



Smart Spaces - AnyLocate capabilities

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Feature history for Smart Spaces - AnyLocate capabilities

- This table provides release and related information for the feature explained in this module.
- This feature is also available in all the releases subsequent to the one in which they are introduced in, unless noted otherwise.

Table 1: Feature history for Smart Spaces - AnyLocate capabilities

Feature Name	Release Information	Feature Description
Smart Spaces - AnyLocate capabilities	Cisco IOS XE 17.18.2	This is a suite of features that enhance indoor location services leveraging technologies like ultra-wideband (UWB), Wi-Fi fine timing measurement (FTM), and enable precise indoor wayfinding and asset tracking.

AnyLocate feature set

AnyLocate capabilities are a suite of features that

- enhance indoor location services
- leverage technologies like ultra-wideband (UWB) and Wi-Fi fine timing measurement (FTM), and
- enable precise indoor wayfinding and asset tracking.

AnyLocate aims to transform the network into a sensor, eliminating the need for additional sensors or gateways by utilizing APs to facilitate location services. This umbrella term encompasses various location-based functionalities, including client location, RFID tags, BLE tags, AP auto-locate, UWB based indoor wayfinding and asset tracking.

Key features:

Indoor Wayfinding: Provides turn-by-turn directions within a building, similar to GPS for outdoor navigation.

Asset Tracking: Monitors the location of assets equipped with tracking tags.

AP Auto-locate: Automatically places APs on network maps using FTM and UWB based inter-AP ranging and GNSS data.

Wi-Fi fine timing measurement

Wi-Fi fine timing measurement (FTM) is a 802.11 standard feature that

- allows devices to measure their distance from Wi-Fi APs
- enhances indoor location accuracy, and
- uses time-stamped signal exchanges for ranging.

FTM improves upon traditional Wi-Fi signal strength (RSSI) based location by using precise time-stamping to calculate distances more accurately.

Supported APs

- Wi-Fi 6: Cisco Catalyst 9130 and 9120 Series APs
- Wi-Fi 6E APs
- Wi-Fi 7 APs



Note For more information, check the [Infrastructure Feature Matrix \(IOS XE\)](#) tables for Wi-Fi 6 and Wi-Fi 7 APs.

Indoor wayfinding

Indoor wayfinding is a highly sought-after feature that

- allows clients to compute their own location within a building
- provides turn-by-turn directions to a desired destination, and

- functions as an indoor equivalent to outdoor GPS navigation.

Indoor wayfinding operates using these protocols.

- Client-side computation: The client device computes its own location.
- Technology leverage: Utilizes UWB DL-TDOA and Wi-Fi FTM for precise positioning.

Asset tracking

Asset Tracking is a feature that

- enables the precise monitoring of physical assets equipped with location tags
- leverages ultra-wideband (UWB) and bluetooth low energy (BLE) technologies, and
- allows the network infrastructure to compute and display the asset's location.

Unlike wayfinding, where the client computes its own location, asset tracking involves the network infrastructure actively listening for signals from specialized tags attached to assets. The network then calculates the tag's position, making it ideal for inventory management, equipment location, and other operational use cases.

Asset tracking operates using these protocols.

- Tag-initiated blinks: UWB-enabled tags periodically transmit short "blinks."
- Network-side listening: APs listen for these blinks, record their reception timestamps, and send this data to a central location engine.
- Infrastructure computation: The network infrastructure computes the tag's precise location based on the time differences of arrival at multiple APs.
- Hybrid tag support: Tags often combine BLE for onboarding and traditional location, with UWB for higher accuracy when available.

Prerequisites for asset tracking

There are four very basic device level prerequisites for asset tracking.

- Enable the global configuration knob for ranging.
- Enable UWB radio in the AP profile (the default setting is enabled).
- Allow and ensure a functional gRPC connection to Cisco Spaces Connector.
- Add the AP to the Cisco Spaces floor map and enable IoT services.



Note Enabling IoT services through Cisco Spaces Connect feature is not supported yet.

After you meet these prerequisites, go to Cisco Spaces to enable the asset tracking feature, onboard tags, and use the detect and locate functions to track assets.

To verify the prerequisites for asset tracking, check [Verify the prerequisites for asset tracking, on page 10](#).

Time difference of arrival (TDOA)

Time difference of arrival (TDOA) operates in two ways

- Downlink time difference of arrival
- Uplink time difference of arrival

Downlink time difference of arrival (DL-TDOA)

Downlink time difference of arrival (DL-TDOA) is a UWB-based positioning method that

- allows client devices to compute their own location
- leverages time-synchronized UWB signals transmitted by APs, and
- ensures client privacy because location computation occurs on the device.

In a DL-TDOA system, APs transmit time-stamped UWB signals. Client devices passively listen to these signals, measure the time differences of arrival from multiple APs, and use this information to calculate their precise indoor position. This method is highly scalable and ensures user privacy because the network does not compute or store the client's location.

Uplink time difference of arrival (UL-TDOA)

Uplink time difference of arrival (UL-TDOA) is a UWB-based positioning method that

- enables the network infrastructure to compute the location of tracking tags
- relies on tags periodically transmitting UWB blinks, and
- is primarily used for asset tracking applications.

In a UL-TDOA system, UWB-enabled tags (attached to assets) periodically transmit short "blinks." APs listen to these blinks, record their reception timestamps, and forward this data to a central location engine. The network infrastructure then computes the tag's precise location based on the time differences of arrival at multiple APs.

Automatic reclustering for clock synchronization

Summary

Automatic reclustering for clock synchronization is the automated process of reconfiguring the UWB network's clusters and roles when an AP joins, leaves, or undergoes configuration changes, ensuring continuous and optimized location services.

- Wireless LAN Controller : Detects AP status changes and initiates reclustering requests.
- Cisco Spaces: Receives reclustering requests, initiates AP to AP ranging over UWB if necessary, computes new cluster configurations, and pushes them to the controller.
- APs: Apply new cluster configurations and participate in UWB location services.

Workflow

Reclustering behavior helps you anticipate network adaptation when APs change.

Prerequisites for wayfinding configurations

Ensure these prerequisites are met for UWB wayfinding functionality.

- Cisco Spaces integration: The controller must be onboarded to Cisco Spaces using a connector.
- AP placement on maps: Place all APs accurately on a map and associate them with a floor map in Cisco Spaces.
- Geo-coordinates: Enter geo-coordinates for each AP. Using AP Autolocate is preferred.
- Height and floor level: Record each AP's height above the floor and specify its floor level.
- WLAN beacon broadcast: Enable beacon broadcast for at least one WLAN on each AP to support UWB Out-of-Band (OOB) communication with mobile devices.
- UWB coverage density: Deploy APs so that each AP covers 800 to 1000 square feet and provides adequate UWB coverage.



Note Perform a proper RF design. Position each AP with equal importance as the AP density.

Impact of AP downtime on location services

An AP going down can affect UWB location service coverage.

- Localized blackout: If an AP goes down in your environment, you may lose location services in that area.
- Coverage resilience: In the event that one AP in your deployment becomes non-operational while four other anchors remain active, your location services continue to function. If there are fewer than four anchors in a specific area, computed location might be degraded or inaccurate.
- Maintenance window: Expect AP downtime during maintenance windows or network events. The system automatically recovers by reclustering when these events occur.

Enable UWB wayfinding (GUI)

Activate UWB wayfinding to enhance location services on an AP.

Before you begin

UWB must be enabled to proceed with this task.

Procedure

- Step 1** Choose **Configuration > Tags & Profiles > AP Join**.
 - Step 2** Select the **AP Join Profile**.
 - Step 3** Click on the **Geolocation** tab.
 - Step 4** In the **Ultra-Wide Band (UWB)** section, toggle the button to enable **UWB Wayfinding**.
 - Step 5** The **UWB Wayfinding Block Duration** value by default is one second.
-

Enable UWB wayfinding (CLI)

Enable UWB wayfinding and configure its block duration on a wireless AP profile using commands.

Procedure

- Step 1** Enter global configuration guide.
Example:

```
Device# configure terminal
```
 - Step 2** Configure an AP profile and enter AP profile configuration mode.
Example:

```
Device(config)# ap profile ap-profile1
```
 - Step 3** Enable geolocation UWB wayfinding.
Example:

```
Device(config-ap-profile)# [no] geolocation uwb wayfinding
```

Use the **no** form of the command to disable UWB wayfinding.
 - Step 4** Configure the geolocation UWB wayfinding block duration.
Example:

```
Device(config-ap-profile)# geolocation uwb wayfinding block-duration 1second
```

The **UWB Wayfinding Block Duration** value by default is one second. The **UWB Wayfinding Block Duration** has two values: one second and 500 ms.
-

Configure height above the floor (GUI)

Set the physical mounting height of an AP in centimeters as part of the AP provisioning process using the GUI.

