



# Aironet 802.11ac Wave 2 APs Mobility Express

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# Moving Towards a Mobile First World

Why 802.11ac (aka Gigabit WiFi)



SUPPORT GROWING NUMBER  
OF MOBILE APPLICATIONS

MORE BANDWIDTH - MORE  
APPLICATIONS

END-USER & IoT DEVICES ARE  
WIRELESS

IMPROVED CLIENT  
DENSITY SUPPORT

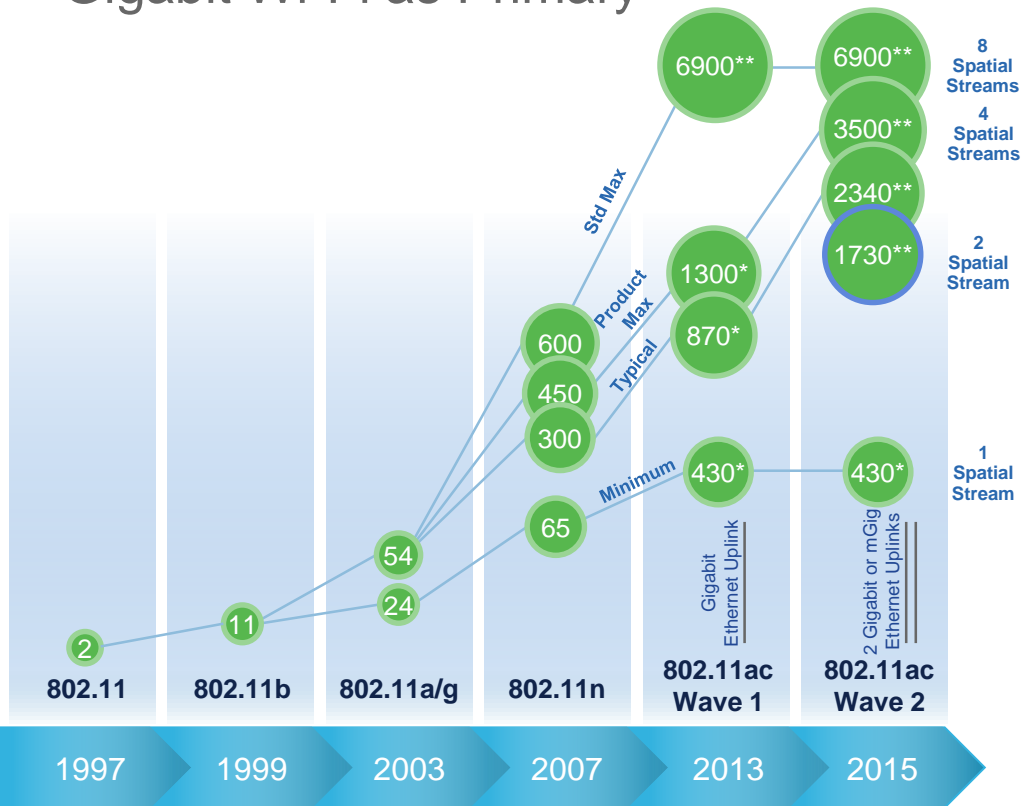
Wi-Fi HAS TO EXTEND  
EVERYWHERE

INCREASED SCALE AND  
COVERAGE

Need for control, monitoring and advanced features

# Wi-Fi Speed

## Gigabit Wi-Fi as Primary



4SS	Desktops
3SS	Desktops/Laptops
2SS	Laptops/Tablets
1SS	Tablets/Smartphones

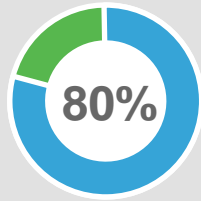
● = Connect Rates (Mbps)

SS = Spatial Streams

\*Assuming 80-MHz channel is available and suitable

\*\*Assuming 160-MHz channel is available and suitable

# How 802.11ac Wave 2 Works



speed boost compared to Wave 1, thanks to:



Multiuser MIMO  
(MU-MIMO)



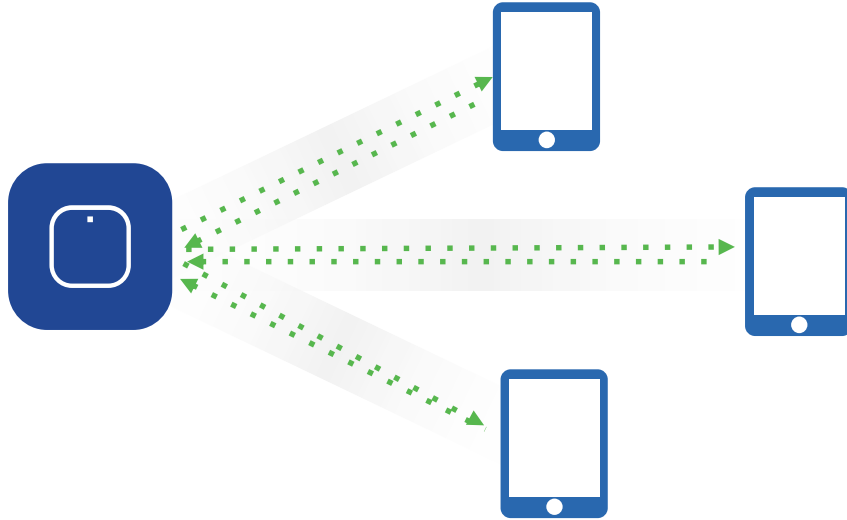
Wider RF Channels



Four Spatial Streams

# How 802.11ac Wave 2 Works

## Multiuser MIMO (MU-MIMO)



Clients get on and off the network quicker, allowing more clients to be served.



