

Configuring Access Node Control Protocol

Access Node Control Protocol (ANCP) creates a control plane between a service-oriented aggregation device and an access node (AN) (for example, a DSLAM) in order to perform QoS-related, service-related, and subscriber-related operations. An ANCP server accepts and maintains ANCP adjacencies (sessions with an ANCP neighbor), and sending and receiving ANCP messages. ANCP allows static mapping between ANCP ports and VLAN subinterfaces so that DSL rate updates for a specific subscriber received by the ANCP server are applied to the QoS configuration corresponding to that subscriber. DSL train rates received via ANCP are used to alter shaping rates on subscriber-facing interfaces and subinterfaces on the router. ANCP runs as a single process on the route processor (RP).

This module provides the conceptual and configuration information for implementing ANCP.

Line Card, SIP, and SPA Support

Feature	ASR 9000 Ethernet Line Cards	SIP 700 for the ASR 9000
Access Node Control Protocol	yes	no

Feature History for Configuring Access Node Protocol on Cisco ASR 9000 Series Routers

Release	Modification
Release 3.7.2	The Access Node Control Protocol feature was introduced.
Release 3.9.0	Mapping of ANCP ports to VLAN interfaces over Ethernet bundles was added.
Release 4.0.0	ANCP over Multi Chassis Link Aggregation was introduced.

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Prerequisites for Configuring ANCP

Restrictions for Configuring ANCP

The following restrictions apply when configuring ANCP on your network:

- Only Rate Adaptive Mode is supported in Cisco IOS XR Release 3.7.2.
- VPN routing and forwarding (VRF) awareness is not supported in Cisco IOS XR Release 3.7.2. All IP interfaces receiving ANCP traffic should be in default VRF.
- ANCP over IPv6 is not supported for Cisco IOS XR Release 3.7.2.
- Only VLAN subinterfaces over Ethernet and Ethernet bundle ports can be mapped to AN ports using ANCP.

Information About Configuring ANCP

To implement ANCP, you must understand the following concepts:

ANCP Adjacencies

The ANCP server accepts TCP connections from access nodes. An ANCP neighbor is any access node that establishes an adjacency with an ANCP server. ANCP is configured globally, and as long as it is IP-enabled, there is no restriction on whether ANCP messages are received on the physical or logical interface.

TCP creates a separate connection socket for each access node. Because access nodes are not identified explicitly in ANCP messages, the TCP socket serves as the ANCP neighbor identifier for the ANCP server.

Once the TCP connection between ANCP neighbors has been made, the ANCP adjacency protocol establishes an ANCP session over that connection and negotiates ANCP capabilities. There is a single ANCP session per ANCP neighbor. ANCP session information becomes a subset of the information of a corresponding neighbor.

ANCP protocol supports dynamic neighbor detection so no configuration of access nodes is required. ANCP neighbors can also be statically preconfigured on the ANCP server. In such a case, access nodes are explicitly identified by their IDs, which then must match the **sender-name** field in the ANCP adjacency protocol messages.

Neighbor Adjacency Timing

The adjacency timer defines the maximum delay between different stages of ANCP session establishment and the period of ANCP keepalive.

ANCP adjacency lifetime is governed by the adjacency protocol. If synchronization with the peer access node is lost (for example, if the adjacency dead timer expires), the ANCP server removes the adjacency, and the underlying TCP connection is closed.

ANCP Messages

Two ANCP message types are processed by the ANCP server: Port Up and Port Down. Port Up messages contain DSL rate information; Port Down messages indicate that the corresponding access line is no longer available. DSL rate updates from Port Up messages are made available to the QoS subsystem. Port Down messages are used to internally track the ANCP port state.

These messages can only be received by the server after the ANCP adjacency is established. However, once a Port Up message is received, the DSL rate information it contains is considered valid indefinitely, provided AN-port-to-interface mapping is configured for that port. It is stored in the AN port database until it is overwritten by another Port Up message for this port or is cleared manually. The removal of an adjacency or the reception of a Port Down message is reflected in the database for display and troubleshooting purposes, but DSL rate information is not invalidated.

Port Mapping

AN ports are statically mapped to VLAN subinterfaces, referred to as AN-port-to-interface mapping. This implies that there is at least one VLAN subinterface configured per subscriber line. There is no limit to the number of interfaces that can be mapped to an AN port.

VLAN subinterfaces mapped to an AN port can be created or removed. When mapping is configured, VLAN subinterfaces are referenced in the ANCP module by name. This name is used for notifications of interface creation and deletion and provides the information that is used in updating the DSL rate.

An AN port database is maintained for all ports learned from Port Up messages. This database also contains the AN-port-to-interface mapping database. If a Port Up message for an AN port arrives but no interface is mapped to that port, the rate information is stored in the AN port database but not published. When a mapping for that port is configured, the AN port database is scanned to identify any ANCP messages that were received on this port prior to the mapping configuration. If there were, the known rate is published.

Rate Adjustment

ANCP can apply a correction factor to the DSL line rate reported in Port Up messages before publishing the rate update to the system. This correction factor or rate adjustment is configurable in the global configuration mode per DSL type and access encapsulation type (ATM or Ethernet). DSL type and encapsulation type are provided in mandatory type, length, and value (TLV) data in the Port Up message.



Note To use the rate adjustment feature for non-default loop types (Ethernet), DSLAMs must support the optional Access Loop Encapsulation sub-TLV.

ANCP rate-adaptive mode information is processed by the ANCP module to determine the maximum bandwidth (shape rate) available for a given subscriber line. A fixed correction factor is then applied to the ANCP bandwidth based on the DSL type to account for the overhead of different DSL technologies. For example, a given subscriber's ANCP bandwidth may be 15 Mbps, but due to the DSL technology overhead, the effective bandwidth for that subscriber should be limited to 80 percent of 15 Mbps, which is 12 Mbps. This corrected effective bandwidth is conveyed to QoS modules to limit the maximum rate for the subscriber's traffic.

Note The ANCP rate is used as a QoS shaping rate only if the ANCP rate is greater than the currently configured QoS shaping rate. (The ANCP rate used by QoS is rounded down to the nearest 128 kbps.)

Prioritization of ANCP Traffic

In case of congestion, the Cisco ASR 9000 Series Router marks ANCP messages as high priority so that the aggregation network between the Network Access Server (NAS) and the access node (AN) can prioritize the ANCP messages ahead of other traffic.

Process Restart

During a process restart, TCP connections with ANCP neighbors normally drop. When the ANCP server comes back, TCP connections and ANCP sessions are reestablished by the neighbors. Upon reconnecting to the server, DSLAMs send Port Up messages for every active port. Any published rate information received prior to restart is restored in the ANCP configuration. If the restart occurred due to a crash, conflicts between published data and configuration data are detected and published data is corrected.

