CISCO VEHVR2777 Wireless Access Point Instructions

Contents

CISCO VEHVR2777 Wireless Access Point

Specifications

- **Brand:** Cisco Systems, Inc.

- **Model:** 6 GHz Geolocation system w/proxy
- **Geolocation Accuracy:** 95%
- **Transmitter Height Adjustment:** Manual entry by professional installer
- **GPS Antenna Adjustment:** Cable length entry for uncertainty adjustment
- **Installation Restrictions:** Limited to professional installers

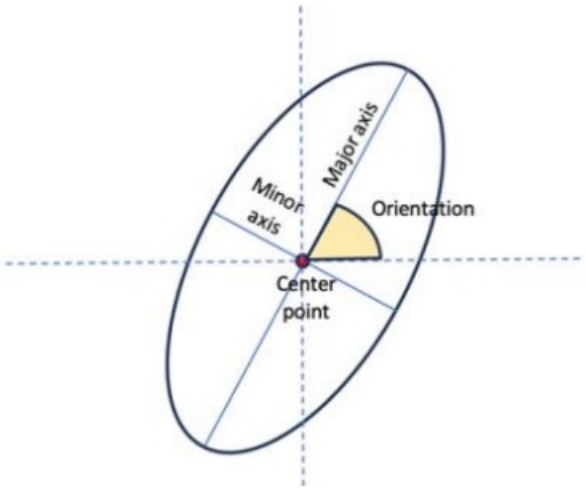
General Description of Geolocation Accuracy
The following is a general description of how a Cisco Wireless access point acquires location information and maintains a confidence level of at least 95% in the accuracy of said location information, when under the control of an automated frequency coordination (AFC) system. Cisco Wireless access points have the option of being managed by either the Catalyst Wireless Controller or the Meraki Cloud Controller.

Acquiring location information using hardware interfaces:
To provide accurate location information to AFC systems, a Cisco Wireless access point (AP) capable of transmitting to standard power limits in UNII-5 and UNII-7 bands will be equipped with a GNSS receiver, which can be in one of two forms of A

1. USB dongle (peripheral)
2. Interposer (embedded in the access point)

In either case, the AP will self-locate using the GNSS receiver and report the geolocation at a regular interval to a wireless controller. The GNSS uses GPS and Galileo constellations for acquiring GNSS fix.

- The AP stores the location data and any updates to the location coming from the GNSS receiver in a dataset.
- The dataset is a Last-In-First-Out (LIFO) with a limited period, meaning that older data points are replaced with new data points. After the stored locations in the dataset are examined, the position of the AP is calculated as the average of the geocoordinates of all points in the dataset. The uncertainty area is expressed in the form of the ellipse which contains a center point, a minor axis, a major axis, and an orientation:



Note that the computations are iterative and do not wait for the full observation period to be over. As time passes and the GNNS receiver collects more and more location data, are gathered known geolocation coordinates of AP become more accurate. This is how we, Cisco Systems, Inc., are at least 95% confident in the accuracy of the AP location information.

In some cases, an AP may not be able to acquire a strong enough GNSS signal due to a limited sky view or poor GPS signal strength in certain location, or because the AP has not yet been equipped with a GNSS USB dongle (should that AP not already integrate the interposer version). In such cases, the Catalyst Wireless Controller or Meraki Cloud Controller will try to locate the access point, using the location information of neighboring APs within

the same network.

Multiple techniques can be used to derive the location of the neighboring APs:

- Cisco Discovery Protocol: information of devices networked with one another.
- Signal strength information (RSSI).
- Measurements using ranging technologies such as UWB, and Fine Timing (FTM).

Using one of the above-mentioned techniques, the wireless controller estimates the distance from a neighboring AP which has location information, and the computed distance is then added to the area of uncertainty of the source access point from which the location is derived.

