

Applying QoS Policies to VPN Services

The Cisco IP Solution Center (ISC) supports Ethernet QoS provisioning at the access circuit (the CPE-PE link). ISC can provision QoS policies for a network independent of VPN services (IP QoS) or in addition to VPN services that have been provisioned by ISC (Ethernet QoS and IP QoS for MPLS VPN).

- IP QoS provisioning is described in Chapter 5, "Provisioning Process for IP QoS."
- QoS policies for VPN services (Ethernet QoS) are deployed on top of an existing VPN service request; such as MPLS, L2VPN, and VPLS. ISC derives interface configuration information from the VPN service and applies the QoS policy to the interfaces.

Additionally, ISC supports the following QoS parameters for VPN services:

• For an MPLS network, marking packets with MPLS Experimental values (MPLS Exp.) at the PE ingress interface.

This chapter describes how to apply QoS policies to VPN services provisioned by ISC.

In ISC, the Ethernet QoS service model is comprised of:

- Ethernet Qos Policy
- Ethernet Qos policies applied to an Ethernet (L2VPN, MPLS VPN, VPLS) service request

The chapter contains the following sections:

- Service Level Ethernet QoS Policy, page 7-1
- Ethernet QoS for L2VPN, VPLS, and Layer 2 Access into MPLS VPN, page 7-10
- IP QoS for MPLS VPNs, page 7-14

Service Level Ethernet QoS Policy

The Ethernet QoS policy is the set of rules or conditions that apply to frames as they come across each port. This set of rules is defined in an Ethernet QoS service class.

An Ethernet QoS service class provides a method for classifying traffic flows into classes of service (CoS) so that you can apply the appropriate QoS parameters to a class of traffic instead of applying them to all traffic. For example, all IP traffic might be grouped into a single class so that bandwidth is allocated for the class and not for individual traffic flows.

An Ethernet QoS service class can include:

- Methods for classifying traffic (all IP traffic, all Mac traffic, DSCP value, IP precedence value)
- Methods for marking traffic (class of service)

- Rate limiting parameters (mean, burst size, conform/exceed)
- Congestion management parameters (bandwidth and queue limit)

A typical service provider network might create different QoS policies, and each QoS policy might contain 3 to 4 service classes. For example, a service provider might have gold, silver, and bronze QoS policies, each specifying different service level agreements (SLA), and each of those QoS policies might contain one or more service classes. Most networks require at least a voice, and a data service class.

ISC provides four default CoS templates to modify.

- Architecture for Voice, Video and Integrated Data (AVVID)
- Call Control ٠
- **Business** Critical
- Best Effort ٠

Select the service classes to use in the Ethernet QoS policy and edit each one with the required parameters. All service classes should contain, at least, rate limiting information. You can also add a service class, delete an unused service class, or change the order of the service classes. ISC supports the number of service classes defined by the Cisco differentiated services (DiffServ) architecture; up to 64 classes for DSCP traffic, and up to 8 service classes for IP Precedence traffic.

The following sections describe how to create the CoS portion of an Ethernet QoS Policy using the ISC user interface. For detailed information on the entry fields for each service class parameter, see Service Level Ethernet QoS Policy Entry Fields, page 7-8.

To create an Ethernet QoS policy:

Step 1 On the Service Design tab, click **Policy Manager** (see Figure 7-1).

Home | Shortcuts | Account | Index | Help | About | Logout CISCO SYSTEMS **IP Solution Center** ىللە. vice Inventory Service Design Monitoring Administration User: admir You Are Here: • Service Design Customer: No Service Design Tools to create and manage policies, templates, protocols, network objects, and FVVSM resource Create and manage Policies for licensed services Create and man age Templates and associated dat Create and manage Protocols and Protocol Bundles QoS Link QoS Create and manage IP Link QoS settings. Create and manage network objects for security services. The Policies window appears (Figure 7-2).

Figure 7-1 **Policy Manager**

4 141

Figure 7-2

Create QoS Policy

CISCO SYSTEMS]	(P \$	Solution Co	enter			Hon	ne Shorto	uts Acco	unt Index F	Help About Logo	out
v Policies v	Temp	Serv ates	• Protocols • Lin	Service Design	Monitoring	Admin	istration				User: adn	nin
You Are Here: Service Desig	n > Polic	ies									Customer: No	one
	Р	olici	ies									
				Show Po	licies with Policy N	ame	Matching *		of	Type All	• Find	
										Showing	1 - 10 of 25 record	s
		# □		Policy Name			Туре			Owne	r	
		1. 🗖	ATM_no CE			L2VPN			Customer -	CUST-B		
		2. 🗖	CE No VLANID			VPLS			Customer -	CUST-B		
		3. 🗖	CUST-B ERS L2VPN	QoS		Ethernet	QoS		Customer -	CUST-B		
		4. 🗖	Cust-B EVVS Policy			L2VPN			Customer -	CUST-B		
		5. 🗖	CUST-BI2vpn EWS			Ethernet	QoS		Customer -	CUST-B		
		6. 🗖	CUST-Bino VLANID			L2VPN			Customer -	CUST-B		
		7. 🗖	Cust-B QoS			IP QoS		MPLS	Policy	:UST-B		
		8. 🗖	Cust-B_ERS			L2VPN		L2VPN	Policy	:UST-B		
		9. 🗖	ERS_no_CE			L2VPN		VPLS	Policy	:UST-B		
	1	0. 🗖	ews noce novlanid			VPLS		QoS	Policy	:UST-B		
		Por						IPsec	Policy	to name: 1	of 3 [60] [0.01]	
		NU	ws per page. 110					Firewa	II Policy	to page. I		
								Create	▼ E	dit Co	py Delete	105
												4

The Policies window lists all policies that currently exist for the different ISC services. Use this window to create, edit, or delete to an existing policy.

Note

Policies that are currently associated with a QoS service request cannot be edited or deleted.

Step 2 Click Create and choose QoS Policy from the menu. The Qos Policy Creation window appears (see Figure 7-3).

