Site Survey Best Practices

How to Survey Sites Efficiently and Accurately

White Paper

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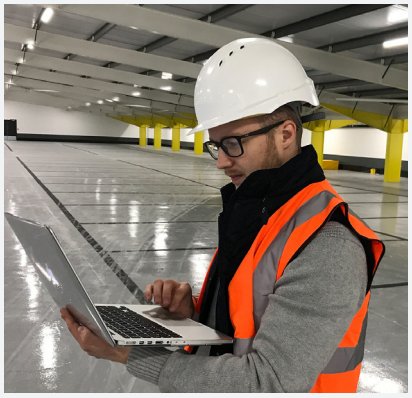
Thesis Statement: How to Survey Sites Efficiently and Accurately



Site Survey Best Practices

INTRODUCTION

Why to survey

Before a discussion of how to best conduct a site survey (and what things to take into consideration) it's important to understand why a site survey should be performed in the first place. At its most basic, a site survey is performed in order to collect empirical data of the RF at a site. This can then be used to drive reliable analysis of the wireless network coverage and performance. Whether conducting the survey before the deployment or after, this goal still applies - survey data will be used to understand the RF situation.

Leveraging data obtained from a survey, you will be able to take actionable steps to address any network deficiencies found, or feel confident that the network is performing as best as can be expected. A site survey has a key benefit that planning does not, it is measured data taken at the location of the network. Planning helps minimize repeated repositioning of APs, but only a survey allows us to state confidently that the results of the plan worked out correct, that the installation went according to plan, and that the network users will have reliable wireless connectivity.

When to survey

A site survey can be performed at any time, but the goals and value of a survey will vary depending on when it was conducted. The three general timeframes for conducting a site survey are: pre-deployment, post- deployment, and mid-operation.

A. Pre-deployment

A pre-deployment survey is done to understand a site's characteristics before deployment. There may be an existing network already in place that will be replaced/upgraded, for instance, so collecting current survey data on an existing network will help to understand performance that is intended to be improved with the new network plan. When there is no network in place, the RF nature of a site (and any neighboring networks) can be captured by a site survey to understand what issues will need to be dealt with in the coming deployment and planning cycle.

There is one particular method of a pre-deployment survey which deserves special mention, and that is AP-on-a-Stick.

AP-on-a-Stick: a specific type of pre-deployment survey in which a single 'test' AP is brought along to the site and used to mimic AP coverage. This test AP is typically mounted on a tripod (the 'stick') in an anticipated AP installation location, and the surveyor will walk the area around that AP to understand the limits of coverage and attenuation factors within the building that impact the RF in that area. The AP can then be moved to a new location and the steps repeated. Once several locations have been walked and mapped, the results can be merged together to create a virtual heatmap similar to what one would expect if the network truly had multiple APs in place. One large benefit to the AP-on-a-Stick methodology is that the intended AP model for installation can be used, so a very accurate feel of the AP, antennas, and transmit/receive characteristics can be obtained in the specific building environment.

A pre-deployment survey is done to understand a site's characteristics before deployment.

AP-on-a-Stick
This test AP is typically mounted on a tripod (the 'stick') in an anticipated AP installation location, and the surveyor will walk the area around that AP...

B. Post-Deployment

A post-deployment site survey, also referred to as a verification survey, is what most people think of when someone mentions performing a site survey. After a new site design has been completed and APs have been installed (often by contractors), a site survey is performed to confirm the network is performing as expected. There are a number of network issues that can be caught at this stage. If an AP was misconfigured, improperly installed, or misaligned, it can be caught as the coverage maps will look different than predicted in the plan. A post-deployment survey can also help to catch environmental situations that can't be determined from a floorplan. Neighboring APs, offce furniture, as well as interfering equipment can all cause network issues but would not necessarily be known during the planning phase. A post-deployment survey is successful when it either confirms that the performance meets the design expectations or it catches and allows for correction of factors that prevented the network from meeting expectations.

C. Mid-Operation

While often overlooked as a diagnostic tool, a site survey can also be done during normal operation of a network to understand limitations or gather data on systemic issues experienced throughout a site. Such a site survey is intended to capture information to help determine what may have changed at a site compared to known good data (such as a post-deployment validation survey), or to push the limits of the network in a way that wasn't previously considered.