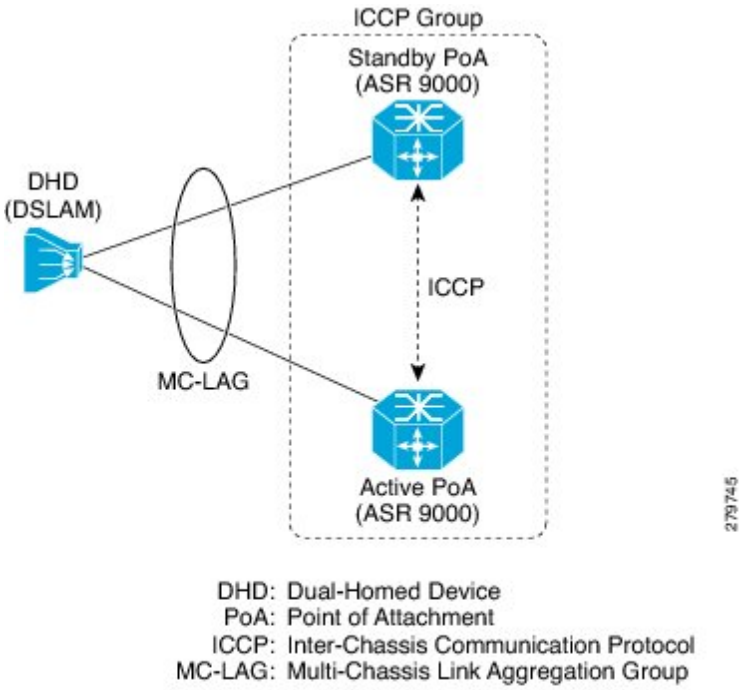
ANCP and QoS Interaction

When the ANCP value is applied correctly, it overrides the configured QoS shaper value. For an example of an ANCP value applied incorrectly and an example of the interaction with QoS when the ANCP value is applied correctly, see "ANCP and QoS Interaction: Example" section on page 105.

Multi Chassis Link Aggregation

Multi Chassis Link Aggregation (MC-LAG) provides a simple redundancy mechanism for a Digital Subscriber Line Access Multiplier (DSLAM) to Cisco ASR 9000 Series Router connection. The redundancy is achieved by allowing a dual-homed connection to two routers. There is no added software complexity on the DSLAM, because the DSLAM views the dual-homed connection as a single LAG. The DSLAM is known as a dual-homed device (DHD), and each router is known as a point of attachment (PoA) in MC-LAG terminology. For more detailed information about MC-LAG, see the *Cisco ASR 9000 Series Aggregation Services Router L2VPN and Ethernet Services Configuration Guide*.

Figure 1: MC-LAG connects DSLAM to ASR 9000 Series Routers



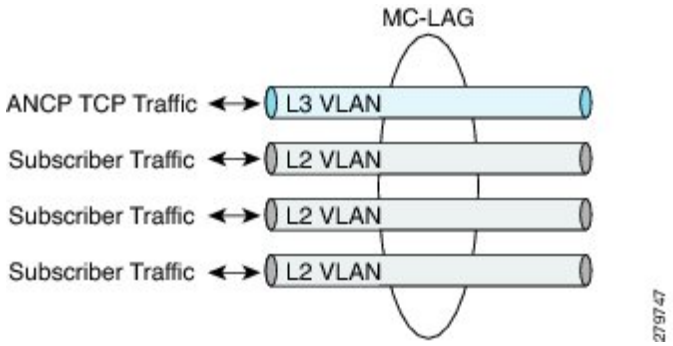
ANCP over MC-LAG

Access Node Control Protocol (ANCP) is required to support a network topology that includes MC-LAG connections to DSLAMs. CPE circuits connect to DSLAMs and adjust line speeds based on signal quality with Rate Adaptive DS. Uplinks connect DSLAMs to routers. If the line speed of a circuit adjusts to a lower data rate than the uplink, subscriber data can be lost on the DSLAM. To prevent data loss, a DSLAM notifies the router of the new DSL rate with ANCP, and downstream shaping is dynamically applied on the router such that the data rate of the uplink does not exceed the CPE circuit data rate.

ANCP applies DSLAM subscriber circuit DSL rate data it learns, to MC-LAG VLAN subinterfaces that are mapped to the subscriber circuit. The rates are applied to QoS shapers. The DSL rates that ANCP has applied to the MC-LAG VLAN subinterfaces are distributed by the ANCP application running on the active PoA for the MC-LAG to the ANCP application that is running on the standby PoA for the MC-LAG, using ICCP (Inter-Chassis Communication Protocol). ANCP on the standby PoA for the MC-LAG applies the DSL rate data to the corresponding MC-LAG VLAN subinterfaces. When an event occurs that causes one of the standby PoAs to assume the active role for the MC-LAG, the ANCP application on the newly active PoA has already applied the DSL rates to shapers on the MC-LAG VLAN subinterfaces, so the correct DSL rates are applied when this LAG goes active and congestion and subsequent data loss does not occur at the DSLAM.

A DSLAM establishes an ANCP adjacency with a router over a TCP connection. The DSL rates for the DSLAM subscriber circuits are communicated over this TCP connection. The DSL rates are applied to Layer 2 VLAN subinterfaces that are mapped to the subscriber circuits. The ANCP TCP connection that is used to send DSL rates for Layer 2 VLAN subinterfaces on an MC-LAG must be on a Layer 3 VLAN subinterface that is in the same MC-LAG as the L2VLAN subinterfaces. Note that this constraint implies that there is one ANCP TCP connection between the DSLAM and router per MC-LAG.

Figure 2: ANCP over MC-LAG VLAN Subinterfaces



When an active PoA for a MC-LAG becomes the standby, the DSLAM ANCP TCP connection is terminated. The DSLAM re-establishes the ANCP TCP connection with the PoA that assumes the active role for the MC-LAG.

How to Configure ANCP on Cisco

This section contains instructions for the following tasks:

- Enabling ANCP, page 88
- Configuring ANCP Server Sender Name, page 90
- Configuring ANCP Neighbors, page 91
- Mapping AN Ports to VLAN Subinterfaces, page 94
- Configuring ANCP Rate Adjustment, page 96

Enabling ANCP

To enable ANCP, use the **ancp** command in global configuration mode.

Prerequisites

To use this command, you must be in a user group associated with a task group that includes the proper task IDs for ANCP.

SUMMARY STEPS

1. **configure** RP/0/RSP0/CPU0:router# configure RP/0/RSP0/CPU0:router(config)#
2. **ancp** RP/0/RSP0/CPU0:router(config)# ancp
3. **end**
4. or **commit**
5. **show ancp summary [statistics][detail]** RP/0/RSP0/CPU0:router# show ancp summary

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure** RP/0/RSP0/CPU0:router# configure RP/0/RSP0/CPU0:router(config)#	Enters global configuration mode.
Step 2	**ancp** RP/0/RSP0/CPU0:router(config)# ancp	Enables ANCP.
Step 3	**end**	

Step 4	or **commit**
	Example:
	`RP/0/RSP0/CPU0:router(config-ancp)# end`
	or
	`RP/0/RSP0/CPU0:router(config-ancp)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		Uncommitted changes found, commit them before exiting (yes/no/cancel)? [cancel]:
		Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		Entering cancel leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Step 5	**show ancp summary [statistics][detail]** RP/0/RSP0/CPU0:router# show ancp summary	(Optional) Displays ANCP summary and general configuration information.

Configuring ANCP Server Sender Name

The ANCP server sender name is used by the ANCP server in adjacency protocol messages to DSLAMs.

