



Sensor Survey for RTLS Calibration

How-To Guide

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1 Introduction

Sensory Survey is a type of Wi-Fi survey available in AD Mobile (ADM) 6.2 or later that is used to determine what the coverage area is for the Sensors that are reporting to AirDefense Services Platform (ADSP) 9.0 or later. This document will go into the more specific use of the Sensor Survey to calibrate ADSP for more accurate location tracking. By default, ADSP uses predictive Sensor coverage calculations unless it is given Sensor Survey data that has been gathered in the environment. The Sensor Survey data gives ADSP the actual coverage characteristics of the Sensors to use in location calculation.

2 ADSP & WLAN Pre-Configuration

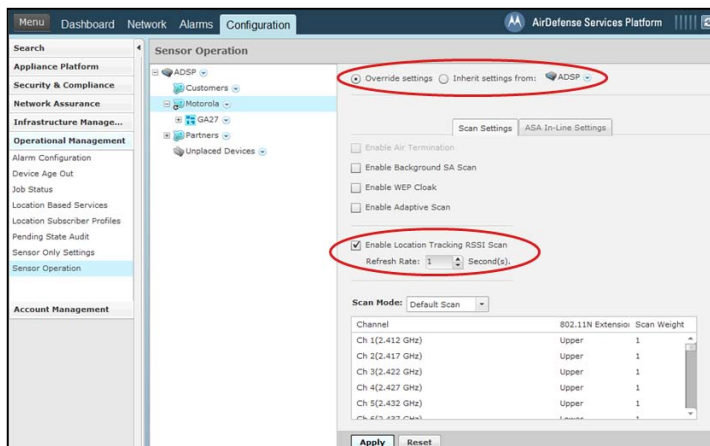
Before the Sensor Survey is started, ADSP and the WLAN infrastructure must be configured specifically for the survey. This gives a Sensor Survey a more complete picture of the Sensor coverage which in turn increases the speed of the survey.

2.1 ADSP Pre-Configuration

ADSP must be configured for the Sensor Survey, so that the survey itself can be done as quickly as possible and the optimal amount of data is gathered.

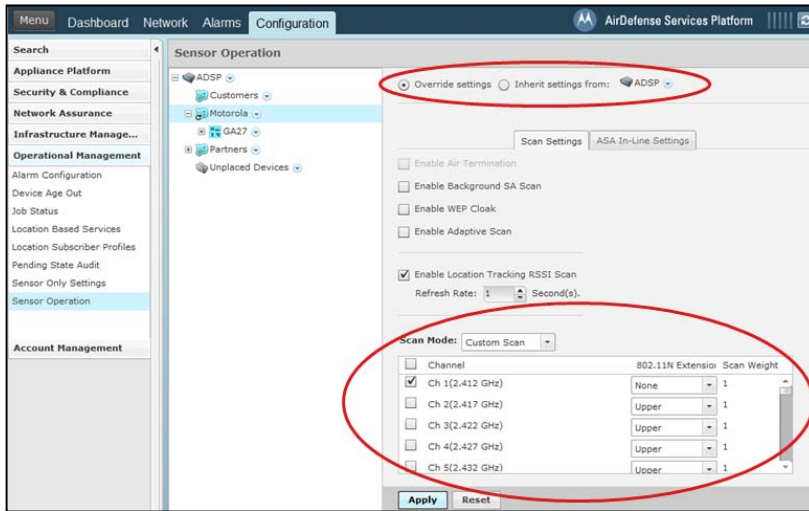
2.1.1 Sensor Operation—Location Tracking RSSI Scan

For the scope that is being surveyed, it must be verified that the Location Tracking RSSI Scan is enabled and set to 1 second. These values can be overridden from the production value at the needed scope level during the Sensor Survey.



2.1.2 Sensor Operation—Scan Mode

Also within the Sensor Operation, the Scan Mode needs to be set to **Custom** and select one 2.4GHz channel and one 5GHz channel. The settings can be overridden at the needed scope level during the Sensor Survey.



2.1.3 Sensor Licensing

It is good to verify that all Sensors being used for location tracking have Proximity and Analytics licenses applied.

2.2 WLAN Pre-Configuration

To have complete Sensor coverage data, the WLAN infrastructure must be configured specifically for the Sensor Survey. For the best results and survey speed, all APs must be set to one 5GHz channel and one 2.4GHz channel across the infrastructure. The channels selected should be the same ones selected for the Sensor **Scan Mode** in **Sensor Operation** of ADSP.

3 AD Mobile Setup

Before beginning the Sensor Survey, the survey hardware and AD Mobile must be set up. A Sensor Survey can be performed for both 2.4GHz and 5GHz bands as long as the survey laptop has two Wi-Fi adapters attached. Keep in mind, several people can perform the Sensor Survey at the same time, but they should use the same Wi-Fi adapters and use the same settings in the following steps.

3.1 Wi-Fi Adapter Setup

AD Mobile does not have complete control of the Wi-Fi adapters, so there are a few configuration changes that will need to be made through Windows settings.

