

Wireless Management

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Feature history for wireless management

Developments in wireless management, release by release.

Table 1: Feature history

Feature Name	Release Information	Description
Wireless Management for ISR 1000 Series Routers with WiFi 5	Cisco IOS XE Catalyst SD-WAN Release 17.6.1a Cisco vManage Release 20.6.1	This feature enables you to configure wireless LAN settings on WiFi 5-capable Cisco 1000 Series Integrated Services Routers using Cisco SD-WAN Manager. With Cisco SD-WAN Manager, you can automate the wireless LAN controller configuration and provide wireless connectivity without the need for another external controller to configure and manage the wireless settings on the routers.
Wireless Management for ISR 1000 Series Routers with WiFi 6	Cisco IOS XE Catalyst SD-WAN Release 17.9.1a Cisco vManage Release 20.9.1	This feature enables you to configure wireless LAN settings on WiFi 6-capable Cisco 1000 Series Integrated Services Routers using Cisco SD-WAN Manager. The Embedded Wireless Controller on these routers facilitates wireless connectivity management without the need for an external controller.

Wireless management on ISR 1000 series routers

Wireless Management on Cisco ISR 1000 Series Routers is a capability that enables the configuration and management of wireless LAN settings, provisioned through a Wireless LAN (WLAN) module, and utilizing an embedded virtual wireless LAN controller. This feature provides wireless connectivity without the need for an external controller to manage the router's wireless settings.

This capability is implemented through:

- WLAN Module Provisioning: A WLAN module is provisioned on the Cisco ISR 1000 Series Routers to provide wireless connectivity
- Embedded Virtual Controllers (EWC): The WLAN module hosts a virtual wireless LAN controller.
- Cisco SD-WAN Manager Integration: Wireless settings are configured and managed using SD-WAN Manager.

Cisco Mobility Express

Cisco Mobility Express is a virtual wireless LAN controller installed in the WLAN module of WiFi 5-capable Cisco ISR 1000 Series Routers. It provides the interface where wireless settings for LAN access are available.

Embedded wireless controller

The Embedded Wireless Controller is a virtual wireless controller installed on the WLAN module of WiFi 6-capable C1131 Cisco IOS XE Catalyst SD-WAN devices. Similar to Cisco Mobility Express, the EWC provides the interface for wireless LAN access settings.

Supported devices for wireless management

This section identifies Cisco device models that are compatible with wireless LAN management capabilities. It details the specific device models and the minimum software release versions required for wireless management on the Cisco ISR 1000 Series, assisting users in verifying their hardware for wireless deployments.

The following table displays a list of Cisco ISR 1000 Series routers that include the WLAN module.

Table 2: Cisco ISR 1000 Series Routers

Device Family	Device Name	Release Version
Cisco ISR 1000 Series Routers with WLAN module supporting WiFi 5	• C1101-4PLTEPW • C1109-4PLTE2PW • C1111-4PW • C1111-8PLTEEAW • C1111-8PW • C1112-8PLTEEAW • C1112-8PW • C1113-8PLTEEAW • C1113-8PMW • C1113-8PW • C1116-4PLTEEAW • C1116-4PW • C1117-4PLTEEAW • C1117-4PLTELAW • C1117-4PMLTEEAW • C1117-4PMW • C1117-4PW • C1121-8PLTEPW • C1121X-8PLTEPW	Cisco IOS XE Catalyst SD-WAN Release 17.6.1a Cisco SD-WAN Release 20.6.1
Cisco ISR 1000 Series Routers with WLAN module supporting WiFi 6	• C1131X-8PLTEPW • C1131-8PLTEPW • C1131X-8PW • C1131-8PW	Cisco IOS XE Catalyst SD-WAN Release 17.9.1a Cisco vManage Release 20.9.1

Prerequisites for wireless management on Cisco ISR 1000 series routers

WLAN module VLAN association

Add the management interface of the Wireless LAN (WLAN) module to a specific VLAN in order to access servers such as DHCP and RADIUS.

DHCP server

Configure a DHCP server to assign the IP address for the access point.

SVI for WLAN controller

Configure a switch virtual interface (SVI) on the Cisco ISR 1000 Services Router for virtual WLAN controller management.