A NOTE ON PLANNING

The need for site surveys should not be taken as an indication that planning is less important or unnecessary. A site survey augments planning in a positive way, whether it is a pre-deployment survey done to characterize the environment, or post-deployment survey to ensure the installation was done correctly. The costs of a deployment would be much higher if the planning step was skipped. No amount of surveying will eliminate the need for solid planning, just as there is no amount of planning that will completely eliminate the need for a reliable site survey.

THE DIFFERENT TYPES OF SURVEYS

The following are several different types of surveys supported in most site-survey tools:

Passive

You can't accurately understand an RF environment without knowing everything going on in the air. A passive survey allows the user to understand all the AP and channel usage at a location so that you can adjust the network to perform optimally.

What it is

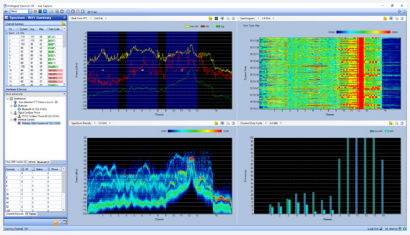
A passive survey captures all information seen in the wireless environment (IE the APs that could belong to the site, neighboring APs, anything). Channels and signal strength for all APs seen are collected and displayed for the site.

When it's used

A passive survey is typically conducted pre- and post-deployment. Co-channel and adjacent channel interference can be key culprits in low throughput and poor application performance. In the case of a pre-deployment passive survey, data can be used to better plan the channel selection for new APs to avoid co-channel interference with existing

It is important to understand the different types of surveys to get a better picture of your network health.

Active Survey
An active survey attaches to a network at either the AP level or at the SSID level and maps the coverage for that specific AP or SSID.



Tools made for the job
Spectrum analyzers provide visibility into the Wi-Fi spectrum and can be used to detect, identify, and locate interfering devices. *(Screenshot of NetAlly AirMagnet Spectrum XT)*

neighboring APs. In the case of post-deployment, a passive survey will help to verify that no co-channel interference is present in the actual design.

Active
An active survey allows the user to map an existing deployment's effective network coverage.

What it is
An active survey attaches to a network at either the AP level or at the SSID level and maps the coverage for that specific AP or SSID. Roaming criteria can be set for the adapter to determine when the survey device will roam to the next AP.

Active Association
An active association survey will attach to the network and keep this active association as the client roams throughout the network. The survey is specific to the AP or SSID of interest which ensures that the data being seen is relevant to the network being analyzed.

Active iPerf
An active iPerf survey allows the user to evaluate application performance in a wireless network. By running a real-world throughput test, the network is validated to be capable of sustaining the throughput necessary to support key business applications. The survey is specific to the AP or SSID of interest which ensures that the data being seen is relevant to the network being analyzed.

When it's used
An active survey can be conducted both pre- and post- deployment, but most often it is done post- deployment. In the case of a pre-deployment active survey, data can be used to better plan AP locations compared to current locations to ensure necessary performance is provided. In the case of post-deployment, an active survey will validate that the network is meeting the application design goals in terms of throughput and availability.

An active survey may also be conducted mid-operation when new applications are being rolled out onto the network that have throughput and performance requirements that the network hasn't been validated for. Depending on the results gathered, this could result in mild tweaks to the current network, or this survey could end up being a pre-deployment survey for wholesale network changes.

Spectrum
Non-Wi-Fi interferers raise the overall noise floor and can render some channels virtually unusable for reliable network performance. These devices are everywhere, and in some cases interfering devices may be an integral part of other solutions deployed at a site. Understanding not only what is interfering but also where on the floorplan that interference is seen is essential to analyzing and validating network performance.

Interference analysis is a key component of validating a site, although it may not get all the attention that signal strength or SNR readings do in a site survey. Best practice for validating a deployment should always include integrated interference maps and analysis to ensure optimal network performance.

What it is
A spectrum survey leverages a spectrum analyzer to map key spectral data onto a floorplan during a site survey. This is independent of Wi-Fi signaling by looking at the RF spectrum directly.

An active survey can be conducted both pre- and post- deployment.

