

WLAN Deployment Done Right with WiTuners®

❖ The Nightmare

“So, what's the big deal?” you tell your fellow school board members. “The principals and administrators think that they can't get along without Wi-Fi any longer, we only have five school buildings plus the town offices, and I know how a network is put together. I'll just run down to Best Buy, get some inexpensive APs (access points), string some wire in the drop ceilings, plug it all into our Ethernet, and we'll be all set.”

This is how many a sad deployment saga begins, with a “Ready, Fire, Aim” approach to setting up a Wi-Fi network (wireless local area network or WLAN). But we all know how it unfolds: complaints about dead zones, data rates dropping in the cafeteria at noon, network anomalies, and high maintenance as mystery glitches plague the network.

Another more common circumstance might be that everyone just scratches their head and nobody can come up with a way to start at all. Maybe call the Geek Squad, but that doesn't guarantee an optimal outcome either.

How does an end use client avoid these types of scenarios? Where can they go to help them plan, budget, and reduce their initial setup costs and continuing maintenance costs? Let's start by putting a little structure into the deployment process.

❖ Getting Started Properly

Before you know what to do, you have to decide where you're starting from and where you want to end up. Gather as much of the following information as you can:

- A floor plan of the areas to be covered
- A diagram of the existing LAN, telecommunication, and power resources
- A compilation of the total number of users and their locations (often varying with time)
- An estimate of the types and quantities of applications to be run (data, voice, video)
- A list of your available resources (budget, personnel, network capability)

This list is a good start: define the state that you're in and where you'd like to go. However, that last item in our list (budget) often turns out to be the long pole in the tent. The resources may or may not be able to cover the activities needed to achieve the goal of setting up and running your WLAN as well as meeting all of the expectations of the users. A number of questions must be answered in an attempt to see if and how we can meet these expectations.

Question 1: Budget, budget, budget! Determine how much the WLAN will cost by asking:

- How many APs must be bought?
- What will it cost to interconnect, power, and set up the WLAN?
- Do we need management software and how much will it cost?
- Do we need additional equipment or software upgrades and how much are they?
- Will an administrator and/or outside services be needed and how much will they cost?

Question 2: The Wi-Fi performance criteria must be considered:

- What performance can we expect from this deployment design?
- How can we ensure satisfactory WLAN performance?

Question 3: If you're a techie, you will find yourself wondering:

- Where should the APs be located and what antennas are needed?

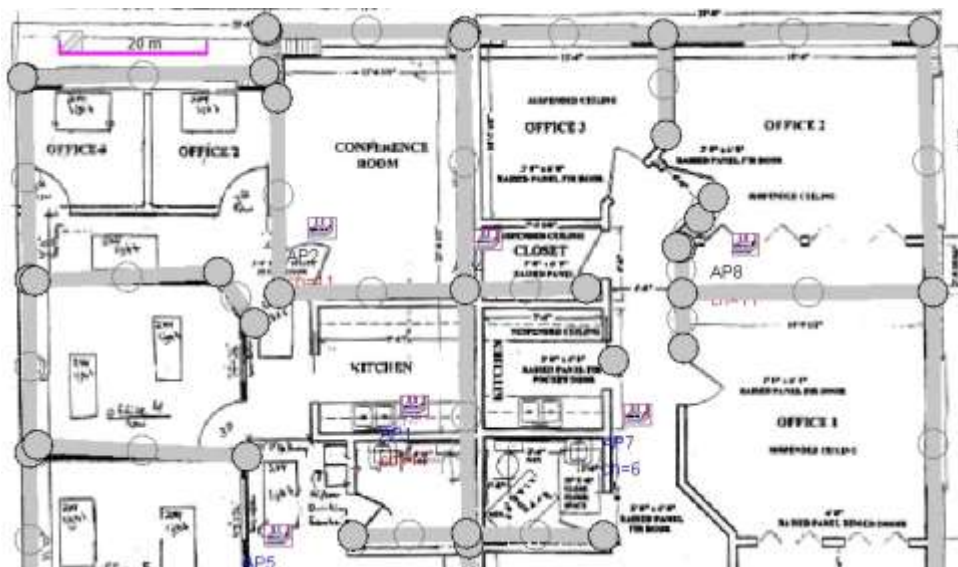
Question 4: And if you're even more of a techie:

- What are the values to which the AP configuration controls must be set?
- Or for that matter to ask how, on earth, to figure that out?