# Cisco Aironet Indoor Access Points Portfolio

Industry's Best 802.11ac Series Access Points



VALUE  
**1830**



- 802.11ac W2
- 870 Mbps PHY
- 3x3:2SS
- Spectrum Analysis\*
- Tx Beam Forming
- USB 2.0
- Mobility Express

VALUE  
**1850**



- 802.11ac W2
- 1.7 Gbps PHY
- 4x4:4SS
- Spectrum Analysis\*
- Tx Beam Forming
- 2 GE Ports, USB 2.0
- Mobility Express

PERFORMANCE  
**2700**



- 802.11ac W1
- 1.3 Gbps PHY
- 3x4:3 SS
- HDX: High Density Experience
- Cisco CleanAir 80 MHz
- Cisco ClientLink 3.0
- 2 GE Ports

PREMIUM  
**3700**



- 802.11ac W1, 1.3 Gbps PHY
- 4x4:3 SS
- HDX: High Density Experience
- Cisco CleanAir 80 MHz
- Cisco ClientLink 3.0
- Cisco StadiumVision® Solution
- Modularity: Security, 3G Small Cell or Wave 2 802.11ac

ENTRY LEVEL

MAINLINE

BEST IN CLASS

\* Planning



# 1850 Series with 802.11ac Wave 2 MU-MIMO



- Next-generation 4x4 MIMO:4 spatial streams (SS) **Wave 2** 802.11ac access points
- Dual radio, 802.11ac Wave 2, 80 MHz
- 5 GHz: 4x4 supporting
  - 3 SS MU-MIMO
  - 4 SS SU-MIMO
  - 1.7 Gbps Max 5-GHz PHY
  - 2.0 Gbps Max Aggregate PHY
- 2 x Gigabit Ethernet and USB 2.0
- Internal and external antenna models

**Cisco Aironet® 1850 Series**



Gigabit Wi-Fi has fully arrived.



# 1830 Series with 802.11ac Wave 2 MU-MIMO



- Next-generation 3x3 MIMO:2 spatial streams (SS) **Wave 2** 802.11ac access points
- Dual radio, 802.11ac Wave 2, 80 MHz
- 5 GHz: 3x3 supporting
  - 2 SS SU/MU-MIMO
  - 870 Mbps Max 5-GHz PHY
  - 1 Gbps Max Aggregate PHY
- 1 x Gigabit Ethernet and USB 2.0
- Internal antenna model

Cisco Aironet® 1830 Series



802.11ac Wave 2 MU-MIMO



# Cisco Aironet 802.11ac Access Point Comparison

Indoor Access Points	Enterprise			
	AP1830	AP1850	AP2700	AP3700
Max PHY Data Rate (5GHz)	870 Mbps	1.7 Gbps	1.3 Gbps	1.3 Gbps
RF Design (MU-MIMO)	3x3:2, Dual SU-MIMO W2 3x3:2 Dual MU-MIMO W2	4x4:4, SU-MIMO W2 4x4:3, MU-MIMO W2	3x4:3, Dual SU-MIMO W1	4x4:3, Dual SU-MIMO W1
Performance/Coverage/ Investment Protection	◆◆	◆◆◆	◆◆◆	◆◆◆◆
Max No. of Clients per AP	400	400	400	400
RRM	✓	✓	✓	✓
High Density Experience			✓	✓
Cisco CleanAir® Technology	Spectrum Analysis*	Spectrum Analysis*	✓	✓
Beam Forming	Tx BF	Tx BF	Cisco ClientLink 3.0	Cisco ClientLink 3.0
BandSelect	✓	✓	✓	✓
VideoStream	✓	✓	✓	✓
Rogue AP Detection	✓	✓	✓	✓
Adaptive wIPS	✓	✓	✓	✓
External Antenna Option		✓	✓	✓
Ethernet Ports	1 x GE	2 x GE	2 x GE	1 x GE
LAG Support	n/a	✓	n/a	n/a
USB	2.0	2.0		
Module Options				Security, 3G Small Cell, High-Accuracy Location



IEEE 802.11ac Wave 2 Access Points  
Comparative Performance

Cisco Aironet 1852i

Aruba AP-325

Ruckus R710



DR151120C  
December 2015

Miercom  
[www.miercom.com](http://www.miercom.com)

