

# How to Troubleshoot Roaming Problems for a Cisco Wireless IP Phone 7920

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## Introduction

The new Cisco Wireless IP Phone 7920 introduces the wireless component into IP Telephony networks. This new combination of technologies can present challenges. If you do not properly configure the phone, its performance suffers.

This document provides information about generic "roaming problems". The document shows you how to capture the information that you need to troubleshoot the issue and analyze the information in order to find the possible cause and resolution.

## Prerequisites

### Requirements

There are no specific requirements for this document.

### Components Used

The information in this document is based on these software and hardware versions:

- Cisco CallManager 3.3(3)SR1
- Cisco IP Phone Firmware (FW) 7900 Series Software version 7920.3.3-01-07
- Cisco Aironet 1200 Series Access Point (AP) that runs Cisco IOS® Software Release 12(2)15JA

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

## Related Products

This configuration can also be used with these hardware and software versions:

- Cisco CallManager version 3.2(2c) or later
- IP Phone FW 7900 Series Software version 7920.3.3–01–06 or earlier

**Note:** Some parameter values differ in previous versions.

- Aironet 1200, 1100, or 350 Series AP that runs Cisco IOS Software Release 12(2)11JA or later

## Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

## How to Troubleshoot Roaming Problems

A number of issues can cause the "roaming problems" symptom. Most often, roaming is interference–related, or a lack of adequate coverage causes the problem. You need additional details in order to determine the cause.

You need to answer an initial set of questions in order to obtain these crucial details. Then, you need to capture tracing information in each of the places where the problem occurs.

## Collect Information

Follow these instructions in order to collect all pertinent information:

1. Answer these questions in order to obtain an exact description of what occurs:

- ◆ What exactly do you notice?
- ◆ When does the problem happen?
- ◆ Does the problem affect all phones? How many phones from the total install base does the problem affect?
- ◆ Where does the problem happen?

**Note:** The problem can appear to occur *everywhere*. But most often, this is not the case. Determine the locations in which the problem occurs so that you can analyze each location one by one.

2. Collect traces and other information for specific locations with the roaming problem.

For each of the places with a roaming issue, you need to perform a test and capture the information that this step lists. This information is for later analysis. Start with one location and, on the basis of the results, analyze the other locations afterward.

- a. Set up the test scenario in this way:

- a. If you have a map of the building, mark the location of your test scenario.

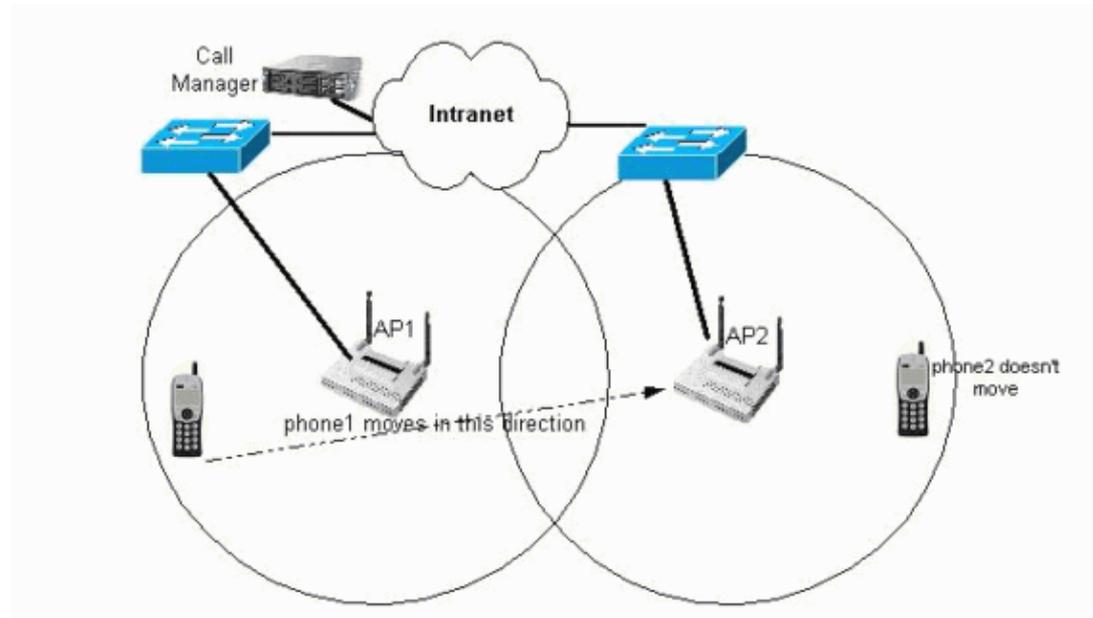
This map is useful if you need to resolve the issue with the assistance of Cisco Technical Support. The map reveals possible obstacles, corners, and other information.

