Configure QoS with APIC-EM Controller

APIC-EM Controller Overview

The APIC-EM Controller provides a centralized system for managing network traffic so that you always have the bandwidth to maintain communications, even in congested networks. You can configure Cisco Unified Communications Manager to use the APIC-EM Controller to manage SIP media flows thereby providing the following benefits:

- Centralizes QoS management, thereby eliminating the need for endpoints to assign DSCP values.

- Applies differential QoS treatment for different media flows. For example, you can prioritize audio over video to ensure that basic audio communication is always maintained, even when network bandwidth is low.

- External QoS setting in the SIP Profile allows you to target which users will use the APIC-EM. For example, you may have Cisco Jabber users use the APIC-EM to manage media flows, while Cisco Unified IP Phone users use the DSCP settings in Cisco Unified Communications Manager

SIP Media Flow Management

For SIP calls that use APIC-EM, Cisco Unified Communications Manager sends the policy request to the APIC-EM Controller at the call outset notifying the APIC-EM of the media flow that is being set up. The policy request contains information about the call, including the IP address and ports for source and destination devices, the media type for the flow and the protocol.

The APIC-EM notifies the switch at the beginning of the call flow of the DSCP values for the associated media flows. The switch inserts those DSCP values into individual media packets, overwriting any values that the endpoint inserts. If a gateway in the call flow experiences congestion, that gateway sends through the packets with the higher DSCP values first. This ensures that high priority audio and video streams are not blocked by lower-priority network traffic such as email, print jobs, or software downloads. When the call ends, Cisco Unified Communications Manager notifies the APIC-EM and the APIC-EM notifies the switch to delete the flow.

External QoS Support

In order for Cisco Unified Communications Manager to use the APIC-EM to manage media flows, the External QoS parameter must be enabled at both the system level, via a clusterwide service parameter, and at the device level, via the SIP Profile.

APIC-EM Controller Prerequisites

Before using APIC-EM, you must do the following:

- Configure DSCP priority for different SIP media flows in Cisco Unified Communications Manager. For details, see DSCP Settings Configuration Task Flow.

- Configure the APIC-EM controller hardware within your network. For details, see the hardware documentation that comes with the APIC-EM controller.

APIC-EM Controller Configuration Task Flow

Complete these tasks on Cisco Unified Communications Manager to enable APIC-EM Controller to manage SIP media flows.

Procedure

	Command or Action	Purpose
Step 1	Configure the APIC-EM Controller, on page 3	Configure Unified CM on the APIC-EM Controller.
Step 2	Upload APIC-EM Controller Certificate, on page 3	Upload the APIC-EM certificate into Cisco Unified OS Administration.
Step 3	Configure HTTPS Connection to APIC-EM Controller, on page 4	Configure an HTTP Profile that points to the APIC-EM service.
Step 4	Enable External QoS Service for System, on page 4	Enable the **External QoS Enable** service parameter to configure the system to use the APIC-EM to manage media flows. The service parameter must be enabled for devices to use the APIC-EM for SIP media flow management. **Note** You must also enable external QoS within the SIP Profile for devices that will use the APIC-EM for SIP media flow management.
Step 5	Configure External QoS Service at SIP Profile Level, on page 4	Enable external QoS within a SIP Profile. All devices that use this SIP Profile will be able to use the APIC-EM to manage SIP media flows

	Command or Action	Purpose
		You can use the SIP Profile setting to configure which devices and device types you want the APIC-EM to manage media flows.
Step 6	Assign SIP Profile to Phones, on page 5	Associate the external QoS-enabled SIP Profile to a phone.

Configure the APIC-EM Controller

Use this procedure on the APIC-EM Controller to add Cisco Unified Communications Manager as a user. APIC-EM's role-based access control feature provides Cisco Unified Communications Manager with access to APIC-EM resources.

Procedure

Step 1 On the APIC-EM Controller, choose **Settings** > **Internal Users**.

Step 2 Create a new user with the following role: **ROLE_POLICY_ADMIN**. Keep track of the username and password that you enter because you must enter identical credentials in Cisco Unified Communications Manager's **HTTP Profile** window.

