Configuring the WiFi Interface

This chapter provides details on how to configure the WiFi interface on the Cisco 1000 Series Connected Grid Routers (hereafter referred to as the router). The WiFi interface helps to provide remote wireless connectivity to a router for diagnostics by field personnel. Information about wireless LANs (WLANs) as it relates to the configuration of the WiFi interface is also provided.

Note: The WiFi interface can be configured on a Cisco 1000 Series Connected Grid router running a Cisco CG-OS or Cisco IOS operating system.

This chapter includes the following sections:

- Information about the WiFi Interface, page 3
- Configuring the WiFi Interface, page 5
- Verifying the Configuration, page 13
- Configuration Examples, page 16
- Configuration Requirements for Remote Client Devices (CG-OS), page 18
- Feature Information, page 19

Information about the WiFi Interface

- WiFi Role in Connected Grid Mesh, page 3
- WiFi Settings, page 4
- SSID, page 4
- BSSID, page 4
- 802.11i, page 4
- Security, page 4

WiFi Role in Connected Grid Mesh

Cisco 1000 Series Connected Grid Router WiFi supports IPV4 for routed interfaces.

WiFi Access Point

The router’s 2.4GHz WiFi radio interface can function as an access point that provides connectivity to 802.11 b/g/n devices. This WiFi connectivity allows remote access and diagnostics of the router in the field. The router WiFi interface can associate up to five 802.11 b/g/n devices concurrently.

Note: WiFi access point functionality is supported on Cisco CG-OS and Cisco IOS routers.

Note: WiFi access point does not function as a local bridge. It provides access point functionality.
WiFi Settings

The Cisco 1000 Series Connected Grid Router WiFi hardware is assigned module 2 and this cannot be changed.

For CGRs running the Cisco CG-OS operating system the WiFi interface is identified as ‘wifi 2/1’ and for routers running Cisco IOS the WiFi interface is identified as ‘dot11Radio 2/1’.

The essential configuration elements are:

- WiFi interface IP address.
- Service set identifier (SSID).
- Authentication type for enabling the router’s WiFi functionality.
- Configuring a passphrase if WPA/WPA2 authentication is selected.

For more information, see the SSID and Security sections as well as the Configuring the WiFi Interface section.

SSID

The WLAN associates a service set identifier (SSID) to the WiFi interface. An SSID must be assigned to the WiFi interface for it to be active in the network.

The SSID can be suppressed such that it is not advertised in the 802.11 beacons. Two SSIDs can be configured but the WiFi interface supports only one SSID—only one active SSID can be assigned at a time to the WiFi Interface (wifi 2/1) of a Cisco CG-OS operating system or the WiFi interface (dot11Radio 2/1) of a Cisco IOS router.

Note: SSID broadcast is always disabled on routers running Cisco CG-OS.

BSSID

BSSID is a unique identifier (generally the MAC address) for an access point in a Basic Service Set (BSS) network. When a WLAN is operating in infrastructure mode, each access point and its connected devices are called the Basic Service Set.

802.11i

The WiFi interface is 802.11i compliant. The 802.11i standard includes improved encryption for networks operating with 802.11 b/g/n clients and incorporates two new encryption key protocols: Temporal Key Integrity Protocol (TKIP) and Advanced Encryption Standard (AES). The WiFi interface employs the AES encryption algorithm using Counter Mode with Cipher Block Chaining Message Authentication Code Protocol (AES-CCMP).

Security

The WiFi interface supports WiFi Protected Access (WPA)-Pre-shared key (PSK), WPA2, and WPA/WPA2 Mixed-mode.

This section contains information about:

- WPA, page 5
- WPA2, page 5
- WPA/WPA2 Mixed-mode, page 5
WPA

WPA represents the first implementation of the IEEE 802.11i standard for WLANs that provides data protection and access control for wireless LAN systems.

WPA provides support for the TKIP encryption key protocol and PSK for authentication. PSK requires the user to configure a pre-shared key (or passphrase) that can be used as the pairwise master key (PMK) between the clients and the Cisco 1000 Series Connected Grid router.

WPA2

WPA2 provides full implementation of the IEEE 802.11i standard for WLANs and supports the enhanced AES-CCMP encryption algorithm.