SUMMARY STEPS

1. **configure** RP/0/RSP0/CPU0:router# **configure** RP/0/RSP0/CPU0:router(config)#
2. **ancp server sender-name** {H.H.H | A.B.C.D} RP/0/RSP0/CPU0:router(config)# **ancp server sender-name 0013.1aff.c2bd**
3. **end**
4. or **commit**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure** RP/0/RSP0/CPU0:router# **configure** RP/0/RSP0/CPU0:router(config)#	Enters global configuration mode.
Step 2	**ancp server sender-name** {H.H.H | A.B.C.D} RP/0/RSP0/CPU0:router(config)# **ancp server sender-name 0013.1aff.c2bd**	Configures a local sender name.
Step 3	**end**	

Step 4	or **commit**
	Example:
	`RP/0/RSP0/CPU0:router(config-ancp)# end`
	or
	`RP/0/RSP0/CPU0:router(config-ancp)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		Uncommitted changes found, commit them before exiting (yes/no/cancel)? [cancel]:
		Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		Entering cancel leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Configuring ANCP Neighbors

The TCP connection from any neighbor is accepted on any interface. To match a neighbor configuration to a respective TCP connection, ANCP neighbors are identified by a sender name that must match the corresponding field in adjacency protocol messages. Optionally, a description string can be supplied to identify the ANCP neighbor on the system and an adjacency timer interval configured.

SUMMARY STEPS

1. **configure**
2. **ancp** neighbor sender-name {H.H.H | A.B.C.D}[**description** string]
3. **ancp neighbor sender-name** {*H.H.H* | *A.B.C.D*} [**adjacency-timer** *interval*]
4. **end** or **commit**

5. show ancp neighbor {**description** *description-string*| **sender-name** {*H.H.H* | *A.B.C.D*}} [**statistics**][**detail**] RP/0/RSP0/CPU0:router# show ancp neighbor sender-name 0006.2aaa.281b
6. show ancp neighbor summary [**statistics**][**detail**] RP/0/RSP0/CPU0:router# show ancp neighbor summary
7. clear ancp neighbor {**all** | **description** description-string | **sender-name** {H.H.H | A.B.C.D}}[**state** | **statistics**] RP/0/RSP0/CPU0:router# clear ancp neighbor all
8. clear ancp summary [statistics | detail] RP/0/RSP0/CPU0:router# clear ancp summary statistics
9. show ancp neighbor [all] [statistics] RP/0/RSP0/CPU0:router# show ancp neighbor statistics
10. show ancp neighbor state [none | synsent | synrcvd | estab} [statistics] RP/0/RSP0/CPU0:router# show ancp neighbor none

DETAILED STEPS

Procedure

	Command or Action	Purpose

Step 1	**configure**
	Example:
	`RP/0/RSP0/CPU0:router# configure`
	`RP/0/RSP0/CPU0:router(config)#`
		Enters global configuration mode.

Step 2	**ancp** neighbor sender-name {H.H.H | A.B.C.D}[**description** string] **Example:** `RP/0/RSP0/CPU0:router(config)# ancp neighbor sender-name oo13.1aff.c2bd description vendorA1`	Sets neighbor description parameter to easily identify DSLAMs.
Step 3	**ancp neighbor sender-name** {*H.H.H* | *A.B.C.D*} [**adjacency-timer** *interval*] **Example:** `RP/0/RSP0/CPU0:router(config)# ancp neighbor sender-name 0013.1aff.c2bd adjacency-timer 20`	Sets neighbor adjacency timer parameter. If a neighbor session is already established, it will be reset so this timer can take affect. **Note** • Configured ports are placed in a down state while unconfigured ports are released.

Step 4	**end** or **commit**
	Example:
	`RP/0/RSP0/CPU0:router(config-ancp)# end`
	or
	`RP/0/RSP0/CPU0:router(config-ancp)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		Uncommitted changes found, commit them before exiting (yes/no/cancel)? [cancel]:
		Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.

	Command or Action	Purpose
		Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes. Entering cancel leaves the router in the current configuration session without exiting or committing the configuration changes. • Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.
Step 5	show ancp neighbor {**description** *description-string*| **sender-name** {*H.H.H* | *A.B.C.D*}} [**statistics**][**detail**] RP/0/RSP0/CPU0:router# show ancp neighbor sender-name 0006.2aaa.281b	(Optional) Displays data or message statistics associated with individual ANCP adjacencies or sets of adjacencies.
Step 6	show ancp neighbor summary [**statistics**][**detail**] RP/0/RSP0/CPU0:router# show ancp neighbor summary	(Optional) Displays adjacency counts by state.
Step 7	clear ancp neighbor {**all** | **description** description-string | **sender-name** {H.H.H | A.B.C.D}}[**state** | **statistics**] RP/0/RSP0/CPU0:router# clear ancp neighbor all	(Optional) Clears ANCP neighbors, either all or individually. Configured ports are placed in a down state while releasing unconfigured ports. If state is selected, the adjacency is reset without clearing the TCP socket.
Step 8	clear ancp summary [statistics | detail] RP/0/RSP0/CPU0:router# clear ancp summary statistics	(Optional) Clears aggregate message statistics only, without modifying individual neighbor or port statistics.
Step 9	show ancp neighbor [all] [statistics] RP/0/RSP0/CPU0:router# show ancp neighbor statistics	(Optional) Displays ANCP neighbor information.
Step 10	show ancp neighbor state [none | synsent | synrcvd | estab} [statistics] RP/0/RSP0/CPU0:router# show ancp neighbor none	(Optional) Displays adjacency protocol state information.

Mapping AN Ports to VLAN Subinterfaces

Port mapping associates DSLAM access ports or customer premises equipment (CPE) clients of a DSLAM with VLAN subinterfaces. The VLANs can be IEEE 802.1Q or QinQ hierarchical VLANs. To map AN ports to VLAN subinterfaces, use the **ancp an-port** command in global configuration mode.

SUMMARY STEPS

1. **configure**
2. ancp an-port circuit-id *Access-Loop-Circuit*-ID [**interface** type interface-path-id | **interface Bundle-Ether** *bundle-id*] RP/0/RSP0/CPU0:router(config)# ancp an-port circuit-id circuit1 interface gigabitethernet 2/0/1/1.1
3. **end** or **commit**
4. show ancp an-port {circuit-id *Access-Loop-Circuit-ID* | **interface** type interface-path-id | **interface Bundle-Ether** *bundle-id* | **mapping} [statistics** | detail]
5. show ancp an-port [configured | dynamic-only][statistics]

6. show ancp an-port summary [**statistics**][**detail**]
7. **clear ancp an-port** {**all** | **circuit-id** Access-Loop-Circuit-Id | **interface** type interface-path-id | **interface Bundle-Ether** *bundle-id* | **neighbor** {**description** string | **sender-name** {H.H.H | A.B.C.D}}[**statistics**]
8. **show ancp an-port** {**description** description-string | **sender-name** {*H.H.H* | *A.B.C.D*}}
9. **show ancp an-port state** [**up** | **down** | **none**] [**statistics**]

DETAILED STEPS

Procedure

	Command or Action	Purpose

Step 1	**configure**
	Example:
	`RP/0/RSP0/CPU0:router# configure`
	`RP/0/RSP0/CPU0:router(config)#`
		Enters global configuration mode.

