Release Notes for Cisco Embedded Wireless Controller on Catalyst Access Points, Cisco IOS XE 17.2.x

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Introduction to Cisco Embedded Wireless Controller on Catalyst Access Points

The Cisco Embedded Wireless Controller on Catalyst Access Points is a version of the Cisco IOS XE-based controller software on Catalyst access points. In this solution, a Catalyst access point (AP) that is running the Cisco Embedded Wireless Controller on Catalyst Access Points software, is designated as the primary AP. Other APs, referred to as subordinate APs, associate to this primary AP.

The Cisco Embedded Wireless Controller on Catalyst Access Points provides enterprise-level WLAN features while maintaining operational simplicity and affordability. This solution is targeted at small and medium-sized business (SMB) customers or distributed enterprises, and can be run at single site deployments.

- The controllers come with high availability (HA) and seamless software updates. This keeps your services on always, both during planned and unplanned events.
- The deployment can be managed using a mobile application, Cisco Digital Network Architecture (DNA) Center, Netconf/Restconf, web-based GUI, or CLI.

What's New in Cisco IOS XE Amsterdam 17.2.1a

There are no new features or enhancements in this release.

What's New in Cisco IOS XE Amsterdam 17.2.1

This section provides information about the new features and enhancements in this release.

Cisco Workgroup Bridges Client Support: A workgroup bridge (WGB) is a mode that can be configured on Cisco Wave 2 APs such as Cisco Aironet 2800 Series APs, Cisco Aironet 3800 Series APs, and Cisco Aironet 1560 Series APs, to provide wireless connectivity to a lightweight AP on behalf of clients that are connected by Ethernet to the WGB access point.

Flexible NetFlow Exporter Support: Flexible Netflow (FnF) Exporter is supported on Embedded Wireless Controller.

Web UI features:

WLAN Web UI Simplification: From Cisco IOS XE Amsterdam 17.2.1 onwards, the Web UI for WLAN creation is simplified. Only mandatory attributes are displayed under the **Basic Wireless Setup**. The association of the AAA server per WLAN also has been simplified.

New and Modified Commands

The following commands are introduced in the Embedded Wireless Controller, in this release:

Configuration Commands:

- **ccx aironet-iesupport**
- **exporter default-flow-exporter**
- **flow exporter** *flow-export-name*
- **flow monitor** *monitor-name*
- **ipv4 flow monitor** *monitor-name* **input**
- **ipv4 flow monitor** *monitor-name* **output**
- **ipv6 flow monitor** *monitor-name* **input**
- **ipv6 flow monitor** *monitor-name* **output**
- **record wireless avc basic**
- **transport udp** *port-value*

Show Commands:

- **show platform software wlavc status cp-exporter**
- **show wireless wgb client mac-address** *MAC-address* **detail**
- **show wireless wgb mac-address** *MAC-address* **detail**
- **show wireless wgb summary**

Behavior Change

- **SMU: AP Service Pack** APSP is not supported in Cisco IOS XE Amsterdam 17.2.1.

Supported Cisco Access Point Platforms

The following Cisco access points are supported in the Cisco Embedded Wireless Controller on Catalyst Access Points network. Note that the APs listed as primary APs can also function as subordinate APs.

Table 1: Cisco APs Supported in Cisco Embedded Wireless Controller on Catalyst Access Points

Primary AP	Subordinate AP
Cisco Catalyst 9115 Series Cisco Catalyst 9117 Series Cisco Catalyst 9120 Series Cisco Catalyst 9130 Series	Cisco Aironet 1540 Series Cisco Aironet 1560 Series Cisco Aironet 1815i Cisco Aironet 1815w Cisco Aironet 1830 Series Cisco Aironet 1840 Series Cisco Aironet 1850 Series Cisco Aironet 2800 Series Cisco Aironet 3800 Series Cisco Aironet 4800 Series Cisco Catalyst 9115 Series Cisco Catalyst 9117 Series Cisco Catalyst 9120 Series Cisco Catalyst 9130 Series

Table 2: Image Types and Supported APs in Cisco Embedded Wireless Controller on Catalyst Access Points

