Wireless Tech Update 23 og 25 Oktober 2012

Ib Hansen: ibhansen@cisco.com

Agenda

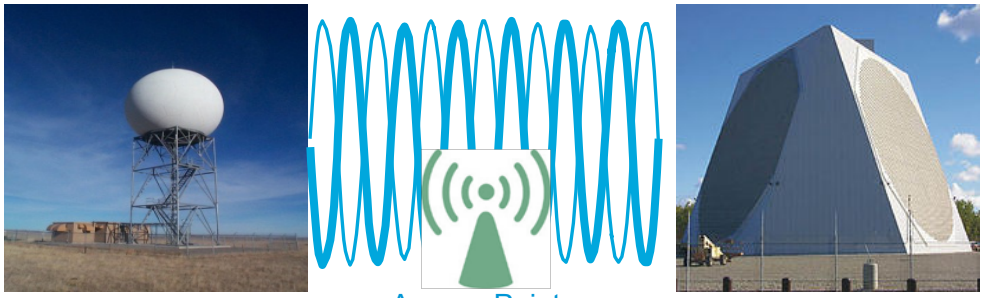
I denne tech update kommer vi til at gennemgå

- Gennemgang af den nye Accesspoint portefølje
  - EOS 1042 og 1142
  - AP 1600
  - AP 2600
  - AP 3600
    - AC Modul
    - Security Modul
- Gennemgang af den nye Controller portefølje
  - Virtuel WLC
  - 8510
- Feature gennemgang
  - HA
  - Bonjour
  - AVC
  - Connected mobile expirience

EOS 1042 og 1142

European DFS Regulation Changes

- New DFS regulation in Europe effective on Jan. 1, 2013 requires more granular DFS pulse detection at the rate of 0.5 µs (vs. current 0.8 µs)
  - → Driven by new military/weather radar in EU that pulses at 0.5 µs rate



- Impacted AP's
  - AP1142 and AP1252 (already EoL)
- Access Points shipped before Jan. 1, 2013 are not affected by this change
- AP platforms deployed can continue to upgrade software post Jan. 1, 2013
  - **For AP1142 EoS announcement done 9/1/12 with last time buy of 11/30/12 – This is NOT EoL only EoS!**
  - **Inventory within EU Distribution can continue to be sold beyond Jan. 1, 2013**

Aironet 1600/2600/3600 Series Access Point

Cisco Aironet 802.11n G2 Series
2nd Generation 802.11n Access Points
Product Positioning

BEST IN CLASS

AVAILABLE NOW

MISSION CRITICAL

Orderable Nov'12
FCS Dec'12

ENTERPRISE READY

3600
- High Client Density
- HD Video/VDI
- Investment Protection
- 11ac Migration
- Comprehensive Security

2600
- Any Device / BYOD Optimized
- Client Scalability
- RF Interference Mitigation

1600
- Enterprise-class Performance
- Voice/Video/Multimedia

TELEWORKER

600
- Basic Connectivity
- Deployment Flexibility

INVESTMENT PROTECTION

Q1 2013

802.11ac Module
WSSI Module

Home | Sm/Med | Sm/Med/Large | Med/Large Enterprise

Coming in 7.4

Cisco Aironet AP1600

3X3:2 MIMO
Access Point

802.11abgn
Up to 300 Mbps
Data Rate

* CleanAir Express
HW Enabled

ClientLink 2.0
Beamforming

Sealed
Ruggedized
Enclosure
Ext Ant Optional

* Roadmap - Cisco Confidential—NDA Only

New with 7.3

Cisco Aironet AP2600

3X4:3 MIMO Access Point

802.11abgn Up to 450 Mbps Data Rate

Autonomous Capable

ClientLink 2.0 Beamforming

CleanAir ASIC

Sealed Ruggedized Enclosure Ext Ant Optional

New with 7.2

Cisco Aironet AP3600

4X4:3 MIMO Access Point

802.11ac Wave 1 Module * Q2CY13

802.11abgn Up to 450 Mbps Data Rate

Dual Band Security Module *Q4CY12

ClientLink 2.0 Beamforming

CleanAir ASIC

Sealed Ruggedized Enclosure Ext Ant Optional

* Roadmap - Cisco Confidential—NDA Only

Cisco Mobility

Mobility / RF Innovation
Predictability and Reliability

CLIENTLINK	Chip level proactive and automatic electronic beamforming to increase client throughput and range by up to 60%
CLEANAIR	Hardware-accelerated proactive and seamless interference detection and mitigation
RADIO RESOURCE MANAGEMENT	Simplified advanced RF management
BANDSELECT	Proactive and automatic band steering for 5GHz capable clients
VIDEOSTREAM	Chip level wired multicast over a wireless network
AWARD WINING DESIGN	Purpose-built WiFi chipset entailing Industry leading RF design up to 4x4 MIMO, with secure and robust form factor (no open vents)

Policy & Network Management

ISE
Control

Cisco Prime
Visibility

Cisco Aironet 802.11n Indoor Access Point

Feature Comparison Matrix

* Future Support

AP Model (availability)		600 Series	1600 Series (CY12Q4)	2600 Series	3600 Series
Max Data Rate		300 Mbps	300 Mbps	450 Mbps	1.3 Gbps
Radio Design (MIMO: Spatial Streams)		2X3:2	3X3:2	3X4:3	.11n: 4X4:3 .11ac: 3x3:3*
Max Clients Per Radio		15 (Total per AP)	128	200	200
Spectrum Intelligence		-	CleanAir Express*	CleanAir	CleanAir
Client Acceleration		-	ClientLink 2.0	ClientLink 2.0	ClientLink 2.0
Max ClientLink Support Per Radio		-	32	128	128
BandSelect		-	✔	✔	✔
VideoStream		-	✔	✔	✔
Rogue AP Detection		-	✔	✔	✔
Adaptive wIPS		-	✔	✔	✔
DEPLOMENT MODES	**Centralized**	-	✔	✔	✔
	FlexConnect	-	✔	✔	✔
	Wireless Mesh	-	✔	✔	✔
	Office Extend	✔	✔	✔	✔
	Autonomous	-	✔(O_2)*	✔	✔ (O_2)*
Power		100 to 240 VAC, 50-60 Hz	802.3af	802.3af	11n: 802.3af 11ac: Enhanced PoE, 802.3at or UPoE

Cisco CleanAir Comparison

	Competitor	CleanAir Express*	CleanAir	CleanAir with WSSI
Access Point	Software Based	1600	2600 and 3600	3600
RF Interference Detection	Poor	✔	✔	✔
RF Interference Classification	Poor	✔	✔	✔
RF Interference Mitigation	Poor	✔	✔	✔
RF Interference Location	Poor	✔	✔	✔
Top Severity List			✔	✔
Alert Correlation			✔	✔
Air Quality Index			✔	✔
Zone of Impact			✔	✔
Performance Optimized			✔	✔
Off Channel Scanning				✔
Proactive Intelligent Channel Switching with RRM				✔

* Future support

Cisco ClientLink Comparison

Only Cisco Aironet G2 Series

	Competitors	ClientLink 1.0	ClientLink 2.0
Beamforming Type	Standards	Beyond Standards	Standards and Beyond Standards
Access Points Supported	Most 802.11n	1140, 1260, 3500	3600, 2600, 1600*
No. of Transmitters to Improve Reliability for Downlink Traffic	2-3	2	3-4
Clients Supported	802.11n	802.11a/g	802.11a/g/n
No. of Clients Supported (per Radio)	-	15	128 (1600 = 32*)
Optimized for iPhone, iPads (1x1:1SS, 11n)	No	No	Yes
Optimized for Newer Laptops from Apple. Dell, Lenovo, HP (3x3:3SS, 11n)	No	No	Yes (2600, 3600)
Ready for Mobile Devices Influx (BYOD)	No	No	Yes
Optimizes AP Resources for Higher Client Density Support	No	Yes (Limited)	Yes (2600, 3600)
Client Performance and Coverage Improvements			

Cisco Aironet 802.11n Indoor Access Point
Positioning Comparison Matrix

AP Model	600 Series	1600 Series	2600 Series	3600 Series
Targeted for	Remote worker	Sm/Med Enterprises, midmarket	Sm/Med/Large Enterprises, midmarket	Mid/Large Enterprises
Site Type	Home	Indoor office, small warehouse	Indoor office, medium warehouse	Large office, med/ large warehouse
Application Performance Profile	Consumer data/ video	Data	Data/Video, mobile device optimized	2-way HD video, mobile device optimized
Future-proof modularity	No	No	No	Yes
Crowded areas	No	No	Yes	Yes

802.11n AP Product Portfolio Transition

Aironet G1

3500
2x3:2
$1395

1260
1140
2x3:2
$995

1040
2x2:2
$795

Aironet G2

3600
4x4:3
$1495

New

2600
3x4:3
$1095

AVAILABLE NOW

New

1600
3x3:2

December 2012

Aironet AP-1600

(AP-1600)-E
External Antennas

(AP-1600)-I
Internal Antennas

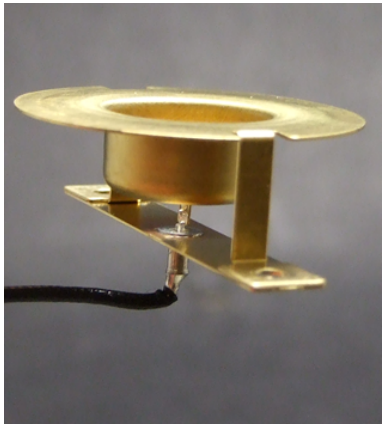
AP-1600 a peek inside…

Smaller printed circuit board, plastic top, metal bottom

Lighter weight, metal can on PCB sinks to metal bottom chassis

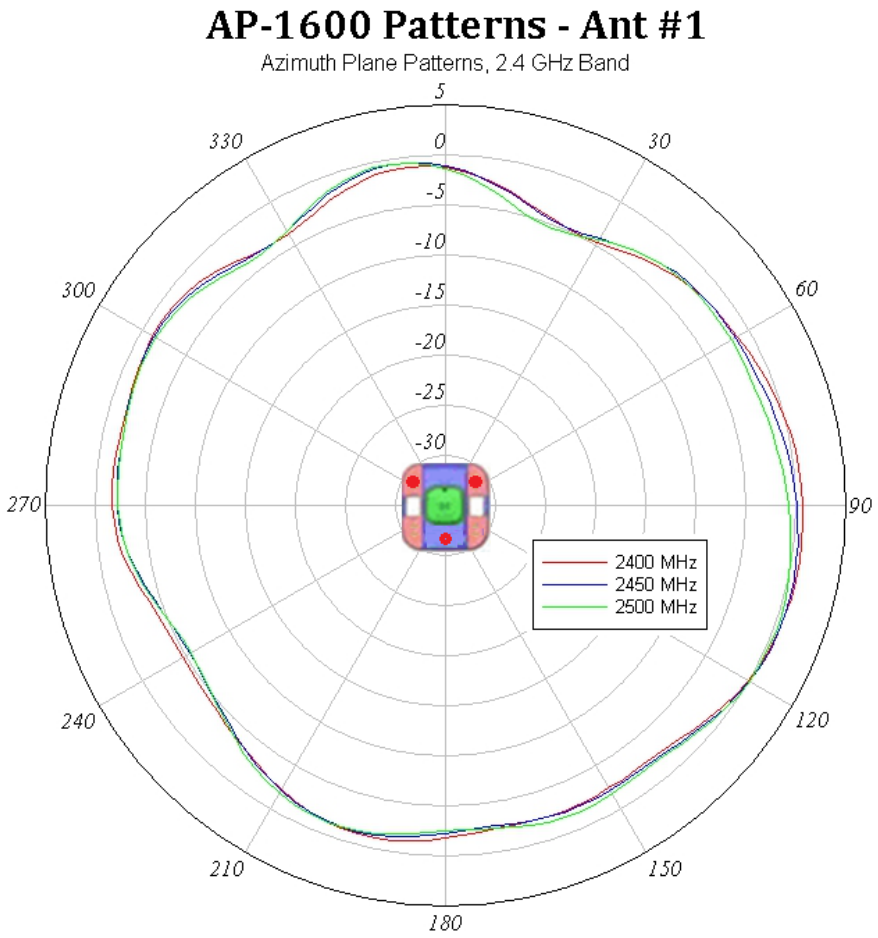
AP-1600 antenna specifications

AP-1600 Dual-Resonant Integrated Antenna Performance Specifications				
Parameter	**Minimum**	**Nominal Value**	**Maximum**	**Comments**
Antenna Type		Omnidirectional		
Operating Frequency Range		2400 - 2484 MHz		
		5150 - 5850 MHz		
Nominal Input Impedance		50 Ω		
VSWR		2400 - 2484 MHz, 2:1		Including all attached cable
		5150 - 5850 MHz, 2:1		
Peak Gain	2.5 dBi	2.4 GHz Band: 4 dBi	5 dBi	Including all attached cable, over frequency
	3.0 dBi	5 GHz Band: 4 dBi	5 dBi	
Polarization		Linear		Both bands
Elevation Plane 3-dB Beamwidth	40°	2.4 GHz Band: 150°	180°	BW Measured in ϕ = 90° plane
	40°	5 GHz Band: 50°	70°	BW Measured in ϕ = 90° plane
Azimuth Plane Ripple	5 dB	2.4 GHz Band: 7 dB	10 dB	
	8 dB	5 GHz Band: 12 dB	15 dB	

