Novinky v architektuře a produktech pro firemní sítě – mobilita a bezpečnost

Nové vlastnosti Cisco WLAN

Jaroslav Čížek, Cisco
Prosinec 2014
Agenda

- Nové vlastnosti Cisco WLAN
  Přehled verzí a podporovaného HW
  Novinky AireOS
  Novinky IOS-XE

- Cisco CMX

- Dotazy
Enterprise Unified Access Innovations

- 802.11ac Gigabit Wi-Fi
- High Density Experiences
- Stateful Switchover
- Application Visibility and Control
- mDNS / IPv6
- Wireless Policy Classification Engine
- Connected Mobile Experiences
- Converged Access
- Identity Services Engine
- Prime Infrastructure
Cisco Unified Access: Wireless Deployment Options

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<td>11ac: 3700 / 2700 / 1700</td>
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<td>11n: 1600e / 700</td>
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<td>Catalyst Switches</td>
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<td>6800/4500/3850/3650</td>
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<td>4500-X / 2960-X</td>
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<td>Controllers</td>
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<td>8510 / 7510</td>
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<tr>
<td>CENTRALIZED</td>
<td>Aironet Access Points</td>
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<td>11ac: 3700 / 2700</td>
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<td>11n: 1600e / 700</td>
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<td>Catalyst Switches</td>
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<td>6800/4500/3850/3650</td>
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<td>4500-X / 2960-X</td>
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<td>8510 / 5760 / 5508 / WiSM2 / 2504 / vWLC</td>
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<td>CONVERGED</td>
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<td></td>
<td>11ac: 3700/2700(/1700)</td>
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<td>11n: 1600 / 700</td>
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<td>Catalyst Switches</td>
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<td>6800/4500/3850/3650</td>
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<td>4500-X</td>
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<td>Controllers</td>
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<td>Integrated</td>
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<td></td>
<td>5760 external MC</td>
</tr>
</tbody>
</table>

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## CUWN Release - Key Controller Features

<table>
<thead>
<tr>
<th>December 2012</th>
<th>August 2013</th>
<th>Q4CY13</th>
<th>Q2CY14</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUWN 7.4</td>
<td>CUWN 7.5</td>
<td>CUWN 7.6</td>
<td>CUWN 8.0</td>
</tr>
<tr>
<td>Interoperability with MSE 7.4, ISE 1.1, and PI 1.3</td>
<td>Interoperability with MSE 7.5, ISE 1.1, and 1.2, PI 1.4</td>
<td>Interoperability with MSE 7.6, ISE 1.2, PI 1.4x</td>
<td>Interoperability with MSE 8.0, ISE 1.2 and 1.3, PI 2.1</td>
</tr>
</tbody>
</table>

### AP1600 Support
- AP3600: 802.11ac 11ac: Wave 1 Module
- AP3700: Integrated 802.11ac Wave 1—Modular AP
- Native IPv6 (Centralized Mode Only)

### AP3600 WSSI Module
- AP700 Support
- AP1532 (Centralized, Mesh, Bridge)
- Bonjour filter per location, AAA override (per user)

### Application Visibility and Control (Phase 1)
- OEP 600 Split Tunneling
- AP1552: With Emerson Sensor Gateway
- AVC and Bonjour Policies with WLC Policy Classification Engine

### Bonjour Services Directory (Phase 1)
- OEAP Support on vWLC
- 3G Small Cell Module: For AP3600 and AP3700
- VideoStream for FlexConnect Mesh support for FlexConnect

### AP Neighbor List (Subset of 802.11k)
- WLC 2500 High-Availability Licensing SKU (N:1)
- AP3702P (with StadiumVision Antennas)
- AP1600 CleanAir Express

### Scale 2500 Series to 75 APs and 1,000 Clients
- Guest Anchor Controller for WLC 8500
- FQDN Pre-Auth ACL for Onboarding
- PMIPv6 MAG on AP

### High-Availability Licensing (N:1)
- Profiling and Policy on WLC
- AP700W (Wall mount)
- FIPS, CC, UcAPL, USGv6

### 802.11w (Local Mode) Protected Management Frame
- Client SSO Over Any L2 Connection

### Link Aggregation: 8500,7500, 2500
- AVC and BSD (Phase 2)

### Guest Anchor Controller for WLC 2500
- FlexConnect Additions: PEAP/EAP-TLS AAA ACL, and QoS 802.11w

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## H/W Platform supported in 8.0

