



Configuring Quality of Service

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Quality of Service

Cisco UCS provides the following methods to implement quality of service:

- System classes that specify the global configuration for certain types of traffic across the entire system
- QoS policies that assign system classes for individual vNICs
- Flow control policies that determine how uplink Ethernet ports handle pause frames

Configuring System Classes

System Classes

Cisco UCS uses Data Center Ethernet (DCE) to handle all traffic inside a Cisco UCS domain. This industry standard enhancement to Ethernet divides the bandwidth of the Ethernet pipe into eight virtual lanes. Two virtual lanes are reserved for internal system and management traffic. You can configure quality of service for the other six virtual lanes. System classes determine how the DCE bandwidth in these six virtual lanes is allocated across the entire Cisco UCS domain.

Each system class reserves a specific segment of the bandwidth for a specific type of traffic. This provides a level of traffic management, even in an oversubscribed system. For example, you can configure the Fibre Channel Priority system class to determine the percentage of DCE bandwidth allocated to FCoE traffic.

The following table describes the system classes that you can configure:

Table 1: System Classes

System Class	Description
Platinum Gold Silver Bronze	A configurable set of system classes that you can include in the QoS policy for a service profile. Each system class manages one lane of traffic. All properties of these system classes are available for you to assign custom settings and policies.
Best Effort	A system class that sets the quality of service for the lane reserved for Basic Ethernet traffic. Some properties of this system class are preset and cannot be modified. For example, this class has a drop policy that allows it to drop data packets if required. You cannot disable this system class.
Fibre Channel	A system class that sets the quality of service for the lane reserved for Fibre Channel over Ethernet traffic. Some properties of this system class are preset and cannot be modified. For example, this class has a no-drop policy that ensures it never drops data packets. You cannot disable this system class.

Configuring QoS System Classes

The type of adapter in a server may limit the maximum MTU supported. For example, network MTU above the maximums may cause the packet to be dropped for the following adapters:

- The Cisco UCS M71KR CNA adapter, which supports a maximum MTU of 9216.
- The Cisco UCS 82598KR-CI adapter, which supports a maximum MTU of 14000.

Procedure

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- Step 1** In the **Navigation** pane, click the **LAN** tab.
 - Step 2** In the **LAN** tab, expand **LAN > LAN Cloud**.
 - Step 3** Select the **QoS System Class** node.
 - Step 4** In the **Work** pane, click the **General** tab.
 - Step 5** Update the following properties for the system class you want to configure to meet the traffic management needs of the system:

Note Some properties may not be configurable for all system classes.

Name	Description
Enabled check box	<p>If checked, the associated QoS class is configured on the fabric interconnect and can be assigned to a QoS policy.</p> <p>If unchecked, the class is not configured on the fabric interconnect and any QoS policies associated with this class default to Best Effort or, if a system class is configured with a Cos of 0, to the Cos 0 system class.</p> <p>Note This field is always checked for Best Effort and Fibre Channel.</p>
CoS field	<p>The class of service. You can enter an integer value between 0 and 6, with 0 being the lowest priority and 6 being the highest priority. We recommend that you do not set the value to 0, unless you want that system class to be the default system class for traffic if the QoS policy is deleted or the assigned system class is disabled.</p> <p>Note This field is set to 7 for internal traffic and to any for Best Effort. Both of these values are reserved and cannot be assigned to any other priority.</p>
Packet Drop check box	<p>If checked, packet drop is allowed for this class. If unchecked, packets cannot be dropped during transmission.</p> <p>This field is always unchecked for the Fibre Channel class, which never allows dropped packets, and always checked for Best Effort, which always allows dropped packets.</p>
Weight drop-down list	<p>This can be one of the following:</p> <ul style="list-style-type: none"> • An integer between 1 and 10. If you enter an integer, Cisco UCS determines the percentage of network bandwidth assigned to the priority level as described in the Weight (%) field. • best-effort. • none.
Weight (%) field	<p>To determine the bandwidth allocated to a channel, Cisco UCS:</p> <ol style="list-style-type: none"> 1 Adds the weights for all the channels 2 Divides the channel weight by the sum of all weights to get a percentage 3 Allocates that percentage of the bandwidth to the channel

Name	Description
MTU drop-down list	<p>The maximum transmission unit for the channel. This can be one of the following:</p> <ul style="list-style-type: none"> • An integer between 1500 and 9216. This value corresponds to the maximum packet size. • fc—A predefined packet size of 2240. • normal—A predefined packet size of 1500. <p>Note This field is always set to fc for Fibre Channel.</p>
Multicast Optimized check box	<p>If checked, the class is optimized to send packets to multiple destinations simultaneously.</p> <p>Note This option is not applicable to the Fibre Channel.</p>

Step 6 Click **Save Changes**.