<http://blogs.cisco.com/wireless/miercom-report-out-in-front-with-wave-2>

<http://miercom.com/pdf/reports/20151120.pdf>

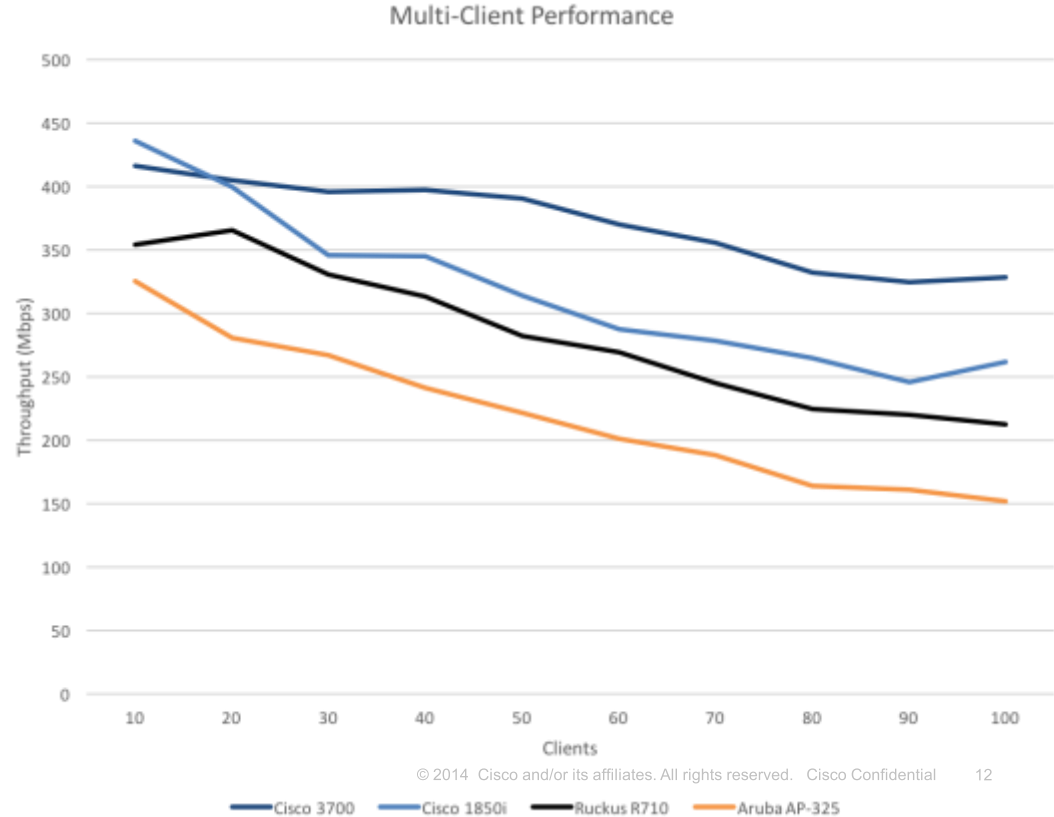
# Test 1: 100 Client Test

- We setup a mixture of 100 clients representative of the real world
  - 10x MacBook Pro 11n
  - 10x iPad Air 11n
  - 10x Dell E6430 w/ Broadcom 43460 11ac
  - 20x MacBook Pro 11ac
  - 20x MacBook Air 11ac
  - 30x Dell 6430 w/ Intel 7260 11ac
- 70/30 Mix between 5 GHz and 2.4 GHz
- Clients were spread around the AP from 10' (3m) to 45' (13.7m)



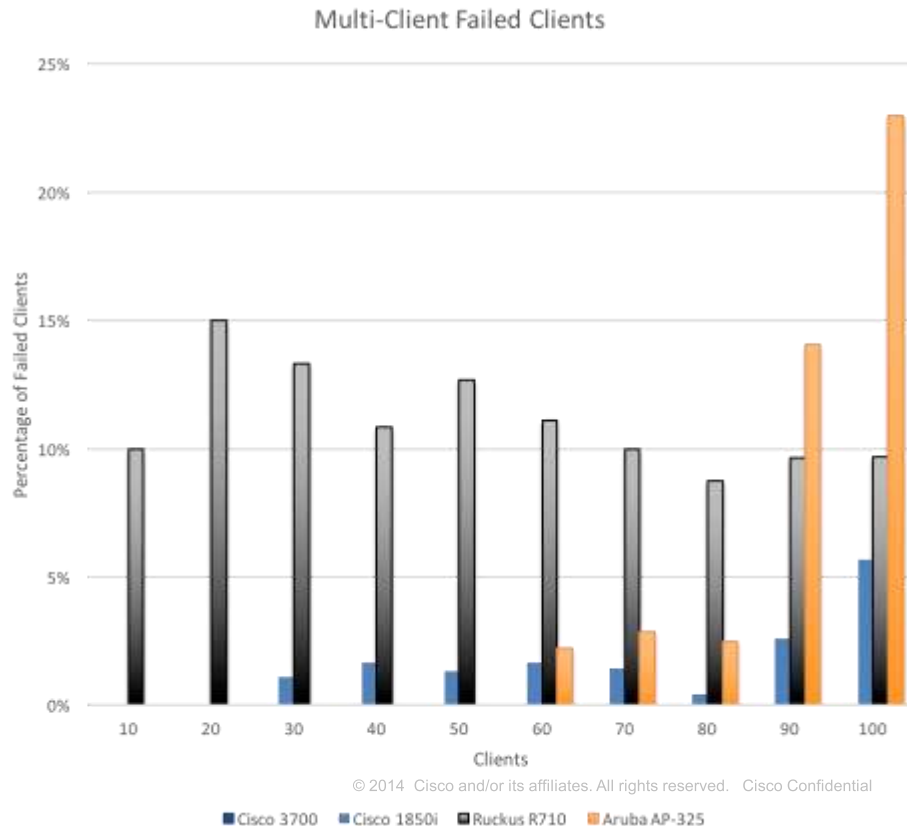
# Test 1: 100 Client Test - Results

- AP3700 w/ HDX still the undisputed champion of high density
- AP3700
  - 1.8x avg. advantage over Aruba AP-325
  - 1.3x avg. advantage over Ruckus R710
- AP1850
  - 1.5x avg. advantage over Aruba AP-325
  - 10% avg. advantage over Ruckus R710



# Test 1: 100 Client Test – Failed Clients

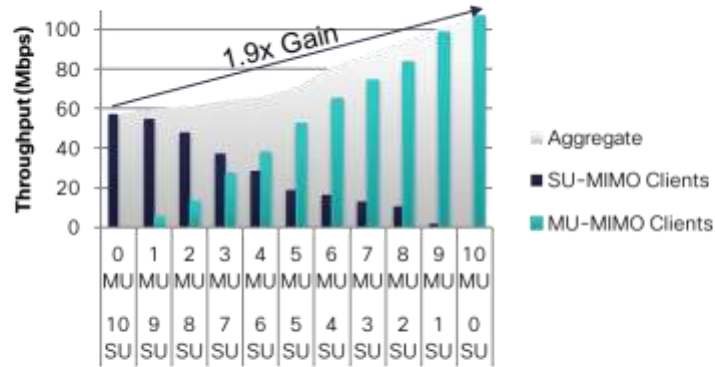
- AP3700 has no failed clients
- Average failure rates:
  - Cisco 3700 – 0%
  - Cisco 1850 – 2%
  - Aruba AP-325 – 4%
  - Ruckus R710 – 11%



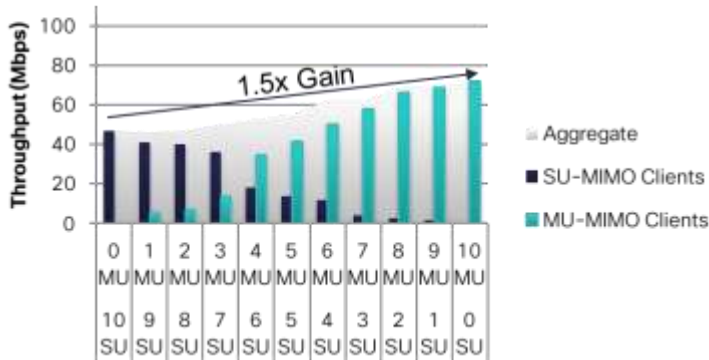
# Test 2a: The Multi-User MIMO Gain

- SU-MIMO Clients
  - 10x iPhone 6 (1ss)
- MU-MIMO
  - 10x Acer Aspire E15 (1ss)
- 20 MHz Channel
- TCP Traffic

