Cambium Networks™

Cambium-AeroScout Healthcare Solution Configuration Guide

System Release 1.5

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Contents

Abbreviations and Terms

Terms	Description
AES	AeroScout Engine Server
AEM	AeroScout Engine Manager
AP	Access Point
WLAN	Wireless Local Area Network
UDP	User Datagram Protocol
CLI	Command line Interface
IP	Internet Protocol
MAC	Media Access Control (Hardware Address)
RFID	Radio Frequency Identification
RTLS	Real Time Location System
Tag	AeroScout Tag

Revision History

Date	Version #	Author(s)
19/03/2021	1.0	Anandakrishnan V
04/08/2021	1.1	Marc H
10/08/2021	1.2	Marc H
25/08/21	1.3	Marc H
01/09/2021	1.4	Marc H
21/9/2021	1.5	Marc H

Introduction

STANLEY Healthcare provides a Unified Visibility solution that utilizes the power of Cambium Networks Enterprise Wi-Fi 6 access points to provide significant business and patient experience benefits through Real-time Location, Active RFID, sensors, and telemetry. Cambium Networks Wi-Fi 6 access points provide the network bandwidth necessary for STANLEY Healthcare solutions to accurately track the real-time location and status of valuable assets such as equipment or people. Cambium Networks Wi-Fi products provide a single, unified wireless network throughout the healthcare facility. STANLEY Healthcare's solutions leverage the Wi-Fi network to enable customers to accurately track and monitor valuable assets ultimately using this visibility information to make everyday decisions, improve operational efficiency and provide security for patients and staff.

Cambium Networks empowers millions of people with wireless connectivity worldwide. Our wireless portfolio is used by commercial and government network operators as well as broadband service providers to connect people, places, and things. With a single network architecture spanning fixed wireless and Wi-Fi, Cambium Networks enables operators to achieve maximum performance with minimal spectrum. End-to-end cloud management transforms networks into dynamic environments that evolve to meet changing needs with minimal physical human intervention. Cambium Networks empowers a growing ecosystem of partners who design and deliver gigabit wireless solutions that just work.

Cambium Networks provides industry-leading solutions used in many areas such as:

- Education
- Enterprise
- Federal Government
- Healthcare
- Hospitality
- Industrial
- Oil and Gas
- Public Wi-Fi
- Retail
- Service Providers
- Smart Cities

Solution Overview

STANLEY AeroScout systems use Cambium Wi-Fi networks as core infrastructure. All wireless visibility solutions require Wi-Fi infrastructure devices to pass wireless signals from tags or sensors to the network. AeroScout enhances this capability by enabling real-time tracking of thousands of tagged devices and people, e.g., staff and at-risk patients.

Using Cambium Networks wireless access points as wireless readers, organizations can locate and track their assets and people with AeroScout tags and software using a single unified wireless network for data, voice, and location services.

Cambium Networks Enterprise Wi-Fi Access Points

Cambium Networks XV access points, cnMaestro X, and XMS-Cloud management systems deliver Enterprise grade Wi-Fi with Single Pane of Glass visibility to manage 802.11 Wi-Fi. Edge intelligent 802.11 access points are RF aware, provide seamless roaming and make intelligent decisions at the most impacted access point. Edge intelligent networks support more devices and more content, at higher bit rates.

Cambium Networks Wi-Fi 6 access points, the XV3-8 and XV2-2 deliver all the features available in the 802.11ax specification such as:

- Multi-user OFDMA – more efficient for small to large packet sizes
- 8x8 MU-MIMO – offer targeted beam steering and 2x capacity
- Spectrum reuse – allows multiple networks to overlap
- Target Wait Time – schedules sleep and wake uptime
- Preamble 3dB and longer OFDM symbol – extend the outdoor range
- 1024 QAM and 2.4GHz band operation

XV3-8–Indoor Wi-Fi 6 Access Point

The XV3-8 features a total of five radios to deliver a next-generation network with edge services with high capacity and high density. Three data radios can be configured as two 5GHz 4x4 plus one 2.4GHz 4x4, or the two 5GHz radios can be combined into a single 5GHz 8x8 radio with the maximum power and performance of the 802.11ax standard. A dedicated network scanning radio provides continuous network monitoring to enhance security protocols, detailed network reports, and automatic RF optimizations. Add the Bluetooth Smart 4.1 IoT radio for BLE-based location services and you get a multi-radio, high-capacity Wi-Fi 6 AP designed for the most demanding networks in the enterprise, healthcare, education, retail, and public venues.

XV2-2–Indoor Wi-Fi 6 Access Point

The XV2-2 is a dual-radio Wi-Fi 6 access point designed to deliver next generation networks with edge services at a value-based price. While delivering all the features available in the 802.11ax specification, the XV2-2 is fully backward compatible with existing Wi-Fi technology and enables a massive growth of low power, low-bitrate IoT devices to add infrastructure intelligence into any market.

XMS-Cloud Management System

XMS-Cloud is a powerful management solution for deploying and managing Cambium Networks Wi-Fi and Switching portfolios with complete control and visibility. It provides zero-touch activation to automate software upgrades, patches, and licenses. IT enjoys the benefits of a superior console interface where all services are integrated at no extra cost. The system supports Wi-Fi devices, including IoT endpoints, regardless of the operating system. DPI technology lets network administrators control more than 2,400 applications at the network's edge where they can be allowed, blocked, or throttled to achieve predictable performance, even under heavy network load. Integrated into the system is EasyPass, a suite of 8 different access portals which include Microsoft and Google portals, On-boarding, Guest, and Personal Wi-Fi portals.

cnMaestro X Management System

cnMaestro X is a simple, yet sophisticated cloud-first, next-generation network management solution for Cambium Networks wireless and wired solutions. The system can run in the cloud, or onsite, in your existing VM environment. cnMaestro X offers single-pane-of-glass management to deliver secure, end-to-end network and wireless lifecycle management with zero-touch provisioning, monitoring, and troubleshooting capabilities. Advanced features include an MSP Dashboard, Restful APIs, Webhooks, Support for Software Defined Radios, Support for 1,024 Enterprise Wi-Fi PSKs, and Advanced Captive Portal capabilities including paid gateways. The powerful set of tools simplifies operations, troubleshooting, and ongoing maintenance.

Active RFID tags

Active RFID tags contain their batteries and transmit their ID signal at regular intervals, without requiring an external trigger. Tags send a periodic beacon that is used to identify their location.

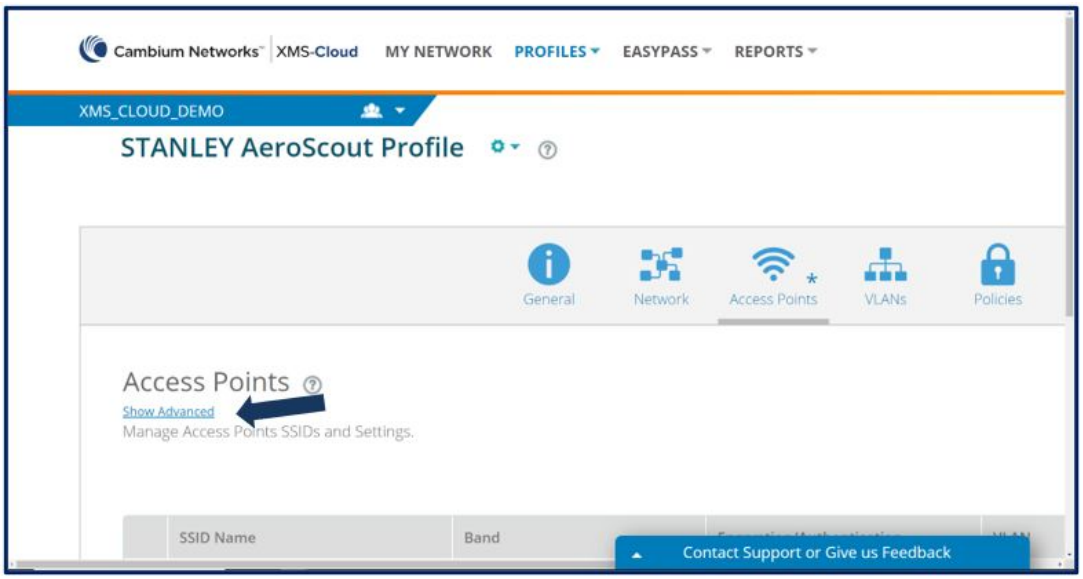
AeroScout Location Engine

AeroScout utilizes a Location Engine to determine the position of Wi-Fi tags. The Location Engine delivers accurate and reliable location data for assets and people with STANLEY Healthcare Wi-Fi tags. The AeroScout Location Engine determines location using signal strength measurements (RSSI) collected by the Cambium Wi-Fi APs, which can simultaneously serve location sensors and provide network access. It is an integral component of STANLEY Healthcare's AeroScout RTLS solutions.

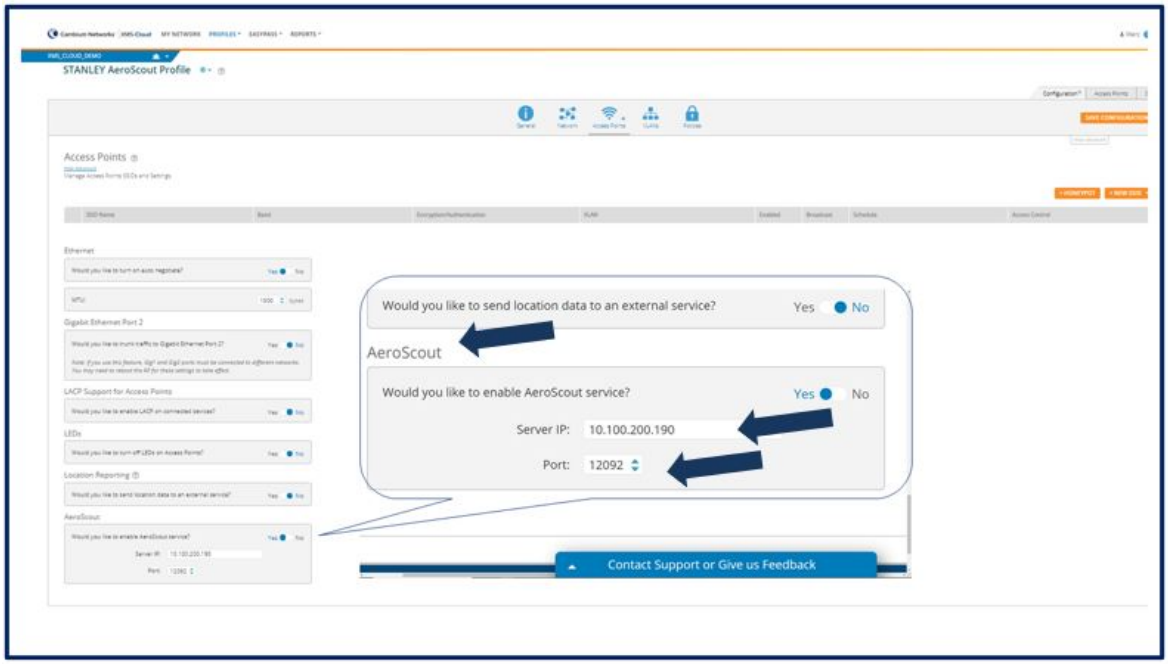
Configuration – Cambium and AeroScout

Configuring the AeroScout server in XMS-Cloud

- Open a **Profile** and go to the **Access Points** page and click the **Show Advanced** link.



- Go to **AeroScout**, select **Yes**, and enter the **Server IP address** and **Port** for your **AeroScout** server. (Port 12092 is the default).

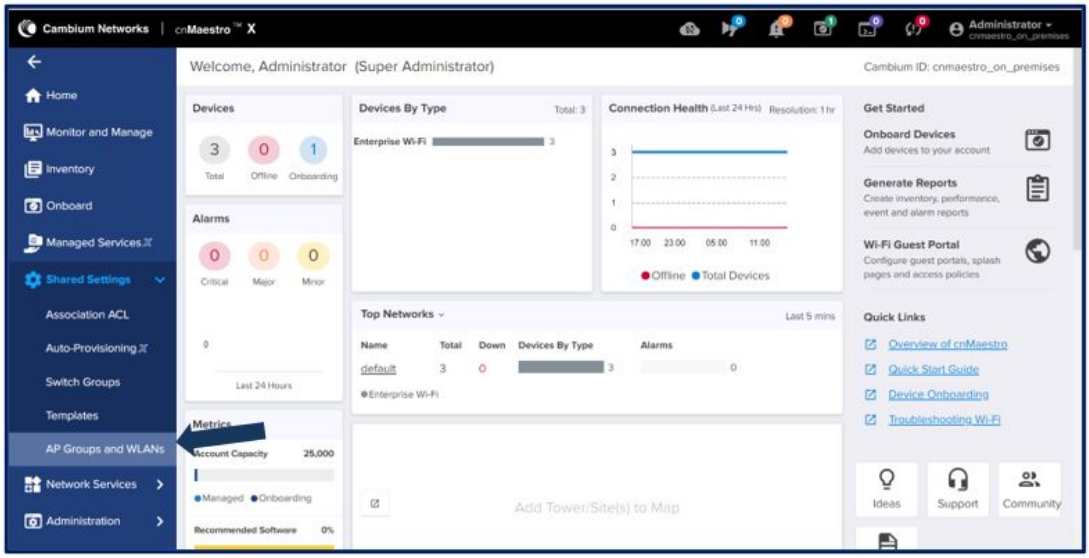


Note

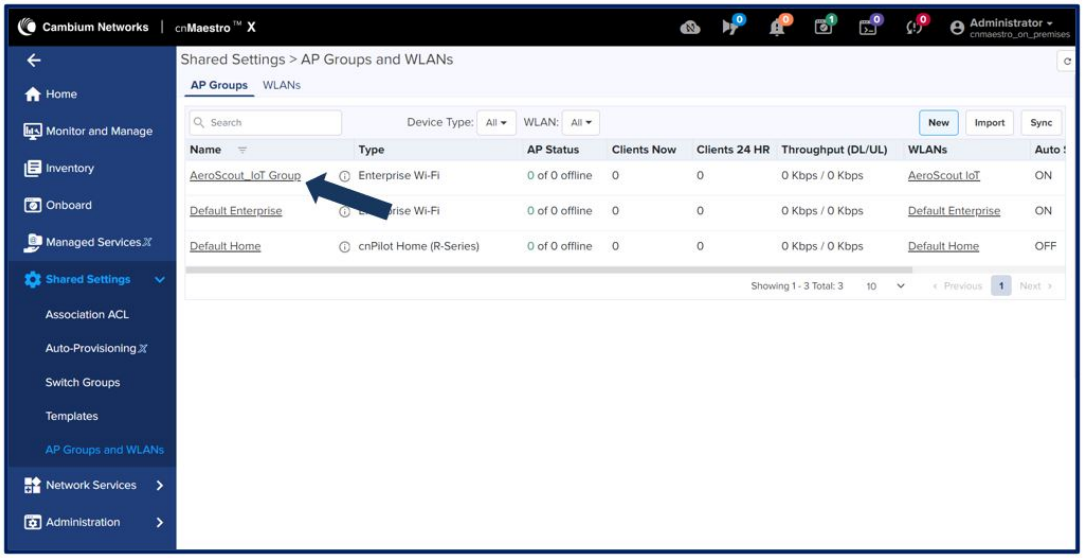
BLE tags are currently not supported in XMS-Cloud with the XV access points. Support for BLE will be available in an upcoming release update.

Configuring the AeroScout server in cnMaestro X

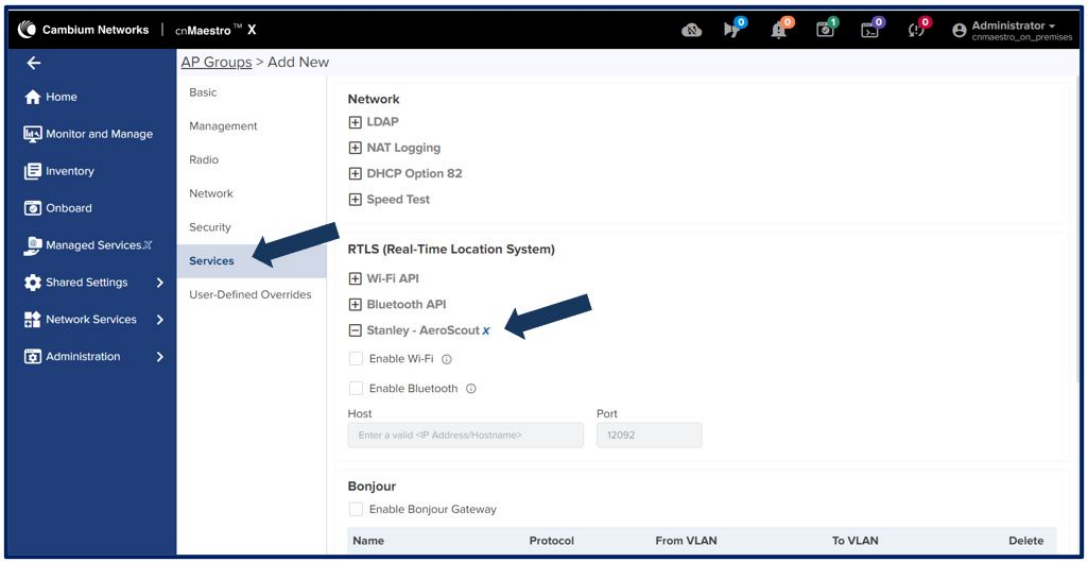
- On the **cnMaestro X Home page**, go to **Shared Settings** > **AP Groups and WLANs**



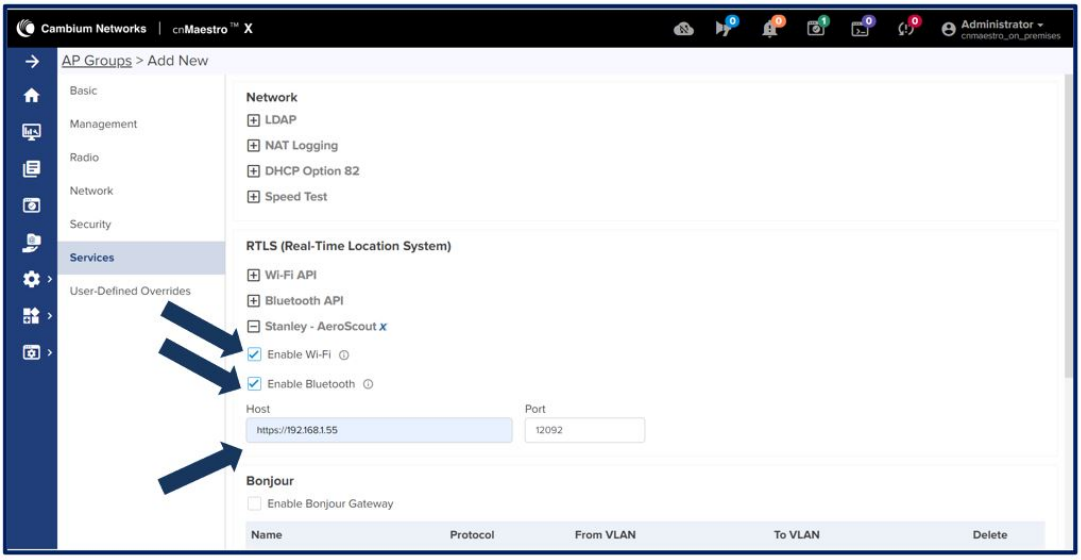
- Open an **existing AP Group**



- On the **Services** tab, locate and expand the **Stanley-AeroScout** section



- Select **Enable Wi-Fi**, **Enable Bluetooth**, and enter **the IP address** of the **AeroScout server**.



Configuring the Cambium AP Using the Command Line Interface (CLI)

- AeroScout commands available on the AP
    - **ble-tag**: Run the command to send the RFID tag information to the AeroScout RTLS Engine via BLE.
    - **wifi-tag**: Run the command to send the RFID tag information to the AeroScout RTLS Engine via Wi-Fi.
    - **server**: IP address of the AeroScout Location Engine.

- **server-port**: Port the Location Engine will listen to incoming location reports default UDP port is 12092.

```
XV2-2-1(config)#
XV2-2-1(config)#
XV2-2-1(config)#
XV2-2-1(config)#
XV2-2-1(config)# rtls aeroscout

  ble-tag              : Enable Aeroscout BLE Tag
  server               : Configure Aeroscout Server IP or FQDN
  server-port          : Configure Aeroscout Server Port (Default port:12092)
  wifi-tag             : Enable Aeroscout WiFi Tag


XV2-2-1(config)# rtls aeroscout
```

- AeroScout sample configuration.

```
XV2-2-1(config)#
XV2-2-1(config)#
XV2-2-1(config)#
XV2-2-1(config)# rtls aeroscout ble-tag
XV2-2-1(config)#
XV2-2-1(config)#
XV2-2-1(config)# rtls aeroscout wifi-tag
XV2-2-1(config)#
XV2-2-1(config)#
XV2-2-1(config)# rtls aeroscout server 192.168.1.55
XV2-2-1(config)#
XV2-2-1(config)#
XV2-2-1(config)# rtls aeroscout server-port 12092
XV2-2-1(config)#
XV2-2-1(config)#
XV2-2-1(config)# save
[Config Save OK]
XV2-2-1(config)#
XV2-2-1(config)#
XV2-2-1(config)#
```

- Run the **SAVE** command to apply the configuration.

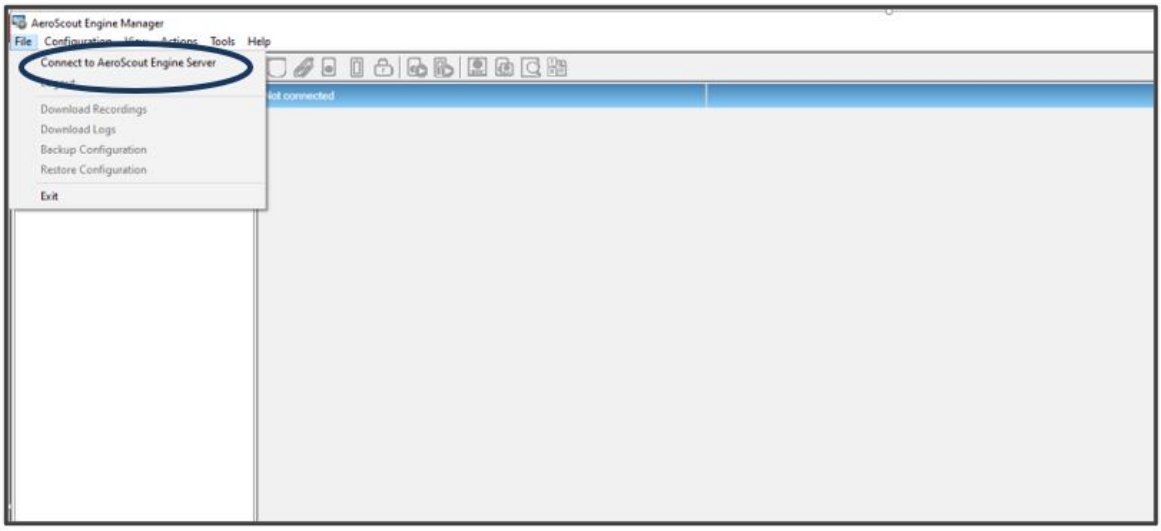
Configuring AeroScout Engine Manager

Prerequisites

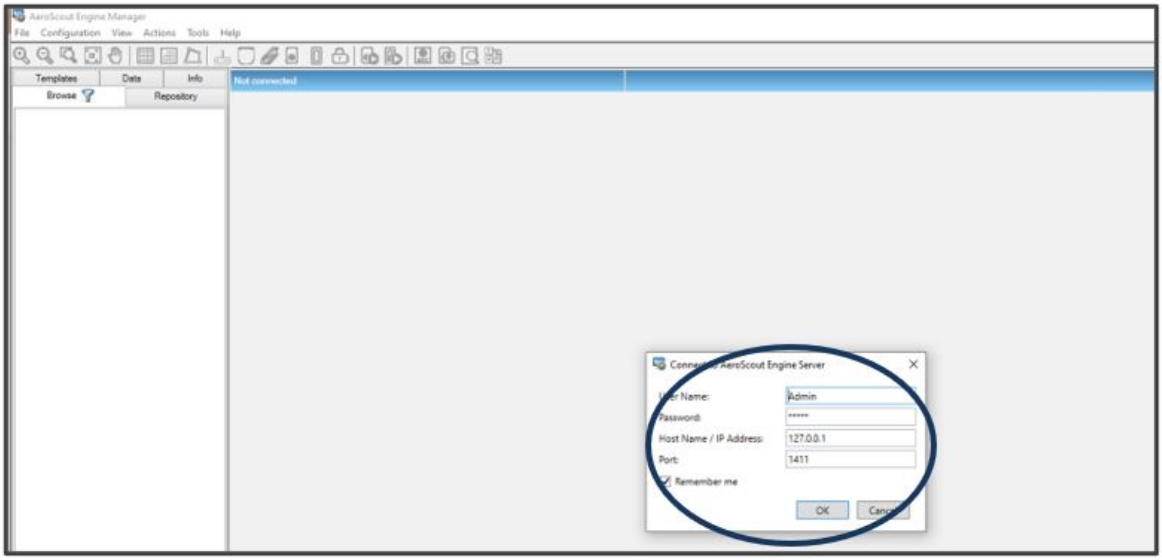
- Aeroscout Engine Server (AES) is installed and running
- Aeroscout Engine Manager (AEM) is installed

Connect to the AES server

- Open **AeroScout Engine Manager (AES).**
- In **AeroScout Engine Manage**r go to **File > Connect to AeroScout Engine Server.**

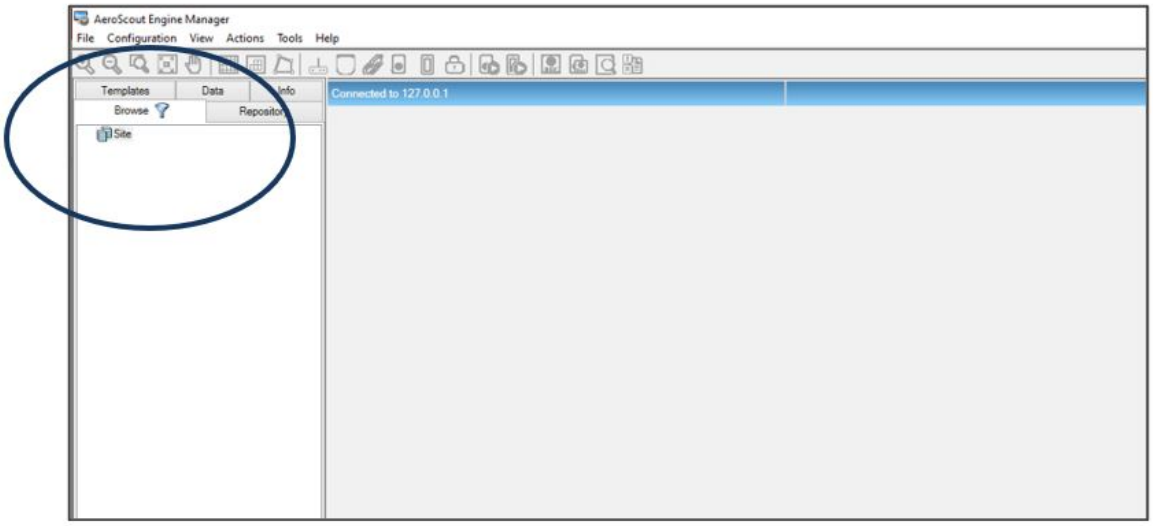


- Enter the login credentials and **AeroScout Engine Server** IP address and click **OK**.



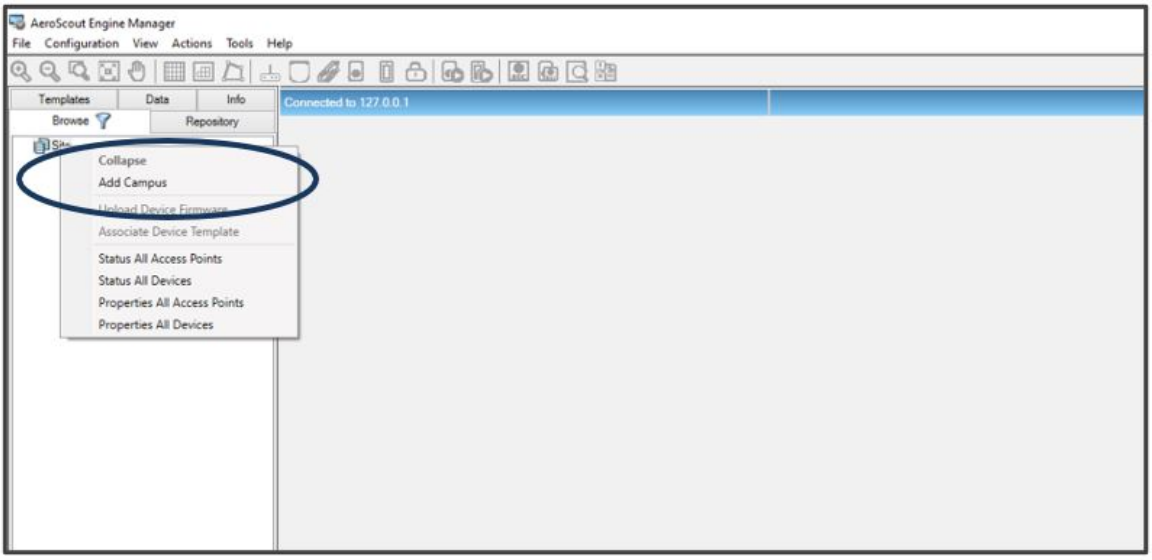
- On the **Browse** tab, **AEM** will display the **default Site**. You will now add a Campus, a building, a

floor, and a map to the default site.



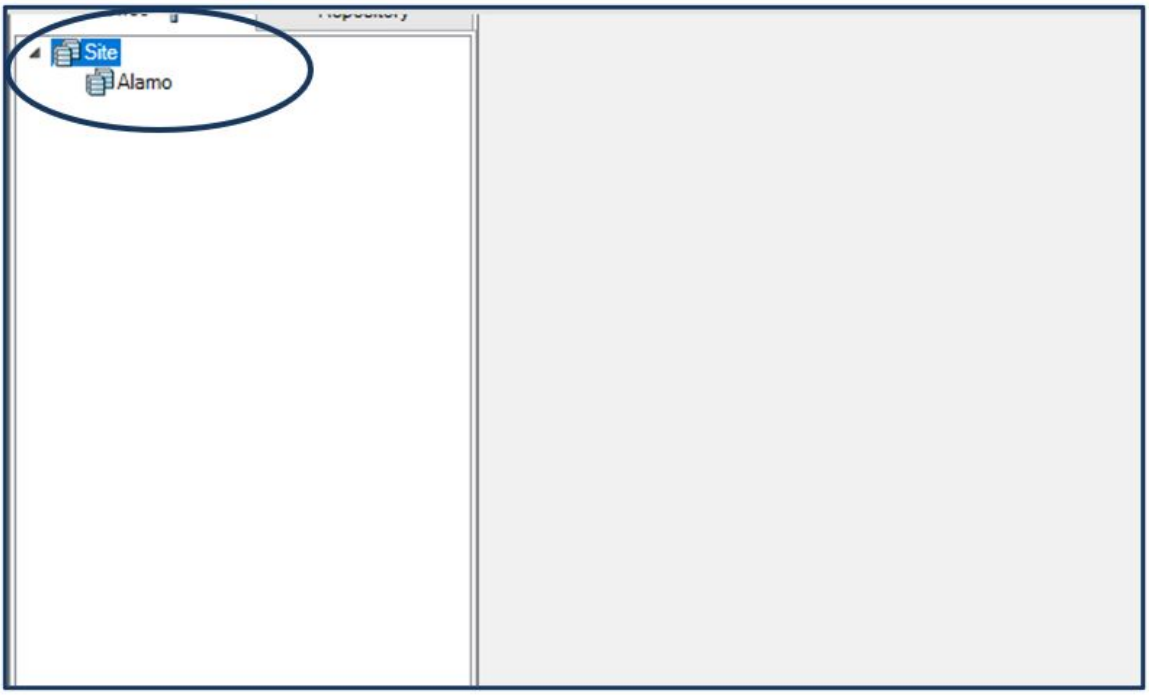
Add a Campus

- Right-click on the **Site**, and click on **Add Campus**



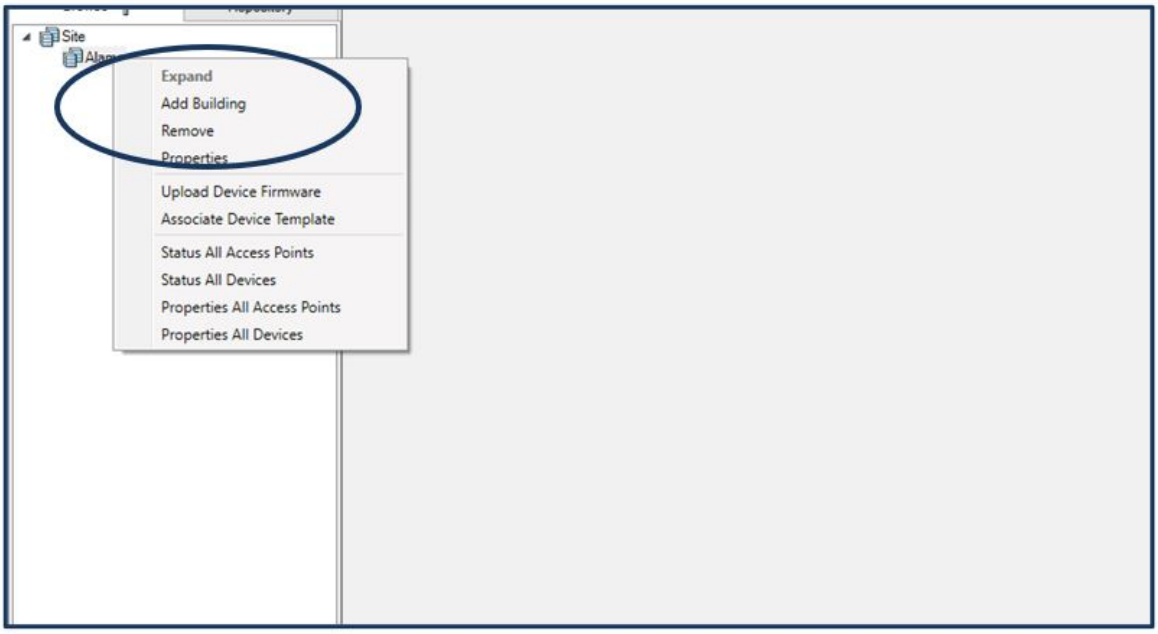
- On the **Campus Properties** page, give the **Campus a name** and click **OK.**

- The **Site**, “Alamo” has been created..



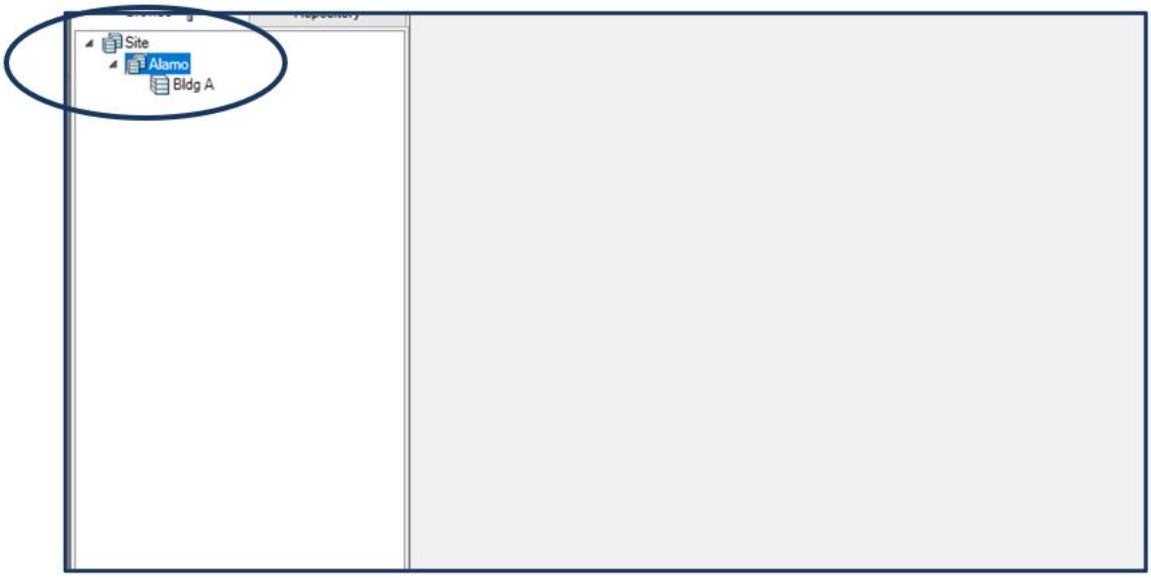
Add a Building

- Right-click on the **Alamo Campus**, and click on **Add Building**



- Give the new building a name. In this example, the name is **Bldg A**

Campus = **Alamo**, Building = **Bldg A**



Add a Floor

- Right-click on **Bldg A**, and click on **Add Floor**

Enter a name for the **Floor** and a **Floor Number**.

Campus = **Alamo**, Building = **Bldg A**, Floor = **Ground Level**

Add a Map

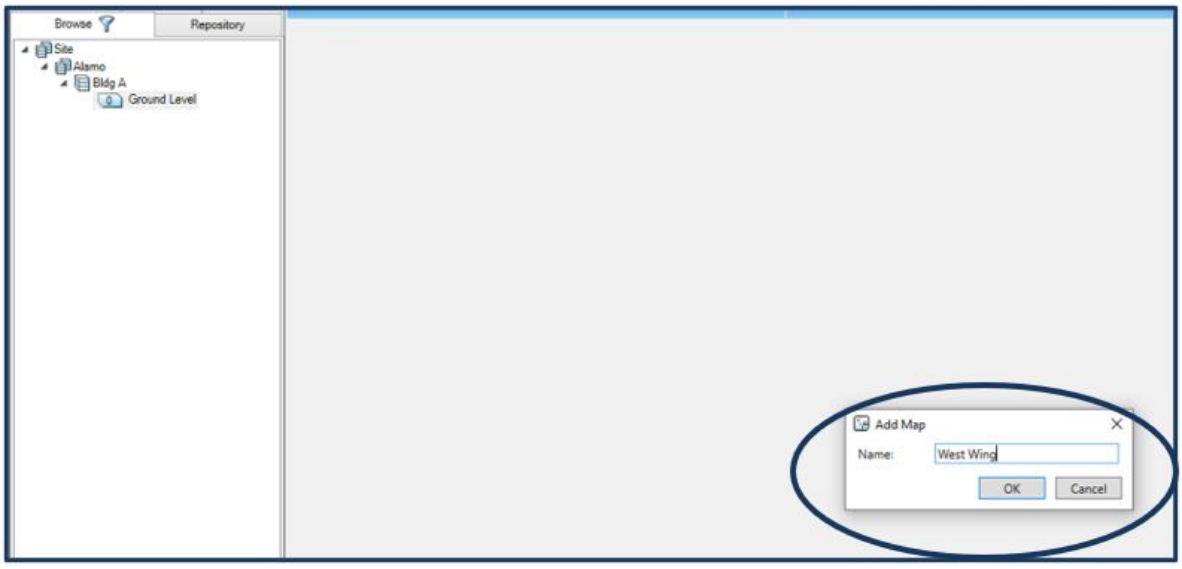
Maps are scaled drawings that show the physical layout between rooms, spaces, and other features. Maps are used to display where the devices are installed or located.

Note

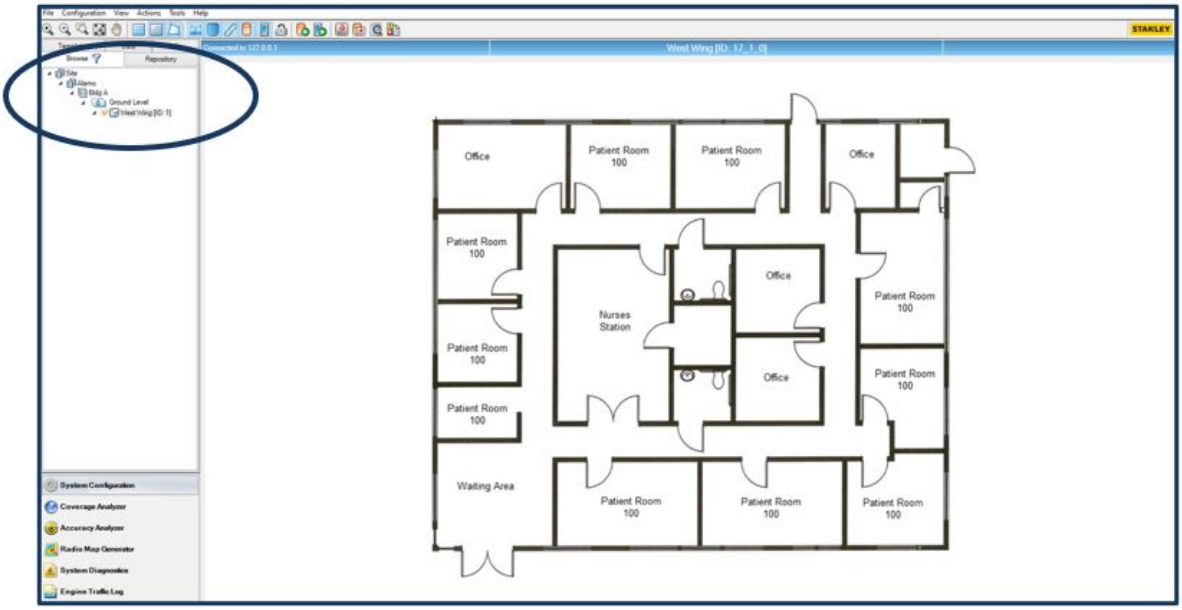
Create image map files for all floors. Map image files must be saved as BMP, jpeg, gif, or png format files.

- Right-click on the floor, **Ground Level**, and click on **Add Map**

Enter a descriptive name for the map that will make it easy to identify and click **OK**. You will then browse out to your local system and select a map to **import** into **AEM**.



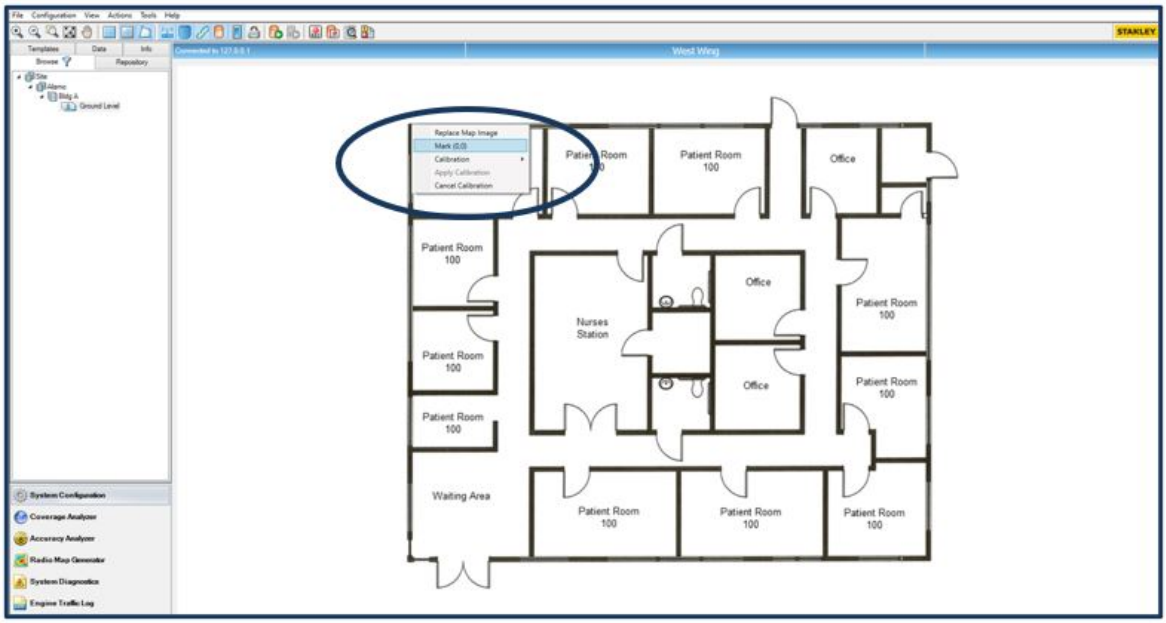
Campus = **Alamo**, Building = **Bldg A**, Floor = **Ground Level**, Map = **West Wing**



Calibrating Map

After importing a map, the next step is to calibrate the map to identify the Tags and the location of the Tags using RSSI levels.

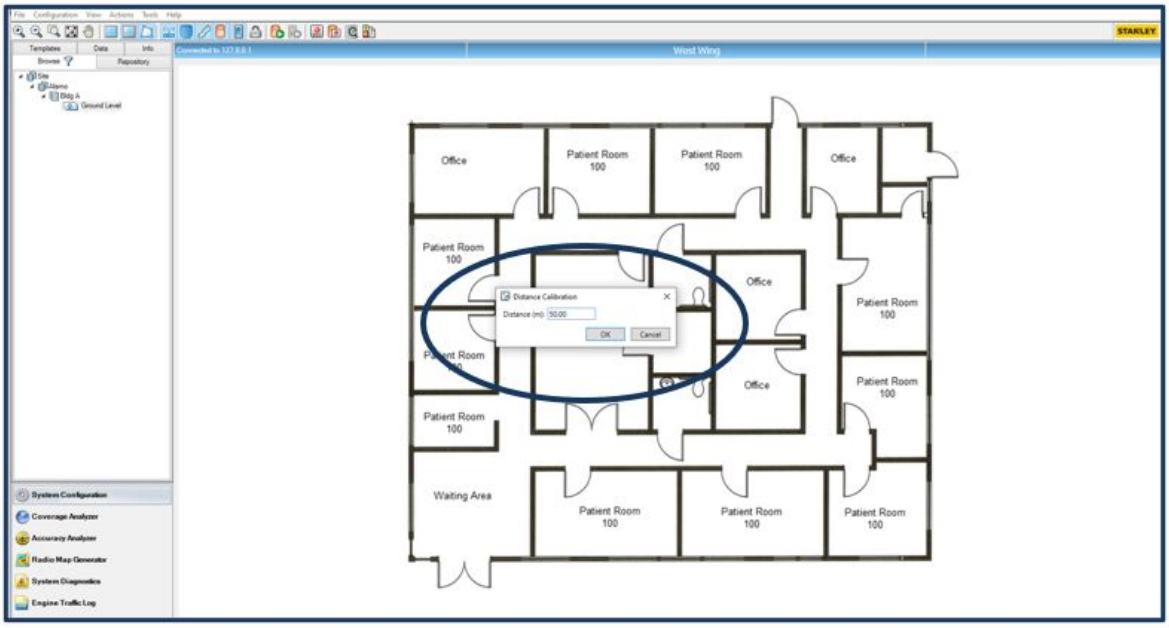
Right-click on the map, **West Wing**, and place your mouse over the location where you want to set the reference point, and click the **Mark (0,0)** menu item.



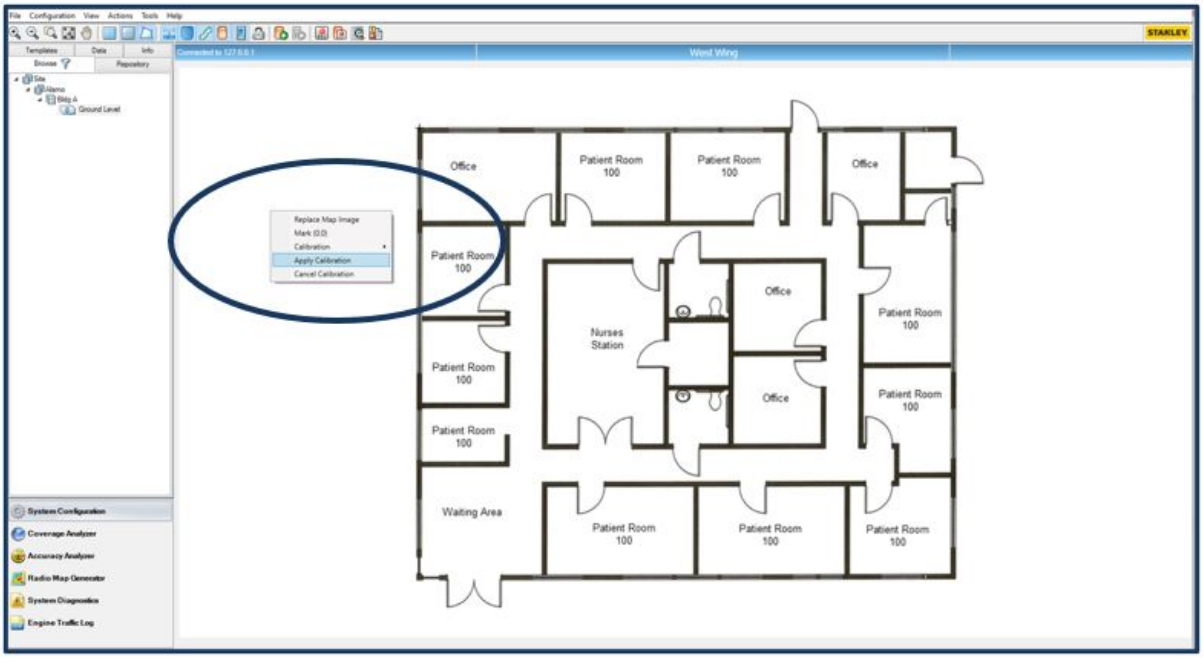
Next, right-click on the **West Wing** map, and click **Calibration > Calibrate Distance**

Left-click on a location on the map (the pointer will turn into a cross), and click and drag the mouse from one point to another to draw a line between the two endpoints.

The **Distance Calibration** dialog box opens. Enter the **distance (meters)** in the field and click **OK**.



Right-click on the map and click **Apply Calibration**.

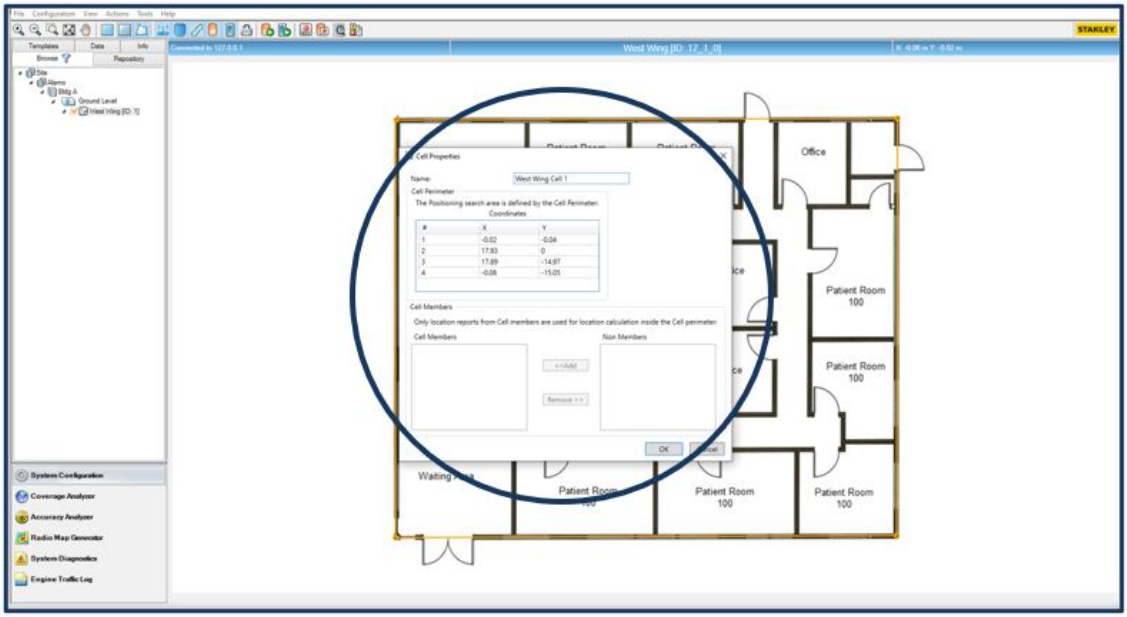


Define a Cell

Cells are used to break the map into smaller sections to help understand the Access Points location and coverage. Up to 35 devices can be attached to a Cell.

- To define a Cell, **right-click** on the map and select the **Add Cell** option.

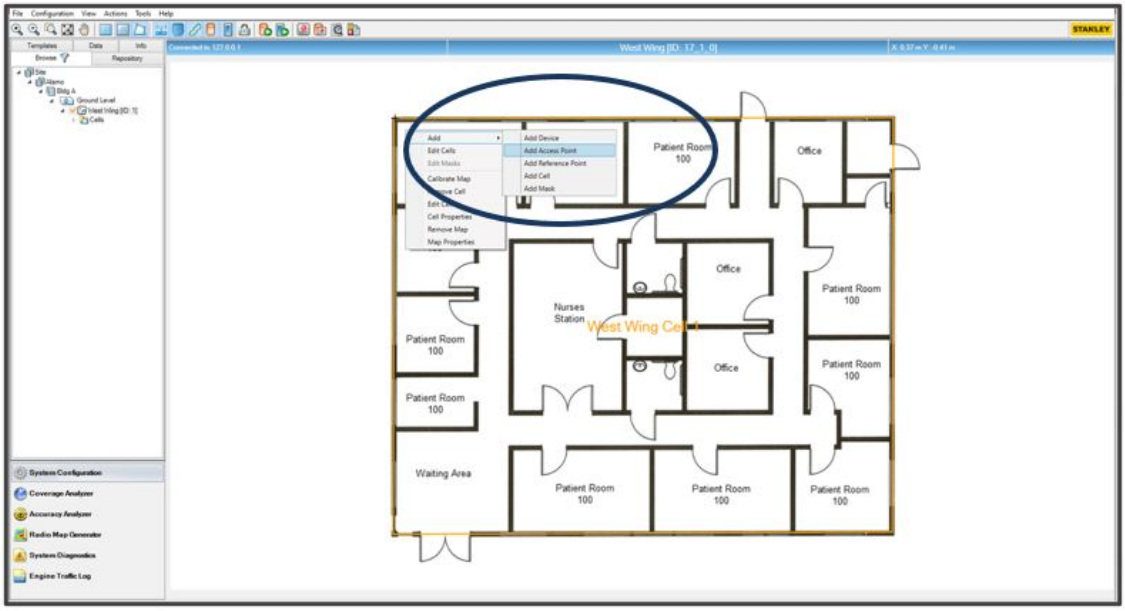
- Draw a Cell by clicking on an area on the map and drag your mouse and continue to click the next points to define the cell endpoints. A Cell Properties box opens when you finalize the outlining of the Cell.
- Enter a name for the new Cell.
- Click **OK**.



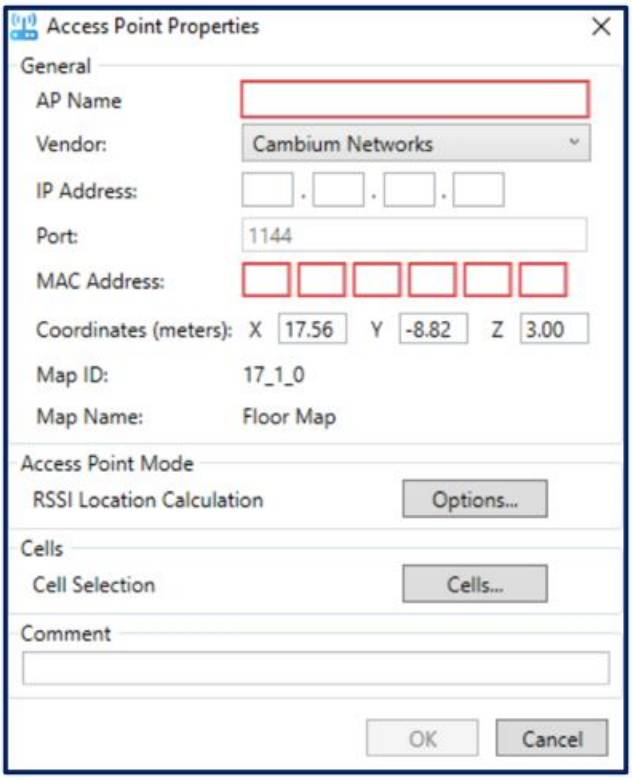
Adding Access Points to the Map

The next step is to place access points on the map.

- On the map, right-click the physical location of the AP and select **Add > Add Access Point**.



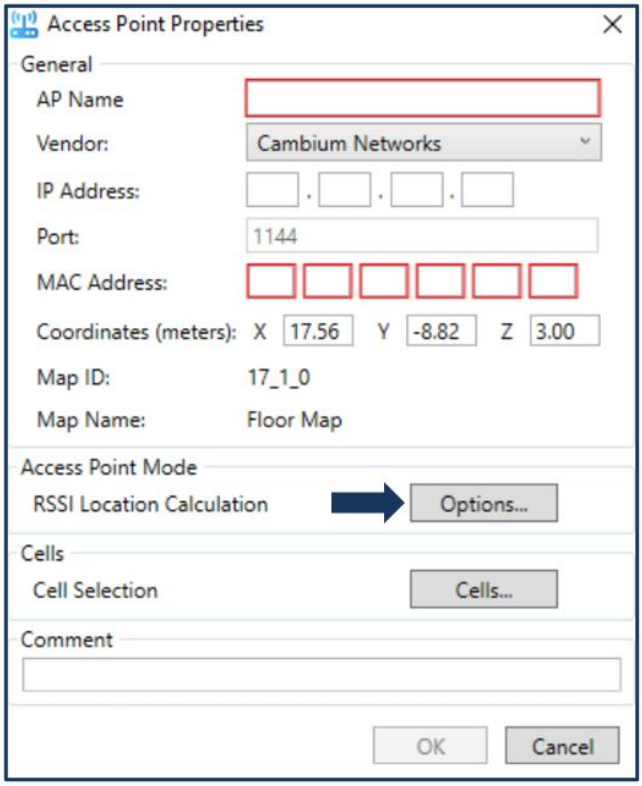
The **Access Point Properties** dialog window opens.



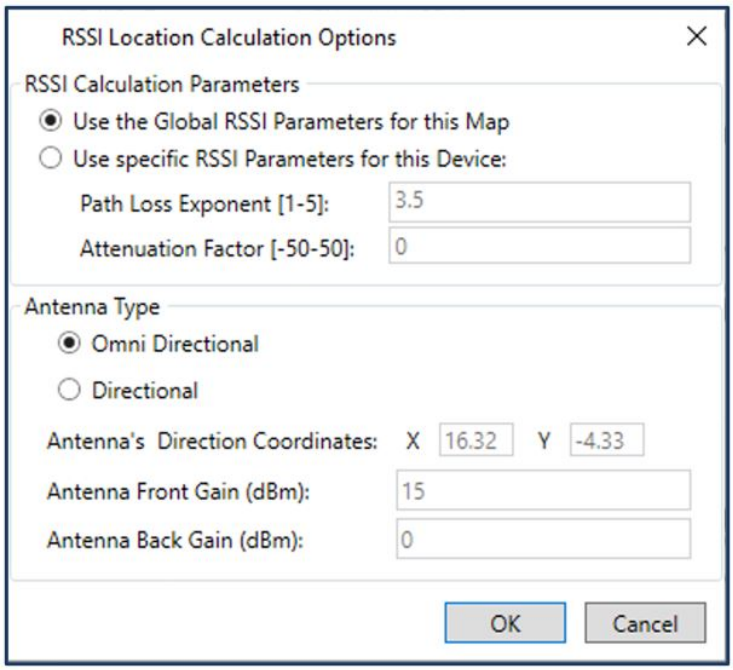
- Enter the following information

- **Name**: Give the AP a recognizable name
- **Vendor**: Select Cambium Networks from the drop-down menu
- **IP Address**: Enter the AP's IP address
- **MAC**: Enter the AP's MAC address
- **Coordinates**: In Z Coordinates, enter the height at which the AP is mounted in meters

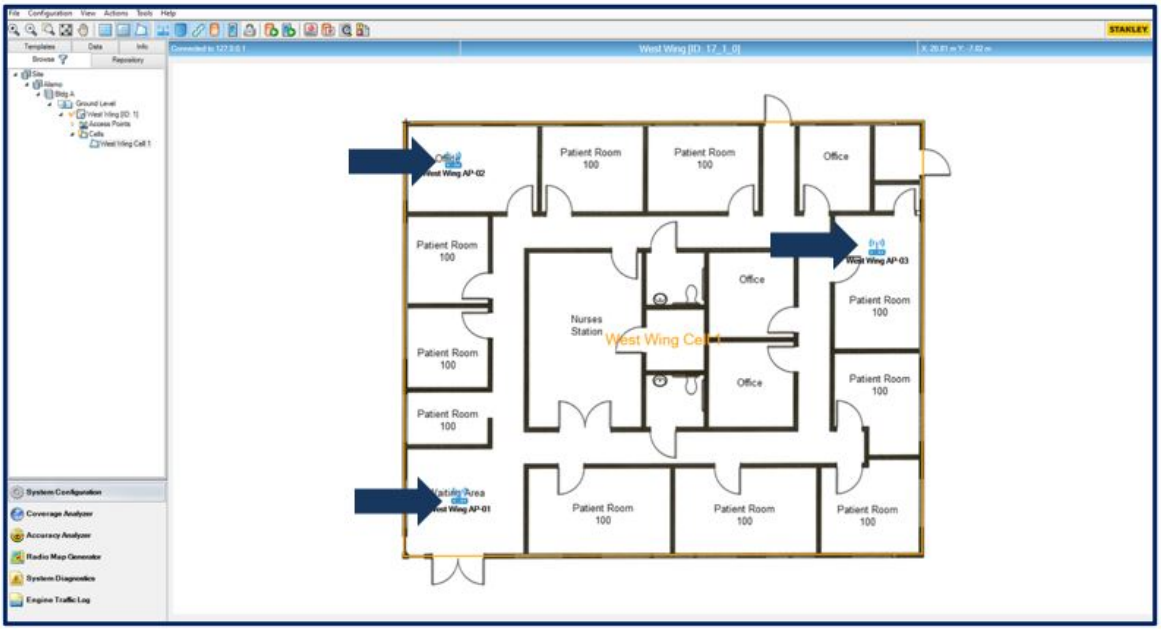
- Assign the AP to a Cell
- Check and confirm the RSSI parameters. In this example, we are using AeroSocut's default RSSI parameters settings. However, you can define the Path Loss Exponent and Attenuation Factor parameters to override the global values set in Map Properties.
- Click **OK**
- Check and confirm RSSI parameters. On the Access Point Properties page, under Access Point Mode, click Options.



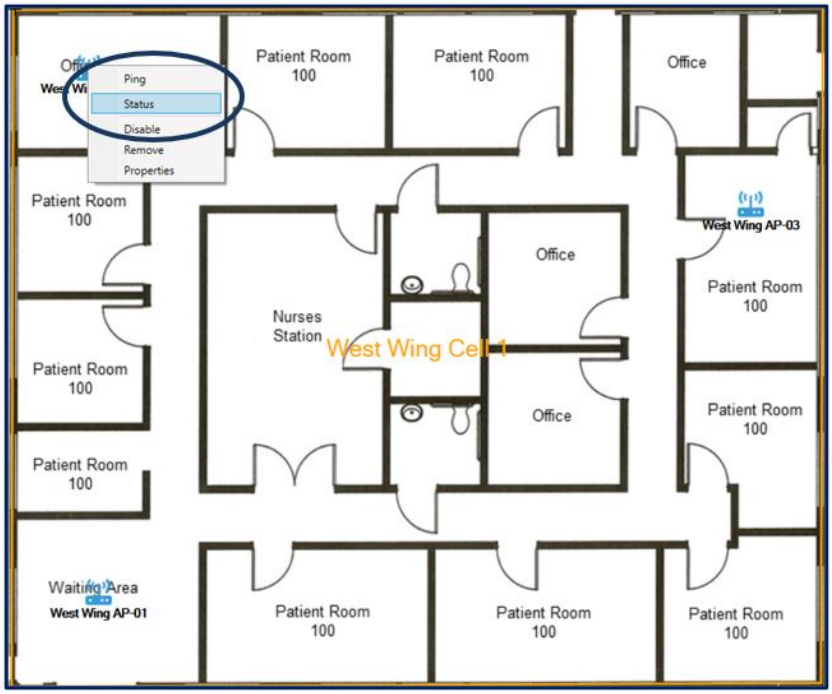
Verify the RSSI parameters. In this example, we are using Aeroscout's default RSSI parameter settings. You can define the Path Loss Exponent and Attenuation Factor parameters to override the global values set in Map Properties.

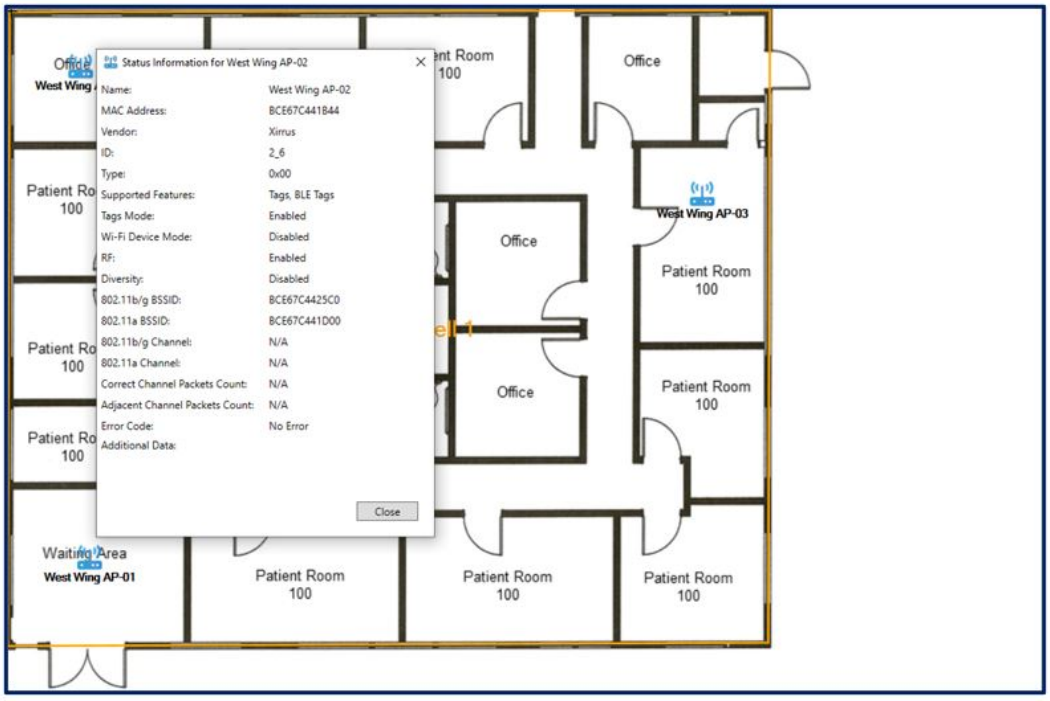


- Select the **Antenna Type**. Refer to the access point's user guide for antenna type details. Note: Antenna patterns can be obtained from the Cambium Networks Support site. (support.cambiumnetworks.com).
- Click **OK** to continue.
- Initially, the AP will be offline. After a moment or two, the AP will appear on the map as online and available.



- Repeat these steps for all other access points that will be placed on this map
- To confirm the status of an AP, right-click on the AP icon and select the **Status** option from the popup menu





Version Compatibility and Configuration Suggestion

Firmware Version details

AeroScout Engine Manager	55 MR2
Cambium Access Point	6.3-r10 for Wi-Fi Support
	6.4-rx for BLE support (Coming soon)
cnMaestro X (On-Premises)	3.0.4
cnMaestro X Cloud	Updated by Cambium
XMS-Cloud	Updated by Cambium

Supported TAG formats

Cambium and AeroScout joint solutions work with both IBSS and WDS tag formats.

Note

The CCX format is not supported.

Supported AP Models

Cambium Networks XV2-2 and XV3-8.

Cambium AP configuration suggestions

- OCS scan should be disabled
- A minimum of one WLAN should be enabled for AP to listen to TAGs
- Tags will work only on 2.4 GHz
- Schedule Access and Monitor Host features should be disabled if a single WLAN profile is configured
- When using Packet Capture on the home channel, Wi-Fi Tag messages may be dropped
- Wi-Fi Tag messages can be lost while using Spectrum Analyzer and Wi-Fi Analyzer

Cambium AP deployment suggestions

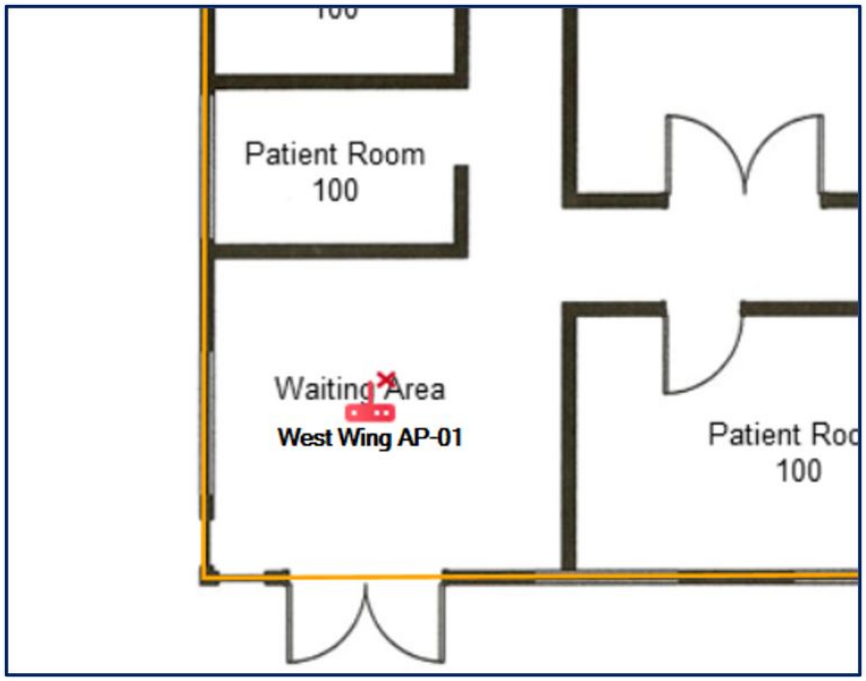
When mounting APs to the ceiling or walls, ensure that all the APs throughout the building are mounted at approximately the same height, and within the range of 2.5 - 3.5 meters off the ground. Since RTLS works by measuring the received strength of packets, APs should not be placed inside of ceiling tiles or in/behind solid objects. The physical orientation of the APs does not affect the accuracy, so they can be mounted in whichever way is the easiest.

Once the APs have been deployed, wireless coverage will need to be validated, which can be done by using a site survey tool such as Ekahau. For Wi-Fi location, the survey needs to confirm that there is at least an RSSI >=-67dBm and a Signal Noise Ratio (SNR) of 25 or higher to three APs at any point throughout the floorplan. Client devices that do not meet these guidelines may be difficult to locate accurately inside the network perimeter.

