

## Ways To Increase Airtime

Category	Sub-Category	Strategy	Explanation
Optimise Design	5GHz vs. 2.4GHz	Encourage (exclusive) use of the 5GHz band	The 5GHz band has many advantages over 2.4, including more channel space and less interferers
Optimise Design	5GHz vs. 2.4GHz	Prevent cross-band roaming	Stop clients roaming between 2.4GHz and 5GHz by using different ESSIDs on each band
Optimise Design	5GHz vs. 2.4GHz	Selectively disable 2.4GHz radios	After optimising for 5GHz, 2.4GHz performance can be improved by disabling some radios, thereby minimising CCI
Optimise Design	Authentication	Avoid captive portals	These have a very high overhead compared to all other authentication methods
Optimise Design	Authentication	Use iPSK instead of 802.1x	While less secure, iPSK has less authentication overhead, and may be appropriate in some situations
Optimise Design	Choice of Technology	Avoid using Wi-Fi bands where there is an alternative	For exactly a wireless voice service may be better off using 1.8GHz DECT technology than contending with WLAN services
Optimise Design	Choice of Technology	Use Technology that Coexists Well With Wi-Fi	For example, Bluetooth plays nicely with Wi-Fi up to a fairly wide margin
Optimise Design	Client Behaviour	Optimise the design for client roaming behaviour	Ensure mobile clients always have options to transition seamlessly between APs. Test that they behave as expected. This will minimise probing, reassociations and retries
Optimise Design	Radio Configuration	Increase basic rate and minimum transmit rates on each ESS	Get your management and control traffic on and off the medium much quick. Block legacy clients from connecting
Optimise Design	Radio Configuration	Lower Transmit Power	In general the lowest transmit power needed to achieve the required performance should be used. This will minimise signal outside the cell
Optimise Design	Radio Configuration	Minimise the number of SSIDs	Each SSID consumes airtime. Use features like Role-based access control (RBAC) instead of multiple SSIDs where user segmentation is required
Optimise Design	Radio Configuration	Optimise Channel re-use	Ensure channels are only re-used as absolutely necessary and that CCI is avoided where possible
Optimise Design	Radio Configuration	Use a static channel plan	In many cases, static channel plans have a net benefit over dynamic channel assignment, especially HD & VHD (note: each case is debatable)
Optimise Design	Radio Configuration	Use narrow channels in medium to high contention environments	Narrower channels can lead to higher net throughput in as ESS as they consume less channel space
Optimise Design	Radio Configuration	Use radio resource management (RRM)	In some cases, dynamic channel assignment may have a net benefit over static channel plans (note: each case is debatable)
Optimise Design	Radio Configuration	Use wide channels in low contention environments	Where there is sufficient channel space, allow wide channels for higher per-client throughput. In contended environments this reduces throughput
Optimise Design	Signal Containment	Use directional antennas where appropriate	Directional antennas can help to contain signal within a cell in some situations