**Cisco 1850: Multi User MIMO Gain**



**Ruckus R710: Multi User MIMO Gain**

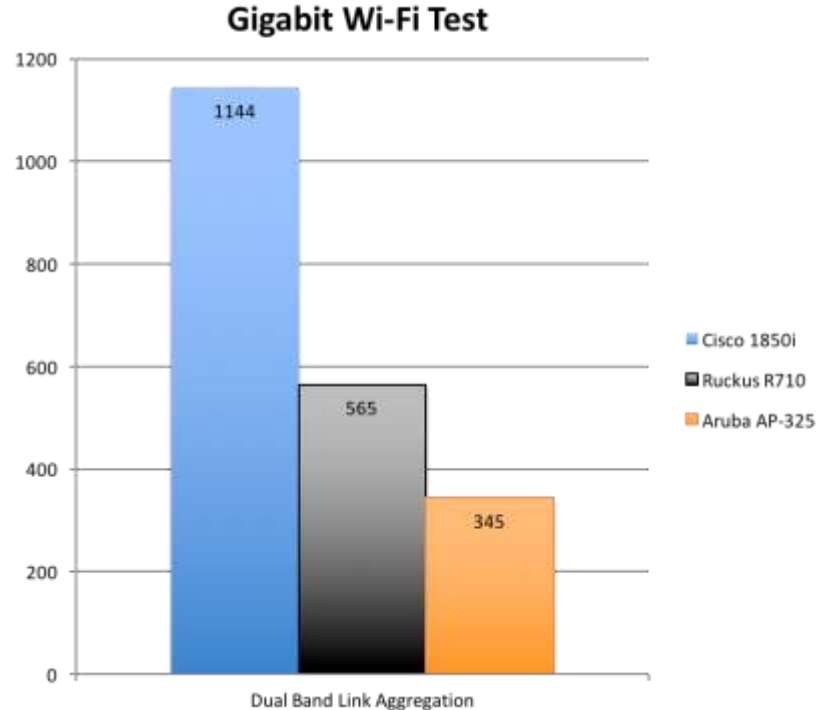


**Aruba AP-325: Multi User MIMO Gain**



# Test 3: Exceeding a Single Gigabit Uplink

- Can these APs make good on the promise of “Gigabit Wi-Fi”?
- Link aggregation using both GbE uplinks
- One client connected to each radio
  - 4x4 Linksys EA8500 connected to 5 GHz
  - 3x3 MacBook Pro connected to 2.4 GHz
- TCP Down (both radios)



# Mobility Express



# Simple by Design: Mobility Express

Optimized for Small Scale Wi-Fi implementations



Simple 3-step over-the-air  
setup

1



Simple clustered  
management

2



Cisco® Aironet® 1830 and  
1850 Series  
802.11ac Wave 2

3

# Mobility Express: Use Cases and Details



Sites with 500 clients or less where IT has limited span of control or reach



Autonomous Mode implementations looking to refresh 802.11abgn to 802.11ac wave 2



Companies or Sites looking to implement overlay / segmented Guest Access



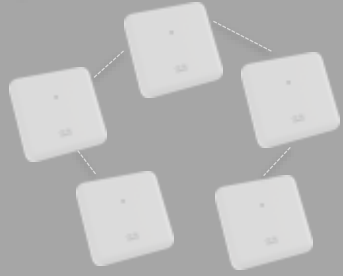
Companies or organization that need to quickly setup temporary Wi-Fi for events

Key Features	Details
Clients	500
Access Points	25
RF Management	Yes
Advanced Security	Yes
<a href="#">Cisco Best Practices</a>	Yes
Fast Secure Roaming	Yes
Rogue AP Detection	Yes
<a href="#">Application Visibility</a>	Yes
Guest Network / Firewall	Yes
<a href="#">Device profiling</a>	Yes
<a href="#">Mobile app</a>	Yes
High Availability	Yes
Local Radius Server	Yes
Interoperability	PI 3.0.1 CMX 10.2 (CMX Presence) ISE 1.4 (802.1x authentication)

# Unified Access: One Architecture, Multiple Deployment Options



Prime Infrastructure, Identity Service Engine, Connected Mobile Experiences



MOBILITY EXPRESS

## Small Network

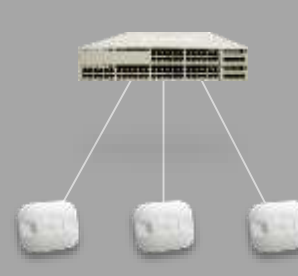
- Single site
- Low IT footprints
- SP hotspots
- Controller function on AP
  - 11ac: 1850/1830



FLEX CONNECT

## Branch

- Distributed network
- Highly scalable
- Best in class
- Controllers
  - New 8540 Controller
  - New 5520 Controller
  - or other Cisco Wireless Controllers



CONVERGED

## Small Campus / Branch

- Simplified Campus/Branch
- Consistent Wired/Wireless
- Common OS
- Controllers
  - Integrated 3650/3850/Sup 8E
  - 5760 Controller external MC



CENTRALIZED

## Large Campus

- Data center hosted controller
- Distributed enterprises
- Controllers
  - New 8540 Controller
  - New 5520 Controller
  - or other Cisco Wireless Controllers

## Aironet Access Points

- 11ac: 3700/2700/1700/1850/1830
- 11n: 3600/2600/1600/700i/700w

# What Access Points can be managed by the Mobility Express WLAN Controller function?

The Mobility Express solution can manage other Access Points series, such as AP1600, 1700, AP2700, AP3600, AP3700, and AP1570, but refer to the Mobility Express Release Notes for a full list of currently compatible access points.

# What are the licensing requirements for Mobility Express?

Mobility Express does not require any licenses for access points.

