5.   Tester B sends a CONNECT message to SUT B.
         [The CONNECT message from Tester B contains no ATD I.E.]
    6.   Observe that SUT B sends a CONNECT message to SUT A.
         (Also observe that SUT A sends a CONNECT message to
         Tester A.)
    7.   The final state is ((10,10),(10,10)).

    Verdict Criteria:
        Observe that SUT B sends a CONNECT message with the ATD
        I.E. with the same contents as those in the SETUP
        message sent by SUT B to Tester B with the exception of
        the Traffic Management Options.

13.   Test Case ID: V5221EST013_TRA

Test Purpose: To check that, after alerting, two switches
                 progress the CONNECT message with the ATD I.E.
                 of which parameters has been negotiated during
                 call setup. - SUT A (first switch) adds ATD
                 I.E. on the CONNECT message.
Reference: 6.5.2.6.2
Pre-requisite: Must have passed Test Case V5221EST004_TRA.
Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((3,9),(3,6)). {Note: Use Test
      Case V5221EST004_TRA to reach this state.}
2.   Tester B sends a CALL PROCEEDING message to SUT B.
3.   Tester B sends an ALERTING message to SUT B.
4.   Observe that SUT B sends an ALERTING message to SUT A.
      (Also observe that SUT A sends an ALERTING message to
      Tester A.)
5.   Tester B sends a CONNECT message to SUT B.
      [The CONNECT message sent by Tester B contains no ATD
      I.E.]
6.   Observe that SUT B sends a CONNECT message to SUT A.
      (Also observe that SUT A sends a CONNECT message to
      Tester A.)
7.   The final state is ((10,10),(10,10)).

Verdict Criteria:
      Observe that SUT A sends a CONNECT message with an ATD
      I.E. of which contents are same with those of the SETUP
      message sent by SUT B to Tester B with the exception of
      the Traffic Management Options.

14-26   Repeat Test cases 1 - 13 with the call initiated in the
         other direction. Tester A, SUT A, SUT B, and Tester B
         are exchanged with Tester B, SUT B, SUT A, and Tester A;
         and the state notation is changed from ((s1,s2),(s3,s4))
         to ((s4,s3),(s2,s1)).

5.2.3 5.2.3   Establishing an SVC (SS_M) Detailed for Test
        Configuration #3b

1.   Test Case ID: V5203EST001_CNI
      Test Purpose: To verify that normal call setup can be
                      supported between two switches. (connection
                      identifier I.E. - associated signalling 1)
      Reference: 6.5.2.2.1
      Pre-requisite: - Signalling between SUT A and SUT B is
                      configured as associated signalling (i.e.,
                      (VPCI,VCI) = (non-zero,5)).
                      - SUT A has higher node ID than SUT B.
      Test Configuration: #3b

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is (0,(0,0))
      2.   Tester A sends a SETUP message to SUT A.
      3.   Observe that SUT A sends a SETUP message to SUT B.
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B.)
      5.   Tester B sends a CALL PROCEEDING message to SUT B.
      6.   The final state is (9,(3,9))

      Verdict Criteria:
            Observe that SUT A sends a SETUP message with a
            Connection identifier I.E., whose VP associated
            signalling field is coded as "VP associated signalling"
            and the Preferred/exclusive field is coded as "Exclusive
            VPCI; exclusive VCI".
      - AND -
            Observe that SUT B sends a CALL PROCEEDING message with
            the same Connection identifier I.E. as received in the
            SETUP message from SUT A.

2.   Test Case ID: V5203EST002_CNI
3.   Test Case ID: V5203EST003_CNI
4.   Test Case ID: V5203EST004_CNI

 : Obtained from V5202EST002_CNI, V5202EST003_CNI and
V5202EST004_CNI by following changes,
   1. Replace states ((s1,s2),(s3,s4)) by (s2,(s3,s4)).
   2. Replace step 3 of Test Procedure by,
     "3. Observe that SUT A sends a SETUP message to SUT B."

5.   Test Case ID: V5203EST005_CON
6.   Test Case ID: V5203EST006_ALR
7.   Test Case ID: V5203EST007_ACN
 : Obtained from V5202EST005_CON, V5202EST006_ALR and
V5202EST007_ACN by following changes,
   1. Replace states ((s1,s2),(s3,s4)) by (s2,(s3,s4)).

8.   Test Case ID: V5203EST008_QOS
   Test Purpose: To verify that both SUTs transfer QoS I.E. if
               it is included in the received SETUP message.
   Pre-requisite:
   Reference: 6.5.2.3.5
   Test Configuration: #3b

   Test Set-up:
   1.   Connect the two SUTs with one physical link.
   2a. Connect Tester A (UNI) to SUT A.
   2b. Connect Tester B (PNNI) to SUT B.

   Test Procedure:
   1.   The initial state is (0,(0,0)).
   2.   Tester A sends a SETUP message to SUT A.
       [The SETUP message contains QoS I.E.]
   3.   Observe that SUT A sends a SETUP message to SUT B.
   4.   Observe that SUT B sends a CALL PROCEEDING message to
       SUT A. (Also observe that SUT B sends a SETUP message
       to Tester B.)
   5.   The final state is (9,(3,6)).

   Verdict Criteria:
       Observe that SUT A sends a SETUP message to SUT B that
       includes QoS I.E. (Also observe that SUT B sends a SETUP
       message to Tester B that includes QoS I.E.)

9.   Test Case ID: V5203EST009_QOS

Test Purpose: To verify that the first switch sends SETUP
                including Extended QoS I.E. when the setup
                indication includes neither Extended QoS I.E.
                nor End-to-end transit delay I.E. and ATM
                service category of the call is CBR, real-time
                VBR, or non-real-time VBR, and the second
                switch increments values of the QoS parameters
                during call/connection establishment.
Reference: 6.5.2.3.5
Pre-requisite:
Test Configuration: #3b

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (UNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is (0,(0,0)).
2.   Tester A sends a SETUP message to SUT A.
      [The SETUP message contains neither Extended QoS I.E.
      nor End-to-end transit delay I.E. and ATM service
      category of the call is CBR, real-time VBR, or   non-
      real-time VBR.]
3.   Observe that SUT A sends a SETUP message to SUT B.
4.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A.   (Also observe that SUT B sends a SETUP message
      to Tester B.)
5.   The final state is (9,(3,6)).

Verdict Criteria:
      Observe that SUT A sends a SETUP message to SUT B that
      includes Extended QoS I.E.
- AND -
      Using both SETUP messages received by and sent from SUT
      B, check that SUT B incremented the cumulative forward
      and backward values of individual QoS parameters
      included in the Extended QoS I.E.

10.   Test Case ID: V5203EST010_CNI
      Test Purpose: To verify that normal call setup can be
                      supported between two switches. (connection
                      identifier I.E. - associated signalling 1)
      Reference: 6.5.2.2.1

        Pre-requisite: - Signalling between SUT A and SUT B is
                          configured as associated signalling (i.e.,
                          (VPCI,VCI) = (non-zero,5)),
                          - SUT B has higher node ID than SUT A.
        Test Configuration: #3b

        Test Set-up:
        1.   Connect the two SUTs with one physical link.
        2a.   Connect Tester A (UNI) to SUT A.
        2b.   Connect Tester B (PNNI) to SUT B.

        Test Procedure:
        1.   The initial state is (0,(0,0))
        2.   Tester B sends a SETUP to SUT B.
        3.   Observe that SUT B sends a SETUP message to SUT A.
              (Also Observe that SUT B sends a CALL PROCEEDING message
              Tester B.)
        4.   Observe that SUT A sends a CALL PROCEEDING message to
              SUT B. (Also observe that SUT A sends a SETUP message
              to Tester A.)
        5.   The final state is (3,(9,3))

        Verdict Criteria:
              Observe that SUT B sends a SETUP message to SUT A with a
              Connection identifier I.E., whose VP associated
              signalling field is coded as "VP associated signalling"
              and the Preferred/exclusive field is coded as "Exclusive
              VPCI; exclusive VCI".
        - AND -
              Observe that SUT A sends a CALL PROCEEDING message to
              SUT B with the same Connection identifier I.E. as
              received in the SETUP message from SUT B.

11.   Test Case ID: V5203EST011_CNI
12.   Test Case ID: V5203EST012_CNI
13.   Test Case ID: V5203EST013_CNI
 : Obtained from V5202EST002_CNI, V5202EST003_CNI and
V5202EST004_CNI by following changes,
   1. Replace Tester A, SUT A, SUT B and Tester B by Tester B, SUT
B, SUT A and Tester A, respectively.
   2. Replace states ((s1,s2),(s3,s4)) by (s3,(s2,s1)).

14.   Test Case ID: V5203EST014_CON
15.   Test Case ID: V5203EST015_ALR
16.   Test Case ID: V5203EST016_ACN

 : Obtained from V5202EST005_CON, V5202EST006_ALR and
V5202EST007_ACN by following
   changes,
   1. Replace Tester A, SUT A, SUT B and Tester B by Tester B, SUT
B, SUT A and Tester A, respectively.
   2. Replace states ((s1,s2),(s3,s4)) by (s3,(s2,s1)).

17. Test Case ID: V5203EST017_QOS
     Test Purpose: To verify that the first switch transfers QoS
                     I.E. if it is included in the received SETUP
                     message.
     Reference: 6.5.2.3.5
     Pre-requisite:
     Test Configuration: #3b

     Test Set-up:
     1.   Connect the two SUTs with one physical link.
     2a. Connect Tester A (UNI) to SUT A.
     2b. Connect Tester B (PNNI) to SUT B.

     Test Procedure:
     1.   The initial state is (0,(0,0)).
     2.   Tester B sends a SETUP message to SUT B.
          [The SETUP message contains QoS I.E.]
     3.   Observe that SUT B sends a SETUP message to SUT A. (Also
          observe that SUT B sends a CALL PROCEEDING message to
          Tester B.)
     4.   Observe that SUT A sends a CALL PROCEEDING message to
          SUT B. (Also observe that SUT A sends a SETUP message
          to Tester A.)
     5.   The final state is (3,(9,3)).

     Verdict Criteria:
          Observe that SUT B sends a SETUP message with QoS I.E.

18. Test Case ID: V5203EST018_QOS
     Test Purpose: To verify that the first switch increments
                     values of the QoS parameters during
                     call/connection establishment.
     Reference: 6.5.2.3.5
     Pre-requisite:
     Test Configuration: #3b

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (UNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is (0,(0,0)).
2.   Tester B sends a SETUP message to SUT B.
      [The SETUP message contains Extended QoS I.E. and   End-
      to-end transit delay I.E.]
3.   Observe that SUT B sends a SETUP message to SUT A.
      (Also observe that SUT B sends a CALL PROCEEDING message
      to Tester B.)
4.   Observe that SUT A sends a CALL PROCEEDING message to
      SUT B. (Also observe that SUT A sends a SETUP message
      to Tester A.)
5.   The final state is (3,(9,3)).

Verdict Criteria:
      Using both SETUP messages received by and sent from SUT
      B, check that SUT B incremented the cumulative forward
      and backward values of individual QoS parameters
      included in Extended QoS I.E. and End-to-end transit
      delay I.E.

5.2.3.1 5.2.3.1 Optional tests for Establishment: Negotiation of ATM traffic descriptors (OPT_5)

These tests are to be executed only if the implementation supports the optional procedures for Negotiation of ATM traffic descriptors as stated in Annex G #37 of the PNNI v1.0 specification.

1.   Test Case ID: V5231EST001_TRA
      Test Purpose: To check that SUT B (second switch) progresses
                       the CONNECT message with the same ATD I.E. if
                       it is contained in the received CONNECT
                       message.
      Reference: 6.5.2.6.2
      Pre-requisite:
      Test Configuration: #3b

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is (9,(3,6)).
      2.   Tester B sends a CALL PROCEEDING message to SUT B.
      3.   Tester B sends a CONNECT message to SUT B.
            [The CONNECT message from Tester B contains the same ATD
            I.E. as received in the SETUP message from SUT B.]
      4.   Observe that SUT B sends a CONNECT message to SUT A.
            (Also observe that SUT A sends a CONNECT message to
            Tester A.)
      5.   The final state is (10,(10,10)).

      Verdict Criteria:
            Observe that SUT B sends a CONNECT message with the same
            ATD I.E. as received from Tester B with the exception of
            the Traffic Management Options. (Also observe that SUT
            A sends a CONNECT message to Tester A.)

2.   Test Case ID: V5231EST002_TRA
      Test Purpose: To check that, after alerting, second switch
                       progresses the CONNECT message with the same
                       ATD I.E. if it is contained in the received
                       CONNECT message.

Reference: 6.5.2.6.2
Pre-requisite:
Test Configuration: #3b

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (UNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is (9,(3,6)).
2.   Tester B sends a CALL PROCEEDING message to SUT B.
3.   Tester B sends an ALERTING message to SUT B
4.   Observe that SUT B sends an ALERTING message to SUT A.
      (Also observe that SUT A sends an ALERTING message to
      Tester A.)
5.   Tester B sends a CONNECT message to SUT B.
      [The CONNECT message from Tester B contains the same ATD
      I.E. as received in the SETUP message from SUT B.]
6.   Observe that SUT B sends a CONNECT message to SUT A.
      (Also observe that SUT A sends a CONNECT message to
      Tester A.)
7.   The final state is (10,(10,10)).

Verdict Criteria:
      Observe that SUT B sends a CONNECT message with the same
      ATD I.E. as received from Tester B with the exception of
      the Traffic Management Options. (Also observe that SUT
      A sends a CONNECT message to Tester A.)