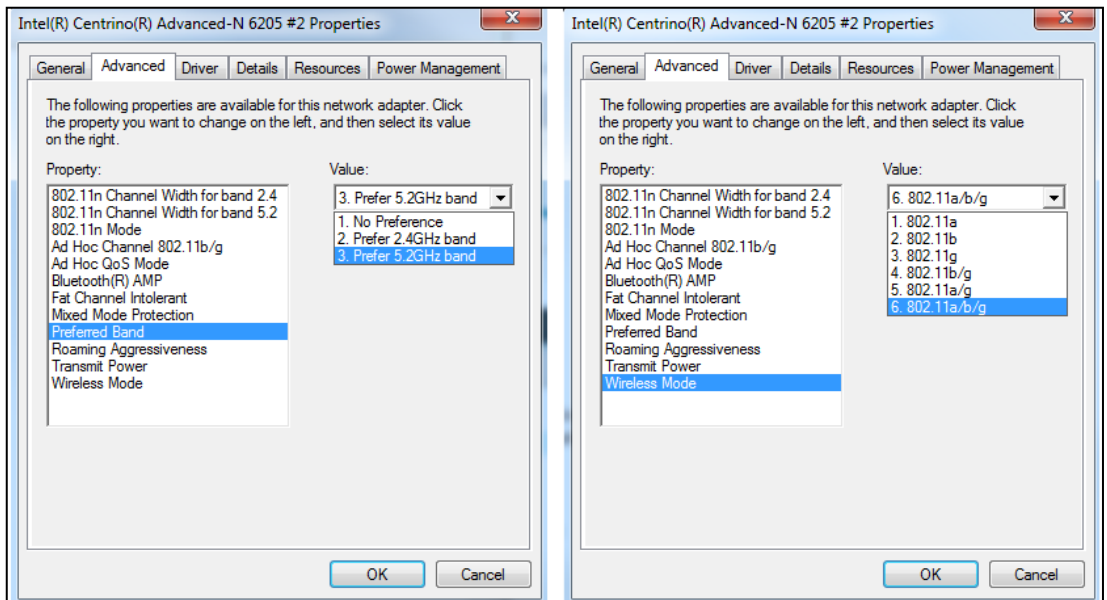
3.1.1 Lock Band

The first setting that needs to be made is locking the Wi-Fi adapter to a single band. This is required for surveying with a single adapter or dual adapters. For a survey with two adapters, you must lock one to 2.4GHz and the other to 5GHz. If you are only using one adapter, but surveying both bands, you must first lock the adapter to 2.4GHz and perform the survey. Then, lock the adapter to 5GHz and perform the survey again.

The option for locking an adapter to a single band is in the network adapter settings in Windows. You can reach these settings in all versions of Windows by going to **Device Manager** and finding your Wi-Fi adapters. Then, go to the properties window for each adapter and select the **Advanced** tab.

In this tab, there is a Property list that you should find settings similar to “Wireless Mode” or “Preferred Band”. These property values need to be set for the band you want that adapter to connect to. Some adapters will have values for both “Wireless Mode” and “Preferred Band”. Both should be set in that case.

Keep in mind that 802.11a is 5GHz and 802.11b/g is 2.4GHz. 802.11n can be both bands.

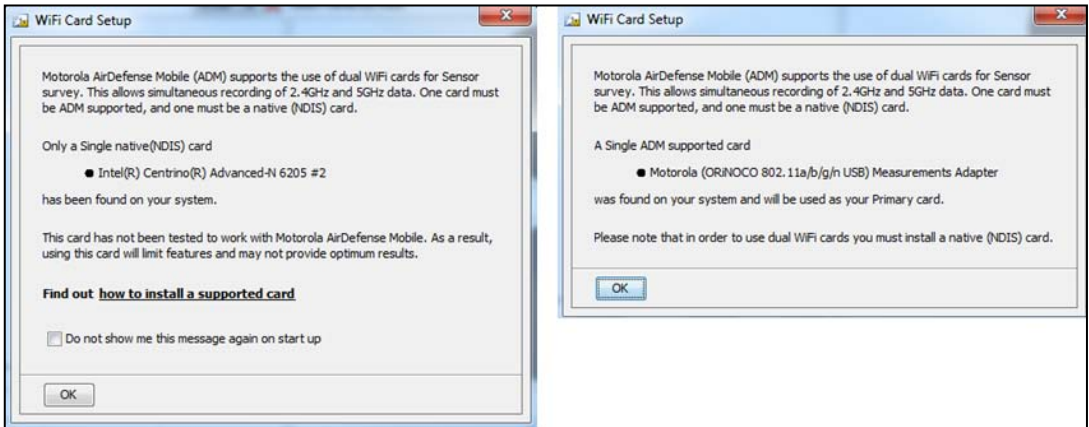


3.1.2 Setup for WLAN

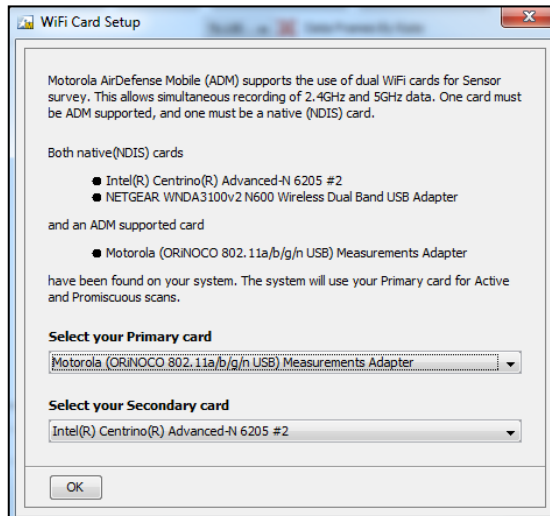
Once the adapters have been locked to the correct bands, the WLAN profiles must be set up in Windows as well. This procedure is the same as connecting Windows to any WLAN for normal use. If you have WLANs on specific bands, then your adapter will only be able to see the WLANs broadcast on the band it is set for.

