

VISUALRF USER GUIDE

OV3600, VERSION 6.2

Document Part Number: 0510594-01

Table of Contents

Overview	2
Features	2
Useful Terms	2
Basic QuickView Navigation	3
General Navigation Tips	5
Process Detailed in Document	6
Additional Sections within Document	6
1. Setup and Tuning the VisualRF Engine	7
2. Configuring QuickView Personal Preferences	11
3. Creating Campuses and Buildings	12
4. Importing a Floor Plan	14
5. Provisioning Existing Access Points onto the Floor Plan	19
6. Increasing Location Accuracy	21
7. Viewing Floor Plans and Utilizing QuickView	26
8. Pre-deployment Planning and Provisioning	31
Appendix A - VisualRF and Performance	36
Appendix B – CAD Importation	38
Appendix C – AP Deployment Planning for Location Accuracy	39
Appendix D – Batch Floor Plan Upload Wizard	40
Appendix E – MMS to OV3600 Floor Plan Conversion	43
Appendix F – Import Floor Plans from an Alcatel-Lucent WLAN Switch	45
Appendix G - VisualRF Location API	46
Appendix H - VisualRF Diagnostics	48
Basic Diagnostic Procedure	48
Understanding APIs (What VisualRF Consumes from OV3600)	48
Review Visualrf.log	51
Review Visualrf_poller.log	52
Review ssl_error.log	52
Review error.log	53
Review catalog-repository file	53
VisualRF's File Structure on the OV3600 Server	54

Overview

The VisualRF module is an add-on to the OmniVista 3600 Air Manager (OV3600) that provides a real-time picture of the actual radio environment of your wireless network.

To understand what is happening on your wireless network, you need to know where your users and devices are located – and you need to monitor the RF environment in those areas. The VisualRF module puts this information at your fingertips through integrated mapping and location data. VisualRF uses sophisticated RF fingerprinting to accurately display coverage patterns and calculate the location of every wireless device in range. Moreover, VisualRF does not require dedicated RF sensors or a costly additional location appliance – all the necessary information is gathered from your existing wireless access points and controllers.

Features

- Floor plan upload wizard enables direct importation of JPEG, GIF, PNG, and CAD files for floor plans.
- Batch upload wizard enables batch uploads of multiple CAD files with corresponding walls, and access points.
- Accurate calculation of the location of all client devices (laptops, RFID Tags, PDAs, Phones) using RF data from your existing APs and controllers. Location accuracy increases with higher density, providing more data points to triangulate the location of each device. Further improvements in accuracy can be achieved with site surveys.
- 3D navigation allows your Help Desk to view floor plans simply by clicking on the appropriate campus, building, or floor.
- Heatmaps depict the strength of RF coverage in each location
- Color-coded channel maps help you reduce interference and quickly identify or detect potential coverage holes.
- Data rate view which depicts the highest possible data rate at every location on a floor plan.
- Integrates with the OmniVista 3600 Air Manager (OV3600) for onscreen display of alerts and error conditions (i.e., an AP icon will display in red when a critical alert is active or when usage conditions exceed pre-defined thresholds)
- Location playback viewer which allows visual tracking of up to 24 hours of location history.
- Dynamically recalculates path loss and device locations based on real-time data from your wireless LAN, for increased location accuracy.
- Calibrates RF data from multiple vendors' APs (and across different product lines from the same vendor) for accurate display even in multi-vendor and multi-architecture environments.
- Google Earth integration for depiction of outdoor coverage and device location.

Useful Terms

- **VisualRF** – the service within OV3600 that calculates location, calculates path loss, and provides floor plan editing capabilities.
- **QuickView** – Flash front-end for VisualRF which displays information generated by the backend service.
- **mW** – 1/1000 of a Watt. It is a linear measurement (always positive) generally used to represent transmission.
- **dB** (Decibels) – difference/ratio between two signal levels.
- **dBm** – dB as compared to 1 mW. It is a logarithmic measurement (integer) which is typically used in place of mW to represent receive-power level. OV3600 normalizes all signals to dBm, so it easy to evaluate performance between various vendors

- **RSSI** (Received Signal Strength Indicator) - IEEE defines RSSI is a mechanism by which RF energy is to be measured by the circuitry on a wireless NIC (0-255). RSSI is not standard across vendors. Each vendor determines their own RSSI scale/values.
- **AP-to-AP Signal (Neighbor)** – Some APs/Controllers have the ability to report the signal strength of APs that they hear. OV3600 utilizes these signal strength readings to dynamically attenuate floors plans thus making client locations and heat maps more accurate.
- **Unassociated Client Information** – Some APs/Controllers have the ability to report the signal strength clients they hear, but are not associated with a radio on the AP. OV3600 utilizes these signal strength readings to more accurately place clients.
- **Client Surveys** – Client surveys are facilitated completely within VisualRF and utilize access points to understand which clients they hear and at what signal strength.
- **Rogue Surveys** – Rogue surveys are facilitated by AMC and VisualRF and utilize the client's radio to understand which access points they hear and what signal strength.

OV3600 is the only WLAN management application that understands unique RF characteristics for every enterprise WLAN manufacturer. This includes receive sensitivity at all data rates, antenna characteristics, and supported transmit power levels for every architecture and individual model. OV3600 normalizes signal metrics which might come as RSSI or SNR into dBm enabling customers to visualize and compare different vendors, models, and architectures.

Figure 1. "Sample Vendor Specific Implementation of RSSI"

		100% RSSI																	
RSSI		WLAN Vendor #1														Vendor #1			
		WLAN Vendor #2														Vendor #2			
		WLAN Vendor #2														Vendor #3			
	dBm	20	15	10	5	2	1	0	-1	-5	-10	-20	-30	-40	-50	-60	-70	-80	dBm
	mW	100	32	10	3.2	1.6	1.3	1	0.79	0.32	0.1	0.01	0.001	0.0001	0.00001	0.000001	0.0000001	0.00000001	mW
		Max														Min			
		Outdoor														Receive			

Basic QuickView Navigation

QuickView is designed to be very intuitive with easy to use pull down menus. The RF pull down menus are split into two major, display toggles and editing tools.




Display Toggles

- **Overlays** – select which overlay to view
 - Channel – provides channel interferences by color and PHY
 - Heatmap – provides the highest dBm (energy level) for all areas of a floor plan.
 - Data Rate – provides the highest for all areas of a floor plan.
 - Sensor Coverage – provides the farthest area which a sensor can hear.
- **Heatmap / Data Rate Slider** – If the Heatmap overlay toggle is selected then the heatmap RSSI ring will appear. If the Channel overlay toggle is selected then the Data Rate slider will appear.
- **Display**
 - Sensors – toggle sensors on or off. *Note: off by default on all views.*
 - Regions – toggle regions on or off. *Note: off by default on all views.*
 - Surveys – toggle surveys on or off. *Note: off by default on all views.*
 - Walls – toggle walls on or off. *Note: on by default on all views.*
 - Users – display wireless users. *Note: on by default on all views.*
 - Tags – toggle WiFi Tags on or off. *Note: off by default on all views.*
 - Labels – toggle labels on or off. *Note: off by default on all views.*
 - Rogues – toggle surveys on or off. *Note: off by default on all views.*
 - Relational Lines Sub-menu – expanded by clicking on the down arrow










- Mesh – toggles lines between Mesh portals and nodes
- Survey – toggles lines between client (x,y) to access points by client during survey window
- Rogue – toggles lines between rogue devices and the radios within access points on the floor plan which heard the rogue device
- User Neighbor – toggles lines between client and radios which hear the client not including the radio of association.
- AP Neighbors – toggles lines between access points on the floor plans which heard each other.
- Tag Neighbors – toggles lines between WiFi Tags and radios which hear the Tags. There is no radio of association.
- User Association – on by default representing line between the wireless user and AP of association.

Note: All 2.4 GHz lines are blue, 5 GHz lines are green, and both PHYs are yellow.

- **Frequency & PHY** – select the desired frequency and PHY
 - 2.4 GHZ (lines are always blue)
 - 11b
 - 11g
 - 11ng
 - 5 GHz (lines are always green)
 - 11a
 - 11na
- **Options** – various buttons
 - Refresh
 - Detailed help file
 - Preferences
 - General: Auto-Refresh, Show grid lines and size
 - APs: Triggers and AP icon size
 - Users: Triggers and User icon size
 - Overlay Style: Grid or Vector

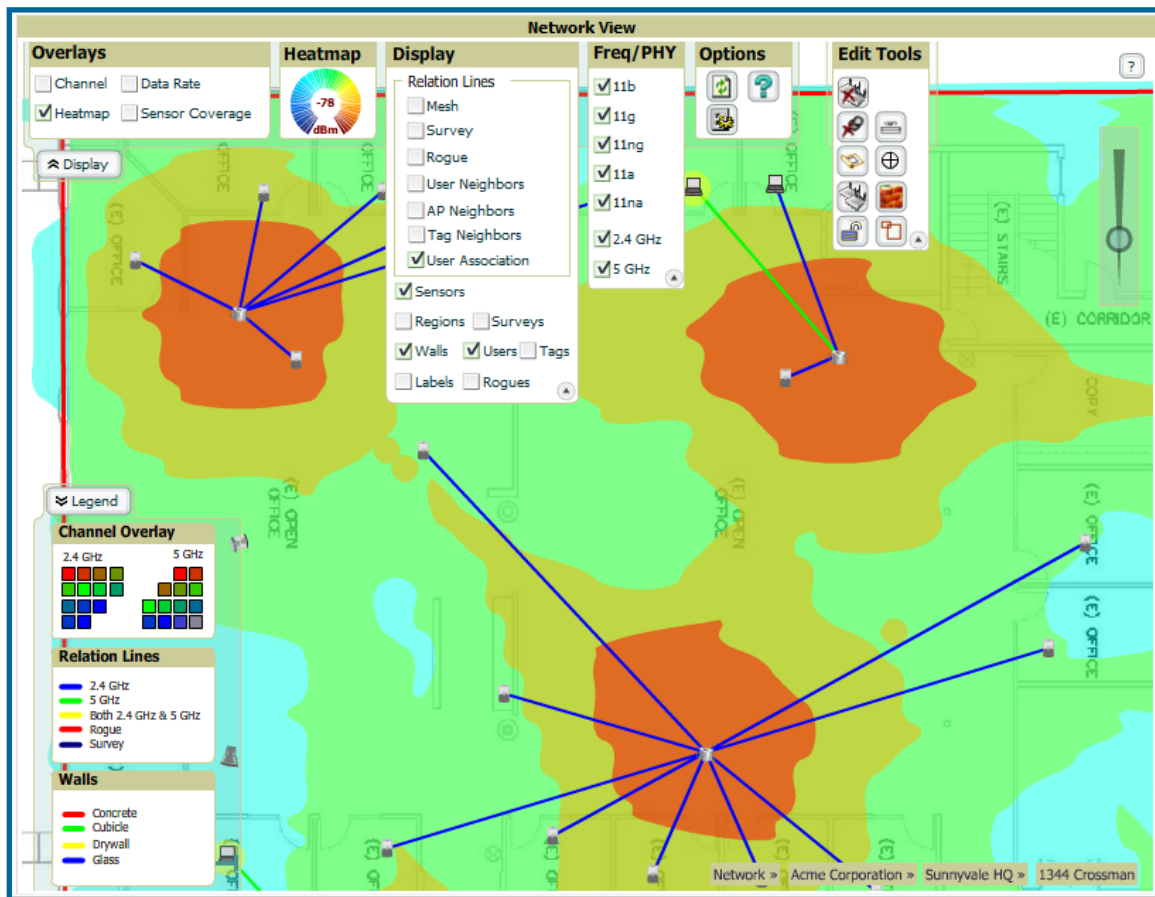
Icons	Description
Refresh 	Refresh the floor plan to see changes
Preferences 	Configure personal viewing preferences
Help 	Launch help window

Edit Tools

Icons	Description
Add Regions 	Add regions onto a floor plan
Add Walls 	Add walls onto a floor plan
Delete APs 	Delete all access points on a floor plan
Delete Survey 	Delete all surveys (rogue and client) on floor plan
Edit Lock 	Edit floor plans by locking of a floor plan by locking it
Resize Floor 	Change the size of the floor plan
Provision APs 	Provision new APs onto a floor plan
Provisoin APs 	Manually provision (drop & drag) APs onto a floor plan
Auto Provision 	Automatically provision APs onto a floor plan

Additionally there are a couple of other controls within QuickView. In the bottom left corner of the window is the Legend pushup. In the top right corner is the zoom control. You can also zoom by using your mouse wheel as well or the ‘+ and –’ keys. In the bottom right corner are breadcrumbs related to network, campus, and building.

Figure 2. “Basic Navigation”



General Navigation Tips

- **Right Click** – right clicking on an object will display monitoring statistics about that object
- **Left Click** – left clicking on an object will allow you to edit that object
- **Left Click Hold** – enables panning on the floor plan or background image
- **CTRL+ALT+Shift+X+M+L** – displays XML behind Flash output
- **Roll Mouse Wheel** – zooms in or out of a floor plan or campus, building view

Process Detailed in Document

1. **Setup and Tuning the VisualRF Service** – enabling the service and ensure the proper performance characteristics
2. **Configure QuickView Personal Preferences** – configure RF toggles
3. **Creating Campuses and Buildings** – each floor must be associated with a building and campus
4. **Importing a Floor Plan** – the Floor Plan Importation Wizard walks through several steps
 - Background image importation
 - Image cropping
 - Image sizing
 - Assign image properties: floor number, name, number of grid cell size, and other floor plan information

Note: support for all versions of CAD (dwg and dwf) files versions 1999 – 2007.
5. **Provisioning Existing Access Points onto Floor Plan** – drag and drop
6. **Increasing Accuracy**
 - Drawing Walls – only need to incorporate exterior walls, because VisualRF will automatically calculate interior Path Loss.
 - Client Training for Stationary Devices – used for desktop or other stationary wireless devices
 - Remote Client Surveys – the ability to remotely survey the RF environment via any wireless client connected to the network. Provides additional RF inputs for low-coverage areas.
 - Fine Tuning Location Service – grid cell size and deviation variation
 - Ensure RF Data Frequency – configuring OV3600 and the infrastructure to provide timely RF statistics
 - AP placement for capacity versus location accuracy
7. **Viewing Floor Plans and Utilizing QuickView**
 - Client View
 - AP View
 - Floor Plan View
 - Network → Campus → Build View
8. **Pre-deployment Provisioning and Planning**
 - Manually provision access points onto floor plan
 - Automatically provision access points onto floor plan
 - Replicate floor plan vertically
 - Print BOM report
 - Export campus
 - Import exported campus
 - Match access points

Additional Sections within Document

Appendix A – VisualRF and Performance

Appendix B – CAD Importation

Appendix C – AP Deployment Planning for Location Accuracy

Appendix D – Batch Floor Plan Upload Wizard

Appendix E – Importing Floor Plans from Alcatel-Lucent's MMS Server

Appendix F – Importing Floor Plans from Alcatel-Lucent WLAN Switch (AOS-W)

Appendix F – VisualRF Location API

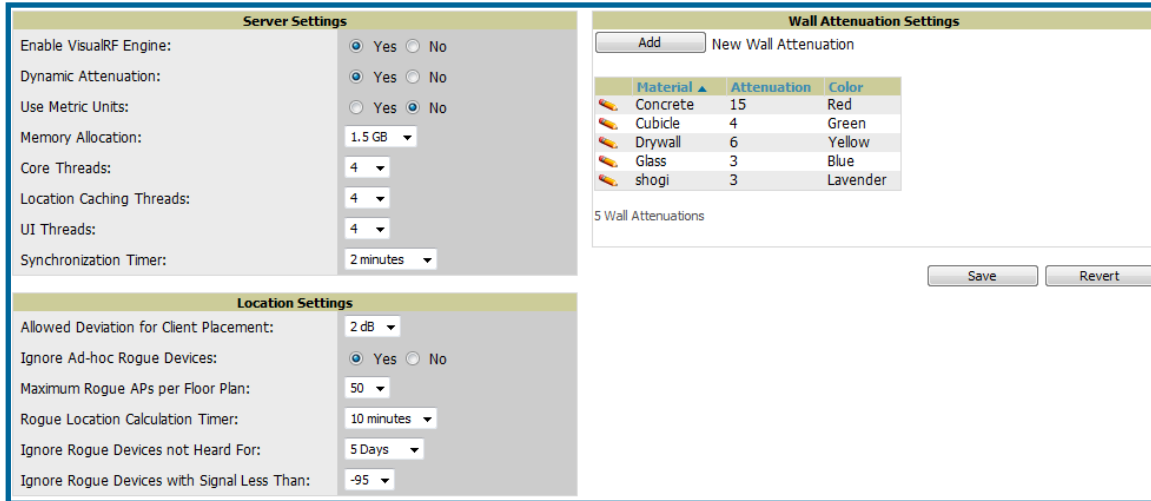
Appendix G – VisualRF Diagnostics

1. Setup and Tuning the VisualRF Engine

The **VisualRF→Setup** page configures advanced setting for the VisualRF service. Please reconfigure these settings very carefully, because these settings can impact your server's performance as well as your location accuracy.

Note: Clicking on the 'save' button will cause the VisualRF service to restart disrupting or delaying the usability for up to 5 minutes.

Figure 3. "VisualRF Setup Page"



The screenshot shows the VisualRF Setup Page with three main sections:

- Server Settings:**
 - Enable VisualRF Engine: Yes No
 - Dynamic Attenuation: Yes No
 - Use Metric Units: Yes No
 - Memory Allocation: 1.5 GB
 - Core Threads: 4
 - Location Caching Threads: 4
 - UI Threads: 4
 - Synchronization Timer: 2 minutes
- Location Settings:**
 - Allowed Deviation for Client Placement: 2 dB
 - Ignore Ad-hoc Rogue Devices: Yes No
 - Maximum Rogue APs per Floor Plan: 50
 - Rogue Location Calculation Timer: 10 minutes
 - Ignore Rogue Devices not Heard For: 5 Days
 - Ignore Rogue Devices with Signal Less Than: -95
- Wall Attenuation Settings:**
 - Buttons: Add, New Wall Attenuation
 - Table:

Material	Attenuation	Color
Concrete	15	Red
Cubicle	4	Green
Drywall	6	Yellow
Glass	3	Blue
shogi	3	Lavender
 - 5 Wall Attenuations
 - Buttons: Save, Revert

To enable the VisualRF service and tune memory and performance navigate to the Server Setting area on this page.

Setting	Default	Description
<i>VisualRF Engine</i>	Disabled	Enables or disables the VisualRF engine. This setting must be enabled to use VisualRF. If you do not have a license for the VisualRF service, this page will not appear.
<i>Dynamic Attenuation</i>	Enabled	Dynamic attenuation will incorporate AP to AP readings as well as site survey information and dynamically recalculate the path loss of each radio to every grid cell on the floor plan, increasing coverage and location accuracy.
<i>Use Metric Units</i>	No	This setting instructs the VisualRF engine to display all units of measurements in Metric.

