Cisco Hyperlocation Module with Advanced Security

The Cisco® Hyperlocation solution delivers unprecedented average of 1- to 3-meter Wi-Fi client location accuracy. It provides always-on advanced security scanning and spectrum intelligence, and multiple Bluetooth low-energy (BLE) beacons. And now, with the addition of client applications downloaded to the mobile device, location updates take place in near real time. The Hyperlocation modules include:

- Hyperlocation Module with Advanced Security
- Hyperlocation Antenna

Product Overview

The same business and personal benefits that GPS and mobile map services have brought to the outdoors are now being realized in the indoor enterprise space. The applications are numerous, and they include wayfinding in malls, hospitals, and hotels; flexible employee workspace use; tracking wait times at airport security lines; retail product placement; etc. To date the solutions that cater to these applications have multiple challenges and limitations, such as coarse 5- to 10-meter accuracy and slow location refresh, along with nonstandard expensive approaches using video and RF technology. Occasionally, these solutions cleverly use battery-powered BLE beacons that, although simple in concept, are logistically and operationally onerous.

The Cisco Hyperlocation solution introduces hardware and software innovation that can deliver 1- to 3-meter location accuracy on average for associated Wi-Fi clients. This solution takes advantage of existing Cisco Wi-Fi networks and can be centrally managed. The Cisco Hyperlocation Module with Advanced Security also integrates BLE beacons with the module. Customers can take advantage of hassle-free BLE beacon deployment that is powered over Ethernet and centrally managed from the convenience of a data center. This model eliminates the need for local IT engineers to do a walk-by inspection of BLE beacon health using applications on their smart devices. Cisco Hyperlocation brings beacon technology so that a single Hyperlocation module provides five different BLE beacons for consumer applications. With this five-beacon advantage, a retail store can have unique applications developed for a shopper, a vendor who fills the merchandise aisle, and retail staff doing routine price checks.

By combining location data and the BLE signal from the Hyperlocation module with sensors on the mobile device, location can be determined to within 1 to 3 meters on average, in near real time. In navigation and wayfinding applications, the result is a true blue dot experience. Customers can find their location, pinpoint nearby points of interest, and, using a mapping application, determine the fastest path to their destination.

In addition to the location solution, the Hyperlocation Module with Advanced Security provides the next-generation always-on advanced security scanning and spectrum intelligence that today's Cisco Aironet® Access Point Module for Wireless Security (WSM) delivers and adds the capability to operate at 20, 40, and 80 MHz.

Features and Benefits

Table 1 lists the features and benefits of the Hyperlocation Module with Advanced Security.

Table 1. Hyperlocation Module with Advanced Security

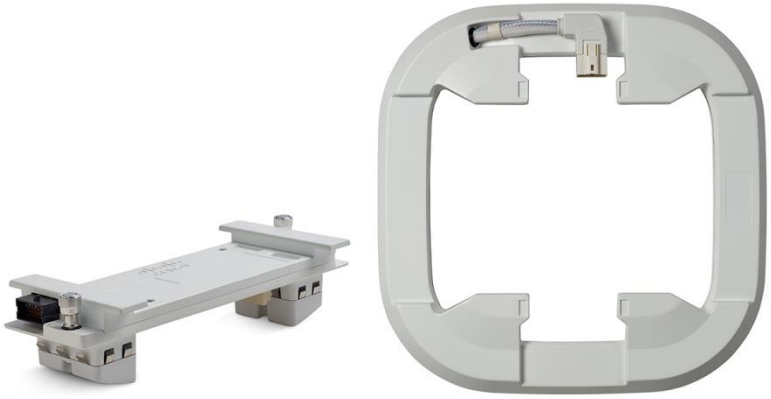
Feature	Benefit
1- to 3-meter location accuracy on average	Provides 1- to 3-meter (median) location accuracy for associated Wi-Fi clients, depending on deployment
True blue dot experience	Supports navigation and wayfinding applications with highly accurate and near-real-time location
Next-generation wireless security module	Delivers always-on robust security and policy enforcement, and Cisco CleanAir® Spectrum Intelligence for 20-, 40-, and 80-MHz channels
BLE beacon	Incorporates five centrally managed BLE beacons with separate universally unique identifiers (UUIDs) and power levels
FastLocate	Generates frequent location updates for connected Wi-Fi clients
Field-upgradable module	Offers field upgradability of the Cisco AP3602i and AP3602e and Cisco AP3702i and AP3702e Series access point modules with both the Hyperlocation module and the antenna

