

IoT Service (Wired)

• Overview, on page 1

Overview



Cisco DNA Spaces is now **Cisco Spaces**. We are in the process of updating our documentation with the new name. This includes updating GUIs and the corresponding procedures, screenshots, and URLs. For the duration of this activity, you might see occurrences of both **Cisco DNA Spaces** and **Cisco Spaces**. We take this opportunity to thank you for your continued support.

Overview of IoT Service (Wired)

Cisco Spaces enables end-to-end wired and wireless IoT device management, monitoring, and business outcome delivery at an enterprise scale using the following:

- Cisco Spaces: IoT Service
- Cisco Spaces: IoT Device Marketplace
- Cisco Spaces App Center

In addition to serving as the management hub for wireless IoT devices, IoT Service can now integrate with Cisco Catalyst 9300 and 9400 Series Switches from Release 17.3.3 or later to receive IoT service (wired) data from sensors, such as:

- Passive infrared (PIR) sensors for presence detection
- · Temperature and humidity sensors
- Smart lighting devices
- Smart shades
- Ethernet port status
- Smart power distribution unit (PDU)
- Hella Camera

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Integrating IoT service (wired) with the Cisco Catalyst 9300 and 9400 Series Switches series platform requires the following:

- Cisco Spaces: Connector
- A IoT service (wired) gateway deployed and managed by Cisco Spaces

Cisco Catalyst 9300 and 9400 Series Switches can send critical IoT data to IoT service (wired). IoT service (wired) can then transmit the information to:

- Business outcome applications on Cisco Spaces
- · Cisco Spaces App Center using the Firehose API

Figure 1: Data flow in IoT Service (Wired)



IoT Service (Wired)

Compatibility Matrix for IoT Service (Wired)

Application Name	Support for IoT Service (Wired)
Cisco Spaces: Connector Docker	2.0.455 and later
Cisco Spaces: Connector OVA	2.3 and later
Cisco Prime Infrastructure	Cisco Prime Infrastructure Release 3.8 MR1
Catalyst Center (for map import)	Catalyst Center Release 2.1.1 and later
Switch as a gateway	 Cisco Catalyst 9300 Series Switches Cisco Catalyst 9400 Series Switches Cisco IOS XE Amsterdam 17.3.x and later releases.
Wired Application Version	1.0.46 and later

IoT service (wired) is not supported with Cisco Spaces tenants or deployments leveraging the following configurations:

- · Connecting directly with controller
- CMX Tethering

Prerequisites for Cisco Spaces: IoT Service (Wired)

The following are the necessary prerequisites to get you started with Cisco Spaces: IoT Service (Wired):

- Install Cisco Spaces: Connector in your network.
- Configure a network with one or more Cisco Catalyst 9300 and 9400 Series Switches, Release 17.3.3 or later.
- Switches must have Cisco DNA Advantage subscription.
- Deploy wired sensors in your network. See Compatibility Matrix for IoT Service (Wired), on page 3
- Ensure that Cisco Spaces is configured with maps either from Cisco Prime Infrastructure or Catalyst Center.
- Configure AAA on aCisco Catalyst 9300 Series Switches or a Cisco Catalyst 9400 Series Switches before adding it to Cisco Spaces by running these commands in:
 - aaa new-model
 - aaa authentication login default local
 - · aaa authorization exec default local

For more information, see Command Reference, Cisco IOS XE Amsterdam 17.3.x (Catalyst 9300 Switches)

 Perform NTP synchronization across wireless controllers, Cisco Spaces: Connectors, and switches in the network. • Enable NETCONF on Cisco Catalyst 9300 or 9400 Series Switches on port 830, along with permission to use NETCONF.

Note Cisco Catalyst 9300 and 9400 Series Switches require a local privilege level 15 user to use NETCONF. Additionally, the user must be a password-protected local user, because public-key authentication is not supported.

Design Prerequisites

Ensure you have the following information handy before proceeding:

Figure 2: Design Prerequisites



- **Destination SPAN VLAN**: The VLAN used to send Encapsulated Remote Switched Port Analyzer (ERSPAN) traffic from Power over Ethernet (PoE) nodes to Cisco IOx App. You can use an existing VLAN or create a new one. This VLAN can also be local to the switch.
- **Destination SPAN VLAN IP address**: This is the Switched Virtual Interface (SVI) or the IP address of the destination VLAN that can be used to route traffic. If you are using an existing VLAN, you can provide the same IP address. We recommend that you create a new VLAN so that you can keep the ERSPAN traffic local without impacting the existing configuration. Note that this VLAN is used only within the switch for the SPAN traffic.
- Source SPAN VLAN list: List of VLANs to which the wired devices are connected. The traffic on these VLANs are monitored. If the wired devices are connected to multiple VLANs, enter the VLANs separated by a comma.
- Monitor SPAN origin IP address: This is the source IP address of the monitor session. This can be from the SPAN VLAN. This can also be the same as the destination VLAN IP address.
- IoX application Span IP Address
- Application Cisco Spaces Connector VLAN: This is the VLAN on which the connector is reachable (for management or data). You can configure the Cisco IOx App's second interface to use this VLAN to

send traffic to the connector. This VLAN can be the same as the wired PoE node VLAN. The connector must be permitted to accept communications from the Cisco IOx application.

- DHCP: When enabled, DHCP allocates an IP address from the Application DNA Spaces Connector VLAN to the Cisco IOx App's second interface.
- **IoX application IP address**: This is the IP address that you must manually configure for the Cisco IOx App's second interface, and is used to communicate with the Connector. This is not required if you select DHCP.
- **IoX application netmask**: This is the IP subnet mask that you must manually configure for the Cisco IOx App's second interface, and is used to communicate with the connector. This is not required if you select DHCP.
- **IoX application gateway address**: This is the IP address that you must manually configure for the Cisco IOx App's second interface, and is used to communicate with the connector. This is not required if you select DHCP.

Figure 3: Sample Configuration



Prerequisites for Cisco Spaces: IoT Service (Wired)

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- Switches must have Cisco DNA Advantage subscription.
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- Ensure that Cisco Spaces is configured with maps either from Cisco Prime Infrastructure or Catalyst Center.
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Figure 5: Sample Configuration



Open Ports for IoT service (wired)

This section lists the connector ports that must be open for the proper functioning of each service or protocol. *Figure 6: Open Ports for IoT Service (Wired) with the IoT Gateway*





Open Ports for IoT Service (Wired) without the IoT Gateway



	Primary IP Address	Disaster Recovery	
US Setup Type	52.20.144.155	54.176.92.81	
	34.231.154.95	54.183.58.225	
EU Setup Type	63.33.127.190	3.122.15.26	
	63.33.175.64	3.122.15.7	
Singapore Setup (SG) Type	13.228.159.49	13.214.251.223	
	54.179.105.241	54.255.57.46	

Configure IoT Service (Wired)

Step 1 From the Cisco Spaces dashboard left-navigation pane, click Setup and choose Wired Networks.

Step 2 From the **Connect your wireless network** window that is displayed, go to the **Step 2** area and click **View Connectors**.

Figure 7: View Connectors

E CISCO SPACE	15
贷 Setup	€ ess network
Wireless Network Wired Network Map Service	rts ces Connector ay to get your wireless network connected to Cisco DNA Spaces. No need to upgrade Wireless LAN Controllers or reconfigure your wireless network.
	es Connector OVA spaces Connector OVA as a virtual machine, meetor (2
Webex	paces Connector We 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 Spaces Connector to connect via HTTP's prov. Create Connector View Connectors Add Controllers Add and associate controller to your Claco DNA Spaces Connector(s)
	1 / 2 controller(s) active Add Controllers View Controllers
(4)	Import Maps Prime/DNAC map requires in order to work Locate & detect, Asset tracker, and IOT services, and proximity Report 2 buildings imported 2 floors imported 4 Import/Sync Maps Map Upload History Manage Maps
5	Setup location hierarchy Once the mass imported, you can add them into location hierarchy

Step 3 Click a connector 3 of your choice.

Note You can use the same connector that you used for Cisco Spaces: IoT Service (Wireless).

Step 4 In the connector details window that is displayed, click **Add Services**.

Figure 8: Add Services

←Back Setup > Connectors > Test ID : 8142444	8212902120000 Last Modified : Apr 29, 2022, 11:04:25 AM
SUMMARY 0 0 0 0 0 0 Instances Active Inactive Service Switches enabled	
Instances Configuration Metrics	Cenerate Token 🐵 Troubleshoot Connector
Services	Add Services
You have not added any services yet. Click * Add Service* to configure services. Switches	Add Switch
You have not added any switches yet. Click "Add Switch" to configure switches.	

Step 5 In the Add Service window that is displayed, choose IoT Wired and click Add.

Figure 9: Adding a Service

←Back Setup > Connectors > Test		ID : 81424448212902120000 Last Modified : Apr 29, 2022, 11:04:25	AM
SUMMARY 0 0 0 Instances Active Inactive	2 0 Services Switches enabled		
Instances Configuration Metrics		🖉 Generate Token 🛛 🌚 Troubleshoot Connector	
Services		🕒 Add Servic	es
Service Name	Version	Last Updated	
000 service-manager	2.8.0.123	Never	
all iot-services	2.8.0.33	Never	
Switches		Add Switch	

In the **Connector Details** window, you can see that the **IoT Wired** service has been added. Click the gear icon near the **IoT Wired** row.

Step 6

Figure 10: Gear Icon of IoT Wired



- **Step 7** (Optional) In the **Manage IoT Streams** window that is displayed, check if the connector is not already enabled, and if it is not, click **Configure to Enable**.
- **Step 8** From the list of switches, click the vertical three-dot icon adjacent to the switch and select **Enable Service**.

Figure 11: Enable Service

Manage Connector Discossion Configuration to setup IoT Services in switches when the configuration can not be applied automatically. Use the three dots action of Enable/Disable Stream to apply configuration changes to the switches. Switch Name Connector IP Switch IP Operation Status Operation Log Last updated Manage Switch Successfully set configuration changes to the switches May 13, 2023, 707/10 MI Imable Service Imable Servic	Manage loT Se	rvices				×
Use Manual Configuration to setup IoT Services in switches when the configuration can not be applied automatically. Use the three dots action of Enable/Disable Stream to apply configuration changes to the switches. Switch Name Connector IP Switch IP Operation Status Operation Log Last updated (establisht-9900-tap-1 10.22.243.64 10.22.243.73 SUCCESS Successfully set config May 13, 2023, 7:07:10 AM I Manage Switch Setup IoT Services stream authentication and certificate to allow switches to connect with the Cisco Spaces Connector Configuration changes. The AireOS Controller will be configured to send notifications to Cisco Spaces Connector for switch configuration changes.	Manage Connecto Enable IoT Services on	r SUCCESS Cisco Spaces Conne	ector			Configure to enable
Use the three dots action of Enable/Disable Stream to apply configuration changes to the switches. Switch Name Connector IP Switch IP Operation Status Operation Log Last updated usingst-9300-gs-1 10.22.243.73 SUCCESS Successfully set config May 13, 2023, 7:07:10 AM Image Manage Switch Disable Service Disable Service Enable Service Enable Service Setup IoT Services stream authentication and certificate to allow switches to connect with the Cisco Spaces Connector Enable Service Enable Service The AireOS Controller will be configured to send notifications to Cisco Spaces Connector for switch configuration changes. The AireOS Controller will be configured to send notifications to Cisco Spaces Connector for switch configuration changes.	Use Manual Configurati	on to setup IoT Serv	ices in switches wh	en the configuration car	not be applied automatical	ly.
Switch Name Connector IP Switch IP Operation Status Operation Log Last updated catalyst=9300-ga-1 10.22.243.64 10.22.243.73 SUCCESS Successfully set config May 13, 2023, 7:07:10 AM Image Switch Manage Switch Setup IoT Services stream authentication and certificate to allow switches to connect with the Cisco Spaces Connect Enable Service Image Switch Setup IoT Services stream authentication and certificate to allow switches to connect with the Cisco Spaces Connect Enable Service Enable Service The AireOS Controller will be configured to send notifications to Cisco Spaces Connector for switch configuration changes. The AireOS and the configured to send notifications to Cisco Spaces Connector for switch configuration changes.	Use the three dots action	on of Enable/Disable	Stream to apply co	onfiguration changes to t	he switches.	
cetalyst-9300-ga-1 10.22.243.64 10.22.243.73 SUGCESS Successfully set config May 13, 2023, 7:07:10 AM 1 Manage Switch Disable Service	Switch Name	Connector IP	Switch IP	Operation Status	Operation Log	Last updated
Manage Switch Setup IoT Services stream authentication and certificate to allow switches to connect with the Cisco Spaces Connect The AireOS Controller will be configured to send notifications to Cisco Spaces Connector for switch configuration changes.	catalyst-9300-qa-1	10.22.243.64	10.22.243.73	SUCCESS	Successfully set config	May 13, 2023, 7:07:10 AM
	Manage Switch Setup IoT Services stre The AireOS Controller v	am authentication ar	id certificate to allo	w switches to connect w	ith the Cisco Spaces Conne	Disable Service on ac c Enable Service changes.



Step 9 Enter the SPAN VLAN and the Cisco IOx App details.

- **Destination SPAN VLAN**: The VLAN used to send Encapsulated Remote Switched Port Analyzer (ERSPAN) traffic from Power over Ethernet (PoE) nodes to Cisco IOx App. You can use an existing VLAN or create a new one. This VLAN can also be local to the switch.
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Figure 12: Configure Switch

Configure Switch
Destination SPAN VLAN IP address
Enter the destination SPAN VLAN IP addres
Source SPAN VLAN list
Enter the source SPAN VLAN list
Use comma as a seperator for multiple vlan
Monitor SPAN origin IP address
Enter the Monitor SPAN origin IP address
IOx application SPAN IP address
Enter the IOx application SPAN IP address
Application Cisco Spaces Connector VLAN
Enter the application Cisco Spaces Connec
Use DHCP
IOx application IP address
Enter the IOx application IP address
IOx application netmask
Enter the IOx application netmask
IOx application gateway address
Enter the IOx application gateway address
Cancel Configure

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Figure 13: Configure Switch Image: system of the system of the



Step 10 Click Configure.

The configurations are deployed on the switch. The following diagram shows the corresponding CLI commands you can use in place of the GUI configuration.

Figure 15: GUI-Command Line Mapping

Destination SPAN VLAN	
1234	
Destination SPAN VLAN IP address	
124.124.124.1	
Source SPAN VLAN list	
111	Vlan 1234
Use comma as a seperator for multiple vian	interface AppGigabitEthernet1/0/1 description Uplink to Application
Monitor SPAN origin IP address	switchport mode trunk
124.124.124.1	interface Vlan1234 ip address 124.124.124.1 255.255.255.0
IOx application SPAN IP address	! iox
124.124.124.50	monitor session 44 type erspan-source
	source vlan 111 destination
Application DNA Spaces Connector VLAN	erspan-id 44 mtu 9000
111	ip address 124.124.124.50 origin ip address 124.124.124.1
Use DHCP	app-hosting appid clsco_dnas_wired_iox_app upp-waic_AppGigubitChernet_trunk
IOx application IP address	guest-inderess 10.10.111.13 netnask 255.255.0 vlan 1224 guest-interface 1
10.10.111.13	guest-ipaddress 124.124.124.50 netnask 255.255.255.0 app-default-gateway 10.10.111.6 guest-interface 0
	run-opts 1 "-e GAPC_SERVER_IP-10.10.111.0" run-opts 2 "-e GAPC_SERVER_PORT=8003"
IOx application netmask	<pre>run-opts 3 "-e GRPC_SERVER_TOKEN-eyInbGc101JTUZ1NWITsToR5c run-opts 4 "-e APP_FD55_LD=c0134:fe:81:c0:00"</pre>
255.255.255.0	Fun-opts 5 "-6 APF_MOST_IP-18.18.11.26"
IOx application gateway address	
10.10.111.6	

Step 11 In the **Manage IoT Services** window that you are taken to, you can click on a name of the switch to see the list of steps executed on that switch.