Enabling a QoS System Class

The Best Effort or Fibre Channel system classes are enabled by default.

Procedure

- Step 1** In the **Navigation** pane, click the **LAN** tab.
 - Step 2** In the **LAN** tab, expand **LAN > LAN Cloud**.
 - Step 3** Select the **QoS System Class** node.
 - Step 4** In the **Work** pane, click the **General** tab.
 - Step 5** Check the **Enabled** check box for the QoS system that you want to enable.
 - Step 6** Click **Save Changes**.
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Disabling a QoS System Class

You cannot disable the Best Effort or Fibre Channel system classes.

All QoS policies that are associated with a disabled system class default to Best Effort or, if the disabled system class is configured with a Cos of 0, to the Cos 0 system class.

Procedure

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- Step 1** In the **Navigation** pane, click the **LAN** tab.
 - Step 2** In the **LAN** tab, expand **LAN > LAN Cloud**.
 - Step 3** Select the **QoS System Class** node.
 - Step 4** In the **Work** pane, click the **General** tab.
 - Step 5** Uncheck the **Enabled** check box for the QoS system that you want to disable.
 - Step 6** Click **Save Changes**.
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Configuring Quality of Service Policies

Quality of Service Policy

A quality of service (QoS) policy assigns a system class to the outgoing traffic for a vNIC or vHBA. This system class determines the quality of service for that traffic. For certain adapters you can also specify additional controls on the outgoing traffic, such as burst and rate.

You must include a QoS policy in a vNIC policy or vHBA policy and then include that policy in a service profile to configure the vNIC or vHBA.

Creating a QoS Policy

Procedure

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- Step 1** In the **Navigation** pane, click the **LAN** tab.
 - Step 2** In the **LAN** tab, expand **LAN > Policies**.
 - Step 3** Expand the node for the organization where you want to create the pool.
If the system does not include multitenancy, expand the **root** node.
 - Step 4** Right-click **QoS Policy** and select **Create QoS Policy**.
 - Step 5** In the **Create QoS Policy** dialog box, complete the following fields:

Name	Description
Name field	<p>The name of the policy.</p> <p>This name can be between 1 and 16 alphanumeric characters. You cannot use spaces or any special characters other than - (hyphen), _ (underscore), : (colon), and . (period), and you cannot change this name after the object has been saved.</p>

Name	Description
Priority drop-down list	<p>The priority assigned to this QoS definition. This can be one of the following:</p> <ul style="list-style-type: none"> • Fe—Use this priority for QoS policies that control vHBA traffic only. • Platinum—Use this priority for QoS policies that control vNIC traffic only. • Gold—Use this priority for QoS policies that control vNIC traffic only. • Silver—Use this priority for QoS policies that control vNIC traffic only. • Bronze—Use this priority for QoS policies that control vNIC traffic only. • Best Effort—Do not use this priority. It is reserved for the Basic Ethernet traffic lane. If you assign this priority to a QoS policy and configure another system class as CoS 0, Cisco UCS Manager does not default to this system class. It defaults to the priority with CoS 0 for that traffic.
Burst field	<p>The normal burst size for servers which use this policy. This field determines how large traffic bursts can be before some traffic is considered to exceed the rate limit. The default is 10240. The minimum value is 0, and the maximum value is 65535.</p> <p>This setting is not applicable to all adapters.</p>
Rate field	<p>The expected average rate of traffic. Traffic that falls under this rate will always conform. The default is line-rate, which equals a value of 0 and specifies no rate limiting. The minimum value is 8, and the maximum value is 40,000,000.</p> <p>The granularity for rate limiting on a Cisco UCS M81KR Virtual Interface Card adapter is 1Mbps. These adapters treat the requested rate as a "not-to-exceed" rate. Therefore, a value of 4.5Mbps is interpreted as 4Mbps. Any requested rate of more than 0 and less than 1Mbps is interpreted as 1Mbps, which is the lowest supported hardware rate limit.</p> <p>Rate limiting is not applicable to all adapters. For example, this setting is not supported on the Cisco UCS M82-8P Virtual Interface Card.</p>

Name	Description
Host Control field	<p>Whether Cisco UCS controls the class of service (CoS). This can be one of the following:</p> <ul style="list-style-type: none"> • None—Cisco UCS uses the CoS value associated with the priority selected in the Priority drop-down list regardless of the CoS value assigned by the host. • Full—If the packet has a valid CoS value assigned by the host, Cisco UCS uses that value. Otherwise, Cisco UCS uses the CoS value associated with the priority selected in the Priority drop-down list. <p>This setting is not applicable to all adapters.</p>

Step 6 Click **OK**.