Setting	Default	Description
Memory Allocation	512 MB	This is the amount of memory dedicate to the VisualRF service. It is not dynamically allocated and all the memory is consumed upon starting the service. Be sure to check the memory and swap utilization in the Systems → Performance page. <ul style="list-style-type: none"> • 25 floors or less 512 MB • 25 to 75 floors 1 GB • More than 75 floors 1.5 GB <p><i>Note: If you see “Out of Memory” errors in the SSL error log on the System → Status page you should increase memory allocation.</i></p>
Core Threads	1 times number of cores	Number of threads that calculate path loss for each floor. These threads also regenerate a floor’s RF properties when new APs, walls, or regions are added to a floor plan. <p><i>Note: To validate that these allocated threads are sufficient check that each floor’s calculation time on the VisualRF → Floors page is less than the client location timer setting on this page.</i></p>
Location Caching Threads	1 times number of cores	Number of threads that calculate the location of all clients associated with access points on this floor plan. <p><i>Note: To validate that these allocated threads are sufficient check that each floor’s calculation time on the VisualRF → Floors page is less than the client location timer setting on this page.</i></p>
UI Threads	1 times number of cores	Number of threads that service users accessing QuickView as well as OV3600 to VisualRF communication. <p><i>Note: If users experience timeout errors while using QuickView then allocate additional UI Threads.</i></p>
Synchronization Timer	5 minutes	This timer indicates how often VisualRF will synchronize state with OV3600.

To tune location accuracy, navigate to the Location Setting area on this page.

Setting	Default	Description
Allowed Deviation for Client Placement	2 dB	When VisualRF locates a client or rogue it utilizes signal metrics from all the APs that hear the client or rogue device. VisualRF builds a fingerprint location for all clients with similar transmit-power capability. All subsequent clients that fall within the deviation will be placed on the same location fingerprint or x, y coordinates. <p><i>Example: AP1 hears client1 at -72 and AP2 hears client 1 at -64. VisualRF calculates the client’s location to be at coordinates 100, 200. Client2 is heard by AP1 at -71 and AP2 at -65. VisualRF will use the average of the difference in signals (AP1 -72 and -71) to see if the client matches a pre-calculated location fingerprint. $1 + 1 \text{ (differences in signals)} / 2 \text{ (\# of APs)} = 1$ which falls within the deviation of 2, hence the client would be located at 100,200.</i></p>
Ignore Ad-hoc Rogue APs	Yes	This setting determines if ad-hoc rogue devices are displayed within VisualRF.

Setting	Default	Description
Maximum Rogue APs per Floor	30	<p>Sets the maximum number of rogues OV3600 will place on a Floor. No rogues will display on a floor if the floor contains more than the number specified in the drop-down menu.</p> <p>Use this filter in combination with the “Not heard for” and “Signal” filters to intelligently control the number of rogue devices displayed per floor.</p> <p><i>Note: Increasing this value could increase the load on the server and the clutter on the screen.</i></p>

Setting	Default	Description
Rogue Location Timer	30 minutes	<p>This timer indicates how often VisualRF will calculate rogue device location for every floor. Each floor has a unique timer to ensure your server performs consistently. A lower timer will ensure more accurate and timely rogue locations, but will also increase the load on your server.</p> <p><i>Note: Rogue locations do not generally require the same frequency calculation as client devices.</i></p>
Ignore Devices not heard for	1 week	<p>This is filter will ensure VisualRF only displays rogue devices that were heard recently.</p> <p>Use this filter in combination with the “Maximum Rogue APs per Floor” and “Signal” filters to intelligently control the number of rogue devices displayed per floor.</p>
Ignore Devices With Signals Less Than	- 85	<p>This is filter will ensure VisualRF only displays Rogue devices that have a strong signal or are closest to your access points.</p> <p>Use this filter in combination with the “Maximum Rogue APs per Floor” and “Not heard for” filters to intelligently control the number of rogue devices displayed per floor.</p>

To tune the wall settings within the VisualRF UI navigate to the Wall Attenuation Settings section.

Setting	Default	Description
Glass Attenuation (dB)	2	<p>Specifies the attenuation for any glass walls that are drawn in VisualRF.</p> <p><i>Note: All of these values are global variables that can't be overridden for individual floor plans. These values are utilized by the VisualRF service to calculate path loss and client locations. Walls within VisualRF are interpreted as pure dB loss without adjusting for wall thickness.</i></p>
Cubicle Attenuation (dB)	4	<p>Specifies the attenuation for any cubicle walls that are drawn in VisualRF.</p>
Drywall Attenuation (dB)	6	<p>Specifies the attenuation for any drywall walls that are drawn in VisualRF.</p>
Concrete Attenuation (dB)	15	<p>Specifies the attenuation for any concrete walls that are drawn in VisualRF.</p>

When tuning the VisualRF server be sure to utilize the default settings as recommend above. If you do change any of these setting above, change one at a time and see how the system performs. Each time you restart the VisualRF service it will take at least 30 minutes to return to normal processing.

If you use ‘top’ command to check on VisualRF resource utilization ensure you use the ‘1’ and ‘H’ flags to show cores and threads. Remember ‘top’ also takes 1-2 minutes to normalize and provide accurate data.

It is very normal for VisualRF to consume 20% of each core with a combination of threads. It will utilize excess CPU cycles on all cores when required.

Figure 4. “Example top Output”

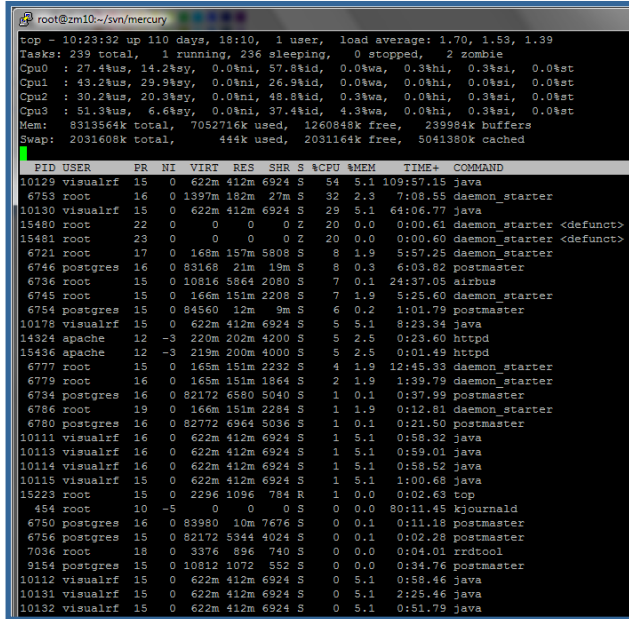


Figure 5. “Example Threading”

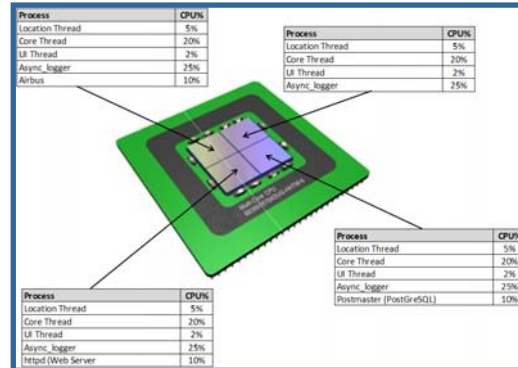
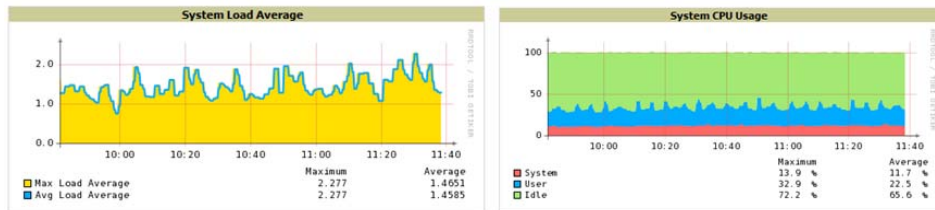


Figure 6. System Performance Graphs

System Information

CPU
Intel(R) Xeon(R) CPU E5310 @ 1.60GHz 4 Cores 4096 KB cache (1595.988 MHz actual)

Memory
Installed Physical RAM: 7.93 GB
Configured Swap Space: 1.94 GB



On the **System → Performance** page you can quickly determine if the system is overloaded. The system load should not average more than the number of cores. In this case the server is averaging a little less than two. With four cores, the server is averaging less than half capacity. The CPU usage graph indicates that system is 30%-40% loaded.

2. Configuring QuickView Personal Preferences

To configure your personal preference click on the Display pull down and click on the preferences icon.

- **General** – select from preferences pull down
 - Enable auto-Refresh toggle
 - Refresh Interval in minutes
 - Show Grid Lines toggle
 - Grid Lines width (in feet) slider
 - Show Scale
 - Overlay Style
 - Grid – based on grid size
 - Vector – smoothed

- **APs** – select from preferences pull down
 - BW – select the kbps threshold for normal (green), high (yellow), and excessive (red)
 - # of Users – select the number of users threshold for normal (green), high (yellow), and excessive (red)
 - % of Uptime for the last 24 hours for normal (green) and excessive (red)
 - Error Toggle – display red or green depending on the status of the radios within the AP.
 - Status Toggle – display red or green in relation to up/down status of AP.
 - Icon Size – select the size of the AP icon display on the floor plan.

- **Users** – select from preferences pull down
 - BW – select the kbps threshold for normal (green), high (yellow), and excessive (red)
 - Signal Strength – select the dBm client threshold for excellent (green), average (yellow), and poor (red).
 - Icon Size – select the size of the client device icon display on the floor plan.

- **Navigation** – select from preferences pull down (campus and buildings)
 - % of APs Up for the last 24 hours for normal (green) and excessive (red)
 - Icon Size for campus, building and floors

Figure 7. “Personal Preferences”



Note: These preferences are stored in a Flash Shared Object analogous to a cookie and will be remember on subsequent sessions.

3. Creating Campuses and Buildings

Floors are associated with a building and buildings are associated with a campus. In order to create a new floor, you must first create a campus and building.

3.1 Create campus

- Navigate to VisualRF → Floor Plans page
- Right Click on the background
- Select New Campus option
- When the Create New Campus window appears enter the following Campus information:
 - Campus name
 - User Transmit Power – used in auto placement of access points onto floors within this campus
 - Enter Desired Data Rate – used in auto placement of access points onto floors within this campus

Note: Buildings and floors inherit transmit power and data rate from campus.

- Click on the “OK” button to save. You will see a new Campus icon appear on the campus canvas.

Note: OV3600 ships with a default campus and building.

- Add appropriate network geographical background or upload a personalized image by right-clicking on the background.
 - Set Map – allows you to browse with Alcatel-Lucent included maps.
 - Custom – launches the image upload wizard documented below in the Importing Floor Plans section.
- Drag the Campus icon to the appropriate location on the map background.

Note: QuickView automatically saves background map images, campus locations, building locations, and building types.

3.2 Create building

- Click on the newly created Campus icon from the previous You will drill into to a blank canvas without a background.
- Right click on the background and select New Building
- When the New Building window appears, enter the following information:
 - Building name
 - Select Campus from pull down
 - Enter Longitude and Latitude
 - Distance between floors
 - Attenuation between floors

Figure 8. “New Campus input”

Figure 9. “New Campus on map”

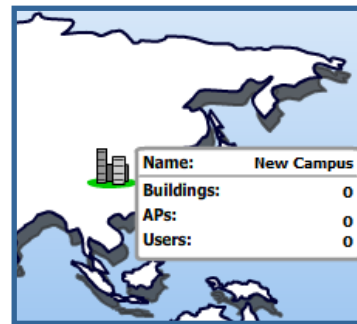


Figure 10. “Select Background”

Figure 11. “New Building input”

step.

- User (client device) transmit power
- Desired data rate
- Address (optional)

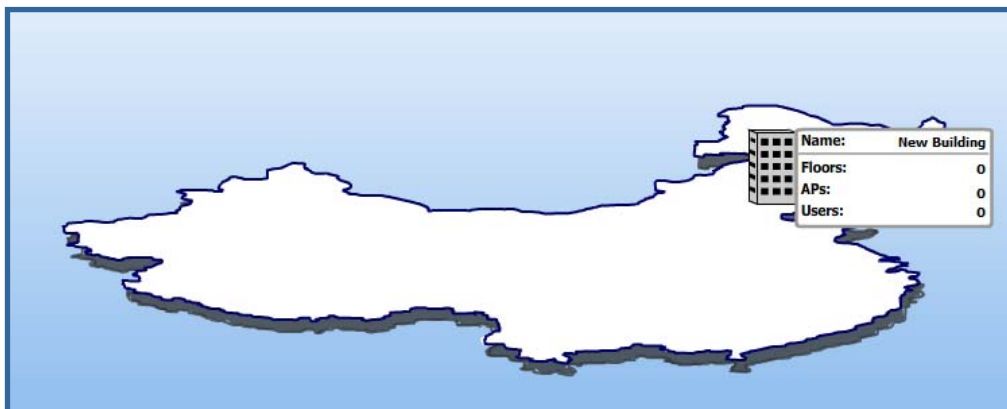
Field	Description
<i>Building</i>	Name of the building; located on an existing campus.
<i>Campus</i>	Pull down of all campuses configured on your OV3600.
<i>Longitude & Latitude</i>	These fields are used to represent a building on Google Earth.
<i>Distance between Floors</i>	The normal distance between floors in the building. This value can be overridden as each floor is created, but this will be the default value for every new floor added to the system. This information is used to calculate path loss between floors and vertically locating client and rogue devices.
<i>Attenuation between Floors</i>	Enter the attenuation loss in decibels between floors. This value can be overridden as each floor is created, but this will be the default value for every new floor added to the system. This information is used to calculate path loss between floors and vertically locate client and rogue devices
<i>User Transmit Power</i>	This value is used when auto-provisioning access points onto a floor plan.
<i>Desired Data Rate</i>	Data rate will determine the new access points when auto-provisioning Greenfield deployment
<i>Address</i>	Building or Campus address.

• Right click on the “OK”

button to save. You will see a new Building icon appear in the middle of the canvas.

- Drag the Building icon to the appropriate location on the map background.
Note: QuickView automatically saves background map images, campus locations, building locations, and building types.
- Add appropriate geographical background or upload a personalized image by right-clicking on the background.
 - Set Map – allows you to browser with Alcatel-Lucent included maps.
 - Custom – launches the image upload wizard documented below in the Importing Floor Plans section.

Figure 12. “New Building on map”



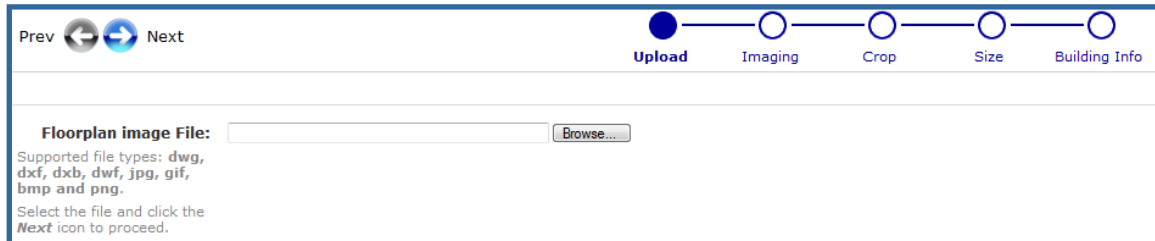
- Click on the newly created Building icon from the previous step. You will be redirected to a blank canvas without a background. You are now ready for Step #4.

4. Importing a Floor Plan

Step 4.1 – Import Floor Plan background image file.

- Right click on the background image and select New Floorplan option.

Figure 13. “Step 1 of the Floor Plan creation wizard”

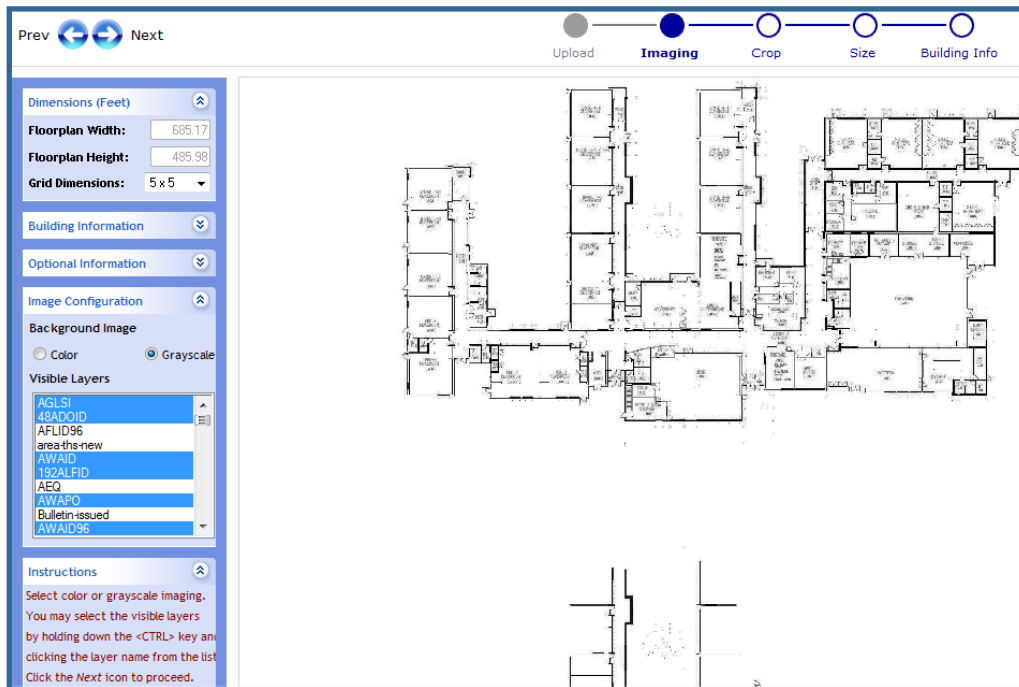


- Browse your local file system by clicking on the “Browse” button to locate a floor plan image file
- Click on the “Next” arrow to proceed to Step 2

Note: you will see the following status message “Please wait while file is uploaded...”

Step 4.2 – Image manipulation.

Figure 14. “Step 2 of the Floor Plan creation wizard”



- Select “Grayscale” to remove colors embedded in the CAD file.

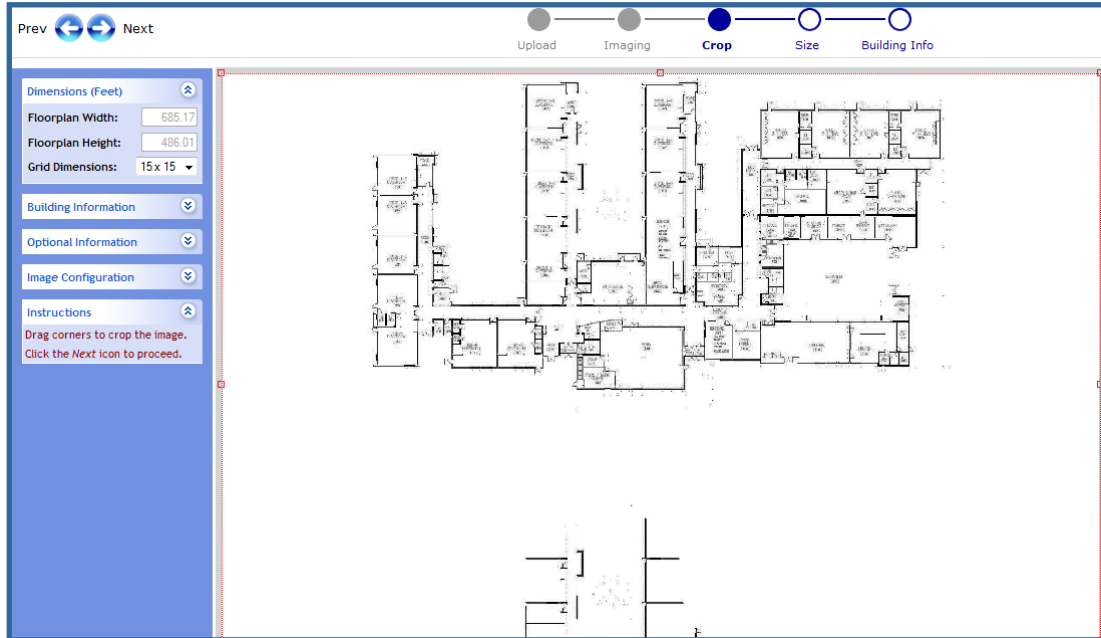
Note: It is recommended to user “Grayscale”, because the floor plan background colors will conflict with coloring used by QuickView.