Step 2	ancp an-port circuit-id *Access-Loop-Circuit*-ID [**interface** type interface-path-id	**interface Bundle-Ether** *bundle-id*] RP/0/RSP0/CPU0:router(config)# ancp an-port circuit-id circuit1 interface gigabitethernet 2/0/1/1.1	Defines a unique access node ID. This ID information is included in the ANCP Port Up and Port Down messages. The Circuit ID must be supplied before the access node port configuration can be committed. When using a shared policy instance in subinterfaces with ANCP, the same AN port circuit ID must be mapped to all subinterfaces that have the same shared policy instance.

Step 3	**end** or **commit**
	Example:
	`RP/0/RSP0/CPU0:router(config-ancp)# end`
	or
	`RP/0/RSP0/CPU0:router(config-ancp)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		Uncommitted changes found, commit them before exiting (yes/no/cancel)? [cancel]:
		Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		Entering cancel leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

	Command or Action	Purpose
Step 4	show ancp an-port {circuit-id *Access-Loop-Circuit-ID* | **interface** type interface-path-id | **interface Bundle-Ether** *bundle-id* | **mapping} [statistics** | detail] **Example:** `RP/0/RSP0/CPU0:router# show ancp an-port gigabitethernet 2/0/1/1.1`	(Optional) Displays information about the association of DSLAM access ports (or CPE clients of a DSLAM) with VLAN subinterfaces.
Step 5	show ancp an-port [configured | dynamic-only][statistics] **Example:** `RP/0/RSP0/CPU0:router# show ancp an-port configured`	(Optional) Displays summary data or statistics for AN ports that are or are not mapped to interfaces.
Step 6	show ancp an-port summary [**statistics**][**detail**] **Example:** `RP/0/RSP0/CPU0:router# show ancp an-port summary`	(Optional) Displays port counts by state.
Step 7	**clear ancp an-port** {**all** | **circuit-id** Access-Loop-Circuit-Id | **interface** type interface-path-id | **interface Bundle-Ether** *bundle-id* | **neighbor** {**description** string | **sender-name** {H.H.H | A.B.C.D}}[**statistics**] **Example:** `RP/0/RSP0/CPU0:router# clear ancp an-port all`	(Optional) Clears AN ports of dynamic data or statistics either individually or in groups. Published information is cleared and information learned from the DSLAM is cleared.
Step 8	**show ancp an-port** {**description** description-string | **sender-name** {*H.H.H* | *A.B.C.D*}} **Example:** `RP/0/RSP0/CPU0:router# show ancp an-port description vendor3b`	(Optional) Displays AN port information.
Step 9	**show ancp an-port state** [**up** | **down** | **none**] [**statistics**] **Example:** `RP/0/RSP0/CPU0:router# show ancp an-port state up`	(Optional) Displays AN port state information.

Configuring ANCP Rate Adjustment

Use the **ancp rate-adjustment** command to apply a mathematical correction to the ANCP rate update prior to applying it as a shaper rate.

SUMMARY STEPS

1. **configure** RP/0/RSP0/CPU0:router# **configure** RP/0/RSP0/CPU0:router(config)#

2. **ancp rate-adjustment** dsl-type **access-loop-type percent-factor** factor
3. **end** or **commit**
4. show ancp summary detail RP/0/RSP0/CPU0:router# show ancp summary detail

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure** RP/0/RSP0/CPU0:router# **configure** RP/0/RSP0/CPU0:router(config)#	Enters global configuration mode.
Step 2	**ancp rate-adjustment** dsl-type **access-loop-type percent-factor** factor **Example:** `RP/0/RSP0/CPU0:router(config)# ancp rate-adjustment adsl2 ethernet percent-factor 90`	Sets the parameters for the ANCP shaper percent factor. *dsl-type* and *access-loop-type* are compared to appropriate values in optional type-length values (TLVs) in the ANCP Port Up message and the ANCP rate is adjusted by a configured factor in case of a match. • dsl-type—(Required) Sets DSL type code: **adsl1 adsl2 adsl2+ vdsl1 vdsl2 sdsl** • *access-loop-type*—(Required) Sets *access-loop-type* to **ATM** or **Ethernet**. • **percent-factor** factor—(Required) A percent value to be applied to the ANCP reported rate update prior to configuring it as a shaping rate.

Step 3	**end** or **commit**
	Example:
	`RP/0/RSP0/CPU0:router(config)# end`
	or
	`RP/0/RSP0/CPU0:router(config)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		Uncommitted changes found, commit them before exiting (yes/no/cancel)? [cancel]:
		Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		Entering cancel leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

	Command or Action	Purpose
Step 4	show ancp summary detail RP/0/RSP0/CPU0:router# show ancp summary detail	(Optional) Shows generic ANCP configuration information along with rate adjustment configuration information.

Configuration Examples for Configuring ANCP contains the following examples:

- Configuring ANCP Server Sender Name: Example, page 99
- Configuring ANCP Neighbors: Example, page 99
- Mapping AN ports to VLAN Subinterfaces: Example, page 102
- Configuring ANCP Rate Adjustment: Example, page 103
- ANCP and QoS Interaction: Example, page 105
- QoS Policy Inconsistency on an Interface: Example, page 108

Configuring ANCP Server Sender Name: Example

Configuring ANCP Neighbors: Example

The following example shows how to set ANCP neighbor parameters:

```
configure
ancp neighbor sender-name 0001.2222.3333 description VendorA-1
ancp neighbor sender-name 0001.2222.3333 adjacency-timer 20

commit
```

The following example shows the output from a specific neighbor using the **sender-name** MAC address:

```
show ancp neighbor sender-name 0006.2aaa.281b

            ANCP Neighbor Data
  ------------------------------------------
  Sender Name              0006.2aaa.281b
  Description              first
  State                    ESTAB
  Capability               Topology Discovery
  Ports:
    State Up               25
    State Down             5
    Total                  30
```

The following example shows the same command with the addition of the **detail** keyword, showing a summary of AN ports that were reported by that neighbor:

```
show ancp neighbor sender-name 0006.2aaa.281b detail
```

```
            ANCP Neighbor Data
  ------------------------------------------
  Sender Name               0006.2aaa.281b
  Description               first
  State                     ESTAB
  Capability                Topology Discovery
  Ports:
    State Up                4
    State Down              0
    Total                   4
Remote IP Addr/TCP Port   209.165.200.225/11126
Local  IP Addr/TCP Port   209.165.200.250/6068
Server Sender Name        0013.1aff.c2bd
Remote Timeout            25500 msec
Local  Timeout            10000 msec
Adjacency Uptime          01:25:20
Time Since Last Port Msg  00:00:04
Remote Port               0
Remote Instance           1
Local Instance            1
Remote Partition ID       0

List of AN port data for neighbor sender name 0006.2aaa.281b
------------------------------ ----- ---------- -------- ----  ------------
                                                 Line     Num   Adjusted DS
Circuit-id                     State Uptime     State    Intf  Rate (kbps)
------------------------------ ----- ---------- -------- ----  ------------
circuit1                       UP    00:27:49   SHOWTIME   3    2250
circuit2                       UP    00:00:49   SHOWTIME   2    2250
circuit3                       UP    00:00:49   SHOWTIME   2    2250
circuit4                       UP    00:00:49   SHOWTIME   0    2250
```

The following example shows the same command, this time with the addition of the **statistics** keyword, showing a summary of message statistics for the selected neighbor:

```
show ancp neighbor sender-name 0006.2aaa.281b statistics

ANCP Neighbor Message Statistics
for Sender-name -, Description 0006.2aaa.281b
-----------------------------------------------
               Sent         Received
SYN            1            2
SNYACK         1            0
ACK            589          238
RSTACK         0            0
Port Up        -            10
Port Down      -            0
Drops          0            0
Total          600          250
```