Figure 7-3	Create U05 Policy		
CISCO SYSTEMS	IP Solution Center	Home Shortcuts Account Index Help About Logout	
• Policies	Service Inventory Service Design Monitoring Administration Templates • Protocols • Link QoS • Network Objects •	User: admin	
You Are Here: Service Desig	1º Policies	Customer: None	
Selection IP QoS <u>Ethernet QoS</u>	QoS Policy Creation This section contains tasks specific to creating IP QoS Policies and Ethernet QoS Policies		114107

7 0

Step 3 Select Ethernet QoS from the TOC at left. The Edit Ethernet QoS Policy window (Figure 7-4) appears.

Figure 7-4	Edit	Ether	net QoS Po	olicy						
Cisco Systems untilitionantilition. • Poli	IP Ser	Soluti vice Inv ver + Te	on Center entory Servi mplate Manager	ce Design Mon	nitoring 🖡 🔹 Link QoS I	ldministrat Manager ↓ N	tion letwork Objec	Home IAccou ts Manager ↓	unt Index Logout	l Help About User: admin
You Are Here: Service Design:	 Policy Mar 	nager								
	Edit	Etherne	t QoS Policy							
		Policy Nar	ne*:							
		Owner*:	Customer C Provider		Select					
									Showing 1-4 of 4	records
		#				Name			Order	
		1.		AVVID					↑ ↓	
		2.		CALL_CONTROL					+ ↓	
		З.		BUSINESS_CRITICAL					↑ ↓	
		4.		BEST EFFORT					↑ ↓	
		Rows	per page: 10 💌					🛛 🗐 🗐 Go to page	e: 1 of 1 🙆	
						Add CoS	Edit CoS	Delete CoS	Save Ca	ncel
1000		Note: * - F	equired Field							

The Edit Ethernet QoS Policy window lists the policy name, the owner (customer or provider) for this policy, and the four default service classes for ISC. Use this window to select and edit the service classes to use in the QoS policy.

In the Edit Ethernet QoS Policy window, enter the Policy Name. Choose a policy name that is easily Step 4 identified for your network. For example, if your customer is CustomerA, the policy name might be CustomerA-QoS-Policy.



We recommend that you choose an abbreviated policy name because it becomes part of the policy map name in the device configuration, and the policy map name cannot exceed 40 characters.

- Step 5 Select an Owner (Customer or Provider) for this QoS policy. Click the appropriate radio button and then click Select.
- Step 6 In the Customer (or Provider) for QoS Policy popup, choose the customer (provider) and click Select (Figure 7-5).

		Customer for QoS Policy
	Sł	how Customers with Customer Name matching
		Showing 1-2 of 2 records
	Select	Name
1.	۲	Customer-A
2.	0	Customer-B
	Row	s per page: 10 💌
		Select Cancel

Figure 7-5 Select Customer for QoS Policy

This identifies the customer for the QoS policy. You return to the Edit Ethernet QoS Policy window.

- **Step 7** The next step in defining the service level Ethernet QoS policy is to edit the service classes. You can include one or more service classes with the QoS policy. Edit the default service classes provided by ISC, delete the unwanted service classes, or create additional data service classes (**Add CoS**) if necessary.
- **Step 8** To modify a service class to an Ethernet QoS policy, select the class of service and click **Edit CoS**. The Edit Service Class window appears (Figure 7-6 and Figure 7-7).

Serv	vice Inventory Service Design Monitoring	Administration		Use
Policy Manag	er 🔹 Template Manager 🔶 Protocol Manager 🔶 Link (QoS Manager 🔹 Netwo	rk Objects Manager 🔸	
Service Design • Policy Man	lager			
Edit S	Service Class			
		Service Attributes		
	General			
	Service Name*	AVVID		
	Traffic Classification [*] (at least one setting is requi	red)		
	All IP Traffic:			
	All Mac Traffic:			
	DSCP (0-63):		(af41, af42, af43,) or (34, 36, 38,)	
	IP Precedence (0-7):	5	(3 4 5)	
	Marking	,	(of doing	
	Enabled:			
	COS:	5 -		
	Rate Limiting			
	Enabled:			
	Mean Rate (8000 - 2000000000 bps)*:			
	Conformed Burst Size (1000 - 512000000 bytes)		_	
	Conform Action	transmit	_	
	Exceed Action	dron	_	
	Conform Action	transmit	-	
			_	
	Congestion Management	Jurop		
	Enabled:	u		
	Bandwidth Maintet (1 85528);	1		
			_	
	Bandwidth in bps (1 - 10000000 bps):			
	Queue Limit Weight (1 - 100): 💛	20		
	Queue Number:	Priority Queue		

Figure 7-6 Edit Service Class—AVVID

Figure 7-7 Edit Service Class AVVID (continued)

Conform Action	transmit	
Exceed Action	drop	
Congestion Management	,	
Enabled:		
Bandwidth Weight (1 - 65536): 🍳	1	
Bandwidth in bps (1 - 10000000 bps): 🔍		
Queue Limit Weight (1 - 100): ᡐ	20	
Queue Number:	Priority Queue	
	ОКС	ancel
Note: * - Required Field		1426

Step 9 From the Edit Service Class window, enter the QoS parameters to apply to this service class and click **OK**.

Depending on the service class you are editing, you receive the appropriate window. For a detailed explanation of the entry fields for this service class and the windows for the other service classes, see Service Level Ethernet QoS Policy Entry Fields, page 7-8.

Step 10 Repeat Steps 7 and 8 for all service classes that you want applied to your QoS policy.

To change the processing order of the service classes, use the up and down arrow keys on the Edit Ethernet QoS Policy window. The processing order dictates the order in which the class-maps are applied to the policy map and subsequently the order in which they are processed.

- Step 11 Add another service class, if required. See Adding a Data Service Class, page 6-21.
- Step 12 Delete any service class that you do not require for this QoS policy. See Deleting a Service Class, page 6-21.
- Step 13 After you edit and create the required service classes, click Save to save the Ethernet QoS policy.