Active iPerf Survey
An active iPerf survey allows the user to evaluate application performance in a wireless network.

When it's used

A spectrum survey is often done either pre- or post-deployment, but if done for one will not necessarily be needed for the other. In the case of a pre-deployment survey, spectrum interference data can be used to better plan AP channel placements. In the case of post-deployment, spectrum data can be used to understand possible impacts and poor performance seen during concurrent active survey data collection.

Voice/Roaming

With the increase in mobility application and voice devices, a survey focused on roaming and the quality of connections across those roaming points is valuable.

What it is

A VoFi survey tracks a VoWLAN phone conversation for call quality and roaming events. A VoFi survey provides details about the active call such as WiMOS, roaming frequency, and signal strength.

When it's used

A VoFi survey is often done post-deployment. Roaming data can be used to understand how well the design is handling the anticipated voice needs.

A VoFi survey may also be done mid-operation to determine if a site is ready to support voice, or whether changes are needed.

PREPARING FOR A SURVEY

Adapters

Wi-Fi has become so ubiquitous that the majority of the time we don't pay any attention to the characteristics of a wireless adapter beyond what generation of technology it is (802.11a vs. 802.11n vs. 802.11ac vs. 802.11ax) because common network usage will rarely expose design differences between chipsets or adapters. This isn't the case when that same adapter is used for a site survey for data collection as all adapters are not equal, so knowing what you've got becomes key.

Knowing your Adapter

When performing a site survey, a variety of data may be collected by the application depending on the type of survey: signal strength, SNR readings, beacon information, or throughput. All of these depend on accurate data being passed along by the network adapter in use. If the adapter's radio sensitivity or overall design is poor, the signal strength readings may be off, non-linear or skewed, resulting in unreliable coverage maps. If the adapter lacks the horsepower to keep up with high data rates or suffers from excessive lost packets, measured throughput may be artificially low throughout a site. Of the major data measurements you count on your adapter for, only the least valuable (information contained in beacons) is relatively immune from adapter characteristics.

Most tools should be capable of working with any adapter, because after all, they're all network adapters at the end of the day. However, if you're looking to do enterprise class work and analysis, it's key that you use an adapter you can trust. Realistically few of us have the time to test out an adapter directly to determine its characteristics, instead we rely on our tool vendor to point us in the right direction to tell us which adapters they've tested and which can be relied upon over others. Only by using a quality recommended adapter can we get reliable results.

Even with a recommended adapter, it's important that you have a good understanding of that adapter's characteristics. This will help you to interpret

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Know your adapter
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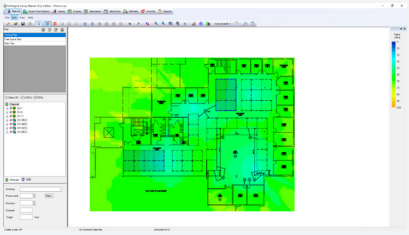


Importing a Floor Plan
Minimize the amount of unnecessary white space around the outside of your floor plan. *(Screenshot of NetAlly AirMagnet Planner)*

the results you get effectively. If you know that your adapter has really strong receive sensitivity, then you may choose to 'back off' those readings when interpreting how well a phone will work in the same environment. If you know that the adapter has mediocre throughput, then you'll know that in those places where higher throughput was recorded that other adapters may perform even better.

Using Multiple Adapters

Most survey products allow the user to apply multiple adapters at the same time. This can be a highly valuable time-saving technique rather than trying to conduct multiple surveys one after the other.

Should you need to perform an active and a passive survey [See The Different Types of Surveys section] at a site, using two adapters will allow both surveys to be performed concurrently. There is additional benefit to using multiple adapters than simple time savings.

RF is a variable medium, thus other devices and other attenuating sources (such as people) can change the readings you might get. By collecting all data at the same time on the same walk through, you can feel comfortable that any oddities or poor performance seen on one survey can be cross- compared reliably to data collected with other adapters as they were subject to the same conditions. This is more reliable than trying to correlate data from surveys taken at different times, as you cannot be sure whether both surveys reflect the same RF conditions.

