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### Internet of Things on the Next Generation Cisco Catalyst Wireless Wi-Fi 6E Access Points

Jose Correa, Technical Marketing Engineer Ali Samioglu, Leader, Systems Engineering BRKEWN-1538



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	8:19 🕣 🔹 🖬
	Catalyst 9000 Series Switching Family =
	technologies, and features in the Catalyst 9000 Switches.
	Speaker(s)
	Kenny Lei
	Cisco Systems, Inc.   Technical Market
	Categories
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	Tracks > Networking (220)
	Session Type
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	SHOW 2 MORE V
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# Agenda



- Integrated IoT Radio
- Built-in Environmental Sensors
- Meraki IoT Integrations
- Application Hosting on Catalyst Wi-Fi 6E Access Points
- Wipelot Eagle Eye



#### Jose Correa Technical Marketing Engineer

#### • 3 Years at Cisco

- Working on Access Points, Wireless Sensors, and IoT technology for Cisco Catalyst Wireless
- Loves eating new food and watching Netflix



# Industry's best & broadest Wi-Fi 6/6E portfolio



Management mode can be changed<sub>#CiscoLive</sub> BRKEWN-1538

### Catalyst 6E Access Points Enabling New Experiences



#### Cisco CleanAir® Pro

# Internet of Things Overview



# What is IoT?

"The Internet of things (IoT) describes physical objects (or groups of such objects) with <u>sensors</u>, processing ability, <u>software</u> and other technologies that connect and exchange data with other devices and systems over the <u>Internet</u> or other communications networks."

-Wikipedia



Ecosystem

Relationships between different objects to exchange data

# Growing Number of IoT Devices

#### The Beginning

The path to IoT began with basic forms of Iong distance communication. In 1832, Baron Shillings in Russia invented the first electromagnetic telegraph.

### Concept of IoT is born

While working at Procter & Gamble, Kevin Ashton coined the term "Internet of Things" during a presentation on RFID.

### IoT grows from Tech

As more Tech Giants realize the benefits of IoT, we have seen a large increase in IoT devices each year. In 2017, we recorded 8.4 billion IoT devices.

#### Present

In 2023, the market for the Internet of Things is expected to grow 18 percent to **14.4 billio**n active connections.

 1832
 1990
 1999
 2013
 2017
 2021
 2023

#### First IoT Device

John Romkey creates the first smart toaster that could be controlled from the internet. He showcased his invention at the INTEROP conference.

#### **Using Sensors**

Thermostats and home lighting start using sensors to accurately sense the surrounding environment. This allowed people to control home lighting, garage doors, and thermostats all from their phone.

#### IoT grows in Enterprise

The market grew to **12.3 billion** connected IoT devices and roughly **\$160 billion** in IoT enterprise spending.



### **Benefits of IoT Solutions**

Better utilization and monitoring of resources

Reduce manual effort and increase automation

Power and cost efficiency has increased

### Example Use Cases



### **Example Verticals**



# Wi-Fi 6E Access Points Integrated IoT Radio

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# Integrated IoT Radio Placement



# Integrated IoT radio use cases

**Asset Tracking** 

- Track assets in real time
- Leverage one singular platform

 Measure and display a variety of environmental statistics

**Environmental** 

Monitoring

 Alerting and reporting based on the data



Workspace Optimization

- Insight on workspaces to enhance visitor and employee experience
- Increase internal efficiency and utilization within your workspaces

# Integrated IoT Radio in DNA Management Mode Access Points



Leverage outcomes via Spaces Native & Partner Apps



### Catalyst 9100 Series Access Points have a builtin IoT radio which integrates with Cisco Spaces



# Architecture of the Catalyst 9100 Series AP IoT radio with Cisco Spaces



(\*) BLE Floor Beacon data is sent to the Cisco Spaces Connector, then sends to the data to DNAS Cloud via the HTTPs tunnel where is shown in the Dashboard

Supports all AP modes: Local, FlexConnect, Fabric, monitor, sniffer

## IoT Device Telemetry using IoT Services Integration with Cisco Spaces

Monitor various telemetry data in Cisco Spaces Dashboard





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# IoT Device Marketplace

#### Ecosystem of third-party IoT devices - wired and wireless

Industry Workspaces	V Use Case	•		
FILTER BY		EnOcean		<b>V</b> anew
Туре				
• Wirel	ss 🔿 Wired			
Drico		EDRPB-CS	M1 Tag Beacon	17
Price	clear clear	Lead Times 0.5 week	Battery 8 months	Battery 1.6 years
⊖ < us	20 🔿 US \$20 - \$40	Features Self-powered, no batteries, lighting, HVAC and shutter control, NFC	Lead Times 3-5 weeks Features 3-axis accelerometer sensor optional	Lead Times 6-8 weeks Features Replaceable battery, external on/off
⊖ us \$	) - \$60 O US \$60 - \$80	Price for 1 unit US \$41.28		button
⊖ us \$	0 - \$100 🔿 US \$100+	Volume discount for 1000 units Up to 19%	Volume discount for 1000 units Up to 41%	Price for 1 unit         US \$15.00           Volume discount for 1000 units         Up to 20%
Batter	Life CLEAR	View Details	View Details	View Details
() > 3 m	nths 0 1-2 years			
O 2-3 y	ars 🔘 3-4 years	e <sup>®</sup> keetelt le	4	EnOropp
○ 4-5 y	ars 🔘 5+ years	e"s northannan	ũΦΩ <sup>™</sup> WAY	Enocean