WPA/WPA2 Mixed-mode

WPA/WPA2 Mixed-mode allows support of WPA/TKIP and WPA2/AES-CCMP clients on a common SSID. The access point advertises the available encryption methods (TKIP, AES-CCMP) on the network, and the WiFi client then selects which security method it wants to employ.

Configuring the WiFi Interface

Each time you enter commands in global configuration mode the running configuration file is changed. For these changes to take permanent effect, you must save the running configuration file to the startup configuration file. To save the running configuration to the startup configuration, use the `copy running-config startup-config` command in user EXEC mode.

Each time you make a change to the WiFi interface configuration of a Cisco CG-OS or Cisco IOS router, you must execute the `shutdown` and `no shutdown` commands sequentially in interface configuration mode to complete the change.

This section includes:
- Configuring the WiFi Interface for Cisco CG-OS, page 5
- Configuring the WiFi Interface for Cisco IOS, page 9

Configuring the WiFi Interface for Cisco CG-OS

- Configuring the WiFi Interface for Cisco CG-OS, page 5
- Creating an SSID for Cisco CG-OS, page 5
- Configuring the Channel Number for Cisco CG-OS, page 7
- Configuring the Power Level for Cisco CG-OS, page 8

Creating an SSID for Cisco CG-OS

The service set identifier (SSID) is a unique identifier of the wireless network that wireless networking devices use to establish and maintain wireless connectivity. Multiple access points on a network or sub-network can use the same SSID. An SSID name is case sensitive and can contain up to 32 alphanumeric characters. Do not include spaces in your SSID name.

You must define an SSID for the WiFi interface to activate the interface within the network.

Note: Only one active SSID can be associated with the interface.
**BEFORE YOU BEGIN**

No prerequisites.

**DETAILED STEPS**

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td>2.</td>
<td>wifi ssid ssid-name</td>
<td>Creates and configures a SSID (network name) for the interface and enters the SSID mode.</td>
</tr>
<tr>
<td>3.</td>
<td>authentication key-management {wpa-mixed-psk</td>
<td>wpa-psk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ wpa-mixed-psk—Allows support of WPA/TKIP and WPA2/CCMP-AES clients on a common SSID. The WiFi client can select which authentication method it wants to use to connect to the access point.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ wpa-psk—Employs the TKIP encryption protocol.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ wpa2-psk—Employs the CCMP-AES (AES, 128-bit key encryption) encryption protocol for additional security.</td>
</tr>
<tr>
<td>4.</td>
<td>{wpa-mixed-psk</td>
<td>wpa-psk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: For an ASCII pre-shared key, you must enter a minimum of 8 letters, numbers, or symbols, and the access point expands the key.</td>
</tr>
</tbody>
</table>

**EXAMPLE**

This example shows how to create an SSID on the WiFi interface.

```
router(config)# configure terminal
router(config)# wifi ssid CGOS_SSID
router(config-ssid)# authentication key-management wpa-mixed-psk
router(config-ssid)# wpa-mixed-psk ascii secretword
```

**Assigning an SSID and IP Address to the WiFi Interface for Cisco CG-OS**

**Note:** Only one SSID can be applied to the dot11radio 2/1 interface.

**BEFORE YOU BEGIN**

Create a service set identifier (SSID) for assignment to the interface and enable the interface. For more information, see [Creating an SSID for Cisco CG-OS](#).
### DETAILED STEPS

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><code>configure terminal</code></td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td>2.</td>
<td><code>interface wifi 2/1</code></td>
<td>Enters the interface mode.</td>
</tr>
<tr>
<td>3.</td>
<td><code>ssid ssid-name</code></td>
<td>Assigns the SSID to the interface.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong></td>
<td>A laptop used for remote diagnostics must be a member of this SSID as</td>
</tr>
<tr>
<td></td>
<td></td>
<td>well. For more information, see the Configuration Requirements for Remote</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Client Devices (CG-OS).</td>
</tr>
<tr>
<td>4.</td>
<td><code>ip address ip-address mask</code></td>
<td>Sets the IP address for the WiFi interface.</td>
</tr>
<tr>
<td>5.</td>
<td><code>(no) suppress ssid</code></td>
<td>Prevents SSID from being advertised in the 802.11 beacons. Use 'no'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with the same command to undo suppressing the SSID.</td>
</tr>
<tr>
<td>6.</td>
<td><code>shutdown</code></td>
<td>Disables the WiFi interface.</td>
</tr>
<tr>
<td>7.</td>
<td><code>no shutdown</code></td>
<td>Enables the dot11Radio 2/1 interface.</td>
</tr>
</tbody>
</table>

