15 PNNI Commands

The following chapter contains information on Text-Based PNNI commands. Topics include:

- Viewing PNNI information
- Configuring PNNI nodes and routing protocols
- Configuring static routes

Refer to the command task list below to find the page number for a specific task. To reference configuration tasks based on traditional UI commands, refer to Appendix A.

view pnni node

Command Usage

View PNNI node-specific information.

Syntax Options

view pnni node (No additional syntax options are used.)

Corresponding UI Command

pninfo

Remarks

The last set of parameters in the table below (**PGL Priority** through **Parent PGL Node ID**) will not display unless you have installed the software for multiple-peer group PNNI.

In a single peer group network, the Node ID is computed using the lowest-level node convention.

Screen Output

A screen similar to the following will be displayed:

ATM PNNI Node Information

Node ID:	**50a0 3903488001bc9000010178aee00020da78aee000**		
ATM address of this Node:	**3903488001bc9000010178aee00020da78aee000**		
Node level:	**50 (80 decimal)**		
Peer group ID:	**50 3903488001bc90000101000000**		
PNNI node index:	**1**		
Administrative status:	**ENABLED**	**Operational status:**	**UP**
Lowest level node:	**True**	**Restricted transit:**	**False**
Complex representation:	**False**	**Restricted branching:**	**False**
Address summarization:	**Configured (and operational)**		
Summary address:	**3903488001bc9000010178aee0**		

Table Description

Node ID. The value used to identify this node within the PNNI network. If this node is a lowest-level node, then the Node ID is as follows: the first octet equals the node level within the PNNI hierarchy, the second octet equals 160, and the last 20 octets equal the node's ATM address.

If this is not a lowest-level node (i.e., it is an LGN), then the Node ID is as follows: the first octet equals the node level within the PNNI hierarchy, the next 14 octets equal the Peer Group ID for the Peer Group Leader (PGL) node connected to this LGN, the next six octets equal the End System Identifier (ESI) of the physical switch implementing this LGN functionality, and the last octet equals zero.

ATM address of this Node. This node's ATM address. Remote systems must direct packets or calls to this address to exchange PNNI protocol packets with this node.

Node level. The level within the PNNI hierarchy where this node exists. This value may range from 0 to 104 with higher values indicating nodes lower in the PNNI hierarchy. This level is used to determine the default node ID and the default peer group ID for this node. The default node level is 80 decimal. Since only one peer group is supported, all nodes will be at the same level.

Peer group ID. The peer group identifier of the peer group to which this node will become a member. The default value of this ID is as follows: the first octet is the level within the PNNI hierarchy where nodes in this peer group are located and the next 13 octets are the prefix for the ATM End System Address of the node.

PNNI node index. The value assigned to this node to identify itself to SNMP management software.

Administrative status. Indicates the Administrative Status of this node. **ENABLED** means that the node is allowed to become operationally active and participate in PNNI protocol exchanges. **DISABLED** means the node will be inactive and not participate in PNNI protocol exchanges.

Operational status. Indicates whether this node is active (**UP**) or whether it has become non-operational (**DOWN**). When **DOWN**, all state information is cleared from the node and the node is not communicating with any of its neighbor nodes.

Lowest level node. Indicates whether this node acts as a lowest-level node or whether it is a Logical Group Node (LGN) that becomes active when one of the other nodes in this peer group becomes a Peer Group Leader (PGL). A value of **False** indicates nodes that are capable of becoming Logical Group Nodes. Since only one peer group is supported in this release, all nodes will be lowest-level nodes and this value will be **True**.

Restricted transit. Indicates whether this node is restricted from supporting Switched Virtual Circuits (SVCs) transversing this node. **False** means this node can support ATM data links transversing this node for another destination. **True** means this node will be restricted from setting up SVCs unless overridden by another PNNI parameter.

Complex representation. Specifies whether this node uses complex node representation. **True** indicates complex representation is used. **False** indicates that simple node representation is used. The switch currently supports only simple node representation so this value should always be **False**.

Restricted branching. Indicates whether the originating node is able to support additional multicast virtual circuit branches. **False** means that the node can support additional multicast branches. **True** means that additional branches are not supported because the maximum number of multicast virtual circuits on all modules in the node has been reached. The maximum number of multicast virtual circuits supported by a CSM-155 module is 8000, and the maximum supported by a CSM-622 module is 16,000.

Address summarization. Indicates whether this node uses summarization when advertising the addresses of attached devices to other PNNI nodes. Using address summarization to advertise internal reachability speeds PNNI database searches.

Summary address. The summary address that will be used to advertise all devices attached to this node. The summary address is the only address advertised, reducing the PNNI database size and the amount of information exchanged in PTSEs. This address prefix is also used by ILMI when registering clients.

view pnni timer

Command Usage

View PNNI timer information.

Syntax Options

view pnni timer (No additional syntax options are used.)

Corresponding UI Command

ptinfo

Screen Output

A screen similar to the following will be displayed:

```
                    PNNI Timer Information
          (All time values are seconds unless otherwise specified)

PNNI node index:                          1

PTSE refresh interval:                    1800
PTSE lifetime factor:                     2   (refresh intervals)
PTSE hold down interval:                  1
PTSE delayed acknowledgement timer:       1

PTSP transmit timer:                      10
PTSE request re-transmit timer:           1
PTSE aging timer:                         10
Database summary re-transmit interval:    3

Hello interval:                           15
Hello hold down interval:                 3
Hello inactivity factor:                  5   (hello intervals)

Link AvCR proportional multiplier:        50%
Link AvCR minimum threshold:              3%
Link CTD proportional multiplier:         50%
Link CDV proportional multiplier:         25%
```

Table Description

PNNI node index. A value used by SNMP to identify this node in the PNNI network.

PTSE refresh interval. The time, in seconds, before a self-originated PTSE is updated. PTSEs are aged out of the database unless refreshed by the originating node. The lifetime of a PTSE is determined by multiplying the Refresh Interval by the Lifetime Factor. The range for this value is 1 to 32,767 seconds. The default value is 1800 seconds.

PTSE lifetime factor. The value for the PTSE lifetime multiplier expressed as a percentage. Valid values are integers ranging from 1 to 255. This value helps determine the initial lifetime of a PTSE. The Lifetime Factor multiplied by the PTSE Refresh Interval is the initial lifetime of a PTSE. The default value is 2.

PTSE hold down interval. The minimum time, in seconds, before which this node can refresh PTSEs. A node can prevent a PTSE from aging out of the topology database by refreshing it. This holddown value limits the node from refreshing PTSEs too often and exhausting database space too quickly.

PTSE delayed acknowledgement timer. When a node receives a PTSE from another node it sends back an Acknowledgment packet. However, this acknowledgment is not immediate. This value is the amount of time between the receipt of a PTSE and its acknowledgment.

PTSP transmit timer. PTSPs are sent until they are acknowledged by neighboring nodes. This variable is the amount of time, in seconds, between successive transmissions of PTSPs. If a PTSP is acknowledged before this time interval, then a retransmission will not be sent.

PTSE request re-transmit timer. The time interval between the receipt of Database Summaries and the sending of PTSE Request packets. Database Summary packets contain an index of the PTSEs in a node's topology database. Other nodes use Database Summary packets to request PTSEs. If a node requires a PTSE listed in a Database Summary packet, then it will request that PTSE in the form of a PTSE Request packet.

PTSE aging timer. The time, in seconds, before a given PTSE entry in the topology database is aged out of the database. The PTSE may be refreshed by the originating node before this entry ages out. The timer may range from 1 to 255 seconds.

Database summary re-transmit interval. The time, in seconds, before this node will re-transmit a Database Summary packet that has gone unacknowledged by another node.

Hello interval. The value for the Hello timer in seconds. In the absence of triggered Hellos, this node will send one Hello packet on each of its ports at the interval specified here. Values can range from 1 to 255 seconds.

Hello hold down interval. The value for the Hello hold down timer. This node will use this value to limit the rate at which it sends Hello messages. Valid values range from 1 to 255 seconds.

Hello inactivity factor. The number of Hello intervals that may pass without receiving a Hello before the neighboring node is determined to have gone down. Valid values range from 1 to 255.

Link AVCR proportional multiplier. The Available Cell Rate (AVCR) Proportional Multiplier expressed as a percentage. Valid values are integers from 1 to 99. This value is used in determining what defines a significant change in the Available Cell Rate, which is a measure of the bandwidth available for each service class. The switch will measure the AVCR at the current time and at a previous time. The percent indicated here is multiplied by the previous AVCR. If the difference between the current AVCR and the previous AVCR is greater than the product of the Proportional Multiplier (i.e., this value) and the previous AVCR, then the change in AVCR will be considered significant by PNNI.

Link AVCR minimum threshold. The Available Cell Rate (AVCR) Minimum Threshold expressed as a percentage. Valid values are integers from 1 to 99. This value is used in computing the lowest level of significant change in the Available Cell Rate, which is the bandwidth available for each service type. The value you indicate here is multiplied by the Maximum Cell Rate to yield the minimum difference (allowed in computations) between the current AVCR and a previously measured AVCR. If the previously measured AVCR multiplied by the AVCR Proportional Multiplier (indicated on line 4 in this menu) is less than the Maximum AVCR multiplied by the value indicated here, then this value will be used in computations to determine upper and lower limits of significance in AVCR change.

Link CTD proportional multiplier. The Cell Transfer Delay (CTD) Proportional Multiplier expressed as a percentage. Valid values are integers from 1 to 99. This value is used in determining what defines a significant change in the Cell Transfer Delay, which is the time it takes cells to transmit across a link within a single peer group. The switch will measure the CTD at the current time and at a previous time. The percent indicated here is multiplied by the previous CTD. If the difference between the current CTD and the previous CTD is greater than the product of the Proportional Multiplier (i.e., this value) and the previous CTD, then the change in CTD will be considered significant by PNNI.

Link CDV proportional multiplier. The Cell Delay Variation (CDV) Proportional Multiplier expressed as a percentage. Valid values are integers from 1 to 99. This value is used in determining what defines a significant change in the Cell Delay Variation, which is a measure of "jitter" or the change in cell spacing over a given link. The switch will measure the CDV at the current time and at a previous time. The percent indicated here is multiplied by the previous CDV. If the difference between the current CDV and the previous CDV is greater than the product of the Proportional Multiplier (i.e., this value) and the previous CDV, then the change in CDV will be considered significant by PNNI.

view pnni general

Command Usage

View general PNNI information.

Syntax Options

view pnni general (No additional syntax options are used.)