3.   Test Case ID: V5231EST003_TRA
      Test Purpose: To check that the call can be progressed when
                      two switches are able to provide the traffic
                      parameter values specified in the ATD I.E. and
                      Minimum acceptable ATD I.E.
      Reference: 6.5.2.3.4
      Pre-requisite: - Arrange the generation of a SETUP message
                      from Tester A to Tester B with:
                      - ATD I.E. and Minimum Acceptable ATD I.E.
                      such that, both SUT B and SUT A are able to
                      provide the traffic parameter values specified
                      in the ATD I.E.
      Test Configuration: #3b

      Test Set-up:

```
     1.     Connect the two SUTs with one physical link.
     2a.    Connect Tester A (UNI) to SUT A.
     2b.    Connect Tester B (PNNI) to SUT B.

     Test Procedure:
     1.     The initial state is (0,(0,0)).
     2.     Tester B sends a SETUP message to SUT B.
     3.     Observe that SUT B sends a SETUP message to SUT A.
            (Also observe that SUT B sends a CALL PROCEEDING message
            to Tester B.)
     4.     Observe that SUT A sends a CALL PROCEEDING message to
            SUT B.  (Also observe that SUT A sends a SETUP message
            to Tester A.)
     5.     The final state is (3,(9,3)).

     Verdict Criteria:
            Observe that SUT B sends a SETUP message with the same
            ATD I.E. and the same Minimum acceptable ATD I.E. which
            are sent by Tester B.
     - AND -
            Observe that SUT A sends a CALL PROCEEDING message to
            SUT B.  (Also observe that SUT A sends a SETUP message
            to Tester A.)
```

```
4.     Test Case ID:    V5231EST004_TRA
5.     Test Case ID:    V5231EST005_TRA
6.     Test Case ID:    V5231EST006_TRA
7.     Test Case ID:    V5231EST007_TRA
8.     Test Case ID:    V5231EST008_TRA
9.     Test Case ID:    V5231EST009_TRA
```
: Obtained from V5221EST002_TRA, V5221EST003_TRA, V5221EST004_TRA,
V5221EST005_TRA, V5221EST006_TRA, V5221EST007_TRA by following
changes,
    1. Replace Tester A, SUT A, SUT B and Tester B by Tester B, SUT
B, SUT A and Tester A, respectively.
    2. Replace states ((s1,s2),(s3,s4)) by (s3,(s2,s1)).
    3. Replace Verdict Criteria of each test case by,

```
    "1.    Observe that SUT B sends a SETUP message with the same
           ATD I.E. and the same Minimum acceptable ATD I.E. as
           received.
     2.    Observe that SUT A sends a CALL PROCEEDING message to
           SUT B.  (Also Observe that SUT A sends a SETUP to Tester
           A.)"
```
    for the test V5231EST004_TRA and V5231EST005_TRA.

"1.   Observe that SUT B sends a SETUP message with the
      modified ATD I.E. and the same Minimum acceptable ATD
      I.E. as sent by Tester B.
 2.   Observe that SUT A sends a CALL PROCEEDING message to
      SUT B. (Also observe that SUT A sends a SETUP message
      to Tester A.)"
 for the test V5231EST006_TRA.

"1.   Observe that SUT B send a SETUP message with the same
      ATD I.E. and the same Alternative ATD I.E. as received.
 2.   Observe that SUT A sends a CALL PROCEEDING message to
      SUT B. (Also observe that SUT A sends a SETUP message
      to Tester A.)"
 for the test V5231EST007_TRA, V5231EST008_TRA and
V5231EST009_TRA.

5.2.4 5.2.4   Establishing an SVC (SS_M) Detailed for Test
      Configuration #3c

1.   Test Case ID: V5204EST001_CNI
      Test Purpose: To verify that normal call setup can be
                      supported between two switches. (connection
                      identifier I.E. - associated signalling 1)
      Reference: 6.5.2.2.1
      Pre-requisite: - Signalling between SUT A and SUT B is
                      configured as associated signalling (i.e.,
                      (VPCI,VCI) = (non-zero,5)),
                      - SUT A has higher node ID than SUT B.
      Test Configuration: #3c

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (UNI) to SUT B.

      Test Procedure:
      1.   The initial state is (0,0)
      2.   Tester A sends a SETUP message to SUT A.
      3.   Observe that SUT A sends a SETUP message to SUT B.
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B.)
      5.   The final state is (9,3)

      Verdict Criteria:
            Observe that SUT A sends a SETUP message with a
            Connection identifier I.E., whose VP associated
            signalling field is coded as "VP associated signalling"
            and the Preferred/exclusive field is coded as "Exclusive
            VPCI; exclusive VCI".
      - AND -
            Observe that SUT B sends a CALL PROCEEDING message with
            the same Connection identifier I.E. as received in the
            SETUP message from SUT A.

2.   Test Case ID: V5204EST002_CNI
3.   Test Case ID: V5204EST003_CNI
4.   Test Case ID: V5204EST004_CNI
  : Obtained from V5202EST002_CNI, V5202EST003_CNI and
V5202EST004_CNI, respectively, by following

changes,
1. Replace states ((s1,s2),(s3,s4)) by (s2,s3).
2. Replace step 3 of Test Procedure by,
   "3. Observe that SUT A sends a SETUP message to SUT B."

5.   Test Case ID: V5204EST005_CON
6.   Test Case ID: V5204EST006_ALR
7.   Test Case ID: V5204EST007_ACN
 : Obtained from V5202EST005_CON, V5202EST006_ALR, and
V5202EST007_ACN, respectively,
   by following replacements,
   1.   Replace states ((s1,s2),(s3,s4)) by (s2,s3).

8.   Test Case ID: V5204EST008_QOS
     Test Purpose: To verify that the preceding side includes QoS
                     I.E. in the corresponding SETUP message, when
                     the preceding side receives a setup indication
                     that includes a QoS parameter I.E.
     Reference: 6.5.2.3.5
     Pre-requisite:
     Test Configuration: #3c

     Test Set-up:
     1.   Connect the two SUTs with one physical link.
     2a. Connect Tester A (UNI) to SUT A.
     2b. Connect Tester B (UNI) to SUT B.

     Test Procedure:
     1.   The initial state is (0,0)
     2.   Tester A sends a SETUP message to SUT A.
     3.   Observe that SUT A sends a SETUP message to SUT B.
          [The SETUP message contains QoS I.E.]
     4.   Observe that SUT B sends a CALL PROCEEDING message to
          SUT A. (Also observe that SUT B sends a SETUP message
          to Tester B.)
     5.   The final state is (9,3)

     Verdict Criteria:
          Observe that SUT A sends a SETUP message to SUT B that
          includes QoS I.E.

9.   Test Case ID: V5204EST009_QOS

Test Purpose: To verify that the first switch sends SETUP
                including Extended QoS I.E. when the setup
                indication includes neither Extended QoS I.E.
                nor End-to-end transit delay I.E. and ATM
                service category of the call is CBR,   real-
                time VBR, or non-real-time VBR.
Reference: 6.5.2.3.5
Pre-requisite:
Test Configuration: #3c

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (UNI) to SUT A.
2b.   Connect Tester B (UNI) to SUT B.

Test Procedure:
1.   The initial state is (0,0)
2.   Tester A sends a SETUP message to SUT A.
      [The SETUP message sent by Tester A contains neither
      Extended QoS I.E. nor End-to-end transit delay I.E. and
      ATM service category of the call is CBR, real-time VBR,
      or non-real-time VBR.]
3.   Observe that SUT A sends a SETUP message to SUT B.
4.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)
5.   The final state is (9,3)

Verdict Criteria:
      Observe that SUT A sends a SETUP message to SUT B that
      includes Extended QoS I.E.

*5.3 10 - 18   Repeat Test Cases 1 - 9 with the call initiated in
the other direction (i.e. from Tester B). The state notation
is changed from (s1,s2) to (s2,s1).*

5.3   Release

5.3.1 Releasing an SVC (SS_M)

1.   Test Case ID: V5301REL001
      Test Purpose: Verify that SUT A releases a call request
                      through SUT B.
      Reference: 6.5.3.3
      Pre-requisite: - PNNI Routing has completed and
                     - Call/connection was established (i.e. must
                       have passed Test Case V5201EST005.)
      Test Configuration: #3c

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (UNI) to SUT B.

      Test Procedure:
      1.   PNNI Routing has completed between SUT A and SUT B.
      2.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      3.   Establish a call. {Note: Use Test Case V5201EST005 to
            establish a call.}
      4.   Tester A sends a RELEASE message to SUT A.

      Verdict Criteria:
            Observe that a RELEASE message is sent from SUT A to SUT
            B. (Also observe a RELEASE COMPLETE message from SUT A
            to Tester A.)

2.   Test Case ID: V5301REL002
      Test Purpose: Verify that SUT B acknowledges the release
                      call request.
      Reference: 6.5.3.3
      Pre-requisite: - PNNI Routing has completed,
                     - Call/connection was established (i.e. must
                       have passed Test Case V5201EST005), and
                     - passed Test Case V5301REL001.
      Test Configuration: #3c

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (UNI) to SUT B.

Test Procedure:
1.   PNNI Routing has completed between SUT A and SUT B.
2.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
3.   Establish a call. {Note: Use Test Case V5201EST005 to
     establish a call.}
4.   Tester A sends a RELEASE message to SUT A.
5.   Observe that a RELEASE message is sent from SUT A to SUT
     B. Also observe a RELEASE COMPLETE message from SUT A
     to Tester A.

Verdict Criteria:
     Observe that a RELEASE COMPLETE message is sent from SUT
     B to SUT A. (Also observe a RELEASE message is sent
     from SUT B to Tester B.)

3.   Test Case ID: V5301REL003
     Test Purpose: Verify that the SVC is released.
     Pre-requisite: - PNNI Routing has completed,
                     - Call/connection was established (i.e. must
                     have passed Test Case V5201EST005), and
                     - passed Test Case V5301REL001.
     Reference: 6.5.3.3
     Test Configuration: #3c

     Test Set-up:
1.   Connect the two SUTs with one physical link.
2a. Connect Tester A (UNI) to SUT A.
2b. Connect Tester B (UNI) to SUT B.

     Test Procedure:
1.   PNNI Routing has completed between SUT A and SUT B.
2.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
3.   Establish a call. {Note: Use Test Case V5201EST005 to
     establish a call.}
4.   Tester A sends a RELEASE message to SUT A.
5.   Observe that a RELEASE message is sent from SUT A to SUT
     B. Also observe a RELEASE COMPLETE message from SUT A
     to Tester A.
6.   Observe that a RELEASE COMPLETE message is sent from SUT
     B to SUT A. Also observe a RELEASE message is sent from
     SUT B to Tester B.
7.   Tester B sends a RELEASE COMPLETE message.
8.   Have Tester A send a user data ATM cell using the
     VPI/VCI that was used for this call on interface A.

Verdict Criteria:
        Observe that the user data ATM cell is not passed over
        the VPI/VCI that was used for this call over interface
        D.

4-6   Repeat test cases 1-3 but with the release call request
        initiated in the other direction. (i.e. Tester B to
        Tester A)

7-9   Repeat Test Cases 1-3 with Test Configuration #3a.

5.3.2 10-12   Repeat Test Cases 7-9 with Test Configuration #3a
    and with the release call request initiated in the other
    direction (i.e. Tester B to Tester A).

5.3.2 Releasing an SVC (SS_M) Detailed for Test Configuration
#3a

1.   Test Case ID: V5302REL001_BFR
      Test Purpose: To verify that a call/connection can be
                       released by originating user side before
                       connection is established.
      Reference: 6.5.3
      Pre-requisite:
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((3,9),(3,9)).
      2.   Tester A sends a RELEASE message to SUT A.
      3.   Observe that SUT A sends a RELEASE message to SUT B.
            (Also Observe that SUT A sends a RELEASE COMPLETE
            message to Tester A.)
      4.   Observe that SUT B sends a RELEASE COMPLETE message to
            SUT A. (Also observe that SUT B sends a RELEASE message
            to Tester B.)
      5.   Tester B sends a RELEASE COMPLETE message to SUT B.
      6.   The final state is ((0,0),(0,0)).

      Verdict Criteria:
            Observe that SUT A sends a RELEASE message to SUT B.
            (Also observe that SUT A sends a RELEASE COMPLETE
            message to Tester A.)
      - AND -
            Observe that SUT B sends RELEASE COMPLETE message to SUT
            A. (Also observe that SUT B sends a RELEASE message to
            Tester B.)

2.   Test Case ID: V5302REL002_BFR
      Test Purpose: To verify that a call/connection can be
                       released by destination user side before
                       connection is established.
      Reference: 6.5.3
      Pre-requisite:

Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((3,9),(3,6)).
2.   Tester B sends a RELEASE message to SUT B.
      [The RELEASE message contains no Crankback I.E.]
3.   Observe that SUT B sends a RELEASE message to SUT A.
      (Also observe that SUT B sends a RELEASE COMPLETE
      message to Tester B.)
4.   Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A.)
5.   Tester A sends a RELEASE COMPLETE message to SUT A.
6.   The final state is ((0,0),(0,0)).

Verdict Criteria:
      Observe that SUT B sends a RELEASE message to SUT A.
      (Also observe that SUT B sends a RELEASE COMPLETE
      message to Tester B.)
- AND -
      Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A.)

3.   Test Case ID: V5302REL003_CNI
      Test Purpose: To verify that a call/connection can be
                      released by a failure of connection identifier
                      assignment.
      Reference: 6.5.2.2, 6.5.3
      Pre-requisite: The node ID of SUT B is smaller than Tester B.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((3,9),(3,6)).
      2.   Tester B sends a RELEASE COMPLETE message to SUT B.

[The RELEASE COMPLETE message has cause #45, "no VPCI/VCI available]
3.   Observe that SUT B sends a RELEASE message to SUT A.
4.   Observe that SUT A sends a RELEASE COMPLETE message to SUT B. (Also observe that SUT A sends a RELEASE message to Tester A.)
5.   Tester A sends a RELEASE COMPLETE message to SUT A.
6.   The final state is ((0,0),(0,0)).

Verdict Criteria:
      Observe that SUT B sends a RELEASE message to SUT A that includes a Crankback I.E.
- AND -
      Observe that SUT A sends a RELEASE COMPLETE message to SUT B. (Also observe that SUT A sends a RELEASE message to Tester A.)

4.   Test Case ID: V5302REL004_DTL
      Test Purpose: To verify that the release of a call/connection can be relayed when call clearing occurs due to DTL processing failure.
      Reference: Annex B, 6.5.3
      Pre-requisite:
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((3,9),(3,9)).
      2.   Tester B sends a RELEASE message to SUT B.
            [The RELEASE message has cause code #3 "destination unreachable" and the crankback cause #3.]
      3.   Observe that SUT B sends a RELEASE message to SUT A. (Also observe that SUT B sends a RELEASE COMPLETE message to Tester B.)
      4.   Observe that SUT A sends a RELEASE COMPLETE message to SUT B. (Also observe that SUT A sends a RELEASE message to Tester A.)
      5.   Tester A sends a RELEASE COMPLETE message to SUT A.
      6.   The final state is ((0,0),(0,0)).