<table>
<thead>
<tr>
<th>Product</th>
<th>H/W Platform Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP</td>
<td>WSSI module, 11ac module, 3G Module</td>
</tr>
<tr>
<td></td>
<td>1260, 3500, 600,1600, 3600, 2600, 3700, 2700, 702, 702W, 802,1530, 1552WU, 1550**</td>
</tr>
<tr>
<td></td>
<td>*1040, *1140, *#1130, *#1240, **1520</td>
</tr>
<tr>
<td>WLC</td>
<td>2500, WLCM2, 5500, WiSM2, 7500, 8500, vWLC, HA-SKU, UCS-E platforms</td>
</tr>
<tr>
<td>MSE</td>
<td>3355, Virtual Appliance</td>
</tr>
</tbody>
</table>

*EOL Platforms in 8.0  
*# feature parity with 7.6 sw release; 8.0 features not supported  
** 1520 and 1550 with 64MB will not support PPPoE and PMIPv6
WLC Stateful Switchover

Sub Second Recovery / Convergence for Both WLAN and LAN

BEFORE
WLAN and LAN Recovery / Convergence Times Significantly Different

- 30+ second recovery / convergence
- WLAN Sub second recovery / convergence
- LAN Sub second recovery / convergence

AFTER
WLAN and LAN Recovery / Convergence Times Are Both Sub Second

- WLAN Sub second recovery / convergence
- LAN Sub second recovery / convergence

Cisco SSO—Improves Predictability
Centralized Mode HA

### Client SSO

- **Requirements**
  - Minimum release: 7.5
  - WLC: 5508, WiSM2, 7500, 8510
  - L2 connection
  - Same HW and software
  - 1:1 box redundancy

- **Benefits**
  - Active Client State is synched
  - AP state is synched
  - No Application downtime
  - HA-SKU available

### AP SSO

- **Requirements**
  - Release: 7.3 and 7.4
  - WLC: 5508, WiSM2, 7500, 8510
  - Direct physical connection
  - Same HW and SW
  - 1:1 box redundancy

- **Benefits**
  - AP state is synched
  - No SSID downtime
  - HA-SKU available (> 7.4)

### N+1 Redundancy

- **Requirements**
  - Each Controller has to be configured separately

- **Benefits**
  - Available on all controllers
  - Crosses L3 boundaries
  - Flexible: 1:1, N:1, N:N
  - HA-SKU available (> 7.4)
<table>
<thead>
<tr>
<th>AP SSO - 7.3</th>
<th>Client SSO - 7.5</th>
<th>Improvements - 8.0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase - 1</strong></td>
<td><strong>Phase - 2</strong></td>
<td><strong>Phase - 3</strong></td>
</tr>
<tr>
<td>Active – Standby 1:1 Redundancy</td>
<td>Active – Standby can be geographically separated over L2 VLAN/Fiber</td>
<td>Auto-recovery from maintenance mode once Peer-RP and default gateway reach-ability is restored</td>
</tr>
<tr>
<td>Both WLC share IP Address of management interface</td>
<td>Client database is synced to the Standby</td>
<td>SSO Support for Internal DHCP Server</td>
</tr>
<tr>
<td>Bulk and Incremental Config Sync</td>
<td>Client information is synced when client moves to RUN state.</td>
<td>SSO support for sleeping clients</td>
</tr>
<tr>
<td>APs does not go in Discovery state when Active WLC fails</td>
<td>Client re-association is avoided on switch over</td>
<td>SSO support for OEAP 600</td>
</tr>
<tr>
<td>Supported on 5500 / 7500 / 8500 and WiSM-2 WLC</td>
<td>Fully authenticated clients (RUN state) are synced to the peer</td>
<td>CAC method Bandwidth allocation parameters for both voice &amp; video and Call Statistics synced to the Standby</td>
</tr>
<tr>
<td>Downtime 5 - 1000 msec in case of Box failover, ~3 seconds in case of Network Issues</td>
<td>Effective service downtime = Detection time + Switch Over Time (Network recovery/convergence)</td>
<td>GW reach-ability check mechanism enhanced to avoid false positives</td>
</tr>
</tbody>
</table>

Peer RMI ICMP ping replaced with UDP messages

Faster HA Pair-up
Cisco Application Visibility and Control for WLCs

• Introduced in AireOS 7.4
  AireOS 7.6 introduced “Protocol Pack” support + Cisco Jabber support
• Leverages the IOS NBAR2 Engine
  same list of traffic signatures as IOS & XE

AVC in the Wireless LAN Controller

• Discover which applications are running on your corporate and guest WLANs
• Prioritize critical wireless apps and de-prioritize non-business apps
• Monitor voice and video performance on the WLAN
AVC Summary
Application Statistics with more details UP/Down Streams