# What are the management options for Mobility Express?

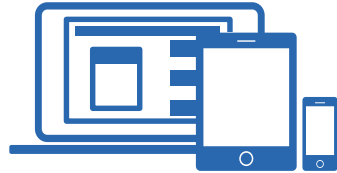
Mobility Express can be managed by:

- Web User Interface
- Cisco Wireless Mobile Application
- Prime Infrastructure with release 3.0.1 or newer
- Command Line Interface through console cable, SSH, or Telnet

# Mobility Express: Fast IT Deploy in Minutes



**Fast IT**



**Connect Via Any  
Wireless Device**



**Enable Multiple APs  
Simultaneously with  
Setup Wizard**



**Access Management  
Dashboard: Operate, Monitor  
and Troubleshoot**

# Mobility Express: Zero Compromise

## Large Enterprise Features optimized for Small Scale implementations



### Optimized Wi-Fi Environment

Streamline deployments with out of the box best practice configuration

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### Analytics Dashboard

Better decisions with Access Point, Client, and Application Visibility

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### Cisco Advanced Functionality

Cisco Large Enterprise DNA applied to enhance Small Scale implementations



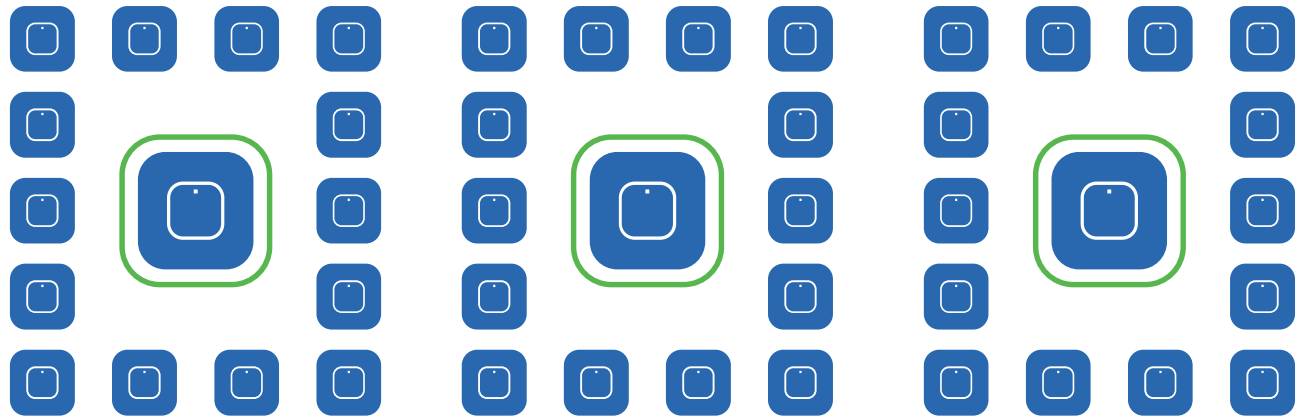


# Mobility Express: Investment Protection

Same Access Point hardware regardless of where the WLAN Controller function is located – Access Point, Appliance, Switch, Router, Virtual Machine, etc.



Investment  
Protection



 Management Point



Wireless  
Controller

Hardware Protection

Flexible Migration

Feature Protection

# Over-the-Air WLAN Express Setup

## Connecting to *CiscoAirProvision* and starting setup wizard

➤ Connect to *CiscoAirProvision* SSID



➤ Enter Password as *password*



➤ Connected to *CiscoAirProvision*; IP Address assigned



➤ Launch setup wizard at <http://192.168.1.1> & create admin account



# Over-the-Air WLAN Express Setup

## 3 Steps < 10 Minutes

1. Setup Your Controller

1 Set Up Your Controller

Name:

Country:

Date & Time:

Timezone:

ICF Server:

Management IP Address:

State or Area:

Default Domain:

2. Setup Wireless Networks

2 Setup Your Wireless Networks

Enterprise Network

Network Name:

Security:

Pass Phrase:

Guest Pass Phrase:

VLAN:

Guest Network

3. Enable RF Parameter Optimization

3 Advanced Settings

RF Parameter Optimization

Client Density:

Traffic Type:

Confirm Settings and reboot the controller

4 Confirm Settings and Reboot

These settings will be applied:

Name: **MobilityExpress**

Country: **United States (US)**

Date & Time: **10/06/2015 16:10:18**

Timezone: **Pacific Time (US and Canada)**

ICF Server: **171.68.30.25**

Management IP Address: **10.10.10.10**

State or Area: **200.218.210.0**

Default Domain: **10.10.10.0**

Enterprise Network

Network Name: **Employee-WebApp**

Security: **WPA2 Personal**

Pass Phrase:

Guest Pass Phrase:

VLAN: **Management VLAN**

Guest Network

RF Parameter Optimization

Client Density: **Typical**

Traffic Type: **Data and Voice**



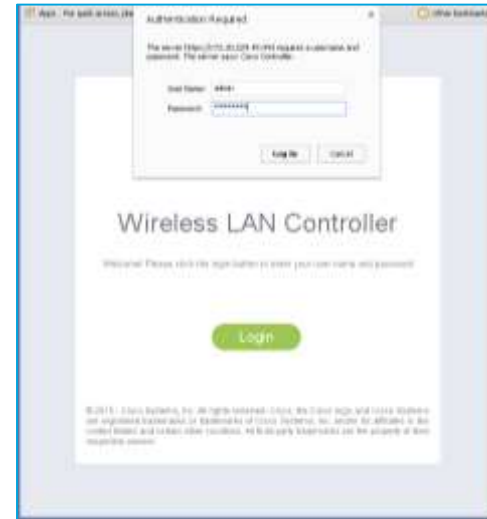
# Logging into Mobility Express



Access Mobility Express using the controller's management IP address-  
Example: [https://<controller\\_mgmt\\_ip\\_addr>](https://<controller_mgmt_ip_addr>)



Enter admin account username and password configured during the WLAN Express setup>



