



Quick and Dirty 802.11n Design

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I've been teaching about 802.11n for many years now. All about the new acronyms, technology at the hardware layer, PHY layer and MAC layer. There is so much to learn about this new protocol. But invariably the discussion leads to the question on how to design for .11n.

I was going to also talk about the 'morality' of designing and selling a Legacy Access Point solution in today's market, when .11n APs are available and you KNOW they are better than any Legacy AP ever could be. But I'll leave that discussion for a different episode.

There is the very long, technical and perhaps a bit boring answer. Or, as I've found after sharing this with hundreds of individuals, there is the "Quick and Dirty" method. This is NOT the best way to design for .11n. But it is a way that is very quick, simple, and provides the 80 in the 80/20 rule.

If you have lots of money, plenty of time, and want to over architect your Wireless LAN – there are much more sophisticated models. This isn't the answer to all possible scenarios. Remember, it's the "Quick and Dirty" method – so "don't be hating" on this...

Well, here goes.



This method of designing for .11n makes a couple of initial assumptions. First, you currently have an 802.11abg system in place that is working fine for you. If you are thinking of designing for a brand new installation, you could design for 802.11abg, then follow the "Quick and Dirty" method and you'll also be alright. (Again, there are many more sophisticated design methodologies for .11n – this isn't one of them.)

So if you do meet the stated assumption above, you already have an 802.11abg system in place – then you can choose from either of the two simple options listed below. The first is the easiest, and cheapest, but doesn't take into consideration for current .11a clients. If you HAVE TO use current .11a clients, you might want to look to the second option.

This is not the best way to design for .11n but it is the quickest.

Option 0 – Replace Access Points

- Mixed Mode

This is kind of like ‘kissing your sister’ - not really what you are after. It’s a compromise, and thus option ‘zero’. This doesn’t give you the major benefits of moving to 802.11n - but this is a transition type move that some folks think of as ‘safe’.

Each location where you have abg AP replace with abgn AP

2.4Ghz Frequency

2.4GHZ is for Legacy Only

2.4GHz is 20MHz – 1, 6, 11 ONLY -(normal channel planning)

Turn off support for .11b (if you can) – Require 6Mbs

Turn off support for 1, 2, 5.5 and perhaps also 11 data rates

SSID = Corp (or whatever your current SSID is)

Legacy Only – Everyone who is non-HT

No .11n Support needed in 2.4GHz

5GHz Frequency

5-GHz is for both Legacy and HT Only (also known as Mixed Mode)

5-GHz is 20MHz – use UNII-1, UNII-2, UNII-2e, or UNII-3 as country allows

Turn ON support for all Non-HT legacy devices (.11a)

SSID = Corp-Fast

HT Clients (.11n) - AND Legacy clients (.11a)

Only 20MHz support

Adapt channel plan if DFS situation within range

This makes the 2.4GHz frequency for older .11g devices and uses the 5GHz frequencies for both .11a and .11n clients in mixed mode. There will be a HUGE penalty for the .11n clients required to use protection mechanisms.

Do NOT use 40Mhz wide channels - it will only make the protection losses greater.

Option 1 – Replace Access Points

Each location where you have abg AP replace with abgn AP

2.4GHz Frequency

2.4GHz is for Legacy Only

2.4GHz is 20MHz – 1, 6, 11 ONLY -(normal channel planning)

Turn off support for .11b (if you can) – Require 6Mbs

Turn off support for 1, 2, 5.5 and perhaps also 11 data rates

SSID = Corp (or whatever your current SSID is)

Legacy Only – Everyone who is non-HT

No .11n Support needed in 2.4GHz

5GHz Frequency

5-GHz is for HT Only (also known as Greenfield)

5-GHz is 40MHz – use UNII-1, UNII-2, UNII-2e, or UNII-3 as country allows

Turn off support for all Non-HT legacy devices (.11a)

SSID = Corp-Fast

HT Clients only (.11n)

No 20MHz support

Adapt channel plan if DFS situation within range

Complaint Driven Solution

Everyone who can ‘see’ the “Corp-Fast” network will self-move over to the faster network. Each person that moves over to .11n not only receives a huge boost in their own throughput, but also takes a small load off the currently over-crowded 2.4GHz band.

The only issue with this scenario, is if you have people currently using their .11a devices, they will no longer be able to access the 5GHz frequency and will have to return to the 2.4GHz mess. So if you have folks in this category, and they complain, just get them a brand new .11n card, either internal or external and they’ll be able to reap all the benefits of a .11n Greenfield.

What if you have either lots of .11a clients, or your firm has already committed to a .11a 5GHz VoIP WiFi Phones... Well then, if you fit in that category, you ought to try out Option 2, below.

Option 2 -Additional Access Points

Each location where you have .11abg Access Point, leave it in place, and then add a new .11n Access Point

2.4Ghz Frequency - Same as in Option 1 above

Turn off the 2.4GHz frequency from the old legacy AP. This legacy AP is now only supporting .11b and .11g clients.

- 2.4GHZ is for Legacy Only
- 2.4GHz is 20MHz – 1, 6, 11 ONLY -(normal channel planning)
- Turn off support for .11b (if you can) – Require 6Mbps
- Turn off support for 1, 2, 5.5 and perhaps also 11 data rates
- SSID = Corp (or whatever your current SSID is)
- Legacy Only – Everyone who is non-HT
- No .11n Support needed in 2.4GHz

5GHz Frequency

Part One – *Currently Installed Access Points*

- 5-GHz UNII-3 will be used exclusively for the .11a clients
- 5-GHz is 20MHz – use UNII-3 as country allows (could be 5 available channels)
- Support ONLY (.11a) – no .11n things turned on
- SSID = Corp-Voice
- .11a 5GHz voice clients only
- Only 20MHz support

Part Two – *New .11n Access Points* (Same as in Option 1 above)

- 5-GHz is for HT Only (also known as Greenfield)
- 5-GHz is 40MHz – use UNII-1, UNII-2, UNII-2e, or UNII-3 as country allows
- Of course leaving off the UNII band used for the .11a phones!
- Turn off support for all Non-HT legacy devices (.11a)
- SSID = Corp-Fast
- HT Clients only (.11n)
- No 20MHz support
- Adapt channel plan if DFS situation within range

Option 2 wouldn't have any more Access Points than Option 1 above, but you would have additional costs, an additional network drop for the AP, as well as an extra PoE switch port. But you'd have basically two systems running side by side.

I know, we didn't talk about designing for MIMO and multipath – but remember, this is only the “Quick and Dirty” way to design for .11n. Now, go out there and make some great .11n networks, you'll be glad you did.



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