When you save an Ethernet QoS policy, a status information box is displayed on the bottom left of the ISC window. The following examples show the different status messages and user action required, to correct any problems.

a. Save succeeded. No further action is required. (Figure 7-8).

Figure 7-8 Save is Successful

Status	
Operation:	Save QoS Policy
Status:	🛒 Succeeded

b. Policy is in use and cannot be edited or deleted (Figure 7-9). To read the warning message, click More Info and take the necessary action to resolve the issue.

Figure 7-9 Edit QoS Policy with Warning

Status	
Operation:	Edit QoS Policy
Status:	Warning More Info

c. Save QoS policy failed (Figure 7-10). Click **More Info** to determine the source of the problem. You must fix all errors and resave before you can continue.

Figure 7-10 Save Unsuccessful

Status	
Operation:	Save QoS Policy
Status:	Failed More Info



Not all devices and Cisco IOS platforms support all QoS parameter options. If you have specified an option for a device that is not supported, you don't receive the warning or error until after you deploy the service request.

Service Level Ethernet QoS Policy Entry Fields

The service level Ethernet QoS policy contains entry fields on the service class windows and dialog boxes. These include all entry fields in the Architecture for Voice, Video and Integrated Data (AVVID), Call Control, Business Critical, and Best Effort service classes.

All the Ethernet QoS service classes have the same set of entry fields, including newly created service classes.

The window you see depends on the service class being edited. Figure 7-11 and Figure 7-12 show the Edit Service Class window for the AVVID service class.

 Policy Manager 	♦ Template Manager ♦ Protocol Manager ♦ Link	QoS Manager 🔸 Network Objects N	lanager 🔸
Service Design > Policy Manage Edit Sei	er rvice Class		
Eure Ser		Carnina Attaikudaa	
	General	Service Attributes	
	Service Name	AVVID	
	Traffic Classification [*] (at least one setting is requi	red)	
	All IP Traffic:		
	All Mac Traffic:		
	DSCP (0-63):	(af41, af4	2, af43,) or (34, 36, 38,)
	IP Precedence (0-7):	5 (3.4.5.))
	Marking	[(o, 1, 0)	,
	Enabled:		
	cos:	5 -	
	Rate Limiting		
	Enabled:		
	Mean Rate (8000 - 2000000000 bps)*:		
	Conformed Burst Size (1000 - 512000000 bytes)		
	Conform Action	transmit	
	Exceed Action	drop	
	Conform Action	transmit	
	Exceed Action	drop	
	Congestion Management		
	Enabled:		
	Bandwidth Weight (1 - 65536): 🍑	1	
	Bandwidth in bps (1 - 10000000 bps): ᡐ		
	Queue Limit Weight (1 - 100): 🍑	20	
	Queue Number:	Priority Queue	
			OK Cancel

Figure 7-11 Edit Ethernet QoS Service Class

drop
R.
14
1
20
Priority Queue
OK

Figure 7-12 Edit Ethernet QoS Service Class (continued)



Entry Field	Description
General	
Service Name	The name of the service class (AVVID, CALL_CONTROL, BUSINESS_CRITICAL, BEST EFFORT, or the name of your choice).
Traffic Classification	
All IP Traffic	Select all IP traffic.
All Mac Traffic	Select all Mac traffic
DSCP (0-63)	Selects traffic classification based on the packet's DSCP value.
IP Precedence	Selects traffic classification based on the packet's IP Precedence value.
Marking	
Enabled	Enable packet marking.
cos	Select a class of service. The range is 0 to 7.
Rate Limiting	
Enabled	Enable rate limiting.
Mean Rate	The long-term average transmission rate. The range is 8000 to 2000000000 bps.
Conformed Burst Size	The maximum size that traffic bursts can be before some traffic exceeds the rate limit. The range is 1000-512000000 bps.
Conform Action	The action to take on packets that conform to the specified rate limit. The default for Ethernet QoS is transmit —Sends the packet.
Exceed Action	The action to take on packets that exceed the specified rate limit. The default for Ethernet QoS is drop —drop the packet.
Congestion Management	
Enabled	Enable congestion management parameters.
Bandwidth Weight	The bandwidth guarantee for this service class. The range is 1 to 65536. This parameter is for the Catalyst 3550 switch only.

 Table 7-1
 Edit Ethernet Service Class Entry Fields

Entry Field	Description
Bandwidth in bps	The bandwidth in bps for this service class. The range is 1 to 10000000 bps. This parameter is for the Catalyst 4x00 switch only.
Queue Limit Weight	Limit the queue depth of the congesting traffic. The range is 1 to 100. This parameter is for the Catalyst 3550 switch only.
Queue Number	Choose a queue number from the drop-down menu. The choices are: 1, 2, Voice Ctrl Queue, or Priority queue.

Table 7-1	Edit Ethernet Service Class Entry Fields	(continued)
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Ethernet QoS for L2VPN, VPLS, and Layer 2 Access into MPLS VPN

This section describes how to apply QoS parameters to an existing Ethernet (L2VPN, MPLS, or VPLS) service request.

Note

Layer 2 access into the MPLS VPN service is a specialized service within MPLS VPN. See *Cisco IP Solution Center MPLS VPN User Guide*, 4.0 for more information.

Checking Prerequisites

Before you can apply QoS parameters to an Ethernet network, you must already have:

- An existing Ethernet QoS policy.
- An existing L2VPN, MPLS, or VPLS service request. This service request can either be in the *Requested*, *Deployed*, or *Failed Deployed* state. However, we recommend that you use an L2VPN, MPLS, or VPLS service request that is in the *Deployed* state because the QoS service request might rely on port/interface configuration from the L2VPN, MPLS, or VPLS service request.

See *Cisco IP Solution Center L2VPN User Guide*, 4.0 for more information on creating L2VPN and VPLS service requests.

Creating a QoS Service Request from an L2VPN, MPLS, or VPLS Service Request

The steps for creating an Ethernet QoS service request are as follows:

- Create a Ethernet QoS Policy as described in Service Level Ethernet QoS Policy, page 7-1.
- Create a QoS service request.
- Select a customer.
- Select a service request for L2VPN, MPLS, or VPLS (the service request must already exist)
- Select a QoS Policy (created in Step 1 above).
- Save the service request.