Verdict Criteria:
    Observe that SUT B sends a RELEASE message to SUT A with
    crankback I.E. (Also observe that SUT B sends a RELEASE
    COMPLETE message to Tester B.)
- AND -
    Observe that SUT A sends a RELEASE COMPLETE message to
    SUT B. (Also observe that SUT A sends a RELEASE message
    to Tester A.)

5.   Test Case ID: V5302REL005_USR
    Test Purpose: To verify that a call/connection can be
                     released by originating user side after
                     call/connection completion.
    Reference: 6.5.3
    Pre-requisite:
    Test Configuration: #3a

    Test Set-up:
    1.   Connect the two SUTs with one physical link.
    2a. Connect Tester A (PNNI) to SUT A.
    2b. Connect Tester B (PNNI) to SUT B.

    Test Procedure:
    1.   The initial state is ((10,10),(10,10)).
    2.   Tester A sends a RELEASE message to SUT A.
    3.   Observe that SUT A sends a RELEASE message to SUT B.
        (Also observe that SUT A sends a RELEASE COMPLETE
        message to Tester A.)
    4.   Observe that SUT B sends a RELEASE COMPLETE message to
        SUT A. (Also observe that SUT B sends a RELEASE message
        to Tester B.)
    5.   Tester B sends a RELEASE COMPLETE message to SUT B.
    6.   The final state is ((0,0),(0,0)).

    Verdict Criteria:
        Observe that SUT A sends RELEASE message to SUT B.
        (Also observe that SUT A sends a RELEASE COMPLETE
        message to Tester A.)
    - AND -
        Observe that SUT B sends a RELEASE COMPLETE message to
        SUT A. (Also observe that SUT B sends a RELEASE message
        to Tester B.)

6.   Test Case ID: V5302REL006_USR
      Test Purpose: To verify that a call/connection can be
                       released by destination user side after
                       call/connection completion.
      Reference: 6.5.3
      Pre-requisite:
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((10,10),(10,10)).
      2.   Tester B sends a RELEASE message to SUT B.
      3.   Observe that SUT B sends a RELEASE message to SUT A.
            (Also observe that SUT B sends a RELEASE COMPLETE
            message to Tester B.
      4.   Observe that SUT A sends a RELEASE COMPLETE message to
            SUT B. (Also observe that SUT A sends a RELEASE message
            to Tester A.)
      5.   Tester A sends a RELEASE COMPLETE message to SUT A.
      6.   The final state is ((0,0),(0,0)).

      Verdict Criteria:
            Observe that SUT B sends a RELEASE message to SUT A.
            (Also observe that SUT B sends a RELEASE COMPLETE
            message to Tester B.)
      - AND -
            Observe that SUT A sends a RELEASE COMPLETE message to
            SUT B. (Also observe that SUT A sends a RELEASE message
            to Tester A.)

7-12   Repeat Test cases 1 - 6 with the call initiated in the
          other direction. Tester A, SUT A, SUT B, and Tester B
          are exchanged with Tester B, SUT B, SUT A, and Tester A;
          and the state notation is changed from ((s1,s2),(s3,s4))
          to ((s4,s3),(s2,s1)).

5.3.3 5.3.3   Releasing an SVC (SS_M)   Detailed for Test
     Configuration #3b

1.   Test Case ID: V5303REL001_BFR
     Test Purpose: To verify that a call/connection can be
                     released by originating user side before
                     connection is established.
     Reference: 6.5.3
     Pre-requisite:
     Test Configuration: #3b

     Test Set-up:
     1.   Connect the two SUTs with one physical link.
     2a. Connect Tester A (UNI) to SUT A.
     2b. Connect Tester B (PNNI) to SUT B.

     Test Procedure:
     1.   The initial state is (9,(3,9)).
     2.   Tester A sends a RELEASE message to SUT A.
     3.   Observe that SUT A sends a RELEASE message to SUT B.
          (Also observe that SUT A sends a RELEASE COMPLETE
          message to Tester A.)
     4.   Observe that SUT B sends a RELEASE COMPLETE message to
          SUT A. (Also observe that SUT B sends a RELEASE message
          to Tester B.)
     5.   Tester B sends a RELEASE COMPLETE message to SUT B.
     6.   The final state is (0,(0,0)).

     Verdict Criteria:
          Observe that SUT A sends a RELEASE message to SUT B.
     - AND -
          Observe that SUT B sends a RELEASE COMPLETE message to
          SUT A. (Also observe that SUT B sends a RELEASE message
          to Tester B.)

2.   Test Case ID: V5303REL002_BFR
3.   Test Case ID: V5303REL003_CNI,
4.   Test Case ID: V5303REL004_DTL,
5.   Test Case ID: V5303REL005_USR, and
6.   Test Case ID: V5303REL006_USR,
are obtained from V5302REL002_BFR, V5302REL003_CNI,
V5302REL004_DTL, V5302REL005_USR, and V5302REL006_USR,
respectively, by following changes,
     1.   Replace states ((s1,s2),(s3,s4)) by (s2,(s3,s4)).

2.   Replace Verdict Criteria of each Test Case by,

    "1.   Observe that SUT B sends a RELEASE message to SUT A.
            (Also observe that SUT B sends a RELEASE COMPLETE
            message to Tester B).
     2.   Observe that SUT A sends a RELEASE COMPLETE message to
            SUT B. (Also observe that SUT A sends a RELEASE message
            to Tester A.)"
      for the test V5303REL002_BFR,

    "1.   Observe that SUT B sends a RELEASE message to SUT A with
            crankback I.E. (Also observe that SUT B sends a RELEASE
            COMPLETE message to Tester B).
     2.   Observe that SUT A sends a RELEASE COMPLETE message to
            SUT B. (Also observe that SUT A sends a RELEASE message
            to Tester A.)"
      for the tests V5303REL003_CNI and V5303REL004_DTL,

    "1.   Observe that SUT A sends a RELEASE message to SUT B.
     2.   Observe that SUT B sends a RELEASE COMPLETE to SUT A.
            (Also observe that SUT B sends a RELEASE message to
            Tester B.)"
      for the test V5303REL005_USR, and

    "1.   Observe that SUT B sends a RELEASE message to SUT A.
            (Also observe that SUT B sends a RELEASE COMPLETE
            message to Tester B).
     2.   Observe that SUT A sends a RELEASE COMPLETE message to
            SUT B. (Also observe that SUT A sends a RELEASE message
            to Tester A.)"
      for the test V5303REL006_USR.

7.   Test Case ID: V5303REL007_BFR
     Test Purpose: To verify that a call/connection can be
                      released by originating user side before
                      connection is established.
     Reference: 6.5.3
     Pre-requisite:
     Test Configuration: #3b

     Test Set-up:
     1.   Connect the two SUTs with one physical link.
     2a. Connect Tester A (UNI) to SUT A.
     2b. Connect Tester B (PNNI) to SUT B.

```
    Test Procedure:
    1.    The initial state is (3,(9,3)).
    2.    Tester B sends a RELEASE message to SUT B.
    3.    Observe that SUT B sends a RELEASE message to SUT A.
          (Also observe that SUT B sends a RELEASE COMPLETE
          message to Tester B.)
    4.    Observe that SUT A sends a RELEASE COMPLETE message to
          SUT B.  (Also observe that SUT A sends a RELEASE message
          to Tester A.)
    5.    Tester A sends a RELEASE COMPLETE message to SUT A.
    6.    The final state is (0,(0,0)).


    Verdict Criteria:
          Observe that SUT B sends a RELEASE message to SUT A.
          (Also observe that SUT B sends a RELEASE COMPLETE
          message to Tester B.)
    - AND -
          Observe that SUT A sends a RELEASE COMPLETE message to
          SUT B.  (Also observe that SUT A sends a RELEASE message
          to Tester A.)



8.   Test Case ID:   V5303REL008_BFR
9.   Test Case ID:   V5303REL009_USR, and
10.  Test Case ID:   V5303REL010_USR,
are obtained from V5302REL002_BFR, V5302REL005_USR, and
V5302REL006_USR, respectively, by following changes,
    1. Replace Tester A, SUT A, SUT B and Tester B by Tester B, SUT
B, SUT A and Tester A, respectively.
    2. Replace states ((s1,s2),(s3,s4)) by (s3,(s2,s1)).
    3. Replace Verdict Criteria of each test case by,

        "1.   Observe that SUT A sends a RELEASE message to SUT B.
         2.   Observe that SUT B sends a RELEASE COMPLETE message to
              SUT A.  (Also observe that SUT B sends a RELEASE message
              to Tester B.)"
        for the test V5303REL008_BFR,

        "1.   Observe that SUT B sends a RELEASE message to SUT A.
              (Also observe that SUT B sends a RELEASE COMPLETE
              message to Tester B).
         2.   Observe that SUT A sends a RELEASE COMPLETE message to
              SUT B.  (Also observe that SUT A sends a RELEASE message
              to Tester A.)"
        for the test V5303REL009_USR, and
```

"1.   Observe that SUT A sends a RELEASE message to SUT B.
 2.   Observe that SUT B sends a RELEASE COMPLETE message to
      SUT A. (Also observe that SUT B sends a RELEASE message
      to Tester B.)"
 for the test V5303REL010_USR.

5.3.4 5.3.4   Releasing an SVC (SS_M) Detailed for Test
      Configuration #3c

1.   Test Case ID: V5304REL001_BFR
      Test Purpose: To verify that a call/connection can be
                      released by originating user side before
                      connection is established.
      Reference: 6.5.3
      Pre-requisite:
      Test Configuration: #3c

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (UNI) to SUT B.

      Test Procedure:
      1.   The initial state is (9,3).
      2.   Tester A sends a RELEASE message to SUT A.
      3.   Observe that SUT A sends a RELEASE message to SUT B.
            (Also observe that SUT A sends a RELEASE COMPLETE
            message to Tester A.)
      4.   Observe that SUT B sends a RELEASE COMPLETE message to
            SUT A. (Also observe that SUT B sends a RELEASE message
            to Tester B.)
      5.   Tester B sends a RELEASE COMPLETE to SUT B.
      6.   The final state is (0,0).

      Verdict Criteria:
            Observe that SUT A sends a RELEASE message to SUT B.
      – AND –
            Observe that SUT B sends a RELEASE COMPLETE message to
            SUT A. (Also observe that SUT B sends a RELEASE message
            to Tester B.)

2.   Test Case ID: V5304REL002_BFR
3.   Test Case ID: V5304REL003_USR, and
4.   Test Case ID: V5304REL004_USR,
are obtained from V5302REL002_BFR, V5302REL005_USR, and
V5302REL006_USR, respectively, by following changes,
   1. Replace states ((s1,s2),(s3,s4)) by (s2,s3).
   2. Replace Verdict Criteria of each test case by,

"1.   Observe that SUT B sends a RELEASE message to SUT A.
 2.   Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A.)"
 for the test V5304REL002_BFR,

"1.   Observe that SUT A sends a RELEASE message to SUT B.
 2.   Observe that SUT B sends a RELEASE COMPLETE message to
      SUT A. (Also observe that SUT B sends a RELEASE message
      to Tester B.)"
 for the test V5304REL003_USR, and

"1.   Observe that SUT B sends a RELEASE message to SUT A.
 2.   Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A.)"
 for the test V5304REL004_USR.

*5.4 5 - 8 Repeat Test Cases 1 - 4 with the call initiated in the
     other direction (i.e. from Tester B). The state notation is
     changed from (s1,s2) to (s2,s1).*

5.4   DTL Processing

To observe whether an SUT is generating or processing Designated
Transit Lists (DTLs) correctly requires a lot of prior network
configurations in order to influence the creation and processing
of DTLs, so that DTL processing may be observed.

5.4.1 DTL processing an SVC

The test cases shown here reflect a minimal network configuration.
That is, given two ATM switches, either they are in the same peer
group or different peer groups. The first is where both SUTs are
within the same peer group. The second is where the SUTs are
border nodes in different peer groups.

1.   Test Case ID: V5401DTL001
      Test Purpose: To verify that two switches process DTLs
                       correctly during call/connection setup when
                       SUTs are in the same lowest level peer group.
      Reference: Annex A
      Pre-requisite: - PNNI routing complete,
                      - SUT A and SUT B are in the same peer group,
                        and
                      - both SUTs are SS_M.
      Test Configuration: #3

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A to SUT A.
      2b.   Connect Tester B to SUT B.

      Test Procedure:
      1.   PNNI Routing has completed between SUT A and SUT B.
      2.   Monitor the PNNI Signalling channel (VPI/VCI=0/5)
            between SUT A and SUT B).
      3.   Tester A sends a SETUP message to SUT A.
      4a.   Observe that SUT A sends a SETUP message to SUT B.
      4b.   Store the DTL for examination.
      5.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. Also observe that SUT B sends a SETUP message to
            Tester B.

      Verdict Criteria:
            Observe that the only DTL in the SETUP message contains
            the node ID of SUT A and the node ID of SUT B with the

current transit pointer set to point to the second
element (i.e. SUT B).
- AND -
Observe that SUT B sends a CALL PROCEEDING message to
SUT A. Also observe that SUT B sends a SETUP message to
Tester B.

2.   Test Case ID: V5401DTL002
      Test Purpose: To verify that two switches process DTLs
                      correctly during call/connection setup when
                      SUTs are in two different lowest level peer
                      groups.
      Pre-requisite: - PNNI routing complete,
                      - SUT A and SUT B are in different peer group,
                      and
                      - both SUTs are at least SS_B,
                      - SUT A and SUT B have the same parent peer
                      group,
                      - There are peer group leaders in SUT A's and
                      SUT B's peer groups.
      Reference: Annex A
      Test Configuration: #3

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A to SUT A.
      2b.   Connect Tester B to SUT B.

      Test Procedure:
      1.   PNNI Routing has completed between SUT A and SUT B.
      2.   Monitor the PNNI Signalling channel (VPI/VCI=0/5)
            between SUT A and SUT B).
      3.   Tester A sends a SETUP message to SUT A.
      4a.   Observe that SUT A sends a SETUP message to SUT B.
      4b.   Store the DTL for examination.
      5.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. Also observe that SUT B sends a SETUP message to
            Tester B.

      Verdict Criteria:
            Observe that the only DTL in the SETUP message contains
            the node ID of the parent node of SUT A and the node ID
            of the parent node of SUT B, with the transit pointer
            set to the second element (i.e. the parent node of SUT
            B).
      - AND -

Observe that SUT B sends a CALL PROCEEDING message to
SUT A. Also observe that SUT B sends a SETUP message to
Tester B.