Corresponding UI Command

pginfo

Screen Output

A screen similar to the following will be displayed:

ATM PNNI General Information

Nodes in this switch:	1	Neighbors detected:	5
PNNI highest version supported:	1	Lowest version:	1
Node routing database size:	7	Address database size:	10
PTSEs in database:	24	RCCS in database:	5
Times SPF executed:	5		
Pt to Pt calls in progress:	13	Pt to MultiPt calls in prog:	11
Conns cranked back to this sys:	0	Conns cranked from border:	0
DTL stacks in use:	24	DTL Stacks Free:	176
Total DTL stacks originated:	453	Total DTL borders originated:	0
Alt DTLs originated:	0	Alt border DTLs originated:	0
Route failures:	13	Border failures:	0
Route unreachable errs:	0	Border unreachable errs:	0
PNNI AAL Discards:	0		
Max Concurrent Pt-Mpt Calls	500		

Table Description

Nodes in this switch. The number of instances of the PNNI protocol within this switch. In the current release, only one instance of PNNI, or node, can exist in a single switch.

Neighbors detected. The number of neighboring nodes attached to this node. Neighbor nodes are physically connected to this node via a CSM port.

PNNI highest version supported. The highest version of the PNNI protocol that the software in this switch is capable of executing. The current release supports PNNI version 1.0.

Lowest version. The lowest version of the PNNI protocol that the software in this switch is capable of executing.

Node routing database size. The current number of valid pre-calculated PNNI routes to nodes.

Address database size. The current number of valid PNNI routes from nodes in this PNNI routing domain to exterior ATM addresses and transit networks.

PTSEs in database. The total number of PNNI Topology State Elements (PTSEs) in this node's topology database.

RCCS in database. The number of Routing Control Channels (RCCs) currently in the database. RCCs are used to route PNNI management information, such as PNNI Topology State Packets (PTSPs) and Database Summary packets.

Times SPF executed. The number of times the Shortest Path First (SPF) algorithm has been executed to compute paths for call connections.

Pt to Pt calls in progress. The number of point-to-point calls that are being set up right now. Once a call has been set up it will not be included in this count.

Pt to Multi-Pt calls in prog. The number of point-to-multipoint calls that are being set up right now. Once a call has been set up it will not be included in this count.

Conns cranked back to this sys. The total number of connection setup messages, including DTL stacks originated by this node, that have cranked back to this node at all levels of the PNNI hierarchy. Connection setups will crankback when one node along the pre-computed path is not able to set up the connection due to bandwidth, Quality of Service, or other considerations.

Conns cranked from border. The total number of connection setup messages, including DTLs by this node as an entry border node, that have cranked back to this node at all levels of the PNNI hierarchy. This value does not include crankbacks for which this node was not the crankback destination. It includes only those crankbacks that were directed to this node. Border nodes are not supported in this release, so this value will be 0.

DTL stacks in use. The number of Designated Transit Lists (DTLs) that are in use right now to set up point-to-point and point-to-multipoint PNNI calls. If no calls are being set up, then this field will read zero (0).

DTL Stacks Free. The number of Designated Transit List (DTLs) that are available to set up PNNI calls. This value does not indicate how many DTLs are in use; it indicates the number of DTLs in the PNNI database that may be put to use for settings up calls.

Total DTL stacks originated. The total number of DTL stacks that this switch has originated and placed into signalling messages. This value includes the initial DTL stacks computed by this node as well as any alternate DTL routes (second, third choice, etc.) computed in response to crankbacks.

Total DTL borders originated. The number of partial DTL stacks that this switch has added into signalling messages as an entry border node. This includes the initial partial DTL stacks computed by this system as well as any alternate route (second, third choice, etc.) partial DTL stacks computed by this node in response to crankbacks. Border nodes are not supported in this release, so this value will be 0.

Alt DTLs originated. The total number of alternate DTL stacks that this node has computed and placed into signalling messages as the DTL Originator.

Alt Border DTLs originated. The total number of alternate partial DTL stacks that this node has computed and placed into signalling messages as an entry border node. Border nodes are not supported in this release, so this value will be 0.

Route failures. The number of times this node failed to compute a viable DTL as the originator of a call. This value further indicates the number of times a call was cleared from this node due to originator routing failure.

Border failures. The number of times this node failed to compute a viable partial DTL stack as an entry border node for a call. This value indicates the number of times a call was either cleared or cranked back from this node due to border routing failure. Border nodes are not supported in this release, so this value will be 0.

Route unreachable errs. The total number of times this node failed to compute a viable DTL stack as the DTL originator because the destination was unreachable (i.e., those calls that are cleared due to an unreachable transit network or destination).

Border unreachable errs. The number of times this node failed to compute a viable partial DTL stack as an entry border node because the target of the path calculation was unreachable (i.e., those calls that are cleared are cranked back due to an unreachable transit network or destination). Border nodes are not supported in this release, so this value will be 0.

PNNI AAL Discards. An indicator of congestion-related problems. This value should always be zero (0).

Max Concurrent Pt-Mpt Calls. The maximum number of point-to-multipoint calls that this switch can support.

view pnni neighbors

Command Usage

View PNNI neighbor information.

Syntax Options

view pnni neighbors (No additional syntax options are used.)

Corresponding UI Command

pnbrs

Screen Output

A screen similar to the following will be displayed:

```
                        PNNI Port Neighbor Information

Neighbor:  50a03903488001bc900001010230e00020da0230e000    Nbr State: FULL
    PTSP      PTSE ACKS  PTSE REQs   DB Sums                 Port Count: 1
Rcvd/Xmtd   Rcvd/Xmtd   Rcvd/Xmtd   Rcvd/Xmtd   Local Ports To This Neighbor
---------   ---------   ---------   ---------   ----------------------------
       2/          5/          1/          2/   5/2
        5           2           1           5

Neighbor:  50a03903488001bc9000010175ee100020da75ee1000    Nbr State: FULL
  PTSP      PTSE ACKS  PTSE REQs   DB Sums         Port Count: 1
Rcvd/Xmtd   Rcvd/Xmtd   Rcvd/Xmtd   Rcvd/Xmtd   Local Ports To This Neighbor
---------   ---------   ---------   ---------   ----------------------------
       2/          3/          1/          2/   5/1
        4           2           1           5
```

Table Description

Neighbor. The Node ID of the neighboring peer node. This command displays a separate Node ID and a separate listing for each neighbor of this node.

Nbr State. The state of the neighboring node's Peer State Machine. The neighboring Peer State Machine manages exchanges of Hello and topology state packets. In addition, it describes the state of database synchronization and flooding ongoing with the neighboring peer. Possible states are as follows:

DOWN	No active links to the neighboring peer node.
NEGOTIATING	The first step in setting up a link between two neighbor nodes. The master node is determined during this step.
EXCHANGING	The node describes its topology database to its neighboring peer in the form of Database Summary packets.
LOADING	All Database Summary packets have been exchanged and all required PTSEs have been requested, but not all PTSEs have been received.
FULL	All PTSEs have been received from the neighboring peer node. Links to this node can now be advertised to other nodes via PTSEs.

PTSP Rcvd/Xmtd. The number of PNNI Topology State Packets (PTSPs) received from and transmitted to the neighboring peer node. PTSPs received are listed on the first line and PTSPs transmitted are listed on the bottom line.

PTSE Ack Rcvd/Xmtd. The number of PNNI Topology State Element (PTSE) Acknowledgment packets received from and transmitted to the neighboring peer node. Received PTSE Acknowledgments are listed on the first line and transmitted PTSE Acknowledgments are listed on the bottom line.

PTSE REQ Rcvd/Xmtd. The number of PTSE Request packets received from and transmitted to the neighboring peer node. Received PTSE Requests are listed on the first line and transmitted PTSE Acknowledgments are listed on the bottom line.

DB Sum Recvd/Xmtd. The number of Database Summary packets received from and transmitted to the neighboring peer node. Received Database Summaries are listed on the first line and transmitted Database Summaries are listed on the bottom line.

Port Count. The number of ports on this node that connect to the neighboring peer node. If the neighboring peer only communicates via an SVCC-based RCC, then the value of this variable will be zero. Otherwise it is set to the total number of ports connected to the neighboring peer that are in the Hello state, 2-WayInside. The ports included in this count are listed under the **Local Ports To This Neighbor** column.

Local Ports To This Neighbor. The local ports (i.e., ports on this switch) connected to the neighboring peer node that are in the Hello state, 2-WayInside. In this Hello state, bi-directional communication between the two nodes has been achieved. The nodes are in the same peer group. Database summary packets, PTSE Request packets, PTSPs, and PTSE Acknowledgment packet can be transmitted over this link.

view pnni port

Command Usage

View PNNI port information.

Syntax Options

view pnni port (No additional syntax options are used.)

Corresponding UI Command

ppinfo

Screen Output

A screen similar to the following will be displayed:

PNNI Port Information

PNNI Sl/Prt PortId	VPI//VCI Type	VP Cap	Neighbor State	Advertised Max CR/ Avail CR	Admin Weight		
5/ 2 (257)	0/18 OC3	n	RCC Unavail	350000	CBR:5040 rt-VBR:5040	ABR:5040	UBR:5040 nrt-VBR:5040
7/ 1 (384)	0/18 OC3	n	LOADING	350000	CBR:5040 rt-VBR:5040	ABR:5040	UBR:5040 nrt-VBR:5040

Table Description

PNNI Sl/Prt PortId. The slot and port for this CSM port. The first number is the slot number for the CSM module and the second number (after the slash) is the port number on the CSM module. The number in parentheses is the internal identification for this port.

Vpi/Vci. The Virtual Path Identifier (VPI) and Virtual Channel Identifier (VCI) for the Routing Control Channel (RCC) defined here. The VPI is listed first, followed by a slash (/), and then the VCI.

The port type is listed under the VPI/VCI. This information indicates whether this is an OC-3c/STM-1c port connection (155 Mbps) or an OC-12c/STM-4c (622 Mbps) port connection. If this entry is describing the internal port on an FCSM module or an ATM uplink port on an ASM module, then this column will read **ASM**.

VpCap. Indicates whether this port advertises to other nodes that its supports the establishment of Virtual Paths. **Y** means the port advertises that Virtual Paths can be established on this physical link. **N** means that this port does not advertise that it is capable of setting up Virtual Paths.

Neighbor state. Indicates the state of the neighboring node. Possible states are as follows:

DOWN	No active links to the neighboring peer.
NEGOTIATING	The first step in setting up a link between two neighbors.
EXCHANGING	The node describes its topology database to its neighboring peer in the form of Database Summary packets.
LOADING	All Database Summary packets have been exchanged and all required PTSEs have been requested, but not all PTSEs have been received.
FULL	All PTSEs have been received from the neighboring peer. Links to the neighboring peer can now be advertised to other nodes via PTSEs.
RCC Unavail	The Routing Control Channel is not available on his link. The link may not be supported by PNNI.

