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Cisco Catalyst Center Al-Enhanced RRM Deployment Guide

Overview of Cisco Catalyst Center AI-Enhanced RRM

AI-Enhanced RRM is the next evolution of Cisco's award-winning RRM (Radio Resource Management). RRM was originally introduced with Cisco AireOS and Aironet in 2005 and managed the complexities of RF from Wi-Fi 1-6 and now Wi-Fi 6E. RRM has fluidly grown to include innovative algorithms like Flexible Radio Architecture (FRA), and Dynamic Bandwidth Selection (DBS) to the traditional algorithms of Dynamic Channel Assignment (DCA) Transmit Power Control (TPC).

On a Cisco Catalyst C9800, traditional RRM runs as a process. Cisco RRM manages the RF Group (the components making up the RF Network) based on dynamic measurements between every AP and its neighbors. This information is stored in a local database on the RF Group Leader controller. At runtime, RRM draws on the last 10 minutes of collected data and gently optimizes based on the current network conditions. Cisco RRM has proven to be extremely effective and trustworthy over the years. Configured correctly for the type of RF network coverage desired (Capacity vs. Coverage), it can adapt to almost any size or deployment density. In Wi-Fi, RF Conditions can dynamically change with different network loads, numbers of devices, and number of users in the environment. RRM has continued to measure up well to this task, with caveats that require some learning for the environment being tuned.

Enter Cisco's AI-Enhanced RRM. AI-Enhanced RRM integrates the power of Artificial Intelligence and Machine Learning (AI, ML) into the reliable and trusted Cisco RRM Product family algorithms in the Cloud. AI-Enhanced RRM is coordinated through Cisco's Catalyst Center (on-prem appliance) as a service. Existing Cisco Catalyst C9800 RRM sites can seamlessly transition to an intelligent centralized service. As with other Cisco Catalyst Center services, AI-Enhanced RRM brings a host of new features with it. The Cisco Catalyst Center RRM Control Center allows administrators to quickly assess the health and performance of the RF coverage from the enterprise level all the way down to a single site or building level.

Cisco AI-Enhanced RRM is different as it allows the analysis of historical dynamic RF data over time. The ability to evaluate complex RF data often comes down to being able to factor in local knowledge of "Normal" against the currently displayed data. "Normal" can and does vary from site to site based on the equipment choices and architectural design vs. Client density.

After an initial learning period, the Cisco AI Analytics Cloud will begin to provide insights into the performance and tuning of the RF network. Insights provide granular guidance on:

- Performance against SLAs
- The effectiveness of present settings/configurations
- The Quality of the coverage

Together, the AI-Enhanced RRM Algorithms with the power of the Cisco AI Analytics Cloud and Cisco's Catalyst Center take Wi-Fi RF Management to an unprecedented level that correlates 24x7 observations from the network and the client devices themselves and applies 20+ years of Cisco RF Excellence to drive exceptional user experiences into the future.

Cisco AI-Enhanced RRM Data Flows and Functional Components

Cisco AI-Enhanced RRM operates as a distributed RRM service. RF telemetry is collected from the Cisco Access Points by the Catalyst WLC and passed through the Cisco Catalyst Center to the Cisco AI Analytics Cloud, where the data is stored. The RRM Algorithms run against this telemetry data stored in the cloud. Al analyzes the solutions and returns any configuration change information to the Cisco Catalyst Center. Catalyst Center maintains the control connection with the enrolled Cisco C9800 and returns any individual AP

configuration changes to the APs. The Cisco Al Analytic Cloud operates like the WLC RF Group Leader on the controller today but with much more storage, compute power, and intelligent analysis.

Network-wide holistic Optimizations are performed by the RRM Resource Analytics Engine, which focuses on dynamically created groups of radios (Clusters) to optimize local performance without falling victim to the pitfalls of greedy optimizations leading to cascading network changes and potential network disruptions. Algorithms for Dynamic Channel Change (DCA), Transmit Power Control (TPC), Flexible Radio Assignment (FRA) and Dynamic Bandwidth Selection (DBS) are some examples of the types of optimizations performed. These algorithms are latency-tolerant and blend well with Catalyst Center Eco System management.

The RRM Edge Compute Engine focuses on latency-sensitive and client-specific optimizations. Examples of these types of services include Optimized Roaming, DFS Optimizations, Coverage Hole Detection/Mitigation, EDRRM, and Dynamic DFS amongst others. These functions are maintained on the local WLC, the telemetry data is sent to AI-Cloud where AI-Enhanced RRM algorithms run. This analysis will provide optimization guidance and insights to the RRM Control Center to help Admins further optimize the configurations and monitor performance.

The Cisco AI Analytics Cloud provides the core support to Cisco Catalyst Center for AI-Enhanced RRM core services and ML features. The architecture supports the methods and framework necessary to create a seamless upgrade path for existing customers to benefit from adaptive RRM optimizations and finally simplify customer configurations using intent-based RRM workflows through both local and cloud-based C9800 Wireless LAN Controllers.

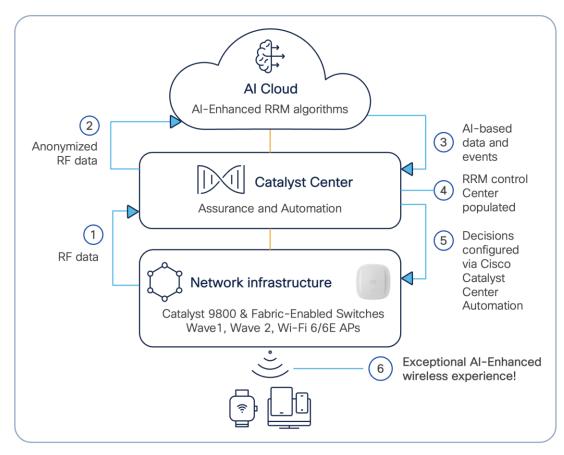


Figure 1 AI-Enhanced RRM Architecture and Data Flow

Recommended Software

- Cisco Catalyst Center Release 2.3.7.6 (Minimum version: 2.3.3.7)
- Cisco WLC and AP Release Cisco IOS XE 17.12.3 (Minimum version 17.7.1)

Supported device software and hardware

Cisco Catalyst wireless controllers that support AI-Enhanced RRM

Supported Catalyst wireless controllers	Minimum supported Cisco IOS XE version	Recommended Cisco IOS XE version
Cisco Catalyst 9800-CL Wireless Controller for Cloud	17.7.1	17.12.3
Cisco Catalyst 9800-L Wireless Controller	17.7.1	17.12.3
Cisco Catalyst 9800-40 Wireless Controller	17.7.1	17.12.3
Cisco Catalyst 9800-80 Wireless Controller	17.7.1	17.12.3
Cisco Software-Defined Access Wireless Controller	17.9.1	17.12.3

Cisco APs that support AI-Enhanced RRM

	Cisco IOS XE software					
Supported access points	Minimum version	Recommended version				
Aironet 1540 Series	17.7.1	17.12.3				
Aironet 1560 Series	17.7.1	17.12.3				
Aironet 1815 Series	17.7.1	17.12.3				
Aironet 1830 Series	17.7.1	17.12.3				
Aironet 1840 Series	17.7.1	17.12.3				
Aironet 1850 Series	17.7.1	17.12.3				
Aironet 2800 Series	17.7.1	17.12.3				
Aironet 3800 Series	17.7.1	17.12.3				
Aironet 4800 Series	17.7.1	17.12.3				
Catalyst 9105AX Series	17.7.1	17.12.3				

	Cisco IOS XE softwa	re		
Supported access points	Minimum version	Recommended version		
Catalyst 9115AX Series	17.7.1	17.12.3		
Catalyst 9117AX Series	17.7.1	17.12.3		
Catalyst 9120AX Series	17.7.1	17.12.3		
Catalyst 9130AX Series	17.7.1	17.12.3		
Catalyst 9124AX Series	17.7.1	17.12.3		
Catalyst IW6300 Heavy Duty Series	17.7.1	17.12.3		
6300 Series Embedded Services	17.7.1	17.12.3		
Catalyst 9136 Series	17.7.1	17.12.3		
CW 9164 Series	17.9.1	17.12.3		
CW 9166 Series	17.9.1	17.12.3		
CW 9162 Series	17.9.1	17.12.3		
CW CW 9163 Series	17.12.3	17.12.3		
Catalyst Wireless Cisco IW9165	17.14.1	17.14.1		
Catalyst Wireless Cisco IW9167	17.9.4	17.12.3		

Day-O configuration: Setting up Cisco Catalyst Center to use AI-Enhanced RRM

Precaution: Make sure to set a maintenance window while enabling AI-Enhanced RRM, as this workflow will interrupt wireless operations for a blip.

Prepare Cisco Catalyst Center

The following subsections provide step-by-step instructions for setting up the day-0 configurations necessary to use AI-Enhanced RRM.

Install the Al Network Analytics package onto Cisco Catalyst Center

Cisco Catalyst Center provides the option to download a couple of packages called Al Network Analytics and

Assurance - Base.

To download and install this package, follow the steps below:

• Click the hamburger menu top left corner of the screen. Click System, then Software Updates.

- Click **Installed Apps** on the left side of the screen.
- Scroll down to **Assurance** and you will find the **Al Network Analytics** and **Assurance Base** packages ready for download and installation (Figure 2).

Note: If you do not see the AI Network Analytics and Assurance – Base packages after performing the steps above, please contact a Cisco account sales representative or an account sales engineer for additional support.

ASSURANCE		
Al Network Analytics	3.1.39.362	
Assurance - Base	2.3.7.5165	
Assurance - Sensor	2.3.7.5122	⊗ Uninstall
Automation - Intelligent Capture	2.1.715.60643	⊗ Uninstall
Automation - Sensor	2.1.715.60643	⊗ Uninstall
Machine Reasoning	2.1.715.210132	
Path Trace	2.1.715.60643	
Rogue and aWIPS	2.9.0.404	⊗ Uninstall

Figure 2 Location of the AI Network Analytics package within the Software Updates page

Prepare 9800 Wireless controller

We recommend doing a DCA (Dynamic channel Assignment) for all bands while transitioning from Traditional RRM to AI-Enhanced RRM. This will help AI-Enhanced RRM recalculate the neighbors and efficiently assign channels.

Note: This is an optional but recommended step

Use this command in the 9800 Wireless Controller CLI:

ap dot11 {24ghz | 5ghz | 6ghz} rrm dca restart

To ensure the Wireless LAN Controller (WLC) you want to include can successfully connect as a member to the AI-Enhanced RRM RF Group Leader, it's essential that the RRM settings for all frequency bands on that WLC are configured with the Group Mode set to 'Automatic,' enabling automatic RF grouping.

If the controller is configured as a Static Leader and member controllers are assigned to it, ensure that the member controllers have the same RRM config and RF Profile settings before changing the leader configuration to Auto. Once set to auto, all the previously grouped controllers will automatically negotiate a new RF Group Leader, and the RF Group Leader will use the new RF Group Leader controllers RRM configs.

Cisco Cisco C	atalyst 9800-L Wireless Cc Welcome <i>admin</i>	
Q Search Menu Items	Logical Ethernet	
Dashboard	Wireless	-L Wireless Controller Welcome admin 🖌 📽 🛦 🖺 🌣 👰 🤣 🛠 Search APs and Clients 🔾 🛛 🖾 Feedback 🖍 🚱
Monitoring	Discovery Protocols VLAN VTP	ation * > Radio Configurations * > RRM
~~~	adl⊛ Radio Configurations > CleanAir High Throughput	nd <b>5 GHz Band</b> 2.4 GHz Band FRA I Coverage DCA TPC <b>RF Grouping</b> Spatial Reuse
C Licensing Troubleshooting	Media Parameters Network Parameters	Vice State S
	RRM Routing Protectus	hp Mode
Walk Me Through >	Static Routing	up Role Static-Leader

Figure 3 Changing RF Group Mode to Automatic on the Catalyst 9800 Wireless Controller

In addition to setting RF Grouping to Automatic, ensure that RF channel Assignment and Tx Power Level Assignment for all radios operate Global mode (Automatic) and are not set to a static value on the AP Radio.

**Note:** Not doing this step will cause repeated false RRM change requests on the AI-Enhanced RRM control center. Although this is encouraged but not mandatory, a subset of the radios can be on static channel and power settings, and AI-enhanced RRM will simply work on the other set of radios under automation mode.

To do this, navigate on the sidebar Configuration > Access Points >Expand the 6 GHz /5 GHz /2.4 GHz Radios dropdown. If the Channel and Power Level values have Asterisk (*) in their values, they are operating in "Global assignment" mode and will be managed by AI-Enhanced RRM. Manage any radios not going through the radio configuration dialogue and set the channel and Power back to Global.

	2	_													
	2% 0	Configuration >	AP Name	:	AP Model	s	lots	Admin Status	Up Time	IP Address	Base Radio MAC	: Е	thernet MAC	AP Mode	Pc Ci
cisco Cásco Cá cisco 17.8.1etz     Q. Search Menu Items	atalyst 9800-L Wireless Contr	Services	TME-lab-9130i	山田	C9130AXI-B	3		•	10 days 22 hrs 45 mins 18 secs	192.168.151.16 6	04eb.409f.6600	0	4eb.409e.1ff4	Local	Ye
Dashboard	Logical Ethernet Wireless	AireOS Config Translator Application Visibility Cloud Services	TME-lab-9166i-3	山山	CW9166I-B	3		۲	16 days 4 hrs 19 mins 40 secs	192.168.151.12 6	10f9.20fd.a4e0	C	c9c.3ef4.c600	Local	Ye
Monitoring :		Custom Application IOx Location	TME-lab-9166i-2	孟圖	CW9166I-B	3		۲	16 days 4 hrs 20 mins 26 secs	192.168.151.15 3	10f9.20fe.06c0	C	c9c.3ef4.e820	Local	Ye
Configuration :	VLAN VTP Ade Radio Configurations	mDNS Multicast NetFlow	TME-lab-9166i-1	击回	CW9166I-B	3		۲	16 days 4 hrs 20 mins 17 secs	192.168.151.12 3	6c8d.772e.1520	C	c9c.3ef5.2d50	Local	Ye
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Walk Me Through 2	RRM Routing Protocols Static Routing Security AAA	Calendar EoGRE Flax Mutt BSSID Policy Power Profile	TME-lab-2800	<b>₽</b> 101	AIR-AP2802I-B-K9	2		•	10 days 22 hrs 45 mins 39 secs	192.168.151.17 5	b4de.31b5.e8e0	6	cb2.aef6.cccc	Local	Nc
	Ada ACL Advanced EAP PKI Management Guest User Local EAP	Renore LAN Ref;Radio Tags WLANs C Wireless	TME-lab-3800	њы	AIR-AP3802I-D-K9	2		۲	10 days 22 hrs 45 mins 20 secs	192.168.151.17 4	cc16.7e5f.de10	0	042.68c5.bbb2	Local	Nc
	Local Policy Threat Defense Trustsec	Access Points Advanced	TME-lab-9162	ah lat	CW9162I-B	3		۲	16 days 3 hrs 45 mins 12 secs	192.168.151.12 4	ecf4.0c20.7300	C	c9c.3eef.cd10	Local	Ye
	URL Filters Web Auth Wireless AAA Policy	Air Time Fairness Change to Meraki Persona Fabric	⊣ 1 ►		100 🗸								1 - 8 of 8 i	iccess points	Ċ
	Wireless Protection Policies	Guest LAN Hotspot/OpenRoaming Media Stream Mesh Mobility	> 6 GHz Radio	s											
			> 5 GHz Radio	s											
			> 2.4 GHz Rad	ios											
			> Dual-Band F	adios											
			> Country												

Figure 4 Location Of Access Point Radios On Catalyst 9800 Wireless Controller

THE 100-01001-2		-	1013.2016.0000		•	s-Walkways-Aux	WD1-3003	Ki - Hout	40 WH 12	(03,03)	1/0 (10 00)
TME-lab-9166i-1	<u>laid</u>	2	6c8d.772e.1520	0	0	CLUS_HD	MBY-WOS2	RF-Omnis	40 MHz	(33,37)*	*1/8 (18 dBn
TME-lab-9162	<u>laid</u>	2	ecf4.0c20.7300	•	O	CLUS_Hallways	MBY-SCC2	RF-Omnis	40 MHz	(49,53)*	*1/8 (15 dBr
		100 🔻									1 - 4 of 4 items
<ul> <li>5 GHz Radios</li> </ul>											
Total 5 GHz radios : 9	9							(13	6.	(0) 8∕	abm)
AP Name	:	Slot No	Base Radio MAC	Admin Status	Operation : Status	Policy Tag	Site Tag	RF Tag :	Channel Width	Channel	Pow Level
TME-lab-9130i	Lad.	1	04eb.409f.6600	•	0	PT_LasVe_Manda_H allway_24d05	ST_LasVe_Mandalay _f7844_0	Test-AI-RF-Profile	20 MHz	(136)*	*7/8 (0 dBm
TME-lab-9130i	Lad.	2	04eb.409f.6600	$\oslash$	0	PT_LasVe_Manda_H allway_24d05	ST_LasVe_Mandalay _f7844_0	Test-AI-RF-Profile	40 MHz	(52,56)*	*7/8 (0 dBm
TME-lab-9166i-3	40	1	10f9.20fd.a4e0	0	o	CLUS_Registration	MBY-WOS2	RF-WOS	20 MHz	(100)*	*3/8 (16 dB
TME-lab-9166i-2	<u>lad</u>	1	10f9.20fe.06c0	۲	o	MBY_SCC1_Hallway s-Walkways-Aux	MBY-SCC3	RF-Trout	20 MHz	(52)*	*4/8 (12 dB
TME-lab-9166i-1	<u>lahl</u>	1	6c8d.772e.1520	0	o	CLUS_HD	MBY-WOS2	RF-Omnis	20 MHz	(36)*	*5/8 (10 dB
TME-lab-9120i	Lat.	1	a453.0e7d.0980	۲	o	PT_LasVe_Manda_H allway_24d05	ST_LasVe_Mandalay _f7844_0	Test-AI-RF-Profile	20 MHz	(120)*	*7/8 (0 dBm
TME-lab-2800	<u>lad</u>	1	b4de.31b5.e8e0	۲	o	PT_LasVe_Manda_H allway_24d05	ST_LasVe_Mandalay _f7844_0	Test-AI-RF-Profile	20 MHz	(64)*	*7/7 (2 dBm
TME-lab-3800	<u>lad</u>	1	cc16.7e5f.de10	۲	O	PT_LasVe_Manda_H allway_24d05	ST_LasVe_Mandalay _f7844_0	Test-Al-RF-Profile	20 MHz	(36)*	*1/8 (22 dB
TME-lab-9162	<u>lat</u>	1	ecf4.0c20.7300	0	o	CLUS_Hallways	MBY-SCC2	RF-Omnis	20 MHz	(161)*	*5/8 (8 dBm
I I ► 1		100 🗸									1 - 9 of 9 items

Figure 5 Verifying (*) On Channel And Power Level Assignment In Radios Table

⊲ ⊲ 1 ▶ ⊨ 100 ▼	Edit Radios 5 GHz Ba	nd		×
	Configure Detail			
> 6 GHz Radios	General		RF Channel Assignment	
✓ 5 GHz Radios	AP Name	TME-lab-9120i	Current Channel	120
Total 5 GHz radios : 9	Admin Status		Channel Width	20 MHz 🔍
AP Name Slot No	CleanAir Admin Status	ENABLED	Assignment Method	Global 🔻
TME-lab-9130i 🔟 1	Antenna Parameters		Tx Power Level Assignment	nent
TME-lab-9130i 🔟 2	Antenna Type		Current Tx Power Level	7
TME-lab-9166i-3 III 1	Antenna Mode	Omni	Assignment Method	Global
TME-lab-9166i-2 III 1	Antenna A		BSS Color	
TME-lab-9166i-1 🖬 1 TME-lab-9120i 🖬 1	Antenna B		BSS Color	Global
TME-lab-2800	Antenna C		Configuration	
TME-lab-3800 🛄 1	Antenna D		BSS Color Global Admin Status	Disabled 💈
TME-lab-9162 🔟 1	Antenna Gain (in .5 dBi units)	10	BSS Color Radio Operational Status (1)	Disabled
i⊲ ⊲ 1 ⊳ ⊨ 100 <del>v</del>	•		BSS Color Radio Admin Status	ENABLED
> 2.4 GHz Radios			Current BSS Color	1
> Dual-Band Radios	Download Core Dump to	bootflash		
> Country				
> LSC Provision				
> AP Certificate Policy	Cancel			Update & Apply to Device

Figure 6 Set Channel And Tx Power Assignment To Global For Rrm

# Part 1: Build a site hierarchy

You can create a network hierarchy that represents your network's geographical locations. The hierarchical organization enables you to easily apply design settings or configurations to a specific hierarchical element. For example, you can apply design settings to an entire area or to only a floor.

**Note:** This step is important as AI-Enhanced RRM uses Building/Sites to group a Set of Access points to display the dashboard data and apply the AI-RF profile. After enabling the feature, you will click on the individual site to view the site-level view of the AI-Enhanced RRM control center.

Follow the below link to understand how to create Site Hierarchy:

https://www.cisco.com/c/en/us/td/docs/cloud-systems-management/network-automation-andmanagement/catalyst-center/2-3-7/user_guide/b_cisco_catalyst_center_user_guide_237/m_design-the-networkhierarchy.html

# Part 2: Discovery and inventory

**Description:** Cisco Catalyst Center's **Discovery** application allows a network administrator to add their network device to the platform.

Section goals: Discover WLC and APs and assign them to the site created in the previous section.

Make sure to assign location to WLCs and Access points. This is a pre-requisite for AI-Enhanced RRM.

Follow the below link to get more information on how to discover your devices and add them to inventory:

https://www.cisco.com/c/en/us/td/docs/cloud-systems-management/network-automation-andmanagement/catalyst-center/2-3-

7/user guide/b cisco catalyst center user guide 237/b cisco dna center ug 2 3 7 chapter 010.html

# Part 3: Enable Cisco Al-Enhanced RRM

**Description:** Cisco Catalyst Center's Cisco Al Analytics page provides an option to enable all Al Analytics features and allows you to select a cloud cluster where the data will be store for Al Algorithms to process.

Section goals: Enable AI-Enhanced RRM and choose a cloud cluster where your data will be stored.

Prerequisite: To enable AI Network Analytics, Access Points and 9800 Wireless Controller need to be a part the inventory.

## Step 1: Navigate to the Cisco Al Analytics page.

- 1. Click the hamburger menu in the top left corner of the screen. Click System, then Settings
- 2. Navigate to Cisco Al Analytics on the sidebar as shown.



Figure 7 Settings Location

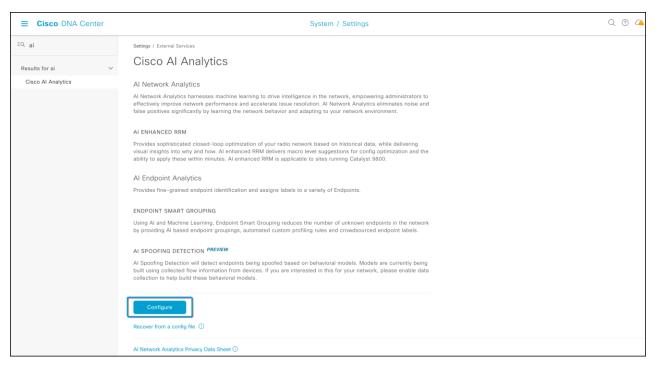


Figure 8 Location Of The Cisco Al Analytics Page On The Cisco Catalyst Center Homepage

## Step 2: Enable AI-Enhanced RRM

To allow Cisco Catalyst Center turn on AI-Enhanced RRM, you need to

- 1. Enable AI Network Analytics and AI-Enhanced RRM
- 2. Select the closest or preferred cloud cluster you would want to store your cloud data.
- 3. Make sure the cloud connection status is green and click enable.

cisco Catalyst Center	System / Settings	\$ Q @ Q	Q godmode ∽
Search	Settings / External Services		
PnP Device Authorization	Cisco Al Analytics		
Device Prompts			
Configuration Archive	Al Network Analytics		
xternal Services $\checkmark$	Al Network Analytics harnesses machine learning to drive intelligence in the network, empowering administrators to		
Umbrella	effectively improve network performance and accelerate issue resolution. Al Network Analytics eliminates noise and false positives significantly by learning the network behavior and adapting to your network environment.		
Authentication and Policy Servers			
Integrity Verification	Enable AI Network Analytics		
SD-Access Compatibility Matrix			
IP Address Manager	AI-ENHANCED RRM		
Cloud Access Login	Provides sophisticated closed-loop optimization of your radio network based on historical data, while delivering		
Cisco Al Analytics	visual insights into why and how. Al-Enhanced RRM delivers macro level suggestions for config optimization and the ability to apply these within minutes, Al-Enhanced RRM is applicable to sites running Catalyst 9800.		
Stealthwatch			
Talos IP Reputation	Enable AI-Enhanced RRM		
Destinations			
Cisco Spaces/CMX Servers	SYSLOG MESSAGE TEXT EXPORT		
Catalyst Dashboard	If Syslog Message Text Export is enabled message texts will be exported using the secure cloud connection without data anonymization; please refer to the Cisco Catalyst Center Data Privacy and Security Data Sheet for more		
Machine Reasoning Engine	details. If Syslog Message Text Export is disabled, only Syslog metadata will be exported without the full text and		
Cloud Authentication	some functionality will be disabled.		
Cisco Catalyst - Cloud	Enable Non-anonymized Syslog Message Text Export		
Webex Integration	entante reni anoriginico ogalog mosargo nexi export		
ThousandEyes Integration			
ystem Configuration $\sim$	Al Endpoint Analytics		
Debugging Logs	Provides fine-grained endpoint identification and assigns labels to a variety of Endpoints.		
Visibility and Control of Configur	ENDPOINT SMART GROUPING		
Geo Map Settings	Using AI and Machine Learning, Endpoint Smart Grouping reduces the number of unknown endpoints in the network by providing AI based endpoint groupings, automated custom profiling rules and crowdsourced endpoint labels.		

Figure 9 Cisco Al Analytics

ing lata

Figure 10 Enable AI Network Analytics And AI-Enhanced RRM

# Step 3: Enable Device Controllability

This Feature requires customers to enable Device controllability as Catalyst center will be managing the RF profiles and RF Tags on the 9800 Wireless controller. To enable this, click hamburger menu  $\equiv$  > System > Settings >Device Controllability.

Click on the Enable Device Controllability check box and hit SAVE.

cisco DNA Center	System / Settings	☆ Q 🛆 ⑦ 🗘   ႙ admin ∨
	Settings / Device Settings	
2 Search	Device Controllability	
Sisco Accounts 🗸 🗸	,	
PnP Connect	Device Controllability is a system-level process on Cisco DNA Center that enforces state synchronization for some device-layer features. Its purpose is to aid in the deployment of the system of the state of the	
Cisco.com Credentials	required network settings that Cisco DNA Center needs to manage devices. Changes are made on network devices during discovery, when adding a device to Inventory, or when	
Smart Account	assigning a device to a site. If changes are made to any settings that are under the scope of this process, these changes are applied to the network devices during the Provision and	
Smart Licensing	Update Telemetry Settings operations, even if Device Controllability is disabled. The following device settings will be enabled as part of Device Controllability when devices are	
SSM Connection Mode	discovered:	
Nevice Settings $\lor$	SNMP Credentials     NETCONF Credentials	
PnP AP Location	Subsequent to discovery, devices will be added to Inventory. The following device settings	
Image Distribution Servers	will be enabled when devices are added to inventory:	
Device Controllability	Cisco TrustSec (CTS) Credentials	
Network Resync Interval	The following device settings will be enabled when devices are assigned to a site. Some of these settings can be defined at a site level under Design > Network Settings > Telemetry	
SNMP	& Wireless.	
ICMP Ping	Wired Endpoint Data Collection Enablement     Controller Certificates	
Device EULA Acceptance	SNMP Trap Server Definitions     Syslog Server Definitions	
PnP Device Authorization	Application Visibility	
Device Prompts	Application QoS Policy     Wireless Service Assurance (WSA)	
Configuration Archive	Wireless Telemetry     DTLS Ciphersuite	
xternal Services 🗸 🗸	AP Impersonation	
Authentication and Policy Servers	If Device Controllability is disabled, Cisco DNA Center does not configure any of the preceding credentials or settings on devices during discovery, at runtime, or during site	
Integrity Verification	assignment. However, the telemetry settings and related configuration are pushed when the device is provisioned or when the Update Telemetry Settings action is performed.	
SD-Access Compatibility Matrix	the device is provisioned of when the opticite relementy becauge deton is performed.	
vManage	Enable Device Controllability	
IP Address Manager	Save	
Cloud Access Login		

## Figure 11 Device Controllability

#### **Step 4: Sitewise Timezone**

The time zone needs to be set for every area to make sure this feature works efficiently. By default, UTC time zone is set to all locations if not set otherwise.

To do this

Click the hamburger menu icon ( $\equiv$ ) and choose Design à Network Settings a Servers tab.

If all your sites are in the same time zone, select global in the Hierarchy selection.

Select the 1st site in the Hierarchy selection if you have different time zones.

Scroll down to the Time Zone section and select the correct time zone of the site, depending on the exact physical location.

Repeat the same for all different locations.

≡ 'liulu' Catalyst Center	Design / Network Settings	☆ Q <⊘ ⑦ ♫ │ Q admin ·	
	Design / Network Settings	x 4 6 6 4 1 x mm	Ť
Servers Device Credentials	IP Address Pools Wireless Telemetry Security and Trust		
Q Find Hierarchy Search Help ✓ ♥ Global ✓ ₱% san jose	Configure external network servers, assign time zones to sites, and customize device CLI login banner messa system will deploy these settings when devices are provisioned.	sages. The	
	Time Zone Construction is used when soft provisioning and updates.  Select the time zone that corresponds to the site's physical location. The site time zone is used when soft provisioning and updates.   GMT   C Search Europe/Bucharest Europe/Bucharest Europe/Budapest Europe/Chisinau	theduling device	
	Europe/Copenhagen Europe/Dublin GMT	Reset	6

Figure 12 Set Timezone in network settings

# Part 4a: AI-Enhanced RRM Workflow for v2.3.7.4 and above

**Description:** This new workflow will help users to enable AI-Enhanced RRM in a simpler way with and without device provisioning.

If using Device provisioning workflow, make sure to have a pre-deployed network profile and have the devices assigned to respective sites.

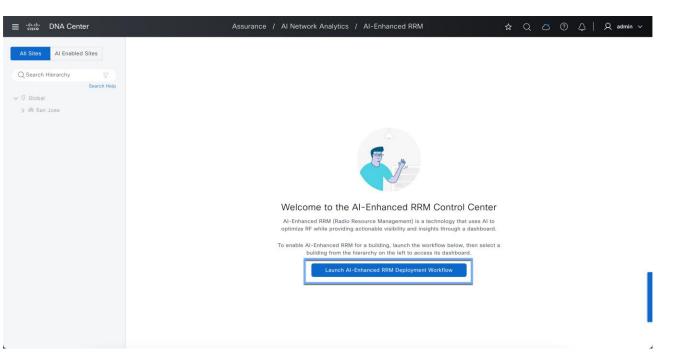
Different ways of launching this workflow:

- 1.  $(\equiv)$  > Assurance > AI-Enhanced RRM
- 2. ( $\equiv$ ) > Workflow > AI-Enhanced RRM
- 3.  $(\equiv)$  > Design > Network Settings > Wireless > RF Profile > AI RF Profile > Action button

Let us talk about 1st way of launching the workflow.

# Step 1: Launch Al-Enhanced RRM Deployment Workflow

Click the menu icon ( $\equiv$ ) > Assurance > AI-Enhanced RRM



# Figure 13 Workflow To Create AI RF Profile

Step 2: Assign a name to the task and click Next.

	DNA Center	Configure AI-Enhanced RRM	☆	Q	උ (	)	$Q$ admin $\vee$
	Get Started To help you identify your workflow, assign a meaningful and unique name workflow at any time and resume working on it later.	to it. You can exit this					
	Assign_ai_rf_17_10_23_12_25_AM						
Exit							Next

#### Figure 14 Assign task name for the AI-enhanced RRM workflow

## Step 3: Select Deployment type.

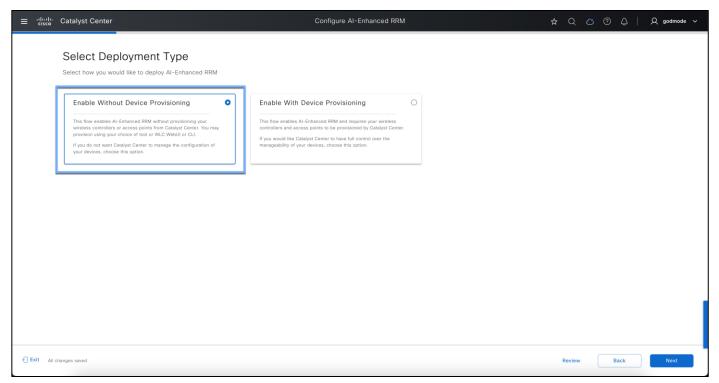
This page allows customers to choose between Device Provisioning and non-Device provisioning workflow.

• With Device Provisioning: When employing device provisioning, network profiles within Cisco Catalyst Center are utilized to administer the entire 9800 Wireless Controller. This approach necessitates that users provision both their Cisco Catalyst 9800 Wireless Controller and Access Points using the designated network profile. All configurations are done through Profiles that are maintained on Catalyst center.

• Without Device Provisioning: For users who choose not to provision their 9800 Wireless Controller through Cisco Catalyst Center, there is an alternative method that enables the management of RF configurations directly via the Catalyst Center, while all other settings are managed locally on the Catalyst 9800 Wireless Controller itself. In this scenario, the user employs the local GUI or CLI to configure the WLC, and the Catalyst Center is utilized solely for monitoring purposes, providing assurance and Al-Enhanced RRM services.

## 3A: Without Device Provisioning workflow:

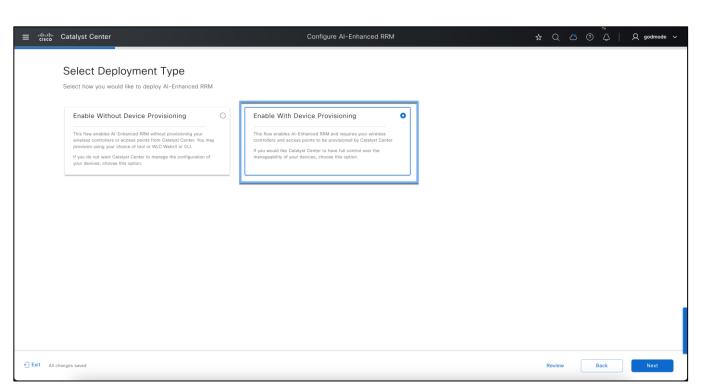
This process allows for AI-Enhanced Radio Resource Management (RRM) without needing to configure your wireless controllers or access points through Catalyst Center. You have the flexibility to provision using your preferred tool, the WLC WebUI, or CLI. If you prefer not to have Catalyst Center handle your device configurations, select this option.



#### Figure 15 Without Device Provisioning workflow

#### **3B: With Device Provisioning workflow:**

If a user has provisioned their 9800 Wireless controller with a Network profile before this setup (Using Catalyst Center Network profile-based Automation), they will select **Enable with Device Provisioning.** 



## Figure 16 With Device Provisioning workflow

## **Step 4: Prerequisites check**

At this stage, if you have not met with any prerequisites, this page will call it out and have a red cross or error sign like shown below. You can select the redirect allow icon which will take you to the settings page to enable the needful. Once enabled, you can hit the individual refresh button in the tile and then hit next.

dudu DNA Cen	ter	Configure AI-Enha	nced RRM	☆ Q	. 8 0	\$	Q admin
These a		Enhanced RRM without device provisioning. If you sure to refresh the card to view the updated status.					
Enat	ole Cisco Al Analytics 🛛 🧭	Assign Al-Enhanced RRM Capable Devices to Site(s)	Enable Device Controllability 🗾				
Al-En Enable conne Cloud, RF tele optimi	work Analytics hanced RRM	Assign wireless controller(s) and access point(s) to buildings where you would like to enable Al- Enhanced RRM. An access point's site assignment is mandatory to determine the RF Tags configured for a building.	Device Controllability Enable Device Controllability in System Settings to allow Cisco DNA Center to configure the optimized RF settings on the Catalyst 9800 controller.				
	🕑 Go to System Settings	[2] Go to Inventory	C Go to System Settings				
xit All changes saved				Review	Back		Next

# Figure 17 Check For Prerequisites

## Step 5: Select the location to assign the AI RF Profile

AI-Enhanced RRM is enabled at the WLC level globally, just like RRM. All sites having APs associated with the controller assigned to other buildings will also be managed by AI-Enhanced RRM; the workflow supports this, and all impacted sites will be listed as Impacted and assigned as well. Make sure to add all the sites associated with 1 controller.

**Note:** v2.3.7.4/5 supports 20 building selections at a time. If you have more than 20 buildings in a WLC, split out the building selections.

Select the buildings in the same 9800 controller at this step.

diadio DNA Center		Con	figure AI-Enhanced RRM		☆ Q 凸 © ֆ│.	Q admi
Select the locations where a	ns to Assign AI F you would like to assign the / ssigned to buildings manage or sites managed by a provisi	Al enabled RF Profiles d by Cisco Catalyst 9800				
Q Search Hierarchy → □ 0 Global	Search Help	Site selection summ	hary		$\nabla$	
<ul> <li>◇ ○ </li> <li>◇ ○ </li> <li>○ </li></ul>	t.	Selected Building	Impacted Locations 📀	Primary WLC	As of: Oct 17, 2023 12:27 AM Secondary WLC •	
> □ @ SCJ06				No data to display		
t All changes saved					Review Back	Next

## Figure 18 Select The Buildings To Enable AI-Enhanced Rrm

# 5A: Without Device Provisioning workflow:

If you have some sites not selected from the same controller, the system will alert you via a pop-up warning saying more locations in this WLC have not been selected. All sites on a given controller must run the same RRM algorithm. If there are sites associated with the controller that have not been selected

	DNA Center	Configure AI-Enhanced RRM		* Q 🖒	⑦
	DVA Center  Select Locations to Assign A Select the locations where you would like to assign A FF Profiles can only be assigned to buildings ma controllers, Ineligible sites or sites managed by a pr selectable.  Search Hierarchy  Search Hierarchy	AI RF Profiles the AI enabled RF Profiles naged by Cisco Catalyst 9800 wireless	inge	As of Oct 31, 2023 Secondary WLC Assign	Ŷ
- Exit a	UI changes saved	1 Record(s)	Show F	Records: 25 ∨ 1 - 1 < Review Bz	0 >

Figure 19 Pop-Up Warning If All Buildings In The Same 9800 WLC Are Not Selected

To mitigate this, choose "Select more Locations" and go back to site selection, adding the remaining buildings.

WARNING: In this step, it's crucial to select all the buildings that are associated with the same 9800 WLC. If you proceed with "Continue with Current Selection" without including all the relevant buildings and their access points, the unselected sites and APs will be excluded from receiving RRM services.

## **5B: With Device Provisioning workflow**

After building selection, a consent window pops up to make sure you have a network profile assigned to the WLC.

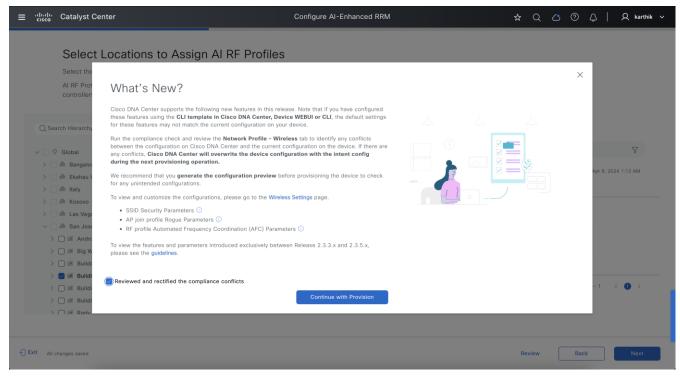


Figure 20 Pop-Up On What's New In 2.3.7.X

**Note:** For onboarding Without Device Provisioning see <u>step 6</u>. With Device Provisioning proceeded to <u>step 7</u>.

# Step 6: Select with Primary and Secondary WLC

At this step, please select the Primary WLC for each site.

Select Locations to	Assign Al I	RF Profiles				
Select the locations where you wou	Ild like to assign the	Al enabled RF Profiles				
AI RF Profiles can only be assigned controllers. Ineligible sites or sites selectable.						
Q Search Hierarchy		Site selection summa	ry			
✓ □ ♀ Global (3)	Search Help	Q Search Table				$\nabla$
✓ □ in San Jose						
🗸 🕝 🗃 Building 14					As of: Oct 17,	2023 12:29 AM
🗌 🗟 Floor 1		Selected Building	Impacted Locations 💿	Primary WLC	Secondary WLC -	
<ul> <li>□ @ Floor 2</li> <li>&gt; Ø ፼ Building 18</li> <li>&gt; Ø ፼ Building 24</li> </ul>		San Jose/Building 14	San Jose/Building 24,San Jose/Building 18	Karthik-demo-9800 Change	Assign	
> 🗌 🗃 SCJ06		San Jose/Building 18	Not Available	Karthik-demo-9800 Change	Assign	
		San Jose/Building 24	Not Available	Karthik-demo-9800 Change	Assign	
		3 Record(s)		Show	w Records: 25 🗸 1 - 3	< 0 >

## Figure 21 Select Primary And Secondary WLC

In case of having multiple controllers in the same building, you can select individual wireless controllers for each floor in this page.

# Hit confirm once done.

	DNA Center		Configure AI-	Enhanced RRM		\$ Q 🖒 🕅	⊜   Q admin ∨
	Select Location: Select the locations where y AI RF Profiles can only be as controllers. Ineligible sites or selectable.	Select the secondary wireless cont not push any configuration on the of Select Deployment Type • All floors are managed by the	roller managing <b>San Jose/Bui</b> controller.	-	Center assignment only and does r different wireless controller(s)	×	
	Q Search Hierarchy → □ ♡ Global (3)	Wireless Controllers (3)	)				V
	✓ Ø San Jose ✓ Ø I Building 14 Ø Floor 1	WLC Name	IP Address	Reachability	Site A	s of: Oct 17, 2023 12:29 ary WLC 🔺	AM
	<ul> <li>Floor 2</li> <li>E Building 18</li> <li>E Building 24</li> </ul>	MBCC-IMPACT-SSO- 1.demo.local	172.20.228.117	<ul> <li>Reachable</li> <li>Reachable</li> </ul>	Not Available		
	> ] @ SCJ06	O Karthik-demo-9800	172.20.228.104	Reachable	Not Available		
		3 Record(s)		Show Re	cancel	✓ 1-3 < ①	
🗧 Exit Al	I changes saved					Review Back	Next

Figure 22 Select WLC For The Building

## Step 7: Select the AI RF Profile to assign.

You can select from a previously configured AI RF Profile, or by selecting the actions menu "Create a new AI RF Profile to add" or "Clone Existing AI RF Profile". Let us create an AI-RF profile using this workflow.

	NA Center		Config	ure AI-Enhanced RRM	1	\$ Q C @ \$	
	Assign AI RF P	rofile and Verify T	ags				
		the locations, choose the AI enail enabled RF Profile in the list? F Profile to apply	bled RF Profiles to use fro	m			
	the configured RF Tag. Sin basis, it is optional but high unique across access point	building. Cisco DNA Center ass ce AI-Enhanced RRM provides a hly recommended that the RF Ta ts of different buildings. If acces le insights generated for a single for that building.	ctionable insights on a pe gs on your Cisco 9800 co s points across buildings	er-building ontroller are share the			
	Buildings (3)						
	Q Search Table						$\nabla$
						As of: Oct 17, 2023 12:33 AM	S
	Location 🔺	Select AI RF Profile	Primary WLC	Secondary WLC	RF Tags 🕠	Overlapping RF Tags () Actions	
	San Jose/Building 14	SJC-18 🗶 🗡	Karthik-demo-9800	Not Assigned	SJC	SJC	
	San Jose/Building 18	SJC-18 (2) V	Karthik-demo-9800	Not Assigned	AIRRM-SJC18, SJC	Create a new AI RF Profile to add Clone Existing AI RF Profile Apply This AI RF Profile to All	
	San Jose/Building 24	SJC-24 🙁 🗡	Karthik-demo-9800	Not Assigned	Netherlands		
🗧 Exit All ch	anges saved					Review Back	Next

## Figure 23 Select AI RF Profile

## Step 8: Creating a new AI RF Profile

- Enter a Name to the AI RF Profile
- Select the Bands you want AI-Enhanced RRM to manage.
- Enter the Busy Hour of your network and how sensitive your network is to RRM Changes
- Enable all the Algorithms you want to use in this AI RF profile.

What is Busy Hour? The concept of 'Busy Hour' refers to the time period during which your network experiences the highest levels of activity and to make optimizations tailored for that period. This optimization is usually applied after busy hour unless necessary. 'Busy Hour Sensitivity' is a specific setting that adjusts how responsive the AI-Enhanced RRM is in optimizing radio frequency during these identified busy periods.

- High Sensitivity RRM optimizations will occur whenever RF improvements are possible.
- Medium Sensitivity (Default mode) RRM optimizations will occur less frequently than high sensitivity.
- Low Sensitivity RRM optimizations will only be crucial changes affecting operations, and the rest of the changes will be deferred until after the configured busy hour.

Crucial changes include:

- o DFS hits
- o ED-RRM
- o RF Jammer
- o Persistent, excessive co-channel interferences from nearby rogues

Note: Sensitivity outside the configured busy hour is equivalent to high sensitivity

An AI RF Profile contains the same elements as a legacy controller-based RF Profile but adds the service configurations and other element configurations to which it will be subscribed.

The Services include:

- FRA Flexible Radio Assignment
- DCA Dynamic Chanel Assignment
- TPC Transmit Power Control
- DBS Dynamic Bandwidth Selection

**Note:** At least 1 of the 4 (FRA, DCA, TPC and DBS) AI-Enhanced RRM services must be enabled to onboard a site in AI-Enhanced RRM Service.

Any changes or corrections can be made at this time and saved. The profile only exists on the Cisco Catalyst Center at this point. Until the devices are provisioned and have profiles (either classic or AI) selected and pushed, no changes are made to the controllers or the associated APs operational configurations.

When satisfied select "Save" to complete the action. Upon saving you will be returned to the AI RF-Profiles main screen showing the results of the actions.

■ Cisco DNA Center	Design / Network Settings / Create Al RF Profile	Q @ 🛎 🗘
Wireless / Create AI RF Profile		
Create Al Radio Frequency Profile Profile Name* Test-Al-RF-Profile		
<ul> <li>Basic Settings</li> <li>Radio Frequency Settings</li> <li>2.4 GHz</li> <li>5 GHz</li> <li>6 GHz</li> <li>Busy Hours</li> <li>Start time</li> <li>9:00</li> <li>17:00</li> <li>Low</li> <li>Medium</li> </ul>		
Enable RF Settings 2.4 GHz	5 GHz 6 GHz	
Flexible Radio Assignment 💿		
Dynamic Channel Assignment 💿		
Dynamic Bandwith Selection 💿		
Transmit Power Control 💿		
> Advanced		
		Cancel Save

#### Figure 24 Create AI RF Profile



Figure 25 Advance AI RF Profile Configurations For DCA And DBS

	12	18	24	36	48	54	
Mandatory Data Rates	Choose upto two data rat	e					
<b>6</b> 9	12 🗌 18 🗌 24	36	48 🗌 54				
TX POWER CONFIG	JRATION						
Power Level							
-10				30		RX SOP Auto	~
dBm	1	l0dBm		30dBm			
TPC POWER THRES	HOLD						
	-67						
dBm	-	65dBm		-50dBm			
CLIENT LIMIT							
CLIENT LIMIT ① Max Client*							
	Range: 0-40	_					

# Figure 26 Advanced AI RF Profile Configurations For TPC And Data Rate Support

You can apply the same AI RF profile to all the selected buildings.

Note: We recommend using individual RF profiles per Building

Should you encounter a scenario where RF tags are duplicated across multiple buildings, the workflow will alert you to the potential issue of applying identical AI-RF profiles to these buildings. To resolve this, you can follow the outlined steps to alter the RF tags within your 9800 controller. **Not a mandatory step, just a recommendation.** 

The caveats of overlapping tags are that getting an insight on a particular site with overlapping RF Tags will restrict you from applying the insights directly. As a workaround, you can use the suggested action to create new RF Tags and then apply Insights.

This warning will inform you that you have overlapping RF tags and ask if you still want to proceed.

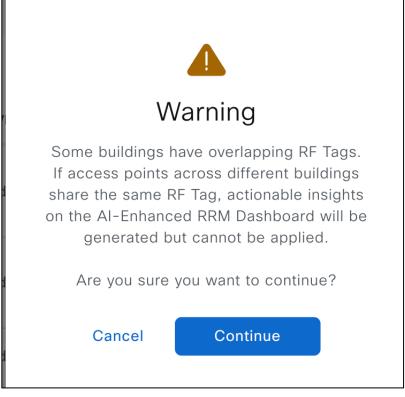


Figure 27 RF tag overlapping warning

# Step 9: Resolving Overlapping RF Tags (Optional Step)

**Note:** This step is only applicable for Without Device provisioning workflow.

Overlapping RF Tags means you have access points across multiple buildings sharing the same RF-Tag on 9800.

When you share overlapping RF Tags across different sites on the 9800, we will be restricted to using the same AI-RF profiles for those shared RF tag buildings. The reason for that is that this workflow can only modify the RF tag settings with 1 per band RF profile on 9800.

This is not a blocker but will lead to sharing AI-RF profile settings across buildings, including busy hours. In such situations, we will block applying Insights on a per-site basis as it will make an overall AI-RF profile change, which could impact multiple locations.

If you want to eliminate this warning and create individual Rf tags per site, we suggest some actions. You can click on Suggested Actions on individual sites:

E disco DI	NA Center		Config	gure AI-Enhanced RRM		\$ Q C @ Q   A	admin 🗸
	unique across access poin	ts of different buildings. If a le insights generated for a s	F Tags on your Cisco 9800 cr ccess points across buildings ingle building can not be app	share the			
	Buildings (3)						
	Q Search Table					$\nabla$	
						As of: Oct 17, 2023 12:33 AM 🛛 🦯	
	Location +	Select AI RF Profile	Primary WLC	Secondary WLC	RF Tags 🕕	Overlapping RF Tags 🕕 Actions	
	San Jose/Building 14	SJC-18	∑ Karthik-demo-9800	Not Assigned	SJC	▲ SJC Suggested Actions	
	San Jose/Building 18	SJC-18	∑ Karthik-demo-9800	Not Assigned	AIRRM-SJC18, SJC	▲ SJC	
	San Jose/Building 24	SJC-24	⊻ Karthik-demo-9800	Not Assigned	Netherlands		
	3 Record(s)					Show Records: 25 🗸 1 - 3 < 4 >	
Exit All cha	nges saved					Review Back No	ext

Figure 28 Suggested action for overllaping RF tags

# Update RF Tags

Update the RF Tag for access points in **San Jose/Building 14** using the WLC WebUI on both, the primary and secondary wireless controllers. Once updated, resync the device in inventory and refresh the table to ensure the right tags are displayed. Note that it may take a few minutes for Cisco DNA Center to display the updated tags.

## For Karthik-demo-9800

#### If using Static Configuration Method to Tag access points:

Download the below CSV file with AP Mac addresses and new RF Tag. Import the CSV on the controller Web UI to update the tags on these access points. Please make sure that the RF Tag below is already present on the wireless controller. If not, please add the tag in Web UI before uploading this file.

Or

Download the below CLI configuration file with AP Mac addresses and new RF Tag. Apply the configuration settings from the downloaded CLI configuration file on the controller command-line interface.

Suggested RF Tag Name*
AIRRM-Building-14

Download CSV File or CLI Configuration File

#### If using AP Filter Method to Tag access points:

Modify the AP filter on the WLC WebUI or CLI to have unique RF Tags for each building. Download the list of access points per building to assist you in this task.

#### Download list of access points

#### If using Location Method to Tag access points:

Modify the existing locations on the WLC WebUI or CLI to have unique RF Tags for each building. Download the list of access points per building to assist you in this task.

Download list of access points

#### Figure 29 Different options of updating RF tags

We have 3 options for you here:

1. Create a new RF-Tag and take a CLI dump to paste it to the 9800.

Close

X

#### If using Static Configuration Method to Tag access points:

Download the below CSV file with AP Mac addresses and new RF Tag. Import the CSV on the controller Web UI to update the tags on these access points. Please make sure that the RF Tag below is already present on the wireless controller. If not, please add the tag in Web UI before uploading this file.

Or

Download the below CLI configuration file with AP Mac addresses and new RF Tag. Apply the configuration settings from the downloaded CLI configuration file on the controller command-line interface.

Suggested RF Tag Name*
AIRRM-Building-14

Download CSV File or CLI Configuration File

Figure 30 Download CLI template for static tagging

# wireless tag rf AIRRM-Building-14 exit ap 00:42:68:c5:bb:b2 rf-tag AIRRM-Building-14 policy-tag SJC site-tag SJC exit ap ac:4a:56:be:da:78 rf-tag AIRRM-Building-14 policy-tag SJC site-tag SJC exit ap 70:69:5a:76:34:d8 rf-tag AIRRM-Building-14 policy-tag SJC site-tag SJC exit ap 04:eb:40:9e:1f:f4 rf-tag AIRRM-Building-14 policy-tag SJC site-tag SJC exit ap 0c:75:bd:0d:46:88 rf-tag AIRRM-Building-14

# Figure 31 CLI template for static tagging

policy-tag SJC

This CLI template can be directly copied to the 9800 CLI in the Config Terminal.

2. CSV with all the AP mac on this site.

If using Static Configuration Method to Tag	g access points:
	ddresses and new RF Tag. Import the CSV on the controller Web UI to ase make sure that the RF Tag below is already present on the wireless UI before uploading this file.
Or	
Download the below CLI configuration file wi from the downloaded CLI configuration file o	th AP Mac addresses and new RF Tag. Apply the configuration settings n the controller command-line interface.
Suggested RF Tag Name*	
AIRRM-Building-14	

## Figure 32 Download CSV file for static tagging

Download CSV File or CLI Configuration File

The CSV file provided can be used for Static Tagging, which will give a list of APs with the respective Policy Tag, Site Tag, and the new RF Tag mentioned in the Suggestive Action page.

- 1. RF Tag name "AIRRM-Building-14" from the suggested RF Tag name should be manually added on 9800.
- 2. Then use the downloaded .csv to upload through 9800.

**Note:** 9800 only supports an upload limit of 20Kb. The CSV file download will be limited to 20Kb and bundled into multiple CSV files in a zip format.

00:42:68:c5:t SJC	SJC	AIRRM-Building-14
ac:4a:56:be:cSJC	SJC	AIRRM-Building-14
70:69:5a:76:: SJC	SJC	AIRRM-Building-14
04:eb:40:9e:: SJC	SJC	AIRRM-Building-14
0c:75:bd:0d:4 SJC	SJC	AIRRM-Building-14
04:5f:b9:c4:0 SJC	SJC	AIRRM-Building-14
58:ac:78:dc:f SJC	SJC	AIRRM-Building-14
)		
L		

# Figure 33 CSV for static tagging

To import the	CSV on 980	), you go to	Configuration >	Tags >	AP > Static.
---------------	------------	--------------	-----------------	--------	--------------

Cisco Cata	alyst 9800-80 Wireless Controller	W	/elcome admin 🛛 🛠 🕼 🛱	Search APs and Clients Q
Q. Search Menu Items	Configuration · > Tags & Profiles · > Tags Policy Site RF AP			
Dashboard     Monitoring >	Tag Source Static Location Filter		B Select File	1 Lupload File
Configuration >	Number of AP Tag mappings selected : 0		Select CSV File	
© Licensing	AP MAC Address     045f.b9c4.0620	Policy Tag Name     HD-ALL	Site Tag Name  HD-Local	RF Tag Name
X Troubleshooting	04eb.409e.05e8	WPA3-Flex	HD-Flex-119	HD-RF-Tag
Troubleshooting	04eb.409e.06dc	HD-ALL	HD-Local	HD-RF-Tag

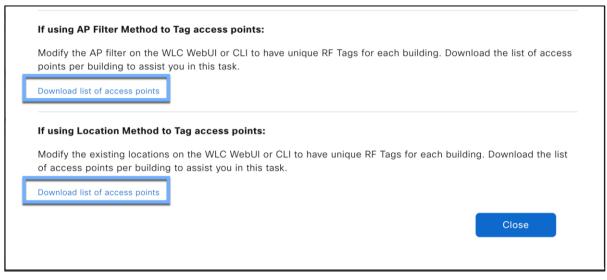
## Figure 34 Upload CSV for static tagging on Catalyst 9800 Wireless controller

To import the CSV on 9800, you go to Configuration > Tags > AP > Static.

**Note:** If you have a zip file downloaded from the workflow, make sure to unzip the file and upload 1 CSV file at a time.

3. CSV to import into rule-based tagging.

You can download the AP MAC address list in CSV format for this site and import it to the location/Filter based tagging.



## Figure 35 CSV files for filter based tagging

**Note:** This list only has APs for 1 selected site. Make sure to do this for all the sites with suggested actions.

Once you have modified the 9800 with new RF tags, you will have to resync the 9800.

To do that, Open a new tab for the Catalyst Center.

- Hamburger menu > Provision > Inventory
- Select the 9800 where these changes have been made > Click Action > Inventory > Resync Device

	Devices (1	) Focus: Default ~						
	Q Click here to apply basic or advanced filters or view recently applied filters							
	1 Selected	Tag 🕂 Add Device 🗛	actions 🔨 🕕					
	)	Device Name	Inventory	>	Edit Device			
		LIVE-C9800-4	Software Image	>	Resync Device			
		Watchlist	Provision	>	Reboot Device			
			Telemetry	>	Delete Device			
<			Device Replacement	>	Import Inventory			

#### Figure 36 Resync device

Once the device has been successfully resynced, go back to the workflow, and hit the refresh button on the page. This should detect your new RF Tags and remove the warning for the respective sites.

	DNA Center		Configur	re AI-Enhanced RRM		\$ Q 🖒	⑦ ♫ │ ႙ admin ∨
	unique across access poin	hly recommended that the RF Ta ats of different buildings. If acces ble insights generated for a singl for that building.	ss points across buildings sh	are the			
	Buildings (3)						
	Q Search Table						$\nabla$
						As of: Oct 17, 202	23 12:33 AM 📿
	Location A	Select AI RF Profile	Primary WLC	Secondary WLC	RF Tags 🕕	Overlapping RF Tags 🕕	Actions
	San Jose/Building 14	SJC-18 (⊠ ∨	Karthik-demo-9800	Not Assigned	SJC	SJC Suggested Actions	
	San Jose/Building 18	SJC-18	Karthik-demo-9800	Not Assigned	AIRRM-SJC18, SJC	SJC Suggested Actions	
	San Jose/Building 24	SJC-24 🗷 🗡	Karthik-demo-9800	Not Assigned	Netherlands	-	
€ Exit A	3 Record(s)					Show Records: 25 V 1 -	3 < 1 > Back Next
	g						

## Figure 37 Refresh after changing tagging on Catalyst 9800 Wireless controller

**Note:** Refreshing will take time in a high AP scale environment. You can resume the workflow in 15 mins.

# Step 10: Review and verify the Summary.

On the summary page, all the configurations from the AI RF Profile will be listed out along with the site assignments. Click next once verified.

	DNA Center	Configure AI-Enhanced	RRM	☆ Q C Ø Q	, │ Q admin ∽
	Summary				
		make any changes if needed by clicking on Edit link.			
	✓ Task Details				
	Task Name	Assign_ai_rf_17_10_23_12_25_AM			
	<ul> <li>Select Deployment Type</li> </ul>				
	Deployment Type	Enable Without Device Provisioning			
	<ul> <li>Select Locations to Enable AI-Enhance</li> </ul>	nced RRM Edit			
	Buildings (3)				
	Q Search Table				
	Selected Building *	Primary WLC	Secondary WLC		
	San Jose/Building 14	Karthik-demo-9800	Not Assigned		
🕣 Exit 🛛 All	I changes saved			Back	Next

Figure 38 Summary of AI RF profile assignment to a site

# **Step 11: Configuration Generator**

Selecting next will push the AI RF Profile to the selected WLC and APs once provisioned. As with legacy RF Profiles, changing or applying an RF Profile causes a CAPWAP reset and momentarily disrupts AP connectivity.

	DNA Center	Configure AI-Enhanced RRM	☆	Q	♂ ⊘	¢	Q admin $\sim$	
	Schedule Task							
	Schedule Task							
	Choose when you would like to deploy the AI RF Profiles on	n the selected locations.						
	This workflow supports enforcing network administrators and Settings → Visibility and Control of Configurations	ind other users to preview configurations before deploying them on the network device	s. To configure this sett	ing, go	to System →	×		
	Now							
	C Later							
	<ul> <li>Generate configuration preview ()</li> <li>Creates preview which can be later used to deploy on selected devices.</li> </ul>	View status in Work Items						
	Task Name							
	Assign_ai_rf_17_10_23_12_25_AM							
								-
🗧 Exit 🛛 A	I changes saved				Back		Deploy	

# Figure 39 Generate configuration preview

Download backup profile consist of you the AP to RF profile mapping. This CSV can be used to import while unassigning AI-Rf profile from a WLC. This will roll back to original customer configuration.

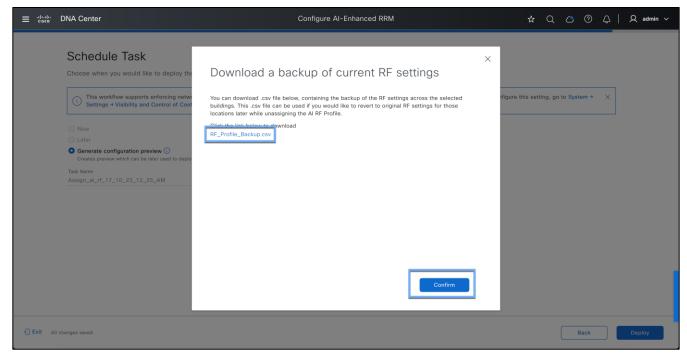


Figure 40 Download backup for current RF settings

The generate config preview page will show all the configs being pushed from Catalyst Center to 9800. This workflow will involve:

- Changing the RF group leader for each band
- Adding RF profiles for 2.4,5 and 6Ghz
- Modifying RF profiles on the respective RF Tags.

≡ ^{diada} DNA Center	Configure AI-Enhanced RRM	🖈 Q 🔿 🕜 👃 🛛 admin 🗸
When you start previewing device of can choose another device to gene	ation - Assign_ai_rf_17_10_23_12_52_AM onfigurations, the system automatically chooses the first listed device and generates its configuration p rate its configuration preview. When you are ready to submit the configurations for all the devices listed r this process to complete, you can leave this page at any time by clicking 'Exit and Preview Later' but	. click "Deploy". Status: 🥥 Ready
Group By • Platform V	Device IP: 172.20.228.104 Site: Global/San Jose/Buildi () Config Sourced From • All ∨	Show in tree view
CISCO CATALYST 9800 SERIES Karthik-demo-9800	<pre>crrm=rldr-set xmlns= "http://cisco.com/ns/yang/Cisco-105-XE-mireless-rrm=rpc" &gt; clp=addr=JZ2.28.225.31</pre> cloader-name:127.28.225.31 crl=network-names/gen=RBW crl=network	@ Hide line numbers │ Q. Search
() Generation Status Legend	22 strf-arofilm	Exit and Preview Later Discard Deploy

#### Figure 41 Config preview

Al RF Profile deployment can be done now or can be scheduled for a non-operational hour.

≡ ^{dualu:} DNA Center	Configure AI-E	nhanced RRM	☆ Q C ② Q   Q ad	dmin 🗸
Preview Configur	ation - Assign_ai_rf_17_10_23_12_56_/	Deploy		$\times$
	configurations, the system automatically chooses the first listed device and generates rrate its configuration preview. When you are ready to submit the configurations for a	• Now O Later		
i If you do not wish to wait for Items window.	or this process to complete, you can leave this page at any time by clicking 'Exit and	Task Name Assign_ai_rf_17_10_23_12_56_AM		
Group By • Platform > 0	Device IP: 172.20.228.104 Site: Global/San Jose/Buildi () Config Sourced From • All ∨ 1 * crrm-rldr-set xmlns= "http://cisco.com/ns/yong/Cisco-IOS-XE-wirele			
<ul> <li>CISCO CATALYST 9800 SERIES</li> <li>Karthik-demo-9800</li> </ul>	2 <tp-addr:122.00.225.11< tp=""></tp-addr:122.00.225.11<>			
Generation Status Legend			Cancel	hit

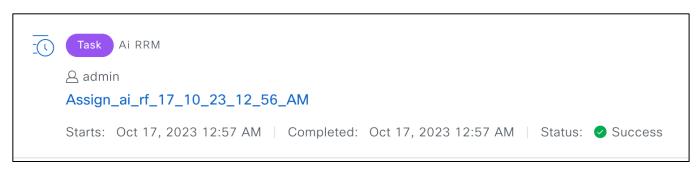
## Figure 42 Deploy Al-enhanced RRM

Once you hit submit, AI-RF profile is pushed to the 9800 in for of 3 RF profiles for each band.

DNA Center	Configure AI-Enhanced RRM	☆ (	20	0	Q   X	Q admin ∨
Done! AI RF Profiles Assigned We expect this to take some time. Please check Tasks page for updated s	tatus.					
San Jose>Building 14 deployment triggered     San Jose>Building 18 deployment triggered     San Jose>Building 24 deployment triggered						
WHAT'S NEXT? Visit Al-Enhanced RRM Dashboard See all RF Profiles List						
C Workflows Home						
			ask Su		ed	×

## Figure 43 Select tasks to view update

When you click on Tasks, you will see the task progress. Once the task has successfully completed, you can go back to AI-Enhanced RRM Page and look at the AI enabled sites.



#### Figure 44 Task progress

## Step 12: Verify the Assignment

Verify AI RF Profile is successfully assigned to the Site.

- Go to the Hamburger Menu (≡) > Assurance > AI-Enhanced RRM
- Use the Site Hierarchy sidebar and navigate to the site where AI RF Profile is deployed.
- An AI logo will be shown along with highlighting the site name, which confirms AI RF Profile is successfully assigned to the site.

**Note:** It takes about 30 mins to get data populated on the AI-Enhanced RRM Control center after enabling the solution.

≡ ^{altata} DNA Center	Assurance / Al Network Analytics / Al-	Enhanced RRM 🛧 Q 🔿 🖓   Q admin 🗸
All Sites Al Enabled Sites	① 24 Hours ∨ Band 5GHz 2.4GHz 6GHz AI RF Profile: SJC-18	Next RRM Run 🛈 : Estimating 🖥 Oct 16, 2023 12:54 AM - Oct 17, 2023 12:54 AM
Q Search	▲ Some of the configurations on this building might change after the corresponding	work item is deployed. To see all the active work items, go to Activities $ arrow$ Work Items $\mathbb{C}^*$ $\qquad$
III San Jose/Building 24 III San Jose/Building 14 III San Jose/Building 18	SUMMARY RF PERFORMANCE SUMMARY 6 0 - /100 - % - Total AP Count Total Clients RRM Performance ① APs with High CCI ① R	RF COVERAGE SUMMARY AI RF PROFILE SIMULATOR High N/A Run RRM Simulation
	Insights	C Fetching Data
	~ RF Performance	
	RRM Changes ① Latest TREND	FRA Changes 🛈
		Task Submitted ×
	$\bigcirc$	

Figure 45 Al-enhanced RRM control center after enablement

# Part 4b: AI-Enhanced RRM Workflow for v2.3.7.3 and below (Older versions)

### **Create an AI RF profile**

To add a site to the AI-Enhanced RRM service to manage the sites and APs' RRM, you must create an AI RF profile. If you have learned the profiles and configurations from the controller already (via the Learn Device

Configuration workflow), you can convert an existing RF profile to an AI RF profile. There is also a workflow for creating and assigning an AI RF profile to a site.

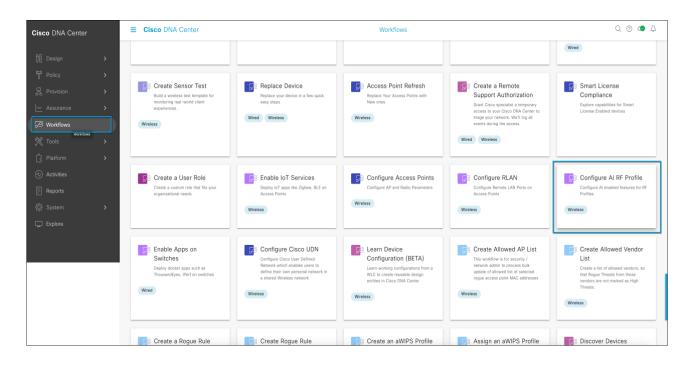
### **Option 1: Creating AI RF Profile from Network Settings**

- Click the hamburger menu icon ( $\equiv$ ) and choose **Design > Network Settings > Wireless** Tab > **Global**.
- on Sidebar > Scroll down to Wireless Radio Frequency Profile.
- You can check the box for an existing RF profile > go to Actions and select Upgrade to AI.
- To create a brand-new AI RF Profile, select +Add > AI RF Profile and customize the AI RF profile according to your wireless network requirements.
- Go to the AI RF Profile tab to find your newly created AI RF Profile.
- To assign this AI RF Profile to a site, on your AI RF Profile column click on ... then go to Assign Locations
- Select all the buildings you want to assign this AI RF Profile to and want to use AI-Enhanced RRM, then select **Assign**.

### **Option 2: Creating AI RF Profile using a Workflow.**

### Step 1: Create an AI RF profile.

Click the hamburger menu and choose Workflows > Configure AI RF Profile.



### Figure 46 Config AI RF Profile Workflow

Step 2: Assign a name to the task and click Next.

≡ Cis	co DNA Center	Configure AI RF
	Get Started	
	To help you identify your workflow, assign a meaningful You can exit this workflow at any time and resume work	
	Task Name* Create AI-RF profile	

Figure 47 Create AI RF profile task

### Step 3: Select the location to assign the AI RF profile.

AI-Enhanced RRM is enabled at the WLC level globally, just as RRM is. All sites having APs associated with the controller but assigned to other buildings will also be managed by AI-Enhanced RRM; the workflow supports this. All impacted sites will be listed as Impacted and assigned as well.

Select the site(s) to assign and click **Next**.

≡ Cisco DNA Center	Configure AI RF Profile		Q @ @ A
Select Locations to Assign AI RF Profiles Select the locations where you would like to assign the AI enabled RF Profiles The AI enabled RF Profiles can be assigned to buildings or sites that are eligible and managed by Cisco Catalyst 9800 WLCs. The sites that are not eligible cannot be selected			
Q Search Hierarchy 🐨	Site selection summary: Selected Location	Impacted Location No impacted locations available	
Exit All changes saved		Review	Back Next

### Figure 48 Site Assignment for the AI RF Profile

### Step 4: Select the AI RF profile to assign.

You can select from a previously configured AI RF profile or select the Actions menu and choose "Create a new AI RF Profile to add" or "Copy the currently assigned RF Profile and AI Settings."

■ Cisco DNA Center		Configure AI RF Profi	le	ର୍ ଡ ଏ	۵ ۵
Select AI RF Profiles to assign Based on the selection of the locations, choose the AI enabled Can't find an AI enabled RF Profile in the list? Create a new AI					
(i) To assign the same AI RF Profile across all buildings, select a n	ow with AI RF Profi	ile assigned from dropdown an	f click on 'Apply All'.	×	
Buildings					
Q Search Table				$\nabla$	
0 Selected Apply All				As of: Sep 26, 2022 3:58 PM	
Location A	Floors	Current RF Profiles	Replace with AI RF Profiles	Actions	
United States/Las Vegas/Mandalay Bay Convention Center	1		Select Create a new AI RF Profile to ad Copy Current RF Profile & AI Set		
Exit All changes saved			Re	view Back Next	

# Figure 49 Selecting the AI RF Profile

### Step 5: Create a new AI RF profile (6-GHz support starts with Cisco Catalyst Center Release 2.3.4)

- Enter a name for the AI RF profile.
- Select the bands you want your network to operate on.
- Enter the busy hour of your network and how sensitive your network is to RRM changes.
- Enable all the algorithms you want to use in this AI RF profile.

What is the busy hour? It determines when RRM optimizations will occur based on how sensitive your network is to changes:

- High Sensitivity RRM optimizations will occur whenever RF improvements are possible.
- Medium Sensitivity (Default mode) RRM optimizations will occur less frequently than high sensitivity.
- Low Sensitivity RRM optimizations will only be crucial changes affecting operations, and the rest of the changes will be deferred until after the configured busy hour. Crucial changes include:
  - DFS hits
  - ED-RRM
  - RF Jammer
  - · Persistent, excessive co-channel interferences from nearby rogues

Note: Sensitivity outside the configured busy hour is equivalent to high sensitivity

An AI RF profile contains the same elements as a legacy controller-based RF profile but adds configurations for services and other elements that will be subscribed to.

The services include:

- FRA: Flexible Radio Assignment
- DCA: Dynamic Chanel Assignment
- TPC: Transmit Power Control
- DBS: Dynamic Bandwidth Selection

**Note:** At least one of the four AI-Enhanced RRM services (FRA, DCA, TPC, and DBS) must be enabled to onboard a site in the AI-Enhanced RRM service.

Any changes or corrections can be made at this time and saved. The profile exists only on Cisco Catalyst Center at this point. Until the devices are provisioned and have profiles (either classic or AI) selected and pushed, no changes are made to the controllers or the associated APs' operational configurations.

When satisfied, select **Save** to complete the action. Upon saving you will be returned to the AI RF profiles main screen showing the results of the actions.

E Cisco DNA Center	Design / Network Settings / Create AI RF Profile	Q @ C Q
Wireless / Create AI RF Profile		
Create AI Radio Frequency Profile Profile Name* Test-AI-RF-Profile		
<ul> <li>&gt; Basic Settings</li> <li>Radio Frequency Settings</li> <li>2.4 GHz ≥ 5 GHz ≥ 6 GHz ○</li> <li>Busy Hours ○</li> <li>Start time End time 9:00 17:00</li> <li>Busy Hour Sensitivity ○ Low Medium High</li> </ul>		
Enable RF Settings 2.4 GHz 5 GHz	6 GHz	
Flexible Radio Assignment 💿		
Dynamic Channel Assignment 💿		
Dynamic Bandwith Selection 💿		
Transmit Power Control O		
> Advanced		
	Ca	Save

### Figure 50 Creating an AI RF Profile

<ul> <li>Advanced</li> </ul>			
Display Tuning Controls for 2.4 GHz 5	GHz 6 GHz		
Channel Width Best			
DBS WIDTH			
20	80		
0 20MHz 40MHz	80MHz 1	60MHz	
160 MHz			
40 MHz			
	ער אנה	אות העריאה עוד אות	
1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69	73 77 81 85 89 93 97 101 105 109 113 117 121 125 129 133 137 141 145 149 153 15	7 161 105 169 173 177 181 185 189 193 197 201 205 209 213 217 221 225 229 233	
<ul> <li>UNII 5 (1-93)</li> <li>UNII 6 (97-113)</li> <li>UNII 7 (1</li> </ul>	17-185) • UNII 8 (189-233)		
DCA CHANNEL			
Select All			
🕑 UNII-5 1-93	UNII-6 97-113	🕑 UNII-7 117-185	UNII-8 189-233
<b>1 5 9 1</b>	<b>2</b> 97 <b>2</b> 101 <b>2</b> 105 <b>3</b> 109	2 117 2 121 2 125 2 129	2 189 2 193 2 197 2 201
<b>17 21 25 29</b>	113	2 133 2 137 2 141 2 145	205 209 213 217
S 33 S 37 A1 45		149 153 157 161	221 225 229 233
<b>2</b> 49 <b>2</b> 53 <b>3</b> 57 <b>2</b> 61		😢 165 😢 169 🕑 173 😒 177	
65 2 69 2 73 2 77		2 181 2 185	
81 85 89 93			
Hide Advanced			

Figure 46 Advanced AI RF profile configurations for DCA and DBS

SUPPORTED DATA R	ATE				
Mandatory Data Rates C	hoose upto two data rate	24 36	48 54		
0 6 0 9 0 1	2 18 24 36 48 (	54			
TX POWER CONFIGU	JRATION				
Power Level					
-10		30	RX SOP Auto	~	
0dBm	10dBm	30dBm			
TPC POWER THRESH	HOLD				
	-67				
0dBm	-65dBm	-50dBm			
CLIENT LIMIT 🕕					
Max Client* 200					
	Range: 0-400				

### Figure 52 Advanced AI RF Profile Configurations for TPC and Data Rate Support

# Step 6: Assign an AI RF profile to a site.

Select an AI RF profile to assign to the site, as shown in Figure 68.

⊟ Cis	co DNA Center		Configure Al RF Profi	le	Q () () Q
	Select AI RF Profiles to assign Based on the selection of the locations, choose the AI enabled Can't find an AI enabled RF Profile in the list? Create a new AI				
	() To assign the same AI RF Profile across all buildings, select a	ow with AI RF Profil	le assigned from dropdown an	d click on 'Apply All'.	×
	Buildings				
	Q Search Table				$\nabla$
	0 Selected Apply All				As of: Sep 26, 2022 4:01 PM
	Location *	Floors	Current RF Profiles	Replace with AI RF Profiles	Actions
	United States/Las Vegas/Mandalay Bay Convention Center	1		Test-AI-RF-Profile 3 ^ Q  şearch Test-AI-RF-Profile	
🕣 Exit 🛛 Al	I changes saved			Re	view Back Next

### Figure 53 Selecting an AI RF Profile

# Step 7: Review and verify the summary.

All the configurations from the AI RF profile will be listed on the summary page, along with the site assignments. Click **Next** once you have verified the information.

≡ Cisco	DNA Center		Configure AI RF F	Profile		Q @ (@ Q	
	Details of selected You are going to replace existing If following Al enabled RF Profiles Yo Or For every 30 minutes, Al enhi-	RF Profiles in 1 buildings across u can change any of these set		×			
	Test-AI-RF-Profile     2.4 GHz     Al Settings     Status     Dynamic Channel Assignment     Transmit Power Control	Enabled Enabled Enabled	<b>5 GHz</b> Al Settings Status Dynamic Channel Assignment Transmit Power Control	Enabled Enabled Enabled			
	Dynamic Bandwidth Selection Common Settings Flexible Radio Assignment Busy Hours Busy Hour Sensitivity	Not Applicable Disabled 9:00-17:00 Medium	Dynamic Bandwidth Selection	Enabled			
← Exit All ch	Assignment Assigned to 1 buildings across 1 s United States / Las Vegas/Mandali anges saved				Review	Back Next	

### Figure 54 Summary of an AI RF Profile Assignment to a Site

### Step 8: Choose when to deploy the AI RF profile.

Al RF profile deployment can be done now or can be scheduled for a nonoperational hour.

Selecting **Next** will push the AI RF profile to the selected WLC and APs once provisioned. As with legacy RF profiles, changing or applying an RF profile causes a Control and Provisioning of Wireless Access Points (CAPWAP) reset and momentarily disrupts AP connectivity. A warning is displayed, as shown in Figure 71.

≡	Cisco DNA Center	Configure AI RF Profile	Q @ 🖉 🗘
	Deploy the AI RF Profiles		
	To deploy the assigned AI RF Profiles to the s devices across these locations need to be pr these locations to be restarted.	selected locations shown below, the associated ovisioned, and this would require the APs in	
	IMPACTED LOCATIONS		
	United States>Las Vegas > Mandalay Bay Convention	on Center	
	When would you like to deploy these AI RF Profiles?		
1	Now      Later		
	Task Name Create Al-RF profile		
ĺ			
Exit	All changes saved		Back Deploy

Figure 55 Deploying an AI-RF Profile to a Site

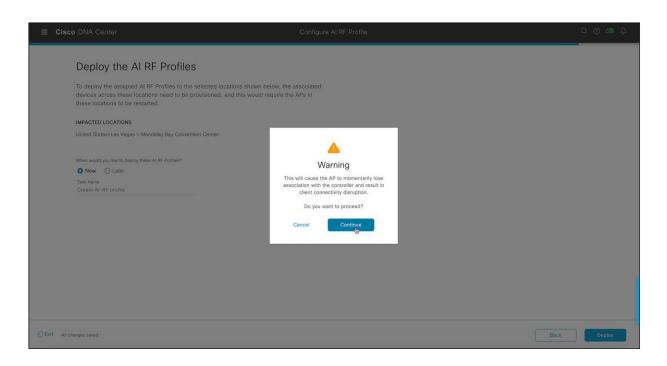


Figure 56 Warning displayed when deploying an AI RF Profile to a Site

# Part 5: Verifying AI-Enhanced RRM deployment

# **Cisco Catalyst Center Verification**

Go to Enhanced RRM page and select the site with AI RF Profile. The AI-Enhanced RRM controller should be up and should be collecting data from the controller and access points.

≡ dudu DNA Center	Assurance / Al Network Analytics / Al-Enha	anced RRM 🖈 Q 🖒 🖉 Q godmode 🗸
All Sites Al Enabled Sites	○ 14 Days ∨ Band 5GHz 2.4GHz 6GHz AI RF Profile: demo-ai-profile_Building 14	4 Next RRM Run (): 6 m 6 s Oct 16, 2023 7:43 AM - Oct 30, 2023 7:43 AM
Q Search Hierarchy Search Help ✓ Ø Global	There are one or more APs or WLC in this building that are either not provisioned or provisioning has WLC/APs.	failed. For better RF Performance please provision all the APs or fix the provision failures on
<ul> <li>&gt; ම Bangalore</li> <li>&gt; ම Ekahau Wi-Fi Day</li> <li>&gt; ම Ekosovo</li> <li>&gt; ම Las Vegas</li> </ul>	SUMMARY     RF PERFORMANCE SUMMARY       10     40     82 /100     0 %     0       Total AP Count     Total Clients     RRM Performance ③     APs with High CCI ④     RRM Changes	RF COVERAGE SUMMARY     AI RF PROFILE SIMULATOR ①       High     High (40 dB)       AP Density     Connectivity
<ul> <li>◇ 参 San Jose</li> <li>&gt;&gt; eif Andro-SJC22</li> <li>&gt;&gt; eif Big Warehouse</li> <li>&gt;&gt; eif Building 1</li> <li>&gt;&gt; eif Building 14 @</li> </ul>	Consider changing the configured Channel Width for improved performance.  Insights	
> 6년 Building 18 년 > 6년 Building J > 6년 Rady > 6년 SCJ06	~ RF Performance	
> III TheOffice III San Jose Fabric > & Santa Cruz > & Utah-Lakepoint > & Utah-Lakepoint	RRM Changes ① LATEST TREND	FRA Changes  LATEST TREND All Radios: 20 Total FRA Enabled Radios: 14
2 89 20MT-0	Provide the second seco	PRA Casebon Radius 20
	Channel Change     Channel Width Change     Tx Power Change     Band/Role Change	2.4 GHz     S GHz     Monitor

### Figure 47 Ai-Enhanced RRM control center

# **Catalyst 9800 Wireless Controller Verification**

# Step 1: Verifying RRM group leader.

On the Wireless 9800 controller, go to Configuration > RRM > 6/5/2.4Ghz Band > RF Grouping.

- The Group Role should be Remote-Member.
- The Group Leader should be the Cisco Catalyst Center's IP address.

cisco Cisco ( 17.9.1etz	Catalyst 9800-L Wireless Cont Welcome admin	🔏 🐔 🗛 🖹 🌣 🖄 🙆	6 GHz Band 5 GHz Band 2.4 GHz B	and FRA		
Search Menu Items Dashboard	Logical Ethernet Wireless	AireOS Config Translator Application Visibility Cloud Services	General Coverage DCA TPC	C RF Grouping Spatial Reuse	"D Restart	
Monitoring	Layer2     Discovery Protocols     VLAN     VTP	Custom Application IOx Location mDNS Multicast	Group Mode	Automatic     Leader     Off		🖺 Apply
Administration	Adio Configurations     CiesnAir     High Throughput     Media Parameters	NetFlow Python Sandbox QoS RA Throttle Policy	Group Role Group Update Interval	Remote-Member		
	Network Parameters RRM	Tags & Profiles AP Join Calendar	Group Leader	172.20.228.102 (172.20.228.102)		
Walk Me Through >	Routing Pro.	EoGRE Flex Multi BSSID Policy	Group Members Total Group Members :	1		
	AAA ACL Advanced EAP PKI Management	Power Profile Remote LAN RF/Radio Tags	Group Name Protocol Version	Open-RRM 0		
	Guest User Local EAP	WLANs Wireless	Controller Name	T IPv4 Address	▼ IPv6 Address	Ŧ
10.228.104/webuj#jmm	Local Policy Threat Defense Trustsec	Access Points Advanced Air Time Eximate	MBCC-IMPACT-SSO-1	192.168.151.150		1 - 1 of 1 items

# Figure 48 Verifying RF Group Leader

# Day-1 AI-Enhanced RRM features and use cases

The heart of AI-enhanced RRM Management is in the RRM Control Center, where information regarding the current (Latest) and Trend information regarding current actions and overall performance can be visualized.

Each element on the dashboard has tool tips that explain what it means or how it's measured.

At the top of the page is the focus selections. This sets the context for the information being displayed on the page. Selections for timespan are 24 hours, 7 days, or 14 days (the current maximum data period). Band Selection of 2.4 or 5 GHz, and the AI RF Profile in use.



## Figure 49 SELECTING FOCUS AND CONTEXT OF THE RRM CONTROL CENTER

# **Summary Bar / Headlines**

Below are the headlines regarding the RF Coverage and performance, which includes the overall RRM Performance score (100-0, with 100 being excellent) as well as highlights such as % APs with poor Co-channel Interference and count of RRM changes being made. The RRM Coverage summary looks at the AP density (the number of AP neighbors seen at or above -70 dBm) and Connectivity - the average client SNR during the last RRM run.

SUMMARY		RF PERFORMANCE SUMMARY			RF COVER	AGE SUMMARY	AI RF PROFILE SIMULATOR 🕕
17	7	100 /100	0 %	0	Low	High (42 dB)	Run RRM Simulation
Total AP Count	Total Clients	RRM Performance 🕕	APs with High CCI 🕕	RRM Changes	AP Density	Connectivity	

## Figure 50 SUMMARY BAR FOR THE AI-ENHANCED RRM "HEADLINES"

The calculation for the Neighbor Density Metric (NDM) is as follows:

NDM is determined by counting the total number of 'strong' neighbors, which are defined as neighboring devices with an Received Signal Strength Indicator (RSSI) greater than -70.

The categorization of Radio Frequency (RF) density is based on the average NDM and is classified in the following manner:

- Very High: The average NDM is greater than 15.
- High: The average NDM is greater than 10 but less than or equal to 15.
- Medium: The average NDM is greater than 5 but less than or equal to 10.
- Low: The average NDM is less than or equal to 5.

### Insights

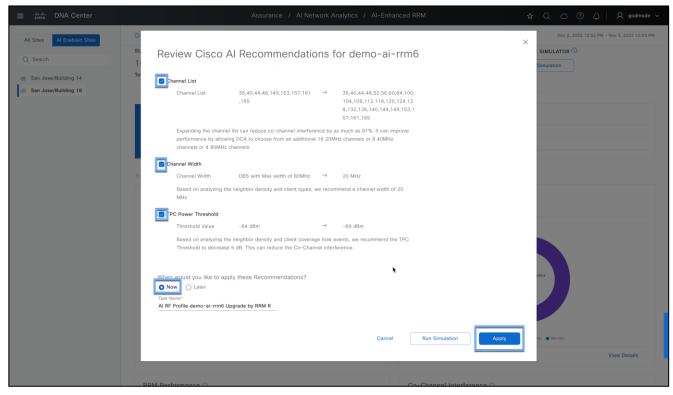
One way that AI-Enhanced RRM truly distinguishes itself from Cisco's already powerful industry-leading RRM is the AI and ML components, along with the ability to store and use historical telemetry data and establish "normal" for a given observation over time. RRM on the controller has always been limited to viewing the current conditions as the data storage requirements were quite high.



#### Figure 51 AI Provided Actionable Insights Into System Performance And Configuration

Insights displayed here may be blank initially but will populate after an initial week of learning. Al will look at multiple aspects of the configuration and measure against the performance. One example of learned data is the Busy Hour configuration initially set in the AI RF Profile. learnings. The initial "Busy Hours" was configured when the AI RF Profile was created and assigned. Over time, and with clients on the network, AI-Enhanced RRM observes what when busy hours (when the network is under load) occur and may suggest an enhancement to the AI RF Profile. Selecting the insight test – will lead you to where the configuration can be changed. The administrator always has control of when to re-deploy/Assign the changed profile to the site. Al will provide insights on Tx Power, Channel Bandwidth, DCA settings, AP density, SNR etc.

