Release Notes for Cisco Catalyst 9800 Series Wireless Controller, Cisco IOS XE Dublin 17.11.x

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Introduction to Cisco Catalyst 9800 Series Wireless Controllers

The Cisco Catalyst 9800 Series Wireless Controllers comprise next-generation wireless controllers (referred to as *controller* in this document) built for intent-based networking. The controllers use Cisco IOS XE software and integrate the radio frequency (RF) capabilities from Cisco Aironet with the intent-based networking capabilities of Cisco IOS XE to create a best-in-class wireless experience for your organization.

The controllers are enterprise ready to power your business-critical operations and transform end-customer experiences:

- The controllers come with high availability and seamless software updates that are enabled by hot and cold patching. This keeps your clients and services up and running always, both during planned and unplanned events.
- The controllers come with built-in security, including secure boot, run-time defenses, image signing, integrity verification, and hardware authenticity.
- The controllers can be deployed anywhere to enable wireless connectivity, for example, on an on-premise device, on cloud (public or private), or embedded on a Cisco Catalyst switch (for SDA deployments) or a Cisco Catalyst access point (AP).
- The controllers can be managed using Cisco Catalyst Center, programmability interfaces, for example, NETCONF and YANG,or web-based GUI or CLI.
- The controllers are built on a modular operating system. Open and programmable APIs enable the automation of your day zero to day *n* network operations. Model-driven streaming telemetry provides deep insights into your network and client health.

The controllers are available in multiple form factors to cater to your deployment options:

- Catalyst 9800 Series Wireless Controller Appliance
- Catalyst 9800 Series Wireless Controller for Cloud
- Catalyst 9800 Embedded Wireless Controller for a Cisco Switch

Note All the Cisco IOS XE programmability-related topics on the controllers are supported by DevNet, either through community-based support or through DevNet developer support. For more information, go to https://developer.cisco.com.

Note For information about the recommended Cisco IOS XE releases for Cisco Catalyst 9800 Series Wireless Controllers, see the documentation at:

https://www.cisco.com/c/en/us/support/docs/wireless/catalyst-9800-series-wireless-controllers/214749-tac-recommended-ios-xe-builds-for-wirele.html

What's New in Cisco IOS XE Dublin 17.11.1

Table 1: New and Modified Software Features

Feature Name	Description and Documentation Link
6-GHz Radio Support for Albania, Norway, Switzerland, Lichtenstein, and Iceland	From this release, Albania, Iceland, Lichtenstein, Norway, and Switzerland are added to the list of countries that support 6-GHz radio band. For more information, see the chapter Countries and Regulations.
Background Scanning and MAP Fast Ancestor Find Mode	The Background Scanning and MAP Fast Ancestor Find Mode feature updates the child MAPs about their neighbors across all the channels. This feature also helps child MAPs to switch to a neighbor of any channel, and use that neighbor as the next parent for uplink. Background scanning allows MAPs to save time during the scan-and-seek phase while looking for a new parent. The following command is introduced: • **map-fast-ancestor-find** For more information, see the chapter Mesh Access Points.
Built-in Captive Portal Improvements	This release introduces support for special characters in the login portal banner title and banner text. The number of characters supported on the banner text has been doubled to 400. The following command is introduced: • **exec-character-bits** For more information, see the chapter Web-Based Authentication.
Calendar Profile Enhancement	This release allows you to create a single calendar profile in the controller GUI, spanning across midnight (for example, from 5 p.m. to 7 a.m.), instead of two separate calendar profiles.

Feature Name	Description and Documentation Link
Client Debug Bundle	This feature helps to collate the radioactive trace debug logs, packet captures in a control plane, AP logs, and the output of **show** commands related to clients, which are useful in troubleshooting wireless client issues. The log is collected in a tar file through a single **debug** command. The following commands are introduced: • **debug wireless bundle client abort** • **debug wireless bundle client mac** • **debug wireless bundle client start** • **debug wireless bundle client stop-all collect** For more information, see the chapter Conditional Debug, Radioactive Tracing, and Packet Tracing.
Convert Redundant 2.4-GHz Radios to Monitor Mode	From this release, you can select the redundant dual-band radios in a network to operate in monitor only mode. For more information, see the chapter Cisco Flexible Radio Assignment.
Enhancement in Client Steering During Rolling AP Upgrade	This release introduces the option to not deauthenticate clients connected to the APs that are selected for the upgrade. Use the **no ap upgrade staggered client-deauth** command to stop deauthenticating clients before the AP performs an upgrade. By default, the AP deauthenticates all clients before performing an upgrade. For more information, see the chapter N+1 Hitless Rolling AP Upgrade.
Flex OTT and Roaming Latency Validation over BGP EVPN	This release supports Over The Top (OTT) Ethernet Virtual Private Network (EVPN) solution. For more information on the EVPN solution, see the BGP EVPN VXLAN Configuration Guide.
GNSS Support	AP tracks GPS information for devices deployed in the outdoor environment and sends the GNSS information to the wireless controller. The following command is introduced on the AP: **show gnss info**. The following commands display the GPS location of the AP: • show ap geolocation summary • show ap name geolocation detail For more information, see Cisco Catalyst IW9167E Heavy Duty Access Point Configuration Guide.

Feature Name	Description and Documentation Link
iCAP Spectrum Analysis Enable and Update	The spectral capture update rate (using iCAP on Cisco DNA Centre) for the WiFi6E APs, such as 9136, 9166, 9164, and 9162, are improved by about 70 percent. Rogue client detection is impacted slightly while performing spectral capture. However, rogue AP detection is not affected and impacts only the APs performing spectral capture. When Fastlocate, Cisco Hyperlocation, or Rogue Containment features are enabled, spectral capture updates won't cause an impact. When you perform a full packet data capture for a Wifi6E client using Cisco DNA Center, the broadcast frames, such as FILS and UPBR, do not appear in the packet data capture. The only broadcast frames included are management frames beacon.
Jumbo Frame Support for RADIUS Packets	This release supports higher RADIUS packet fragmentation. The fragmentation size is increased to 9000 bytes. For more information, see the chapter Multiple Authentications for a Client.
Location-Capable Attribute in the Access-Request Messages	This release supports Location-Capable attribute from RFC 5580, which provides details of the available location profiles' configuration on the device. The following command is introduced: • **radius-server attribute wireless location delivery out-of-band include-location-capable** For more information, see the chapter Configuring RFC 5580 Location Attributes.
Multiauthentication Combination of 802.1X and Local Web Authentication	This feature supports the merging of applied policies during the multiauthentication of 802.1X or MAC Authentication Bypass and Local Web Authentication. The following command is introduced: • **consent activation-mode merge** For more information, see the chapter Security.
New AAA Command	A new command is introduced to display brief information about AAA servers: • **show aaa server brief** For more information, see the Cisco Catalyst 9800 Series Wireless Controller Command Reference.

Feature Name	Description and Documentation Link
Out-of-Band AP Image Download	The AP image upgrade method is enhanced to make the upgrades faster and more flexible. The following commands are introduced: • **ap upgrade method https** • **ap file-transfer https port** • **show ap upgrade method** For more information, see the chapter Efficient Image Upgrade.
RAP Ethernet Daisy Chain with WSTP	RAP Ethernet Daisy Chain feature is enhanced in this release. WSTP hello message is used for root port detection to support flexible topology. A dedicated command is introduced to enable this feature: **rap-eth-daisychain**. The following command is introduced to configure primary ETH port: **ap name mesh backhaul ethernet**. For more information, see Cisco Catalyst IW9167E Heavy Duty Access Point Configuration Guide.
Reload Reason History	The Reload Reason History feature tracks the controller reload reason. Using the **show version** command and Network Configuration Protocol (NETCONF), you can view the reload reason history, which is useful for troubleshooting and serviceability. For more information, see the chapter Reload Reason History.
RFID Hardening	The **show wireless rfid detail** command has been enhanced to display information about the neighbouring APs.
Secure Data Wipe	This feature allows you to securely erase files from the file system of Cisco Access Points. For more information, see the chapter Secure Data Wipe.
Site Survey mode	From this release, the site survey mode is supported on the Cisco Catalyst IW9167E Heavy Duty Access Points.
Subscription Dampening-Period for On-Change Telemetry	This feature introduces a dampening period for on-change subscriptions. All record updates are sent at the end of the dampening period, even when there are multiple updates of the same record during that period. Without a dampening period, the receiver may be flooded with repeated updates that could exhaust the resources in the publisher and receiver. For more information, see the Programmability Configuration Guide.