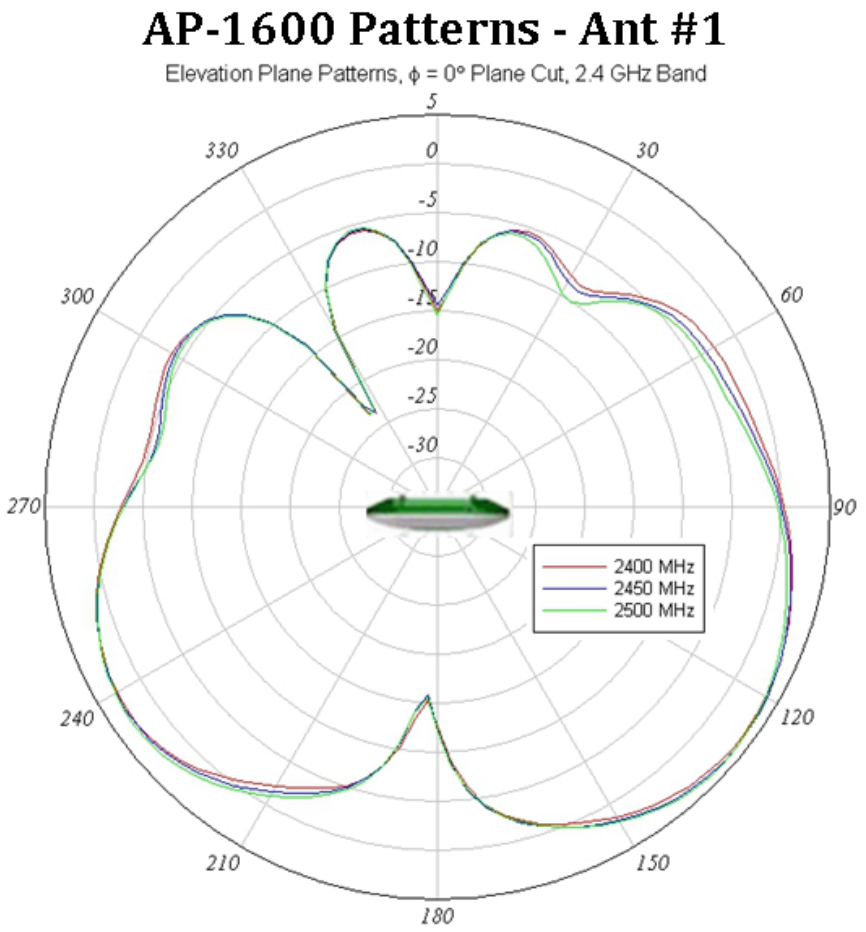


dual radiating element

AP-1600 2.4 GHz antenna patterns

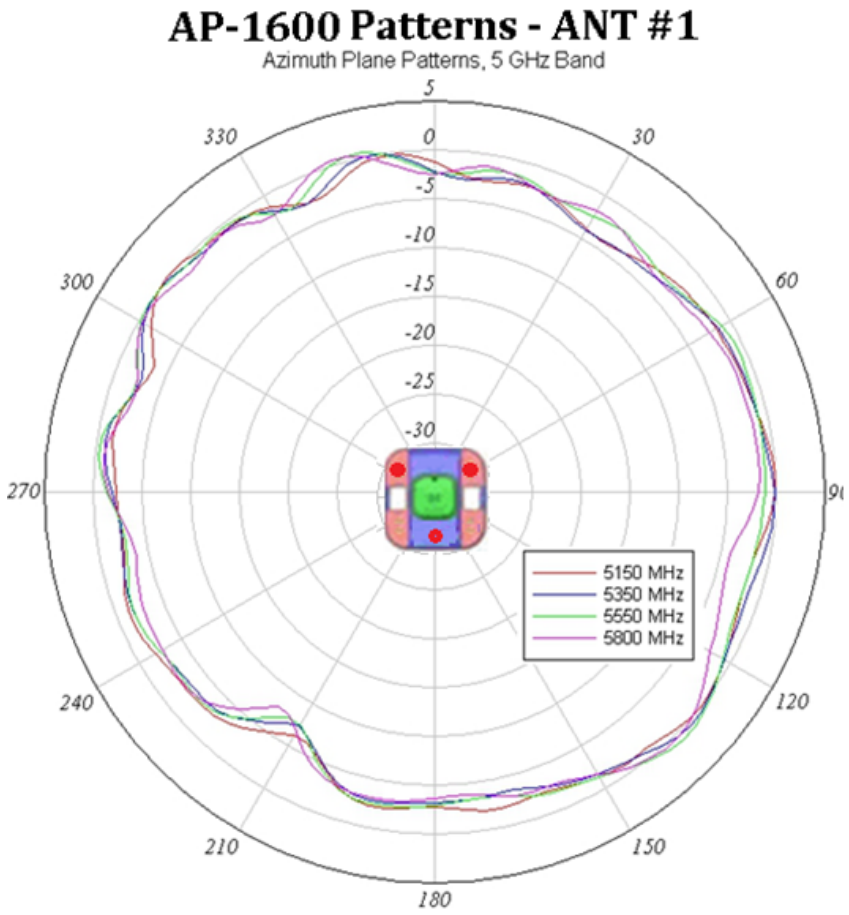


2.4 GHz Azimuth

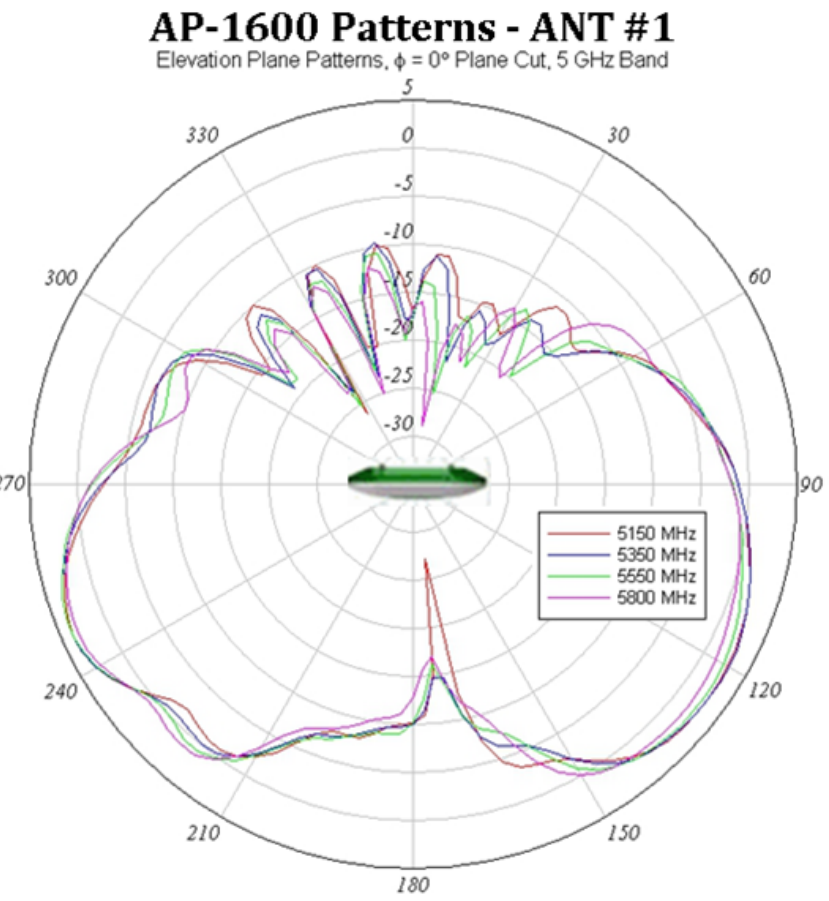


2.4 GHz Elevation

AP-1600 5 GHz antenna patterns



5 GHz Azimuth



5 GHz Elevation

Aironet 2600 Series Access Point

Cisco Aironet 2600i /2600e Access Points

- Aironet 2600i Access Point
- For indoor installations and office environments

- CleanAir Technology
- ClientLink 2.0
- Attractive, high-quality design
- Internal dual-band integrated antennas

AIR-CAP2602I-x-K9	Dual-band 802.11 a/g/n controller-based access point
AIR-CAP2602I-xK910	**10 Pack** 802.11 a/g/n controller-based access point
AIR-SAP2602I-x-K9	Dual-band 802.11 a/g/n Standalone access point
AIR-SAP2602I-xK9-5	**5 Pack** 802.11 a/g/n standalone access point

- Aironet 2600e Access Point
- For factories, warehouses and other industrial environments

- CleanAir Technology
- ClientLink 2.0
- Ruggedized enclosure
- 4 External dual-band antennas – *Sold separately*
- Extended operating temperature

AIR-CAP2602E-x-K9	Dual-band 802.11 a/g/n external antenna controller-based access point
AIR-CAP2602E-xK910	**10 Pack** 802.11 a/g/n external antenna controller-based access point
AIR-SAP2602E-x-K9	Dual-band 802.11 a/g/n external antenna Standalone access point
AIR-SAP2602E-xK9-5	**5 Pack** 802.11 a/g/n external antenna Standalone access point

General Availability – Sept 2012

AP2600 vs. AP3600 Differentiation

- AP3600 offers the BEST IN CLASS PERFORMANCE
  - AP3600 is ideal for high density and higher capacity environments
- AP3600 modularity design offers future protection
  - Security Monitor Module
  - 11ac module (Pre-Commit)
  - Additional modules under evaluation
- AP3600 is a 4x4:3SS, extra Tx chain for additional downlink performance for all bands/clients
- AP3600 is ultimate in rugged/sturdiness – able to withstand being run over by a truck!!!

Cisco Access Point Portfolio

Delivers Wireless Performance, Reliability & Innovation

	Organization Size	Data Support	Ideal for
Aironet 3600 Series *Carpeted / Challenging Environment*	Mid-size – Large Enterprise with High Mobile Density	High-demand, Best performance, Mission-critical	Highest 802.11n performance with client enhancements and RF environment optimization (ClientLink2.0, CleanAir, & VideoStream)
Aironet 3500/2600 Series *Carpeted / Challenging Environment*	Mid-size - Large Enterprise & Stadium	Mission-critical	802.11n performance with client enhancements and RF environment optimization (ClientLink2.0, CleanAir, & VideoStream)
Aironet 1260 Series *Challenging Environment*	Mid-size Enterprise	Rich-media	802.11n performance with client enhancements (ClientLink, Bandselect & VideoStream)
Aironet 1140 Series *Carpeted Environment*	Mid-size Enterprise	Rich-media	802.11n performance with client enhancements (ClientLink, Bandselect & VideoStream)
Aironet 1040 Series *Carpeted Environment*	Branch / Small Enterprise	Business-ready	802.11n performance (Bandselect)
Aironet 600 Series *OfficeExtend / Home Environment*	Remote / Teleworker	Personal & business use	802.11n performance from home or remote offices
Aironet 1550 Series *Outdoor Environment*	Mid-size-Large Enterprise	Mission-critical	802.11n performance with ClientLink and RF environment optimization

AP-2600e and AP2600i

Identical in appearance to the AP-3600
Except the Cisco Logo now has an
embossed frame around the Logo

This allows you to identify it visually
as an AP-2600

AP-2600 Product Description

AP-2600 Access Point

- Client Link 2.0 -- 3x4, 3SS, MIMO, beam forming, antenna system
- 3 Tx 4 Rx dual band radio design, (extra radio receiver for uplink performance)
- Using 3x4:3 Architecture (Support up to 450 Mbps)
- Support for newer 3-SS MCS rates 16-23
- Compatible with existing mounting brackets and 802.3af PoE
- Support for Cisco CleanAir Spectrum Intelligence

AP-2600 Support for 3 Spatial Streams

AP-2600 – Key takeaways

- The extra spatial stream with its additional MCS rates improve reliability and performance allowing faster throughput and more data rates choices to be able to shift to.
- Support for 3 spatial streams as well as Client Link 2.0 an 802.11n beam-forming method **results in less retries and more predictable performance.**
- **Net result, it increases the overall data rates @ usable distances maintaining a better link at those top speeds**

				Signal BW =20 MHz		40 MHz	
MCS	Coding	Modulation	Streams	GI = 800 nS	GI =400 nS	GI = 800 nS	GI =400 nS
MCS16	1/2	BPSK	3	19.5	21.7	40.5	45
MCS17	1/2	QPSK	3	39	43.3	81	90
MCS18	3/4	QPSK	3	58.5	65	121.5	135
MCS19	1/2	16-QAM	3	78	86.7	162	180
MCS20	3/4	16-QAM	3	117	130	243	270
MCS21	2/3	64-QAM	3	156	173.3	324	360
MCS22	3/4	64-QAM	3	175.5	195	364.5	405
MCS23	5/6	64-QAM	3	195	216.7	405	450

Like the AP-3600, the AP-2600 Supports three spatial streams permitting MCS16-23 for up to 450 Mbps throughput

Feature Comparison Matrix

The AP-2600 is similar to the AP-3600

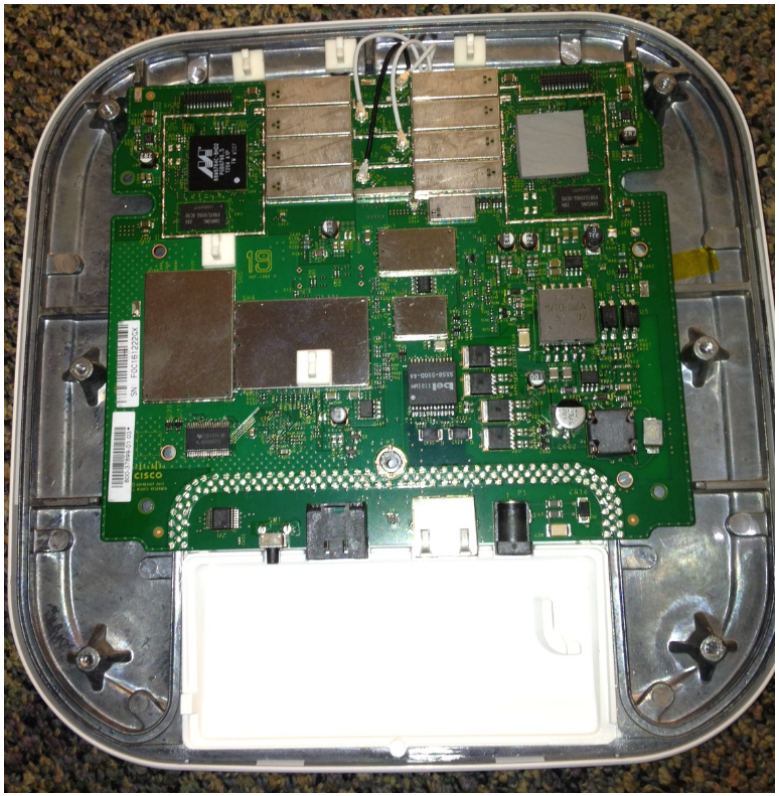
However:
It is not 4x4:3 and does not have Module support

