Wireless in Retail

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Agenda

- Introduction
- Cisco Unified Wireless Network Fundamentals
- Wireless for Retail
  - H-REAP
  - VoWLAN
  - Context-aware mobile services
- Q&A
Expansion of Mobile Clients and Services

Moral of the Story: WLAN needs to be ready for new applications

- Agile Branches
- Digital Divide
- Video Surveillance
- Smart Phones
- Patient Monitoring
- Manufacturing automation
- Connected cars
- Connected Stadiums
- Digital Signage
- Wireless Kiosks
- Municipal Safety
- Connected Buildings
- Voice over WLAN
- Inventory Management
- Custom-facing retail apps
- Guest Access
- RFID
- Environmental Monitoring
- Public transit
- Teleworker
- Tags & exciters
- IDS/IPS
- Data
- Asset tracking
- Teleworker
- Guest Access
Wireless LAN Mobility Services

Security
- Automatic, 24 x 7 security and compliance monitoring for breaches via wireless medium
- Network access control based on user location

Guest
- Guest networks for customers, partners and auditors
- Vendor replenishment networks
- Public access networks

Voice
- Real-time mobile voice communications
- Improved collaboration via mobile unified communications
- Faster customer service response

Location
- Asset management
- Location-based content distribution
- Streamlined workflow using historical location data

Pervasive Wireless Network
CUWN Components and Hierarchy

Centralized

SNMP

WCS

Configuration and Monitoring

SNMP

Mobility and Radio Management

LWAPP

WLC

802.11 WLAN Client Services

LWAPP

AP

LWAPP

WLC

LWAPP

AP

LWAPP

AP

LWAPP

AP
Unification of Applications

Cisco:
- WLAN service delivery
- Real-time RF management
- Encryption/authentication
- Intrusion protection
- Location tracking
- Capacity Management
- Seamless mobility
- Guest Access
- Centralized management
- Dynamic Control

Cisco WLAN:
- Mobility Services
- Cisco WCS
- Switch/Routed Network
- Cisco AP Zero Touch

Cisco WCS: Mobility Services
AP/Controller Division of Labor

Real-time 802.11/MAC functionality
- Remote RF interface
- Data Encryption/Decryption
- WLAN IDS Signature analysis

Non real-time 802.11/MAC functionality
- Security management
- QoS policies enforcement
- Firmware management
- Northbound management interfaces

Mutual Authentication (X.509 Certificate)
LWAPP Control is AES Encrypted
LWAPP Data is Encapsulated

Switched/Routed Wired Network
Lightweight Access Point
Control Messages Data Encapsulation

Ingress/Egress point to wired network (802.1Q trunk)

LWAPP Tunnel
Ingress/Egress point to wired network (802.1Q trunk)
Where to Place a WLAN Controller?

Distributed Designs

- WiSM(s) or 440x WLAN controller(s) connected at distribution layer
- Controller redundancy
- Key design considerations:
  - Spanning tree
  - HSRP/GLBP
  - Traffic flow
    - Load balancing
    - Resiliency
  - Access layer “collapsed” into distribution layer
    - Access layer IP addressing
    - Access layer features need to be implemented in the distribution layer

-Mobility!
RRM – Radio Resource Management

- The RF domain is an ever changing environment
- The controller has a system level view
- Transmit Power Control
- Dynamic Channel Assignment
- Coverage Hole
Cisco Wireless Controller Family

Cisco Wireless Controller Family

Deployment Size

ISR WLC Module
8, 12, 25 APs

Cisco 3750
25 APs

Cisco 4402-25
25 APs

Cisco 4402-12
12 APs

Cisco 2106
6, 12, 25 APs

H-REAP

Cisco 3750
50 APs

Cisco 4402-50
50 APs

Cisco 4404
100 APs

Cisco WISM
300 APs

Cisco 4402-25
8 , 12, 25 APs

Cisco 3750
50 APs

Cisco 4402-50
50 APs

Cisco 4404
100 APs

Cisco WISM
300 APs
## Cisco Access Points

<table>
<thead>
<tr>
<th></th>
<th>AP 1130</th>
<th>AP 1240</th>
<th>AP 1250</th>
<th>AP 1520</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Modular Platform</strong></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Data Uplink (Mbps)</strong></td>
<td>10/100</td>
<td>10/100</td>
<td>10/100/1000</td>
<td>10/100/1000</td>
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<tr>
<td><strong>Power Requirement</strong></td>
<td>802.3af</td>
<td>802.3af</td>
<td>802.3af*</td>
<td>AC/12VDC</td>
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<tr>
<td><strong>Installation</strong></td>
<td>Standard</td>
<td>Rugged</td>
<td>Rugged</td>
<td>Outdoor</td>
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<tr>
<td><strong>Antennas</strong></td>
<td>Internal</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td><strong>Wi-Fi 802.11n draft 2.0 Certified</strong></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
The Aironet 1140 Series Access Point

- Integrated Radios
  - 2.4 GHz (b/g/n)
  - 5 GHz (a/n)
- 10/100/1000 Ethernet Port
- Console port
- Security lock
- Plastic over metal design
- Powered via 802.3af PoE
- Retrofit Mounting Kit allows the AP1140 to slide into existing AP1130 mounting brackets (ordered separately)
# 1140 vs 1250 Positioning

<table>
<thead>
<tr>
<th></th>
<th>1140</th>
<th>1250</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deployment</strong></td>
<td>Indoor</td>
<td>Ruggedized</td>
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<tr>
<td><strong>Antennas</strong></td>
<td>Integrated</td>
<td>External (RP-TNC)</td>
</tr>
<tr>
<td><strong>Wired Uplink</strong></td>
<td>Gigabit</td>
<td>Gigabit</td>
</tr>
<tr>
<td><strong>Power Options</strong></td>
<td>PoE, AC, Pwr Inj</td>
<td>PoE*, ePoE, AC, Pwr Inj</td>
</tr>
</tbody>
</table>

* 1250 runs on PoE with reduced performance
Cisco Wireless Control System (WCS)

Features
- Client troubleshooting (via CCX)
- Planning, configuration, monitoring, location, IDS/IPS, and troubleshooting
- Hierarchical maps
- Intuitive GUI and templates
- Policy based networking (QoS, security, RRM, etc.)

Benefits
- Lower OPEX and CAPEX
- Better visibility and control of the air space
- Consolidate functionality into a single management system
- Determines location and voice readiness
System Monitoring – Network Summary

Wireless Control System

Dashboard

Coverage

Utilization

Client Count

Customize

View Choice

Total APs not yet assigned to Maps: 17

LWAPP Uptime

View All Maps

Controller Memory Utilization (%)

Min | Max | Avg | View Choice

Recent Coverage Holes (0)

No Coverage Holes found
WCS Location Service Planning

- Location readiness
  Assess location accuracy for existing deployments

- Location planning mode
  Suggests AP density and placement based on data, voice, or location services

- Location inspector
  Post deployment and calibration tool for location quality verification

- Accuracy improvements
  Smoothing, additional antennas, faster calibration, enhanced algorithms—minimum variance estimation
Integrated Wireless Intrusion Protection

- Detect common RF-related attacks
  - Netstumbler, wellenreiter, void11, FakeAP, address spoofing, DoS, etc.
- Customizable attack signatures
- Real-time 24x7 monitoring and alarming
- Rogue AP/client detection, location, and containment
  - Identify known (i.e. “trusted”) rogues
- Manually disable clients
- View dynamically excluded clients
- Rogue AP switchport tracing
Scheduled Shut off of WLAN and Access Point Radios

Feature

- Scheduled configuration change of the operational mode (on/off) of access points can be set by Cisco WCS

Benefit

- Supports deactivation of WLAN to meet security requirements during business or non-business hours
Cisco Compatible Extensions

Over 90% of client devices Cisco Compatible

Client Devices

Features
- Assured compatibility with 400+ devices
- Standards-based
- Enhanced security, mobility, and performance
- Supports Mobility Services i.e.. Location, voice

Benefits
- Accelerates innovation
- Supports diverse enterprise applications
- Ensures multi-vendor interoperability
- Enables simplified deployment of mobile WLAN clients

http://www.cisco.com/go/ciscocompatible/wireless
Cisco Secure Services Client

- **Key Features:**
  - 802.1X authentication for wired and wireless devices
  - Windows XP/2000 support
- **EAP:**
  - EAP-FAST, EAP-MD5, PEAP-MSCHAP, PEAP-GTC, EAP-TLS, EAP-TTLS, Cisco LEAP
- **Encryption:**
  - WEP, Dynamic WEP, TKIP, AES
- **Standards:**
  - WPA and WPA2

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**Cisco Secure Services Client**

**Features**
- Unified wired and wireless client
- Support for industry standards
- Endpoint integrity
- Single sign-on capable
- Enabling of group policies
- Administrative control

**Benefits**
- Reduces client software
- Simple, secure device connectivity
- Minimizes chances of network compromise from infected devices
- Reduces complexity
- Restricts unauthorized network access
- Centralized provisioning
Cisco Context Aware Mobility Solution
Moving from Cisco 2710 to Cisco MSE Platform

Cisco 2700 Series
Wireless Location Appliance
- Indoor only
- 2500 tags and clients
- RSSI only
- Industry’s first location solution integrated into the WLAN infrastructure
- Location only
- Open API
- WCS management

Cisco 3300 Series
Mobility Services Engine
- Indoor, outdoor, high ceilings
- 18,000 tags and clients
- RSSI and TDOA
- Next-generation
- Open API
- WCS management
- Robust architecture for adding other technologies (UWB, passive)
- Shared platform for other mobility services (incl. future)
Wireless for Retail
Retail

- PCI COMPLIANCE!!
- Carpeted and Warehouse environment
- Use of small Handheld equipment

HREAP for less than 3 Access Points

Small Store

Large Store

Small Controller with More Access-Points

Headquarters

Internet
Branch Office Deployment—Hybrid REAP

Design Considerations:

- Allows bridging/tagging of traffic locally (local switching) by WLAN
- Allows simultaneous tunneling of traffic to WLC (central switching) by WLAN
- “Connected Mode”—LWAPP control centralized
- “Standalone Mode” (WAN outage)
  - Locally switched WLANs stay up
  - Some lost functionality
- ← 100 msecs latency between APs and WLC
- H-REAP APs should be connected to trunk ports—allow only the relevant, locally switched VLANs
- No optimization for:
  - Fast, secure roaming (CCKM, PKC)
  - Voice (no CAC or TSPEC support in standalone mode)
HREAP – 802.1x Auth on the AP

**Features**
- Allows HREAP to do 802.1x authentication on the AP itself in standalone mode
- Uses a pre-configured list of usernames and passwords
- During WAN outage HREAP can authenticate users using the HREAP’s RADIUS server

**Benefits**
- Ensure minimum service even during WAN outage
- No additional HW required for 802.1x authentication
HREAP – CCKM

- **HREAP supports Layer 2 fast secure roaming**
  - Cisco Centralized Key Management (CCKM) roaming on local controller if the WAN link connection is lost

- **Benefit**
  - Roaming voice clients in remote locations and branch offices will stay connected even when the WAN link to the wireless LAN controller is lost
7921G Overview

- 802.11a/b/g
- 2 in (5 cm) color display with 176 x 220 pixel resolution
- Dedicated Volume and Mute buttons
- Application button supports PTT via XML
- Two softkey buttons
- Speakerphone
- Diversity antenna (5GHz band only)
- Ringing, message waiting, and charging LED
- 5-way navigation key
- Separate ringer and speaker
  - Louder ring volume
- Vibrate alert
- Backlit keypad and display
- Headset connector 2.5mm (4-conductor/tri-band)
- USB 1.1 connector
Context Aware Mobility Solution

Contextual Information of Mobile Assets

Identity
Time
Location
Temperature
Availability
Humidity

Right Device
Right Business Application
Right Team
Right Network
Right Place
Right Time

Context Aware Mobility

End User Experience

Ability to Dynamically Capture and Use Contextual Information of Mobile Assets to Optimize, Change or Create Communications Flow and Business Processes
Challenges of Today’s Solutions

In close proximity
Passive RFID

Campus
Wi-Fi (TDoA, Chokepoint)

Building
Wi-Fi (RSSI, Chokepoint)

Nationwide
Cellular, GPS

Different Devices, Networks and Applications to Manage for Each Workspace Involved in the Business Process
How TDoA works

- Time Difference of Arrival
- Used with any CCX tags (not client)
- Wi-Fi TDoA receivers are synchronized
- Distances between the tag and APs is calculated based on the time difference of arrival
- Requires Line of Sight
- Recommended for high ceilings, outdoors and outdoor like environments (e.g. warehouses, parking lots)
How RSSI works

- Received Signal Strength Indicated
- Used with Tags and Clients
- Receivers are the access points
- Distances between the tag and APs is calculated based on the received signal strength
- Requires medium to short read range for better accuracy
- Recommended for indoors
How Chokepoint works

- Hybrid tags with 125 kHz passive and Wi-Fi active sides
- Tags and chokepoints have to be from the same vendor (Aeroscout or WhereNet)
- When the tag is in close proximity of the chokepoint, its passive side gets excited and captures the information (location and sensing) then the active side sends the information over Wi-Fi
- The tag beaoning frequency can be reconfigured by the chokepoint
- Indoor or Outdoor
Why Use Chokepoint Triggers?

- Chokepoint triggers cause tagged assets to indicate they are within the confines of a chokepoint or other constricted area.
  - A direct result of the asset tag entering the stimulation zone of the chokepoint trigger.

- Chokepoint triggers can be used to:
  - Trigger tags to transmit stored msgs
  - Provide proximity asset location with granularity dependent on trigger range
  - Determine asset floor location
  - Modify tag state
    - Activate on entry or deactivate on exit
  - Modify tag configuration
  - Trigger tags to initiate data retrieval

- Cisco OEMs Exciters from AeroScout
Use Cases

- Accurate detection in a confined area
  - Asset count in room, on shelf, etc.
- