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The bridge to possible

Cut the Cord

Design Principles to Deliver a
Wireless-First Enterprise

Leigh Jewell
Solutions Engineer
BRKEWN-1107

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Your speaker



Leigh Jewell

- Technical Solution Architect
- Cisco, Sydney, Australia
- Worked in Cisco IT for 13 years deploying wireless networks
- First wireless project was deploying WEP
- Second wireless project was removing WEP

<https://www.linkedin.com/in/leigh-jewell/>

Cisco Webex App

Questions?

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How

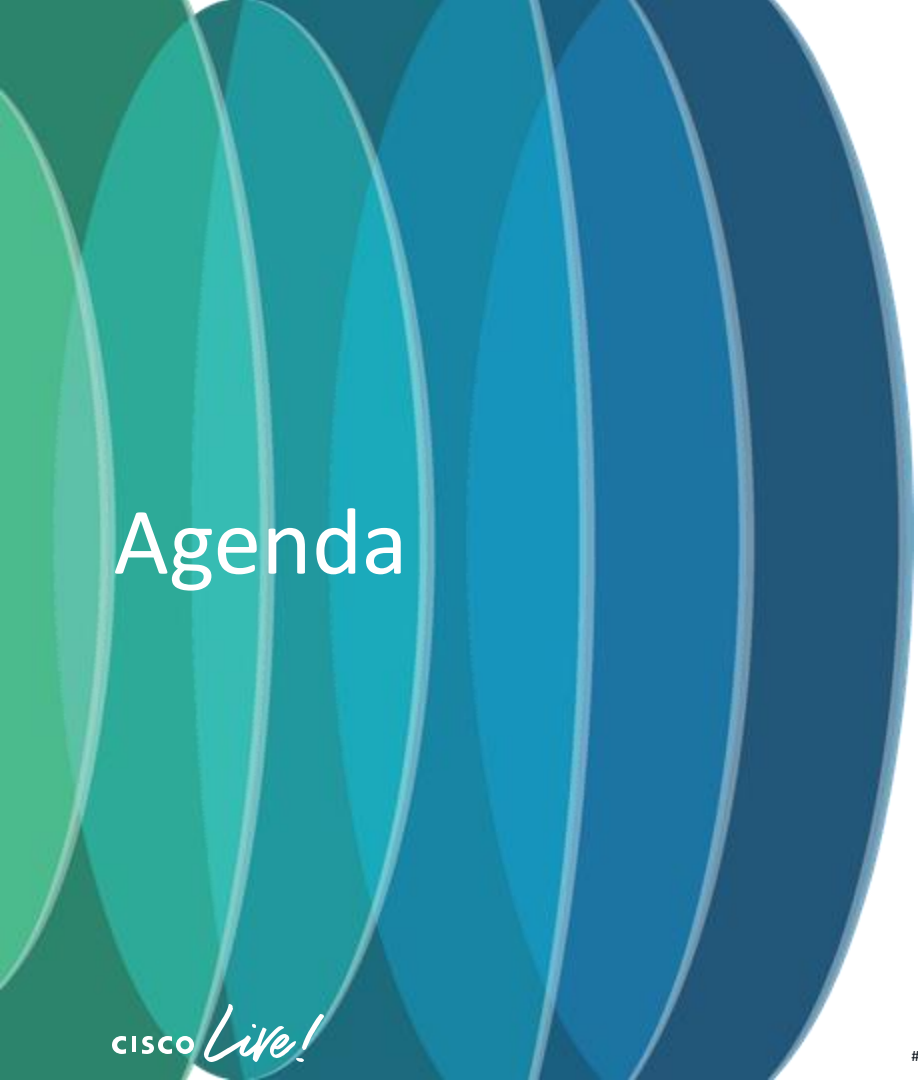
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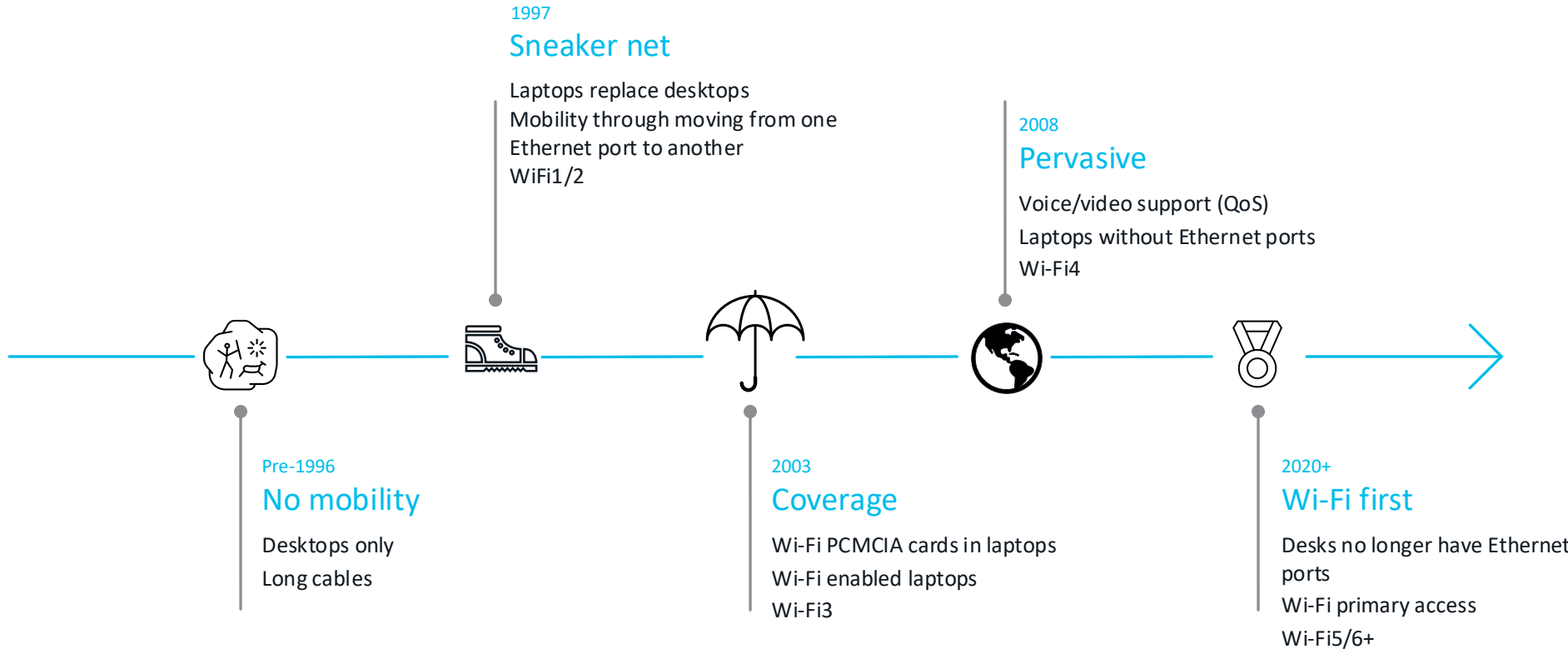
Agenda

- What is wireless-first
- Wireless-first design
- Capacity planning
- Site survey
- Resiliency
- Quality of experience
- Assurance
- Conclusion

What is Wireless-First?



Mobility evolution



The cutting of the cord



Apple MacBook Air
released in 2008
never had an Ethernet
port



Apple MacBook
Pro laptop
eliminated the
Ethernet port in
2012



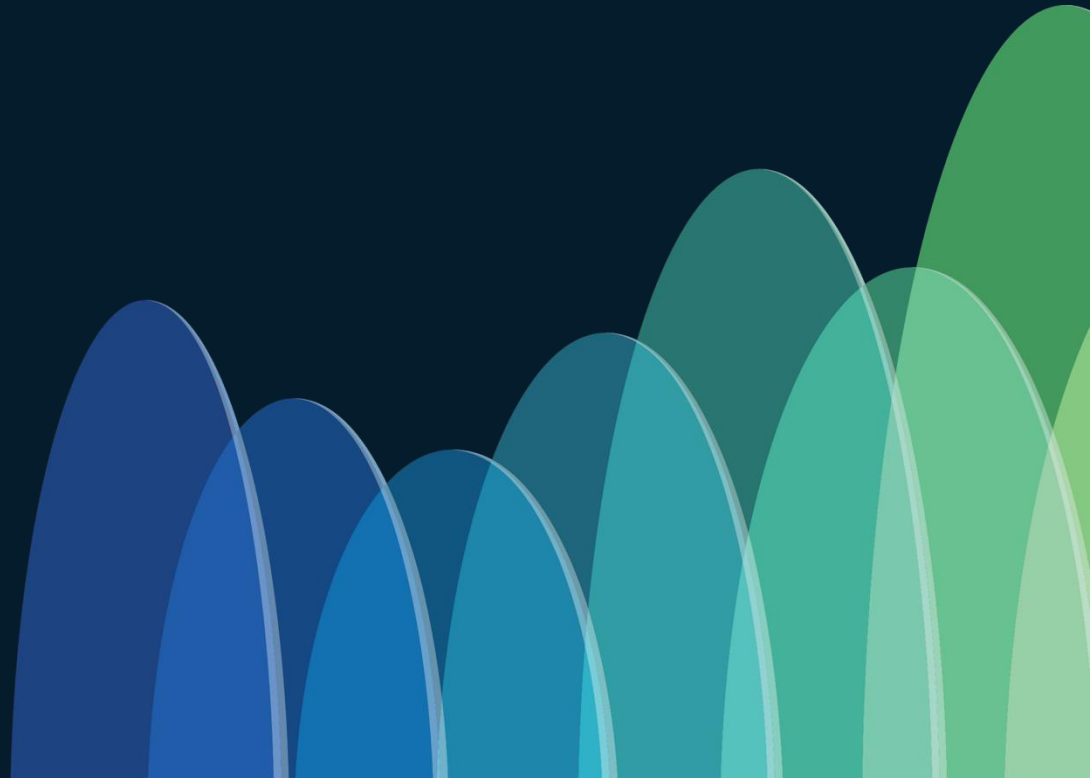
Lenovo ThinkPad
X1 Carbon
moved to mini
Gigabit Ethernet
5th Gen 2017



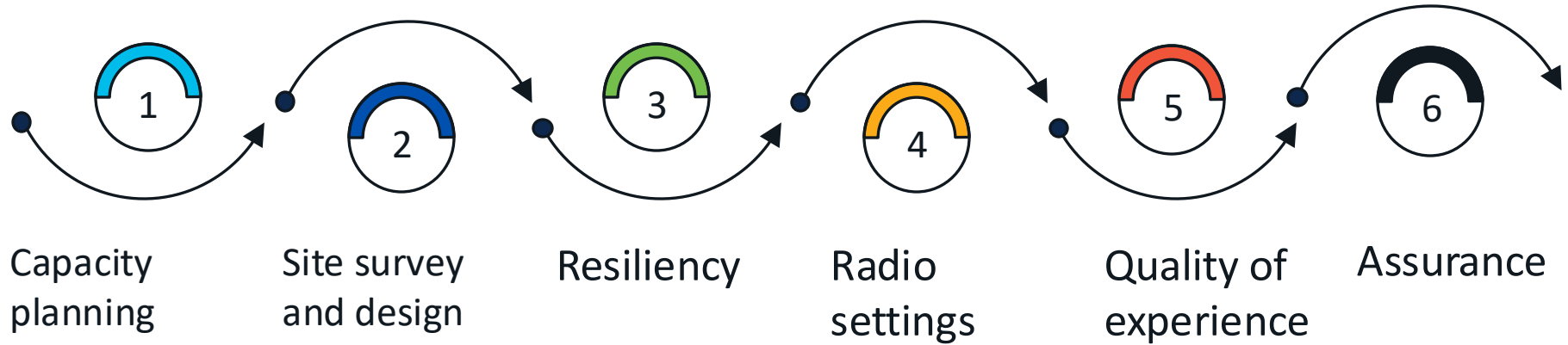
Lenovo 2021 added
models without Ethernet
ports including the T
series



Wi-Fi First Design

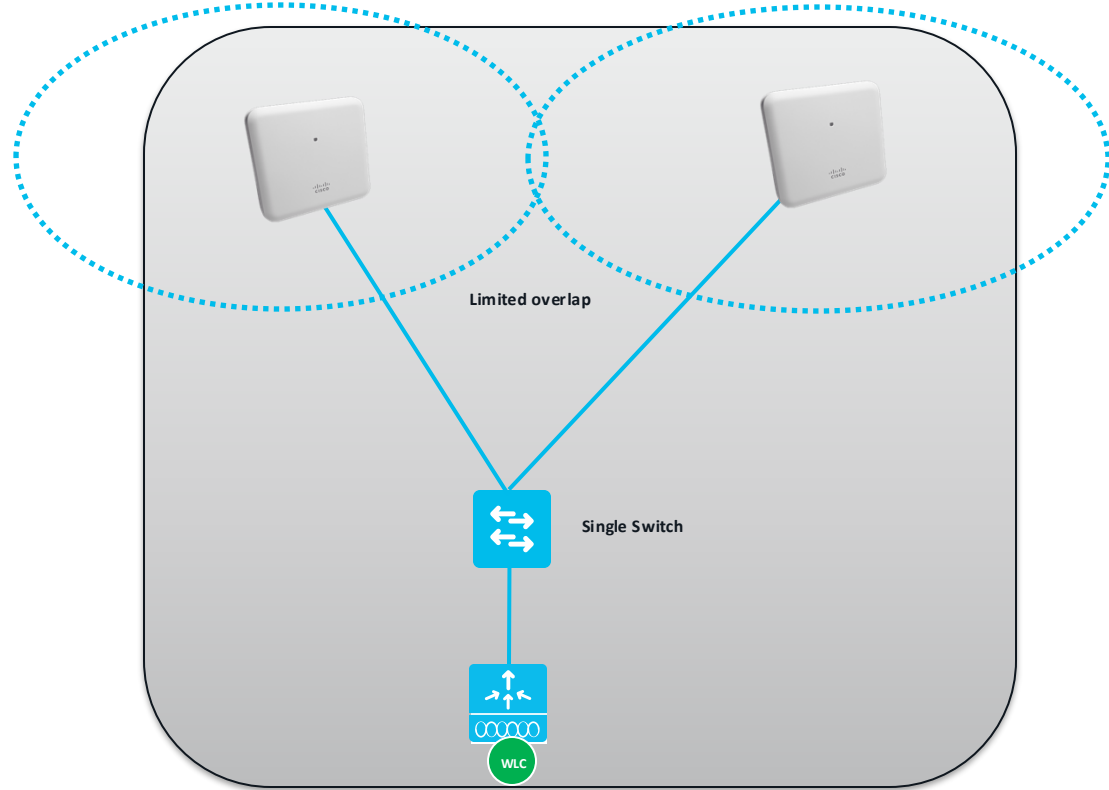


Components of a wireless first design



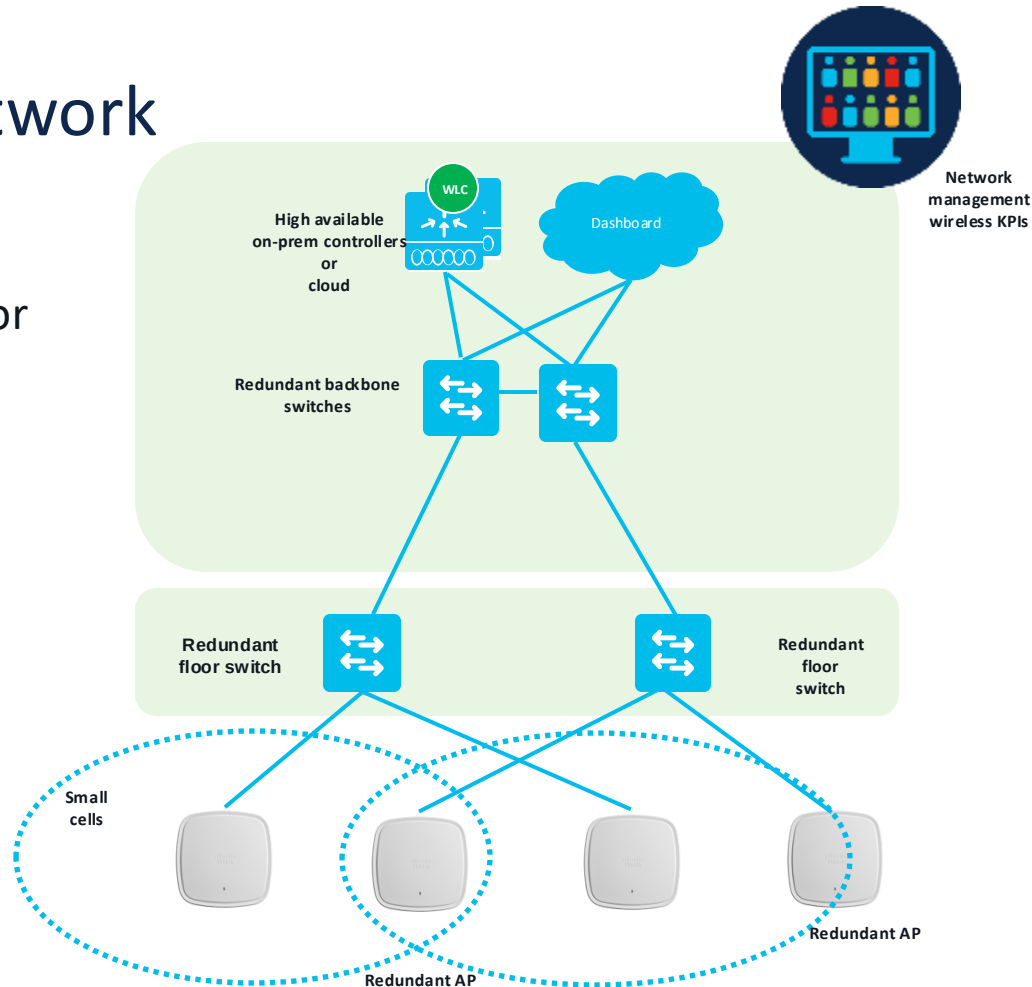
Legacy - wireless as a secondary network

- Ethernet primary access
- Wireless supplementary use
- Non business critical
- Monitoring priority P3
- No resiliency
- Coverage only
- No quality of experience
- Static channels and power



Future - wireless first network

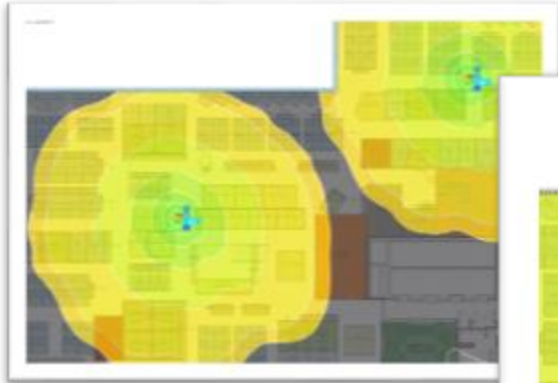
- No single points of failure to the AP
- Stateful, highly available controllers or cloud dashboard
- Small cells sizes
- High density design
- Multi-gigabit Ethernet to edge
- Optimised PoE
- Quality of Experience
- Wireless KPI and metrics
- Location services
- Dynamic power and channels



Capacity Planning

Goldilocks principle of Wi-Fi APs

Not too many, not too few, just right



Too few



Just right



Too many

How to calculate how many APs to deploy?



