

Context Aware and Location FAQ

Introduction

The Cisco® Context-Aware Mobility solution provides the ability to capture and integrate into business processes detailed contextual information about such things as location, temperature, and the availability of an asset. The integration of contextual information with business process applications is fast becoming the next level of true enterprise mobility. With the Cisco Context-Aware Mobility solution, mobile users can go beyond anytime, anywhere connectivity to automatically having the right device, the right application, and the right environment while on the go.

Refer to [Cisco Technical Tips Conventions](#) for more information on document conventions.

Context Aware Design Considerations

- Q.** What devices can be tracked with the Cisco Context Aware Services?
- A.** The Cisco Context-Aware Services allows you to track and locate IP enabled devices both wired and wireless with the Cisco Unified Wireless Network and Wired network. Wireless devices include Wi-Fi enabled client devices and Wi-Fi active RFID CCX tags. Wired devices include any IP enabled wired device that connects to a Cisco Catalyst switch.
- Q.** How long does it take to complete location calculation for a Wi-Fi device?
- A.** Latency is a function of the number of devices that move at the same time and can take from a few seconds up to ten seconds.
- Q.** Are there location accuracy differences between Wi-Fi clients and Tags?
- A.** There exists no difference in the location computation of clients and Tags. If Clients are CCX v4, the location accuracy is identical between Tags and clients.
- Q.** What are the challenges for RSSI based location systems?
- A.** The common challenges are:

Wrong channel problem (WCP) - When the AP is on a particular channel it is possibly able to receive packets transmitted from adjacent channels albeit at a lower received power. Thus the AP then reports the packet with lower RSSI value, which would cause the location of the client to be estimated further than actual in the location server. This is observed in 2.4 GHz band due to AP filter limitations and 802.11b modulation techniques, even for 802.11g/n clients, as they use 802.11b for probe requests. S60 client driver can eliminate such problems.

Antenna diversity issues (ADI) - It was also observed that the same packet was received on the 2 AP antennas at considerably different power. This can be due to challenges of gathering reliable RSSIs with antenna diversity. The AP must listen on one antenna during start of packet then switch to a different antenna during packet reception in order to get better reception, all within a few micro seconds.

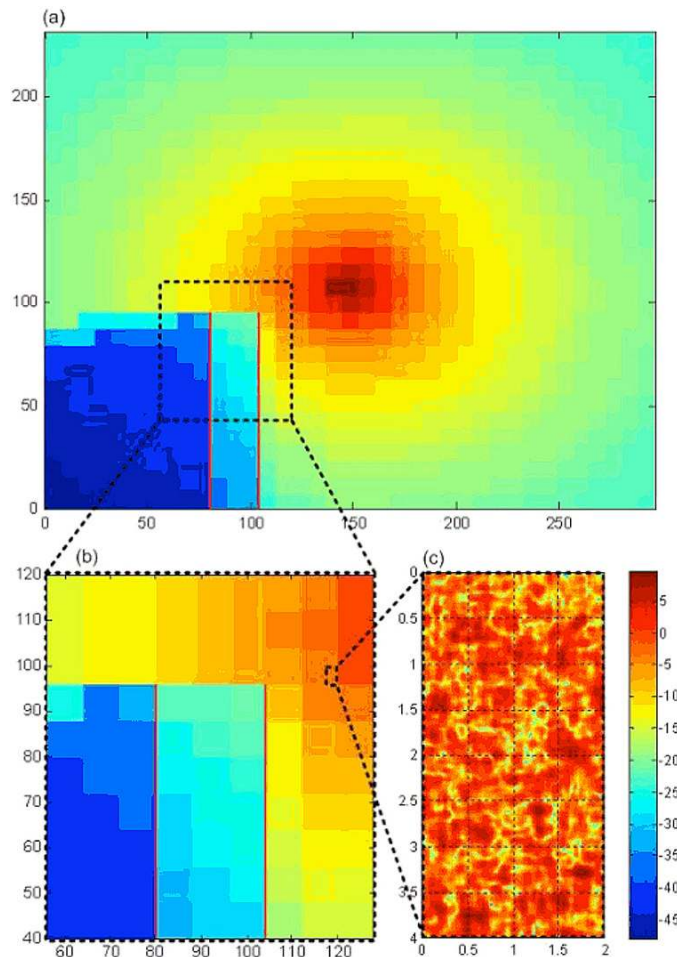
Client concerns and environmental issues - Client transmission, which are frequency and transmit power levels, are dictated by client drivers. These can be augmented by the use of CCXV4, but tests today cannot take advantage of this CCX standard. The high ceiling and metal racks presents a challenging RF environment. See the How RF propagation helps (and hinders) Location question for more information on RF environment challenges.

Missing RSSIs - Due to client/driver behavior, AP traffic and RF environment issues, not all APs, get RSSI readings. In a typical high ceiling environment, APs can hear neighboring APs stronger than the clients on the floor. This along with the metal racks can worsen the hidden node problems, wherein the clients on the floor try to communicate with the closest AP, which can see packets from neighboring APs on the same channel. The client is unaware of these packets due to the poor RSSI from the neighbor AP at its end. During some readings, not all APs receive RSSI measurements. Thus the location calculation is carried out with an incomplete set of APs, and results in poor location accuracy. S36 and S60 force the client to send more packets frequently and thus overcome this problem.

Note: S36 and S60 are client drivers compatible with specific Cisco Compatible Extensions. S36 is compatible with CCXv2 or later. S60 is compatible with CCXv4 or later.

Q. How does RF propagation affect Location?

Figure 1. (a) Power Law Propagation (b) Shadowing, for Example, by Two Walls (c) Multipath Fading



A. The signal strength between a client and an AP varies at different distance scales, as shown in the Figure. The large scale helps with location accuracy, the medium scale can help or hinder, but the small scale is nothing but a nuisance:

Large - As a rule of physics, signal strength varies inversely with the square of distance in free space. As a rule of thumb, signal strength varies inversely with (about) the cube of distance indoors. This power law propagation is the main indicator of range between AP and client. The signal drops most steeply near an AP, and so this yields the best distance information.