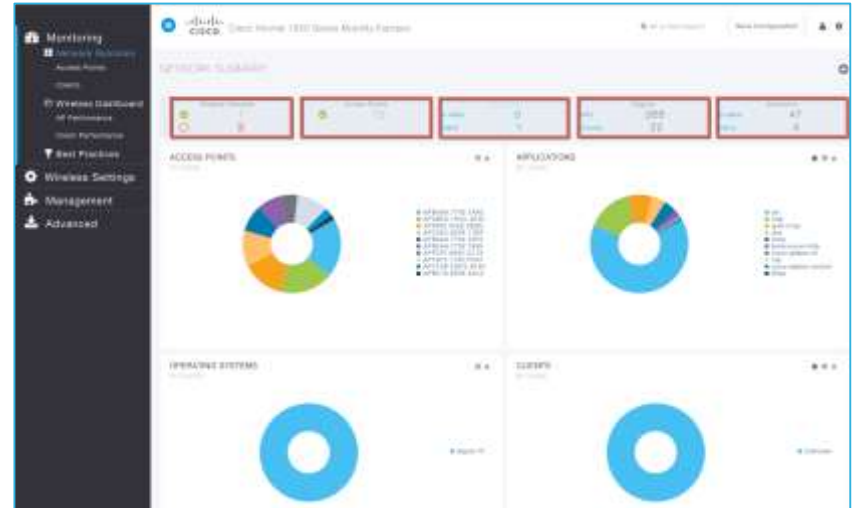
# Network Summary

Displays high level view of Wireless Network

Network Summary shows count of Wireless Networks, Access Points, Clients, Rogues and Interferers in 2.4 and 5.0 GHz band

Graphical and Tabular representation of APs, OS, Clients, Application Visibility and Top WLANs

Add/Delete Widgets



# Monitoring – Access Points



Displays list of Access Points in the network; Inventory, Uptime, Usage etc.



Detailed Access Point view displays details AP information, Radio Performance summary, list of connected clients, etc.

The screenshot displays the Cisco Prime Network Manager interface for monitoring Access Points. The sidebar on the left shows the navigation menu with 'Monitoring' selected. The main content area is titled 'ACCESS POINTS' and shows a table of APs. Below this, a detailed view for a specific AP, 'APICEL001F\_T1EP', is shown, including general information and performance metrics. The performance section includes a 'RF PERFORMANCE' graph and a 'CLEAN AIR OPERATIONS' graph.

# Monitoring – Clients



Displays list of Clients in the network; client type, client connection speed, Uptime etc.



Detail Client view displays Signal Quality, Device Type, Application Visibility, QoS, Security, Policy assignment etc.

The screenshot displays the Cisco Meraki dashboard interface for monitoring clients. The top navigation bar includes 'Monitoring', 'Network Summary', and 'Client Profiles'. The main content area is titled 'CLIENT VIEW' and is divided into several sections:

- GENERAL:** Displays client details for 'admin-PC', including IP address (192.168.1.10), MAC address (AA-AA-AA-AA-AA-AA), and signal strength (-41 dBm).
- TOP APPLICATIONS:** A table showing the top applications used by the client.
- NETWORK:** A table showing network-related information such as IP address, MAC address, and client type.
- SECURITY & POLICY:** A table showing security and policy assignments for the client.
- GUEST TEST:** A section for guest testing, showing a 'GUEST TEST' button and a progress indicator.

# Best Practices



Best Practices are enabled by default at Day 0



Best Practices relevant to Mobility Express deployments are displayed



For few Best Practices (Ex. NTP), Manual Configuration will link to relevant page

The screenshot displays the Cisco Prime Network Manager interface for a Cisco Aironet 1250 Series Mobility Express device. The left sidebar shows navigation options: Monitoring, Network Summary, Access Points, Clients, Wireless Dashboard, AP Performance, Client Performance, Best Practices, Wireless Settings, Management, and Advanced. The main content area is titled 'BEST PRACTICES' and shows a 'Best Practices Score' of 100%. The practices are organized into three sections:

- CONFIGURATION:** AIC Enable, Local Routing, NTP, Fast DDP, NTP for Management, and Arpoid B.
- SECURITY:** WLAN with SEC Enable, Rogue Policies, Min Rogue RSSI Threshold, SBC/Total APs/Cell, Client Encryption, Layer 2, Local Management, Firmware Policies, and User Login Policies.
- MANAGEMENT:** High RSSI Clients, Client Management, AAD External Channel Assignment, Auto Tunnel Power Control, Auto Channel Bid Selection, Channel Selection, and Auto Show RSSI.



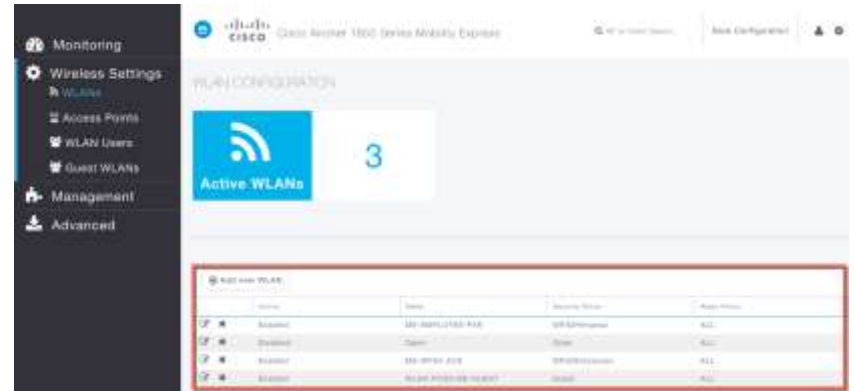
# Wireless Setting - WLAN

➤ Max WLAN count supported is 16

➤ Security Type – Open, WPA2 - PSK, WPA2 Enterprise, Guest

➤ WLAN to VLAN Mapping, ACL Rules

➤ Application Visibility is enabled for each WLAN



# Wireless Setting – WLAN Users



Add, Modify, Delete WLAN users for 802.1x local authentication



Add, Modify, Delete Guest Users

The screenshot displays the Cisco WLC GUI for 'Class-Kinvel 1250 Series Mobility Express'. The left sidebar contains navigation options: Monitoring, Wireless Settings (selected), Access Points, WLAN Users, Guest WLANs, Management, and Advanced. The main content area shows the 'WLAN Users' configuration page. A summary card indicates 'Users' with a count of '2'. Below this is a table with columns: Add WLAN User, User Name, Guest User, System Assigned, WLAN Profile, Password, and Description. The table contains two entries: 'john' and 'jane'. The bottom section shows the 'Add WLAN User' form with fields for User Name, Guest User, System Assigned, WLAN Profile, Password, and Description. A dropdown menu for 'Role' is open, showing options: 'EMPLOYEE' (selected), 'MANAGER', 'New Password', and 'Guest'.