Estimate throughput

Find your target application:

Application	Estimated throughput
Video conferencing	1.5Mbps
Streaming – video	768kbps
Streaming – video HD	768– 8Mbps
Streaming – 4K	8 – 20Mbps
VR training headset	50Mbps

Understand client capabilities

Check the data sheet of the devices you will be supporting

Overview Connections Performance Roaming Timeline

Status associated since May 10 15:39

SSID epoch

Access point [ljewell-downstairs-new](#) [topology](#)

Splash N/A

Signal 46dB (channel 104, 5 GHz)

Device type, OS Apple iPhone 13, IOS17.4.1

Capable Wi-Fi standards 802.11ax - 2.4 and 5 GHz, Fastlane

Tools [history](#) [packet capture](#) [disconnection](#)

Notes

Current client connection

Capable channel width 80 MHz

Maximum bitrate 1200 Mbps

Spatial streams 2

802.11r Off

Fastlane Capable

Let's assume we must support iPhone13

It can support Wi-Fi6 up to 80Mhz and 1,200Mbps

But can our Wi-Fi support this speed?

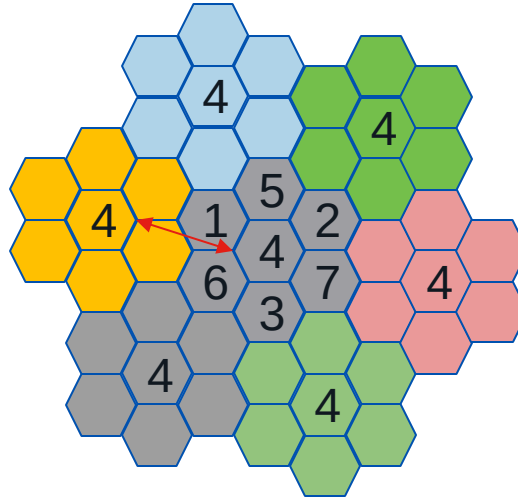
How many channels required?

Hexagons are great model for channel plans

We want a channel plan with minimum reuse of channels as possible

7 channel plan provide maximum distance between same channel

Channel 4 is two cells away
from another channel 4



Could we run 80Mhz bonded channels?

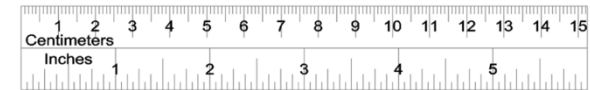
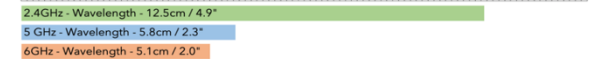
2.4Ghz – we can only run 20Mhz (3 channels)

5Ghz – we can only run 40Mhz (11 channels)

6Ghz – we can run 80Mhz (14 channels) (low power indoors)

2.4 GHz Channels			
ISM Band	2407 + 5 X Ch. Number		
Channel	1	6	11
Center Freq	2.412	2.437	2.462

WIRELESSLAN
PROFESSIONALS



2.4 GHz Channels			80 MHz		
	ISM Band	2407 + 5 X Ch. Number		Wavelength	12.5cm - 4.9" to 12.0cm - 4.7"
Qty	Channel	1	6	11	
3	Center Freq	2.412	2.437	2.462	

5 GHz Channels		
Frequency	5000 + 5 X Ch. Number	
Wavelength	5.8cm - 2.3" to 5.1cm - 2.0"	

Radio Band Center Freq		DFS Channels												DFS Channels												City			
		U-NII-1				U-NII-2a				U-NII-2c (Extended)								U-NII-3											
25	20 MHz	5100	5200	5220	5240	5260	5280	5300	5320	5500	5520	5540	5560	5580	5598	5616	5634	5652	5670	5688	5700	5720	5745	5765	5785	5805	5825	25	
11	40 MHz	36	40	44	48	52	56	60	64	100	104	108	112	116	120	124	128	132	136	140	144	149	153	157	161	165	169	11	
5	80 MHz	38	46			54	62			102			110		118		126			134	142			151	159			5	
2	160 MHz		42			58				106					122					138				155				2	
					50					114														165					
		165 was GSM, now U-NII-3																											

6 GHz Channels		
Frequency	5950 + 5 X Ch. Number	
Wavelength	5.1cm - 2.0" to 4.2cm - 1.6"	

FCC - USA		5950 to 5 X Ch. Number		Wavelength		5.1cm - 2.0" to 4.2cm - 1.6"							
Low Power Indoor		5dBm/MHz - Net EIRP 18dBm		5GHz									
Radio Band													
Center Freq													
City	5950	5975	5995	6015	6035	6055	6075	6095	6115	6135	6155	6175	6195
59	20 MHz	1	5	9	13	17	21	25	29	33	37	41	45
59	40 MHz	3	11			19	27		35	43			51
14	80 MHz		7			23			39				55
7	160 MHz				15				47				79

Radio Band		U-NII-5		U-NII-6		U-NII-7		U-NII-8																
20 MHz	1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69	73	77	81	85	89	93
40 MHz	3	11			19	27			35	43			51	59			67	75			83	91		
80 MHz		7			23				39				55				71				87			
160 MHz				15					47				79								143			

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2.4 GHz Channels			80 MHz
ISM Band			2407 + 5 X Ch. Number
Wavelength			12.5cm - 4.9" to 12.0cm - 4.7"
Qty	Channel	Center Freq	
3	1 6 11	2.412 2.437 2.462	

5 GHz Channels			500 MHz
Frequency			5000 + 5 X Ch. Number
Wavelength			5.8cm - 2.3" to 5.1cm - 2.0"

Radio Band Center Freq		DFS Channels										DFS Channels										City												
		U-NII-1					U-NII-2a					U-NII-2c (Extended) TDWR					U-NII-3																	
25	40 MHz	5100	5200	5220	5240	5260	5300	5320	5340	5360	5400	5420	5440	5460	5480	5500	5520	5540	5560	5580	5590	5620	5640	5660	5680	5700	5720	5740	5760	5780	5800	5820	25	
11	40 MHz	36	40	44	48	52	56	60	64	100	104	108	112	116	120	124	128	132	136	140	144	149	153	157	161	165								11
5	80 MHz		38		46		54		62		102		110		118		126		134		142		151		159									5
2	160 MHz			42			58					106				122				138				155										2
					50									114																				
		165 was GSM, now U-NII-3																																

Could we run 80Mhz bonded channels?

2.4Ghz – we can only run 20Mhz (3 channels)

5Ghz – we can only run 40Mhz (11 channels)

6Ghz – we can run 80Mhz (14 channels) (Low Power Indoors)

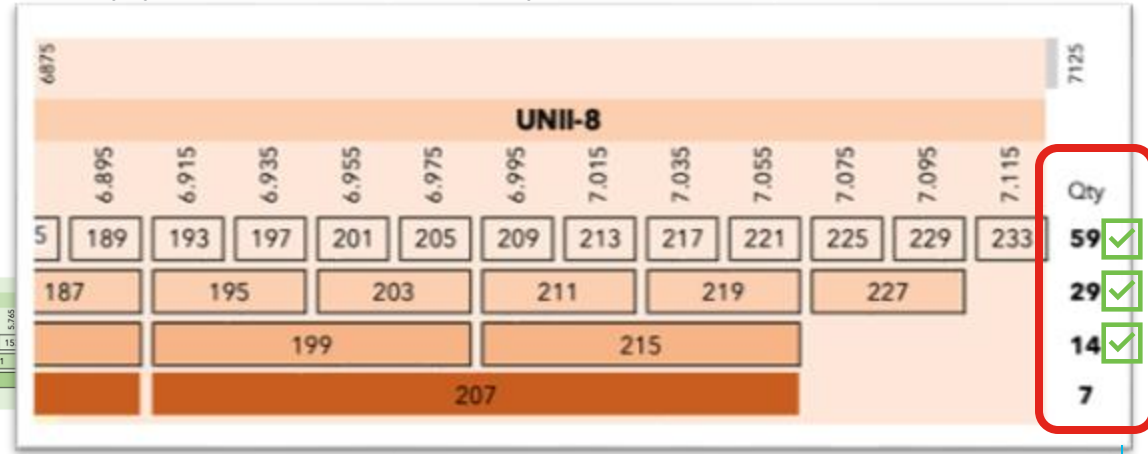
2.4 GHz Channels			80 MHz
ISM Band	2407 + 5 X Ch. Number		Wavelength 12.5cm - 4.9" to 12.0cm - 4.7"
Channel	1	6	11
Center Freq	2.412	2.437	2.462

5 GHz Channels			500 MHz
Frequency	5000 + 5 X Ch. Number		Wavelength 5.8cm - 2.3" to 5.1cm - 2.0"

Radio Band		U-NII-1		U-NII-2a		U-NII-2c (Extended)		U-NII-5		U-NII-6		U-NII-7		U-NII-8	
Center Freq		5.180		5.200		5.220		5.240		5.260		5.280		5.300	
20 MHz		36	40	44	48	52	56	60	64	100	104	108	112	116	120
40 MHz		38	46	54	62	102	110	118	126	134	142	150	158	166	174
80 MHz		42	58	106	138	151	159	167	175	183	191	199	207	215	223
160 MHz		50	114	122	130	138	146	154	162	170	178	186	194	202	210

6 GHz Channels			1,200 MHz
FCC - USA	5950 + 5 X Ch. Number		Wavelength 5.1cm - 2.0" to 4.2cm - 1.6"
Low Power Indoor	5dBm/MHz - Net EIRP 18dBm		

Radio Band		U-NII-5		U-NII-6		U-NII-7		U-NII-8	
Center Freq		5.955		5.975		5.995		6.015	
20 MHz		1	5	9	13	17	21	25	29
40 MHz		3	11	19	27	35	43	51	59
80 MHz		7	23	39	55	71	87	103	119
160 MHz		15	47	79	111	143	175	207	239



Speed and modulation

<https://mcsindex.net/>

	MCS Index				Spatial Stream	Modulation	Coding	484-tone RU / 40MHz		
	HT	VHT	HE	EHT				3.2μs GI	1.6μs GI	0.8μs GI
	8	0	0	0	2	BPSQ	1/2	29.3	32.5	34.4
	9	1	1	1	2	QPSK	1/2	58.5	65.0	68.8
	10	2	2	2	2	QPSK	3/4	87.8	97.5	103.2
	11	3	3	3	2	16-QAM	1/2	117.0	130.0	137.6
	12	4	4	4	2	16-QAM	3/4	175.5	195.0	206.5
	13	5	5	5	2	64-QAM	2/3	234.0	260.0	275.3
	14	6	6	6	2	64-QAM	3/4	263.3	292.5	309.7
	15	7	7	7	2	64-QAM	5/6	292.5	325.0	344.1
Wi-Fi5		8	8	8	2	256-QAM	3/4	351.0	390.0	412.9
		9	9	9	2	256-QAM	5/6	390.0	433.3	458.8
Wi-Fi6		10	10	10	2	1024-QAM	3/4	438.8	487.5	516.2
		11	11	11	2	1024-QAM	5/6	487.5	541.7	573.5
Wi-Fi7			12	12	2	4096-QAM	3/4	526.5	585.0	619.4
			13	13	2	4096-QAM	5/6	585.0	650.0	688.2

We have
Wi-Fi6 APs
so
iPhone will
max speed
is **573Mbps**

Modulation tells us signal strength

If we want our iPhone13 to run at 573Mbps we need a target signal strength of -49dBm



Higher signal strength

=



Higher speed

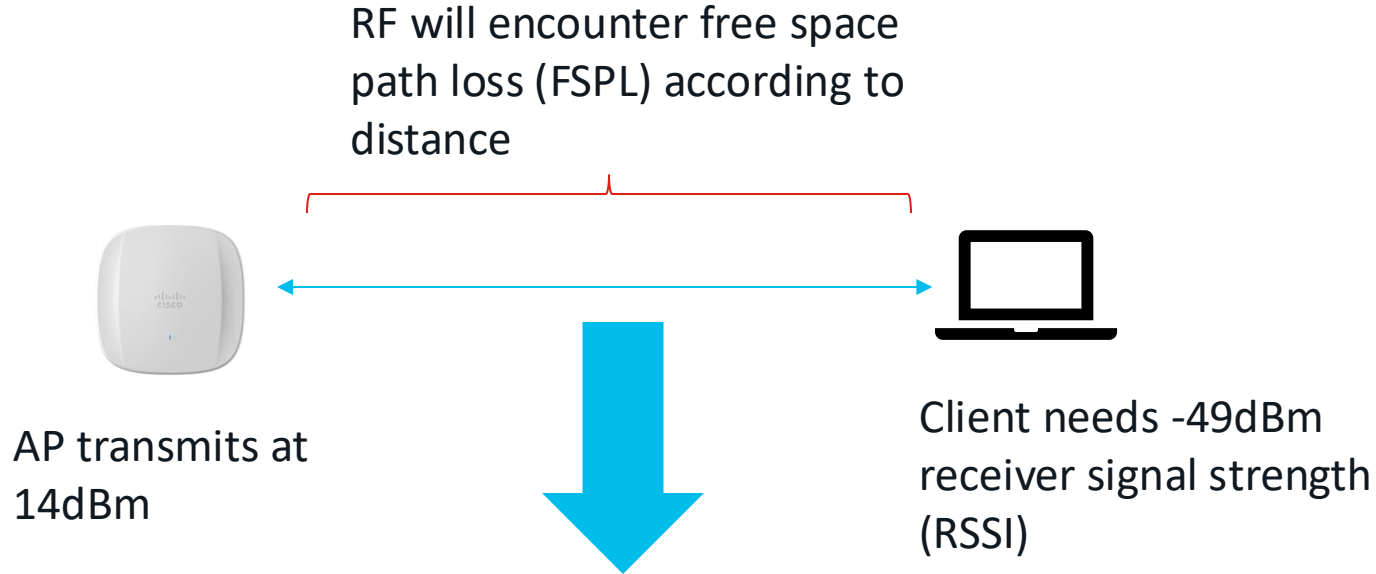
Wi-Fi6 standards

Table 36-67—Receiver minimum input level sensitivity

Modulation	Rate (R)	Minimum sensitivity (20 MHz PPDU) (dBm)	Minimum sensitivity (40 MHz PPDU) (dBm)	Minimum sensitivity (80 MHz PPDU) (dBm)	Minimum sensitivity (160 MHz PPDU) (dBm)	Minimum sensitivity (320 MHz PPDU) (dBm)
BPSK	1/2	-82	-79	-76	-73	-70
QPSK	1/2	-79	-76	-73	-70	-67
QPSK	3/4	-77	-74	-71	-68	-65
16-QAM	1/2	-74	-71	-68	-65	-62
16-QAM	3/4	-70	-67	-64	-61	-58
64-QAM	2/3	-66	-63	-60	-57	-54
64-QAM	3/4	-65	-62	-59	-56	-53
64-QAM	5/6	-64	-61	-58	-55	-52
256-QAM	3/4	-59	-56	-53	-50	-47
256-QAM	5/6	-57	-54	-51	-48	-45
1024-QAM	3/4	-54	-51	-48	-45	-42
1024-QAM	5/6	-52	-49	-46	-43	-40