5.4.2 5.4.2   DTL processing an SVC Detailed for Test
        Configuration #3a

1.   Test Case ID: V5402DTL001
      Test Purpose: To verify that two switches process DTLs
                      correctly during call/connection setup as an
                      entry border node and as an exit border node
                      of the same peer group.
      Reference: Annex A
      Pre-requisite: SUT A is SS_B
                      SUT B is SS_B and SS_P.
                       Arrange the topology state of switches SUT A
                      and SUT B such that:
                      - When a call/connection flows from Tester A
                      to Tester B,
                      - SUT A and SUT B belong to a same lowest
                      level peer group,
                      - SUT A is an entry border node for the peer
                      group, and
                      - SUT B is an exit border node for the peer
                      group.
                      - SUT B is PGL.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((0,0),(0,0)).
      2.   Tester A sends a SETUP message to SUT A.
      3.   Observe that SUT A sends a SETUP message to SUT B.
            (Also observe that SUT A sends a CALL PROCEEDING message
            to Tester A.)
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B.)
      5.   The final state is ((3,9),(3,6)).

      Verdict Criteria:
            Observe that SUT A sends a SETUP message to SUT B.
            Check that the SETUP message includes a new DTL for the
            lowest level with the current transit pointer pointing
            to the node ID of SUT B and includes a DTL for the next

higher level with the current transit pointer pointing
to the node ID of the lowest level peer group containing
SUT A and SUT B. (Also observe that SUT A sends a CALL
PROCEEDING message to Tester A.)
- AND -
Observe that SUT B sends a CALL PROCEEDING message to
SUT A. (Also observe that SUT B sends a SETUP message
to Tester B. Check that the SETUP does not include a
DTL for the lowest level and includes at least one DTL
for higher level.

2.   Test Case ID: V5402DTL002
      Test Purpose: To verify that two switches process DTLs
                       correctly during call/connection setup as an
                       entry border node and as an intermediate node.
      Reference: Annex A
      Pre-requisite: SUT A is SS_B.
                       SUT B is SS_M.
                       Arrange the topology state of switches SUT A
                       and SUT B such that:
                       - When a call/connection flows from Tester A
                       to Tester B,
                       - SUT A, SUT B, and Tester B belong to the
                       same lowest level peer group,
                       - SUT A is an entry border node for the peer
                       group,
                       - SUT B is neither entry nor exit border node
                       for the peer group, and
                       - Tester B is PGL.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((0,0),(0,0)).
      2.   Tester A sends a SETUP message to SUT A.
      3.   Observe that SUT A sends a SETUP message to SUT B.
            (Also observe that SUT A sends a CALL PROCEEDING message
            to Tester A.)

    4.   Observe that SUT B sends a CALL PROCEEDING message to
          SUT A. (Also observe that SUT B sends a SETUP message
          to Tester B.)
    5.   The final state is ((3,9),(3,6)).

    Verdict Criteria:
          Observe that SUT A sends a SETUP message to SUT B.
          Check that the SETUP includes a DTL for the lowest level
          with the current transit pointer pointing to the node ID
          of SUT B and includes a DTL for the next higher level
          with the current transit pointer pointing to the node ID
          of the lowest level peer group containing SUT A and SUT
          B. (Also observe that SUT A sends a CALL PROCEEDING
          message to Tester A.)
    - AND -
          Observe that SUT B sends a CALL PROCEEDING message to
          SUT A. (Also observe that SUT B sends a SETUP message
          to Tester B. Check that the SETUP include a DTL for the
          lowest level with the current transit pointer pointing
          to the node ID of Tester B and includes a DTL for the
          next higher level with the current transit pointer
          pointing to the node ID of the lowest level peer group
          containing SUT A and SUT B.)

3.   Test Case ID: V5402DTL003
      Test Purpose: To verify that two switches process DTLs
                       correctly during call/connection setup as an
                       intermediate node and as an exit border node.
      Reference: Annex A
      Pre-requisite: SUT A is SS_M,
                       SUT B is SS_B,
                       Arrange the topology state of switches SUT A
                       and SUT B such that:
                       - When a call/connection flows from Tester A
                       to Tester B,
                       - Tester A, SUT A, and SUT B belong to the
                       same lowest level peer group,
                       - SUT A is neither entry nor exit border node
                       for the peer group,
                       - SUT B is an exit border node for the peer
                       group, and
                       - Tester A is PGL.
      Test Configuration: #3a

      Test Set-up:

    1.   Connect the two SUTs with one physical link.
    2a. Connect Tester A (PNNI) to SUT A.
    2b. Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP message to SUT A.
3.   Observe that SUT A sends a SETUP message to SUT B.
    (Also observe that SUT A sends a CALL PROCEEDING message
    to Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
    SUT A. (Also observe that SUT B sends a SETUP message
    to Tester B.)
5.   The final state is ((3,9),(3,6)).

Verdict Criteria:
    Observe that SUT A sends a SETUP message to SUT B.
    Check that the SETUP includes a DTL for the lowest level
    with the current transit pointer pointing to the node ID
    of SUT B and includes a DTL for the next higher level
    with the current transit pointer pointing to the node ID
    of the lowest level peer group containing SUT A and SUT
    B. (Also observe that SUT A sends a CALL PROCEEDING
    message to Tester A.)
– AND –
    Observe that SUT B sends a CALL PROCEEDING message to
    SUT A. (Also observe that SUT B sends SETUP message to
    Tester B. Check that the SETUP does not include a DTL
    for the lowest level and includes at least one DTL for
    higher level.)

4.   Test Case ID: V5402DTL004
    Test Purpose: To verify that two switches process DTLs
                   correctly during call/connection setup as
                   intermediate nodes.
    Reference: Annex A
    Pre-requisite: SUT A and SUT B are both SS_M
                   Arrange the topology state of switches SUT A
                   and SUT B such that:
                   - When a call/connection flows from Tester A
                   to Tester B,
                   - Tester A, SUT A, SUT B, and Tester B belong
                   to the same lowest level peer group, and
                   - SUT A and SUT B are neither entry nor exit
                   border nodes for the peer group.

Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP message to SUT A.
3.   Observe that SUT A sends a SETUP message to SUT B.
      (Also observe that SUT A sends a CALL PROCEEDING message
      to Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)
5.   The final state is ((3,9),(3,6)).

Verdict Criteria:
      Observe that SUT A sends a SETUP message to SUT B.
      Check that the SETUP includes a DTL for the lowest level
      with the current transit pointer pointing to the node ID
      of SUT B. (Also observe that SUT A sends a CALL
      PROCEEDING message to Tester A.)
- AND -
      Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B. Check that the SETUP includes a DTL for
      the lowest level with the current transit pointer
      pointing to the node ID of Tester B.)

5.   Test Case ID: V5402DTL005
      Test Purpose: To verify that two switches process DTLs
                       correctly during call/connection setup as an
                       exit border node and as an entry border node
                       of different peer groups.
      Reference: Annex A
      Pre-requisite: Both SUT A and SUT B are SS_B,
                       Arrange the topology state of switches SUT A
                       and SUT B such that :
                       - When a call/connection flows from Tester A
                       to Tester B,
                       - SUT A and SUT B belong to two different peer
                       groups at the lowest level,

                        - Tester A and SUT A belong to the same lowest
                        level peer group with Tester A as PGL,
                        - SUT B and Tester B belong to the same lowest
                        level peer group with Tester B as PGL,
                        - SUT A is an exit border node for one peer
                        group, and
                        - SUT B is entry border node for the other
                        peer group
Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP message to SUT A.
3.   Observe that SUT A sends a SETUP message to SUT B.
        (Also observe that SUT A sends a CALL PROCEEDING message
        to Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
        SUT A. (Also observe that SUT B sends a SETUP message
        to Tester B.)
5.   The final state is ((3,9),(3,6)).

Verdict Criteria:
        Observe that SUT A sends a SETUP message to SUT B.
        Check that the SETUP does not include a DTL for the
        lowest level and includes at least one DTL for higher
        level. (Also observe that SUT A sends a CALL PROCEEDING
        message to Tester A.)
- AND -
        Observe that SUT B sends a CALL PROCEEDING message to
        SUT A. (Also observe that SUT B sends a SETUP message
        to Tester B. Check that the SETUP includes a new DTL
        for the lowest level with the current transit pointer
        pointing to the node ID of Tester B and includes a DTL
        for the next higher level with the current transit
        pointer pointing to the node ID of the lowest level peer
        group containing SUT B.)

6.   Test Case ID: V5402DTL006

Test Purpose: To verify that two switches process DTLs
                  correctly as an intermediate node followed by
                  an entry border node.
Reference: Annex A
Pre-requisite: SUT A is SS_N,
                  SUT B is SS_B,
                  Arrange the topology state of switches SUT A
                  and SUT B such that:
                  - Tester B and SUT B belong to the same lowest
                  level peer group, with PGL Tester B,
                  - Tester A and SUT A belong to the same lowest
                  level peer group, which is the parent peer
                  group of Tester B and SUT B.
Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   PNNI Routing has completed between SUT A and SUT B
2.   Monitor the PNNI Signalling channel (VPI/VCI=0/5)
      between SUT A and SUT B.
3.   Tester A sends a SETUP message to SUT A.
4a.   Observe that SUT A sends a SETUP message to SUT B.
4b.   Store the DTL for examination.
5.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. Also observe that SUT B sends a SETUP message to
      Tester B and store the DTL for examination.

Verdict Criteria:
      Observe that the only DTL in the SETUP message between
      the SUTs contains the node ID of Tester A, the node ID
      of SUT A, and the node ID of the parent node of SUT B,
      with the transit pointer set to point to the third
      element (i.e. the parent node of SUT B).
- AND -
      Observe that SUT B sends a CALL PROCEDDING message to
      SUT A. Also observe that SUT B sends a SETUP message to
      Tester B. Observe that the DTL at the bottom of the DTL
      stack is identical to that originally received by SUT B,
      and that another DTL has been pushed on top of the
      stack.

7.   Test Case ID: V5402DTL007
      Test Purpose: To verify that two switches process DTLs
                       correctly as an exit border node followed by
                       an intermediate node.
      Reference: Annex A
      Pre-requisite: SUT A is SS_N,
                       SUT B is SS_B,
                       Arrange the topology state of switches SUT A
                       and SUT B such that:
                       - Tester B and SUT B belong to the same lowest
                       level peer group, with PGL Tester B,
                       - Tester A and SUT A belong to the same lowest
                       level peer group, which is the parent peer
                       group of Tester B and SUT B.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   PNNI Routing has completed between SUT A and SUT B
      2.   Monitor the PNNI Signalling channel (VPI/VCI=0/5)
            between SUT A and SUT B.
      3.   Tester B sends a SETUP message to SUT B.
      4a.   Observe that SUT B sends a SETUP message to SUT A.
      4b.   Store the DTL for examination.
      5.   Observe that SUT A sends a CALL PROCEEDING message to
            SUT B. Also observe that SUT A sends a SETUP message to
            Tester A and store the DTL for examination.

      Verdict Criteria:
            Observe that the only DTL in the SETUP message between
            the SUTs contains the node ID of the parent node of SUT
            B, the node ID of SUT A, and the node ID of Tester A,
            with the transit pointer set to point to the second
            element (i.e. SUT A).
      - AND -
            Observe that SUT A sends a CALL PROCEDDING message to
            SUT B. Also observe that SUT A sends a SETUP message to
            Tester A. Observe that the DTL sent by SUT A contains
            the same node IDs as in the DTL originally received by
            SUT A, but the current transit pointer now points to the
            third element (i.e. Tester A).

5.4.3 5.4.3   DTL processing an SVC Detailed for Test
        Configuration #3b

1.   Test Case ID: V5403DTL001
      Test Purpose: To verify that two switches process DTLs
                      correctly during call/connection setup as a
                      DTL originator and as an entry border node of
                      two different lowest level peer groups.
      Reference: Annex A
      Pre-requisite: SUT A is SS_B and SS_P,
                      SUT B is SS_B,
                      Arrange the topology state of switches SUT A
                      and SUT B such that:
                      - SUT A and SUT B belong to different peer
                      groups at the lowest level, and
                      - SUT B and Tester B belong to the same lowest
                      level peer group with Tester B PGL.
      Test Configuration: #3b

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is (0,(0,0))
      2.   Tester A sends a SETUP message to SUT A
      3.   Observe that SUT A sends a SETUP message to SUT B.
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B.)
      5.   The final state is (9,(3,6))

      Verdict Criteria:
            Observe that SUT A sends a SETUP message to SUT B.
            Check that the SETUP message does not include a DTL for
            the lowest level and includes at least one DTL for
            higher level.
      - AND -
            Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B. Check that the SETUP includes a new DTL
            for the lowest level with the current transit pointer
            pointing to the node ID of Tester B and includes a DTL

for the next higher level with the current transit
pointer pointing to the node ID of the lowest level peer
group containing SUT B.)

2.   Test Case ID: V5403DTL002
     Test Purpose: To verify that two switches process DTLs
                     correctly during call/connection setup as a
                     DTL originator and as an exit border node of a
                     same lowest level peer group.
     Reference: Annex A
     Pre-requisite: SUT A is SS_M
                     SUT B is SS_B and SS_P,
                     Arrange the topology state of switches SUT A
                     and SUT B such that:
                     - SUT A and SUT B belong to the same lowest
                     level peer group and SUT B is an exit border
                     node for the group when a call flows from
                     Tester A to Tester B, and
                     - SUT B is PGL.
     Test Configuration: #3b

     Test Set-up:
     1.   Connect the two SUTs with one physical link.
     2a. Connect Tester A (UNI) to SUT A.
     2b. Connect Tester B (PNNI) to SUT B.

     Test Procedure:
     1.   The initial state is (0,(0,0))
     2.   Tester A sends a SETUP message to SUT A.
     3.   Observe that SUT A sends a SETUP message to SUT B.
     4.   Observe that SUT B sends a CALL PROCEEDING message to
          SUT A. (Also observe that SUT B sends a SETUP message
          to Tester B.)
     5.   The final state is (9,(3,6))

     Verdict Criteria:
          Observe that SUT A sends a SETUP message to SUT B. Check
          that the SETUP includes a new DTL for the lowest level
          with the current transit pointer pointing to the node ID
          of SUT B and includes a DTL for the next higher level
          with the current transit pointer pointing to the node ID
          of the lowest level peer group containing SUT A and SUT
          B.
     - AND -

Observe that SUT B sends a CALL PROCEEDING message to
SUT A. (Also observe that SUT B sends a SETUP message
to Tester B. Check that the SETUP does not include a
DTL for the lowest level and includes at least one DTL
for higher level.)