### EXAMPLE

This example shows how to assign an SSID to the WiFi interface.

```
router(config)# configure terminal
router(config)# interface wifi 2/1
router(config-if)# ssid CGOS_SSID
router(config-if)# ip address 192.168.1.1 255.255.255.0
router(config-if)# suppress ssid
router(config-if)# shutdown
router(config-if)# no shutdown
```

### Configuring the Channel Number for Cisco CG-OS

Configure the channel on which the WiFi onboard access point communicates. Table 1 lists the channel number frequencies for the United States of America (USA).

**Note:** Only the 20 MHz channel bandwidth is supported. The 2.4GHz/40MHz mode is not supported.
BEFORE YOU BEGIN
Create a service set identifier (SSID) for assignment to the interface and enable the interface. For more information, see the Creating an SSID for Cisco CG-OS.

DETAILED STEPS

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td>2.</td>
<td>interface wifi 2/1</td>
<td>Enters the interface mode.</td>
</tr>
<tr>
<td>3.</td>
<td>channel {frequency frequency</td>
<td>index index}</td>
</tr>
<tr>
<td>4.</td>
<td>shutdown</td>
<td>Disables the WiFi interface.</td>
</tr>
<tr>
<td>5.</td>
<td>no shutdown</td>
<td>Enables the WiFi interface.</td>
</tr>
</tbody>
</table>

EXAMPLE
This example shows how to configure the channel on which the WiFi onboard access point communicates.

```
router(config)# configure terminal
router(config)# interface wifi 2/1
router(config-if)# channel frequency 2462
router(config-if)# shutdown
router(config-if)# no shutdown
```

Configuring the Power Level for Cisco CG-OS
Configures the power level for the WiFi interface.

BEFORE YOU BEGIN
Create a service set identifier (SSID) for assignment to the interface and enable the interface. For more information, see the Creating an SSID for Cisco CG-OS.
DETAILED STEPS

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td>2.</td>
<td>interface wifi 2/1</td>
<td>Enters the interface mode to configure the WiFi interface.</td>
</tr>
<tr>
<td>3.</td>
<td>power local value_in_dBm</td>
<td>Defines the power value (measured in dBm) of the WiFi interface: value_in_dBm—Any value, 1 to 15.</td>
</tr>
<tr>
<td>4.</td>
<td>shutdown</td>
<td>Disables the WiFi interface.</td>
</tr>
<tr>
<td>5.</td>
<td>no shutdown</td>
<td>Enables the WiFi interface.</td>
</tr>
</tbody>
</table>

EXAMPLE

This example shows how to configure a power value of 15 dBm on the WiFi interface.

```
router(config)# configure terminal
router(config)# interface wifi 2/1
router(config-if)# power local 15
router(config-if)# shutdown
router(config-if)# no shutdown
```

Configuring the WiFi Interface for Cisco IOS

- Creating an SSID for Cisco IOS
- Assigning an SSID and IP Address to the WiFi Interface for Cisco IOS
- Configuring the Channel Number for Cisco IOS
- Configuring the Power Level for Cisco IOS

Creating an SSID for Cisco IOS

The service set identifier (SSID) is a unique identifier of the wireless network that wireless networking devices use to establish and maintain wireless connectivity. Multiple access points on a network or sub-network can use the same SSID. An SSID name is case sensitive and can contain up to 32 alphanumeric characters. Do not include spaces in your SSID name.

You must define an SSID for the WiFi interface to activate the interface within the network.