3dB penalty from bonding

Calculate the path loss



$FSPL = 14 + 49 = 63\text{dBm}$ (how much signal expected to degrade)

Free space path loss provides distance

$$\text{FSPL(dB)} = 20\log_{10}(d) + 20\log_{10}(f) + 92.45$$

$$\text{dist} = 10^{[(\text{FSPL}) - 20\log(\text{freq}) - 92.45]/20}$$

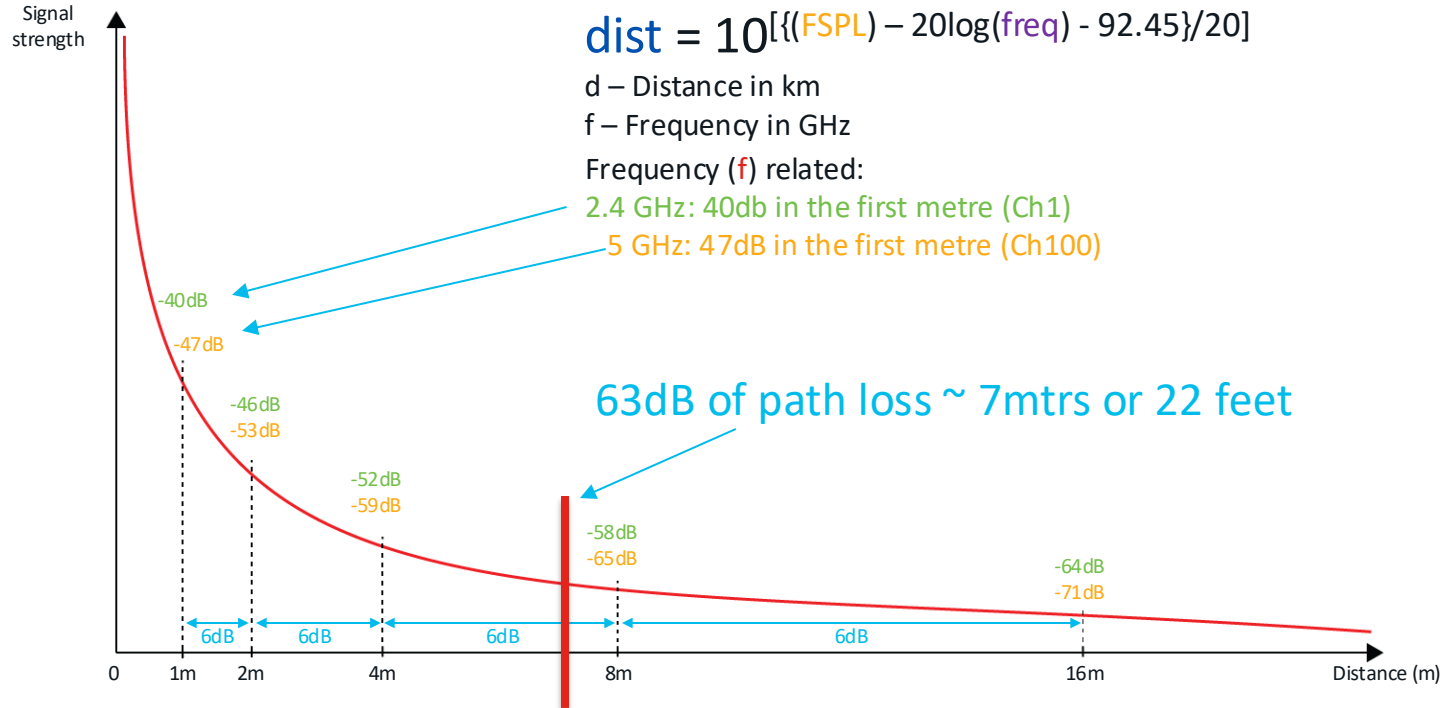
d – Distance in km

f – Frequency in GHz

Frequency (f) related:

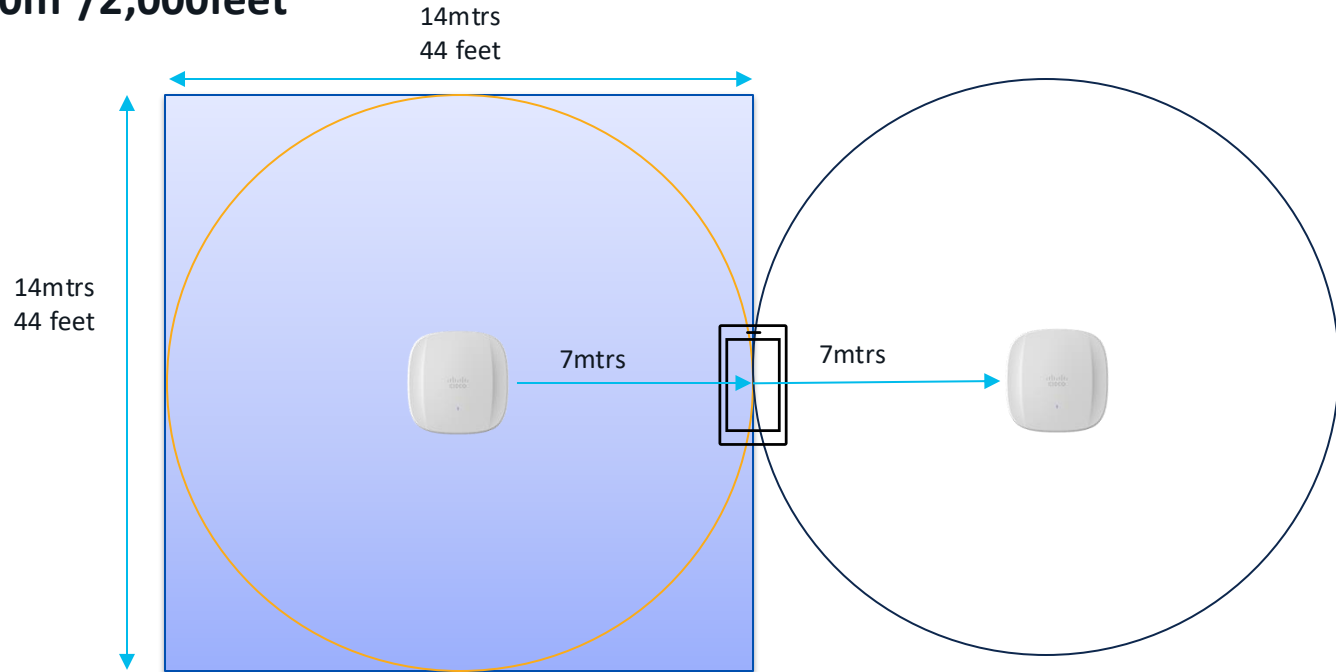
2.4 GHz: 40db in the first metre (Ch1)

5 GHz: 47db in the first metre (Ch100)



AP to AP distance

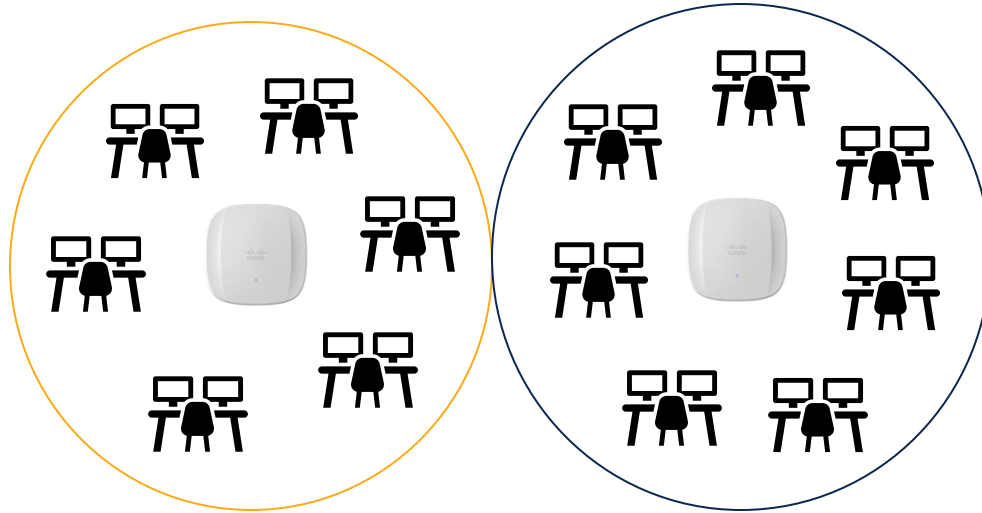
Basic AP to AP distance calculates to 14mtrs/44feet or an
AP per $\sim 200\text{m}^2/2,000\text{feet}^2$



How many clients per AP?

North American average is 137 feet per employee

AP per 2,000feet² ~15 people per AP (approximately)



Client Wi-Fi capabilities

Doing some calculations we can for estimated throughput

		iPhone13
Assumptions	Streams	2
	Data rate (Mbps)	573
	Overhead – 30%	401
	Simplex – 50%	200
	Clients per AP	15
	Per user throughput	13Mbps
	Application	Streaming HD video

Roaming makes things different

- iPhones/iPads are designed to roam at -70dBm
 - <https://support.apple.com/en-au/HT203068>
- Mac Book Pros are designed to roam at -75dBm
 - <https://support.apple.com/en-au/102002>
- Use 802.11k to help overcome sticky clients
 - iPhones and iPads support 802.11k
 - macOS Monterey supports 802.11k on Mac computers with Apple silicon.

Consider this threshold in view of the signal overlap between your wireless cells. macOS maintains a connection until the -75 dBm threshold, but 5 GHz cells are designed with a -67 dBm overlap. Those clients will remain connected to the current BSSID longer than you might expect.

What about Wi-Fi7?



1K-QAM
Easier to read
SNR ~35dB

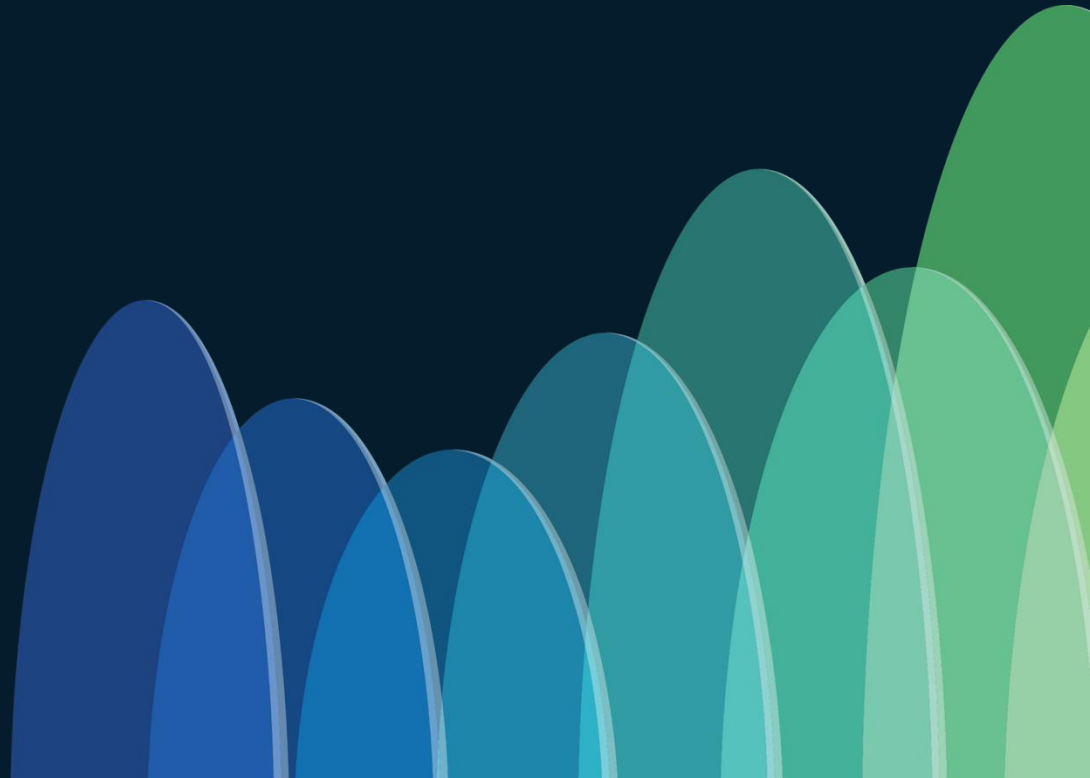
You will need 7dB more power from AP to client

Wi-Fi7



4K-QAM
Harder to read
SNR ~42dB

Site Survey and Design



Steps to wireless first deployment

- Predictive design
- Onsite inspection to verify assumptions
 - Obstacles are what you think
 - Distance is correct
- Update predictive design
- Deploy to site
- Post deployment active survey
- Corrective action based on results

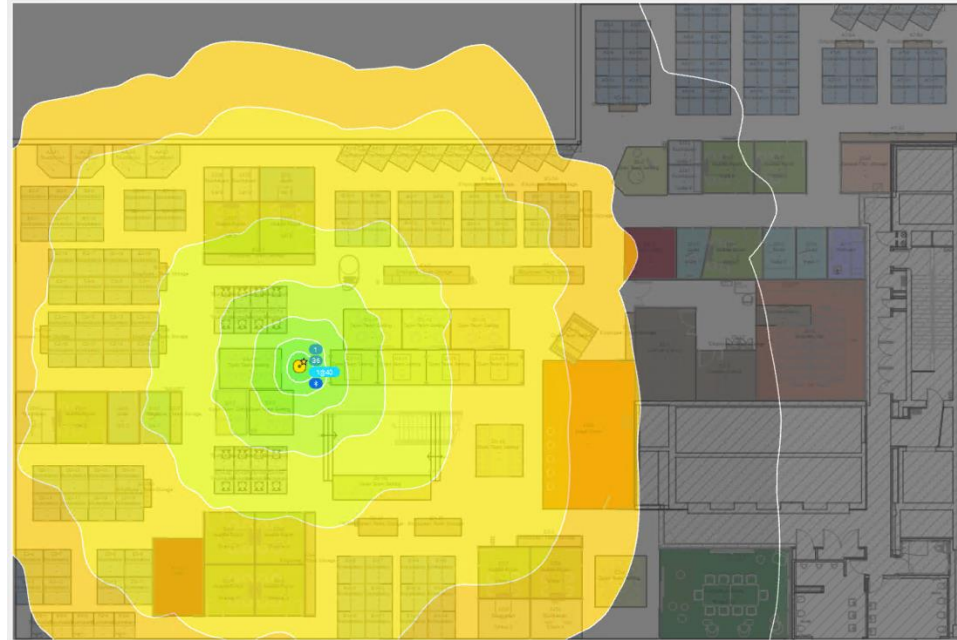


Predictive wireless design

Tool that uses several models:

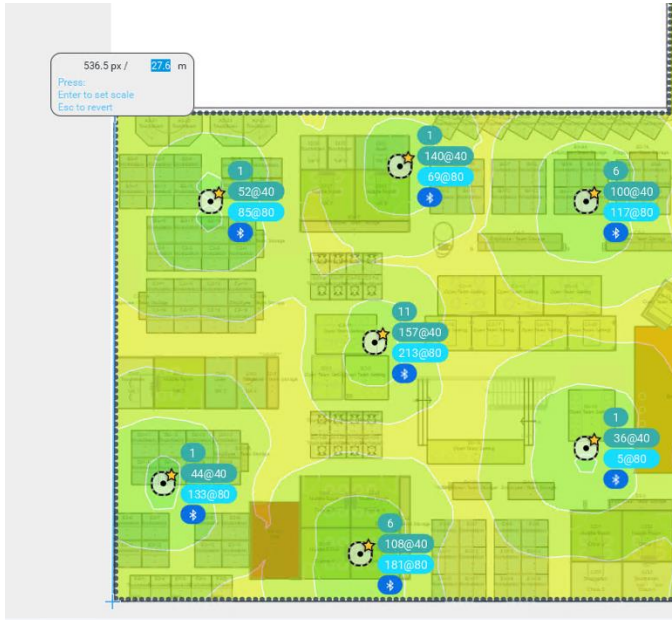
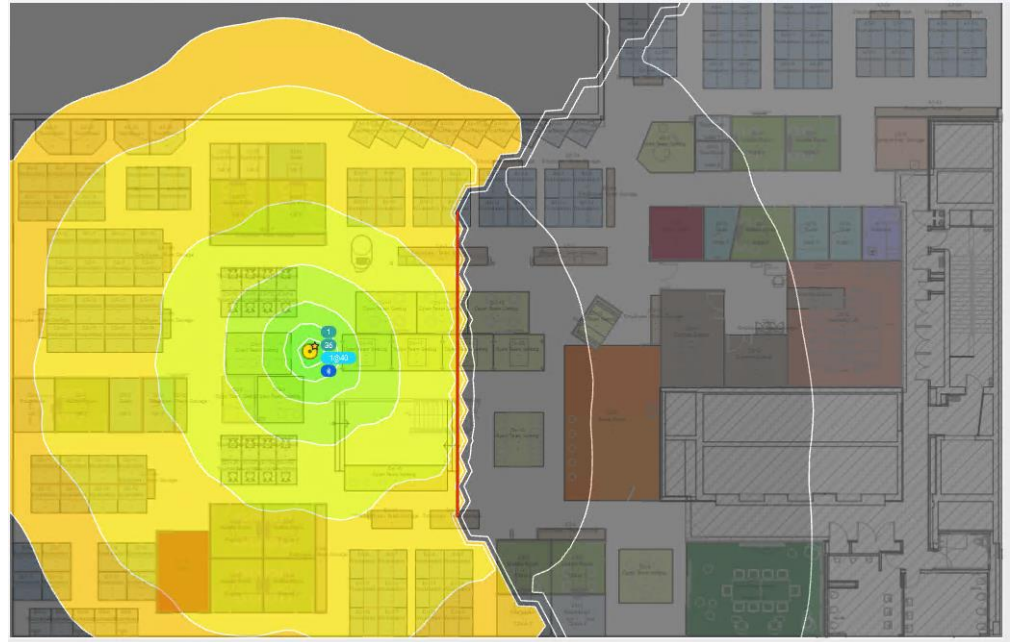
- Scaled floor plan
- Free Space Path Loss (FSPL)
- AP data sheet
- Obstacles with standard attenuations

And visualisations them in an easy-to-understand result.