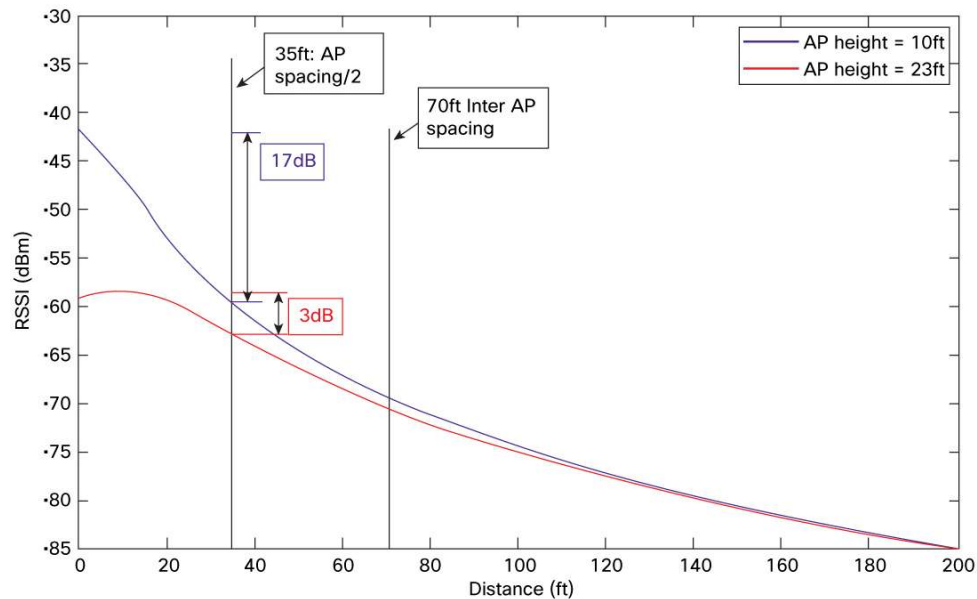
Medium - Environmental clutter such as bookcases, filing cabinets, cube walls, and whiteboards can screen the client from the AP. Conversely, lack of clutter such as hallways gives a better link. In both cases these are major errors from the power law propagation. This is called shadowing. Typically shadowing causes about an error of around 7 dB, sometimes more, sometimes less, or equivalently a two times uncertainty in range. This uncertainty is reduced by the receipt of measurements from multiple APs and the use of statistical techniques to average down the errors in order to reduce problem. For many applications, averaging across APs is sufficient. For those cases where precision location is needed, you can elect to measure these shadowing variations with the use of calibration (site surveys) and/or reference tags; the location server then has enhanced location fingerprints to help with accuracy.

Small - Like a wave that crashes on a steeply shelving beach and reflects back to double the strength of the next wave, multipath is the superposition of multiple rays that travel between transmitter and receiver and arrive with small differences in delay. Sometimes they add up, and sometimes they cancel. This multipath fading also causes errors in power law propagation, sometimes profound ones. For a worst case environment, there can be a ten percent chance of a ten dB drop in signal strength and a one percent chance of a 20 dB fade. This variation occurs over a fraction of a wavelength, for example, an inch or so at 2.4 GHz, and is sensitive to slight movements of the environment, for example, a door that opens and closes, so acts as noise to any location system.

In summary, power law propagation and shadowing, if determined through calibration and/or reference tags, help with location accuracy, yet shadowing, if unknown, and multipath hinder location accuracy.

- Q.** Is there any difference in accuracy with respect to Cisco's 802.11n infrastructure products such as the 1250 series AP?
- A.** Usually, deployments use a single type of Access Points for the entire floor; different access types over a floor are less common. Deployments that use AP1250 have shown improved and more accurate RSSI reception as compared to non-802.11n based access points.
- Q.** What are the advantages with 11n?
- A.** 802.11n APs have multiple RF streams so they monitor three, not just two, antennas, and the monitoring is full-time. If you choose three points in Figure 1(c), observe that the average RSSI across them significantly reduces the variations. 802.11n APs improve location accuracy because they reduce the observed RSSI variations.
- Q.** What are deployment challenges in a high ceiling environment?
- A.** The high ceiling degrades the RSSI versus distance relationship and results in lack of strong RSSI to locate the device closer to the AP.

Figure 2. Very Little RSSI Variation with Distance in High Ceiling Environments



As seen from the previous figure, the change in RSSI between AP and half the inter AP distance (35 feet) is 17 dB for an AP placed at ten feet high while only 3 dB for AP placed at 23 feet high. As RSSI location algorithms depend on RSSI values to determine location, a large change in RSSI is desired over small distances, in order to achieve granular distance resolution. Note that beyond 35 feet, the device is expected to fall within the steep RSSI curve of a neighboring AP, due to 70 feet inter AP spacing. Such steep RSSI characteristics from the nearest AP, along with neighboring APs, contribute towards good location accuracy. So usually for higher ceilings, a combination of more APs and directional antennas, which point to the floor, can be required in order to improve location accuracy.

- Q.** Can a single WCS server manage two MSEs tracking, one tracking only clients and other tracking only tags?
- A.** Yes, a single WCS can manage multiple MSEs with each tracking different categories of devices. The partitioning of devices tracked by the MSE can be easily setup with either licensing or filtering in order to enforce the appropriate rule.
- Q.** Is there a limitation of number of APs for each floor?
- A.** MSE does not have limitations in regards to the maximum number of access points for each floor although there is a recommendation from WCS to limit the number of APs for each floor to 100 and the number of floors for each building to 20. The recommendation in WCS helps to maintain a reasonable degree of performance of the system.
- Q.** What are the three main things to keep in mind during the performance of an accuracy test for client devices?
- A.** During an accuracy test it is critical that the client device used during testing be at every location test point for a set period of time (60 seconds) in order to receive a location update. The test should be run for at least two minutes at each location. Client must be heard by a minimum of three APs at each location in order for a MSE to provide optimal accuracy results.