- Select or deselect visible layers by holding <CTRL> key and left clicking. After changing visible layers, click on the “Next” arrow to see the results.

Note: Within this step the “Next” arrow will not proceed to the next crop phase until you have finished manipulating layers.

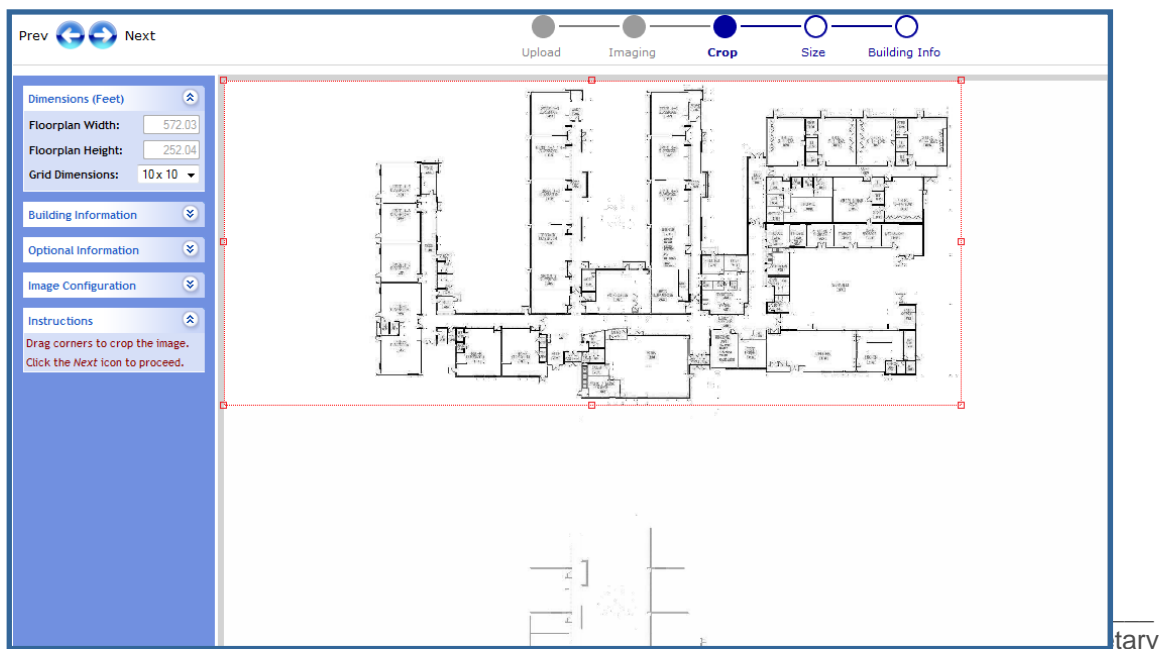
Step 4.3 – Crop Floor Plan background image.

Figure 15. “Step 3 of the Floor Plan creation wizard”



- Grab one of the cropping handles and size accordingly to remove extra white space.

Figure 16. “Cropping within the Floor Plan creation wizard”



Note: The Floor Plan Height changed after the cropping

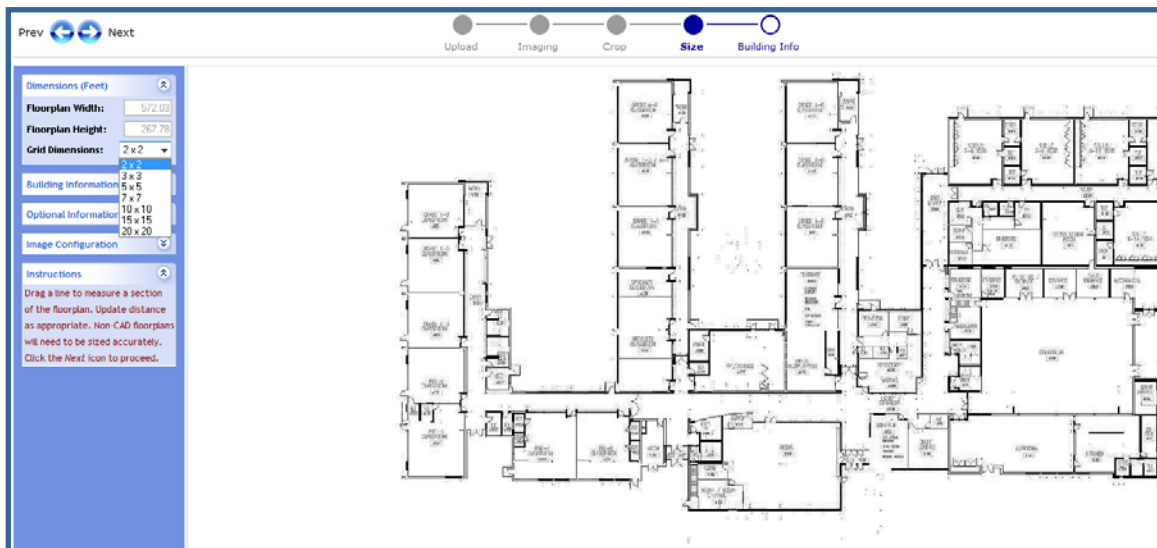
Setting	Default	Description
Grid Dimensions	Dynamic	<p>The VisualRF service dissects each floor plan into a grid consisting of cells specified in this setting. The Core Thread service calculates the path loss for every radio to every cell on the floor plan.</p> <p>By default the importation wizard allocates 2,500 grid cells to each site based on dimensions. If you have a site that is 250 ft. by 100 ft, the Floor Plan importation wizard would calculate the grid cell size at 10 feet. $250 \text{ ft.} \times 100 \text{ ft.} = 25,000 \text{ ft.}$ $25,000 \text{ ft.} / 2,500 \text{ ft.} = 10 \text{ ft.}$</p> <p><i>Note: Decreasing the grid cell size will increase accuracy, but it also increase CPU consumption by the floor caching threads and the location caching threads. Check the System → Performance page to ensure your server is functioning properly when you make a change to this setting.</i></p>

Items to note:

- If this is a CAD file, then the Floor Plan creation wizard will automatically inherit height and width from the drawing.
- If this is a non-CAD file, then the height and width will be zero.
- CAD files are converted to a JPG with a resolution of 4096 horizontal pixels at 100% quality prior to cropping. If you crop, then you will lose clarity.
- CAD files may not exceed 10 MB.
- Metric CAD files are supported.
- Importing GIF files for floor plans will result in blank QuickView thumbnails.
- Click on “Next” arrow to proceed to Step 4 (Size).

Step 4.4 – Size a Floor Plan background image.

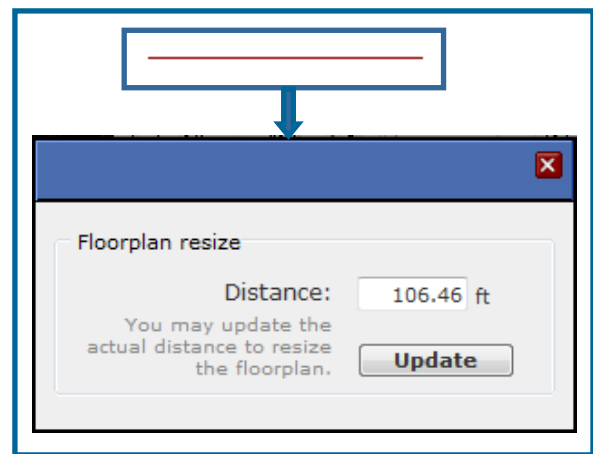
Figure 17. “Step 4 of Floor Plan importation wizard”



Note: You should not have to resize a CAD drawing unless you see nonsensical dimensions.

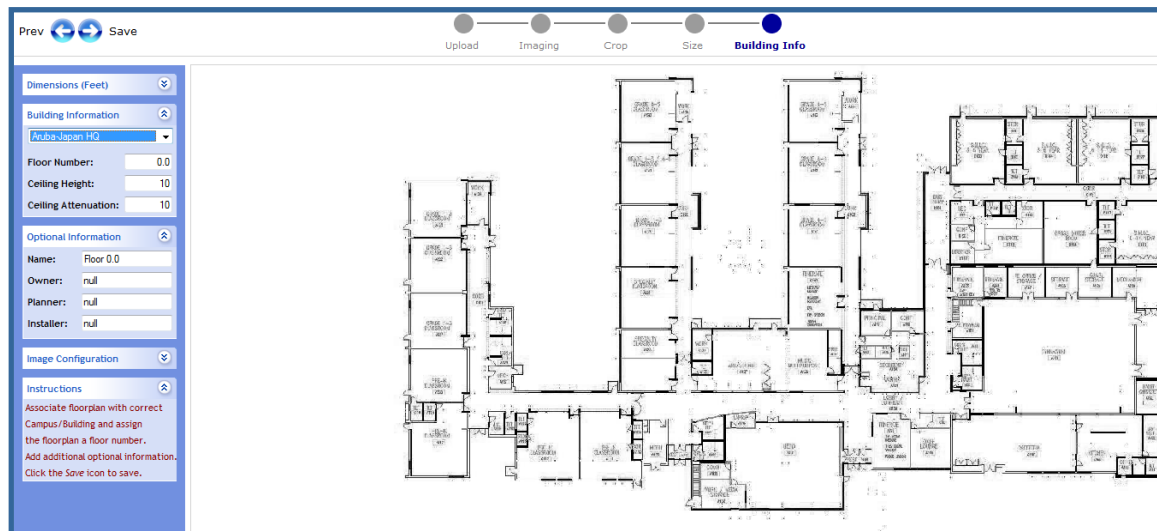
- Your mouse pointer should be a cross-hair symbol indicating that you are ready to size.
- Locate two points within the floor plan that you know the distance. Most door-jams (door openings) are 3 feet.
- Left click and hold to establish the first point and drag your mouse to the second point and release.
- A distance dialogue box will appear. Input the proper length in feet. If this line represented a door-jam then you enter 3 feet.
- Click on the "Update" button.
- Click on "Next" arrow to proceed to Step 5 (Building Info)

Figure 18. "Sizing example"



Step 4.5 – Enter Campus Building and Floor and Floor information

Figure 19. "Step 5 of Floor Plan importation wizard"



- Navigate to the Building Information section and enter the following information

Setting	Default	Description
Campus Building Pull down		Use this pull down to associate the floor with a campus and building. <i>Note: Campuses and Buildings should be pre-configured on the VisualRF → Campus/Building pages prior to importing the floor plan. You are unable to create campuses or floors within VisualRF.</i>

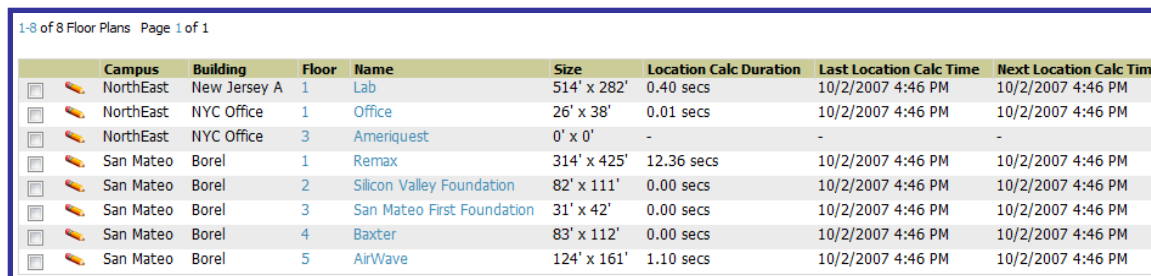
Setting	Default	Description
Floor		The floor number. You can enter negative numbers for basements. <i>Note: QuickView will check for duplicate floor numbers on a particular Building Campus pair.</i>
Ceiling Height	10	Specifies the height from the floor to the ceiling. This will default to the ceiling height for the building, but you can override here if needed for atria or basements.
Ceiling Attenuation	20	Specifies the attenuation characteristics in dB of the ceiling or the floor above. <i>Note: This value is utilized by the VisualRF service to calculate path loss and client locations. Ceiling attenuation is interpreted as pure dB loss and VisualRF does not contemplate floor thickness.</i>

- Navigate to the Optional Information section and enter the following information

Setting	Default	Description
Name (optional)		A descriptive name for the floor. It will inherit the floor number if nothing is entered.
Owner (optional)		The owner of the floor (used in diagnostics and alerts).
Planner (optional)		The person in charge of planning the RF layout for the floor.
Installer (optional)		The person in charge of installing RF equipment for the floor.

- Click the “Save” (they Next button will change to Save) button to save the file.
- You will be redirected to the **VisualRF → Floor Plans** page. You will notice that the VisualRF service is calculating the attenuation grid and creating the thumbnail image because the size equals “0 x 0” and there are no values for location calculation columns, last, next, and duration. This is normal and expected behavior.

Figure 20. “VisualRF → Floor Plans page with new floor listing”

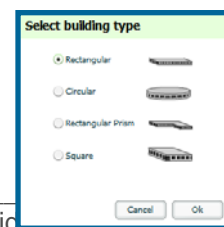


1-8 of 8 Floor Plans Page 1 of 1

	Campus	Building	Floor	Name	Size	Location Calc Duration	Last Location Calc Time	Next Location Calc Time
<input type="checkbox"/>	NorthEast	New Jersey A	1	Lab	514' x 282'	0.40 secs	10/2/2007 4:46 PM	10/2/2007 4:46 PM
<input type="checkbox"/>	NorthEast	NYC Office	1	Office	26' x 38'	0.01 secs	10/2/2007 4:46 PM	10/2/2007 4:46 PM
<input type="checkbox"/>	NorthEast	NYC Office	3	Ameriquest	0' x 0'	-	-	-
<input type="checkbox"/>	San Mateo	Borel	1	Remax	314' x 425'	12.36 secs	10/2/2007 4:46 PM	10/2/2007 4:46 PM
<input type="checkbox"/>	San Mateo	Borel	2	Silicon Valley Foundation	82' x 111'	0.00 secs	10/2/2007 4:46 PM	10/2/2007 4:46 PM
<input type="checkbox"/>	San Mateo	Borel	3	San Mateo First Foundation	31' x 42'	0.00 secs	10/2/2007 4:46 PM	10/2/2007 4:46 PM
<input type="checkbox"/>	San Mateo	Borel	4	Baxter	83' x 112'	0.00 secs	10/2/2007 4:46 PM	10/2/2007 4:46 PM
<input type="checkbox"/>	San Mateo	Borel	5	AirWave	124' x 161'	1.10 secs	10/2/2007 4:46 PM	10/2/2007 4:46 PM

Figure 21. “Building Type”

- To change building types right click on building icon).
- Select proper building type.

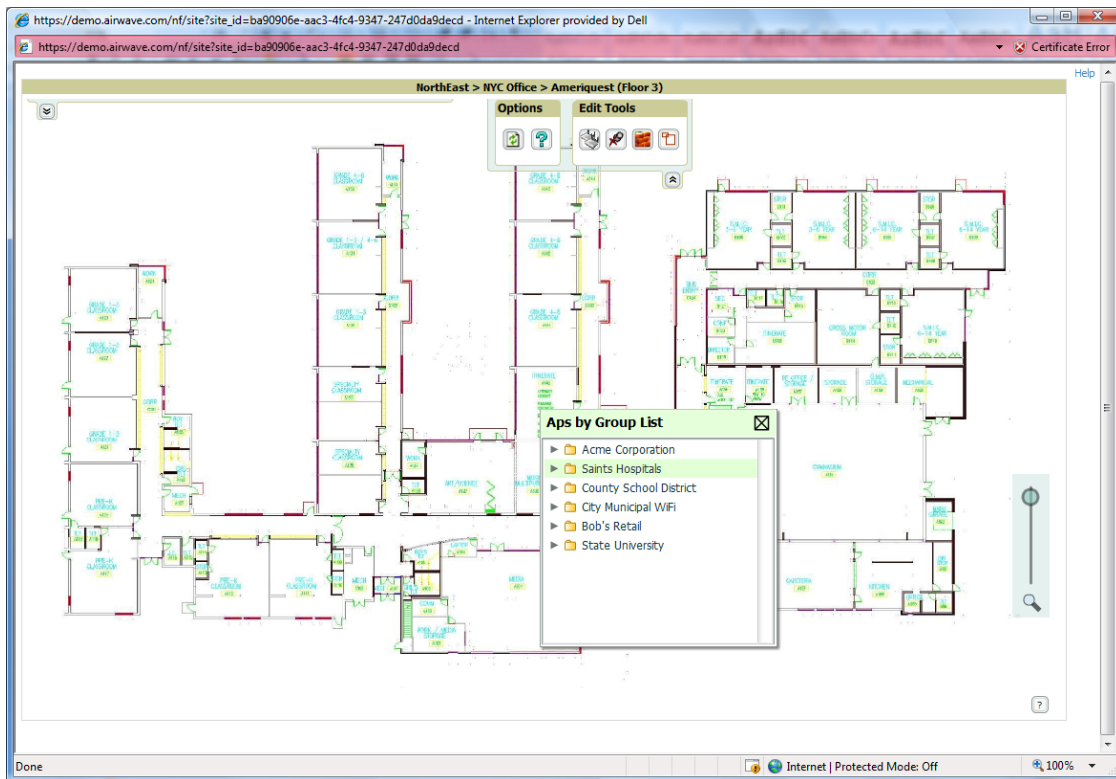


Note: QuickView automatically saves background map images, campus locations, building locations, and building types

5. Provisioning Existing Access Points onto the Floor Plan

- Select the floor plan by clicking on the floor number or name links in the list.
- Select the provision AP icon (stacked APs) in the Floor Edit Tools section. A popup (APs by Group selection) list of devices will appear on the screen.

Figure 22. "Provision APs onto Site"



- Expand the Group containing the access points which need to be provisioned on this floor plan.
- Left-click and hold on an AP which has an AP icon next to it. The red circle with a line through it means the AP has already been provisioned onto this or another floor plan.
- Drag the AP to the proper location on the floor and release the left mouse key.

Note: Once on the floor plan the AP icon will look like the actual AP with a green circle so you easily located it.

