BEST PRACTICES FOR SUPPORTING WI-FI CLIENTS

About Jim Vajda

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Wi-Fi is a Network of Radios

- Wi-Fi clients make up 80-95% of radios in the network
- A 1000 AP WLAN may have 5,000-20,000 clients or more
- All 802.11 stations impact overall performance, not just AP's
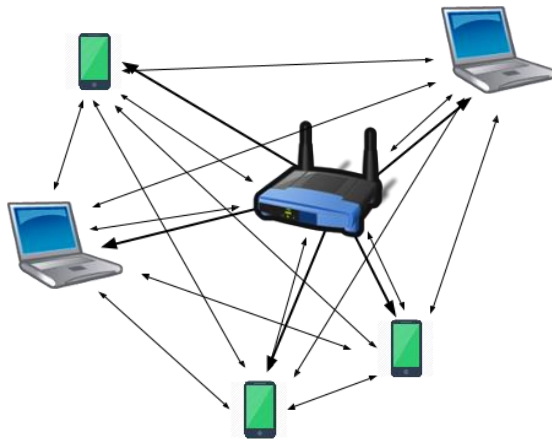
A Station is a Station

What if your AP's were all different models from different manufacturers with different code levels? This is the state of 80-95% of your WLAN.

BYOD

- You can't control makes/models/adapters/drivers ☹
- Manage expectations!
  - Some clients will perform better than others
  - Some clients won't work at all
  - Discourage VoWiFi
  - This is because of these clients, not your AP's
  - End-users rarely consider their clients when Wi-Fi problems occur
- Publish minimum device requirements
  - 802.11ac (because it always means 5 GHz support)
  - WPA2-Enterprise
  - Make it scary: "BYOD devices that do no meet these specifications will not allow you to <complete this task>."
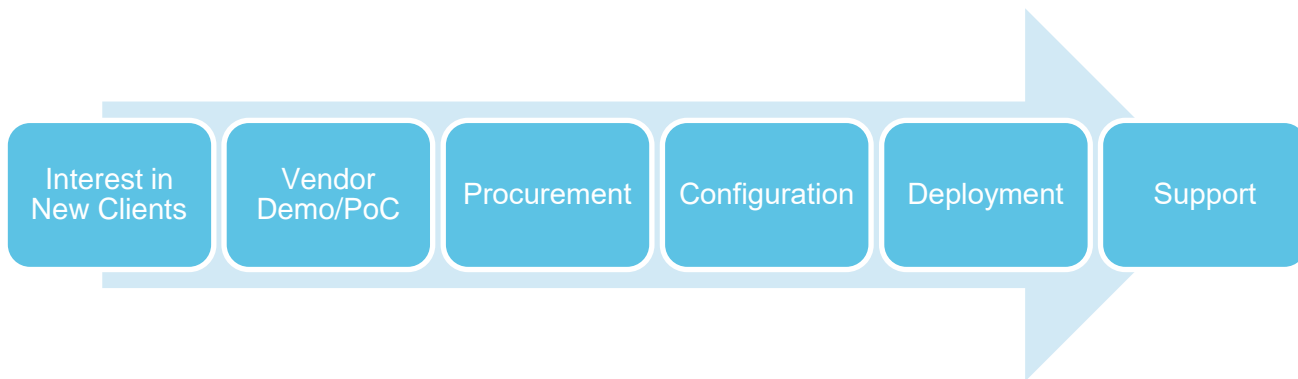- Disable 2.4 GHz?

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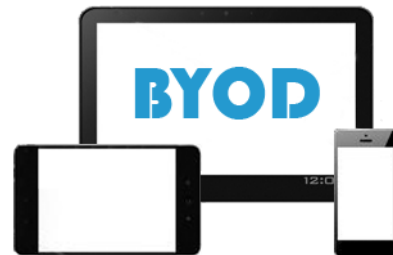
Enterprise Clients

- Talk to device and desktop groups
- Talk to Procurement, get embedded in the device purchasing process
  - Require demo units for in-person testing before purchasing
  - Test compatibility and performance
  - VoWiFi requires excellent clients, no exceptions!
  - Client roaming performance is undocumented and often terrible

Enterprise Clients

- Publish standardized "blessed" configurations
  - Specific adapters, driver versions, and advanced driver settings
- Share with desktop and help desk groups
  - They should validate client config before escalating a Wi-Fi ticket

Interest in New Clients	Vendor Demo/PoC	Procurement	Configuration	Deployment	Support

Enterprise Windows Clients

- Advanced driver settings are vendor specific
  - Intel: https://www.intel.com/content/www/us/en/support/articles/000005585/wireless/legacy-intel-wireless-products.html
- Look for and test band preference and roaming aggressiveness settings

The following properties are available for this network adapter. Click the property you want to change on the left, and then select its value on the right.