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Optimise Design	Signal Containment	Use natural attenuation of nearby objects when placing APs	APs can be placed near highly-antennating structures or objects to limit signal spread in that direction
Optimise Design	Signal Containment	Use pico-cells techniques in VHD environments	For example, using the natural attenuation of the human body
Optimise Design	Backhaul	Ensure uplink and WAN bandwidth is sufficient	This can eliminate some retransmission on the WLAN
Optimise Configuration	Available Channels	Disable AWDL (Apple Wireless Direct Link)	This technology creates another BSS that consumes UNII-3 channels
Optimise Configuration	Available Channels	Disable problematic channels	For example DFS channels that are repeatedly triggered should be removed from the design
Optimise Configuration	Available Channels	Verify full regulatory domain support	Ensure all valid channels in the regulatory domain are being use by APs and supported by clients
Optimise Configuration	Bandwidth Controls	Turn off shaping or rate-limiting on network infrastructure	Rate-limiting generally has a detrimental effect on wireless as it works against the built-in contention mechanisms by buffering on network infrastructure
Optimise Configuration	DHCP Lease Times	Increase DHCP lease times	Increase as far as practical to minimise lease traffic without leading to pool exhaustion
Optimise Configuration	Idle Timeouts	Increase idle timeouts on authentication and application servers	Longer timeouts can reduce the amount of reauthentication traffic on the air
Optimise Configuration	Quality of Service	Ensure traffic is marked correctly in both directions	For WMM and QoS to do it's job, traffic must be correctly marked
Optimise Configuration	Quality of Service	Map the wired QoS policy to wireless QoS policy	802.3 QoS is not directly compatible with 802.11 QoS. Administrators must define the classification policy for each and the mapping between them
Optimise Configuration	Vendor Features	Band-Steering (Balanced)	While band-steering can use more airtime initially, it can also ultimately lead to more balanced usage of each band's channel space
Optimise Configuration	Vendor Features	Cell-Size Reduction	Seeks to reduce the sensitivity of APs as a proxy for reducing the cell size
Optimise Configuration	Vendor Features	Enable Airtime fairness	Changes the weighted-fair queuing algorithm to weight higher-data-rate clients higher, thereby increasing net throughput
Optimise Configuration	WLAN Features	Configure Fast-Roaming	Use 802.11r or OKC where supported by clients
Optimise Configuration	WLAN Features	Don't use TKIP	TKIP-encrypted frames are limited to 54Mbps. But of course you shouldn't use TKIP for other reasons
Optimise Configuration	WLAN Features	Enable Wireless Multimedia (WMM)	WMM essentially implements quality of service for WLANs
Optimise Configuration	WLAN Features	Use Open authentication instead of 802.1x	In VHD applications, open authentication can preserve large amount of airtime. It is less secure however.

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Optimise Configuration	WLAN Tweaks	Disable MU-MIMO & Transmit Beamforming	This feature of the 802.11ac standard has very high overhead due to the channel sounding
Optimise Configuration	WLAN Tweaks	Disable Power-save	Power-save features can cause excess traffic by clients polling for non-existing traffic
Optimise Configuration	WLAN Tweaks	Enable Frame Aggregation	A-MSDUs and A-MPDUs are aimed at reducing overhead and increasing throughput
Optimise Configuration	WLAN Tweaks	Increase Idle Timeouts on the WLAN	This can minimise the amount of reauthentication traffic
Optimise Configuration	WLAN Tweaks	Increase TXOP Time	Allows more airtime to be reserved for transmission - can reduce overhead but could also lead to increased contention and starvation for of lower priority classes
Optimise Configuration	WLAN Tweaks	Lower the maximum number of retries allowed	Prevent poor quality frames being retransmitted excessive numbers of times. Allow higher-layer protocols like TCP to do the work
Optimise Configuration	WLAN Tweaks	Use Long-Guard Interval in certain environments	Configuring the WLAN for long-guard interval can be helpful in large or outdoor environments where the propagation time of a frame is longer than usual
Optimise Configuration	WLAN Tweaks	Use Short-Guard Interval (SGI) in most environments	The short-guard interval saves 400 nanoseconds. Time you can now spend with your family
Optimise Infrastructure	Choice of Infrastructure	Dedicated scanners / sensors	Deploy dedicated sensor APs and minimise or disable scanning on client-serving APs to ensure APs are always available
Optimise Infrastructure	Choice of Infrastructure	Use APs with sufficient user capacity for the design	Designs requiring 50+ associations per radio may need higher-end APs with more CPU and memory
Optimise Infrastructure	Choice of Infrastructure	Use dual-5GHz radio APs where appropriate	These may provide extra capacity in some situations, in others they are no benefit
Optimise Clients	Configure Clients	"Forget" unused Wi-Fi networks	Prevents clients from probing for unused or non-existent WLANs
Optimise Clients	Configure Clients	Configure Client Drivers	Some drivers may allow configuration of various options that may be beneficial to airtime
Optimise Clients	Upgrade Clients	Upgrade & Test Client Drivers	Use the latest drivers and test them for compatibility and performance with each network
Optimise Clients	Upgrade Clients	Upgrade Client NICs	To at least 2x2:2 MIMO radios
Optimise Clients	Wired vs. Wireless	"If it doesn't move, wire it"	Keep clients that don't need to be wireless from consuming airtime
Reduce Unwanted Traffic	Application Traffic	Uninstall or replace chatty applications	Especially multicasting applications like Bonjour
Reduce Unwanted Traffic	Application Traffic	Use efficient video and voice codecs	More efficient codecs use less bandwidth and therefore less airtime
Reduce Unwanted Traffic	Broadcast Suppression	Convert broadcast to unicast	Some vendors implement this feature on some or all broadcast traffic. Limits the spread of broadcast traffic to BSS's that do not require it