Use this task during bulk AP provisioning to ensure accurate floor mapping and optimal wireless coverage by specifying a realistic height above floor.

Procedure

- Step 1** Choose **Configuration > Wireless > Bulk AP Provisioning**.
 - Step 2** Click on **Select a workflow to create a AP Provisioning task**.
 - Step 3** Select the AP and click **Next**.
 - Step 4** In the **Floor** section, enter the **Height Above Floor (centimeters)** value. The **Height Above Floor (centimeters)** value's valid range is from 1 to 4000.
 - Step 5** Click **Next**.
-

What to do next

To verify the configuration, check [Verify AP location information, on page 10](#).

Configure height above the floor (CLI)

Specify the height of an AP above the floor to improve the accuracy of location services using commands.

The height above the floor (HATF) information is crucial for 3D location computations, especially for wayfinding and asset tracking use cases. This configuration can be done per AP.

Before you begin

- Ensure the AP is operational and managed by the controller.
- Know the precise height of the AP from the floor in centimeters.

Procedure

Configure the geolocation height above the floor for a Cisco AP.

Example:

```
Device# ap name cisco-ap-name geolocation height-above-the-floor 1-4000
```

The valid range is from 1 to 4000 cm. Use the **no** form of the command to disable height above the floor for a Cisco AP.

The AP's height above the floor is set for use by location services.

What to do next

To verify the configuration, check [Verify AP location information, on page 10](#).

Verify AP UWB wayfinding status

Use these commands to verify the status of AP UWB wayfinding.

- **Device# show ap name <ap_name> geolocation uwb wayfinding**
- **Device# show ap geolocation uwb wayfinding detail**
- **Device# show ap geolocation uwb wayfinding status**
- **Device# show ap geolocation uwb wayfinding group <group name>**

To verify the AP geolocation UWB wayfinding, enter this command from the console:

```
Device# show ap name <ap_name> geolocation uwb wayfinding

AP MAC Address: f0d8.054c.12e0
Group ID: new_curl_group1
Status: Active
Number of Clusters: 1
Role: Initiator
Round Index: 0
Number of Responder Anchor: 1
Responder MAC      Slot Index
-----
ecf4.0c92.b340    1
```

To verify the AP geolocation UWB wayfinding detail when AP is active, enter this command from the console:

```
Device# show ap geolocation uwb wayfinding detail
AP Name AP MAC Site Tag Group ID Status Block
Duration
NAlpine2 ecf4.0c92.b340 default-site-tag new_curl_group Active 1sec
NAlpine3 ecf4.0c92.b980 default-site-tag new_curl_group Active 1sec
NAlpine1 ecf4.0c9c.bd60 default-site-tag new_curl_group Active 1sec
NZealand1 f0d8.054c.12e0 default-site-tag new_curl_group Active 1sec
```

To verify the AP geolocation UWB wayfinding detail when the AP is in paused state, enter this command from the console:

```
Device# show ap geolocation uwb wayfinding detail
AP Name AP MAC Site Tag Group ID Status Block
Duration
NAlpine2 ecf4.0c92.b340 default-site-tag new_curl_group Paused 1sec
NAlpine3 ecf4.0c92.b980 default-site-tag new_curl_group Paused 1sec
NAlpine1 ecf4.0c9c.bd60 default-site-tag new_curl_group Paused 1sec
NZealand1 f0d8.054c.12e0 default-site-tag new_curl_group Paused 1sec
```

To verify the AP geolocation UWB wayfinding detail when the AP is in pending state, enter this command from the console:

```
Device# show ap geolocation uwb wayfinding detail
AP Name AP MAC Site Tag Group ID Status Block
Duration
NAlpine2 ecf4.0c92.b340 default-site-tag new_curl_group Pending 1sec
NAlpine3 ecf4.0c92.b980 default-site-tag new_curl_group Pending 1sec
NAlpine1 ecf4.0c9c.bd60 default-site-tag new_curl_group Pending 1sec
NZealand1 f0d8.054c.12e0 default-site-tag new_curl_group Pending 1sec
```