# Wireless Setting – Guest WLAN



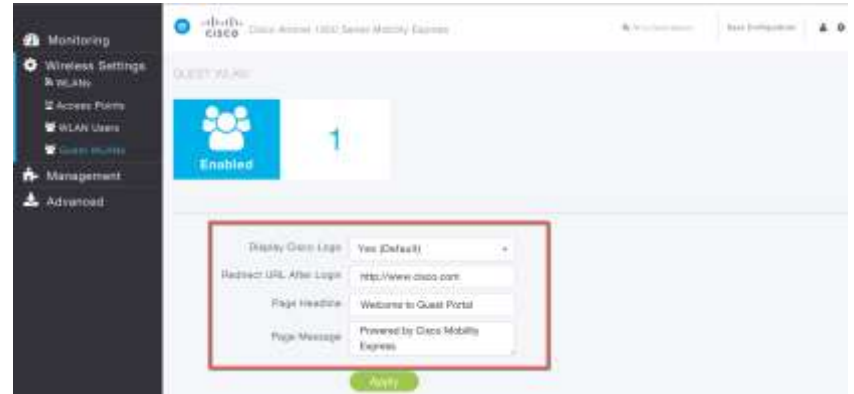
Local Web Auth. with local guest users  
Guest Access is for 24 Hours, not configurable



No LWA with ISE



No Lobby Ambassador  
No customized Web Auth. page



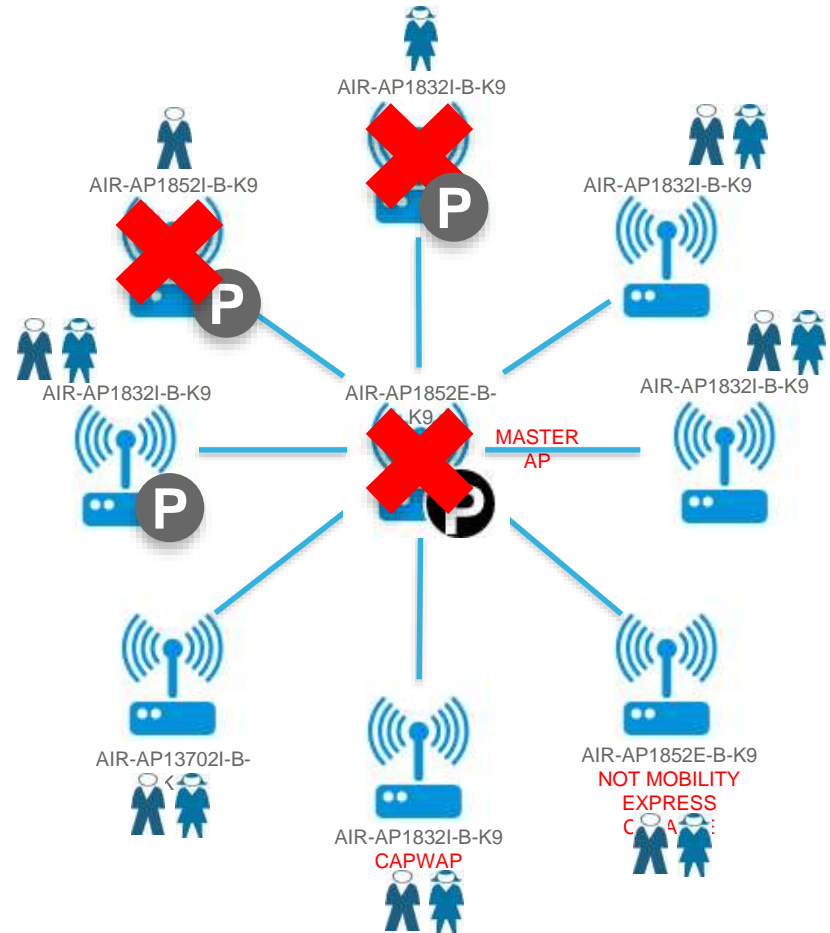
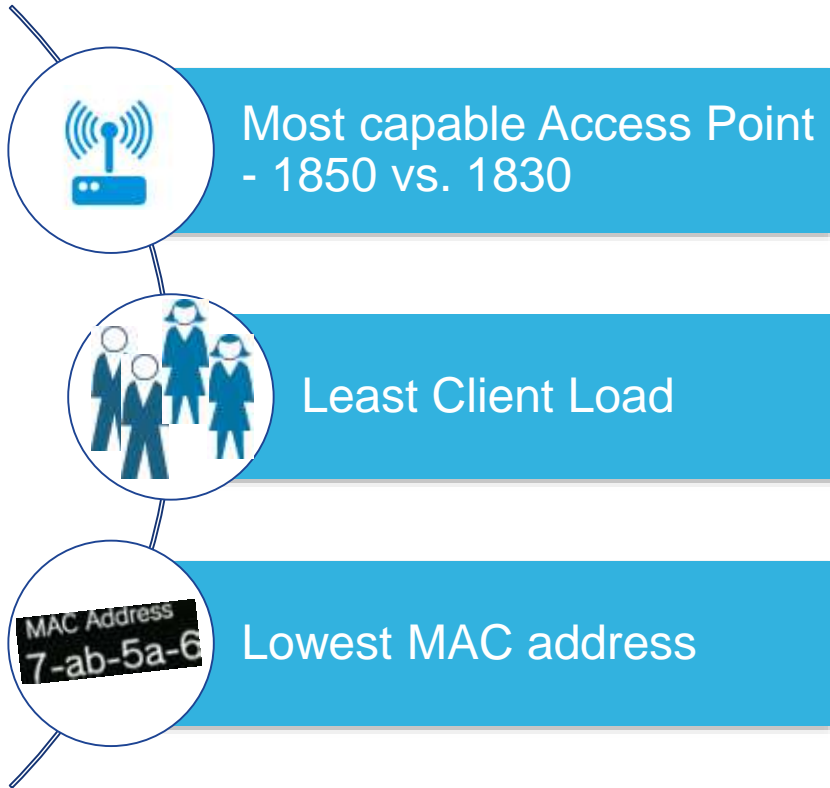
# Management – Access

