

Troubleshooting the 792xG Series Wireless IP Phone

Understanding the 792xG Series Wireless IP Phone

The Cisco Unified Wireless IP Phone 792xG Series are 802.11 dual-band wireless devices that provide comprehensive voice communications in conjunction with the Cisco Unified Communications Manager and Cisco Aironet 802.11b/g and Cisco Aironet 802.11a Access Points (APs) within the Cisco Unified Wireless Network (CUWN). These phone models, like other network devices, must be configured and managed. The phones encode G.711a, G.711u, G.729a, G.729ab, G.722/iLBC, and decode G.711a, G.711b, G.711u, G.729, G.729a, G.729b, and G.729ab.

Understanding Basic Operation

The 792xG Series wireless IP phones are very similar to wired IP phones. If you are using a DHCP Server and Cisco Unified Communications Manager, the phone will obtain the address for the TFTP server through preconfigured options within the DHCP scope. It is important to make sure that the IP address of the publisher is configured in Option 150 or Option 66 in the DHCP scope options.

Please refer to *Configuring Windows 2000 DHCP Server for Cisco Unified Call Manager* available at the following URL for details:

http://www.cisco.com/en/US/products/sw/voicesw/ps556/products_tech_note09186a00800942f4.shtml

Basic Connectivity Problems

Symptom: No Association to Cisco Aironet Access Points

After the Greeting Message displays, if a phone continues to cycle through messages displaying on the phone screen, the phone is not associating with the access point properly. The phone cannot successfully start up unless it associates and authenticates with an access point.

Verifying Access Point Settings

The Cisco Unified Wireless IP Phone 792xG Series must first authenticate and associate with an access point before it can obtain an IP address. The phone follows this start-up process with the access point:

1. Scans for an access point.

2. Associates with an access point.
3. Authenticates using a preconfigured authentication method (if configured, can use LEAP, EAP-FAST, Auto (AKM), or others).
4. Obtains an IP address.
 - a. Check the SSID settings on the access point and on the phone to be sure the SSID matches.
 - b. Check the authentication type settings on the access point and on the phone to be sure authentication/encryption settings match.

**Note**

If the message “No Service - IP Config Failed” displays, DHCP failed because the encryption between the access point and phone do not match.

If using static WEP, check the WEP key on the phone to be sure it matches the WEP key on the access point. Re-enter the WEP key on the phone to be sure it is correct.

**Note**

If open authentication is set, the phone is able to associate to an access point, although the WEP keys are incorrect or mismatched.

Error Messages during Authentication

Authentication failed, No AP found

1. Check if the correct authentication method and related encryption settings are enabled on the AP.
2. Check that the correct SSID is configured on the phone.
3. Check that the correct username and password are configured when using LEAP, EAP-FAST or Auto (AKM) authentication.
4. If you are using a WPA Pre-Shared key or WPA2 Pre-Shared Key, check that you have the correct passphrase configured.

**Note**

You might need to enter the username on the phone in the domain\username format when authenticating with a Windows domain.

EAP authentication failed

1. If you are using EAP, you might need to enter the EAP username on the phone in the domain\username format when authenticating with a Windows domain.
2. Check that the correct EAP username and password are entered on phone.

AP Error-cannot support all requested capabilities

1. On the access point, check that CKIP/CMIC is not enabled for the voice VLAN SSID. The Cisco Unified Wireless IP Phone 792xG Series does not support these features.

Table 3-1 Common Status Messages

Message	Description	Possible Cause and Action
Network Busy	The phone is unable to complete a call.	CAC is enabled and the available bandwidth (Medium Times) has been reached per AP/Channel, causing the call to be rejected by the Wireless LAN Controller. Wait a few minutes and try the call again. If the problem persists, utilize the “debug cac all enable” to troubleshoot.
Leaving Service Area	The phone is unable to place or receive calls. The no signal icon displays on the phone screen.	The phone cannot detect any beacons from the AP. The phone is either out of range of an AP or the AP may have stopped beaconing unexpectedly.
Locating Network Services	The phone is searching for an AP.	The phone is searching all beacons and scanning for a channel and SSID to use.
Authentication Failed	The phone is unable to access the WLAN, and the main phone screen is not active.	The authentication server does not accept the security credentials. Verify that the security mode and credentials are correct by viewing the Network profile.
Configuring IP	The main phone screen is not active.	The phone is attempting to obtain network parameters such as its IP address, or the IP address of the gateway or router from the DHCP server. If the phone is unable to retrieve the IP address, then check that the DHCP server is up and running.
Configuring CM List	The main phone screen is not active.	The phone is downloading its configuration files from the TFTP server. Wait a few minutes for the phone to download all of its configuration files.

**Note**

If you suspect the AP is the root cause, run the following diagnostic tests on the AP and submit the output to the Cisco TAC.

1. On AP console, enter:

```
AP1252-b5:c8>debug dot1 d0 trace print txev rcv beacons
```

2. From the Wireless LAN Controller:

```
(WiSM_4) >debug ap enable AP1252-b5:c8
```

```
(WiSM_4) >debug ap command 'debug dot11 d0 trace print txev rcv beacon' AP1252-b5:c8
```

Monitoring the Cisco 792xG Series Wireless IP Phone

Once the phone has authenticated, associated and obtained a valid IP address, it will locate the Cisco Unified Communications Manager through preconfigured DHCP options, retrieve its configured directory number (DN), and download the latest version of firmware.

In order to monitor WLAN information, WLAN Statistics and Stream information pertaining to a VoWLAN call, use the following method.

`https://[IP address]`

The default username is “Admin” and the password is “Cisco.”

**Note**

While monitoring is not in real-time, you can see somewhat consistent data by constantly refreshing the page.

For the purposes of understanding how to troubleshoot a call using the Web pages on the Cisco 792xG Series wireless IP phone, we have provided an example of a call made from a 7925G Series wireless IP phone with MAC 00:23:33:41:63:6F to another 7925G Series wireless IP phone with MAC 00:23:33:41:95:72.

As you can seen in [Figure 3-1](#), the information provided allows the systems engineer to understand what the basic information is with regard to the call. The web pages displayed in [Figure 3-1](#) and [Figure 3-2](#) provide the BSSID, the AP where the 7925G IP phone is associated, the Tx Power (50 mW), Channel, RSSI, and Channel Utilization. These are all important values to understand with regard to your VoWLAN deployment.

Figure 3-1 Cisco 7925 IP Phone 1



Cisco Unified Wireless IP Phone 7925G

SEP00233341636F

Phone DN 2000

WLAN Information	
Active Network Profile	chestes
MAC Address	00233341636F
SSID	chestes-voice
802.11 Mode	802.11a
Scan Mode	Auto
Restricted Data Rates	False
Call Power Save Mode	U-APSD/PS-POLL
BSSID	0023332c467d
Restricted Data Rates	False
Call Power Save Mode	U-APSD/PS-POLL
BSSID	0023332c467d
Access Point	00:23:33:2c:46:7d
Tx Power	17 dBm
Channel	56
RSSI	-41
Channel Utilization	103
DTIM period (ms)	1
Security Mode	Open
Encryption	None
Key Management	Open

Figure 3-2 Cisco 7925 IP Phone 2



Cisco Unified Wireless IP Phone 7925G

SEP002333419572

Phone DN 2001

HOME
SETUP
NETWORK PROFILES +
USB SETTINGS
TRACE SETTINGS
WAVELINK SETTINGS
CERTIFICATES
CONFIGURATIONS
PHONE BOOK +
INFORMATION
NETWORK
WIRELESS LAN
DEVICE
STATISTICS
WIRELESS LAN
NETWORK
STREAM STATISTICS
STREAM 1
STREAM 2
SYSTEM
TRACE LOGS
SITE SURVEY
DATE & TIME

WLAN Information	
Active Network Profile	chestes
MAC Address	002333419572
SSID	chestes-voice
802.11 Mode	802.11a
Scan Mode	Auto
Restricted Data Rates	False
Call Power Save Mode	U-APSD/PS-POLL
BSSID	0023332c467d
Access Point	00:23:33:2c:46:7d
Tx Power	17 dBm
Channel	56
RSSI	-44
Channel Utilization	111
DTIM period (ms)	1
Security Mode	Open
Encryption	None
Key Management	Open

If the RSSI, or channel utilization, is poor and does not adhere to design and deployment best practices as outlined in the *VoWLAN Design Guide 4.1*, please review the WLAN Statistics and the Stream Statistics web page to further troubleshoot the problem. [Figure 3-3](#) and [Figure 3-4](#) display the same call made between the 7925 IP phones at MAC 63:6F and 95:72 outlining what to look for on each of these pages.