3.1.3 Setup in AD Mobile

When you first start AD Mobile, it will ask you about the adapters you want to use. If you have only one Wi-Fi adapter, then you will not have a choice and will see a screen similar to one of the following.

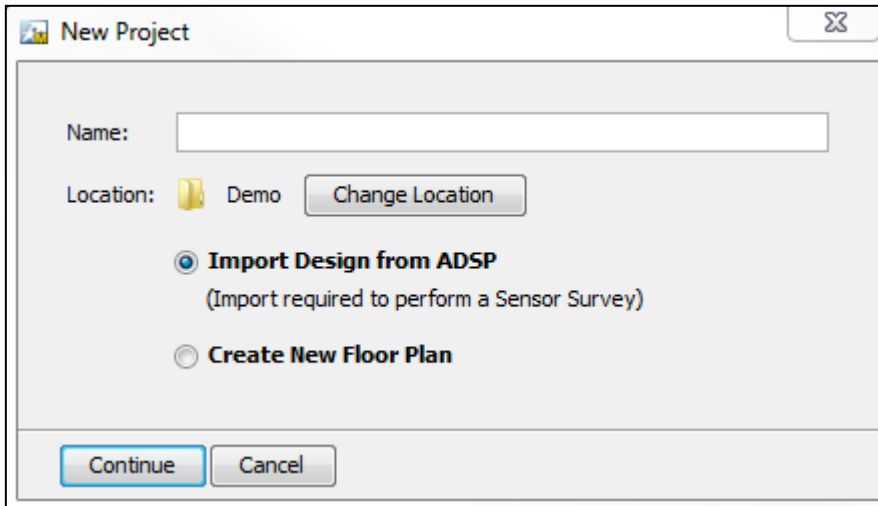


If you have multiple adapters, you will see a window with a couple of choices. You must select the two adapters that you want to use for the Sensor Survey.




3.2 Retrieve Design from ADSP

Once the adapters have been selected, you must download the design from ADSP. Go to the **Survey** tab in AD Mobile and press the **Get Started Now** button. In the new window, enter the name for the project and the location where you want to save it. Then, select the **Import Design from ADSP** option.



New Project

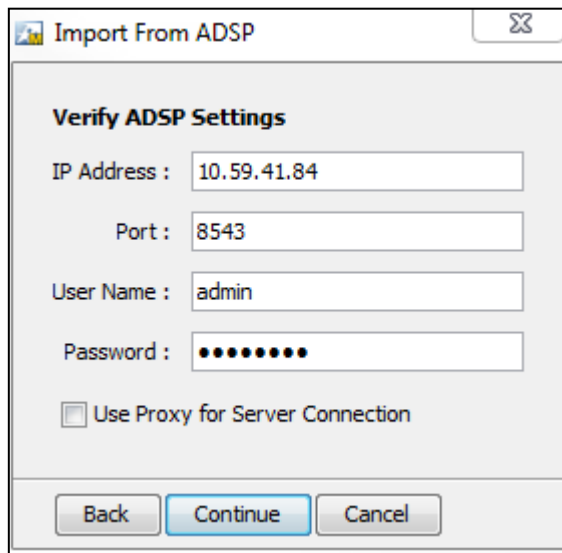
Name:

Location:  Demo

Import Design from ADSP
(Import required to perform a Sensor Survey)

Create New Floor Plan

AD Mobile will now need the connection information for ADSP. Enter or verify the IP address, port (default 8543), and username/password for an account on ADSP.



Import From ADSP

Verify ADSP Settings

IP Address :

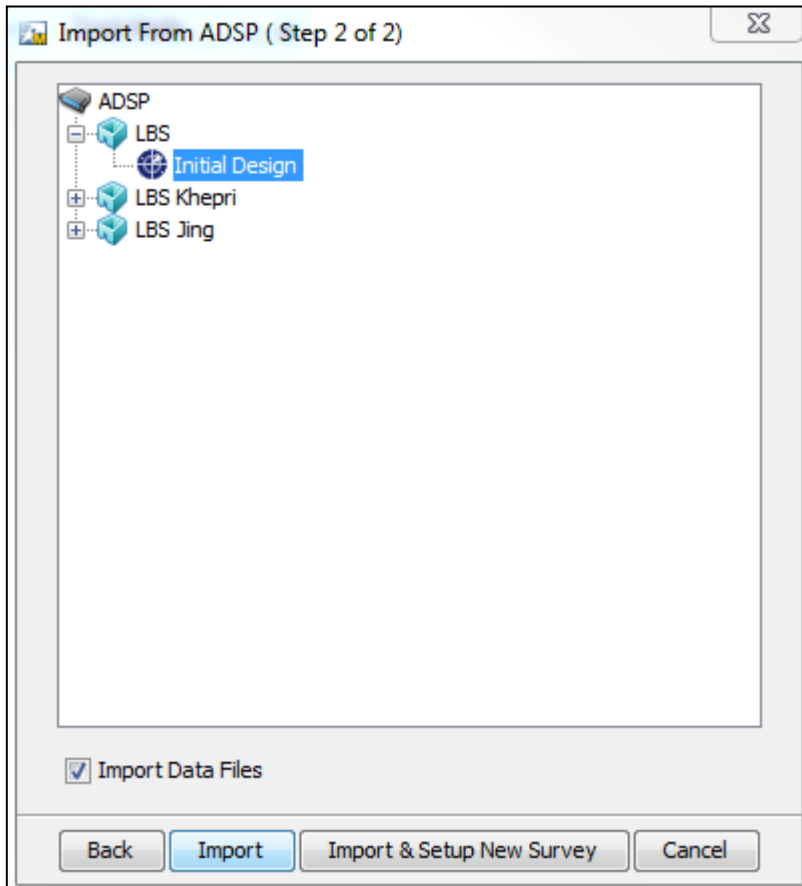
Port :

