

Wireless Voice Troubleshooting hints



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Pre requirement: Configuration

- How to configure IOS AP with WDS for voice , ref link blow.
<https://supportforums.cisco.com/docs/DOC-13438>

Symptoms

Make sure the symptoms are clearly identified with all the details. It is important to collect as much as possible the details about the symptom itself by asking adequate questions.

1. Do you have wireless connectivity?

An ip phone 792x is just another wireless client.

So we need to make sure the wireless client has association and authentication done successful and gets network access on the voice vlan.

This troubleshooting steps are the same as we know from any other wireless client

Infrastructure APs connected to WDS :> ***show wlccp wds ap***

Infrastructure Radio interface running :>***show controllers dot11 0*** (0/1 depending on b/g versus a)

WDS successful authenticated the wireless client :> ***show wlccp wds mn***

Client is associated: > ***show dot11 associations all***

Verify wireless client association

:>***debug dot11 dot11Radio 0 trace print mgmt clients txfail voicerates***

Symptoms

2. Can a call be placed?

Check communication to the callmanger (CM/CME) using SCCP (TCP 2000)

-> voice control UP4 (COS) between 792x and CM/CME

If connection is good but 792x not register on CM/CME or you are not able to place a call, you will need help from the voice team specialized for CM/CME.

Symptoms

3.) What do you mean by bad voice quality (robotic, gaps, one-way, which direction, during roaming or stationary...)?

Voice specifically show commands

> ***show dot11 traffic-streams***

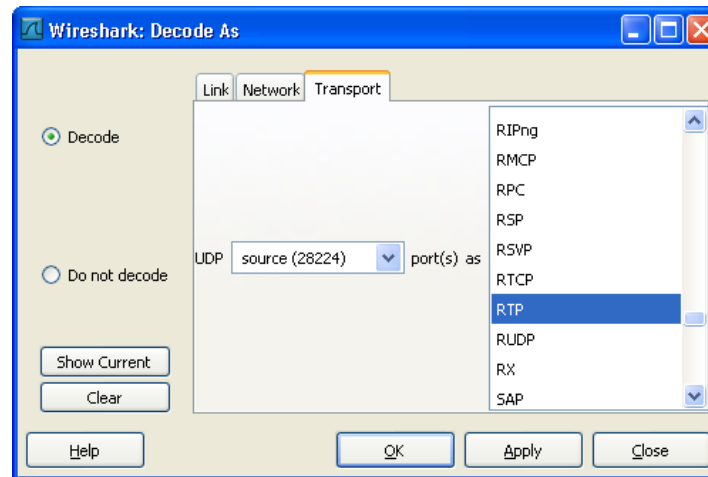
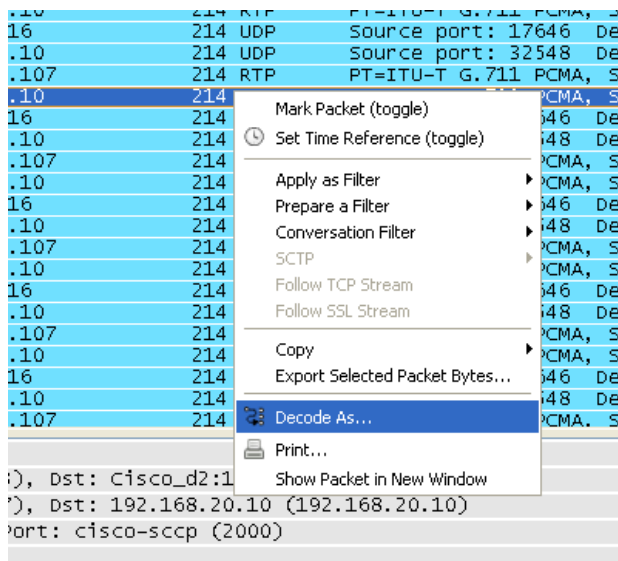
> ***show dot11 cac***

You can learn from RTP sniffer trace about jitter, delay, dropped packets, and latency by analyze RTP using Wireshark.

Wireshark - Jitter-Drops etc.