Property:

802.11n Channel Width for 2.4GHz
802.11n Channel Width for 5.2GHz
Ad Hoc Channel 802.11b/g
Ad Hoc QoS Mode
ARP offload for WoWLAN
Bluetooth(R) AMP
Fat Channel Intolerant
GTK rekeying for WoWLAN
HT Mode
Mixed Mode Protection
NS offload for WoWLAN
Preferred Band
Roaming Aggressiveness
Sleep on WoWLAN Disconnect

Value:

3. Prefer 5.2GHz band

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HT Mode
Mixed Mode Protection
NS offload for WoWLAN
Preferred Band
Roaming Aggressiveness
Sleep on WoWLAN Disconnect

Value:

4. Medium-High

Enterprise Windows Clients

- Windows 10 supports 802.11k/v/r with certain adapters
  - https://docs.microsoft.com/en-us/windows-hardware/drivers/network/fast-roaming-with-802-11k--802-11v--and-802-11r
- Intel adapters include 7265 and newer
  - https://www.intel.com/content/www/us/en/support/articles/000021562/wireless/intel-wireless-products.html

Support for Fast BSS Transition Roaming on Windows® 10 with Intel® Wireless Adapters

Newer generations of Intel® Wireless Adapters support fast roaming with 802.11r, 802.11k, and 802.11v on Windows® 10. No set up is required on the client (Wi-Fi adapter) side. Fast roaming is automatically enabled on the client with a supported Intel Wireless Adapter on Windows® 10, when connected to a fast roaming enabled Wi-Fi network.

> **Note**
>
> Older versions of Windows such as 7 and 8.1 don't support fast roaming with 802.11r, 802.11k, and 802.11v.
> Windows® 10 currently doesn't support 802.11r with Pre-Shared-Key (PSK) and Open Networks.

Product	802.11k	802.11v	802.11r
Intel® Wi-Fi 6E AX210	Yes	Yes	Yes

Documentation

Content Type
Compatibility

Article ID
000021562

Last Reviewed
03/26/2021

Enterprise Windows Clients

- Beware some Intel drivers with 802.11ax AP's!
- https://www.intel.com/content/www/us/en/support/articles/000054799/wireless.html

Intel® Wireless Adapter Supporting 802.11ac Isn't Showing Wi-Fi 6 (802.11ax) Capable Wireless Routers and Access Points When Displaying Available Networks

Depending on the Wi-Fi driver version used, Intel® Wireless Adapters supporting 802.11ac may not show Wi-Fi 6 (802.11ax) networks in their scan lists, and as a result, might not be able to connect to Wi-Fi 6 (802.11ax) capable wireless routers and access points, even at 802.11ac speeds.

Intel recommends using the latest driver version (Download the latest Wi-Fi driver) for your Intel® Wireless Adapter since issues get resolved and new functionality gets added to newer driver versions.

Intel has included a fix for this particular issue in the following Wi-Fi driver versions:

Driver versions for Windows 10	Supported Adapters
20.70.0.5 and newer	Intel® Wireless-AC 9560 Intel® Wireless-AC 9462 Intel® Wireless-AC 9461 Intel® Wireless-AC 9260 Intel® Dual Band Wireless-AC 8265 Intel® Dual Band Wireless-AC 8260

Documentation

Content Type
Compatibility

Article ID
000054799

Last Reviewed
03/26/2021

Enterprise Apple Clients

- It is what it is… 🦹
- OS updates can affect Wi-Fi performance
- iOS: -70 dBm RSSI roaming threshold
    - Supports 802.11k/v/r
    - "About wireless roaming for enterprise" doc
    - https://support.apple.com/en-us/HT203068
- macOS: -75 dBm RSSI roaming threshold
    - Does not yet support 802.11k/v/r but is tolerant of these features
    - "macOS wireless roaming for enterprise customers" doc
    - https://support.apple.com/en-us/HT206207
- Good WLAN Design Reference
    - Enterprise Best Practices for iOS Devices and Mac Computers on Cisco Wireless LAN
    - https://www.cisco.com/c/dam/en/us/products/se/2018/4/Collateral/AppleCiscoWirelessBestPractice WhitePaper-v5c-28Mar2018.pdf

Enterprise Android Clients

- Fragmentation Problem
  - Each device model should be treated as potentially unique
  - 802.11k/v/r support is mixed
  - Open-source OS means device manufacturers can change anything
- Some devices have configurable Wi-Fi settings (Zebra, Spectralink, and more)
- Test new OS upgrades (these may include driver updates)
- Samsung "Enhanced Roaming Algorithm," -75 dBm roaming threshold
  - https://docs.samsungknox.com/admin/knox-platform-for-enterprise/kbas/kba-115013403768.htm

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Client Platforms: Inventory ⓘ

Platform	Make	Model	Adapter	Driver	Unique Devices
▦ Windows					328
	LENOVO				320
		10AAS5HC00			158
			Microsoft - Intel(R) Dual Band Wireless-AC 7260	17.15.0.5	123
			Intel - Intel(R) Dual Band Wireless-AC 7260		36
				18.33.17.1	22
				18.33.13.4	9
				18.33.6.2	5

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Client Adapters: Roaming Problems ⓘ 📄 (Show All Clients With Roaming Problems)

Platform	Adapter	Driver	Roaming
⊞ Windows	Microsoft - Intel(R) Dual Band Wireless-AC 7260	17.15.0.5	16770
⊞ Windows	Intel - Intel(R) Dual Band Wireless-AC 7260	18.33.17.1	1327
⊞ Windows	Intel - Intel(R) Dual Band Wireless-AC 7260	18.33.6.2	1126
⊞ Windows	Intel - Intel(R) Dual Band Wireless-AC 7260	18.33.13.4	1154
⊞ Windows	Microsoft - Intel(R) Dual Band Wireless-AC 8265	19.50.1.6	139
⊞ Windows	Microsoft - Intel(R) Dual Band Wireless-AC 8265	20.50.0.5	23
⊞ Windows	Microsoft - Intel(R) Dual Band Wireless-AC 8265	20.70.3.3	0

QUESTIONS AND ANSWERS

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Thank you!

go.7signal.com/tour
Every Friday at 12 pm Eastern