- b. Use a 7920 phone (PH1) that connects to an AP (AP1) in order to initiate a call to another phone (PH2).

PH2 can be a 7920 phone that connects to a second AP (AP2) and remains constant during the test.

- c. After establishment of the call, begin a conversation and, with PH1, walk from the AP1 area of coverage toward the AP2 area of coverage.

Write down information as you move. See the site survey in Step F. Note when the problem appears and disappears.



- d. End the call.

- b. Gather this information about your setup:

- ◇ The IP address and MAC address of PH1, which is the moving phone
- ◇ The IP address and MAC address of PH2, which is the phone that remains near AP2 and does not move
- ◇ The IP address and MAC address of AP1, with which PH1 is associated when the test begins
- ◇ The IP address and MAC address of AP2, to which PH2 roams during the test

- c. Gather this information about the software levels:

- ◇ The software versions of the APs
- ◇ The phone FW version

**Note:** Choose **Menu > Phone Settings > Phone Status > FW version** in order to find this information.

- ◇ The Cisco CallManager version

- d. Obtain the configuration of the two APs that are involved in the roaming.

Issue the **show run** command on a Cisco IOS AP in order to obtain the configuration.

- e. Obtain logs on both APs that correspond to these times:

- ◇ The moment that the roaming takes place
- ◇ A few seconds before the roaming takes place
- ◇ A few seconds after the roaming takes place

Issue the **show log** command on a Cisco IOS AP in order to find the logs.

- f. Perform a site survey for information at different locations during the test, as this step shows.

**Note:** The site survey provides the information that is most useful to understand radio frequency (RF)–related issues with the phone. Ensure that you capture accurate data in this step.

- a. Choose **Menu > Network Configuration** in order to locate the Site Survey menu on the phone.

The information that appears has this structure: (status)–channel–ssid–rssi–qbss.  
Here is an example:

```
(c)6,ssid...,42,0
(a)11,ssid...,14,1
(a)1,ssid...,26,4
```

- b. For each capture that you take, write down each line in entirety and include every line.

You can skip the service set identifier (SSID) if it is the same in every entry. Skip the last number, which is the QoS basis service set (QBSS), if the value is 5 or less in every entry.

- c. Capture the entire site survey at different points between the departure point (near AP1) and the end point (past AP2), and indicate the time at each position.

Capture approximately five positions. Note when the problem occurs and when it is resolved.

This example provides a capture of a position where a problem has not yet occurred:

**AP1 - 10m**

*!--- This is the position.*

```
(a)1,18
```

*!--- These are site survey values. The SSID value is not included  
!--- because it is the same in each entry. The QBSS is also omitted  
!--- because this value is always less than 5.*

```
(c)6,38
```

This example provides a capture of a position where a problem appears:

**AP1+30m**

*!--- Note: This is also AP2-20m.  
!--- Here, the voice begins to be lost.*

```
(c)6,18
(a)11,25
```

**AP1+30m**

*!--- Note: This is also AP2-20m.  
!--- The voice has returned.*

```
(a)6,25
(c)11,40
```

# Analyze the Collected Information

## Description of the Problem

When you answer the questions in Step 1 of Collect Information, you clarify the cause of the problem because you determine specific symptoms.

- What exactly do you notice?

This information helps identify the problem. Try to specifically indicate the total connection time lost.

- When does the problem happen?

This information helps determine if the problem is only related to roaming, or if the problem happens periodically during a call.

- Does the problem affect all phones? How many phones from the total install base does the problem affect?

This information helps identify hardware problems that can exist on specific phones, or configuration settings that are only applied to the affected phones. This information also indicates the extent of the problem.

- Where does the problem happen?