Feature Name	Description and Documentation Link
User-Configurable Ethernet Port LEDs	In this release, the Ethernet port LEDs in APs are enabled or disabled (switched ON or OFF) as per the system LED. For example, if the system LED is ON, the Ethernet LED will also be ON. For more information, see the chapter AP Management.
WGB mode and uWGB mode	From this release, the Workgroup Bridge (WGB) mode and Universal Workgroup Bridge (uWGB) mode are supported on the Cisco Catalyst IW9167E Heavy Duty Access Points. For more information, see Cisco Catalyst IW9167E Heavy Duty Access Point Workgroup Bridge Configuration Guide.
Wireless Client Latency Statistics	From this release onwards, the wireless client latency statistics allow you to view a client's statistics using the client's MAC address. The following command is introduced: • **show wireless client mac-address stats latency**
Zero Wait DFS Support on Cisco Catalyst 9136 AP	From this release, Zero Wait Dynamic Frequency Selection feature is supported on the Cisco Catalyst 9136 Series Access Points. For more information, see the chapter Dynamic Frequency Selection.

Table 2: New and Modified GUI Features

Feature Name	GUI Path
Out-of-Band AP Image Download	• **Configuration >Wireless >Wireless Global**
Convert Redundant 2.4-GHz Radios to Monitor Mode	• **Configuration > Radio Configurations > RRM > FRA**
Background Scanning and MAP Fast Ancestor Find Mode	• **Configuration > Wireless > Mesh > Profiles**
Calendar Profile Enhancement	• **Configuration > Tags & Profiles > Calendar**
User-Configurable Ethernet Port LEDs	• **Configuration >Wireless > Access Points**

MIBs

The following MIBs are newly added or modified:

- AIRESPACE-WIRELESS-CAPABILITY
- AIRESPACE-WIRELESS-MIB

- CISCO-LWAPP-AP-MIB
- CISCO-LWAPP-TC-MIB

Strong Crypto Algorithms

We strongly recommend stronger cryptographic algorithms instead of weak cryptographic algorithms, such as RSA keys of less than 2048 bits, MD5 for authentication, DES, and 3DES for encryption. Soon, such weak algorithms will no longer be allowed by default. An explicit configuration is required to continue using such weak algorithms.

For SNMP v3 users with weak cryptographic properties, the SNMP operations to the device will fail, resulting in loss of management access to device through SNMP. Similarly, if the RSA key pair is not updated to be at least 2048 bits for SSH, the SSH server will be disabled, resulting in loss of remote access to the device through SSH.

For more information on how to migrate to stronger cryptographic algorithms for SNMP, see the Field Notice Number: FN72509.

For more information on how to migrate to stronger cryptographic algorithms for SSH, see Field Notice Number: FN72511.

Product Analytics

This feature allows for the collection of non-personal usage device systems information for Cisco products, which helps in continuous product improvements. This feature is supported on the Cisco Catalyst 9800 Series Wireless Controllers (9800-80, 9800-40, 9800-L, 9800-CL, CW9800M, and CW9800H1/H2). You can use the the **pae** command to enable or disable this feature.

The following commands are introduced as part of this feature:

- **pae**
- **show product-analytics kpi**
- **show product-analytics report**
- **show product-analytics stats**

Note Turning off Smart Licensing Device Systems Information does not impact other Systems Information collection including from Cisco Catalyst Center or vManage.

Important: We are constantly striving to advance our products and services. Knowing how you use our products is key to accomplishing this goal. To that end, Cisco will collect device and licensing Systems Information through Cisco Smart Software Manager (CSSM) and other channels for product and customer experience improvement, analytics, and adoption. Cisco processes your data in accordance with the General Terms and Conditions, the Cisco Privacy Statement and any other applicable agreement with Cisco. To modify your organization's preferences for device and licensing systems information, use the **pae** command. For more information, see *Cisco Catalyst 9800 Series Wireless Controller Command Reference*.

For additional information on this feature, see *Wireless Product Analytics FAQ*.

Behavior Changes

- RADIUS packets were getting fragmented with the default value of 1396. With the change in behavior, RADIUS packets are fragmented based on the source interface IP MTU.

  This behaviour change is applicable only when the RADIUS source interface is attached under the RADIUS group. If there is no source interface attached under the RADIUS group, this change is not applicable.

- When nonrealm clients join realm-enabled SSIDs, accounting requests are sent to the AAA server that is mapped to the accounting method list configured under the policy profile after clients move to the RUN state.
- CAPWAP packets that are sent towards APs are tagged with a device tag.
- From this release, Online subscription with Encryption (OSEN) can be enabled with WPA2.
- From Cisco IOS XE Dublin 17.11.1, for 6-GHz bandwidth, the **DBS Minimum Channel Width** and **DBS Maximum Channel Width** fields are moved from **Configuration > Radio Configurations > RRM > 6 Ghz Band > General** to **Configuration > Tags & Profiles > RF Profile > RRM > DCA > Channel width > DBS channel width**.
- If you have configured CISCO_IDEVID_SUDI trustpoint in your configuration, you will need to replace it with CISCO_IDEVID_CMCA3_SUDI to avoid client connection and AP join issues. The reason for this change being the CISCO_IDEVID_SUDI changed from SW-SUDI certificate in previous releases to HW-SUDI certificate. The processing of HW-SUDI certificate is much slower than the SW-SUDI. Here, CISCO_IDEVID_CMCA3_SUDI is the new SW-SUDI certificate.

Interactive Help

The Cisco Catalyst 9800 Series Wireless Controller GUI features an interactive help that walks you through the GUI and guides you through complex configurations.

You can start the interactive help in the following ways:

- By hovering your cursor over the blue flap at the right-hand corner of a window in the GUI and clicking **Interactive Help**.
- By clicking **Walk-me Thru** in the left pane of a window in the GUI.
- By clicking **Show me How** displayed in the GUI. Clicking **Show me How** triggers a specific interactive help that is relevant to the context you are in.

  For instance, **Show me How** in **Configure** > **AAA** walks you through the various steps for configuring a RADIUS server. Choose **Configuration**> **Wireless Setup** > **Advanced** and click **Show me How** to trigger the interactive help that walks you through the steps relating to various kinds of authentication.

The following features have an associated interactive help:

- Configuring AAA
- Configuring FlexConnect Authentication
- Configuring 802.1X Authentication

- Configuring Local Web Authentication
- Configuring OpenRoaming
- Configuring Mesh APs

Note If the WalkMe launcher is unavailable on Safari, modify the settings as follows:

1. Choose **Preferences > Privacy**.
2. In the **Website tracking** section, uncheck the **Prevent cross-site tracking** check box to disable this action.
3. In the **Cookies and website data** section, uncheck the **Block all cookies** check box to disable this action.

Supported Hardware

The following table lists the supported virtual and hardware platforms. (See Supported PIDs and Ports for the list of supported modules.)

Table 3: Supported Virtual and Hardware Platforms

Platform	Description
Cisco Catalyst 9800-80 Wireless Controller	A modular wireless controller with up to 100-GE modular uplinks and seamless software updates. The controller occupies a 2-rack unit space and supports multiple module uplinks.
Cisco Catalyst 9800-40 Wireless Controller	A fixed wireless controller with seamless software updates for mid-size to large enterprises. The controller occupies a 1-rack unit space and provides four 1-GE or 10-GE uplink ports.
Cisco Catalyst 9800-L Wireless Controller	The Cisco Catalyst 9800-L Wireless Controller is the first low-end controller that provides a significant boost in performance and features.
Cisco Catalyst 9800 Wireless Controller for Cloud	A virtual form factor of the Catalyst 9800 Wireless Controller that can be deployed in a private cloud (supports VMware ESXi, Kernel-based Virtual Machine [KVM], Microsoft Hyper-V, and Cisco Enterprise NFV Infrastructure Software [NFVIS] on Enterprise Network Compute System [ENCS] hypervisors), or in the public cloud as Infrastructure as a Service (IaaS) in Amazon Web Services (AWS), Google Cloud Platform (GCP) marketplace, and Microsoft Azure.

Platform	Description
Cisco Catalyst 9800 Embedded Wireless Controller for Switch	The Catalyst 9800 Wireless Controller software for the Cisco Catalyst 9000 switches brings the wired and wireless infrastructure together with consistent policy and management. This deployment model supports only Software Defined-Access (SDA), which is a highly secure solution for small campuses and distributed branches.

The following table lists the host environments supported for private and public cloud.

Table 4: Supported Host Environments for Public and Private Cloud

Host Environment	Software Version
VMware ESXi	• VMware ESXi vSphere 6.0, 6.5, 6.7, and 7.0 • VMware ESXi vCenter 6.0, 6.5, 6.7, and 7.0
KVM	• Linux KVM-based on Red Hat Enterprise Linux 7.6, 7.8, and 8.2 • Ubuntu 16.04.5 LTS, Ubuntu 18.04.5 LTS, Ubuntu 20.04.5 LTS
AWS	AWS EC2 platform
NFVIS	ENCS 3.8.1 and 3.9.1
GCP	GCP marketplace
Microsoft Hyper-V	Windows Server 2019, and Windows Server 2016 (Version 1607) with Hyper-V Manager (Version 10.0.14393)
Microsoft Azure	Microsoft Azure

The following table lists the supported Cisco Catalyst 9800 Series Wireless Controller hardware models.