Important inputs to the model

- Scale wrong mean your FSPL will be wrong
- Obstacles are wrong will result in large differences in coverage
- Model parameters are important



Parameters influence data rate

Requirement Cisco Design Guideline Delete Add Make Default

Criteria

- Signal Strength
- Secondary Signal Strength

2.4GHz 5GHz 6GHz

Min -65 -65 -65 dBm

Min -75 -68 -75 dBm

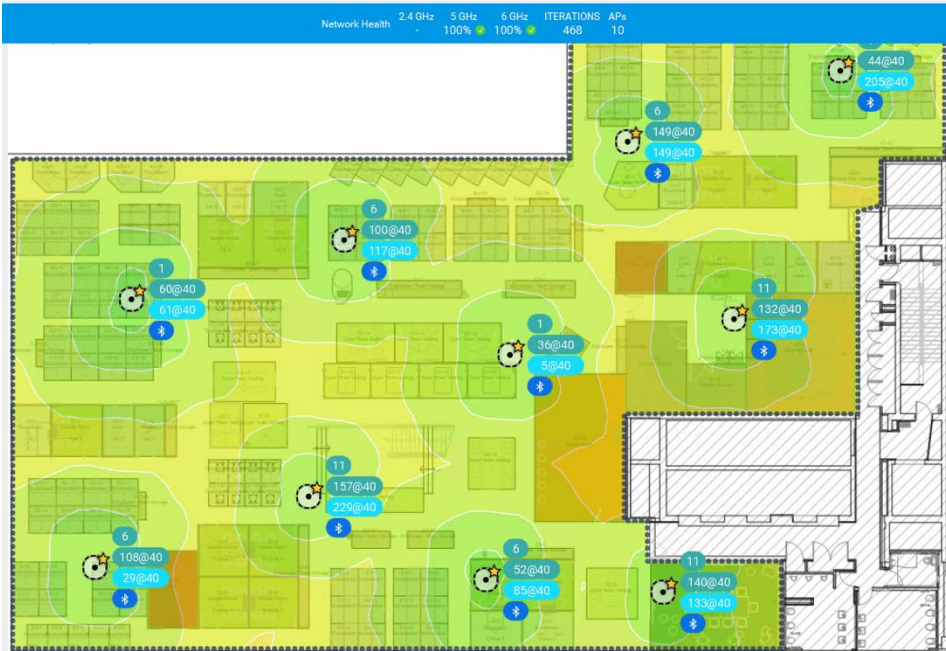
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QPSK	1/2	-79	-76	-73	-70	-67
QPSK	3/4	-77	-74	-71	-68	-65
16-QAM	1/2	-74	-71	-68	-65	-62
16-QAM	3/4	-70	-67	-64	-61	-58
64-QAM	2/3	-66	-63	-60	-57	-54
64-QAM	3/4	-65	-62	-59	-56	-53
64-QAM	5/6	-64	-61	-58	-55	-52
256-QAM	3/4	-59	-56	-53	-50	-47
256-QAM	5/6	-57	-54	-51	-48	-45
1024-QAM	3/4	-54	-51	-48	-45	-42
1024-QAM	5/6	-52	-49	-46	-43	-40

							OFDM & OFDMA (		
MCS Index				Spatial Stream	Modulation	Coding	242-tone RU / 20MHz		
HT	VHT	HE	EHT				3.2μs GI	1.6μs GI	0.8μs GI
8	0	0	0	2	BPSQ	1/2	14.6	16.3	17.2
9	1	1	1	2	QPSK	1/2	29.3	32.5	34.4
10	2	2	2	2	QPSK	3/4	43.9	48.8	51.6
11	3	3	3	2	16-QAM	1/2	58.5	65.0	68.8
12	4	4	4	2	16-QAM	3/4	87.8	97.5	103.2
13	5	5	5	2	64-QAM	2/3	117.0	130.0	137.6
14	6	6	6	2	64-QAM	3/4	131.6	146.3	154.9
15	7	7	7	2	64-QAM	5/6	146.3	162.5	172.1
	8	8	8	2	256-QAM	3/4	175.5	195.0	206.5
	9	9	9	2	256-QAM	5/6	195.0	216.7	229.4
	10	10	10	2	1024-QAM	3/4	219.4	243.8	258.1
	11	11	11	2	1024-QAM	5/6	243.8	270.8	286.8
		12	12	2	4096-QAM	3/4	263.3	292.5	309.7
		13	13	2	4096-QAM	5/6	292.5	325.0	344.1

Wi-Fi6 data speeds

Wi-Fi4 (802.11n) -65dBm



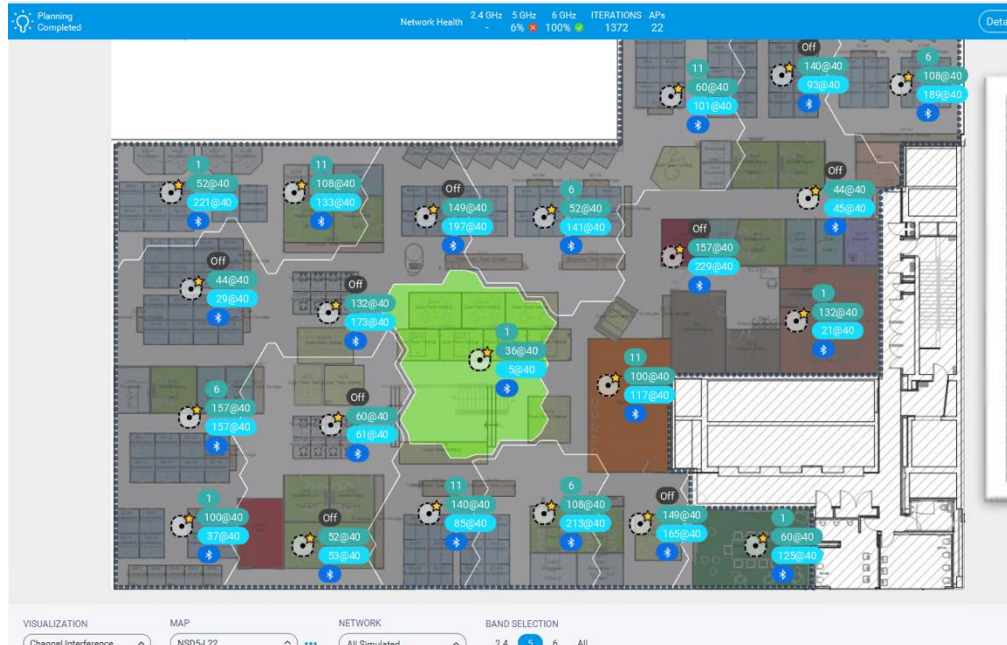
Wi-Fi6 (802.11ax) -54dBm



Wi-Fi6 for everyone but co-channel interference

-54dB deployment 40Mhz = 22 AP's

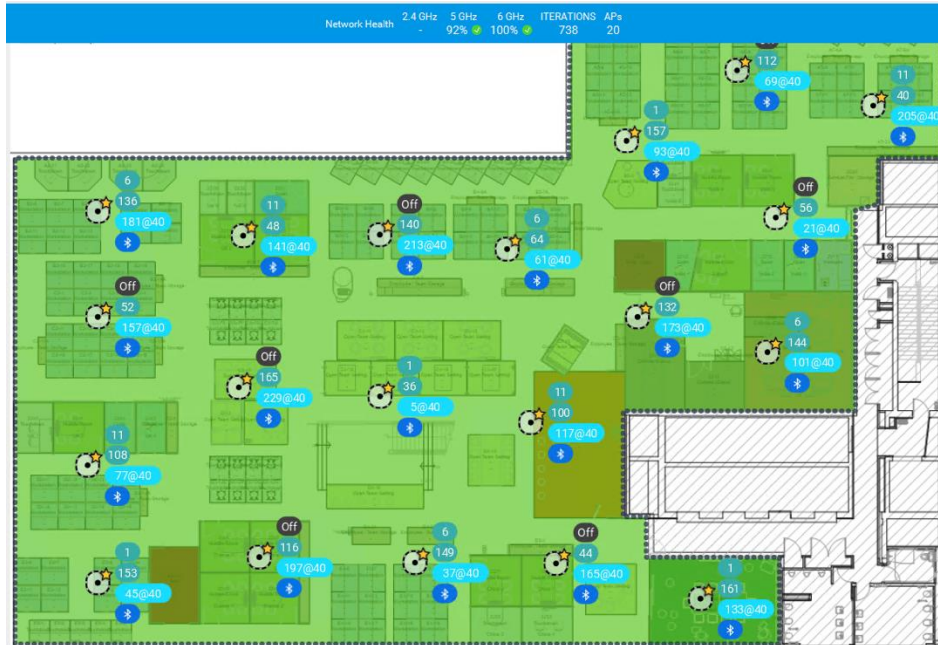
Green only area without co-channel
Laptop only 4Mbps



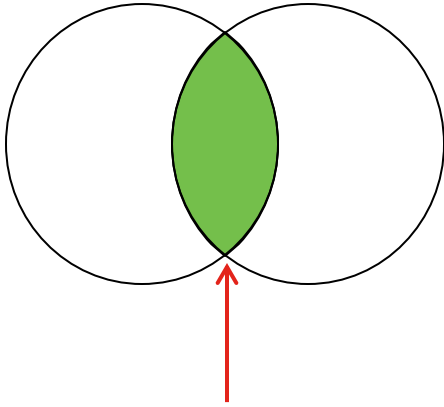
Reduce channel width

-54dB deployment 20Mhz channels
Now only 20APs no co-channel

Laptop 8Mbps (100% increase)
with 2 less APs



Importance of secondary coverage

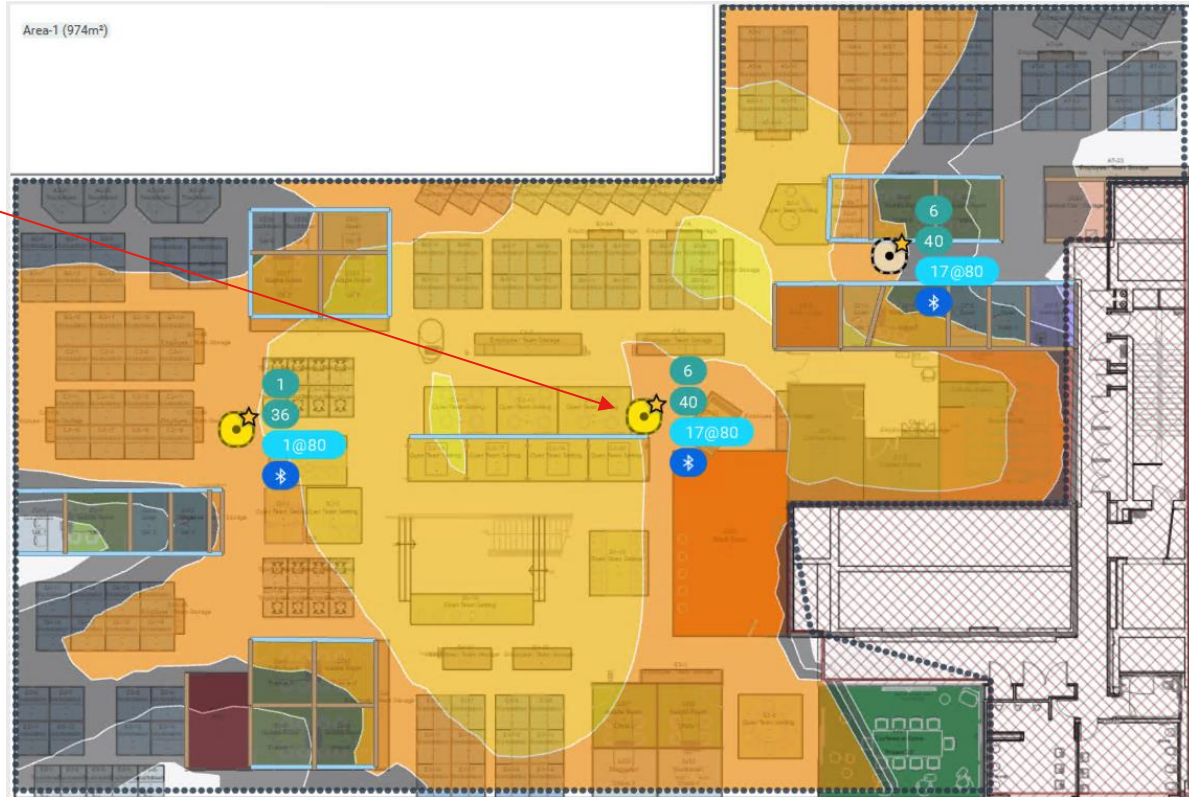


Secondary coverage is areas that are supported by two or more APs



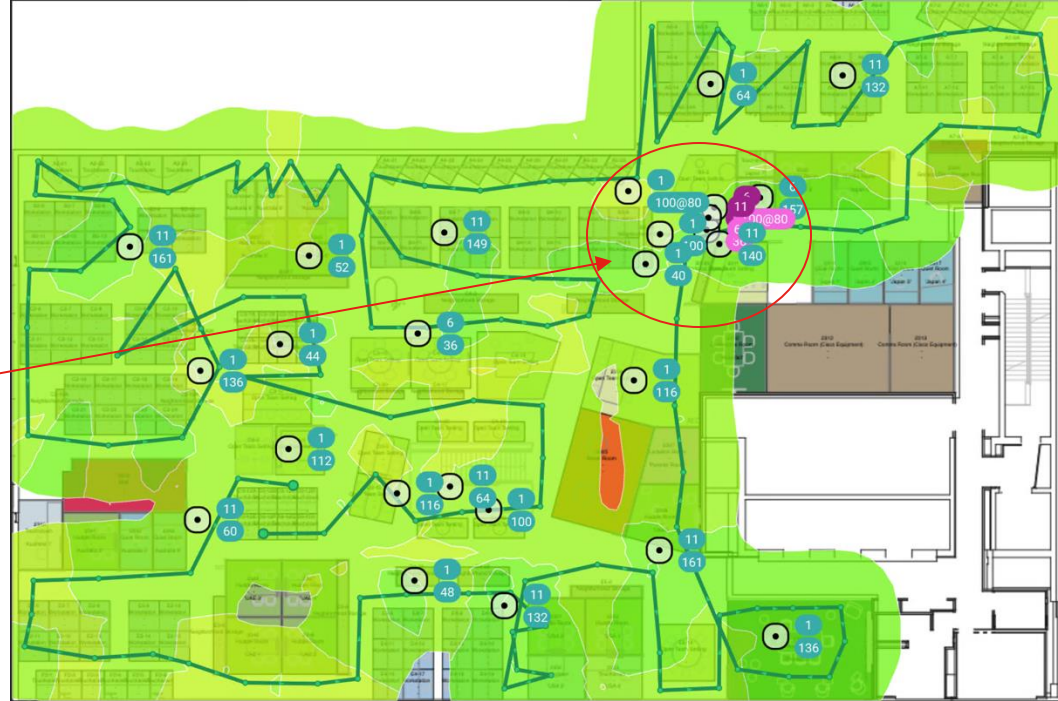
Importance of secondary coverage

Additional AP has increased secondary coverage which provides resiliency



Site survey investment

- Essential to survey to ensure the we not only have coverage but also the required speed
- Surveys highlights things you don't expect.