Image Type	Supported APs
ap1g4	Cisco Aironet 1810 Series Cisco Aironet 1830 Series Cisco Aironet 1850 Series
ap1g5	Cisco Aironet 1815i Cisco Aironet 1815w Cisco Aironet 1540 Series Cisco Aironet 1840 Series
ap1g6	Cisco Catalyst 9117 Series
ap1g6a	Cisco Catalyst 9130 Series
ap1g7	Cisco Catalyst 9115 Series Cisco Catalyst 9120 Series

Image Type	Supported APs
ap3g3	Cisco Aironet 2800 Series Cisco Aironet 3800 Series Cisco Aironet 4800 Series Cisco Aironet 1560 Series

Maximum APs and Clients Supported

Table 3: Scale Supported in Cisco EWC Network

Primary AP Model	Maximum APs Supported	Maximum Clients Supported
Cisco Catalyst 9105 AWI	50	1000
Cisco Catalyst 9115 Series	50	1000
Cisco Catalyst 9117 Series	50	1000
Cisco Catalyst 9120 Series	100	2000
Cisco Catalyst 9130 Series	100	2000

Note If 25 to 100 APs have joined the EWC network, the maximum clients on the EWC internal AP is limited to 20.

Compatibility Matrix

The following table provides software compatibility information:

Table 4: Compatibility Information

Cisco Embedded Wireless Controller on Catalyst Access Points	Cisco ISE	Cisco CMX	Cisco DNA Center
Amsterdam 17.2.1a Amsterdam 17.2.1	2.6 2.4 2.3	10.6.2 10.6 10.5.1	1.3.3.0

Supported Browsers and Operating Systems for Web UI

Note The following list of Supported Browsers and Operating Systems is not comprehensive at the time of writing this document and the behavior of various browser for accessing the GUI of the EWC is as listed below.

Table 5: Supported Browsers and Operating Systems

Browser	Version	Operating System	Status	Workaround
Google Chrome	77.0.3865.120	macOS Mojave Version 10.14.6	Works	Proceed through the browser warning.
Safari	13.0.2 (14608.2.40.1.3)	macOS Mojave Version 10.14.6	Works	Proceed through the browser warning.
Mozilla Firefox	69.0.1	macOS Mojave Version 10.14.6	Works only if exception is added.	Set the exception.
Mozilla Firefox	69.0.3	macOS Mojave Version 10.14.6	Works only if exception is added.	Set the exception.
Google Chrome	77.0.3865.90	Windows 10 Version 1903 (OS Build 18362.267)	Works	Proceed through the browser warning.
Microsoft Edge	44.18362.267.0	Windows 10 Version 1903 (OS Build 18362.267)	Works	Proceed through the browser warning.
Mozilla Firefox	68.0.2	Windows 10 Version 1903 (OS Build 18362.267)	Works	Proceed through the browser warning.
Mozilla Firefox	69.0.3	Windows 10 Version 1903 (OS Build 18362.267)	Works only if exception is added.	Set the exception.
Google Chrome	78.0.3904.108	macOS Catalina 10.15.1	Does not work	NA

Upgrading the Controller Software

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

Note Before converting from CAPWAP to embedded wireless controller (EWC), ensure that you upgrade the corresponding AP with the CAPWAP image in Cisco AireOS Release 8.10.105.0. If this upgrade is not performed, the conversion will fail.

Finding the Software Version

The following table lists the Cisco IOS XE 17.2.1 software for Cisco Embedded Wireless Controller on Catalyst Access Points.

Choose the appropriate AP software based on the following:

- Cisco Embedded Wireless Controller on Catalyst Access Points software to be used for converting the AP from an unified wireless network CAPWAP lightweight AP to a Cisco Embedded Wireless Controller on Catalyst Access Points-capable AP (primary AP)
- AP software image bundle to be used either for upgrading the Cisco Embedded Wireless Controller on Catalyst Access Points software on the primary AP or for updating the software on the subordinate APs or both

Prior to ordering Cisco APs, see the corresponding ordering guide for your Catalyst or Aironet access point.