**Note:** Only one active SSID can be associated with the interface.
DETAILED STEPS

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>enable</td>
<td>Enables privileged EXEC mode. Enter your password if prompted.</td>
</tr>
<tr>
<td>2.</td>
<td>configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td>3.</td>
<td>dot11 ssid ssid-name</td>
<td>Creates and configures a SSID (network name) for the interface and enters the SSID mode.</td>
</tr>
<tr>
<td>4.</td>
<td>authentication open</td>
<td>Sets the authentication type to open for this SSID. Open authentication allows any device to authenticate and then attempt to communicate with the access point.</td>
</tr>
<tr>
<td>5.</td>
<td>authentication key-management {wpa-mixed-psk</td>
<td>wpa-psk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>wpa-mixed-psk</strong>—Allows support of WPA/TKIP and WPA2/CCMP-AES clients on a common SSID. The WiFi client can select which authentication method it wants to use to connect to the access point.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>wpa-psk</strong>—Employs the TKIP encryption protocol.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>wpa2-psk</strong>—Employs the CCMP-AES (AES, 128-bit key encryption) encryption protocol for additional security.</td>
</tr>
<tr>
<td>6.</td>
<td>{wpa-mixed-psk</td>
<td>wpa-psk</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong>: For an ASCII pre-shared key, you must enter a minimum of 8 letters, numbers, or symbols, and the access point expands the key.</td>
</tr>
</tbody>
</table>

EXAMPLE

This example shows how to create an SSID on the WiFi interface.

```
router(config)# configure terminal
router(config)# dot11 ssid CGIOS_SSID
router(config-ssid)# authentication open
router(config-ssid)# authentication key-management wpa2-psk
router(config-ssid)# wpa-mixed-psk ascii 12345678
```

Assigning an SSID and IP Address to the WiFi Interface for Cisco IOS

**Note**: Only one active SSID can be associated with the interface.

BEFORE YOU BEGIN

Create a service set identifier (SSID) for assignment to the interface and enable the interface. For more information, see the Creating an SSID for Cisco IOS.
DETAILED STEPS

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td>2.</td>
<td>interface type slot/port</td>
<td>Enters interface mode.</td>
</tr>
<tr>
<td>3.</td>
<td>ssid ssid-name</td>
<td>Assigns the SSID to the interface.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A laptop used for remote diagnostics must be a member of this SSID as well. For more information, see Configuration Requirements for Remote Client Devices (CG-OS).</td>
</tr>
<tr>
<td>4.</td>
<td>ip address ip-address mask</td>
<td>Sets the IP address for the WiFi interface.</td>
</tr>
<tr>
<td>5.</td>
<td>ipv6 enable</td>
<td>Enables IPv6 on the interface</td>
</tr>
<tr>
<td>6.</td>
<td>ipv6 address autoconfig</td>
<td>Enables automatic configuration of IPv6 addresses using stateless autoconfiguration on the interface</td>
</tr>
<tr>
<td>7.</td>
<td>(no) suppress ssid</td>
<td>Prevents SSID from being advertised in the 802.11 beacons. Use ‘no’ with the same command to undo suppressing the SSID.</td>
</tr>
<tr>
<td>8.</td>
<td>shutdown</td>
<td>Disables the WiFi interface.</td>
</tr>
<tr>
<td>9.</td>
<td>no shutdown</td>
<td>Enables the dot11Radio 2/1 interface.</td>
</tr>
<tr>
<td>10.</td>
<td>do copy running-config startup-config</td>
<td>Copies the running configuration to the startup configuration. The do keyword allows you to run the command without returning to user EXEC mode.</td>
</tr>
</tbody>
</table>

EXAMPLE

This example shows how to assign an SSID to the WiFi interface.

```
router(config)# configure terminal
router(config)# interface dot11Radio 2/1
router(config-if)# ssid CGIOS_SSID
router(config-if)# ip address 192.168.1.1 255.255.255.0
router(config-if)# ipv6 enable
router(config-if)# ipv6 address autoconfig
router(config-if)# suppress ssid
router(config-if)# shutdown
router(config-if)# no shutdown
```

Configuring the Channel Number for Cisco IOS

Configure the channel on which the WiFi onboard access point communicates. Table 2 lists the channel number frequencies for the United States of America (USA).