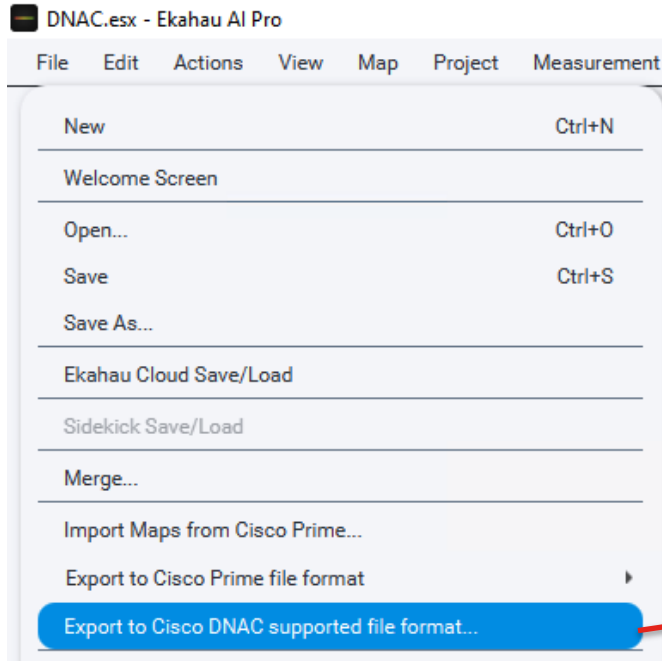


Take a walk in your client's shoes

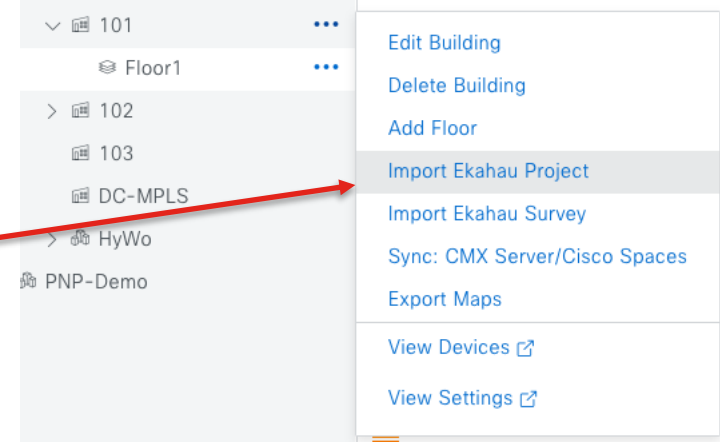
Think about where the clients will use the Wi-Fi
New Hamina app provides a client walk through feature.



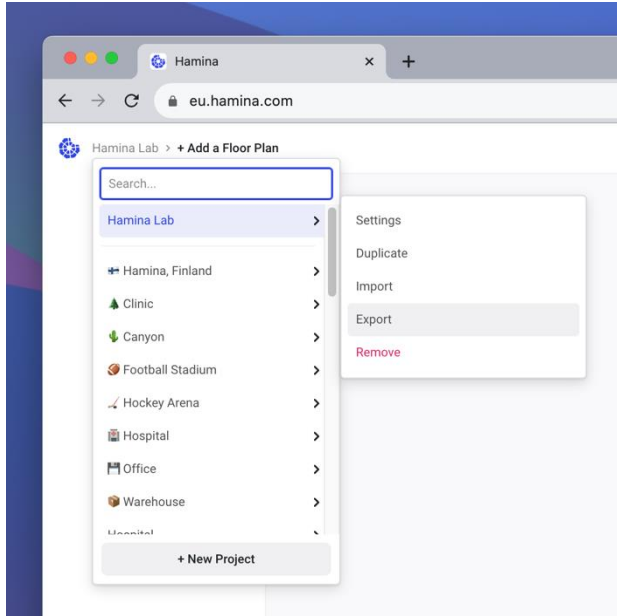
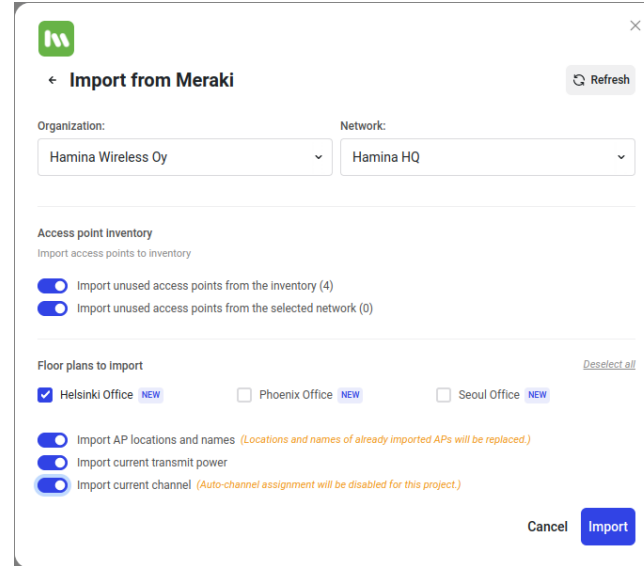
Using Catalyst Center and Ekahau



After you create wireless design export into Catalyst Center format and import as a Ekahau project directly

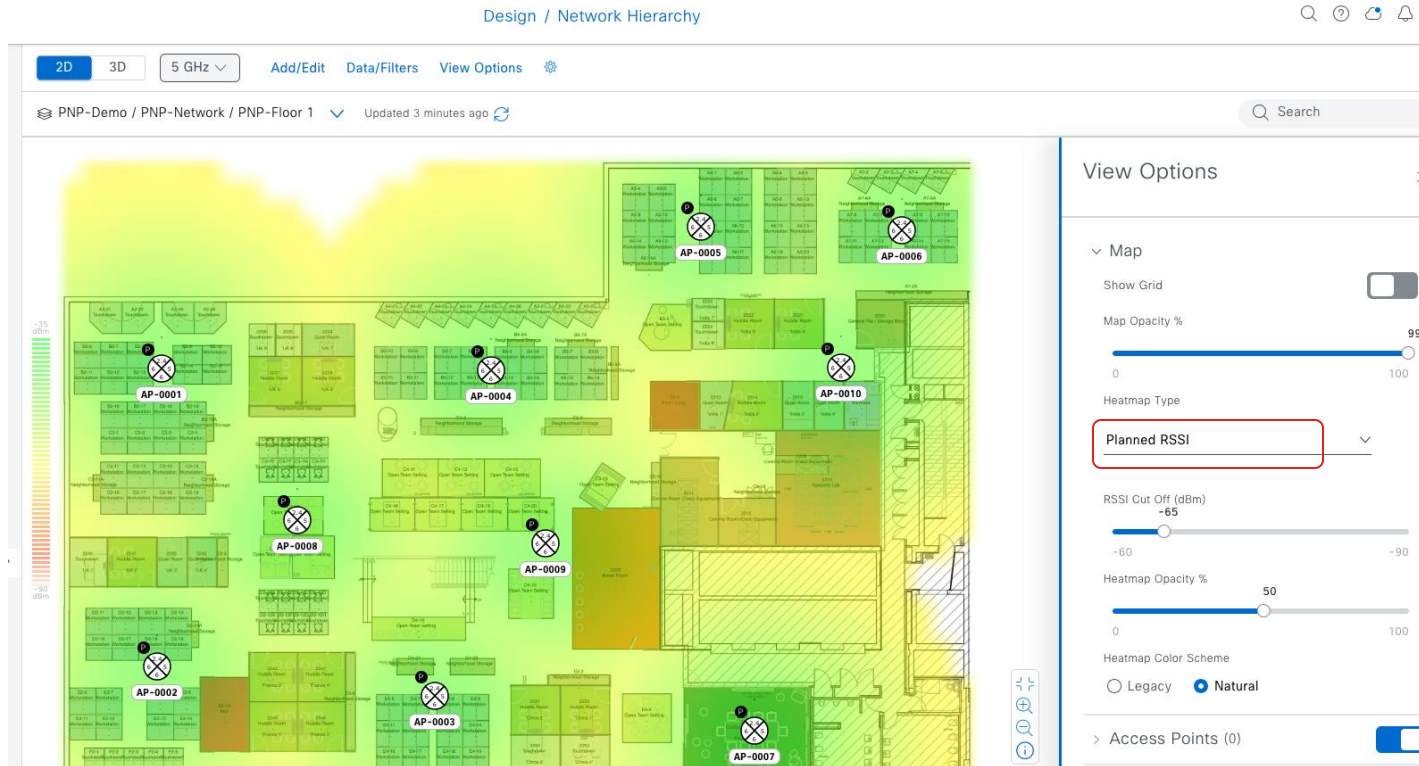


Using Catalyst Center/dashboard and Hamina

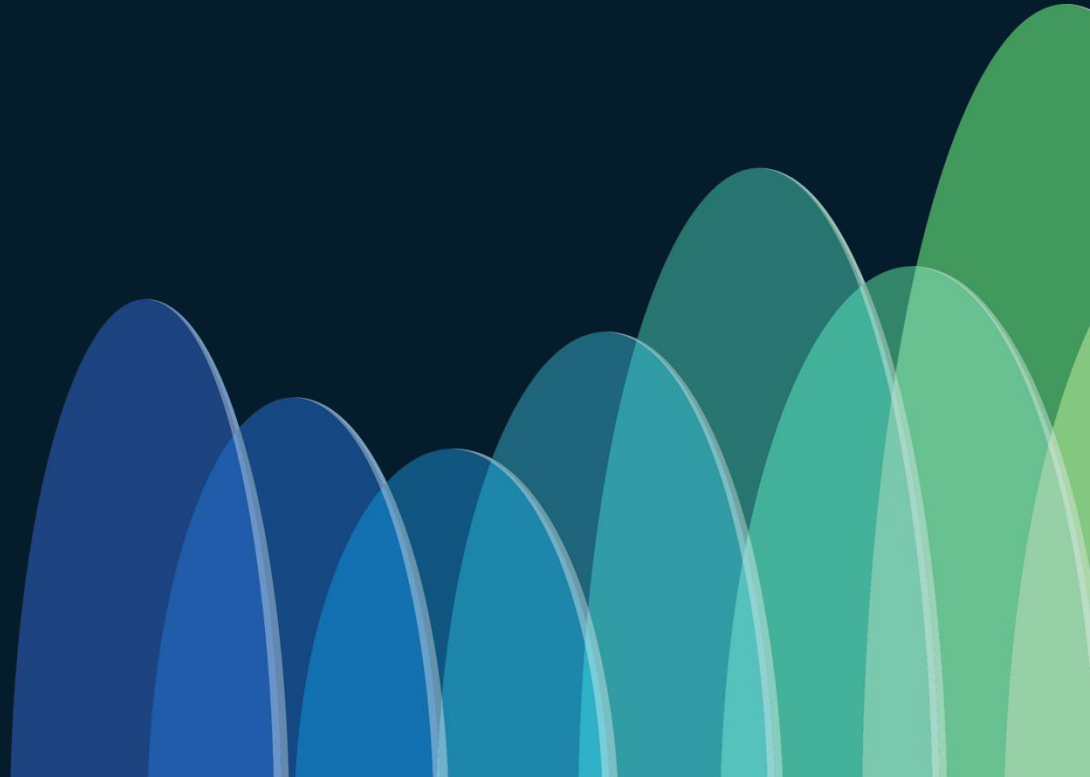


<https://docs.hamina.com/planner/import-export/cisco-catalyst-center>

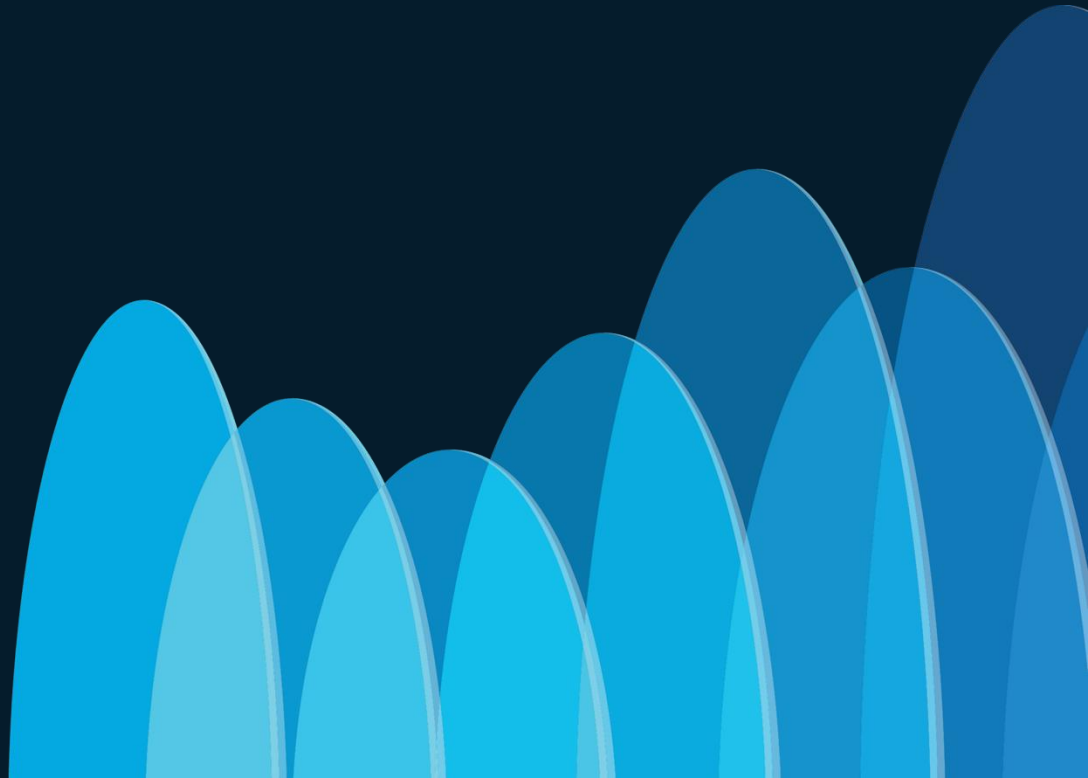
Catalyst Center AP planning



Resiliency



Wireless First Switching Architecture



Wireless first needs switching resiliency



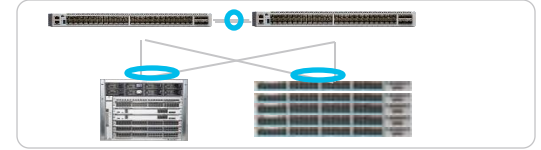
Platform resiliency

- **Redundant switches and supervisors** for standalone and modular switches with non-stop forwarding and routing (NSF/NSR)
- **Redundant fan and power** supply in case of any hardware failure



Design resiliency

- **StackWise Virtual:** redundant system for high availability, simplified design and configuration
- **GIR:** no downtime when device removed for maintenance



Operational resiliency

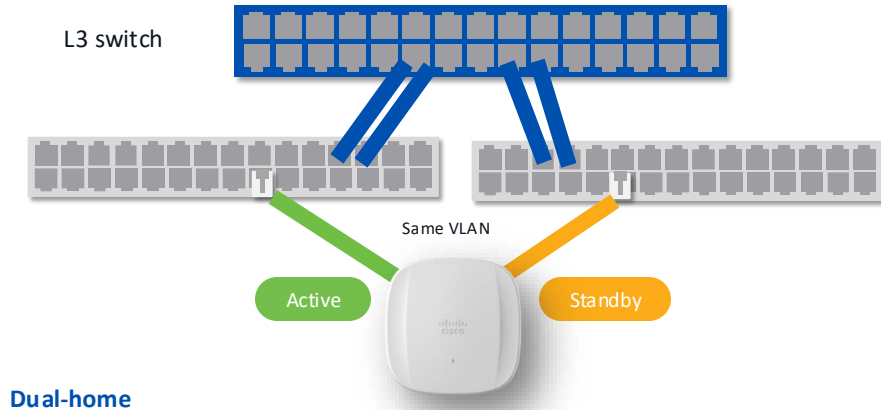
- **ISSU:** upgrade software with minimal to no traffic loss
- **xFSU :** upgrade or reload the Catalyst 9300 with very minimal traffic loss
- **Hot Patching:** no downtime for bug fixes (no reboot)