PREPARING YOUR SITE PLAN

Importing your floor plan

Most tools allow a floor plan to be imported in a variety of formats. One consideration when selecting your floor plan image/file is to minimize the amount of unnecessary white space around the outside of your floor plan because excessive white space can take up screen real estate and require zooming in just to see the applicable area. In addition, ensure that your floor plan has enough resolution to capture any key details you will need to see when conducting a survey.

Calibrating the floor plan

Once imported, the floor plan will need to be calibrated. Calibration of the dimensions of your site ensures that propagation estimations and signal loss interpolation is calculated accurately. When performing calibration, it's best to pick a larger dimension (if known) such as the width of the building or the length of a long hallway. Small errors in a large measurement are less impactful to your results than small errors in a small measurement (such as a doorway).

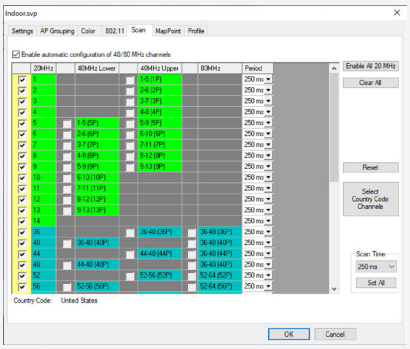
PATH SELECTION

The path you choose to walk onsite will influence the data you receive and the reliability of your results. It's important to ensure that the path is well chosen and executed.

Where to walk

An easy mistake to make is to walk the site using knowledge of where the APs are located or where you expect to get coverage. Path selection is better done by thinking about the users, how they will use the network and where you expect your users to need that network access, then build out plans for a path that will give you confidence that your network meets those expectations. This may mean extra time spent collecting data in high-usage areas and less focus on others, with the goal being to get the right data necessary to make critical network decisions.

Site survey software allows you to choose which channels to scan.



Scan Pattern
Scan Patterns refer to the method, timing, and choice of how the data is collected.

Some general rules of thumb when walking a site include:

- Walking both sides of obstacles whenever possible
- This allows the RF attenuation properties of that obstacle to be accurately reflected in the resulting heatmaps
- Walk the edges

This applies to rooms, as well as the site as a whole. If you're only checking the middle of a room then you have no idea what things look like at the edge, you'd be trusting your signal propagation to 'paint' those areas. It's far better to walk into the corners and along the edges to collect the necessary data.

SCAN PATTERN

The scan pattern that survey software uses refers to the method, timing, and choice of how the data is collected across the wide variety of wireless channels available. There are many aspects to consider, and there is no right answer, but this section will go through the important considerations to help you make the right choice for your survey needs.

Choosing your channels

Most site survey software allows you to choose which channels you would like to survey on. This will limit your adapter's data collection to ONLY those channels which you choose. The two most obvious schools of thought are "all the channels there are" and "only the channels my APs are on". Both choices have their advantages and disadvantages.

Scanning all channels: The real benefit to scanning all channels is that you have complete information as this will allow unexpected APs (those on channels you didn't believe APs were installed on) to be caught as well as adjacent channel interfering APs to be identified. Should configuration changes be needed, the information is now available for other channels to aid in decisions for new channel assignments.

Scanning only select channels: Scanning selected channels saves the amount of time each data sweep takes plus ensures data and heatmaps are shown relative to those specific channels that the network is deployed on. This can save time when conducting the site survey.

How to decide what's right for you

There is no simple right answer, but some of the questions you should ask yourself when configuring the channels to scan are:

- Am I confident that I know which channels do and do not have APs on them?
- Do I believe there are a large number of neighboring networks where I may benefit from understanding adjacent channel data?
- Do I believe I will I need to reconfigure my channel plan as the result of my survey?

If data on channels where your network APs are not installed will not add any useful information for your survey, then it makes sense to limit the scan pattern. If you plan to leverage survey data in a way that will benefit from the additional channel information, or if you're not sure of the answers to these questions, it's best to invest the time and collect all the data.

Implications of the decision

The more channels you choose to scan, the longer it will take to collect one full set of data, thus this will increase the amount of time it takes to complete

Scanning predetermined channels saves time.

Dwell Time
Is the amount of time your wireless adapter spends on a given channel.

a site survey. While a few seconds here or there may not seem like much, if you have a large building with several thousand data collection points, a few seconds can quickly add up to an hour or more of additional time on site.