Figure 24. "New AP on Canvas"

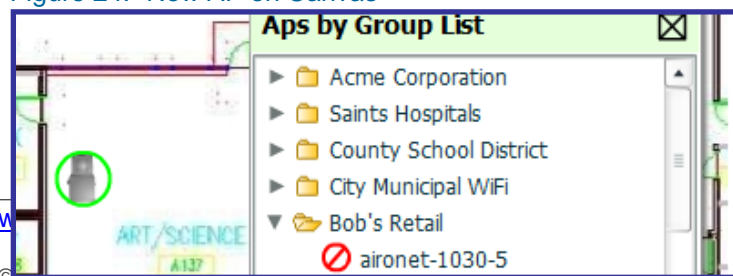
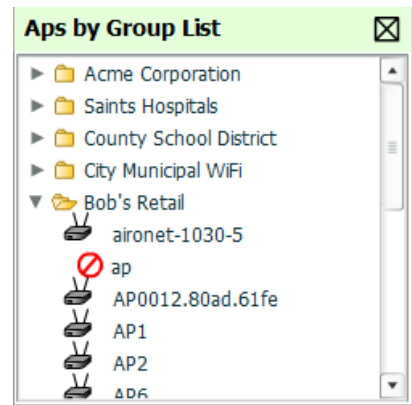


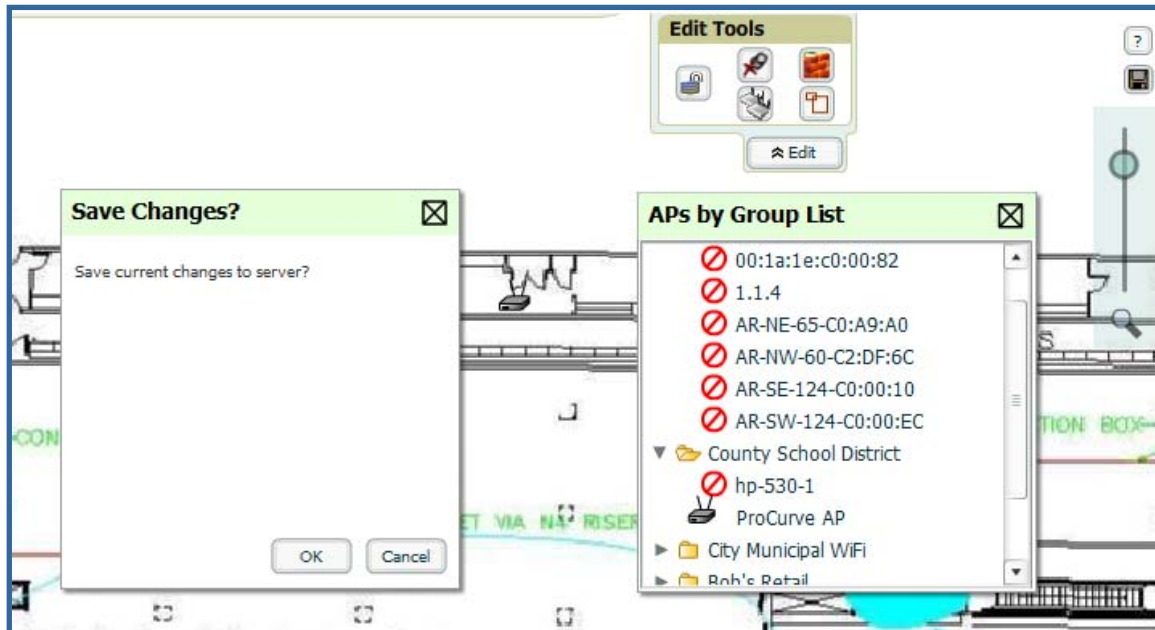
Figure 23. "APs by Group List"



Confidential & Proprietary

- Once all APs are provisioned on the floor plan click the Save icon (floppy disk) in the top right of the QuickView window.

Figure 25. "New AP on Canvas"



- A Save Changes dialog box will appear.
- Click the OK button to commit the change.
- A Changes Saved dialog box will appear
- Click the OK button to continue

Note: The floor is submitted to one of the core threads to recalculate path loss and then to one of the location caching threads to recalculate client locations. All changes may not be visible on a refresh until this process complete.

6. Increasing Location Accuracy

The Location Service will utilize all RF information available to increase location accuracy of clients, tags, and rogue devices. Understanding your infrastructure's inherent capabilities is key to understand how much extra effort is required to ensuring location accuracy.

There are three key elements read from controllers or access points that increase location accuracy: signal strength of a client as heard by the AP of association, signal strength of a client as heard by APs other than the AP of association, and signal strength that an AP hears other APs.

MFG/Model	Client Signal Associated AP	AP-to-AP Signals (Dynamic Attenuation)	Unassociated Client Signal	Rogue AP Signal
Cisco LWAPP	Yes	Yes	Yes	Yes
Cisco IOS	Yes	Yes	No	With WLSE
Cisco VxWorks	Yes	No	No	No
Alcatel-Lucent	Yes	Yes	Yes	Yes
Trapeze	Yes	No	No	Yes
Meru	No	No	No	Yes
Proxim	Yes	Yes	Yes	Yes
Symbol Thick AP	Yes	No	No	Yes
Symbol Thin AP	Yes	No	Yes	Yes
Proxim AP-2000	Yes	No	Yes	Yes
Proxim AP-4000	Yes	Yes	Yes	Yes
ProCurve WeSM	Yes	Yes	No	Yes
ProCurve 530	Yes	Yes	Yes	Yes
ProCurve 420	Yes	Yes	No	Yes

OV3600 provides three main methods to increase accuracy once your access points are deployed.

Adding Exterior Walls – increases location accuracy by reducing the statistical probability of placements outside the office confines

Client Training for Stationary Devices – ensure non-mobile clients like desktops or scales will always remain in a defined static location. Statically assigning non-mobile devices reduces the CPU load on your server, because the VisualRF service does not evaluate any signal metrics for this MAC address when associated with an AP on the floor plan.

Remote Client Surveys – provides additional attenuation inputs for corners and low-coverage areas without the burden of actually carrying a laptop to the physical location.

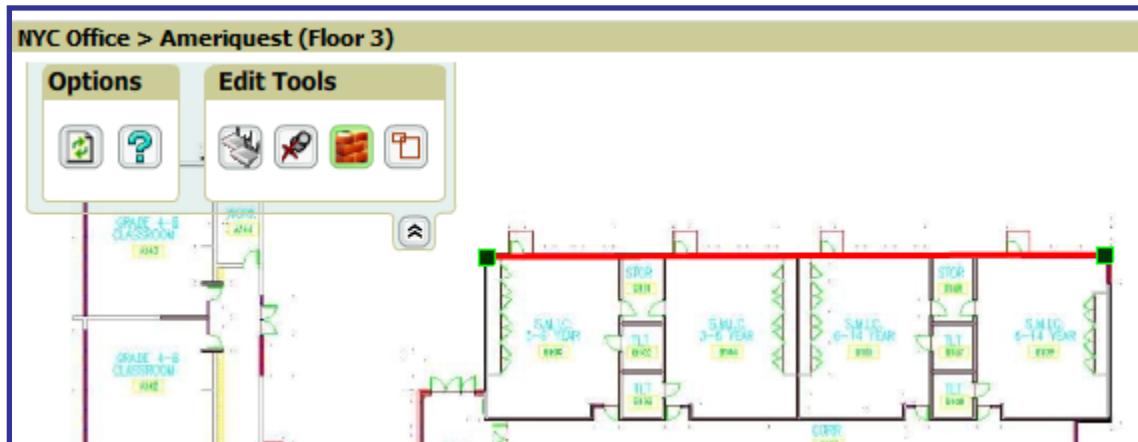
Step 6.1 – Adding Exterior Walls

Because VisualRF utilizes as much existing RF information, generally only external walls are required for accurate client locations. VisualRF's Dynamic Attenuation utilizes AP-to-AP information to calculate attenuation for interior areas negates then need to input interior walls. If you devices support AP-to-AP information in the table above, you should only input exterior walls.

Process

- Click on the Wall icon (Brick Wall) in the Floor Edit Tools section. A green border will appear around the icon.
- Left-click and hold at the begin point of the wall
- Move the cursor to the end point of the wall
- Release the left mouse button

Figure 26. “Draw a wall”



- To toggle off wall drawing tool click on the Wall icon in the Floor Edit Tools section.
- To move or resize the wall grab one of the end point handles (black squares with green borders).
- To change the attenuation of a wall left-click on the wall and select the appropriate building material.
- To delete a wall left-click on the wall and select the “Delete Wall” option.
- Once all walls are provisioned on the floor plan click the Save button (floppy disk) at the bottom right of the page.
- A Save Changes dialogue box will appear.
- Click the OK button to commit the change.
- A Changes Saved dialogue box will appear
- Click the OK button to continue

Note: Alcatel-Lucent recommends only drawing outside walls. If you are seeing inaccurate client locations or heat maps after entering exterior walls, proceed to Client Surveys. If you still experience problems, then you can proceed to adding interior walls.

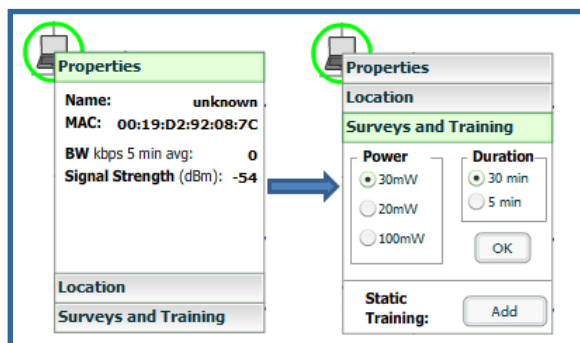
Step 6.2 – Location Training for Stationary Devices

QuickView provides the ability to statically assign a permanent x, y coordinate to stationary devices like PCs, Scales, and Point-of-Sale terminals. This will reduce the calculation requirements on the VisualRF location service and increase the accuracy of the RF characteristics of individual floor plans.

Process

- Left-click and hold client device that you want to utilize for the survey.
- Move to proper location and release left mouse button. A popup menu will

Figure 27. “Add Static Training”

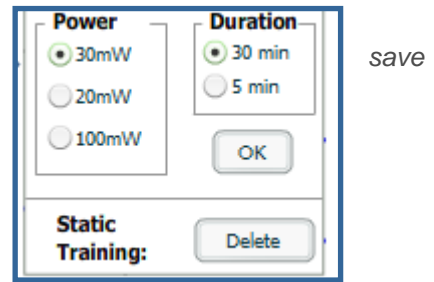


- Select Surveys and Training option
- Click the “Add” button for Static Training

*Note: The static locations are automatically saved, so the button (floppy disk) will **not** appear.*

- To remove a statically trained left-click on the client, and select the Surveys and Training option
- Click on the “Delete” button for Static Training

Figure 28. “Remove Static Training”



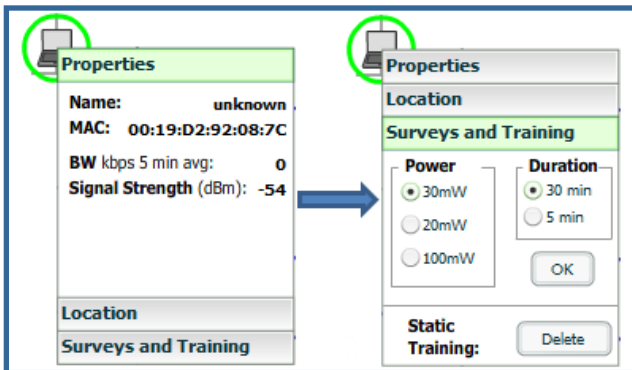
Step 6.3 – Add Client Surveys

Client surveys provide a method for increasing the accuracy of the attenuation grid by taking real signal samplings from client devices associated with the WLAN. Key differentiators of Alcatel-Lucent’s client surveys are: (1) they utilize readings from the access points and not the client and (2) they utilize numerous samples. This produces a more accurate representation because signals obtained from the client’s card (what signal a client hears the AP) can vary from vendor to vendor. The signal-levels at which APs can hear a client are already normalized. Utilizing multiple samples alleviates spikes or troughs than come from utilizing a single sample

Process

- Left-click and hold client device that you want to utilize for the survey.
- Move to proper location and release left mouse button. A popup menu will appear.

Figure 29. “Client Surveys”

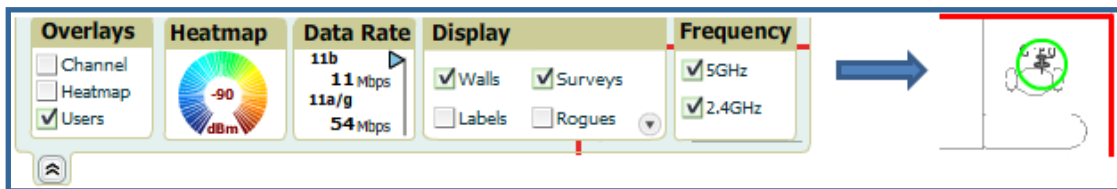


- Select Surveys and Location option
- Select the appropriate transmit power for the wireless client. Default to 30mW if you are unsure.
- Select Duration or the time that you want to sample the client’s signal measurements. Longer durations will increase Path Loss accuracy and location accuracy.
- Click OK button to begin the survey.

To display survey locations

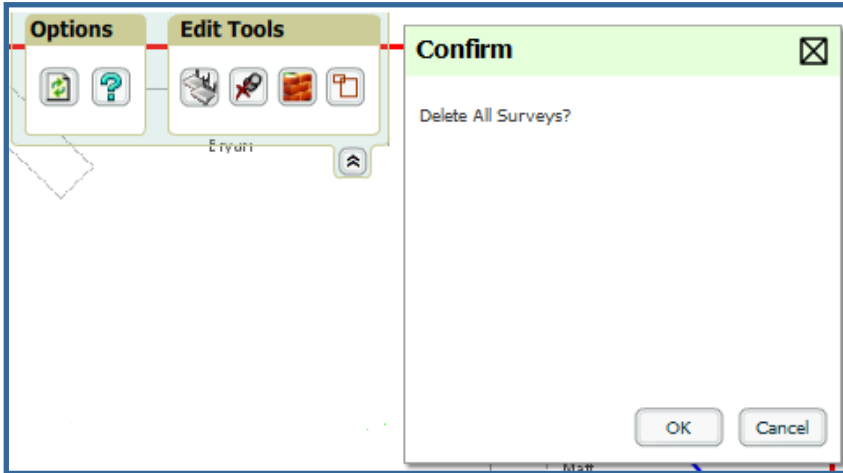
- Click on the top left pull down menu widget
- Select the survey toggle.

Figure 30. “Survey Toggle”



- To delete surveys click on the top right pull down menu widget
- Select the delete Surveys icon
- A Confirmation dialogue box will appear.
- Click the OK button to commit the change.

Figure 31. “Delete Surveys”



Note: The static locations are automatically saved so the save button (floppy disk) will **not** appear.

Note: Ensure the client will remain in the same location for at least 30 minutes.

Note: You should delete and resurvey an area or a floor plan after a remodel or significant interior movement.

Note: Surveys should be conducted during normal business hours to reflect normal RF activity on the floor.

Note: 11a clients automatically inherit the proper transmit power from the 11g configuration. Most people know the 11b/g transmit power. Example 30mW Pre-2006 Laptops equate to 20mW for 11a clients.

Client Type	Transmit Power 11g
Pre-2006 Laptops	30 mW
Post -2006 Laptops	100 mW
SOHO WLAN Cards <ul style="list-style-type: none"> • D-Link • Net Gear • LINKSYS 	30 mW
RFID Tags	10 mW
PDA	20 mW
IPhone	20 mW
Desktop	100 mW
Cisco Cards	100 mW

Note: Alcatel-Lucent dynamically assigns a transmit power to every client based on OUI. This step increases the accuracy for surveys by allowing an override.

Step 6.4 – Fine Tuning Location Service

There are several options on the **VisualRF → Setup** page which increase client location accuracy.

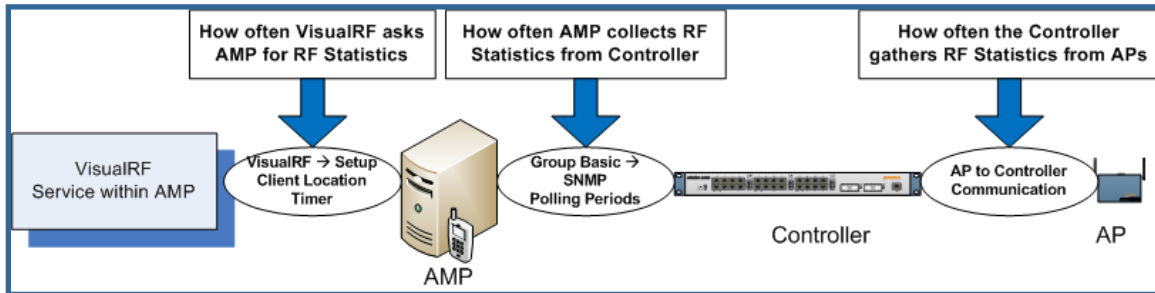
Note all of these items will increase the processing requirements for the location service and could negatively impact the overall performance of OV3600.

- Grid Size – decreasing the grid size will enable the location to place clients in a small grid which will increase accuracy. You can right click on a floor plan within a building view and change this setting.
- Location Caching Timer – decreasing the timer will ensure that client locations are calculated more frequently and represent current location.
- Dynamic Attenuation – enabling dynamic attenuation (which is on by default) instructs the location service to sample the current RF environment and to dynamically adjust Path Loss.

Step 6.5 – Configuring Infrastructure

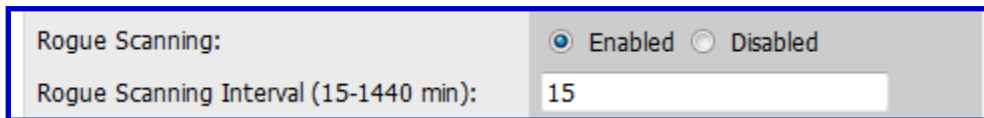
Ensure the hardware is configured to retrieve the RF information and that it will provide this information on a timely basis. There are three unique timing mechanisms which impact location accuracy: how often the infrastructure collects and correlates RF statistics in their MIB, how often the OV3600 queries those MIB entries, and how often VisualRF service queries OV3600 for this RF information.

Figure 32. “Location Timing Chart”



- Thick AP and Thin – ensure on the **Group → Radio** page that Rogue Scanning is enabled and the interval is accurate.

Figure 33. Group Rogue Scanning Configuration



- Thin AP – ensure that the controllers are configured to gather RF information from the thin APs frequently.
 - For Cisco LWAPP navigate to **Groups → Airespace Radio** page

Figure 34. Airespace RRM Configuration

802.11a Noise/Interference/Rogue Monitoring Channels		802.11bg Noise/Interference/Rogue Monitoring Channels	
Monitoring Channels:	Country Channels	Monitoring Channels:	Country Channels
802.11a Monitor Intervals		802.11bg Monitor Intervals	
Signal Measurement (60-3600 sec):	300	Signal Measurement (60-3600 sec):	300
Noise Measurement (60-3600 sec):	300	Noise Measurement (60-3600 sec):	300
Load Measurement (60-3600 sec):	300	Load Measurement (60-3600 sec):	300
Coverage Measurement (60-3600 sec):	300	Coverage Measurement (60-3600 sec):	300

- Signal Measurement – How frequently LWAPP APs measure their neighbors. This should be the same as your Location Caching Timer on the **VisualRF → Setup** page. Alcatel-Lucent recommends 180 (3 minutes) as a default.

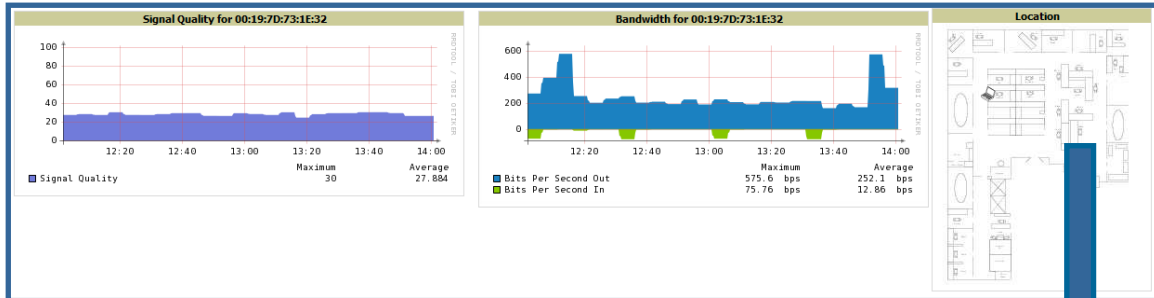
7. Viewing Floor Plans and Utilizing QuickView

QuickView has 4 distinct views or entry points: client view, access point view, floor plan view, and network, campus, and building view.