Module and Antenna

The Hyperlocation solution involves two field-upgradable hardware modules (Figure 1):

- Hyperlocation Module with Advance Security
- Hyperlocation Antenna

Figure 1. Hyperlocation Module (left) and Antenna (right)



Hyperlocation Module

The Hyperlocation Module with Advanced Security is an evolution of the existing Cisco Aironet WSM; an added advantage is that it expands the capability to include 40- and 80-MHz operation to address 802.11n and 802.11acW1 applications. The module has Wi-Fi RF transmit hardware to potentially take advantage of in the future for features such as neighbor discovery packet and rogue containment.

Additionally, the module incorporates five built-in, centrally managed BLE beacon radios with five separate UUIDs, each of which can be set to a different transmit power level.

The module also has the added advantage of the FastLocate capability, which provides more frequent location updates for connected clients.

Hyperlocation Antenna

The Cisco Aironet Hyperlocation Antenna is required along with the module to provide the average of 1- to 3-meter location accuracy. The array antenna brings angle-of-arrival (AoA) capability on top of the existing received signal strength indication (RSSI)-based 5- to 10-meter solution, increasing location accuracy to 1 to 3 meters on average.

Licensing

No additional licenses are needed for the Hyperlocation solution; required licenses follow:

- Cisco Wireless Intrusion Prevention System (WIPS) licenses to enable full WIPS support with the Hyperlocation module:
  - L-WIPS-MM-1AP: 1 access point WIPS Monitor Mode license
  - L-WIPS-MM-100AP: 100 access points WIPS Monitor Mode license
  - L-WIPS-MM-1000AP: 1000 access points WIPS Monitor Mode license
- For Cisco Connected Mobile Experiences (CMX) licenses to enable the calculation of the location with the Hyperlocation module or antenna, the following CMX SKU is required per access point:
  - L-LS-1AP-N: 1 access point CMX Base license, which provides X,Y of the device and location APIs
  - L-AD-LS-1AP-N: 1 access point CMX Advanced license, which adds analytics to X,Y of the device and analytics API

Product Specifications

Table 2 lists the product specifications for the Cisco Hyperlocation solution, which includes the Hyperlocation Module with Advanced Security and the Hyperlocation Antenna.

Table 2. Product Specifications for Cisco Aironet Hyperlocation Solution and Modules

Item	Specification
Part numbers	**The Cisco Hyperlocation solution modules:** ● AIR-RM3010L-x-K9= Hyperlocation Module with Advanced Security; regulatory domain "-x" ● AIR-ANT-LOC-01= Hyperlocation Antenna, model 1, attached omnidirectional antenna ● AIR-ANT25-LOC-02= Hyperlocation Antenna, model 2, detached directional antenna (future) **Regulatory domains: "-x" ⇔ Regulatory domain** Customers are responsible for verifying approval for use in their individual countries. To verify approval and to identify the regulatory domain that corresponds to a particular country, visit the Wireless LAN Compliance Status document at: http://www.cisco.com/go/aironet/compliance. Not all regulatory domains have been approved. As they are approved, the part numbers will be available on the Global

Item	Specification	
	Price List and Compliance Status document. **Wireless Intrusion Prevention System (WIPS) licenses to enable full WIPS support with the Hyperlocation module:** ● L-WIPS-MM-1AP 1 AP WIPS Monitor Mode license ● L-WIPS-MM-100AP 100 AP WIPS Monitor Mode license ● L-WIPS-MM-1000AP 1000 AP WIPS Monitor Mode license	
	Connected Mobile Experiences (CMX) licenses to enable the calculation of the location with the Hyperlocation module require the following CMX SKU for each access point. The Base license is required, and the Advanced license gives analytics along with location calculation: ● L-LS-1AP-N 1 AP CMX Base license ● L-AD-LS-1AP-N 1 AP CMX Advanced license **Cisco Smart Net Total Care™ Service for the Cisco Aironet Hyperlocation Modules:** **Cisco Wireless LAN Services:** ● AS-WLAN-CNSLT Cisco Wireless LAN Network Planning and Design Service ● AS-WLAN-CNSLT: Cisco Wireless LAN RF Design Services for Context-Aware Location ● CON-AS-WLAN: Cisco Wireless LAN Optimization Services	
Software*	Cisco Unified Wireless Network Software release with AireOS wireless controllers: Location ● Cisco Unified Wireless Network Software Release WLC 8.3, CMX 10.2.2, PI 3.1 (today) ◦ Hyperlocation, BLE, and CleanAir® Spectrum Intelligence WIPS ● Cisco Unified Wireless Network Software Release WLC 8.1MR3, MSE 8.0MR2, PI 2.2 or later ◦ CleanAir Spectrum Intelligence, Rogue Detection, and WIPS ◦ 20-MHz channel support ● Cisco Unified Wireless Network Software Release WLC 8.2, MSE 8.0MR3, PI 3.0TP2 or PI 3.1 ◦ CleanAir Spectrum Intelligence, Rogue Detection, and WIPS ◦ 20-, 40-, and 80-MHz channel support * General guidance. For exact software release and feature content, check release notes.	
Wireless LAN controllers (WLCs)	Hyperlocation module operates in local and flex mode settings. Suitable controllers include. AireOS wireless controllers: ● Cisco 2500 Series Wireless LAN Controllers, Cisco Wireless Services Module 2 (WiSM2) for the Cisco Catalyst® 6500 Series Switches, Cisco 5500 Series Wireless LAN Controllers (5508 and 5520), Cisco Flex® 7500 Series Wireless LAN Controllers, and Cisco 8500 Series Wireless LAN Controllers (8510 and 8540) Cisco IOS® Software Wireless LAN Controllers: ● Cisco Catalyst 3850 and 3650 Series Switches	
Transmit power and antenna gain	The Hyperlocation module can operate with just the access point, or in conjunction with the Hyperlocation antenna. The BLE radio on the Hyperlocation module transmits at 2.4 GHz and is compatible with most regulatory domains. The BLE Tx, if enabled, always transmits from the antenna residing on the module itself. The BLE maximum Tx power is 0 dBm, with an omnidirectional antenna gain of 2 dBi. The Wi-Fi serving radios of the access points transmit and receive on their separate antennas and are not part of this Hyperlocation data sheet.	
Regulatory		
Operating frequency range	**2.4 GHz:** 2400 to 2483.5 MHz	**5 GHz:** 5150 to 5350, 5470 to 5850 MHz
Frequency band and 20-MHz operating channels	**A (A regulatory domain):** ● 2.412 to 2.462 GHz; 11 channels ● 5.180 to 5.320 GHz; 8 channels ● 5.500 to 5.700 GHz; 8 channels (excludes 5.600 to 5.640 GHz) ● 5.745 to 5.825 GHz; 5 channels **B (B regulatory domain):** ● 2.412 to 2.462 GHz; 11 channels ● 5.180 to 5.320 GHz; 8 channels ● 5.500 to 5.720 GHz; 12 channels ● 5.745 to 5.825 GHz; 5 channels **C (C regulatory domain):**	**K (K regulatory domain):** ● 2.412 to 2.472 GHz; 13 channels ● 5.180 to 5.320 GHz; 8 channels ● 5.500 to 5.620 GHz; 7 channels ● 5.745 to 5.805 GHz; 4 channels **N (N regulatory domain):** ● 2.412 to 2.462 GHz; 11 channels ● 5.180 to 5.320 GHz; 8 channels ● 5.745 to 5.825 GHz; 5 channels **Q (Q regulatory domain):** ● 2.412 to 2.472 GHz; 13 channels ● 5.180 to 5.320 GHz; 8 channels

