



Recommendations & Best Practices for
Wi-Fi and Apple Devices



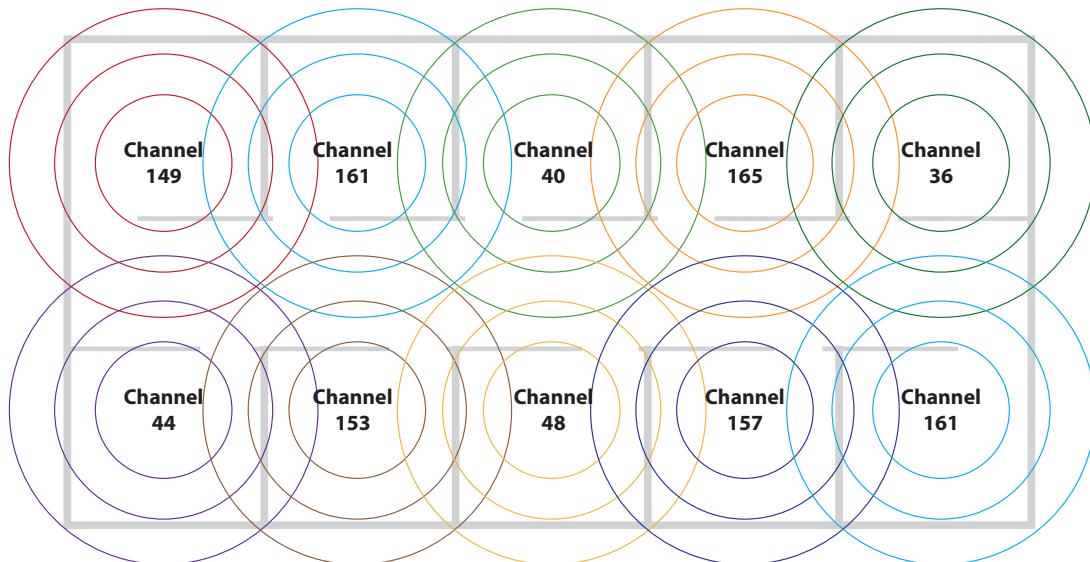


Overview

The purpose of this document is to supply guidance and best practice solutions around wireless network specifications to improve the user experience. This includes technical steps as well as coaching and mentoring for the technical staff.

List of Wi-Fi recommendations

- In order to use certain services related to physical location, Apple devices need to detect, but not necessarily join, an SSID that uses the 2.4GHz radio space. If there is not already another reliably available 2.4GHz network, and you want to provide a Guest SSID, consider configuring your Guest SSID to use 2.4GHz.
- Focus on 5GHz channels. If possible, don't use 2.4GHz channels.
 - Using 20 MHz wide channels and 5GHz gives you more channels for strategic mapping and reduces the chances of overlapping.
 - If you require more bandwidth increase to 40MHz wide for 5GHz.
 - i. This will reduce available channels.
 - ii. Proper channel mapping becomes critical.
 - Use the full spectrum including Dynamic Frequency Selection (DFS) channels.
 - Skip channels between adjacent Access Points (A/P).
 - i. This provides an extra buffer between adjacent channels reducing the risk for overlap and co-channel interference (CCI).
 - Strongly consider using 5GHz only for institution-owned devices (primary SSID). After you turn on content caching on a Mac, it keeps a copy of all supported content that local networked devices (called clients) download.





