This section contains background information about pure IP Cisco Unified MeetingPlace systems. For detailed instructions on how to implement the techniques described here, see Configuring a Pure IP Cisco Unified MeetingPlace System.

## Contents

## About QoS Configuration

Before configuring the Multi Access Blades in an IP system, you must know which Quality of Service (QoS) configuration you are using.

For pure IP configurations, there are two QoS mechanisms that you can use:

- IP precedence
- Differentiated Services Code Point (DSCP)

First, determine which mechanism your IP network uses, then determine, with your IT department, the appropriate settings for these values.

**Note** Cisco Unified MeetingPlace IP gateways do not support sending layer 2, QOS (COS). This means that QOS priorities for the Cisco Unified MeetingPlace system or Cisco Unified MeetingPlace H.323/SIP Gateway cannot be set on the layer 2 switch level.

## About Type of Service Byte

Within the voice packets, the Type of Service (ToS) byte is an 8-bit field in the IP header used for either IP precedence or DSCP (another term for byte is octet). When this byte is used for IP precedence, three bits are used for the IP precedence value and four bits are used for the ToS value.

The following shows the bit layout:

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| IP precedence | | | Type of service | | | | |

**Note:** Note the differences in terminology: the ToS byte includes all 8 bits; but the ToS field is only 4 bits within this byte. The IP precedence mechanism partitions the ToS byte into an IP precedence field and a ToS field.

When this byte is used for DSCP, six bits are used for DSCP. The following is the bit layout:

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| Differentiated services code point | | | | | | | |

Notice that the DSCP field overlaps the fields used for IP precedence. Therefore, if DSCP values are chosen carefully, then backward compatibility can be achieved if your network has a mixture of devices (some using IP precedence, others using DSCP).

## About IP Precedence

If you use the traditional IP precedence QoS mechanism, you must provide two values to be used for pure IP configuration:

- IP precedence value - A value from 0 to 7. The IP precedence is used to classify and prioritize types of traffic. Most implementations use an IP precedence value of 5. Here is a complete list of values:

  0-Routine 1-Priority 2-Immediate 3-Flash 4-Flash override 5-CRITIC/ECP 6-Internetwork control 7-Network control
- ToS value - A value from 0 to 15. The ToS value can determine special handling of packets, such as minimizing delay or maximizing throughput. This value is best set to 0.

## About DSCP

DSCP (sometimes called "DiffServ") is the newer mechanism. It is described in RFC 2474. The DSCP ranges from 0 to 63. In practice, most implementations use a DSCP value of 40, which corresponds exactly to an IP Precedence value of 5.

NOTE: The "IP Precedence" and "Type of Service" fields must be set to "unused" if a DSCP setting is to be used exclusively on the blade.

## About Jitter Buffer Settings

The jitter buffer concept is driven by the realities of voice packet networks such as network delay, delay jitter, packet loss, and clock drift. The jitter buffer (also known as a "delay jitter buffer") enforces an additional packet delay of typically 50 to 150 additional milliseconds, but it provides the following important benefits:

- Smooths jitter-By delaying all the packets, it is possible to eliminate most effects of delay jitter. That is, for any packets that arrive slightly early or slightly late, the jitter buffer allows the packets to be processed at precise intervals. However, any packets that arrive later or earlier than the size of the jitter buffer are discarded; therefore, the jitter buffer should not be set too small. The jitter buffer should not be set too large because too much delay can be noticed by participants talking to each other.
- Handles packets out of sequence-In some cases, various delays can cause consecutive packets to be received out of sequence. A jitter buffer provides an opportunity to put these packets back into the proper sequence.
- Handles missing packets-A jitter buffer makes it easier to handle missing (as opposed to just late) packets. When the software determines that the packet is missing, it provides a reasonable approximation for the missing packet. This assumes that the sender enables redundancy support (RFC 2198).
- Handles overruns and underruns-When clocks are not synchronized, there are occasional packet overruns or underruns (depending on whether the far end clock is faster or slower). The jitter buffer allows for a more graceful way of dealing with these.

## About Jitter Buffer Configuration

There are two jitter buffer parameters that you can configure:

- Jitter buffer minimum size-The jitter buffer automatically adapts to changing jitter values, but a minimum value needs to be defined. The default value is 100 milliseconds. This is a reasonable value for most installations; however, some environments may do better with a different value. The **blade** command allows for values from 1 to 1000 milliseconds.

  A smaller value reduces the noticeable voice delay, but increases the risk of missing packets that degrade voice quality. A smaller value can be considered for IP networks that are:

  ◊ Small geographically
  ◊ Few hops
  ◊ High bandwidth

  A larger value can provide better voice quality; however, the increased delays may become annoying for users. A higher value can be considered for IP networks that are:

  ◊ Large geographically
  ◊ Many hops

    - ◊ Potential bandwidth bottlenecks

- Jitter buffer optimization-The jitter buffer optimization factor controls how quickly the jitter buffer can react to network jitter. The **blade** command allows for optimization factor values from 0 to 12 and the value defaults to 7.

  At the highest setting, the jitter buffer quickly tracks to the maximal network latencies and stays there, thus minimizing packet error rates but also maximizing delays. At the lowest setting, the jitter buffer increases delay only to compensate for clock drifts and soon decays to its minimal setting again. Midrange values (such as a default value of 7) provide a reasonable middle ground that is appropriate for most systems.