The more data you have, the more prepared you can be for the unexpected. You don't always know heading into a survey what may prove to be important and unimportant. Having survey data across all channels may save time in the long run if valuable insights can be gained from information contained on those channels.

Choosing your dwell time
The dwell time is the amount of time your wireless adapter spends on a given channel collecting data before moving to the next channel. This is of particular importance in passive surveys where data is being collected for beacons heard. As the beacon interval is variable in most enterprise AP configurations, it is often valuable to alter the dwell time of your adapter accordingly.

How to decide what's right for you
There are several factors that can impact the dwell time you choose. Most obvious would be the beacon interval of the infrastructure installed (if any) at the location. If you know that the beacon interval has been adjusted to be longer than the common default of 100ms, you will want to ensure that the dwell time in your site survey tool is also adjusted or data collection may miss beacons (and thus miss data points) during a survey.

In addition to configuration, the amount of traffic on a channel can also impact the regularity of beacons. As a shared medium, a given AP's beacons will often not be perfectly 100ms apart even if they are configured that way. Overlapping BSSs or on-channel noise may cause a beacon to be delayed a few minutes. On the whole, this shouldn't cause beacons to be missed too regularly, but in a very RF heavy environment this lack of regularity of beacons could cause misses and would be a viable reason to adjust the dwell time up a bit to compensate and ensure all beacons are received.

Implications of the decision
It might seem that there is no downside to increasing the dwell time, but this isn't the case. As the dwell time determines how long the adapter stays on one channel before moving to the next it has a direct impact on how long it will take an adapter to collect a full sweep of data across all configured channels. If your network requires a longer dwell time, it's important to take that into account when collecting data and to ensure that either walking speed (for auto-sampling) or 'wait time' (for click-to- sample) [See Collecting the data points] is adjusted to compensate for the new dwell time.

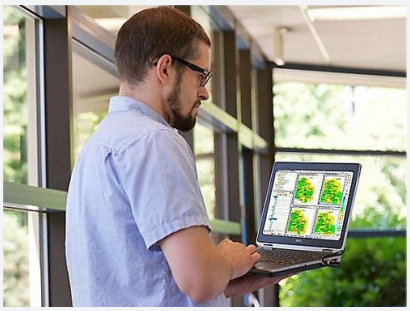
Usually a single missed beacon at one data location will not throw off the resulting heatmaps if good data collection practices have been followed in that area (plenty of other data points nearby) as the beacon will be picked up at one of the other collection points, but it is best not to count on luck to save your survey. With the amount of time that needs to be invested to walk a site, it's far better to set the dwell time intelligently from the start to ensure that reliable data is captured.

SETTING THE CORRECT SIGNAL PROPAGATION

The signal propagation value determines how far your site survey software will assume a given reading is applicable. As you can't viably walk every square inch of a site, the software will need to do some interpolation to create a heatmap. If this value is set too small, then you will not be left with a heatmap but instead

Using the correct Signal Propagation for your environment is essential.

Signal Propagation
Determines how far your site survey software will assume a given reading is applicable.



How to Collect
Walking should be done at a steady pace, it's important to ensure data is collected withing a similar time frame.

with a series of colored dots along your walking path, whereas if this value is set unrealistically large, you will begin to show signal strength reading and values in locations that you didn't survey and can't accurately predict.

Choosing the correct propagation value means understanding the nature of the site. An open convention center or arena may allow for a larger propagation value as there are minimal obstructions within the environment (although care should be taken in highly dense environments to compensate for what happens when the location is full of people). A facility with large numbers of walls and obstructions would be better served with a lower propagation value to avoid giving a false impression of measured signal on the other side of an obstruction. (Note that this can also be mitigated by good path choice).

Ideally the signal propagation value should be chosen before the survey is conducted by consideration of the site as this helps to avoid allowing human bias to influence the choice after the fact when looking at the resulting heatmaps.

