# Configuring Media and EDCA Parameters



# Configuring Voice and Video Parameters

## Voice and Video Parameters

Three parameters on the controller affect voice and/or video quality:

- Call admission control
- Expedited bandwidth requests
- Unscheduled automatic power save delivery

Each of these parameters is supported in Cisco Compatible Extensions (CCX) v4 and v5.

This section contains the following subsections:

### Call Admission Control

Call admission control (CAC) enables an access point to maintain controlled quality of service (QoS) when the wireless LAN is experiencing congestion. It works by rejecting requested calls (traffic streams) if the channel lacks the capacity to service the request. It requires that WMM be enabled on the WLAN. CAC is also known as ACM (Admission Control).

The following two types of CAC are available:

- Load-based CAC (recommended): All channel utilization (QBSS) is considered, including interference and noise, as well as AP traffic.
- Static CAC: Only the traffic to and from this AP is considered when evaluating the channel's capacity.

The following restrictions apply:

- CAC is not supported in FlexConnect local authentication, resulting in voice traffic not getting properly tagged.
- CAC supports the following PHY rates: 6,11,12,24 megabits per second. If CAC is enabled, then at least one of these rates should be enabled on the AP.

This section contains the following subsections:

### Static CAC

Static CAC enables the client to specify how much bandwidth or shared medium time is required to accept a new call and in turn enables the access point to determine whether it is capable of accommodating this particular call. The access point rejects the call if necessary in order to maintain the maximum allowed number of calls with acceptable quality.

The QoS setting for a WLAN determines the level of static CAC support. To use static CAC with voice applications, the WLAN must be configured for Platinum QoS. To use static CAC with video applications, the WLAN must be configured for Gold QoS. Also, make sure that WMM is enabled for the WLAN. See the 802.3 Bridging section for QoS and WMM configuration instructions.

**Note** You must enable admission control (ACM) for CCXv4 clients that have WMM enabled. Otherwise, static CAC does not operate properly.

### Load-Based CAC

Load-based CAC incorporates a measurement scheme that takes into account the bandwidth consumed by all traffic types (including that from clients), co-channel access point loads, and collocated channel interference, for voice applications. Load-based CAC also covers the additional bandwidth consumption resulting from PHY and channel impairment.

In load-based CAC, the access point continuously measures and updates the utilization of the RF channel (that is, the percentage of bandwidth that has been exhausted), channel interference, and the additional calls that the access point can admit. The access point admits a new call only if the channel has enough unused bandwidth to support that call. By doing so, load-based CAC prevents oversubscription of the channel and maintains QoS under all conditions of WLAN loading and interference.

## Expedited Bandwidth Requests

The expedited bandwidth request feature enables clients to indicate the urgency of a WMM traffic specifications (TSPEC) request (for example, an e911 call) to the WLAN. When the controller receives this request, it attempts to facilitate the urgency of the call in any way possible without potentially altering the quality of other TSPEC calls that are in progress.

You can apply expedited bandwidth requests to load-based CAC. Expedited bandwidth requests are disabled by default. When this feature is disabled, the controller ignores all expedited requests and processes TSPEC requests as normal TSPEC requests.

*Table 1: TSPEC Request Handling Examples*

| CAC Mode | Reserved bandwidth for voice calls | Usage | Normal TSPEC Request | TSPEC with Expedited Bandwidth Request |
|---|---|---|---|---|
| Static CAC | 75% (default setting) | Less than 75% | Admitted | Admitted |
| | | Between 75% and 90% (reserved bandwidth for voice calls exhausted) | Rejected | Admitted |
| | | More than 90% | Rejected | Rejected |
| Load-based CAC | | Less than 75% | Admitted | Admitted |
| | | Between 75% and 85% (reserved bandwidth for voice calls exhausted) | Rejected | Admitted |
| | | More than 85% | Rejected | Rejected |

[1] For static CAC, the voice call bandwidth usage is per access point and does not take into account co-channel access points. For load-based CAC, the voice call bandwidth usage is measured for the entire channel.

[2] Static CAC (consumed voice and video bandwidth) or load-based CAC (channel utilization [Pb]).

**Note** Admission control for TSPEC g711-40ms codec type is supported.

**Note** When video ACM is enabled, the controller rejects a video TSPEC if the non-MSDU size in the TSPEC is greater than 149 or the mean data rate is greater than 1 Kbps.

## U-APSD

Unscheduled automatic power save delivery (U-APSD) is a QoS facility defined in IEEE 802.11e that extends the battery life of mobile clients. In addition to extending battery life, this feature reduces the latency of traffic flow delivered over the wireless media. Because U-APSD does not require the client to poll each individual packet buffered at the access point, it allows delivery of multiple downlink packets by sending a single uplink trigger packet. U-APSD is enabled automatically when WMM is enabled.