Good News
AP-2600
AP-3600
Both support Client Link 2.0

	3600 Series	3500 Series	2600 Series
Data Rate	450 Mbps	300 Mbps	450 Mbps
Radio Design	4X4:3	2X3:2	3x4:3
CleanAir	☑	☑	☑
ClientLink	ClientLink 2.0	☑	ClientLink 2.0
BandSelect	☑	☑	☑
VideoStream	☑	☑	☑
Rogue AP Detection	☑	☑	☑
Adaptive wIPS	☑	☑	☑
Module Support	☑		
FlexConnect	☑	☑	☑
Wireless Mesh	☑	☑	☑
Data Uplink (Mbps)	10/100/1000	10/100/1000	10/100/1000
Power	802.3af	802.3af	802.3af
Temperature Range in Celsius	(i) -0 to 40° C (e) -20 to 55°C	(i) -0 to 40° C (e) -20 to 55°C	(i) -0 to 40° C (e) -20 to 55°C
Wi-Fi Standards	802.11 a/b/g/n	802.11 a/b/g/n	802.11 a/b/g/n

All Cisco Access Points are well shielded

Robust with all cables inside shielded moisture resistant housing



Access Point inside view AP-2600

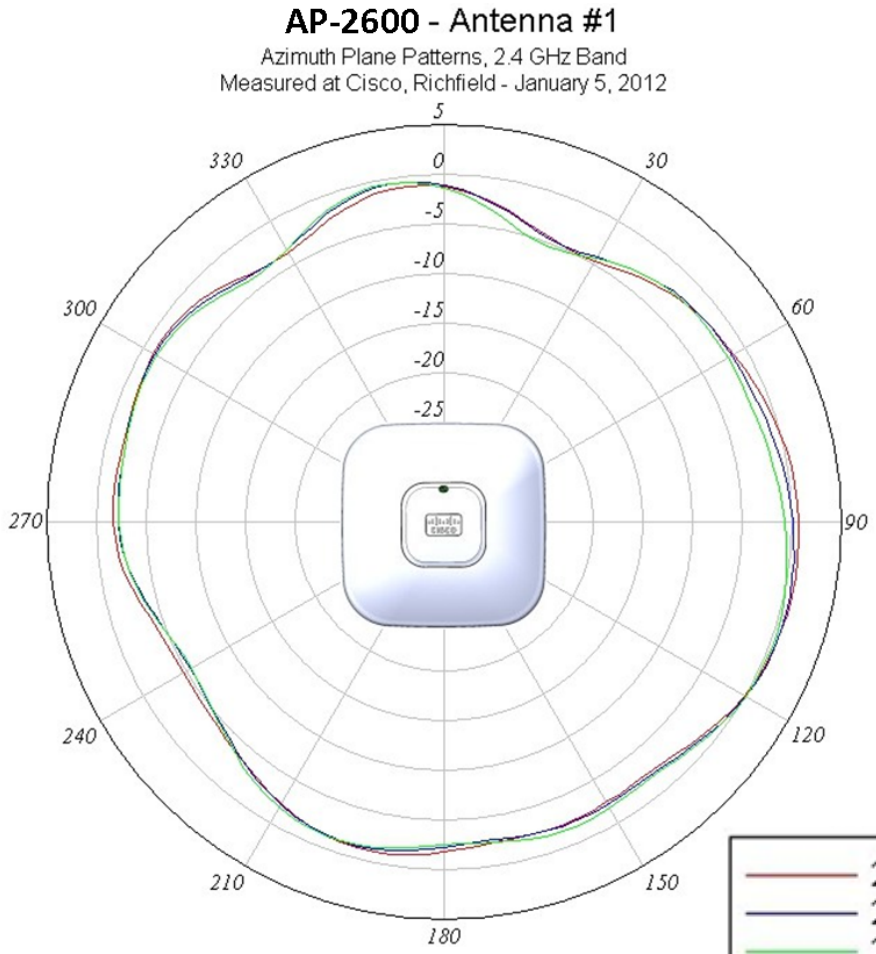
Cisco Access Points are well shielded and designed for areas where moisture is present.

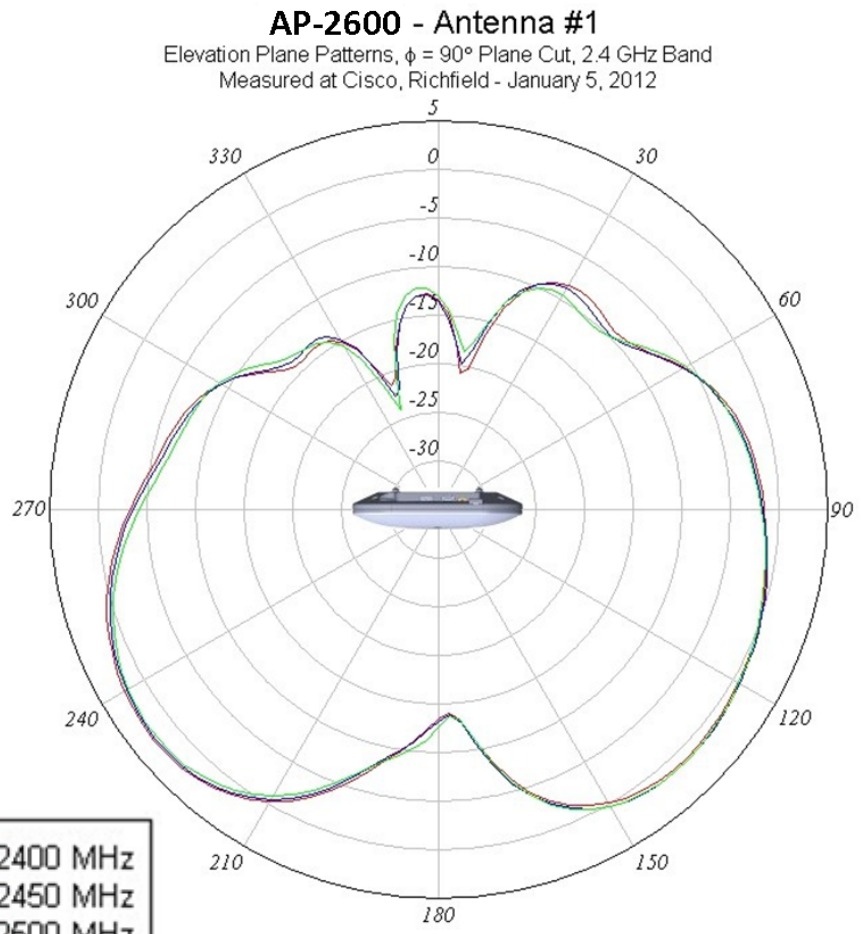
This AP is designed to run without the need for venting

Cisco 2600 series Access Points are properly shielded and all components are able to handle the heat generated without open air “vent holes”