Keep the lights on



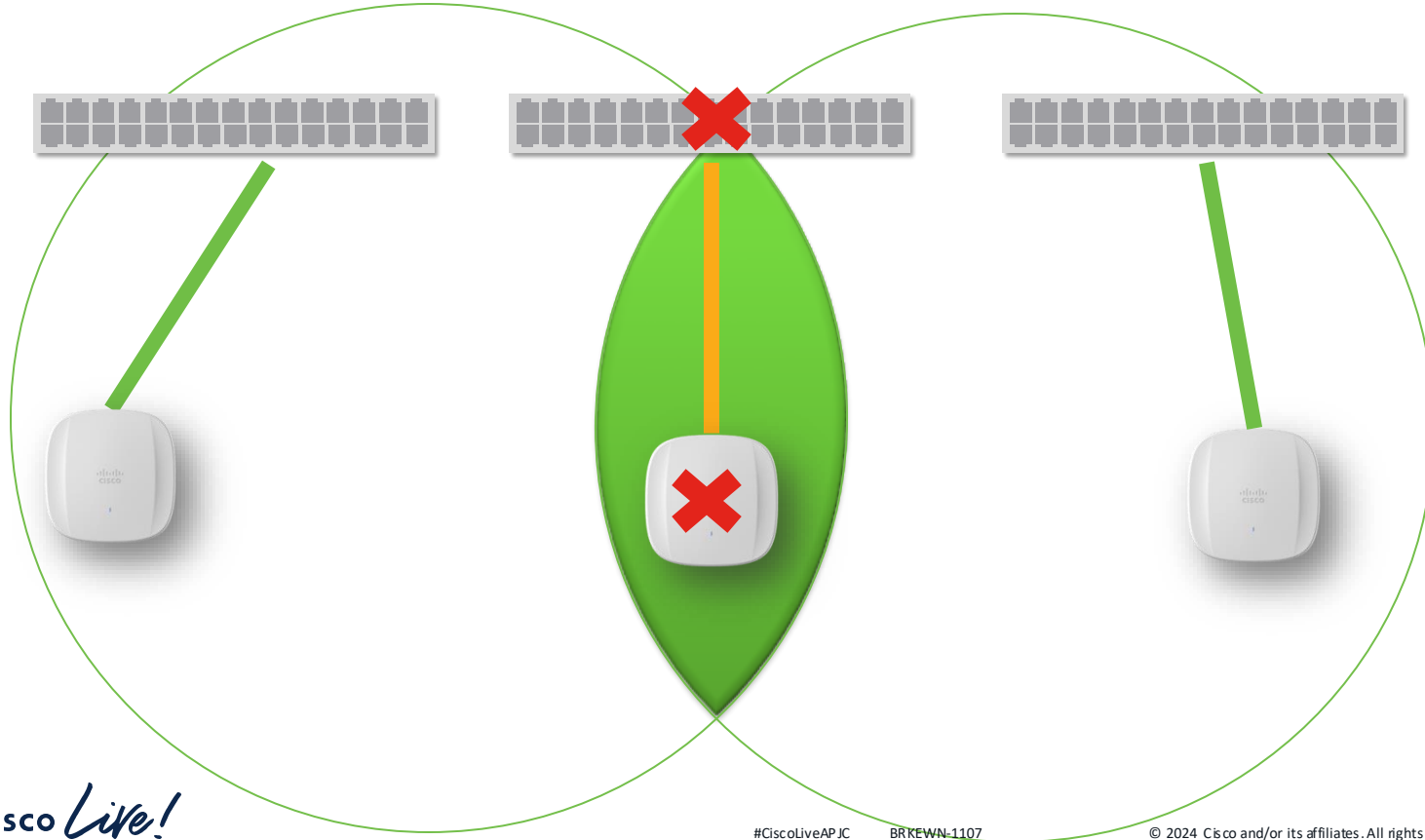
- **StackPower** “zero-footprint” power redundancy
- **Fast PoE** restores power to connected devices within 30 seconds
- **Perpetual PoE** maintains power to connected devices during reload
- **PoE Port Priority** loss of a power-supply will ensure APs have priority over other devices

Catalyst AP C9136 to switch connection

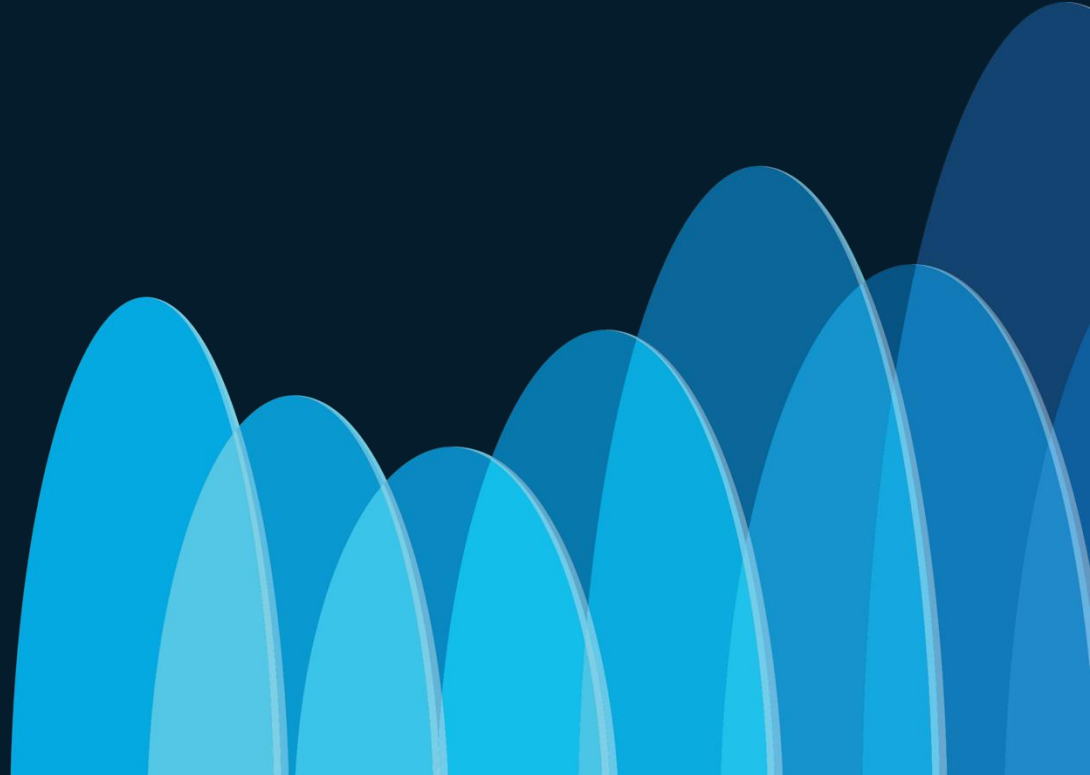


- Dual-home to two different switches
 - Recommend to connect to switches in different IDF, whenever possible
- Single-home to one logical switch (StackWise, vPC, multi-layer switch, etc.)
 - Recommend to connect to two different members of the stack or line-cards
- In both scenario, the switchports must be configured in the same VLAN

Secondary coverage and switch ports



Controller Resiliency (On-Prem)



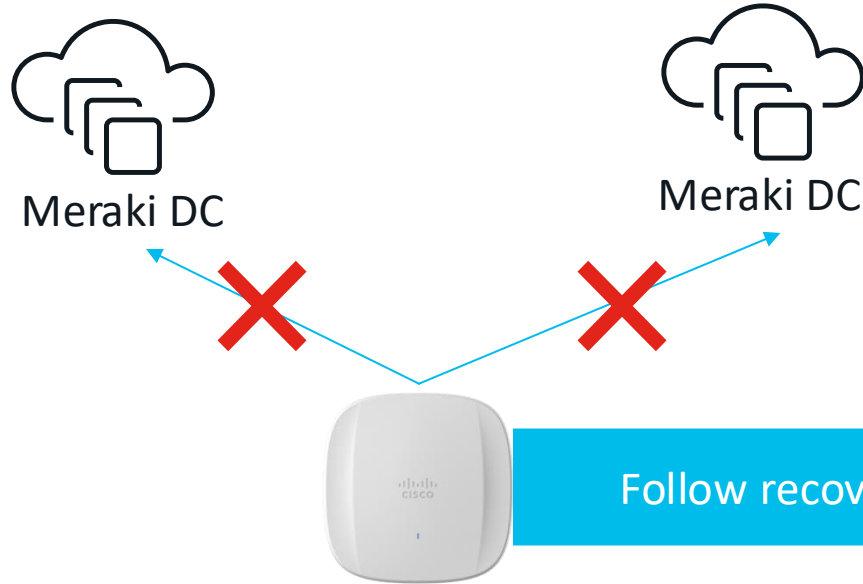
High availability | SSO vs N+1

Functionality	SSO	N+1
Failover time	Sub second for device failure and <8sec for default gateway failure	45-60seconds for rediscovery and join of secondary controller
Config sync	Automatic configuration client state synchronised	N.A
Detection mechanism	Keep alive timers between active/Standby 100-1,000msec and retry count 5-10	Based on various timers including heartbeat and discovery request timers
Layer2/3 topology	Only layer-2 between Active/Standby supported	Layer3 supported between primary and secondary controllers

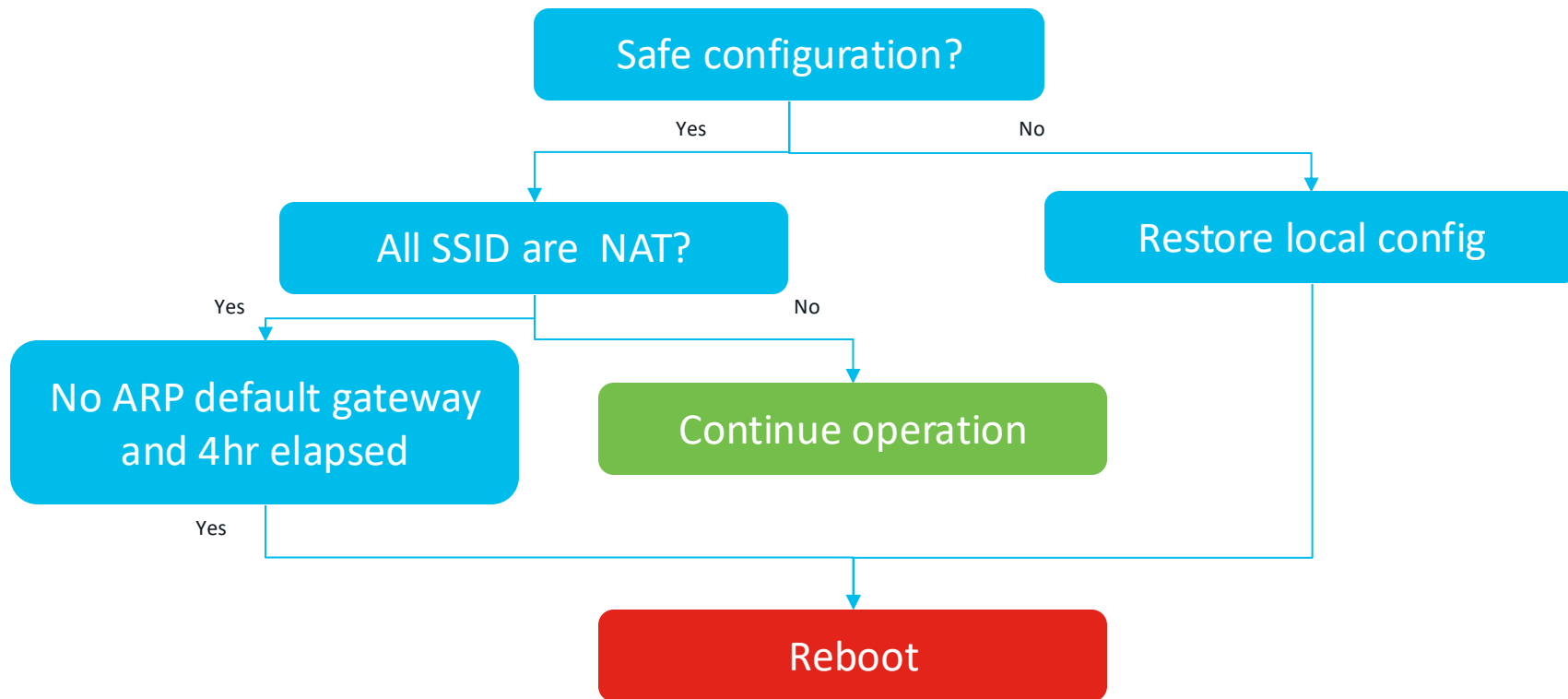
Cloud redundancy

Each region at minimum, has a geographically matched pair of data centres where any endpoint's primary Meraki server will be located

Region	Data center 1	Data center 2
North and South America	USA	USA
Europe	Germany	Germany
Asia	Australia	Singapore
China	China	China
Canada	Canada	Canada

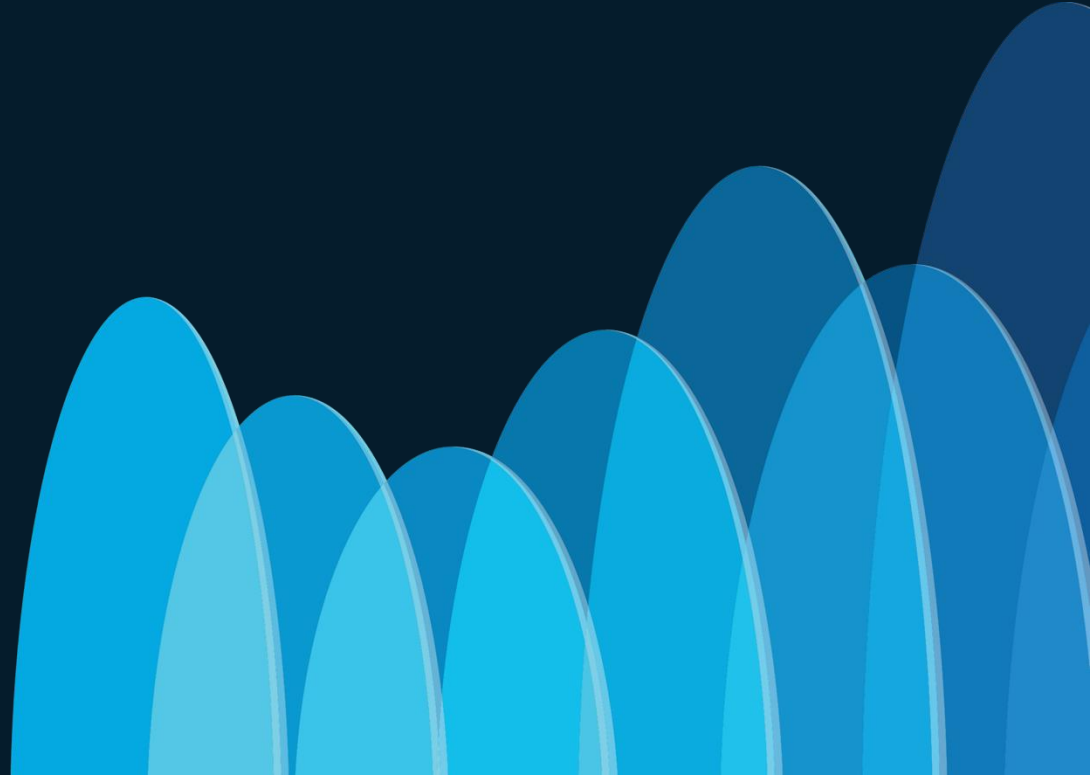


Meraki dashboard recovery workflow



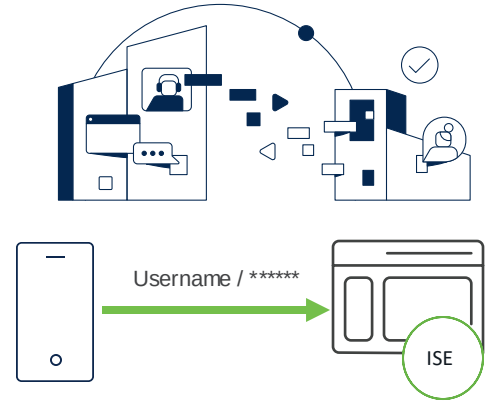
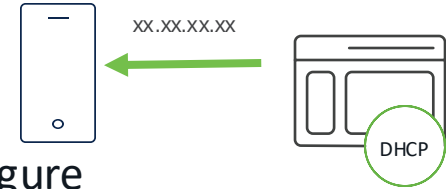
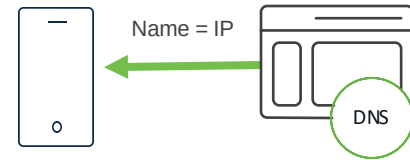
Safe configuration is the last configuration the device received from the cloud that was not followed by a reboot within 30 minutes.