# IoT Explorer

Monitor, manage, and optimize assets, Internet of Things (IoT) sensors, alerting system, and operational workflows



# Demo

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IoT Services Help 🕑 Devices Groups Policies Settings Home Floor Beacons AP Beacons Wired Sensors () Cameras () Smart PDUs 1 All Campuses  $\sim$ Claimed Beacons All Profiles IBeacon Eddystone UID Eddystone URL Other Profiles 42 2639 11 11 63 0 . Profile Type equals Kontakt imesSave as New As of: Jan 20, 2023 2:27 PM CRefresh TExport √ Filters Actions ∨ Advance Configuration Last Heard 🔻 Adv. TxPower (dBm) Mac Address Mac Address Type Label Location Group Name **Profile Type** Battery Unique Id Firmware Jan 20th, 2023 02:27:30 PM fc:3d:d2:43:47:0f San Jose->Building 14->Floor 1 Kontakt 100% VuCmly 2.0 --a few seconds ago Jan 20th, 2023 02:27:30 PM f0:97:41:75:94:3f San Jose->Building 14->Floor 1 Kontakt 77% uuVf3U 2.0 --a few seconds ago Jan 20th, 2023 02:27:27 PM e3:73:94:43:93:66 San Jose->Building 14->Floor 1 Kontakt VuaPMi 2.0  $\square$ --100% a few seconds ago Jan 20th, 2023 02:27:27 PM

Kontakt

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San Jose->Building 14->Floor 1

-

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# Partner App Center

Integrated marketplace of application partners focused on business outcomes



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# Example Partner Application Simon Healthcare - optimizing healthcare operational efficiency



Integrated IoT Radio in Meraki Management Mode Access Points

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#### Cisco Spaces Architecture with Meraki Cloud-to-Cloud integration with Cisco Spaces



#### IoT Radio on Meraki Dashboard Quickly enable IoT Radio settings

🤶 W	lireless	Monitor	Configure
	Cameras	Overview	SSIDs
• C:		Access points	Access control
ili In	nsight	Air Marshal	Firewall & traffic shaping
	Organization	Location heatmap	Splash page
<u> </u>		Splash logins	SSID availability
		PCI report	IoT radio settings 🛛 🗸
		Bluetooth clients	Port profiles

#### AP Scanning BLE Devices





#### AP Broadcasting iBeacon

Beaconing					
Use APs as location	markers. For more information, see o	ur documentation.			
Advertising	On Off				
	e4f97a78-9598-4024-a4a1	-49f872e3735a		1	
	The UUID is typically used to have the same UUID set.	o identify your organ	zation. You car	use templates t	o ensure your networks
	Generate new LILIID				
	Generate new COID	_			
Major/Minor Assignment	Unique Non-ur	nique			
	Dashboard will automatically APs in the same network will a	assign unique beac	on identifiers to ajor Number ar	o each AP. Ind distinct Minor	Numbers. These
	identifiers won't change once	set, even if you temp	orarily disable	beaconing.	
	To override Dashboard's auton API to set Major Numbers, Min will replace the automatically g	natically generated in or Numbers, and UU generated ones in the	lentifiers for a IDs for an indiv table.	node, use the De idual device. Any	vice Bluetooth Settings manually set values
	Node	Major	Minor	UUID	
	SJC14-F1-9166-J1	1	8		
	SJC14-F1-9166-J9	1	5		
	SJC14-F1-9166-J3	1	0		
	01014 51 0100 10		0		

### Meraki Dashboard Location Heatmap Locate BLE clients in Meraki Dashboard

Location heatmap for the last 5 minutes -	View old version
4:00 pm         8:00 pm         12:00 am         4:00 am         8:00 am         12:00 pm	n 3:00 pm
<ul> <li>Address, zip code, etc. Go</li> <li>Address, zip code, etc. Go</li> <li>Address, zip code, etc. Go</li> <li>Associated WiFi clients</li> <li>Unassociated WiFi clients</li> </ul>	<ul> <li>WiFi clients</li> <li>WiFi clients</li> <li>✓ APs</li> </ul>
BLE clients	Map data @2023 Google_Terms of Use_Report a map error

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#### Meraki IoT Integration with Cisco Spaces Locate BLE clients in Detect and Locate



### IoT Explorer – Asset Tracker Monitor, manage, and optimize assets in Cisco Spaces



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Built-in Environmental Sensors in DNA Management Mode Access Points

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### **Built-in Environmental Sensor Placement**

### Catalyst 9136I

### Catalyst 9166I



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Environmental Sensors with Cisco Spaces

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# Catalyst 9136I and 9166I have three built-in environmental sensors with full Cisco Spaces integration



Note: The temperature generated by the AP will be considered during temperature and IAQ readings.

