StoreNext

Technical Bulletin

Wireless Networks for Retail — Course 202

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This bulletin is a supplement to any one of the excellent site survey guides available on the market or internet today. It is important that this document is used as a supplement and ***not*** as a starting point! WiFi enabling is a broad and complex subject that cannot be easily reduced to a few short definitions and instructions. However, the information provided here is intended to provide WiFi installers with some ideas, concepts and options designed to save time and money. Additionally it assumed that you've read and understand the concepts and principles laid out in the preceding Wireless Networks for Retail — Course 101.

The specific purpose here is an attempt to provide a simplified, perhaps 'shortcut' and time-saving approach to the formal recommended approach suggested by the experts. As always, any shortcut runs all the standard risks—namely it may just not work at all and you'll have to turn around and take the long way. But if you're anything like me a shortcut is hard to resist. The point is that with a little understanding of WiFi and a lot of common sense you may well be able to get away with a solid working solution without all the tedious manual effort associated with a 'proper' site survey and the pain associated with 'proper' access point placement. This said — and with the possibility that someone still may no fully understand the intent — shortcuts are great: but if it doesn't work, and it may not, take the time to do it right and learn from your mistakes. Without much doubt, after you've successfully conducted a half dozen formal site surveys you'll inherently feels much more comfortable to experiment with the ideas presented here.

So hit the next page and let's get started!

To Your Success,

Tim

Tim Klingenberg
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BEFORE YOU START

1. ***The hardest part of this whole thing*** is forcing yourself take the time to learn and understand the wireless attributes of both your hand-held and the access point. Never, ***never*** accept the default SSID, Channel, and default for no WEP security. I say this respectfully — if you don't understand why this is true, then just take a minute and Google up keyword 'WarDriving'. Any questions?
2. Additionally take the time to read and understand everything there is to know about your hand-held's wireless configuration. For example, never set a hand-held to connect to 'any available network' always set it up for 'infrastructure' or 'access point only'. And never leave an installation with multiple preferred access points or SSID. Keep your installation 'lean and mean' — performance is everything.
3. Although proper network configuration suggests a very careful placement of the access point in the store to ensure best possible coverage, the truth is that this location in the store is almost always the most difficult location(s) to install and maintain. Grocery stores seldom have a WAN and power connection, high up and centrally located on the sales floor. However, if you can reasonably manage it, and you are comfortable that maintenance of said device will not be prohibitive—then without doubt—this is the first location to test the access point.

STEP ONE

Walk the store and determine where a convenient location is to mount the access point where you have access to power and WAN connectivity and yet also gives you the best 'line of sight' availability throughout the sales floor. Line of sight is always the best but realistically not always available so do your best.

> *For example: Supermarkets often have the POS and managers offices located on a second floor overlooking the sales floor. Under the right conditions – the access point's first test location might be just outside the POS office window overlooking the store with easy and simple access to power and WAN connectivity.*

STEP TWO

Connect the access point to power—you do not initially need WAN connectivity. Your initial goal is to simply test the access point and hand-held connectivity. Network connectivity to the server is not important just yet.
Power on the access point and hand-held and make sure you have connectivity, hand-held to access point.

> *Note: If you're having problems connecting – check to make sure both the access point and the hand-held have the following synchronized:*
>
> 1. *SSID*
> 2. *WEP Key*
> 3. *MAC table is properly set on the access point.*
> 4. *Network access on the HH is set for Infrastructure or access point only.*

STEP THREE

Using the HH, begin the process of walking the store—stopping regularly to take signal strength, and signal to noise readings. Not to state the obvious—but don't take your readings where line of site is the best. Sure you need to verify connectivity—but your goal is to test real working conditions. Get down low where users will be scanning items on the bottom shelf, where there is a lot of product density between you and the access point. Look also for areas where there is a lot of liquid product density. These are the areas with the greatest potential for problems, so focus you attention here.

a. Signal Strength—measures how well the hand-held can detect signal strength. Generally a signal strength approaching –85 dB is getting quite weak. Although it may still be OK, at rates approaching this level should be a 'yellow flag'. Signal strength readings exceeding –88 dB in my book suggest a 'red flag' and should be duly noted. The point is that your objective is to provide the very best signal to all parts of the working area of the store as is possible.

b. Signal to Noise ratio — although you may have good signal strength, it certainly does not mean that the signal is clean. Thus the need for good signal to noise ratio measurements. A low signal to noise ratio indicates that there are influences at play within the environment that can and likely will make life difficult (some old microwave ovens are a great example of this).

c. The point of this exercise is to gauge the viability of your chosen access point placement.

d. Make sure you don't forget to include the backroom area. This is often a very high use area for wireless hand-helds especially for inventory receiving purposes. And also remember this is the area that is also full of all sorts of wireless signal busting devices (compressors, coolers, freezers, etc. etc.)