Restrictions for wireless management on Cisco ISR 1000 series routers

Single Cisco mobility express access point

Configure only one access point on the LAN side of the router when using Cisco Mobility Express. However, you can connect other external access points to the router that are not configured with Cisco Mobility Express.

Absence of other wireless controllers

Ensure that no other wireless controllers are accessible on the LAN side of the router.

Configuring wireless management

Describes methods for configuring wireless management.

Configure wireless management on Cisco ISR 1000 series routers using a configuration group

Before you begin

On the **Configuration** > **Configuration Groups** page, choose **SD-WAN** as the solution type.

Procedure

Step 1 From the Cisco SD-WAN Manager menu, choose **Configuration** > **Configuration Groups**.

Step 2 Create and configure a Wireless LAN feature in Service profile.

a) Configure the basic details for the wireless LAN.

Field	Description
Enable 2.4G*	Disable this option to shut down the radio type of 2.4 GHz. Default: Enabled
Enable 5G*	Disable this option to shut down the radio type of 5 GHz. Default: Enabled
Country*	Choose the country where the router is installed.
Username*	Specify the username of Cisco Mobility Express.

Field	Description
Password*	Specify the password of Cisco Mobility Express.

b) Configure ME IP address.

Field	Description
ME Dynamic IP*	Enable this option so that the interface receives its IP address dynamically from a DHCP server.
ME IP Address	Specify the IP address of Cisco Mobility Express.
Subnet Mask	Specify the subnet mask of Cisco Mobility Express.
Default Gateway	Specify the default gateway address of Cisco Mobility Express.

c) Configure the Wi-Fi SSID details for setting up a wireless LAN.

Field	Description
Add SSID	
SSID Name*	Enter a name for the wireless SSID. It can be a string from 4 to 32 characters. The SSID must be unique.
Admin State*	Enable this option to indicate that the interface has been configured.
Broadcast SSID*	Enable this option if you want to broadcast the SSID. Disable this option if you do not want the SSID to be visible to all the wireless clients.
VLAN (Range 1-4094)*	Enter a VLAN ID for the wireless LAN traffic.
Radio Type	Choose one of the following radio types: • **2.4GHz** • **5GHz** • **All**
Security Type*	Choose a security type: • **WPA2 Enterprise**: Choose this option for an enterprise where you authenticate and authorize network users with a remote RADIUS server. • **WPA2 Personal**: Choose this option to authenticate users who want to access the wireless network using a passphrase. • **Open**: Choose this option to allow access to the wireless network without authentication.
Passphrase*	This field is available if you choose **WPA2 Personal** as the security type. Set a pass phrase. This pass phrase provides users access to the wireless network.

Field	Description
QoS Profile	Choose a QoS profile.

What to do next

Refer to Deploy a Configuration Group in the *Cisco Catalyst SD-WAN Configuration Groups Reference Guide*.

Configure wireless management on ISR 1000 series routers

Use this procedure to configure and manage wireless settings on your Cisco ISR 1000 Series Routers using Cisco SD-WAN Manager. This task allows you to enable wireless LAN functionality directly on the router, leveraging its embedded wireless controller capabilities.

Wireless management on ISR 1000 Series Routers enables you to set up wireless LANs (WLANs) directly on the router, utilizing its embedded wireless controller. This eliminates the need for an external wireless LAN controller, simplifying network architecture and management.

Before you begin

- Ensure your Cisco ISR 1000 Series Router is a supported model with a WLAN module (WiFi 5 or WiFi 6 capable).
- Confirm that necessary network prerequisites, such as DHCP server availability and proper VLAN configuration for the WLAN module's management interface, are in place.

Follow these steps to configure wireless management using feature templates in Cisco SD-WAN Manager:

Procedure

Step 1 From the Cisco SD-WAN Manager menu, choose **Configuration** > **Templates**.

Step 2 Click **Feature Templates**.

In Cisco vManage Release 20.7.x and earlier releases, **Feature Templates** is titled as **Feature**.

Step 3 Click **Add Template** to select an appropriate device model.

Step 4 In the left pane, from **Select Devices**, choose a Cisco ISR 1000 Series Router for which you are creating a template.