Q. What are the types of Accuracy Tests that can be run?

A. There are two types of Accuracy tests that can be run:

- On Demand Accuracy Test
- Scheduled Accuracy Test

Q. Can an accuracy test be run only in a particular part of the floor or is it necessary to run the test across the entire floor?

A. An accuracy test can be run at whatever section or points of the floor as desired. Test results provide accuracy for that section of the floor where accuracy test was run.

Q. Can I apply a calibration model to a specific region on a Floor?

A. You cannot currently apply a calibration model to a specific region on the floor from WCS UI. But, if you create the floor as two adjacent floors, then yes, you can apply the models to specific portions of the floors, which is defined as another floor. Also in the two floors in one scenario, also known as the split floor, you can do Model 1 for part 1 of the floor (defined as floor 1) and Model 2 for part 2 of the floor (defined as floor 2). If there is a problematic area in a floor that shows location errors, then additional data points can be added to the existing calibration model and recalibrate/apply the model to the floor in question.

Wireless Infrastructure

Q. Are there any bandwidth requirements between the Wireless LAN Controller and the MSE?

A. It is recommended that an MSE be connected to a WLC or WCS through a high-speed network connection. MSE should not be connected to WLC or WCS on a WAN connection.

Q. What are the design recommendations for controllers to track Wi-Fi Clients and Tags?

A. Based on 7.0.116 software release

Controllers	Client Capabilities	Tag Capabilities
7500	30000	20000
WiSM2	15000	5000
WiSM	10000	5000
4404	5000	2500
5508	7000	5000
4402	2500	2500
3750	2500	2500
2500	500	256
2106	500	256
WLCM	500	256

Q. Can a Controller (WLC) be added to multiple Location Appliances/MSEs?

A. Some controllers can be synced with more than one MSE with few exceptions:

If a controller is on 4.2 or 5.0 code, then multiple NMSP connections are not supported, so it can only be synced to one 2710 Location Appliance or MSE. Make sure to use 6.0 code on the MSE for this purpose.

If WIPS has been enabled on the MSE, and WLC has been added to the MSE, then the same WLC cannot be assigned to another MSE.

- Q.** Can an MSE be dedicated to specific functionality, for example, one for WIPS and another for RFID? If not, can they be filtered to show only what is required?
- A.** Yes, an MSE can be dedicated for each function. With software release 6.0 and later, a single MSE can run both services.
- Q.** How many wireless LAN Controllers can an MSE support?
- A.** MSE supports up to 100 wireless LAN Controllers.
- Q.** How many MSE 3350s can be supported by a WCS?
- A.** Cisco recommends that each MSE is managed by only one WCS. A WCS can manage multiple MSEs. WCS has bounds from several perspectives, which can determine how many MSEs it can manage based on distribution of those units across MSEs. Factors include the maximum number of elements supported, maximum number of floors supported, maximum number of APs supported. Officially Cisco supports five MSEs for each WCS.
- Q.** How many tags and Location Appliance 2710, and MSE models 3310/3350 can track clients?
- A.** Cisco 2710 can track up to 2500 devices, any mix of tags and clients. MSE3310 can track 2000 devices and MSE3350 can track up to 18000 devices. Note that although 3310 can track a total of 2000 devices, it can track up to 1000 tags and up to 1000 clients. So for example if in a deployment there are 700 tags and zero clients, then you can add only 300 more tags, although you have zero clients. The scalability bandwidth of clients and tags are not sharable with each other as lowest license for tag or client is available for 1K.
- In another example, if there are 500 tags and 1500 clients to be tracked with 3310, it is not possible to have 1500 clients tracked, as clients license is available in the bundle of 1K. So to track 1500 clients you have to buy two 1K licenses for clients, which is not possible as 500 tags are also been tracked. The maximum device count of 18000 devices on the MSE 3350 can be any mix of clients and tags. Refer to the [ordering guide](#) for MSE for more information.
- Q.** On MSE running 6.0 code one can run multiple services, WIPS and Context Aware. What are the scalability limits with multiple services for clients and tags?
- A.** Scalability limits depend upon the platform that is used: MSE 3310, MSE 3350, or virtual appliance (VA). Refer to the [ordering guide](#) for MSE for more information.

MSE-3310

2K			
1K			
0			
	0	1K	2K

MSE-3310 Service Support Matrix
wIPs and Context Aware

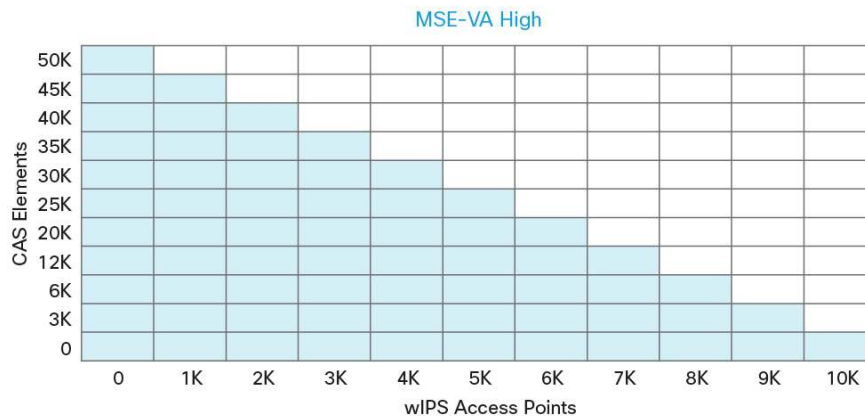
Clients/Tags	2000	Y		
	1000	Y	Y	
	0	Y	Y	Y
		0	1000	2000
wIPS Monitor Mode APs				

MSE-3350/55

18K					
12K					
6K					
3K					
2K					
1K					
0					
	0	1.5K	3K	4K	4.5K
wIPS Access Points					