<table>
<thead>
<tr>
<th>Aggregate</th>
<th>Upstream</th>
<th>Downstream</th>
</tr>
</thead>
<tbody>
<tr>
<td>App Name</td>
<td>Packet Count</td>
<td>Packet Count</td>
</tr>
<tr>
<td>ms-lync</td>
<td>35970</td>
<td>19366158</td>
</tr>
<tr>
<td>ssl</td>
<td>5482</td>
<td>4840784</td>
</tr>
<tr>
<td>rtp</td>
<td>6830</td>
<td>4063702</td>
</tr>
<tr>
<td>rtcp</td>
<td>578</td>
<td>326084</td>
</tr>
<tr>
<td>http</td>
<td>296</td>
<td>328084</td>
</tr>
<tr>
<td>bittorrent</td>
<td>457</td>
<td>57236</td>
</tr>
<tr>
<td>citrix</td>
<td>345</td>
<td>30004</td>
</tr>
<tr>
<td>dns</td>
<td>61</td>
<td>12831</td>
</tr>
<tr>
<td>webeex-meeting</td>
<td>15</td>
<td>5925</td>
</tr>
<tr>
<td>skype</td>
<td>63</td>
<td>5449</td>
</tr>
</tbody>
</table>

Application Last 90 Secs Usage(%)
AVC on 8.0

Teacher

- YouTube
- Facebook
- Skype
- bittorrent

Switch

AP

SSID: Classroom
Security: WPA2/802.1x

Student

- YouTube
- Facebook
- Skype
- bittorrent

Cisco-av-pair=avc-profile-name=<avc profile on wlc>
Cisco-av-pair=role=<role name>

AAA profile enables different users / clients obtain different mDNS/AVC profiles even though they are connected to same SSID which is tied to the same VLAN
### AVC - 7.4 Phase - 1
- Application classification and Control of 1039 applications with NBAR2 engine
- Support of 16 AVC profiles with 32 rules per profile
- One AVC profiles support per WLAN; same profile support on multiple WLANs
- AVC profile mapped to WLAN has a rule for MARK or DROP action
- Graphical presentation on the controller of all classified applications
- One NetFlow exporter and monitor can be configured on WLC
- AVC NetFlow monitoring on PI with PAM license

### AVC – 7.5 Phase - 2
- Protocol Pack 4.1 Support in AVC phase 2
- Additional application support – total of 1056
- Protocol Pack dynamic load to update applications support

### AVC – 8.0 Phase - 3
- Protocol Pack 9.0
- NBAR Engine rel 3.1
- AAA AVC Profile over-ride for clients
- AVC Per Application, Per Client based Rate limiting on WLAN
- Integration of AVC profiles to the Local Policy classification per user and per device
- AVC Directional QoS DSCP Marking for Upstream and Downstream traffic
- Support for 1088 applications
Apple Bonjour - Challenges across VLAN’s

- Bonjour is link local multicast and thus forwarded on Local L2 domain
- mDNS operates at UDP port 5353 and sent to the reserved group addresses:
  IPv4 Group Address – 224.0.0.251
  IPv6 Group Address – FF02::FB

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8.0 Bonjour Service Control
Organize by using policies

- In 8.0 you can create Service Groups: Users (roles and identity), Devices, Service
- And then you decide how these Service Groups interact by using Bonjour Polices and Profiles with ISE on mDNS enabled Controller
<table>
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<th>Bonjour - 7.4 Phase -1</th>
<th>Bonjour - 7.5 Phase -2</th>
<th>Bonjour - 8.0 Phase -3</th>
</tr>
</thead>
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<tr>
<td>Bonjour service with mDNS gateway for wired and wireless services</td>
<td>Support of mDNS services across L3 domains</td>
<td>Bonjour GW with access policy controlled service discovery</td>
</tr>
<tr>
<td>Bonjour Service policy applied per Interface or per WLAN</td>
<td>Introduction of mDNS AP for Bonjour service snooping on 10 Wired VLANs</td>
<td>Device service mapping to access policy</td>
</tr>
<tr>
<td>mDNS services cached on the controller</td>
<td>LSS – Location Specific Services</td>
<td>Bonjour Group and single access policy management</td>
</tr>
<tr>
<td>Bonjour services available on all Controller seen L2 domains</td>
<td>Priority MAC of Bonjour service</td>
<td>Bonjour profile control by local policy</td>
</tr>
<tr>
<td>Bonjour services supported with L2 and L3 roaming</td>
<td>Origin Based service discovery</td>
<td>Bonjour Device management from ISE portal</td>
</tr>
<tr>
<td>100 services and 64 service-providers per service type</td>
<td>6400 services and service-providers per service type</td>
<td>Introduction of Bonjour admin to manage specific Bonjour services from Cisco Prime</td>
</tr>
<tr>
<td>Support of Flex Connect APs in central and local mode</td>
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## Wireless – IPv6