## Traffic Stream Metrics

In a voice-over-wireless LAN (VoWLAN) deployment, traffic stream metrics (TSM) can be used to monitor voice-related metrics on the client-access point air interface. It reports both packet latency and packet loss. You can isolate poor voice quality issues by studying these reports.

The metrics consist of a collection of uplink (client side) and downlink (access point side) statistics between an access point and a client device that supports CCX v4 or later releases. If the client is not CCX v4 or CCXv5 compliant, only downlink statistics are captured. The client and access point measure these metrics. The access point also collects the measurements every 5 seconds, prepares 90-second reports, and then sends the reports to the controller. The controller organizes the uplink measurements on a client basis and the downlink measurements on an access point basis and maintains an hour's worth of historical data. To store this data, the controller requires 32 MB of additional memory for uplink metrics and 4.8 MB for downlink metrics.

TSM can be configured through either the GUI or the CLI on a per radio-band basis (for example, all 802.11a radios). The controller saves the configuration in flash memory so that it persists across reboots. After an access point receives the configuration from the controller, it enables TSM on the specified radio band.

**Note** Traffic stream metrics (TSM) can be used to monitor and report issues with voice quality.

**Note** Access points support TSM entries in both local and FlexConnect modes.

***Table 2: TSM Entries in Cisco 5508 and Flex 7510 WLCs***

| TSM Entries | 5508 | Flex 7510 |
|---|---|---|
| MAX AP TSM entries | 100 | 100 |
| MAX Client TSM entries | 250 | 250 |
| MAX TSM entries | 100*250=25000 | 100*250=25000 |

**Note** Once the upper limit is reached, additional TSM entries cannot be stored and sent to Cisco Prime Infrastructure. If client TSM entries are full and AP TSM entries are available, then only the AP entries are stored, and vice versa. This leads to partial output. TSM cleanup occurs every one hour. Entries are removed only for those APs and clients that are not in the system.

# Configuring Voice Parameters

## Configuring Voice Parameters (GUI)

**Step 1** Ensure that the WLAN is configured for WMM and the Platinum QoS level.

**Step 2** Choose **Wireless** and then **Network** under 802.11a/n or 802.11b/g/n, uncheck the 802.11a (or 802.11b/g) **Network Status** check box, and click **Apply** to disable the radio network.

**Step 3** Choose **Wireless** > **802.11a/n** or **802.11b/g/n** > **Media**. The 802.11a (or 802.11b) > Media page appears. The **Voice** tab is displayed by default.

**Step 4** (Optional) Check the **Admission Control (ACM)** check box to enable static CAC for this radio band. The default value is disabled.

**Step 5** (Optional) Select the **Admission Control (ACM)** you want to use by choosing from the following choices:

- **Load-based**—To enable channel-based CAC. This is the default option.
- **Static**—To enable radio-based CAC.

**Step 6** In the **Max RF Bandwidth** field, enter the percentage of the maximum bandwidth allocated to clients for voice applications on this radio band. Once the client reaches the value specified, the access point rejects new calls on this radio band.

The range is 5% to 85%. The sum of maximum bandwidth percentage of voice and video should not exceed 85%.

The default is 75%.

**Step 7** In the **Reserved Roaming Bandwidth** field, enter the percentage of maximum allocated bandwidth that is reserved for roaming voice clients. The controller reserves this bandwidth from the maximum allocated bandwidth for roaming voice clients.

The range is 0% to 25%.

The default is 6%.

**Step 8** To enable expedited bandwidth requests, check the **Expedited Bandwidth** check box. By default, this field is disabled.

**Step 9** To enable SIP CAC support, check the **SIP CAC Support** check box. By default, SIP CAC support is disabled.

**Step 10** From the **SIP Codec** drop-down list, choose one of the following options to set the codec name. The default value is G.711. The options are as follows:

- User Defined
- G.711
- G.729

**Step 11** In the **SIP Bandwidth (kbps)** field, enter the bandwidth in kilobits per second.

The possible range is 8 to 64.

The default value is 64.

**Note** The **SIP Bandwidth (kbps)** field is highlighted only when you select the SIP codec as User-Defined. If you choose the SIP codec as G.711, the **SIP Bandwidth (kbps)** field is set to 64. If you choose the SIP codec as G.729, the SIP Bandwidth (kbps) field is set to 8.

**Step 12** In the **SIP Voice Sample Interval (msecs)** field, enter the value for the sample interval.

**Step 13** In the **Maximum Calls** field, enter the maximum number of calls that can be made to this radio. The maximum call limit includes both direct and roaming-in calls. If the maximum call limit is reached, the new or roaming-in calls result in failure.