MSE-3350 Service Support Matrix
wIPs and Context Aware

Clients/Tags	18000	Y			
	12000	Y	Y		
	6000	Y	Y	Y	
	0	Y	Y	Y	Y
		0	1000	2000	3000
wIPS Monitor Mode APs					



- Q.** Can a MSE running on 5.2 code work with WCS 6.0 code?
- A.** It is not a supported configuration. Cisco always recommends same software release level for MSE and WCS. So 6.0 MSE/6.0 WCS; 5.2 MSE/5.2 WCS are the supported configurations. Note that WCS can manage a wireless LAN Controller, which is up to 2 releases behind the software release that runs on WCS.
- Q.** Can a WCS server be locked down to read only on the controller?
- A.** Yes, a WCS instance can be configured for read only operation of a controller. Additionally, individual users that have login privileges to WCS can also be limited to only reading and do not make changes to the network configuration. You need to be a root or superuser mode in order access the Services tab and to do any MSE/LBS related configuration under this tab.
- Q.** Can the WLC be configured to send RFID information to one MSE and WIPS information to another?
- A.** You can choose the tracking option on the Tracking Parameters page or run different services on different MSEs. The MSE is subscribed to the services based on what is configured. If MSE is configured to track RFID tags, the WLC only sends RFID information, whereas another MSE that is only configured for WIPS service, receives WIPS related information from the WLC.
- Q.** What are the LAN port speeds on the MSE?
- A.** The MSE 3310 and 3350 have two 10/100/1000 Mbps Ethernet interfaces.
- Q.** What type of Antennas are officially supported by Cisco Context aware service?
- A.** Cisco does not support non-Cisco antennas for Context-Aware. If you use non-Cisco antennas, heatmaps are not generated, which means that the RSSIs received at these antennas are ignored during location calculation. On the WCS page these are marked as other antennas from the drop-down antenna list for each AP. These are things to remember when you use non-Cisco antennas:
- No heatmaps are generated for these APs
 - RSSIs received from these APs are ignored

The antennas gains are allowed to be changed through WLC, which is required for FCC compliance. In order to ensure that APs radiate the correct Effective Isotropic Radiated Power (EIRP), you should use Cisco antennas. If you choose external antenna, and lower antenna gain than actually deployed antennas, then the APs transmit at a higher power level and can cross the FCC specified limits. If you use Cisco antennas, this avoids similar situations because the gains are precisely measured and used internally by the system.

Q. What are the differences between Monitor Mode versus Local mode?

A. Local Mode refers to the normal mode of operation of an AP, for example, transmitting/receiving of data from wireless client. Monitor Mode operation of AP optimizes monitoring and location calculation of tags. In Monitor Mode, the APs scan all channels. In Location Optimized Monitor Mode, the channel list can be specified for the 2.4 GHz band. This can facilitate better tag tracking, if you set the scanning channel list to the channels on which tags are going to beacon, for example, normally 1, 6, 11. 5 GHz certainly has some advantages as it has more channels, more power and less interference.

Q. How is WCS used to locate clients?

A. There are two primary ways to find clients with the WCS UI. Choose Monitor > Clients on WCS or use the Search option on the UI. The obtained client details depend on where they are searched.

Search Clients based on the WCS only, for example, neither 2710 or MSE is deployed. This shows the client information retrieved by the WCS from the wireless LAN Controllers. There is no location server/MSE involved this case.

Search Clients based on the MSE. This shows that the clients located and are tracked by the MSE.

When you use the Client Search option to find a client on the MSE, you can specify a few search criteria such as client state, time for search, profile, CCX compatibility and so forth. If the MSE with CAS service tracks clients, then clients can also be located on the floor maps.

These videos enable you to understand this topic in detail:

- [Wi-Fi Client Tracking](#)
- [Location-Assisted Troubleshooting](#)
- [Location-Based Security Alerts](#)

Q. For accuracy of location computation, do power levels of APs need to be manually adjusted if the distance between AP's is less than 60 feet. For example if they are only 20 feet apart, but otherwise comply with deployment patterns, do any settings need to be adjusted?

A. No, AP settings in WLC and WCS do not need to be adjusted. Location calculations are based on the Rx power at the AP not the Tx power. But you can experience such as clients jumping too much and so forth, which can be a significant problem for a wireless VOIP device.

Q. Is an overlay location solution recommended?

A. Cisco does not recommend an overlay location solution on Cisco Unified Wireless Network. An overlay location solution has inherent drawbacks because it depends on SNMP polling of the Wireless LAN Controller (WLC). The challenges include latency, scalability and CCX tag information like chokepoints data and telemetry not exposed through SNMP.

Context-Aware Configuration

Q. Are there any best practices or workaround in order to avoid the duplicate entries?

A. Our recommendation is to divide up your network design with respect to the controller that controls that campus. If you can divide it up such that there is a clean separation of the two with no overlap, you never get multiple records. But, there is nothing wrong if you receive multiple records.

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- Q.** How do you determine if the tag is CCX compliant?
- A.** In WCS move the mouse on the tag, and if the pop up window for tag displays the battery status that indicates that it is a CCX tag. For MSE, only CCX compliant tags are tracked/displayed. On WLC Tag, the status can be checked with the show rfid detail <rfid mac> command, which also indicates if a tag is CCX compliant.
- Q.** What is the latest version of the CCX specification for tags?
- A.** CCXv1.
- Q.** What ports are required to be open for normal operation of the MSE?
- A.** These ports are used by the MSE:
- NMSP: 16113
 - http: 80
 - https: 8001
 - ssh (for logging into the MSE)
 - ftp (for backup/restore/upgrade/etc.)
 - SNMP: 161, 162
- Q.** What are the different types of protocols used among different entities in the network for the Context-Aware service?
- A.** These protocols are used:
- Communication between WCS and MSE: SOAP/XML
 - Communication between WCS and WLC: SNMP
 - Communication between WLC and MSE: NMSP
- Q.** How is NMSP protocol between Controller and MSE more beneficial than the SNMP between the Controller and MSE?
- A.** Earlier Software versions prior to 4.1 release of Location server used to fetch the location RSSI data from controllers with the use of SNMP. In this approach location server periodically polls the controllers for RSSI data and performs the calculations on retrieved data. Few issues in this approach are:

In this approach, to choose the poll interval is very challenging as larger poll interval drastically effects latency and lower polling interval results severe scaling issues as huge amount the redundant data are fetched and lower polling interval is resource intensive on both location server and MSE. It was challenging even to suggest an appropriate polling interval based on deployment and load.