7.1 User View – view wireless user’s RF environment from **Client** → **Detail** page.

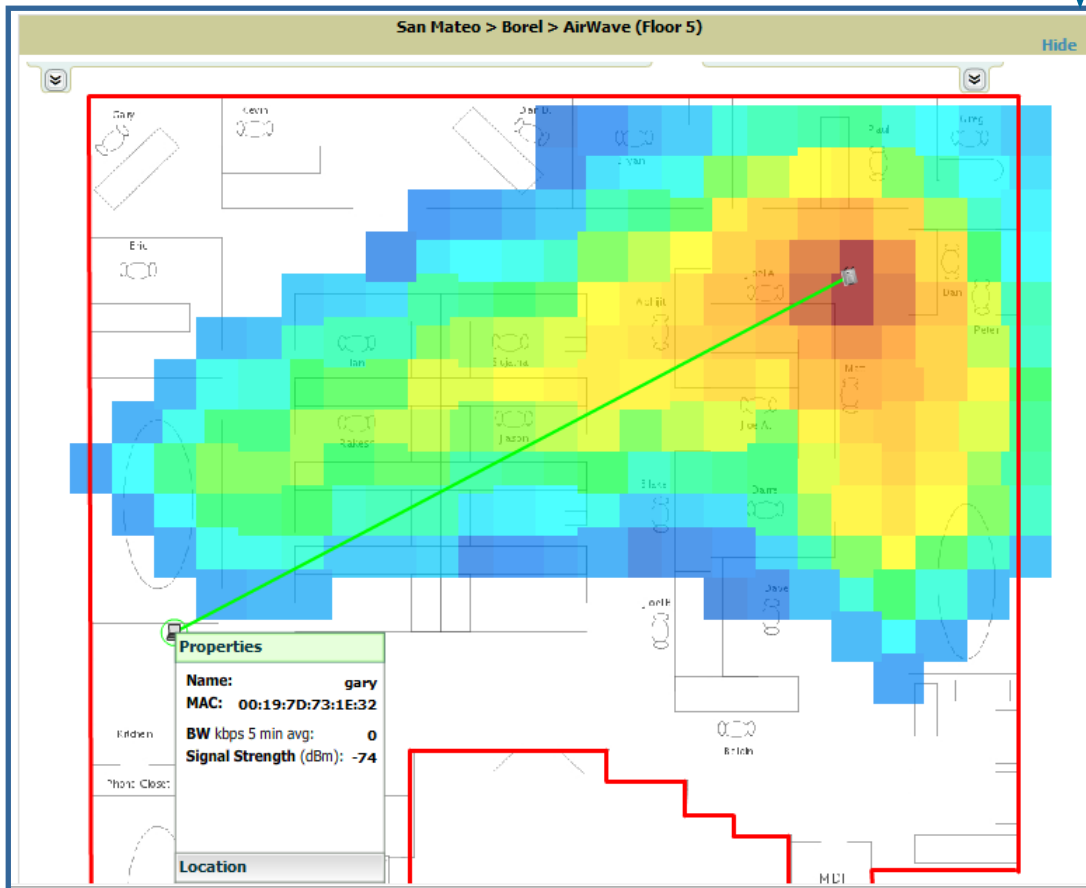
- Select user of interest
- **Click on thumbnail** – note location in thumbnail should be accurate

Figure 35. “User → Detail thumbnail”



- A QuickView window will open below the thumbnail

Figure 36. “User → Detail QuickView”



This view is focused on the wireless user enabling you quick resolution of a user’s issues and therefore disables most RF objects by default.

RF Objects

- **Users** – only the user in focus is displayed
- **APs** – only the access point in which the focus client is associated with is displayed
- **Radios** – the heatmap represents only the radio to which the client in focus is associated
- **Rogues** – all rogues are off
- **Client/Rogue Surveys** – all surveys are off
- **Walls** – all walls on displayed
- **Lines** – client to AP of association
- **Labels** – all labels are disabled

To further diagnose client issues QuickView provides several toggles.

Track Location History

- Left-click on the client icon
- Select timeframe
- A location history player will appear at the bottom of the QuickView window.

Figure 37. “Timeframe”

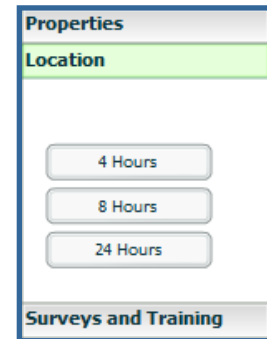


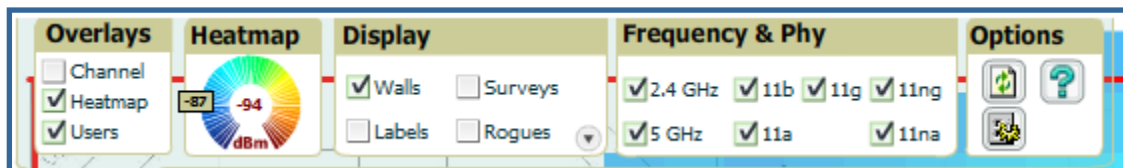
Figure 38. “Location History Player”



Check Signal Strength to Client Location

- Click on the Display pull down
- Adjust the dBm selector wheel to desired signal level

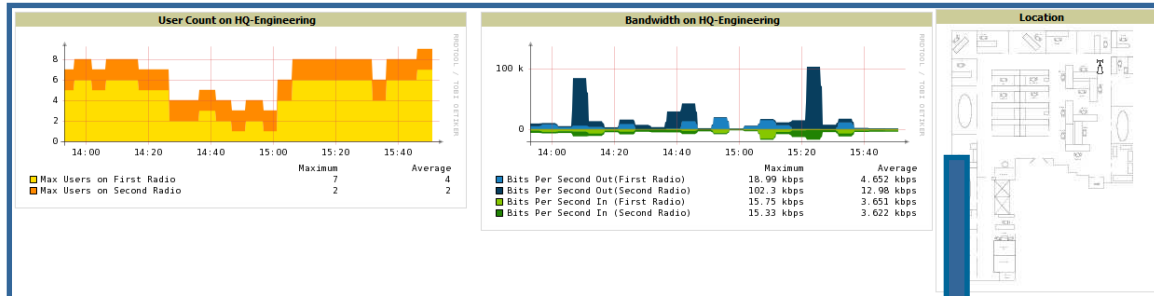
Figure 39. “dBm Selector Wheel”



7.2 AP View – view an access point’s RF environment from **Device** → **Detail** page

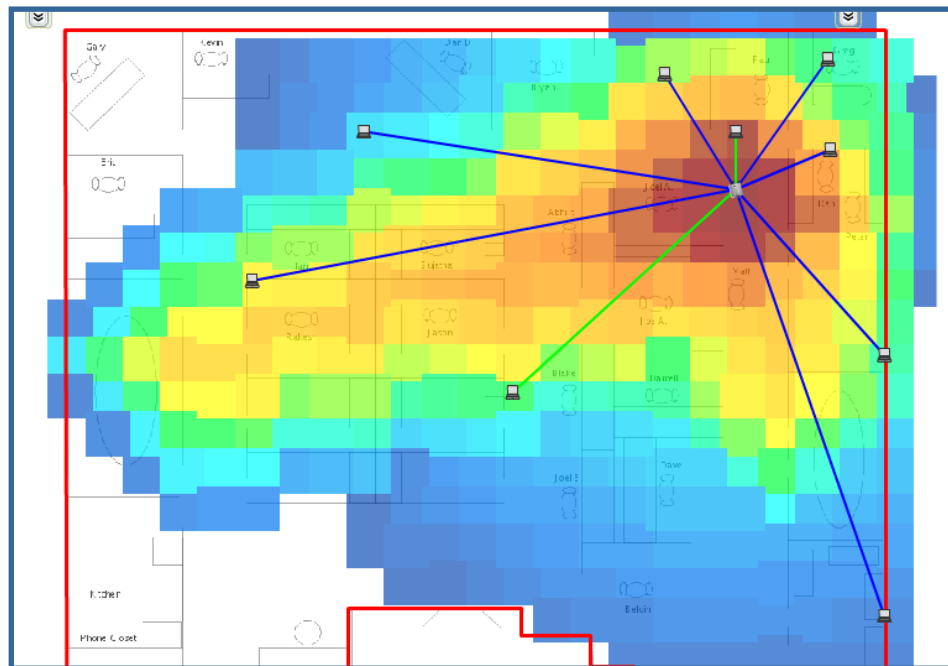
- Select device of interest
- **Click on thumbnail** – note location of AP in thumbnail should be accurate

Figure 40. “Device → Detail thumbnail”



- A QuickView window will open below the thumbnail

Figure 41. “AP → Detail QuickView”



This view is focused on enabling quick resolution of AP issues and therefore disables many RF objects by default.

RF Objects

- **Users** – only users associated with radios within access point of focus are displayed
- **APs** – only the access point in focus is displayed
- **Radios** – the heatmap represents all radios within the access point of focus
- **Rogues** – all rogues are off
- **Client/Rogue Surveys** – all surveys are off
- **Walls** – all walls on displayed

- **Lines** – client to AP of association are displayed
- **Labels** – all labels are disabled

7.3 Floor Plan View – view a floor plan’s RF environment from VisualRF → Floor Plans page

Figure 42. “Floor Plan List View”

Campus	Building	Floor	Site Name	Size	Location Calc. Duration	Last Location Calc. Time	Next Location Calc. Time	# of APs	# of Radios	# of Clients	# of Rogues	File Size	Last Modified Date
Madrid	Brich Tower	0	Dan Augustine	150' x 115'	2.58	5/22/2007 4:25 PM	5/22/2007 4:26 PM	1	2	0	0	92 KB	4/13/2007 9:43 AM
San Mateo	Borel	2	A.G. Edwards	500' x 386'	23.03	5/22/2007 4:24 PM	5/22/2007 4:25 PM	0	0	0	0	86 KB	1/3/2007 7:54 AM
San Mateo	Borel	3	Borel Financial	4164' x 3218'	3.66	5/22/2007 4:25 PM	5/22/2007 4:26 PM	1	2	1	0	278 KB	5/18/2007 3:06 PM
San Mateo	Borel	4	Remax	500' x 386'	0.00	5/22/2007 4:25 PM	5/22/2007 4:26 PM	2	1	0	0	121 KB	1/2/2007 3:12 PM
San Mateo	Borel	5	AirWave	124' x 161'	40.36	5/22/2007 4:24 PM	5/22/2007 4:25 PM	4	8	4	0	483 KB	5/21/2007 8:52 AM
San Mateo	Borel	6	Penthouse Suite	400' x 309'	0.00	5/22/2007 4:24 PM	5/22/2007 4:23 PM	6	9	0	0	302 KB	5/18/2007 1:47 PM
San Mateo	Borel	20	400by300PNG	400' x 309'	0.00	5/22/2007 4:25 PM	5/22/2007 4:26 PM	3	3	0	0	139 KB	5/7/2007 10:02 AM

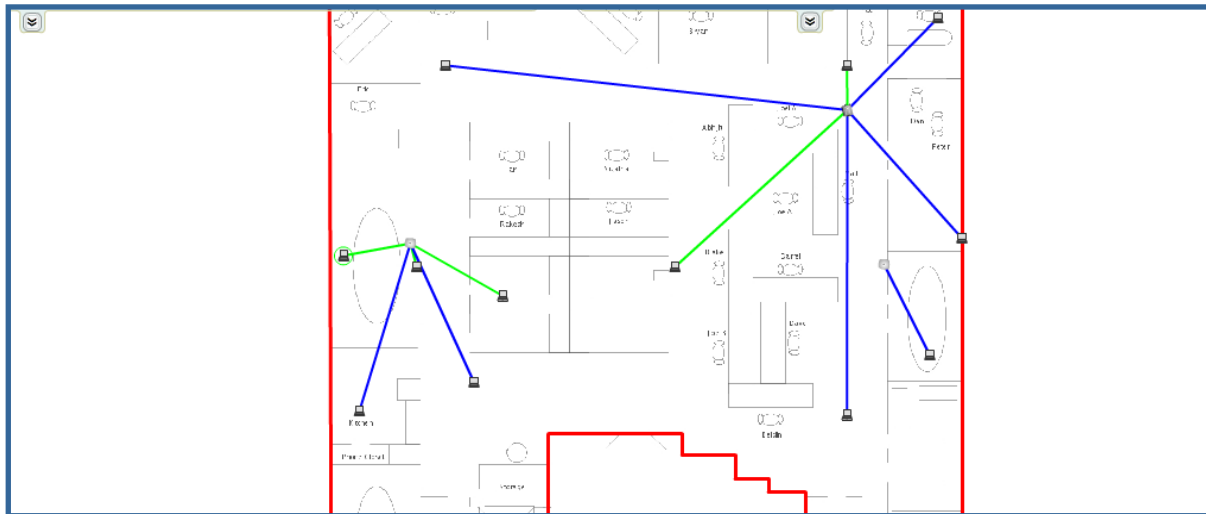
This page has a fixed sorting filter of Campus → Building → Floor number.

Note: This page will provide a snapshot of how the VisualRF service is performing.

Field	Description
Campus	Campus associated to the floor.
Building	Building associated to the floor
Floor	Floor number
Floor Name	Optional name of a floor
Size	The height and width in feet of the floor plan including white space.
Location Calc. Duration	How long in seconds it took the VisualRF service to calculate path loss and client locations. <i>Note: If any floor’s Location Calc. Duration exceeds the Location Caching Timer value configured on VisualRF → Setup page, then VisualRF is not able to calculate locations for clients per your desired interval. See resolving performance problems below.</i>
Last Location Calc. Time	Last date and time that the VisualRF service calculated client locations for the floor.
Next Location Calc. Time	Next date and time when the VisualRF service will calculate client locations for the floor.
# of APs	The number of access points on the floor.
# of Radios	The number of radios associated with access points on the floor
# of Users	The number of wireless users associated with access points on the floor <i>Note: Locating users is the biggest consumer of resources within the VisualRF service. A floor with hundreds or thousands of clients will take minutes to calculate.</i>
# of Rogues	The number of rogue devices heard by access points on the floor. This number reflects the filters configured on the VisualRF → Setup. This means that while APs on the floor might hear more rogue devices they are being filtered because of weak signal, or they haven’t been heard recently, or they are ad-hoc.
File Size	The floor plan background or image reported in KB. The larger the file the longer it will take to render in the canvas.
Last Modified	The date and time when the floor was last modified.
Image Link	A link to download the original image background file.

- Select floor plan of interest by clicking on the floor number or name link

Figure 43. “Floor Plan View”



- A QuickView window will open within the floor plan list.

This view is focused on providing insight into the RF environment of an entire floor.

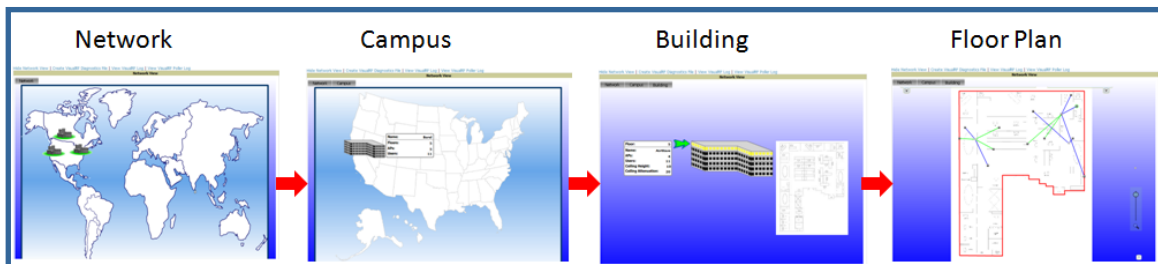
RF Objects

- **Users** – all users associated with all access points on this floor
- **APs** – all access points on this floor
- **Radios** – all radios for all access points on this floor are displayed
- **Rogues** – all rogues are off
- **Heatmaps** – all are off by default
- **Client/Rogue Surveys** – all surveys are off
- **Walls** – all walls on displayed
- **Lines** – client to AP of association
- **Labels** – all labels are disabled

7.4 Network, Campus, Building View – view floors from a geographical perspective from VisualRF → Floor Plans page

- Click on the **Show Network View** link
- This will launch the 3-D QuickView navigation system

Figure 44. “Floor Plan View”



This view provides:

- **Network View** – contains all campuses within your WLAN
- **Campus View** – all buildings within a campus
- **Building View** – all floors within a building
- **Floor Plan View** – all devices access points, clients, and rogues within the floor

8. Pre-deployment Planning and Provisioning

With the release of 6.0, VisualRF provides the capability to plan campuses, buildings, floors, and access points prior to the actual access point deployment.

Workflow Overview

- Create a campus
- Create a building associated with your campus
- Create a floor for your building
- Draw exterior walls
- Manually provision access points onto floor plan
- Automatically provision access points onto floor plan
- Replicate floor plan vertically
- Print BOM report
- Export campus
- Deploy production OV3600 and manage devices
- Import exported campus
- Match access points

8.1 Create campus – as detailed above

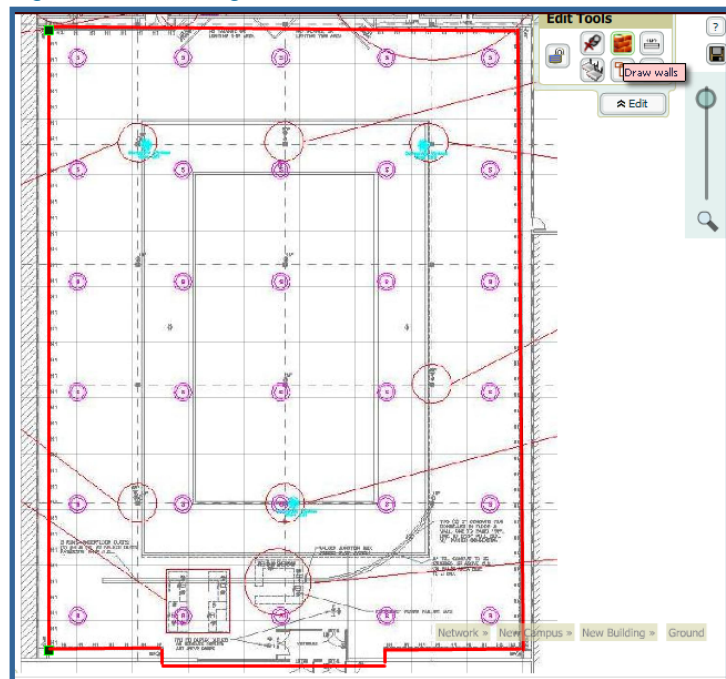
8.2 Create building – as detailed above

8.3 Create floor plan – as detailed above

8.4 Draw exterior walls

- Add exterior walls by clicking on the newly imported floor in the Building view
- To toggle off wall drawing tool click on the Wall icon in the Floor Edit Tools section.
- To move or resize the wall grab one of the end point handles (black squares with green borders).
- To change the attenuation of a wall left-click on the wall and select the appropriate building material.
- To delete a wall left-click on the wall and select the “Delete Wall” option.
- Once all walls are provisioned on the floor plan click the Save button (floppy disk) at the bottom right of the page.
- A Save Changes dialogue box will appear.
- Click the OK button to commit the change.
- A Changes Saved dialogue box will appear
- Click the OK button to continue

Figure 45. “Drawing Walls”

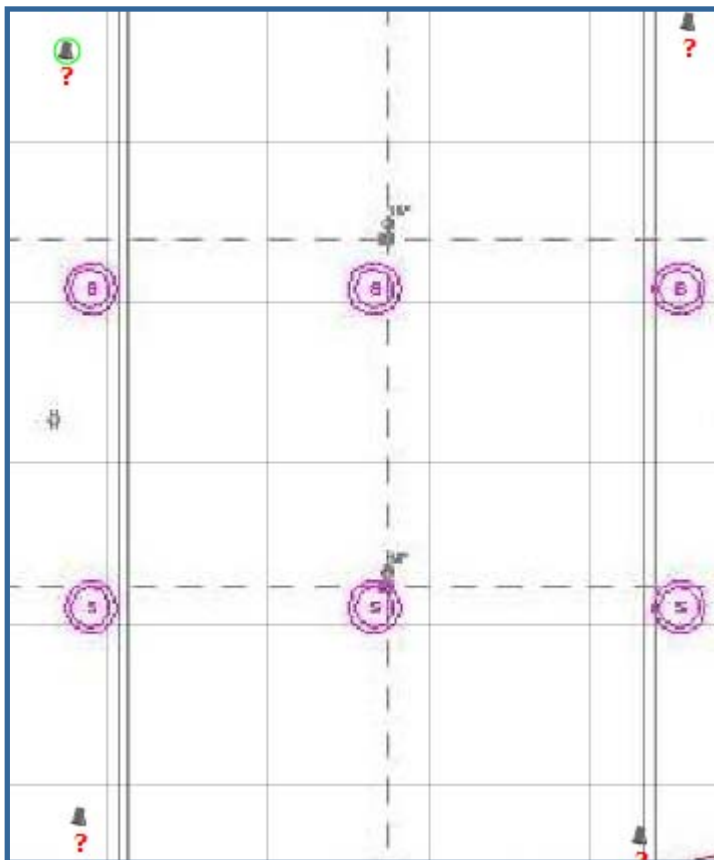


Note: There is no need to draw interior walls on a floor plan. VisualRF will automatically calculate path loss in the interior of a building.