Sometime you will have to interpret the UDP as RTP stream

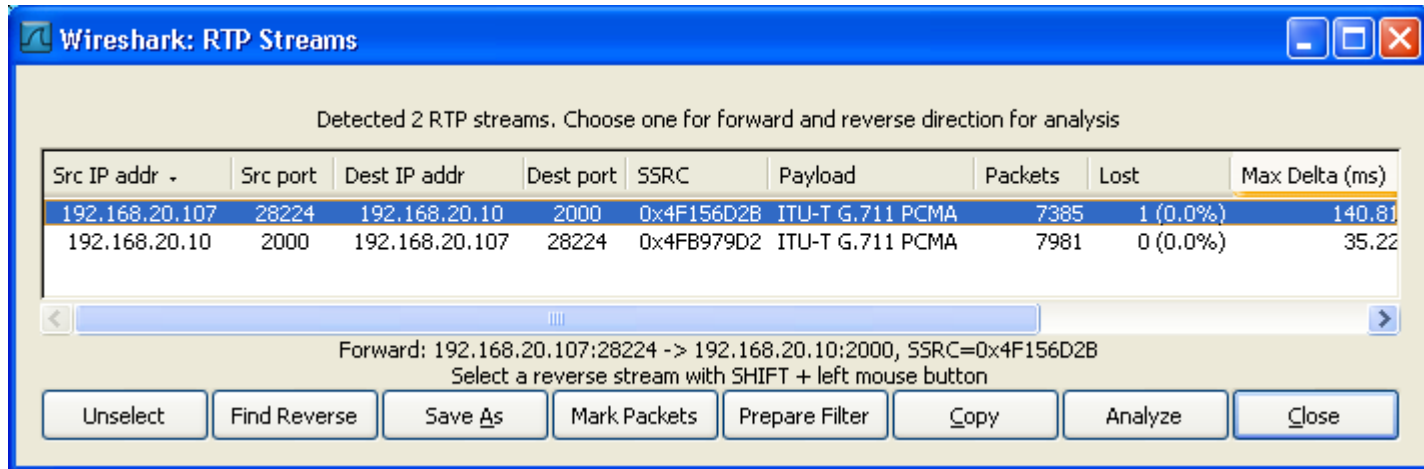
GUI > right mouse > Decode As .. > RTP > Apply



Wireshark - Jitter-Drops etc.

Example analyze RPT using Wireshark

GUI > Statistics > RTP > Show All Stream



Wireshark - Jitter-Drops etc.

Example analyze RPT using Wireshark

Select the stream (mous click) > Analyze

Wireshark: RTP Stream Analysis

Forward Direction | Reversed Direction

Analysing stream from 192.168.20.107 port 28224 to 192.168.20.10 port 2000 SSRC = 0x4F156D2B

Packet #	Sequence	Delta (ms)	Jitter (ms)	IP BW (kbps)	Marker	Status
1	63905	0.00	0.00	1.60		[Ok]
5	63906	20.02	0.00	3.20		[Ok]
9	63907	20.00	0.00	4.80		[Ok]
13	63908	20.35	0.02	6.40		[Ok]
17	63909	19.62	0.04	8.00		[Ok]
21	63910	20.03	0.04	9.60		[Ok]
25	63911	20.00	0.04	11.20		[Ok]
29	63912	25.33	0.37	12.80		[Ok]
33	63913	16.02	0.60	14.40		[Ok]
37	63914	18.72	0.64	16.00		[Ok]
41	63915	19.96	0.60	17.60		[Ok]
45	63916	19.98	0.57	19.20		[Ok]
49	63917	20.27	0.55	20.80		[Ok]
53	63918	19.74	0.53	22.40		[Ok]
57	63919	21.00	0.56	24.00		[Ok]
65	63920	48.83	2.33	25.60		[Ok]