The base PIDs are the model numbers of the controller.

The bundled PIDs indicate the orderable part numbers for the base PIDs that are bundled with a particular network module. Running the **show version**, **show module**, or **show inventory** command on such a controller (bundled PID) displays its base PID.

Note that unsupported SFPs will bring down a port. Only Cisco-supported SFPs (GLC-LH-SMD and GLC-SX-MMD) should be used on the route processor (RP) ports of C9800-80-K9 and C9800-40-K9.

Table 5: Supported PIDs and Ports

Controller Model	Description
C9800-CL-K9	Cisco Catalyst Wireless Controller as an infrastructure for cloud.

Controller Model	Description
C9800-80-K9	Eight 1/10-Gigabit Ethernet SFP or SFP+ ports and two power supply slots.
C9800-40-K9	Four 1/10-Gigabit Ethernet SFP or SFP+ ports and two power supply slots.
C9800-L-C-K9	• 4x2.5/1-Gigabit ports • 2x10/5/2.5/1-Gigabit ports
C9800-L-F-K9	• 4x2.5/1-Gigabit ports • 2x10/1-Gigabit ports

The following table lists the supported SFP models.

Table 6: Supported SFPs

SFP Name	C9800-80-K9	C9800-40-K9	C9800-L-C-K9	C9800-L-F-K9
COLORCHIP-C040-Q020-CWDM4-03B	Supported	—	—	—
DWDM-SFP10G-30.33	Supported	Supported	—	—
DWDM-SFP10G-61.41	Supported	Supported	—	—
FINISAR-LR – FTLX1471D3BCL [1]	Supported	Supported	—	Supported
FINISAR-SR – FTLX8574D3BCL	Supported	Supported	—	Supported
FINISAR-FTL4C1QL2L	Supported	—	—	—
FINISAR-FTL4C1QE1C	Supported	—	—	—
GLC-BX-D	Supported	Supported	Supported	Supported
GLC-BX-U	Supported	Supported	Supported	Supported
GLC-EX-SMD	Supported	Supported	—	—
GLC-LH-SMD	Supported	Supported	Supported	—
GLC-SX-MMD	Supported	Supported	Supported	Supported
GLC-T	Supported	—	Supported	—

SFP Name	C9800-80-K9	C9800-40-K9	C9800-L-C-K9	C9800-L-F-K9
GLC-TE	Supported	Supported	Supported	Supported
GLC-ZX-SMD	Supported	Supported	Supported	Supported
QSFP-100G-LR4-S	Supported	—	—	—
QSFP-100G-SR4-S	Supported	—	—	—
QSFP-40G-BD-RX	Supported	—	—	—
QSFP-40G-CSR-S	Supported	—	—	—
QSFP-40G-ER4	Supported	—	—	—
QSFP-40G-LR4	Supported	—	—	—
QSFP-40G-LR4-S	Supported	—	—	—
QSFP-40G-SR-BD	Supported	—	—	—
QSFP-40G-SR4	Supported	—	—	—
QSFP-40G-SR4-S	Supported	—	—	—
QSFP-40GE-LR4	Supported	—	—	—
QSFP-H40G-ACU7M	Supported	—	—	—
SFP-10G-AOC10M	Supported	Supported	—	—
SFP-10G-AOC1M	Supported	Supported	—	—
SFP-10G-AOC2M	Supported	Supported	—	—
SFP-10G-AOC3M	Supported	Supported	—	—
SFP-10G-AOC5M	Supported	Supported	—	—
SFP-10G-AOC7M	Supported	Supported	—	—
SFP-10G-ER	Supported	Supported	—	—
SFP-10G-LR	Supported	Supported	—	Supported
SFP-10G-LR-S	Supported	Supported	—	Supported
SFP-10G-LR-X	Supported	Supported	—	Supported
SFP-10G-LRM	Supported	Supported	—	Supported
SFP-10G-SR	Supported	Supported	—	Supported
SFP-10G-SR-S	Supported	Supported	—	Supported
SFP-10G-SR-X	Supported	Supported	—	Supported

SFP Name	C9800-80-K9	C9800-40-K9	C9800-L-C-K9	C9800-L-F-K9
SFP-10G-ZR	Supported	Supported	—	—
SFP-H10GB-ACU10M	Supported	Supported	—	Supported
SFP-H10GB-ACU7M	Supported	Supported	—	Supported
SFP-H10GB-CU1.5M	Supported	Supported	—	Supported
SFP-H10GB-CU1M	Supported	Supported	—	Supported
SFP-H10GB-CU2.5M	Supported	Supported	—	Supported
SFP-H10GB-CU2M	Supported	Supported	—	Supported
SFP-H10GB-CU3M	Supported	Supported	—	Supported
SFP-H10GB-CU5M	Supported	Supported	—	Supported

[1] The FINISAR SFPs are not Cisco specific and some of the features, such as DOM, may not work properly.

Optics Modules

The Cisco Catalyst 9800 Series Wireless Controller supports a wide range of optics. The list of supported optics is updated on a regular basis. See the tables at the following location for the latest transceiver module compatibility information:

https://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-device-support-tables-list.html

Network Protocols and Port Matrix

Table 7: Cisco Catalyst 9800 Series Wireless Controller - Network Protocols and Port Matrix

Source	Destination	Protocol	Destination Port	Source Port	Description
Any	Cisco Catalyst 9800 Series Wireless Controller	TCP	22	Any	SSH
Any	Cisco Catalyst 9800 Series Wireless Controller	TCP	23	Any	Telnet

Source	Destination	Protocol	Destination Port	Source Port	Description
Any	Cisco Catalyst 9800 Series Wireless Controller	TCP	80	Any	HTTP
Any	Cisco Catalyst 9800 Series Wireless Controller	TCP	443	Any	HTTPS
Any	Cisco Catalyst 9800 Series Wireless Controller	UDP	161	Any	SNMP Agent
Any	Any	UDP	5353	5353	mDNS
Any	Cisco Catalyst 9800 Series Wireless Controller	UDP	69	69	TFTP
Any	DNS Server	UDP	53	Any	DNS
Any	Cisco Catalyst 9800 Series Wireless Controller	TCP	830	Any	NetConf
Any	Cisco Catalyst 9800 Series Wireless Controller	TCP	443	Any	REST API
Any	WLC Protocol	UDP	1700	Any	Receive CoA packets.
AP	Cisco Catalyst 9800 Series Wireless Controller	UDP	5246	Any	CAPWAP Control
AP	Cisco Catalyst 9800 Series Wireless Controller	UDP	5247	Any	CAPWAP Data
AP	Cisco Catalyst 9800 Series Wireless Controller	UDP	5248	Any	CAPWAP MCAST

Source	Destination	Protocol	Destination Port	Source Port	Description
AP	Cisco Catalyst Center	TCP	32626	Any	Intelligent capture and RF telemetry
AP	AP	UDP	16670	Any	Client Policies (AP-AP)
Cisco Catalyst 9800 Series Wireless Controller	Cisco Catalyst 9800 Series Wireless Controller	UDP	16666	16666	Mobility Control
Cisco Catalyst 9800 Series Wireless Controller	SNMP	UDP	162	Any	SNMP Trap
Cisco Catalyst 9800 Series Wireless Controller	RADIUS	UDP	1812/1645	Any	RADIUS Auth
Cisco Catalyst 9800 Series Wireless Controller	RADIUS	UDP	1813/1646	Any	RADIUS ACCT
Cisco Catalyst 9800 Series Wireless Controller	TACACS+	TCP	49	Any	TACACS+
Cisco Catalyst 9800 Series Wireless Controller	Cisco Catalyst 9800 Series Wireless Controller	UDP	16667	16667	Mobility
Cisco Catalyst 9800 Series Wireless Controller	NTP Server	UDP	123	Any	NTP
Cisco Catalyst 9800 Series Wireless Controller	Syslog Server	UDP	514	Any	SYSLOG
AP	Cisco Catalyst 9800 Series Wireless Controller	HTTPS	8443	Any	Out of Band AP Image Download Cisco CleanAir Spectral Capture

Source	Destination	Protocol	Destination Port	Source Port	Description
Cisco Catalyst 9800 Series Wireless Controller	NetFlow Server	UDP	9996	Any	NetFlow
Cisco Catalyst 9800 Series Wireless Controller	Cisco Connected Mobile Experiences (CMX)	UDP	16113	Any	NMSP
Cisco Catalyst Center	Cisco Catalyst 9800 Series Wireless Controller	TCP	32222	Any	Device Discovery
Cisco Catalyst Center	Cisco Catalyst 9800 Series Wireless Controller	TCP	25103	Any	Telemetry Subscriptions

Supported APs

The following Cisco APs are supported in this release.