User Name :

Password :

Use Proxy for Server Connection

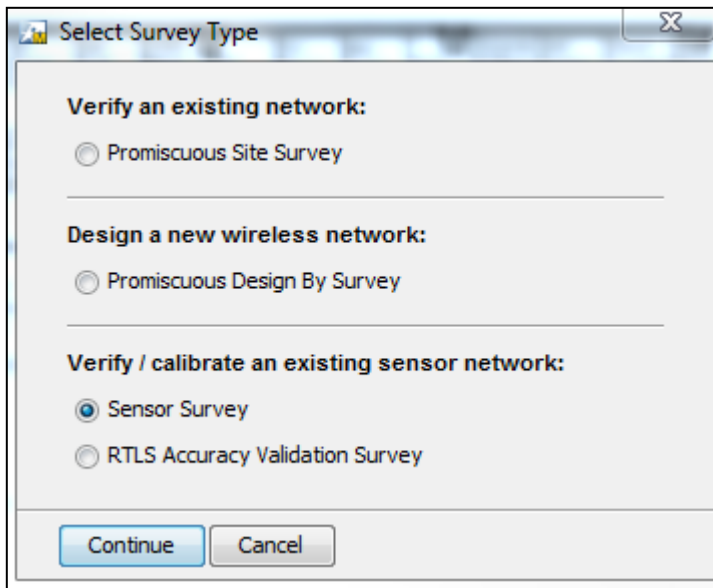
AD Mobile will now connect to ADSP and retrieve the scope tree from ADSP. Find the building design that the Sensor Survey will be performed on and select it. Then, press the **Import & Setup New Survey** button.



3.3 Sensor Survey Setup

3.3.1 Select Survey Type

After completing the previous steps AD Mobile will download the design from ADSP and then ask what survey type needs to be setup. In this case Sensor Survey will be selected.



3.3.2 Survey Sample Interval

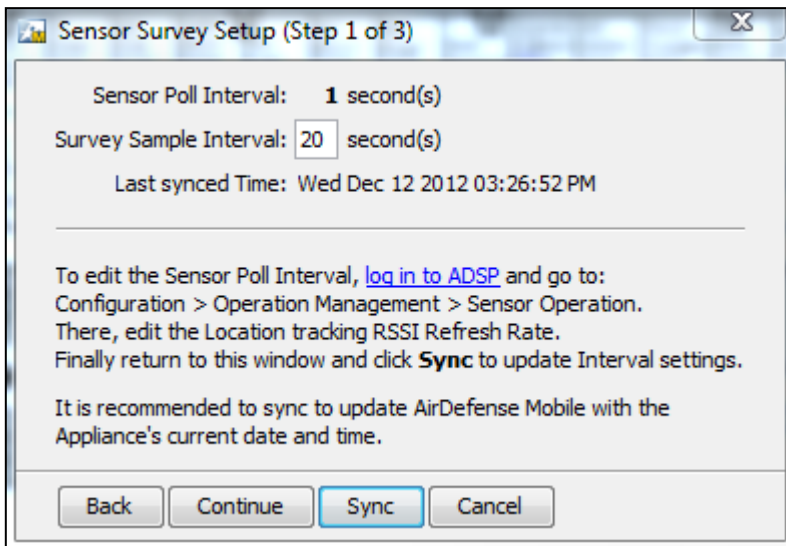
AD Mobile will now display some information.

Sensor Poll Interval—this is the value set by the Location Tracking RSSI Scan in ADSP. It should be set for 1 second for a Sensor Survey. AD Mobile will give a warning if it is set higher.

Survey Sample Interval—this is how long an individual sample should be. The default is 20 seconds. The minimum that should be used is 12 seconds. The sample interval is dependent on the Sensor Operation and model. Basically, if a Sensor radio is scanning more than one channel, then use the number of channels times 10 seconds.

If you have any single radio dedicated Sensors, then they will scan both bands and therefore be scanning two channels if the Sensor Operation Scan Mode is set for a 2.4GHz channel and a 5GHz channel. This would be a single radio AP used as a Sensors or a dual radio AP with only one radio set as a dedicated Sensor.