Step 3 Go to the **Discovery** tab and add a discovery with CDP or the IP address range of the available devices.

Step 4 Select the **Device Inventory** tab and select the reachable devices.

Step 5 Click on **Set Policy Tag**.

Step 6 Create a policy tag and set it for the devices.

Step 7 On the **EasyQoS** tab, select the policy that you created and enable **DynamicQoS**.

Upload APIC-EM Controller Certificate

Use this procedure to upload the APIC-EM controller certificate into Cisco Unified Communications Manager.

Procedure

Step 1 From Cisco Unified OS Administration, choose **Security** > **Certificate Management**.

Step 2 Click **Upload Certificate/Certificate Chain**.
The **Upload Certificate/Certificate Chain** popup window appears.

Step 3 From the **Certificate Purpose** drop-down list, choose **CallManager-trust**.

Step 4 Enter a **Description** for the certificate.

Step 5 Click **Browse** to search for, and select, the certificate.

Step 6 Click **Upload**.

Configure HTTPS Connection to APIC-EM Controller

Use this procedure to set up an HTTP Profile to connect Cisco Unified Communications Manager to the APIC-EM Controller. In this connection, Cisco Unified Communications Manager acts as an HTTP user and the APIC-EM acts as the HTTP server.

Procedure

Step 1 From Cisco Unified CM Administration, choose **Call Routing** > **HTTP Profile**.

Step 2 Enter a **Name** for the service.

Step 3 Enter the **User Name** and **Password** for this HTTP connection. The user name does not have to be a configured end user in Cisco Unified Communications Manager, but the user name and password must match the values that are configured in the APIC-EM Controller.

Step 4 In the **Web Service Root URI** text box, enter the IP address or fully qualified domain name of the APIC-EM service.

Step 5 Configure any remaining fields in the HTTP Profile window. For help with the fields and their options, refer to the online help.

Step 6 Click **Save**.

Enable External QoS Service for System

Enable External QoS Service for System

Use this procedure to configure Cisco Unified Communications Manager to use an external service for QoS management. You must enable this service parameter in order to use an APIC-EM controller for QoS.

Procedure

Step 1 From Cisco Unified CM Administration, choose **System** > **Service Parameters**.

Step 2 From the **Server** drop-down list, select the publisher node.

Step 3 From the **Service** drop-down list, select **Cisco CallManager**.

Step 4 Set the value of the **External QoS Enabled** service parameter to **True**.

Step 5 Click **Save**.

Note To use the APIC-EM to manage call flows for devices, you must also enable external QoS within the SIP Profile for the device.

Configure External QoS Service at SIP Profile Level

If you have enabled the **External QoS Enabled** clusterwide service parameter, use this procedure to enable external QoS for SIP devices that use this SIP Profile.

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Note External QoS must be enabled at both the system level and in the SIP Profile to use the APIC-EM to manage QoS.

Procedure

Step 1 In Cisco Unified CM Administration, choose **Device** > **Device Settings** > **SIP Profile**.

Step 2 Do one of the following:

- Click **Find** and select an existing SIP Profile.
- Click **Add New** to create a new SIP Profile.

Step 3 Check the **Enable External QoS** check box. This check box must be checked for phones that use this SIP Profile to use the APIC-EM Controller to manage QoS.

Step 4 Complete the remaining fields in the **SIP Profile Configuration** window. For help with the fields and their settings, see the online help.

Step 5 Click **Save**.

Assign SIP Profile to Phones

Use this procedure if you want to assign the external QoS-enabled SIP Profile that you created to a phone.

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Tip Use the Bulk Administration Tool to update the SIP Profile for a large selection of phones in a single operation. For details, see the *Bulk Administration Guide for Cisco Unified Communications Manager.*

Procedure

Step 1 In Cisco Unified CM Administration, choose **Device** > **Phone**.

Step 2 Click **Find** and select an existing phone.

Step 3 From the **SIP Profile** drop-down list, select the SIP Profile that you updated for phones that will use the APIC-EM Controller to manage traffic.

Step 4 Complete any remaining fields in the **Phone Configuration** window. For more information on the fields and their configuration options, see Online Help.

Step 5 Click **Save**.