The following example shows how to display generic information about ANCP configuration, along with neighbor and port counts by state:

```
show ancp summary

 ANCP Summary Information
 ------------------------------------------
 Capability:                Topology Discovery
 Server sender-name:        0013:1aff.c2bd

 Neighbor count by state:
   -                          0
   SYNSENT                    0
```

```
   SUNRCVD                      0
   ESTAB                        1
   ---------------------------------
   Total                        1

Port count by state:
  State Up                    1
  State Down                  0
  State Unknown               0
  ---------------------------------
  Total                       1

  No. configured ports        1
  No. mapped sub-interfaces   4
```

The following example shows how to display rate adjustment configuration information in addition to the generic information shown in the previous example:

```
show ancp summary detail

    ANCP Summary Information
   ---------------------------------------------
   Capability:                Topology Discovery
   Server sender-name:        0013:1aff.c2bd

Neighbor count by state:
  -                           0
  SYNSENT                     0
  SUNRCVD                     0
  ESTAB                       1
  ---------------------------------
  Total                       1
Port count by state:
  State Up                    1
  State Down                  0
  State Unknown               0
  ---------------------------------
  Total                       1

  No. configured ports        1
  No. mapped sub-interfaces   4

Rate adjustment configuration:
-----------------------------------------
DSL Type   Loop Type        Percent-Factor
-----------------------------------------
ADSL1      ETHERNET               90
ADSL2      ETHERNET               100
ADSL2PLUS  ETHERNET               100
VDSL1      ETHERNET               100
VDSL2      ETHERNET               100
SDSL       ETHERNET               100
ADSL1      ATM                    100
ADSL2      ATM                    100
ADSL2PLUS  ATM                    100
VDSL1      ATM                    100
VDSL2      ATM                    100
SDSL       ATM                    100
```

The following example shows how to display a summary of ANCP message statistics:

```
show ancp summary statistics
```

```
 ANCP Summary Message Statistics
-------------------------------------
              Sent          Received
SYN           3             6
SYNACK        4             0
ACK           7105          2819
RSTACK        2             0
Port Up       -             6
Port Down     -             0
Drops         0             0
Total         7114          2831
```

The following example shows how to clear all neighbor data and statistics:

```
clear ancp neighbor all
```

The following example shows how to clear a specific neighbor:

```
clear ancp neighbor description vendor1a
```

The following example shows how to clear aggregate message statistics:

```
clear ancp summary statistics
```

Mapping AN ports to VLAN Subinterfaces: Example

The following example shows a unique access node ID being defined:

```
configure
ancp an-port circuit-id circuit1 interface gigabitethernet 2/0/1/1.1
```

The following example shows how to display information for a port identified by its subinterface:

```
show ancp an-port interface gigabitethernet 0/0/0/37.1
```

```
  AN port circuit-id ccc1:

  State                                                 UP
  UPtime                                                02:23:45
  Time Since Last Message                               00:00:00
  Encap Type                                            ETHERNET
  DSL type                                              ADSL1
  DSL Line State                                        SHOWTIME
  Number of Mapped Interfaces                           3
  Neighbor sender-name                                  0006.2aaa.281b
  Neighbor description                                   7200-client
  Configured Rate Adjustment                            90%
  Actual Downstream Data Rate (kbps)                    2500
  Effective Downstream Data Rate (kbps)                 2250
```

The following example shows how use the **detail** keyword to display port information as well as a list of the interfaces mapped to that port.

```
show ancp an-port circuit-id ccc1 detail
```

```
  AN port circuit-id ccc1:

  State                                                 UP
  UPtime                                                02:31:36
```

```
  Time Since Last Message                                   00:00:00
  Encap Type                                                ETHERNET
  DSL type                                                  ADSL1
  DSL Line State                                            SHOWTIME
  Number of Mapped Interfaces                               3
  Neighbor sender-name                                      0006.2aaa.281b
  Neighbor description                                       7200-client
  Configured Rate Adjustment                                90%
  Actual Downstream Data Rate (kbps)                        2500
  Effective Downstream Data Rate (kbps)                     2250
  Actual Data Rate Upstream/Downstream (kbps)               2500/2500
  Minimum Data Rate Upstream/Downstream (kbps)              0/0
  Attainable Data Rate Upstream/Downstream (kbps)           0/0
  Maximum Data Rate Upstream/Downstream (kbps)              0/0
  Minimum Low Power Data Rate Upstream/Downstream (kbps)    0/0
  Maximum Interleaving delay Upstream/Downstream (ms)       0/0
  Actual Interleaving Delay Upstream/Downstream (ms)        0/0

  Sub-interface Summary: total 3
  ------------------------------------------------
  Sub-interface Name                    ifhandle
  --------------------------------      ----------
  GigabitEthernet0/0/0/37.1             0x0
  GigabitEthernet0/0/0/37.11            0x0
  GigabitEthernet0/0/0/38.10            0xb80
```

The following example uses the **statistics** keyword to display port message statistics for a specific AN port:

```
show ancp an-port circuit-id ccc1 statistics

  Port message statistics for circuit-id ccc1:

    Port Up       5
    Port Down     0
```

The following example shows how to display port counts by state:

```
show ancp an-port summary

     AN Port Count Summary
  ------------------------------
  State UP                 4
  State DOWN               0
  Config only ports        0
  Total                    4
  # Configured ports       1
  # Mapped sub-interfaces  4
```

The following example shows how to clear message statistics for all AN ports:

```
clear ancp an-port all statistics
```

The following example shows how to clear dynamic data for all AN ports:

```
clear ancp an-port all
```

The following example show how to clear dynamic data for a specific interface:

```
clear ancp an-port interface gigabitethernet 0/1/0/10.5
```

Configuring ANCP Rate Adjustment: Example

ANCP and QoS Interaction: Example

The following example shows a hierarchical QoS policy configuration with and without an ANCP value applied:

```
policy-map child-3play
 class 3play-voip
  priority level 1
  police rate 65 kbps
  !
 !
 class 3play-video
  priority level 2
  police rate 128 kbps
  !
  random-detect cos 3 10 ms 100 ms
  random-detect cos 4 20 ms 200 ms
 !
 class 3play-premium
  bandwidth percent 100
 !
 class class-default
 !
 end-policy-map
!
policy-map parent-3play-subscriber-line
 class class-default
  service-policy child-3play
  shape average 1 mbps
 !
 end policy-map
!
```

A policy is applied on an interface without ANCP:

```
interface GigabitEthernet 0/1/0/0.1 l2transport
encapsulation dot1q 2
 service-policy output parent-3play-subscriber-line
!
```