3.   Test Case ID: V5403DTL003
      Test Purpose: To verify that two switches process DTLs
                       correctly during call/connection setup as a
                       DTL originator and as an intermediate node of
                       the same lowest level peer group.
      Reference: Annex A
      Pre-requisite: SUT A and SUT B are both SS_M,
                       Arrange the topology state of switches SUT A
                       and SUT B such that:
                       - SUT A and SUT B belong to the same peer
                       group and SUT B is not an exit border node for
                       the peer group when a call flows from Tester A
                       to Tester B, and
                       - Tester B is PGL.
      Test Configuration: #3b

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is (0,(0,0))
      2.   Tester A sends a SETUP message to SUT A.
      3.   Observe that SUT A sends a SETUP to SUT B.
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B.)
      5.   The final state is (9,(3,6))

      Verdict Criteria:
            Observe that SUT A sends a SETUP message to SUT B. Check
            that the SETUP includes a DTL for the lowest level with
            the current transit pointer pointing to the node ID of
            SUT B.
      - AND -
            Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message

        to Tester B. Check that the SETUP include a DTL for the
        lowest level with the current transit pointer pointing
        to the node ID of Tester B.)

4.   Test Case ID: V5403DTL004
      Test Purpose: To verify that two switches process DTLs
                      correctly during call/connection setup as an
                      exit border node and as a DTL terminator of
                      two different lowest level peer groups.
      Reference: Annex A
      Pre-requisite: SUT A is SS_B and SS_P,
                      SUT B is SS_B,
                      Arrange the topology state of switches SUT A
                      and SUT B such that:
                      - SUT A and SUT B belong to different peer
                      groups at the lowest level, and
                      - SUT B and Tester B belong to the same lowest
                      level peer group with Tester B as PGL.
      Test Configuration: #3b

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is (0,(0,0))
      2.   Tester B sends a SETUP message to SUT B.
      3.   Observe that SUT B sends a SETUP message to SUT A.
            (Also observe that SUT B sends a CALL PROCEEDING message
            Tester B.)
      4.   Observe that SUT A sends a CALL PROCEEDING message to
            SUT B. (Also observe that SUT A sends a SETUP message
            to Tester A.)
      5.   The final state is (3,(9,3))

      Verdict Criteria:
            Observe that SUT B sends a SETUP message to SUT A.
            Check that the SETUP does not include a DTL for the
            lowest level and includes at least one DTL for higher
            level. (Also observe that SUT B sends a CALL PROCEEDING
            message to Tester B.)
      - AND -

        Observe that SUT A sends a CALL PROCEEDING message to
        SUT B. (Also observe that SUT A sends a SETUP message
        to Tester A.)

5.   Test Case ID: V5403DTL005
      Test Purpose: To verify that two switches process DTLs
                       correctly during call/connection setup as an
                       entry border node and as a DTL terminator of a
                       same lowest level peer group.
      Reference: Annex A
      Pre-requisite: SUT A is SS_M,
                       SUT B is SS_B and SS_P,
                       Arrange the topology state of switches SUT A
                       and SUT B such that :
                       - SUT A and SUT B belong to the same lowest
                       level peer group and SUT B is an entry border
                       node for the group when a call flows from
                       Tester B to Tester A, and
                       - SUT B is PGL.
      Test Configuration: #3b

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is (0,(0,0))
      2.   Tester B sends a SETUP message to SUT B.
      3.   Observe that SUT B sends a SETUP message to SUT A.
            (Also observe that SUT B sends a CALL PROCEEDING message
            to Tester B.)
      4.   Observe that SUT A sends a CALL PROCEEDING message to
            SUT B. (Also observe that SUT A sends a SETUP message
            to Tester A.)
      5.   The final state is (3,(9,3))

      Verdict Criteria:
            Observe that SUT B sends a SETUP message to SUT A.
            Check that the SETUP includes a new DTL for the lowest
            level with the current transit pointer pointing to the
            node ID of SUT A and includes a DTL for the next higher
            level with the current transit pointer pointing to the
            node ID of the lowest level peer group containing SUT B

and SUT A. (Also observe that SUT B sends a CALL
PROCEEDING message to Tester B.)
- AND -
     Observe that SUT A sends a CALL PROCEEDING message to
     SUT B. (Also observe that SUT A sends a SETUP message
     to Tester A.)

6.   Test Case ID: V5403DTL006
     Test Purpose: To verify that two switches process DTLs
                     correctly during call/connection setup as an
                     intermediate node and as a DTL terminator of a
                     same lowest level peer group.
     Reference: Annex A
     Pre-requisite: SUT A and SUT B are both SS_M,
                     Arrange the topology state of switches SUT A
                     and SUT B such that:
                     - SUT A and SUT B belong to the same peer
                     group and SUT B is an intermediate node for
                     the peer group when a call flows from Tester B
                     to Tester A, and
                     - Tester B is PGL.
     Test Configuration: #3b

     Test Set-up:
     1.   Connect the two SUTs with one physical link.
     2a. Connect Tester A (UNI) to SUT A.
     2b. Connect Tester B (PNNI) to SUT B.

     Test Procedure:
     1.   The initial state is (0,(0,0))
     2.   Tester B sends a SETUP message to SUT B.
     3.   Observe that SUT B sends a SETUP message to SUT A.
          (Also observe that SUT B sends a CALL PROCEEDING message
          to Tester B.)
     4.   Observe that SUT A sends a CALL PROCEEDING message to
          SUT B. (Also observe that SUT A sends a SETUP message
          to Tester A.)
     5.   The final state is (3,(9,3))

     Verdict Criteria:
          Observe that SUT B sends a SETUP message to SUT A.
          Check that the SETUP includes a DTL for the lowest level
          with the current transit pointer pointing to the node ID
          of SUT A (Also observe that SUT B sends a CALL
          PROCEEDING message to Tester B.)

- AND -
      Observe that SUT A sends a CALL PROCEEDING message to
      SUT B. (Also observe that SUT A sends a SETUP message
      to Tester A.)

7.   Test Case ID: V5403DTL007
      Test Purpose: To verify that two switches process DTLs
                       correctly as an originating node that is not
                       an exit border node followed by an entry
                       border node.
      Reference: Annex A
      Pre-requisite: SUT A is SS_N,
                       SUT B is SS_B,
                       Arrange the topology state of switches SUT A
                       and SUT B such that:
                       - Tester B and SUT B belong to the same lowest
                       level peer group, with PGL Tester B,
                       - SUT A's lowest level peer group is the
                       parent peer group of Tester B and SUT B.
      Test Configuration: #3b

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   PNNI Routing has completed between SUT A and SUT B
      2.   Monitor the PNNI Signalling channel (VPI/VCI=0/5)
            between SUT A and SUT B.
      3.   Tester A sends a SETUP message to SUT A.
      4a.   Observe that SUT A sends a SETUP message to SUT B.
      4b.   Store the DTL for examination.
      5.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. Also observe that SUT B sends a SETUP message to
            Tester B and store the DTL for examination.
      Verdict Criteria:
            Observe that the only DTL in the SETUP message between
            the SUTs contains the node ID of SUT A and the node ID
            of the parent node of SUT B, with the transit pointer
            set to point to the second element (i.e. the parent node
            of SUT B).
      - AND -
            Observe that SUT B sends a CALL PROCEDDING message to
            SUT A. Also observe that SUT B sends a SETUP message to

Tester B. Observe that the DTL at the bottom of the DTL
stack is identical to that originally received by SUT B,
and that another DTL has been pushed on top of the
stack.

5.4.4 5.4.4   DTL processing an SVC Detailed for Test
       Configuration #3c

1.   Test Case ID: V5404DTL001
      Test Purpose: To verify that two switches process DTLs
                       correctly during call/connection setup as a
                       DTL originator and as a DTL terminator of two
                       different lowest level peer groups.
      Pre-requisite: - PNNI routing complete,
                       - both SUTs are SS_B and SS_P,
                       - SUT A and SUT B are in different peer group,
                       and
                       - both SUTs are PGLs with the same parent peer
                       group.
      Reference: Annex A
      Test Configuration: #3c

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (UNI) to SUT B.

      Test Procedure:
      1.   The initial state is (0,0).
      2.   PNNI Routing has completed between SUT A and SUT B.
      3.   Monitor the PNNI Signalling channel (VPI/VCI=0/5)
            between SUT A and SUT B).
      4.   Tester A sends a SETUP message to SUT A.
      5a.   Observe that SUT A sends a SETUP message to SUT B.
      5b.   Store the DTL for examination.
      6.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. Also observe that SUT B sends a SETUP message to
            Tester B.
      7.   The final state is (9,3).

      Verdict Criteria:
            Observe that the only DTL in the SETUP message contains
            the node ID of the parent node of SUT A and the node ID
            of the parent node of SUT B, with the transit pointer
            set to the second element (i.e. the parent node of SUT
            B).
      - AND -

        Observe that SUT B sends a CALL PROCEEDING message to
        SUT A. Also observe that SUT B sends a SETUP message to
        Tester B.

2.   Test Case ID: V5404DTL002
      Test Purpose: To verify that two switches process DTLs
                       correctly during call/connection setup as a
                       DTL originator and as a DTL terminator of a
                       same lowest level peer group.
      Reference: Annex A
      Pre-requisite: - PNNI routing complete,
                       - SUT A and SUT B are is the same peer group,
                       and
                       - both SUTs are SS_M.
      Test Configuration: #3c

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (UNI) to SUT B.

      Test Procedure:
      1.   The initial state is (0,0).
      2.   PNNI Routing has completed between SUT A and SUT B.
      3.   Monitor the PNNI Signalling channel (VPI/VCI=0/5)
            between SUT A and SUT B).
      4.   Tester A sends a SETUP message to SUT A.
      5a.   Observe that SUT A sends a SETUP message to SUT B.
      5b.   Store the DTL for examination.
      6.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. Also observe that SUT B sends a SETUP message to
            Tester B.
      7.   The final state is (9,3).

      Verdict Criteria:
            Observe that the only DTL in the SETUP message contains
            the node ID of SUT A and the node ID of SUT B with the
            current transit pointer set to point to the second
            element (i.e. SUT B).
      - AND -
            Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. Also observe that SUT B sends a SETUP message to
            Tester B.

5.5 3 - 4 Repeat Test Cases 1 - 2 with the call initiated in the other direction (i.e. from Tester B). The state notation is changed from (s1,s2) to (s2,s1).

5.5   Crankback Processing

Crankback processing may not be possible for interoperability
testing, since it is necessary to control the SUT that will
initiate crankback. However, when a call is not able to be
established (i.e. a test case from the establishment section
fails), the RELEASE or RELEASE COMPLETE message should be examined
to determine whether a crankback IE is included.

5.5.1 Crankback processing on an SVC (SS_M)

These are not test cases, but are listed as examples.

1.   Test Case ID: V5501CRK001(Failure of V5201EST012)
                      {Note: Test Case V5201EST012 failed because a
                      CALL PROCEEDING message was not sent from SUT
                      B to SUT A.}
      Test Purpose: Verify that SUT B includes a Crankback IE in a
                      RELEASE COMPLETE message.
      Pre-requisite: PNNI Routing has completed
      Reference: Annex B & 6.5.2.3
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   PNNI Routing has completed between SUT A and SUT B.
      2.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
      3.   Tester A sends a SETUP message to SUT A.
      4.   Observe that a SETUP message is sent from SUT A to SUT
            B. (Also observe that a CALL PROCEEDING message is sent
            from SUT A to Tester A.)

      Verdict Criteria:
            Observe a RELEASE COMPLETE message with a Crankback IE
            from SUT B to SUT A.

2.   Test Case ID: V5501CRK002(Failure of V5201EST012)

                         {Note: In Test Case V5201EST012, it failed to
                         observe a SETUP message sent from SUT B to
                         Tester B.}
Test Purpose: Verify that SUT B includes a Crankback IE in a
                         RELEASE message.
Pre-requisite: PNNI Routing has completed
Reference: Annex B & 6.5.2.3
Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   PNNI Routing has completed between SUT A and SUT B.
2.   Monitor the PNNI (VPI/VCI=0/5) between SUT A and SUT B.
3.   Tester A sends a SETUP message to SUT A.
4.   Observe that a SETUP message is sent from SUT A to SUT
      B. (Also observe that a CALL PROCEEDING message is sent
      from SUT A to Tester A.)
5.   Observe that a CALL PROCEEDING message is sent from SUT
      B to SUT A.

Verdict Criteria:
      Observe a RELEASE message with a Crankback IE from SUT B
      to SUT A.

5.5.2 5.5.2   Crankback processing on an SVC (SS_M) Detailed for
        Test Configuration #3a

1.   Test Case ID: V5502CRK001
      Test Purpose: To verify two switches, as an entry border
                       node and as an exit border node, perform
                       crankback procedure correctly when there is no
                       alternate route.
      Reference: 6.5.3, Annex B.

      Pre-requisite: - Arrange the topology state of switches SUT A
                       and SUT B such that when a call/connection
                       flows from Tester A to Tester B,
                       - SUT A and SUT B belong to the same lowest
                       level peer group,
                       - SUT A is an entry border node for the peer
                       group,
                       - SUT B is an exit border node for the peer
                       group, and
                       - there is no alternate route from SUT A to
                       the next destination at any hierarchical
                       level.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((0,0),(0,0)).
      2.   Tester A sends a SETUP message to SUT A.
      3.   Observe that SUT A sends a SETUP message to SUT B. (Also
            observe that SUT A sends a CALL PROCEEDING message to
            Tester A.)
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B.)
      5.   Tester B sends a RELEASE COMPLETE message to SUT B.
            [The RELEASE COMPLETE message contains Crankback I.E.
            whose crankback level is higher than lowest level and
            blocked transit type is either "blocked node" or
            "blocked link."]
      6.   Observe that SUT B sends a RELEASE message to SUT A.

7.   Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A.)
8.   The final state is ((0,0),(0,0)).