Step 5 Under **OTHER TEMPLATES**, click **ISR1K Wireless** to select it as the feature template.

Step 6 In the **Template Name** field, enter a name for the feature template.

This field is mandatory and can contain only uppercase and lowercase letters, the digits 0 to 9, hyphens (-), and underscores (_). It cannot contain spaces or any other characters.

Step 7 In the **Description** field, enter a description for the feature template.

This field is mandatory, and it can contain all characters and spaces.

Step 8 Enter the Wi-Fi SSID details for setting up a wireless LAN:

Parameter Name	Description
Wireless Network Name (SSID)	Enter a name for the wireless SSID. It can be a string from 4 to 32 characters. The SSID must be unique.
VLAN (Range 1-4094)	Enter a VLAN ID for the wireless LAN traffic.
Security Type	Choose a security type: • **WPA2 Enterprise**: Choose this option for an enterprise where you authenticate and authorize network users with a remote RADIUS server. • **WPA2 Personal**: Choose this option to authenticate users who want to access the wireless network using a passphrase. • **Open**: Choose this option to allow access to the wireless network without authentication.
RADIUS Server IP	(Optional) This field is available if you choose the **WPA2 Enterprise** option as the security type. Enter the IP address of the RADIUS server.
Authentication Port	(Optional) This field is available if you choose the **WPA2 Enterprise** option as the security type. Enter the authentication port number of the RADIUS server.
Shared Secret	(Optional) This field is available if you choose the **WPA2 Enterprise** option as the security type. Enter the shared secret key of the RADIUS server.
Passphrase	(Optional) This field is available if you choose the **WPA2 Personal** option as the security type. Set a pass phrase. This pass phrase provides users with access to the wireless network.
Admin State	Choose an admin state.
Radio Type	Choose one of the following radio types: • **2.4GHz** • **5GHz** • **Both**
Broadcast SSID	Choose **On** to broadcast the SSID. Choose **Off** if you do not want the SSID to be visible to all the wireless clients.
QoS Profile	Choose a QoS profile.

Step 9 Enter the **General** details for the wireless LAN:

Parameter Name	Description
Country	Choose the country where the ISR is installed.
Username	Specify the username of Cisco Mobility Express. If you are using a C1131 Cisco IOS XE Catalyst SD-WAN device specify the username for the EWC.
Password	Specify the password for Cisco Mobility Express or the EWC.

Step 10 Enter the **Advanced** details for the wireless LAN:

Parameter Name	Description
Controller IP Address	**Note** For Cisco IOS XE Catalyst SD-WAN Release 17.6.1a, and Cisco vManage Release 20.6.1 and earlier releases, this field is displayed as **ME IP Address.** Specify the Management IP address of Cisco Mobility Express or EWC.
Subnet Mask	Specify the subnet mask for the Management IP address.
Default Gateway	Specify the default gateway address of Cisco Mobility Express or EWC.
2.4GHz Shutdown	Click **Yes** to shut down the 2.4 GHz radio type. Click **No** to not shut down this radio type.
5GHz Shutdown	Click **Yes** to shut down the 5 GHz radio type. Click **No** to not shut down this radio type.

Step 11 Click **Save** to save your wireless configuration.

After completing these steps, the wireless LAN settings are configured on your Cisco ISR 1000 Series Router via the feature template, enabling wireless connectivity.

What to do next

Deploy the configured feature template to the desired devices. For more information, see Deploy a Configuration Group.

Configure wireless management on Cisco ISR 1000 series routers using CLI commands

Use this procedure to apply Command Line Interface (CLI) templates to configure wireless LAN settings on your Cisco ISR 1000 series routers. This method allows for direct configuration using pre-defined command sets.

CLI templates are pre-configured sets of commands that simplify the deployment of wireless settings. They allow for precise control over radio profiles, WLAN SSIDs, and general wireless LAN parameters. By default, these commands are executed in global configuration mode.

Before you begin

Ensure you have console or SSH access to the Cisco ISR 1000 series router.