#### Environmental sensor use cases





# Topology of the Catalyst 9136I and 9166I environmental sensors with Cisco Spaces



(\*) Sensor data is sent to C9800 via CAPWAP, Spaces Connector subscribes to the Yang models and get the data via telemetry, then sends to the data to DNAS Cloud via the HTTPs tunnel where is shown in the Dashboard

Supports all AP modes: Local, FlexConnect, Fabric, monitor, sniffer

# Catalyst 9136I and 9166I has three built-in environmental sensors with full Cisco Spaces integration



AP Environmental Sensor Telemetry





#### **Environmental Metrics**

Trends and Insights from Environmental Data from your Network Devices in your buildings



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## IoT Explorer

Monitor, manage, and optimize assets, Internet of Things (IoT) sensors, alerting system, and operational workflows



## Demo



#### Demo

≡ CISCO SPACES						III 🛛 \varTheta
Home <b>Devices</b> Groups	Policies Settings					IoT Services Help 😧
Floor Beacons AP Beacons	Wired Sensors () Cameras (	Smart PDUs ()				
All Campuses V						
All Profiles	Transmit	Transmit	Transmit	Scan	Dual	
10 AP Sensors	IBeacon	Eddystone UID	Eddystone URL	Scan Mode	Dual Mode	
10	0	0	0	2	0	
Needs Config Change Disabled						
8 10						
					An of to 20, 2022 2:22 B	N. C. Dofrach. A Surgert
List View Map View V Filters Actions	s V Bulk Request History				AS 01: Jan 20, 2023 2.33 P	M C Refresh 1 Export
Mac Address AP Name -	Sensor BLE	AP Model Profile Type	Label Location	BLE Firmware	Version AP Beacon Channel Last H	leard WLC BLE
ec:f4:0c:0e:7a:e0 APCC9C.3EE7.69	50 🗸 Enabled 🗙 Disabled	CW9162I-B Scan	- San Jose->Build	ing 14->Floor 1 n/a	Jan 20th, 2023 02:32:19 P a minute ago	M 10.14.99.4
	OC 04 A Fachlad A Fachlad	001261 D	Con Jose - Dulid	les 14 - Floor 1 - Ia	Jan 20th, 2023 02:32:19 P	M 10.14.00.4 Bass

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#### **IoT enhanced hybrid work experience** Catalyst 9100 Series Access Points integrate with Cisco Spaces for back-to-office use cases



Cisco Spaces will support rich maps for an immersive experience

Network experience and BLE IoT integration to drive business outcomes

Catalyst<sup>®</sup> 9136I and 9166I have builtin environmental sensors that feed Cisco Spaces data

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Environmental Sensors without Cisco Spaces

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#### Topology of the Environmental Sensors on Catalyst Wi-Fi 6E Series Access Points using Model Driven Telemetry



#### Example Environmental Sensor Temperature Telemetry Output



#### Temperature

- Humidity (%)
- Temperature (°C)

#### Example Environmental Sensor Air Quality Telemetry Output

```
"ap-mac": "XX:XX:XX:XX:XX",
"event-type": "access-point-oper-data/ap-air-quality",
"rmox_0": "1018991936.000000",
...
"
"rmox_12": "90387552.000000",
"iaq": "3.051500",
"etoh": "0.633100",
"tvoc": "1.190300"
```

#### Air Quality

- Calculated Air Quality (IAQ) score between 1-7
- Total Volatile Organic Compounds (TVOC) in mg/m3
- Estimated Ethanol (ETOH) in ppm
- Mox Resistance (RMOx) values as raw data

# Environmental Sensor Data from the Catalyst 91361 and 91661 visualized in Grafana





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#### Demo of Environmental Sensors with Grafana



## Meraki IoT Integrations





## IoT Connector (Add-On) ESL Infrastructure

- IoT Connector infrastructure (APs for Wi-Fi and ESL using a separate PCle card or USB ESL gateway)
  - Does <u>not</u> require additional switch ports
  - Might require extra PoE Budget





## Integrated (Native) ESL

- Integrated (native) infrastructure (no additional HW)
  - <u>Decreases</u> CAPEX
  - No additional switch ports
  - <u>No</u> extra PoE requirements
  - <u>No</u> separate devices to troubleshoot, update, and maintain