Troubleshooting

General

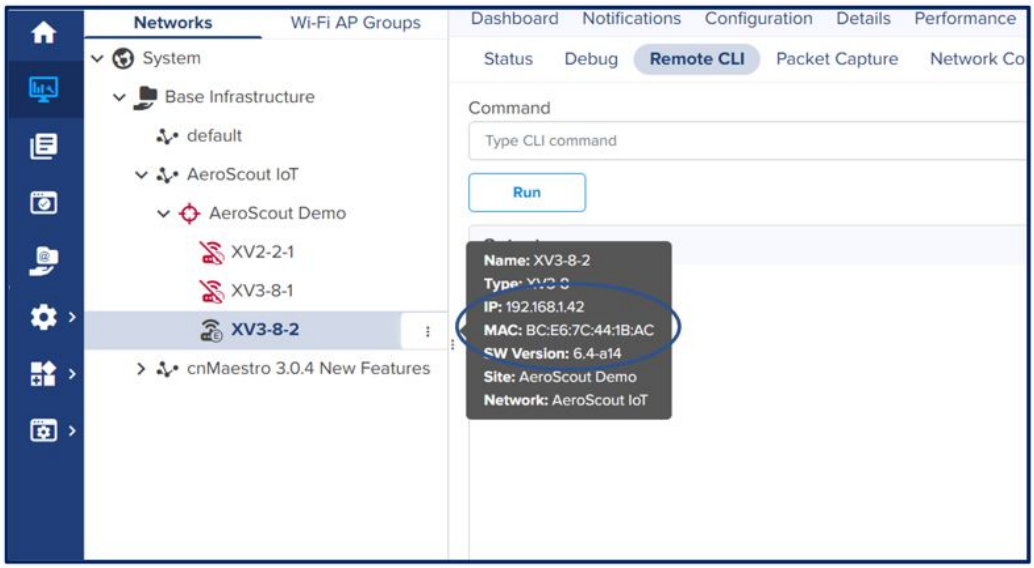
Problem: The **AP** shows the status of **Offline.**



Resolution:

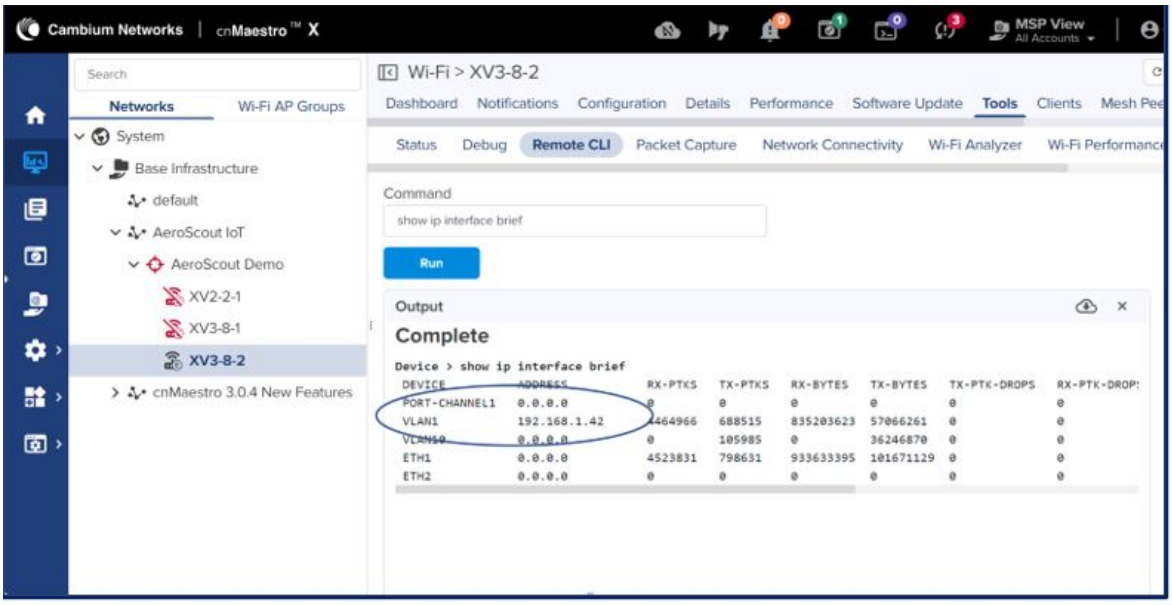
Verify that the AP IP address and MAC address are entered correctly in the Engine Manager.

Go to Monitor and Manage and hover your mouse over the offline **AP**. A **popup window** will display various information about the AP including the **IP and MAC address**.

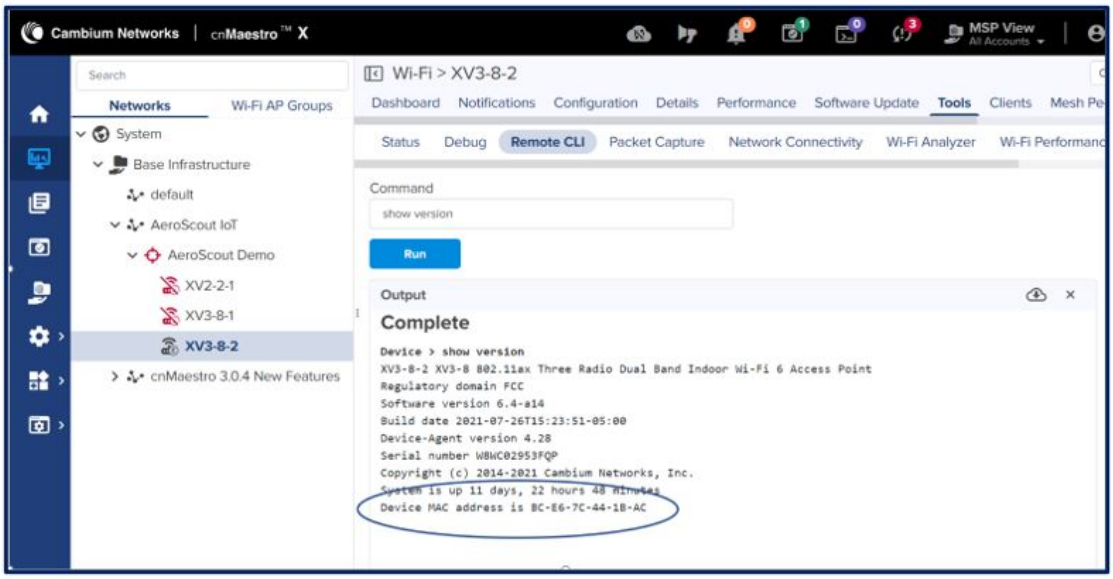


Or use the CLI to verify the AP IP address and MAC address. Go to **Monitor and Manage** and select the AP. Then go to **Tools > Remote CLI**.

- To **verify the IP address**, run the CLI command: **show ip interface brief**



- To **verify the MAC address**, run the CLI command: **show version**



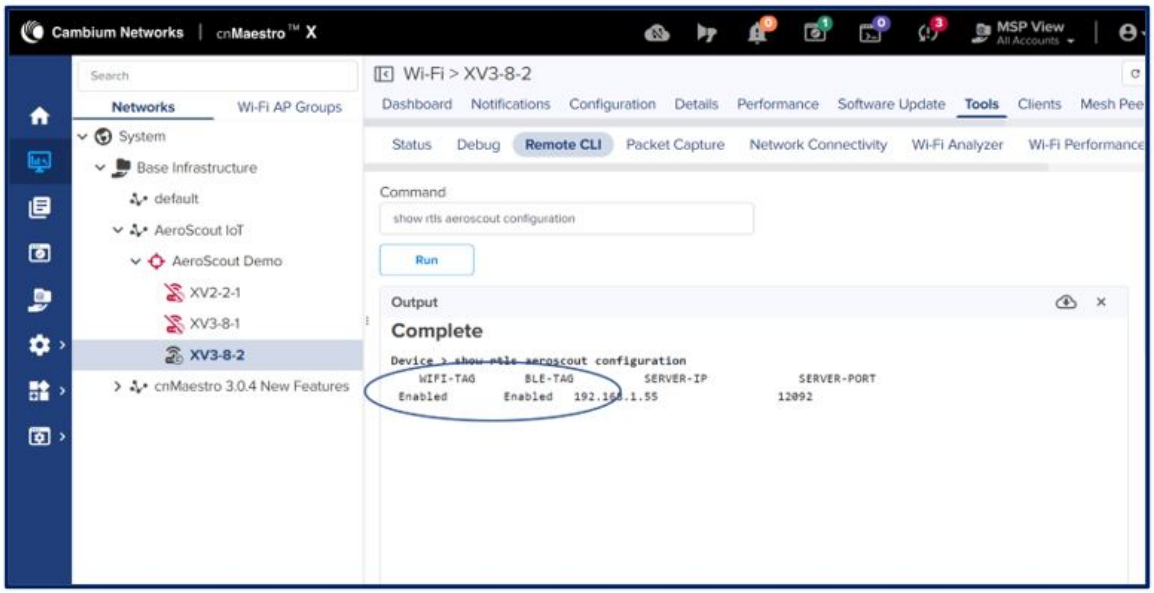
Show/Debug commands on the AP

Problem: The AP does not appear to be passing **Aeroscout** tags

Resolution:

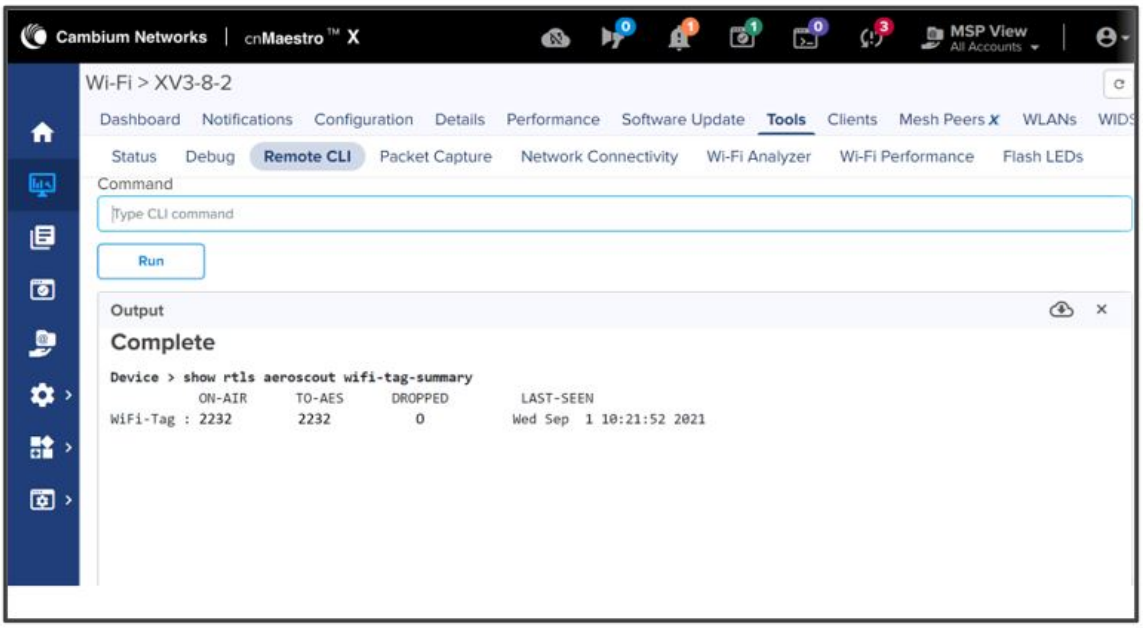
Verify that Aeroscout Wi-Fi tags and/or BLE tags are enabled on the AP.