This information helps identify environmental factors, such as areas without adequate radio coverage. Obstacles like a sudden loss of signal or sources of interference can result in inadequate radio coverage. The roaming issues may occur only in specific places, such as stairs, tunnels, behind a corner, or when you cross a thick door. In this case, use the site survey information that you captured in Step F of Collect Information in order to narrow down the exact RF issue.

This table provides some symptoms and possible causes of roaming problems. On the basis of your answers to the questions in the section Description of the Problem, you can probably eliminate some of the causes and continue your investigation.

| Symptom  | Possible Cause   |
|--|--|
| <b>Roaming to a particular AP takes too long and voice is lost for a few seconds</b> | <b>Configuration errors</b> Verify the AP1 and AP2 configuration with regard to radio settings and QoS. Particularly with Cisco IOS APs that have been migrated from VxWorks, there is a possibility that some values were not properly set during the conversion. Ensure that the default values are set for traffic queues. Traffic class commands should not appear in the Cisco IOS configuration because they must be set to default values. Also, ensure that the default values are set for the RTS <sup>1</sup> -related setting. If you change these values, you can create an unstable RF environment for roaming. |
|  | <b>Hardware incompatibility with Supervisor Engine II in Cisco Catalyst 4500/4000</b> If the voice path goes across a Catalyst 4500/4000 switch, check the   |

|  |   |
|--|---|
|  | <p>Supervisor Engine version. Significant delay has been associated with Supervisor Engine II cards. Upgrade to Supervisor Engine II+ or Supervisor Engine III.</p> <p><b>Interferences from other devices, which include other APs</b> Interferences on the same channels from which the originating AP or destination AP transmit can affect the roaming decision. These interferences can even generate a loss of voice for a few seconds. Perform the design carefully so that, on the site survey, only one AP for each nonoverlapping channel appears with a strong signal. Consider an RSSI<sup>2</sup> of about 35 to be a strong signal.</p> <p><b>Very sudden loss of signal</b> The phone is optimized to roam in environments where very sudden losses of signal from the current AP are unlikely to occur. If a sudden loss of signal does occur, reassociation to a new AP can take a few seconds. Ensure that the phone has already roamed before it reaches the place where the sudden loss of signal occurs. Modify the power levels on the AP or, under certain conditions, add an additional AP in order to better cover particular locations.</p> |
| <p><b>Roaming to a particular AP is not possible</b></p>                                       | <p><b>Configuration errors</b> Verify the AP2 and RADIUS server configuration with regard to authentication. For shared key authentication, verify the WEP<sup>3</sup> key. There is a possibility that the AP configuration does not match the setting on the phones. For LEAP<sup>4</sup>, there is a possibility that the AP and RADIUS server are not properly configured and requests fail to reach the RADIUS server. Verify that the TCP ports configuration and shared secret password match on both sides.</p> <p><b>Configuration error</b> Verify that AP1 and AP2 are in the same IP subnet. Currently, the 7920 phone supports only Layer 2 roaming.</p> <p><b>Configuration error</b> Verify that the AP2 SSID is the same (or is the broadcast SSID) as the one that is configured on the SSID list on the phone.</p>  |
| <p><b>Voice is lost for a few seconds during roaming and lost several times during the</b></p> | <p><b>Interferences from other devices, which include other APs</b> Interferences on the same channels from which the originating AP or the destination AP transmit can affect the roaming decision. These interferences</p>  |

|                     |  |
|---------------------|--|
| <b>conversation</b> | <p>can generate a loss of voice for a few seconds during a call. Investigate possible sources of interferences, which include other APs on the same channel. You can use the ACU<sup>5</sup> on your PC and measure the SNR<sup>6</sup>. Or you can use another third-party tool, such as a spectrum analyzer, in order to detect the interferences.</p> |
|                     | <p><b>Channel utilization is too high</b> On the site survey, verify the values of the channel utilization. Look at the QBSS digit for each line. If the values are excessively high and other APs have excessively high channel utilization values, the voice quality may degrade during conversations and during roaming.</p>                          |

<sup>1</sup> RTS = Request to Send

<sup>2</sup> RSSI = received signal strength indication

<sup>3</sup> WEP = Wired Equivalent Privacy

<sup>4</sup> LEAP = Lightweight and Efficient Application Protocol

<sup>5</sup> ACU = Aironet Client Utility

<sup>6</sup> SNR = signal-to-noise ratio

## AP and Phone Versions

If the AP and phone versions are not up to date with the latest on Cisco.com, check the release notes of each version in order to ensure that no bug has been fixed in the latest version. Be particularly sure to check the release notes for a bug if a version is several releases earlier than the latest version. A bug can cause your roaming problem.