The possible range is 0 to 25.

The default value is 0, which indicates that there is no check for maximum call limit.

**Note** If SIP CAC is supported and the CAC method is static, the Maximum Possible Voice Calls and Maximum Possible Roaming Reserved Calls fields appear.

**Step 14** Check the **Metrics Collection** check box to collect traffic stream metrics. By default, this box is unselected. That is, the traffic stream metrics is not collected by default.

**Step 15** Click **Apply**.

**Step 16** Choose **Network** under 802.11a/n or 802.11b/g/n, check the **802.11a** (or **802.11b/g**) **Network Status** check box, and click **Apply** to reenable the radio network.

**Step 17** Click **Save Configuration**.

**Step 18** Repeat this procedure if you want to configure voice parameters for another radio band.

## Configuring Voice Parameters (CLI)

**Before you begin**

Ensure that you have configured SIP-based CAC.

**Step 1** See all of the WLANs configured on the controller by entering this command:

**show wlan summary**

**Step 2** Make sure that the WLAN that you are planning to modify is configured for WMM and the QoS level is set to Platinum by entering this command:

**show wlan** *wlan_id*

**Step 3** Disable the radio network by entering this command:

**config** {**802.11a** | **802.11b**} **disable network**

**Step 4** Save your settings by entering this command:

**save config**

**Step 5** Enable or disable static CAC for the 802.11a or 802.11b/g network by entering this command:

**config** {**802.11a** | **802.11b**} **cac voice acm** {**enable** | **disable**}

**Step 6** Set the percentage of maximum bandwidth allocated to clients for voice applications on the 802.11a or 802.11b/g network by entering this command:

**config** {**802.11a** | **802.11b**} **cac voice max-bandwidth** *bandwidth*

The *bandwidth* range is 5 to 85%, and the default value is 75%. Once the client reaches the value specified, the access point rejects new calls on this network.

**Step 7** Set the percentage of maximum allocated bandwidth reserved for roaming voice clients by entering this command:

**config** {**802.11a** | **802.11b**} **cac voice roam-bandwidth** *bandwidth*

The *bandwidth* range is 0 to 25%, and the default value is 6%. The controller reserves this much bandwidth from the maximum allocated bandwidth for roaming voice clients.

**Step 8** Configure the codec name and sample interval as parameters and to calculate the required bandwidth per call by entering this command:

**config** {**802.11a** | **802.11b**} **cac voice sip codec** {**g711** | **g729**} **sample-interval** *number_msecs*

**Step 9** Configure the bandwidth that is required per call by entering this command:

**config** {**802.11a** | **802.11b**} **cac voice sip bandwidth** *bandwidth_kbps* **sample-interval** *number_msecs*

**Step 10** Reenable the radio network by entering this command:

**config** {**802.11a** | **802.11b**} **enable network**

**Step 11** View the TSM voice metrics by entering this command:

**show [802.11a | 802.11b] cu-metrics** *AP_Name*

The command also displays the channel utilization metrics.

**Step 12** Enter the **save config** command to save your settings.

**Step 13** Configure voice automatically for a WLAN by entering this command:

**config auto-configure voice cisco** *wlan-id* **radio** {**802.11a** | **802.11b** | **all**}

**Step 14** Enter the **save config** command to save your settings.

# Configuring Video Parameters

## Configuring Video Parameters (GUI)

**Step 1** Ensure that the WLAN is configured for WMM and the Platinum or Gold QoS level.

**Step 2** Choose **Wireless** and then **Network** under 802.11a/n or 802.11b/g/n, uncheck the **802.11a** (or **802.11b/g**) **Network Status** check box, and click **Apply** to disable the radio network.

**Step 3** Choose **Wireless** > **802.11a/n** or **802.11b/g/n** > **Media**. The 802.11a (or 802.11b) > Media page appears.

**Step 4** In the **Video** tab, check the **Admission Control (ACM)** check box to enable video CAC for this radio band. The default value is disabled.

**Step 5** From the **CAC Method** drop-down list, choose between **Static** and **Load Based** methods.

The static CAC method is based on the radio and the load-based CAC method is based on the channel.

**Note** For TSpec and SIP based CAC for video calls, only Static method is supported.

**Step 6** In the **Max RF Bandwidth** text box, enter the percentage of the maximum bandwidth allocated to clients for video applications on this radio band. When the client reaches the value specified, the access point rejects new requests on this radio band.

The range is 5% to 85%. The sum of maximum bandwidth percentage of voice and video should not exceed 85%. The default is 0%.

