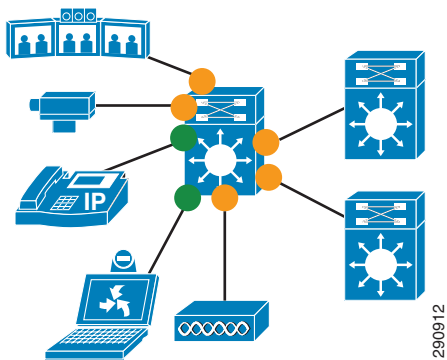


## Role in Medianet Campus Network

The Cisco Catalyst 4500 series switches with Supervisor 6-E/7-E are well-suited to the role of access- or distribution-layer switches in medianet campus networks. As such, these switches may connect directly to a variety of endpoints, as well as to distribution-layer and/or core-layer switches, as shown in Figure 1.

**Figure 1 Cisco Catalyst 4500 Series Switch with Supervisor 6-E/7-E in a Medianet Campus Network**



## QoS Design Steps

There are only two main steps to configure QoS on a Cisco Catalyst 4500 series switch with Supervisor 6-E/7-E:

1. Configure Ingress QoS Model(s):
  - Trust DSCP Model
  - Conditional Trust Model
  - Service Policy Models
2. Configure Egress Queuing

### Step 1: Configure Ingress QoS Model(s)

The three most utilized ingress QoS models for medianet campus networks are:

- Trust DSCP Model
- Conditional Trust Model
- Service Policy Models

Combinations of these ingress QoS models may be used at the same time.

### Trust DSCP Model

By default all interfaces trust DSCP; as such, no explicit configuration is required to enable this model.

In the default trust DSCP state, the interface statically accepts and preserves the Layer 3 DSCP markings of all incoming packets. This model is suitable for interfaces connecting to endpoints that can mark DSCP values and are administratively controlled (such as WLAN controllers) as well as for any uplinks to distribution layer switches. Switch ports that should trust DSCP are shown as yellow circles in Figure 1.

### Conditional Trust Model

This model is configured with the **mls qos trust device cisco-phone** interface-configuration command along with some additional MQC configuration to perform CoS-to-DSCP mapping.

The Conditional Trust model configures the interface to dynamically accept markings from endpoints that have met a specific condition (currently based on a successful Cisco Discovery Protocol identification). This model is suitable for switch ports connecting to Cisco IP phones, as well as for ports connecting to PCs and untrusted devices (since the ports connecting to such devices will remain in an untrusted state). Switch ports that can be set to conditional trust are shown as green circles in Figure 1.

### Service Policy Models

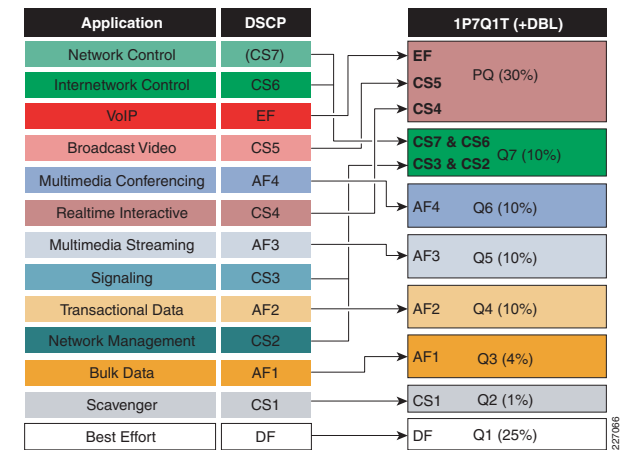
There may be cases where administrators require more detailed or granular policies on their ingress edges and as such they may construct MQC policies to implement classification, marking, and/or policing policies. These policies are constructed with:

- class-maps which identify the flows using packet markings or by access-lists or other criteria
- policy-maps which specify policy actions to be taken on a class-by-class basis
- service-policy statements which apply a specific policy-map to an interface(s) and specify direction

## Step 2: Configure Egress Queuing

The medianet egress queuing model for the Catalyst 4500 with Supervisor 6-E/7-E is shown in Figure 2.

**Figure 2 Cisco Catalyst 4500 Supervisor 6-E/7-E Egress Queuing Model**



## EtherChannel QoS

Ingress QoS policies on the Cisco Catalyst 4500 Supervisor 6-E/7-E are configured on the logical Port-Channel interface (but typically these are simply to enable DSCP trust—which requires no explicit configuration), while egress QoS policies (such as the service-policy-statement to enable egress queuing) are configured on the physical port-member interfaces.

## Cisco Validated Design (CVD)

The Cisco Validated Design for Cisco Catalyst 4500 with Supervisor 6-E/7-E in the role of an access switch in a medianet campus network is presented on the reverse.