Verdict Criteria:
      Observe that SUT B sends a RELEASE message to SUT A that
      contains Crankback I.E. whose crankback level is the
      same as received in the RELEASE COMPLETE message.
- AND -
      Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A with Crankback I.E. whose crankback level is
      no less than that of the received RELEASE message.)

2.   Test Case ID: V5502CRK002
      Test Purpose: To verify two switches, as an entry border
                       node and as an intermediate node, perform
                       crankback procedure correctly when there is no
                       alternate route.
      Reference: 6.5.3, Annex B.
      Pre-requisite: -Arrange the topology state of switches SUT A
                       and SUT B such that when a call/connection
                       flows from Tester A to Tester B,
                       - SUT A, SUT B, and Tester B belong to the
                       same lowest peer group,
                       - SUT A is entry border node, and
                       - There is no alternate route from SUT A to
                       the next destination at any hierarchical
                       level.
      Test Configuration: #3a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is ((0,0),(0,0)).
      2.   Tester A sends a SETUP message to SUT A.
      3.   Observe that SUT A sends a SETUP to SUT B. (Also
            observe that SUT A sends a CALL PROCEEDING message to
            Tester A.)

4.   Observe that SUT B sends a CALL PROCEEDING message to
     SUT A. (Also observe that SUT B sends a SETUP to Tester
     B.)
5.   Tester B sends a RELEASE COMPLETE message to SUT B.
     [The RELEASE COMPLETE message contains Crankback I.E.
     whose crankback level is lowest level and blocked
     transit type is either "blocked node" or "blocked
     link".]
6.   Observe that SUT B sends a RELEASE message to SUT A.
7.   Observe that SUT A sends a RELEASE COMPLETE message to
     SUT B. (Also observe that SUT A sends a RELEASE message
     to Tester A.)
8.   Tester A sends a RELEASE COMPLETE message to SUT A.
9.   The final state is ((0,0),(0,0)).

Verdict Criteria:
     Observe that SUT B sends a RELEASE message to SUT A that
     contains Crankback I.E. whose crankback level is lowest
     level.
- AND -
     Observe that SUT A sends a RELEASE COMPLETE message to
     SUT B. (Also observe that SUT A sends a RELEASE message
     to Tester A that contains Crankback I.E. whose crankback
     level is higher than lowest level.)

3.   Test Case ID: V5502CRK003
     Test Purpose: To verify two switches, as an intermediate
                     node and as an exit border node, perform
                     crankback procedure correctly when there is no
                     alternate route.
     Reference: 6.5.3, Annex B.

     Pre-requisite: - Arrange the topology state of switches SUT A
                     and SUT B such that when a call/connection
                     flows from Tester A to Tester B,
                     - Tester A, SUT A and SUT B belong to the same
                     lowest level peer group,
                     - SUT B is an exit border node for the peer
                     group, and
                     - there is no alternate route from SUT A to
                     the next destination at any hierarchical
                     level.
     Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a. Connect Tester A (PNNI) to SUT A.
2b. Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP message to SUT A.
3.   Observe that SUT A sends a SETUP message to SUT B. (Also
     observe that SUT A sends a CALL PROCEEDING message to
     Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
     SUT A. (Also observe that SUT B sends a SETUP message
     to Tester B.)
5.   Tester B sends a RELEASE COMPLETE message to SUT B.
     [The RELEASE COMPLETE message contains Crankback I.E.
     whose crankback level is higher than lowest level and
     blocked transit type is either "blocked node" or
     "blocked link."]
6.   Observe that SUT B sends a RELEASE message to SUT A.
7.   Observe that SUT A sends a RELEASE COMPLETE message to
     SUT B. (Also observe that SUT A sends a RELEASE message
     to Tester A.)
8.   The final state is ((0,0),(0,0)).

Verdict Criteria:
     Observe that SUT B sends a RELEASE message to SUT A that
     contains Crankback I.E. whose crankback level is the
     same as received in the RELEASE COMPLETE message.
- AND -
     Observe that SUT A sends a RELEASE COMPLETE message to
     SUT B. (Also observe that SUT A sends a RELEASE message
     to Tester A with Crankback I.E. whose crankback level is
     the same as received in the RELEASE message.)

4.   Test Case ID: V5502CRK004
     Test Purpose: To verify two switches, as intermediate nodes,
                     perform crankback procedure correctly when
                     there is no alternate route.
     Reference: 6.5.3, Annex B.

     Pre-requisite: - Arrange the topology state of switches SUT A
                     and SUT B such that when a call/connection
                     flows from Tester A to Tester B,

- Tester A, SUT A, SUT B, and Tester B belong
to the same lowest level peer group,
- there is no alternate route from SUT A to
the next destination at any hierarchical
level.

Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP message to SUT A.
3.   Observe that SUT A sends a SETUP message to SUT B. (Also
      observe that SUT A sends a CALL PROCEEDING message to
      Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)
5.   Tester B sends a RELEASE COMPLETE message to SUT B.
      [The RELEASE COMPLETE message contains Crankback I.E.
      whose crankback level is lowest level and blocked
      transit type is either "blocked node" or "blocked
      link."]
6.   Observe that SUT B sends a RELEASE message to SUT A.
7.   Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A.)
8.   The final state is ((0,0),(0,0)).

Verdict Criteria:
      Observe that SUT B sends a RELEASE message to SUT A that
      contains Crankback I.E. whose crankback level is lowest
      level.
- AND -
      Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A with Crankback I.E. whose crankback level is
      lowest level.)

5.   Test Case ID: V5502CRK005
      Test Purpose: To verify two switches, as an exit border node
                      and as an entry border node, perform crankback

procedure correctly when there is no alternate
route.
Reference: 6.5.3, Annex B.
Pre-requisite: - Arrange the topology state of switches SUT A
                  and SUT B such that when a call/connection
                  flows from Tester A to Tester B,
                  - SUT A and SUT B belong to two different
                  lowest level peer groups,
                  - SUT A is an exit border node for one peer
                  group,
                  - SUT B is entry border node for the other
                  peer group, and
                  - there is no alternate route from SUT B to
                  the next destination at any hierarchical
                  level.
Test Configuration: #3a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B.

Test Procedure:
1.   The initial state is ((0,0),(0,0)).
2.   Tester A sends a SETUP message to SUT A.
3.   Observe that SUT A sends a SETUP message to SUT B.
      (Also observe that SUT A sends a CALL PROCEEDING message
      to Tester A.)
4.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)
5.   Tester B sends a RELEASE COMPLETE message to SUT B.
      [The RELEASE COMPLETE message contains Crankback I.E.
      whose crankback level is lowest level and blocked
      transit type is either "blocked node" or "blocked
      link".]
6.   Observe that SUT B sends a RELEASE message to SUT A.
7.   Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A.)
8.   The final state is ((0,0),(0,0)).

Verdict Criteria:
      Observe that SUT B sends a RELEASE message to SUT A that
      contains Crankback I.E. whose crankback level is higher
      than lowest level.

– AND –
  Observe that SUT A sends a RELEASE COMPLETE message to
  SUT B. (Also observe that SUT A sends a RELEASE message
  to Tester A with Crankback I.E. whose crankback level is
  the same as received in the RELEASE message.)

6-10   Repeat Test cases 1 – 5 with the call initiated in the
          other direction. Tester A, SUT A, SUT B, and Tester B
          are exchanged with Tester B, SUT B, SUT A, and Tester A;
          and the state notation is changed from ((s1,s2),(s3,s4))
          to ((s4,s3),(s2,s1)).

5.5.3 5.5.3   Crankback processing on an SVC (SS_M) Detailed for
      Test Configuration #3b

1.   Test Case ID: V5503CRK001
      Test Purpose: To verify two switches, as a DTL originator
                       and as an entry border node, perform crankback
                       procedure correctly when there is no alternate
                       route.
      Reference: 6.5.3, Annex B.
      Pre-requisite: - Arrange the topology state of switches SUT A
                       and SUT B such that when a call/connection
                       flows from Tester A to Tester B,
                       - SUT A and SUT B belong to two different
                       lowest level peer groups,
                       - SUT B is an entry border node for its peer
                       group, and
                       - There is no alternate route from SUT B to
                       the next destination at any hierarchical
                       level.
                       - There is no alternate route from SUT A to
                       the next destination at any hierarchical
                       level.
      Test Configuration: #3b

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is (0,(0,0)).
      2.   Tester A sends a SETUP message to SUT A.
      3.   Observe that SUT A sends a SETUP message to SUT B.
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B.)
      5.   Tester B sends a RELEASE COMPLETE message to SUT B.
            [The RELEASE COMPLETE message contains Crankback I.E.
            whose crankback level is the lowest level and blocked
            transit type is either "blocked node" or "blocked
            link".]
      6.   Observe that SUT B sends a RELEASE message to SUT A.
      7.   Observe that SUT A sends a RELEASE COMPLETE message to
            SUT B. (Also observe that SUT A sends a RELEASE message
            to Tester A.)

8.   The final state is (0,(0,0)).

Verdict Criteria:
     Observe that SUT B sends a RELEASE message to SUT A.
     Check that the RELEASE message contains Crankback I.E.
     whose crankback level is higher than the lowest level.
- AND -
     Observe that SUT A sends a RELEASE COMPLETE message to
     SUT B. (Also observe that SUT A sends a RELEASE message
     to Tester A.)

2.   Test Case ID: V5503CRK002
      Test Purpose: To verify two switches, as a DTL originator
                      and as an exit border node, perform crankback
                      procedure correctly when there is no alternate
                      route.
      Reference: 6.5.3, Annex B.
      Pre-requisite: - Arrange the topology state of switches SUT A
                      and SUT B such that when a call/connection
                      flows from Tester A to Tester B,
                      - SUT A and SUT B belong to the same lowest
                      level peer group,
                      - SUT B is an exit border node for the lowest
                      level peer group, and,
                      - There is no alternate route from SUT A to
                      the next destination at any hierarchical
                      level.
      Test Configuration: #3b

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
      1.   The initial state is (0,(0,0)).
      2.   Tester A sends a SETUP message to SUT A.
      3.   Observe that SUT A sends a SETUP message to SUT B.
      4.   Observe that SUT B sends a CALL PROCEEDING message to
            SUT A. (Also observe that SUT B sends a SETUP message
            to Tester B.)
      5.   Tester B sends a RELEASE COMPLETE message to SUT B.
            [The RELEASE COMPLETE message contains Crankback I.E.
            whose crankback level is higher than the lowest level

and blocked transit type is either "blocked node" or
"blocked link."]
6.   Observe that SUT B sends a RELEASE message to SUT A.
7.   Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A.)
8.   The final state is (0,(0,0)).

Verdict Criteria:
      Observe that SUT B sends a RELEASE message to SUT A.
      Check that the RELEASE message contains a Crankback I.E.
      whose crankback level is the same as received in the
      RELEASE COMPLETE message.
- AND -
      Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A.)

3.   Test Case ID: V5503CRK003
      Test Purpose: To verify two switches, as DTL originator and
                       as an intermediate node, perform crankback
                       procedure correctly when there is no alternate
                       route.
      Reference: 6.5.3, Annex B.
      Pre-requisite: - Arrange the topology state of switches SUT A
                       and SUT B such that when a call/connection
                       flows from Tester A to Tester B,
                       - SUT A, SUT B, and Tester B belong to the
                       same lowest level peer group, and
                       - There is no alternate route from SUT A to
                       the next destination at any hierarchical
                       level.
      Test Configuration: #3b

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (UNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B.

      Test Procedure:
            1.   The initial state is (0,(0,0)).
            2.   Tester A sends a SETUP message to SUT A.
            3.   Observe that SUT A sends a SETUP message to SUT B.

4.   Observe that SUT B sends a CALL PROCEEDING message
      to SUT A. (Also observe that SUT B sends a SETUP
      message to Tester B.)
5.   Tester B sends a RELEASE COMPLETE message to SUT B.
      [The RELEASE COMPLETE message contains Crankback
      I.E. whose crankback level is lowest level and
      blocked transit type is either "blocked node" or
      "blocked link".]
6.   Observe that SUT B sends a RELEASE message to SUT
      A.
7.   Observe that SUT A sends a RELEASE COMPLETE message
      to SUT B. (Also observe that SUT A sends a RELEASE
      message to Tester A.)
8.   The final state is (0,(0,0)).

Verdict Criteria:
      Observe that SUT B sends a RELEASE to SUT A. Check that
      the RELEASE message contains a Crankback I.E. whose
      crankback level is the lowest level.
- AND -
      Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A.)

5.5.4 5.5.4   Crankback processing on an SVC (SS_M) Detailed for
     Test Configuration #3c

5.5.5 Not applicable for this Test Configuration.

5.5.5Crankback processing on an SVC (SS_M) Detailed for Test
Configuration #4a

Test Cases in this section require so much configuration that
figures are provided to complete the Pre-requisite section for
each Test Case.