#### Meraki ESL Ecosystem Overview

Vendor	ESL Integration Type	Supported Models
SES-imagotag	Native (MR loT radio)	Most MRs, See <u>Deployment</u> <u>Guide</u> for all Supported Models
SoluM	USB ESL gateway	MR57, CW9166/64/62I-MR
Hanshow	USB ESL gateway	MR57, CW9166/64/62I-MR

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#### SES Native ESL Integration

**ses** imagotag

Native (Built-In IoT radio)







### SoluM USB ESL Integration

SOLUM

IoT Connector (USB)







#### Hanshow USB ESL Integration





Application Hosting on Catalyst Wi-Fi 6E Access Points in DNA Management Mode

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#### Application Hosting on Cisco Catalyst Access Points in DNA Management Mode Enterprise Wireless Internet-of-Things



Available on all Cisco<sup>®</sup> Catalyst<sup>®</sup> 9100 Access Points

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#### Partner Solution Use Cases



#### Catalyst 9100 Series Access Points support application hosting for an enterprise wireless IoT experience



#### **Application Hosting Partners and Solutions**





## Wipelot Eagle Eye

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#### Ali Samioglu Leader of Systems Engineering, GVSE MEA

- 14 years at Cisco in multiple roles; including post-sales and pre-sales
- CCIE RS&DC #29893, Cisco Hall of Fame
- Leading the Eagle Eye project from the incubation to final product



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#### and introducing... Wipelot EagleEye

- Ultra Wideband location tracking
- Accuracy up to 20cm
- Enhanced personnel safety and asset accountability
- Workplace Safety
- Social Distancing
- Workplace planning

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#### Leveraging UWB Technology

To leverage this UWB technology, this solution requires the following:

- 1. Cisco DNA Center Used to manage the deployment and serviceability of Wipelot's RTLS IOx Application.
- Wiplot's RTLS IOx Application Deployed to the Catalyst 9100 Series AP through Cisco DNA Center to allow the AP
  to control the UWB dongle and communicate to the Wipelot Mobile Tag and send data to the Wipelot web dashboard.
- 3. Wipelot's UWB Dongle Inserted into the Cisco Catalyst 9100 Series AP and emits UWB RF.
- 4. Wipelot's Mobile Tag Attached to equipment or people and sends UWB location data to the Wipelot UWB dongle.
- 5. Wipelot's Web Dashboard Web UI used to visualize the location of Wipelot's mobile tags.

When Wiplot's RTLS IOx application has been deployed to the AP, the following topology can be referenced for how location data is sent from the mobile tags to the UWB dongle, then through the IOx application to the Wipelot web dashboard. Data structure is private and it is binary data with timing information of tags and anchors.







Cisco Catalyst 9100 Series AP with a Wipelot UWB dongle

20cm

Accuracy

#### Metrics & use cases

- Accurate location information provides detailed route analysis
- Detailed heatmap
- Distance measurement
- Region based idle work
   hour calculations
- Collision avoidance
- Lone worker safety
- Social distancing
- Environmental monitoring





#### Greece CDA Pilot in Momus Contemporary Arts Museum









- Cisco Catalyst c9100 Wifi6 AP + Eagle Eye Dongles
- Real time location tracking with sub-meter accuracy
- Tags are provided to visitors
- Visitor's Dwell Time for each art
- Visitor footprint / heatmaps
- Museum Art Planning



#### Eagle Eye POV

Demonstration Site: Parking Lot Size: 1100 Square meters. Green Arrows: Demonstration Area Anchors: EagleEyes Sense & EagleEye Motion Environment: Metal Number of Anchors: 8 Number of Taes: 270



- Parking Lot 1100 m2
- Metal Constructions
- Hybrid Eagle Eye Deployment Cisco Catalyst C9100/ IOT IW6300
- CM Level Accuracy with 270 tags

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#### What's next

Blogs / Cisco Live sessions/ Partner Events

EagleEye website: https://www.wipeloteagleeye.com

Reach out to Ali Samioglu or Jose Correa for any opp.



Email Us! Ali Samioglu - asamiogl@cisco.com Jose Correa - joseacor@cisco.com





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   Meet the Engineer meeting
- Attend the interactive education with DevNet, Capture the Flag, and Walk-in Labs
- Visit the On-Demand Library for more sessions at <u>www.CiscoLive.com/on-demand</u>

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Attendees will also earn 100 points in the **Cisco Live Challenge** for every survey completed.



These points help you get on the leaderboard and increase your chances of winning daily and grand prizes



### Thank you



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### Cisco Live Challenge

Gamify your Cisco Live experience! Get points for attending this session!

#### How:



Open the Cisco Events App.

- Click on 'Cisco Live Challenge' in the side menu.
- 3 Click on View Your Badges at the top.