Item	Specification			
	● 2.412 to 2.472 GHz; 13 channels ● 5.745 to 5.825 GHz; 5 channels **D (D regulatory domain):** ● 2.412 to 2.462 GHz; 11 channels ● 5.180 to 5.320 GHz; 8 channels ● 5.745 to 5.825 GHz; 5 channels **E (E regulatory domain):** ● 2.412 to 2.472 GHz; 13 channels ● 5.180 to 5.320 GHz; 8 channels ● 5.500 to 5.700 GHz; 8 channels (excludes 5.600 to 5.640 GHz) **F (F regulatory domain):** ● 2.412 to 2.472 GHz; 13 channels ● 5.745 to 5.805 GHz; 4 channels **H (H regulatory domain):** ● 2.412 to 2.472 GHz; 13 channels ● 5.150 to 5.350 GHz; 8 channels ● 5.745 to 5.825 GHz; 5 channels **I (I regulatory domain):** ● 2.412 to 2.472 GHz; 13 channels ● 5.180 to 5.320 GHz; 8 channels		● 5.500 to 5.700 GHz; 11 channels **R (R regulatory domain):** ● 2.412 to 2.472 GHz; 13 channels ● 5.180 to 5.320 GHz; 8 channels ● 5.660 to 5,805 GHz; 7 channels **S (S regulatory domain):** ● 2.412 to 2.472 GHz; 13 channels ● 5.180 to 5.320 GHz; 8 channels ● 5.500 to 5.700 GHz; 11 channels ● 5.745 to 5.825 GHz; 5 channels **T (T regulatory domain):** ● 2.412 to 2.462 GHz; 11 channels ● 5.280 to 5.320 GHz; 3 channels ● 5.500 to 5.700 GHz; 8 channels (excludes 5.600 to 5.640 GHz) ● 5.745 to 5.825 GHz; 5 channels **Z (Z regulatory domain):** ● 2.412 to 2.462 GHz; 11 channels ● 5.180 to 5.320 GHz; 8 channels ● 5.500 to 5.700 GHz; 8 channels (excludes 5.600 to 5.640 GHz) ● 5.745 to 5.825 GHz; 5 channels	
Maximum number of nonoverlapping channels	**2.4 GHz:** ● 802.11g (.11b n/a): ◦ 20 MHz: 3 ● 802.11n: ◦ 20 MHz: 3		**5 GHz:** ● 802.11a: ◦ 20 MHz: 21 ● 802.11n: ◦ 20 MHz: 21 ◦ 40 MHz: 9 ● 802.11ac: ◦ 20 MHz: 21 ◦ 40 MHz: 9 ◦ 80 MHz: 5	
Note: This information varies by regulatory domain. Refer to the product documentation for specific details for each regulatory domain.				
Receive sensitivity **At 40 MHz: Increase by 3 dB** **At 80 MHz: Increase by 6 dB**	● 802.11b (CCK) ◦ -102 dBm @ 1 Mbps ◦ -100 dBm @ 2 Mbps ◦ -92 dBm @ 5.5 Mbps ◦ -91 dBm @ 11 Mbps	● 802.11g (non- HT20) ◦ -92 dBm @ 6 Mbps ◦ -92 dBm @ 9 Mbps ◦ -91 dBm @ 12 Mbps ◦ -91 dBm @ 18 Mbps ◦ -88 dBm @ 24 Mbps ◦ -86 dBm @ 36 Mbps ◦ -81dBm @ 48 Mbps ◦ -80 dBm @ 54 Mbps	● 802.11a (non-HT20) ◦ -92 dBm @ 6 Mbps ◦ -92 dBm @ 9 Mbps ◦ -92 dBm @ 12 Mbps ◦ -91 dBm @ 18 Mbps ◦ -88 dBm @ 24 Mbps ◦ -85 dBm @ 36 Mbps ◦ -80 dBm @ 48 Mbps ◦ -79 dBm @ 54 Mbps	
	2.4-GHz ● 802.11n (HT20) ◦ -92 dBm @ MCS0 ◦ -91 dBm @ MCS1 ◦ -90 dBm @ MCS2 ◦ -87 dBm @ MCS3 ◦ -84 dBm @ MCS4 ◦ -80 dBm @ MCS5 ◦ -79 dBm @ MCS6 ◦ -78 dBm @ MCS7 ◦ -90 dBm @ MCS8 ◦ -90 dBm @ MCS9	**5-GHz** ● 802.11n (HT20) ◦ -91 dBm @ MCS0 ◦ -91 dBm @ MCS1 ◦ -89 dBm @ MCS2 ◦ -86 dBm @ MCS3 ◦ -84 dBm @ MCS4 ◦ -79 dBm @ MCS5 ◦ -78 dBm @ MCS6 ◦ -76 dBm @ MCS7 ◦ v91 dBm @ MCS8 ◦ -89 dBm @ MCS9	**5-GHz** ● 802.11n (HT40) ◦ -88 dBm @ MCS0 ◦ -88 dBm @ MCS1 ◦ -87 dBm @ MCS2 ◦ -83 dBm @ MCS3 ◦ -81 dBm @ MCS4 ◦ -76 dBm @ MCS5 ◦ -75 dBm @ MCS6 ◦ -74 dBm @ MCS7 ◦ -88 dBm @ MCS8 ◦ -86 dBm @ MCS9	**5-GHz** ● 802.11ac (VHT20) ◦ -91 dBm, Nss=1, MCS0 ◦ -74 dBm, Nss=1, MCS8 ◦ -91 dBm, Nss=2, MCS0 ◦ -72 dBm, Nss=2, MCS8 ◦ -91 dBm, Nss=3, MCS0 ◦ -68 dBm, Nss=3, MCS9 ● 802.11ac (VHT40) ◦ -88 dBm, Nss=1, MCS0 ◦ -69 dBm, Nss=1, MCS9 ◦ -88 dBm, Nss=2, MCS0