STEP FOUR

Unless you are ***very*** good ***and*** very lucky at the same time, you will see areas in the store where signal coverage is poor to non-existent. If this is your situation consider the following:

a. High-gain antennas have been known to solve many of these types of signal problems. No they are not magic, but they certainly can surprise you. While on the subject of high gain antennas, it is important that you understand that antennas are far from created equal. Certain brands and designs have radically different characteristics. If this concept is at all confusing to you—take the time to do a little research—talk to an expert—ideally one familiar with you brand of access point. Don't quit until you have a good understanding of the differences between antenna tuned for transmit vs. receive as well as those compromised for the best of both worlds — by the way these are the types you want! ***Note***: if you've chosen an access point with no option to replace the antenna then this discussion of high gain has no value to you for this installation.

b. If after experimenting with high gain antennas and you are still experiencing signal quality problems at this point you have two remaining options:

    i. Relocate the access point to a more appropriate location for signal (and undoubtedly a less appealing location for power, WAN, and maintenance). Or,

    ii. Consider adding a second access point.

c. Assuming you're a hard case like me and the thought of having to string WAN and power to that best location doesn't appeal to you at all—then your option is that second option of installing a second access point.

   i. Now it is important to note that the purists reading this will groan and shake their fingers spouting the ills of our stubborn and sinful nature. They're right you know — but if you can find another location for a second access point that is much better suited to install and you have the guts to try it — then why not go for it?

   ii. Remember that environments that require multiple access points have clear rules:

      1. If they are not spaced far enough apart—access points will fight with each other and in fact create a condition that is worse than the problem you are trying to solve. General rule of thumb is greater than 80 feet apart.

      2. Do not mix brands—auto roaming capabilities may well be far less than acceptable between different brands and manufacturers. Again check with your manufacturer and heed their recommendation.

      3. Make sure the second access point has the same SSID, WEP, and MAC filters ***but does not*** share the same channel. This is very important. A discussion on channels is beyond the scope of this document—but as you are already becoming familiar—If you are confused by this—take a ½ hour and research this a bit. This said I'll give you just a most basic overview. Although 802.11 access points are configurable for any channel 1 to 11 there are really only 3 channels that do not overlap with each other: (1, 6 & 11). Most access points come factory defaulted to channel 6—so for this reason it is suggested to only use channel 6 if you are adding a third access point. For the first and second access point it is recommended to use channel 1 and 11.

d. OK …. in most environments a second access point should now provide you with excellent coverage throughout the store including the backroom.

   Note: back room coverage is often one of the most important needs in the store because—yes you guessed it—this is where receiving takes place with wireless hand-helds.

e. If for some reason you are still on the fringes of satisfaction—you can always add another pair of high gain antennas on the second access point.

STEP FIVE

Finalizing the access point locations.

a. Before we move on — do a 'sanity check'— make sure you are comfortable with the following — and keep in mind good old Murphy's laws:

   i. Did you verify signal coverage down low and close to the shelf —especially in front of heavy liquids such as gallon jugs of bleach?

   ii. Did you verify a good signal behind walls, pillars, coolers, steel objects and in the worst most hidden locations in the store?
   Remember the traditional rule of thumb is that if the signal is excellent while you're in the store … it will certainly drop to only "good" the moment you leave the store. Take this thought to it's logical conclusion—if you take a chance and configure the network with areas where the signal is already

known to be weak, you'll be hauling your self back to the store to fix it — and probably at the worst possible time.

b. Assuming everything is solid and you're feeling comfortable with this nifty network site survey shortcut, you're ready to perform the permanent access point install (WAN and Power). Nothing more to say here: you know what to do…

STEP SIX

This is about security — all too often people either completely ignore security — because they don't think it applies to them — or they go completely off the deep end and so over-complicate it that it strikes fear and paralysis into everyone around them. Remember the basics—no security is just foolish and at the same time remember that you're not protecting Fort Knox. What ever security you choose make sure it is well documented and the documents protected and yet available for authorized trouble shooting and maintenance.

a. Last note reserved for the end of this document. There are some wonderful tools available via the internet that can be of great help in your endeavors to provide solid reliable WiFi in your stores. Just a couple are provided here—just enough to spark your interest and set you off and running.

b. The best mini WiFi detector I've seen can be in your hands direct including batteries for $25.00:

http://melbourne.craigslist.org/sys/46321248.html

c. Here's an excellent "beggar-ware" WiFi sniffer for use with your wireless enabled laptop:

http://www.netstumbler.com/downloads/

This is probably one the best little applications available. Download this and see for yourself. For your purposes it will require a laptop with a wireless card (Note: not all wireless cards work—and some work partially or better than others). But this little application will make you a believer — and remember it is also available to any 'WarDriver' out there.

Good luck and success. And now for the final disclaimer: This document is not now or ever was intended to replace a proper site survey. If it works for you—excellent; if it makes you nervous or otherwise jittery—you know what to do—throw this in the garbage and do a right and proper site survey as called for by the experts.