## Configuration of the Two APs That Are Involved in the Roaming

The configuration on the APs with regard to security must match the settings on the phone. These security-related settings are:

- SSID
- Type of authentication
- RADIUS server
- WEP key

Roaming to APs with settings that do not match is not possible.

Radio settings and QoS settings affect how the association and roaming take place. If you are not sure of the effect, do not modify these settings.

For an AP that runs Cisco IOS Software, retain these default values under Radio0-802.11B Settings:

|                                 |  |                                 |  |
|---------------------------------|--|---------------------------------|--|
| <b>Beacon Period:</b>           | <input type="text" value="100"/> (20-4000 Kusec) | <b>Data Beacon Rate (DTIM):</b> | <input type="text" value="2"/> (1-100)     |
| <b>Max. Data Retries:</b>       | <input type="text" value="64"/> (1-128)          | <b>RTS Max. Retries:</b>        | <input type="text" value="64"/> (1-128)    |
| <b>Fragmentation Threshold:</b> | <input type="text" value="2346"/> (256-2346)     | <b>RTS Threshold:</b>           | <input type="text" value="2312"/> (0-2347) |

Also, retain these default values for QoS Access Categories:

| Services: QoS Policies - Access Category Definition |   |   |                                |
|---|---|---|--------------------------------|
| Access Category                                     | Min Contention Window<br>(2 <sup>x</sup> -1; x can be 0-10) | Max Contention Window<br>(2 <sup>x</sup> -1; x can be 0-10) | Fixed Slot Time<br>(0-20)      |
| Background<br>(CoS 1-2)                             | <input type="text" value="5"/>                              | <input type="text" value="10"/>                             | <input type="text" value="6"/> |
| Best Effort<br>(CoS 0)                              | <input type="text" value="5"/>                              | <input type="text" value="10"/>                             | <input type="text" value="2"/> |
| Video<br>(CoS 3-5)                                  | <input type="text" value="4"/>                              | <input type="text" value="5"/>                              | <input type="text" value="1"/> |
| Voice<br>(CoS 6-7)                                  | <input type="text" value="3"/>                              | <input type="text" value="4"/>                              | <input type="text" value="1"/> |

Enable Address Resolution Protocol (ARP) caching on the AP in order to prevent one-way voice situations.

**Note:** If the voice crosses a Supervisor Engine II in a Catalyst 4500/4000, there is a good chance of slow roaming. You do not configure this on the AP itself. You need to upgrade to Supervisor Engine II+ or Supervisor Engine III.

## AP Logs

With the AP origin and destination logs that you have collected, you can find authentication errors, an unsupported configuration, and whether the roaming is "clean". You can determine the time at which the roaming occurred and if the phone remained associated in the same AP for some time or if the phone quickly moved to another AP. The use of a syslog server can facilitate the verification of all the AP logs on a single server.

The logs for proper roaming are similar to the logs that this section shows. The time of the Roamed to and the Associated messages (or Reassociated, if associated before) in both AP logs are the same or are separated by just a few seconds. In order to verify, ensure that the clocks of the two APs are synchronized.

### On AP1

```
Nov 17 15:38:55.475 Information Station 000d.2228.5225 Roamed to
000d.211d.88af
```

```
Oct 17 15:38:55.475 Information Interface Dot11Radio0, Deauthenticating Station
000d.2228.5225 Reason: Deauthenticated because sending station is leaving
(or has left) BSS
```

### On AP2 (mac address 000d.211d.88af )

```
Nov 17 15:38:55.475 Information Interface Dot11Radio0, Station
000d.2228.5225 Reassociated KEY_MGMT[NONE]
```

If roaming seems to happen, not to a single AP, but to several APs, one after another within a small period of time (approximately 1 minute), you can have configuration issues. Verify the configuration, especially the parameters that the Configuration of the Two APs That Are Involved in the Roaming section of this document lists.