Figure 3-3 WLAN Statistics for IP Phone with MAC 00:23:33:41:63:6F

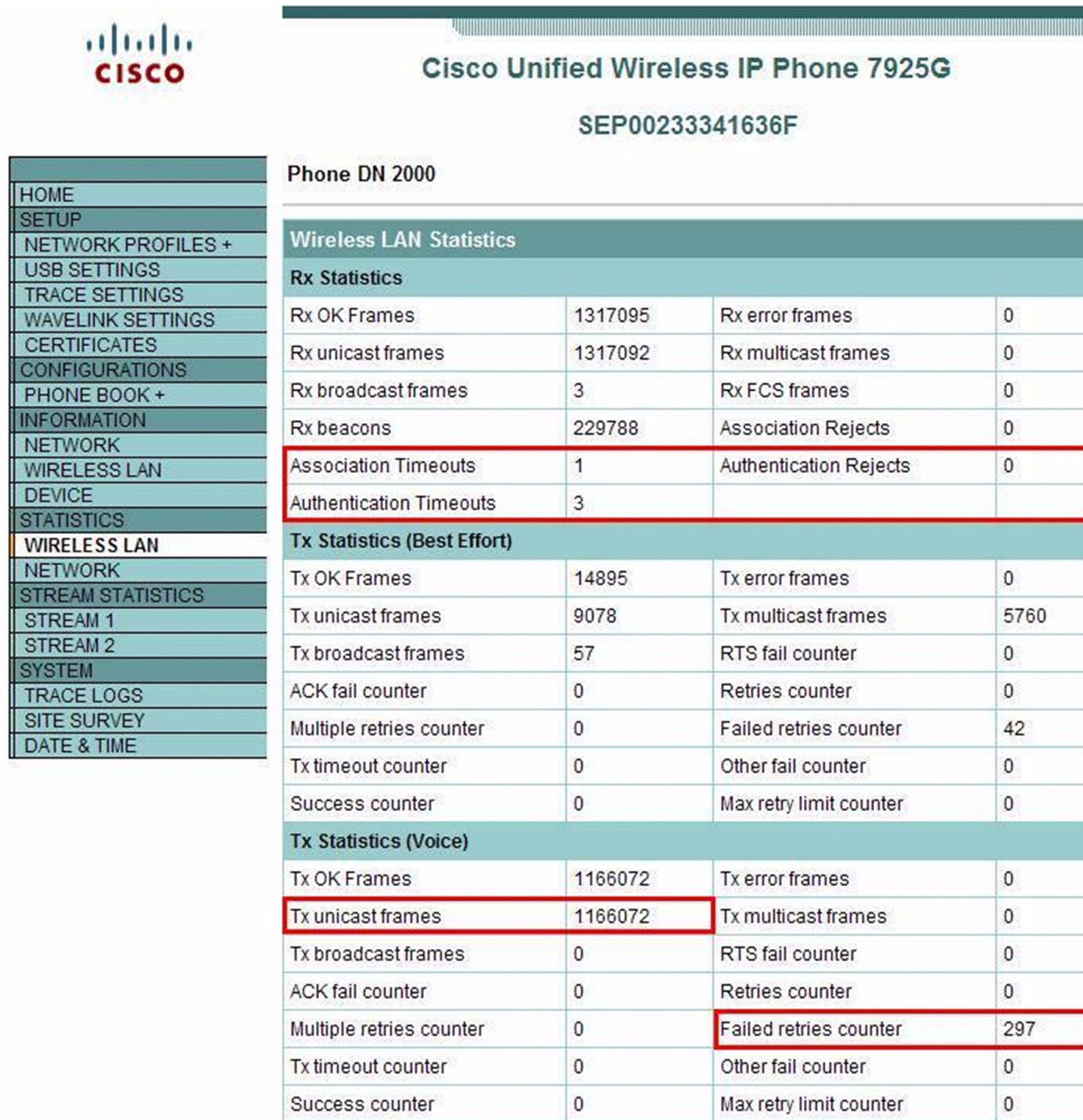


Figure 3-4 WLAN Statistics for IP Phone with MAC 00:23:33:41:95:72

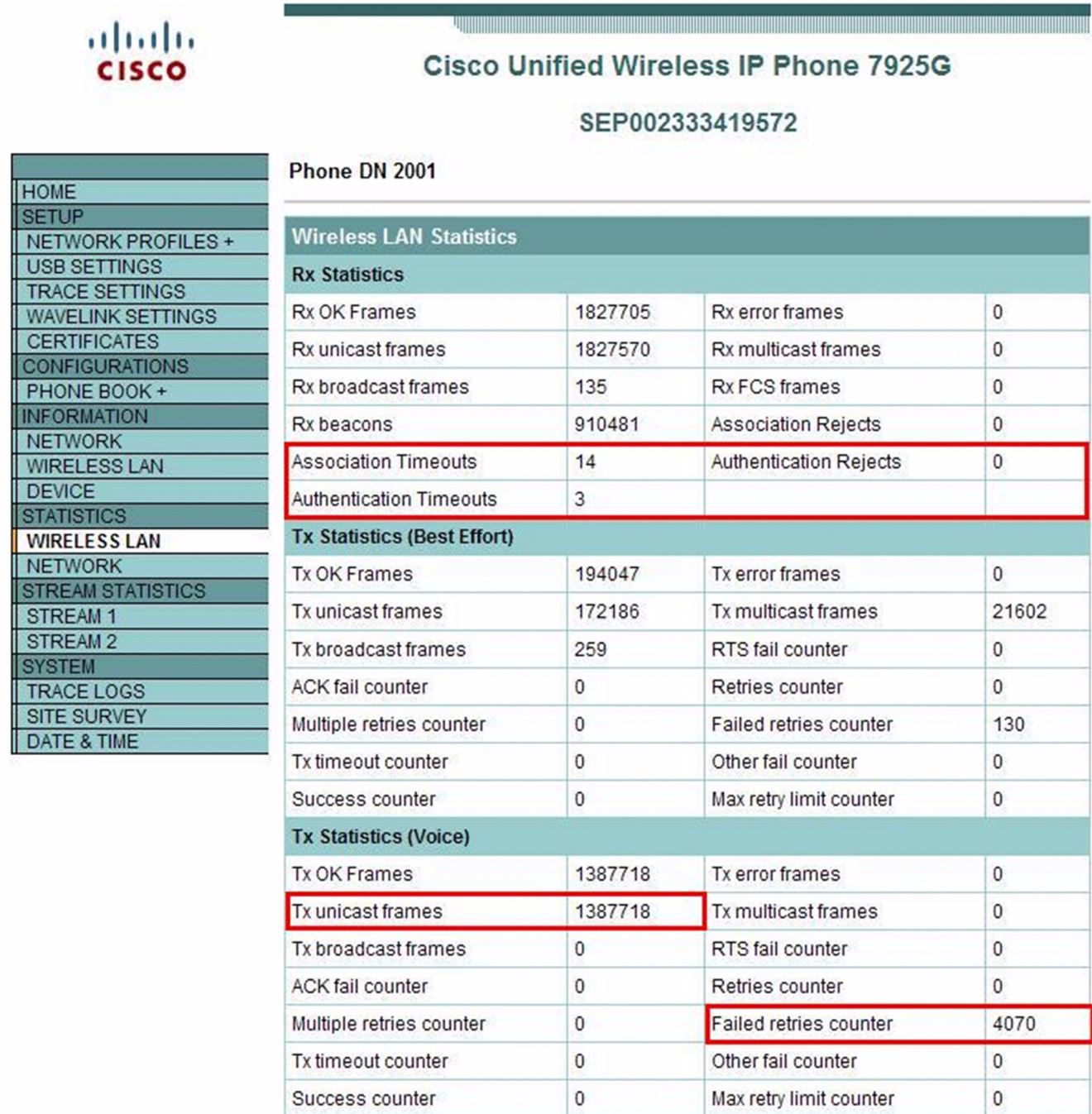


Table 3-2 **WLAN Statistics Definitions**

Item	Description
Association Timeouts	Number of failed association attempts due to timeout.
Authentication Timeouts	Number of failed authentication attempts due to timeout.
Authentication Rejects	Number of authentication attempts that the AP rejected.
Tx Unicast Frames	Number of frames transmitted that are unicast traffic.
Failed Retries Counter	Number of frames without acknowledgements.