- Because Apple devices need a reliability available 2.4GHz network, keep the following recommendations in mind as you design your network that uses both 5GHz and 2.4GHz channels:
 - 2.4GHz networks should only use channels 1, 6, and 11.
 - Reduce the Radio Transmit Power (TX) to minimal levels. because 2.4GHz has tremendous range.
 - 2.4GHz channels may cover a wider physical area than expected.
 - Although it's technically possible to use a channel width other than the default 20MHz to attempt to increase bandwidth provided to clients, do not use 40MHz channel width with 2.4GHz.
 - To reduce the amount of RF pollution, configure several access points (APs) to use 5GHz, and fewer APs to use 2.4GHz.
 - Disable any custom SSID that may be automatically created by a printer (these are designed to be used for initial configuration for home and small business environments). Consider connecting printers to your network over Ethernet and turning off their Wi-Fi capability.
 - Be aware that cell phone hot spots broadcast in the 2.4GHz spectrum.
 - Be aware that most specialty devices (light switches, light bulbs, door locks, cameras, etc.) use the 2.4GHz spectrum.
 - If 2.4GHz channels are required, the 2.4GHz channels should be set 10 dBm lower than your hottest 5GHz
- Reduce the Radio Transmit Power (TX) for each AP to its lowest possible setting, so that you achieve a -80 to -90 dBm signal with an active AP.
 - Wi-Fi RSSI should be -65dBm to -60dBm or better. Apple devices will not scan for a different AP until the RSSI with their currently-associated AP drops below -70dBm.
- Signal-to-noise ratio (SNR) should be 20 dB or better.
- Test for ground-based radar channel changes at sites to see if you are in an at risk area.
 - Note: that these hops can be triggered by some Access Point (AP) own sensitivity to RF radiation and not from actual radar.
- Avoid using Hidden SSID's (Service Set Identifier).
 - Use Wi-Fi authentication security protocols to protect all SSID's.
- Decrease the total number of SSIDs that are being broadcasted by the Access Point (AP).
- Design for -65dBm cell edge for Primary SSID.
- Design for -65dBm cell edge for Secondary SSID.
- Scope Access Points (AP) to have unique channels, and avoid channel overlapping in close proximity.
- Configure each Access Point (AP) to not have the radios broadcast at 100% power (site survey will determine at what strength each AP should be configured).
- Do not depend on vendor "Auto/Automatic" settings for channels or AP power. Be precise with your settings.
- Disable broadcasting on 5GHz 149 & 153) on Access Points AP , to optimize peer-to-peer AirPlay from the Apple TVs, as documented here: <https://help.apple.com/deployment/ios/#/apd8fc751f59>



Cisco and Meraki specific suggestions for Apple Devices

- Set Minimum Data Rate to 12 Mbps.
- Enable 12 and 24 as Mandatory Rates.
- Design for signal-to-noise ratio of 25 dB or better.
- Keep Retry rates of less than 15%.
- Keep Layer 3 packet loss of less than 1%.
- Keep Jitter less than 100ms.
- Average Channel Utilization of less than 40% – target less than 30%.
- Turn on support for 802.11r – Fast Transition.
- Turn on support for 802.11k – Neighbor Reporting.
- Turn on support for 802.11v – BSS Transition Management.
- Apple devices will not scan until their associated Access Point's (A/P) RSSI drops below -70dBm.
- Set WMM On.
- Set AVC on – set Voice QoS to Platinum.

Determine if the Wi-Fi infrastructure is configured for “client-to-client” communications

Wi-Fi vendors have differing terminology for client-to-client communications, some examples include:

- Cisco - Peer-to-Peer Blocking
- Meraki - Bridge Mode

Apple TV and your Wireless network

Based on documented best practices, the following links provide Apple TV best practices with recommendations for Network design and implementation.

- Deployment Reference for iPhone and iPad:
<http://help.apple.com/deployment/ios/#/apd8fc751f59>
- If AirPlay or screen mirroring isn't working on your device:
<https://support.apple.com/en-us/HT204291>
- Manage AirPlay settings on your Apple TV:
<https://support.apple.com/en-us/HT202618>



Support For Your Apple Solution

Next Steps

This document contains important information about obtaining support for your Apple solution. To ensure the ongoing success of your deployment, APS suggests becoming familiar with these resources. Contact your Apple Sales team if you have any questions about these resources.

Successful Adoption of Your Apple Solution

Teachers and staff may want additional information about using Apple products in education. We recommend sharing the Apple in Education resources web site, where your faculty can learn about iPad and Mac features, Apple's commitments to Special Education, and hear real stories from other educators about using Apple products to enhance education. Visit <http://www.apple.com/education/>.

Continued Success of Your Apple Solution

Continued success of your Apple solution requires having the right support and resources available when you need them. In addition to the coaching and mentoring during your APS engagement, these resources will help you continue to maintain and grow your Apple solution.

- IT Resources for K-12 Education:
<http://www.apple.com/education/it/>
- Training and Certification:
<http://training.apple.com>

AppleCare

Because Apple makes the hardware, the operating system, and many applications, Apple products are truly integrated systems. And only AppleCare products give you one-stop service and support from Apple experts, so most issues can be resolved in a single call.

- Contact AppleCare online:
<http://www.apple.com/support/contact/>
- Call AppleCare support for education:
1-800-800-APPL (2775)
- AppleCare OS Support:
<http://www.apple.com/support/professional/it-departments/>
- iPad support:
<http://www.apple.com/support/ipad/>
- Mac Support:
<http://www.apple.com/support/mac/>

If you'd like help implementing the solution in this white paper, we are ready to help; contact us at info@hconline.com or (866) 518-9672.

If you have corrections please send them to info@hconline.com.

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