## Site Survey

The site survey shows what the phone sees on the RF side. The example in this section provides a working scenario in order to clarify the site survey feature. This section also helps you analyze the site survey results from Step F of the Collect Information section.

1. For each site survey sample, verify that the design requirements are met.

Some key points are:

- ◆ Design your network with nonoverlapping channels.

Of all the frequency channels that are assigned for wireless, only three are nonoverlapping frequencies that do not interfere with each other (for example, 1–6–11). Only use nonoverlapping channels for the AP in your wireless design. Phones are optimized when they work with nonoverlapping channels to avoid the interferences that affect the voice.

- ◆ Be sure that you have two APs with good coverage at all times.

An AP is a "possible candidate" to send and receive the data from a phone under these circumstances:

- ◇ The signal is strong enough

A signal is strong if the RSSI is approximately 35 or higher, but never lower than the minimum of 20.

- ◇ The channels utilization is low enough

Be sure that the QBSS is less than 15.

- ◆ You must have a roaming area, rather than a roaming point, in which there is good coverage from two or three APs on different channels.

The roaming occurs smoothly in that area when the difference in signal from the APs is great enough. For example, a site survey in a roaming area can give you two entries that are similar to this for a phone that has just roamed to an AP on channel 6:

```
(c)6,ssid...,46,3  
(a)11,ssid...,30,7
```

- ◆ Never have more than one AP with a high signal on the same channel.

If two or more entries with a high signal are on the same channel, the data sent by each AP can interfere with the other AP and the clients.

If one of the requirements is not met, a roaming problem can result. Some design fine-tuning can be necessary to evaluate and correct the problem.

2. Evaluate the evolution of the signal for the two APs that are involved for each sample that you captured.

Typically, the signal evolution shows that the RSSI of the current AP slowly decreases as the RSSI of the AP that serves as the roaming destination slowly increases. In the overlapping area, you find that both APs have strong signals at the same time, but on different channels. Roaming takes place when a particular difference in the RSSI of the two APs is reached in a particular area.

If there is a very sudden loss of signal from the current AP and the signal of the destination AP is not yet strong enough, you can lose voice packets. You need to perform one of these actions:

- ◆ Discover the cause of the sudden loss of signal, which can be:
  - ◇ An obstacle to the RF
  - ◇ A corner
  - ◇ Interference, such as a microwave oven, Bluetooth, or machinery that is in the same frequency
  - ◇ Other APs
- ◆ Fine-tune your design with an increase in the roaming area in order to overcome the RF obstacle.

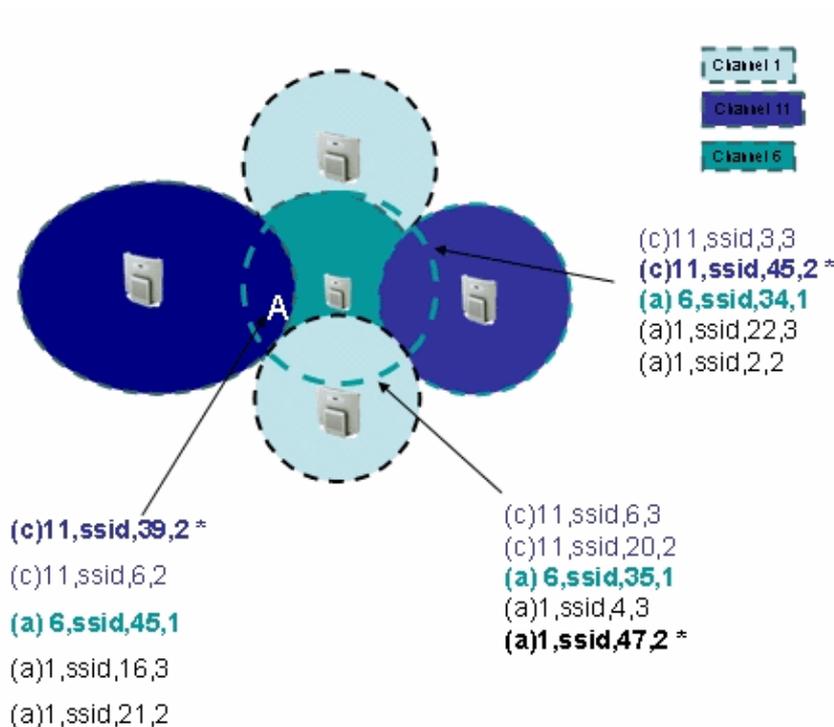
For example, you can increase the transmit power or reallocate the AP.