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ĥ	My Profile NOT SIGNED IN	Log in to disco
	Discover >	Cisco Live 202
		View My Sch
60	My Surveys	
ē	Session Catalog	
6	OpenRoaming	
Even	t Info	
	Things To Do	
Ē	Programs	
P	World of Solutions	Thursday, M
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×	Health & Safety	Featured Session
		Register



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Deploying IoT Services on Cisco Spaces

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### Day 1: Enabling IoT Services on Spaces Dashboard

Part 1 – Enable Streaming on Spaces Connector and Wireless Controller

Section goals: Enable IoT Services through the Cisco Spaces Dashboard which sets up both the Spaces Connector, Wireless Controller, and Access Point for IoT capability.

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#### Step 1: Enable Streaming on Spaces Connector

(	1	

Log in DNA Spaces Dashboard -> Navigate to Setup -> Wireless Networks



Under the connector that was created, click on View Connectors

Cisco DNA Spaces	
🔂 Home	
O Location Hierarchy	
Integrations >	Setup
🗠 Monitor	Wired Network
Admin Management	Map Service
IoT Services >	Camera
ô Setup >	Sensors
	Data Export
	Webex
	pxGrid Cloud

1)	Install Spaces Connector OVA
Ĭ	Download and install Spaces Connector OVA as a virtual machine. Download Spaces Connector II ≤
-	Configure Spaces Connector
	You will need a token to configure Spaces Connector. You need to connect to https:// <your connector="" ip="">/ from a browser to configure the token. You can optionally configure</your>



# Step 1: Enable Streaming on Spaces Connector (Continued)

3 Select the Connector



Select Manage IOT Streams

= c	ISCO S	SPACES							
Setu	p > Connecte	ors							
		SUMMAR	Y						
		1 Connectors	<b>1</b> Up	0 Down					
с	onnectors	5							
	Name		Release		Instances	Switches	Controllers	APs	Status
	bleeding- connector	edge-	ova-2.3.49	7	NA	0	1	14	🕤 Up

		# <b>0</b> <del>0</del>
1	ID:56971405127553740000   Last Mod	lified : Dec 2, 2022, 7:57:27 AM
🖉 Generate Toke	n 🛞 Troubleshoot Connector	Manage IOT Streams Add Controller
Actions		
ve		
		(1 - 1 of 1): 1 pages



# Step 1: Enable Streaming on Spaces Connector (Continued)

5
Ľ

If the connector's streaming server is not initiated yet, click the Configure to Enable button



There will be a configuration successful message and see the Manage Connector as a Success.

Manage IoT Streams	×	
Manage Connector NOT_INITIATED Enable Streaming server in connector to allow Access Points to connect to connector Manage Controller	Configure to Enable	ManasConfiguration successful
Setup Stream Authentication key and Certificate in controller to allow APs to connect with connector. Use Enable/Disable Stream to auto setup.	e action	
Use Manual Configuration to setup stream in Controllers (Marked *) that does not support auto configura Cloud.	tion from	Manage Connector success
Controller Controller IP Operation Status Last up	odated	Enable IoT Streams on Cisco DNA Spaces Connector
test 10.10.111.10 NOT_INITIATED	:	
(First   Previous 1 Next   Last	(1 - 1 of 1): 1 pages	



### Step 2: Enable Streaming on the Wireless Controller



Select the three dots options button under the Controller section and select Enable Stream

2
2
$\smile$

Select either default AP group or all AP groups. There is a success message after confirming your selection.

Manage IoT Streams						×
	_					
Manage Connector Succes	ss				Configure t	o enable
Enable IoT Streams on Cisco DN	A Spaces Connector					
Use Manual Configuration to setu	up IoT Services in Contro	oller when the configurat	ion can not be applied automa	tically.		
				,		
Use the three dots action of Enal	ble/Disable Stream to ap	ply configuration change	es to the Controller.			
Controller	Connector IP	Controller IP	Operation Status	Operation Log	Last updated	
TME-Demo-C9800-40		10.14.99.4	NOT INITIATED			-
Manage Controller					Disable Stream	ion
Wanage Controller					Cashie Chara	ion
Setup IoT Services stream authe	ntication and certificate	to allow APs to connect	with the Cisco DNA Spaces Co	onnector	Enable Stream	
The WLC will be configured to se	end notifications to Cisco	DNA Spaces Connecto	r for AP configuration changes	5.		





# Step 2: Enable Streaming on the Wireless Controller (Continued)



The Manage Controller Part is showing Operation Status as Success which means that the Stream Authentication key and Certificate in controller to allow APs to connect with connector is properly configured.

Manage IoT Streams							
Manage Connector s Enable IoT Streams on Cisc Use Manual Configuration t Use the three dots action c	JOCESS to DNA Spaces Connec o setup IoT Services in f Enable/Disable Strear	tor Controller when the c n to apply configuratio	configuration can not be app on changes to the Controller	lied automatically.	Configure to	o enable	
Controller	Connector IP	Controller IP	Operation Status	Operation Log	Last updated		
TME-Demo-C9800-40	10.14.99.11	10.14.99.4	SUCCESS	Successfully set config	Dec 2, 2022, 11:24:39 AM	1	
Manage Controller       Sample configuration         Setup IoT Services stream authentication and certificate to allow APs to connect with the Cisco DNA Spaces Connector       The WLC will be configured to send notifications to Cisco DNA Spaces Connector for AP configuration changes.							