• Deploy the service request.

Use the following procedure to create a QoS service request from an L2VPN, MPLS, or VPLS Service Request:

Step 1 Select Service Inventory > Inventory and Connection Manager > Service Request. The Service Requests window appears (Figure 7-13).

Home | Shortcuts | Account | Index | Help | About | Logout **CISCO SYSTEMS IP Solution Center** Service Inventory Service Design Monitoring Administration User: admin Inventory and Connection Manager Service Requests Customer: Non ou Are Here: • Service In Service Requests Selection Service Requests of Type All Matching * • Find Show Services with Job ID Inventory Manager Topology Tool Showing 1 - 10 of 13 records # 🗖 Job Operation Type Customer Creator Policy Name Last Modified Description Туре · Devices Device Groups 1. 🔲 14 INVALID L2VPN MODIFY admin CUST-B Cust-B ERS 10/21/03 1:12 PM > Customers Cust-B EVVS 9/2/03 1:06 PM ·· Customer Sites 2. 🔲 16 REQUESTED L2VPN ADD admin CUST-B ·· CPE Devices 3. 🗖 17 REQUESTED L2VPN CUST-B ERS no CE 9/2/03 1:31 PM Providers ADD admin ·· Provider Regions 4. 🕅 18 REQUESTED L2VPN ADD admin CUST-B EVVS_no_CE 9/2/03 1:55 PM ··· PE Devices 5. 🔲 19 REQUESTED VPLS CUST-B mpls ers ce 9/4/03 2:42 PM ·· Access Domains ADD MPLS VPN Resource Pools CE Routing Communities 6. 🔲 20 DEPLOYED VPLS ADD CUST-B mpls ers noce 10/21/03 1:11 PM L2VPN 7. 🔲 21 mpls ews ce 10/21/03 1:09 PM INVALID VPLS ADD CUST-B VPLS AAA Servers mpls evvs 8. 🗖 22 9/4/03 4:08 PM REQUESTED VPLS ADD CUST-B Named Physical Circuits QoS noce NPC Rings REQUESTED L2VPN Cust-B_ERS 10/14/03 6:34 PM 9. 🔲 39 ADD CUST-B **IPsec** Cust-B EVVS 10/14/03 6:57 PM 10. 🗖 40 REQUESTED L2VPN CUST-B L ADD IPsec RA Policy Firewall of 2 💿 🛛 🕬 Rows per page: 10 -Go to page: 1 NAT Details Deploy Decommission Auto Refresh: 🔽 Create Edit

Figure 7-13 Service Requests List

The Service Requests window lists the current list of service requests for this user name.

- NoteFor more information on service requests, see QoS Service Requests, page 8-3.Step 2From the Service Requests window, click Create and choose QoS.
- Step 3 Select the customer for this QoS service request and click OK (Figure 7-14).

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Figure 7-14	Select Customer	
Cisco Systems	Home Account Inc IP Solution Center Service Inventory Service Design Monitoring Administration	iex Logout Help About User: admin
♦ Inv	entory and Connection Manager 🔹 Deployment Flow Manager 🔸 Device Console 🔸	
You Are Here: Service Invento	ry > Inventory and Connection Manager > Service Requests	
TOC • Service Requests • Inventory Manager • Topology Tool • • Devices • Device Groups • Customers • Customers • Customers • Customers • Customers • Customers • Cre Devices • Provider Regions • Resource Pools • Ce Routing Communities • VPNs • AAA Servers > Named Physical Circuits • NPC Rings	Select Customer Customer name matching Filter Showing 1-2 of 2 records Name Customer1 Customer1 Customer2 Rows per page: 10 N Cancel OK Cancel	2 12
		1042

The QoS Service Editor window appears (Figure 7-15).

Figure 7-15 QoS Service Editor

CISCO SYSTEMS	IP Solution Cen	ter		Home Account Index	l Logout I Help I About
adillinadillina -	Service Inventory S	ervice Design Monitoring 4	Administration		User: admin
Inver	ntory and Connection Manag	er 🔹 Deployment Flow Manager 🔹 D	evice Console 🔹		
You Are Here: Service Inventory	Inventory and Connection Manager	Service Requests			
	QoS Service Editor				
TOC					
Inventory Manager	Job ID: New	Policy: None -		State: REQUEST	ED
·· Topology Tool					
 Devices	Description:		<u></u>		
Device Groups			V		
Customers					Showing 0 of 0 records
Customer Sites CDE Devices	# 📃 Link Op. Type 🤇	CE Link Endpoint CE Templates F	PE Link Endpoint PE Tem	olates Link QoS Settings	Bandwidth (kbps)
Providers				_	
•• Provider Regions	Rows per page: 10 💌			🛛 🗐 🗐 Go to page: 1	of 0 💿 👂 🕅
·· PE Devices					
Resource Pools		Select MPLS SR for IP QoS	Select SR for Ethernet Qo	S Add IP QoS Link	Save Cancel
CE Routing Communities					
·· VPNs	Note: * - Required Field				
AAA Servers Named Physical Circuits					
NPC Rings					
					0
					0

Step 4 Click Select SR for Ethernet QoS. The QoS Service Editor–Select SR window appears (Figure 7-16).