Note: Only the 20 MHz channel bandwidth is supported. The 2.4GHz/40MHz mode is not supported.
Table 2 Channel Number Frequencies for the USA

<table>
<thead>
<tr>
<th>Channel Index</th>
<th>Frequency (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2412</td>
</tr>
<tr>
<td>2</td>
<td>2417</td>
</tr>
<tr>
<td>3</td>
<td>2422</td>
</tr>
<tr>
<td>4</td>
<td>2427</td>
</tr>
<tr>
<td>5</td>
<td>2432</td>
</tr>
<tr>
<td>6</td>
<td>2437</td>
</tr>
<tr>
<td>7</td>
<td>2442</td>
</tr>
<tr>
<td>8</td>
<td>2447</td>
</tr>
<tr>
<td>9</td>
<td>2452</td>
</tr>
<tr>
<td>10</td>
<td>2457</td>
</tr>
<tr>
<td>11</td>
<td>2462</td>
</tr>
</tbody>
</table>

BEFORE YOU BEGIN

Create a service set identifier (SSID) for assignment to the interface and enable the interface. For more information, see the Creating an SSID for Cisco IOS section on page 9.

DETAILED STEPS

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td>2.</td>
<td>interface dot11Radio 2/1</td>
<td>Enters the interface mode.</td>
</tr>
<tr>
<td>3.</td>
<td>channel {frequency frequency</td>
<td>index index}</td>
</tr>
<tr>
<td>4.</td>
<td>shutdown</td>
<td>Disables the WiFi interface.</td>
</tr>
<tr>
<td>5.</td>
<td>no shutdown</td>
<td>Enables the WiFi interface.</td>
</tr>
</tbody>
</table>

EXAMPLE

This example shows how to configure the channel on which the WiFi onboard access point communicates.

```
router(config)# configure terminal
router(config)# interface dot11radio 2/1
router(config-if)# channel frequency 2462
router(config-if)# shutdown
router(config-if)# no shutdown
```

Configuring the Power Level for Cisco IOS

The steps described configure the power level for the WiFi interface.

BEFORE YOU BEGIN

Create a service set identifier (SSID) for assignment to the interface and enable the interface. For more information, see the “Creating an SSID for Cisco IOS” section on page 9.
DETAILED STEPS

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td>2.</td>
<td>interface dot11Radio 2/1</td>
<td>Enters the interface mode to configure the WiFi interface.</td>
</tr>
<tr>
<td>3.</td>
<td>power local value_in_dBm</td>
<td>Defines the power value (measured in dBm) of the WiFi interface: value_in_dBm—Any value, 0 to 15.</td>
</tr>
<tr>
<td>4.</td>
<td>shutdown</td>
<td>Disables the WiFi interface.</td>
</tr>
<tr>
<td>5.</td>
<td>no shutdown</td>
<td>Enables the WiFi interface.</td>
</tr>
</tbody>
</table>

EXAMPLE

This example shows how to configure a power value of 15 dBm on the WiFi interface.

```bash
router(config)# configure terminal
router(config)# interface dot11Radio 2/1
router(config-if)# power local 15
router(config-if)# shutdown
router(config-if)# no shutdown
```

Verifying the Configuration

- Displaying Cisco CG-OS Configuration Information, page 13
- Displaying Cisco IOS Configuration Information, page 14

Displaying Cisco CG-OS Configuration Information

To display Cisco CG-OS WiFi configuration information, enter any or all of the commands in Table 3.
Table 3  Cisco CG-OS WiFi show Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| `show interface wifi 2/1 [associations | brief | description | statistics]` | Summarizes the status of the interface as up or down, the five second input and output rate and the number of input and output packets. Additionally, the Cisco CG-OS router displays hardware details such as radio type (802.11N, 2.4 GHz radio), MAC address and MTU setting. The command options are:  
  - **associations**—Displays a detailed listing of items for the WiFi interface such as associated clients, signal strength, signal-to-noise ratio, (SNR), and current rated.  
  - **brief**—Lists only the interface states, up or down status, and MTU setting.  
  - **description**—Displays any entered description for the interface an optional configuration.  
  - **statistics**—Displays statistics for the receiver and transmitter on the interface. |
| `show controller wifi 2/1`                   | Displays serial number, software version, and configured frequency and power settings                                                |
| `show run interface wifi 2/1`                | Displays the configuration details of the WiFi interface.                                                                                |
| `show run | section wifi ssid`                      | Displays the configuration details of the global SSID configuration.                                                                     |

Displaying Cisco IOS Configuration Information

To display Cisco IOS WiFi configuration information, enter any or all of the commands in Table 4.