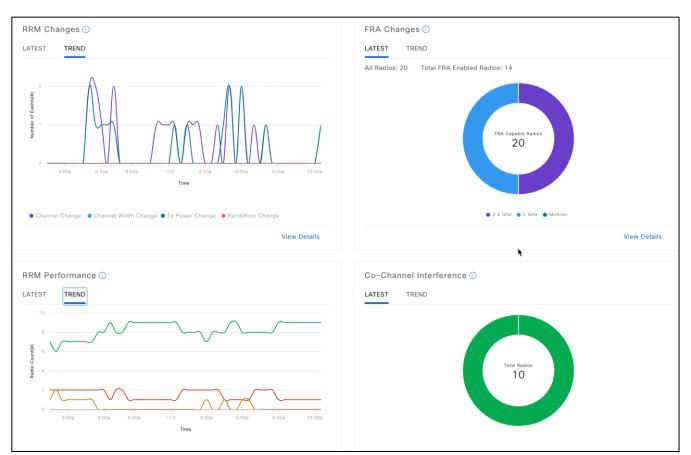
**Note:** If you are overlapping RF Tags across sites, you will not be allowed to apply the insights to the Al-RF Profile. This will cause RF Tag level changes which is shared across sites. Recommendation here is to create a new RF Tag for the site with insights and then apply it after. A workaround will be to use the insight recommendation and manually making changes to the Al-RF profile which will also affect other sites sharing the same RF Tag.



### Figure 52 Applying Insights To The AI RF Profile

**Note:** For busy hour insight to be generated, there will need to be a difference of at least 5 clients between min and max clients – and there must be traffic on the network – sleeping clients do not count.

In the next section, each of the performance metrics from the headlines is broken out into useful widgets, which let you explore the context of each down to the contributing radios/APs making up each component.



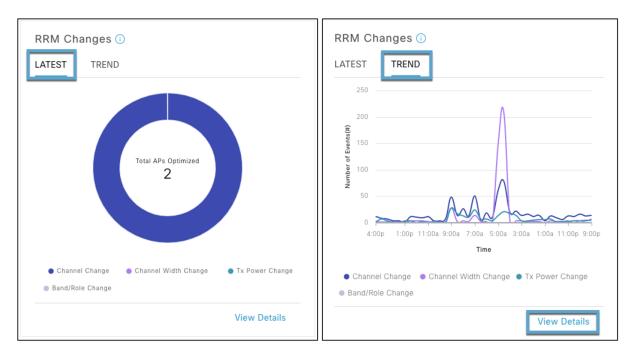
**Note:** The RF Performance matrix will not show radios if they are powered down or in power save mode.

Figure 53 AI Enhanced RRM Performance Widgets

# **RRM Changes**

In AI-Enhanced RRM, "Latest" always shows the current 30-minute AI-Enhanced RRM run period results. As such, on a small network (this one has 5 APs total) there may not be any changes in the last reporting period so "0". Trend shows the full span for the currently selected time (24 hours, 7 or 14 days) and allows the cursor to focus on a specific time in the chart to see how many of what kind of change was made. Selecting view details further expands the selection to include the APs that were affected, and selecting an AP shows the actions taken in the RRM change.

You can export the RRM changes into a CSV file and review it.





	Changes 2022 4:35 PM - Oct 17, 2022 4:35 PI	M   🕅 SJC01   Band: 5GHz		×
LATEST	TREND			
Number of Events(#)	50 50	00p 12.00p 11.00a 9.00a 1	, , , , , , , , , , , , , , , , , , ,	600a 5.00a 4.00a 3.00a 2.00a 1.00a 10/17 11.00p 10.00p 9.00p
Selec	annel Change • Channel Width Ch tion on Graph: 10/137/2022, Dess Points Search Table			Event Reasoning Slot – 1, Channel Width is changed to 40 MHz from 80 MHz. Channel bandwidth quality is improved 71 percentage.
	Radio 🕕 🔺	Change Category 🕕	U	-DBS selects the best channel width to reduce co-channel interference.
0		Channel Change		
0		Channel Width Change		
0	<b>≑ AP4800</b>	Channel Change		
0	<b>≑ AP4800</b>	Channel Width Change		
0		Channel Change		
0		Channel Width Change		
46 Recor	ds	Show Records: 25 🗸 1 - 25	< 1 2 →	

Figure 55 Trend view with export option

А	В	с	D	E	F	G	н	I	J
1 Radio 슈	Change Category	Event Reaso	oning						
2 SJC14-F1-9136-2	Channel Width Change	[System Dri	ven Channel V	Nidth Change	- Slot 1] -Ch	annel Width is	changed to 8	0 MHz from	40 MHz(
3 SJC14-F1-9164-3	Channel Change	[System Dri	ven Channel (	Change - Slot :	1] -Channel is	s changed to [	153, 149, 157	7, 161] from	[144, 140]
4 SJC14-F1-9164-3	Channel Width Change	[System Dri	ven Channel V	Nidth Change	- Slot 1] -Ch	annel Width is	changed to 8	0 MHz from	40 MHz(
5 SJC14-F1-9166-2	Channel Change	[System Dri	ven Channel (	Change - Slot :	1] -Channel is	s changed to [	108, 112] fro	m [112, 108]	]Channe
6 SJC14-TME-AP10	Channel Width Change	[System Dri	ven Channel V	Nidth Change	- Slot 1] -Ch	annel Width is	changed to 8	0 MHz from	40 MHz(
7 SJC14-TME-AP10	Channel Change	[System Dri	ven Channel (	Change - Slot :	1] -Channel is	s changed to [	120, 116, 124	4, 128] from	[128, 124]
8 SJC14-TME-AP11	Channel Width Change	[System Dri	ven Channel V	Nidth Change	- Slot 1] -Ch	annel Width is	changed to 4	0 MHz from	20 MHz(
9 SJC14-TME-AP6	Channel Width Change	[System Dri	ven Channel V	Nidth Change	- Slot 1] -Ch	annel Width is	changed to 8	0 MHz from	40 MHz(
10 SJC14-TME-AP6	Channel Change	[System Dri	ven Channel (	Change - Slot :	1] -Channel is	s changed to [	64, 60, 52, 56	6] from [56, 5	52]Duty
11 SJC14-TME-AP7	Channel Width Change	[System Dri	ven Channel V	Nidth Change	- Slot 1] -Ch	annel Width is	changed to 8	0 MHz from	40 MHz(
12 SJC14-TME-AP7	Channel Change	[System Dri	ven Channel (	Change - Slot :	1] -Channel is	s changed to [	64, 60, 52, 56	6] from [60, 6	54]Interf
13				-					_
14									

### Figure 56 RRM Changes in CSV

# FRA Changes

FRA changes widget lists down all FRA capable radios and their current operation mode which is 2.4 GHz/5GHz/Monitor. This widget is only available in 2.4 and 5GHz bands. When selecting trend view, it shows all the FRA changes in a timelapse view. View details will list out all the Access points with their different slot IDs, Coverage overlap factor %, suggested mode and current channel the radio is operating on.

Coverage Overlap Factor – output of FRA algorithm, represents percentage of 2.4 GHz cell covered to -67 dBm by other 2.4 GHz radios.

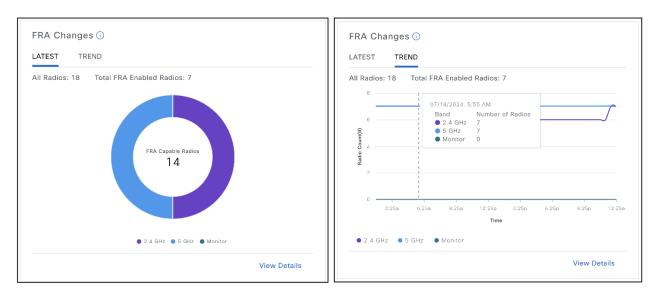
Cisco's FRA does 3 things:

- Calculates and maintains a measurement of redundancy for 2.4 GHz radios and represents this as a new measurement metric called COF (Coverage Overlap Factor).
- Manages radio "role" assignment or re- assignment for interfaces that are marked as redundant interfaces

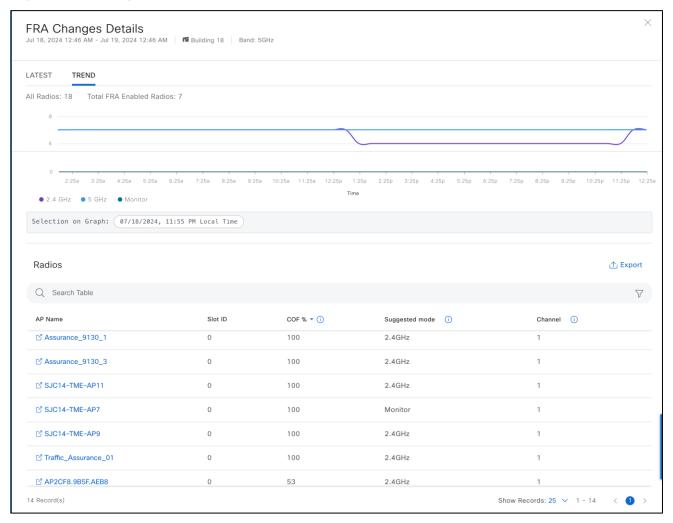
• For Macro/Micro implementations FRA Manages Client load balancing across dual 5 GHz interfaces) FRA decisions are made depending on the Coverage Overlap Factor % of each AP. The threshold for COF changes depending on busy hour sensitivity in the AI RF profile as shown below.

### Busy hour sensitivity with respective to COF %:

Low Sensitivity: 100% COF Medium Sensitivity: 95% COF High Sensitivity: 90% COF After busy hour: 90% COF



#### Figure 57 FRA changes width and trend view



#### Figure 58 FRA change detailed view

# **RRM Performance**

RRM Performance tracks the performance score and how it changes over time. RRM Performance consists of multiple scores measuring co-channel, near-channel interference, and duty cycle. The default latest view shows the results as of the last RRM run (30 minutes). Trend displays a trend line and transitions for all APs contributing to the scores and allows selection of a specific point in time, which then displays the information – and details shows all the AP's included in the score at any point in time. Note the export button, which will send any of the chart's data to a CSV file for download. Selecting any Access point cross-links to the Device 360 view to further investigate the APs history and behavior.

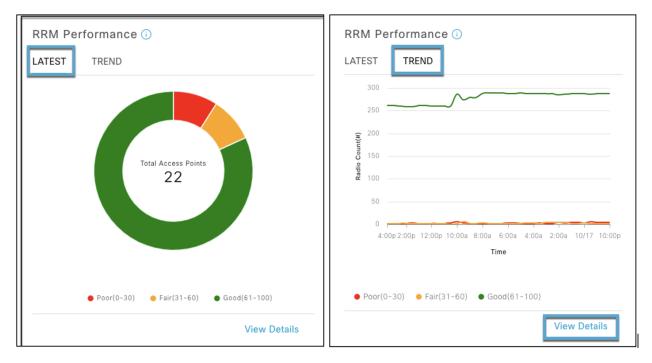
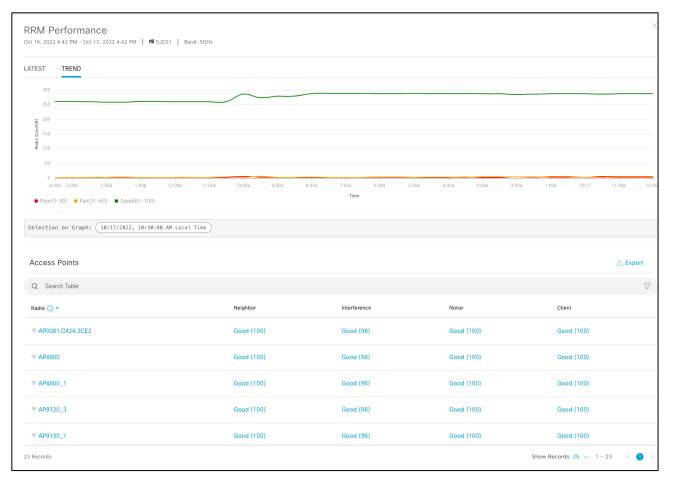


Figure 59 RRM PERFORMANCE TREND DETAIL VIEWS – VISUALIZE TRANSITIONS IN AP RF HEALTH SCORES



## Figure 60 RRM PERFORMANCE DETAIL VIEWS

## **Co-Channel Interference**

The Co-Channel interference widget follows the same pattern, showing the Latest Data from the last 30-minute interval and Trend which details the channel currently in use, an Impact Score (based on the duty cycle and RF Distance of co-channel neighbors) the CCI values in dBm and Channel Duty cycle (at that point in time)

CCI impact score = 100 - Co-Channel neighbor score

CCI Impact score ranges from 0-100, where the scores are categorized as:

- 0-40 = Low
- 41-70 = Med
- 71-100 = High

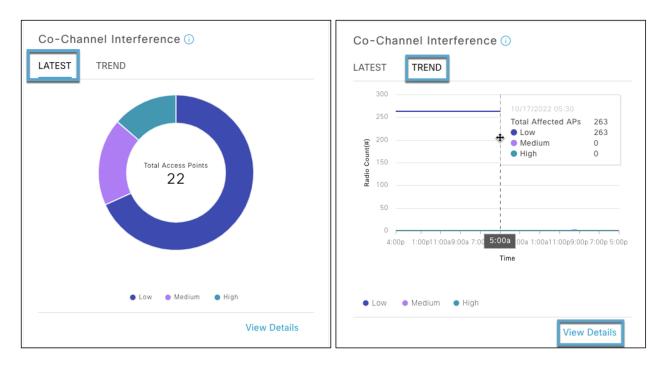


Figure 61 Co-Channel Interference Trend Data Help Visualize Co-Channel Interference Scores of Managed APs

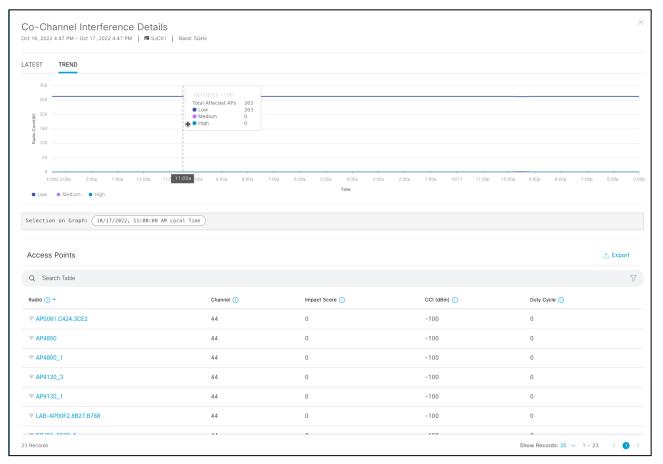


Figure 62 Co-Channel Interference Data

# **Utilization per Channel and AP Radios per Channel**

The features "Utilization Per Channel" and "AP Radios Per Channel" provide a visual representation of the distribution and efficiency of access point (AP) radio deployment across the available wireless spectrum. These tools are critical for network administrators to evaluate whether AP radios are well-allocated, minimizing co-channel interference and optimizing network performance.

When APs are methodically dispersed across different channels, we anticipate a uniform pattern of channel utilization. This balanced spread ensures that each channel is used optimally, without excessive overlap that could lead to congestion and reduced throughput. It's the concept of "spatial reuse," where the same frequencies can be reused at different locations without causing interference, thereby maximizing the capacity of the wireless environment.

Cisco has conducted extensive testing to validate the effectiveness of AI-enhanced RRM. One such test involved initially configuring all APs to operate on the same channel. This scenario, which would typically lead to severe interference and poor network performance, serves as a stress test for the AI-Enhanced RRM system. Over the course of an hour or so, the AI-Enhanced RRM algorithm actively redistributed the APs across the spectrum. The result? The APs were automatically reassigned to different channels, leading to a more efficient use of the spectrum, as indicated by the even distribution in the post-test charts.

This kind of intelligent, automated channel management is particularly beneficial in dynamic environments where network conditions can change rapidly. Instead of relying on manual adjustments, network administrators can trust AI-Enhanced RRM to continuously analyze and optimize the radio frequency assignments, ensuring that the network can adapt to varying demands and maintain high performance.

The inclusion of a trend function enhances this feature by allowing users to review historical data on channel utilization over a specified period, which can extend up to two weeks. This historical data is valuable for identifying patterns in network usage, such as peak hours or days when the network experiences the most traffic.

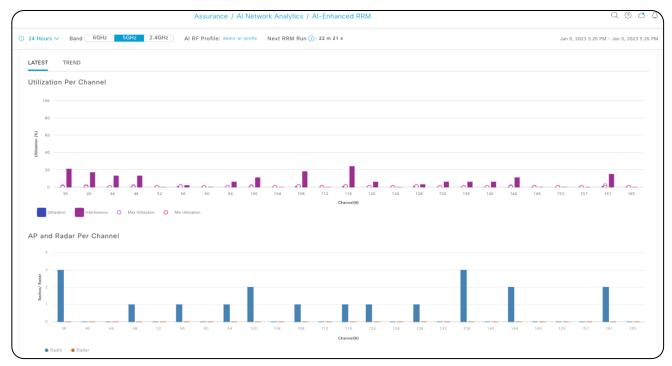


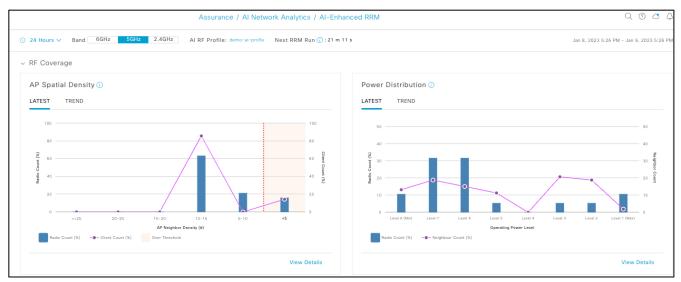
Figure 63 AI-Enhanced RRM Control Center

## **RF Coverage**

The full RRM Control Center view. AP Spatial Density visualizes Neighboring AP/radio density in the RF neighborhood as the number of neighbors that can be seen at or above -70 dBm.

The Power Distribution Chart visualizes power distribution across the networks and provides a corresponding neighbor count to correlate AP density with power assignments. Trend allows visualization of history for up to two weeks. Selecting a time on the trend line opens the details for that point in time and lists the contributing APs.

Lower AP Spatial Density indicates fewer neighbors, which eventually leads to more APs with higher Power Levels. Similarly, more AP Neighbor density leads to lower Average Operational Power level on Aps.



### Figure 64 RF coverage

## **RRM Simulator**

The **RRM Simulator** enables the network operator to preview the impact of RRM changes on the live network. When Cisco Catalyst Center recommends RRM setting changes through insights, or when the network administrator plans changes to settings such as channel, channel width, and power, the network administrator will be able to:

- Simulate how the RF environment will respond to recommended changes
- Analyze the impact of potential changes during a particular time interval
- View the proposed changes measured in quantified statistics, including RRM health, co-channel interference and utilization, and RRM changes

## Step 1:

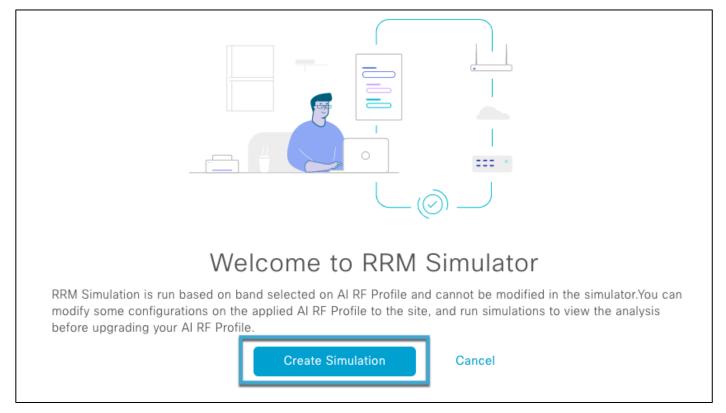
To use this feature on the Cisco Catalyst Center, go to the AI-Enhanced RRM control center from the Hamburger menu > Assurance > Enhanced-RRM > Select your site where you want to try these changes using RRM Simulator > Select the Band on the top on the control center > Click **Run RRM Simulator from the Hero bar.** 

3	342	95 /100	0 %	8	High	High (40 dB)	Run RRM Simulation
tal AP Count	Total Clients	RRM Performance 🕕	APs with High CCI 🕕	RRM Changes	AP Density		
	Onsider cl	nanging the configured Bus	y Hours for RRM to be n	nore effective.			
Insights		nanging the configured Bus			and improved pa	rformanaa	

Figure 75 Location Of RRM Simulator On AI-Enhanced RRM Control Center

# Step 2:

Click on Create Simulation from the Welcome to RRM Simulator page.



## Figure 65 Create Simulation On RRM Simulator

## Step 3:

Make the changes necessary to the simulation profile which you need to analyze for a specific band (supported for only 1 band at a time).

In this case, we will change the DBS from 40 MHz to 80 MHz

Click Run Simulation to simulate RF performance data for the newly modified RF settings.

	ter A	l Network An	alytics / A	Al-Enhanc 🕁	Q 🖒 (	⑦
Create Sin	nulation					
Configure the below AI		s to run a simula	tion and view 1	the metrics during	the recorded busy	hour on Building 14.
Simulation Name*				-		-
SJC14-AIRRM						
<ul> <li>Basic Settings</li> </ul>						
Radio Frequency Se	ttings					
	5 GHz 🛛 6 GHz 🤇	D				
Busy Hours 🛈						
Start time	End time	Busy Hour Ser	sitivity 🕕			
9:00 AM 🔨	> 5:00 PM	∑ O Low ○	Medium			
		🔵 High				
Enable RF Settings		2.4 GHz	5 GHz	6 GHz		