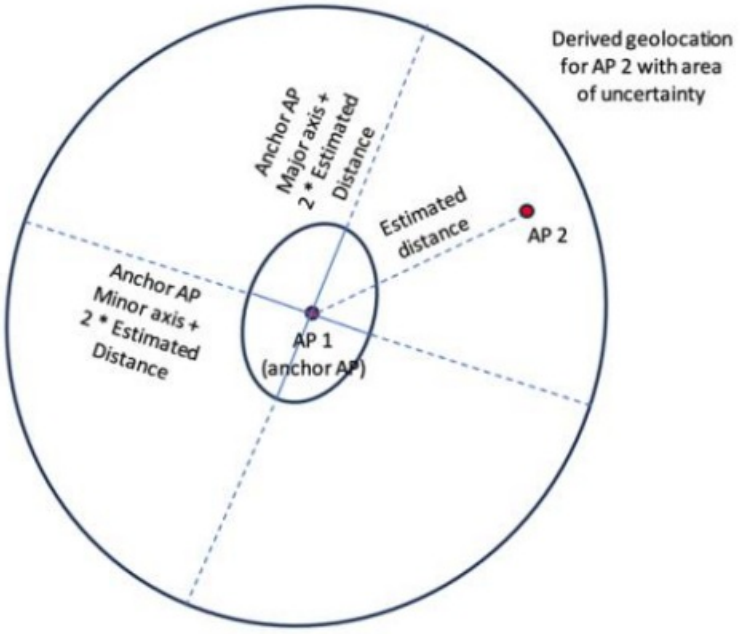


Figure 2. Derived geolocation for Catalyst AP

An AP under the management of the Meraki Cloud Controller, the confidence level is solely based on the ellipsis major axis, making the area of uncertainty slightly bigger, maintaining the confidence level of the location data to be at least 95%. See the image below:

Additional Information on software-based location information handling:

- Both the Catalyst Wireless Controller or Meraki Cloud Controller keep track of the AFC response expiration time for each AP and perform new AFC requests before expiration.
- Each AFC request is sent with updated location information, using the format defined in the AFC System to the AFC Device Interface Specification from the Wi-Fi Alliance.
- Any change in location information (e.g., a user configures new height information) triggers a new AFC request and the AP adapts its channel/power plan based on new information and new instruction from the AFC.
- In case of an AP power cycle, the AP begins operating at LPI power limits (if LPI + SP capable) or with 6 GHz radio disabled (outdoor APs).
- Only when geolocation information is acquired, a new AFC request is sent, and the AP eventually moves to SP limits based on the new AFC response. The Meraki Cloud Controller will continuously track an AP's location and trigger new AFC requests when the AP has moved.

User entry of transmitter height
The installation height of a Cisco Wireless access point will be entered manually by a professional installer, either through a web interface, command line, or a dashboard. Installers will enter both the height and corresponding uncertainty (in meters). These entries allow a professional installer to specify the height from the ground level (AGL) of the AP together with its uncertainty. Above mean sea level (AMSL) height entries are not an option for installers.

If an external GPS antenna is used, installers will also enter the cable length of the GPS antenna to adjust the uncertainty accordingly.
Installations and manual entry of the transmitter height is limited to professional installations. Due to the specific channels in which Cisco Systems, Inc. places APs on the US market, general users will not be installing standard power-capable APs. Furthermore, managed user accounts with security measures are required to access AP configurations.

APPENDIX A – Glossary

- **AFC =** Automated Frequency Coordination
- **AGL =** Above Ground Level
- **AMSL =** Above Mean Sea Level
- **AP =** Access Point
- **FTM =** Fine Time Measurement
- **GNSS =** Global Navigation Satellite System
- **GPS =** Global Positioning System
- **LPI =** Low Power Indoor
- **RSSI =** Received Signal Strength Indicator
- **SP =** Standard Power
- **UWB =** Ultra-Wide Band

MORE INFORMATION

- Cisco Systems, Inc.
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Frequently Asked Questions

- **Q: Can general users install standard power-capable APs?**
  - A: No, general users are not permitted to install standard power-capable APs due to specific channel placements in the US market by Cisco Systems, Inc.
- **Q: How is geolocation accuracy maintained at 95%?**
  - A: Geolocation accuracy is maintained at 95% by basing the confidence level on the ellipsis major axis, slightly increasing the area of uncertainty while ensuring a minimum 95% confidence level in the location data.
- **Q: What are some key glossary terms related to this product?**
  - A: Some key glossary terms include AFC (Automated Frequency Coordination), AGL (Above Ground Level), AMSL (Above Mean Sea Level), AP (Access Point), FTM (Fine Time Measurement), GNSS (Global Navigation Satellite System), GPS (Global Positioning System), LPI (Low Power Indoor), RSSI

(Received Signal Strength Indicator), SP (Standard Power), UWB (Ultra-Wide Band).

Documents / Resources

	CISCO VEHVR2777 Wireless Access Point [pdf] Instructions VEHVR2777, LDKVEHVR2777, vehvr2777, VEHVR2777 Wireless Access Point, VEHVR2777, Wireless Access Point, Access Point, Point

References

- User Manual