Item	Specification			
	◦ -89 dBm @ MCS10 ◦ -86 dBm @ MCS11 ◦ -84 dBm @ MCS12 ◦ -78 dBm @ MCS13 ◦ -77 dBm @ MCS14 ◦ -75 dBm @ MCS15 ◦ -92 dBm @ MCS16 ◦ -89 dBm @ MCS17 ◦ -88 dBm @ MCS18 ◦ -85 dBm @ MCS19 ◦ -81 dBm @ MCS20 ◦ -76 dBm @ MCS21 ◦ -75 dBm @ MCS22 ◦ -74 dBm @ MCS23	◦ -87 dBm @ MCS10 ◦ -84 dBm @ MCS11 ◦ -81 dBm @ MCS12 ◦ -77 dBm @ MCS13 ◦ -75 dBm @ MCS14 ◦ -74 dBm @ MCS15 ◦ -90 dBm @ MCS16 ◦ -88 dBm @ MCS17 ◦ -85 dBm @ MCS18 ◦ -83 dBm @ MCS19 ◦ -80 dBm @ MCS20 ◦ -74 dBm @ MCS21 ◦ -73 dBm @ MCS22 ◦ -72 dBm @ MCS23	◦ -84 dBm @ MCS10 ◦ -80 dBm @ MCS11 ◦ -79 dBm @ MCS12 ◦ -75 dBm @ MCS13 ◦ -73 dBm @ MCS14 ◦ -72 dBm @ MCS15 ◦ -87 dBm @ MCS16 ◦ -84 dBm @ MCS17 ◦ -82 dBm @ MCS18 ◦ -78 dBm @ MCS19 ◦ -77 dBm @ MCS20 ◦ -72 dBm @ MCS21 ◦ -70 dBm @ MCS22 ◦ -69 dBm @ MCS23	◦ -66 dBm, Nss=2, MCS9 ◦ -88 dBm, Nss=3, MCS0 ◦ -65 dBm, Nss=3, MCS9 ● 802.11ac (VHT80) ◦ -85 dBm, Nss=1, MCS0 ◦ -66 dBm, Nss=1, MCS9 ◦ -84 dBm, Nss=2, MCS0 ◦ -64 dBm, Nss=2, MCS9 ◦ -85 dBm, Nss=3, MCS0 ◦ -62 dBm, Nss=3, MCS9
Note: Sensitivity is measured at the internal RF connectors.				
Dimensions (W x L x H)	● Hyperlocation module (AIR-RM3010L-x-K9): 8.5 x 2.5 x 2.0 in. (21.5 x 6.4 x 5.0 cm) ● Hyperlocation antenna model 1 (AIR-ANT-LOC-01=): 12.0 x 12.0 x 2.2 in. (30.5 x 30.5 x 5.5 cm)			
Weight	● Hyperlocation module (AIR-RM3010L-x-K9): 0.6 lb (0.3 kg) ● Hyperlocation antenna model 1 (AIR-ANT-LOC-01=): 2.3 lb (1.1 kg)			
Environmental	**Cisco Aironet 3600i and Aironet 3700i with the Hyperlocation module installed:** ● Nonoperating (storage) temperature: -22 to 158°F (-30 to 70°C) ● Nonoperating (storage) altitude test: 77°F (25˚C), 15,000 ft ● Operating temperature: 32 to 104°F (0 to 40°C) ● Operating humidity: 10 to 90% percent (noncondensing) ● Operating altitude test -40°F (-40˚C), 9843 ft **Cisco Aironet 3600e and Aironet 3700e with the Hyperlocation module installed:** ● Nonoperating (storage) temperature: -22 to 158°F (-30 to 70°C) ● Nonoperating (storage) altitude test: 77°F (25˚C), 15,000 ft ● Operating temperature:-4 to 113°F (-20 to 45°C) with module ● Operating humidity: 10 to 90 percent (noncondensing) ● Operating altitude test -40°F (-40˚C), 9843 ft			