Flexible Radio Assig	nment 🕕					
Dynamic Channel As	ssignment 🛈					
Dynamic Bandwidth	Selection 🕕					
	trol 🛈					
Transmit Power Con						
Transmit Power Con						
		lz 5 GHz	6 GHz			
~ Advanced		Iz 5 GHz	6 GHz			
<ul> <li>Advanced</li> <li>Display Tuning Contr</li> </ul>		lz 5 GHz	6 GHz			
<ul> <li>Advanced</li> <li>Display Tuning Contr</li> </ul>	rols for 2.4 GH	lz 5 GHz	6 GHz 160MHz			
<ul> <li>Advanced</li> <li>Display Tuning Contr</li> <li>DBS Max Width</li> <li>20MHz 40MHz</li> </ul>	rols for 2.4 GH	lz 5 GHz				
<ul> <li>Advanced</li> <li>Display Tuning Contr</li> <li>DBS Max Width</li> </ul>	rols for 2.4 GH	lz 5 GHz				
<ul> <li>Advanced</li> <li>Display Tuning Contribution</li> <li>DBS Max Width</li> <li>20MHz</li> <li>40MHz</li> <li>Auto Channels logic</li> <li>160 MHz</li> <li>80 MHz</li> </ul>	rols for 2.4 GH	lz 5 GHz				
<ul> <li>Advanced</li> <li>Display Tuning Contr</li> <li>DBS Max Width</li> <li>20MHz</li> <li>40MHz</li> <li>40 MHz</li> <li>40 MHz</li> </ul>	80 80 80MHz		160MHz			
<ul> <li>Advanced</li> <li>Display Tuning Contribution</li> <li>DBS Max Width</li> <li>20MHz</li> <li>40MHz</li> <li>40 MHz</li> <li>40 MHz</li> <li>40 MHz</li> <li>40 MHz</li> </ul>	80 80 80MHz		160MHz		69 173 177	
<ul> <li>Advanced</li> <li>Display Tuning Contraction</li> <li>DBS Max Width</li> <li>20MHz</li> <li>40 MHz</li> </ul>	80 80 80MHz	108 112 116 120 124 1	160MHz 28 132 136 140 144	149 153 157 161 165	169 173 177	
<ul> <li>Advanced</li> <li>Display Tuning Contraction</li> <li>DBS Max Width</li> <li>20MHz</li> <li>40 MHz</li> </ul>	80 80 80MHz 52 56 60 64 100 104 1 48) UNII 2 (52-64)	108 112 116 120 124 1	160MHz 28 132 136 140 144	149 153 157 161 165	69 173 177	
<ul> <li>Advanced</li> <li>Display Tuning Contribution</li> <li>DBS Max Width</li> <li>20MHz</li> <li>40MHz</li> <li>40 MHz</li> <li>20 MHz</li> <li>40 MH</li></ul>	80 80 80MHz 52 56 60 64 100 104 1 48) UNII 2 (52-64)	108 112 116 120 124 1	160MHz 28 132 136 140 144	149 153 157 161 165	169 173 177	

Figure 66 Changes Needed To Be Made In AI RF Profile To Run Simulation

# Step 4:

Simulation result is displayed as shown in the figure below. All the widgets tagged as **UPDATED** have changed after the RF settings modification. You can compare the simulated RF performance data with your current RF Performance data by selecting the **Compare to Al RF Profile** check box.

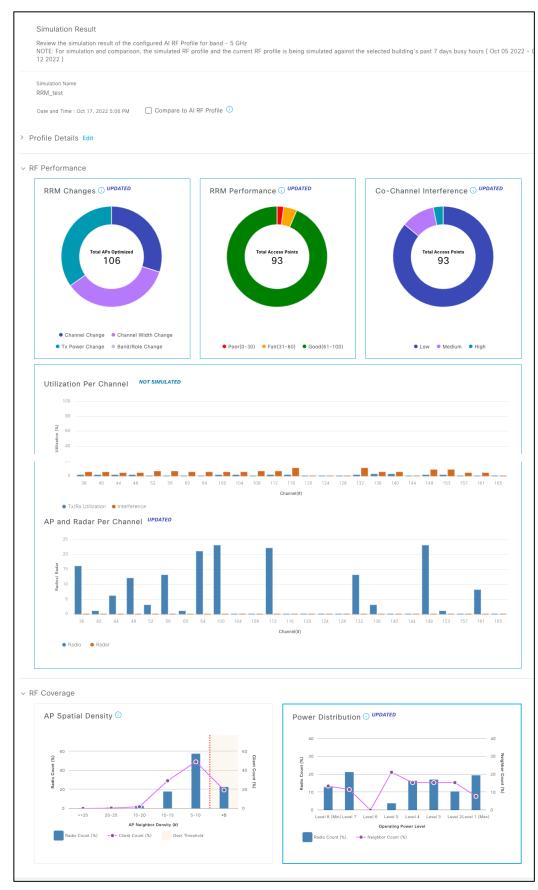


Figure 67 RRM Simulator Result After Making Changes To AI RF Profile

# Step 5:

You can compare all the Widgets between the simulation and deployed Al RF profile for this site. The comparison is shown below. You can select **Upgrade Al RF Profile** if you wish to add these changes to the current Al-RF Profile. You can select cancel if you do not wish to make the changes to the Al RF Profile.

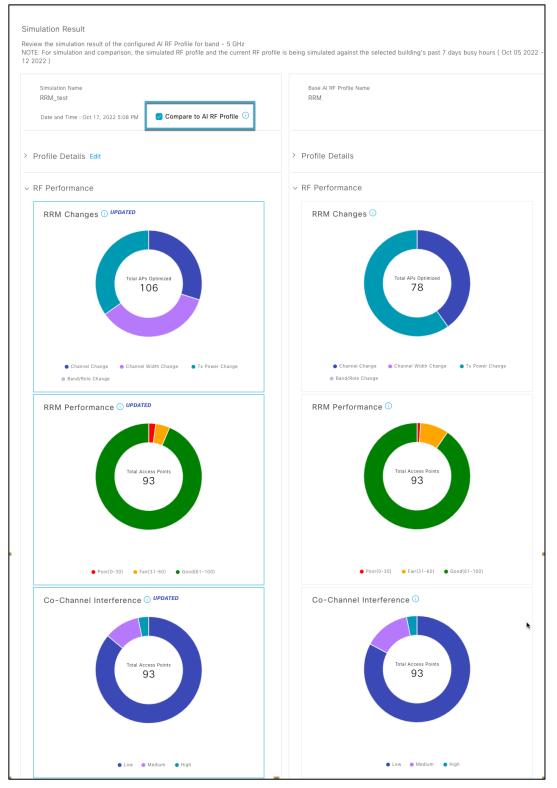


Figure 68 Comparing Simulation Result With Current RF Performance Parameters

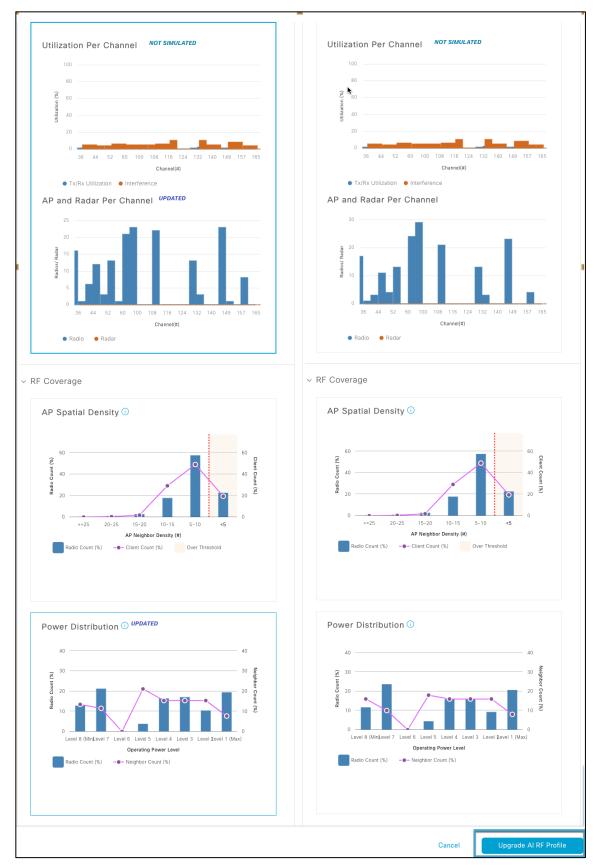


Figure 69 Comparing Simulation Result With Current RF Performance Parameters (Cont.)

# Day N: Making changes to AI RF Profile

When it comes to making changes to deployed AI RF Profile, there are 2 ways of doing it,

# Step 1: Make changes to the AI-RF profile.

- 1. Selecting the AI RF profile hyperlink from the AI-Enhanced RRM control center page
- 2. Applying Insights from the control center (As Shown in the **Insights** section of **DAY-1 AI-ENHANCED RRM FEATURES AND USE CASES)**
- 3. Using RRM simulator and selecting Upgrade AI RF Profile (As Shown in the **RRM Simulator** section of **DAY-1 AI-ENHANCED RRM FEATURES AND USE CASES)**
- 4. Making changes through the Network settings page
  - a. Click the hamburger menu icon (=) and choose Design > Network Settings > Wireless
     Tab > Global > select RF Profiles Thumbnail > Select Al RF Profile tab > Click the checkbox of the Al RF Profile you want to edit and click edit.

cisco Catalyst Center		Design / Netwo	rk Settings / Wir	eless			\$ Q 🔿	⑦ ♫ │ ႙ godmode
All / RF Profiles								
RF Profiles								
Configure Wireless Radio Frequency Profiles. You	can assign them to access points during	AP provisioning.						
Wireless Radio Frequency Profile								🕂 Add
Basic RF Profile AI RF Profile								
AI RF Profile (13)								
Q Search Table								V
_								¥
Edit/View Delete Create a Clone 1 Selected								
Profile Name *	Busy Hours	Busy Hour Sensitivity	FRA	DCA	DBS	TPC	Mapped Buildings	Actions
AI_RRM_Test11	9:00-17:00	Medium	•	•	0	•	0	
demo-ai-profie	9:00-17:00	Medium	•	•	•	•	0	
demo-ai-profie_Building 14	9:00-17:00	Medium	•	•	•	•	0	
demo-ai-rrm	9:00-17:00	High	•	•	•	•	0	
demo-ai-rrm1	9:00-17:00	High	•	•	0	•	0	
13 Record(s)							Show Records: 10	0 ∨ 1 - 10 < ① 2 >

#### Figure 70 Editing existing AI RF Profile

b. Make changes to the AI RF Profile and hit save.

cisco Catalyst Center			Design / Network Settings / Wireless		🛠 Q 🛆 🕐 📮 🛛 🗙 godmode
/ RF Profiles / Edit AI RF Profile					
DCA CHANNEL					
Select All					
🕑 UNII-1 36-48	UNII-2 52-1	14	UNII-3 149-173		
🕑 36 🕑 40 🕑 44 🔮	48 52 5	6 60 64	🕑 149 🕑 153 🕑 157 🕑 161		
	► 100 □ 1	04 🗌 108 🗌 112	🕑 165 🕑 169 🕑 173		
	116 0 1	20 124 128			
	132 1	36 140 144			
Hide Advanced					
SUPPORTED DATA RATES	18				
	0				
6 9	12 18	24 36	48 54		
Mandatory Data Rates Choose up to two da	ita rates				
6 9 12 🗹 18 🕻	24 36 48 54				
TX POWER CONFIGURATION					
Power Level					
	10		30 RX-SOP Threshold (dBm)		
dBm	10dBm	3	30dBm Auto	¥ (i)	
TPC POWER THRESHOLD					
	-64				
	0				
ldBm	-65dBm	-(	50dBm		
					Canad
					Cancel Save

Figure 71 Modify configs in AI RF Profile

Note: Any changes to Basic Settings or Channel Width in AI RF Profile do not need Steps 2 and 3.

Step 2: This step is necessary if any change is made to the Advanced section in AI RF Profile To assign this AI RF Profile to a site, on your AI RF Profile column, click on (...), then go to **Assign location**.

At this step, the workflow will take you back to **Part 4a: AI-Enhanced RRM Workflow for v2.3.7.4 and above >** Step 2

Basic RF Profile AI RF Profile								
AI RF Profile (13)								
Q Search Table								
Edit/View Delete Create a Clone 1 Selected								
Profile Name *	Busy Hours	Busy Hour Sensitivity	FRA	DCA	DBS	TPC	Mapped Buildings	Actions
AI_RRM_Test11	9:00-17:00	Medium	•		0		0	
AI_RRM_Test11 demo-ai-profie	9:00-17:00 9:00-17:00	Medium Medium	•	•	•	•	Assign Lo	

Figure 72 Assign Location

# Disable AI-Enhanced RRM: Unassign AI RF Profile

This workflow will disable AI-Enhanced RRM in your Catalyst 9800 Wireless controller. This will move your RF group leader back to the WLC.

# Step 1:

Click the hamburger menu icon ( = ) and choose **Design > Network Settings > Wireless** Tab **> Global >** select **RF Profiles** Thumbnail **>** Select **AI RF Profile** tab.

# Step 2:

To unassign this AI RF Profile from a site, on your AI RF Profile column, click on (...), then go to **Unassign location**.

Wire	eless Radio Frequency Profile									+ Add
Bas	IC RF Profile									
AI R	F Profile (13)									
Q	Search Table									$\nabla$
Edit/V	iew Delete Create a Clone 0 Selected									
$\Box$	Profile Name 🔦	Busy Hours	Busy Hour Sensitivity	FRA	DCA	DBS	TPC	Mapped Bui	ildings Actions	
$\Box$	demo-ai-rrm2	9:00-17:00	Low	•	•	U	•	0		
	demo-ai-rrm6	9:00-4:00	Low	•	•	0	•	1	<u> </u>	
	demo-ai-rrm6_Building-14	9:00-18:00	Low	•	•	•	•	1	Assign Locations Unassign Locations	
	miercom	9:00-17:00	Medium	•	•	•	•	0		
0	RRM_MBY-Hallways	9:00-17:00	Medium	•	•	•	•	0		
13 Re	cord(s)							Sh	ow Records: 10 ∨ 1 - 10 <	0 ₂ →

### Figure 73 Unassign workflow

# Step 3:

Select the buildings as part of the AI RF profile.

In this step, all impacted buildings will be automatically selected which as part of the same 9800 Wireless Controller.

≡ ^{dhalla} Ca	atalyst Center		Unassign Al RF Profile	1	\$ Q 🔿	04	Q godmode	
S Ei B	Select Locations to Disa elect the locations where you would like to nhanced RRM service. ased on your selection, Al-Enhanced RRM scation and it's impacted locations.	unassign the AI RF Profile and	disable the Al-					
	Access points in the below selected and it	mpacted sites will be provisioned w	with the selected Basic RF Profile.				×	
	Q Search	Site selection summary						
	🕑 🖻 San Jose/Building 18	Q Search Table				V		
					As of: Apr	17, 2024 5:53 PI	И	
		Location *	Impaced Locations 💿	Primary WLC	Secondary WU	; 		
		San Jose/Building 14	No impacted locations available	LIVE-C9800-40-SSO.wireless- tme.com	Not Assigned			
		San Jose/Building 18	San Jose/Building 14	LIVE-C9800-40-SSO.wireless- tme.com	Not Assigned			
		2 Record(s)		Show Re	cords: 25 🗸 1 - 1	< 0	>	
Exit All chang	ges saved				Review	Back	Next	Ī

Figure 74 Impacted buildings with unassigning location

# Step 4:

For Device Provisioning deployment:

## **Option 1:**

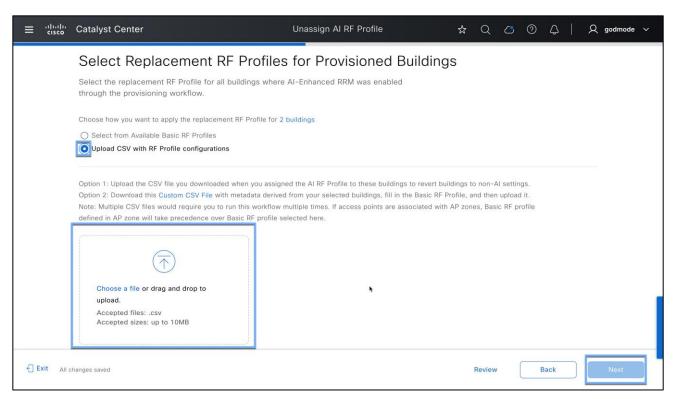
Select a Basic RF Profile available from Network settings.

≡ ;	ılı.ılı. cısco	Catalyst Center		Unassign	AI RF Profile		☆	Q	්	0	¢	ļ .	Q godmo	de 🗸
		Select Replace	ement RF Pro	ofiles for Pr	ovisioned B	uilding	s							
		Select the replacement RF through the provisioning w		s where AI-Enhance	d RRM was enabled									
		Choose how you want to appl	ly the replacement RF Pro	file for 2 buildings										
		Select from Available Bas	sic RF Profiles											
		O Upload CSV with RF Profi	le configurations											
		If access points are associate	d with AP zones, Basic RF	profile defined in AP	zone will take precedenc	e over Basic	RF pro	file sele	cted he	ere.				
		Location Name	Replace with Basic RF	Profile										
		San Jose/Building 18	TYPICAL RF-Gillaroo RF-Omnis	^	•									
		San Jose/Building 14	Test											
			LOW											
			HIGH											
			TYPICAL											
Exit	All c	hanges saved						Review		E	Back		Next	

## Figure 75 Select RF profile after disabling Al-enhanced RRM

Option 2:

Upload RF_profile_backup from Part 4a: AI-Enhanced RRM Workflow > Step 8



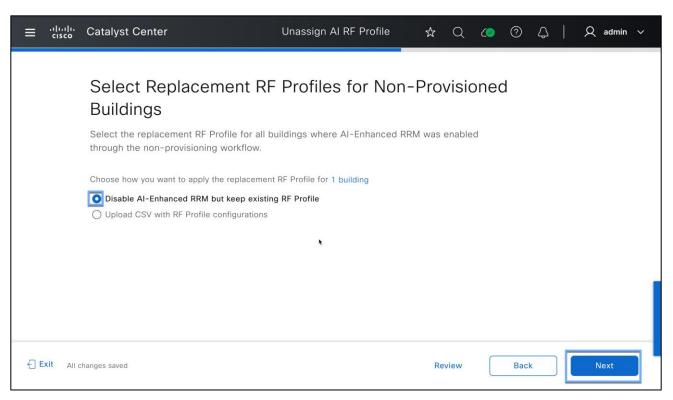
### Figure 76 Upload backup RF settings CSV

For without Device Provisioning deployment:

### **Option 1:**

Disable AI-Enhanced RRM by keeping the same RF profile settings.

This step will only disable RF grouping and keep all the RF Profile settings as is in the Catalyst 9800 Wireless Controller



### Figure 77 Disable AI-enhanced RRM with existing RF profile configs

#### **Option 2:**

Upload RF_profile_backup from Part 4a: AI-Enhanced RRM Workflow > Step 8

	'' Catalyst Center	Unassign AI RF Profile	🛠 Q 📀 🖓 🗘	│ Q admin ∽
	Select Replacement RF P	rofiles for Non-Provisioned E	Buildings	
	Select the replacement RF Profile for all buildi through the non-provisioning workflow.	ngs where AI-Enhanced RRM was enabled		
	Choose how you want to apply the replacement RF	Profile for 1 building		
	<ul> <li>Disable AI-Enhanced RRM but keep existing RF</li> <li>Upload CSV with RF Profile configurations</li> </ul>	Profile	*	
		h you assigned the AI RF Profile to these buildings to revert data derived from your selected buildings, fill in the Basic R	· ·	
Exit ,	All changes saved		Review Back	Next

### Figure 78 Upload Backup RF Settings CSV

# Step 5:

Go through summary and apply the configurations.

# Step 6:

Cisco Cata	alyst 9800-40 Wireless Controller	Welcom	ne admin 🛛 🕷 📢	A B & 0 0 0 0 0 0	Search APs and Clients Q	Teedback 🖉
Q Search Menu Items	Configuration • > Radio Configurations • > RRM					
Dashboard	6 GHz Band 5 GHz Band 2.4 GHz Band FRA	_				
Monitoring >	General Coverage DCA TPC RF Group	ing Spatial Reuse				
Configuration				D Restart		Th Assets
	Group Mode	<ul> <li>Automatic</li> </ul>				Apply 🖺
(O) Administration >		<ul> <li>Leader</li> <li>Off</li> </ul>				
C Licensing		-				
💥 Troubleshooting	Group Role	Auto-Leader				
	Group Update Interval	600 second(s)				
	Last Group Update	325 second(s) ago	_			
Walk Me Through >	Group Leader	KT-9800-40 (192.168.151.151)				
	Group Members					
	Total Group Members :	1		h		
	Group Name	KT-9800-40				
	Protocol Version	0				
	Controller Name	T IPv4 A	Address	IPv6 Address		Ŧ
	KT-9800-40	192.1	168.151.151			
	⊣ 1 ▶ ⊢ 100 ▼					1 - 1 of 1 items

Verify RF group leader in Catalyst 9800 Wireless Controller as the controller itself.

Figure 79 RF group leader changed to 9800 wireless controller

# Useful links

**Cisco Catalyst Center User Guide, Release 2.3.7** 

https://www.cisco.com/c/en/us/td/docs/cloud-systems-management/network-automation-andmanagement/catalyst-center/2-3-7/user guide/b cisco catalyst center user guide 237/m configurenetwork-settings.html

**Cisco Catalyst Center Information** 

```
https://www.cisco.com/site/us/en/products/networking/dna-center-platform/index.html?dtid=osscdc000283
```

**Cisco Catalyst 9800 Information** 

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

**Cisco Catalyst 9100 Information** 

https://www.cisco.com/c/en/us/products/wireless/catalyst-9100ax-access-points/index.html

## **Useful Videos**

**Cisco Al Enhanced RRM: The Next Chapter in RF Performance** 

https://www.youtube.com/watch?v=-ImLXmS7n8c

Unleash the power of AI in Wi-Fi with Cisco's AI-Enhanced RRM: How to Demo

https://www.youtube.com/watch?v=fVzrfb1wi9g&t=9s