Follow these steps to configure wireless management settings using CLI templates:

Configure a WLAN profile using a CLI template

Note By default, CLI templates execute commands in global config mode.

```
wlan-profile wlan-profile-sample-1
vlan-id 100
ssid sample-ssid-1
data-security personal
passphrase 0 Pass-Phrase-Sample123#
qos-type silver
wlan-profile wlan-profile-sample-2
vlan-id 200
ssid sample-ssid-2
data-security enterprise
aaa radius-server 10.2.3.4 auth-port 1812 shared-secret 0 EsrdT_23sss

qos-type gold
nobroadcast-ssid
```

Configure general WLAN settings using a CLI template

Note By default, CLI templates execute commands in global config mode.

Here is the complete configuration example that shows that show how to configure and manage wireless settings on Cisco ISR 1000 Series Routers.

```
wlan-profile TEST-Enterprise
radio-band all
vlan-id 300
ssid TEST-Enterprise
data-security enterprise
aaa radius-server 192.168.100.20 auth-port 1812 shared-secret 6 EsrdT_23sss
qos-type silver


wlan-profile TEST-Personal
radio-band all
ssid TEST-Personal
data-security personal
passphrase 0 IdSvs23452#
qos-type silver
```

```
radio-profile 24ghz
channel auto
channel-bandwidth auto


radio-profile 5ghz
channel auto
channel-bandwidth auto


wireless-lan mgmt ip address 192.168.1.11 255.255.255.0 default-gateway 192.168.1.1
wireless-lan mgmt credential username admin password 6 sRe32dfst#asd
wireless-lan country US
```

Procedure

Step 1 Access the router's command-line interface.

Log in to your Cisco ISR 1000 series router.

Step 2 Enter global configuration mode.

From privileged EXEC mode, enter configure terminal.

```
Router# configure
Router(config)#
```

Step 3 Configure the radio profiles.

Apply the necessary CLI commands to define the 2.4GHz and 5GHz radio settings, such as shutdown status, channel, and bandwidth.

```
radio-profile 24ghz
shutdown
exit
radio-profile 5ghz
no shutdown
```

Step 4 Configure the WLAN profiles.

Apply the CLI commands to define your wireless SSIDs, including VLAN IDs, security types (WPA2 Personal, WPA2 Enterprise, Open), passphrases, RADIUS server details, and QoS profiles.

```
wlan-profile wlan-profile-sample-1
vlan-id 100
ssid sample-ssid-1
data-security personal
passphrase 0 Pass-Phrase-Sample123#
qos-type silver
wlan-profile wlan-profile-sample-2
vlan-id 200
ssid sample-ssid-2
data-security enterprise
aaa radius-server 10.2.3.4 auth-port 1812 shared-secret 0 EsrdT_23sss

qos-type gold
nobroadcast-ssid
```

Step 5 Configure general wireless LAN settings.

Apply the CLI commands to set the country code, management IP address, default gateway, and management credentials for Cisco Mobility Express or the Embedded Wireless Controller (EWC).

```
wireless-lan country US
wireless-lan mgmt ip address10.16.1.100 255.255.255.0 default-gateway 192.168.1.1
wireless-lan mgmt credential username admin password 0 sRe32dfst#asd
```

Step 6 Commit the configuration changes.

Here is the complete configuration example that shows that show how to configure and manage wireless settings on Cisco ISR 1000 Series Routers.

```
wlan-profile TEST-Enterprise
radio-band all
vlan-id 300
ssid TEST-Enterprise
data-security enterprise
aaa radius-server 192.168.100.20 auth-port 1812 shared-secret 6 EsrdT_23sss
qos-type silver


wlan-profile TEST-Personal
radio-band all
ssid TEST-Personal
data-security personal
passphrase 0 IdSvs23452#
qos-type silver


radio-profile 24ghz
channel auto
channel-bandwidth auto


radio-profile 5ghz
channel auto
channel-bandwidth auto


wireless-lan mgmt ip address 192.168.1.11 255.255.255.0 default-gateway 192.168.1.1
wireless-lan mgmt credential username admin password 6 sRe32dfst#asd
wireless-lan country US
```

The wireless management settings are applied to your Cisco ISR 1000 series router using the specified CLI templates. The router's wireless module will now operate according to the configured radio and WLAN profiles.