CISCO SYSTEMS										Home	Account Index L	.ogout Help About
	IP Solution Center Service Inventory Serv	ice De	sig	n	Monitori	ng (Admi	nistratio	n			User: admin
♦ Inve	ntory and Connection Manager	 Deplo 	yme	nt F	low Manage	er 🔶 D	evice	Console 🔍	•			
You Are Here: Service Inventor	y Inventory and Connection Manager Se	ervice Re	quest	is								
TOC	QoS Service Editor - Sele	ct SR										
• Service Requests								C1-) = 6 4 0 m = = = m d =		
Inventory Manager			-	loh			OP	Sn	owing 1-10	or to records		
Topology Tool		#		ID	State	Туре	Туре	VPN	Customer	Policy		
Devices Device Groups		1.		16	REQUESTED	L2VPN	ADD	CUST- B_EWS	CUST-B	Cust-B EWS Policy		
 Customers Customer Sites 		2.		17	REQUESTED	L2VPN	ADD	CUST- B_EWS	CUST-B	ERS_no_CE		
•• CPE Devices • Providers		3.		18	REQUESTED	L2VPN	ADD	CUST- B_EWS	CUST-B	EVVS_no_CE		
Provider Regions PE Devices		4.		39	REQUESTED	L2VPN	ADD	CUST- B_ERS	CUST-B	Cust-B_ERS		
•• Access Domains •• Resource Pools		5.		40	REQUESTED	L2VPN	ADD	CUST- B_EWS	CUST-B	Cust-B EWS Policy		
CE Routing Communities VPNs		6.		41	REQUESTED	L2VPN	ADD	CUST- B_ERS	CUST-B	ERS_no_CE		
AAA Servers Named Physical Circuits NOC Rises		7.		42	REQUESTED	L2VPN	ADD	CUST- B_EWS	CUST-B	EVVS_no_CE		
·· NPC Rings		8.		19	REQUESTED	VPLS	ADD	VPLS-ERS	CUST-B	mpls ers ce		
		9.	₽	20	DEPLOYED	VPLS	ADD	VPLS-ERS	CUST-B	mpls ers noce		
		10.		22	REQUESTED	VPLS	ADD	VPLS_EVVS	CUST-B	mpls ews noce		
			Rows	s per	page: 10 💌	1		Go to page: 1	6	if 1 💿 🖓 🕅		
									ок	Cancel		

Figure 7-16 Select L2VPN Service Request for QoS

This window lists existing service requests, including the deployment state, the customer, and policy name.

Step 5 Select an existing service request and click OK. The QoS Service Editor window appears (Figure 7-17).

Figure 7-17 QoS Service Editor

CISCO SYSTEMS	-	~ • •	. ~ .			Home Shortcuts Account Inde	ex Help About Logout
attillinantillina.	Seru Seru Conne	Solut vice Inv ction Ma	ion Cent entory Se anager + Dep	ervice Design Monitoring loyment Flow Manager + Device	g Administration e Console +	.	User: admin
You Are Here: Service Inventory In	nventor	y and Con	nection Manager	Service Requests			Customer: None
Selection • Service Requests • Traffic Engineering Management	Job	ID: 13	Euro	Policy: qos	State: REQUES	TED	
Inventory Manager Topology Tool	Des	cription:				A P	
Devices Device Groups	#		_ink Op. Type	CLE	CLE Templates	PE	Showing 1-2 of 2 records PE Templates
Customer Sites CPE Devices Providers Provider Regions	1.		ADD	Region: West CLE: mlsw1 Intf: GigabitEthernet0/11 VC: VLAN; Vlan id= State: REQUESTED	Add Templates	Region: West PE: enswosr1 Inff: FastEthernet8/10.600 VC: VLAN; Vlan id=600 State: REGUESTED	Add Templates
PE Devices Access Domains Resource Pools CE Routing Communities VPNs	2.		ADD	Region: East CLE: mIsw3 Intf: GigabitEthernet0/10 VC: VLAN; Vlan id= State: REQUESTED	Add Templates	Region: East PE: enswosr2 Intf: FastEthernet8/10.500 VC: VLAN; Vlani id=500 State: REGUESTED	Add Templates
AAA Servers Named Physical Circuits NPC Rings	F	Rows per p	age: 10 💌			∎⊲] ⊲] Go to page: 1	of 1 💿 👂 🕅
				Select SR for E	thernet QoS Dele	ete Link v Templates v	Save Cancel
	Note:	* - Require	ed Field				126150

This window lists the QoS links and includes the following information about the CLE-PE link:

- Link Op. Type—The link operation type for this CLE-PE link. For example, ADD means that you are adding this link to the service request.
- CLE—The CLE (customer location equipment) device interface. CLE refers to a switch for the L2VPN link.
- CLE Templates —Associate a template with the CLE device. See *Cisco IP Solution Center Infrastructure Reference*, 4.0 for information on creating templates
- PE—The PE device interface.
- PE Templates —Associate a template with the PE device. See *Cisco IP Solution Center Infrastructure Reference, 4.0* for information on creating templates

Note

Templates enable additional commands that are not specifically associated with the service request to be included in the provisioning (download).

For more information on L2VPN and VPLS provisioning, see *Cisco IP Solution Center L2VPN User Guide*, 4.0. For more information on MPLS VPN provisioning, see *Cisco IP Solution Center MPLS VPN User Guide*, 4.0.

From this window you can delete links.

- **Step 6** Select a Policy from the **Policy** drop-down menu.
- Step 7 Click Save SR to save the QoS service request.

To apply QoS policies to the VPN service request, you must deploy the QoS service request. When you deploy a QoS service request, ISC compares the device information in the repository (the ISC database) with the current device configuration and generates a configlet.

When the configlets are generated and downloaded to the devices, the QoS service request enters the *Pending* state. When the devices are successfully audited, the QoS service request enters the *Deployed* state.

IP QoS for MPLS VPNs

ISC supports the following QoS parameters for MPLS VPNs:

- IP QoS based on DSCP or IP Precedence value before the packet enters the MPLS network
- Map DSCP or IP Precedence value to MPLS Exp. value at the ingress router to the MPLS Network (PE ingress interface)
- IP QoS based on DSCP or IP Precedence values continues after the packet leaves the MPLS network

The following sections describes how to apply IP QoS parameters to an MPLS service request.

Checking Prerequisites

For an MPLS network, ISC marks packets with MPLS Experimental values (MPLS Exp.) at the PE ingress interface. Before you can apply QoS parameters to an MPLS network, you must already have:

• An existing IP QoS policy.