Last Synced Time—this is the last time AD Mobile synchronized with ADSP. If this has been over a day it would be a good idea to force synchronization.



3.3.3 Ping Settings

To generate traffic on the Wi-Fi adapters, AD Mobile will attempt to ping a device on the network. By default, it tries to pull the gateway IP from one of the Wi-Fi adapters. You will get an error if the adapter is not connected to the network or does not have a gateway address. In this case, you can enter an IP manually. In either case, if AD Mobile is not able to ping the address it will not matter because there will still be frames transmitted in the air that the Sensors will be able to hear.

4 Performing Survey

Once the project is set up, the Sensor Survey can be performed. There are several guidelines (described below) that need to be followed to make sure that a complete survey is done.

4.1 Sample Distance and Pattern

To get complete coverage, there is a maximum distance of 8 to 10 feet between each survey point. Smaller distances can be used, but are not necessary. In an open area, it is best to use a staggered pattern. In environments with lots of aisles, walk up and down each one with samples every 8 to 10 feet. If there are wider aisles, it may be beneficial to walk down one side and then back up the other.

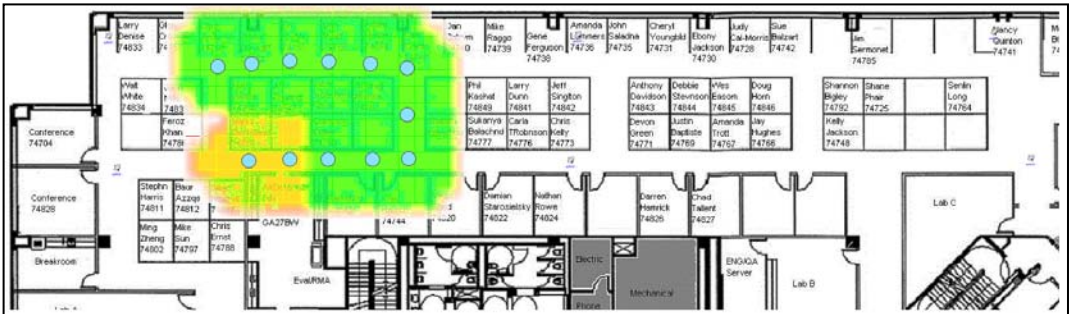
4.2 Survey Area

When planning and performing the survey, it is important to keep in mind that once ADSP has calibration data for a design, it will ignore areas that have no data. If you have a device that is physically located in an un-surveyed area, ADSP will try to find the best location within the surveyed area to place it. Basically, if you do not survey all possible areas that you want to track devices, then there will be inaccuracies.

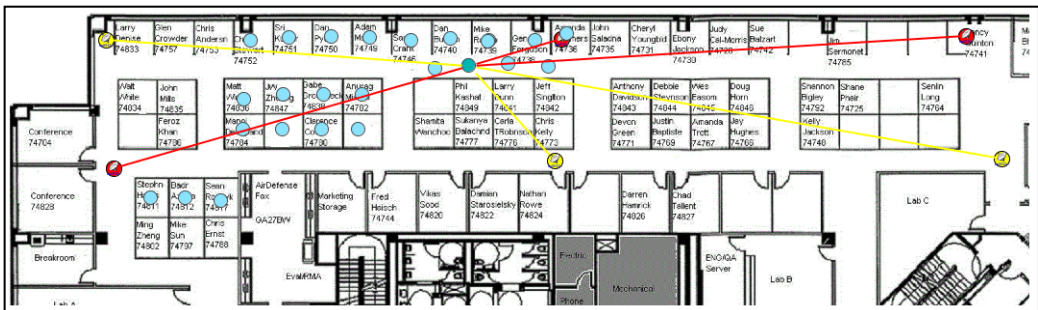
4.3 Test Samples

Before completing the entire survey, it is good practice to gather test samples throughout the survey area. A measurement run can be started by turning off visualization mode if enabled, verifying Sensor Survey is selected as the type, and pressing the play button. After gathering these, you will need to look ahead to Section 5 about fetching the RSSI data.

The first reason is to verify that you are getting data for all bands that you are surveying. This can be done with the RTLS Coverage visualization and checking both bands. If there is no data or spotty data, this could simply be an issue with the Wi-Fi adapter settings. It could also mean there is an issue with the Sensor configuration or infrastructure settings. You may need to look through the previous steps to verify settings.



The second reason is to verify that all Sensors are reporting data back to ADSP. This can be checked by using the **Client Visibility** visualization. After selecting a marker, AD Mobile will indicate what Sensor reported back for that location.



4.4 Complete Survey

Once you are certain that the settings are right and you are getting the expected data from the Sensors, then it is time to complete the survey. Continue to follow the guidelines and complete the survey. It is a good practice to stop a measurement run by pressing the **Stop** button, save the entire project, and then start a new run about every 30 markers or so.

5 RSSI Data

Once the survey is complete, AD Mobile must retrieve the RSSI data from ADSP. Without this step, the project will only have survey markers with no data and the visualizations will not work. Also, AD Mobile will not let you export Sensor Survey measurement files to ADSP that have not been synchronized with RSSI data.

5.1 Fetch RSSI Data

Fetching the RSSI data from ADSP is a fairly easy task. First, the laptop with AD Mobile must have access to ADSP. The RSSI data fetch tool is located at **File-> Fetch Sensor Survey RSSI Data**.