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Reduce Unwanted Traffic	Broadcast Suppression	Enable ARP Caching	Enable this to reduce the number of ARP requests on the medium
Reduce Unwanted Traffic	Broadcast Suppression	No hidden SSIDs	This leads to more broadcasts
Reduce Unwanted Traffic	Broadcast Suppression	VLAN Pooling	Limit the size of broadcast domains by placing clients in separate VLANs.
Reduce Unwanted Traffic	Multicast Optimization	Multicast Domain features	Use vendor features like Aruba's Airgroup to create administrator defined multicast domains, limiting the spread of multicast traffic
Reduce Unwanted Traffic	Multicast Optimization	Multicast Optimization features	May transmit multicast frames at a higher rate or convert this traffic to unicast, similar to many broadcast suppression options
Reduce Unwanted Traffic	Probe Suppression	Increase probe-response threshold	Configure APs to ignore probes below a certain SNR to prevent clients with poor signal associating
Reduce Unwanted Traffic	Probe Suppression	Enable 802.11k	In theory this cuts down on the need for clients probe and improves roaming behaviour
Reduce Unwanted Traffic	Probe Suppression	Enable 802.11v	In theory this cuts down on the need for clients probe and improves roaming behaviour
Reduce Unwanted Traffic	Unwanted Protocols	Block or deconfigure IPv6 (if unused)	Disable this protocol on network infrastructure and clients can significantly reduce unwanted traffic
Reduce Interference	Non-Wi-Fi Interference	Discover & remove or replace faulty or poorly shielded hardware	Like microwave ovens and electrical motors with damage or manufacturing defects
Reduce Interference	Non-Wi-Fi Interference	Discover & remove or replace sources on non-Wi-Fi interference	Like cordless phones
Reduce Interference	Rogue & Neighbour APs	Disable Wi-Fi Direct on printers and televisions	Often enabled by default, and with poor default configuration
Reduce Interference	Rogue & Neighbour APs	Disable Wi-Fi on printers and other devices where not used	Often enabled by default, and with poor default configuration
Reduce Interference	Rogue & Neighbour APs	Policy to ban or discourage hotspots among staff	Hotspots consume a lot of airtime and channel space and are often poorly configured
Reduce Interference	Rogue & Neighbour APs	Provide a better alternative to hotspots by delivering a BYOD service	Better than a ban is providing a controlled alternative
Reduce Interference	Rogue & Neighbour APs	Use "House" channels	Isolate poor-performing or authorised rogue APs to a specific "house" channel, to preserve performance in the rest of the channel space
Outside the Box	More Channel Space	Petition regulatory bodies like the FCC and ACMA for more channel space	More channels = more airtime
Outside the Box	Neighbour Aps	Block neighbouring Wi-Fi signals using Faraday cage	Yes, apparently a customer of one of the attendees has actually taken this drastic step!

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Outside the Box	Neighbour APs	Visit your neighbours and give them this list.	What works for you will work for everyone!
Outside the Box	Power Connections for Clients	Provide power connections to mobile clients	Providing powered cables like USB for charging in spaces like meeting rooms can ensure portable or mobile clients are using their radio's full performance capabilities