Wireless Services Resiliency

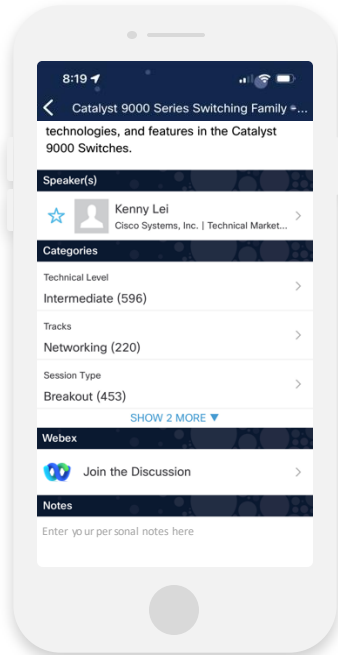
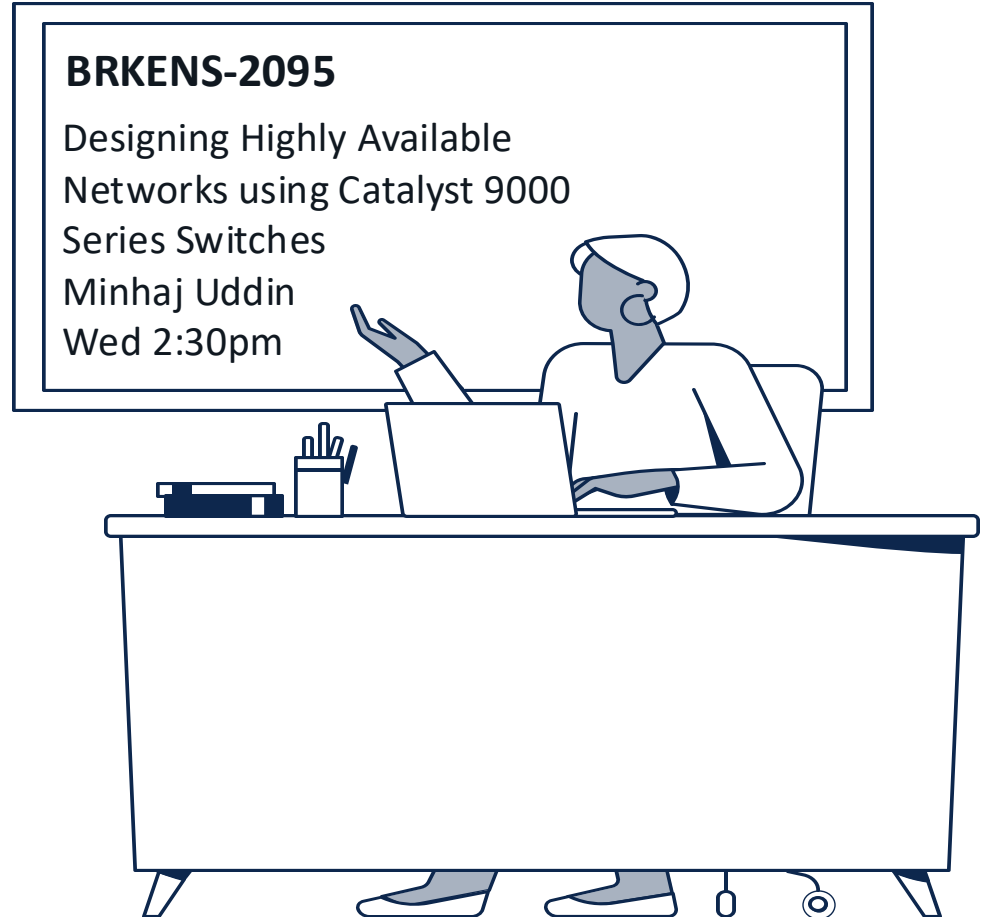


Don't forget RADIUS, DHCP and DNS

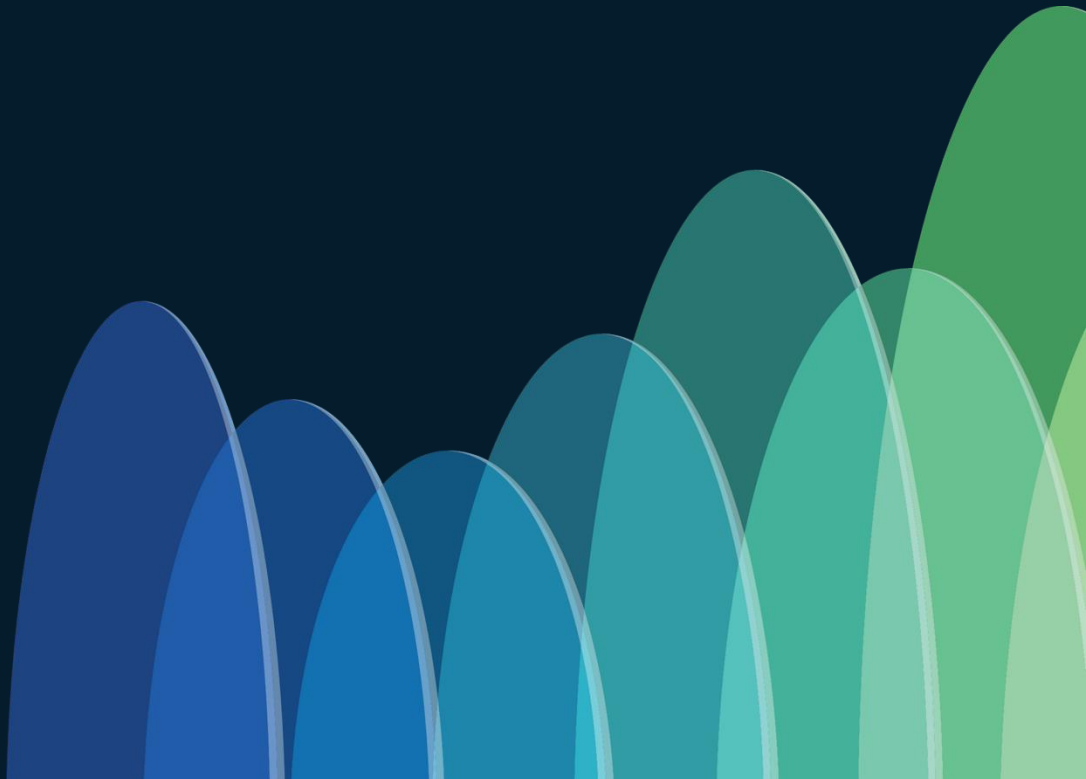
- RADIUS load balancing
 - Session persistence is important
 - Network device IP load balancing works well
 - Accounting is important too for licensing release
- DHCP
 - Configure lease time to prevent exhaustion
 - Split scope redundancy can work well and is easy to configure
- DNS
 - Consider anycast for DNS



For more information



RF Resiliency

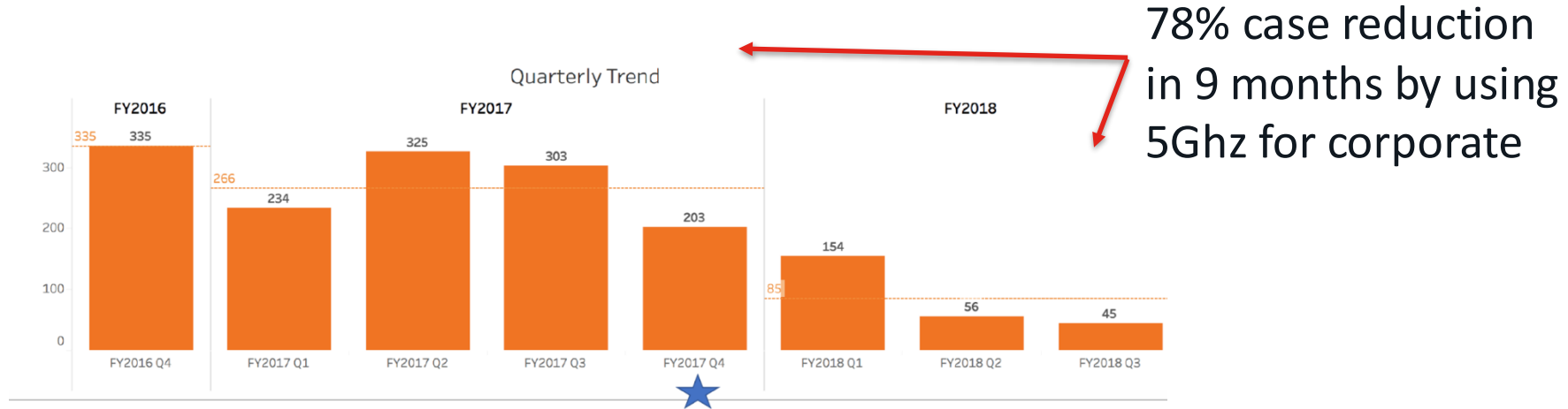


Building resiliency into your Wi-Fi

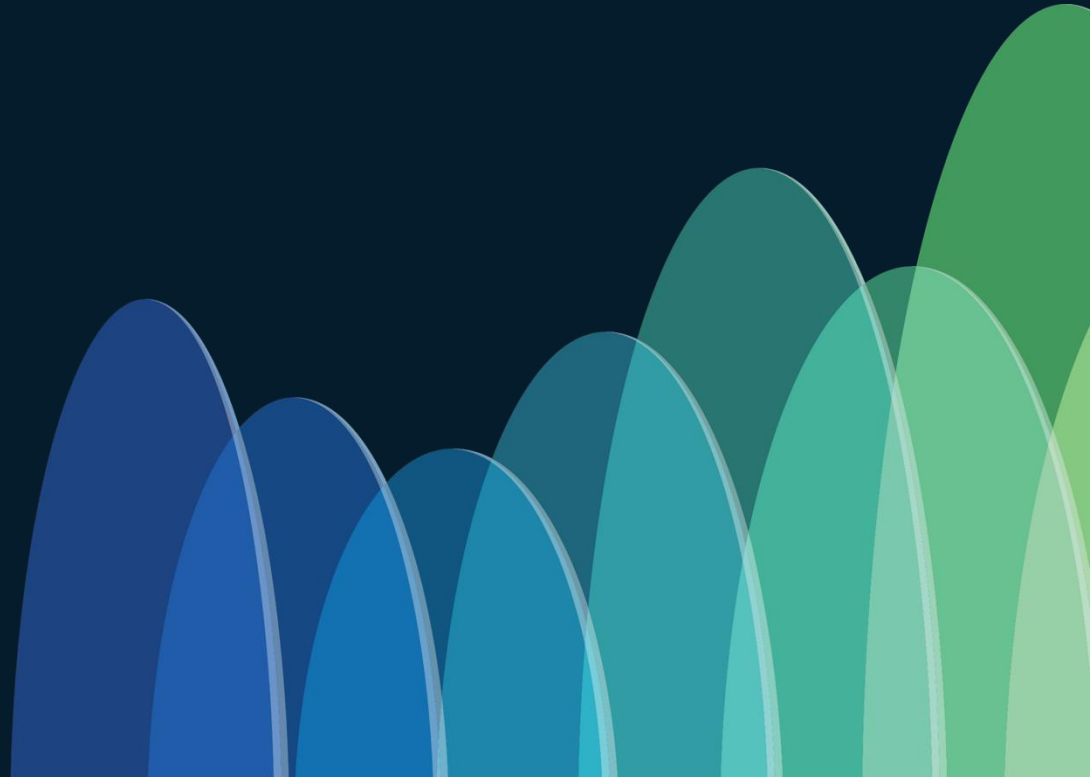
Requirement	Features on-prem	Features cloud
RF resiliency	RRM & AI-RRM, dynamic channel assignment, transmit power coordination, coverage hole detection, RX-SOP	Auto-RF & AI-RRM, auto power reduction, auto channel selection, RX-SOP
Interference mitigation	Spectrum analyser, advanced WIPS CleanAir/Pro, ED-RRM excluding DFS channels	Spectrum analyser, AirMarshall, Exclude DFS channels

Role of 2.4Ghz in a wireless first design

- Corporate traffic on 5/6Ghz
- Guest/IOT on 2.4Ghz



Quality of Experience



QoE best practice recommendations

- Enable Wireless QoS
 - Great for Wi-Fi5 and older technology
- Deploy Wi-Fi6/6E
 - OFDMA great for high density, delay sensitive application with low bandwidth requirements i.e. voice
- Fastlane+ enhances the user experience for latency-sensitive voice and video applications in a high-density user environment
 - Kicks in when channel utilisation hits 50%
 - Support in AP 9130/9124 + 9162/9164/9166 + AerOS 8.10 and IOS-XE 17.4+



How Fastlane+ solves the problem of efficiency

1

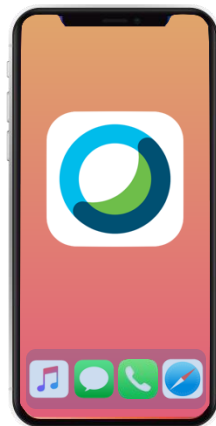
iOS device sends ASR trigger to the network.

2

ASR session is established between network and client.

3

Network uses ASR trigger data to estimate all future BSRs.



1

ASR trigger:

- Periodicity of traffic
- Traffic bitrate

2

ASR session established

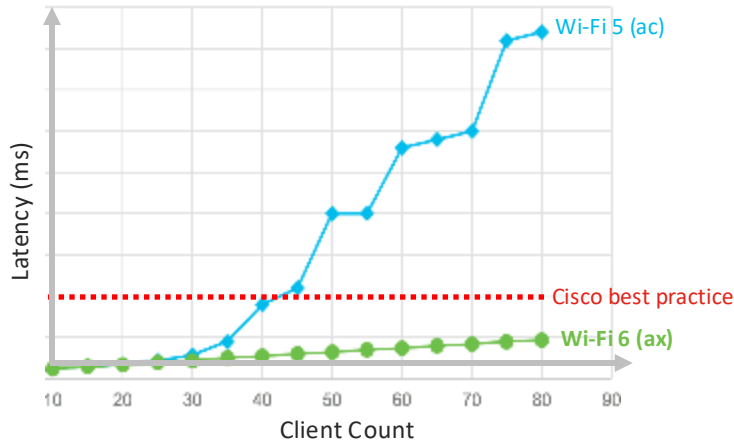
ASR = advanced scheduling request

BSR = buffer status report

Wi-Fi6/6E, provide determinism at scale

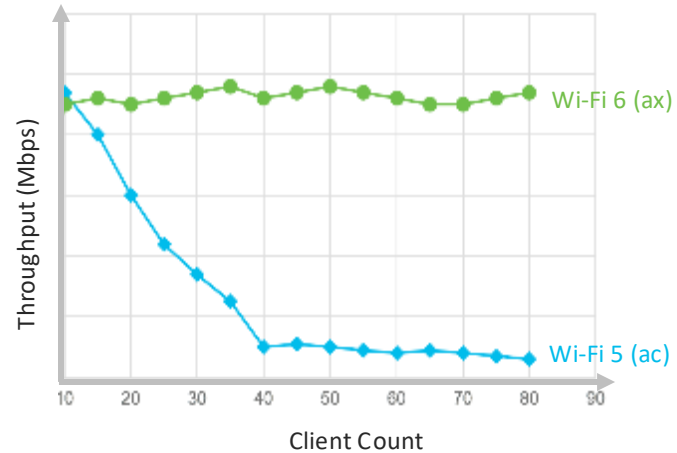
Enabling high-quality voice, video, and data services cost-effectively

Linear **voice** delay



Source: Cisco sponsored research

Consistent **data** throughput



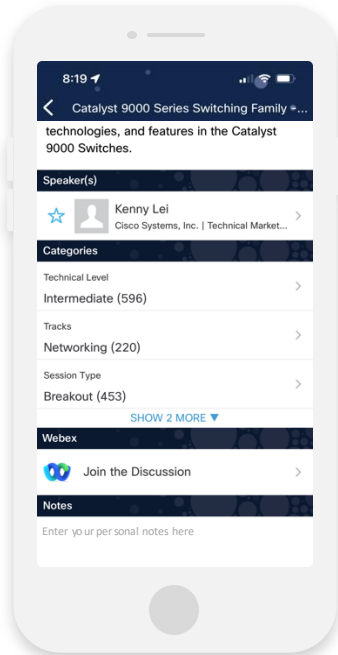
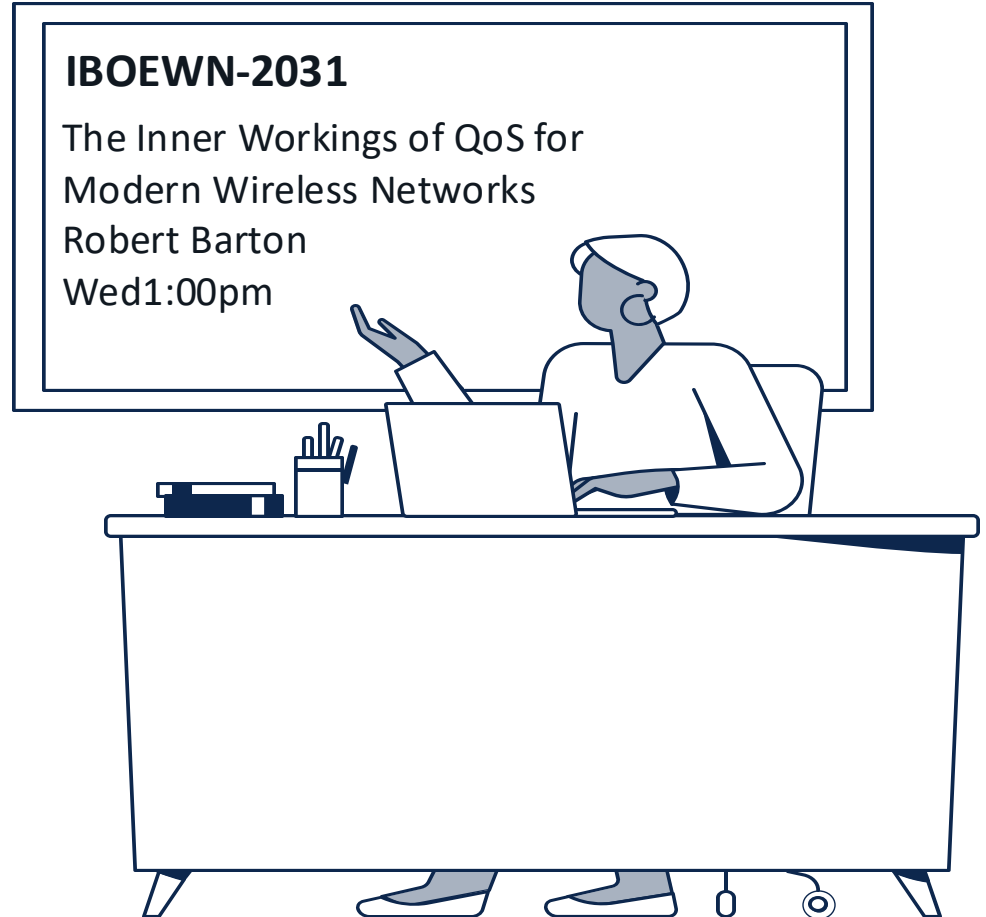
Source: Cisco sponsored research