The tool has a list of all Sensor Survey measurement runs and their status. Blue arrows mean the data files need to be synced and green checks indicate files that have already been synced. To sync a file(s), just move it to the bottom list by adding all unsynced files or selecting the desired unsynced files individually. Once all the unsynced files have been added, press the **Sync** button and AD Mobile will connect to ADSP and pull the RSSI data down. This can take several minutes depending on the number of files and number of markers in each file. Once it is complete, just press the **Close** button.

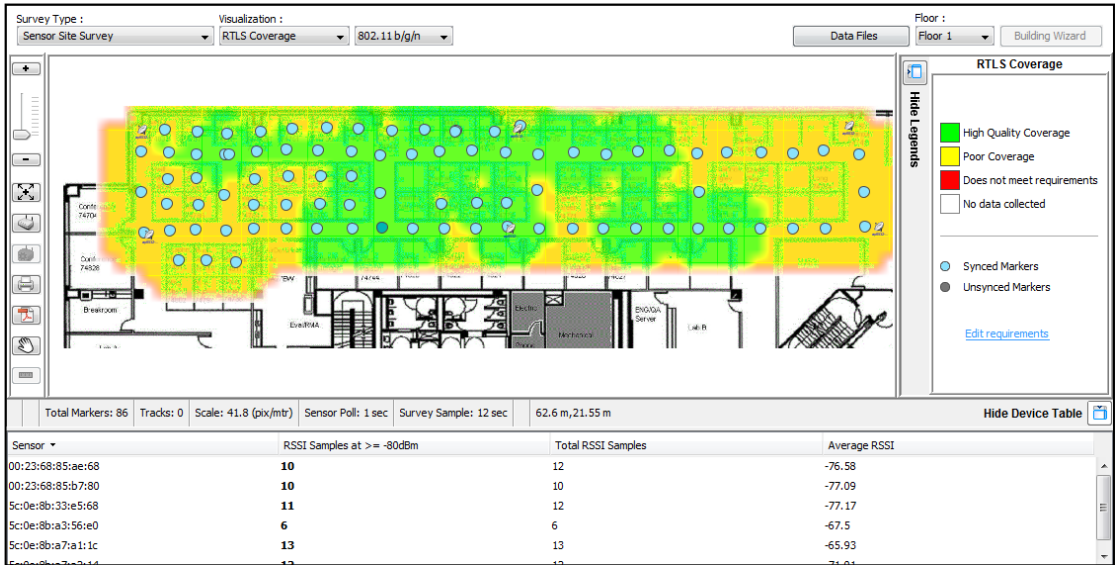
5.2 Verify Survey Coverage and Data

Once the RSSI data has been retrieved, it can now be visualized in AD Mobile. The visualizations can be used to help verify coverage and data collected.

5.2.1 RTLS Coverage

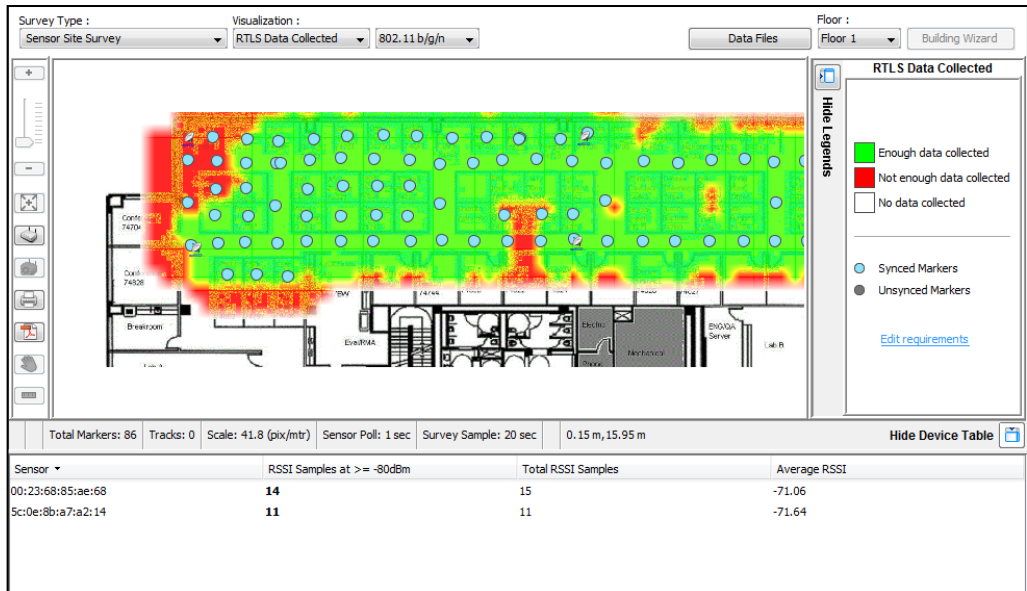
The RTLS Coverage visualization will give information on Proximity Sensor coverage based on the number of Sensors that saw the survey device at a minimum of -80dbm. The required Sensor number and RSSI level can be edited by selecting **Edit requirements** in the visualization key.