Advertised Max CR/Avail CR. The first line is the maximum cell rate (in cells per second) for each QoS on this port. This value is determined by hardware. The second line is the currently available bandwidth for each QoS; this value may be less than the maximum cell rate due to usage on the port. The maximum cell rate, in cells per second, for each CSM port type is as follows:

- OC-3 ports 350,000
- OC-12 ports 1,400,000
- ATM 25 Mbps ports 50,000

AdminWt. The Administrative Weight assigned to each Class of Service on this port.

view pnni link

Command Usage

View PNNI link information.

Syntax Options

view pnni link (No additional syntax options are used.)

Corresponding UI Command

plink

Screen Output

A screen similar to the following will be displayed:

PNNI Link Table

Lcl/Rmt PortId	S/P/I IfIndex	State/ Version	Neighbor	Hellos Xmtd/Recvd	Link Type
128/	3/1	2 WAY INSIDE	3903488001bc90000101	1295/	Lowest Level
128	30100	1	7a1bd00020da7a1bd000	1287	Horizontal
144/	3/3	2 WAY INSIDE	3903488001bc90000101	1295/	Lowest Level
144	30300	1	7a1bd00020da7a1bd000	1286	Horizontal
160/	3/5	2 WAY INSIDE	3903488001bc90000101	1295/	Lowest Level
160	30500	1	7a1bd00020da7a1bd000	1286	Horizontal

Table Description

Lcl/Rmt PortId. The first line in each row of this column is the PNNI Port Identifier of the local port on this link as selected by the local node. This value is relevant to the local switch only. Different ATM switches may use different formulas to derive this value.

The second line in each row of this column is the Port Identifier at the remote end of this link as assigned by the remote node. If the Link Type is **Outside Uplink**, then this ID is assigned by the lowest-level neighbor node to identify the outside link. If the Remote Port ID is unknown or the link type is **Uplink**, then this value is set to zero.

S/P/I If Index. The first line in each row of this column is the CSM slot and port for link. The second line is the IfIndex for this interface. For horizontal and outside links between the lowest-level nodes and for links of an unknown type, the IfIndex identifies the physical interface to which to which this logical link corresponds. For all other links, this value is zero.

State. Indicates the state of the Hello protocol exchange over this link. Possible values are as follows:

DOWN	No PNNI Routing packets sent or received over the link.
ATTEMPTING	Attempts were made to contact the neighboring node with Hello messages, but no valid Hellos have been received from the neighbor.
1 WAY INSIDE	A Hello has been received from the neighboring node. Both nodes are members of the same peer group, but the node and port identifiers from the neighbor are set to zero.
2 WAY INSIDE	Bi-directional communication between the two nodes on this link has been achieved. The nodes are in the same peer group. Database summary packets, PTSE Request packets, PTSPs, and PTSE Acknowledgment packets can be transmitted over this link.
1 WAY OUTSIDE	A Hello has been received from the neighboring node. The nodes are members of different peer groups. The node and port identifiers from the neighbor are set to zero. This node will now search for a common peer group that contains both nodes.
2 WAY OUTSIDE	A Hello has been received from the neighboring node. The nodes are members of different peer groups. Valid node and port identifiers have been received, but a common peer group between the two nodes has not be identified. This node will now search for a common peer group that contains both nodes.
COMMON_OUTSIDE	Bi-directional communication between the two nodes on this link has been achieved. This link can now be advertised through PTSEs.

Version. Indicates the version of the PNNI Routing protocol used to exchange information over this link. If communication with the neighbor node has not yet been established, then this value is set to **Unknown**. The version of PNNI supported in this release is 1.0.

Neighbor. Indicates the Node ID of the remote (neighboring) node on the other end of the link. If the Link Type is **Outside Uplink**, then this is the Node ID of the lowest-level neighbor node on the other end of the outside link. If the remote node ID is unknown or if the Link Type is **Uplink**, then this variable is set to all zeros.

Hellos: Transmitted and Received. For horizontal links between lowest-level nodes, these values indicate the number of Hello packets transmitted or received over this link.

Type. The type of link described in this display. The following types are possible:

Unknown	Unknown type of link.
Lowest Level Horizontal	Lowest-level node, horizontal link.
Lowest Level Outside	Lowest-level node connected via an outside link.
Hor link to LGN	Horizontal link to a Logical Group Node. (Not supported in a single peer group network).
Uplink	Uplink to a Logical Group Node in another peer group. (Not supported in a single peer group network.)
Outside uplink	An outside link that is also an uplink. (Not supported In a single peer group network.)

view pnni ptse

Command Usage

View the PTSE database.

Syntax Options

view pnni ptse (No additional syntax options are used.)

Corresponding UI Command

pptse

Screen Output

A screen similar to the following will be displayed:

```
                    PNNI PTSE Database Summary

Node ID:50a03903488001bc900001010230e00020da0230e000      PTSE ID:   1
Checksum: 1a81     Remaining lifetime: 3129  seconds    Sequence #: 1
Information Group Carried: Nodal IG
================================================================================
Node ID:50a03903488001bc900001010230e00020da0230e000      PTSE ID:   3
Checksum: 58da     Remaining lifetime: 3519  seconds    Sequence #: 1
Information Group Carried: Horizontal Links IG
================================================================================
Node ID:50a03903488001bc9000010175ee100020da75ee1000      PTSE ID:   1
Checksum: 5408     Remaining lifetime: 2888  seconds    Sequence #: 1
Information Group Carried: Nodal IG
================================================================================
Node ID:50a03903488001bc9000010175ee100020da75ee1000      PTSE ID:   2
Checksum: 5a49     Remaining lifetime: 3168  seconds    Sequence #: 1
Information Group Carried: Horizontal Links IG
================================================================================
Node ID:50a03903488001bc90000101761c900020da761c9000      PTSE ID:   1
Checksum: 53ab     Remaining lifetime: 3490  seconds    Sequence #: 1
Information Group Carried: Nodal IG
================================================================================
Node ID:50a03903488001bc90000101761c900020da761c9000      PTSE ID:   2
Checksum: d8db     Remaining lifetime: 3520  seconds    Sequence #: 1
Information Group Carried: Horizontal Links IG
================================================================================
```

Table Description

Node ID. The Node Identifier of the node that originated the PTSE.

PTSE ID. The PTSE Identifier assigned to this PTSE by the node that originated the PTSE.

Checksum. The value of the PTSE checksum as it appears in the local topology database.

Remaining lifetime. The remaining lifetime, in seconds, for this PTSE in the local node's topology database.

Sequence #. The sequence number for this PTSE as it appears in this node's local topology database. This value differs from the PTSE ID as it is defined by the recipient of the PTSE (i.e., this node). The PTSE ID is assigned by the sender of the PTSE (i.e., the originating neighbor node).

INFORMATION GROUPS CARRIED. The type of information contained in this PTSE.

view pnni adjacency

Command Usage

View PNNI end-point adjacencies.

Syntax Options

view pnni adjacency (No additional syntax options are used.)

Corresponding UI Command

padj

Screen Output

A screen similar to the following will be displayed:

```
                              PNNI Adjacency Table

Client: 47007900000000000000000000a03e00000100      Advertised: TRUE
Learnt: TUE JAN 20 11:44:59 1998                    Slot/Port/Inst:  3/8 (port 184)

The following adjacencies are summarized by this node's summary address
(which is 3903488001bc900001017a1bd0):

                  Native Address                      PNNI Port     Learned at Time
========================================== ========== ==========  ===============
3903488001bc900001017a1bd000041347561000  3/ 8     (184)  TUE JAN 20 11:44:59
```

Table Description

Client. The 20-octet End System ATM address for the adjacency described by this entry.

Learnt. The date and time at which this adjacency was learned by this node. Node adjacencies are normally learned through ILMI.

Advertised. Since adjacencies are learned via ILMI, they can be learned at any time, including when PNNI is not operational in the switch. If PNNI is not operational or if it has not been updated with this adjacency information, then this information is not advertised by PNNI throughout the network. In other words, information on this adjacency is not being passed via PTSEs to other nodes and this field would be False (**F**). If PNNI is operational and information on this adjacency is being passed to other nodes, then this field will be True (**T**).

Slot/Port/Inst. The CSM slot and port to which this adjacency is attached. The slot number is listed first, followed by a slash (/), and then the port number on the CSM module.

Some adjacencies may use address summarization to advertise their status. Those addresses that use summarization are listed with the following column descriptions:

Native Address. The full non-summarized 20-octet ATM address used to describe this adjacency.

PNNI Port. The physical slot and port number and the internal port number for this adjacency.

Learned at Time. The date and time at which the PNNI database learned about this adjacency.

view pnni map table

Command Usage

View the PNNI map table.

Syntax Options

view pnni map table (No additional syntax options are used.)

Corresponding UI Command

pmap

Screen Output

A screen similar to the following will be displayed:

PNNI Map Table

1)	**Orig Node Id:**	**50a03903488001bc900001010230e00020da0230e000**		
	Remote Node Id:	**50a03903488001bc90000101761c900020da761c9000**		
	PGID:	**50 3903488001bc90000101000000**		
	Orig Port ID:	**192**	**Remote Port ID:**	**384**
	Map entry type:	**Horizontal Link**	**Derived Aggr Token:**	**1**
	PTSE-Id:	**3**	**VP Capability:**	**Enabled**

Table Description

Orig Node Id. The node identifier of the node originating the PTSE. If the **Map entry type** is **Node**, then this value is also set to zero.

Remote Node Id. For horizontal links, this value is the node identifier of the node at the other end of the link from the node originating the PTSE. If the link is unknown, then PNNI sets this value to all zeros. If the **Map entry type** is **Node**, then this value is also set to zero.

PGID. The peer group ID of the originating node.

Orig Port ID. The Port Identifier assigned to this port by its node. The first number is the CSM slot number and the second number (after the slash) is the port number on the module.

Remote Port Id. For horizontal links, this value is the Port Identifier of the port at the remote end of this link. If the remote port is unknown, then PNNI sets this value to zero. For Nodes, this value is the Port Identifier of the remote port connected to the originating port. This value is only relevant to the local switch as ATM switches calculate this value differently.

Map entry type. The type of PNNI entity described in this entry. The PNNI type will either be a Horizontal Link (**HORIZ LINK**) or a Node (**NODE**).

Derived Aggr Token. The aggregation token for this port on the remote node. This variable is configured through the **ppcfg** command. The aggregation token allows links from the same switch to be advertised separately and contain independent topology metrics. If two links contain different aggregation tokens, then they will be viewed as distinct links by the peer group. If two links have the same aggregation token value, then they will be viewed as the same link by the peer group.

PTSE-Id. The PTSE Identifier for the PTSE sent by the originating node that contains the information group(s) describing the PNNI entity. Each PNNI entity (node or link) or aspect of a PNNI entity (such as a node's peer group) is completely described by a single PTSE.