Power draw	Cisco Aironet 3600i, 3600e, 3700i, or 3700e Access Point with the Hyperlocation module requires 18.2W			
Powering options	Cisco Aironet 3600i, 3600e, 3700i, or 3700e Access Point with the Hyperlocation module ● Enhanced Power over Ethernet (PoE+): Up to 20W configurable on an Ethernet port basis ● 802.3at PoE+: 25.5W delivered to the access point ● Cisco Aironet 3600 and 3700 Series Power Injectors (AIR-PWRINJ4=) ● Cisco Aironet 3600 and 3700 Series Local Power Supply (AIR-PWR-B=)			
Warranty	Limited Lifetime Hardware Warranty			
Compliance standards	● UL 60950-1 ● CAN/CSA-C22.2 No. 60950-1 ● UL 2043 **(AP+ Hyperlocation Module; excluding Hyperlocation antenna)** ● IEC 60950-1 ● EN 60950-1 ● EN 50155 ● EMI and susceptibility (Class B) ● FCC Part 15.107, 15.109, 15.247, 15.407 ● ICES-003 (Canada) ● VCCI (Japan) ● EN 301.489-1 and -17 (Europe) ● EN 60601-1-2 EMC requirements for the Medical Directive 93/42/EEC ● IEEE Standard: ◦ IEEE 802.11a/b/g, IEEE 802.11n, IEEE 802.11acw1, IEEE 802.11h, IEEE 802.11d **(Hyperlocation angle of arrival does not operate in 802.11b)** ● Multimedia:			

Item	Specification
	◦ Wi-Fi Multimedia (WMM) ● Other: ◦ FCC Bulletin OET-65C ◦ RSS-102 ◦ RSS-247 ◦ RSS-GEN

Limited Lifetime Hardware Warranty

The Cisco Aironet Access Point Hyperlocation Module with Advanced Security and the Hyperlocation Antenna come with a Limited Lifetime Warranty that provides full warranty coverage of the hardware for as long as the original end user continues to own or use the product. The warranty includes 10-day advance hardware replacement and helps ensure that software media is defect-free for 90 days. For more details, please visit: http://www.cisco.com/go/warranty.

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For More Information

For more information about the Cisco Aironet Access Point Hyperlocation Module with Advanced Security and the Hyperlocation Antenna, visit http://www.cisco.com/go/wireless or contact your local Cisco account representative.

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San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

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