8.5 Manually provision access points onto floor plan

- Click on the planning icon within Edit Tools pull down. A new provisioning popup will appear.
- Select manufacturer.
- Drag access points from provision window onto floor plan.
- Configure antenna gain, beam width, and orientation (optional)
- Repeat process until coverage planning is complete.
- Notice that manually provisioned access point show with a red question mark below the.

Figure 48. “Unmatched APs”



- Click on the save icon (floppy disk) to save the floor plan.

8.6 Automatically provision access points onto floor plan

- Click on the auto provisioning icon within Edit Tools pull down. A new provisioning popup will appear.
- You will see a new cross hair with circle pointer
- Draw your polygon

Figure 46. “Provision APs”

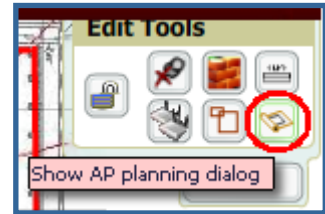
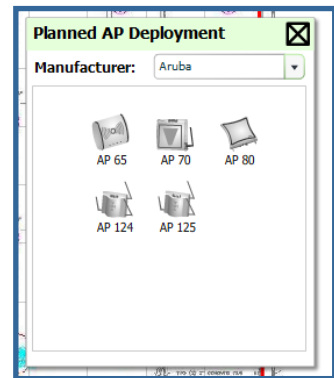
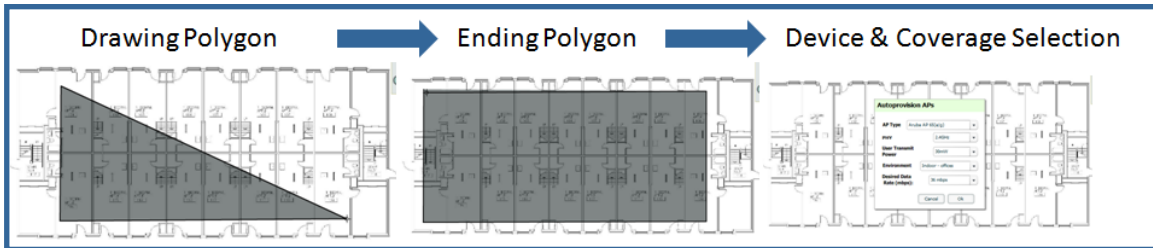


Figure 47. “Provision APs”



- o Left click to initiate the process
- o The tool will automatically shade in your provisioning area
- o Complete the polygon by double left-clicking the mouse

Figure 49. Drawing Provisioning Polygon”



Enter the following information:

- Device MFG & Model
- PHY Type
- User Transmit Power – the average transmit power of the client devices on this floor plan
- Office Environment
- Desired Data Rate

8.6 Replicate floor plans

- Navigate back to the Building view by click on the navigation tags in the bottom right corner of the window.
- Right click on the floor and select “Duplicate”
- Enter the following information:
 - o Starting and ending floors
Note: starting floor will add one to the highest floor in the building and the ending floor defaults to 10 more than the starting floor.
 - o Select the toggles to copy walls, regions, data rates, and AP placement.
- Click the “OK” button to save your changes.
- Manually refresh page and your will be redirected to the **VisualRF → Floor Plan** page.

Figure 50. “Replicate Floors”

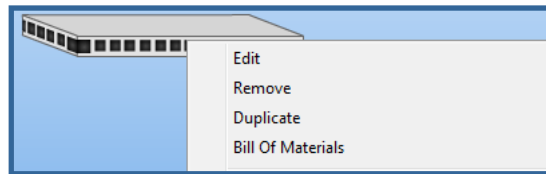


Figure 51. “Replicate Floor Input”

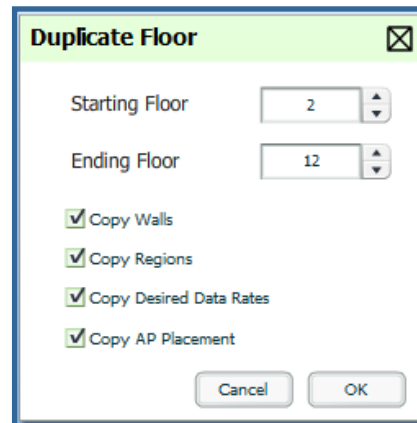


Figure 52. “Floor Plan List Page”

<input type="checkbox"/>	New Campus	New Building	1.0	Ground	132' x 164'	0.11	5/6/2008 7:30 AM	5/6/2008 7:32 AM	4	8	0	0	473 KB	
<input type="checkbox"/>	New Campus	New Building	2.0	Floor 2.0	132' x 164'	0.00	5/6/2008 7:31 AM	5/6/2008 7:33 AM	4	8	0	0	473 KB	
<input type="checkbox"/>	New Campus	New Building	3.0	Floor 3.0	132' x 164'	0.00	5/6/2008 7:30 AM	5/6/2008 7:32 AM	4	8	0	0	473 KB	
<input type="checkbox"/>	New Campus	New Building	4.0	Floor 4.0	132' x 164'	0.00	5/6/2008 7:31 AM	5/6/2008 7:33 AM	4	8	0	0	473 KB	
<input type="checkbox"/>	New Campus	New Building	5.0	Floor 5.0	132' x 164'	0.00	5/6/2008 7:31 AM	5/6/2008 7:33 AM	4	8	0	0	473 KB	
<input type="checkbox"/>	New Campus	New Building	6.0	Floor 6.0	132' x 164'	0.02	5/6/2008 7:32 AM	5/6/2008 7:34 AM	4	8	0	0	473 KB	
<input type="checkbox"/>	New Campus	New Building	7.0	Floor 7.0	132' x 164'	0.00	5/6/2008 7:30 AM	5/6/2008 7:32 AM	4	8	0	0	473 KB	
<input type="checkbox"/>	New Campus	New Building	8.0	Floor 8.0	132' x 164'	0.00	5/6/2008 7:31 AM	5/6/2008 7:33 AM	4	8	0	0	473 KB	
<input type="checkbox"/>	New Campus	New Building	9.0	Floor 9.0	132' x 164'	0.01	5/6/2008 7:32 AM	5/6/2008 7:34 AM	4	8	0	0	473 KB	
<input type="checkbox"/>	New Campus	New Building	10.0	Floor 10.0	132' x 164'	0.00	5/6/2008 7:30 AM	5/6/2008 7:32 AM	4	8	0	0	473 KB	
<input type="checkbox"/>	New Campus	New Building	11.0	Floor 11.0	132' x 164'	0.00	5/6/2008 7:31 AM	5/6/2008 7:33 AM	4	8	0	0	473 KB	
<input type="checkbox"/>	New Campus	New Building	12.0	Floor 12.0	132' x 164'	0.00	5/6/2008 7:31 AM	5/6/2008 7:33 AM	4	8	0	0	473 KB	

Note: you should see all replicate floors with matching number of access points.

- The Building view will reflect the new floors.

8.7 Print BOM report

- Navigate back to the Network view
- Right click on the Campus icon
 - Select options
 - Select output format
- Select Bill of Materials
- A generating report popup will appear.
- Click the “OK” button
- A BOM report will appear in a new window

Figure 53. “Bill of Materials Selection”

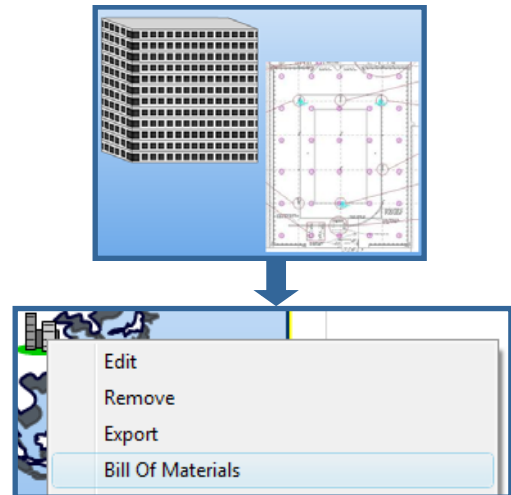
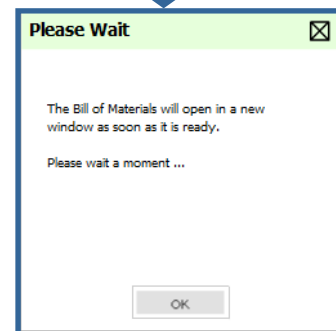
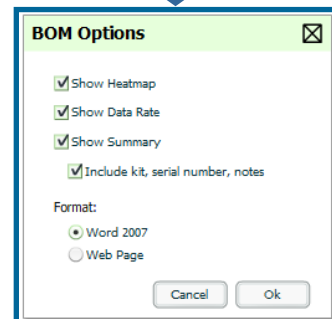
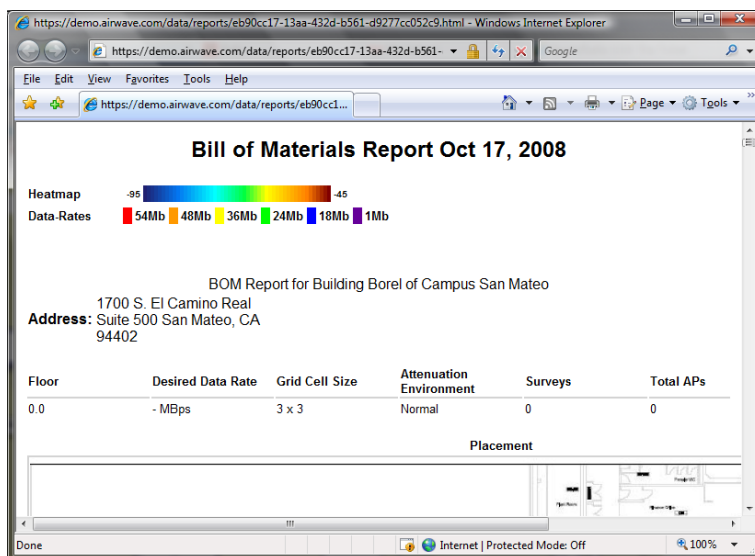


Figure 54. “Bill of Materials Report”



8.8 Export Campus

- Navigate back to the Network view
- Right click on the Campus icon
- Select Export
- An object selection window will appear.
- Select the objects to export and click on the “Export” button.
- A File Download window will appear.
- Click on the “Save” button and save the zipped file to your local hard drive for importation to another OV3600.

Figure 55. “Export Selection”

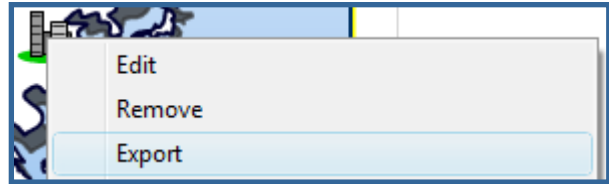


Figure 56. “Export Object Selector”

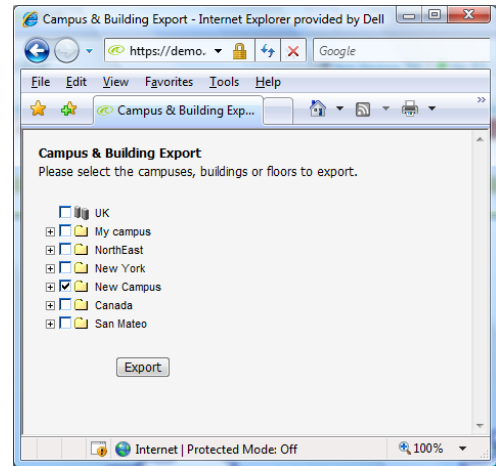
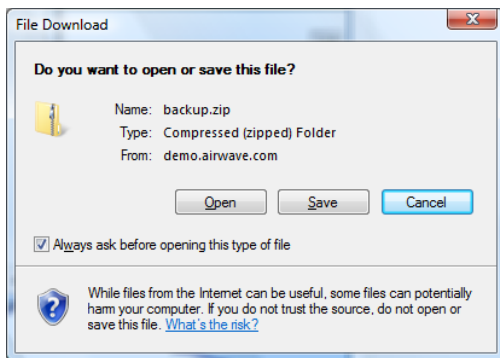


Figure 57. “File Download Window”



Appendix A - VisualRF and Performance

The first place to check for performance issues is the **VisualRF → Floors** page. If any floor's location calculation duration **exceeds** the location caching timer value configured on **VisualRF → Setup** page, then VisualRF is not able to calculate locations for clients per your desired interval.

Floor Specific Elements Impacting VisualRF Performance

- **Number of clients** – VisualRF calculates location for every client associated with access points on the floor per the value of location calculation timer. Hundreds or thousands of clients on a floor may cause location calculations for that floor to take minutes instead of seconds.
- **Dimensions of floor plan** – VisualRF calculates path loss for every radio to every cell on the floor plan. If the floor is 2,000 feet by 1,500 feet and grid cell size is 5 x 5 and there are 50 dual radio access points, then VisualRF will need to make 12,000,000 path loss calculations (400 cells * 300 cells * 100 radios).
- **Number of APs/Radios on a floor plan** – VisualRF calculates path loss for every radio to every cell on the floor plan.
- **Floor plan image size** – the bigger the file size the longer the floor will take to render.
- **Number of Rogue devices on a floor plan** – VisualRF calculates location for every rogue device heard by APs on the floor per the value of the rogue calculation timer.

Global Elements Impacting VisualRF Performance

- **Client Location Caching Timer** – This timer indicates how often VisualRF will calculate path loss and client location for every floor. A lower timer will ensure more accurate and timely client locations, but will also increase the load on your server.
- **Grid Cell Size** – The VisualRF service dissects each floor plan into a grid consisting of cells specified in this setting. Decreasing the grid cell size will increase accuracy, but it also increase CPU consumption by the floor caching threads and the location caching threads.

Identifying Performance Problems

- **Ensure all floors are calculating locations per specifications** – navigate to the **VisualRF → Floors** page.
- **Check Memory Utilization** – navigate to the **System → Performance** page and locate System Memory Usage graph. Ensure there is free memory. Check trending after adding new floors or making change to the **VisualRF → Setup** page.
- **Check Swap Utilization** – navigate to the **System → Performance** page and locate the System Swap Usage graph. Ensure the server is not swapping.
- **Check System CPU Utilization** – navigate to the **System → Performance** page and locate System CPU Utilization graph. Ensure the server has average idle time.
- **Check System Load Average** – navigate to the **System → Performance** page and locate the System Load Average graph. Ensure that load average is below 2 times the number of cores. For example if you have a dual dual-core server, the average load time should be at or below 8.

Resolving Performance Problem

- **Floor location calculation duration exceeding Client Location Timer**
 - Migrate to faster hardware
 - Increase Core Caching Threads
 - Increase Location Caching Threads
 - Decrease the Location Caching Timer
 - Increase Grid Cell Size
- **Memory or swap issues**
 - Add more memory
 - Reduce polling intervals on OV3600 on the **Group → Basic** page
 - Reduce polling interval polling router and switches

- **Server load issues**
 - Migrate to faster hardware
 - Decrease polling frequency of various polling buckets on Groups → Basics page
 - Increase the Client Location Caching Timer
 - Increase Cell Grid Size
 - Increase the Rogue Location Caching Timer
 - Tweak Rogue Location Filters

Consult the OV3600 Sizing Guide location on the **Home → Documentation page** to properly size your production server to properly support VisualRF.

Appendix B – CAD Importation

The Floor Plan Upload Wizard (FUW) should inherit all pertinent information from your CAD file.

FUW Importation Process

- **Determine UNITS** – all modern CAD versions (2001 and newer) support UNITS
- **Determine MEASURE** – Legacy CAD versions (2000 and older) used a simplistic Imperial or Metric system.
 - If UNITS are 0 or undefined, then the standard dictates defaulting to MEASURE value
 - If MEASURE is 0 or undefined, then the standard dictates defaulting to English and inches
- **Find Model** – If the drawing contains multiple views the FUW will default to the “Model” view
- **Determine Bounding Box** – FUW will encompass all lines and symbols on the drawing and create a bounding box which is generally smaller than entire drawing. It is based on the UNITS or MEASUREMENT above.
- **Convert to JPG** – FUW will convert the bounding box area to a JPG file with a resolution of 4096 horizontal pixels at 100% quality.
- **Start Web UI of FUW Step #1** – This is the cropping step.

Note: This and all subsequent steps are utilizing the the floor plan dimensions the image will provide.

MEASURE Meaning	MEASURE Value
English	0
Metric	1

Units Meaning	Units Value
Undefined	0
Inches	1
Feet	2
Miles	3
Millimeters	4
Centimeters	5
Meters	6
Kilometers	7
Microinches	8
Mils	9
Yards	10
Angstroms	11
Nanometers	12
Microns	13
Decimeters	14
Dekameters	15
Hectometers	16
Gigameters	17
Astronomical	18
LightYears	19
Parsecs	20

converted JPG file. The greater less clarity the background

Most Common Importation Problems

- Improper or undefined UNITS or MEASURE
- Text embedded into the Model view which causes an inconsistent bounding box
- Large dimensions which cause grainy resolution upon zoom
- Legacy CAD versions prior to Release 15 or AutoCAD 2000.