Indoor Access Points

- Cisco Catalyst 9105AX (I/W) Access Points
- Cisco Catalyst 9115AX (I/E) Access Points
- Cisco Catalyst 9117AX (I) Access Points
- Cisco Catalyst 9120AX (I/E/P) Access Points
- Cisco Catalyst 9130AX (I/E) Access Points
- Cisco Catalyst 9136 (I) Access Points
- Cisco Catalyst 9162 (I) Series Access Points
- Cisco Catalyst 9164 (I) Series Access Points
- Cisco Catalyst 9166 (I) Series Access Points
- Cisco Aironet 1815 (I/W), 1830 (I), 1840 (I), and 1850 (I/E) Access Points
- Cisco Aironet 2800 (I/E) Series Access Points
- Cisco Aironet 3800 (I/E/P) Series Access Points
- Cisco Aironet 4800 Series Access Points

Outdoor Access Points

- Cisco Aironet 1540 Series Access Points
- Cisco Aironet 1560 Series Access Points
- Cisco Catalyst Industrial Wireless 6300 Heavy Duty Series Access Point
- Cisco 6300 Series Embedded Services Access Point
- Cisco Catalyst 9124AX (I/D/E) Access Points
- Cisco Catalyst Industrial Wireless 9167 (E) Heavy Duty Access Point

Integrated Access Points

- Integrated Access Point on Cisco 1100 ISR (ISR-AP1100AC-x, ISR-AP1101AC-x, and ISR-AP1101AX-x)

Network Sensor

- Cisco Aironet 1800s Active Sensor

Pluggable Modules

- Wi-Fi 6 Pluggable Module for Industrial Routers

Supported Access Point Channels and Maximum Power Settings

Supported access point channels and maximum power settings on Cisco APs are compliant with the regulatory specifications of channels, maximum power levels, and antenna gains of every country in which the access points are sold. For more information about the supported access point transmission values in Cisco IOS XE software releases, see the *Detailed Channels and Maximum Power Settings* document at https://www.cisco.com/c/en/us/support/ios-nx-os-software/ios-xe-17/products-technical-reference-list.html.

For information about Cisco Wireless software releases that support specific Cisco AP modules, see the "Software Release Support for Specific Access Point Modules" section in the *Cisco Wireless Solutions Software Compatibility Matrix* document.

Compatibility Matrix

The following table provides software compatibility information. For more information, see Cisco Wireless Solutions Software Compatibility Matrix

Table 8: Compatibility Information

Cisco Catalyst 9800 Series Wireless Controller Software	Cisco Identity Services Engine	Cisco Prime Infrastructure	Cisco AireOS-IRCM Interoperability	Cisco Catalyst Center	Cisco CMX
Dublin 17.11.1	3.2 3.1 3.0 2.7 2.6 2.4 * all with latest patches	3.10.3	8.10.183.0 8.10.182.0 8.10.181.0 8.10.171.0 8.10.162.0 8.10.151.0 8.10.142.0 8.10.130.0 8.8.130.0 8.5.176.2 8.5.182.104	See Cisco Catalyst Center Compatibility Information	11.0.0 10.6.3

GUI System Requirements

The following subsections list the hardware and software required to access the Cisco Catalyst 9800 Controller GUI.

Table 9: Hardware Requirements

Processor Speed	DRAM	Number of Colors	Resolution	Font Size
233 MHz minimum[2]	512 MB[3]	256	1280 x 800 or higher	Small

[2] We recommend 1 GHz.
[3] We recommend 1-GB DRAM.

Software Requirements

Operating Systems:

- Windows 7 or later
- Mac OS X 10.11 or later

Browsers:

- Google Chrome: Version 59 or later (on Windows and Mac)
- Microsoft Edge: Version 40 or later (on Windows)
- Safari: Version 10 or later (on Mac)
- Mozilla Firefox: Version 60 or later (on Windows and Mac)

Note Firefox Version 63.x is not supported.

The controller GUI uses Virtual Terminal (VTY) lines for processing HTTP requests. At times, when multiple connections are open, the default number of VTY lines of 15 set by the device might get exhausted. Therefore, we recommend that you increase the number of VTY lines to 50.

To increase the VTY lines in a device, run the following commands in the following order:

1. **device#** configure terminal
2. **device(config)#** line vty 50

   A best practice is to configure the service tcp-keepalives to monitor the TCP connection to the device.
3. **device(config)#** service tcp-keepalives-in
4. **device(config)#** service tcp-keepalives-out

Before You Upgrade

Ensure that you familiarize yourself with the following points before proceeding with the upgrade:

- When you upgrade from Cisco IOS XE 17.9.5 or 17.12.2 to Cisco IOS XE 17.15.x, the controller WebUI does not support images greater than 1.5 GB.

  Workaround:

  - Upgrade using the CLI commands, or,
  - Upgrade to a fixed release first, and then upgrade to 17.15.x.

- When you upgrade from Cisco IOS XE Dublin 17.12.3 to 17.12.4 or Cisco IOS XE 17.15.1, the Cisco Catalyst Wi-Fi 6 APs fail to upgrade the AP image.

  Workaround:

  - Reboot the impacted APs through the power cycle.

  For more information, see CSCwm08044

Caution During controller upgrade or reboot, if route processor ports are connected to any Cisco switch, ensure that the route processor ports are not flapped (shut/no shut process). Otherwise, it may lead to a kernel crash.

- ISSU feature is supported only within and between major releases, for example, 17.3.x (within a release) and 17.3.x to 17.6.x (among major releases).
- Controller upgrade from Cisco IOS XE Bengaluru 17.3.x to Cisco IOS XE Bengaluru 17.6.x or Cisco IOS XE Cupertino 17.9.x or later using ISSU may fail if the **domain** command is configured. Ensure that you run the **no domain** command before starting an ISSU upgrade because the **domain** command has been removed from Cisco IOS XE Bengaluru 17.6.x.
- Controller upgrade from Cisco IOS XE Bengaluru 17.3.x to any release using ISSU may fail if the **snmp-server enable traps hsrp** command is configured. Ensure that you remove the **snmp-server enable traps hsrp** command from the configuration before starting an ISSU upgrade because the **snmp-server enable traps hsrp** command has been removed from Cisco IOS XE Bengaluru 17.4.x.
- Controller upgrade to Cisco IOS XE Dublin 17.12.x from any prior release using ISSU may fail if the **snmp-server enable traps license** command is configured. Ensure that you remove the **snmp-server enable traps license** command from the configuration before starting an ISSU upgrade because the **snmp-server enable traps license** command has been removed from Cisco IOS XE Dublin 17.12.x.
- Rolling AP upgrade, which is a part of the ISSU feature, is not supported for mesh APs.
- Ensure that you add Authentication and Key Management (AKM) setting when you configure WPA3. In older releases, this scenario was not mandatory which resulted in an invalid configuration. However, from 17.9 and higher releases, this invalid scenario is detected and prevented.

Cisco Wave 2 APs may get into a boot loop when upgrading software over a WAN link. For more information, see: https://www.cisco.com/c/en/us/support/docs/wireless/catalyst-9800-series-wireless-controllers/220443-how-to-avoid-boot-loop-due-to-corrupted.html.

The following Wave 1 APs are not supported from 17.4 to 17.9.2, 17.10.x, 17.11.x, 17.13.x, 17.14.x, and 17.15.x:

- **Cisco Aironet 1570 Series Access Point**
- **Cisco Aironet 1700 Series Access Point**
- **Cisco Aironet 2700 Series Access Point**
- **Cisco Aironet 3700 Series Access Point**

Note

- Support for the above APs was reintroduced from Cisco IOS XE Cupertino 17.9.3.
- Support for these APs does not extend beyond the normal product lifecycle support. Refer to the individual End-of-Support bulletins on Cisco.com.
- Feature support is on parity with the 17.3.x release. Features introduced in 17.4.1 or later are not supported on these APs in the 17.9.3 release.
- You can migrate directly to 17.9.3 from 17.3.x, where x=4c or later.

- From Cisco IOS XE Dublin 17.10.x, Key Exchange and MAC algorithms like diffie-hellman-group14-sha1, hmac-sha1, hmac-sha2-256, and hmac-sha2-512 are not supported by default and it may impact some SSH clients that only support these algorithms. If required, you can add

them manually. For information on manually adding these algorithms, see the **SSH Algorithms for Common Criteria Certification** document available at: https://www.cisco.com/c/en/us/td/docs/routers/ios/config/17-x/sec-vpn/b-security-vpn/m_sec-secure-shell-algorithm-ccc.html

- If APs fail to detect the backup image after running the **archive download-sw** command, perform the following steps:

  1. Upload the image using the **no-reload** option of the **archive download-sw** command:

     ```
     Device# archive download-sw /no-reload tftp://<tftp_server_ip>/<image_name>
     ```

  2. Restart the CAPWAP process using **capwap ap restart** command. This allows the AP to use the correct backup image after the restart (reload is not required.)

     ```
     Device# capwap ap restart
     ```

Caution The AP will lose connection to the controller during the join process. When the AP joins the new controller, it will see a new image in the backup partition. So, the AP will not download a new image from the controller.