**Step 7** In the Reserved Roaming Bandwidth text box, enter the percentage of the maximum RF bandwidth that is reserved for roaming clients for video.

**Step 8** Configure the SIP CAC Support by checking or unchecking the **SIP CAC Support** check box.

SIP CAC is supported only if SIP Snooping is enabled.

**Note** You cannot enable SIP CAC if you have selected the Load Based CAC method.

**Step 9** Click **Apply**.

**Step 10** Choose **Network** under 802.11a/n or 802.11b/g/n, check the **802.11a** (or **802.11b/g**) **Network Status** check box, and click **Apply** to reenable the radio network.

**Step 11** Click **Save Configuration**.

**Step 12** Repeat this procedure if you want to configure video parameters for another radio band.

## Configuring Video Parameters (CLI)

**Before you begin**

Ensure that you have configured SIP-based CAC.

**Step 1** See all of the WLANs configured on the controller by entering this command:

**show wlan summary**

**Step 2** Make sure that the WLAN that you are planning to modify is configured for WMM and the QoS level is set to Gold by entering this command:

**show wlan** *wlan_id*

**Step 3** Disable the radio network by entering this command:

**config** {**802.11a** | **802.11b**} **disable network**

**Step 4** Save your settings by entering this command:

**save config**

**Step 5** Enable or disable video CAC for the 802.11a or 802.11b/g network by entering this command:

**config** {**802.11a** | **802.11b**} **cac video acm** {**enable** | **disable**}

**Step 6** To configure the CAC method as either static or load-based, enter this command:

**config** {**802.11a** | **802.11b**} **cac video cac-method** {**static** | **load-based**}

**Step 7** Set the percentage of maximum bandwidth allocated to clients for video applications on the 802.11a or 802.11b/g network by entering this command:

**config** {**802.11a** | **802.11b**} **cac video max-bandwidth** *bandwidth*

The *bandwidth* range is 5 to 85%, and the default value is 5%. However, the maximum RF bandwidth cannot exceed 85% for voice and video. Once the client reaches the value specified, the access point rejects new calls on this network.

**Note** If this parameter is set to zero (0), the controller assumes that you do not want to do any bandwidth allocation and, therefore, allows all bandwidth requests.

**Step 8** To configure the percentage of the maximum RF bandwidth that is reserved for roaming clients for video, enter this command:

**config** {**802.11a** | **802.11b**} **cac video roam-bandwidth** *bandwidth*

**Step 9** To configure the CAC parameters for SIP-based video calls, enter this command:

**config** {**802.11a** | **802.11b**} **cac video sip** {**enable** | **disable**}

**Step 10** Process or ignore the TSPEC inactivity timeout received from an access point by entering this command:

**config** {**802.11a** | **802.11b**} **cac video tspec-inactivity-timeout** {**enable** | **ignore**}

**Step 11** Reenable the radio network by entering this command:

**config** {**802.11a** | **802.11b**} **enable network**

**Step 12** Enter the **save config** command to save your settings.

# Viewing Voice and Video Settings

## Viewing Voice and Video Settings (GUI)

**Step 1** Choose **Monitor** > **Clients** to open the Clients page.

**Step 2** Click the MAC address of the desired client to open the Clients > Detail page.

This page shows the U-APSD status (if enabled) for this client under Quality of Service Properties.

**Step 3** Click **Back** to return to the Clients page.

**Step 4** See the TSM statistics for a particular client and the access point to which this client is associated as follows:

a) Hover your cursor over the blue drop-down arrow for the desired client and choose **802.11aTSM** or **802.11b/g TSM**. The Clients > AP page appears.

b) Click the **Detail** link for the desired access point to open the Clients > AP > Traffic Stream Metrics page.

This page shows the TSM statistics for this client and the access point to which it is associated. The statistics are shown in 90-second intervals. The timestamp text box shows the specific interval when the statistics were collected.

**Step 5** See the TSM statistics for a particular access point and a particular client associated to this access point, as follows:

a) Choose **Wireless** > **Access Points** > **Radios** > **802.11a/n** or **802.11b/g/n**. The 802.11a/n Radios or 802.11b/g/n Radios page appears.

b) Hover your cursor over the blue drop-down arrow for the desired access point and choose **802.11aTSM** or **802.11b/g TSM**. The AP > Clients page appears.

c) Click the **Detail** link for the desired client to open the AP > Clients > Traffic Stream Metrics page.

This page shows the TSM statistics for this access point and a client associated to it. The statistics are shown in 90-second intervals. The timestamp text box shows the specific interval when the statistics were collected.