❖ Planning

Sounds like a formidable task? Don't worry. There are WLAN services available on the market these days to help. WiTuners, for example, is an excellent place to start (available at www.wituners.com). WiTuners comes with an auto deployment planning Wizard that makes your planning task easy by guiding you through the job step by step.

After launching the wizard, it prompts you to load a scanned copy of your floor plan, set the scale, and set the overall deployment area surrounding the desired structure(s).



The Wizard allows you to customize many system settings. The parameters that describe the environment of the office may be set. These can vary significantly between indoor/outdoor, home/business, and public/private areas of the deployment. Default values can be used as is, but if the user wishes to depart from the norm, facilities are available for customization that best fits your needs.

Next, the specifications for the access points themselves are input via defaults or by being individually specified. *Arcane* is a word often used to describe these types of specifications, and the casual user should

probably leave them alone. However, the knowledgeable wireless engineer will find them invaluable in tweaking the deployment to accurately model the problem at hand.

Name:	AP2	PHY Type:	11g
Channel:	11	Transmit Power (dBm):	20
Antenna Gain:	2.2	Sensitivity (dBm):	-84
Syssl0ss:	7	Noise:	-100
Cca Threshold:	-84	Snr Threshold:	9
Snr Data Threshold:	23	Sensitivity Data:	-68
Co-Channel APs:	3	Call Capacity:	18
Throughput:	0	Neighbors:	3

Neighbouring AP Name	Received Signal Strength (dBm)
AP2	0
AP1	-78.134
AP4	-78.802

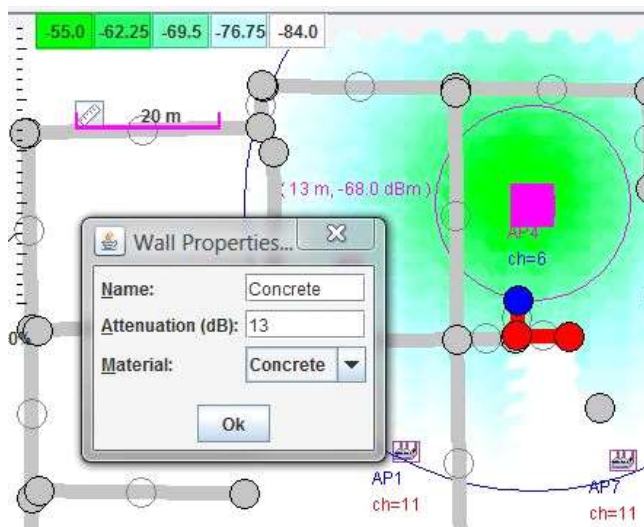
Finally, a simple click will automatically generate a deployment for you, resulting in the required number of APs, their optimized placement throughout the office area and best of all, their optimal settings.

One can further fine tune the deployment plan manually by: moving the APs around the floor plan to better match the building topology, customizing the settings for individual APs, adding walls in the floor plan, and so forth. The deployment plan's fidelity improves (and the predicted network performance will better reflect reality) as walls are added using their specific properties (drywall, wood, metal, etc.) and as APs and antennas are selected to match the requirements of the environment. As one plays with the adjustment, an updated optimal setting is always be achieved with one click.

Now that we know how many APs are needed (i.e., the topmost concern of budget), you wonder what performance your planned WLAN will yield. WiTuners is again there; ready to guide your further exploration.

❖ Performance

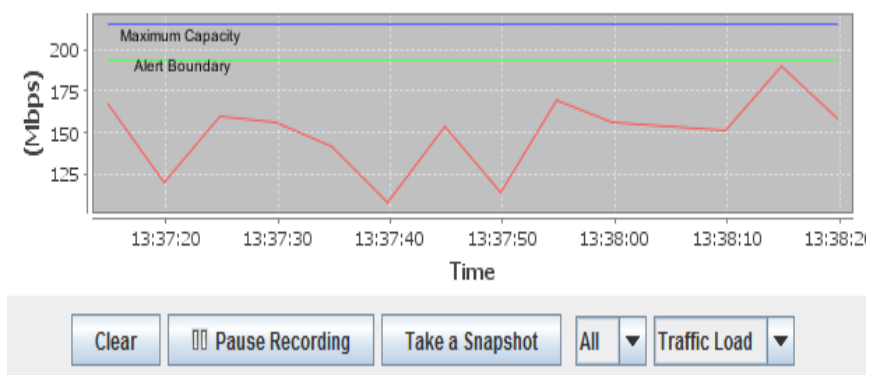
WiTuners presents heat-maps of the APs to exhibit the propagation characteristics within the WLAN environment. The AP radiation pattern is shown as a graduated color scale, and received values of power are listed at adjacent access points.