This section provides a sample Command Line Interface (CLI) configuration for wireless management on Cisco ISR 1000 Series Routers. This example illustrates a complete setup, including WLAN profiles, radio settings, and general wireless LAN management parameters, serving as a factual representation for reference and implementation. Refer to Configuration example for wireless configuration on Cisco ISR 1000 series routers, on page 12.

What to do next

Monitor the wireless configuration to verify that the settings are active and functioning as expected. For verfication steps, refer to Monitor wireless configuration on Cisco ISR 1000 series routers, on page 12.

Configuration example for wireless configuration on Cisco ISR 1000 series routers

This section provides a sample CLI configuration for wireless management on Cisco ISR 1000 series routers. This example illustrates a complete setup, including WLAN profiles, radio settings, and general wireless LAN management parameters, serving as a factual representation for reference and implementation.

Wireless configuration example

```
wlan-profile TEST-Enterprise
radio-band all
vlan-id 300
ssid TEST-Enterprise
data-security enterprise
aaa radius-server 192.168.100.20 auth-port 1812 shared-secret 6 EsrdT_23sss
qos-type silver


wlan-profile TEST-Personal
radio-band all
ssid TEST-Personal
data-security personal
passphrase 0 IdSvs23452#
qos-type silver


radio-profile 24ghz
channel auto
channel-bandwidth auto


radio-profile 5ghz
channel auto
channel-bandwidth auto


wireless-lan mgmt ip address 192.168.1.11 255.255.255.0 default-gateway 192.168.1.1
wireless-lan mgmt credential username admin password 6 sRe32dfst#asd
wireless-lan country US
```

Monitor wireless configuration on Cisco ISR 1000 series routers

Use this procedure to monitor the wireless settings configured on your Cisco ISR 1000 series routers using Cisco SD-WAN Manager. This allows you to verify the operational status of your wireless LAN, including radio parameters, SSID information, and connected clients.

After configuring wireless management, it is essential to monitor the operational status to ensure that the settings have been applied correctly and the wireless network is functioning as expected. Cisco SD-WAN Manager provides real-time monitoring capabilities for this purpose.

Before you begin

- Wireless management must be configured and deployed on the Cisco ISR 1000 Series Router.
- You must have access to Cisco SD-WAN Manager with appropriate monitoring permissions.

Follow these steps to monitor the wireless configuration using Cisco SD-WAN Manager:

Procedure

Step 1 From the Cisco SD-WAN Manager menu, navigate to **Monitor** > **Network**.

Step 2 Choose a router from the list of the routers.

Step 3 Click **Real Time** in the left pane.

Step 4 From the **Device Options** drop-down list, choose one of the following options:

Device Option	Description
Wireless Radio	Displays the radio parameters of the wireless LAN.
Wireless SSID	Displays information about the wireless SSID.
Wireless Clients	Displays information about the wireless clients in the wireless LAN.

Upon selecting a device option, the real-time data for the chosen wireless aspect (Radio, SSID, or Clients) is displayed, providing insight into the current state of the wireless configuration on the selected Cisco ISR 1000 Series Router.

Troubleshooting wireless configuration on Cisco ISR 1000 series routers

To ensure successful connection of an access point to the Cisco Mobility Express virtual controller or the Embedded Wireless Controller (EWC).

This guidance applies when a Cisco Mobility Express-enabled or EWC-enabled access point fails to establish a connection to the Cisco ISR 1000 Series Router's wireless controller.

The primary reason for this connectivity failure is the absence of an active DHCP server within the management VLAN that is assigned to the Wlan-GigabitEthernet interface. Without an IP address dynamically assigned by a DHCP server, the access point cannot communicate with the controller.

If a DHCP server is not configured in the appropriate VLAN, the access point will remain unable to connect to the wireless controller, thereby preventing wireless client connectivity through that access point.

- Configure a DHCP Server: Ensure a DHCP server is configured and active within the native VLAN of the WiFi module. This server must be capable of assigning IP addresses to the access points.
- Verify WLAN Module VLAN Configuration: Confirm that the management interface of the WLAN module is correctly assigned to a specific VLAN that has access to the DHCP server and other necessary network services (e.g., RADIUS).