- If the *Cisco-IOS-XE-wireless-access-point-oper* shows country operator as **ZZ**, the information is specific for countries supporting multiple regulatory domains. These records should only be accessed and referred to by such countries. For country-specific information, refer to the respective record using the country code.
- You might observe a high Confd CPU when full synchronization occurs between NETCONF datastore and Cisco IOS configuration. This behavior is normal and is triggered by the **line vty** command.
- From Cisco IOS XE Cupertino 17.7.1 onwards, for Cisco Catalyst 9800-CL Wireless Controller, ensure that you complete Resource Utilization Measurement (RUM) reporting and ensure that the ACK is made available on the product instance at least once. This is to ensure that correct and up-to-date usage information is reflected in the Cisco Smart Software Manager (CSSM).
- Fragmentation lower than 1500 is not supported for the RADIUS packets generated by wireless clients in the Gi0 (OOB) interface.
- Cisco IOS XE allows you to encrypt all the passwords used on the device. This includes user passwords and SSID passwords (PSK). For more information, see the "Password Encryption" section of the Cisco Catalyst 9800 Series Configuration Best Practices document.
- While upgrading to Cisco IOS XE 17.3.x and later releases, if the **ip http active-session-modules none** command is enabled, you will not be able to access the controller GUI using HTTPS. To access the GUI using HTTPS, run the following commands in the order specified below:

  1. **ip http session-module-list pkilist OPENRESTY_PKI**
  2. **ip http active-session-modules pkilist**

- Cisco Aironet 1815T OfficeExtend Access Point will be in local mode when connected to the controller. However, when it functions as a standalone AP, it gets converted to FlexConnect mode.
- The Cisco Catalyst 9800-L Wireless Controller may fail to respond to the BREAK signals received on its console port during boot time, preventing users from getting to the ROMMON. This problem is observed on the controllers manufactured until November 2019, with the default config-register setting of 0x2102. This problem can be avoided if you set config-register to 0x2002. This problem is fixed in

the 16.12(3r) ROMMON for Cisco Catalyst 9800-L Wireless Controller. For information about how to upgrade the ROMMON, see the Upgrading ROMMON for Cisco Catalyst 9800-L Wireless Controllers section of the Upgrading Field Programmable Hardware Devices for Cisco Catalyst 9800 Series Wireless Controllers document.

- By default, the controller uses a TFTP block size value of 512, which is the lowest possible value. This default setting is used to ensure interoperability with legacy TFTP servers. If required, you can change the block size value to 8192 to speed up the transfer process, using the **ip tftp blocksize** command in global configuration mode.
- We recommend that you configure the **password encryption aes** and the **key config-key password-encrypt** *key* commands to encrypt your password.
- If the following error message is displayed after a reboot or system crash, we recommend that you regenerate the trustpoint certificate:

  ```
  ERR_SSL_VERSION_OR_CIPHER_MISMATCH
  ```

  Use the following commands in the order specified below to generate a new self-signed trustpoint certificate:

  1. device# **configure terminal**
  2. device(config)# **no crypto pki trustpoint** *trustpoint_name*
  3. device(config)# **no ip http server**
  4. device(config)# **no ip http secure-server**
  5. device(config)# **ip http server**
  6. device(config)# **ip http secure-server**
  7. device(config)# **ip http authentication** *local/aaa*

- Do not deploy OVA files directly to VMware ESXi 6.5. We recommend that you use an OVF tool to deploy the OVA files.
- Ensure that you remove the controller from Cisco Prime Infrastructure before disabling or enabling Netconf-YANG. Otherwise, the system may reload unexpectedly.
- Unidirectional Link Detection (UDLD) protocol is not supported.
- SIP media session snooping is not supported on FlexConnect local switching deployments.
- The Cisco Catalyst 9800 Series Wireless Controllers (C9800-CL, C9800-L, C9800-40, and C9800-80) support a maximum of 14,000 leases with internal DHCP scope.
- Configuring the mobility MAC address using the **wireless mobility mac-address** command is mandatory for both HA and 802.11r.
- If you have Cisco Catalyst 9120 (E/I/P) and Cisco Catalyst 9130 (E) APs in your network and you want to downgrade, use only Cisco IOS XE Gibraltar 16.12.1t. Do not downgrade to Cisco IOS XE Gibraltar 16.12.1s.
- The following SNMP variables are not supported:
  - CISCO-LWAPP-WLAN-MIB: cLWlanMdnsMode

- CISCO-LWAPP-AP-MIB.my: cLApDot11IfRptncPresent, cLApDot11IfDartPresent

- If you are upgrading from Cisco IOS XE Gibraltar 16.11.x or an earlier release, ensure that you unconfigure the *advipservices* boot-level licenses on both the active and standby controllers using the **no license boot level advipservices** command before the upgrade. Note that the **license boot level advipservices** command is not available in Cisco IOS XE Gibraltar 16.12.1s and 16.12.2s.
- The Cisco Catalyst 9800 Series Wireless Controller has a service port that is referred to as *GigabitEthernet 0* port.

  The following protocols and features are supported through this port:

  - Cisco Catalyst Center
  - Cisco Smart Software Manager
  - Cisco Prime Infrastructure
  - Telnet
  - Controller GUI
  - DNS
  - File transfer
  - GNMI
  - HTTP
  - HTTPS
  - LDAP
  - Licensing for Smart Licensing feature to communicate with CSSM
  - Netconf
  - NetFlow
  - NTP
  - RADIUS (including CoA)
  - Restconf
  - SNMP
  - SSH
  - SYSLOG
  - TACACS+

- During device upgrade using GUI, if a switchover occurs, the session expires and the upgrade process gets terminated. As a result, the GUI cannot display the upgrade state or status.
- From Cisco IOS XE Bengaluru 17.4.1 onwards, the telemetry solution provides a name for the receiver address instead of the IP address for telemetry data. This is an additional option. During the controller downgrade and subsequent upgrade, there is likely to be an issue—the upgrade version uses the newly

named receivers, and these are not recognized in the downgrade. The new configuration gets rejected and fails in the subsequent upgrade. Configuration loss can be avoided when the upgrade or downgrade is performed from Cisco Catalyst Center.

- From Cisco IOS XE Bengaluru 17.4.1 onwards, session timeout under the policy profile is supported.
- Communication between Cisco Catalyst 9800 Series Wireless Controller and Cisco Prime Infrastructure uses different ports:
  - All the configurations and templates available in Cisco Prime Infrastructure are pushed through SNMP and CLI, using UDP port 161.
  - Operational data for controller is obtained over SNMP, using UDP port 162.
  - AP and client operational data leverage streaming telemetry:
    - Cisco Prime Infrastructure to controller: TCP port 830 is used by Cisco Prime Infrastructure to push the telemetry configuration to the controller (using NETCONF).
    - Controller to Cisco Prime Infrastructure: TCP port 20828 is used for Cisco IOS XE 16.10.x and 16.11.x, and TCP port 20830 is used for Cisco IOS XE 16.12.x, 17.1.x and later releases.
- The Cisco Centralized Key Management (CCKM) feature was deprecated in Cisco IOS XE 17.10.x, but currently remains supported. However, support for CCKM will be removed in a future release. Therefore, we recommend that you migrate to Fast Transition (FT) with 802.1X authentication and validate the configuration with supported key caching mechanisms.
- To migrate public IP address from 16.12.x to 17.x. ensure that you configure the **service internal** command. If you do not configure the **service internal** command, the IP address does not get carried forward.
- RLAN support with Virtual Routing and Forwarding (VRF) is not available.
- When you encounter the SNMP error *SNMP_ERRORSTATUS_NOACCESS 6*, it means that the specified SNMP variable is not accessible.
- We recommend that you perform a controller reload whenever there is a change in the controller's clock time to reflect an earlier time.

Note The DTLS version (DTLSv1.0) is deprecated for Cisco Aironet 1800 based on latest security policies. Therefore, any new out-of-box deployments of Cisco Aironet 1800 APs will fail to join the controller and you will get the following error message:

```
%APMGR_TRACE_MESSAGE-3-WLC_GEN_ERR: Chassis 1 R0/2: wncd: Error in AP Join, AP <AP-name>,
mac:<MAC-address>Model AIR-AP1815W-D-K9, AP negotiated unexpected DTLS version v1.0
```

To onboard new Cisco Aironet 1800 APs and to establish a CAPWAP connection, explicitly set the DTLS version to 1.0 in the controller using the following configuration:

```
config terminal
ap dtls-version dtls_1_0
end
```

Note that setting the DTLS version to 1.0 affects all the existing AP CAPWAP connections. We recommend that you apply the configuration only during a maintenance window. After the APs download the new image and join the controller, ensure that you remove the configuration.

To upgrade the field programmable hardware devices for Cisco Catalyst 9800 Series Wireless Controllers, see *Upgrading Field Programmable Hardware Devices for Cisco Catalyst 9800 Series Wireless Controllers*.