Default reasonable interval chosen was five minute, which means latency was greater than 5 minutes.

Another issue related to this polling is if multiple controllers detect the same element, then there is absolutely no way to determine location server received all the data from all the controllers to start the calculation. As such determination cannot be made, location calculation was done with the available data, and this affects the location accuracy.

SNMP is not an efficient protocol to transfer the huge amount of RSSI data.

In order to overcome all the previous issues for real-time location, NMSP protocol was designed ground-up. It is similar to CAPWAP/LWAPP. RSSI data is binary optimized for efficient transfer. Change in the RSSI data is now aggregated and now sent as per the notification interval to location server/mse from controller. So it is now deterministic to identify the data arrival from multiple controllers and to perform the accurate calculation.

- Q.** Is there a maximum limit for each Network design or network designs as a whole added to the WCS/MSE?
- A.** There are no limits for Network Designs added to MSE. But, the AeroScout engine has a limit that depends on the number of floors, dimensions and amount of elements for MSE. The maximum number of floors is limited to 255. If the devices are deployed every 60m and grid resolution of 1m, a small installation can support 15 maps and large installation (higher memory requirement) can support 90 maps.
- Q.** When Devices are shown on the wrong floor, what is the interfloor debug checklist/procedure?
- A.** The floor determination is carried out based on the RSSIs received by APs on different floors. So if APs are incorrectly placed on floors this can lead to interfloor. Also, verify the current location of the device under consideration; make sure it has not moved to a different floor by another user.

Is the deployment correct? - Incorrectly placed APs on the WCS maps can cause interfloor and in general lead to poor location accuracy. Check if the APs physical location is consistent with the APs position marked on WCS maps.

Does the deployment comply with the deployment guidelines? - Inconsistency in these deployment guidelines between floors can also lead to interfloor problems. Refer to the user guide on deployment guidelines.

Does the problem only occur in some area or everywhere? - Due to building structure and RF characteristics, APs on adjacent floors can hear a device more strongly than the APs on the current floor. From software release 5.2, new algorithms were added to mitigate such scenarios. The addition of few APs in such regions usually provides the information needed by the system to correct such problems.

- Q.** Do maps have to be re-imported/re-built? Is it possible to move MSE database? If it is possible, then are there any specific recommendations?
- A.** Maps do not need to be rebuilt. This information is pushed to the MSE during the synchronization process.
- Q.** Are Northbound events generated for clients as well as tags?
- A.** Northbound Notification are for CCX tags as well as clients. Every tag/client beacon generates a northbound notification if enabled. MSE acts as a passthrough for North Bound notifications. Location and related information are sent if enabled in the configuration. To enable the notification choose Services > Mobility Services > Context Aware Service > Advanced > Notification Parameters.

MSE Operation

- Q.** What protocols are used for file transfers in MSE?
- A.** All the file transfers use FTP. The MSE/Locserver does not run any FTP server; it acts as a client and connects to the FTP server of the WCS.
- Q.** How does the Cisco MSE/Location Server get the username/password of the WCS FTP server?
- A.** When the user invokes any of the operations, the WCS sends the username/password in a SOAP request. Note, since the communication is over an HTTP"S" link, the username/password in the SOAP message are secure (encrypted).

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- Q.** What are the implications of the definition of a separate management IP address on the WCS, which results in FTP being operated on a separate IP address?
- A.** The configuration is better understood through an example. For example, define the MSE IP as 10.2.2.10 and the WCS IP as 10.2.2.11.

The 10.2.2.0 network is both reachable by MSE and WCS, so they can communicate with each other. If no management IP is given to WCS, FTP works fine and is carried out on this link.

If, you give a management IP to the WCS, example -172.16.5.10 and FTP server is now reachable on this IP only, then you should make sure that the MSE can reach the 172.16.5.0 network. If it cannot, FTP fails and the operation fails in turn.

- Q.** Under what conditions does a user receive the server unreachable error message after a restore DB operation is invoked?
- A.** This is an expected behavior. The MSE/Location Appliance Server becomes unreachable when a restore operation is in progress. This is because the appliance does not entertain any external requests when restore function takes place.

MSE Licensing

- Q.** What are the different licenses available for the Context-Aware service running on the MSE?

- A.** Refer to the [ordering guide](#) for more information on the different available licenses.

- Q.** What are the steps to get a license for clients?

- A.** Complete these steps in order to obtain a license for tracking clients:

Purchase the SW license and then you receive the Product Authorization Key (PAK) by mail (license document).

Go to <http://www.cisco.com/go/license> (registered customers only) in order to register PAK for clients.

Enter the MSE UDI information in the host ID field. Accept the agreement and continue.

License is sent to your e-mail.

Choose Services > Mobility Services > MSE > System > General Properties in order to get the MSE UDI on the WCS.

- Q.** What are the steps to get license for tags?

- A.** Complete these steps in order to obtain a license for tracking tags:

Purchase the SW license and then you receive the Product Authorization Key (PAK) by mail (license document).

Go to <http://support.AeroScout.com>  in order to registers PAK for tags.

Log on to [AeroScout Support Portal](#) .

Choose Home > Register Products Purchased from Cisco. Register your products, and provide contact details, PAK#, MSE ID (MSE S\N) and Installation Type. You then receive an email message that confirms the registration.