Note: Our antenna connections are not exposed to moisture and open air

AP-2600i – Antenna Patterns 2.4 GHz

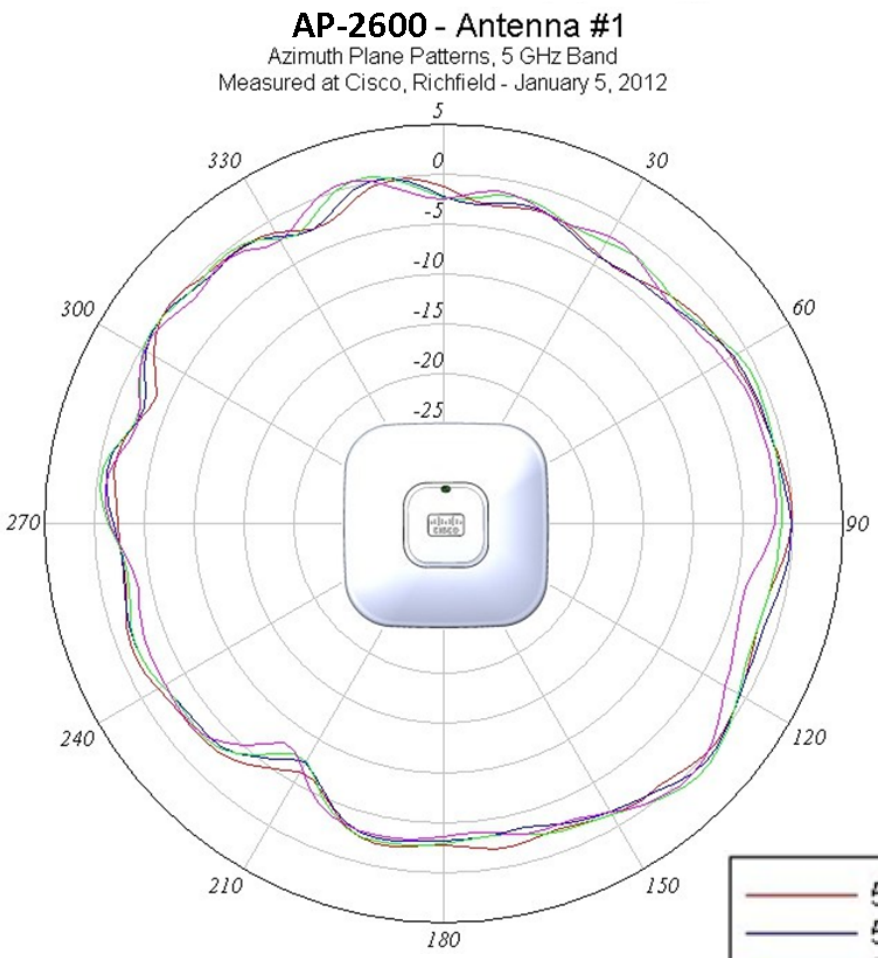


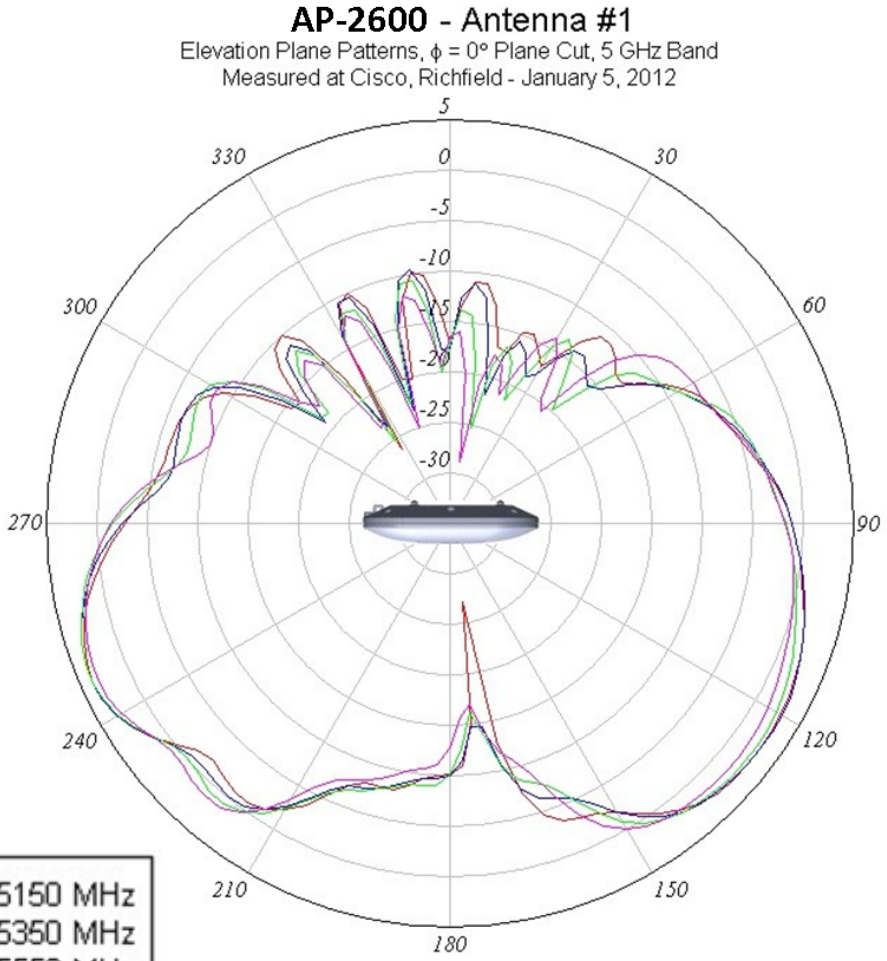


Azimuth Plane 2.4 GHz

Elevation Plane 2.4 GHz

AP-2600i – Antenna Patterns 5 GHz



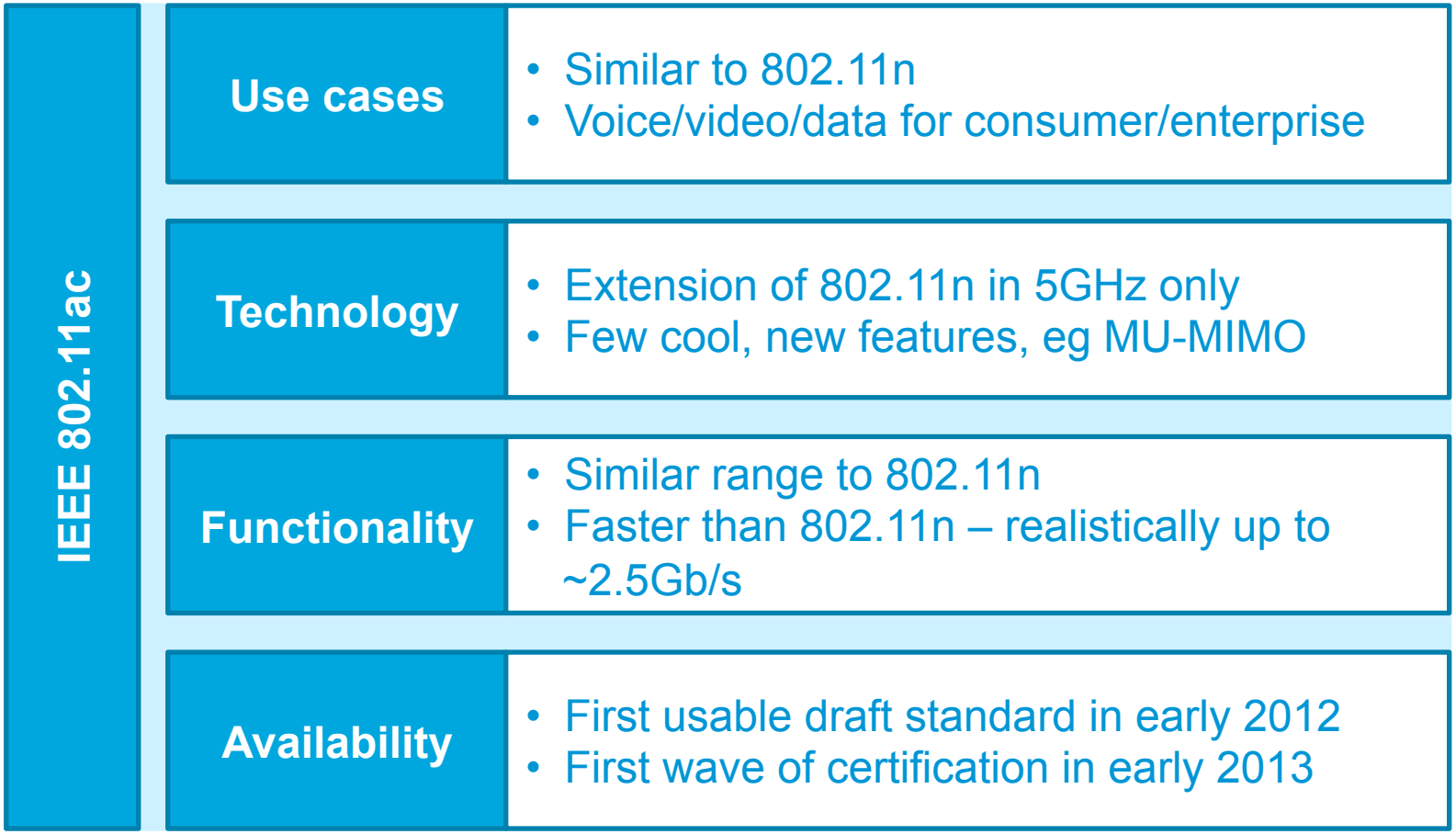


Azimuth Plane 5 GHz

Elevation Plane 5 GHz

802.11ac modulet

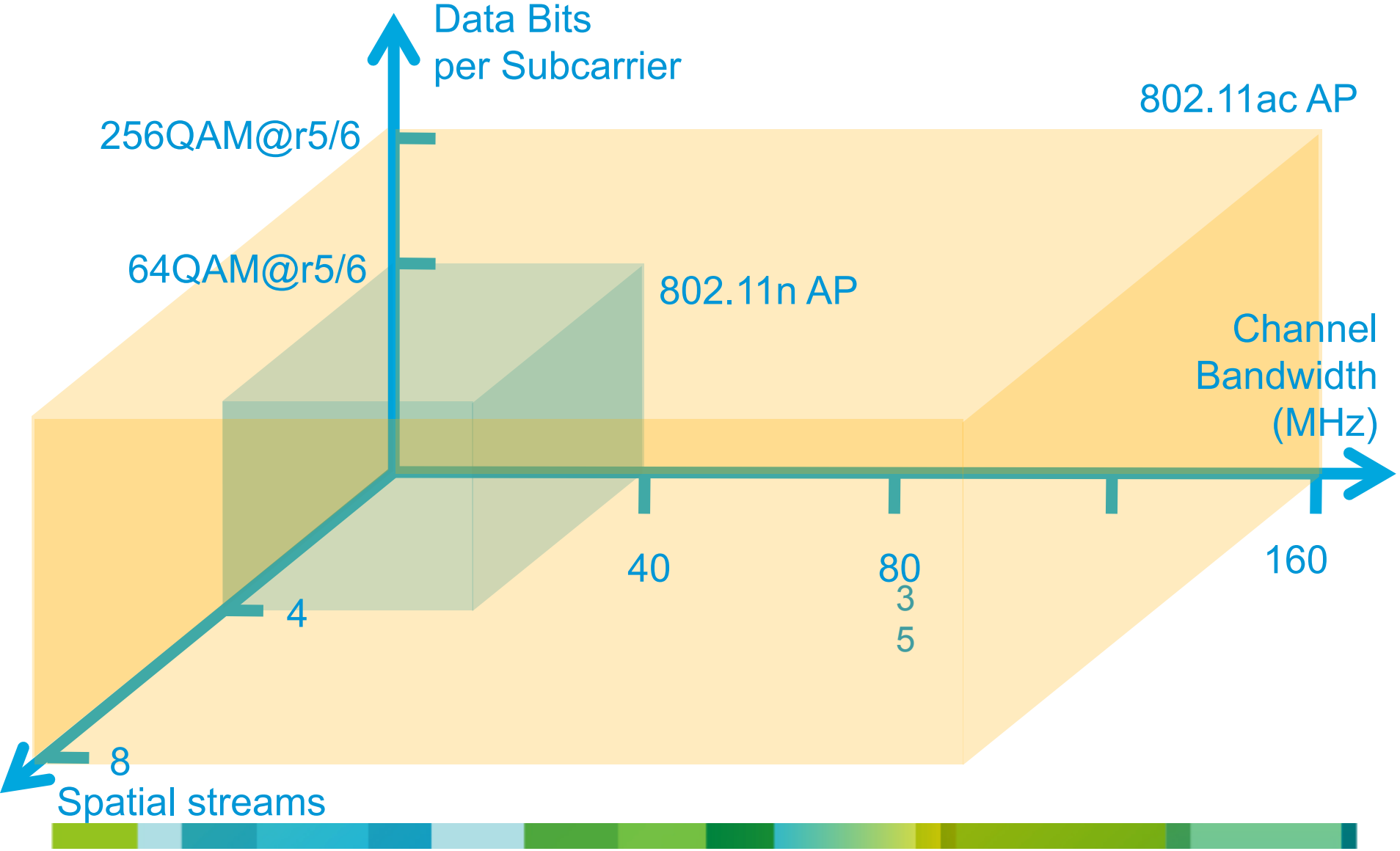
802.11ac, the Next Generation Wi-Fi, is "Just Around the Corner"



802.11ac Mainly Just Extends 802.11n Technology … and Adds MU-MIMO

Feature	Comments
5 GHz only	Avoids interference-plagued 2.4 GHz
80MHz channels	Optional 160MHz and 80+80MHz
256QAM	802.11n has lower modulations
Up to 8 spatial streams	1 SS mandatory, 2 SS for non-battery APs at WFA
Beamforming	Single mechanism this time
MU-MIMO	Cool new technology! MU = Multi-User
RTS/CTS	Improvements for wider bandwidths
Better CCA	Detects energy in secondary channel
Deletes stuff	“Dark corners of 802.11n left to die” ☺

802.11ac Goes Faster with More Bits/Carrier, Bandwidth & Spatial Streams



802.11ac Can Plausibly Operate at up to ~3.5Gb/s (@PHY) or ~2.5Gb/s (@MAC)

80 MHz	MCS (QAMr5/6)	
Spatial streams	64	256
1	290[1]	430
	330[1]	
2	650[2]	870
3	980[1]	1300
4		1700
8		3500

160 MHz	MCS (QAMr5/6)	
Spatial streams	64	256
1	650	870
2	1300	1700
3	2000	2600
4		3500
8		6900

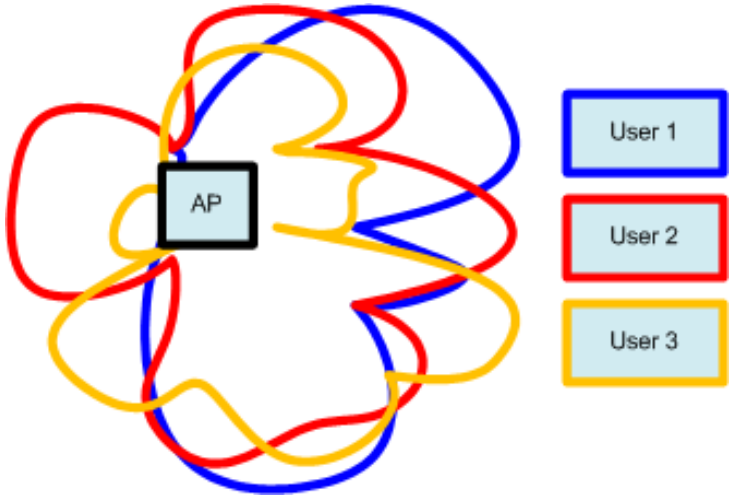
[1] Mandatory for battery devices, long GI

[2] Mandatory for powered APs

Easy | Plausible | Fantasy

802.11ac Uses MU-MIMO to Provide "Switch" Rather than "hub" Technology

- Single User MIMO in 802.11n sends one frame to one receiver
- Multi-user MIMO in 802.11ac sends multiple frames to multiple receivers

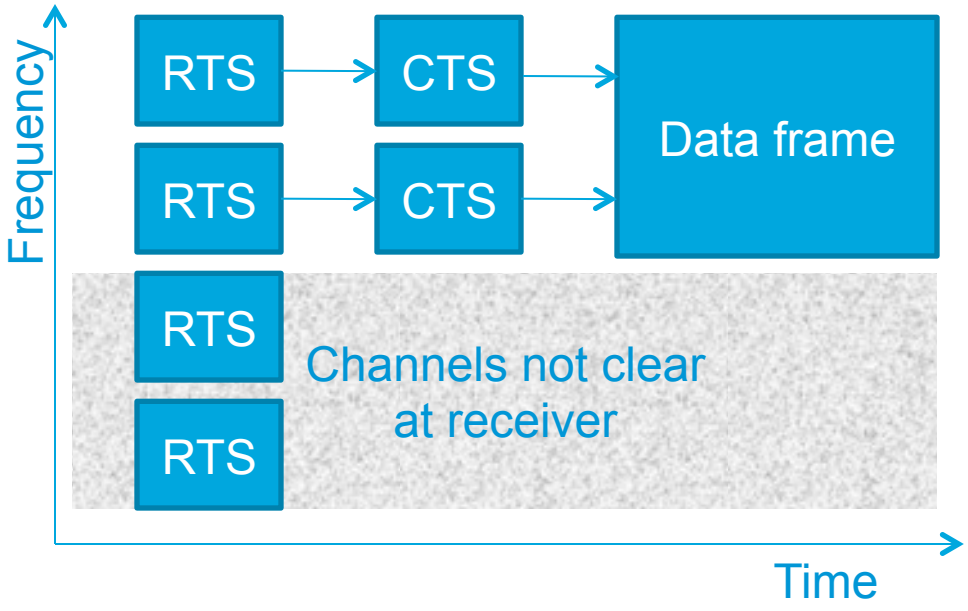


AP with 4 antennas can send 1 stream each to 3 smartphones, all at the same time

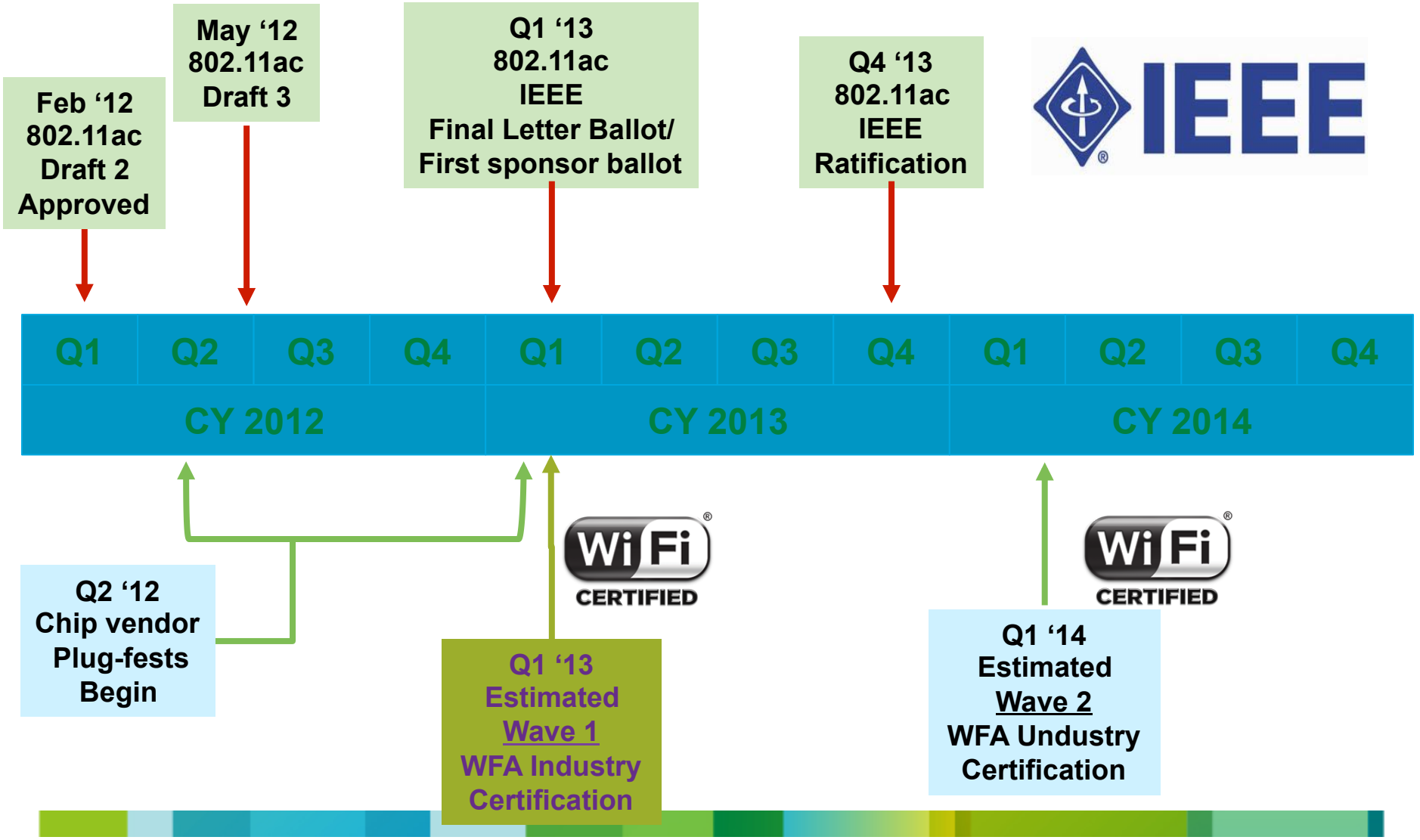
AP must beamform 1 space-time stream to the each receiver & simultaneously null-steer that space-time streams to the two other receivers

802.11ac Supports Extended RTS/CTS Mode for Dynamic Wider Bandwidth

- Initiator transmits multiple RTS's on free channels
- Responder transmits CTS's on channels it:
  - Received an RTS
  - Senses as free
  - Supports bandwidth-wise
- Initiator transmits data only over free channels



