Aironet 802.11ac Wave 2 APs
Mobility Express

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Wireless Product Sales Specialist
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Moving Towards a Mobile First World
Why 802.11ac (aka Gigabit WiFi)

- MORE BANDWIDTH - MORE APPLICATIONS
- END-USER & IoT DEVICES ARE WIRELESS
- IMPROVED CLIENT DENSITY SUPPORT
- INCREASED SCALE AND COVERAGE

SUPPORT GROWING NUMBER OF MOBILE APPLICATIONS

Need for control, monitoring and advanced features

Wi-Fi HAS TO EXTEND EVERYWHERE
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

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How 802.11ac Wave 2 Works

80% 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
- 3x3:2 SS
- Spectrum Analysis*
- Tx Beam Forming
- USB 2.0
- Mobility Express

**VALUE 1850**
- 802.11ac W2
- 1.7 Gbps PHY
- 4x4:4 SS
- 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

* Planning For Your Reference
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

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 802.11ac Access Point Comparison

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

1. Simple 3-step over-the-air setup
2. Simple clustered management
3. Cisco® Aironet® 1830 and 1850 Series 802.11ac Wave 2
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

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

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Unified Access: One Architecture, Multiple Deployment Options

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

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

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

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

Small Network
- Small Network
- Small Campus / Branch
- Large Campus

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

Prime Infrastructure, Identity Service Engine, Connected Mobile Experiences
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

Analytics Dashboard
Better decisions with Access Point, Client, and Application Visibility

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.
Over-the-Air WLAN Express Setup
Connecting to *CiscoAirProvision* and starting setup wizard

1. Connect to *CiscoAirProvision* SSID
2. Enter Password as *password*
3. Connected to *CiscoAirProvision*; IP Address assigned
4. Launch setup wizard at [http://192.168.1.1](http://192.168.1.1) & create admin account
Over-the-Air WLAN Express Setup
3 Steps < 10 Minutes

1. Setup Your Controller

2. Setup Wireless Networks

3. Enable RF Parameter Optimization

Confirm Settings and reboot the controller
Logging into Mobility Express

Access Mobility Express using the controller’s management IP address-
Example: 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.
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.
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
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
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

- Most capable Access Point - 1850 vs. 1830
- Least Client Load
- Lowest MAC address

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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.
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
TOMORROW starts here.