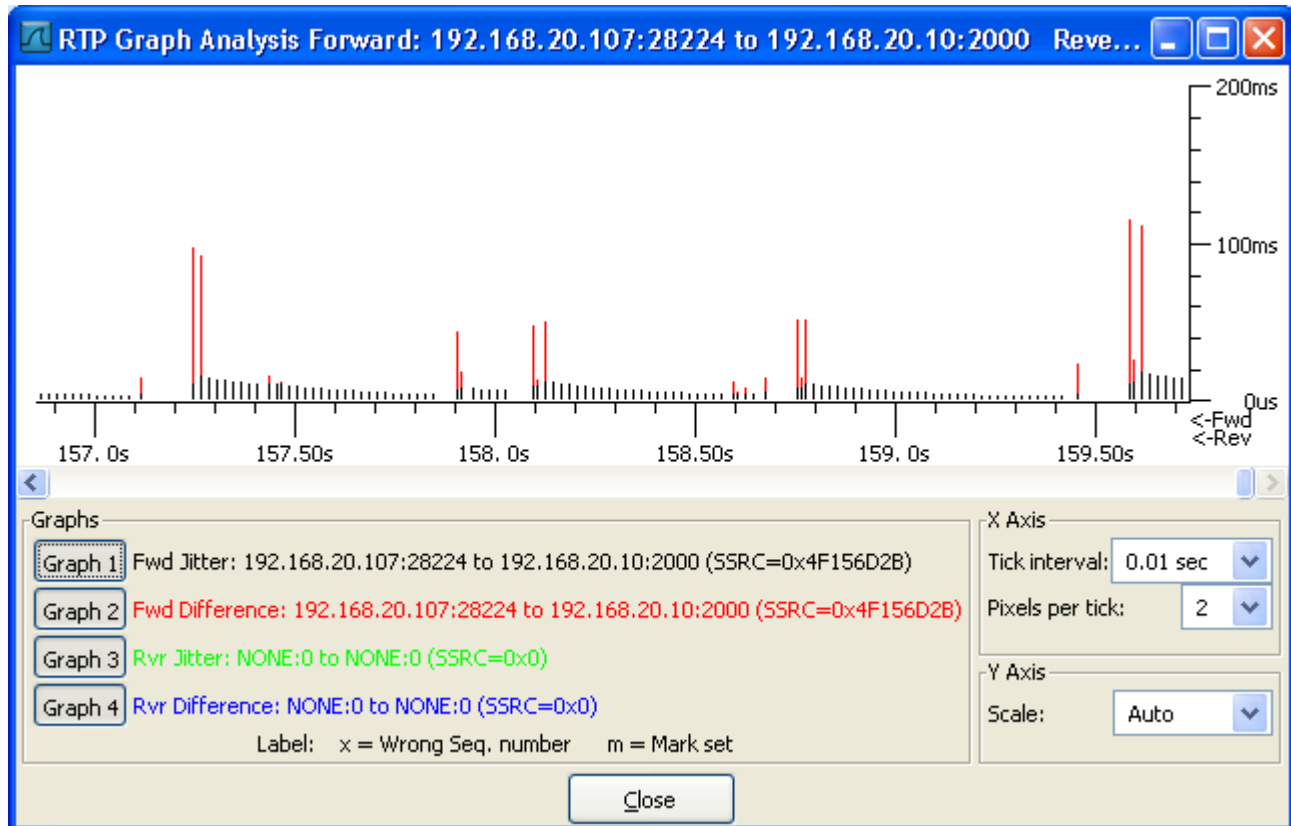
Max delta = 0.140815 sec at packet no. 13532
Total RTP packets = 7385 (expected 7386) Lost RTP packets = 1 (0.01%) Sequence errors = 1

Save payload... | Save as CSV... | Refresh | Jump to | Graph | Next non-Ok | Close

Wireshark - Jitter-Drops etc.

Example analyze RPT using Wireshark

> Graph

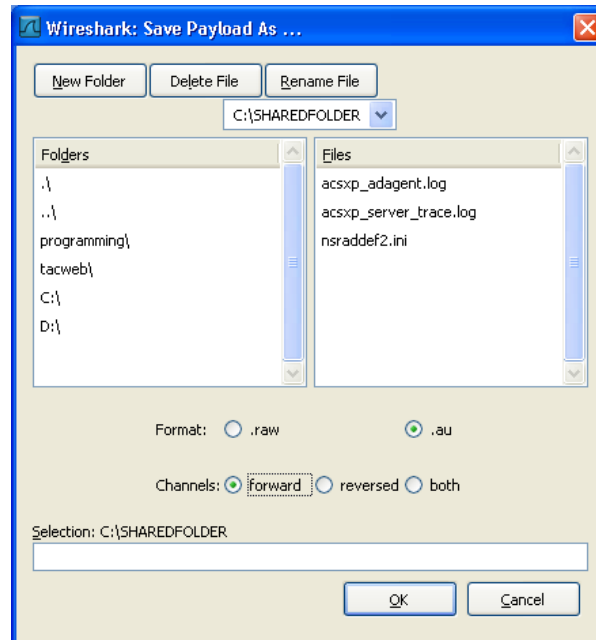


Wireshark - Jitter-Drops etc.