802.11ac Adoption
IEEE Standards Timeline (Estimates)



802.11ac Adoption
Client and Infrastructure Timeline—Estimated

First Gen 11ac Smartphones and Tablets (1x1, 2x2)

- Mobile chipsets will be optimized for lower power consumption to allow 5GHz/11ac support
- Post-iPhone 5 and other smartphones in CY13 will likely be 11ac capable
- Higher powered Tablets will be 11ac enabled in CY13

Broader 11ac client adoption and proliferation

Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
CY 2012				CY 2013				CY 2014			

Consumer Class AP's Linksys, NetGear, D-Link

Wi Fi CERTIFIED

11ac WFA Industry Certification for Enterprise Class Interoperability

802.11ac Module for AP3600 FCS

802.11ac compared with 802.11n

- **The next generation of wireless** building upon 802.11n, designed to provide better bandwidth and better coverage
- **Focused on driving wireless data rates from 1Gbps**, up to 6.9Gbps

Feature	802.11n Standard	802.11ac Draft 2
Band supported	2.4 GHz and 5 GHz	5 GHz only
PHY Rate MAC Throughput*	65 Mbps - 600[a] Mbps 45* Mbps - 420* Mbps	290 Mbps - 6.9[a] Gbps 194* Mbps - 4.8* Gbps
# of Spatial Streams	4[a]	8[a]
Modulation	64 QAM	256 QAM
Channel Width	20, 40 MHz	20, 40, 80, 80+80, 160 MHz
MIMO	Single User MIMO	Multi User MIMO
802.11 protocol support	b,g,n and a,n	a, ac, n

* : MAC throughput calculated @ 70% the defined PHY capability

[a] : Theoretical Maximum as per the respective standards/specifications

802.11ac: First 2 Waves

- The 802.11ac standard will come to market in 2 phases “Waves”
- Each Wave of 802.11ac will require new chip sets - and introduce new HW

Feature	Wave 1 – 2013	Wave 2 – 2014
PHY Rate MAC Throughput	290 Mbps - 1.3 Gbps 194* Mbps - 910* Mbps	3.5 Gbps 2.4* Gbps
# of Spatial Streams	3[b]	4[b]
Modulation	256 QAM	256 QAM
Channel Width	20, 40, 80 MHz	20, 40, 80, 80+80, 160 MHz
MIMO	Single User	Multi User
802.11 protocol support	a, n, ac	a, n, ac

* : MAC throughput calculated @ 70% the defined PHY capability

[b] : Commercial chipset dependent, subset of theoretical max defined in the standard

Vis video fra Wifi Field Days 3

- http://techfieldday.com/appearance/cisco-presents-at-wireless-field-day-3/

- Se fra min 16. - 18

AP3600 – Investment Protection 802.11ac Wave 1 Module

Availability 1H CY13

- A field-upgradable 802.11ac module add-on to the AP3600
- 802.11ac Wave 1 – 5 GHz AP3600 Module
  - 5 GHz independent radio module
  - 1.3 Gbps PHY
  - 3 Spatial Streams, 80 MHz, 256 QAM
  - Explicit Beam Forming support as per the 802.11ac standard
  - Both 5 GHz radios work together
  - Supporting 802.11ac clients on the module, and 802.11a and n clients on the integrated 5 GHz radio

Cisco Switches Ready for 802.11ac

80% of Cisco switches sold today are capable of enhanced or 802.3at PoE

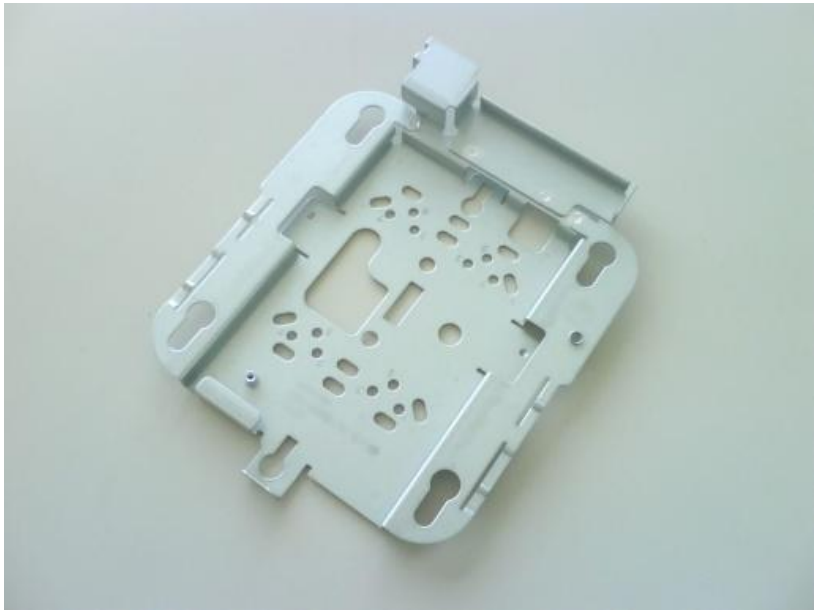
Cisco Switches	802.3af PoE	802.3af - Enhanced PoE	802.3at - PoE+	UPoE
802.11ac Ready	X	✔	✔	✔
4500 E Series 47xx line card	✔	X	✔	✔
4500 E Series all other copper line cards	✔	X	✔	X
4500 non E Series	✔	X	X	X
3750-X	✔	X	✔	X
3750-E	✔	✔	X	X
3750-G	✔	X	X	X
3560-X	✔	X	✔	X
3560-E	✔	✔	X	X
3560-C	✔	X	✔	X
2960-S	✔	X	✔	X
2960-C	✔	X	X	X
2960	✔	X	X	X
Power Injector		AIR-PWR-INJ4		

AP Beslag / Antenner / Powerinjector

AP-1600 (AIR-AP-BRACKET-1 & 2)

AIR-AP-BRACKET-1
AP Bracket: Low-Profile

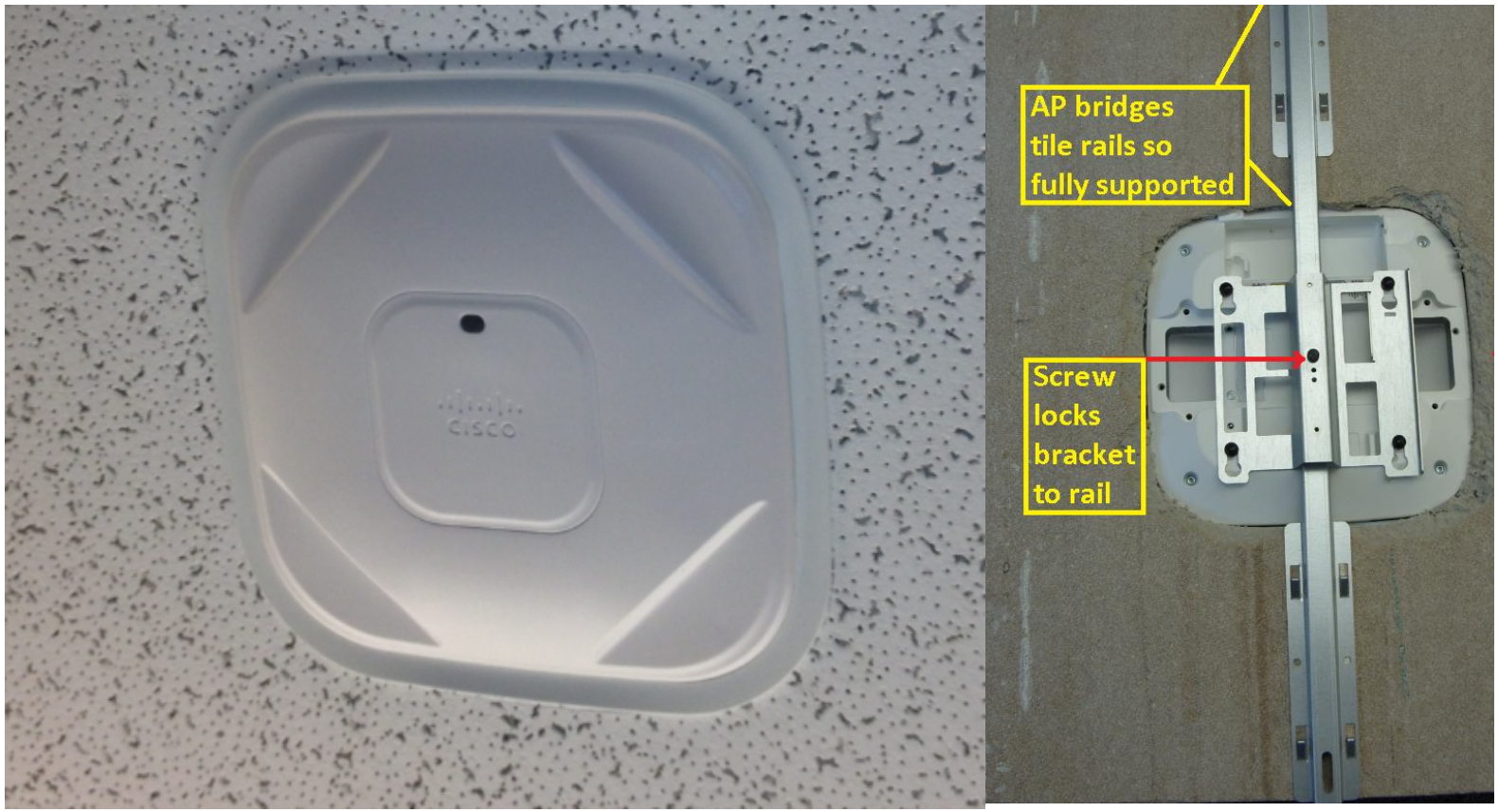
This Bracket provides the best (flush) mount for below ceiling tiles but does not accommodate network / electrical box or wall mounting



AIR-AP-BRACKET-2
AP Bracket: Universal

This bracket will work with electrical boxes, wall mounting and adapts to ceiling installations but not as flush to the tile as the low profile bracket. Works in all environments.

Flush tile mount (AIR-AP-BRACKET-3)



Flush mount bracket part number is **AIR-AP-BRACKET-3**
Note: This mount spans the rails a plus for Earthquake Building codes.

Take-away: Our competitors don't have this very elegant option

AP-1600e antenna considerations

Orange stripe indicates 2.4 & 5 GHz dual band antenna

Do not use single band antennas unless you choose to use the AP-1600 as a single band device (disabling the other radio) otherwise use dual band antennas.

Dual band antennas for AP1600e

Note: NO NEW ANTENNAS FOR 1600 – Uses the same as AP-2600/3600

Product ID	Description		Gain
AIR-ANT2524DB-R AIR-ANT2524DB-R=	2.4 GHz 2 dBi / 5 GHz 4 dBi Dipole Ant., Black, RP-TNC connectors		2 dBi (2.4 GHz) 4 dBi (5 GHz)
AIR-ANT2524DG-R AIR-ANT2524DG-R=	2.4 GHz 2 dBi / 5 GHz 4 dBi Dipole Ant., Gray, RP-TNC connectors		2 dBi (2.4 GHz) 4 dBi (5 GHz)
AIR-ANT2524DW-R AIR-ANT2524DW-R=	2.4 GHz 2 dBi / 5 GHz 4 dBi Dipole Ant., White, RP-TNC connectors		2 dBi (2.4 GHz) 4 dBi (5 GHz)
AIR-ANT2566P4W-R=	2.4 GHz 6 dBi/5 GHz 6 dBi Directional Ant., 4-port, RP-TNC connectors		6 dBi (2.4 GHz) 6 dBi (5 GHz)
AIR-ANT2524V4C-R=	2.4GHz 2 dBi/5GHz 4 dBi Ceiling Mount Omni Ant., 4-port, RP-TNC connectors		2 dBi (2.4 GHz) 4 dBi (5 GHz)
AIR-ANT2544V4M-R=	2.4GHz 4 dBi / 5GHz 4 dBi Wall Mount Omni Ant., 4-port, RP-TNC connectors		4 dBi (2.4 GHz) 6 dBi (5 GHz)

Note: 2566,2524 & 2544 have 4 antenna leads just leave one unused

Introducing a new power injector “INJ5”

AIR-PWR-INJ5
15 Watt Injector

AIR-PWR-INJ4
30 Watt Injector

AIR-PWRINJ5 is a cost reduced power injector introduced for the AP-1600

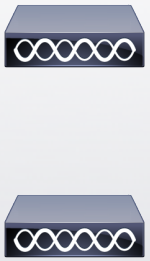
Physically smaller with a component reduction from 3 LEDS down to 1 LED

This injector will work with any Cisco Access Point that can operate at 802.3af PoE (15.4 Watts) or less

We still recommend INJ4 for use with the AP-3600 since the module option will push the power requirement over 15.4 Watts