Supported via HTTP, HTTPS, Telnet, SSHv2

HTTPS, SSHv2 enabled by default



# Master Election Process



# Interoperability



AireOS 8.1.122.0



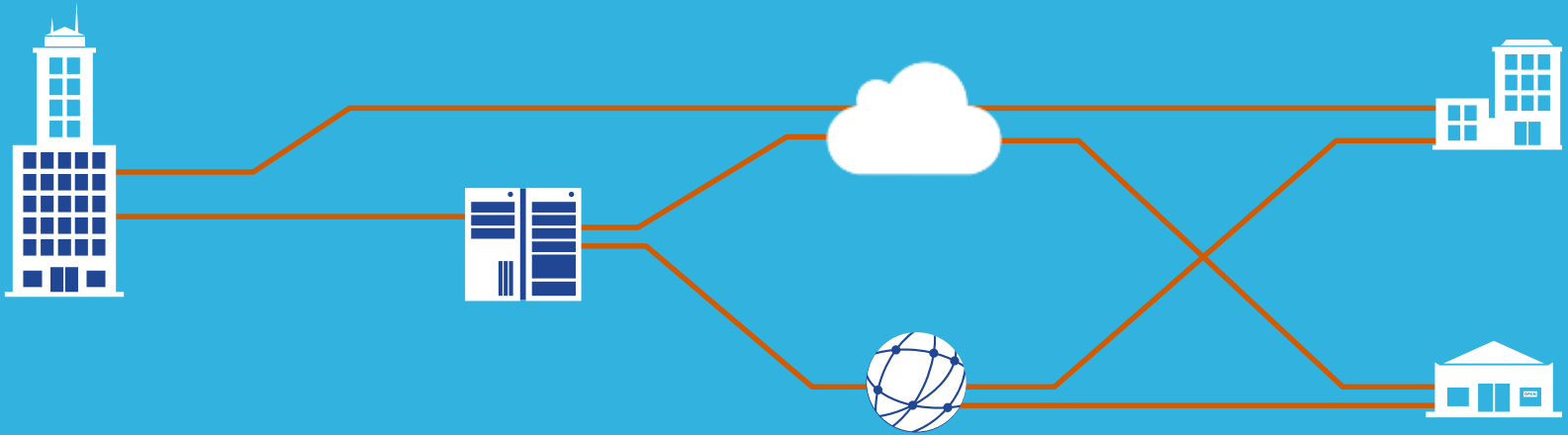
ISE Express 1.4  
802.1x Authentication



CMX 10.2  
Presence



PI 3.0 Patch 1.0



# “Cisco Wireless” App



Provisioning & Monitoring supported on software release 8.1 MR3

Monitoring supported on software release 8.1MR2



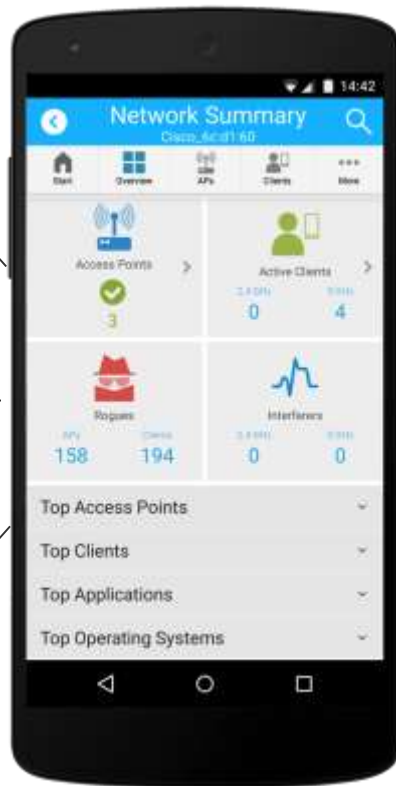
# Simple By Design: Mobile Application

## Configure Wireless, View Key Performance Indicators & Analytics

ACCESS POINT  
DETAILS

ACCESS POINT  
HEALTH

ROGUE  
DETECTION



CLIENT &  
APPLICATION  
VISIBILITY

INTERFERENCE  
DETECTION

APPLICATION  
VISIBILITY AND  
LOCAL CLIENT  
PROFILING



# What is the difference between Mobility Express Solution and a Mobility Express Bundle?

- Mobility Express can be appliance-less that scales up to 500 clients or 25 Access Points
- **Mobility Express Bundle includes a 2504 appliance-based WLAN Controller that scales up to 1,500 clients and 75 Access Points.**



Cisco Mobility Express Bundle

Access Point	Controller	Price
2 x AP1700I 	 WLC2504 + 25 AP License	AIR-AP1702I-x-WLC* \$1490
2 x AP2700I 		AIR-AP2702I-UX-WLC \$2290
2 x AP3700I 		AIR-AP3702I-UX-WLC \$3090

\*For AP1700, 'x' = Regulatory domain: A, C, D, E, F, H, K, N, Q, S, T, Z

# Kiedy zestawy CME z WLC2504 a kiedy Mobility Express z 1830/1850

## CME z WLC2504:

- Fizyczny kontroler i np. możliwość pracy dwóch w układzie 1+1 (stoi w bezpiecznym miejscu)
- Pełna funkcjonalność WLC → ruch idzie przez kontroler (lepsza kontrola pasma i widoczność)
- Lepsze punkty dostępowe AP2702 oraz AP3702
- Powyżej 25AP

## Mobility Express z 1830/1850:

- Alternatywa dla AP autonomicznych
- 802.11ac wave 2
- Do 25AP
- Aruba Instant lub inne rozwiązania controllerless



**CISCO**

*TOMORROW starts here.*