Example analyze RPT using Wireshark

> Save payload...

You can play the voice as wav file now, however be carefully the wav file does not take into account some delay as frames are simple add after eachother.



Symptoms

4.) Can you test with wired and wireless IPphone?

Make sure to simplify the setup as much as possible by test only with one 792x IPphone and as peer device using a wired IPphone e.g 7940 / 7960.

Avoid using as peer device any mobile or fix phone via call gateway.
This allows to exclude issue with call gateway.

This allows us to trouble shoot only one 792x from client and AP point of view.
This allows to confirm wired IP phone have no problem.

Setup

- Make sure the setup are clearly identified with all the details.

Hardware Type and Software Version: including 792x firmware version, Cisco wireless setup type and version, Access Point type and its software version, CCM or CME version

Based on the collected version information, ensure 7921G/7925G is on a recent public available firmware code downloadable from CCO; ensure the APs are not running some unsupported (from 7921G/7925G perspective) code.

Check the 7921G/7925G version release notes for details:

http://www.cisco.com/en/US/products/hw/phones/ps379/prod_release_notes_list.html

-1.3.3 7921G/7925G

http://www.cisco.com/en/US/docs/voice_ip_comm/cuipph/7925g/firmware/1_3_3/english/release/notes/792x_133.html

-1.3.4 7921G/7925G

http://www.cisco.com/en/US/docs/voice_ip_comm/cuipph/7925g/firmware/1_3_4/english/release/notes/792x_134.html

Site Survey Confirmation

- Refer **Cisco Unified Wireless IP Phone Deploy Guide**

http://www.cisco.com/en/US/docs/voice_ip_comm/cuipph/7921g/6_0/english/deployment/guide/7921dply.pdf

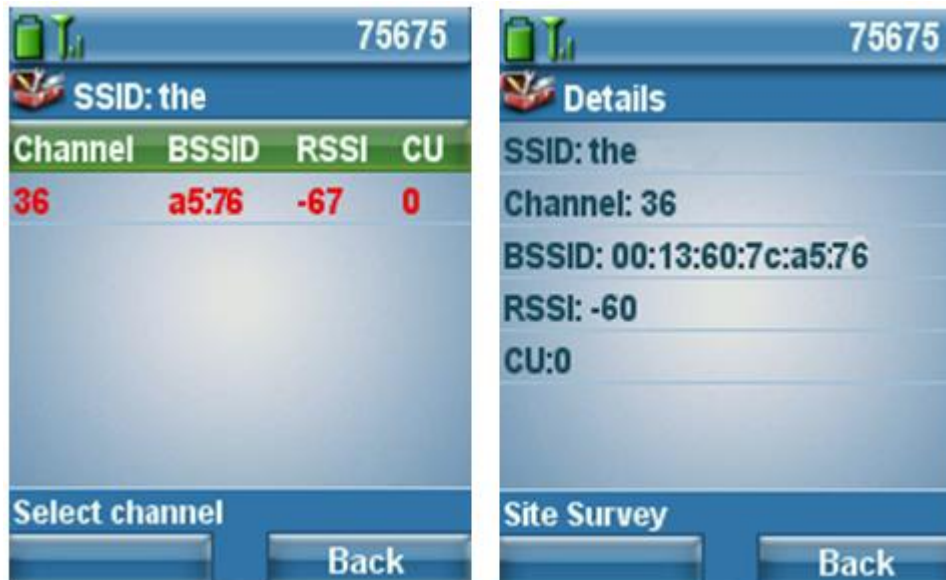
to ensure correct site survey and RF design haven been performed for voice deployment. Due to the nature of 802.11 networks, which utilizes unlicensed 2.4GHz and 5 GHz spectrums, the site survey should not be considered as a one-time-only effort. Rather, the RF environment is subject to constant changes in many external factors, therefore site survey is an ongoing effort.

However do not persist on this information if you don't have it – you still keep troubleshooting as based on logs you can find out about bad RF situation.

- Audio quality issue often times are related to insufficient signal strength due to Poor RF Coverage, holes, near cell edges etc. Ensure CP-7921G can always see two APs and above anytime, with signal strength of -67dBm and above, and PER less than 1% as required.