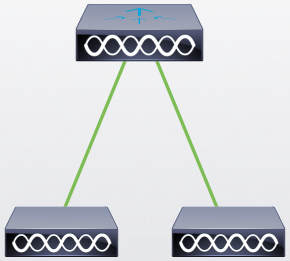
Controller Update

Cisco Deployment Options



Standalone APs

Traffic distributed at AP

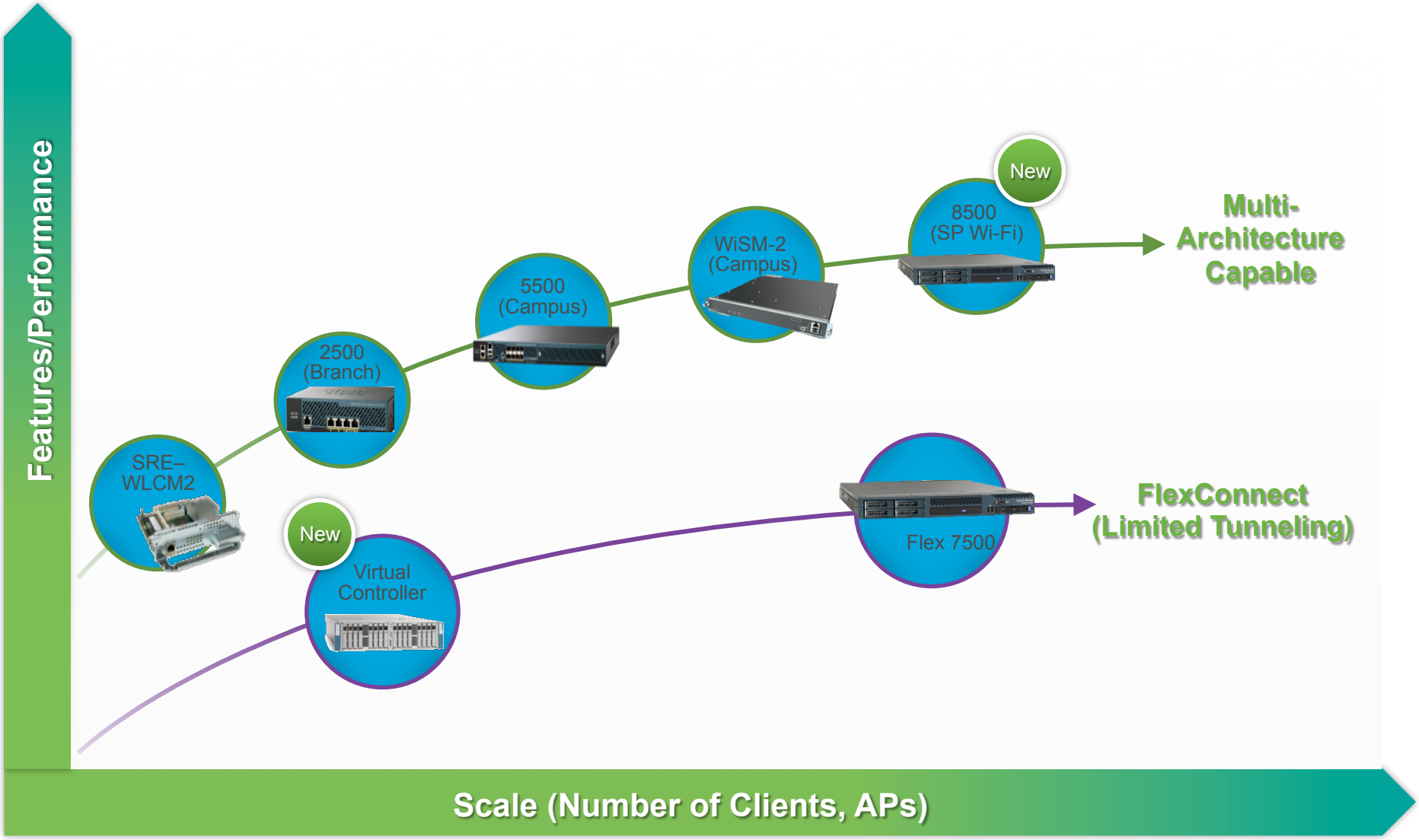


Traffic centralized at Controller

Autonomous	FlexConnect	Centralized
• Controller-less • WLAN is overlay to LAN • Distributed Control Plane • Distributed Data Plane • Static RF Management	• WLAN overlay to LAN • Central Control Plane • Distributed Data Plane • Distributed Policy • Dynamic RF Management • No Controller at remote site	• WLAN overlay to LAN • Central Control Plane • Central Data Plane • Centralized Policy • Dynamic RF Management
Autonomous Access Points AP1600* AP2600 AP3600*	• 7500 • 8500 • Virtual Controller	• 2504 • 5508 • WiSM2 • 8500

* Roadmap - Cisco Confidential—NDA Only

Cisco Wireless Controllers



Cisco Wireless Controllers

	Virtual Controller	Controller for ISRG2	2500 Series	5500 Series	WiSM2	7500 Series	8500 Series
Target Deployments	Small or midsized business branch	Small or midsized business branch	Small or midsized business branch	Midsized to large enterprise	Midsized to large enterprise	Large number of branches	Large enterprise and service provider
Form Factor	Virtual Machine Software	ISR SRE	Desktop	1RU Appliance	Catalyst 6500 Module	1RU appliance	1RU appliance
FlexConnect	✓	✓	✓	✓	✓	✓	✓
Local Mode	-	✓	✓	✓	✓	-	✓
Mesh	-	✓	✓	✓	✓	-	✓
OfficeExtend	-	-	✓	✓	✓	✓	✓
Scale							
Min Access Points	5	5	5	12	100	300	300
Max Access Points	200	50	50	500	1000	6000	6000
Max Client Support	3000	500	500	7,000	15,000	64,000	64,000
Max RF Tag Support	3000	500	500	5,000	5,000	50,000	50,000
Max Throughput	500 Mbps	500 Mbps	500 Mbps	8 Gbps	20 Gbps	1 Gbps	10 Gbps
Max # of AP Groups	200	30	30	500	1000	6000	6000
Max # of Flex Groups	100	30	30	100	100	2000	2000
Max APs per Group	100	25	25	25	25	100	100
Max # WLANs	512	16	16	512	512	512	512
Max # VLANs	512	16	16	512	512	4095	4095

Cisco Wireless Controllers (Cont.)

	Virtual Controller	Controller for ISRG2	2500 Series	5500 Series	WiSM2	7500 Series	8500 Series
Workgroup Bridge	✓	✓	✓	✓	✓	✓	✓
LAG	-	-	-	✓	-	-	-
Mobility	L2	L2/L3	L2/L3	L2/L3	L2/L3	L2	L2/L3
DTLS	-	-	✓	✓	✓	✓	✓
CAC	✓	✓	✓	✓	✓	✓	✓
Cisco VideoStream	-	✓	✓	✓	✓	-	✓
Guest Svcs (Wireless)	✓	✓	✓	✓	✓	✓	✓
Guest Svcs (Wired)	-	-	-	✓	✓	-	-
Guest Anchor	-	-	-	✓	✓	-	-
FIPS	In plan		In plan	Certified	Certified	In plan	In plan
Common Criteria	In plan		In plan	Certified	Certified	In plan	In plan
DISA UCAPL	In plan		In plan	Certified	Certified	In plan	In plan
Platform Details							
Interfaces	2 vNICs	ISR G2 backplane	4 x 1GbE	8 x 1GbE	Catalyst 6500 backplane	2 x 10GbE	2 x 10GbE
Redundant Power	NA	✓ (option)	No	✓ (option)	✓	✓ (installed)	✓ (installed)
Redundant Fans	NA	✓	Fanless	✓	✓	✓	✓
Max Power	-	Refer to SRE	80W	125W	220W	675W	675W
Hardware Warranty	NA	90 days	90 days	90 days	90 days	90 days	90 days
Software Warranty	90 days	90 days	90 days	90 days	90 days	90 days	90 days

New with 7.3

8510 Wireless Controller

Supports up to 2,000 FlexConnect groups and up to 100 APs in a FlexConnect group in FlexConnect mode

Supports Up to 6,000 Access Points

Supports up to 64,000 clients

802.11ac Forward Compatible

Up to 10 Gbps of Wireless Throughput

Application Visibility and control*

Redundant AC, DC Power Supplies and Dual 10 Gbps Uplinks

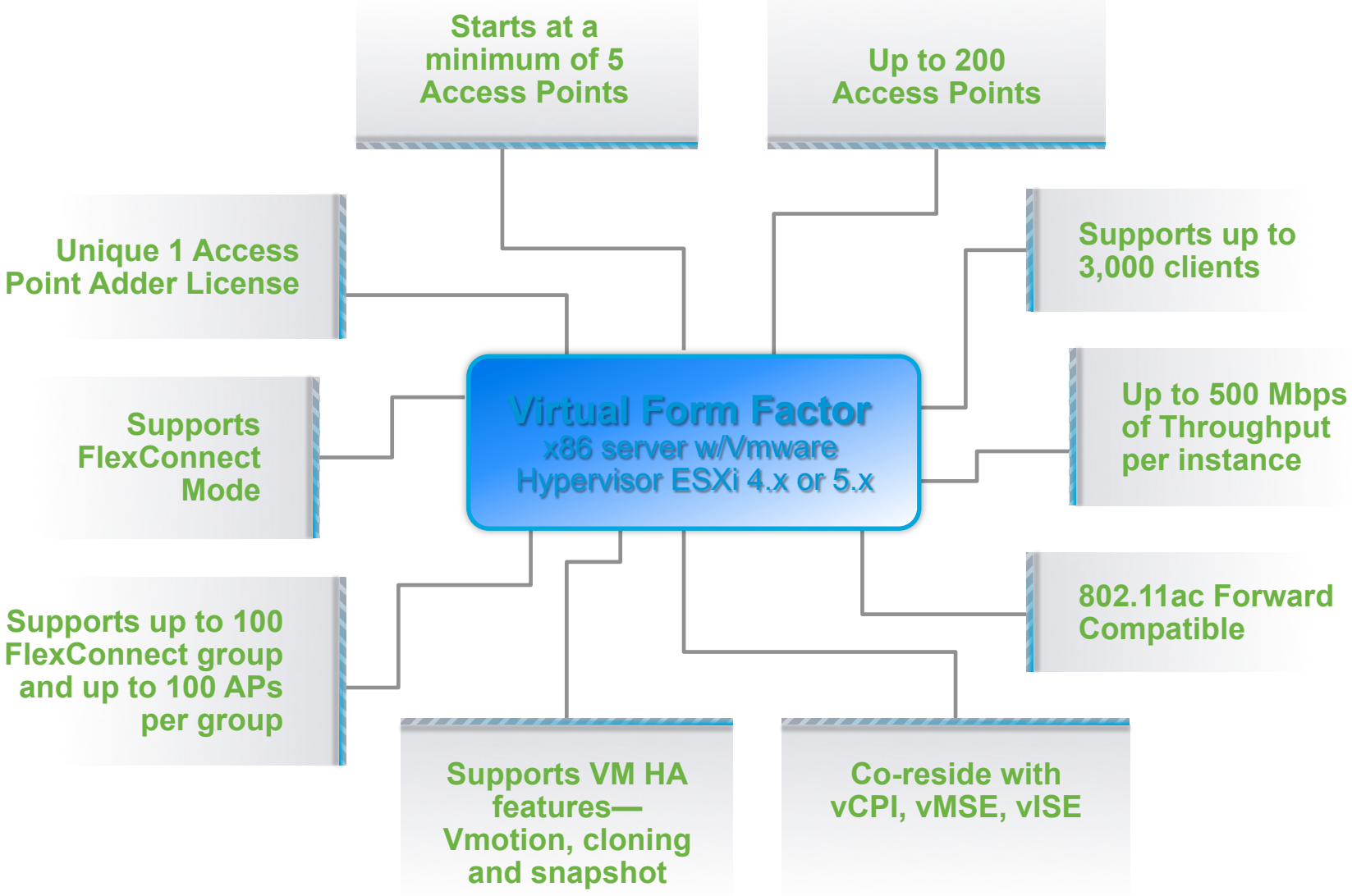
Supports FlexConnect, Mesh and Centralized Deployment Models

Sub-second AP Stateful Switchover

* Roadmap - Cisco Confidential—NDA Only

New with 7.3

Virtual Wireless Controller



Update coming in 7.4

2504 Wireless Controller

Supports Up to 75 Access Points*

Guest Anchor Controller capable*

Supports up to 1,000 clients*

802.11ac Forward Compatible

Up to 1 Gbps of Wireless Throughput*

Supports FlexConnect, Mesh and Centralized Deployment Models

Application Visibility and control*

* Roadmap - Cisco Confidential—NDA Only

Virtual Wireless LAN Controller

7.3 release

Virtual Controller Support

- **Platform**: AIR-CTVM-K9
- **Hardware**: Cisco UCS, UCS Express, HP and IBM servers
  - Other HW in future releases.
- **Vmware OS**: ESX/ESXi 4.x/5.x
- **FlexConnect Mode**: central and local switching
  - Local mode APs will join but not associate clients.
  - Autoconvert to FlexConnect is supported.
- **No data DTLS**: DTLS in software path for control traffic only
- **Throughput**: 500 – 750M
- **High Availability:** not supported
- **Licensing**: Node locked licenses

Virtual WLC Scale and Performance

7.3 Release Limit

Max # of APs	**200**
Max # of Clients	**3000**
Max # of FlexConnect Groups	**100**
Max # of APs per FlexConnect Group	**100**
Max # of Rogue APs	**800**
Max # of Rogue Clients	**1500**
Max # of RFID Tags	**3000**
Max APs per RRM Group	**400**
Max AP Group	**200**

ESX Server

Manufacturer	IBM
Model	System x3550 M3
CPU Cores	8 CPUs x 2.4 GHz
Processor Type	Intel ® Xeon® CPU E5620 @ 2.40GHz

Minimum vWLC Recommendation

Minimum Number of vCPUs	**1**
Minimum Memory	**3 GB**
Required Storage	**8 GB**
Min number of VMNICs	**2**

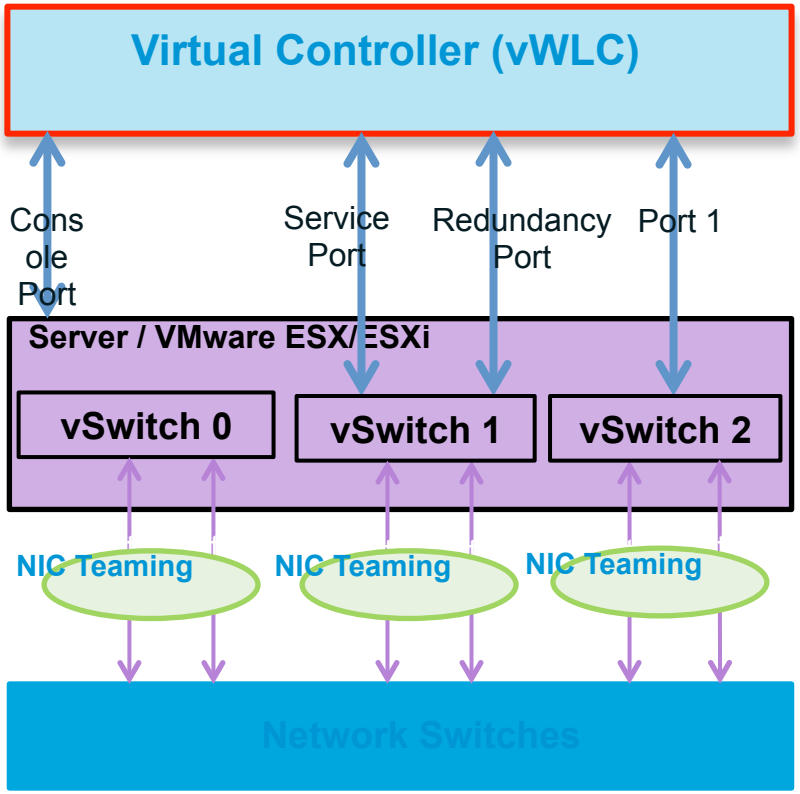
Virtual Controller VMware Features

Feature	Supported	Comments
Snap shot	Yes	Alternative backup, revert as needed
Cloning	Yes	• vWLC is restored • Identified illegal move • ***License clears and UDI changes*** • ***New license needs to be installed***
vMotion	Yes	• Seamless legal move • vWLC restored License • UDI remains same
Fault Tolerance	No	Vmware Tools not available internally
High Availability	No	Vmware Tools not available internally
DRS	No	Dynamic vMotion to be tested
NIC teaming fallback	Yes	Primary port goes down, backup port comes up…
NIC load balancing	No	To be tested

Virtual Controller Limitation in 7.3

- **Data DTLS** - No hardware virtualization, no co-processor present as in other platform.
- **OEAP** – no Data DTLS
- **Rate Limiting** – currently only on Cavium; additional code requirement for generic forwarding path.
- **Internal DHCP server** - Scale issues.
- **Mobility/Guest Anchor** – no support on UCS based platform.
- **Multicast-Unicast mode** – no support on UCS based platform.
- **Outdoor Mesh APs** - currently not supported.