You can obtain the MSE Serial number from the WCS in Services > Mobility Services > MSE > Advanced Parameters.

- Q.** What could be the issue if I do not see clients or tags detected by my MSE or if I see very few clients or tags?
- A.** Permanent license has not been installed for the Context Aware Service or the evaluation license has expired. You can go to the License Center in WCS in order to see the status of the available licensed limit and status for the MSE. Permanent licenses can be installed from the License Center.
- Q.** What are the tracking engine options in MSE to track clients and tags?
- A.** Prior to software release 7.0.116 Cisco Context-Aware Engine tracks only clients and Partner Engine tracks tags. With release 7.0.116 and above, Cisco Context-Aware Engine supports tracking tags in addition to clients at the same time. MSE maintains an existing Partner Tag Engine to also track CCX tags. If selecting the Partner engine, a physical 'KT' type license is required to track tags only (a separate CAS license is required to track clients). If Cisco Tag Engine is considered, then Cisco's 'KC' CAS license can be shared to track both tags and clients.
- Q.** Can both Cisco Context-Aware Engine and Partner Tag Engine be selected used at the same time?
- A.** No, only one engine can be selected at deployment, consider the appropriate context-aware engine and licenses requirement before deploying MSE.
- Q.** How do I install a tag license?
- A.** If you are acquiring a 'KT' AeroScout license, you need to use the System Manager software from AeroScout to install the tag license. If you are using Cisco Context-Aware Engine for both tags and clients, therefore acquiring 'KC' license, you can use WCS/NCS to install the license.
- Q.** Does the MSE running software version 6.0 (or later) retain the installed licenses while restoring a 5.x or earlier database?
- A.** Yes. Existing license files are retained unless the backup that is restored has its own set of license files.
- Q.** During the restoration of database with 6.x or later, does a customer lose current license file, if you assume that the back up has been taken?
- A.** The restore operation brings back your system to the configuration it had when you took the backup, which includes the license files at that time.
- Q.** Can I install a wIPS Monitor mode AP upgrade license without the installment of a base license first?
- A.** No. Install a wIPS Monitor mode AP base license first, or the MSE will reject the upgrade license.
- Q.** How does the Evaluation License work and what are its limits?
- A.** Customers who purchase an MSE with a single service automatically get an evaluation license for the other services. Evaluation license is valid for 60 days, and it can be extended only once. Evaluation license limits are 100 clients, 100 tags and 20 wIPS APs.
- Q.** Do the evaluation extension license and tag licenses show in the License Center after installation?
- A.** Evaluation extension licenses and tag licenses are not displayed in the License center.
- Q.** What happens if an MSE evaluation license expires?
- A.** If the evaluation license expires and the MSE is not restarted, core MSE services continue to run and licensed services like Context Aware also continue to run, but devices are not tracked. If the evaluation license expires and the MSE is restarted, then licensed services do not start. Devices are not tracked.

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- Q.** How long does it take for an MSE to appear, after Context Aware Service license has been installed?
- A.** Typically, it takes from three to four minutes for services to come up once a Context Aware license is installed. A good way to check is to run the `getserverinfo` command on the MSE CLI, in order to check if the MSE is ready.
- Q.** Can a customer upgrade their client license?
- A.** Yes, you can easily upgrade the client license. Client licenses are additive. For example if you have a 3K client license, and another 12K client license is loaded, then the client licenses get added automatically and can now track 15K clients.
- Q.** Can a customer upgrade their tag license?
- A.** Existing tag license is overwritten by the new tag license. For example if you have an existing license to track 3K tags and you want to upgrade to track 6K tags, then the 3K tag license has to be added to your existing 3K license. As the current license is overwritten by the new license, AeroScout issues a 6K tag license in order to cover the entire new tag count.
- Q.** Are the clients, tags and wIPS licenses tied to particular Serial number?
- A.** Yes, the client and wIPS licenses are tied to a particular UDI and the tag licenses to a particular serial number but they can be rehosted if needed. Rehosting was designed in order to allow customers to move a license from a failed unit. It involves a TAC call. You can not re-host fractional license. The entire license has to be moved.
- Q.** When an MSE is being RMAed, should the new serial number of the MSE be registered for PAK registration on Cisco or AeroScout pages?
- A.** MSE License is tied to Unique Device Identifier (UDI). If the same unit is fixable, then UDI is the same and the same License can be rehosted. But if the unit has to be replaced, then UDI changes, so a new license has to be generated. MSE does not accept the license if UDI does not match. But Cisco TAC helps customers with this process. You should call TAC and provide the old and new UDI. TAC deactivates the old license and issues a new one.

MSE Database/History Operation

- Q.** What is the difference between current and history location tables?
- A.** History tables are separate from current location tables, and archival duration for history is configurable through WCS, (default 30 days) in the History Parameters section. Pruning interval is the configurable schedule by which history tables are pruned (default 1440 mins). The location data in current tables for Tags, Clients, Rogue AP and Rogue Clients, is updated each time the location is calculated; in essence there is only one row for each MAC ID in the current tables. When the location of a device changes by more than ten meters or the floor change occurs, and History Logging of Location Transitions is enabled in the History Parameters configuration, then the current location data is moved for that device into the location history table (new row inserted), and the current location table row updated with new location. Note, only row inserts occur on History tables, no row updates; and during Pruning, rows are deleted based on the archival configuration settings.

Q. How can one view the Location History of tags and clients?

A. The client or Tag Location history can be seen if you go to the Detail page of the particular element. Then choose the Location History from the drop-down menu on the top right-hand corner. These points are important to note about the location history:

The history tracking should be enabled to retrieve any history information about an element.

The number of days to history and pruning time should be properly selected.

Although the number of days to save history is not limited on the UI, the history stored on the server is limited by the disk space and performance impact on the overall system. Refer to the Release notes/Product Documentation in order to find an optimal value for the archival period.