### 3. Evaluate the QBSS values in order to determine if a high QBSS value triggered the roaming.

A high QBSS value indicates that the channel is very congested. If this is the case, you need to perform one of these actions:

- ◆ Limit the traffic load on that AP.
- ◆ Ensure that you have redundancy in your design, with two or three APs available at all times. These APs must have strong signals and channels that are not congested.

This example provides site survey values for a design in which roaming is successful from and to all the APs that are represented:



#### Note:

- Each circle represents the coverage area for the AP that is located at the center. Smaller circles have lower transmit power configured on the AP.
- There are two **dark blue** and two **light blue** circles. Each peer represents two APs that use the same channel. The transmit power and location of each AP have been properly selected so that the AP does not cause any interferences. The site survey samples confirm these selections. Each sample has a unique entry with a strong signal on channel 11 and one strong signal on channel 1.
- Point **A** represents a location in the roaming area from AP channel 1 to AP channel 6. This area has

good coverage because both APs enable smooth roaming. These site survey entries show strong AP signals for this area:

```
(c)1,ssid,27,2
!--- This is where the phone is currently connected.

(a)6,ssid,40,0
!--- This is where the phone roams to when it reaches
!--- the required RSSI difference.
```

- The other points are randomly selected in order to verify that the design rules are being followed. Step 1 of the Site Survey section discusses these design rules.
- These items appear in the site surveys in the example:

- ◆ One entry with a **(c)** and an **\*** at the end of the line that represents the AP to which the phone connects
- ◆ Other entries that include an **(a)** , which indicates active channels

The channels can be roaming candidates under these circumstances:

- ◇ They have a strong signal.
- ◇ They have a low QBSS value.
- ◇ They get better RSSI or QBSS than the connected AP by a certain difference.
- ◆ For some channels, a second entry with a **(c)** but without the **\*** at the end of the line

This represents another AP on the same channel. This AP interferes only if it has a strong signal.

- When an RSSI value is greater than 35, the signal is "strong enough". Avoid values that are lower than 20 on a connected AP. If the QBSS value is greater than 15, it is "low enough". This means that the channel is said to have not-high channel utilization.

In order to permit roaming, there must be a difference between the current AP and candidate AP in RSSI or in QBSS. The phone FW defines both values as the RSSI Diff Threshold and QBSS Diff Threshold parameters. In the current phone FW version (01-07), the difference in RSSI or QBSS that is necessary to trigger roaming is 15. In earlier phone FW versions, these thresholds can have different values. In order to verify the threshold values of your FW version, check the release notes.

## Case Studies

The two case studies that this section provides follow the troubleshooting methodology that the How to Troubleshoot Roaming Problems section of this document explains. Each case study uncovers the cause of the roaming problem and suggests corrective action.

### Case Study 1: Voice Is Lost with 7920 Phones

In Case Study 1, the voice is lost on 7920 phones. This case study follows the procedures to Collect Information and Analyze the Collected Information.

1. Answer these questions in order to obtain an exact description of what occurs:

- ◆ What exactly do you notice?

The voice is lost for a few seconds during an active call.

- ◆ When does the problem happen?

It happens at any moment of the active call, at any time of the day.

- ◆ Does the problem affect all phones? How many phones from the total install base does the problem affect?

Yes, all 20 phones are affected.

- ◆ Where does the problem happen?

It only happens in a specific office on the ground floor.

## 2. Collect traces and other information for specific locations where the problem appears.

- a. Set up the test scenario.

A couple of 7920 phones are kept in the office where the problem exists. The phones are not moved. The AP, only a few meters away, is directly visible in order to avoid coverage issues. A call is made and the information is captured in order to troubleshoot.

- b. Gather information about the AP and phone versions.

The AP runs Cisco IOS Software Release 12.(2)15JA, and the phones run FW 01–07. No bugs have been reported in these versions that can explain the symptoms.

