Quality of Service

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

Global QoS changes made to the QoS system class may result in brief data-plane interruptions for all traffic. Some examples of such changes are:

- Changing the MTU size for an enabled class
- Changing packet drop for an enabled class
- Changing the CoS value for an enabled class

Guidelines and Limitations for Quality of Service on Cisco UCS 6300 Series Fabric Interconnect

- Cisco UCS 6300 Series Fabric Interconnect uses a shared buffer for all system classes.
- Multicast optimization is not supported.
- When you change the QoS parameters for any class causes traffic disruption to all classes. The following table lists the changes in the QoS system class and the conditions that trigger a system reboot.

QoS System class status	Condition	FI Reboot Status
Enabled	Change between drop and no drop	Yes
No-drop	Change between enable and disable	Yes

QoS System class status	Condition	FI Reboot Status
Enable and no-drop	Change in MTU size	Yes

- The subordinate FI reboots first as a result of the change in the QoS system class. The primary FI reboots only after you acknowledge it in **Pending Activities**.

Guidelines and Limitations for Quality of Service on Cisco UCS Mini

- Cisco UCS Mini uses a shared buffer for all system classes.
- The bronze class shares the buffer with SPAN. We recommend using either SPAN or the bronze class.
- Multicast optimization is not supported.
- Changing the QoS parameters for any class causes traffic disruption to all classes.
- When mixing Ethernet and FC or FCoE traffic, the bandwidth distribution is not equal.
- Multiple streams of traffic from the same class may not be distributed equally.
- Use the same CoS values for all no-drop policies to avoid any FC or FCoE performance issues.
- Only the platinum and gold classes support no-drop policies.

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 (QoS) 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, which 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. For Cisco UCS Mini, packet drop can only be disabled on the platinum and gold classes. Only one platinum and one gold class can be configured as a no drop class at a time.
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. **Note** FCoE traffic has a reserved QoS system class that should not be used by any other type of traffic. If any other type of traffic has a CoS value that is used by FCoE, the value is remarked to 0.

Configuring QoS System Classes

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

- The Cisco UCS 82598KR-CI adapter that supports a maximum MTU of 140009.

Note Under the network QoS policy, the MTU is used only for buffer carving when no-drop classes are configured. No additional MTU adjustments are required under the network QoS policy to support jumbo MTU.

Note For VIC 14xx adapters, you can change the MTU size of the vNIC from the host interface settings. When the Overlay network is configured, make sure that the overall MTU size does not exceed the MTU value in the QoS system class. If this MTU value exceeds the MTU value in the QoS system class, packets could be dropped during data transmission.

Important Use the same CoS (Class of Service) values on UCS and N5K for all the no-drop policies. To insure that end-to-end PFC works correctly, have the same QoS policy configured on all intermediate switches.

Procedure

Step 1 In the **Navigation** pane, click **LAN**.

Step 2 Expand **LAN** > **LAN Cloud**.

Step 3 Select the **QoS System Class** node. Packet drop should be unchecked to configure MTU.

MTU is not configurable for drop type QoS system classes and is always set to 9216. MTU is only configurable for no-drop type QoS system classes

Step 4 In the **Work** pane, click the **General** tab.

Step 5 Update the properties for the system class that you want to configure to meet the traffic management needs of the system.

Note Some properties may not be configurable for all system classes. The maximum value for MTU is 9216.

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 **LAN**.

Step 2 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**.

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

Step 1 In the **Navigation** pane, click **LAN**.

Step 2 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**.

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

Step 1 In the **Navigation** pane, click **LAN**.

Step 2 Expand **LAN** > **Policies**.

Step 3 Expand the node for the organization where you want to create the pool.

If the system does not include multi tenancy, 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 required fields.

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 multitenancy, Cisco UCS Manager first attempts to find a matching QoS policy in the organization hierarchy.

Procedure

Step 1 In the **Navigation** pane, click **LAN**.

Step 2 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 a confirmation dialog box displays, 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, ensure that the receive parameter in the network port is set to on or to desired. If you want the Cisco UCS port to receive flow-control frames, ensure that the send parameter is set to on or to desire on the network port. If you do not want to use flow control, you can set the send and receive parameters on the network port to off.

Procedure

Step 1 In the **Navigation** pane, click **LAN**.

Step 2 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 required fields.

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 **LAN**.

Step 2 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 a confirmation dialog box displays, click **Yes**.