Virtual Controller – Block Diagram

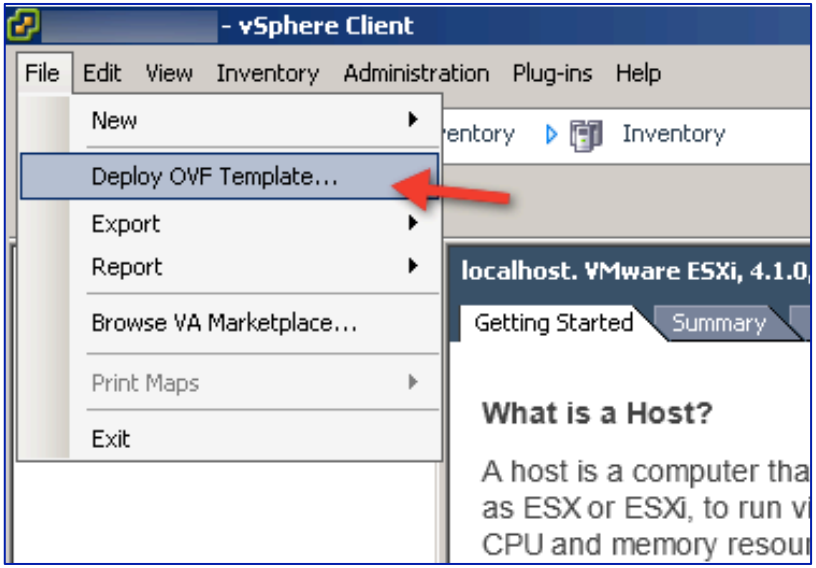


- 3 virtual switches
  - vSwitch 0: Service console, vMotion
  - vSwitch 1: vWLC Service Port
  - vSwitch 2: vWLC Data port
- LAG is not required with VMs
  - NIC teaming provides equivalent functionality

Deploying vWLC on VMware

There will be two types of vWLC images available for customer use:

- OVA image which is needed only for first time installation.
- .AES image which can be subsequently used for upgrading/ downgrading



vWLC – Certificate Considerations

- The virtual controller uses Self Signed Certificates (SSC) as against the Manufacturing Installed Certificates (MIC) in the traditional controller.
- Typically, APs can join a traditional controller, download the hash keys and then can join a virtual controller.
- If AP is joined to a traditional controller, hash validation can be turned off and it can join any virtual controller.
- AP should be able to validate the SSC certificate provided by virtual controller.
- The hash key can be configured in the controller mobility configurations, which gets pushed to all the APs which are joined.
- AP will save this configuration until it successfully associate to another controller, after which it inherits the hash key configuration from the new controller.

8510

Cisco 8510 series Controller

Optimized for high scale deployments

* *Unique 8500 features*

Orderable Aug 2012

Access Points	300-6,000
Clients	64,000
Branches/locations	6,000 (2000 groups)
Access Points per FlexConnect group	100
Deployment Model	Local, FlexConnect and mesh
Form Factor	1 RU
IO Interface and redundancy	Dual redundant 10GE ports*
Power options	AC and DC*
Power redundancy	Dual redundant power supplies installed*

- High scale for SP deployments
  - 4K vlans*
  - 6000 local mode APs and 64,000 clients in 1RU*
- Rich Features with deployment flexibility (7.3 release)
  - High Availability with Sub-second Stateful Switchover of Aps to standby in case of primary WLC outage.
  - Outdoor AP support
  - FlexConnect, Local mode and mesh support*
  - Right to use (with EULA) for ease of license enablement*
  - 3G Packet core integration: PMIPv6 MAG solution with ASR5K (LMA)
  - FlexConnect with HS2.0 for 3G offload
  - Other key features:

    802.11r fast roaming,

    Rate limit traffic flows,

    Video Stream for rich media flows

Features Not Supported in WLC 8500:

- LAG support for 2 x 10G port redundancy (Kommer i 7.4)
- Guest anchor controller (Kommer i 7.4)
- TrustSec SXP
- Local auth (WLC acting as authenticator)
- Internal DHCP server
- Wired guest

WLC 8500 and other high scale controllers

	8500	7500	5500	WiSM2
Deployment type	Enterprise Large campus and SP Wi-Fi	Cloud controller for large number of distributed, lean/ controller-less branches	Enterprise Campus and full service branch	Enterprise Campus with Catalyst 6k
Operational Modes	Local mode, FlexConnect, Mesh	FlexConnect only	Local mode, FlexConnect, Mesh	Local mode, FlexConnect, Mesh
Maximum Scale	6,000 Aps 64,000 clients	6,000 Aps 64,000 clients	500APs 7000 clients	1,000APs 15000 clients
AP count range	300 – 6K AP	300 – 6K AP	12 – 500 AP	100 – 1000 AP
Connectivity	Dual redundant 10G ports	Dual redundant 10G ports	8x1G ports	Catalyst 6500 switch ports
Throughput (DTLS)	10Gbps (5Gbps)	1Gbps – FlexConnect Central switched	7Gbps (5Gbps)	16Gbps (9Gbps)
Licensing	Right to Use (with EULA)	Right to Use (with EULA)	CISL based (unchanged)	CISL based (unchanged)
Power	AC and DC – dual redundant	AC dual redundant	AC (redundant PSU option)	AC (redundant PSU option)

Right-to-use on Flex7500 and 8500

Right-to-use or honor-based licenses means they are not node locked to UDI:

- Customers accepts ‘End User Licensing Agreement’ to enable licenses
- Customer manages their own licenses with the help of NCS(or Controller CLI)
- Support business agility (expand/RMA) at large enterprise and SP environments

Controller Name	Controller IP	Feature	AP Unit	EULA Status	Type	Status
Controller-8500	172.19.29.119	Base-AP-Count	1000	Accepted	Permanent	In Use
Controller-8500	172.19.29.119	Adder	100	Accepted	Eval(90 days)	Not in Use
Controller-8500	172.19.29.119	Adder	100	Not Activated	Permanent	Not in Use
Controller-8500	172.19.29.119	DTLS		Accepted	Permanent	Active

Flex 7500 Scale Update

Flex 7500 Scale Update (7.2 vs. 7.3)

Scalability	7.2	7.3
Total APs	3000	6000
Total Clients	30,000	64,000
Total FlexConnect Group	1000	2000
Maximum APs per FlexConnect Group	50	100
Total Rogue AP	12000	24000
Total Rogue Client	15000	32000
Number of Vlan Support	512	4095
Number of RFID	20000	50000
Maximum APs per RRM Group	6000	12000

Feature update

Feature update

- Der er afholdt en 7.3 CVU, som gennemgik mange af de features der kom I 7.3
- Denne update kigger lidt længere frem ☺

Controller HA

High Availability in Current Architecture (Recap)

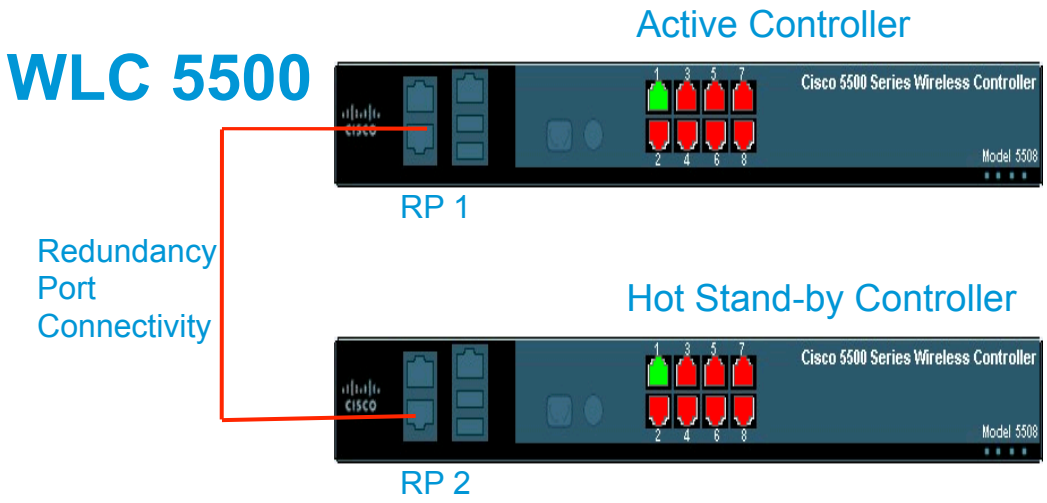
- Primary/Secondary/Tertiary WLC need to be defined on each AP
- Primary and Secondary Backup configuration with Fast Heart Beat
- Each WLC configured separately and have their own unique IP Address
- With Failover detection AP goes in Discovery State and Capwap State Machine is restarted
- Downtime between Failover may go up to 1.5 minutes depending upon number of APs
- All WLCs need to be in same mobility domain for Primary / Secondary / Tertiary concept to work
- Each WLC is managed and monitored separately by NCS

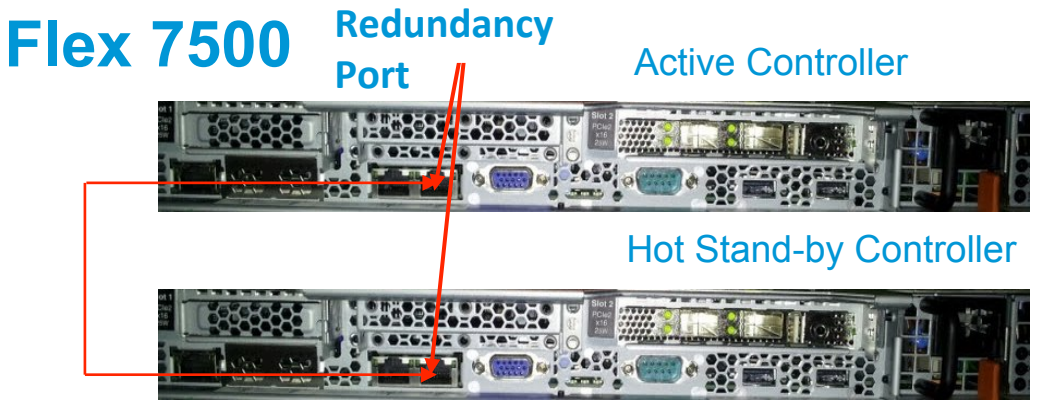
True High Availability in 7.3 release

- Box to Box High Availability i.e. 1:1
- One WLC in Active state and Second WLC in Hot Standby State monitors the health of Active WLC via Redundant Port
- Configuration on Active is synched to Standby WLC via Redundant Port
- Both the WLC shares the same set of configuration including the IP Address of management interface.
- APs Capwap State (Only APs which are in RUN state) also synched. APs does not go in Discovery state when Active WLC fails
- Downtime between failover reduced to 5 - 996 msec in case of Box failover and up to 3 seconds in case of Network Issues
- Supported on 5500 / 7500 / 8500 and WiSM-2 WLC

HA Connectivity on 5500 / 7500 / 8500 WLC

- 5500/7500/8500 WLC have dedicated Redundancy Port which is used to synch configuration from Active to Standby WLC
- Keepalives are sent on RP port from Standby to Active WLC every 100 msec (default timer) to check the health of Active WLC.
- ICMP packets are also sent every one second from each WLC to check reachability to gateway using Redundant Management interface.





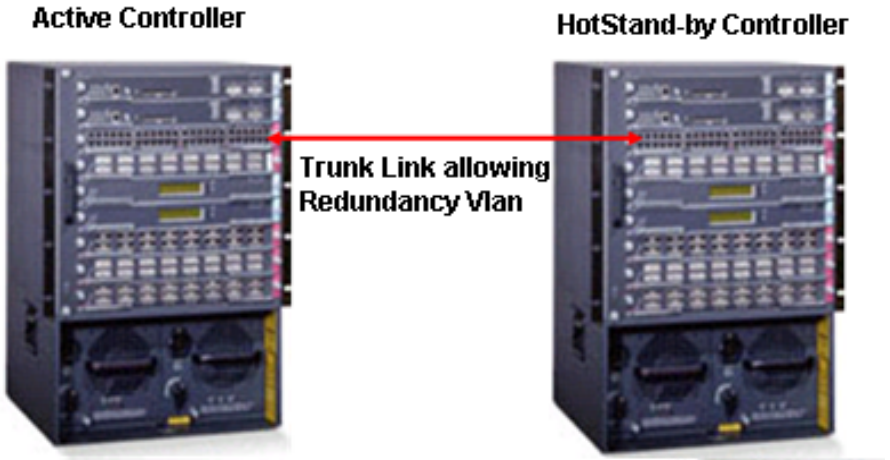
High Availability Connectivity on WiSM-2 WLC

- WiSM-2 WLC have dedicated **Redundancy Vlan** which is used to synch configuration from Active to Standby WLC
- Keepalives are sent on Redundancy Vlan from Standby to Active WLC every 100 msec (default timer) to check the health of Active WLC.
- To achieve HA between WiSM-2 WLCs it can be deployed in single chassis OR can also be deployed between multiple chassis using VSS as well as by extending Redundancy Vlan between two chassis.