## Viewing Voice and Video Settings (CLI)

**Step 1** See the CAC configuration for the 802.11 network by entering this command:

**show ap stats** {**802.11a** | **802.11b**}

**Step 2** See the CAC statistics for a particular access point by entering this command:

**show ap stats {802.11a | 802.11b}** *ap_name*

Information similar to the following appears:

```
Call Admission Control (CAC) Stats
  Voice Bandwidth in use(% of config bw)......... 0
Total channel MT free....................... 0
Total voice MT free......................... 0
Na Direct................................... 0
Na Roam..................................... 0
  Video Bandwidth in use(% of config bw)......... 0
  Total num of voice calls in progress........... 0
  Num of roaming voice calls in progress......... 0
  Total Num of voice calls since AP joined....... 0
  Total Num of roaming calls since AP joined..... 0
 Total Num of exp bw requests received.......... 5
  Total Num of exp bw requests admitted.......... 2

Num of voice calls rejected since AP joined...... 0
  Num of roam calls rejected since AP joined..... 0
  Num of calls rejected due to insufficient bw....0
  Num of calls rejected due to invalid params.... 0
  Num of calls rejected due to PHY rate.......... 0
  Num of calls rejected due to QoS policy..... 0
```

In the example above, “MT” is medium time, “Na” is the number of additional calls, and “exp bw” is expedited bandwidth.

**Note** Suppose an AP has to be rebooted when a voice client associated with the AP is on an active call. After the AP is rebooted, the client continues to maintain the call, and during the time the AP is down, the database is not refreshed by the controller. Therefore, we recommend that all active calls are ended before the AP is taken down.

**Step 3** See the U-APSD status for a particular client by entering this command:

**show client detail** *client_mac*

**Step 4** See the TSM statistics for a particular client and the access point to which this client is associated by entering this command:

**show client tsm** {**802.11a** | **802.11b**} *client_mac* {*ap_mac* | **all**}

The optional **all** command shows all access points to which this client has associated. Information similar to the following appears:

```
Client Interface Mac:               00:01:02:03:04:05
Measurement Duration:               90 seconds

  Timestamp                           1st Jan 2006, 06:35:80
    UpLink Stats
    ================
       Average Delay (5sec intervals)............................35
       Delay less than 10 ms.....................................20
       Delay bet 10 - 20 ms......................................20
       Delay bet 20 - 40 ms......................................20
       Delay greater than 40 ms..................................20
      Total packet Count........................................80
      Total packet lost count (5sec)............................10
      Maximum Lost Packet count(5sec)............................5
      Average Lost Packet count(5secs)...........................2
    DownLink Stats
    ================
       Average Delay (5sec intervals)............................35
```

```
      Delay less than 10 ms.....................................20
      Delay bet 10 - 20 ms......................................20
      Delay bet 20 - 40 ms......................................20
      Delay greater than 40 ms..................................20
     Total packet Count.........................................80
     Total packet lost count (5sec)..............................10
     Maximum Lost Packet count(5sec)............................5
     Average Lost Packet count(5secs)...........................2
```

**Note** The statistics are shown in 90-second intervals. The timestamp text box shows the specific interval when the statistics were collected.

**Note** Clear the TSM statistics for a particular access point or all the access points to which this client is associated by entering this **clear client tsm** {**802.11a** | **802.11b**} *client_mac* {*ap_mac* | **all**} command.

**Step 5** See the TSM statistics for a particular access point and a particular client associated to this access point by entering this command:

**show ap stats** {**802.11a** | **802.11b**} *ap_name* **tsm** {*client_mac* | **all**}

The optional **all** command shows all clients associated to this access point. Information similar to the following appears:

```
AP Interface Mac:                   00:0b:85:01:02:03
Client Interface Mac:               00:01:02:03:04:05
Measurement Duration:               90 seconds

  Timestamp                           1st Jan 2006, 06:35:80
    UpLink Stats
    ================
       Average Delay (5sec intervals)............................35
       Delay less than 10 ms.....................................20
       Delay bet 10 - 20 ms......................................20
       Delay bet 20 - 40 ms......................................20
       Delay greater than 40 ms..................................20
      Total packet Count.........................................80
      Total packet lost count (5sec)..............................10
      Maximum Lost Packet count(5sec)............................5
      Average Lost Packet count(5secs)...........................2
    DownLink Stats
    ================
       Average Delay (5sec intervals)............................35
       Delay less than 10 ms.....................................20
       Delay bet 10 - 20 ms......................................20
       Delay bet 20 - 40 ms......................................20
       Delay greater than 40 ms..................................20
      Total packet Count.........................................80
      Total packet lost count (5sec)..............................10
      Maximum Lost Packet count(5sec)............................5
      Average Lost Packet count(5secs)...........................2
```

**Note** The statistics are shown in 90-second intervals. The timestamp text box shows the specific interval when the statistics were collected.

