

# Configure and Troubleshoot DNA Spaces and Mobility Express Direct Connect

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## Introduction

This document describes

## Background Information

Like a regular AireOS based Wireless LAN Controller, Cisco Mobility Express (ME) running on 802.11ac Wave 2 Access Points (2800, 3800, 4800, 1542, 1562, 1850, 1815) can be connected to DNA Spaces cloud in 3 ways:

- Direct Connection
- Via DNA Spaces Connector
- Via Cisco CMX on-prem appliance or VM

Integration with DNA Spaces is supported starting Mobility Express version 8.3. This article will be covering setup and troubleshooting of Direct Connect only.

**Important:** Direct connection is only recommended for deployments of up to 50 clients. For any larger ones, use DNA Spaces Connector.

## Requirements

### Prerequisites

## Components Used

- Mobility Express image 8.10.
- 1542 AP
- DNA Spaces cloud

Steps outlined in this article assume that ME has already been deployed and has a working web interface and SSH.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

## Configure

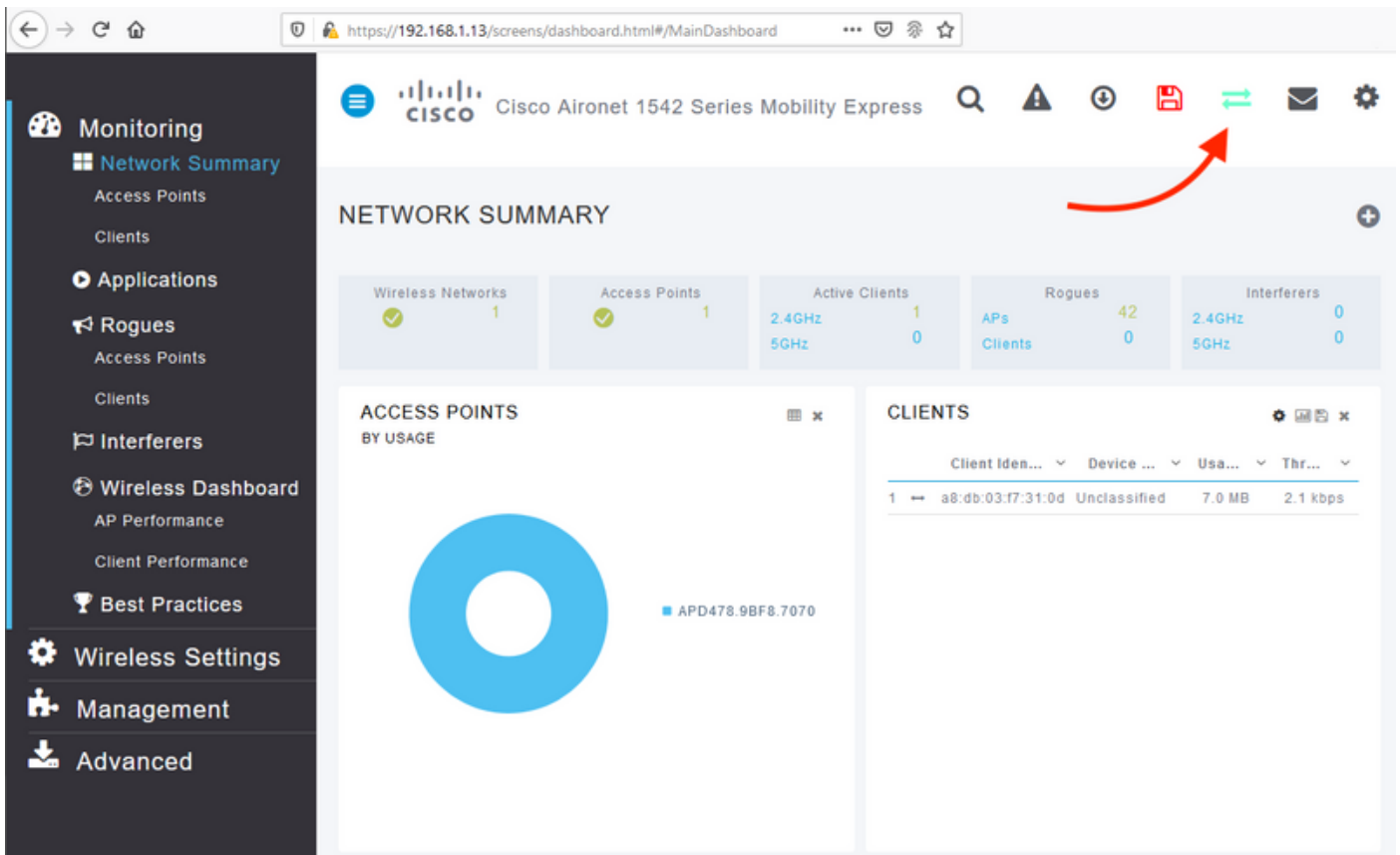
### Mobility Express

DNA Spaces cloud nodes and ME are communicating over HTTPS protocol (port 443). In this test setup the ME running on 1542 AP has been placed behind a NAT with full internet access.

