

# Seven Rules for Accurate Site Surveys

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The process of gathering appropriate and accurate data during a Site Survey is as simple as following a few easy rules.

Break the rules, however, and you could end up with totally useless - but colorful - Heat Maps that have no value to your organization.

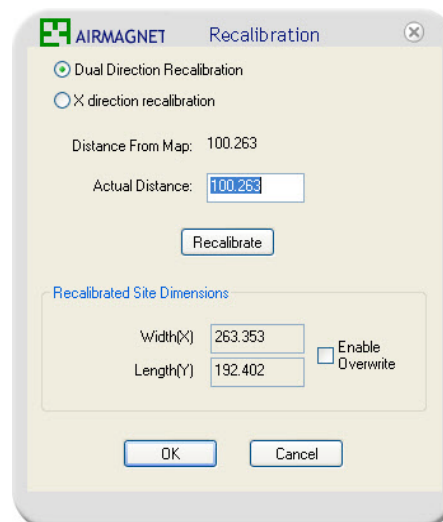
These rules have been gleaned through hundreds of site surveys and through teaching over hundreds networking professionals how to use Site Survey products.

## Rule 1 - Calibrate Your Drawing Properly

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Setting the underlying 'grid' is critical. If you don't accurately calibrate the drawing to reflect the reality of the actual building, with the drawing on your screen - all your data will be virtually worthless. This is #1 in the list because it is the most important step, and you should always do it correctly as soon as you open a new project.

Do not use a doorway as your 'baseline' to calibrate from. Use a longer dimension, as long as you can measure. I use a Laser measuring device that works out to 50m or so. Measuring wheels, long tape measures, laser, or sonar all work; just try to find the longest edge. You only need to have one dimension to accurately calibrate a drawing that comes to you with the correct aspect ratio.

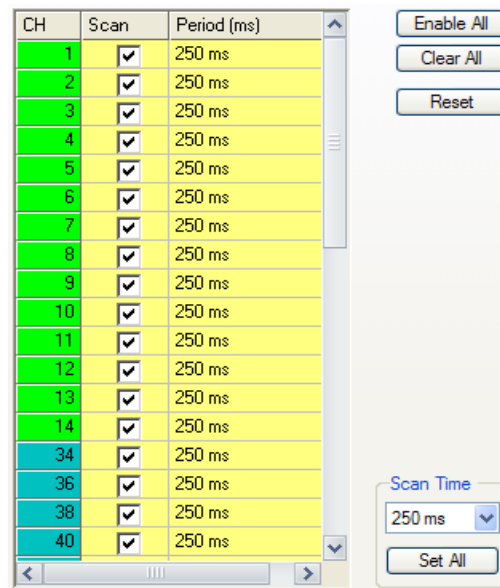


Better yet, have the CAD folks drop a Dimension Line underneath the actual building on the drawing to give you an even more accurate line to calibrate against.

**Note:** While we're on the subject of the drawing, simplify your drawings as much as possible, using only black and white. 'Flatten' the drawing down to just the simple floor plan, no need for furniture, plants, where the jacks are located. Just simple black on white walls in your drawing is best.

## Rule 2 - Set the Channel Scan to the Correct Frequencies

Scan ONLY the channels you want, and don't scan the channels you don't want. This sounds simple... but making a mistake here can cost you greatly in the accuracy of the post survey data. If you 'accidentally' set it to scan ALL channels (over 200 are available to scan) - even at only 250 ms each (1/4 second) the system will nearly a minute of time to return back to the starting channel. (and you can walk quite a long way in a minute!)



CH	Scan	Period (ms)
1	<input checked="" type="checkbox"/>	250 ms
2	<input checked="" type="checkbox"/>	250 ms
3	<input checked="" type="checkbox"/>	250 ms
4	<input checked="" type="checkbox"/>	250 ms
5	<input checked="" type="checkbox"/>	250 ms
6	<input checked="" type="checkbox"/>	250 ms
7	<input checked="" type="checkbox"/>	250 ms
8	<input checked="" type="checkbox"/>	250 ms
9	<input checked="" type="checkbox"/>	250 ms
10	<input checked="" type="checkbox"/>	250 ms
11	<input checked="" type="checkbox"/>	250 ms
12	<input checked="" type="checkbox"/>	250 ms
13	<input checked="" type="checkbox"/>	250 ms
14	<input checked="" type="checkbox"/>	250 ms
34	<input checked="" type="checkbox"/>	250 ms
36	<input checked="" type="checkbox"/>	250 ms
38	<input checked="" type="checkbox"/>	250 ms
40	<input checked="" type="checkbox"/>	250 ms

I recommend setting the scan channels to the 11 (or 13) base 2.4 GHz channels and the 5 GHz channels for your regulatory domain (in the US this can be the 4 Indoor Only, plus the 4 Indoor or outdoor channels) and do a passive survey of the outside perimeter of your building first.