1.   Test Case ID: V5505CRK001
      Test Purpose: To verify two switches, as an entry border
                      node and as an intermediate node, perform
                      crankback procedure correctly when there is an
                      alternate route and crankback level matches.
      Reference: 6.5.3, Annex B.
      Pre-requisite: - see figure 5.5.5-1 for the configuration
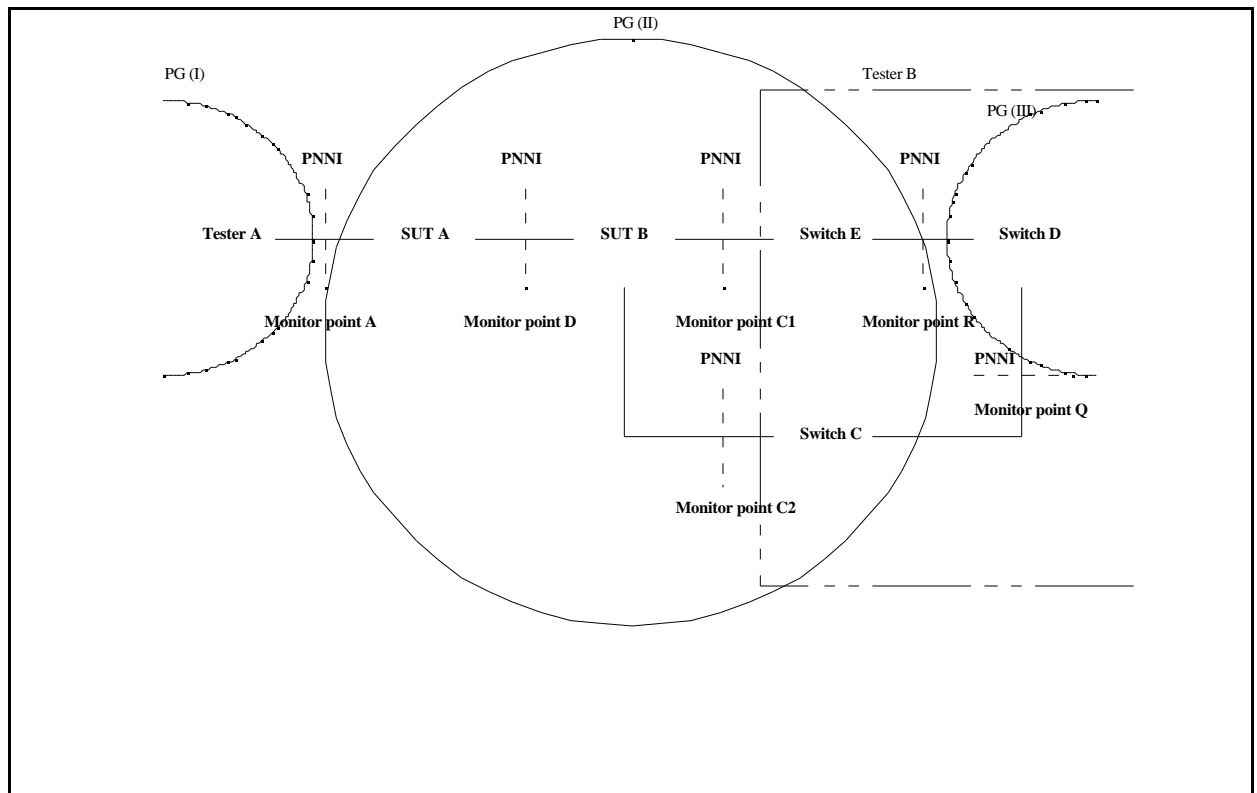   information.

Figure 5.5.5-1

      Test Configuration: #4a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a. Connect Tester A (PNNI) to SUT A.
      2b. Connect Tester B (PNNI) to SUT B with two physical
           links.

Test Procedure:
1.   Tester A sends a SETUP message to SUT A.
2.   Observe that SUT A sends a SETUP message to SUT B.
      (Also observe that SUT A sends a CALL PROCEEDING message
      to Tester A.)
3.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)
4.   Tester B sends a RELEASE COMPLETE message to SUT B.
      [The RELEASE COMPLETE message contains Crankback I.E.
      whose crankback level is lowest level and blocked
      transit type is either "blocked node" or "blocked
      link."]
5.   Observe that SUT B sends a RELEASE message to SUT A.
6a.   Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B.
6b.   Observe that SUT A sends a SETUP message to SUT B.
7.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)

Verdict Criteria:
      Observe that SUT B sends a RELEASE message to SUT A that
      contains Crankback I.E. whose crankback level is lowest
      level.
- AND -
      Observe that SUT A sends a RELEASE COMPLETE message and
      a SETUP message to SUT B. (Also observe that no RELEASE
      message is transmitted from SUT A to Tester A during the
      steps 6a, 6b and 7.)
- AND -
      Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)

2.   Test Case ID: V5505CRK002
      Test Purpose: To verify two switches, as an entry border
                      node and as an intermediate node, relay
                      crankback message correctly when there is an
                      alternate route and crankback level
                      mismatches.
      Reference: 6.5.3, Annex B.
      Pre-requisite: - see figure 5.5.5-1 for the configuration
                      information.

Test Configuration: #4a

Test Set-up:
1.   Connect the two SUTs with one physical link.
2a.   Connect Tester A (PNNI) to SUT A.
2b.   Connect Tester B (PNNI) to SUT B with two physical
      links.

Test Procedure:
1.   Tester A sends a SETUP message to SUT A.
2.   Observe that SUT A sends a SETUP message to SUT B.
      (Also observe that SUT A sends a CALL PROCEEDING message
      to Tester A.)
3.   Observe that SUT B sends a CALL PROCEEDING message to
      SUT A. (Also observe that SUT B sends a SETUP message
      to Tester B.)
4.   Tester B sends a RELEASE COMPLETE message to SUT B.
      [The RELEASE COMPLETE message contains Crankback I.E.
      whose crankback level is higher than the lowest level
      and blocked transit type is either "blocked node" or
      "blocked link."]
5.   Observe that SUT B sends a RELEASE message to SUT A.
6.   Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A.)
7.   Tester A sends a RELEASE COMPLETE message to SUT A.

Verdict Criteria:
      Observe that SUT B sends a RELEASE message to SUT A that
      contains Crankback I.E. whose crankback level is the
      same as received in the RELEASE COMPLETE message.
- AND -
      Observe that SUT A sends a RELEASE COMPLETE message to
      SUT B. (Also observe that SUT A sends a RELEASE message
      to Tester A with Crankback I.E. whose crankback level is
      no less than that of the received RELEASE message.)

3.   Test Case ID: V5505CRK003
      Test Purpose: To verify two switches, as two intermediate
                       nodes, relay crankback message correctly even
                       when there is an alternate route and crankback
                       level matches.
      Reference: 6.5.3, Annex B.
      Pre-requisite: - see figure 5.5.5-2 for the configuration
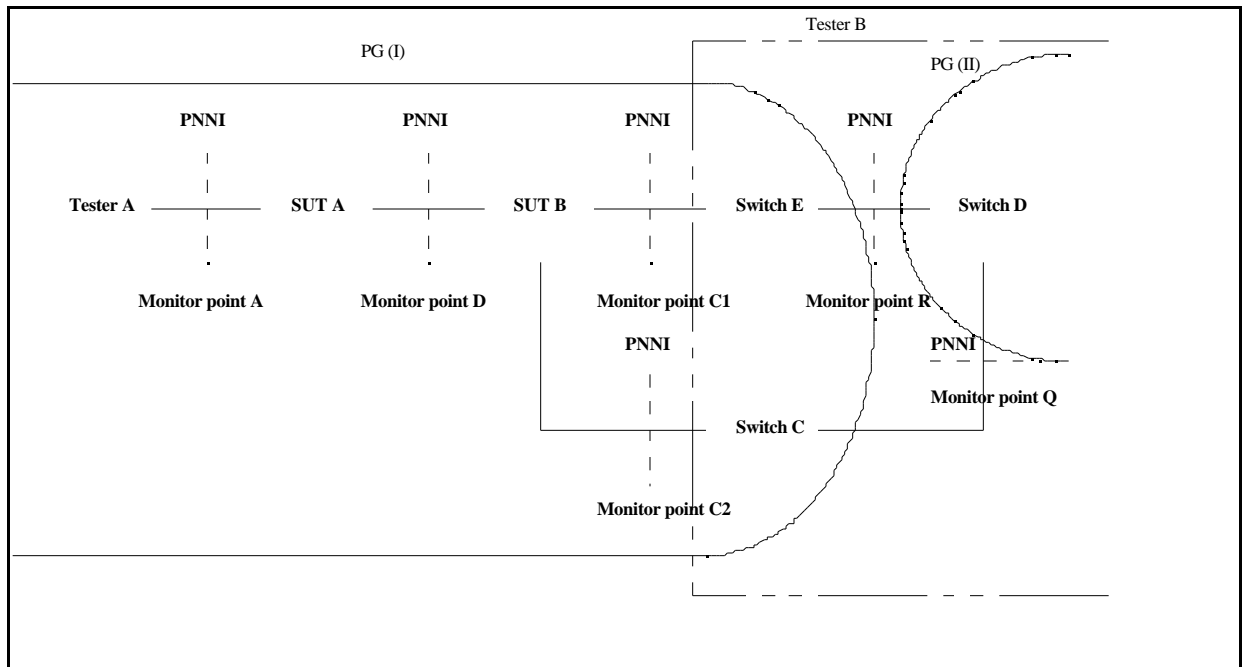   information.

Figure 5.5.5-2

      Test Configuration: #4a

      Test Set-up:
      1.   Connect the two SUTs with one physical link.
      2a.   Connect Tester A (PNNI) to SUT A.
      2b.   Connect Tester B (PNNI) to SUT B with two physical
            links.

      Test Procedure:
      1.   Tester A sends a SETUP message to SUT A.
      2.   Observe that SUT A sends a SETUP message to SUT B.
            (Also observe that SUT A sends a CALL PROCEEDING message
            to Tester A.)

    3.   Observe that SUT B sends a CALL PROCEEDING message to
        SUT A. (Also observe that SUT B sends a SETUP message
        to Tester B.)
    4.   Tester B sends a RELEASE COMPLETE message to SUT B.
        [The RELEASE COMPLETE message contains Crankback I.E.
        whose crankback level is lowest level and blocked
        transit type is either "blocked node" or "blocked
        link."]
    5.   Observe that SUT B sends a RELEASE message to SUT A.
    6.   Observe that SUT A sends a RELEASE COMPLETE message to
        SUT B. (Also observe that SUT A sends a RELEASE message
        to Tester A.)
    7.   Tester A sends a RELEASE COMPLETE message to SUT A.

    Verdict Criteria:
        Observe that SUT B sends a RELEASE message to SUT A that
        contains Crankback I.E. whose crankback level is lowest
        level.
    - AND -
        Observe that SUT A sends a RELEASE COMPLETE message to
        SUT B. (Also observe that SUT A sends a RELEASE message
        to Tester A that contains Crankback I.E. whose crankback
        level is lowest level.)

4.   Test Case ID: V5505CRK004
    Test Purpose: To verify two switches, as an exit border node
                    and as an entry border node, relay crankback
                    message correctly when there is an alternate
                    route and crankback level mismatches for the
                    entry border node.
    Reference: 6.5.3, Annex B.
    Pre-requisite: - see figure 5.5.5-3 for the configuration
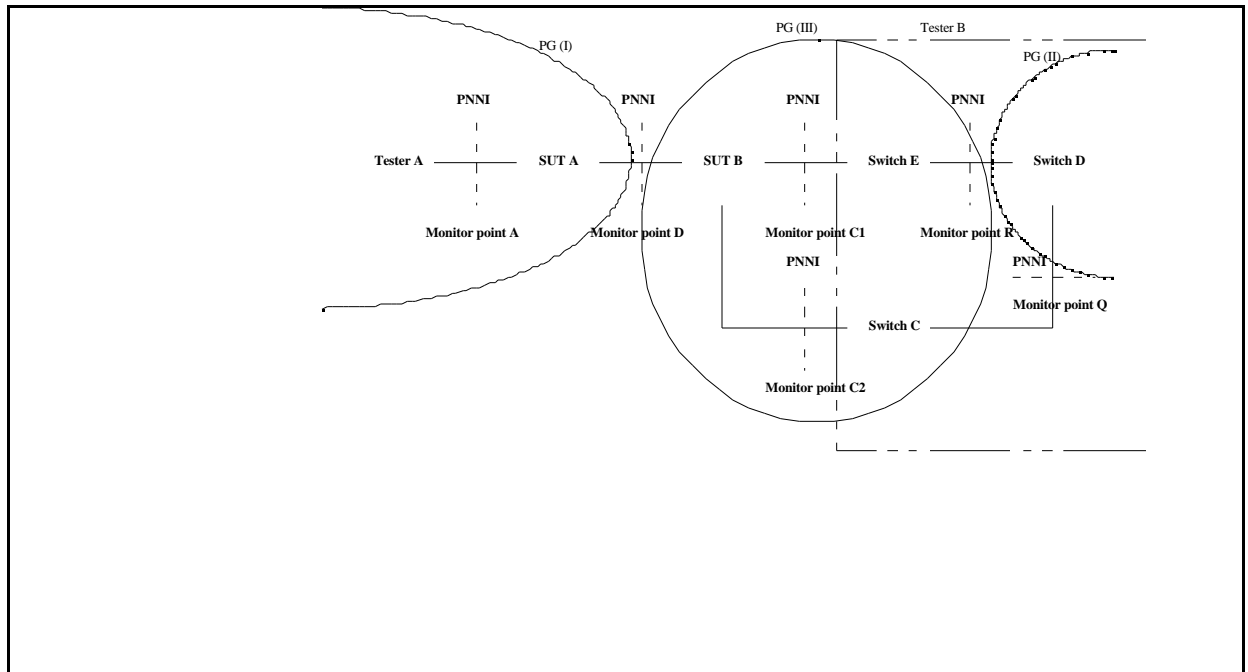   information.

Figure 5.5.5-3

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        Test Configuration:  #4a

        Test Set-up:
        1.    Connect the two SUTs with one physical link.
        2a.   Connect Tester A (PNNI) to SUT A.
        2b.   Connect Tester B (PNNI) to SUT B with two physical
              links.