Table 6: Cisco Embedded Wireless Controller on Catalyst Access Points Software

Primary AP	AP Software for Conversion from CAPWAP to Cisco EWC	AP Software Image Bundle for Upgrade	AP Software in the Bundle
Cisco Catalyst 9115 Series	C9800-AP-universalk9.17.02.01.zip	C9800-AP-universalk9.17.02.01.zip	ap1g7
Cisco Catalyst 9117 Series	C9800-AP-universalk9.17.02.01.zip	C9800-AP-universalk9.17.02.01.zip	ap1g6
Cisco Catalyst 9120 Series	C9800-AP-universalk9.17.02.01.zip	C9800-AP-universalk9.17.02.01.zip	ap1g7
Cisco Catalyst 9130 Series	C9800-AP-universalk9.17.02.01.zip	C9800-AP-universalk9.17.02.01.zip	ap1g6a

Guidelines and Restrictions

Internet Group Management Protocol (IGMP)v3 is not supported on Cisco Aironet Wave 2 APs.

Embedded Wireless Controller SNMP configuration is supported in DNAC.

High memory usage on AP running Embedded Wireless Controller. Enabling **crash kernel** on the AP consumes additional memory on the AP. Hence, if **crash kernel** is enabled, the overall memory usage of the device will increase and will impact the scale numbers. On Cisco Catalyst 9130 Series Access Points, the memory consumption is a high of 128 MB.

Interoperability with Clients

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

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

Table 7: Test Configuration for Interoperability

Hardware or Software Parameter	Hardware or Software Type
Release	Cisco IOS XE Amsterdam 17.2.1
Access Points	• Cisco Aironet Series Access Points • 1540 • 1560 • 1815i • 1815w • 1830 • 1840 • 1850 • 2800 • 3800 • 4800 • Cisco Catalyst 9115AX Access Points • Cisco Catalyst 9117AX Access Points • Cisco Catalyst 9120AX Access Points • Cisco Catalyst 9130AX Access Points
Radio	• 802.11ax • 802.11ac • 802.11a • 802.11g • 802.11n (2.4 GHz or 5 GHz)
Security	Open, PSK (WPA2-AES), 802.1X (WPA2-AES) (EAP-FAST, EAP-TLS), WPA3.
Cisco ISE	See Compatibility Matrix, on page 4.
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 8: Client Types

Client Type and Name	Driver / Software Version
Wi-Fi 6 Devices (Mobile Phone and Laptop)	
Apple iPhone 11	iOS 14.1
Apple iPhone SE 2020	iOS 14.1
Dell Intel AX1650w	Windows 10 (21.90.2.1)
DELL LATITUDE 5491 (Intel AX200)	Windows 10 Pro (21.40.2)
Samsung S20	Android 10
Samsung S10 (SM-G973U1)	Android 9.0 (One UI 1.1)
Samsung S10e (SM-G970U1)	Android 9.0 (One UI 1.1)
Samsung Galaxy S10+	Android 9.0
Samsung Galaxy Fold 2	Android 10
Samsung Galaxy Flip Z	Android 10
Samsung Note 20	Android 10
Laptops	
Acer Aspire E 15 E5-573-3870 (Qualcomm Atheros QCA9377)	Windows 10 Pro (12.0.0.832)
Apple Macbook Air 11 inch	OS Sierra 10.12.6
Apple Macbook Air 13 inch	OS Catalina 10.15.4
Apple Macbook Air 13 inch	OS High Sierra 10.13.4
Macbook Pro Retina	OS Mojave 10.14.3
Macbook Pro Retina 13 inch early 2015	OS Mojave 10.14.3
Dell Inspiron 2020 Chromebook	Chrome OS 75.0.3770.129
Google Pixelbook Go	Chrome OS 84.0.4147.136
HP chromebook 11a	Chrome OS 76.0.3809.136
Samsung Chromebook 4+	Chrome OS 77.0.3865.105
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 (18.32.0.5)
DELL Latitude E5540 (Intel Dual Band Wireless AC7260)	Windows 7 Professional (21.10.1)