**Features availability and releases**

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<tr>
<th>Feature</th>
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<th>7.2</th>
<th>8.0</th>
<th>IOS-XE 3.2, 3.6</th>
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<td><strong>Client Bridging</strong></td>
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<td><strong>Client Mobility</strong></td>
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<tr>
<td><strong>First Hop Security</strong></td>
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<tr>
<td><strong>Management/Visibility</strong></td>
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<tr>
<td><strong>Infrastructure – Dual Stack</strong></td>
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<tr>
<td><strong>Deployment modes:</strong></td>
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</tr>
<tr>
<td>Unified</td>
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<tr>
<td>Flexconnect – central switched only</td>
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<tr>
<td>Autonomous</td>
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<tr>
<td><strong>WLC:</strong> vWLC, 2500, 5508, Flex7500, 8500, WISM2</td>
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<tr>
<td>Catalyst 3650, Catalyst 3850, 5760</td>
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<tr>
<td><strong>AP:</strong> 1040,1140,1260,3500</td>
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<td>1600,2600,2700,3600,3700</td>
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<tr>
<td>1532, 1552</td>
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<tr>
<td>WSSI, 11ac modules</td>
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<tr>
<td><strong>MSE</strong></td>
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<td><strong>PI</strong></td>
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<tr>
<td><strong>Certification - USGv6/IPv6 Logo</strong></td>
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</tbody>
</table>

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8.0 IPv6 Overview

IPv4 Client
IPv6 Client
802.11

IPv4 Client
IPv6 Client
10.10.10.52

IPv4 Client
IPv6 Client
802.11

2001:db8:a:0:1827:91bf:c41b:9683
IPv4/v6 router
2001:db8:a::1/64
10.10.10.1

IPv6 Client
IPv4 Client
802.11

2001:db8:a:0:8a56:caff:1547:9150
10.10.10.51

IPv6 Client
IPv4 Client
802.11

IPv4/v6 router
2001:db8:a::1/64
10.10.10.1

IPv4
IPv6
CAPWAPv6
Ethernet

IPv4
IPv6
CAPWAPv6
Ethernet

IPv4
IPv6
CAPWAPv6
Ethernet

IPv4
IPv6
CAPWAPv6
Ethernet

IP: 2001:db8:a:7/64
Radius Server

IP: 2001:db8:a:6/64
NTP Server

IP: 2001:db8:a:5/64
SNMP Server, Syslog Server, tftp/ftp/scp Server

IP: 2001:db8:a:2/64
Mgmt: 2001:db8:a::2/64
10.10.10.2

IP: 2001:db8:a:6/64
NTP Server

IP: 2001:db8:a:6/64
NTP Server

IP: 2001:db8:a:6/64
NTP Server
Best in class WLAN - The Easy Way

WLAN Express Setup Wizard

- Simplified User Interface
- No console cable or CLI terminal
- Basic Employee and a Guest WLAN
- Improved Guest captive-portal

Best Practices ON by default

- Band Select
- Radio Resource Management
- Clean Air and intrusion detection
- Application Visibility
- Client Profiling
- Bonjour Service Directory
- Int only Guest Access Controls
- Best practice default settings

Available on CT2504 software release 7.6.120.0 or later
Just 3 steps...

**SETUP**
1) Connect the PC Ethernet cable to port 2 on the WLC.
2) Wait for the SYS LED light to be solid green.

**CONFIGURE**
3) Open a web browser and access http://192.168.1.1
4) Go through the setup wizard.
5) Confirm the settings. The WLC will reboot automatically.