### Day 1: Enabling IoT Services on Spaces Dashboard

Part 2 – Deploy BLE Gateway and IOx Application on Access Points

Section goals: Deploy the BLE Gateway on Access Points to scan/transmit BLE device data and deploying the IOx application on Access Points to configure BLE devices.

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### Step 1: Deploying BLE Gateway on Access Point

1	
_	

Select Hamburger Menu -> IoT Services -> IoT gateways



Cisco DNA Spaces	
Image: Home         Image: Location Hierarchy         Image: Integrations         Image: Integrations         Image: Monitor         Image: Admin Management         Image: Integrations         Image: Integrations	IoT Services ( IoT Gateways Device Management Device Monitoring

E CISCO SPACES			•
Home AP Gateway	Wired Gateway	IoT Serv	ice
AP Gateway Stats	Advanced BLE Gateway     Base BLE Gateway		
Access Point Gateways	Deploy DNA Spaces Gateway to your Cisco Access Points Catalyst 9800 WLC with software version 17.3.1 or above is required. Requires DNAS connector. Currently older WLC(AireOS), eWC, and Meraki are not supported. You need to have APs with bluetooth capabilities, all new WIFI 6 APs 91XX series, 4800 are supported. such as 1815, 2800, 3800 support limited gateway functionality, and may require adding a Cisco bluetooth dongle.		



# Step 1: Deploying BLE Gateway on Access Point (Continued)



Select BLE Gateway and hit Next

Deploy Gateways		×
1 Choose Gateway Type	2 Choose Access Points	3 Review
Select Gateway Choose the gateway types(s) that you want to deploy in your locations <b>BLE Gateway</b> Enables configuration of BLE radio within compatible access points. Radio can be configured to Transmit BLE or Scan for BLE, as well as activate and manage compatible BLE Beacons procured via the DNA Spaces End- Device Marketplace		
		Cancel



# Step 1: Deploying BLE Gateway on Access Point (Continued)



Select the Access Points you want to deploy as a BLE Gateway

≡ (	= CISCO SPACES # (						
	Hom		Cotowny - Wired Cotowny				loT Servi
AP	C	)eploy	BLE Gateways				×
			Choose Choose	Sateway Type	2 Choose Access Points	3 Review	
		Choose the	access points that you want to deploy the BLE gatew	ay			
Acc		List vi	ew Map view				
		All Carr	Select All	Hierarchy			
			10:b3:c6:23:2b:20 (AP-SJC14-F1-9120-05)	San Jose->Building 14->Floor 1			
	Ľ	0	68:7d:b4:18:16:60 (AP687D.841C.1D6C)				
Wir			c0:64:e4:22:e0:00 (AP-SJC14-F1-9120-02)	San Jose->Building 14->Floor 1			
			c0:64:e4:23:65:20 (AP-SJC14-F1-9120-07)	San Jose->Building 14->Floor 1			
			c4:17:55:4b:care0 (AP-SJC14-F1-9120-04)	San Jose->Building 14->Floor 1		Cancel Previous	Next



# Step 1: Deploying BLE Gateway on Access Point (Continued)







5

#### Step 2: Advanced BLE Gateway on Access Point

1

Select AP Gateway and select the Access Point



Click the download button to install the IOx application

			<ul> <li>AP Information</li> </ul>		
Home AB Gateway Wired Gateway			Mac Address	10:f9:20:fe:a3:80	Floor Beacon Chan Status
Home Ar Gateway Whee Gateway			IOx App Channel Status	-	Name
			Description	Cisco Catalyst 9164 Series Access Point	AP Model
Stats			AP IP	10.14.99.114	WLC IP
0.44/0.4	0.0		IOx App Name	-	IOx App Version
â 11/24	â 3		Label	-	SW Version
AP Gateways deployed	Adva	anced BLE Gateway	BLE MAC	54:0f:57:e0:48:93	BLE Mode
			BLE Type	Base	BLE Firmware vers
			Location	San Jose->Building 14->Floor 1	Ethernet Mac
			Floor Beacon Channel Last Heard	Dec 2nd, 2022 12:45:29 PM a few seconds apo	AP Beacon Channe Heard
AP Gateways (11) All APs (24)			IOx App Channel Last Heard	-	Zigbee Capable
			IOx Capable	✓ Yes	BLE Capable
			USB Capable	✓ Yes	
List View Map View 🖓 Filters Actions 🗸 Bulk	Request History				
Mac Address Floor Beacon Channel Status	<ul> <li>IOx App Channel Status</li> </ul>	Name	Attributes		
□ 10:19:20:1e::a3:80 ● UP	ан 1	AP-SJC14-F1-9164-02	<ul> <li>App Management</li> </ul>		
01019-2016-72:00 • UP		AP-SJC14-F1-9166-04	Available Apps Cisco DNA	Spaces BLE Management App Upgrade	to
0:19:20:te:9a:s0	824	AP-SJC14-F1-9164-03	BLE v1.4.12 Enable config points	uration of BLE radio within compatible access	