Client Type and Name	Driver / Software Version
DELL XPS 12 v9250 (Intel Dual Band Wireless AC 8260)	Windows 10 (19.50.1.6)
DELL Latitude 5491 (Intel AX200)	Windows 10 Pro (21.40.2)
DELL XPS Latitude12 9250 (Intel Dual Band Wireless AC 8260)	Windows 10 Home (21.40.0)
Lenovo Yoga C630 Snapdragon 850 (Qualcomm AC 2x2 Svc)	Windows 10(1.0.10440.0)
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 you to update to the latest Intel wireless drivers if advertised SSIDs are not visible.	
Tablets	
Apple iPad Pro	iOS 13.5
Apple iPad Air2 MGLW2LL/A	iOS 12.4.1
Apple iPad Mini 4 9.0.1 MK872LL/A	iOS 11.4.1
Apple iPad Mini 2 ME279LL/A	iOS 12.0
Microsoft Surface Pro 3 – 11ac	Qualcomm Atheros QCA61x4A
Microsoft Surface Pro 3 – 11ax	Intel AX201 chipset. Driver v21.40.1.3
Microsoft Surface Pro 7 – 11ax	Intel Wi-Fi chip (HarrisonPeak AX201) (11ax, WPA3)
Microsoft Surface Pro X – 11ac & WPA3	WCN3998 Wi-Fi Chip (11ac, WPA3)
Mobile Phones	
Apple iPhone 5	iOS 12.4.1
Apple iPhone 6s	iOS 13.5
Apple iPhone 8	iOS 13.5
Apple iPhone X MQA52LL/A	iOS 13.5
Apple iPhone 11	iOS 14.1
Apple iPhone SE MLY12LL/A	iOS 11.3
ASCOM SH1 Myco2	Build 2.1
ASCOM SH1 Myco2	Build 4.5
ASCOM Myco 3 v1.2.3	Android 8.1
Drager Delta	VG9.0.2
Drager M300.3	VG2.4
Drager M300.4	VG2.4

Client Type and Name	Driver / Software Version
Drager M540	DG6.0.2 (1.2.6)
Google Pixel 2	Android 10
Google Pixel 3	Android 11
Google Pixel 3a	Android 11
Google Pixel 4	Android 11
Huawei Mate 20 pro	Android 9.0
Huawei P20 Pro	Android 9.0
Huawei P40	Android 10
LG v40 ThinQ	Android 9.0
One Plus 8	Android 10
Oppo Find X2	Android 10
Redmi K20 Pro	Android 10
Samsung Galaxy S7	Andriod 6.0.1
Samsung Galaxy S7 SM - G930F	Android 8.0
Samsung Galaxy S8	Android 8.0
Samsung Galaxy S9+ - G965U1	Android 9.0
Samsung Galaxy SM - G950U	Android 7.0
Sony Experia 1 ii	Android 10
Sony Experia xz3	Android 9.0
Xiaomi Mi10	Android 10
Spectralink 8744	Android 5.1.1
Spectralink Versity Phones 9540	Android 8.1
Vocera Badges B3000n	4.3.2.5
Vocera Smart Badges V5000	5.0.4.30
Zebra MC40	Android 5.0
Zebra MC40N0	Android Ver: 4.1.1
Zebra MC92N0	Android Ver: 4.4.4
Zebra TC51	Android 7.1.2
Zebra TC52	Android 8.1.0
Zebra TC55	Android 8.1.0
Zebra TC57	Android 8.1.0

Client Type and Name	Driver / Software Version
Zebra TC70	Android 6.1
Zebra TC75	Android 6.1.1
Printers	
Zebra QLn320 Printer	LINK OS 6.3
Zebra ZT230 Printer	LINK OS 6.3
Zebra ZQ310 Printer	LINK OS 6.3
Zebra ZD410 Printer	LINK OS 6.3
Zebra ZT410 Printer	LINK OS 6.3
Zebra ZQ610 Printer	LINK OS 6.3
Zebra ZQ620 Printer	LINK OS 6.3
Wireless Module	
Intel 11ax 200	Driver v22.20.0
Intel AC 9260	Driver v21.40.0
Intel Dual Band Wireless AC 8260	Driver v19.50.1.6

Caveats

Caveats describe unexpected behavior in Cisco IOS releases. Caveats 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 will cover 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 a caveat, click the corresponding identifier.

Open Caveats for Cisco IOS XE Amsterdam 17.2.1a

Caveat ID	Description
CSCvu00121	Cisco Aironet AP 185x/184x reboots by deadlock triggered kernel panic in radio driver code.