The **show qos** command verifies that ANCP has not been applied (ANCP is shown as 0 kbps).

```
RP/0/RSP0/CPU0:router# show qos interface GigabitEthernet 0/1/0/0.1 out

Interface: GigabitEthernet0_1_0_0.1 output Bandwidth: 1000000 kbps
ANCP: 0 kbps
Policy: parent-3-play-subscriber-line Total number of classes: 5
------------------------------------------------------------------------------
Level: 0 Policy: parent-3-play-subscriber-line Class: class-default
QueueID: N/A
Shape Profile: 1 CIR: 960 kbps CBS: 1024 bytes PIR: 960 kbps PBS: 13312 bytes
WFQ Profile: 1 Committed Weight: 1 Excess Weight: 1
Bandwidth: 0 kbps, BW sum for Level 0: 1000000 kbps, Excess Ratio: 1
------------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-voip
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 8 (Priority 1)
Queue Limit: 16 kbytes Profile: 3 Scale Profile: 0
```

```
Policer Profile: 0 (Single)
Conform: 65 kbps (65 kbps) Burst: 1598 bytes (0 Default)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
------------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-video
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 9 (Priority 2)
Queue Limit: 8 kbytes (11 Unknown) Profile: 4 Scale Profile: 0
Policer Profile: 24 (Single)
Conform: 128 kbps (128 kbps) Burst: 1598 bytes (0 Default)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
WRED Type: COS based Table: 0 Profile: 4 Scale Profile: 0 Curves: 3
Default RED Curve Thresholds Min : 8 kbytes Max: 8 kbytes
WRED Curve: 1 Thresholds Min : 8 kbytes Max: 8kbytes
 Match: 3
WRED Curve: 2 Thresholds Min : 8 kbytes Max: 8 kbytes
 Match: 4
------------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3-play-premium
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 10 (Priority Normal)
Queue Limit: 16 kbytes Profile: 1 Scale Profile: 1
WFQ Profile: 4 Committed Weight: 100 Excess Weight: 100
Bandwidth: 1000 kbps, BW sum for Level 1: 1000 kbps, Excess Ratio: 1
------------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: class-default
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 11 (Priority Normal)
Queue Limit: 8 kbytes Profile: 1 Scale Profile: 0
WFQ Profile: 5 Committed Weight: 1 Excess Weight: 1
Bandwidth: 0 kbps, BW sum for Level 1: 1000 kbps, Excess Ratio: 1
------------------------------------------------------------------------------
RP/0/RSP0/CPU0:router#
```

ANCP AN-Port to Interface Mapping is applied:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ancp an-port circuit-id dslam1_port1 interface GigabitEthernet
 0/1/0/0.1
```

The **show ancp an-port interface** command shows the ANCP rate for the interface:

```
RP/0/RSP0/CPU0:router# show ancp an-port interface GigabitEthernet 0/1/0/0.1 detail

   AN port circuit-id dlsam1_port1:

   State                                              UP
   Uptime                                             00:00:32
   Time Since Last Message                            00:00:32
   Encap Type                                         ATM
   DSL Type                                           ADSL1
   DSL Line State                                     SHOWTIME
   Number of Mapped Sub-interfaces                    1
   Neighbor sender-name                               0000.0000.1bec
   Neighbor description                               -
   Configured Rate Adjustment                         100%
   Actual Downstream Data Rate (kbps)                 2000
   Effective Downstream Data Rate (kbps)              2000
   Actual Data Rate Upstream/Downstream (kbps)        2000/2000
```

```
   Minimum Data Rate Upstream/Downstream (kbps)           0/0
   Attainable Data Rate Upstream/Downstream (kbps)        0/0
   Maximum Data Rate Upstream/Downstream (kbps)           0/0
   Minimum Low Power Data Rate Upstream/Downstream (kbps) 0/0
   Maximum Interleaving Delay Upstream/Downstream (ms)    0/0
   Actual Interleaving Delay Upstream/Downstream (ms)     0/0

Sub-interface Summary: total 1
-----------------------------------------------------
Sub-interface name                    ifhandle
----------------------------------    ----------
GigabitEthernet0/1/0.1                0x215e042
```

The **show qos** command verifies that ANCP has been applied (ANCP is now shown as 1920 kbps).

```
RP/0/RSP0/CPU0/router# show qos interface GigabitEthernet 0/1/0.1 out

Interface GigabitEthernet0_1_0_0.1 output Bandwidth: 1000000 kbps
ANCP: 1920 kbps
Policy: parent-3play-subscriber-line Total number of classes: 5
----------------------------------------------------------------------
Level: 0 Policy: parent-3-play-subscriber-line Class: class-default
QueueID: N/A
Shape Profile: 1 CIR: 1920 kbps CBS: 1024 bytes PIR: 1920 kbps PBS: 13312 bytes
WFQ Profile: 1 Committed Weight: 1 Excess Weight: 1
Bandwidth: 0 kbps, BW sum for Level 0: 1000000 kbps, Excess Ratio: 1
------------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-voip
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 8 (Priority 1)
Queue Limit: 16 kbytes Profile: 3 Scale Profile: 0
Policer Profile: 0 (Single)
Conform: 65 kbps (65 kbps) Burst: 1598 bytes (0 Default)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
------------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-video
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 9 (Priority 2)
Queue Limit: 8 kbytes (11 Unknown) Profile: 4 Scale Profile: 0
Policer Profile: 24 (Single)
Conform: 128 kbps (128 kbps) Burst: 1598 bytes (0 Default)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
WRED Type: COS based Table: 0 Profile: 4 Scale Profile: 0 Curves: 3
Default RED Curve Thresholds Min : 8 kbytes Max: 8 kbytes
WRED Curve: 1 Thresholds Min : 8 kbytes Max: 8kbytes
 Match: 3
WRED Curve: 2 Thresholds Min : 8 kbytes Max: 8 kbytes
 Match: 4
------------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3-play-premium
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 10 (Priority Normal)
Queue Limit: 24 kbytes Profile: 1 Scale Profile: 8
WFQ Profile: 4 Committed Weight: 100 Excess Weight: 100
Bandwidth: 1920 kbps, BW sum for Level 1: 1920 kbps, Excess Ratio: 1
------------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: class-default
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 11 (Priority Normal)
Queue Limit: 8 kbytes Profile: 1 Scale Profile: 0
```

```
WFQ Profile: 5 Committed Weight: 1 Excess Weight: 1
Bandwidth: 0 kbps, BW sum for Level 1: 1920 kbps, Excess Ratio: 1
------------------------------------------------------------------------------
```

QoS Policy Inconsistency on an Interface: Example

A valid QoS policy with absolute or percentage values must satisfy the following requirement:

interface speed > ANCP rate > QoS parent shaper rate

A Qos policy successfully applied to an interface can become invalid due to two possible external factors. These two factors are an ANCP rate change or a port speed change:

- ANCP Rate Change—If the ANCP rate falls, or the ANCP rate adjustment factor makes the ANCP rate fall below the shaper rate of the top-most QoS policy map, the QoS policy on the interface becomes invalid.
- Port Speed Change—The port of a GigabitEthernet interface can be configured to 10 Mbps or 100 Mbps mode from the default of 1000 Mbps. When this happens, the interface speed drops to less than the ANCP rate and QoS parent shaper rate. The QoS policy on the interface becomes invalid.

When either of these changes occur, the QoS policy on the interface is placed in the inconsistency state. To recover from the inconsistency state, perform one of the following tasks:

- Remove the QoS policy from the interface, adjust the QoS policy values, then reapply the QoS policy to the interface.
- If the ANCP adjustment rate or the ANCP rate has been modified, update the ANCP rate to satisfy the QoS policy rate requirement.
- If port speed has been modified, update the speed to satisfy the QoS policy rate requirement.

Following are examples of the effects of an ANCP rate change and a port speed change have on the following QoS policy configuration on a Gigabit Ethernet interface:

```
policy-map child-3play
 class 3play-voip
  priority level 1
  police rate 65 kbps
  !
 !
 class 3play-video
  priority level 2
  police rate 128 kbps
  !
   random-detect cos 3 10 ms 100 ms
   random-detect cos 4 20 ms 200 ms
 !
 class 3play-premium
  bandwidth percent 100
 !
 Class class-default
 !
 end-policy-map
!
policy-map parent-3play-subscriber-line
 class class-default
  service-policy child-3play
  bandwidth 200 mbps
```

```
  bandwidth remaining percent 100
  shape average 800 mbps
 !
 end-policy-map
!
```

If the ANCP rate value 999936 kbps, and the ANCP rate factor is 100 percent, the ANCP rate value of 999936 is applied to the interface. This satisfies the requirement:

Interface speed (1000000 kbps) > ANCP rate (999936 kbps) > QoS parent shaper rate (800000 kbps)

This is a successful application of the policy as shown by the following **show qos interface** command output:

```
show qos interface gig0/0/0/11.1 output

Wed Mar 18 18:25:20.140 UTC
Interface: GigabitEthernet0_0_0_11.1 output Bandwidth: 1000000 kbps ANCP: 999936 kbps
Policy: parent-3play-subscriber-line Total number of classes: 5
------------------------------------------------------------------------
Level: 0 Policy: parent-3play-subscriber-line Class: class-default
QueueID: N/A
Shape Profile: 1 CIR: 200000 kbps (200 mbps)
CBS: 100352 bytes PIR: 999936 kbps PBS: 12517376 bytes
WFQ Profile: 1 Committed Weight: 51 Excess Weight: 100
Bandwidth: 200000 kbps, BW sum for Level 0: 1000000 kbps, Excess Ratio: 100
------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-voip
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 136 (Priority 1)
Queue Limit: 16 kbytes Profile: 3 Scale Profile: 0
Policer Profile: 0 (Single)
Conform: 65 kbps (65 kbps) Burst: 1598 bytes (0 Default)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-video
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 137 (Priority 2)
Queue Limit: 8 kbytes (11 Unknown) Profile: 4 Scale Profile: 0
Policer Profile: 24 (Single)
Conform: 128 kbps (128 kbps) Burst: 1598 bytes (0 Default)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
WRED Type: COS based Table: 0 Profile: 4 Scale Profile: 0 Curves: 3
Default RED Curve Thresholds Min : 8 kbytes Max: 8 kbytes
WRED Curve: 1 Thresholds Min : 8 kbytes Max: 8 kbytes
 Match: 3
WRED Curve: 2 Thresholds Min : 8 kbytes Max: 8 kbytes
 Match: 4
------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-premium
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 138 (Priority Normal)
Queue Limit: 2097 kbytes Profile: 2 Scale Profile: 0
WFQ Profile: 6 Committed Weight: 1020 Excess Weight: 1020
Bandwidth: 200000 kbps, BW sum for Level 1: 200000 kbps, Excess Ratio: 1
------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: class-default
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 139 (Priority Normal)
Queue Limit: 65 kbytes Profile: 1 Scale Profile: 3
WFQ Profile: 0 Committed Weight: 1 Excess Weight: 1020
```

```
Bandwidth: 0 kbps, BW sum for Level 1: 200000 kbps, Excess Ratio: 1
------------------------------------------------------------------------
```

ANCP Rate Change

If the ANCP rate falls below the QoS parent shaper rate for example, to 300000 kbps, and the ANCP rate adjustment factor remains at 100 percent, the ANCP rate is no longer greater than the QoS parent shaper rate of 800000 kbps. This causes the QoS policy on the interface to be placed in the inconsistency state as shown by the following **show qos interface** command output:

```
show qos interface gig0/0/0/11.1 output

Wed Mar 18 18:21:11.180 UTC
Interface: GigabitEthernet0_0_0_11.1 output Bandwidth: 1000000 kbps ANCP: 299904 kbps
 *Inconsistency* :  ANCP - Downstream Rate less than Shaper Rate
Policy: parent-3play-subscriber-line Total number of classes: 5
------------------------------------------------------------------------
Level: 0 Policy: parent-3play-subscriber-line Class: class-default
QueueID: N/A
Shape Profile: 2 CIR: 200000 kbps (200 mbps)
CBS: 100352 bytes PIR: 800000 kbps PBS: 10027008 bytes
WFQ Profile: 1 Committed Weight: 51 Excess Weight: 100
Bandwidth: 200000 kbps, BW sum for Level 0: 1000000 kbps, Excess Ratio: 100
------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-voip
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 136 (Priority 1)
Queue Limit: 16 kbytes Profile: 3 Scale Profile: 0
Policer Profile: 0 (Single)
Conform: 65 kbps (65 kbps) Burst: 1598 bytes (0 Default)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-video
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 137 (Priority 2)
Queue Limit: 8 kbytes (11 Unknown) Profile: 4 Scale Profile: 0
Policer Profile: 24 (Single)
Conform: 128 kbps (128 kbps) Burst: 1598 bytes (0 Default)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
WRED Type: COS based Table: 0 Profile: 4 Scale Profile: 0 Curves: 3
Default RED Curve Thresholds Min : 8 kbytes Max: 8 kbytes
WRED Curve: 1 Thresholds Min : 8 kbytes Max: 8 kbytes
 Match: 3
WRED Curve: 2 Thresholds Min : 8 kbytes Max: 8 kbytes
 Match: 4
------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-premium
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 138 (Priority Normal)
Queue Limit: 2097 kbytes Profile: 2 Scale Profile: 0
WFQ Profile: 6 Committed Weight: 1020 Excess Weight: 1020
Bandwidth: 200000 kbps, BW sum for Level 1: 200000 kbps, Excess Ratio: 1
------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: class-default
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 139 (Priority Normal)
Queue Limit: 65 kbytes Profile: 1 Scale Profile: 3
WFQ Profile: 0 Committed Weight: 1 Excess Weight: 1020
```

```
Bandwidth: 0 kbps, BW sum for Level 1: 200000 kbps, Excess Ratio: 1
------------------------------------------------------------------------
```

Once the ANCP rate returns to the configured value, the inconsistency is automatically cleared, which can be confirmed by issuing the **show qos interface** command.

Note If the ANCP rate has been configured to a value less than the shape rate, the inconsistency is not automatically cleared, and the policy must be modified and reapplied. To prevent this from occurring, be sure to configure the policy-map shape rate to the minimum value of all ANCP rates for a given service level.

Port Speed Change

If the port speed is configured to less than the QoS parent shaper rate for example to 100 Mbps (100000 kbps), the requirement is no longer met since the port speed is no longer greater than the QoS parent shaper rate of 800000 kbps.