Keep in mind that the Sensor Survey was performed with all Sensors and APs on a single channel per band. In production this will most likely not be the case so the number of required Sensors should not be set less than 5, unless you select only the sensors that you know will be scanning a particular channel. This number will also depend on the overall number of Proximity Sensors in the environment.



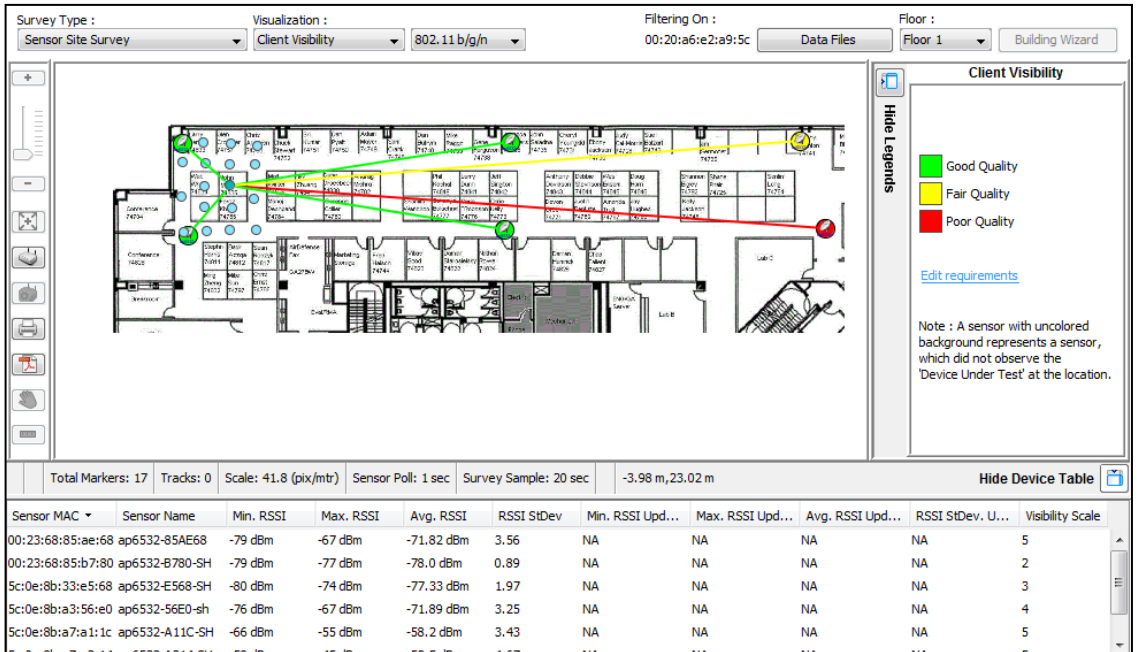
5.2.2 RTLS Data Collected

The RTLS Data Collected visualization helps determine if enough data was collected for a good calibration. If you access the requirements through the legend link “Edit requirements”, you can adjust the number of samples and the maximum RSSI value required. The samples should be between 5 to 10. Leaving the RSSI value at -80dBm should be good.



5.2.3 Client Visibility

The **Client Visibility** visualization is an easy way to determine what Sensors were able to see the survey devices at a given sample marker. After selecting a marker, a line will be drawn to each Sensor that saw the device at that point. The Sensors will be colored based on a visibility scale. **Good Quality** should be set to at least 5 or greater.



6 Export Data to ADSP

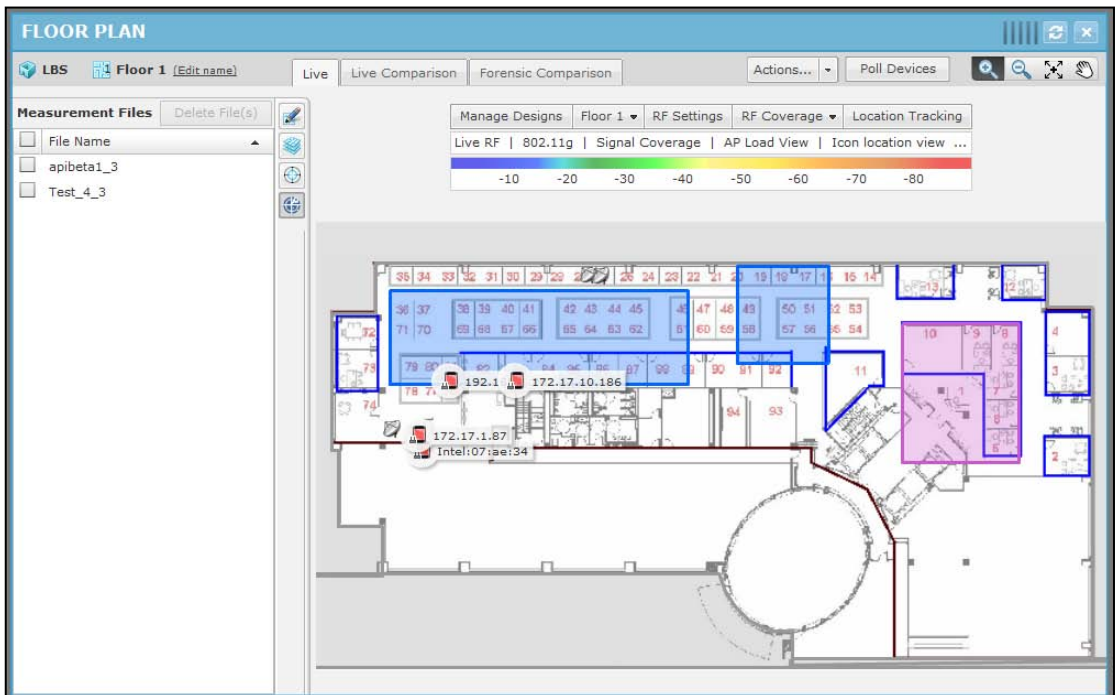
Once the Sensor Survey has been completed and the data collected is complete and satisfactory, you must export it to ADSP. Once ADSP receives the data, it will load in the calibration information to enhance its location calculations.