Open Caveats for Cisco IOS XE Amsterdam 17.2.1

Caveat ID	Description
CSCvm75074	Correct the severity level of logs generated by smart-agent from notice to debug.
CSCvt01659	Client traffic is stuck, after controller receives the Change of Authorization (CoA) as part of Local Web Authentication (LWA) and Central Web Authentication (CWA).
CSCvt29596	Current Tx rate for 802.11ax clients are displayed incorrectly on the controller.
CSCvt35141	Deny webauth WLANs from being tagged to authentication servers that has load balancing enabled.
CSCvt35766	Controller is allowing WPA-TKIP + WPA2, without any encryption.
CSCvt37835	Client is unable to associate when extended supported rates are used.
CSCvt41035	AP shows incorrect WLAN to VLAN assignment.
CSCvt41053	AP shows incorrect WLAN to VLAN assignment.
CSCvt41519	Controller reloads unexpectedly when an AP with same name of an existing AP joins.
CSCvt46733	Cisco Catalyst 9800 Series Wireless Controller Address Resolution Protocol (ARP) handling design change.
CSCvt47787	Roaming is not successful when NAC is enabled in the policy profile.
CSCvt48319	Remove all client lists from the **show tech wireless** command output.
CSCvt49983	The **show ap auto RF** command output is displaying invalid values for some APs.
CSCvt52436	Controller is unable to downgrade license.
CSCvt55482	Controller displays incorrect number of interferers.

Resolved Caveats for Cisco IOS XE Amsterdam 17.2.1a

Caveat ID	Description
CSCvt47413	IW-6300H/1562/2800/3800/4800 series APs are failing DFS compliance.

Caveat ID	Description
CSCvt98797	Channel Availability Check (CAC) is skipped after channel change on 2800/3800/4800/1560/IW6300.
CSCvu02495	Wave 2 AP boot failure with message saying bad lzma header and AP unable to boot and join controller.

Resolved Caveats for Cisco IOS XE Amsterdam 17.2.1

Caveat ID	Description
CSCvk79833	Include the **show vlan** command output in the **show tech wireless** command output.
CSCvk79834	The **show wireless profile policy all** command output is not displaying Cisco Air Time Fairness (ATF) information.
CSCvk79845	WPA-TKIP with Advanced Encryption Standard (AES) is set as required in web UI.
CSCvk79909	Remove all standby R0 commands from the **show tech wireless** command output.
CSCvm68841	Protected Management Frame (PMF) mandatory Preshared Key (PSK) configuration doesn't give an option to input the PSK.
CSCvp76844	Error is reported after a successful client association.
CSCvp88342	WNCD crash is observed.
CSCvp93411	Controller unexpectedly reloads while executing flex CI suite.
CSCvq23530	The **show wireless interface summary** command output is not showing NAT public-ip.
CSCvq40363	When RADIUS server name is configures as %0, it shows up as #CLI on the web UI and CLI.
CSCvq44874	Central Web-Auth local switching Layer 3 VLAN override is snot working.
CSCvq48018	MAC congested @Low PPS, drops/TX_XOFF in Bay 0-Tune settings and pause frames in mgig ports.
CSCvq66798	External web authentication log out page is not working.
CSCvq68047	OpenDNS resolver IPs are not coming with NETCONF/RESTCONF with defaults.

Caveat ID	Description
CSCvq70386	The **show hw-module subslot 0/1 transceiver 0 idprom brief** command failed to show any output.
CSCvq77275	UDP 1518 byte upstream packets are dropped from Cisco Catalyst 9800 Wireless Controller for Cloud hosted on Hyper-V, when MTU is set to 1496.
CSCvq80854	Simplify WLAN configuration for Layer 2 and Layer 3 security options.
CSCvr09334	The **show ap auto-rf dot11 24ghz** command output is not displaying entries of Cisco Aironet 4800 AP, after a day.
CSCvr13531	Core files under standby bootflash is shown twice on the web UI.
CSCvr24930	Controller is displaying *wncd crash@ewlc_dgram_msg_and_msgbuf_free* message with In-Service Software Upgrade (ISSU) flow in scale.
CSCvr26579	Controller deauthenticates client when receiving DHCP release from the client.
CSCvr44175	System displays memory warning during controller image download.
CSCvr45109	Traceback is observed on the standby controller while unconfiguring port-channel.
CSCvr52588	QoS police configuration is deleted after adding or removing it to policy profile using web UI.
CSCvr70395	Controller is sending delete event for AP impersonation.
CSCvr71770	Wired multicast Domain Name System (mDNS) packet is getting punted to WNCD.
CSCvr84336	Client is stuck in IP learn state with flex mode AP.
CSCvr91736	Web UI is not displaying slot-2 details in 360 degree view.
CSCvr96040	NETCONF/RESTCONF server is not reachable after a switchover.
CSCvs01799	Stack_mgr process logs only the internal btrace logs.
CSCvs15446	Cisco Catalyst 9800-L Wireless Controller HA: Traceback is observed after reload.