Important Before you begin a downgrade process, you must manually remove the configurations which are applicable in the current version but not in older version. Otherwise, you might encounter an unexpected behavior.

- When you downgrade an AP from a higher version to Cisco IOS XE Amsterdam 17.3.x, the AP will not be accessible through SSH or the console due to the denial of the **enable** password, when the AP has not yet joined a controller. If the AP joins a controller, then the AP becomes accessible without any password denial.

Upgrade Path to Cisco IOS XE Dublin 17.11.x

Table 10: Upgrade Path to Cisco IOS XE Dublin 17.11.x

Current Software	Upgrade Path for Deployments with 9130 or 9124	Upgrade Path for Deployments Without 9130 or 9124
16.10.x	—[4]	Upgrade first to 16.12.5 or 17.3.x and then to 17.11.x.
16.11.x	—	Upgrade first to 16.12.5 or 17.3.x and then to 17.11.x.
16.12.x	Upgrade first to 17.3.5 or later or 17.6.x or later, and then to 17.11.x.	Upgrade first to 17.3.5 or later or 17.6.x or later, and then to 17.11.x.
17.1.x	Upgrade first to 17.3.5 or later and then to 17.11.x.	Upgrade first to 17.3.5 or later and then to 17.11.x.

Current Software	Upgrade Path for Deployments with 9130 or 9124	Upgrade Path for Deployments Without 9130 or 9124
17.2.x	Upgrade first to 17.3.5 or later and then to 17.11.x.	Upgrade first to 17.3.5 or later and then to 17.11.x.
17.3.1 to 17.3.4	Upgrade first to 17.3.5 or later or 17.6.x or later, and then to 17.11.x.	Upgrade directly to 17.11.x.
17.3.4c or later	Upgrade directly to 17.11.x.	Upgrade directly to 17.11.x.
17.4.x	Upgrade first to 17.6.x and then to 17.11.x.	Upgrade directly to 17.11.x.
17.5.x	Upgrade first to 17.6.x and then to 17.11.x.	Upgrade directly to 17.11.x.
17.6.x	Upgrade directly to 17.11.x.	Upgrade directly to 17.11.x.
17.7.x	Upgrade directly to 17.11.x.	Upgrade directly to 17.11.x.
17.8.x	Upgrade directly to 17.11.x.	Upgrade directly to 17.11.x.
17.9.x	Upgrade directly to 17.11.x	Upgrade directly to 17.11.x
17.10.x	Upgrade directly to 17.11.x	Upgrade directly to 17.11.x
8.9.x or any 8.10.x version prior to 8.10.171.0	Upgrade first to 17.3.5 or later or 17.6.x or later, and then to 17.11.x.	Upgrade directly to 17.11.x.

[4] The Cisco Catalyst 9130 and 9124 APs are not supported in 16.10.x and 16.11.x releases.

Upgrading the Controller Software

This section describes the various aspects of upgrading the controller software.

For information on the upgrade process and the methods to upgrade the Cisco Catalyst 9800 Series Wireless Controller software, see the "Upgrading the Cisco Catalyst 9800 Wireless Controller Software" chapter of the *Cisco Catalyst 9800 Series Wireless Controller Software Configuration Guide*.

Finding the Software Version

The package files for the Cisco IOS XE software are stored in the system board flash device (flash:).

Use the **show version** privileged EXEC command to see the software version that is running on your controller.

Note Although the **show version** output always shows the software image running on the controller, the model name shown at the end of the output is the factory configuration, and does not change if you upgrade the software license.

Use the **show install summary** privileged EXEC command to see the information about the active package.

Use the **dir** *filesystem:* privileged EXEC command to see the directory names of other software images that you have stored in flash memory.

Software Images

- **Release**: Cisco IOS XE Dublin 17.11.x
- **Image Names (9800-80, 9800-40, and 9800-L)**:
  - C9800-80-universalk9_wlc.17.11.x.SPA.bin
  - C9800-40-universalk9_wlc.17.11.x.SPA.bin
  - C9800-L-universalk9_wlc.17.11.x.SPA.bin
- **Image Names (9800-CL)**:
  - **Cloud**: C9800-CL-universalk9.17.11.x.SPA.bin
  - **Hyper-V/ESXi/KVM**: C9800-CL-universalk9.17.11.x.iso, C9800-CL-universalk9.17.11.x.ova
  - **KVM**: C9800-CL-universalk9.17.11.x.qcow2
  - **NFVIS**: C9800-CL-universalk9.17.11.x.tar.gz

Software Installation Commands

Cisco IOS XE Dublin 17.11.x	
To install and activate a specified file, and to commit changes to be persistent across reloads, run the following command: **device# install add file** *filename* **[activate |commit]** To separately install, activate, commit, end, or remove the installation file, run the following command: **device# install ?** **Note** We recommend that you use the GUI for installation.	
add file tftp: *filename*	Copies the install file package from a remote location to a device, and performs a compatibility check for the platform and image versions.
activateauto-abort-timer]	Activates the file and reloads the device. The **auto-abort-timer** keyword automatically rolls back image activation.
commit	Makes changes that are persistent over reloads.
rollback to committed	Rolls back the update to the last committed version.
abort	Cancels file activation, and rolls back to the version that was running before the current installation procedure started.
remove	Deletes all unused and inactive software installation files.

Licensing

The Smart Licensing Using Policy feature is automatically enabled on the controller. This is also the case when you upgrade to this release. By default, your Smart Account and Virtual Account in Cisco Smart Software Manager (CSSM) are enabled for Smart Licensing Using Policy. For more information, see Smart Licensing Using Policy.

For a more detailed overview on Cisco Licensing, see cisco.com/go/licensingguide.

Interoperability with Clients

This section describes the interoperability of the controller software with client devices.

The following table lists the configurations used for testing client devices.

Table 11: Test Configuration for Interoperability

Hardware or Software Parameter	Hardware or Software Type
Release	Cisco IOS XE Dublin 17.11.x
Cisco Wireless Controller	See Supported Hardware, on page 9.
Access Points	See Supported APs, on page 16
Radio	• 802.11ax • 802.11ac • 802.11a • 802.11g • 802.11n • 802.11ax in 6GHz (Wi-Fi 6E)
Security	Open, PSK (WPA2-AES), 802.1X (WPA2-AES) (EAP-FAST, EAP-TLS) WPA3 AKM 802.11ax
RADIUS	See Compatibility Matrix, on page 17.
Types of tests	Connectivity, traffic (ICMP), and roaming between two APs

The following table lists the client types on which the tests were conducted. Client types included laptops, hand-held devices, phones, and printers.

Table 12: Client Types

Client Type and Name	Driver or Software Version
Laptops	
Acer Aspire E 15 E5-573-3870 (Qualcomm Atheros QCA9377)	Windows 10 Pro (12.0.0.832)
Apple Macbook Air 11 inch	macOS Sierra 10.12.6
Apple Macbook Air 13 inch	macOS High Sierra 10.13.4
Macbook Pro Retina	macOS Catalina
Macbook Pro Retina 13 inch early 2015	macOS Mojave 10.14.3
Macbook Pro OS X	macOS X 10.8.5
Macbook Air	macOS Sierra v10.12.2
Macbook Air 11 inch	macOS Yosemite 10.10.5
MacBook M1 Chip	macOS Catalina
MacBook M1 Chip	macOS Ventura 13.2.1
MacBook Pro M2 Chip	macOS Ventura 13.3 beta
MacBook Pro M2 Chip	macOS Ventura 13.1
Dell Inspiron 2020 Chromebook	Chrome OS 75.0.3770.129
Google Pixelbook Go	Chrome OS 97.0.4692.27
HP chromebook 11a	Chrome OS 76.0.3809.136
Samsung Chromebook 4+	Chrome OS 77.0.3865.105
Dell Latitude (Intel AX210)	Windows 11 (22.110.x.x)
Dell Latitude 3480 (Qualcomm DELL wireless 1820)	Win 10 Pro (12.0.0.242)
Dell Inspiron 15-7569 (Intel Dual Band Wireless-AC 3165)	Windows 10 Home (21.40.0)
Dell Latitude E5540 (Intel Dual Band Wireless AC7260)	Windows 7 Professional (21.10.1)
Dell Latitude E5430 (Intel Centrino Advanced-N 6205)	Windows 7 Professional (15.18.0.1)
Dell Latitude E6840 (Broadcom Dell Wireless 1540 802.11 a/g/n)	Windows 7 Professional (6.30.223.215)
Dell XPS 12 v9250 (Intel Dual Band Wireless AC 8260)	Windows 10 Home (21.40.0)
Dell Latitude 5491 (Intel AX200)	Windows 10 Pro (21.20.1.1)