Figure 7-18

• An existing MPLS service request. This service request can either be in the *Requested*, *Deployed*, *Failed Deployed*, or *Pending* state. However, we recommend that you use an MPLS service request that is in the *Deployed* state because the QoS service request might rely on interface configuration from the MPLS service request.

See *Cisco IP Solution Center MPLS VPN User Guide*, 4.0 for more information on creating MPLS service requests.

• Select the Mark MPLS Exp. check box for the QoS policy. This is configured for the QoS service level policy on the Edit QoS Policy window. See Creating the Service Level IP QoS Policy, page 5-10 for more information.

Creating a QoS Service Request from an MPLS Service Request

Service Requests List

Use the following procedure to create a QoS service request from an MPLS service request:

Step 1 Select Service Inventory >Inventory and Connection Manager > Service Request. The Service Request window appears. (Figure 7-18).

CISCO SYSTEMS	IP Solution Cent	er			Hom	e Shortcuts A	ccount Index Help About Logo
Inventory and	Service Inventory Service Service Service	rvice Design M	onitoring	Administ	ration		User: adr
Are Here: Service Inventory	Inventory and Connection Manager >	Service Requests					Customer: No
	Service Requests						
Service Requests Inventory Manager		Show Services with	lob ID	T Matc	hing *	of Ty	ype All Find
Topology Tool				-			Showing 1 - 10 of 13 records
Devices	# 🗖 Job ID State	Type Operation Type Type	Creator	Customer Name	Policy Name	Last Modified	Description
Device Groups Customers	1. 🗖 14 🗾 INVALID	L2VPN MODIFY	admin	CUST-B	Cust-B_ERS	10/21/03 1:12 PM	
Customer Sites CPE Devices	2. 🗖 16 REQUESTED	L2VPN ADD	admin	CUST-B	Cust-B EVVS Policy	9/2/03 1:06 PM	
Providers	3. 🗖 17 REQUESTED	L2VPN ADD	admin	CUST-B	ERS_no_CE	9/2/03 1:31 PM	
•• Provider Regions •• PE Devices	4. 🗖 18 📃 REQUESTED	L2VPN ADD	admin	CUST-B	EVVS_no_CE	9/2/03 1:55 PM	
 Access Domains 	5. 🔲 19 📃 REQUESTED	VPLS ADD	admin	CUST-B	mpls ers ce	9/4/03 2:42 PM	
Resource Pools	6. 🔲 20 DEPLOYED	VPLS ADD	admin	CUST-B	mpls ers noce	10/21/03 1:11 PM	
/PNs	7. 🗖 21 INVALID	VPLS ADD	admin	CUST-B	mpls ews ce	10/21/03 1:09 PM	
AAA Servers lamed Physical Circuits	8. 🗖 22 REQUESTED	VPLS ADD	admin	CUST-B	mpls ews noce	9/4/03 4:08 PM	
•• NPC Rings	9. 🗖 39 📃 REQUESTED	L2VPN ADD	admin	CUST-B	Cust-B_ERS	10/14/03 6:34 PM	
	10. 🗖 40 REQUESTED	L2VPN ADD	admin	CUST-B	Cust-B EVVS Policy	10/14/03 6:57 PM	
	Rows per page: 10					∎⊴ <] Go to page: 1 of 2 💿 🕅
	Auto Refresh: 🔽		Create	▼ Details	Edit	Deploy v	Decommission Purge v

The Service Requests window lists the current list of service requests.



For more information on service requests, see QoS Service Requests, page 8-3.

Step 2 From the Service Requests window, click Create and choose QoS (Figure 7-19).

CISCO SYSTEMS	IF	• s	Solu	tion Cent	er				Home	e Shortcuts A	ccount Index	Help About L	.ogout
	Se	ervi	ice lı	ventory Se	rvice Desi	ign M	onitoring	Adminis	tration	<u> </u>		User: a	admin
↓ Inventory and	Con	nea	tion	Manager 🔸 Depl	oyment Flow	/ Manage	r 🔸 Device (Console 🔸					
You Are Here: Service Inventory	Inver	ntory	/ and C	onnection Manager >	Service Requ	ests						Customer	: None
Selection	Sei	VIL	.e ne	quests									
Service Requests Inventory Manager					Show Service	s with Jo	ob ID	 Matc 	:hing 🚩	of T	iype All	▼ Find	
·· Topology Tool											Showing	g 1 - 10 of 13 rec	ords
·· ·· Devices	#		Job ID	State	Туре	Operation Type	Creator	Customer Name	Policy Name	Last Modified	Des	cription	
Device Groups Customers	1.		14	INVALID	L2VPN	MODIFY	admin	CUST-B	Cust-B_ERS	10/21/03 1:12 PM			
Customer Sites CPE Devices	2.		16	REQUESTED	L2VPN	ADD	admin	CUST-B	Cust-B EVVS Policy	9/2/03 1:06 PM			
 Providers 	З.		17	REQUESTED	L2VPN	ADD	admin	CUST-B	ERS_no_CE	9/2/03 1:31 PM			
Provider Regions PE Devices	4.	Γ	18	REQUESTED	L2VPN	ADD	admin	CUST-B	EVVS_no_CE	9/2/03 1:55 PM			
·· Access Domains	5.		19	REQUESTED	VPLS	ADD	MDI S YDN	CUST-B	mpls ers ce	9/4/03 2:42 PM			
Resource Pools CE Routing Communities	6.	Γ	20	DEPLOYED	VPLS	ADD	I 2WPN	CUST-B	mpls ers noce	10/21/03 1:11 PM			
·· VPNs	7.		21	INVALID	VPLS	ADD	WDL C	CUST-B	mpls ews ce	10/21/03 1:09 PM	1		
AAA Servers Named Physical Circuits	8.		22	REQUESTED	VPLS	ADD	QoS	CUST-B	mpis ews noce	9/4/03 4:08 PM			
• NPC Rings	9.		39	REQUESTED	L2VPN	ADD	IPsec	CUST-B	Cust-B_ERS	10/14/03 6:34 PM			
	10.		40	REQUESTED	L2VPN	ADD	IPsec RA	CUST-B	Cust-B EVVS Policy	10/14/03 6:57 PM			
		Rov	vs per	bage: 10 💌			Firewall NAT			N.	🔇 Go to page: 1	of 2 💿 🕽	DO
	Au	to R	efresi	. 🔽			Create	▼ Details	Edit	Deploy _v	Decommissio	n Purge	1092
													14

Figure 7-19 Create QoS Service Request

The Select Customer window appears as shown in Figure 7-20.