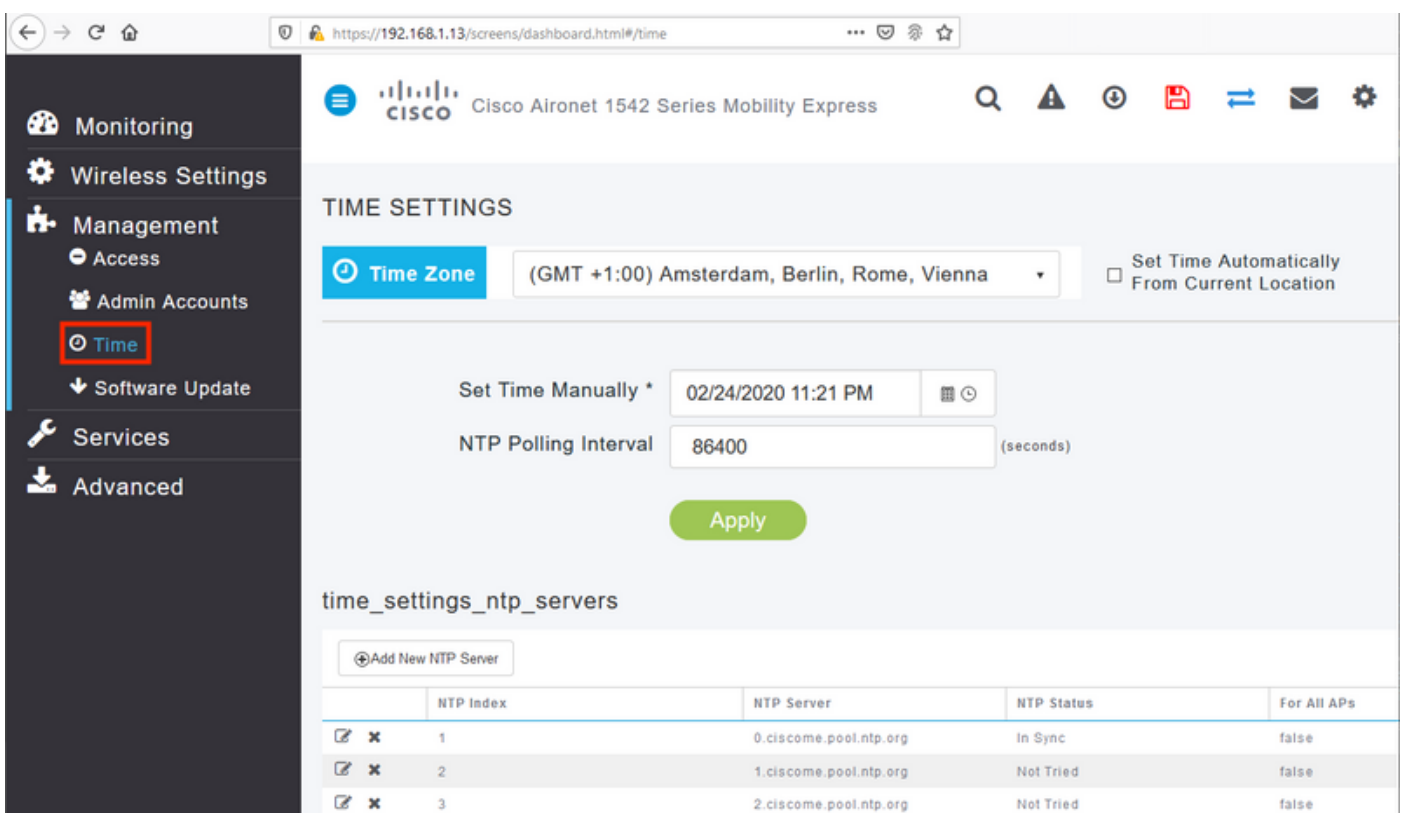
### Configuration via Web Interface

Before Mobility Express controller can be connected to DNA Spaces, it is required to set up a NTP and DNS server and have at least one AP joined. Unlike other AireOS based controllers, Mobility Express does not require a DigiSign root certificate to be installed (at the time of writing of this article).

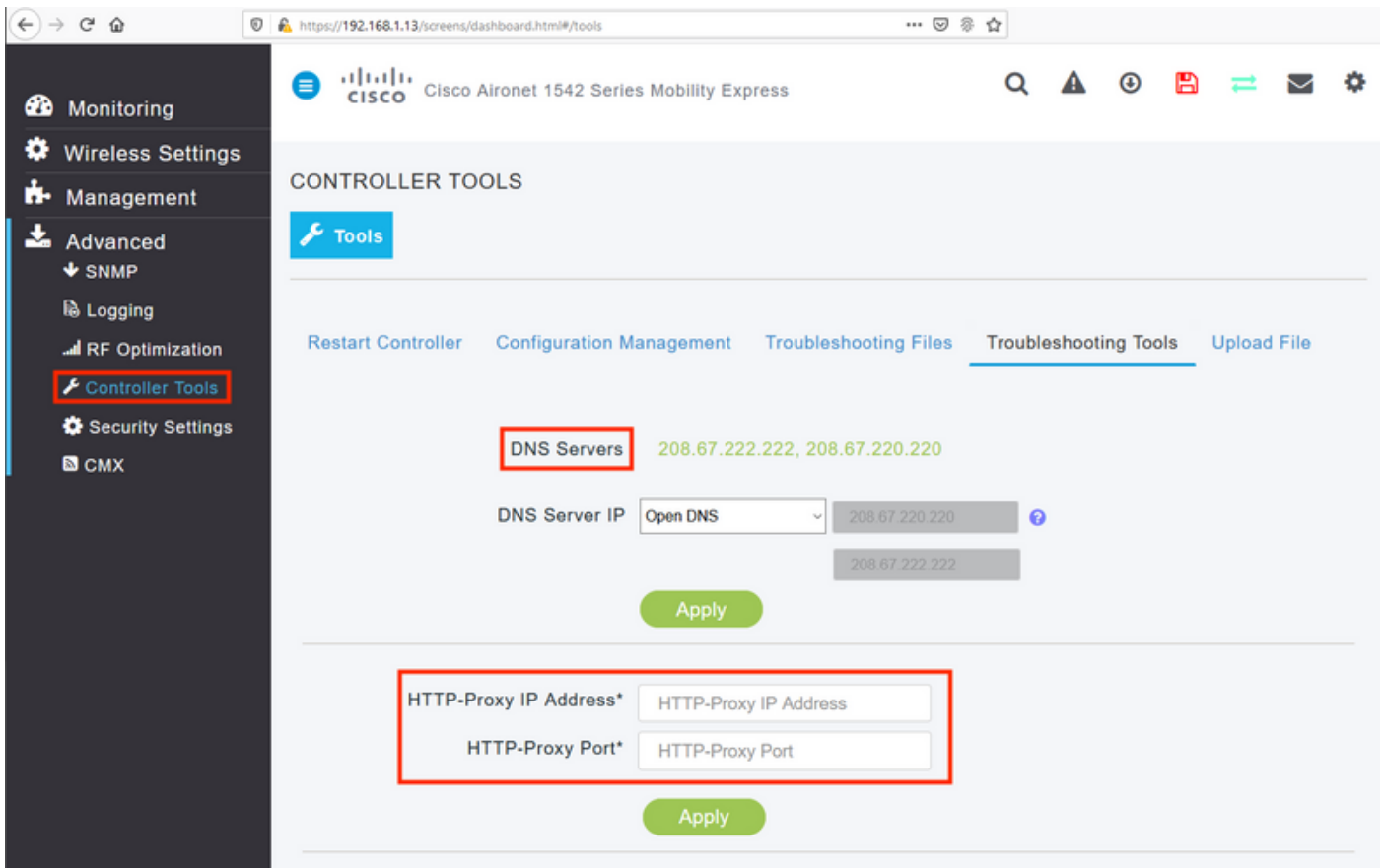
Access the Mobility Express web interface and in the top right corner click on 2 green arrows to enable Expert mode. Expert mode will unlock some of the hidden options:



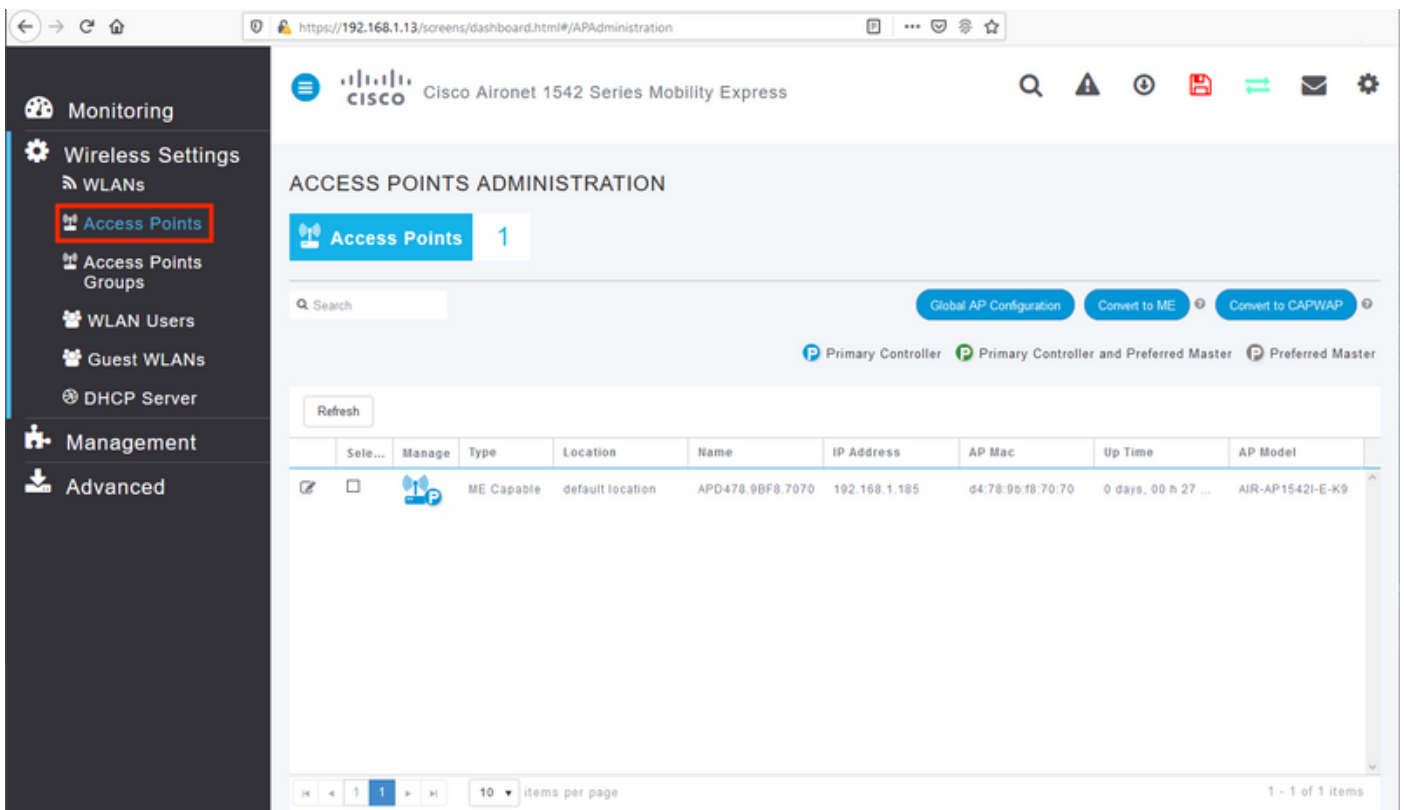
Navigate to **Management > Time** and make sure WLC is synced up with NTP. By default, EWC is preconfigured to use `ciscome.pool.ntp.org` NTP servers:



Navigate to **Advanced > Controller Tools > Troubleshooting Tools** and verify that the DNS server has been added. By default, ME is preconfigured to use Open DNS servers. HTTP proxy address and port can be entered on the same page:



Under **Wireless Settings > Access Points**, verify that at least one AP has been joined. This AP can be the same one on which the ME is running:



On DNA Spaces cloud, login and navigate to **Setup > Wireless Networks > Connect WLC/Catalyst 9800 Directly** and click on **View Token**:

## Connect your wireless network

### Connect WLC/Catalyst 9800 Directly

Connect WLC/Catalyst 9800 Directly is an easy way to get your wireless network connected to Cisco DNA Spaces. No need to upgrade Wireless LAN Controllers or reconfigure your wireless network.

#### 1 Install Root Certificate

You can install the certificate from WLC CLI  
[View root certificate](#)

#### 2 Configure Token in WLC

Configure the token in WLC to establish the connection.

14 Total controller(s)

[View Token](#)

#### 3 Import Controllers into Location Hierarchy

Once the controllers are connected, you can import them into location hierarchy

1 controller(s)  
imported to location  
hierarchy

[Import Controllers](#)

#### Need Help?

Access the below links to view detailed help.

[View Configuration Steps](#)

[System Requirements](#)

[Frequently Asked Questions](#)

Copy the Token and URL:

Token for WLC to connect to DNA Spaces

WLC Cisco Catalyst 9800

Follow the steps below to configure token in WLC CLI

- Execute the following steps in the WLC CLI mode
  - a.config cloud-services cmx disable
  - b.config cloud-services server url <https://vasilijeperovic.dnaspaces.eu> 63.33.127.190
  - c.config cloud-services server id-token [TOKEN]

TOKEN

eyJ0eXAiOiJKV1QiOiJhbnR1eXQ

- Check the summary using the following command:
  - a.show nmsp cloud-services summary

The result should be as follows:

Server	https://vasilijeperovic.dnaspaces.eu
IP Address	63.33.127.190
Connectivity	https: UP
Service Status	Active
Last Request Status	HTTP/1.1 200 OK
Heartbeat Status	OK

Done

In ME web interface, under **Advanced** > **CMX**, paste URL and Authentication Token:

Monitoring  
Wireless Settings  
Management  
Advanced  
SNMP  
Logging  
RF Optimization  
Controller Tools  
Security Settings  
CMX

Cisco Aironet 1542 Series Mobility Express

CONNECTED MOBILE EXPERIENCE: CMX

CMX Settings Enabled

CMX Status Enabled

CMX Server URL \* <https://vasilijeperovic.dnaspaces.eu> Test Link

CMX Server Token \* eyJ0eXAiOiJKV1QiOiJhbnR1eXQ

Apply

To verify that the connection has been established, click on the **Test Link** button. If connection has been established, the button will change to **Link Up**:



Skip the next chapter and go to the “**Import Controllers into Location Hierarchy**”.

## Configuration via CLI

Verify NTP is configured and synced:

```
(ME) >show time

Time..... Mon Feb 24 23:38:13 2020

Timezone delta..... 0:0
Timezone location..... (GMT +1:00) Amsterdam, Berlin, Rome, Vienna

NTP Servers
NTP Version..... 3
NTP Polling Interval..... 86400

Index NTP Key Index      NTP Server                Status      NTP Msg Auth Status
-----
 1 0          0.ciscome.pool.ntp.org    In Sync     AUTH DISABLED
 2 0          1.ciscome.pool.ntp.org    Not Tried  AUTH DISABLED
 3 0          2.ciscome.pool.ntp.org    Not Tried  AUTH DISABLED
```

New NTP servers can be added using `config time ntp server <index> <ip_address>` command.

Verify DNS servers have been configured:

```
(ME) >show network summary

RF-Network Name..... ME
DNS Server IP1..... 192.168.1.1
DNS Server IP2..... 208.67.222.222
DNS Server IP3..... 208.67.220.220
```

New DNS servers can be added using `config network dns serverip <ip_addr>` command.

To confirm AP has been joined:

```
(ME) >show ap summary

Number of APs..... 1

Global AP User Name..... admin
Global AP Dot1x User Name..... Not Configured
Global AP Dot1x EAP Method..... EAP-FAST

* prefix indicates Cisco Internal AP

AP Name          Slots  AP Model          Ethernet MAC      Location          Country
IP Address      Clients DSE Location
-----
*APD478.9BF8.7070  2      AIR-AP1542I-E-K9  d4:78:9b:f8:70:70  default location  BE
192.168.1.185   0      [0 ,0 ,0 ]
```

Like previously mentioned, access DNA Spaces cloud, navigate to **Setup > Wireless Networks > Connect WLC/Catalyst 9800 Directly** and click on **View Token**:

https://dnaspaces.eu/setup/wirelessnetwork

Cisco DNA Spaces **ACT** Active APs 1 of 2000

### Connect your wireless network

#### Connect WLC/Catalyst 9800 Directly

Connect WLC/Catalyst 9800 Directly is an easy way to get your wireless network connected to Cisco DNA Spaces. No need to upgrade Wireless LAN Controllers or reconfigure your wireless network.

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Configure the token in WLC to establish the connection.  
14 Total controller(s) [View Token](#)
- 3 Import Controllers into Location Hierarchy**  
Once the controllers are connected, you can import them into location hierarchy  
1 controller(s) imported to location hierarchy [Import Controllers](#)

**Need Help?**  
Access the below links to view detailed help.  
[View Configuration Steps](#)  
[System Requirements](#)  
[Frequently Asked Questions](#)

Copy the token and URL:



Token for WLC to connect to DNA Spaces

**WLC** Cisco Catalyst 9800

Follow the steps below to configure token in WLC CLI

- Execute the following steps in the WLC CLI mode
  - config cloud-services cmx disable
  - config cloud-services server url <https://vasilijeperovic.dnaspaces.eu> 63.33.127.190
  - config cloud-services server id-token [TOKEN]

TOKEN

eyJ0eXAI0LJKV1C FY18krcrpmRq0g

  - config network dns serverip [dns\_server\_ip]
  - config cloud-services cmx enable
- Check the summary using the following command:
  - show nmsp cloud-services summary

The result should be as follows:

Server	https://vasilijeperovic.dnaspaces.eu
IP Address	63.33.127.190
Connectivity	https: UP
Service Status	Active
Last Request Status	HTTP/1.1 200 OK
Heartbeat Status	OK

Done

Run the following commands:

```
(ME) >config cloud-services cmx disable
(ME) >config cloud-services server url [URL]
(ME) >config cloud-services server id-token [TOKEN]
(ME) >config cloud-services cmx enable
```

To verify that connection with DNA Spaces cloud has been successfully established, run:

CMX Service

```
Server ..... https://vasilijeperovic.dnaspaces.eu
IP Address..... 63.33.127.190
Connectivity..... https: UP
Service Status ..... Active
Last Request Status..... HTTP/1.1 200 OK

Heartbeat Status ..... OK
Payload Compression type ..... gzip
```

## Import Controllers into Location Hierarchy

Rest of the configuration will be done in DNA Spaces. Under **Setup>Wireless Networks>Connect WLC/Catalyst 9800 Directly**, click on **Import Controllers**.

← → ↻ 🏠 <https://dnaspaces.eu/setup/wirelessnetwork> ⋮ 🛡️ 🌐 ⭐

☰ Cisco DNA Spaces ACT Active APs 1 of 2000 ? 🗑️

### Connect WLC/Catalyst 9800 Directly

Connect WLC/Catalyst 9800 Directly is an easy way to get your wireless network connected to Cisco DNA Spaces. No need to upgrade Wireless LAN Controllers or reconfigure your wireless network.

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Configure the token in WLC to establish the connection.  

14 Total controller(s) [View Token](#)
- 3 Import Controllers into Location Hierarchy**  
Once the controllers are connected, you can import them into location hierarchy  

1 controller(s) imported to location hierarchy [Import Controllers](#)

#### Need Help?

Access the below links to view detailed help.

- [View Configuration Steps](#)
- [System Requirements](#)
- [Frequently Asked Questions](#)

Check the radio button next to your account name and click Next. If you already have some Locations added, they will show up in the list below:

← → ↻ 🏠 <https://dnaspaces.eu/setup/wirelessnetwork> ⋮ 🛡️ 🌐 ⭐

☰ Cisco DNA Spaces ACT

### Connect your wireless network

#### Connect WLC/Catalyst 9800 Directly

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You can install the certificate from WLC CLI  
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- 2 Configure Token in WLC**  
Configure the token in WLC to establish the connection.  

14 Total controller(s)
- 3 Import Controllers into Location Hierarchy**  
Once the controllers are connected, you can import them into location hierarchy  

No Controllers added

#### Connect via CMX Tethering

Tethering is an easy way to get your wireless network connected to Cisco DNA Spaces.

#### Connect via Spaces Connector

Connect your wireless network to Cisco DNA Spaces using the Spaces Connector.

### Import Controllers

Where do you want to import this Controller

Choose a location that you want to import this controller.

🔍 Search Locations

TestLocation

[Next](#)

Find your controller IP address, check the box next to it and press **Next**:

Import Controllers ✕

Select the Controller(s) that you want to import  
NOTE: The Controller(s) will be added as a new WLC under "Mezz@Parsnet"

<input type="checkbox"/> 100.156.1.108	1 Apr
<input type="checkbox"/> 100.156.1.129	1 Apr
<input type="checkbox"/> 100.156.1.183	1 Apr
<input checked="" type="checkbox"/> 100.156.1.12	1 Apr

Since no other Locations have been added, just click Finish:

Import Controllers ✕

Locations

Following are auto-discovered locations, select the locations which you wish to add

No Networks are available

WARNING: Selecting any of these locations will delete any existing locations.

Cancel Next Finish

Prompt saying ME has been successfully imported into Location Hierarchy will pop up:



# Controller successfully imported to location hierarchy!

Total controllers added : 1  
Total number of APs : 1  
Total number of Locations : 0

Would you like to organize your location hierarchy

[Yes, take me to location hierarchy](#)

[No, Continue with Setup](#)

Now that the EWC has been successfully connected to the cloud, you can start using all other DNA Spaces features.

## Verify

There is currently no verification procedure available for this configuration.

## Troubleshoot

This section provides the information you can use in order to troubleshoot your configuration.

Debugging on Mobility Express is very limited, and at the time of writing this article, does not provide much insight as to why the connection with the cloud failed. Missing NTP server, DNS not resolving DNA Spaces domain name and Firewall blocking HTTPS traffic will all result with the same debug and show outputs:

(ME) >**show cloud-services cmx summary**

CMX Service

```
Server ..... https://vasilijeperovic.dnaspaces.eu
IP Address..... 0.0.0.0
Service Status ..... Down
Connectivity..... https: Failed to establish connection
Time remaining for next Retry..... 5 Seconds
```

If the connection to the cloud has failed, Mobility Express will retry to establish it every 30 seconds. To enable debugs, simply run:

(ME) >**debug nmsp all enable**

\*emWeb: Jul 01 00:20:52.836: Started http trace logging to file /var/log/debug/wlc-debug-captures.txt

Debug outputs will again be identical for missing NTP server, DNS not resolving DNA Spaces domain name and Firewall blocking HTTPS traffic. Due to this, it is always recommended to perform packet captures on the AP switch port.

Example of a failed connection due to unconfigured NTP can be seen below:

(ME) >**debug nmsp all enable**

Debugging session started on Jul 01 00:20:52.839 for WLC AIR-AP1542I-E-K9 Version :8.10.112.0  
SN :FGL2324B02P Hostname ME

\*nmspTxServerTask: Jul 01 00:21:05.408: Received Message LOCP\_HTTPS\_SERVICE\_UPDATE

\*nmspTxServerTask: Jul 01 00:21:05.408: Received CMX service command CMX\_SERVICE\_LINK\_CHECK,  
Buffer Length 1292

\*nmspTxServerTask: Jul 01 00:21:05.408: **connection failed. Attempt 1**

\*nmspTxServerTask: Jul 01 00:21:05.409: **Configured Domain:**vasilijeperovic.dnaspaces.eu