Ver. String	Meaning	Time Frame
AC1009	Release 9	1987
AC1010	Release 10	1988
AC1012	Release 11 & 12	1992
AC1013	Release 13	1994
AC1014	Release 14	1997
AC1015	Release 15	2000
AC1018	Release 18	2004
AC1021	Release 21	2007

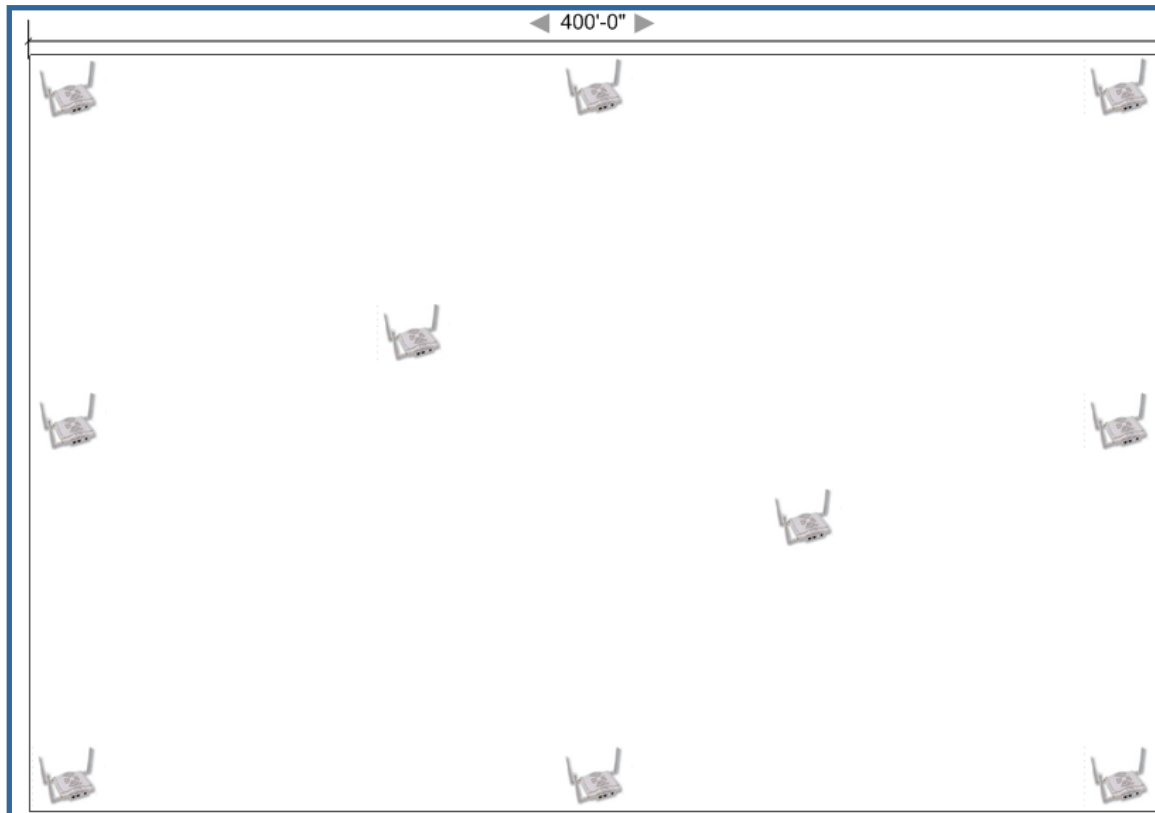
Appendix C – AP Deployment Planning for Location Accuracy

Deploying access points for client location accuracy can be different than deploying access points for capacity.

Rules of Thumb

- Ensure at least 3 radios can hear each client devices at -85 dBm or below
- Ensure you deploy an access point approximately every 3,500 square feet.
- For square or rectangular floor plans ensure access points are deployed on the exterior walls of each floor with access points in the middle as well.

Figure 58. “Rectangular Floor Plan AP Deployment Guide”



Appendix D – Batch Floor Plan Upload Wizard

This process provides the ability to automatically upload many CAD files and auto provision existing walls and access points.

Requirements

- Operating System: Client machine must be Windows XP or Windows Vista
- Flash: Version 9
- Browser: IE6 or IE7

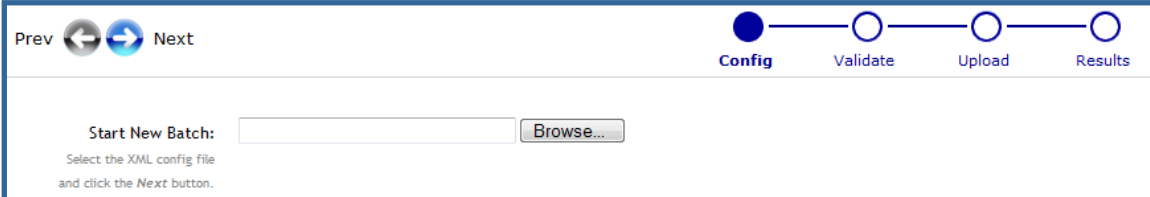
Pre Processing Steps



1. Increase Memory Allocation on **VisualRF → Setup** page
 - 25 floors or less 512 MB
 - 25 to 75 floors 1 GB
 - More than 75 floors 1.5 GB
 - massage the output data.
2. Increase the Location Caching Timer to 1 hour, so the VisualRF does not overload the server calculating client locations while calculating path loss and process floor plan images.

Upload Processing Steps

1. Create CAD XML files which contain drawing filename, dimensions and optional information like device manufacture and model, device coordinates, wall coordinates and building material.
 - This step is usually preformed by your facilities or CAD department.
 - The output of AutoCAD will not be properly formed XML, so you may need to massage the output data.
2. Copy all CAD drawings and corresponding XML files into a single directory on Windows machine. All files **must** be in a single directory.
3. Open IE 6 or 7 and navigate to your OV3600.
4. Navigate to https://<OV3600_NAME>/visualrf/site_batch.

Figure 59. “Batch CAD Importation Wizard”



Prev   Next

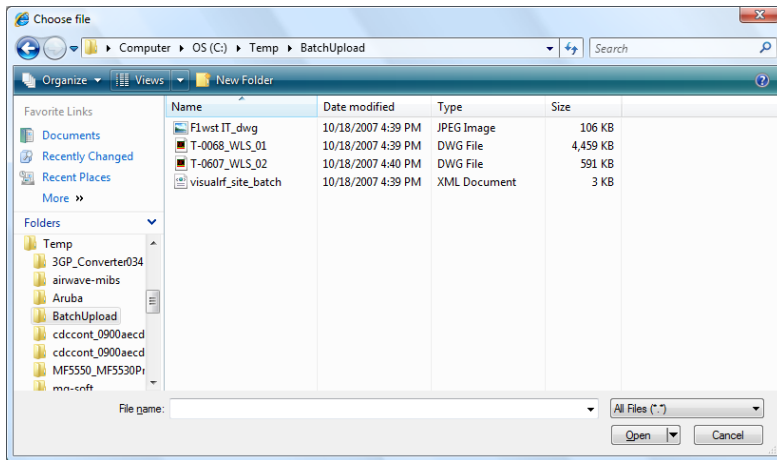
Config Validate Upload Results

Start New Batch:

Select the XML config file and click the Next button.

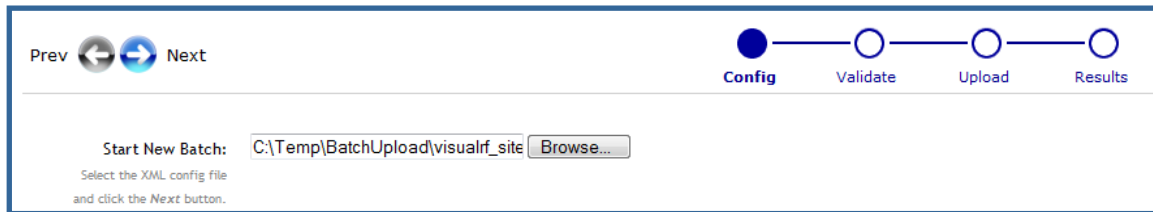
- Click on the Browse button which will launch the File Explorer Window

Figure 60. "File Explorer Window"



- Select the xml file containing the upload instructions and click the Open button
- The File Explorer Window will disappear you will return to the Batch Floor Upload Wizard

Figure 61. "Batch CAD Importation Wizard with upload Instruction File selected"



- Click Next button
- The application will validate the following information
 - Well formed XML
 - All drawing files are accessible
 - All APs are present
 - All Building and Campuses are present
- If there are any error **none** of the floor plans are created

Post Processing Steps

- Decrease the Location Caching Timer to previous value.
- Review the VisualRF → Floor Plans page to ensure server is keeping up.

Sample Upload Instruction XML File

```
<?xml version='1.0' encoding='ISO-8859-1'?>
<visualrf:site_batch xmlns:visualrf='http://www.Alcatel-Lucent.com'
  xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
  version='1' origin='lower-left'>
  <floor name='T-0607' number='21' building-id='218'>
    <image filename='T-0607_WLS_02.dwg' />
    <access-points>
      <access-point id="29648" x="177.51" y="293.15"/>
      <access-point id="29678" x="312.78" y="293.63"/>
      <access-point id="29746" x="450.95" y="292.60"/>
    </access-points>
  </floor>
</site_batch>
```

```
<access-point id="29741" x="384.51" y="358.78"/>
<access-point id="29682" x="417.12" y="431.99"/>
<access-point id="29751" x="243.33" y="358.51"/>
<access-point id="29620" x="385.79" y="223.88"/>
<access-point id="29734" x="244.34" y="224.19"/>
<access-point id="29644" x="192.79" y="414.77"/>
<access-point id="29748" x="259.15" y="432.62"/>
<access-point id="29692" x="309.50" y="415.45"/>
</access-points>
<walls>
  <wall type="4" x1="135.94" y1="159.43" x2="135.94" y2="453.16"/>
  <wall type="4" x1="135.04" y1="453.16" x2="439.83" y2="453.16"/>
  <wall type="4" x1="439.83" y1="453.16" x2="439.83" y2="418.16"/>
  <wall type="4" x1="439.83" y1="418.16" x2="465.71" y2="418.16"/>
  <wall type="4" x1="465.71" y1="418.16" x2="486.61" y2="405.60"/>
  <wall type="4" x1="486.61" y1="405.60" x2="486.61" y2="140.16"/>
  <wall type="4" x1="486.61" y1="140.16" x2="348.94" y2="140.16"/>
  <wall type="4" x1="348.94" y1="140.16" x2="486.61" y2="168.22"/>
  <wall type="4" x1="486.61" y1="168.22" x2="201.69" y2="168.22"/>
  <wall type="4" x1="201.69" y1="168.22" x2="201.69" y2="158.89"/>
  <wall type="4" x1="201.69" y1="158.89" x2="135.94" y2="158.89"/>
  <wall type="2" x1="136.69" y1="404.85" x2="449.13" y2="404.86"/>
  <wall type="2" x1="449.13" y1="404.86" x2="459.50" y2="394.45"/>
  <wall type="2" x1="459.50" y1="394.45" x2="459.48" y2="390.96"/>
  <wall type="2" x1="459.48" y1="390.96" x2="466.75" y2="390.87"/>
  <wall type="2" x1="466.75" y1="390.87" x2="471.75" y2="385.87"/>
  <wall type="2" x1="471.75" y1="385.87" x2="471.75" y2="378.52"/>
  <wall type="2" x1="471.75" y1="378.52" x2="485.85" y2="378.52"/>
</walls>
</floor>
<floor name='T-0068' number='22' building-id='218'>
  <image filename='T-0068_WLS_01.dwg'/>
</floor>
<floor name='Test JPG' number='23' building-id='218' width='523.34'
height='231.34'>
  <image filename='Flwst IT_dwg.jpg'/>
</floor>
</visualrf:site_batch>
```

Appendix E – MMS to OV3600 Floor Plan Conversion

The instructions below will enable you to seamlessly migrate all building, campus, and floor plan information previously entered into MMS.

Pre conversion checklist

- The conversion tool is only supported in **IE6** or **IE7**.

Prior to importing floor plans ensure you VisualRF's memory allocation is sufficient for the anticipated number of floors plans. To change the memory allocation, navigate to the **VisualRF → Setup** page and configure the memory allocation accordingly. Memory allocation should equal .5 GB for 1 – 75 floor plans, 1 GB for 76 – 250 floor plans, 1.5 GB for 251 – 500 floor plans, and 2 GB for 501 – 1,000 floor plans.

Note: Importing a large number of floor plans can impact performance of the OV3600 server. The VisualRF service must create a thumbnail, provision APs, create attenuation grid, and locate all clients on each imported floor plan. This can cause the VisualRF --> Floor Plans page to be unresponsive.

Process

- Navigate to **VisualRF → Import**
- Select the “Import floor plans from MMS” link
- Input the following information:
 - Host – enter the hostname or IP address of the MMS server
 - Username – enter the MMS administrative user account.
 - Password
 - Context (optional) – restrict to a particular building, campus context or leave blank for all floor plans.
- Click on the “Export” button and it will automatically redirect to the page below detailing the status of the export.

Figure 62. – MMS Export to AMP

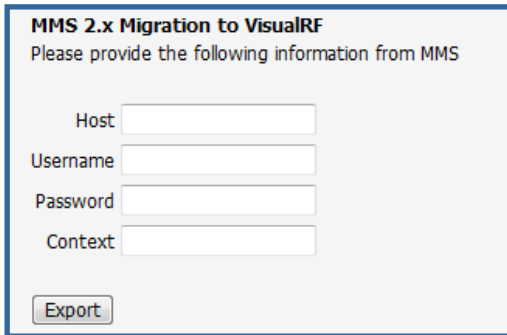


Figure 63. – MMS export status

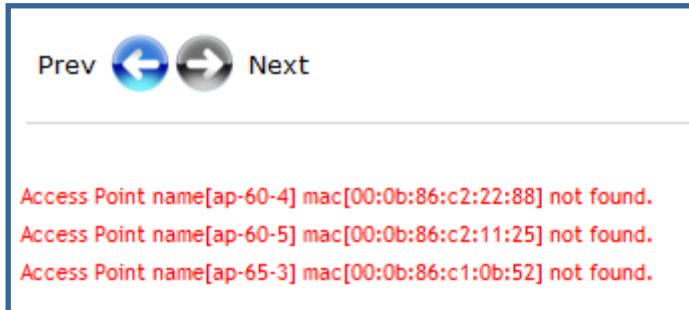
```

Performing MMS export
When this link <Validate> is available the MMS export is complete and ready for validation.
The output log will automatically refresh every 5 seconds until complete.

M2A login succeeded.
Converting MMS data model to AWP ...
Write campus [Main Campus]
Write campus [Dev Campus]
Write building [RF Lab]
Writing floor [RF Lab : Floor 1]
Writing floor image [/var/airwave/data/batch/0a05366b-cd14-46e7-85a9-8f5b728041dc/building--2689597b-118e295e4b5--7fcc.1.jpg]
Writing floor [RF Lab : Floor 2]
Writing floor image [/var/airwave/data/batch/0a05366b-cd14-46e7-85a9-8f5b728041dc/building--2689597b-118e295e4b5--7fcc.2.jpg]
Write campus [Campus13]
Write campus [Campus12]
Write campus [Campus11]
Write campus [Campus10]
Write building [Building 12]
Writing floor [Building 12 : Floor 1]
Writing floor image [/var/airwave/data/batch/0a05366b-cd14-46e7-85a9-8f5b728041dc/building-6766dea5-11959361124--7fdd.1.jpg]
Write building [Building 11]
Writing floor [Building 11 : Floor 1]
Writing floor image [/var/airwave/data/batch/0a05366b-cd14-46e7-85a9-8f5b728041dc/building-6766dea5-11959361124--7fdf.1.jpg]
Write building [Building 10]
Writing floor [Building 10 : Floor 1]
Writing floor image [/var/airwave/data/batch/0a05366b-cd14-46e7-85a9-8f5b728041dc/building-6766dea5-11959361124--7fel.1.jpg]
Write building [Building 9]
Writing floor [Building 9 : Floor 1]
Writing floor image [/var/airwave/data/batch/0a05366b-cd14-46e7-85a9-8f5b728041dc/building-6766dea5-11959361124--7fe3.1.jpg]
Write building [Building 8]
Writing floor [Building 8 : Floor 1]
Writing floor image [/var/airwave/data/batch/0a05366b-cd14-46e7-85a9-8f5b728041dc/building-6766dea5-11959361124--7fe5.1.jpg]
Write building [Building 7]
Writing floor [Building 7 : Floor 1]
    
```


- Once the exportation process is complete the <Validate> tag will change to clickable link.
- Click on the “Validate” link to validate the XML exported from MMS. This will automatically redirect you to the Bulk Importation Wizard.
- The program will automatically launch the Bulk Upload Wizard to import the exported floor plans into OV3600
- If there are errors in the XML you will the following information

Figure 64. – Validation Errors



- If there XML are no importation errors click on the “Next” button to complete the process.

Appendix F – Import Floor Plans from an Alcatel-Lucent WLAN Switch

The instructions below will enable you to seamlessly migrate all building, campus, and floor plan information previously entered into MMS.

Pre conversion checklist

- The conversion tool is only supported in **IE6** or **IE7**.

Prior to importing floor plans ensure you VisualRF's memory allocation is sufficient for the anticipated number of floors plans. To change the memory allocation, navigate to the **VisualRF → Setup** page and configure the memory allocation accordingly. Memory allocation should equal .5 GB for 1 – 75 floor plans, 1 GB for 76 – 250 floor plans, 1.5 GB for 251 – 500 floor plans, and 2 GB for 501 – 1,000 floor plans.

Note: Importing a large number of floor plans can impact performance of the OV3600 server. The VisualRF service must create a thumbnail, provision APs, create attenuation grid, and locate all clients on each imported floor plan. This can cause the VisualRF --> Floor Plans page to be unresponsive.

Process on Controller

- On the controller's UI navigate to the **Plan → Building List** page.
- Select the buildings to be exported and click on the "Export" button.
- When the dialog box appears, make sure that you have included all images and click the "Save" to a file button.

Process on OV3600

- Navigate to **VisualRF → Import**
- Select the "Import floor plans from MMS" link
- Click the "Begin Importing Floor Plans" link.
- Select the "Import floor plans from Alcatel-Lucent WLAN Switch" link
- When prompted for input file use the file saved from the controller process

Appendix G - VisualRF Location API

VisualRF provides the following location APIs:

- Site Inventory: [https://\[OV3600_host\]/visualrf/site.xml?site_id=...](https://[OV3600_host]/visualrf/site.xml?site_id=...)
 - You can find the site_id from the Floor Plan List query defined on the XML API page
 - This interface provides floor details including access points, walls, regions, surveys, etc.
 - The corresponding example XML and schema are attached in visualrf_site_inventory.*
- Device Location: [https://\[OV3600_host\]/visualrf/location.xml?mac=...](https://[OV3600_host]/visualrf/location.xml?mac=...)
 - Provide the radio MAC of the client to locate.
 - The corresponding site where the user was placed will be provided along with the dimensions
 - If a client is heard on multiple floors, it will only be placed on the floor that contains the AP it is associated with.