WISM2 configuration on Cat6k

wism service-vlan 192 (service port Vlan)
wism redundancy-vlan 169(redundancy port Vlan)
wism module 6 controller 1 allowed-vlan 24-38(data vlan)

Multi Chassis Connectivity

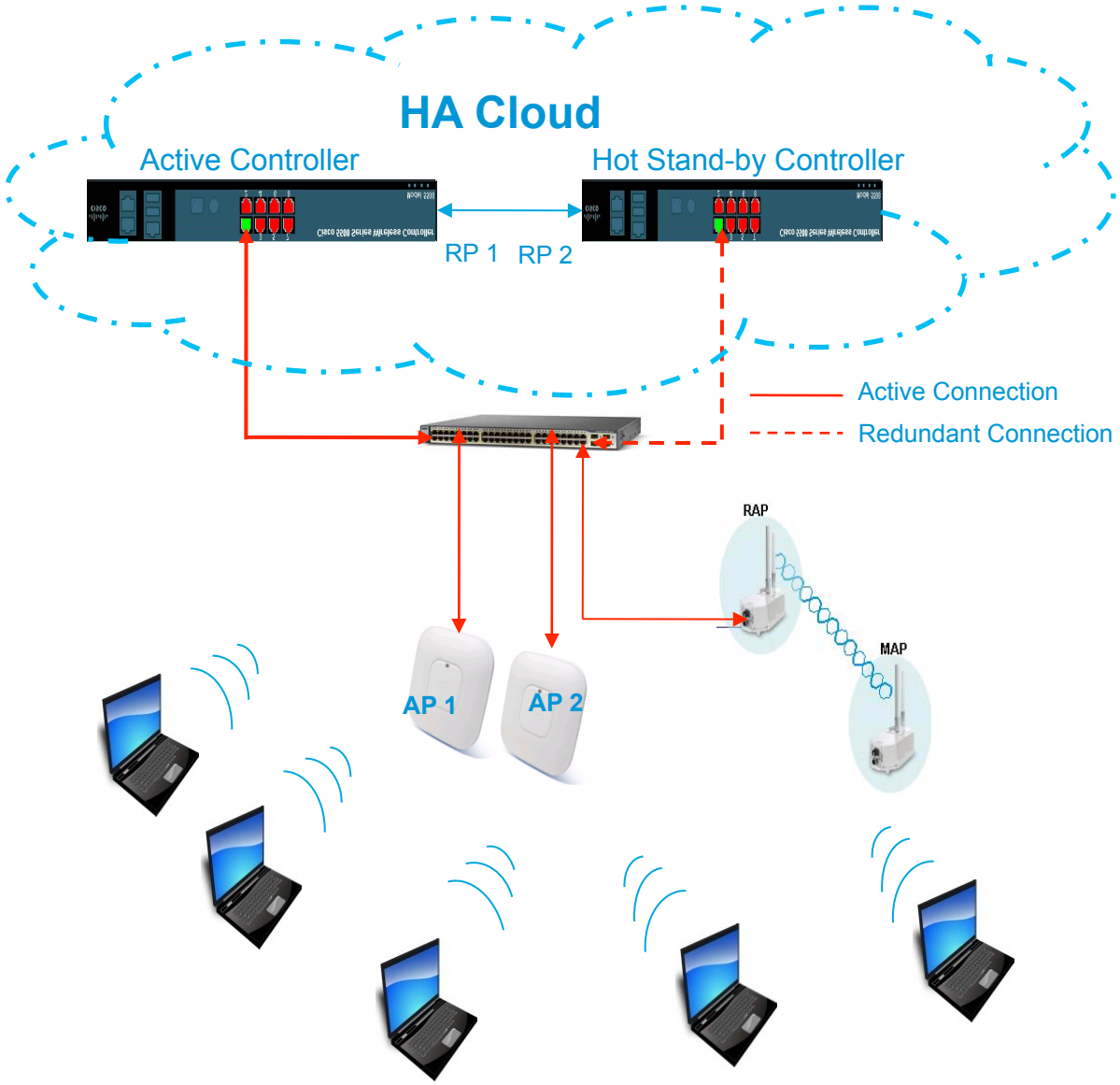


Single Chassis HA Setup

Slot 8: Active WiSM-2
Slot 9: Hot Stand-By WiSM-2

Failover Process

- Standby WLC keep sending keepalive messages on Redundant Port every 100 msec to check the state of Active WLC
- If Active does not acknowledge keepalive message, Standby WLC will immediately send ICMP packet to Active's Redundant Management Interface to check the status via infra network.
- Standby WLC retransmit Keepalive message on Redundant Port after 75 msec. If keepalive is not acknowledged ICMP packet is sent again via Redundant Management interface.
- This process is repeated 3rd time and this time keepalive is sent after 50 msec followed by ICMP packet on infra network if 3rd keepalive packet is also not acknowledged.
- After failure of 3rd Keepalive and ICMP packet **"Switchover"** will trigger and Standby WLC will take over the network serving as Active WLC.
- Anytime in the middle if there is response for ICMP packet, Switchover will not happen.



Network Issues

Sr No	RP Port Status	Peer Reachable via Redundant Management	Gateway Reachable from Active	Gateway Reachable from Standby	Switchover	Results
1	UP	Yes	Yes	Yes	No	No Action
2	UP	Yes	Yes	No	No	Standby will reboot and check for gateway reachibility. If still not reachable will go in maintenance mode.
3	UP	Yes	No	Yes	Yes	Switchover Happens
4	UP	Yes	No	No	No	No Action
5	UP	No	Yes	Yes	No	No Action
6	UP	No	Yes	No	No	Standby will reboot and check for gateway reachibility. If still not reachable will go in maintenance mode.
7	UP	No	No	Yes	Yes	Switchover Happens
8	UP	No	No	No	No	Standby will reboot and check for gateway reachibility. If still not reachable will go in maintenance mode.
9	Down	Yes	Yes	Yes	No	Standby will reboot and check for gateway reachibility. If still not reachable will go in maintenance mode.
10	Down	Yes	Yes	No	No	Standby will reboot and check for gateway reachibility. If still not reachable will go in maintenance mode.
11	Down	Yes	No	Yes	No	Standby will reboot and check for gateway reachibility. If still not reachable will go in maintenance mode.
12	Down	Yes	No	No	No	Standby will reboot and check for gateway reachibility. If still not reachable will go in maintenance mode.
13	Down	No	Yes	Yes	Yes	Switchover Happens and this may result in Network Conflict
14	Down	No	Yes	No	No	Standby will reboot and check for gateway reachibility. If still not reachable will go in maintenance mode.
15	Down	No	No	Yes	Yes	Switchover Happens
16	Down	No	No	No	No	Standby will reboot and check for gateway reachibility. If still not reachable will go in maintenance mode.

System Issue

	Trigger	RP Port Status	Peer Reachable via Redundant Managemnt		Switchover	Result
17	CP Crash	Yes	No		Yes	Switchover Happens
18	DP Crash	Yes	No		Yes	Switchover Happens
19	System Hang	Yes	No		Yes	Switchover Happens
20	Manual Reset	Yes	No		Yes	Switchover Happens
21	Force Switchover	Yes	No		Yes	Switchover Happens
22	CP Crash	No	Yes		Yes	Switchover Happens
23	DP Crash	No	Yes		Yes	Switchover Happens
24	System Hang	No	Yes		Yes	Switchover Happens
25	Manual Reset	No	Yes		Yes	Switchover Happens
26	Force Switchover	No	Yes		Yes	Switchover Happens
27	CP Crash	No	No		Yes	As Updated in Network Issue section
28	DP Crash	No	No		Yes	As Updated in Network Issue section
29	System Hang	No	No		Yes	As Updated in Network Issue section
30	Manual Reset	No	No		Yes	As Updated in Network Issue section
31	Force Switchover	No	No		Yes	As Updated in Network Issue section

High Availability Setup Guidelines

- Direct Connection between Active and Standby Redundant Port for 5500 / 7500 / 8500 series of WLCs.
- WiSM-2 WLCs should be in same 6500 chassis OR can be installed in multiple chassis using VSS setup OR by extending redundancy vlan.
- Physical connection between Redundant Port and Infrastructure Network should be done first before HA configuration
- Keepalive and Peer Discovery timers should be left with default timer values for better performance
- Clear configuration on Active WLC will also initiate clear config on Standby WLC.
- Internal DHCP is not supported when HA configuration is enabled.

Licensing for HA Pair

- HA Pair with HA SKU License on one WLC
  - HA SKU is a new SKU with Zero AP Count License
  - The device with HA SKU becomes standby first time it pairs up
  - AP-count license info will be pushed from Active to Standby
  - On event of Active failure HA SKU will let APs join with AP-count obtained and will start 90-day count-down. The granularity of the same is in days.
  - After 90-days, it starts nagging messages .Won't disconnect connected APs
  - With new WLC coming up HA SKU at the time of paring with get the AP Count
    - If new WLC has higher AP count than previous, 90 days counter is reset.
    - If new WLC has lower AP count than previous, 90 days counter is not reset.
    - After switchover to lower AP count WLC offset timer will continue and nagging messages will be displayed after time expiry.
  - Elapsed time and AP-count should be remembered on reboot
  - Factory default HA-SKU controller should not allow any APs to join

Licensing for HA Pair Cont…

- HA Pair with both the WLC having Valid AP Count License
  - Active / Standby WLC decided based on configuration.
  - AP-count license info will be pushed from Active to Standby
  - In the event of a switch over, the new Active will operate with the license count of the previous Active and will start 90-day count-down.
  - Rest of the behavior is same as defined for HA SKU

- HA Pair with one WLC running Evaluation License and other WLC with HA SKU
  - The device with HA SKU becomes standby first time it pairs up with an existing Active WLC running Evaluation License
  - During HA-role negotiation, remaining time of the evaluation license is synced from Active WLC to Standby WLC running HA SKU
  - In case of a switch over to HA SKU, the HA SKU starts a timer with a value which is lower of the “remaining evaluation license time” or “90 days”.
  - Rest of the behavior is same as defined for HA SKU

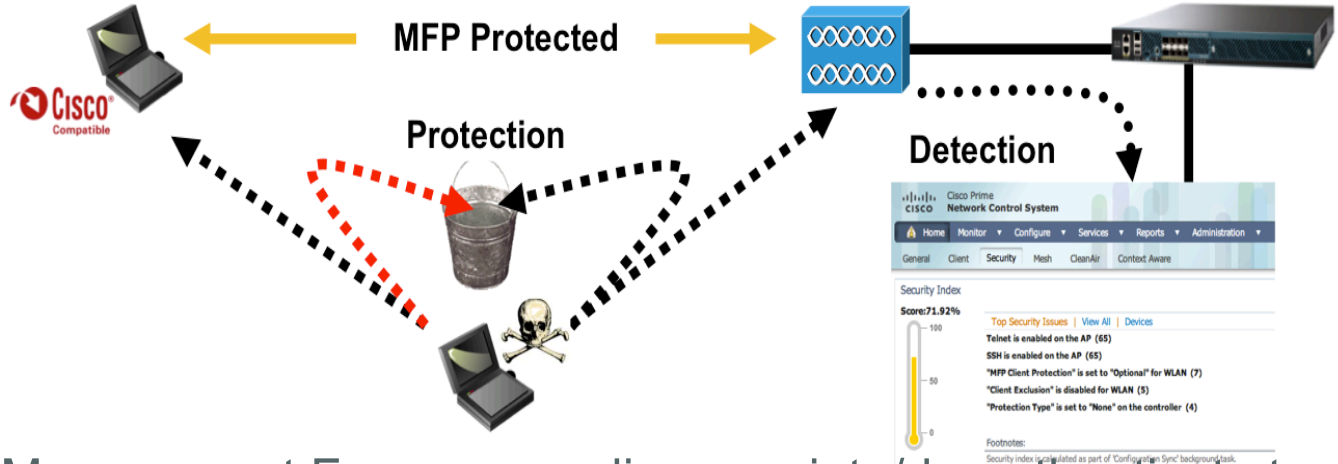
Pricing Considerations for standby WLC

Model	Standby Controller Price-point
5508	$20K
WiSM2	$25K
Flex7500	$40K
8500	$60K
2500	(7.4 release) $2K

- Standby Controller can scale to full capacity(AP count) of the model!
- No standby SKU on SRE and Virtual Controllers
- Supports 1:1 mode L2 Adjacent/Physically connected with Ethernet cable ONLY in 7.3
- CLI to convert deployed controllers to standby mode (5508-50 onwards).
- Not possible to transfer the base licenses off the standby Controller.

802.11w og Windows 8

802.11w: IEEE Standard for MFP
Protected Management Frames



- Management Frames e.g. dis-associate/de-authenticate transmitted in the open
- Vulnerable to man-in-the-middle or DOS attacks
- Cisco Innovation MFP supported in autonomous release 12.3(8)JA starting 2006 and Unified starting 2008 in version 4.0.155.5 avoids these issues by adding integrity into the management frames
- Due to differences between Cisco's implementation and 11w we had a bug CSCua29504: addressed in 7.3.101.0, 7.2.111.3, 7.0.235.3

ENSURE THAT YOUR CONTROLLER IS UPGRADED

Problemer med Windows 8

Cisco Blog > Mobility

Get your Wi-Fi network ready for Windows 8

October 12, 2012 at 5:00 am PST

Jeevan Patil

4 Tweet 50 Like 10

Microsoft will launch Windows 8 in late October. Along with a slew of other features, it will be among the first to support the 802.11w standard to protect Management Frames for client devices on Wi-Fi networks.

Customers running old Cisco unified releases (between 4.2 to 7.2) in local, Flex or mesh mode will run into an interoperability bug (CSCua29504, to be exact) that prevents 802.11w enabled clients from connecting to a Cisco WLAN with Management Frame Protection (MFP) enabled. This bug does not affect customers running autonomous access point deployments or customers running Cisco unified releases older than 4.2.

What are the possible solutions for you?

1. Please upgrade your production environment to one of the following releases, which will interoperate with Windows 8.

- 7.3.101.0
- 7.2.111.3
- 7.0.235.3

Problemer med Windows 8

http://blogs.cisco.com/wireless/get-your-wi-fi-network-ready-for-windows-8/

http://support.microsoft.com/kb/2749073

Thank you.