CONDUCTING THE SURVEY

How to walk/collect
Just as important as where to walk is how to walk [this especially true for an Auto-sampling survey (See Auto- sampling)]. Walking should be done at a steady pace, and common areas of the building should be done at relatively the same time. While click-to-sample gives some freedom around not having to maintain a steady walking pace, it's important to ensure that data is collected in an area within a similar time frame. This will prevent temporal events from impacting only a small subset of data collected in an area. Be sure that the collection device is at a relative height that most clients would be expected as too low or too high won't accurately model what the users will experience.

COLLECTING THE DATA POINTS

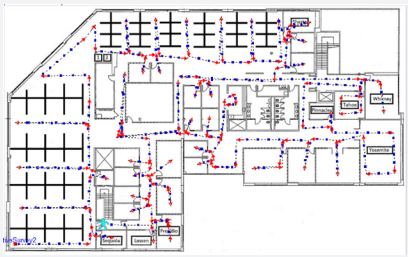
When walking a site and collecting data points during a site survey, there are two basic methodologies: (1) Auto- sampling, which continuously scans the selected channels and writes results automatically along the walking path at points evenly spread between the user's clicks; and (2) Click-to-sample, which writes the most recent scan result to the selected point on the walking path when the user clicks. Both methods can be used to successfully perform a site survey, but there are tradeoffs that should be considered with each.

Click-to-Sample
Click-to-sample is often considered the more flexible of the two methods because data is only logged when the user clicks, which by its nature allows for delays, interruptions, and other distractions that may happen in the course of a survey. The last set of recorded scan data is then written to the location the user clicked on.

For optimal results with click-to-sample, the user needs to be sure to allow enough time for a full scan sweep between clicks on the map, and should ensure that enough click points are recorded for reasonable heatmap extrapolation. Moving too fast between clicks or collecting too few data points will result in unreliable / untrustworthy heatmaps.

Click-to-sample lends itself well to busy or sensitive environments in which the surveyor will frequently need to stop or wait for access to an area or to proceed into a room.

Auto-sampling is often considered the easiest way to perform a survey.



Collecting Data Points
When walking a site and collecting data points during a site survey, there are two basic methodologies: Auto-sample, and Click-to-sample.

Merging Surveys
Comparing the results of one survey to the data collected in another survey can help explain unexpected/poor results. *(Screenshot of NetAlly AirManget Survey)*

Auto-sampling
Auto-sampling is often considered the easier of the two methods because less clicking is required by the user. When performing an auto-sample survey the user need only click when they change walking directions. All sampled data that happened between the last click and the current click is then evenly distributed along a straight line between these two click points.

For optimal results with auto-sampling, the user needs be sure to walk at a consistent pace and should set the auto-logging data period to a reasonable time period. Large changes in walking speed will cause data to become skewed (and thus inaccurate) in the resulting heatmaps.

Auto-sampling lends itself well to long hallways or open environments in which the user will be able to walk their path with little to no interruption.

Which is right?
Neither method is more 'right' than the other, and good (and bad) surveys can be performed with either method. A general recommendation for users would be to 'default' to an auto-sample survey with a slow and steady walking speed unless the nature of the facility or the environment necessitates click-to-sample being used.

How do you know if you're 'done'?
One challenge many people have is knowing when enough data has been collected to have a reliable survey. As with many things there is no hard and fast rule, but there are some things to consider.

What does 'done' look like?
One way to look at the issue is the number of data points collected vs. the overall size of the space being surveyed. Also make sure all areas are covered by looking at the resulting heatmap. Remember that Signal Propagation plays a role here, but it's bad practice to change this after the fact to create a good heatmap. You should have considered and set your signal propagation before beginning the site survey, unless an error is found in your chosen value, to avoid changing it just to create a better looking heatmap. In doing so, you are using the tool to 'hide' a lack of information rather than having the necessary data to draw important conclusions. Gaps in coverage on the heatmap, or areas that are primarily determined as covered due to signal propagation radius are locations that should be given close attention. If any such locations lie in key areas of the site, then additional data should be collected in those locations to ensure that an accurate representation of network availability and performance is available.

ANALYZING THE RESULTS

Merging surveys & cross comparing survey results
As detailed above, each survey has its place and gives insight into different pieces of the overall RF puzzle. By conducting multiple different surveys at the same time, we now have the ability to look across different types of data to try to understand unexpected / poor results we get in one area. Having all this information allows for analysis by comparing the results of one survey to the data collected in another survey to see if it can explain what's seen. For example, if I have run an Active iPerf survey on my WLAN and collect throughput data across my site, I may find an area with unexpectedly low throughput values.