**Step 6** Enable or disable debugging for call admission control (CAC) messages, events, or packets by entering this command:

**debug cac** {**all** | **event** | **packet**}{**enable** | **disable**}

where **all** configures debugging for all CAC messages, **event** configures debugging for all CAC events, and **packet** configures debugging for all CAC packets.

**Step 7** Use the following command to perform voice diagnostics and to view the debug messages between a maximum of two 802.11 clients:

**debug voice-diag** {**enable** | **disable**} *mac-id mac-id2* [**verbose**]

The verbose mode is an optional argument. When the verbose option is used, all debug messages are displayed in the console. You can use this command to monitor a maximum of two 802.11 clients. If one of the clients is a non-WiFi client, only the 802.11 client is monitored for debug messages.

**Note** It is implicitly assumed that the clients being monitored are on call.

**Note** The debug command automatically stops after 60 minutes.

**Step 8** Use the following commands to view various voice-related parameters:

- **show client voice-diag status**

  Displays information about whether voice diagnostics is enabled or disabled. If enabled, will also displays information about the clients in the watch list and the time remaining for the diagnostics of the voice call.

  If voice diagnostics is disabled when the following commands are entered, a message indicating that voice diagnostics is disabled appears.

- **show client voice-diag tspec**

  Displays the TSPEC information sent from the clients that are enabled for voice diagnostics.

- **show client voice-diag qos-map**

  Displays information about the QoS/DSCP mapping and packet statistics in each of the four queues: VO, VI, BE, BK. The different DSCP values are also displayed.

- **show client voice-diag avrg_rssi**

  Display the client's RSSI values in the last 5 seconds when voice diagnostics is enabled.

- **show client voice-diag roam-history**

  Displays information about the last three roaming calls. The output contains the timestamp, access point associated with roaming, roaming reason, and if there is a roaming failure, the reason for the roaming-failure.

- **show client calls {active | rejected} {802.11a | 802.11bg | all}**

  This command lists the details of active TSPEC and SIP calls on the controller.

**Step 9** Use the following commands to troubleshoot video debug messages and statistics:

- **debug ap show stats {802.11b | 802.11a}** *ap-name* **multicast**—Displays the access point's supported multicast rates.
- **debug ap show stats {802.11b | 802.11a}** *ap-name* **load**—Displays the access point's QBSS and other statistics.
- **debug ap show stats {802.11b | 802.11a}** *ap-name* **tx-queue**—Displays the access point's transmit queue traffic statistics.
- **debug ap show stats {802.11b | 802.11a}** *ap-name* **client** {**all** | **video** | *client-mac*}—Displays the access point's client metrics.
- **debug ap show stats {802.11b | 802.11a}** *ap-name packet*—Displays the access point's packet statistics.

- **debug ap show stats {802.11b | 802.11a}** *ap-name* **video metrics**—Displays the access point's video metrics.
- **debug ap show stats video** *ap-name* **multicast mgid** *number* —Displays an access point's Layer 2 MGID database number.
- **debug ap show stats video** *ap-name* **admission**—Displays an access point's admission control statistics.
- **debug ap show stats video** *ap-name* **bandwidth**—Displays an access point's video bandwidth.

# Configuring SIP-Based CAC

## Restrictions for SIP-Based CAC

- SIP CAC should only be used for phones that support status code 17 and do not support TSPEC-based admission control.
- SIP CAC will be supported only if SIP snooping is enabled.

## Configuring SIP-Based CAC (GUI)

**Before you begin**

- Ensure that you have set the voice to the platinum QoS level.
- Ensure that you have enabled call snooping for the WLAN.
- Ensure that you have enabled the Admission Control (ACM) for this radio.

**Step 1** Choose **Wireless** > **Advanced** > **SIP Snooping** to open the SIP Snooping page.

**Step 2** Specify the call-snooping ports by entering the starting port and the ending port.

**Step 3** Click **Apply** and then click **Save Configuration**.

## Configuring SIP-Based CAC (CLI)

**Step 1** Set the voice to the platinum QoS level by entering this command:

**config wlan qos** *wlan-id* **Platinum**

**Step 2** Enable the call-snooping feature for a particular WLAN by entering this command:

**config wlan call-snoop enable** *wlan-id*

**Step 3** Enable the ACM to this radio by entering this command:

**config** {**802.11a** | **802.11b**} **cac** {**voice** | **video**} **acm enable**

**Step 4** To configure the call snooping ports, enter this command:

**config advanced sip-snooping-ports** *starting-port ending-port*

**Step 5** To troubleshoot SIP-based CAC events, enter this command:

**debug sip event** {**enable** | **disable**}

# Configuring Media Parameters

## Configuring Media Parameters (GUI)

**Step 1** Ensure that the WLAN is configured for WMM and the Gold QoS level.

**Step 2** Disable all WLANs with WMM enabled and click **Apply**.

**Step 3** Choose **Wireless** and then **Network** under 802.11a/n or 802.11b/g/n, unselect the **802.11a** (or **802.11b/g**) **Network Status** check box, and click **Apply** to disable the radio network.