**Note:** For information about known bugs, refer to the Bug Toolkit (registered customers only)

- c. Obtain the configuration of the two APs that are involved in the roaming.

The default settings have been retained and a recommended configuration is used. An example of a recommended configuration is ARP caching.

- d. Obtain AP logs for 1 to 2 seconds at the time of a loss of voice.

```
Oct 23 15:09:27.134: %DOT11-4-MAXRETRIES: Packet to client
000d.2222.5522 reached max retries, remove the client
Oct 23 15:09:27.134: %DOT11-6-DISASSOC: Interface
Dot11Radio0, Deauthenticating Station 000d.2222.5522 Reason: Previous
authentication no longer valid
Oct 23 15:09:28.730: %DOT11-6-ASSOC: Interface Dot11Radio0,
Station 000d.2222.5522 Associated KEY_MGMT[NONE]
```

**Problem:** At an attempt to send packets to the phone, the AP cannot reach the phone. The phone is disassociated after several attempts. Approximately 1.5 seconds later, the phone reassociates to the AP. This indicates a loss of RF signal for approximately 1.5 to 2 seconds. Because the phone was not in motion and there were no obstacles in the radio path from the AP to the phone, the conclusion is that another wireless device interfered. The device can be another AP on the same channel.

- e. Perform a site survey.

*!--- This is the beginning of the call, with good quality.*

```
(c)1,ssid,54,1
(a)6,ssid,25,1
```

*!--- The next entry shows the first time that the voice is lost.*

```
(N)1,ssid,56,1
(N)6,ssid,23,1
```

*!--- In the next entries, the voice has returned.*

```
(c)1,ssid,57,0
(a)6,ssid,22,2
```

*!--- This is just before the voice is lost again.*

```
(c)1,ssid,53,2
(a)6,ssid,26,0
```

*!--- In the next entries, the voice is lost again.*

```
(N)1,ssid,52,1
(N)6,ssid,26,0
```

**Problem:** Each time that the voice is lost, the site survey shows entries with a status of **(N)** . This entry indicates that the RF is lost and that a rescan of all frequencies takes place. The entry displays the RSSI and QBSS values that existed before the phone reached the voice-loss state. These values reveal that the QBSS value had been low with a strong signal. Also, there are only two entries for APs in the site surveys, and the channels are nonoverlapping channels. Therefore, a total loss of signal for a short period of time caused the voice loss. Most likely, an interference is the cause, and not the other AP that is on the same channels. Most likely, another device that transmits on the wireless frequencies caused the interference.

f. As an additional step, investigate the possible sources of interference.

First, try to locate the source. Verify that no other APs from neighbors or other departments in the company transmit. Verify that there are no microwave ovens that can leak, nor Bluetooth that is used in that area. Ensure that there is no special machinery with wireless that is used in the vicinity. If you cannot determine the device that transmitted, try to locate the frequency of the interference and determine if the interference only affected certain channels. Modify the design in order to use a channel that is distant from the one that interferes.

You can set up a PC with a wireless card and the ACU client on that same channel. Then, measure the SNR when the voice is gone. In this case, the SNR went as low as 1 or 2 when the voice was gone, and came back to 28 when the voice passed well.

Other third-party tools allow you to see the SNR values in all the channels at the same time. These tools allow you to determine more easily if the interference affects only one channel or more than one. In this case, the noise only affected channel 1.

**Problem:** There is a lot of intermittent noise on channel 1 where the AP transmits. A source of wireless interference appears on occasion and blocks the RF signal to the phone.

**Solution:** Change the AP channel to channel 11 and verify that there is no noise. Be sure that the SNR is greater than 25 at all times. Redesign the channels that are selected for your APs, if necessary, in order to avoid the use of the same channel for two APs with strong signals.

## Case Study 2: Voice Is Lost During Roaming

In Case Study 2, the voice is lost when roaming. This case study follows the procedures to Collect Information and Analyze the Collected Information.

1. Answer these questions in order to obtain an exact description of what occurs:

- ◆ What exactly do you notice?

The voice is lost just before the roaming, when the roamed voice returns.

- ◆ When does the problem happen?

It happens at any time of the day, during roaming.

- ◆ Does the problem affect all phones? How many phones from the total install base does the problem affect?

Yes, in that area, all 30 phones are affected.

- ◆ Where does the problem happen?