```
RP/0/RSP0/CPU0:ro-node1#conf
RP/0/RSP0/CPU0:ro-node1(config)#int gigabitEthernet 0/0/0/1
RP/0/RSP0/CPU0:ro-node1(config-if)#speed 100
RP/0/RSP0/CPU0:ro-node1(config-if)#commit
LC/0/0/CPU0:Nov  4 05:36:55.041 : qos_ma_ea[197]: %QOS-QOS_EA_MODIFY_FAIL-3-ERROR :
inconsistency detected due to ANCP or Bandwidth modification. Execute show qos inconsistency,
 to obtain information. Policy resolution failure
RP/0/RSP0/CPU0:ro-node1(config-if)#end
```

This causes the QoS policy on the interface to be placed in the inconsistency state as shown by the following **show qos interface** command output:

```
RP/0/RSP0/CPU0:ro-node1#sh qos int gigabitEthernet 0/0/0/1.1 output
Interface: GigabitEthernet0_0_0_1.1 output Bandwidth: 1000000 kbps ANCP: 0 kbps
 *Inconsistency* :  Port speed modify fails on Policy
Policy: parent-3play-subscriber-line Total number of classes: 5
------------------------------------------------------------------------
Level: 0 Policy: parent-3play-subscriber-line Class: class-default
QueueID: N/A
Shape Profile: 1 CIR: 200000 kbps (200 mbps)
CBS: 100352 bytes PIR: 800000 kbps PBS: 10027008 bytes
WFQ Profile: 1 Committed Weight: 51 Excess Weight: 100
Bandwidth: 200000 kbps, BW sum for Level 0: 1000000 kbps, Excess Ratio: 100
------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-voip
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 640 (Priority 1)
Queue Limit: 16 kbytes Profile: 3 Scale Profile: 0
Policer Profile: 0 (Single)
Conform: 65 kbps (65 kbps) Burst: 1598 bytes (0 Default)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-video
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 641 (Priority 2)
Queue Limit: 8 kbytes Profile: 4 Scale Profile: 0
Policer Profile: 24 (Single)
Conform: 128 kbps (128 kbps) Burst: 1598 bytes (0 Default)
Child Policer Conform: TX
```

```
Child Policer Exceed: DROP
Child Policer Violate: DROP
WRED Type: COS based Table: 2 Profile: 4 Scale Profile: 0 Curves: 3
Default RED Curve Thresholds Min : 8 kbytes Max: 8 kbytes
WRED Curve: 1 Thresholds Min : 8 kbytes Max: 8 kbytes
 Match: 3
WRED Curve: 2 Thresholds Min : 8 kbytes Max: 8 kbytes
 Match: 4
------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: 3play-premium
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 642 (Priority Normal)
Queue Limit: 4194 kbytes Profile: 2 Scale Profile: 1
WFQ Profile: 3 Committed Weight: 1020 Excess Weight: 1020
Bandwidth: 200000 kbps, BW sum for Level 1: 200000 kbps, Excess Ratio: 1
------------------------------------------------------------------------
Level: 1 Policy: child-3play Class: class-default
Parent Policy: parent-3play-subscriber-line Class: class-default
QueueID: 643 (Priority Normal)
Queue Limit: 4194 kbytes Profile: 2 Scale Profile: 1
WFQ Profile: 4 Committed Weight: 1 Excess Weight: 1
Bandwidth: 0 kbps, BW sum for Level 1: 200000 kbps, Excess Ratio: 1
------------------------------------------------------------------------
```

To resolve this issue, the port speed must be set back to 1000 Mbps (1000000 kbps) using the **no speed** command.

```
RP/0/RSP0/CPU0:ro-node1#conf
RP/0/RSP0/CPU0:ro-node1(config)#int gigabitEthernet 0/0/0/1
RP/0/RSP0/CPU0:ro-node1(config-if)#no speed
RP/0/RSP0/CPU0:ro-node1(config-if)#commit
LC/0/0/CPU0:Nov  4 05:37:39.171 : ifmgr[144]: %PKT_INFRA-LINEPROTO-5-UPDOWN : Line protocol
 on Interface GigabitEthernet0/0/0/1, changed state to Up
```

The clearing of the inconsistency can be verified by again issuing the **show qos interface** command.

The show qos inconsistency Command: Example

A command related to **show qos interface** command provides additional detail about QoS policy inconsistency:

```
RP/0/RSP0/CPU0:RO2#show qos inconsistency detail 0 location 0/7/CPU0

Interface Lists with QoS Inconsistency Warning:
=======================================================

                     Node 0/7/CPU0
-------------------------------------------------------

Interfaces with QoS Inconsistency:  ANCP - No Shaper at top policymap
========================================================================
Interface                  Direction  Policy Name             SPI Name
------------------------------------------------------------------------
GigabitEthernet0/7/0/1.5     output    parent-none

Interfaces with QoS Inconsistency:  ANCP - Downstream Rate less than Shaper Rate
========================================================================
Interface                  Direction  Policy Name             SPI Name
------------------------------------------------------------------------
GigabitEthernet0/7/0/1       output    parent                  SPI1
GigabitEthernet0/7/0/1.2     output    parent
GigabitEthernet0/7/0/1       output    normal-policy-name      normal-spi-name
```

```
RP/0/RSP0/CPU0:RO2#
RP/0/RSP0/CPU0:RO2#show qos inconsistency summary location 0/7/CPU0

Summary Counts of QoS Inconsistency Warnings:
============================================================


                     Node 0/7/CPU0

   Inconsistency Warning Type                 Count
------------------------------------------------------------
ANCP - No Shaper at top policymap:               1
ANCP - Downstream Rate less than Shaper Rate:    4
RP/0/RSP0/CPU0:RO2#
```

Additional References

The following sections provide references related to implementing ANCP.

Related Documents

Related Topic	Document Title
Initial system bootup and configuration	*Cisco ASR 9000 Series Aggregation Services Router Gett Guide*
QoS commands	*Cisco ASR 9000 Series Aggregation Services Router Mod of Service Command Reference*
User groups and task IDs	"Configuring AAA Services on Cisco ASR 9000 Series Ro of Cisco Cisco ASR 9000 Series Aggregation Services Re Security Configuration Guide

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
—	To locate and download MIBs using Cisco IOS XR softw Cisco MIB Locator found at the following URL and choo under the Cisco Access Products menu: http://cisco.com/public/sw-center/netmgmt/cmtk/mibs.sht

RFCs

RFCs	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/cisco/web/support/index.html

Configuring Access Node Control Protocol

Access Node Control Protocol (ANCP) creates a control plane between a service-oriented aggregation device and an access node (AN) (for example, a DSLAM) in order to perform QoS-related, service-related, and subscriber-related operations. An ANCP server accepts and maintains ANCP adjacencies (sessions with an ANCP neighbor), and sending and receiving ANCP messages. ANCP allows static mapping between ANCP ports and VLAN subinterfaces so that DSL rate updates for a specific subscriber received by the ANCP server are applied to the QoS configuration corresponding to that subscriber. DSL train rates received via ANCP are used to alter shaping rates on subscriber-facing interfaces and subinterfaces on the router. ANCP runs as a single process on the route processor (RP).

This module provides the conceptual and configuration information for implementing ANCP.

Line Card, SIP, and SPA Support

Feature	ASR 9000 Ethernet Line Cards	SIP 700 for the ASR 9000
Access Node Control Protocol	yes	no

Feature History for Configuring Access Node Protocol on Cisco ASR 9000 Series Routers

Release	Modification
Release 3.7.2	The Access Node Control Protocol feature was introduced.
Release 3.9.0	Mapping of ANCP ports to VLAN interfaces over Ethernet bundles was added.
Release 4.0.0	ANCP over Multi Chassis Link Aggregation was introduced.