6.1 Export to ADSP

Exporting to ADSP is actually transferring the entire design; so an AD Mobile project that was imported from ADSP is a complete backup of the design. To begin the export, you must go to **File >Export to ADSP**. It will ask you to verify the connection settings to the ADSP appliance. It will then connect to ADSP and pull up the scope tree. Select the design you want to upload the project to and begin the export.

6.2 Verify Data File Upload

Once the export to ADSP is complete it can be verified that the measurement files were uploaded by opening the building design in Live RF on ADSP. On the left, select the **Measurement Files** tab.



7 ADSP & WLAN Post-Configuration

After the Sensor Survey is complete, ADSP and the WLAN infrastructure should be placed back into production configuration.

7.1 ADSP—Post-Configuration

The Sensor Operation must be set back to production settings. Keep in mind that for location tracking to work the Location Tracking RSSI Scan must remain enabled and set at 1 second for real-time tracking. Also, follow the design rules when configuring the Scan Mode.

7.2 WLAN—Post-Configuration

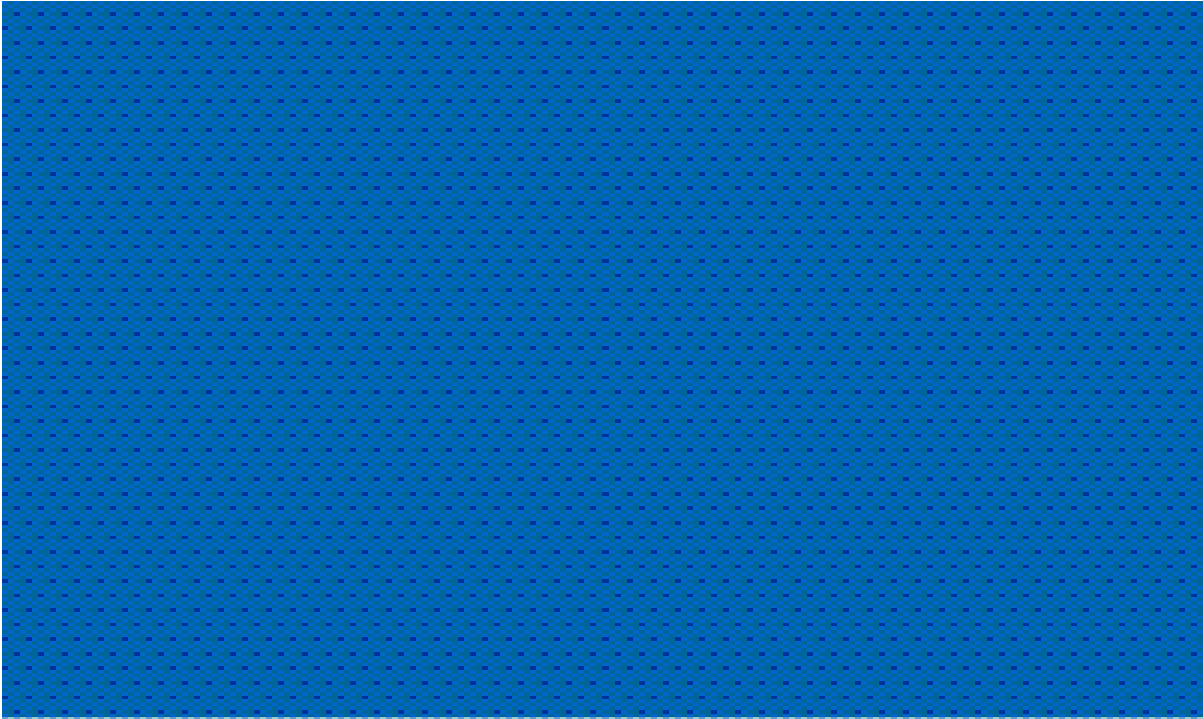
The WLAN infrastructure should now also be put back into production configuration. The location tracking design guidelines must be kept in mind when configuring and designing the WLAN infrastructure.

8 Is Re-Survey Required

A re-survey is required in a few circumstances; but, before doing a re-survey, it is recommended that a RTLS Validation survey be performed to verify accuracy. This will determine if a new Sensor Survey is required.

8.1 Re-Survey Required When

- Radio Share/Dedicated Sensors used for location tracking are moved.
- Radio Share/Dedicated Sensors used for location tracking are replaced with a different model or antenna configuration.
- Radio Share/Dedicated Sensor Wi-Fi band configuration changes from what they were set for during the original Sensor Survey.
- The environment significantly changes. New walls or large obstructions are introduced.



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