The history of an element is recorded only if:

It moves more than ten meters or 30 ft.

If the emergency or panic button is pressed on the tags

If the tag encounters an Exciter

In case the element moves between floors

If the element becomes inactive for an hour, then it is declared as inactive element by the system. If the element remains inactive for 24 hours default, then it no longer tracked by CAS. It is not possible to see the location history in this case.

Q. What is the Absent Data Cleanup feature in Advanced Location Parameters?

A. Essentially, all devices in the current tables count towards the total license count. After the expiry of the Absent Data Cleanup time, the element is no longer saved in the Tracking table. This enables the conservation of memory for devices that are absent for a given amount of time. The history table data for the device stays intact irrespective of data present/absent from the current table until the end of the archival period. After the elements are removed from the tracking table, it is not possible to see the historical location of that device through WCS, but it can still be retrieved with the use of the APIs.

Q. Is there a way to reset data in MSE and clear all historical data?

A. From WCS UI, use the Clear Configuration button on the MSE's System > Advanced Parameters page in order to reset data in MSE. This clears all the configuration and location data on the MSE so it should be used with caution.

Q. How does one check to see if services are up and running correctly?

A. Use the getserverinfo command on the MSE. In the top part of the output, it shows the status of the services.

MSE Security

Q. How is Cisco 2710/MSE username/password stored in WCS? Is it encrypted, and if so, with what ciphers?

A. Username/Password are encrypted in 6.0 release and later of WCS with password-based encryption (PBE) with MD5 and DES. When you use HTTPS between WCS and MSE, all data is encrypted with the TLS/SSL transport. When you use HTTP, no encryption is used. HTTPS uses TCP/UDP port 443.

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- Q.** Can the default admin account that is used for communication between WLA and WCS be changed?
- A.** Use the setup script, invoked through `opt > locserver > setup > setup.sh` in order to change any administrative settings.
- Q.** What are the different types of passwords in MSE?
- A.** Automatic Installation script on the MSE walks you through all type of passwords. First is Default Login, which is root/password. Then comes single user mode.

The single user mode is usually used for recovery operations. For example, when the root password is forgotten, you can log into single user mode and reset the root password. If single user mode password check is enabled and the root password is forgotten, the appliance is unusable as it cannot be logged into successfully. Do not enable this option unless it is required. If single user mode password is lost, then TAC has to be contacted to arrange RMA. Now the user gets an option to change the root password. Then comes the Grand Unified Bootloader (GRUB) password. Cisco does not recommend that you change this password from the default value as well. If the GRUB password is lost, then TAC has to be contacted in order to arrange RMA.

Finally, the user sees the configuration option for WCS Communication password. This password is used for SOAP/XML authentication between WCS and MSE. You have to give the same password, the WCS communication password, on the WCS while you add MSE to the WCS.

- Q.** Why is ftp password for WCS important to remember for MSE?
- A.** When you install WCS, you are asked for a ftp password. A user with ftp-user and given password is stored in the WCS database. These credentials are used for MSE/LBSE related operations like Backup and Restore, Download Software, Download logs, Asset Import/Export and so forth. This password can be changed if you run the `passwd.sh` script on WCS.

Context-Aware API

- Q.** How can I get access to the Context-Aware service SDK?
- A.** In order to get access to the Software Development Kit (SDK) associated with the Context-Aware service that runs on the MSE, you have to sign up to the Technology Licensing Agreement (TLA) available on the [Cisco Developer Portal](http://developer.cisco.com/web/contextaware).

<http://developer.cisco.com/web/contextaware>

- Q.** What constitutes the Context-Aware SDK?
- A.** These are the steps involved in Context-Aware SDK:
- Getting Started Guide
 - Simulator
 - API Specification
 - Sample Code for the .Net and Eclipse development environments
 - Plugin's for .Net and Eclipse development environment
- Q.** Is the classification info for Rogue APs (Unclassified, Malicious, Friendly) available in `GetRogueAPInfolist` or `GetRogueAPLocationList`? If not, how do I get the information as a part of API?
- A.** No, currently it is not provided through the API. Your application can get that information from the WLC if registered to receive SNMP traps.

- Q.** What is the significance of the confidence factor returned with location. Is there a valid range? For example what does a number 224 mean?
- A.** This is the value in feet used to indicate the 95 percent confidence region. For example if the location returned is (x, y) and confidence factor is cf, then we have 95 percent confidence that the device is located within a square with center (x, y) and length 2 x cf. So the top-left and bottom-right co-ordinates of the region are (x-cf, y-cf) and (x+cf, y+cf). Note that the value is in feet.
- Q.** What is the session time out for a client application? Can the ID in AesBusinessSession be shared by many threads in a client application? How many simultaneous sessions can be set up?
- A.** Session time out is 30 mins and is not configurable. Yes, a single session ID can be shared across threads in the client application. There is no design limit to the number of sessions.
- Q.** We see 5-6 clients in WCS, but when I query MSE thru APIs, I get multiples of them and with different floor IDs. Why does this happen even though currently there is only one floor configured?
- A.** Multiple APIs can come from an old configuration on MSE. Cisco recommends to reset the database. Delete the database and then start the server in order to reset data in MSE to stop the mse server.

2710 Location Appliance

- Q.** What are the main differences between 2710 and MSE 3350?
- A.** 2710 uses RSSI based model for Indoor low-ceiling environment tracking a maximum of 2500 Wi-Fi devices. 2710 uses the same calibration for both clients and tags. 2710 can run only a single service, which is Location. MSE uses RSSI and TDOA models for Indoor and Outdoor environments (low and high ceiling) tracking max of 18,000 Wi-Fi devices. MSE can run multiple services at the same time with 6.0 code. MSE can also give location for wired clients. MSE also has redundant power supply, redundant cooling fans, and has removable hard drives. MSE also has built in Exciter support, whereas in 2710 one needs separate software for excitors.