Site Survey

- The 7921G site survey may only show 1 AP when in idle mode, if the current RSSI is above the threshold to not scan other channels
- When the 7921G is on call, the phone will be scanning to discover new APs



Config QoS in the wired network

- Make sure wired QoS (Switch infrastructure) is configured as needed from deployment guide.
- Check if DSCP is correctly configured on CM, such that the Call Statistics of 7921G shows it as DSCP: EF, EF/EF, EF as can be seen on sniffer trace in the next slide.

SEP001BD45857CD

HOME	Phone DN 1002		
SETUP	Stream Statistics		
NETWORK PROFILES +	RTP Statistics		
USB SETTINGS	Domain Name	snmpUDPDomain	Remote Address 10.0.211.104
TRACE SETTINGS	Remote Port	24096	Local Address 10.0.211.103
WAVELINK SETTINGS	Local Port	26656	Sender Joins 2
CERTIFICATES	Receiver Joins	2	Byes 2
CONFIGURATIONS	Start Time	13:20:12	Flow Status Not Ready
PHONE BOOK +	Host Name	SEP001BD45857CD	Sender DSCP EF
INFORMATION	Sender Packets	149	Sender Octets 25628
NETWORK	Sender Tool	G.711u	Sender Reports 1
WIRELESS LAN	Sender Report Time	13:20:13	Sender Start Time 13:20:12
DEVICE	Receiver DSCP (Previous, Current)	EF, EF	Receiver Packets 133
STATISTICS	Receiver Octets	21280	Receiver Tool G.711u
WIRELESS LAN	Receiver Lost Packets	0	Receiver Jitter 19
NETWORK	Receiver Reports	1	Receiver Start Time 13:20:13
STREAM STATISTICS	Voice Quality Metrics		
STREAM 1			
STREAM 2			
SYSTEM			
TRACE LOGS			
BACKUP SETTINGS			
PHONE UPGRADE			
CHANGE PASSWORD			
SITE SURVEY			
DATE & TIME			
PHONE RESTART			

QoS Verification using sniffer trace

Packet Info Packet Number=38 Flags=0x00000000 Status=0x00000000 Packet Length=238 Timestamp=12:18:26.716056000 09/18/2008 Data Rate=108.54 .0 Mbps Chan=36 5180 MHz

802.11 MRC Header

- Version: 0
- Type: %10 Data
- Subtype: %1000 QoS Data
- Frame Control Flags: %00000010
 - 0... Non-strict order
 - .0... Non-Protected Frame
 - ..0... No More Data
 - ...0... Power Management - active mode
 -0... This is not a Re-Transmission
 -0... Last or Unfragmented Frame
 -1... Exit from the Distribution System
 -0... Not to the Distribution System
- Duration: 44 Microseconds
- Destination: 00:18:BA:78:C2:22 7921G
- BSSID: 00:13:5F:FA:25:1F AP
- Source: 00:1D:A2:1A:24:D7
- Seq Number: 3744
- Frag Number: 0

QoS Control Field: %0000000000010110

- AP PS Buffer State: 0
- 0..... A-MSDU: Not Present
-00.... Ack: Normal Acknowledge
-1.... EOSP: End of Triggered Service Period
-x... Reserved
-110 UP: 6 - Voice

IP Header - Internet Protocol Datagram

- Version: 4
- Header Length: 5 (20 bytes)
- Differentiated Services: %10111000
 - 1011 10.. Expedited Forwarding
 -00 Not-ECT
- Total Length: 200
- Identifier: 37214
- Fragmentation Flags: %000
- Fragment Offset: 0 (0 bytes)
- Time To Live: 64
- Protocol: 17 UDP
- Header Checksum: 0xD2A9
- Source IP Address: 10.2.0.250
- Dest. IP Address: 10.2.0.104

UDP: Src=19920 Dst=24096

RTP: Version=2 Extension=0 CSRC Count=0 Marker=0 Payload Type=9 6.722 Sequence=32662 Time Stamp=2124782394 Sync Src ID=2023474068

App Layer: Data Area=(160 bytes)