\*nmspTxServerTask: Jul 01 00:21:05.409: Connect to data.dnaspaces.eu/networkdata, Tenent Id  
vasilijeperovic

\*nmspTxServerTask: Jul 01 00:21:05.409: Keep Alive

Url:https://data.dnaspaces.eu/api/config/v1/nmspconfig/192.168.1.13

\*nmspTxServerTask: Jul 01 00:21:05.409: **Initating cmx-cloud connetion. port 443**, token  
eyJ0eXAiOiJKV1Q[information-omitted]I8krcrpmRq0g

\*nmspTxServerTask: Jul 01 00:21:05.409: [CTX:0] Tx handles in use 0, free 1

\*nmspTxServerTask: Jul 01 00:21:05.411: [CTX:1] Tx handles in use 0, free 32

\*nmspTxServerTask: Jul 01 00:21:05.411: Http connection URL

https://data.dnaspaces.eu/networkdata?jwttoken=eyJ0eXAiOiJKV1Q[information-omitted]I8krcrpmRq0g

\*nmspTxServerTask: Jul 01 00:21:05.411: **Sending Echo Req in start.** Refresh Handle =**Yes**

\*nmspTxServerTask: Jul 01 00:21:05.411: Https Control path handle may be refreshed.

\*nmspMxServerTask: Jul 01 00:21:05.413: Async Perform done on 1 messages

Example of successful connection:

(ME) >**debug nmsp all enable**

Debugging session started on Feb 25 01:13:04.913 for WLC AIR-AP1542I-E-K9 Version :8.10.112.0  
SN :FGL2324B02P Hostname ME

\*emWeb: Feb 25 01:13:10.138: **Init cmx-cloud config: Already initialized**

\*emWeb: Feb 25 01:13:10.138: **Starting connection retry timer**

\*emWeb: Feb 25 01:13:10.138: Posting Service Request 50 to Tx service

\*nmspTxServerTask: Feb 25 01:13:10.212: Received Message LOCP\_HTTPS\_SERVICE\_UPDATE

\*nmspTxServerTask: Feb 25 01:13:10.213: Received CMX service command CMX\_SERVICE\_START, Buffer Length 1292

\*nmspTxServerTask: Feb 25 01:13:10.213: **Configured Domain:**vasilijeperovic.dnaspaces.eu

\*nmspTxServerTask: Feb 25 01:13:10.213: Connect to data.dnaspaces.eu/networkdata, Tenant Id vasilijeperovic

\*nmspTxServerTask: Feb 25 01:13:10.213: Keep Alive

Url:https://data.dnaspaces.eu/api/config/v1/nmspconfig/192.168.1.13

\*nmspTxServerTask: Feb 25 01:13:10.213: **Initating cmx-cloud connetion. port 443,** token eyJ0eXAiOiJKV1Q[information-omitted]I8krcrpmRq0g

\*nmspTxServerTask: Feb 25 01:13:10.216: [CTX:1] Tx handles in use 0, free 32

\*nmspTxServerTask: Feb 25 01:13:10.216: Http connection URL

https://data.dnaspaces.eu/networkdata?jwttoken=eeyJ0eXAiOiJKV1Q[information-omitted]I8krcrpmRq0g

\*nmspTxServerTask: Feb 25 01:13:10.216: **Sending Echo Req in start.** Refresh Handle =No

\*nmspMxServerTask: Feb 25 01:13:10.217: Async Perform done on 1 messages

\*nmspMxServerTask: Feb 25 01:13:10.446: Received: 17 bytes header

\*nmspMxServerTask: Feb 25 01:13:10.446: **Rx Header HTTP/1.1 200 OK**

\*nmspMxServerTask: Feb 25 01:13:10.446: 00000000: 48 54 54 50 2f 31 2e 31 20 32 30 30 20 4f 4b 0d HTTP/1.1.200.OK.

\*nmspMxServerTask: Feb 25 01:13:10.446: 00000010: 0a

.

\*nmspMxServerTask: Feb 25 01:13:10.446: **Received Heartbeat response on connection [0]**

\*nmspMxServerTask: Feb 25 01:13:10.446: **Stopping connection retry timer**

\*nmspMxServerTask: Feb 25 01:13:10.446: **connection succeeded. server IP 63.33.127.190**