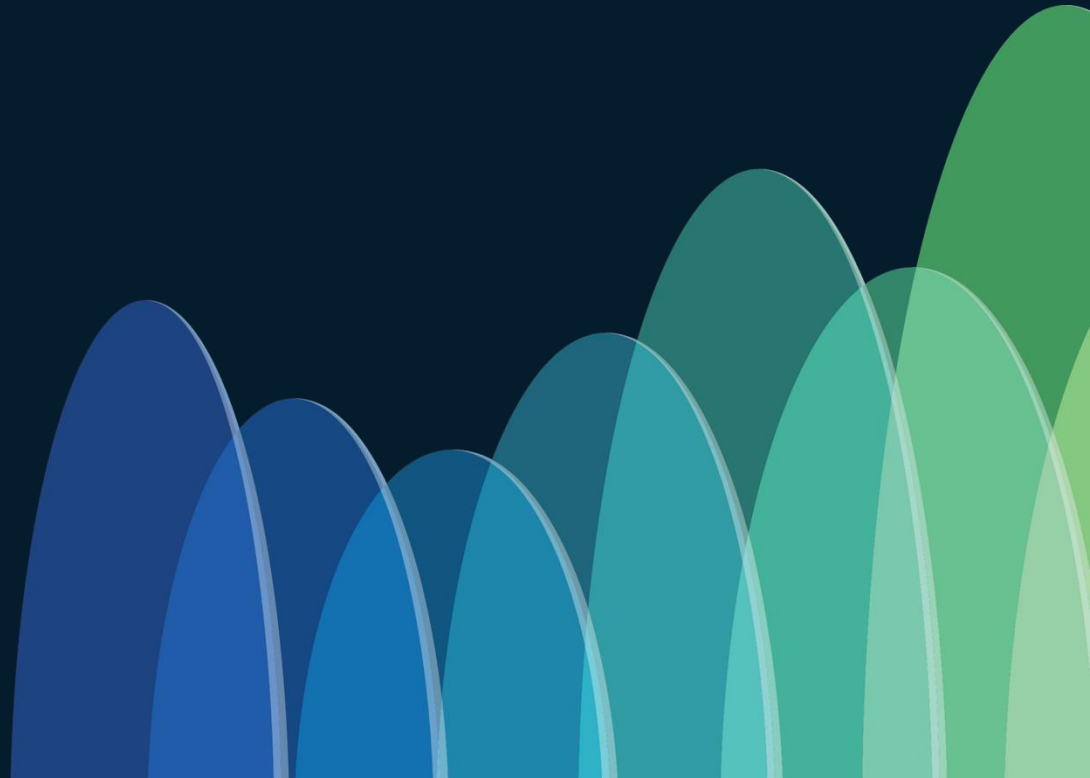
Wi-Fi 6 is now capable of delivering SLAs

CISCO *Live!*

For more information



Assurance



Key performance indicators

Network health

Client experience
+
Network devices
+
Infra connectivity
+
Applications



Wireless health

Failed clients
+
Time to connect
+
Roaming time



Wireless performance

Latency
+
Packet loss
+
Signal quality



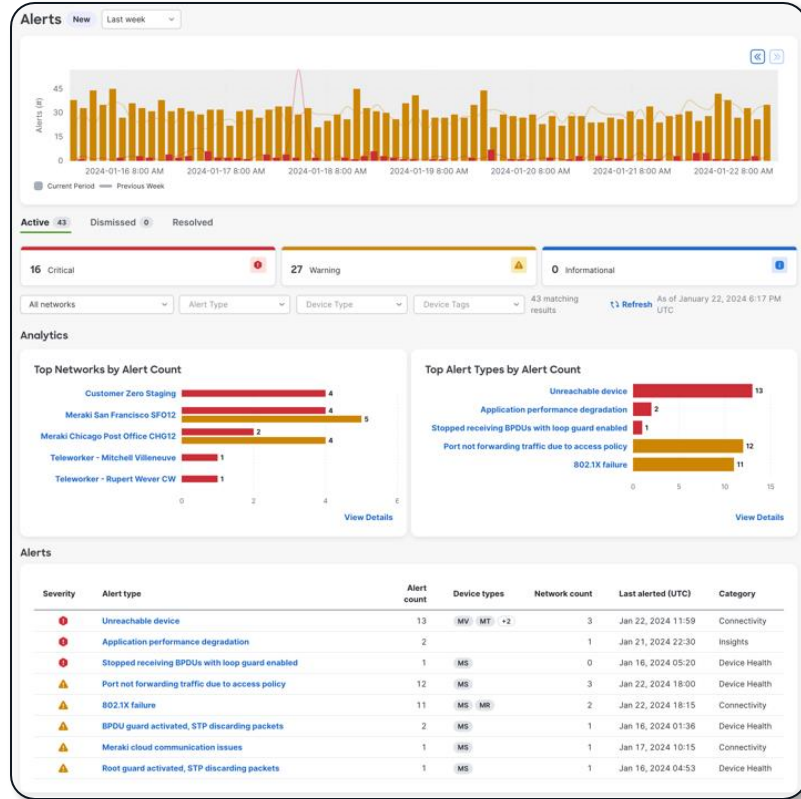
Network service health

RADIUS health
+
DHCP health
+
DNS health



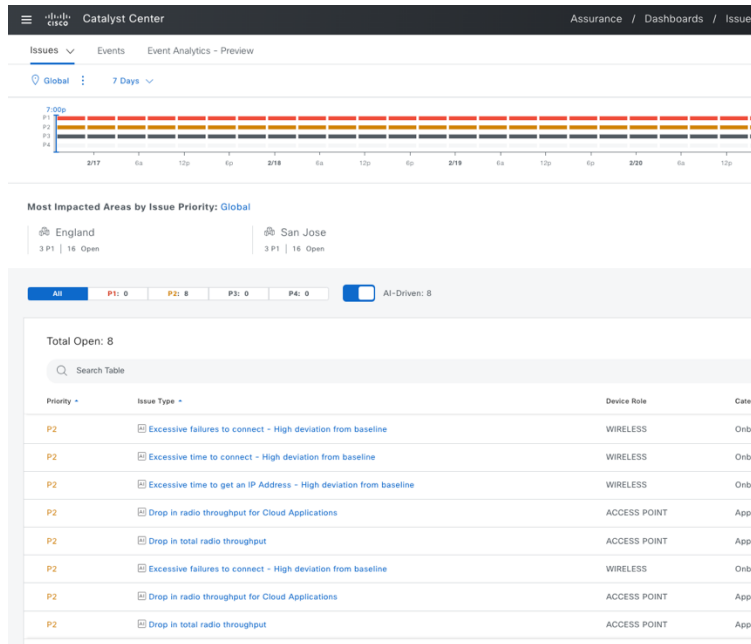
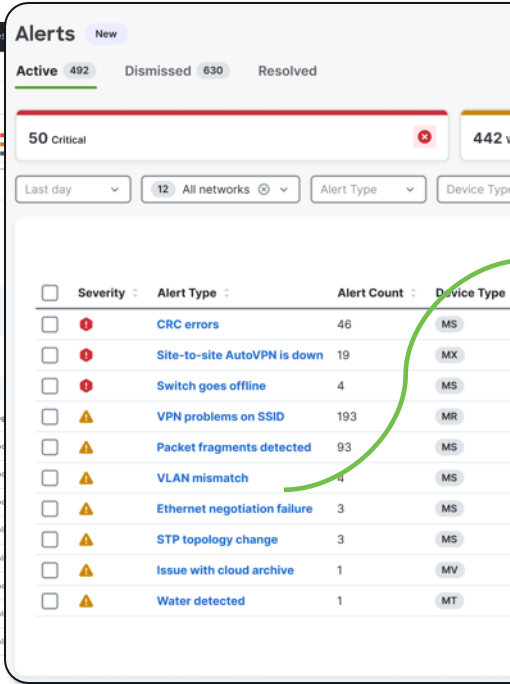
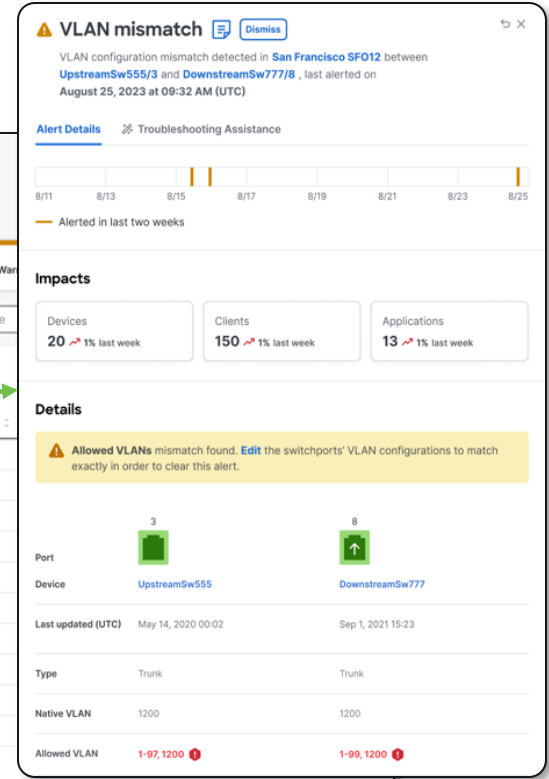
Assurance dashboards

Use the assurance dashboard on Catalyst Center and Dashboard to reduce cognitive overload



AIOps helps when users won't

Use AI-driven events – Catalyst Center and dashboard



Root cause analysis – show the problem

Drop in radio throughput for Cloud Applications / Issue Instance

At least 78% drop in radio throughput for Cloud Applications from baseline for AP(s) in Global/Europe/England/London

Open

Cisco AI



This issue is triggered based on a deviation from a predicted baseline for your specific environment. [Learn More](#)

APs in network are experiencing a drop in Cloud Applications throughput. These radios are in the 5GHz band. These radios are located at Global/Europe/England/London 1/1st Floor

Time: February 22, 2024 12:25 PM - 1:55 PM

Location: Global/Europe/England/London 1/1st Floor

Is this issue helpful?

Show Details On:

Radio 1 (AP: CW91661)

IP Address: 10.10.13.20 MAC Address: e4:38:7e:46:11:b1 AP Group: Connected Time: 43d:0h:55m Up Time: 0d:0h:0m WLC: LDN1-C9800-01.PseudoCo.com

Problem

Impact

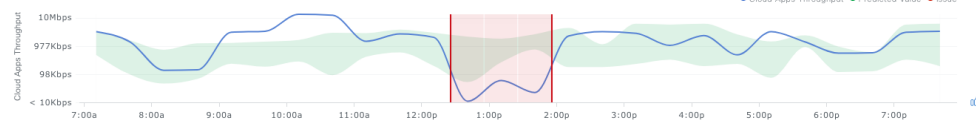
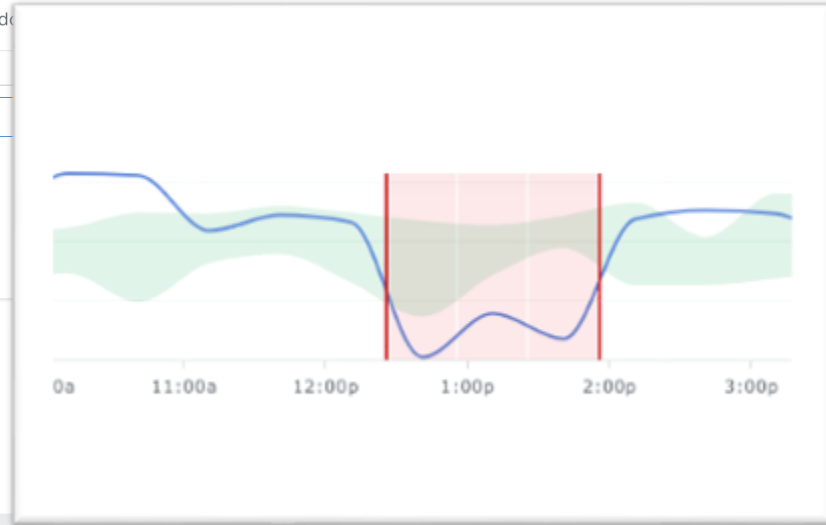
Root Cause Analysis

Suggested Actions

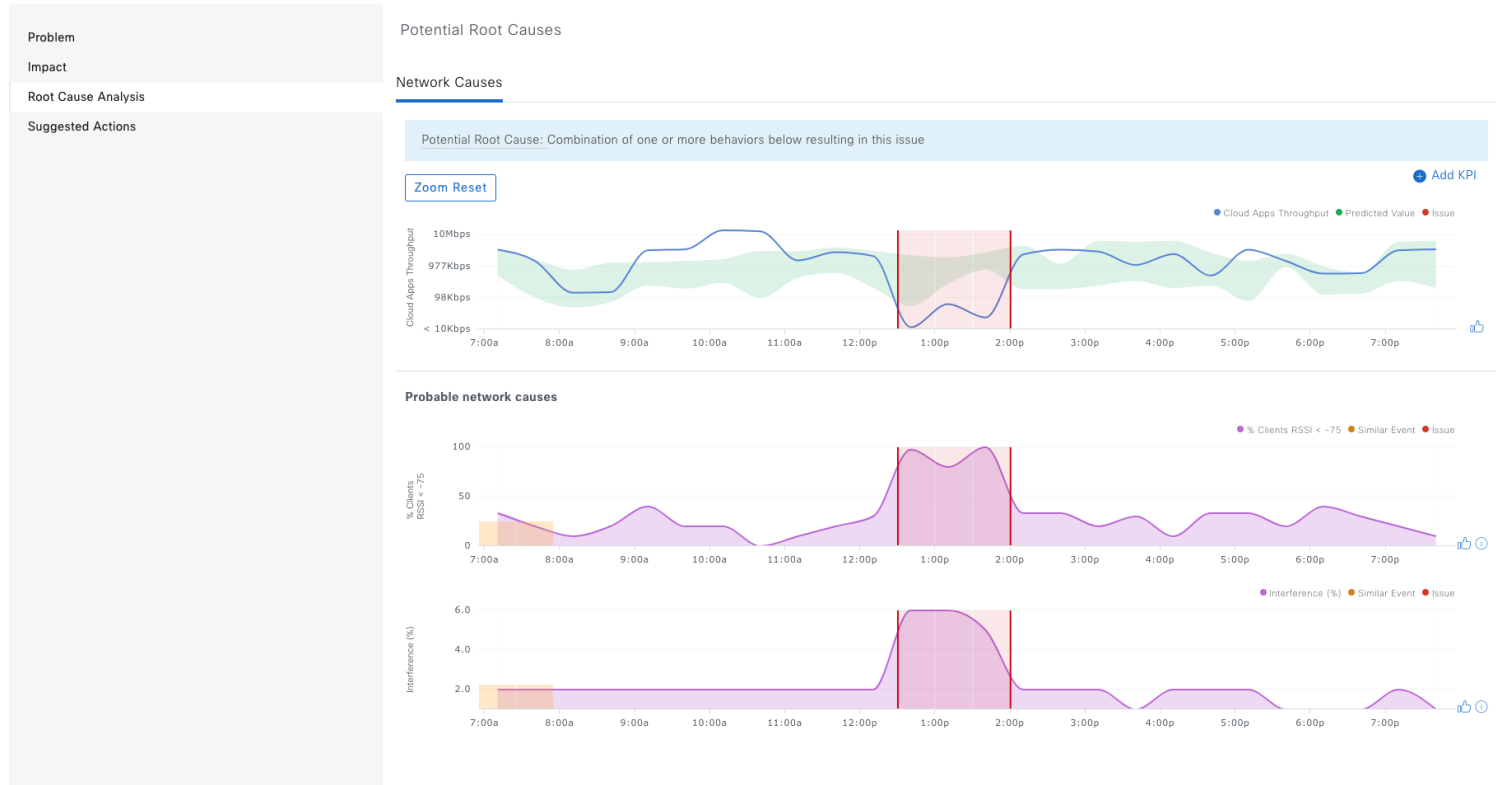
Problem Details

Drop in Cloud Apps Throughput: Radios are seeing a drop below normal in Cloud Application throughput. The green baseline shows the normal bounds of throughput for Cloud Applications given the current state of the network. The period of occurrence of this behavior is highlighted in red.

Zoom Reset



Root cause analysis – show the cause



Root cause analysis – look deeper



Last words on Wi-Fi first

-  **Consider the investment you need to make**
Survey and capacity plan
-  **IT ops may resist moving to Wi-Fi first**
Build resiliency into your wireless and develop assurance tools
-  **Don't make Wi-Fi first a race to the bottom**
Less about reducing cabling and more about meeting the demand

Questions?



Keynote Deep Dives

Wednesday
10:30am – 11:30am



Experiences Amplified:
How AI Can Fuel Better Employee and Customer Experiences

Level 1
Room 106



Smart, Secure, Seamless:
Transforming Experiences with Next-Generation Networking

Level 2
Room 204



Harness a Bold New Era:
Transform Data Centre and Service Provider Connectivity

Level 2
Room 203



Securing User to Application and Everything in Between

Level 2
Melbourne Room 2



Unlocking Digital Resilience through Unified Observability

The HUB
Centre Stage

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Thank you

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