VP Capability. Indicates whether this port advertises to other nodes that its supports the establishment of Virtual Path Connections (VPCs). **Enabled** means the port advertises that Virtual Paths can be established on this physical link. **Disabled** means that this port will not advertise that it is capable of setting up Virtual Paths.

view pnni nodal map table

Command Usage

View the PNNI nodal map table.

Syntax Options

view pnni nodal map table (No additional syntax options are used.)

Corresponding UI Command

pnmap

Remarks

The last set of parameters in the table below (**Preferred PGL** through **Parent PGL Node ID**) will not display unless you have installed the software for multiple-peer group PNNI.

Screen Output

A screen similar to the following will be displayed:

PNNI Nodal Map Table

1)	**Node ID:**	**50a03903488001bc900001010230e00020da0230e000**		
	Peer Group Id:	**50 3903488001bc90000101000000**		
	ESID:	**3903488001bc900001010230e00020da0230e000**		
	Restr. Transit:	**False**	**Restr Branching:**	**False**
	Complex Rep:	**False**	**DB Overloaded:**	**False**
	Is Peer Grp Leader:	**False**	**Leadership Priority:**	**0**

Table Description

Node ID. The node identifier for the node described in this entry.

Peer Group Id. The peer group of the originating node.

ESID. The ATM End System (ES) address of the originating node.

Restr. Transit. Indicates whether this node is restricted from supporting Switched Virtual Circuits (SVCs) transiting this node. **False** means the port can support ATM transit data links. **True** means the port will be restricted from setting up SVCs unless overridden by another PNNI parameter; only SVCs originating and terminating at this node are supported.

Restr Branching. Indicates whether the originating node is able to support additional multicast virtual circuit branches. **False** means that the node can support additional multicast branches. **True** means that additional branches are not supported because the maximum number of multicast virtual circuits on all modules in the node has been reached. The maximum number of multicast virtual circuits supported by a CSM-155 module is 8000, and the maximum supported by a CSM-622 module is 16,000.

Complex Rep. Indicates whether the originating nodes use complex node representation. **True** indicates complex representation is used. **False** indicates that simple node representation is used. The switch currently supports only simple node representation so this value can only be set to **False**.

DB Overloaded. Indicates whether the originating node is currently operating in topology database overload state. If the node is in overload state, you may want to increase PNNI operating limits.

Is Peer Grp Leader. Indicates whether the originating node claims to be peer group leader of its peer group.

Leadership Priority. The leadership priority advertised by the originating node.

view pnni calls

Command Usage

View current PNNI calls.

Syntax Options

view pnni calls (No additional syntax options are used.)

Corresponding UI Command

pcalls

Screen Output

A screen similar to the following will be displayed:

```
The Point-to-Point Call Table is empty.

PNNI Point-to-Multipoint Call Table

  CallRef    Call Id      Dtl          CallRef    Call Id      Dtl
 ========  ========  ======      ========  ========  ======
 4b200010  00000001       1      4b200010  00000002       1
 4b201870  00000004       1      4b201c80  00000005       1
 4b202ab8  00000007       1      4b202cc0  00000008       1
 4b2030d0  0000000a       1      4b2034e0  0000000b       1
 4b203f08  0000000c       1      4b204318  0000000d       1
 4b200010  0000000e       1      4b200010  0000000f       1
 4b200010  00000012       1      4b209458  00000014       1
```

Table Description

CallRef. An internal reference to this call used by the PNNI protocol. This number is useful when using a network analyzer to view call activity.

Call Id. An internal reference to this call used by signaling software. The value is similar to the **CallRef** variable except it is used by signaling software rather than PNNI to identify this call.

Dtl. The Designated Transit List (DTL) or correct path associated with this call.

view pnni dtl table

Command Usage

View current PNNI DTLs.

Syntax Options

view pnni dtl table (No additional syntax options are used.)

Corresponding UI Command

pdtl

Screen Output

A screen similar to the following will be displayed:

PNNI Designated Transit List Table

(Note that RefCount 0 DTLs are free DTL entries.)

DTL Index	Ref Count	Hop Count	DTL (Node ID + Port ID)	
1	0	0	<No DTL>	
2	4	3	50a03903488001bc9000010178aee00020da:78aee000	208
			50a03903488001bc900001010230e00020da:0230e000	209
			50a03903488001bc900001016542fg0020da:6542fg00	210
3	5	3	50a03903488001bc9000010178aee00020da:78aee000	208
			50a03903488001bc900001010230e00020da:0230e000	209
			50a03903488001bc900001010967df0020da:0967df00	201
4	1	2	50a03903488001bc9000010178aee00020da:78aee000	208
			50a03903488001bc900001016542fg0020da:6542fg00	210
6		2	50a03903488001bc900001010230e00020da:0230e000	209
			50a03903488001bc900001016542fg0020da:6542fg00	210
7	10	2	50a03903488001bc9000010178aee00020da:78aee000	208
			50a03903488001bc900001016542fg0020da:6542fg00	210
8	20	2	50a03903488001bc9000010178aee00020da:78aee000	208
			50a03903488001bc9000010178yu650020da:78yu6500	249
9	15	4	50a03903488001bc9000010178aee00020da:78aee000	208
			50a03903488001bc900001010230e00020da:0230e000	209
			50a03903488001bc9000010178yu650020da:78yu6500	249
			50a03903488001bc90000101135jh40020da:135jh400	235
10	6	3	50a03903488001bc9000010178aee00020da:78aee000	208
			50a03903488001bc9000010178yu650020da:78yu6500	249
			50a03903488001bc90000101135jh40020da:135jh400	235

Refer to page 15-27 for a full table description.

Table Description

DTL Index. The internal reference number used by PNNI to identify this Designated Transit List.

Ref Count. The number of calls that have used this DTL to as a path to reach their destination.

Hop Count. The number of hops, or PNNI nodes, on this DTL. This value will be zero (0) until the DTL is actually used by a call. Therefore, if the **Ref Count** column displays a positive number, then the number of hops on this DTL should be listed in this column.

DTL (Node ID + Port ID). A description of the hops, or nodes, that comprise this DTL. Each DTL is described as a number of node and port IDs. Each row describes one node/port in the DTL. The number of node/port pairs should correspond to the number of hops listed in the **Hop Count** column.

view pnni port statistics

Command Usage

View basic port statistics.

Syntax Options

view pnni port statistics (No additional syntax options are used.)

Corresponding UI Command

pgstats

Screen Output

A screen similar to the following will be displayed:

PNNI Port Basic Statistical Information

Neighbor	Intf	Hellos Xmtd/Rcvd	PTSPs Xmtd/Rcvd	Dbase Sum Pdus Xmtd/Rcvd
3903488001bc90000101	5/ 2	7	7	2
75ee100020da75ee1000		6	4	3
3903488001bc90000101	7/ 1	7	3	5
72b1b00020da72b1b000		6	1	3

Table Description

Neighbor. The node identifier of the neighboring peer node.

Intf. The CSM slot and port for which these statistics are compiled. The slot is listed first, followed by a slash (/), and then the port number.

Hello Xmtd/Rcvd. The number of Hello packets transmitted (top value) or received (bottom value) over his link. For links other than those between lowest-level nodes in this peer group, this value will be zero.

PTSPs Xmtd/Rcvd. The number of PTSPs transmitted/retransmitted to (top value) or received from (bottom value) the neighboring peer node. Topology database information in the form of PNNI Topology State Elements (PTSEs) is encoded in PTSPs.

DBase Sum Pdus Xmtd/Rcvd. The number of Database Summary packets transmitted/retransmitted to (top value) or received from (bottom value) the neighboring peer. Database Summary packets contain identifiers of the PTSE data available from the neighboring node's topology database, but these summary packets do not contain the actual PTSE data. To obtain PTSE data, a node issues a PTSE Request packet after receiving a Database Summary packet.

view pnni port error statistics

Command Usage

View port error statistics.

Syntax Options

view pnni port error statistics (No additional syntax options are used.)

Corresponding UI Command

pestats

Screen Output

A screen similar to the following will be displayed:

PNNI Port Error Statistical Information

Neighbor	Intf	Errors		Discards	
		Incoming	Outgoing	Incoming	Outgoing
3903488001bc90000101 75ee100020da75ee1000	5/ 2	0	0	0	0
3903488001bc90000101 72b1b00020da72b1b000	7/ 1	0	0	0	0

Table Description

Neighbor. The ATM address for the node on which error statistics are provided.

Intf. The CSM Slot and Port for which error statistics are provided. The slot is listed first, followed by a slash (/), and then the port number.

Errors Incoming. The number of PNNI Protocol Data Unit (PDU) errors that have been received on this port. This figure includes only malformed frames from remote destinations (i.e., outside this peer group). These errors will not occur between neighboring nodes in the same peer group; errors between such nodes will be resolved by the Hello protocol. For example, if there are errors in Hello messages between two nodes in the same peer group, then the link with the neighboring node will simply not be set up and no PDUs will be exchanged.

Errors Outgoing. The number of PNNI Protocol Data Unit (PDU) errors that have been transmitted on this port. These errors occur when the switch software driver fails to transmit a frame successfully.

Discards Incoming. The number of PNNI Protocol Data Units (PDUs) that have been discarded on the receive side of this port. Received frames are discarded if they are corrupt, received on a user-disabled CSM port, or received on a port where the Hello state has gone Down.

Discards Outgoing. The number of PNNI Protocol Data Units (PDUs) that have been discarded on the transmit side of this port. Transmit frames are discarded when the switch software driver fails to transmit a frame successfully.

view pnni port ptse statistics

Command Usage

View port PTSE statistics.

Syntax Options

view pnni port ptse statistics (No additional syntax options are used.)

Corresponding UI Command

ppstats

Screen Output

A screen similar to the following will be displayed:

PNNI Port PTSE Statistical Information

Neighbor	Intf	PTSE Request Xmtd	PTSE Request Rcvd	PTSE Acknowledgements Xmtd	PTSE Acknowledgements Rcvd
3903488001bc90000101 75ee100020da75ee1000	5/ 2	1	0	2	6

Table Description

Neighbor. The node identifier for the neighboring peer node.

Intf. The CSM slot and port for which these statistics are compiled. The slot is listed first, followed by a slash (/), and then the port number.

PTSE Request Xmtd. The number of PTSE Request frames transmitted via this CSM port to neighboring peer nodes. PTSE Requests are sent by this node in response to Database Summary packets from neighboring nodes. When this node finds a PTSE for which it requires more information, it sends a PTSE Request to obtain the actual PTSE data referred to in the Database Summary packet.