When evaluating the WLAN statistics web page on the 792xG Series wireless IP phone, it is important to understand that Association and Authentication Timeout counters will usually increment when the 792xG Series wireless IP phone is out of range of an AP, has poor signal, or experiences severe packet loss. The “Authentication Rejects” counter is usually due to bad credentials or a problem on the Cisco ACS Server. While it is also important to compare the difference between the overall unicast frames transmitted and the Failed Retry counter, the Stream Statistics seen in [Figure 3-5](#) and [Figure 3-6](#) are far more valuable when troubleshooting the audio problems between IP phones on the WLAN.

Using Stream Statistics and Voice Quality Metrics

To use the metrics for monitoring voice quality, utilize the Stream Statistics web page and document the typical scores under normal conditions and use the metrics as a baseline for comparison. To measure the voice quality of calls that are sent and received on the WLAN, the Cisco Unified IP Phones uses statistical metrics that are based on concealment events. The DSP plays concealment frames to mask frame loss in the voice packet stream.

- **Concealment Ratio metrics** - Show the ratio of concealment frames over total speech frames. An interval conceal ratio is calculated every 3 seconds.
- **Concealed Second metrics** - Show the number of seconds in which the DSP plays concealment frames due to lost frames. A severely “concealed second” is a second in which the DSP plays more than five percent concealment frames.
- **MOS-LQK metrics** - Use a numeric score to estimate the relative voice listening quality. The Cisco Unified IP Phone calculates the mean opinion score (MOS) for listening quality (LQK) based on audible concealment events due to frame loss in the preceding 8 seconds and includes perceptual weighting factors such as codec type and frame size.



Note

MOS LQK scores are produced by a Cisco proprietary algorithm, Cisco Voice Transmission Quality (CVTQ) index. Depending on the MOS LQK version number, these scores might be compliant with the International Telecommunications Union (ITU) standard P.564. This standard defines evaluation methods and performance accuracy targets that predict listening quality scores based on observation of actual network impairment. Concealment ratio and concealment seconds are primary measurements based on frame loss while MOS LQK scores project a “human-weighted” version of the same information on a scale from 5 (excellent) to 1 (bad) for measuring listening quality.

It is important to distinguish significant changes from random changes in metrics. Significant changes are scores that change about 0.2 MOS or greater and persist in calls that last longer than 30 seconds. MOS LQK scores can vary based on the codec that the Cisco Unified IP Phone uses. The following codecs provide these maximum MOS LQK scores under normal conditions with zero frame loss:

- G.711 codec gives 4.5 score
- G.729A/ AB gives 3.7 score

**Note**

A Conceal Ratio of zero indicates that the IP network is delivering frames and packets on time with no loss.

Figure 3-5 Stream Statistics for IP Phone with MAC 00:23:33:41:63:6F



Cisco Unified Wireless IP Phone 7925G

SEP00233341636F

Phone DN 2000

- HOME
- SETUP
- NETWORK PROFILES +
- USB SETTINGS
- TRACE SETTINGS
- WAVELINK SETTINGS
- CERTIFICATES
- CONFIGURATIONS
- PHONE BOOK +
- INFORMATION
- NETWORK
- WIRELESS LAN
- DEVICE
- STATISTICS
- WIRELESS LAN
- NETWORK
- STREAM STATISTICS
- STREAM 1
- STREAM 2
- SYSTEM
- TRACE LOGS
- SITE SURVEY
- DATE & TIME

Stream Statistics			
RTP Statistics			
Domain Name	snmpUDPDomain	Remote Address	192.168.130.55
Remote Port	17824	Local Address	192.168.130.52
Local Port	21360	Sender Joins	15
Receiver Joins	24	Byes	16
Start Time	01:13:13	Row Status	Active
Host Name	SEP00233341636F	Sender DSCP	EF
Sender Packets	0	Sender Octets	0
Sender Tool	G.722	Sender Reports	0
Sender Report Time	00:49:27	Sender Start Time	01:13:11
Receiver DSCP (Previous, Current)	EF, EF	Receiver Packets	345258
Receiver Octets	55233120	Receiver Tool	G.711u
Receiver Lost Packets	2958	Receiver Jitter	1
Receiver Reports	0	Receiver Start Time	01:13:14
Voice Quality Metrics			
MOS LQK	3.0590	Avg MOS LQK	4.4270
Min MOS LQK	2.0000	Max MOS LQK	4.5000
MOS LQK Version	0.95	Cumulative Conceal Ratio	0.0089
Interval Conceal Ratio	0.1872	Max Conceal Ratio	1.0000
Conceal Seconds	168	Severly Conceal Seconds	91