	Location Appliance 2710	MSE 3350/55
Scalability	2,500 Wi-Fi Device Tracked	18,000 Wi-Fi Devices Tracked
Services Supported	CAS	CAS, WiPS
Supported Environments	Indoor low- ceiling	Indoor low-ceiling, Indoor high-ceiling, Outdoor
Tracking Technologies Supported	RSSI	RSSI, TDoA
Client Tracking	Cisco Tracking Engine	Cisco Client Tracking Engine
Tag Tracking	Cisco Tracking Engine	Cisco Tag Tracking Engine or Partner Tag Tracking Engine
Tag Monitoring Information on WCS Monitor > Tags	Refer to Release notes for differences.	
Calibration	Single Calibration for Clients and Tags	Calibration is done separately for Clients and Tags
Advanced Location Parameters (Refer to Release Notes for Specific Parameters)	Applicable for Clients and Tags	Applicable for only Clients
Wi-Fi TDoA Receivers	Not Supported	Supported
Exciter Support	Separate Software required	Built in

- Q.** Can a network that uses Cisco 2710 Location Appliance be seamlessly moved to MSE?
- A.** Yes, it is possible to migrate from Cisco 2710 to MSE. Refer to [Location Appliance to Mobility Services Engine \(MSE\) and Context-Aware Mobility Service Migration Guide](#) for more information on the steps involved in the migration of a Cisco 2700 Series Location Appliance to the Cisco 3300 Series Mobility Services Engine.

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- Q.** How do you configure elements to track on Cisco 2710 Location Appliance?
- A.** The location appliance allows for specific tracked device categories to be enabled through Location > Location Server > Administration > Polling Parameters. In order to make best use of the capacity of each location appliance, Cisco recommends that you enable only those polling categories, for example, client stations, rogues, asset tags, or statistics, in which there is genuine interest and that require simultaneous tracking/historical location.
- Q.** Can one have 2710 and MSE in the same network added to the same WCS?
- A.** Yes, the system does not prevent you from doing so. But, in order to better utilize the resources, try to distribute the MSE and location server across different Network designs, for example, Campus, Building or Floor, and WLCs.
- Q.** How many Clients and Tags can 2710 track?
- A.** 2710 can track up to 2500 devices, for example, Tags, Clients, Rogue APs and Rogue Clients.
- Q.** Is 2710 supported on 6.0 release?
- A.** 2710 is supported on 6.0 release. Please note that 2710 will not be supported beyond 6.0 release.
- Q.** Is Licensing enforced on 2710 with 6.0 release as it is enforced on MSE?
- A.** No, Licensing is not enforced on Location appliance. But certainly you need a WCS Plus license in order to track clients and Tags.
- Q.** Can one track tags and clients using 2710 with WCS base license?
- A.** One certainly needs WCS PLUS License on the WCS in order to track tags and clients. With WCS base license only one client at a time can be tracked to the nearest AP accuracy. This is on demand location that provides only the current location and does not provide historical Location information.
- Q.** Can the Rails and Regions feature be applied to both clients and tags in 2710?
- A.** Location Rails and Regions work with both 2710 and MSE. As for 2710, Rails and Regions are applied to all the devices that are tracked. But, for MSE, Rails and Regions apply to clients, not for tags, since tags are managed by AeroScout Engine. For MSE-CAS implementation, Rails and Regions do not have any impact to tags managed by AeroScout Engine.

AeroScout FAQ

- Q.** What is Interoperability with Mobile View?
- A.** AeroScout MobileView uses the Location API in order to retrieve location information from the 2710 and/or MSE. The Location API is the same between 2710 and MSE, so if you migrate from the 2710 to the MSE, you can use the MobileView application without the need to make any modifications.
- Q.** How are the Exciters configured?
- A.** AeroScout Exciter Manager Software is used to configure exciter parameters.
- Q.** Can the tag tracking s/w read maps from WCS, or must these be put in through the AeroScouts Management application?
- A.** All maps are pushed from WCS to MSE during the synchronization process and read by AeroScout System Manager from the MSE.
- Q.** Which AeroScout Chokepoint models are supported?
- A.** EX2000, EX3200, EX4000.

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- Q.** What are the recommendations to set Tags notification frame interval, and if it depends upon the Tag that is set for Mobility, Acceleration or deceleration?
- A.** Regular tag notification frame interval for a stationary tag should be set to 3 to 5 minutes. For moving tags, the frame interval should be set to 3 to 5 seconds.
- Q.** What do I use to activate Tags?
- A.** Vendor specific tag activation software is used to activate tags, for example for Aeroscout tags you have to use Aeroscout Tag Activator.
- Q.** What is Aeroscout's System Manager?
- A.** It is a Windows-based platform, which is used to push license for Tags to MSE. The latest AeroScout System Manager version 3.2 needs to be used with MSE 6.0 software code.
- Q.** What is AeroScout Analyzer?
- A.** It is a calibration tool from AeroScout in order to perform calibration for tags.
- Q.** Which Tags are CCX certified?
- A.** T2 and T3 tags from AeroScout are CCX certified. Refer to [Cisco Compatible Wi-Fi Tags](#) for more information about CCX information on tags from other vendors.

Related Information

- [Cisco 3310 Mobility Services Engine Getting Started Guide](#)
- [Cisco 3350 Mobility Services Engine Getting Started Guide](#)
- [Cisco Context-Aware Service Configuration Guide, Release 6.0](#)
- [RFID Tags, a closer look to them and their configuration](#)
- [Cisco Mobility Services Engine - Context Aware Mobility Solution Deployment Guide](#)
- [Cisco 3300 Series Mobility Services Engine Licensing and Ordering Guide](#)
- [Wi-Fi Location-Based Services 4.1 Design Guide](#)
- [Video on Location-Assisted Troubleshooting](#)
- [Video on Location-Based Security Alerts](#)
- [Video on Wi-Fi Client Tracking](#)
- [Aersocout Documentation](#)
- [Technical Support & Documentation - Cisco Systems](#)



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