With only the active survey data available, I may not have enough information to know for sure why this area of my building is suffering poor performance. If I have passive and spectrum data I can do more analysis. By looking at my passive survey data I can begin to understand whether there are numerous neighboring

APs in that area all on the same channel. If there are, I may feel that the poor performance is being caused by large amounts of co-channel interference in the area.

Alternatively, I may find by looking at my spectrum survey that there was a large amount of non-Wi-Fi interference in the area at the time (perhaps a wireless camera or a ZigBee system). If none of my other collected survey data sources show an obvious culprit/reason for the poor performance, I may want to look into more networking related issues such as the configuration of the AP or even the wired connection it's fed by.

Having the various pieces of data and comparing and contrasting across the data sets allows for better conclusions plus a more in-depth understanding of each of my results.

FILTERING DATA COLLECTION

A lot of data is collected during the course of a site suvey, with data being important, but not all of it. When analyzing the results, a certain amount of filtering must be done to correctly interpret the data. This is a very delicate balance as filtering too much could risk missing important implications, whereas filtering too little could have the message in the results get lost in a sea of data. Of the various ways to filter data collected in a survey, the most common ones used are SSID, signal level, AP, and channels.

Filtering on APs: Filtering on one or more APs allows you to focus your analysis to a specific set of APs. While filtering is valuable for focusing analysis on items of primary interest, care should be taken not to filter so aggressively that other key data is lost, or that the impact of APs that have been filtered out of the display isn't analyzed.

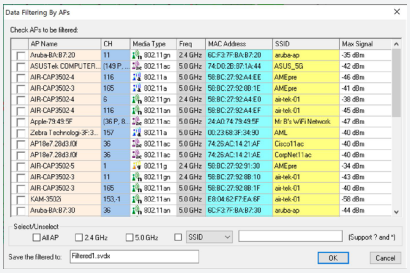
Filtering on SSID: One means to filter on APs is to select an SSID to filter on, this will allow you to see data only from APs with a specific SSID or set of SSIDs. This is often valuable when looking at coverage or interference data where the desire is to ensure that the installed network is well installed and working correctly. In the case of interference this shouldn't be evaluated only with a filter on, but it's often good practice to sanity check that at the very least you are not interfering with yourself (take care of those areas under your direct control).

Filtering on signal level: Filtering on signal level allows those APs whose signal levels were never heard above a specific threshold to be removed from the display. This can be particularly helpful in the case of neighboring APs that are not heard at a high enough level to truly interfere with your network, but whose data could clutter your display if included in the overall data view.

Filtering on Channel/Band: In addition to filtering based upon AP details, filtering can be done on specific channels or bands. This will give specific result analysis on the channel or band of interest. In many cases a network is intended to have full coverage on the 2.4GHz as well as the 5GHz band. Filtering on the band allows easier analysis of each band's data to ensure key metrics are met.

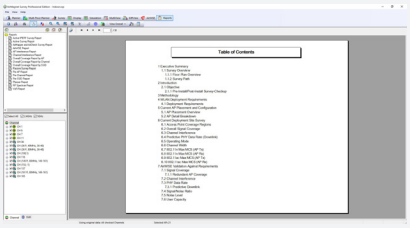
Implications of the decision
Filtering should be done to better understand and parse the data in question, not to get the results you're looking for. To keep human nature in check, it's often valuable to consider what filters to implement and how to slice and view the data before looking at the results of these filters. This can help to remove the temptations after the fact to filter to get data that looks good rather than filtering to get the best view of the situation.

Not all data collected may be important.

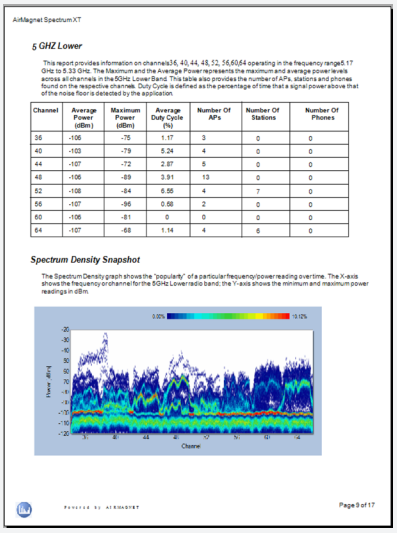


Filtering
When analyzing the results, a certain amount of filtering must be done to correctly interpret the data.