Client Type and Name	Driver or Software Version
Dell XPS Latitude12 9250 (Intel Dual Band Wireless AC 8260)	Windows 10 Home
Dell Inspiron 13-5368 Signature Edition	Windows 10 Home (18.40.0.12)
FUJITSU Lifebook E556 Intel 8260 (Intel Dual Band Wireless-AC 8260 (802.11n))	Windows 8 (19.50.1.6)
Lenovo Yoga C630 Snapdragon 850 (Qualcomm AC 2x2 Svc)	Windows 10 Home
Lenovo Thinkpad Yoga 460 (Intel Dual Band Wireless-AC 9260)	Windows 10 Pro (21.40.0)
Note For clients using Intel wireless cards, we recommend that you to update to the latest Intel wireless drivers if the advertised SSIDs are not visible.	
Tablets	
Apple iPad Pro (12.9 inch) 6th Gen	iOS 16.4
Apple iPad Pro (11 inch) 4th Gen	iOS 16.4
Apple iPad 2021	iOS 15.0
Apple iPad 7the Gen 2019	iOS 14.0
Apple iPad MD328LL/A	iOS 9.3.5
Apple iPad 2 MC979LL/A	iOS 11.4.1
Apple iPad Air MD785LL/A	iOS 11.4.1
Apple iPad Air2 MGLW2LL/A	iOS 10.2.1
Apple iPad Mini 4 9.0.1 MK872LL/A	iOS 11.4.1
Apple iPad Mini 2 ME279LL/A	iOS 11.4.1
Apple iPad Mini 4 9.0.1 MK872LL/A	iOS 11.4.1
Microsoft Surface Pro 3 13 inch (Intel AX201)	Windows 10 (21.40.1.3)
Microsoft Surface Pro 3 15 inch (Qualcomm Atheros QCA61x4A)	Windows 10
Microsoft Surface Pro 7 (Intel AX201)	Windows 10
Microsoft Surface Pro 6 (Marvell Wi-Fi chipset 11ac)	Windows 10
Microsoft Surface Pro X (WCN3998 Wi-Fi Chip)	Windows
Mobile Phones	
Apple iPhone 5	iOS 12.4.1
Apple iPhone 6s	iOS 13.5

Client Type and Name	Driver or Software Version
Apple iPhone 7 MN8J2LL/A	iOS 11.2.5
Apple iPhone 8	iOS 13.5
Apple iPhone 8 Plus	iOS 14.1
Apple iPhone 8 Plus MQ8D2LL/A	iOS 12.4.1
Apple iPhone X MQA52LL/A	iOS 13.1
Apple iPhone 11	iOS 15.1
Apple iPhone 12	iOS 16.0
Apple iPhone 12 Pro	iOS 15.1
Apple iPhone 13	iOS 15.1
Apple iPhone 13 Mini	iOS 15.1
Apple iPhone 13 Pro	iOS 15.1
Apple iPhone SE MLY12LL/A	iOS 11.3
Apple iPhone SE	iOS 15.1
ASCOM i63	Build v 3.0.0
ASCOM Myco 3	Android 9
Cisco IP Phone 8821	11.0.6 SR4
Drager Delta	VG9.0.2
Drager M300.3	VG3.0
Drager M300.4	VG3.0
Drager M540	VG4.2
Google Pixel 3a	Android 11
Google Pixel 4	Android 11
Google Pixel 5	Android 11
Google Pixel 6	Android 12
Google Pixel 7	Android 13
Huawei Mate 20 pro	Android 9.0
Huawei P20 Pro	Android 10
Huawei P40	Android 10
LG v40 ThinQ	Android 9.0
One Plus 8	Android 11
Oppo Find X2	Android 10

Client Type and Name	Driver or Software Version
Redmi K20 Pro	Android 10
Samsung Galaxy S9+ - G965U1	Android 10.0
Samsung Galaxy S10 Plus	Android 11.0
Samsung S10 (SM-G973U1)	Android 11.0
Samsung S10e (SM-G970U1)	Android 11.0
Samsung Galaxy S20 Ultra	Android 10.0
Samsung Galaxy S21 Ultra 5G	Android 13.0
Samsung Galaxy S22 Ultra	Android 13.0
Samsung Fold 2	Android 10.0
Samsung Galaxy Z Fold 3	Android 13.0
Samsung Note20	Android 12.0
Samsung G Note 10 Plus	Android 11.0
Samsung Galaxy A01	Android 11.0
Samsung Galaxy A21	Android 10.0
Sony Experia 1 ii	Android 11
Sony Experia	Android 11
Xiaomi Mi 9T	Android 9
Xiaomi Mi 10	Android 11
Spectralink 84 Series	7.5.0.x257
Spectralink 87 Series	Android 5.1.1
Spectralink Versity Phones 92/95/96 Series	Android 10.0
Spectralink Versity Phones 9540 Series	Android 8.1.0
Vocera Badges B3000n	4.3.3.18
Vocera Smart Badges V5000	5.0.6.35
Zebra MC40	Android 4.4.4
Zebra MC40N0	Android 4.1.1
Zebra MC92N0	Android 4.4.4
Zebra MC9090	Windows Mobile 6.1
Zebra MC55A	Windows 6.5

Client Type and Name	Driver or Software Version
Zebra MC75A	OEM ver 02.37.0001
Zebra TC51	Android 6.0.1
Zebra TC52	Android 10.0
Zebra TC55	Android 8.1.0
Zebra TC57	Android 10.0
Zebra TC58	Android 11.0
Zebra TC70	Android 6.1
Zebra TC75	Android 10.0
Zebra TC520K	Android 10.0
Zebra TC8000	Android 4.4.3
Printers	
Zebra QLn320 Mobile Printer	LINK OS 5.2
Zebra ZT230 IndustrialPrinter	LINK OS 6.4
Zebra ZQ310 Mobile Printer	LINK OS 6.4
Zebra ZD410 Industrial Printer	LINK OS 6.4
Zebra ZT410 Desktop Printer	LINK OS 6.2
Zebra ZQ610 Industrial Printer	LINK OS 6.4
Zebra ZQ620 Mobile Printer	LINK OS 6.4
Wireless Module	
Intel AX 411	Driver v22.230.0.8
Intel AX 211	Driver v22.230.0.8, v22.190.0.4
Intel AX 210	Driver v22.230.0.8, v22.190.0.4, v22.170.2.1
Intel AX 200	Driver v22.130.0.5
Intel 11AC	Driver v22.30.0.11
Intel AC 9260	Driver v21.40.0
Intel Dual Band Wireless AC 8260	Driver v19.50.1.6
Samsung S21 Ultra	Driver v20.80.80
QCA WCN6855	Driver v1.0.0.901
PhoenixContact FL WLAN 2010	Firmware version: 2.71

Issues

Issues describe unexpected behavior in Cisco IOS releases in a product. Issues that are listed as Open in a prior release are carried forward to the next release as either Open or Resolved.

Note All incremental releases contain fixes from the current release.

Cisco Bug Search Tool

The Cisco Bug Search Tool (BST) allows partners and customers to search for software bugs based on product, release, and keyword, and aggregates key data such as bug details, product, and version. The BST is designed to improve the effectiveness in network risk management and device troubleshooting. The tool has a provision to filter bugs based on credentials to provide external and internal bug views for the search input.

To view the details of an issue, click the corresponding identifier.

Open Caveats for Cisco IOS XE Dublin 17.11.1

Identifier	Headline
CSCwe38431	Controller is remarking SIP packets from CS3 to CS0 in upstream/downstream when voice cac is configured.
CSCwd96484	Controller is relaoding unexpectedly and regularly generates "wncd" core files.
CSCwe22861	AID leak is observed in Flex Cisco Wave 2 APs.
CSCwe31030	Cisco Catalyst 9105AXW AP: Kernel panic crash is observed.
CSCwe62694	EVENTLIB-3-CPUHOG Traceback is observed.
CSCwd78616	Cisco Catalyst AP9115 Tx power high and abnormal DCA channel assignment due to no neighbors.
CSCwe11747	Cisco Catalyst AX APs are decoding EAP request ID incorrectly.
CSCwe30473	Radio firmware reloads unexpectedly due to a frozen RC queue.
CSCwe49267	Controller is not sending GTK M5 packet to 8821 after FT roaming between wncds.
CSCwe44991	Cisco Catalyst 9105AX AP: Kernel crash is observed.
CSCwe54575	Dell Latitude 5531 Laptops (Wi-Fi 6) are not able to connect.
CSCwd90742	Cisco Catalyst 9120AX AP: Kernel crash is observed.
CSCwe45894	AP is not forwarding IGMPv3 query to wireless clients.
CSCwe54482	Cisco Catalyst 9120 AP is dropping DHCP offer in click. Not forwarding to wireless interface.