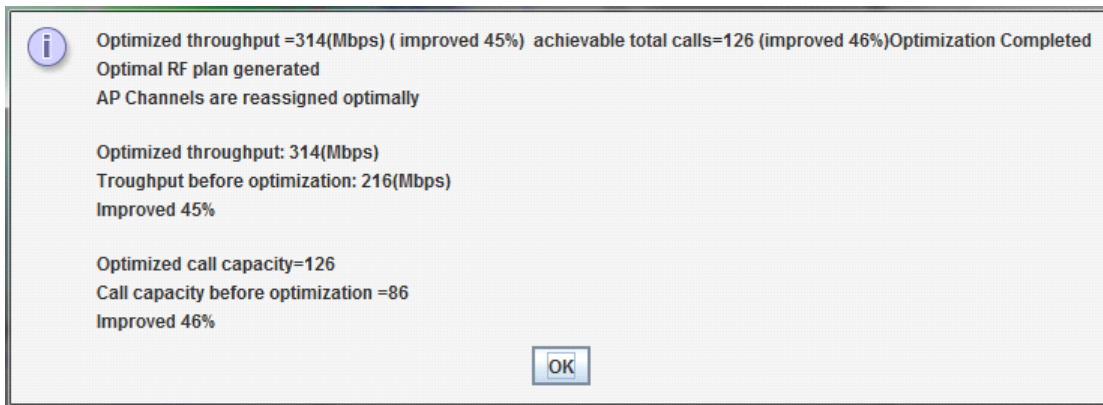
Fan shaped dead zones near columns, falloff through walls, and AP overlaps are easily identified. WiTuners provide a powerful means to visualize where one might expect areas of low connectivity or low throughput and then adjust the locations of APs accordingly.

The traffic load performance can be generated in order to predict the network performance. Simple statistical models are not adequate to model the system wide WLAN operational performance. One should use a time domain tool such as WiTuners so that a more realistic estimate is made, thereby minimizing the probability of running into upper bound problems, choke points, and dead zones. Such a tool not only indicates an upper bound of maximum capacity, but also provides an alert boundary that indicates that a network upgrade or operational change may be necessary.

All AP Traffic Load



Particular locations of interest (cafeterias, conference rooms, etc.) can be problematic for a WLAN deployment, since client demands in such areas can be high (and usually accompanied by correspondingly high levels of complaints). For such areas, virtual site surveys should be performed on those areas, auto placement performed again, and a better deployment realized.



Once this level of planning has been achieved, a comprehensive report is generated, showing:

- Number of required access points
- Optimal locations and placements
- Optimal parameter settings
- Expected performance metrics

Such a report greatly simplifies the ordering process, the job of the installer, and the setup and operation by the network administrator.

Summary

Number of APs 8

Total Throughput per AP 39 (Mbps)

Total call capacity per AP 15

AP Name	channel	Tx power (dBm)	all-channel nbrs	co-channel nbrs	location	throughput (Mbps)	call capacity
AP1	11	20	6	2	(-44,-41,0)	9	9
AP2	1	20	3	1	(-52,-67,0)	18	18
AP3	1	20	3	1	(-5,-16,0)	18	18
AP4	6	20	5	1	(-26,-75,0)	18	18
AP5	1	20	3	1	(-63,-24,0)	18	18
AP6	6	20	5	1	(-33,-11,0)	18	18
AP7	11	20	6	2	(-15,-40,0)	9	9
AP8	1	20	3	1	(-0,-63,0)	18	18

❖ Where We Stand

Now, you have confidence that the deployment plan reflects reality. And you have confidence that the specifications of the number of APs, placement, settings, and operation will meet the expectations of the users. You are ready to go back to the school board with a viable plan that oozes confidence in your ability to say “mission accomplished”.

Equipped with the deployment plan, you are also ready to set off and shop around, approaching wireless firms with questions such as:

- What will it cost to interconnect, power, and set up the WLAN?

- Do we need management software and how much will it cost?
- Do we need additional equipment or software upgrades and how much are they?

The next questions on your list are likely:

- Will an administrator and/or outside services be needed and how much will they cost?
- How to maintain the performance optimal and what does it take?

These are certainly legitimate questions, and could be costly if not carefully addressed. Again, WiTuners' WLAN performance Auditing and Tuning services will help. WiTuners promises an "Easier, Faster and Farther" WLAN for voice, video and enterprise class applications. Stay tuned and we will have Part Two of this series available: "WLAN Optimization and Operation Done Right with WiTuners"