Deploying Application Hosting on DNA Center

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### Day 1: Upload and Deploy IOx Application

#### Part 1 – Upload IOx Application

Section goals: Upload an IOx application into Cisco DNA Center's repository so it can be ready for deployment to the desired access point.

cisco ile

#### Step 1: Navigate to IoT Services

On DNA Center, open the menu, click on **Provision**, then **IoT Services to enter the App Hosting page**.



Cisco DNA Center's IoT Services page provides an intuitive graphical user interface for users to upload and manage a third-party application they would like to deploy onto their access points.

### Step 2: Upload the IOx application to Cisco DNA Center

1 Click on **New App** on the right side of the screen.

■ Cisco DNA Center	Provision / Services / IoT Services	Q 🕐 🏈 🗘
Service Catalog / IoT Services		
	iel en "All Daviese" to morene la T. Comisso en the daviese	All Devices
Choose an app below to install or manage. Or ch	ick off All Devices to manage for Services of the devices.	
Apps(1)   Storage Used : 0.02 GB 🕕		Hew App

cisco / ile !

# Step 2: Upload the IOx application to Cisco DNA Center (Continued)

2

Upload the Application by choosing a file with either of the following application types:

- Option 1 Docker
- Choose this option if the app you are uploading is a Docker app saved as a tar file using the Docker save command.
- Option 2 Cisco Package
- Choose this option if the app you are uploading has been packaged using the Cisco app packaging toolchain.
- For more information regarding both package types, visit: <u>https://developer.cisco.com/docs/iox/</u>

Upload App
$\overline{(\uparrow)}$
Choose a file or drag and drop to upload.
Accepted file types: tar, tar.gz Accepted size: Upto 2 GB
enocean-package-1.tar
Supported app package formats:
Cisco packaged app is packaged with cisco tool chain as     described in Cisco DevNet
<ul> <li>Docker app is saved using docker save as described in docker docs.</li> </ul>
Cancel Upload

### Step 2: Upload the IOx application to Cisco DNA Center (Continued)



### Step 2: Upload the IOx Application to Cisco DNA Center (Continued)

5

(1) To update the application, click on the **Update App** button; (2) To delete the application, click on the **Delete App** button; (3) To edit the application's description, click on the **Edit** button.

■ Cisco DNA Center					
Home / EnOcean Serial Tunnel	for Cisco AP				
E	EnOcean Serial Tunnel for Cisco AP Version: 1.0.0 V   Installed On Devices: 0 App Description App description is not provided				
Last Updated On 12/1/2022, 1:35:58 PM T Update App Delete App	Docker Runtime Options Docker runtime options are not provided Edit				
	Manage				



### Day 1: Upload and Deploy IOx Application

### Part 2 – Deploy IOx Application

Section goals: Deploy an IOx application to all devices within a network hierarchy created in the prior section.

cisco ile

### Step 1: Start the Workflow of installing an application on Access Points



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## Step 1: Start the Workflow of installing an application on Access Points (Continued)

2

Give a Task Name for the workflow then hit Next

⊟ Cise	co DNA Center	Enable IoT Services	Q @ 🖉 🗘
	Get Started Assign a unique name for your workflow for identifi Task Name* Example Task	cation. You can exit the workflow at any stage and resume later. s before proceeding with enabling app-hosting. Click here to know more.	
€] Exit			Next

Cisco DNA Center's "Enable IoT Services Workflow" function allows you to easily deploy your application to either a location or specific access point.

### Step 2: Deploy application to access points on a floor

Select a floor within the network hierarchy to deploy the application, then hit Next 3 = Cisco DNA Center Select Site Select the site where you want to enable IoT services Q Search Hierarchy > 〇 画 Big Warehouse () @ Building 1 v 〇 個 Building 14 O S Floor1 () ⊜ Floor2 > 〇 逦 Building 18 > 〇 逦 Building J > 〇 画 Lab > 〇 뎶 Rady O E SJC24 piver Oaks Pkwy Exit Review Back



3	

Select the AP(s) on this floor where you would like to deploy the application, then click **Next**.