        Test Procedure:
        1.    Tester A sends a SETUP message to SUT A.
        2.    Observe that SUT A sends a SETUP message to SUT B.
              (Also observe that SUT A sends a CALL PROCEEDING message
              to Tester A.)
        3.    Observe that SUT B sends a CALL PROCEEDING message to
              SUT A.  (Also observe that SUT B sends a SETUP message
              to Tester B.)
        4.    Tester B sends a RELEASE COMPLETE message to SUT B.
              [The RELEASE COMPLETE message contains Crankback I.E.
              whose crankback level is higher than the lowest level of
              SUT B and blocked transit type is either "blocked node"
              or "blocked link."]
        5.    Observe that SUT B sends a RELEASE message to SUT A.
        6.    Observe that SUT A sends a RELEASE COMPLETE message to
              SUT B.  (Also observe that SUT A sends a RELEASE message
              to Tester A.)
```

7.   Tester A sends a RELEASE COMPLETE message to SUT A.

Verdict Criteria:
    Observe that SUT B sends a RELEASE message to SUT A that
    contains Crankback I.E. whose crankback level is no less
    than that of the received RELEASE COMPLETE message.
- AND -

5.5.6 Observe that SUT A sends a RELEASE COMPLETE message to SUT
    B.   (Also observe that SUT A sends a RELEASE message to
    Tester A with Crankback I.E. whose crankback level is the
    same as received in the RELEASE message.)

5.5.6 Crankback processing on an SVC (SS_M) Detailed for Test
Configuration #4b

The Test Case in this section requires so much configuration that
a figure is provided to complete the Pre-requisite section this
Test Case.

1.   Test Case ID: V5506CRK001
     Test Purpose: To verify two switches, as a DTL originator
                      and as an intermediate node, perform crankback
                      procedure correctly when there is an alternate
                      route and crankback level matches.
     Reference: 6.5.3, Annex B.
     Pre-requisite: - see figure 5.5.5-4 for the configuration
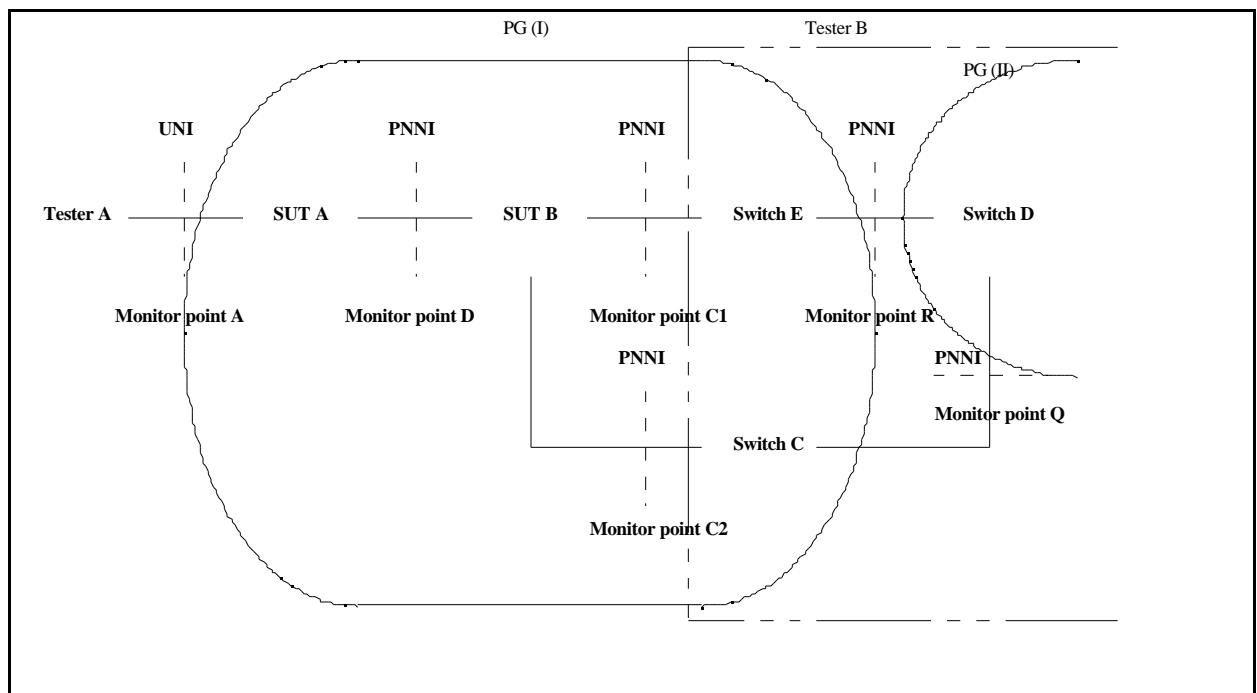   information.

Figure 5.5.5-4

     Test Configuration: #4b

     Test Set-up:
     1.   Connect the two SUTs with one physical link.
     2a. Connect Tester A (UNI) to SUT A.
     2b. Connect Tester B (PNNI) to SUT B with two physical
          links.

Test Procedure:
1.   Tester A sends a SETUP message to SUT A.
2.   Observe that SUT A sends a SETUP message to SUT B.
3.   Observe that SUT B sends a CALL PROCEEDING message to SUT A. (Also observe that SUT B sends a SETUP message to Tester B.)
4.   Tester B sends a RELEASE COMPLETE message to SUT B. [The RELEASE COMPLETE message contains Crankback I.E. whose crankback level is lowest level (i.e., the level of PG(I)) and blocked transit type is either "blocked node" or "blocked link."]
5.   Observe that SUT B sends a RELEASE message to SUT A.
6a.   Observe that SUT A sends a RELEASE COMPLETE message to SUT B.
6b.   Observe that SUT A sends a SETUP message to SUT B.
7.   Observe that SUT B sends a CALL PROCEEDING message to SUT A. (Also observe that SUT B sends a SETUP message to Tester B.)

Verdict Criteria:
      Observe that SUT B sends a RELEASE message to SUT A that contains Crankback I.E. whose crankback level is lowest level.
- AND -
      Observe that SUT A sends a RELEASE COMPLETE and a SETUP message to SUT B. (Also observe that no RELEASE message is transmitted from SUT A to Tester A during the steps 6a, 6b and 7.)
- AND -

5.6 Observe that SUT B sends a CALL PROCEEDING message to SUT A. (Also observe that SUT B sends a SETUP message to Tester B.)

5.6   Test Cases Dynamic Behavior (Point-to-Multipoint)

Most of the test cases for point-to-multipoint require SUTs to have multiple UNIs or PNNIs in order to observe multiple call/connections establishments.

5.6.1 Setup of the initial party (SS_M)

1.   Test Case ID: V5601P2M001
     Test Purpose: Verify that a SETUP message is sent from SUT A
                      to SUT B with an endpoint reference IE,
                      Broadband bearer capability IE set to point-
                      to-multipoint, and no OAM traffic descriptor
                      IE.
     Reference: 6.6.1
     Pre-requisite: Completed PNNI routing
     Test Configuration: #3a,b, or c

     Test Set-up:
     1.   Connect two SUTs with one physical link.

     Test Procedure:
     1.   PNNI Routing has completed between SUT A and SUT B.
     2   Monitor signalling (VPI/VCI=0/5) between SUT A and SUT
          B.
     3.   Tester A (root) sends a SETUP (multipoint) to SUT A.

     Verdict Criteria:
          Observe that a SETUP message is sent from SUT A to SUT B
          with an endpoint reference IE, Broadband bearer
          capability IE set to point-to-multipoint, and no OAM
          traffic descriptor IE.

2.   Test Case ID: V5601P2M002
     Test Purpose: Verify that a CALL PROCEEDING message is sent
                      from SUT B to SUT A with an endpoint reference
                      IE.
     Reference: 6.6.1
     Pre-requisite: Completed PNNI routing
     Test Configuration: #3a,b, or c

     Test Set-up:
     1.   Connect two SUTs with one physical link.

Test Procedure:
1.   PNNI Routing has completed between SUT A and SUT B.
2.   Monitor signalling (VPI/VCI=0/5) between SUT A and SUT
     B.
3.   Tester A (root) sends a SETUP (multipoint) to SUT A.
4.   Observe that a SETUP message is sent from SUT A to SUT B
     with an endpoint reference IE, Broadband bearer
     capability IE set to point-to-multipoint, and no OAM
     traffic descriptor IE.

Verdict Criteria:
     Observe that a CALL PROCEEDING message is sent from SUT
     B to SUT A with an endpoint reference IE. (Also a SETUP
     message is sent to Tester B.)

3.   Test Case ID: V5601P2M003
     Test Purpose: Verify that an ALERTING message is sent from
                     SUT B to SUT A with an endpoint reference IE.
     Reference: 6.6.1
     Pre-requisite: Completed PNNI routing
     Test Configuration: #3a, b, or c

     Test Set-up:
     1.   Connect two SUTs with one physical link.

     Test Procedure:
     1.   PNNI Routing has completed between SUT A and SUT B.
     2.   Monitor signalling (VPI/VCI=0/5) between SUT A and SUT
          B.
     3.   Tester A (root) sends a SETUP (multipoint) to SUT A.
     4.   Observe that a SETUP message is sent from SUT A to SUT B
          with an endpoint reference IE, Broadband bearer
          capability IE set to point-to-multipoint, and no OAM
          traffic descriptor IE.
     5.   Observe that a CALL PROCEEDING message is sent from SUT
          B to SUT A with an endpoint reference IE.
     6.   Observe that a SETUP message is sent to Tester B.
     7.   Tester B sends an CALL PROCEEDING message to SUT B.
     8.   Tester B sends an ALERTING message to SUT B.

     Verdict Criteria:
          Observe that an ALERTING message is sent from SUT B to
          SUT A with an endpoint reference IE.

4.   Test Case ID: V5601P2M004
      Test Purpose: Verify that a CONNECT message is sent from SUT
                       B to SUT A with an endpoint reference IE.
      Reference: 6.6.1
      Pre-requisite: Completed PNNI routing
      Test Configuration: #3a, b, or c

      Test Set-up:
      1.   Connect two SUTs with one physical link.

      Test Procedure:
      1.   PNNI Routing has completed between SUT A and SUT B.
      2.   Monitor signalling (VPI/VCI=0/5) between SUT A and SUT
            B.
      3.   Tester A (root) sends a SETUP (multipoint) to SUT A.
      4.   Observe that a SETUP message is sent from SUT A to SUT B
            with an endpoint reference IE, Broadband bearer
            capability IE set to point-to-multipoint, and no OAM
            traffic descriptor IE.
      5.   Observe that a CALL PROCEEDING message is sent from SUT
            B to SUT A with an endpoint reference IE.
      6.   Observe that a SETUP message is sent to Tester B.
      7.   Tester B sends a CALL PROCEEDING message to SUT B.
      8.   Tester B sends a CONNECT message to SUT B.

      Verdict Criteria:
            Observe that a CONNECT message is sent from SUT B to SUT
            A with an endpoint reference IE.

5.6.2 5.6.2   Adding a party (SS_M)

1.   Test Case ID: V5602P2M001
      Test Purpose: Verify that an ADD PARTY message is sent from
                      SUT A to SUT B to add another party to the
                      existing point-to-multipoint call.
      Reference: 6.6.2
      Pre-requisite: - Completed PNNI routing and
                      - passed Test Case V5601P2M004 (i.e. initial
                      call set up).
      Test Configuration: #3a, b, or c

      Test Set-up:
      1.   Connect two SUTs with one physical link.

      Test Procedure:
      1.   PNNI Routing has completed between SUT A and SUT B.
      2.   Monitor signalling (VPI/VCI=0/5) between SUT A and SUT
            B.
      3.   Complete Test Case V5601P2M004 and store the endpoint
            reference IE.
      4.   Tester A (root) sends an ADD PARTY (multipoint) to SUT
            A.

      Verdict Criteria:
            Observe that an ADD PARTY message is sent from SUT A to
            SUT B with an endpoint reference IE equal to the stored
            value, Broadband bearer capability IE set to point-to-
            multipoint, and no OAM traffic descriptor IE.

2.   Test Case ID: V5602P2M002
      Test Purpose: Verify that an ADD PARTY ACKNOWLEDGE message
                      is sent from SUT B to SUT A to acknowledge
                      another party being added to the existing
                      point-to-multipoint call.
      Reference: 6.6.2
      Pre-requisite: - Completed PNNI routing and
                      - passed Test Case V5601P2M004 (i.e. initial
                      call set up)
      Test Configuration: #3a, b, or c

      Test Set-up:
      1.   Connect two SUTs with one physical link.

Test Procedure:
1.   PNNI Routing has completed between SUT A and SUT B.
2.   Monitor signalling (VPI/VCI=0/5) between SUT A and SUT
      B.
3.   Complete Test Case V5601P2M004 and store the endpoint
      reference IE.
4.   Tester A (root) sends an ADD PARTY (multipoint) to SUT
      A.
5.   Observe that an ADD PARTY message is sent from SUT A to
      SUT B with an endpoint reference IE equal to the stored
      value.
6.   Observe that an ADD PARTY message is sent from SUT B to
      Tester B.
7.   Tester B sends an ADD PARTY ACKNOWLEDGE message to SUT
      B.

Verdict Criteria:
      Observe that an ADD PARTY ACKNOWLEDGEMENT message is
      sent from SUT B to SUT A with an endpoint reference IE
      equal to the stored value. (Also observe that an ADD
      PARTY ACKNOWLEDGEMENT message is sent from SUT A to
      Tester A with an endpoint reference IE equal to the
      stored value.)

5.6.3 5.6.3   Party dropping (SS_M)

1.   Test Case ID: V5603P2M001
       Test Purpose: Verify that a party is dropped by sending a
                       DROP PARTY message.
       Reference: 6.6.3
       Pre-requisite: - Completed PNNI routing and
                       - completed Test Case V5602P2M002 (i.e. at
                       least three parties in the call)
       Test Configuration: #3a, b, or c

       Test Set-up:
       1.   Connect two SUTs with one physical link.

       Test Procedure:
       1.   PNNI Routing has completed between SUT A and SUT B.
       2.   Monitor signalling (VPI/VCI=0/5) between SUT A and SUT
             B.
       3.   Complete Test Case V5601P2M004 and store the endpoint
             reference IE.
       4.   Complete Test Case V5602P2M002 and store the endpoint
             reference IE.
       5.   Tester A (root) sends an DROP PARTY message to SUT A.

       Verdict Criteria:
             Observe that a DROP PARTY message is sent from SUT A to
             SUT B with an endpoint reference IE equal to the stored
             value.

2.   Test Case ID: V5603P2M002
       Test Purpose: Verify that a party dropped from the call is
                       acknowledged by sending a DROP PARTY
                       ACKNOWLEDGE message.
       Reference: 6.6.3
       Pre-requisite: - Completed PNNI routing and
                       - completes Test Case V5602P2M002 (i.e. at
                       least three parties in the call)
       Test Configuration: #3a, b, or c

       Test Set-up:
       1.   Connect two SUTs with one physical link.

       Test Procedure:

1.   PNNI Routing has completed between SUT A and SUT B.
2.   Monitor signalling (VPI/VCI=0/5) between SUT A and SUT
     B.
3.   Complete Test Case V5601P2M004 and store the endpoint
     reference IE.
4.   Complete Test Case V5602P2M002 and store the endpoint
     reference IE.
5.   Tester A (root) sends an DROP PARTY message to SUT A.
6.   Observe that a DROP PARTY message is sent from SUT A to
     SUT B with an endpoint reference IE equal to the stored
     value.
7.   Observe that a DROP PARTY message is sent from SUT B to
     Tester B with an endpoint reference IE equal to the
     stored value.
8.   Tester B sends a DROP PARTY ACKNOWLEDGE message to SUT
     B.

Verdict Criteria:
     Observe that a DROP PARTY ACKNOWLEDGE message is sent
     from SUT B to SUT A with an endpoint reference IE equal
     to the stored value. (Also observe that a DROP PARTY
     ACKNOWLEDGE message is sent from SUT A to Tester A.)