- To **verify the MAC address**, run the CLI command: **show rtls aeroscout configuration**

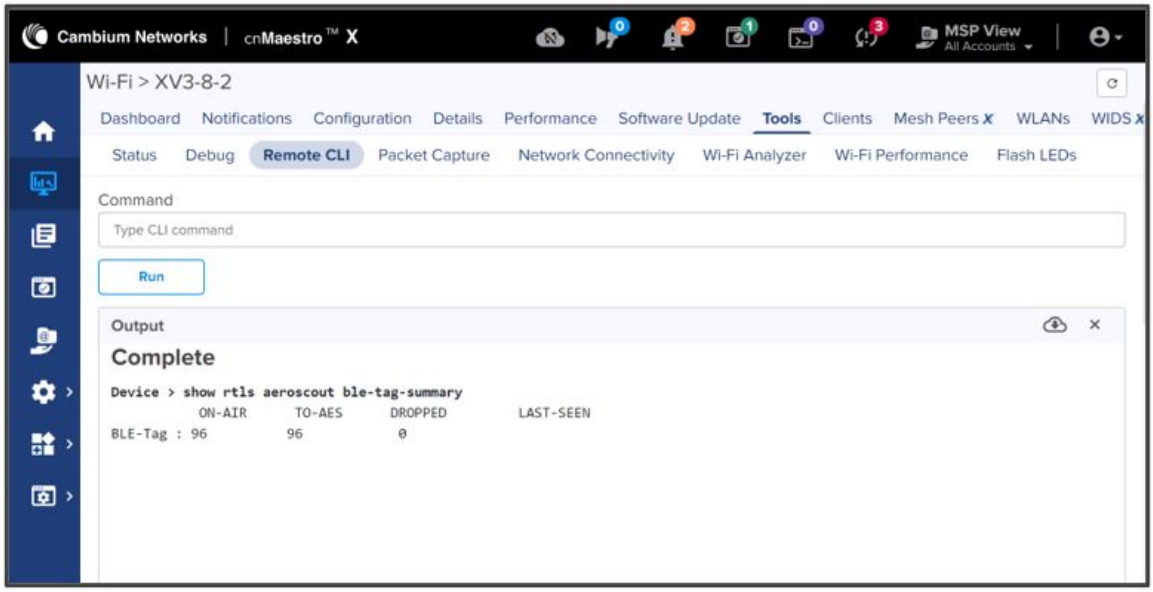


Verify that **Aeroscout Wi-Fi** tags and **BLE tags** are sent from the AP to the Aeroscout server.

- To **verify Wi-Fi tags** are sent to the Aeroscout server, run the CLI command: **show rtls aeroscout wifi-tag-summary**



- To verify BLE tags are sent to the Aeroscout server, run the CLI command: **show rtls aeroscout ble-tag-summary**

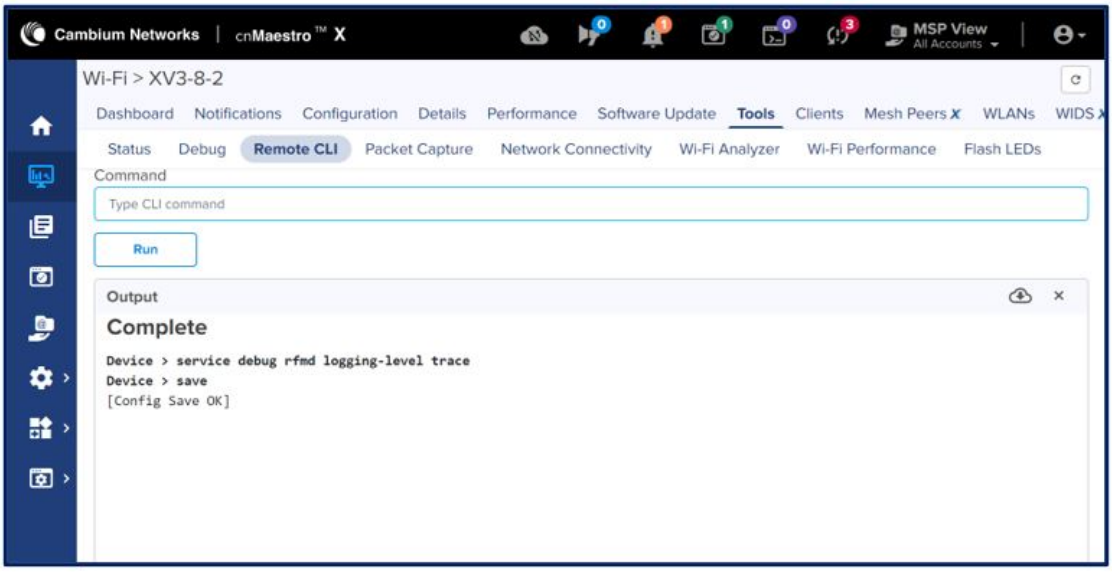


Verify the **Tag message** is seen on AP and sent to the AES server, and verify the format.

- To verify Tag message is seen on AP and sent to the AES server run the CLI commands:

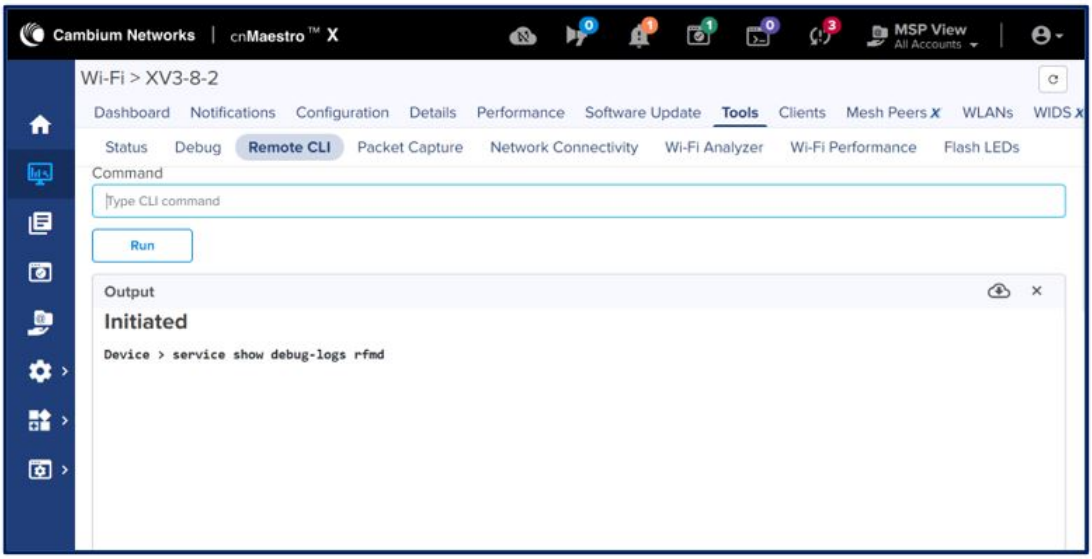
  service debug rfmd logging-level trace

  Save



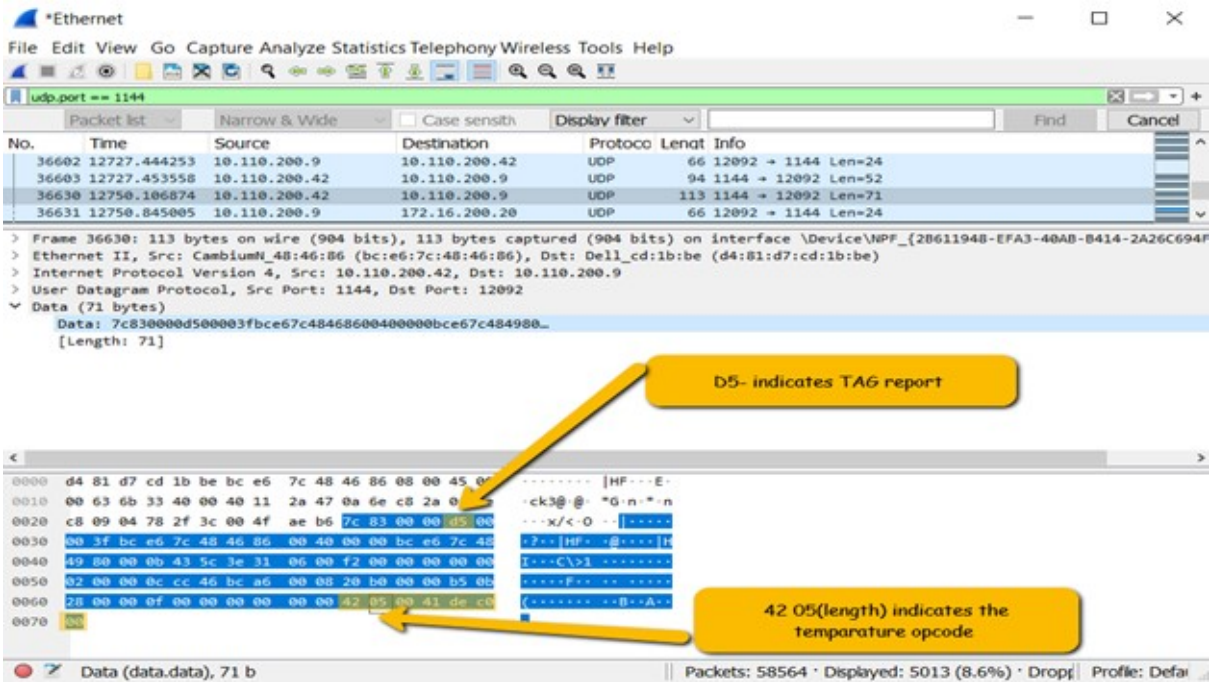
- Once the configuration is saved run this CLI command to view the tag messages

  service show debug-logs rfmd

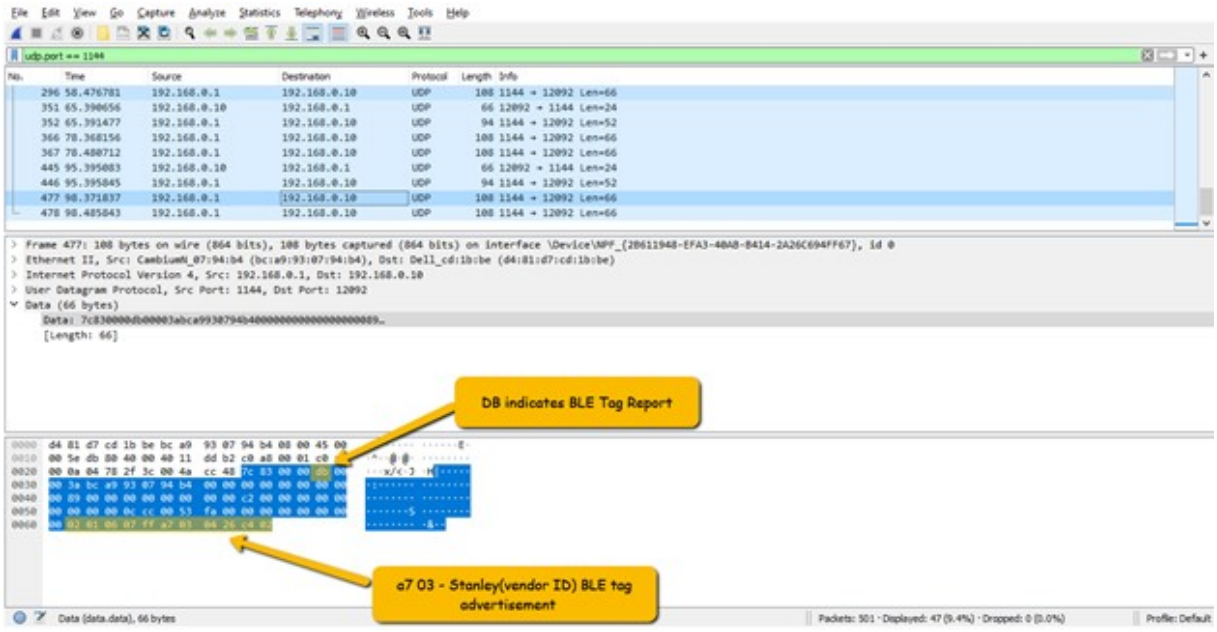


Verification on the AES server

Run Wireshark on the AES server to verify the d5 message (tag report) received on the AES server.



Stanley BLE tag advertisement packet.



Cambium Networks

Cambium Networks delivers wireless communications that work for businesses, communities, and cities worldwide. Millions of our radios are deployed to connect people, places and things with a unified wireless fabric that spans multiple standards and frequencies of fixed wireless and Wi-Fi, all managed centrally via the cloud. Our multi-gigabit wireless fabric offers a compelling value proposition over traditional fiber and alternative wireless solutions. We work with our Cambium certified ConnectedPartners to deliver purposebuilt networks for service provider, enterprise, industrial, and government connectivity solutions in urban, suburban, and rural environments, with wireless that just works.

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User Guides	http://www.cambiumnetworks.com/guides
Address	Cambium Networks Limited, Unit B2, Linhay Business Park, Eastern Road, Ashburton, Devon, TQ13 7UP United Kingdom

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