E Cisco DNA Center	Ena	ble IoT Services			۵	040
Select Access Poi	ints					
Select access points where you v	want to enable helloworld.					
Access Points (13)				🕁 Import 👔	Export 📃 🕅	
V Filter 1 Selected				As of: Dec (	, 2022 11:39 AM 🛛 📿	
Device Name -	Site IP Address	Serial Number	Image Version	Device Series	Readiness I	
AP-SJC14-F1-9136- 01	/Building 14/Floor 10.14.99.118	FOC25322JDT	17.9.2.52	Cisco Catalyst 9136I Series Unified Access Points	Ready See Details	
AP-SJC14-F1-9136- DNAS	/Building 14/Floor 10.14.99.115	F0C25322K31	17.9.2.52	Cisco Catalyst 9136l Series Unified Access Points	Ready See Details	
AD_0 014_01_0104_	Ibuilding 3.4/Elect		Show Re	Clean Catabust Missions 0164		
Exit All changes saved				Review	Back	Next



Review that the application is being deployed to the intended site and access point(s), then click **Provision**.

⊟ Ciso	o DNA Center		
	Summary		
	Review your app deployment configurations. To make	e changes, click Edit. Download Summary	
	<ul> <li>Task Name</li> <li>Test</li> </ul>		
	<ul> <li>✓ App helloworld Version: 1.0</li> </ul>		
	✓ Site Edit Global/San Jose/Building 14/Floor 1		
	<ul> <li>Access Points Edit</li> <li>Total 1 Access Point selected</li> </ul>		
Exit AL	changes saved		Back Provision

- Ensure the Readiness column says Ready
- By default, this page shows an AP list view; however, it can be toggled to a maps view via the map icon at the top right-side corner of the table.

Observe that the application deployment process will begin

≡ Cisco	DNA Center		Enable IoT Services		Q @ 😃 🗘			
	Track Provisioning S Provisioning of helloworld is in progr Task Progress 0 Provisioned 1 In-Progress	catus ess. • 0 Failed Vie	0% zw Details	ov. etails				
	Site Building 14	Access Points	Task Progress	Status	_			
	Floor 1	1	0%	1 In-Progress	-			
Exit All changes saved								



5



After completing the provisioning of your application deployment, hit Next.

	er		Enable IoT Services		Q @ <b>(@</b> Q		
Track F Provisioning Task Progr	Track Provisioning Status Provisioning of helloworld is completed. Task Progress						
1 Provision	1 Provisioned      O In-Progress     O Failed View Details						
Site		Access Points	Task Progress	Status			
i Building	4						
Floor 1		1		<ul> <li>I Provisioned</li> </ul>			
Exit All changes saved					Next		

Warning: If you attempt to deploy an application with a dependency on a USB attachment, and the attachment is not detected, you will receive a Failed message.

7
$\sim$

Click on the **Manage IoT Application** button to continue ( to the application's management page.



On this Application Management page, you're able to manage the status of the deployed applications.

Enable IoT Services		■ Cisco DNA Center						Q @ 🖉 🗘
Done! Task Completed helloworld successfully enabled on 1 Access Point I Access Point on Floor 1 at Building 14 provisioned		Home / helloworld / Manage  helloworld  Devices (1) All  Q. Search Hierarchy $\bigtriangledown$	Running         Stopped         Failed         In Progress           ①         As we are in 'IoT Services', this page displays only 'Unified APs' where app is deployed.					⊘ Summary ×
successfully  C 0 Access Points on Floor 1 at Building 14 could not be provisioned	Se ✓ & Global © Unassigned I > & Ekahau-Site	Search Help <ul> <li></li></ul>	✓ Filter     0 Selected Actions ✓       □     Hostname ▲	App Version App Status ()		As of: Dec 6, 2022 12:03 PM 🦪		
What's Next?  Manage IoT App  Workflows Home		> ﷺ Remote APs > & San Francisco > & San Jose > & Utah-Lakepoint	Ar-SU (4-7 (-9) 30-0)	10,14,39,118	1.0	Running	a wiuz yĝo	• Kunning

Observe beneath the App Status column that you can monitor the status of your application.
## Step 2: Deploy application to access points on a floor (Continued)

9

In order to manage the application deployed to the access point, click on the **Actions** drop-down menu

- Start App If you stopped your app via the Stop App button, you could start it again via this button
- 2. Stop App You can stop the loaded application from running. (Stopping an application does not delete or uninstall it.)
- 3. Upgrade App If you've uploaded a newer version of your use through the initial IoT Services Workflow, you can click on the Upgrade App button to upgrade the application running on the AP to the new version
- 4. Uninstall App Click this button to remove the application from your access point entirely

■ Cisco DNA Center				
Home / helloworld / Manage				
Devices (1)	Running	Stopped	Failed	In Progress
Q Search Hierarchy ⊽ Search Help	(i) As we are in 'IoT Services', this page displays only 'Unified			
<ul><li>✓ ♣ Global</li><li>O Unassigned Devices</li></ul>	Plitter	itname	Start App	ce IP
> 🍪 Ekahau-Site > 📾 Remote APs	AP-SJC14-F1-	-SJC14-F1-913	Stop App Upgrade Ap	4.99.118
> ൽ San Francisco > ൽ San Jose			Uninstall Ap	P
> 💩 Utah-Lakepoint				