Table 4  Cisco IOS WiFi show Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>router# show ip interface dot11radio 2/1</code></td>
<td>Displays the IP interface status and configuration</td>
</tr>
<tr>
<td><code>router# show run interface dot11Radio 2/1</code></td>
<td>Displays the configuration details of the WiFi interface.</td>
</tr>
</tbody>
</table>
To perform diagnostics on the WiFi interface, use the `debug wifi [all | error | pss | trace]` command in user EXEC command mode.

You can also see the debug wifi details when you enter `show log` command in user EXEC command mode.

### Table 4  Cisco IOS WiFi show Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| `router# show interface dot11Radio 2/1 [associations | brief | description | statistics]` | Summarizes the status of the interface as up or down, the five second input and output rate and the number of input and output packets. Additionally, the router displays hardware details such as radio type (802.11N, 2.4 GHz radio), MAC address and MTU setting. The command options are:  
  - **associations**—Displays a detailed listing of items for the WiFi interface such as associated clients, signal strength, signal-to-noise ratio, (SNR), and current rated.  
  - **brief**—Lists only the interface states, up or down status, and MTU setting.  
  - **description**—Displays any entered description for the interface an optional configuration.  
  - **statistics**—Displays statistics for the receiver and transmitter on the interface. |
| `router# show controller dot11Radio 2/1` | Displays serial number, software version, and configured frequency and power settings. |
| `router# show running-config dot11Radio 2/1` | Displays the contents of the current running configuration file or the WiFi interface running configuration file. |
| `router# show dot11 association` | Shows WiFi associations. In WiFi access mode, it displays a list of clients associated with the dot11radio interface. |
| `router# show ipv6 interface brief` | Shows IPv6 addresses and brief status of all interfaces. |
| `router# show ipv6 interface dot11 2/1` | Shows IPv6 addresses and detailed status of the dot11Radio 2/1 interface. |
Cisco IOS Debug Command

To perform diagnostics on the WiFi interface, use the `debug dot11 [all | error | trace]` command in user EXEC command mode.

Configuration Examples

- Example: Configuring a WiFi Interface for WPA2 Authentication (CG-OS), page 16
- Example: Displaying the WiFi Clients Associated with a Router in Access Point Mode (Cisco IOS), page 16
- Example: Displaying Controller Information for the WiFi Interface (Cisco IOS), page 16
- Example: Displaying Status Information for the WiFi Interface (Cisco IOS), page 17
- Example: Displaying WiFi Interface IPv6 Address and Status Information (Cisco IOS), page 17
- Example: Displaying WiFi Interface Status Before and After a WiFi Client Interface Associates With An Access Point (Cisco IOS), page 18

Example: Configuring a WiFi Interface for WPA2 Authentication (CG-OS)

The following example shows how to configure a WiFi interface for WPA2 authentication. The WiFi interface is on a router running the Cisco CG-OS.

```
router(config)# configure terminal
router(config)# wifi ssid CGOS_SSID
router(config-ssid)# authentication key-management wpa2
router(config-ssid)# wpa2-psk ascii secretword
router(config-ssid)# exit
router(config)# interface wifi 2/1
router(config-if)# ssid CGOS_SSID
router(config-if)# channel index 11
router(config-if)# power local 15
router(config-if)# shutdown
router(config-if)# no shutdown
```

Example: Displaying the WiFi Clients Associated with a Router in Access Point Mode (Cisco IOS)

The following example shows the WiFi clients associated with the WiFi interface (dot11radio 2/1) of a Cisco IOS router in access point mode. The sample output indicates the presence of a bug because the IP address of the single WiFi client is unknown.

```
Router# show dot11 associations
Associated Clients: 1
SSID: ArifNXTPSK2

Client No. Associated : 1
MAC Address           : dca5.f41c.4ae0
IP Address            : Unknown
IPv6 Address          : ::
```

Example: Displaying Controller Information for the WiFi Interface (Cisco IOS)

The example displays controller information for the WiFi interface. The sample output is for the WiFi interface (dot11Radio 2/1) of a router running the Cisco IOS operating system.
**Example: Displaying Status Information for the WiFi Interface (Cisco IOS)**