**OPERATE**
6) Connect port 1 of the WLC to the switch trunk port.
7) Connect the access points.
8) Connect the wireless clients.
9) Monitor the network.
Cisco Unified Access: Wireless Deployment Options

**Cisco Cloud Networking**

**Dashboard**
- CLOUD MANAGED
  - Common OS
  - Lean IT
  - Mid-Market / Distributed Enterprise
  - MR Access Points
  - MS switches
  - MX security
  - Dashboard

**Prime**

**Cisco Unified Access: ONE Architecture with 4 Flexible Deployment Options**

**AUTONOMOUS**
- Intended for static installations
- SP Hotspots
- Aironet Access Points
  - 11ac: 3700 / 2700 / 1700
  - 11n: 1600e / 700
- Catalyst Switches
  - 3850 / 3650
  - 2960-X
- Controllers
  - N / A

**FLEX CONNECT**
- Data center hosted controller
- Distributed enterprises
- Aironet Access Points
  - 11ac: 3700 / 2700 / 1700
  - 11n: 1600e / 700
- Catalyst Switches
  - 6800/4500/3850/3650
  - 4500-X / 2960-X
- Controllers
  - 8510 / 7510

**CENTRALIZED**
- Premise-based controller
- Traditional Overlay Model
- Highly Scalable
- Aironet Access Points
  - 11ac: 3700 / 2700
  - 11n: 1600e / 700
- Catalyst Switches
  - 6800/4500/3850/3650
  - 4500-X / 2960-X
- Controllers
  - 8510 / 5760 / 5508 / WiSM2 / 2504 / vWLC

**CONVERGED**
- Common OS
- Consistent Wired/Wireless
- Highest performance
- Aironet Access Points
  - 11ac: 3700/2700(/1700)
  - 11n: 1600 / 700
- Catalyst Switches
  - 6800/4500*/3850/3650
  - 4500-X
- Controllers
  - Integrated
  - 5760 external MC*
One Network, with Converged Access
A New Deployment Option for Wired / Wireless

**IOS Based WLAN Controller**
- Consistent IOS and ASIC w/ Catalyst 3850
- Required to scale beyond 250 AP or 16K client domains

**Converged Access Mode**
- Integrated wireless controller
- Distributed wired/wireless data plane (CAPWAP termination on switch)

New 5760

Catalyst 3850
Catalyst 3650

Cisco Wireless LAN Controller
Internal Resources
Corporate Network
Internet
Cisco Firewall
One Management
Prime
One Policy
ISE
LAN Mgmt
Solution
Identity Mgmt
NAC Profiler
Access Control Server

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IOS-XE3.6.0E/15.2(2)E (Amur) Software Release

4K(SUP8,7,6,4500-X,49xx), 3K(3850,3650,X,C), 2K(2960S,FE,X,XR,C), WLC5760

1. Infrastructure
   - New APs: AP2700, AP7001, AP700W, AP1530
   - New Optics: Active/Passive SFPs CX1, Active SFP+

2. BYOD & Mobility
   - Service Discovery Gateway Ph 2 (Location/HA), Device Profiling & Policy classification Engine for Wired/Wireless

3. IT Simplicity
   - NG Plug & Play (PnP), Interface Template, Auto-conf, Easy VSS, Auto Secure

4. Application Experience
   - AVC Wireless on AP Ph II (QoS tie-in with Policy, Medianet on 3850/3650 (Wired)

5. Govt. Compliance
   - Wired & Wireless: FIPS, Common Criteria, UCAPL, USGv6

6. Manageability
   - Prime 2.1, ISE 1.3, MSE 8.0, WEBGUI

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IOS-XE GUI Example - AVC Monitoring and Statistics

Per Client AVC Stats
Connected Mobile Experiences (CMX)

Detect
Guest Presence

Connect
Guest Access

Engage
Guest Experience

CMX Tools: API, SDK
CMX Analytics
CMX Connect
CMX Facebook

Experience
CMX Engage
CMX Analytics
CMX Tools: API, SDK

Presence
CMX Analytics
CMX Tools: API, SDK
CMX for Retail 8.0

**Customers**

- Improved Guest Access, per location splash page, Facebook splash page, device specific splash page.

**Back Office**

- Native MSE Analytics to understand dwell time, device counts and repeat visitors
- In venue optimization of applications
  - Application changes depending on the specific location in the venue.
- Use API to mesh location information with back end point of sale systems data.
  - Custom development required.
**Probe RSSI Location**
- ~5-10m Accuracy
- ~40 Second Timeliness

**Data RSSI Location**
- ~5-10m Accuracy
- ~5 Second Timeliness

**Data RSSI + Angle of Arrival**
- ~1-3m Accuracy
- <5 Seconds Timeliness

**ROADMAP**
Shrnutí a dotazy
Cisco WLAN - Cloud and on-premise deployment configurations

Hybrid

Optimized for Ease of Management

Cisco Cloud Managed

Cisco Enterprise Core / Datacenter

Cisco Cloud Managed Edge

Cisco Enterprise Campus & WAN

Cisco Cloud Managed Branch

Cisco Enterprise

Optimized for Flexibility and Control

Mid-Market Business

Enterprise and Mid-Market Business

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Thank you.