To verify the AP geolocation UWB wayfinding status, enter this command from the console:

```
Device# show ap geolocation uwb wayfinding status
Group-ID                      Clustered APs State      Active APs
```

```
1760584021797-1          6          Configured  6
```

To verify the AP geolocation UWB wayfinding group, enter this command from the console:

```
Device# show ap geolocation uwb wayfinding group <group name>
Group ID: 1760584021797-1
Max Round: 7
Cluster List
Round Initiator Anchor          Stratum Parent Anchor          List of
Responder Anchors (Slot-Index:Responder)

0      Alpine3                    0                                1:Zealand1
2:Alpine2 3:Alpine1 4:Alpine4 5:Zealand2
```

Verify AP UWB asset-tracking status

Use these commands to verify the status of AP UWB asset-tracking.

- **Device# show ap name <ap_name> geolocation uwb asset-tracking**
- **Device# show ap geolocation uwb asset-tracking status**
- **Device# show ap geolocation uwb asset-tracking detail**

To verify the AP geolocation UWB asset-tracking, enter this command from the console:

```
Device# show ap name <ap_name> geolocation uwb asset-tracking
```

```
AP MAC Address: f0d8.054c.12e0
Group ID: ABC1231
Status: Active
Sync slot index: 0
Primary: 1
RX Bitmap: 0X00000000FFFFFFFF
```

To verify the AP geolocation UWB asset-tracking status, enter this command from the console:

```
Device# show ap geolocation uwb asset-tracking status
```

```
Group-ID          Clustered APs State          Active APs
-----
```

```
ABC1231          4          Configured  4
ne2 3:Alpine1 4:Alpine4 5:Zealand2
```

To verify the AP geolocation UWB asset-tracking detail, enter this command from the console:

```
Device# show ap geolocation uwb asset-tracking detail
```

```
AP Name          AP MAC          Site Tag          Group
ID              Status

-----
```

NAlpine2	Active	ecf4.0c92.b340	default-site-tag	ABC1231
NAlpine3	Active	ecf4.0c92.b980	default-site-tag	ABC1231
NAlpine1	Active	ecf4.0c9c.bd60	default-site-tag	ABC1231
NZealand1		f0d8.054c.12e0	default-site-tag	ABC1231

Verify AP location information

Verify AP location information for these parameters:

- Verify height above the floor and latitude and longitude parameters from Cisco Spaces autoplacement or on the controller's console or GUI.

To verify height above the floor and latitude and longitude parameters from Cisco Spaces autoplacement or on the controller's console or GUI, enter these commands:

```
Device# ap name <ap_name> geolocation coordinate latitude longitude
```

```
Device# show ap name <ap_name> geolocation detail
```

```
AP Name                : Alpine1
GNSS present           : Yes
Location type          : Ellipse
HDOP                   : 0.000000
Source                 : GNSS
Center ellipse - longitude : -121.928826
Center ellipse - latitude  : 37.407565
Ellipse major-axis (meters) : 86
Ellipse minor-axis (meters) : 86
Ellipse orientation     : 0.000000
Last update            : 12/03/2025 22:32:15
Height                 : NA
Height above the floor (cms) : 200
```

Verify the prerequisites for asset tracking

Verify the prerequisites for asset tracking for these parameters:

- Enable the global configuration knob for ranging.
- Enable UWB radio in the AP profile (the default setting is enabled).
- Allow and ensure a functional gRPC connection to Cisco Spaces Connector.
- Verify the controller to connector connection status

To enable the global configuration knob for ranging, use this command: **Device(config)# ap geolocation derivation ranging**

To check the UWB radio enablement in the AP profile, see [Enable UWB wayfinding \(GUI\), on page 5](#) or [Enable UWB wayfinding \(CLI\), on page 6](#).

Allow and ensure a functional gRPC connection to Cisco Spaces Connector by checking the controller connector connection.

To verify the controller to connector connection status, enter this command:

```
Device# show telemetry connection all
Telemetry connections
```

Index	Peer Address	Port	VRF	Source Address	State	State
0	70.0.0.132	8184	0	70.0.0.2	Active	Connection
1	70.0.0.132	8004	0	70.0.0.2	Active	Connection
395	172.19.20.125	25103	1	M 172.20.209.40	Connecting	Connection

request made to transport handler

IoT service enablement is done from Cisco Spaces.

Verify the prerequisites for asset tracking