Caveat ID	Description
CSCvs17412	Backhaul configuration for PSK is showing error as resource not found.
CSCvs20264	Off-channel interference is not being reported.
CSCvs21105	Update & Apply to Device button is not working after configuring FT-PSK with WPA2+WPA3 in web UI.
CSCvs31054	Btman core has been observed.
CSCvs34222	Print a warning message during packet (SWPortMacConflict) drop.
CSCvs45249	Unable to enter a valid URL for urlfilter.
CSCvs60927	Frequent AP channel changes are observed on the 5GHz band radio.
CSCvs63467	IPv6 dual stack is not working.
CSCvs72078	Client retries and Rx packets on Cisco DNA Centre is different from the value seen on the AP.
CSCvs72524	Though dynamic channel allocation (DCA) is set to be OFF, it is still assigning channels to AP radios.
CSCvt13127	Controller is not able to display medium power when AP sends 25W message.
CSCvt16139	Controller is not sending redirect URL if client is already trying to authenticate.
CSCvt55181	Unable to configure SNMP settings using GUI in Japanese mode.
CSCvr74892	EWC WEBUI:Extend button does not do anything in the Day 0 session expiry pop-up.

Troubleshooting

For the most up-to-date, detailed troubleshooting information, visit the Cisco TAC website at:

https://www.cisco.com/en/US/support/index.html

Go to **Product Support** and select your product from the list, or enter the name of your product. Look under **Troubleshoot and Alerts** to find information about the problem that you are experiencing.

Related Documentation

Information about Cisco IOS XE 16 is available at:

https://www.cisco.com/c/en/us/products/ios-nx-os-software/ios-xe/index.html

All the support documentation for Cisco Catalyst 9100 Access Points are available at: https://www.cisco.com/c/en/us/support/wireless/catalyst-9100ax-access-points/tsd-products-support-series-home.html

Cisco Validated Designs documents are available at:

https://www.cisco.com/go/designzone

Cisco Embedded Wireless Controller on Catalyst Access Points

For support information, see the following documents:

- Cisco Wireless Solutions Software Compatibility Matrix
- Cisco Embedded Wireless Controller on Catalyst Access Points Online Help
- Cisco Embedded Wireless Controller on Catalyst Access Points Software Configuration Guide
- Cisco Embedded Wireless Controller on Catalyst Access Points Command Reference Guide

Installation guides for Catalyst Access Points are available at:

https://www.cisco.com/c/en/us/support/wireless/catalyst-9100ax-access-points/products-installation-guides-list.html

For all Cisco Wireless Controller software-related documentation, see:

https://www.cisco.com/c/en/us/support/wireless/catalyst-9800-series-wireless-controllers/tsd-products-support-series-home.html

Wireless Products Comparison

- Use this tool to compare the specifications of Cisco wireless APs and controllers:

  https://www.cisco.com/c/en/us/products/wireless/wireless-lan-controller/product-comparison.html

- Product Approval Status:

  https://prdapp.cloudapps.cisco.com/cse/prdapp/jsp/externalsearch.do?action=externalsearch&page=EXTERNAL_SEARCH

- Wireless LAN Compliance Lookup:

  https://www.cisco.com/c/dam/assets/prod/wireless/wireless-compliance-tool/index.html

Cisco Mobility Services Engine

Cisco Mobility Services Engine Documentation

Cisco Connected Mobile Experiences

Cisco Connected Mobile Experiences Documentation

Cisco DNA Center

Cisco DNA Center Documentation

Communications, Services, and Additional Information

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- To obtain general networking, training, and certification titles, visit Cisco Press.
- To find warranty information for a specific product or product family, access Cisco Warranty Finder.

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