PTSE Request Rcvd. The number of PTSE Request frames received on this CSM port from neighboring peer nodes. PTSE Requests are sent by neighboring nodes in response to Database Summary packets from this node. When a neighboring node finds a PTSE for which it requires more information it sends a PTSE Request to obtain the actual PTSE data referred to in the Database Summary packet.

PTSE Acknowledgement Xmtd. The number of PTSE Acknowledgment frames transmitted via this CSM port to neighboring peer nodes. PTSE Acknowledgments are sent in response to received PTSEs. When this node receives a PTSE it requested through a PTSE Request packet, it acknowledges this receipt via a PTSE Acknowledgment packet.

PTSE Acknowledgement Rcvd. The number of PTSE Acknowledgment frames received on this CSM port from neighboring peer nodes. PTSE Acknowledgments are sent in response to PTSE Requests. When a node receives a PTSE it requested through a PTSE Request packet, it acknowledges this receipt via a PTSE Acknowledgment packet.

view pnni route property

Command Usage

View PNNI route properties.

Syntax Options

view pnni route property (No additional syntax options are used.)

Corresponding UI Command

prp

Screen Output

A screen similar to the following will be displayed:

Currently there is 1 route configurations as follows:

Rt	Slot/ Port	Int/ Ext	Scope	Admin Weight Metrics			TNS in use	# Route Prefixes
1	5/1	Int	80	CBR	In:5000	Out:0	Y	0
				rtVBR	In:0	Out:2000		
				nrtVBR	In: 0	Out:0		
				ABR	In:0	Out:0		
				UBR	In:0	Out:0		

Table Description

Rt. The route index number uses to identify this property in the table.

Slot/Port. The CSM slot and port on which this route property was configured.

Int/Ext. Indicates whether this route is and interior route (i.e., within the same peer group) or an exterior route (i.e., outside the peer group).

Scope. The level within the PNNI hierarchy where this route property is configured.

Admin Weight Metrics. Indicates whether metrics have been configured for a given Class of Service. Service classes are listed with the current status of Incoming and Outgoing traffic. If metrics have been configured, then the field next to the class name will read **configured**. If no metrics are configured for a service class, then the field next to the service class name will be blank.

TNS in use. Indicates whether associated transit networks were set up for this route property.

 # Route Prefixes. The number of route addresses configured for this property.

view pnni route prefix

Command Usage

View PNNI static route prefixes.

Syntax Options

view pnni route prefix (No additional syntax options are used.)

Corresponding UI Command

prt

Screen Output

A screen similar to the following will be displayed:

ATM PNNI Configured Route Prefixes

Prefix Len	Address Prefix	Slot Port	Internal/ Exterior	Scope
0	-- Default Route --	3/3	Ext	20
20	47001	3/3	Int	104
20	47002	3/3	Int	104
20	47003	3/3	Int	104
80	47000400081e2f400005	3/3	Int	104

Table Description

Prefix Len. The number of octets included in the address prefix.

Address Prefix. The address prefix configured for the static route.

Slot/Port. The CSM slot and port where this address was configured.

Internal/Exterior. Indicates where this address is in the same peer group as this node (**Int**) or whether it is outside this peer group (**Ext**).

Scope. Indicates the scope, or level within the PNNI hierarchy, for this address.

pnni node changes apply

Command Usage

Enable or disable real-time PNNI configuration changes.

Syntax Options

pnni node changes apply {enable | disable}

Definitions:
enable = applies any preceding PNNI commands and specifies that any subsequent commands will be applied at the time a command is entered (i.e., real-time)
disable = specifies that subsequent PNNI configuration changes *will not* be applied until the **pnni node changes apply enable** command is entered

Command Default:
{enable | disable} = **enable**

Command Example:
pnni node changes apply enable
pnni node changes apply disable

pnni node address

Command Usage

Specify an ATM address for the current PNNI node.

Syntax Options

pnni node address <*atm-address***>**

Definitions:
atm-address = the ATM address to be used for the current PNNI node (e.g., **3903488001bc900001011234da0020da62da4900**)

Command Example:
pnni node address 3903488001bc900001011234da0020da62da4900

Corresponding UI Command

pncfg

Remarks

Other nodes in the network that need to exchange PNNI protocol packets with the current node will direct packets to the specified address.

pnni node id

Command Usage

Specify a 20-byte identifier for a PNNI node.

Syntax Options

pnni node id <*node-id***>**

Definitions:
node-id = a 20-byte identifier for the PNNI node in hexadecimal format (e.g., **3903488001bc900001011234da0020da62da4900**)

Command Example:
pnni node id 3903488001bc900001011234da0020da62da4900

Corresponding UI Command

pncfg

pnni node level

Command Usage

Set the level within the PNNI hierarchy where the current node exists.

Syntax Options

pnni node level <*value*>
Definitions: *value* = the level within the PNNI hierarchy where the current node exists (e.g., **40**) Command Example: **pnni node level 40**

Corresponding UI Command

pncfg

Remarks

The PNNI node level attribute may only be set when the node's Admin Status is down.

pnni node status

Command Usage

Set the administrative status of a PNNI node.

Syntax Options

pnni node status {up | down}

Definitions:
up = specifies that the node can become operationally active and participate in PNNI protocol exchanges
down = specifies that the node will be inactive and not participate in PNNI protocol exchanges

Command Examples:
pnni node status up
pnni node status down

Corresponding UI Command

pncfg

pnni node advertise summary

Command Usage

Specify whether you want the current node to use summarization when advertising the addresses of attached devices to other PNNI nodes.

Syntax Options

pnni node advertise summary {on | off}

Definitions:
on = enables address summary advertising
off = disables address summary advertising

Command Examples:
pnni node advertise summary on
pnni node advertise summary off

Corresponding UI Command

pncfg

Remarks

Using address summarization to advertise internal reachability speeds PNNI database searches. If a node does not support address summarization, it will advertise the entire local address of its attached devices during PNNI exchanges.

pnni node summary address

Command Usage

Specify a summary address that will be used to advertise all devices attached to the current PNNI node.

Syntax Options

pnni node summary address <*summary-address***>**

Definitions:
summary-address = the summary address used to advertise all devices attached to the current PNNI node (e.g., **3903488001bc90000101xxyyzz**)

Command Example:
pnni node summary address 3903488001bc90000178aee0

Corresponding UI Command

pncfg

Remarks

The specified summary address will be the only address advertised, thus reducing the PNNI database size and the amount of information exchanged in PTSEs.

The **pnni node summary address** command is required only if you enable address summarization via the **pnni node advertise summary** command described on page 15-38).

pnni status

Command Usage

Enable or disable the PNNI routing protocol for all CSM ports that have been configured for PNNI.

Syntax Options

pnni status {enable | disable}

Definitions:
enable = enables the PNNI routing protocol
disable = disables the PNNI routing protocol

Command Example:
pnni status enable
pnni status disable

Corresponding UI Command

pgcfg

pnni spf calculation

Command Usage

Specify the time interval, in seconds, between recalculations of routes in the routing tables based on the current contents of the topology database.

Syntax Options

pnni spf calculation <*timer-value***>**

Definitions:
timer-value = the time interval, in seconds, between recomputations of routes (value may be from 1 to 255—e.g., **175**)

Command Example:
pnni spf calculation 175

Corresponding UI Command

pgcfg

Remarks

Shorter periods increase the sensitivity and reaction time to topology changes, but also consume more switch CPU time in networks where topology changes occur frequently. The switch's default value of 20 is sufficient for most networks.

pnni ptse aging start

Command Usage

Specify the time, in seconds, before the process to age PTSEs starts.

Syntax Options

pnni ptse aging start <*timer-value***>**

Definitions:
timer-value = specifies the time interval, in seconds, before the process to age PTSEs starts (value may be from 1 to 255—e.g., **120**)

Command Example:
pnni ptse aging start 120

Corresponding UI Command

pgcfg

Remarks

When the aging process begins, PTSEs are aged out of the topology database. If a PTSE's lifetime goes to zero (0), it will be removed. However, a PTSE may be refreshed by the originating node before this entry ages out.

pnni avcr multiplier

Command Usage

Set the Available Cell Rate (AVCR) proportional multiplier.

Syntax Options

pnni avcr multiplier <*percent*>

Definitions:
percent = specifies the percent value used to define a significant change in the AVCR (value may be from 1 to 99)

Command Example:
pnni avcr multiplier 50

Corresponding UI Command

pgcfg

Remarks

The AVCR is a measure of the bandwidth available for each service class. The AVCR *proportional multiplier* is expressed as a percentage and is used to define a significant change in the AVCR.

pnni avcr minimum threshold

Command Usage

Set the Available Cell Rate (AVCR) minimum threshold.

Syntax Options

pnni avcr minimum threshold <*percent*>

Definitions:
percent = specifies the percent value used in computing the lowest level of significant change in the Available Cell Rate (value may be from 1 to 99)

Command Example:
pnni avcr minimum threshold 50

Corresponding UI Command

pgcfg

Remarks

The AVCR is a measure of the bandwidth available for each service class. The AVCR *minimum threshold* is expressed as a percentage and is used in computing the lowest level of significant change in the AVCR.

pnni ctd multiplier

Command Usage

Set the Cell Transfer Delay (CTD) proportional multiplier.

Syntax Options

pnni ctd multiplier <*percent*>

Definitions:
percent = specifies the percent value used to define a significant change in the CTD (value may be from 1 to 99—e.g., **50**)

Command Example:
pnni ctd multiplier 50

Corresponding UI Command

pgcfg

Remarks

The CTD is the time it takes cells to transmit across a link within a single peer group. The CTD *proportional multiplier* is expressed as a percentage and is used to define a significant change in the CTD.

pnni cdv multiplier

Command Usage

Set the Cell Delay Variation (CDV) proportional multiplier.

Syntax Options

pnni cdv multiplier <*percent*>

Definitions:
percent = specifies the percent value used to define a significant change in the CDV (value may be from 1 to 99)

Command Example:
pnni cdv multiplier 50

Corresponding UI Command

pgcfg

Remarks

The CDV is a measure of "jitter", or the change in cell spacing over a given link. The CDV *proportional multiplier* is expressed as a percentage (valid values are integers from 1 to 99) and is used to define a significant change in the CDV.

pnni maximum nodes

Command Usage

Specify the maximum number of nodes that are allowed in the current PNNI network.

Syntax Options

pnni maximum nodes <*max-nodes***>**

Definitions:
max-nodes = specifies the maximum number of nodes that are allowed in the current PNNI network (e.g., **75**)

Command Example:
pnni maximum nodes 75

Corresponding UI Command

pgcfg

pnni maximum neighbors

Command Usage

Specify the maximum number of neighboring node connections allowed for each switch.