The example displays status information for the WiFi interface. The sample output is for the WiFi interface (dot11Radio 1/2) of a router running the Cisco IOS operating system.

```
router# show interface dot11Radio 2/1

Dot11Radio2/1 is up, line protocol is up
  Hardware is 802.11N 2.4GHz Radio, address is 44a7.cfd2.6a16 (bia 44a7.cfd2.6a16)
  Internet address is 192.168.111.111/24
  MTU 1500 bytes, BW 72000 Kbit/sec, DLY 0 usec,
     reliability 0/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output never, output hang never
  Last clearing of 'show interface' counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/30 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts (0 IP multicasts)
        0 runts, 0 giants, 0 throttles
        0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
        0 input packets with dribble condition detected
        0 packets output, 0 bytes, 0 underruns
        0 output errors, 0 collisions, 0 interface resets
        0 unknown protocol drops
        0 babbles, 0 late collision, 0 deferred
        0 lost carrier, 0 no carrier
        0 output buffer failures, 0 output buffers swapped out
```

**Example: Displaying WiFi Interface IPv6 Address and Status Information (Cisco IOS)**

The example displays the IPv6 address and detailed status information concerning the WiFi interface. The sample output is for the WiFi interface (dot11Radio 1/2) of a router running the Cisco IOS operating system.

```
Router# show ipv6 interface dot11Radio 2/1

Dot11Radio2/1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80:46A7:CF0F:2F0D:9FC4
  No Virtual link-local address(es):
  No global unicast address is configured
```
Example: Displaying WiFi Interface Status Before and After a WiFi Client Interface Associates With An Access Point (Cisco IOS)

Before a WiFi interface (dot11radio 2/1) configured as a WiFi client links to an access point with its SSID, the WiFi interface status and protocol are both in a down state. After the WiFi client links to an access point and its acquired IP address, then the WiFi interface (dot11radio 2/1) status and protocol change to an up state. This is demonstrated at the command line interface in this section.

This example shows the status of a WiFi interface configured as a WiFi client before linking to an access point—the status and protocol are both in a down state:

```plaintext
router# show ip interface brief
```

<table>
<thead>
<tr>
<th>Interface</th>
<th>IP-Address</th>
<th>OK? Method Status</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>GigabitEthernet0/1</td>
<td>unassigned</td>
<td>YES NVRAM administratively down</td>
<td>down</td>
</tr>
<tr>
<td>Dot11Radio2/1</td>
<td>unassigned</td>
<td>YES manual down</td>
<td>down</td>
</tr>
</tbody>
</table>

This example shows the status of a WiFi interface configured as a WiFi client after linking to an access point—the status and protocol are both in an up state:

```plaintext
router# show ip interface brief
```

<table>
<thead>
<tr>
<th>Interface</th>
<th>IP-Address</th>
<th>OK? Method Status</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>GigabitEthernet0/1</td>
<td>unassigned</td>
<td>YES NVRAM administratively down</td>
<td>down</td>
</tr>
<tr>
<td>Dot11Radio2/1</td>
<td>192.168.200.4</td>
<td>YES DHCP up</td>
<td>up</td>
</tr>
</tbody>
</table>

The `show interface dot11radio 2/1` command can be used to show the status of a WiFi interface configured as a WiFi client after linking to an access point as well. The status and protocol are both in an up state in the command output:

```plaintext
router# show interface dot11Radio 2/1
```

Dot11Radio2/1 is up, line protocol is up

Configuration Requirements for Remote Client Devices (CG-OS)

To ensure connectivity between the WiFi interface on the Cisco CG-OS router and the wireless client of the remote client device, note the following requirements:

- The WiFi interface for both the Cisco CG-OS router and remote client device must be active.
- The remote client device SSID must match the SSID configured for the WiFi interface.
- The remote client device authentication credentials must match the router’s WiFi interface security credentials, if configured.
## Feature Information

### Table 5  Feature Information for Cisco 1000 Series Connected Grid Routers WiFi Software Configuration

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Release</th>
<th>Feature Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>WiFi interface support for remote connectivity.</td>
<td>Cisco CG-OS Release CG1(1)</td>
<td>Initial support of the feature on the CGR 1000 Series Routers (WPA2 support only).</td>
</tr>
<tr>
<td>Support for Cisco IOS</td>
<td>Cisco IOS Release 15.4(1)CG</td>
<td>Support for the Cisco IOS WiFi commands.</td>
</tr>
</tbody>
</table>