Refresh
Stop

Figure 3-6 Stream Statistics for IP Phone with MAC 00:23:33:41:95:72



Cisco Unified Wireless IP Phone 7925G

SEP002333419572

Phone DN 2001

Stream Statistics			
RTP Statistics			
Domain Name	snmpUDPDomain	Remote Address	192.168.130.52
Remote Port	20512	Local Address	192.168.130.55
Local Port	17824	Sender Joins	30
Receiver Joins	39	Byes	30
Start Time	01:13:08	Row Status	Not Ready
Host Name	SEP002333419572	Sender DSCP	EF
Sender Packets	107	Sender Octets	18404
Sender Tool	G.722	Sender Reports	0
Sender Report Time	00:49:25	Sender Start Time	01:13:08
Receiver DSCP (Previous, Current)	EF, EF	Receiver Packets	99
Receiver Octets	15840	Receiver Tool	G.722
Receiver Lost Packets	0	Receiver Jitter	7
Receiver Reports	0	Receiver Start Time	01:13:09
Voice Quality Metrics			
MOS LQK	0.0000	Avg MOS LQK	0.0000
Min MOS LQK	0.0000	Max MOS LQK	0.0000
MOS LQK Version	0.95	Cumulative Conceal Ratio	0.0000
Interval Conceal Ratio	0.0000	Max Conceal Ratio	0.0000
Conceal Seconds	1	Severely Conceal Seconds	1

Table 3-3 Stream Statistics Definitions

Item	Description
Sender DSCP	Must be EF.
Sender Report Time	Internal time stamp indicating when this streaming statistics report was generated.
MOS LQK	Score that is an objective estimate of the mean opinion score (MOS) for listening quality (LQK) that rates from 5 (excellent) to 1 (bad). This score is based on audible concealment events due to frame loss in the preceding 8-second interval of the voice stream.

As you can see from [Figure 3-5](#), the web page displays an active call on the 7925 IP phone ending in MAC 63:6F and provides you with an the Avg. MOS LQK score of 4.4270. Just as long as the 792xG Series wireless IP phone is able to see three or more APs and maintains an RSSI under -67 and a consistently good MOS score, there should not be any audio problems within the area where this call was made.

When troubleshooting VoWLAN issues, it is common for systems engineers to put the 792xG Series wireless IP phone on hold so Music On Hold (MoH) can be streamed via RTP to the wireless IP phone being tested. In most troubleshooting scenarios, we recommend that systems engineers initiate a call from a wired IP phone to the 792xG Series wireless IP phone that is experiencing problems.

**Note**

If a call is initiated from a 792xG Series wireless IP phone 1 to 792xG Series wireless IP phone 2, the wireless IP phone that initiated the hold will not have a MOS score as seen in [Figure 3-6](#). When the unicast stream between both phones is reinitiated, the 792xG Series wireless IP phone will then update its MOS score.

It is very important to constantly monitor and understand how RF changes in your environment and to take snapshots of random calls made from different areas. For new deployments, Cisco recommends that a baseline be created by taking daily, weekly and eventually monthly snapshots of VoIP calls made over the WLAN. This will allow you to create a baseline as mentioned previously and will also help systems administrators to understand which areas are potentially subject to RF problems or anomalies.

Additionally, be sure to understand the intricate details with regard to RRM, as it relates to the Coverage Hole Algorithm (CHA) and how that may inadvertently affect Transmit Power Control (TPC) within your Unified Wireless Network. Once you have had the opportunity to evaluate the information contained within the web page for each phone being tested, please ensure that the deployment is in accordance with Cisco VoWLAN design and deployment best practices. If you discover deviations, we strongly encourage you to perform a post Site Survey and audit how RF propagates within your WLAN.