This will give you a nice capture of your neighbors, as well as your 'leaking' RF. But better yet - it will give you a nice set of channels to concentrate on when moving indoors to do the real Site Surveys.

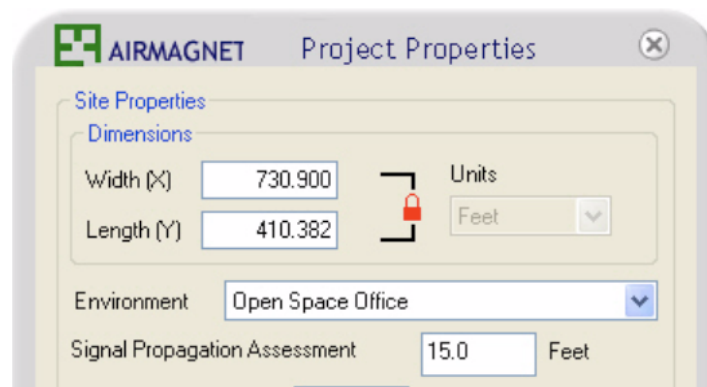
Perhaps even do two survey walks, one for 2.4 GHz and one for 5 GHz channels. That, or watch the bottom left corner of your survey screen and don't move to the next data capture point until the channel scan marker returns back to '1'.

*Scan what you want, and don't scan what you don't want!*

## Rule 3 - Set Your Guess Range Properly

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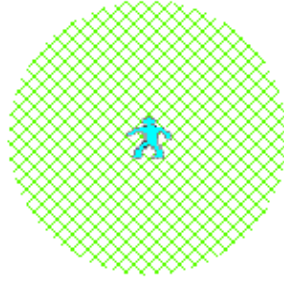
This goes by the more professional term 'Signal Propagation Assessment' - but it basically means how far do you want your Site Survey application to 'guess' (Interpolate) in between your captured data points.



A **really** accurate survey would set this down to one meter. But the problem there would be that you'd have to go and click on every single meter of space in your building. Accurate yes, but practical, no.

Or the opposite, go to the center of your building and take a single data snapshot... then set the Guess Range to 50 meters... This one is easy and quick, but not accurate at all.

Reality is somewhere in between. Most survey applications have a couple of pre-defined options for you. You do not have to use these pre-defined Signal Propagation Assessment (SPA) numbers. Use what you think appropriate for your site; the smaller the better. It will force you to take more data points and thus get more accuracy.



For most indoor buildings, I like about a 5m Signal Propagation Assessment value.

## Rule 4 - Set Appropriate 'Snap Rate' For Your Situation

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The automatic snap rate is based on a time. You set the number of seconds when your survey application will take an extra 'snapshot' of your RF information. Too fast and you'll get 'blue lines' with too much information and slow down your processing. Too few and your snaps will be too spread out. (Think of Goldilocks... just right...)

The screenshot shows a settings window with several tabs: Settings, AP Grouping, Color, 802.11, Scan, MapPoint, and Profile. The 'Settings' tab is active. It contains three main sections:

- AP Survey data:** A text input field for 'Ignore APs whose max discovered signal is less than' is set to '-100'. The unit is 'dBm when opening survey data files'. A checkbox labeled 'Hide ignored Access Point' is checked.
- Logging data:** A text input field for 'Auto logging data period' is set to '1'. The unit is 'seconds'. A checkbox labeled 'Beep when logging data' is checked.
- Sampling options:** Two radio buttons are present: 'Auto sampling through path' (which is selected) and 'Sampling on click only'.

If you are doing a Manual (red-dot-only) survey - be sure to take a snapshot no further than what your SPA is set to. So if you set your 'Guess Range' or SPA at 5m, you must take a snapshot (click) at least every 5m.

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## Rule 5 - Capture on Both Sides of What You Care About

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No '*One Way Guesses*'. This happens when you don't capture on both sides of what you care about. If you take one data capture point on the inside perimeter of your building, and don't also take one on the outside, then your survey application won't know anything about the 'thickness' (in RF Attenuation) of the exterior wall. It 'learns' this by having data captures on both sides of the wall.

If you don't care about the RF leaking outside, then this is fine. But if you do care about some area, whether it is inside or outside, you must do data captures on both sides.

Thus another corollary to this rule - **Capture Outside In, Not Inside Out**. Capture on the perimeters of the rooms you want to prove coverage - not one single shot from the center of each room.

One additional part to this rule; If you have 'special' places you need to be real sure about - then take extra data captures at those locations, ie. CEO's desk, Board Room, etc.

## Rule 6 - Click Accurately

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You don't actually walk through walls, walk on water, or fly when you are doing a Site Survey - don't have your data look like you did or your credibility will be shot.

Prepare your walking paths in advance. You might even put little numbers on your drawing before you import it with the locations where you want to click (capture data) - and then you'll just have to play 'connect the dots' with your feet later during the survey.