What to Do Next

Include the QoS policy in a vNIC or vHBA template.

Deleting a QoS Policy

If you delete a QoS policy that is in use or you disable a system class that is used in a QoS policy, any vNIC or vHBA that uses that QoS policy is assigned to the Best Effort system class or to the system class with a CoS of 0. In a system that implements multi-tenancy, Cisco UCS Manager first attempts to find a matching QoS policy in the organization hierarchy.

Procedure

- Step 1** In the **Navigation** pane, click the **LAN** tab.
- Step 2** On the **Servers** tab, expand **Servers > Policies > *Organization_Name***.
- Step 3** Expand the **QoS Policies** node.
- Step 4** Right-click the QoS policy you want to delete and select **Delete**.
- Step 5** If the Cisco UCS Manager GUI displays a confirmation dialog box, click **Yes**.

Configuring Flow Control Policies

Flow Control Policy

Flow control policies determine whether the uplink Ethernet ports in a Cisco UCS domain send and receive IEEE 802.3x pause frames when the receive buffer for a port fills. These pause frames request that the transmitting port stop sending data for a few milliseconds until the buffer clears.

For flow control to work between a LAN port and an uplink Ethernet port, you must enable the corresponding receive and send flow control parameters for both ports. For Cisco UCS, the flow control policies configure these parameters.

When you enable the send function, the uplink Ethernet port sends a pause request to the network port if the incoming packet rate becomes too high. The pause remains in effect for a few milliseconds before traffic is reset to normal levels. If you enable the receive function, the uplink Ethernet port honors all pause requests from the network port. All traffic is halted on that uplink port until the network port cancels the pause request.

Because you assign the flow control policy to the port, changes to the policy have an immediate effect on how the port reacts to a pause frame or a full receive buffer.

Creating a Flow Control Policy

Before You Begin

Configure the network port with the corresponding setting for the flow control that you need. For example, if you enable the send setting for flow-control pause frames in the policy, make sure that the receive parameter in the network port is set to on or desired. If you want the Cisco UCS port to receive flow-control frames, make sure that the network port has a send parameter set to on or desired. If you do not want to use flow control, you can set the send and receive parameters on the network port to off.

Procedure

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- Step 1** In the **Navigation** pane, click the **LAN** tab.
- Step 2** On the **LAN** tab, expand **LAN > Policies**.
- Step 3** Expand the **root** node.
You can only create a flow control policy in the root organization. You cannot create a flow control policy in a sub-organization.
- Step 4** Right-click the **Flow Control Policies** node and select **Create Flow Control Policy**.
- Step 5** In the **Create Flow Control Policy** wizard, complete the following fields:

Name	Description
Name field	The name of the policy. This name can be between 1 and 16 alphanumeric characters. You cannot use spaces or any special characters other than - (hyphen), _ (underscore), : (colon), and . (period), and you cannot change this name after the object has been saved.

Name	Description
Priority field	This can be one of the following: <ul style="list-style-type: none"> • Auto—Cisco UCS and the network negotiate whether PPP is used on this fabric interconnect • On—PPP is enabled on this fabric interconnect
Receive field	This can be one of the following: <ul style="list-style-type: none"> • Off—Pause requests from the network are ignored and traffic flow continues as normal • On—Pause requests are honored and all traffic is halted on that uplink port until the network cancels the pause request
Send field	This can be one of the following: <ul style="list-style-type: none"> • Off—Traffic on the port flows normally regardless of the packet load. • On—Cisco UCS sends a pause request to the network if the incoming packet rate becomes too high. The pause remains in effect for a few milliseconds before traffic is reset to normal levels.

Step 6 Click **OK**.

What to Do Next

Associate the flow control policy with an uplink Ethernet port or port channel.

Deleting a Flow Control Policy

Procedure

- Step 1** In the **Navigation** pane, click the **LAN** tab.
- Step 2** On the **LAN** tab, expand **LAN > Policies > Organization_Name**.
- Step 3** Expand the **Flow Control Policies** node.
- Step 4** Right-click the policy you want to delete and select **Delete**.
- Step 5** If the Cisco UCS Manager GUI displays a confirmation dialog box, click **Yes**.