Syntax Options

pnni maximum neighbors <*max-neighbors***>**

Definitions:
max-neighbors = the maximum number of neighboring node connections for each switch (e.g., **25**)

Command Example:
pnni maximum neighbors 25

Corresponding UI Command

pgcfg

Remarks

A good rule of thumb is to never attach more than 30 neighbors without making appropriate adjustments to the hello timers.

pnni maximum ptse

Command Usage

Specify the maximum number of PTSEs that can be held in the topology database of a switch.

Syntax Options

pnni maximum ptse <*max-ptse*>

Definitions:
max-ptse = the maximum number of PTSEs to be held in the topology database (value may be from 1 to 65,535—e.g., **15000**)

♦ Syntax Notes ♦

Do not use commas when entering a maximum PTSE value (for example, **15,000** will return a syntax error message).

Command Example:
pnni maximum ptse 15000

Corresponding UI Command

pgcfg

pnni maximum information groups

Command Usage

Specify the maximum number of information groups the current switch will store in its topology state database.

Syntax Options

pnni maximum information groups <*max-groups***>**

Definitions:
max-groups = the maximum number of information groups held in the topology database (value may be from 1 to 65,535—e.g., **15000**)

♦ Syntax Notes ♦

Do not use commas when entering a maximum information groups value (for example, **15,000** will return a syntax error message).

Command Example:
pnni maximum information groups 15000

Corresponding UI Command

pgcfg

pnni maximum reachable address

Command Usage

Specify the maximum number of ATM End System addresses that will be available to nodes in the current PNNI network.

Syntax Options

pnni maximum reachable address <*max-addresses***>**

Definitions:
max-addresses = the maximum number of ATM End System addresses that will be available to nodes in the current PNNI network (value may be from 1 to 65,535—e.g., **15000**)

♦ Syntax Notes ♦

Do not use commas when entering a maximum reachable address value (for example, **15,000** will return a syntax error message).

Command Example:
pnni maximum reachable address 15000

Corresponding UI Command

pgcfg

pnni maximum transit network

Command Usage

Specify the maximum number of transit networks allowed.

Syntax Options

pnni maximum transit network <*max-network***>**

Definitions:
max-network = the maximum number of transit networks allowed (value may be from 1 to 255—e.g., **110**)

Command Example:
pnni maximum transit network 110

Corresponding UI Command

pgcfg

Remarks

A transit network is a route used to tunnel call requests from an ATM End System in one peer group to an ATM End System in another peer group. A transit network differs from a Designated Transit List (DTL) in that it provides a route to links outside the peer group, while a DTL provides a route to nodes within the same peer group.

pnni maximum dtl

Command Usage

Specify the maximum number of Designated Transit Lists (DTLs) that may be set up through the PNNI network.

Syntax Options

pnni maximum dtl <*max-dtl***>**

Definitions:
max-dtl = the maximum number of DTLs allowed (value may be from 1 to 65,535—e.g., **15000**)

♦ Syntax Notes ♦

Do not use commas when entering a maximum DTL value (for example, **15,000** will return a syntax error message).

Command Example:
pnni maximum dtl 15000

Corresponding UI Command

pgcfg

Remarks

A DTL is a complete source route through a peer group.

pnni maximum dtl entries

Command Usage

Specify the maximum number of entries (hops) that can be used to make up a single DTL.

Syntax Options

pnni maximum dtl entries <*max-entries***>**

Definitions:
max-entries = specifies the maximum number of DTLs allowed (value may be from 1 to 500—e.g., **400**)

Command Example:
pnni maximum dtl entries 400

Corresponding UI Command

pgcfg

Remarks

An entire DTL includes all hops that comprise a source route through a peer group. In a single peer group, this value is the maximum path length plus 1.

pnni maximum route requests

Command Usage

Specify the maximum number of call setup messages that can be outstanding at one time.

Syntax Options

pnni maximum route requests <*max-requests***>**

Definitions:
max-requests = the maximum number of call setup messages that can be outstanding at one time (value may be from 1 to 65,535—e.g., **15000**)

♦ **Syntax Notes** ♦

Do not use commas when entering a maximum route requests value (for example, **15,000** will return a syntax error message).

Command Example:
pnni maximum route requests 15000

Corresponding UI Command

pgcfg

Remarks

Call setup messages are initiated by ATM End Systems. When a call setup is in progress, a call descriptor is held by PNNI until the connection is set up or the setup cranksback.

pnni maximum static routes

Command Usage

Specify the maximum number of static routes that can be configured in the PNNI network.

Syntax Options

pnni maximum static routes <*max-routes***>**

Definitions:
max-routes = the maximum number of static routes that can be configured in the PNNI network (value may be from 1 to 10,200—e.g., **4500**)

♦ Syntax Notes ♦

Do not use commas when entering a maximum static routes value (for example, **4,500** will return a syntax error message).

Command Example:
pnni maximum static routes 4500

Corresponding UI Command

pgcfg

pnni maximum static route groups

Command Usage

Specify the maximum number of static route groups allowed.

Syntax Options

pnni maximum static route groups <*max-groups***>**

Definitions:
max-groups = specifies the maximum number of static route groups allowed (value may be from 1 to 255—e.g., **30**)

Command Example:
pnni maximum static route groups 30

Corresponding UI Command

pgcfg

Remarks

A group of static routes is ordered by route properties. The value specified in the **pnni maximum static route groups** command line limits the amount of space reserved for route properties.

pnni maximum multicast endpoints

Command Usage

Specify the maximum number of multicast virtual circuits that may be configured within the PNNI network.

Syntax Options

pnni maximum multicast endpoints <*max-groups*>

Definitions:
max-groups = the maximum number of multicast virtual circuits (e.g., **4000**)

♦ **Syntax Notes** ♦

Do not use commas when entering a maximum multicast endpoints value (for example, **4,000** will return a syntax error message).

Command Example:
pnni maximum multicast endpoints 4000

Corresponding UI Command

pgcfg

Remarks

The maximum number of multicast virtual circuits that may be configured is limited by the type and number of CSM modules installed. CSM-155 modules each support 8,000 multicasts, and CSM-622 modules support 16,000 multicasts.

pnni maximum paths

Command Usage

Specify the maximum number of paths (i.e., physical connections) that may be stored in the current switch.

Syntax Options

pnni maximum paths <*max-paths***>**

Definitions:
max-paths = the maximum number of paths that may be stored in the current switch (e.g., **750**)

Command Example:
pnni maximum paths 750

Corresponding UI Command

pgcfg

pnni maximum retransmissions

Command Usage

Specify the maximum number of times that PTSE requests and PTSEs will be retransmitted before PNNI declares that the neighboring node is down.

Syntax Options

pnni maximum retransmissions <*max-retransmissions***>**

Definitions:
max-retransmissions = the maximum number of times PTSE requests and PTSEs will be retransmitted (e.g., **200**)

Command Example:
pnni maximum retransmissions 200

Corresponding UI Command

pgcfg

pnni maximum routing table entries

Command Usage

Specify the maximum number of routing table entries.

Syntax Options

pnni maximum routing table entries <*max-number***>**

Definitions:
max-number = the maximum number of routing table entries (e.g., **1000**)

Command Example:
pnni maximum routing table entries 1000

Corresponding UI Command

pgcfg

pnni cbr

Command Usage

Specify the metric on which Constant Bit Rate (CBR) traffic will be sorted during path selection computations (i.e., Administrative Weight, Cell Transfer Delay, or Cell Delay Variation).

Syntax Options

pnni cbr {admin wt | cell transfer delay | cell delay variation}

Definitions:
admin wt = CBR traffic will be sorted by Administrative Weight
cell transfer delay = CBR traffic will be sorted by Cell Transfer Delay
cell delay variation = CBR traffic will be sorted by Cell Delay Variation

Command Examples:
pnni cbr admin wt
pnni cbr cell transfer delay
pnni cbr cell delay variation

Corresponding UI Command

pgcfg

pnni vbr rt

Command Usage

Specify the metric on which real-time Variable Bit Rate (VBR-RT) traffic will be sorted during path selection computations (i.e., Administrative Weight, Cell Transfer Delay, or Cell Delay Variation).

Syntax Options

pnni vbr rt {admin wt | cell transfer delay | cell delay variation}

Definitions:
admin wt = VBR-RT traffic will be sorted by Administrative Weight
cell transfer delay = VBR-RT traffic will be sorted by Cell Transfer Delay
cell delay variation = VBR-RT traffic will be sorted by Cell Delay Variation

Command Examples:
pnni vbr rt admin wt
pnni vbr rt cell transfer delay
pnni vbr rt cell delay variation

Corresponding UI Command

pgcfg

pnni vbr nrt

Command Usage

Specify the metric on which non-real-time Variable Bit Rate (VBR-NRT) traffic will be sorted during path selection computations (i.e., Administrative Weight, Cell Transfer Delay, or Cell Delay Variation).

Syntax Options

pnni vbr nrt {admin wt | cell transfer delay | cell delay variation}

Definitions:
admin wt = VBR-NRT traffic will be sorted by Administrative Weight
cell transfer delay = VBR-NRT traffic will be sorted by Cell Transfer Delay
cell delay variation = VBR-NRT traffic will be sorted by Cell Delay Variation

Command Examples:
pnni vbr nrt admin wt
pnni vbr nrt cell transfer delay
pnni vbr nrt cell delay variation

Corresponding UI Command

pncfg

pnni abr

Command Usage

Specify the metric on which Available Bit Rate (ABR) traffic will be sorted during path selection computations (i.e., Administrative Weight, Cell Transfer Delay, or Cell Delay Variation).

Syntax Options

pnni abr {admin wt | cell transfer delay | cell delay variation}

Definitions:
admin wt = ABR traffic will be sorted by Administrative Weight
cell transfer delay = ABR traffic will be sorted by Cell Transfer Delay
cell delay variation = ABR traffic will be sorted by Cell Delay Variation

Command Examples:
pnni abr admin wt
pnni abr cell transfer delay
pnni abr cell delay variation

Corresponding UI Command

pncfg

pnni ubr

Command Usage

Specify the metric on which Unspecified Bit Rate (UBR) traffic will be sorted during path selection computations (i.e., Administrative Weight, Cell Transfer Delay, or Cell Delay Variation).

Syntax Options

pnni ubr {admin wt | cell transfer delay | cell delay variation}

Definitions:
admin wt = UBR traffic will be sorted by Administrative Weight
cell transfer delay = UBR traffic will be sorted by Cell Transfer Delay
cell delay variation = UBR traffic will be sorted by Cell Delay Variation

Command Examples:
pnni ubr admin wt
pnni ubr cell transfer delay
pnni ubr cell delay variation

Corresponding UI Command

pncfg

pnni timer ptse refresh interval

Command Usage

Specify a PTSE refresh interval.