Sample Device Location Response

```
<visualrf:device_location version="1" xmlns:visualrf="www.Alcatel-Lucent.com">
  <device mac="00:13:02:C2:39:28" name="Peter"
    site_id="4f674301-4b47-4ac6-8417-4eba3f7df3a6"
    site_name="Alcatel-Lucent">
    <site-width>124.51</site-width>
    <site-height>161.14</site-height>
    <x>82.50</x>
    <y>37.50</y>
  </device>
</visualrf:device_location>
```

Sample Site Inventory Response

```
<ov3600:ov3600_site_inventory version="1"
  xmlns:ov3600=http://www.Alcatel-Lucent.com
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <site id="b45e7a49-23b5-4db0-891a-2e60bff90d2c" version="677">
    <name>Remax</name>
    <uom>ft</uom>
    <width>314.45</width>
    <height>425.88</height>
    <property name="site_owner" value="" format="" />
    <property name="name" value="Remax" format="" />
    <property name="installer" value="" format="" />
    <property name="planner" value="" format="" />
    <image type="background">
      <filename>/var/Alcatel-Lucent/snapshot/b45e7a49-23b5-4db0-891a-2e60bff90d2c.677/background.jpg</filename>
      <relative-url>/snapshot/b45e7a49-23b5-4db0-891a-2e60bff90d2c.677/background.jpg</relative-url>
      <pixel-width>1151</pixel-width>
      <pixel-height>1557</pixel-height>
    </image>
    <image type="thumbnail">
      <filename>/var/Alcatel-Lucent/snapshot/b45e7a49-23b5-4db0-891a-2e60bff90d2c.677/thumb.jpg</filename>
      <relative-url>/snapshot/b45e7a49-23b5-4db0-891a-2e60bff90d2c.677/thumb.jpg</relative-url>
```

```
<pixel-width>230</pixel-width>
<pixel-height>311</pixel-height>
</image>
<ap id="12615" name="AP-4000M-1">
  <x>118.97</x>
  <y>130.38</y>
  <total-bandwidth>0</total-bandwidth>
  <total-clients>0</total-clients>
  <status>down</status>
  <uptime>0.0</uptime>
  <radio index="1" phy="g" mac="00:20:A6:5A:63:66" beamwidth="0.0"
    gain="1.5" antenna="" orientation="0.0" mount="Ceiling"
    valid="false">
    <discovering-radio id="11276" index="1" dBm="-85" />
    <discovering-radio id="11828" index="1" dBm="-93" />
  </radio>
</ap>
</site>
</ov3600:ov3600_site_inventory>
```

Appendix H - VisualRF Diagnostics

The first place to check for performance issues is the **VisualRF → Floors** page. If any floor's location calculation duration exceeds the location caching timer value configured on **VisualRF → Setup** page, then VisualRF is not able to calculate locations for clients per your desired interval.

Basic Diagnostic Procedure

1. Review VisualRF log file see detail instructions below.
 - Check for validation errors
 - Check for timing errors
2. Review `ssl_error_log` and `error_log`
 - Check for out of memory errors
 - Check for Apache web server errors
3. Review VisualRF → Floor Plans page. It provides a complete status of how long each floor plan is taking to generate and when it will be generated next (you can tell if OV3600 is keeping up).
4. Review the System → Performance page ... could be out-of-memory on OV3600 or OV3600/Apache could be so bogged they can't service VRF.
5. Send customer support the VisualRF Diagnostic Tar file
 - Navigate to **VisualRF → Floor Plans** page
 - Click on Create VisualRF Diagnostic Tar File link
 - Save the tar file locally
 - Email tar file to support@Alcatel-Lucent.com

Note: If you file too large for your email system to process, call or email Alcatel-Lucent support to obtain an FTP location and account.

6. Review the `visualRF_poller` log file. It can impact the VisualRF → Floor Plans page. It will also tell you if VisualRF is correctly pushing info to OV3600.

Understanding APIs (What VisualRF Consumes from OV3600)

A great resource in diagnosing a problem is to review the data that is fed into VisualRF.

`ap_list.xml` – `<server.name>/ap_list.xml` – provides a full list of access points on the OV3600. It is the most important feed that VisualRF receives from OV3600. It enables VisualRF to build the AP List Tree Control and pointers into `ap_detail.xml`.

Sample Output

```
<ap id="11276">
  <firmware>4.1.171.0</firmware>
  <group id="1718">Acme Corp - IT</group>
  <is_up>true</is_up>
  <lan_ip>10.2.26.163</lan_ip>
  <lan_mac>00:12:80:AD:68:CC</lan_mac>
  <mfgr>Cisco</mfgr>
  <model id="88">Aironet 1130 LWAPP</model>
  <monitor_only>true</monitor_only>
  <name>HQ-BoardRoom</name>
  <radio index="1">
    <antenna>Side A</antenna>
    <channel>6</channel>
    <display_channel>6</display_channel>
```

```

<enabled>>true</enabled>
<radio_mac>00:12:44:B1:42:20</radio_mac>
<radio_type>g</radio_type>
<transmit_power>1</transmit_power>      /* xmit power required */
</radio>
<radio index="2">
  <channel>64</channel>
  <display_channel>36</display_channel>
  <enabled>true</enabled>
  <radio_mac>00:12:44:B1:42:20</radio_mac>
  <radio_type>a</radio_type>
  <transmit_power>1</transmit_power>
</radio>
<serial_number>FTX0851T0E3</serial_number>
</ap>

```

ap_list.xml Issues

- Unable to access the API
Resolution – ensure OV3600 Administrator has proper credentials
- Missing or invalid PHY type (<radio_type> element) will cause problems within VisualRF.
Resolution – (1) fetch settings from devices, (2) ensure OV3600 can properly fetch information from a device by check credentials, and (3) remove down device or use the replace hardware button.
- Radio is down (<enabled>>false</enabled>) will disable heatmaps and client placement for that radio
Resolution – Enable radio
- Device down (<is_up>>false</is_up>) will disable heatmaps and client placement for radios associated with this device
- Transmit Power (<xmit-power> element) must be populate and valid for the PHY or VisualRF will not display heatmaps for the radio.

ap_detail.xml – <server.name>/ap_detail.xml?id=<ap_id> – provides detailed information about individual devices including what APs each radio hears, what clients are associated with each radio, what unassociated clients each radio hears, and what rogue devices each radio hears. AP Detail is crucial for properly locating clients and calculating dynamic Path Loss.

Example AP Detail XML

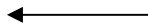
<pre> <ap id="11277"> <is_up>true</is_up> <snmp_uptime>100.00</snmp_uptime> <radio index="1"> <radio_type>g</radio_type> <bw>5</bw> <radio_type>g</radio_type> <client id="151110"> <assoc_stat>true</assoc_stat> <auth_stat>true</auth_stat> <ip>10.2.27.37</ip> <name>bryan</name> <radio_mac>00:0B:7D:06:D1:4F</radio_mac> <rssi>42</rssi> <signal>-57</signal> <snr>27</snr> <vendor>SOLOMON EXTREME INTERNATIONAL LTD.</vendor> </client> </radio> </ap> </pre>	<p>← AP Information Status Uptime</p> <p>← Radio Information PHY BW</p> <p>← Client Information Name Auth BW Signal <i>Key metric for VisualRF (dBm)</i></p>
--	---

```

</client>
<client id="246429">
  <assoc_stat>>false</assoc_stat> /* Unassociated client info */
  <auth_stat>>false</auth_stat>
  <radio_mac>00:0B:7D:11:94:A0</radio_mac>
  <signal>-70</signal>
  <snr>15</snr>
</client>
<neighbor_ap id="11906">
  <channel>6</channel>
  <name>TroposGateway</name>
  <neighbor_mode>ap</neighbor_mode>
  <neighbor_type>managed</neighbor_type> /*Managed Neighbor */
  <radio_mac>00:0D:97:04:0F:BB</radio_mac>
  <rsssi>-57</rsssi>
  <security>none</security>
  <signal>-57</signal>
  <snr>31</snr>
  <vendor>Tropos Networks, Inc.</vendor>
</neighbor_ap>
<neighbor_ap id="19992">
  <channel>7</channel>
  <name>Cisco-5A:AF:E0</name>
  <neighbor_mode>ap</neighbor_mode> /* Rogue Neighbor */
  <neighbor_type>rogue</neighbor_type>
  <radio_mac>00:14:1B:5A:AF:E0</radio_mac>
  <rsssi>-65</rsssi>
  <security>WEP</security>
  <signal>-65</signal>
  <snr>27</snr>
  <ssid>workiosauth</ssid>
  <vendor>Cisco</vendor>
</neighbor_ap>
</radio>
</ap>

```

Neighbor Information
 Vendor
 Mode
 Signal
Key metric for VisualRF (dBm)



visualrf/cache_stats.xml – <server.name>/visualrf/cache_stats.xml – provides detailed information on how long each floor is taking to process coupled within a breakdown of all the processes which encompassed in the caching process. It tells you how long the ap_list.xml took to run for this site and how long the ap_detail.xml took to run for this site. It also tells you how many radios, rogues, and clients are on the device.

Example cache_stats XML

```

<sites interval="120" rogue-interval="900">
  <site id="4f674301-4b47-4ac6-8417-4eba3f7df3a6" version="621">
    <building>Borel</building>
    <floor>5.0</floor>
    <name>Alcatel-Lucent</name>
    <radio-count>8</radio-count>
    <cache rev="0" start="2007-07-09T17:04:40-07:00" time="0.00"
      next="0.00">
      <start>2007-07-09T17:04:40-07:00</start>
      <end>In Progress</end>
      <last-rogue-placement>2007-07-09T16:51:02-07:00</last-rogue-
        placement>
    </cache>
  </site>
</sites>

```



```
<time>0.00</time>
<next>0.00</next>
<ap-list-time>0.12</ap-list-time>
<ap-detail-time>6.07</ap-detail-time>
<clients-placed>0</clients-placed>
<client-hits>0</client-hits>
<rogues-placed>0</rogues-placed>
<rogue-hits>0</rogue-hits>
</cache>
</site>
</sites>
```

Review Visualrf.log

visualrf.log – /var/log/visualrf.log or link from System → Status → VisualRF Engine – this file is very useful for diagnosing location, caching, and site storage engine.

What visualrf.log will tell you?

- Is the VisualRF service running on OV3600?
- If the service is not running why it is not running?
- Data validation errors

Actual Log File where uploaded CAD file exceed the 10 Meg limitations

```
MaxReadBytesException: Content length exceeded (14172329 > 10485760)
    at com.Alcatel-Lucent.core.http.MultipartRequest.initParser(MultipartRequest.java:620)
    at com.Alcatel-Lucent.core.http.MultipartRequest.<init>(MultipartRequest.java:408)
    at com.Alcatel-Lucent.svg.init.RequestHandler.contentParser(RequestHandler.java:892)
    at com.Alcatel-Lucent.svg.init.RequestHandler.run(RequestHandler.java:67)
    at java.util.concurrent.Executors$RunnableAdapter.call(Unknown Source)
    at java.util.concurrent.FutureTask$Sync.innerRun(Unknown Source)
    at java.util.concurrent.FutureTask.run(Unknown Source)
    at java.util.concurrent.ThreadPoolExecutor$Worker.runTask(Unknown Source)
    at java.util.concurrent.ThreadPoolExecutor$Worker.run(Unknown Source)
    at java.lang.Thread.run(Unknown Source)
```

Actual Log File with “No Radio” issues fixed in 5.2rc3

```
java.lang.RuntimeException: placement requires at least one RadioConfig
    at com.Alcatel-Lucent.rf.PlacementService.locate(PlacementService.java:65)
    at com.Alcatel-Lucent.svg.LocationServiceImpl.probability(LocationServiceImpl.java:213)
    at com.Alcatel-Lucent.svg.LocationServiceImpl.get(LocationServiceImpl.java:317)
    at com.Alcatel-Lucent.svg.SiteCoordinatorImpl$1.call(SiteCoordinatorImpl.java:885)
    at com.Alcatel-Lucent.svg.SiteCoordinatorImpl$1.call(SiteCoordinatorImpl.java:882)
    at java.util.concurrent.FutureTask$Sync.innerRun(Unknown Source)
    at java.util.concurrent.FutureTask.run(Unknown Source)
    at java.util.concurrent.Executors$RunnableAdapter.call(Unknown Source)
    at java.util.concurrent.FutureTask$Sync.innerRun(Unknown Source)
    at java.util.concurrent.FutureTask.run(Unknown Source)
    at java.util.concurrent.ThreadPoolExecutor$Worker.runTask(Unknown Source)
    at java.util.concurrent.ThreadPoolExecutor$Worker.run(Unknown Source)
    at java.lang.Thread.run(Unknown Source)
2007-07-17 08:54:37,006 ERROR Placemen[1] com.Alcatel-Lucent.svg.LocationServiceImpl get
java.lang.RuntimeException: placement requires at least one RadioConfig
    at com.Alcatel-Lucent.rf.PlacementService.locate(PlacementService.java:65)
    at com.Alcatel-Lucent.svg.LocationServiceImpl.probability(LocationServiceImpl.java:213)
    at com.Alcatel-Lucent.svg.LocationServiceImpl.get(LocationServiceImpl.java:317)
    at com.Alcatel-Lucent.svg.SiteCoordinatorImpl$1.call(SiteCoordinatorImpl.java:885)
```

Actual Log File with Sample Processing Output and Warning Messages

```
2007-07-11 10:19:34,440 INFO Placemen[1] com.Alcatel-
Lucent.svg.LocationServiceImpl [gun|00:A0:F8:58:DF:3B] placed [430,400]
[14,14]
```

The location service thread #1 placed the MAC 00:A0:F8:58:3B of type "gun" at coordinates 430,400 and 14 radios heard the client and were used in placement of the client.

```
2007-07-11 17:53:12,743 INFO CacheService com.Alcatel-
Lucent.ov3600.APInventoryParserImpl URL [https://localhost:443/ap_list.xml]
2007-07-11 17:53:12,950 WARN CacheService com.Alcatel-
Lucent.core.xml.Validator validation error at (345, 30) [cvc-pattern-valid:
Value '' is not facet-valid with respect to pattern '[0-9A-F][0-9A-F]:[0-9A-
F][0-9A-F]:[0-9A-F][0-9A-F]:[0-9A-F][0-9A-F]:[0-9A-F][0-9A-F]:[0-9A-F][0-9A-
F]' for type 'mactype'.]
```

The caching service is warning that ap_list.xml is providing an invalid MAC address at line 345 position 30. If you generate an ap_list.xml you see the following information at line 345 position 30.

```
<radio index="1">
  <channel>6</channel>
  <display_channel>6</display_channel>
  <enabled>true</enabled>
  <radio_mac /> No radio MAC, it should be <radio_mac>00:01:02:03:04:05</radio_mac>
  <radio_type>g</radio_type>
  <transmit_power>Unsupported</transmit_power>
</radio>
```

Review Visualrf_poller.log

visualrf_poller – /var/log/visualrf_poller.log or link from System → Status → VisualRF Poller – this file is useful in diagnosing communication problems between OV3600 and the VisualRF engine.

What visualrf_poller.log will tell you?

- Can OV3600 retrieve floor plan information from the VisualRF server?
- Can OV3600 retrieve floor location and Path Loss calculation timing

Actual Log File containing and encoding problem between VisualRF and OV3600

```
Can't call method "update" on an undefined value at /usr/local/Alcatel-
Lucent/lib/perl/Mercury/Daemon/VisualRFPoller.pm line 51.
```

```
Started: Mon Jul 9 17:37:10 2007
```

```
Mon Jul 9 17:37:55 2007: Postgres PID: 26246
```

```
Can't call method "update" on an undefined value at /usr/local/Alcatel-
Lucent/lib/perl/Mercury/Daemon/VisualRFPoller.pm line 51.
```

```
Started: Mon Jul 9 17:38:10 2007
```

Resolution – send output of <IP of OV3600>/ visualrf/cache_stats.xml to support@Alcatel-Lucent.com

Review ssl_error.log

httpd/ssl_error_log – /var/log/httpd/ssl_error-log or link from System → Status → Web Server – this file is useful for diagnosing VisualRF problems.

What ssl_error.log will tell you?

- Am I having permission problems?
- Connection timeout warnings

Review error.log

httpd/error_log – /var/log/httpd/error-log there is no link from the System → Status page for this log file. From the command line (1) type `log`, (2) type `cd httpd`, and (3) type `more error.log`

What error.log will tell you?

- Is the VisualRF service running out of memory?
- Is the VisualRF service running out of connections?

Review catalog-repository file

catalog-repository.xml – /var/www/html/static on your OV3600. It is the master repository for RF information used in calculating coverage and heatmaps. It contains receive sensitivity and external antenna information for every MFG/Model radio.

What catalog-repository.xml will tell you?

- Does Alcatel-Lucent have a definition for the MFG/Model that is experiencing a problem?
- Are there inconsistencies between OV3600's possible transmit powers and the catalog's definition?
- Are there inconsistencies between OV3600's possible channels and the catalog's definition?

VisualRF Log file related to Catalog Errors

```
2007-06-04 12:31:56,062 ERROR Alcatel-  
Lucent.Core.Info.Xml.XmlSchemaRepository  
- OV3600 ID[74] Name[MAC_WLC_4402] Access Point manufacturer[Cisco]  
model[Airespace 4400] PHY[] not found.
```

Note: This is normal for a controller, because it does not contain a radio interface and is not found in the catalog.

```
2007-06-04 12:31:56,125 ERROR Alcatel-  
Lucent.Core.Info.Xml.XmlSchemaRepository  
- OV3600 ID[95] Name[cal200hotspotC] Access Point manufacturer[Cisco]  
model[Aironet 1200 IOS] PHY[] not found.
```

Note: This 1200 IOS access point is reporting a NULL PHY which means that OV3600 does not know what type of radios are in the access point. You can rectify this using the "POLL NOW" button in combination to ensuring device credentials are correct.

```
2007-06-04 12:31:56,125 ERROR Alcatel-  
Lucent.Core.Info.Xml.XmlSchemaRepository  
- OV3600 ID[97] Name[cal130a] Radio Channel[116] is not valid for Radio[2]  
defined for access point manufacturer[Cisco] model[Aironet 1130 LWAPP].
```

Note: This means the Catalog does not contain the European mid-high channel bands. This requires and update to the catalog file. Email support@Alcatel-Lucent.com with the log snippet.

```
2007-06-04 12:31:56,125 ERROR Alcatel-  
Lucent.Core.Info.Xml.XmlSchemaRepository  
- OV3600 ID[100] Name[cal1000c] Radio Channel[132] is not valid for Radio[2]  
defined for access point manufacturer[Cisco] model[Aironet 1030 LWAPP].
```

Note: This means the Catalog does not contain the European mid-high channel bands. This requires and update to the catalog file. Email support@Alcatel-Lucent.com with the log snippet.

VisualRF's File Structure on the OV3600 Server

/var/Alcatel-Lucent/cache – where VisualRF keeps a local copy of sites loaded in memory

version – This file contains the running version of the VisualRF engine.

sites.xml – This file contains the output from querying site_list.xml. This file should contain an entry for every site posted to OV3600.

```
<site site_id="4f674301-4b47-4ac6-8417-4eba3f7df3a6">
  <num_aps>3</num_aps>
  <site_name>Alcatel-Lucent Office San Mateo</site_name>
  <site_version>298</site_version>
</site>
<site site_id="71cfbef0-587a-4322-9e4e-5a521fb15908">
  <num_aps>5</num_aps>
  <site_name>Gym Revamp</site_name>_name>
  <site_version>330</site_version>
</site>
```

site sub-directory – There should be a sub-directory matching the site_id for each site listed in sites.xml.

- /var/Alcatel-Lucent/cache/4f674301-4b47-4ac6-8417-4eba3f7df3a6
 - ap_detail.xml – the last query with all access points in inventory.xml
 - ap_list.xml – the last query with all access points in inventory.xml
 - inventory.xml – all access points and their locations on this site
 - backup.svg – for legacy system conversions prior to 5.2
 - backup.xml – for legacy system conversions prior to 5.2
 - resize.xml – xml file of the latest floor plan resizing
 - posted.xml – xml file of the last update relate to the floor plan
 - site.zip – legacy AWSP files