FCS: FCS=0x4C20007B

QoS Control Field: %0000000000010110

- AP PS Buffer State: 0
- 0..... A-MSDU: Not Present
-00.... Ack: Normal Acknowledge
-1.... EOSP: End of Triggered Service Period
-x... Reserved
-110 UP: 6 - Voice

802.2: D=0xAA SNAP S=0xAA SNAP C=0x03 Unnumbered Information

IP Header - Internet Protocol Datagram

- Version: 4
- Header Length: 5 (20 bytes)
- Differentiated Services: %10111000
 - 1011 10.. Expedited Forwarding
 -00 Not-ECT

- RTP packets should be marked with DSCP = EF and UP = 6 downstream to the client

7921G USB Installation

- CCO download: Wireless > Cisco Unified Wireless IP Phone 7921G > IP Phone Tools and Utilities > 1.0(2a) > USB-Install-7921-7925.1-0-2a.exe
- Installation readme: <http://www.cisco.com/web/software/282074239/24333/USB-Install-7921-7925.1-0-2a-Readme.pdf>
- Execute the 7921G USB installation package and the InstallShield wizard will begin.
- USB cable P/N : CP-CAB-USB-7921G=



7921G Web Interface

In order to access the phone via WEB interface it needs to be enabled on the CALLMANAGER!

Configure example of CME :

```
config t
  telephony-s
  service phone webAccess 0
  create cnf-file
```

Reset the 7921G/7925G

Phone Logs

- Phone logs are stored in memory only by default
- Can optionally enable “Preserve Logs” to have the phone log written to flash. Will be disabled after the phone is power cycled.
- Phone logs can also be captured real time via syslog over radio or **USB**
- All trace modules are set to “Error” level by default
- Trace Modules
 - Kernel**
 - Configuration
 - Call Control
 - Network Services
 - Security Subsystem
 - User Interface
 - Wireless**
 - Audio System
 - System
 - Operating System**
 - Phone configuration, firmware upgrade
 - Cisco Unified CallManager data (SCCP)
 - DHCP, TFTP, CDP, WWW, Syslog
 - Application level security
 - Keypad, softkeys, MMI
 - Channel scanning, authentication**
 - RTP, SRTP, RTCP, DSP
 - Event Manager
- Trace Levels
 - Emergency, Alert, Critical, Error, Warning, Notice, Info, **Debug**

Trace Settings – Debug

HOME
SETUP
NETWORK PROFILES +
USB SETTINGS
TRACE SETTINGS
INFORMATION
NETWORK
WIRELESS LAN
DEVICE
STATISTICS
WIRELESS LAN
NETWORK
STREAM STATISTICS
STREAM 1
STREAM 2
SYSTEM
TRACE LOGS
BACKUP SETTINGS
PHONE UPGRADE
CHANGE PASSWORD

Phone DN 75675

Trace Settings

General

Number of Files

Remote Syslog Server

Enable Remote Syslog

IP Address

Port (Valid range is 514, 1024-65535)

Module Trace Level

Kernel

Configuration

Call Control

Network Services

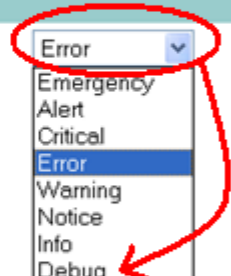
Security Subsystem

User Interface

Wireless

Audio System

System



Advanced Trace Settings

Preserve Logs True False

Save

Phone Logs

Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.723861: Current BSSID = 00:24:97:88:94:9f
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.729537: Attempting handover with candidate index 254,
requestType = 0
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.738008: Candidate BSSID = 01:00:01:c8:ff:ff
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.743978: Assoc/Reassoc status code = 0, connStatus = 3
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.750878: connStatus: HANDOVER SUCCESSFUL
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.756393: *** Succ ROAMING_HANDOVERS *******
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.762706: - Low TX rate = 0
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.766870: - Differential RSSI = 0
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.771593: - QBSS = 0
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.775099: - MAX TX retries = 1
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.779579: - Low Quality = 0
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.783747: - TSPEC = 0
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.787343: - BSS Loss TX = 0
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.791499: - Switch Channel = 0
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.795946: - AP Disconnect = 0
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.800302: - SEC attack = 0
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.804378: *** ROAMING STATISTICS *******
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.810381: - Last roam duration = 33
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.815312: - Num of succesful handovers = 1
Oct 29 10:57:00 192.168.20.102 SEP-kernel: WLAN_DRV: 2540.820924: - Succesful total handover duration = 33