Step 3 Select the customer for this service request and click **OK**.

CISCO SYSTEMS	Home IP Solution Center	Account Index Logout Help About
millinantillina	Service Inventory Service Design Monitoring Administration	User: admin
♦ In	ventory and Connection Manager 🔹 Deployment Flow Manager 🔹 Device Console 🔹	
You Are Here: Service Inven	tory > Inventory and Connection Manager > Service Requests	
	Select Customer	
TOC		
Service Requests		_
 Inventory Manager 	Customer name matching:	
Topology Tool		
" Devices	Showing 1-2 of 2 reco	rds
- Device Groups	# 🗖 Name	
> Customers		_
·· Customer Sites	1. Customer1	
·· CPE Devices	2. 🔲 Customer2	
Providers		
- Provider Regions	Rowe per page: 10 x I/4 / Go to page 1 of 1 60 N	N
·· PE Devices		
·· Access Domains		
. CE Routing Communities	OK Cancel	
·· VPNs		
- AAA Servers		
Named Physical Circuits		
·· NPC Rings		
		, T
		C

Figure 7-20 Select Customer

The QoS Service Editor window appears (Figure 7-21).

CISCO SYSTEMS					1	Home I Account I Index	Logout Help About
alı alı	IP Solution C	enter					
aniiiiiinaaniiiiiina -	Service Inventory	Service Design	Monitoring	Administrati	DN		User: admin
 Inven 	tory and Connection Ma	inager 🔹 Deployment	Flow Manager 🔹	Device Console	÷		
You Are Here: Service Inventory:	Inventory and Connection Ma	nager • Service Requests					
	QoS Service Editor						
TOC							
Service Requests Inventory Manager	Job ID: New		Policy: None -	1		State: REQUEST	D
- Topology Tool				•			
	Description:				~		
Devices Device Groups					,		
> Customers						:	Showing 0 of 0 records
·· Customer Sites	# 🔲 Link Op. Type	e CE Link Endpoint	CE Templates	PE Link Endpoint	PE Templates	Link QoS Settings	Bandwidth (kbps)
CPE Devices Drouidere							
Provider Regions	Rows per page: 10	•				🛛 🕼 📢 Go to page: 1	of 0 💿 👂 🕅
·· PE Devices							
Access Domains Resource Poole		Select M	IPLS SR for IP QoS	Select SR for	thernet QoS	Add IP QoS Link	Save Cancel
CE Routing Communities							
+ VPNs	Note: * - Required Field						
·· AAA Servers							
 Named Physical Circuits NPC Rings 							
							(

QoS Service Editor Figure 7-21

The QoS Service Editor window displays the following information about a link:

- Link Op. Type—The link operation type for this CPE-PE link. For example, ADD means that you are adding this link to the service request.
- CE Link Endpoint—The CE device interface identified as a link endpoint QoS candidate.
- CE Templates—Add a set of commands (that ISC does not include) to the CE device by associating a template with the CE device. See Cisco IP Solution Center Infrastructure Reference, 4.0 for information on creating templates.
- PE Link Endpoint—The PE device interface identified as a link endpoint QoS candidate.
- PE Templates—Add a set of commands (that ISC does not include) to the PE device by associating a template with the PE device. See Cisco IP Solution Center Infrastructure Reference, 4.0 for information on creating templates
- Link QoS Settings—Previously configured link QoS setting to use for this CPE-PE link.
- Bandwidth—You can enter the value for this manually, or it can be pre-populated when you choose ٠ a link qos setting.
- Step 4 Click Select MPLS SR for IP QoS. The QoS Service Editor-Select MPLS SR window appears (Figure 7-22).

Figure 7-22	Select MPLS Service	Reques	t for Qo	S			
Cisco Systems	IP Solution Center Service Inventory Servic	e Design	Monitoring	Adı	ninistrati	Home I	Account IIndex ILogout IHelp IAbout User:admin
You Are Here:	y> Inventory and Connection Manager > Serv QoS Service Editor - Select	ice Requests	ow wanager	V Devi	ce console	*	
• Service Requests • Inventory Manager • Topology Tool		# 🗖 Job	ID State	OP Type	Customer	Showing 1-1 of 1 records Policy	
•• •• Devices •• Device Groups •• Customers •• Customer Sites		1. 🗖 2 Rows per	DEPLOYED	ADD	Customer1	Customer1_MPLS_Policy	
·· CPE Devices Providers ·· Provider Regions ·· PE Devices			, _			OK Cancel	
Access Domains Access Domains CE Routing Communities VPNs							
AAA Servers Named Physical Circuits NPC Rings							ŋ
							10421

This window lists existing MPLS service requests, including the deployment state, the customer, and policy name.

Step 5 Select an existing MPLS service request for creating your QoS service request and click OK. The next QoS Service Editor window appears (Figure 7-23).