Reports are the primary way to share your survey results with others.



Paths Walked
The path walked is an essential part of the data collection process and will be key to anyone who want to interpret the data on the reports.
(Screenshot of NetAlly AirMagnet Survey)


AirMagnet Spectrum XT

5 GHZ Lower

This report provides information on channels36, 40, 44, 48, 52, 56,60,64 operating in the frequency range5.17 GHz to 5.33 GHz. The Maximum and the Average Power represents the maximum and average power levels across all channels in the 5GHz Lower Band. This table also provides the number of APs, stations and phones found on the respective channels. Duty Cycle is defined as the percentage of time that a signal power above that of the noise floor is detected by the application.

Channel	Average Power (dBm)	Maximum Power (dBm)	Average Duty Cycle (%)	Number Of APs	Number Of Stations	Number Of Phones
36	-106	-75	1.17	3	0	0
40	-103	-79	5.24	4	0	0
44	-107	-72	2.87	5	0	0
48	-106	-89	3.91	13	0	0
52	-108	-84	6.55	4	7	0
56	-107	-96	0.68	2	0	0
60	-106	-81	0	0	0	0
64	-107	-68	1.14	4	6	0

Spectrum Density Snapshot

The Spectrum Density graph shows the "popularity" of a particular frequency/power reading overtime. The X-axis shows the frequency or channel for the 5GHz Lower radio band; the Y-axis shows the minimum and maximum power readings in dBm.

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Explanations and Analysis
A good site survey report should leave the reader with as much necessary knowledge of the network as the person who prepared the report.

REPORTING THE RESULTS

A report is often the primary way the results of your survey work will be seen by others. Reports should include all relevant information that is necessary to understand and evaluate the results. The report is often a fine balancing act between providing all necessary information and burying the reading in minutia. While no single table of contents will work for every report, there are some common elements that are valuable in the vast majority of reports.

PATHS WALKED

With the possible exception of AP-on-a-stick surveys, the path is an integral part of the data collection process and will be key to anyone who interprets any other data in the report. Most questions a reader may have about where and what was measured can be quickly and visually answered by a review of the walking path. Providing walking path data aids the reader in understanding the diligence taken when collecting data, plus it can also help to highlight assumptions or challenges of a site (off-limits or inaccessible areas) that may not be immediately obvious simply from heatmaps.

ALL RELEVANT HEATMAPS

Most wireless designs these days have a variety of driving concerns, more than simple signal strength across the floorplan. As such, heatmaps need to be provided that cover all aspects of the design, highlighting key metrics of the network and proving out that the design meets these metrics (or potentially in the case of a pre- deployment survey highlighting the areas currently failing network requirements to point out areas that need to be improved during the redesign). Failed areas can also help to indicate where other design restrictions (budget, installation locations, etc.) have forced compromises with the initial design requirements. All heatmaps that cover a design requirement should be included, but also any heatmaps that highlight a deficiency, compromise, or weakness in the design. While it is human nature to want to accentuate the positive, pointing out the weaknesses is equally important while preparing a report and getting final signoff. Both sides should be in full agreement about the true nature of the network once reviewing the report. There should be no surprises after the fact.

EXPLANATIONS AND ANALYSIS

Along with these heatmaps should be exhaustive notes and analysis of what the reader is seeing. Key details and concerns/features of the design should be called out and noted by the report. A good site survey report should leave the reader with as much necessary knowledge of the network as the person who prepared the report in the first place. As noted in the all relevant heatmaps section, this should reference included heatmaps as necessary to illustrate important points and validate that the work done has covered all bases effectively.

RELEVANT PRODUCTS

AirMagnet® Planner
https://www.netally.com/products/airmagnet-planner/

AirMagnet® Spectrum XT
https://www.netally.com/products/airmagnet-spectrum-xt/