It happens in a specific area, and always with the same two APs.

## 2. Collect traces and other information for specific locations with the roaming problem.

- a. Set up the test scenario.

The test scenario from Case Study 1 is reproduced. A call is made and the information is captured in order to troubleshoot.

- b. Gather information about the AP and phone versions.

The AP runs Cisco IOS Software Release 12.(2)15JA, and the phones run FW 01–07. No bugs have been reported in these versions or later ones that can explain the symptoms.

**Note:** For information about known bugs, refer to the Bug Toolkit (registered customers only).

- c. Obtain the configuration of the two APs that are involved in the roaming.

The default settings have been retained and a recommended configuration is used. An example of a recommended configuration is ARP caching.

- d. Obtain AP logs at the time of the loss of voice.

```
On AP2 (target where is roaming TO)
Oct 17 10:25:06.257 InformationInterface Dot11Radio0,
Station 000d.2222.5544 Associated KEY_MGMT[NONE]
```

```
On AP 1 (source where is roaming FROM)
Oct 17 10:25:06.258 InformationInterface Dot11Radio0, Deauthenticating
Station 000d.2222.5544 Reason: Deauthenticated because sending station
is leaving (or has left) BSS
Oct 17 10:25:06.257 InformationStation 000d.2222.5544 Roamed to
000d.2888.f744
```

**Problem:** No roaming problems appear to exist, and there appears to be no time delay. This indicates that, for a few seconds before the roaming, the voice is not sent. Investigate the site survey in order to determine why the phone does not start the roaming earlier.

- e. Perform a site survey.

**AP1 +8 meters**

(a)1,21,0  
(c)6,28,11

**AP1 +12 meters**

(a)1,17,3  
(c)6,22,10  
(a)11,6,1

**AP1 +15 meters**

*!--- This is during voice loss.*

(c)6,18,10  
(a)11,13,1

*!--- The current AP has an RSSI value that is lower than 20,  
!--- which is not a strong enough signal.  
!--- There is no other roaming candidate with a strong enough signal  
!--- and enough of an RSSI difference (that is, with an additional 15  
!--- or more units for the RSSI value).*

**AP1 +17 meters**

*!--- **Note:** This is also AP2-12 meters.  
!--- The voice has returned.*

(a)6,14,7  
(c)11,30,0

*!--- Roaming occurred after a sudden increase in RSSI,  
!--- so the difference is now enough (greater than 15)  
!--- to make the roaming happen.*

**AP1+17 meters**

*!--- **Note:** This is also AP2-8 meters.*

(a)6,12,6  
(c)11,35,0

**Problem:** Coverage is the problem. The roaming area is inadequate in order to allow smooth roaming. You need two APs with RSSI values of about 35, and in all cases, greater than 20 for minimum voice quality. You also need an adequate difference in signals, 15 or more. Specifically, no AP has a strong signal until you move around a set of stairs. After you move from behind the stairs, the signal from AP2 is strong enough, and there is an adequate difference in signals. Roaming can take place.

**Solution:** Create a roaming area in which the two APs have strong signals when roaming takes place. This area can be at the beginning of the staircase, so that the roaming to AP2 takes place before you turn around and suddenly experience an increase in the AP2 signal. In order to achieve the adequate signal, you can perform one of these actions:

- ◇ Increase the transmit power of AP2.
- ◇ Reallocate AP2.
- ◇ Add a new AP at the middle of the staircase.

**Note:** If you follow the procedure that this document outlines and you are not able to resolve your issue, or if you require additional assistance from Cisco Technical Support, create a service request. Use the information that you captured in the Collect Information section of this document as initial data. The information that you collect provides the engineer with a good point from which to start and helps achieve a faster resolution.

## Related Information

- [Configuring the Cisco 7920 Wireless IP Phone with WEP Keys, VLANs, and LEAP](#)
- [Configuration Guide for Cisco Aironet 350 Series: Diagnostics and Troubleshooting](#)
- [Configuration Guide for Cisco Aironet 1100 Series: Configuring System Message Logging](#)
- [Voice Technology Support](#)
- [Voice and Unified Communications Product Support](#)
- [Troubleshooting Cisco IP Telephony](#) 
- [Technical Support & Documentation – Cisco Systems](#)

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