CISCO SYSTEMS	IP Sol	ution (Center						Home Accou	unt Index Log	jout Help About
	Service	Inventory	Service De	esign	Monitoring	Admini	stration				User: admin
 Invent 	tory and Cor	nnection M	anager 🔸 Depl	oyment	Flow Manager	Device Co	onsole 🔸				
You Are Here: Service Inventory	 Inventory and 	Connection Ma	anager • Service Re	equests							
TOC	QoS Serv	ice Edito	ſ								
• <u>Service Requests</u>	.loh ID: Ne	Job ID: New Police None State: REQUESTED									
Inventory Manager Topology Tool	000 10:110				Policy: [14016				orator	TEQUEUTED	
	Descriptio	on:					<u>~</u>				
Device Groups							Y				
 Customers Customer Sites 										Showin Link QoS	g 1-1 of 1 records Bandwidth
·· CPE Devices	# 🗆 L	ink Op. Type	CE Link Endpoi	nt	CE Templates	PE L	PE Link Endpoint		Templates	Settings	(kbps)
Providers Provider Regions PE Devices Access Domains	1. 🗖	ADD	Site: Site-ence CE: ence61 Intf: FastEthernet2/0/0 VC: None	61 .1025	Add Templates	Add Templates Region: US PE: enpe6 Intf: GigabitEthernet2/0.1025		Add Templates 1		None	
Resource Pools CE Routing Communities			State: UNKNOV	٧N		State	: UNKNOWN				
•• VPNs •• AAA Servers • Named Physical Circuits	Rows	berpage: 10	•						I¶ ¶ Go to	page: 1	of 1 💿 🖓 🕅
·· NPC Rings	S	elect MPLS	SR for IP QoS	Add IP	QoS Link Dela	te Link 🛛 🔻	Select Link P	aram	Templates	s 🔻 Save	Cancel
	Note: * - Rei	quired Field									

Figure 7-23 QoS Service Editor

This window lists the CE and PE links that were created during MPLS provisioning. For more information on MPLS provisioning, see *Cisco IP Solution Center MPLS VPN User Guide*, 4.0.

From this window you can delete or add more links and apply link QoS settings to a link endpoint pair.

Step 6 To apply link QoS settings, select a link endpoint pair and click Select Link Param. Alternately, you can click None in the Link QoS Settings column. The QoS Service Editor–Select Link QoS settings appears (Figure 7-24).

CISCO SYSTEMS							Home	Account Index Logout Help About	
يرالي برالي	IP Solution Center								
	Service Inventory Service	De	sigi	n Mor	nitoring A	dministration	h	User: admin	
 Inve 	ntory and Connection Manager 🔸 🛛	Depl	oym	ent Flow	Manager 🔸	Device Console 🔹			
You Are Here: Service Inventor	ory Inventory and Connection Manager I Servic	e Rec	uest:	B					
	QoS Service Editor - Select L	ink	Qo	S Setti	ngs				
TOC									
Service Requests		П	Set	link QoS	Setting to NON	F			
• Topology Tool					county to rear	Showing	1-3 of 3 records		
			_	Set	0	En constation	Bandwidth (in		
·· Devices		#		Name	Uwner	Encapsulation	kbps)		
Device Groups Customers		1		nostest	Customer -	ATM_VBR_RT-	128		
Customer Sites		- 1.	1	9051051	Customer1	FR_VIP	120		
·· CPE Devices		2.		test	Customer -	NONE	128		
Providers		-			Customer				
Provider Regions		3.		set1	Customer1	NONE	128		
• PE Devices									
·· Resource Pools		Rows per page: 10 🗾							
·· CE Routing									
Communities		OK Cancel							
·· VPNs									
•• AAA Servers									
Circuits									
								22	
								0.26	

Figure 7-24 QoS Service Editor Select – Link QoS Settings

This window lists all set names (link QoS settings) previously defined in the link level QoS policy. See Defining the Link Level QoS Policy, page 5-15 for more information.

Step 7 Select the link QoS setting (set name) to apply to this CPE-PE link and click **OK**. You return to the QoS Service Editor window (Figure 7-25).

CISCO SYSTEMS	IP Serv	Sol vice	ution (Inventory	Center Service I)esign	Monito	ring a	Adminis	stration		Home Accou	nt Index Log	gout Help About User: admin
You Are Here: Service Inventory	Invento	ry and	Connection M	anager • Service I	Requests		agon e c	01100 00					
TOC • Service Requests • Inventory Manager • Topology Tool	Q o S	Serv ID: 9	ice Edito	r		Policy:	Custome	er1_QoS_	Policy •		State:	REQUESTED	
·· Devices	Des	cripti	on:						*				
Device Groups Customers												Showing	g 1-2 of 2 records
·· Customer Sites ·· CPE Devices	#	<u> </u>	.ink Op. Type	CE Link Endpoint		CE Templates		PE Link Endpoint		PE Templates		Link QoS Settings	Bandwidth (kbps)
Providers Provider Regions PE Devices Access Domains Resource Pools	1.		ADD	Site: Site-ence61 CE: ence61 Inft: FastEthernet2/0/0.1025 VC: VLAN; Vlan id=1025 State: REQUESTED		Add Templates		Region: US PE: enpe6 Inft: GigabitEthernet2/0.1025 VC: VLAN; Vlan id=1025 State: REQUESTED		Add Templates		None	
CE Routing Communities VPNs AAA Servers Named Physical Circuits NPC Rings	2.		ADD	Site: Site-ence61 CE: ence61 Intf: FastEthernet2/0/0.1025 VC: None State: UNKNOWN		Add Templates		Region: US PE: enpe6 Inft: GigabitEthernet2/0.1025 VC: None State: UNKNOWN		Add Templates		None	
		Rows	perpage: 10	•							🛛 🖉 🖉 Go ta	page: 1	of 1 💿 🖓 🕅
		5	Select MPLS	SR for IP QoS	Add IP	QoS Link	Delete	Link v	Select Link Pa	aram	Templates		Cancel
mm	Note:	* - Re	quired Field										104259

Figure 7-25 Completed QoS SR from MPLS SR

The CPE-PE links and link QoS settings for the QoS service request are listed. These are the QoS parameters that will be applied to the MPLS service request.

- **Step 8** Click **Save** to save the QoS service request.
- **Step 9** To apply QoS policies to the VPN service request, you must deploy the QoS service request. When you deploy a QoS service request, ISC compares the device information in the Repository (the ISC database) with the current device configuration and generates a configlet.

When the configlets are generated and downloaded to the devices, the QoS service request enters the *Pending* state. When the devices are audited, the QoS service request enters the *Deployed* state.

Note

For more information on deploying and auditing QoS service requests, see QoS Service Requests, page 8-3.