The old adage, Fail to Plan means Plan to Fail... holds true in this respect. I've seen many people who get lost, or get stuck down the end of a hallway and don't seem to know what to do with the Survey, or where to go next. Preparation is key on this point.

If you can't easily find yourself on the floor plan - it is a skill that can be practiced you know - then work on it until you are comfortable moving around in three-dimensional space.

When you are doing an AirMagnet Survey 'manual' survey, with red dots only, the dots are connected with dashed lines. These dashed lines,

without blue dots, can go through walls, walk on water, and fly... it's the autosnap blue dots we worry about.

**Note:** Here's a trick to use while doing a survey. While standing still at the end of one data capture point, place your mouse cursor at the next place you plan on stopping, then start walking. When you arrive at the designated point, you only need to 'click' and the data point is collected right under where the cursor was waiting.

Anytime you can see a specific marking on a blueprint or floor plan, add a click for accuracy. Of course, you could walk the entire hall and your survey application would place all the data points as soon as you finished the length of the hall. But accuracy improves as you have accurate intermediate click points.

If you don't go to all the locations and click accurately, you'll be tempted to increase your SPA to 'fill in' the missing data points. (no one likes to see white spots on their heat maps).

## Rule 7 - Always, Always Do A Passive Survey

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You might have a reason to also do an Active Survey, (*see Passive vs. Active Surveys article*) but you ALWAYS must do a Passive Survey on the entire building you care about. I'd also recommend doing a Passive Survey on the exterior of the building as well.

A Passive Survey can give you information on your neighbors, others, and all of your own devices.

This is especially important for determining RF interference. If you don't have neighbor information in your Active Survey, you can easily miss the interference on specific frequencies. Additionally, this can show you where your 'collision domains' are.

In addition to these rules that pertain to Passive Surveys, Active Surveys have some rules of their own.

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## Additional Rules for Active Surveys

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### **Capture Data from ALL Access Points**

It is quite easy to do an active survey and only get data on a subset of your Access Points. You can merge this with a Passive Survey data set and end up with what looks like an accurate survey, but it is NOT. You need to have ALL Access Points included in your Active Survey for accurate representation of your RF WLAN environment.

### **Capture To The Edge**

When capturing Active Survey data from an Access Point, it is easy to not go to the edge of the coverage area... it's so far to walk - so we might stop as soon as we can see the coverage meets some design goal, like -65dBm. But this is where the failure lies. The easiest requirement to design for a WLAN is RF Coverage, but it is only the first of many requirements (see False God of dB article). The hard thing to deal with is the interference, and you'll only learn about this if you capture data to the edge of each Access Point's coverage area. (*yes, I know this is hard and expensive to do!*)

### **Do NOT Set Roaming To Be Too Aggressive**

I understand you may have the great power to over-ride the WLAN NIC's roaming decision process with your survey application's roaming options feature. This makes surveying much faster and easier. Don't succumb to the temptation! If you set the Roaming Option to only connect at 54, 48, and 36 data rates, then your data will only show 54, 48, and 36 data rates. Since you didn't capture the other data rate information, your report won't show it to you.

In reality, your client cards will roam according to their own algorithms and will downgrade to whatever data rates are supported in the Access Points.

And another adage that should always be remembered with respect to wireless LANs - *just because you can, doesn't mean that you should.*

### **De-Skew Data In Sticky Situations**

Sometimes when taking an Active Survey the data gets a bit 'skewed' in the direction of travel: away from the access points. If this is the case you'll need to do two Active Surveys for each access point, one clockwise and one counter-clockwise and then merge those together to 'de-skew' the stickiness.

## Merge All Actives Before Merging With Passive

Just like it says.

## If You Don't Do Active Surveys Right - Don't Do Active Surveys At All

If you do Active Surveys wrong, you'll end up with a less-accurate and 'worse' data set than not doing any Actives at all.

## Conclusions

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Obey these rules or else... Or else the data you capture will be suspect at best, and totally useless at worst.

Also - don't let your sub-contractors break the rules or 'cheat' on you either. Check out the *How to 'Cheat' Using Survey - Don't be a Victim* article.

Keith Parsons, CWNE #3  
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### Additional Articles for Supporting WLAN Site Surveys

- 7 Rules for Accurate Site Surveys
- How to 'Cheat' On A Survey - Don't be a Victim
- How to Properly Analyze Survey Data
- The Fallacy of Channel Overlap
- Predictive Survey vs Onsite Survey - What's the Big Deal?
- How to 'Spec' your Network's Physical Layer
- Want, Don't Want, Don't Care - Meeting Design Specs
- The Truth about SNR - Where Did that 'N' Come From Anyway?
- What is an Access Point Anyway - Hub, Bridge, Switch or Router?
- Passive vs Active - What's All the Fuss About
- The False God of dB
- Meeting All Device Design Parameters