WLAN Statistics – Web access 7921



Cisco Unified Wireless IP Phone 7921G

SEP001BD45857CD

Phone DN 1002

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
BACKUP SETTINGS
PHONE UPGRADE
CHANGE PASSWORD
SITE SURVEY
DATE & TIME
PHONE RESTART

Wireless LAN Statistics

Rx Statistics

Rx OK Frames	414	Rx error frames	0
Rx unicast frames	414	Rx multicast frames	0
Rx broadcast frames	0	Rx FCS frames	0
Rx beacons	236804	Association Rejects	303
Association Timeouts	61	Authentication Rejects	0
Authentication Timeouts	2		

Tx Statistics (Best Effort)

Tx OK Frames	61655	Tx error frames	44
Tx unicast frames	59312	Tx multicast frames	2141
Tx broadcast frames	246	RTS fail counter	0
ACK fail counter	2213	Retries counter	1317
Multiple retries counter	291	Failed retries counter	21
Tx timeout counter	0	Other fail counter	23
Success counter	61655	Max retry limit counter	6

Tx Statistics (Voice)

Tx OK Frames	344	Tx error frames	3
Tx unicast frames	347	Tx multicast frames	0
Tx broadcast frames	0	RTS fail counter	0
ACK fail counter	77	Retries counter	33
Multiple retries counter	19	Failed retries counter	3
Tx timeout counter	0	Other fail counter	0
Success counter	344	Max retry limit counter	2

Network Statistics – Web access 7921



Cisco Unified Wireless IP Phone 7921G

SEP001BD45857CD

Phone DN 1002

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

Network Statistics

IP Statistics

IpInReceives	30679	IpInHdrErrors	0
IpInAddrErrors	0	IpForwDatagrams	0
IpInUnknownProtos	0	IpInDiscards	0
IpInDelivers	30144	IpOutRequests	35241
IpOutDiscards	0	IpOutNoRoutes	0
IpReasmTimeout	0	IpReasmReqds	0
IpReasmOKs	0	IpReasmFails	0
IpFragOKs	0	IpFragFails	0
IpFragCreates	0		

TCP Statistics

TcpRtoAlgorithm	0	TcpRtoMin	0
TcpRtoMax	0	TcpMaxConn	0
TcpActiveOpens	5486	TcpPassiveOpens	7
TcpAttemptFails	31	TcpEstabResets	0
TcpCurrEstab	3	TcpInSegs	30174
TcpOutSegs	34713	TcpRetransSegs	867
TcpInErrs	0	TcpOutRsts	1

UDP Statistics

UdpInDatagrams	396	UdpNoPorts	1
UdpInErrors	0	UdpOutDatagrams	440

Stream Statistics – Web access 7921



Cisco Unified Wireless IP Phone 7921G

SEP001BD45857CD

Phone DN 1002

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
BACKUP SETTINGS
PHONE UPGRADE
CHANGE PASSWORD
SITE SURVEY
DATE & TIME
PHONE RESTART

Stream Statistics

RTP Statistics

Domain Name	snmpUDPDomain	Remote Address	10.0.211.104
Remote Port	24096	Local Address	10.0.211.103
Local Port	26656	Sender Joins	2
Receiver Joins	2	Byes	2
Start Time	13:20:12	Row Status	Not Ready
Host Name	SEP001BD45857CD	Sender DSCP	EF
Sender Packets	149	Sender Octets	25628
Sender Tool	G.711u	Sender Reports	1
Sender Report Time	13:20:15	Sender Start Time	13:20:12
Receiver DSCP (Previous, Current)	EF, EF	Receiver Packets	133
Receiver Octets	21280	Receiver Tool	G.711u
Receiver Lost Packets	0	Receiver Jitter	19
Receiver Reports	1	Receiver Start Time	13:20:13

Voice Quality Metrics

MOS LQK	4.5000	Avg MOS LQK	4.2893
Min MOS LQK	2.0000	Max MOS LQK	4.5000
MOS LQK Version	0.95	Cumulative Conceal Ratio	0.0064
Interval Conceal Ratio	0.0000	Max Conceal Ratio	0.8361
Conceal Seconds	1002	Severly Conceal Seconds	157

Refresh Stop



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