**Step 1: Configure Ingress QoS Model :****Trust DSCP Model :**

```
<no configuration/default state>
```

**Conditional Trust Model :**

```
class-map match-all VOICE
  match cos 5
class-map match-all SIGNALING
  match cos 3
```

**policy-map CISCO-IPPHONE**

```
class VOICE
  set dscp ef
class SIGNALING
  set dscp cs3
class class-default
  set dscp default
```

```
qos trust device cisco-phone
service-policy input CISCO-IPPHONE
```

**Service Policy Models :**

```
[class-maps omitted for brevity]
```

```
policy-map MARKING-POLICY
  class VOIP
    set dscp ef
  class MULTIMEDIA-CONFERENCING
    set dscp af41
  class SIGNALING
    set dscp cs3
  class TRANSACTIONAL-DATA
    set dscp af21
  class BULK-DATA
    set dscp af11
  class SCAVENGER
    set dscp cs1
  class class-default
    set dscp default
```

```
service-policy input MARKING-POLICY
```

**Step 2 : Egress Queuing Configuration**

```
class-map match-any PRIORITY-QUEUE
```

```
  match dscp ef
  match dscp cs5
  match dscp cs4
```

```
class-map match-any CONTROL-MGMT-QUEUE
```

```
  match dscp cs7
  match dscp cs6
  match dscp cs3
  match dscp cs2
```

```
class-map match-all MULTIMEDIA-CONFERENCING-QUEUE
```

```
  match dscp af41 af42 af43
```

```
class-map match-all MULTIMEDIA-STREAMING-QUEUE
```

```
  match dscp af31 af32 af33
```

```
class-map match-all TRANSACTIONAL-DATA-QUEUE
```

```
  match dscp af21 af22 af23
```

```
class-map match-all BULK-DATA-QUEUE
```

```
  match dscp af11 af12 af13
```

```
class-map match-all SCAVENGER-QUEUE
```

```
  match dscp cs1
```

```
policy-map EGRESS-QUEUING
```

```
  class PRIORITY-QUEUE
```

```
    priority
```

```
  class CONTROL-MGMT-QUEUE
```

```
    bandwidth remaining percent 10
```

```
  class MULTIMEDIA-CONFERENCING-QUEUE
```

```
    bandwidth remaining percent 10
```

```
  class MULTIMEDIA-STREAMING-QUEUE
```

```
    bandwidth remaining percent 10
```

```
  class TRANSACTIONAL-DATA-QUEUE
```

```
    bandwidth remaining percent 10
```

```
    db1
```

```
  class BULK-DATA-QUEUE
```

```
    bandwidth remaining percent 4
```

```
    db1
```

```
  class SCAVENGER-QUEUE
```

```
    bandwidth remaining percent 1
```

```
  class class-default
```

```
    bandwidth remaining percent 25
```

```
    db1
```

```
service-policy output EGRESS-QUEUING
```

Assigns VoIP (EF)  
Broadcast Video (CS5) and  
Realtime Interactive (CS4) to the PRIORITY-QUEUE

Assigns Network Control (CS7), Internetwork Control (CS6),  
Signaling (CS3) and Management (CS2) to the  
CONTROL-MGMT-QUEUE

Assigns AF4 to the  
MULTIMEDIA-CONFERENCING-QUEUE

Assigns AF3 to the  
MULTIMEDIA-STREAMING-QUEUE

Assigns AF2 to the  
TRANSACTIONAL-DATA-QUEUE

Assigns AF1 to the  
BULK-DATA-QUEUE

Assigns CS1 to the  
SCAVENGER-QUEUE

PRIORITY-QUEUE gets strict priority servicing  
(All other queues get percentages of bandwidth *remaining*  
after the PQ has been fully serviced)

CONTROL-MGMT-QUEUE gets 10% of remaining bandwidth

MM-CONF-QUEUE gets 10% of remaining bandwidth

MM-STREAMING-QUEUE gets 10% of remaining bandwidth

TRANS-DATA-QUEUE gets 10% of remaining bandwidth  
and Dynamic Buffer Limiting

BULK-DATA-QUEUE gets 4% of remaining bandwidth  
and Dynamic Buffer Limiting

SCAVENGER-QUEUE is limited to 1% of remaining bandwidth

Default (Best-Effort) queue 25% of remaining bandwidth  
and Dynamic Buffer Limiting

Applies EGRESS-QUEUING policy to interface

Note: Highlighted commands are interface specific; otherwise these are global.

For more details, see Medianet Campus QoS Design 4.0: [http://www.cisco.com/en/US/docs/solutions/Enterprise/WAN\\_and\\_MAN/QoS\\_SRND\\_40/QoS\\_Campus\\_40.html](http://www.cisco.com/en/US/docs/solutions/Enterprise/WAN_and_MAN/QoS_SRND_40/QoS_Campus_40.html).