**Step 4** Choose **Wireless** > **802.11a/n** or **802.11b/g/n** > **Media**. The 802.11a (or 802.11b) > Media > Parameters page appears.

**Step 5** Choose the **Media** tab to open the Media page.

**Step 6** Select the **Unicast Video Redirect** check box to enable Unicast Video Redirect. The default value is disabled.

**Step 7** In the **Maximum Media Bandwidth (0-85%)** text box, enter the percentage of the maximum bandwidth to be allocated for media applications on this radio band. Once the client reaches the specified value, the access point rejects new calls on this radio band.

The default value is 85%; valid values are from 0 to 85%.

**Step 8** In the **Client Phy Rate** text box, enter the value for the rate in kilobits per second at which the client operates.

**Step 9** In the **Maximum Retry Percent (0-100%)** text box, enter the percentage of the maximum retry. The default value is 80.

**Step 10** Select the **Multicast Direct Enable** check box to enable the **Multicast Direct Enable** text box. The default value is enabled.

**Step 11** From the **Max Streams per Radio** drop-down list, choose the maximum number of allowed multicast direct streams per radio. Choose a value between 1 to 20 or No Limit. The default value is set to No Limit.

**Step 12** From the **Max Streams per Client** drop-down list, choose the maximum number of allowed clients per radio. Choose a value between 1 to 20 or No Limit. The default value is set to No Limit.

**Step 13** If you want to enable the best radio queue for this radio, select the **Best Effort QoS Admission** check box. The default value is disabled.

# Configuring Voice Prioritization Using Preferred Call Numbers

## Voice Prioritization Using Preferred Call Numbers

You can configure a controller to support calls from clients that do not support TSPEC-based calls. This feature is known as voice prioritization. These calls are given priority over other clients utilizing the voice pool. Voice prioritization is available only for SIP-based calls and not for TSPEC-based calls. If the bandwidth is available, it takes the normal flow and allocates the bandwidth to those calls.

You can configure up to six preferred call numbers. When a call comes to one of the configured preferred numbers, the controller does not check on the maximum call limit. It invokes the CAC to allocate bandwidth for the preferred call. The bandwidth allocation is 85 percent of the entire bandwidth pool, not just from the maximum configured voice pool. The bandwidth allocation is the same even for roaming calls.

This section contains the following subsections:

## Prerequisites for Configuring Voice Prioritization Using Preferred Call Numbers

You must configure the following before configuring voice prioritization:

- Set WLAN QoS to platinum.
- Enable ACM for the radio.
- Enable SIP call snooping on the WLAN.

## Configuring a Preferred Call Number (GUI)

**Step 1** Set the WLAN QoS profile to Platinum.

**Step 2** Enable ACM for the WLAN radio.

**Step 3** Enable SIP call snooping for the WLAN.

**Step 4** Choose **Wireless** > **Advanced** > **Preferred Call** to open the **Preferred Call** page.

All calls configured on the controller appear.

**Note** To remove a preferred call, hover your cursor over the blue drop-down arrow and choose **Remove**.

**Step 5** Click **Add Number** to add a new preferred call.

**Step 6** In the Call Index text box, enter the index that you want to assign to the call. Valid values are from 1 through 6.

**Step 7** In the Call Number text box, enter the number.

**Step 8** Click **Apply** to add the new number.

## Configuring a Preferred Call Number (CLI)

**Step 1** Set the voice to the platinum QoS level by entering this command:

**config wlan qos wlan-id Platinum**

**Step 2** Enable the ACM to this radio by entering this command:

**config {802.11a | 802.11b} cac {voice | video} acm enable**

**Step 3** Enable the call-snooping feature for a particular WLAN by entering this command:

**config wlan call-snoop enable** *wlan-id*

**Step 4** Add a new preferred call by entering this command:

**config advanced sip-preferred-call-no** *call_index* {*call_number* | **none**}

**Step 5** Remove a preferred call by entering this command:

**config advanced sip-preferred-call-no** *call_index* **none**

**Step 6** View the preferred call statistics by entering the following command:

**show ap stats {802.11{a | b} | wlan}** *ap_name*

**Step 7** Enter the following command to list the preferred call numbers:

**show advanced sip-preferred-call-no**

# Configuring EDCA Parameters

## Enhanced Distributed Channel Access Parameters

Enhanced Distributed Channel Access (EDCA) parameters are designed to provide preferential wireless channel access for voice, video, and other quality of service (QoS) traffic.