Figure 16: Manage IoT Services

Manage IoT S	Services					\times $_{\rm B}$	
Manage Connect Enable IoT Services of	Manage Connector SUCCESS Configure to enable Enable IoT Services on Cisco DNA Spaces Connector						
Use Manual Configur Use the three dots a	ration to setup lo	F Services in swit isable Stream to	ches when the config apply configuration ch	guration can not be applie nanges to the switches.	ed automatically.		
Switch Name	Connector IP	Switch IP	Operation Status	Operation Log	Last updated		
catalyst-9300-qa-1	10.22.243.64	10.22.243.73	SUCCESS	Successfully set config	Jun 3, 2021, 1:00:34 PM	:	
First Previous 1 Ne	ext Last				(1 - 1 of 1) :	: 1 pages	
Manage Switch					Sample configur	ration	
Setup IoT Services st	tream authentica	tion and certificat	e to allow switches to	connect with the Cisco	DNA Spaces Connector		
Click the switch to view the list of steps being executed on the switch. Manage IoT Services × Enable Stream Logs ×						×	
Action	Sta	atus Mess	sage	Start Time	Finish Time		
Enable IOx	SU	CCESS Succ	essfully set config	Jun 3, 2021, 1:00:34 PM	Jun 3, 2021, 1:00:36 PM	(
Switch monitor configu	ration SU	CCESS Succ	essfully set config	Jun 3, 2021, 1:00:36 PM	Jun 3, 2021, 1:00:38 PM	ł	
IOx application configu	ration SU	CCESS Succ	essfully set config	Jun 3, 2021, 1:00:38 PM	Jun 3, 2021, 1:00:41 PM	1	
Disable Stream Lo	ogs						
Action	Status	Messag	e s	Start Time	Finish Time		
			No Data Found				

Verify if Cisco Catalyst 9300 and 9400 Series Switches are Added to the Connector

This procedure helps you verify if a Cisco Catalyst 9300 or 9400 Series Switches are deployed and active. This is a necessary prerequisite for proper functioning of Cisco Spaces: IoT Service (Wired).

- **Step 1** In the Cisco Spaces dashboard left navigation pane, choose **Setup** > **Wired Network**.
- **Step 2** In the **Add Switch** area, click **View Switches**.

Figure 17: View Switches

Configure Spaces Connector You will need a token to configure Spaces Connector, You need to connect to https://-your connector IP>/ from optionally configure Spaces Connector to connect via HTTPS proxy. 1 / 1 connector(s) active Create a new token View Connectors Add Switch Associate Switches with Clsco DNA Spaces Connector(s) Add Switches 1 switches added View Switches	a browser to configure the t
You will need a token to configure Spaces Connector. You need to connect to https://cyour connector IP>/ fro optionally configure Spaces Connector to connect via HTTPS proxy. Image: I	a browser to configure the t
1 1 connector(s) active Create a new token View Connectors Add Switch Associate Switches with Cisco DNA Spaces Connector(s) Add Switches 1 Switches added Add Switches	
Add Switch Associate Switches with Cisco DNA Spaces Connector(s) 1 Switches added	
Add Switch Associate Switches with Cisco DNA Spaces Connector(s) 1 Switches added	
1 Switches added Add Switches View Switches	
Switches added View Switches	
IMDOLT MADS	
If you have wired devices and sensors plotted Prime/DNAC you can import them in to the location hierarchy	
2 buildings imported Import/Sync Maps	
Z Map Upload History	
Import Maps If you have wired devices and sensors plotted Prime/DNAC you can import them in to the location hierarchy 2 buildings imported Import/Sync Maps	

Step 3 Ensure that a switch is listed here, and is connected to a Cisco Spaces: Connector.

Figure 18: View Switches

≡ Cis	co DNA Spaces			0	Θ
	← Switches		Create New Switch		
	Name	Connector			
	catalyst-9330-dev-1	dna-spaces-connector-iot-wired-qa			
	(First Previous 1 Next Last		(1 - 1 of 1): 1 pa	ges	