Identifier	Headline
CSCwe32005	Cisco Catalyst 9130 AP: Packet loss is observed on Digital Signage device.
CSCwe18012	Crash is observed on standby controller while saving tbl QoS table to standby.
CSCwe45970	Cisco Catalyst 9105 AP is stuck in UBOOT.
CSCwe43294	Cisco Catalyst 9105AXW and Cisco Aironet 1815W: Flex RLAN AP does not apply VLAN in the Ethernet port after AAA VLAN override.
CSCwe45300	Cisco Catalyst 9120 AP: Sending Msg:2 in mode:2 to hostapd failed.
CSCwe50033	Cisco Catalyst 9120AX AP: Clients continuously disconnecting with more than 10 clients using MS TEAMS.
CSCwe61597	One of the WNCD is stuck in 100% high CPU.
CSCwe55390	Cisco Aironet 3802AP buffering UP6/voice traffic~500ms after Spectralinkphone roam causing audioissues.
CSCwe44216	Cisco AP reloads unexpectedly due to kernel panic.
CSCwm95849	Cisco Catalyst 9136 AP does not receive the 6e SSID

Resolved Caveats for Cisco IOS XE Dublin 17.11.1

Identifier	Headline
CSCwa79968	SNMP MIB is not returning all data or no data at all for SNMP walk with high client count.
CSCwb19227	Interim update is not sent to AAA during client reassociation/roam in GA.
CSCwb37457	Standby controller crashes when controller is configured in RMI+RP HA mode with wired guest feature.
CSCwb43548	Disable ip proxy-arp command by default.
CSCwb47040	Controller is not updating RFID location properly.
CSCwb52755	Fast Transition capable Apple and Android clients are unable to authenticate with IPSK profile.
CSCwb58100	Controller is unable to map SSID with spaces in it on an attribute list.
CSCwb64761	Controller is discarding location updates from RFID tags.
CSCwb66603	CAPWAPAC_SMGR_TRACE_MESSAGE_AP_JOIN_DISJOIN does not have detail information about AP-NAME.
CSCwb67450	The **show process cpu platform sorted** command is needed in **show tech wireless** command output.

Identifier	Headline
CSCwb69343	6-GHz channels being listed as 2.4 when executing **show ap wlan summary** command.
CSCwb69531	Controller initiates EAPOL reties for the client in RUN state.
CSCwb78191	AAA VLAN override is not taken when iPSK authentication and anchor WLAN.
CSCwb84621	The PSK keys are getting changed while doing edit on pure WPA3 SAE WLAN leading to client connectivty faliure.
CSCwb91373	Cisco DNA Centre-Assurance-Duplicate Events: AP is connected to controller and the CAPWAP channel is up
CSCwb93067	Cisco Catalyst 9800-CL Wireless Controller: Wcnd crash is observed during SISF routines.
CSCwb93513	Stale client entries are not deleted and is stuck on device-tracking database.
CSCwc01644	COS APs are using native VLAN instead of the VLAN specified in the policy profile.
CSCwc04197	Secondary controller crash is observed during redundancy switchover.
CSCwc04328	6-GHz RRM : Channel-aware TPC is always on for 6-GHz TPC.
CSCwc05366	Wireless AAA Dyn VLAN Assignment - wir clients cannot reach each other
CSCwc06408	Creating SNMPv3 user from the user group created through GUI doesn't accept the configured user group.
CSCwc14629	Controller GUI is taking long time to show initial page due to http request wirelessDeviceSummary.
CSCwc15533	Continuous wncmgrd CPUHOG traceback with scale Flexible NetFlow (FNF) mapping to policy profile results in 100% wncd utilization.
CSCwc15944	Multicast data is not sent to clients; some APs are unable to join.
CSCwc17774	Few OIDs under CISCO-ENHANCED-MEMPOOL-MIB shows no instance after switchover.
CSCwc22468	Client traffic fails when client roams between access points with a transition between dot11r and dot11i.
CSCwc26105	High Availability split brain is observed due to multiple secondary addresses in the interface.
CSCwc26819	Controller does not send LLC or XID spoofed frames after a mobility event.
CSCwc28408	Controller crashes intermittently due to wncd critical process failure.
CSCwc31759	Adding policy tag is not allowed in WLAN page even though it meets 32 character.
CSCwc32226	Zebra RF guns gets deleted from controller randomly due to reason: CO_CLIENT_DELETE_REASON_ZONE_CHANGE.

Identifier	Headline
CSCwc36125	Radio Resource Management (RRM) startup mode gets triggered on every reboot as the controller does not keep track of the last state.
CSCwc36910	cEdge device pushes wrong (typo) syntax as "config wlan broadcase-ssid disable 2".
CSCwc38828	Invalid TDL pointers cause wncd crash.
CSCwc41358	MAC filtering: WLAN profile column displays the WLAN name + description.
CSCwc41903	Syslog "LISP RELIABLE REGISTRATION" needs to be enhanced.
CSCwc42784	Client fails to connect when protocol based QoS is configured.
CSCwc45018	Unable to add RADIUS server group if server name includes special character '&'.
CSCwc51857	Controller GUI is displaying 802.1x with a lowercase 'x' instead of 802.1X with a capital 'X'.
CSCwc55982	Observed stale entry in the output of the show wireless device tracking database ip command after client deletion.
CSCwc57227	Controller experiences an unexpected reset resulting in a system report containing a wncd core file.
CSCwc57836	Restore configuration by HTTP mode does not work in EWC.
CSCwc59518	Cisco Catalyst 9800-80 Series Controller crashes with reason critical process wncd fault.
CSCwc62824	Controller is not sending LLC or XID spoofed frames after a mobility event.
CSCwc69815	Cisco Catalyst 9300 switch interface generates RUM reports every 8 hours when AIR controller licenses are handled incorrectly.
CSCwc72047	Access Points operate in disabled RF profile channels.
CSCwc76905	Switch Integrated Security Features (SISF) crash is observed when handling the DHCP messages.
CSCwc86955	Dual DFS stats on AP do not match controller information.
CSCwd00711	WPA3, OWE transition enabled: Non-WPA3 clients are getting network access in webauth-pending state.
CSCwd00979	The output of the **show wlan all** command has incorrect WLAN radio policy information.
CSCwd06018	802.11r re-auth failed due to invalid Pairwise Master Key ID (PMKID) while doing inter-WNCD roaming.
CSCwd08678	The "Re-Authentication Timeout" is seen stuck as "Timer not running" and the client remains in RUN state after session timeout.

Identifier	Headline
CSCwd16409	User-agent details needs to be truncated to string length 234 in WSA to prevent vstring corruption.
CSCwd17349	Active chassis might get stuck during the SSO failover.

Troubleshooting

For the most up-to-date, detailed troubleshooting information, see Troubleshooting TechNotes.

Related Documentation

- Information about Cisco IOS XE
- Cisco Validated Design documents
- MIB Locator to locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets

Cisco Wireless Controller

For more information about the Cisco wireless controller, lightweight APs, and mesh APs, see these documents:

- Cisco Wireless Solutions Software Compatibility Matrix
- Cisco Catalyst 9800 Series Wireless Controller Software Configuration Guide
- Cisco Catalyst 9800 Series Wireless Controller Command Reference
- Cisco Catalyst 9800 Series Configuration Best Practices
- In-Service Software Upgrade Matrix
- Upgrading Field Programmable Hardware Devices for Cisco Catalyst 9800 Series Wireless Controllers

The installation guide for your controller is available at:

- Hardware Installation Guides

All Cisco Wireless Controller software-related documentation

Cisco Catalyst 9800 Series Wireless Controller Data Sheets

- *Cisco Catalyst 9800-CL Wireless Controller for Cloud Data Sheet*
- *Cisco Catalyst 9800-80 Wireless Controller Data Sheet*
- *Cisco Catalyst 9800-40 Wireless Controller Data Sheet*
- *Cisco Catalyst 9800-L Wireless Controller Data Sheet*

Cisco Embedded Wireless Controller on Catalyst Access Points

For more information about the Cisco Embedded Wireless Controller on Catalyst Access Points, see:

https://www.cisco.com/c/en/us/support/wireless/embedded-wireless-controller-catalyst-access-points/tsd-products-support-series-home.html

Wireless Product Comparison

- Compare specifications of Cisco wireless APs and controllers
- Wireless LAN Compliance Lookup
- Cisco AireOS to Cisco Catalyst 9800 Wireless Controller Feature Comparison Matrix

Cisco Access Points–Statement of Volatility

The STATEMENT OF VOLATILITY is an engineering document that provides information about the device, the location of its memory components, and the methods for clearing device memory. Refer to the data security policies and practices of your organization and take the necessary steps required to protect your devices or network environment.

The Cisco Aironet and Catalyst AP Statement of Volatility (SoV) documents are available on the Cisco Trust Portal.

You can search by the AP model to view the SoV document.

Cisco Prime Infrastructure

Cisco Prime Infrastructure Documentation

Cisco Connected Mobile Experiences

Cisco Connected Mobile Experiences Documentation

Cisco Catalyst Center

Cisco Catalyst Center Documentation

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Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a gateway to the Cisco bug-tracking system, which maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. The BST provides you with detailed defect information about your products and software.

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