This section contains the following subsections:

## Configuring EDCA Parameters (GUI)

**Step 1** Choose **Wireless** and then **Network** under 802.11a/n or 802.11b/g/n, unselect the **802.11a** (or **802.11b/g**) **Network Status** check box, and click **Apply** to disable the radio network.

**Step 2** Click **EDCA Parameters** under 802.11a/n or 802.11b/g/n.

**Step 3** The **802.11a (or 802.11b/g) > EDCA Parameters** window is displayed.

**Step 4** Choose one of the following options from the **EDCA Profile** drop-down list:

- **WMM**—Enables the Wi-Fi Multimedia (WMM) default parameters. The WMM option is default and we recommend this setting if you have SpectraLink phones deployed in your network.
- **Spectralink Voice Priority**—This setting is not recommended.
- **Voice Optimized**—Enables Enhanced Distributed Channel Access (EDCA) voice-optimized profile parameters. Choose this option when 8821 phones are deployed in your network, and video services are not in use.
- **Voice & Video Optimized**—Enables EDCA voice-optimized and video-optimized profile parameters. Choose this option when 8821 phones are deployed in your network, and video services are not in use.
- **Custom Voice**—Enables custom voice EDCA parameters for 802.11a. The EDCA parameters under this option also match the 6.0 WMM EDCA parameters when this profile is applied. This setting is not recommended because it is deprecated.

**Note** If you deploy video services, admission control must be disabled.

**Step 5** To enable MAC optimization for voice, check the **Enable Low Latency MAC** check box. By default, this check box is not checked. This feature enhances voice performance by controlling packet retransmits and appropriately aging out voice packets on lightweight access points, which improves the number of voice calls serviced per access point.

**Note** We recommend that you do not enable low latency MAC. You should enable low-latency MAC only if the WLAN allows WMM clients. If WMM is enabled, then low-latency MAC can be used with any of the EDCA profiles.

**Step 6** Click **Apply** to commit your changes.

**Step 7** To re-enable the radio network, click **Network** under 802.11a/n or 802.11b/g/n, check the **802.11a** (or **802.11b/g**) **Network Status** check box, and click **Apply**.

**Step 8** Click **Save Configuration**.

# Configuring EDCA Parameters (CLI)

**Step 1** Disable the radio network by entering this command:

**config** {**802.11a** | **802.11b**} **disable network**

**Step 2** Save your settings by entering this command:

**save config**

**Step 3** Enable a specific EDCA profile by entering this command:

**config advanced {802.11a | 802.11b}** {**wmm-default | svp-voice | optimized-voice | optimzed-voice-video | custom-voice** }

- **wmm-default**—Enables the Wi-Fi Multimedia (WMM) default parameters. This is the default value. Choose this option if voice or video services are not deployed on your network.
- **svp-voice**—Enables SpectraLink voice-priority parameters. Choose this option if SpectraLink phones are deployed on your network to improve the quality of calls.

- **optimized-voice**—Enables EDCA voice-optimized profile parameters. Choose this option if voice services other than SpectraLink are deployed on your network.
- **optimized-video-voice**—Enables EDCA voice-optimized and video-optimized profile parameters. Choose this option if both voice and video services are deployed on your network.
- **custom-voice**—Enables custom voice EDCA parameters for 802.11a. The EDCA parameters under this option also match the 6.0 WMM EDCA parameters when this profile is applied.

**Note** If you deploy video services, admission control (ACM) must be disabled.

**Step 4** View the current status of MAC (low latency MAC) optimization for voice by entering this command:

**show** {**802.11a** | **802.11b**}

Information that is similar to the following example is displayed:

```
Voice-mac-optimization..................Disabled
```

**Step 5** Enable or disable MAC optimization for voice by entering this command:

**config advanced** {**802.11a** | **802.11b**} **voice-mac-optimization** {**enable** | **disable**}

**Note** The low latency MAC option is not supported.

This feature enhances voice performance by controlling packet retransmits and appropriately aging out voice packets on lightweight APs. This, in turn improves the number of voice calls serviced per AP. The default value is disabled.

**Step 6** Re-enable the radio network by entering this command:

**config** {**802.11a** | **802.11b**} **enable network**

**Step 7** Save your settings by entering this command: **save config**.