Syntax Options

pnni timer ptse refresh interval <*timer-value*>

Definitions:
timer-value = the time, in seconds, before a self-originated PTSE is updated (value may be from 20 to 65,535—e.g., **31000**)

♦ Syntax Notes ♦

Do not use commas when entering a timer value (for example, **31,000** will return a syntax error message).

Command Examples:
pnni timer ptse refresh interval 2000

Corresponding UI Command

pncfg

Remarks

A PTSE refresh interval is the time, in seconds, before a self-originated PTSE is updated. (PTSEs are aged out of the database unless they are refreshed by the originating node.)

The refresh interval is multiplied by the lifetime factor to determine the lifetime of a PTSE in the topology database. (For more information on setting lifetime factor values, refer to the **pnni timer ptse lifetime factor** command on page 1-68.)

pnni timer ptse lifetime factor

Command Usage

Specify the value of a PTSE lifetime multiplier.

Syntax Options

pnni timer ptse lifetime factor <*percent*>
Definitions: *percent* = specifies the time, in seconds, before a self-originated PTSE is updated (value may be from 1 to 255—e.g., **215**) Command Examples: **pnni timer ptse lifetime factor 100**

Corresponding UI Command

pncfg

pnni timer ptse hold down

Command Usage

Specify a PTSE holddown value.

Syntax Options

pnni timer ptse hold down <*timer-value*>

Definitions:
timer-value = specifies the minimum time, in seconds, before the current node can refresh PTSEs (value may be from 1 to 255—e.g., **5**)

Command Example:
pnni timer ptse hold down 5

Corresponding UI Command

pncfg

Remarks

A holddown value is the *minimum* time, in seconds, before the current node can refresh PTSEs. A node can prevent a PTSE from aging out of the topology database by refreshing it. A holddown value limits the node from refreshing PTSEs too often and exhausting database space too quickly.

pnni timer ptse delayed ack

Command Usage

Specify a delayed acknowledgment value.

Syntax Options

pnni timer ptse delayed ack <*timer-value***>**

Definitions:
timer-value = the amount of time, in seconds, between the receipt of a PTSE and its acknowledgment (value may be from 1 to 255—e.g., **5**)

Command Example:
pnni timer ptse delayed ack 5

Corresponding UI Command

pncfg

Remarks

When a node receives a PTSE from another node, it sends back a delayed acknowledgment packet. The delayed acknowledgment value is the amount of time, in seconds, between the receipt of a PTSE and its acknowledgment.

pnni timer ptsp transmit

Command Usage

Specify a PTSP transmit timer value.

Syntax Options

pnni timer ptsp transmit <*timer-value***>**

Definitions:
timer-value = the amount of time, in seconds, between successive transmissions of PTSPs (value may be from 1 to 255—e.g., **60**)

Command Example:
pnni timer ptsp transmit 60

Corresponding UI Command

pncfg

Remarks

PTSPs are sent until they are acknowledged by neighboring nodes. If a PTSP is acknowledged *before* the time specified in the command line has been reached, a retransmission will not be sent.

pnni timer ptsp response

Command Usage

Specify the time interval between the receipt of database summary packets and the sending of PTSE request packets.

Syntax Options

pnni timer ptsp response <*timer-value***>**

Definitions:
timer-value = the amount of time, in seconds, between database summary and PTSE requests packets (value may be from 1 to 255—e.g., **60**)

Command Example:
pnni timer ptsp response 60

Corresponding UI Command

pncfg

pnni timer summary retransmit

Command Usage

Specify a database summary retransmit value.

Syntax Options

pnni timer summary retransmit <*timer-value***>**

Definitions:
timer-value = the amount of time, in seconds, before the current node will retransmit a database summary packet (value may be from 1 to 255—e.g., **60**)

Command Example:
pnni timer summary retransmit 60

Corresponding UI Command

pncfg

Remarks

The summary retransmit value is the time, in seconds, before the current node will retransmit a database summary packet that has gone unacknowledged by another node.

pnni timer hello interval

Command Usage

Specify the initial value for the Hello timer.

Syntax Options

pnni timer hello interval <*timer-value***>**

Definitions:
timer-value = the amount of time, in seconds, before the current node will send a Hello packet (value may be from 1 to 255—e.g., **10**)

Command Example:
pnni timer hello interval 10

Corresponding UI Command

pncfg

Remarks

The Hello timer initial value is the amount of time, in seconds, before the current node will send one (1) Hello packet on each of its ports in the absence of triggered Hellos.

pnni timer hello hold down

Command Usage

Specify the initial value for the Hello holddown timer.

Syntax Options

pnni timer hello hold down <*timer-value***>**

Definitions:
timer-value = the rate at which the current node sends Hello messages (value may be from 1 to 255—e.g., **7**)

Command Example:
pnni timer hello hold down 7

Corresponding UI Command

pncfg

pnni timer hello inactivity factor

Command Usage

Specify a Hello inactivity value.

Syntax Options

pnni timer hello inactivity factor <*timer-value***>**

Definitions:
factor = optional command syntax
timer-value = the rate at which the current node sends Hello messages (value may be from 1 to 255—e.g., **7**)

Command Example:
pnni timer hello inactivity factor 7

Corresponding UI Command

pncfg

pnni port status

Command Usage

Enable or disable the PNNI routing protocol for a *single* CSM port.

Syntax Options

pnni port <*slot/port/virtual-tunnel*> status {enable | disable}

Definitions:
slot = the slot number containing the designated port
port = the port to be configured
virtual-tunnel = the virtual tunnel instance for the designated port
enable = enables the PNNI routing protocol for the specified port
disable = disables the PNNI routing protocol for the specified port

Command Examples:
pnni port 4/3/2 status enable
pnni port 8/2 status disable

Corresponding UI Command

ppcfg

pnni port routing vpi

Command Usage

Specify the default Virtual Path Identifier (VPI) that will be used to transmit PNNI routing messages.

Syntax Options

pnni port <*slot/port/[virtual-tunnel]***> routing vpi <***number***>**

Definitions:
slot = the slot number containing the designated port
port = the port to be configured
virtual-tunnel = the virtual tunnel instance for the designated port
number = the default VPI value (value may range from 0 to 255—e.g., **75**)

Command Examples:
pnni port 4/3 routing vpi 75
pnni port 5/1/3 routing vpi 75

Corresponding UI Command

ppcfg

pnni port routing vci

Command Usage

Specify the default Virtual Channel Identifier (VCI) that will be used to transmit PNNI routing messages within each Virtual Path.

Syntax Options

pnni port <*slot/port/[virtual-tunnel]***> routing vci <***number***>**

Definitions:
slot = the slot number containing the designated port
port = the port to be configured
virtual-tunnel = the virtual tunnel instance for the designated port
number = the VCI value (value may range from 1 to 65,536—e.g., **16**)

♦ Syntax Notes ♦

Do not use commas when entering a VCI number (for example, **65,000** will return a syntax error message).

Command Example:
pnni port 4/3/2 routing vci 16
pnni port 4/1 routing vci 6000

Corresponding UI Command

ppcfg

pnni port admin weight

Command Usage

Assign an administrative weight to any service class on a specified CSM port.

Syntax Options

pnni port <*slot/port/virtual-tunnel***> admin weight {cbr | vbr rt | vbr nrt | abr | ubr} <***number***>**

Definitions:
slot = the slot number containing the designated port
port = the port on which the administrative weight is to be assigned
virtual-tunnel = the virtual tunnel instance for the designated port
cbr = Constant Bit Rate (CBR) service class
vbr rt = real-time Variable Bit Rate (VBR-RT) service class
vbr nrt = non-real-time Variable Bit Rate (CBR-NRT) service class
abr = Available Bit Rate (ABR) service class
ubr = Unspecified Bit Rate (UBR) service class
number = the administrative weight value (e.g., **5000**)

Command Example:
pnni port 8/2/1 admin weight cbr 5000
pnni port 4/3/2 admin weight vbr rt 1200
pnni port 5/1/2 admin weight vbr nrt 3300
pnni port 4/3/2 admin weight abr 4000
pnni port 5/1/6 admin weight ubr 2600

Corresponding UI Command

ppcfg

Remarks

The administrative weight indicates the preference of a given link relative to other links. *Lower* administrative weight values have a higher priority than higher values.

pnni port cell transfer delay

Command Usage

Assign a Cell Transfer Delay (CTD) value for any service class on a specified port.

Syntax Options

pnni port <*slot/port/[virtual-tunnel]***> cell transfer delay {cbr | vbr rt | vbr nrt | abr | ubr} <***number***>**

Definitions:
slot = the slot number containing the designated port
port = the port on which the administrative weight is to be assigned
virtual-tunnel = the virtual tunnel instance for the designated port
cbr = Constant Bit Rate (CBR) service class
vbr rt = real-time Variable Bit Rate (VBR-RT) service class
vbr nrt = non-real-time Variable Bit Rate (CBR-NRT) service class
abr = Available Bit Rate (ABR) service class
ubr = Unspecified Bit Rate (UBR) service class
number = the administrative weight value (e.g., **5000**)

Command Example:
pnni port 4/3/2 ctd cbr 5000
pnni port 8/2/2 cell transfer delay vbr rt 1200
pnni port 6/3/5 ctd vbr nrt 3300
pnni port 4/1/6 cell transfer delay abr 4000
pnni port 5/3/2 ctd ubr 2600

Corresponding UI Command

ppcfg

Remarks

The CTD is the time it takes for cells to transmit across a link within a single peer group.

pnni port cell delay variation

Command Usage

Assign a Cell Delay Variation (CDV) value for any service class on a specified port.

Syntax Options

pnni port <*slot/port/[virtual-tunnel]***> cell delay variation {cbr | vbr rt | vbr nrt | abr | ubr} <***number***>**

Definitions:
slot = the slot number containing the designated port
port = the port on which the administrative weight is to be assigned
virtual-tunnel = the virtual tunnel instance for the designated port
cbr = Constant Bit Rate (CBR) service class
vbr rt = real-time Variable Bit Rate (VBR-RT) service class
vbr nrt = non-real-time Variable Bit Rate (CBR-NRT) service class
abr = Available Bit Rate (ABR) service class
ubr = Unspecified Bit Rate (UBR) service class
number = the administrative weight value (e.g., **5000**)

Command Examples:
pnni port 4/3/2 cell delay variation cbr 5000
pnni port 8/2 cell delay variation vbr rt 1200
pnni port 6/3/5 cell delay variation vbr nrt 3300
pnni port 4/1 cell delay variation abr 4000
pnni port 5/3/2 cell delay variation ubr 2600

Corresponding UI Command

ppcfg

Remarks

CDV is also referred to as "jitter," and is the change that occurs in cell spacing from the time cells move from one node to another.

pnni route property

Command Usage

Add a PNNI route property.

Syntax Options

pnni route property <*slot/port/[virtual-tunnel]***> <***description***> {interior | exterior}**

Definitions:
slot/port = the slot and port on which the route property is to be added
virtual-tunnel = the virtual tunnel instance for the specified port
description = a user-defined text string used as a route property description (e.g., **"new route1"**)
interior = specifies that the route property is inside the current PNNI routing domain or peer group
exterior = specifies that the route property is outside the current PNNI routing domain or peer group

♦ Syntax Note ♦

If you want to use spaces between words in a description string, be sure to use quotation marks (**" "**).

Command Examples:
pnni route property 4/3 1 interior
pnni route property 5/3/2 route_1 exterior
pnni route property 8/4/6 "new route1" interior

Corresponding UI Command

prpadd

no pnni route property

Command Usage

Remove a PNNI route property.

Syntax Options

no pnni route property <*slot/port/[virtual-tunnel]***> <***description***>**

Definitions:
slot/port = the slot and port on which the route property is to be removed
virtual-tunnel = the virtual tunnel instance for the specified port
description = a user-defined text string used as a route property description (e.g., **"route prop1"**)

♦ Syntax Notes ♦

If you want to use spaces between words in a description string, be sure to use quotation marks (**" "**).

Also, be sure that the description string exactly matches the description string specified by the **pnni route property** command.

Command Examples:
no pnni route property 4/3 3
no pnni route property 5/3/2 "route prop1"

Corresponding UI Command

prpdel

pnni route property scope

Command Usage

Modify the PNNI scope (i.e., the level within the PNNI hierarchy) where addresses will be advertised.

Syntax Options

pnni route property <*slot/port/[virtual-tunnel]***> <***description***> scope <***value***>**

Definitions:
slot/port = the slot and port on which the route property is to be configured
virtual-tunnel = the virtual tunnel instance for the specified port
description = a user-defined text string used as a route property description (e.g., **1**)
value = the PNNI scope value (value may be from 1 to 104—e.g., **100**)

Command Example:
pnni route property 4/3/2 1 scope 100

Corresponding UI Command

prpadd

Remarks

Lower PNNI scope values have a higher priority than higher values.

pnni route property virtual path

Command Usage

Enable or disable virtual path advertising.

Syntax Options

pnni route property <*slot/port/[virtual-tunnel]***> <***description***> virtual path {true | false}**

Definitions:
slot/port = the slot and port on which the route property is to be configured
virtual-tunnel = the virtual tunnel instance for the specified port
description = a user-defined text string used as a route property description (e.g., **1**)
true = virtual path advertising is enabled
false = virtual path advertising is disabled

Switch Default:
virtual path advertising **true**

Command Example:
pnni route property 4/3/2 1 virtual path true
pnni route property 5/1 route_3 virtual path false

Corresponding UI Command

prpadd

Remarks

When virtual path advertising is *enabled*, the switch will advertise virtual path support to reachable address prefixes.

When virtual path advertising is *disabled*, the switch *will not* advertise virtual path support to reachable address prefixes.

pnni route property vpi

Command Usage

Modify the Virtual Path Identifier (VPI) for static route addresses.

Syntax Options

pnni route property <*slot/port/[virtual-tunnel]***> <***description***> vpi <***number***>**

Definitions:
slot/port = the slot and port on which the route property is to be configured
virtual-tunnel = the virtual tunnel instance for the specified port
description = a user-defined text string used as a route property description (e.g., **1**)
number = the virtual path identifier value (e.g., **15**)

Command Example:
pnni route property 4/3/2 1 vpi 15
pnni route property 5/1 3 vpi 120

Corresponding UI Command

prpadd

Remarks

The VPI value you specify must be within the range of VPIs established for the current CSM port.

pnni route property e.164

Command Usage

Modify the E.164 address associated with the current route property.

Syntax Options

pnni route property <*slot/port/[virtual-tunnel]***> <***description***> e.164 <***address***>**

Definitions:
slot/port = the slot and port on which the route property is to be configured
virtual-tunnel = the virtual tunnel instance for the specified port
description = a user-defined text string used as a route property description (e.g., **1**)
address = the E.164 address to be used for the current route property

Command Example:
pnni route property 4/3 new_property e.164 45

Corresponding UI Command

prpadd

Remarks

E.164 addresses are typically required for routes traversing public carrier networks. In contrast to default PNNI Node addresses, which have a prefix of 39, E.164 addresses use a prefix of 45.

Your Alcatel switch is not a public ATM switch. The E.164 capability allows the switch to act as a gateway between a private network and a public ATM switched network.

pnni route property admin

Command Usage

Modify the cumulative administrative weight calculated for the forward (inbound) or backward (outbound) direction on the current route.

Syntax Options

pnni route property <*slot/port/[virtual-tunnel]***> <***description***> admin weight {inbound | outbound}**

{cbr | vbr rt | vbr nrt | abr | ubr} <*value***>**

Definitions:
slot/port = the slot and port on which the route property is to be configured
virtual-tunnel = the virtual tunnel instance for the specified port
description = a user-defined text string used as a route property description (e.g., **1**)
inbound = specifies forward (or inbound) direction
outbound = specifies backward (or outbound) direction
cbr = specifies Constant Bit Rate (CBR) service class
vbr rt = specifies real-time Variable Bit Rate (VBR-RT) service class
vbr nrt = specifies non-real-time Variable Bit Rate (CBR-NRT) service class
abr = specifies Available Bit Rate (ABR) service class
ubr = specifies Unspecified Bit Rate (UBR) service class
value = the administrative weight value (e.g., **1000**)

Command Examples:
pnni route property 4/3/2 1 admin weight inbound cbr 5000
pnni route property 5/1 33 admin weight outbound vbr nrt 1000

Corresponding UI Command

prpadd

pnni route property cell transfer delay

Command Usage

Modify the cumulative Cell Transfer Delay (CTD), in microseconds, for the forward (Inbound) or backward (Outbound) direction of the route.

Syntax Options

pnni route property <*slot/port/[virtual-tunnel]***> <***description***> cell transfer delay {inbound | outbound} {cbr | vbr rt | vbr nrt | abr | ubr} <***value***>**

Definitions:
slot/port = the slot and port on which the route property is to be configured
virtual-tunnel = the virtual tunnel instance for the specified port
description = a user-defined text string used as a route property description (e.g., **1**)
inbound = specifies forward (or inbound) direction
outbound = specifies backward (or outbound) direction
cbr = specifies Constant Bit Rate (CBR) service class
vbr rt = specifies real-time Variable Bit Rate (VBR-RT) service class
vbr nrt = specifies non-real-time Variable Bit Rate (CBR-NRT) service class
abr = specifies Available Bit Rate (ABR) service class
ubr = specifies Unspecified Bit Rate (UBR) service class
value = the Cell Transfer Delay (CTD) value

Command Examples:
pnni route property 4/3/2 13 cell transfer delay outbound abr 100
pnni route property 8/2 route_1 cell transfer delay inbound vbr rt 1000

Corresponding UI Command

prpadd

Remarks

The cumulative CTD value is the average time it takes for cells to transmit from any incoming port to the outgoing port in the switch for a particular Class of Service.

pnni route property cell delay variation

Command Usage

Modify the cumulative Cell Delay Variation (CDV), in microseconds, for the forward (Inbound) or backward (Outbound) direction of the route.

Syntax Options

pnni route property <*slot/port/[virtual-tunnel]***> <***description***> cell delay variation {inbound | outbound} {cbr | vbr rt | vbr nrt | abr | ubr} <***value***>**

Definitions:
slot/port = the slot and port on which the route property is to be configured
virtual-tunnel = the virtual tunnel instance for the specified port
description = a user-defined text string used as a route property description (e.g., **1**)
inbound = specifies forward (or inbound) direction
outbound = specifies backward (or outbound) direction
cbr = specifies Constant Bit Rate (CBR) service class
vbr rt = specifies real-time Variable Bit Rate (VBR-RT) service class
vbr nrt = specifies non-real-time Variable Bit Rate (CBR-NRT) service class
abr = specifies Available Bit Rate (ABR) service class
ubr = specifies Unspecified Bit Rate (UBR) service class
value = the Cell Delay Variation (CDV) value

Command Examples:
pnni route property 4/3/2 33 cell delay variation outbound abr 100
pnni route property 8/2 route11 cell delay variation inbound vbr rt 1000

Corresponding UI Command

prpadd

Remarks

Also referred to as "jitter," this metric is the change that occurs in cell spacing from the time cells leave one node and arrive at another node.

pnni route

Command Usage

Add a PNNI/IISP static route on a CSM port.

Syntax Options

pnni route <*slot/port/[virtual-tunnel]***> <"***description***"> <"***address-prefix***"> <***bit-length***>**

Definitions:
slot/port = the slot and port on which the static route address is to be configured
virtual-tunnel = the virtual tunnel instance for the specified port
description = a user-defined text string used as a route property description (e.g., **newroute3**)
address-prefix = the ATM end system address prefix (e.g., **47000400063456230000**)
bit-length = the prefix length to be applied to the ATM end system address prefix (e.g., **80**)

♦ Syntax Notes ♦

You must use quotation marks (**" "**) when entering a description string *and* address prefix. Refer to the command example below.

Also, be sure that the description string exactly matches the description string specified earlier by the **pnni route property** command.

Command Example:
pnni route 4/3 "newroute3" "47000400063456230000" 80

Corresponding UI Command

pradd

Remarks

Before you can add a PNNI static route, you must first add route properies via the **pnni route property** command. Refer to page 15-83 for information on using the **pnni route property** command.

The ATM End System address prefix is an ATM address of up to 19 octets. The default address prefix length is set to the number of characters entered in the command line multiplied by 4. For example, if you enter **49**, the default prefix length is **8** (4 x 2 characters=8).

A prefix with a length of zero (0) specifies a default route for all unmatched addresses.

no pnni route

Command Usage

Delete a PNNI/IISP static route from a CSM port.

Syntax Options

no pnni route <*slot/port/[virtual-tunnel]***> <"***description***"> <***index***>**

Definitions:
slot/port = the slot and port from which the static route is to be removed
virtual-tunnel = the virtual tunnel instance for the specified port
description = a user-defined text string used as a route property description (e.g., **"newroute1"**)
index = the index number for the route; the index number is the order in which the route appears in the PNNI Configured Route Prefixes table (e.g., **2**)

♦ Syntax Notes ♦

You must use quotation marks (**" "**) when entering a description string.

Also, be sure that the description string exactly matches the description string specified earlier by the **pnni route** and **pnni route property** commands.

Command Example:
no pnni route 4/3/2 "newroute1" 2

Corresponding UI Command

prdel

Remarks

To access the PNNI Configured Route Prefixes table, use the **view pnni route prefix** command. For more information, refer to page 15-32.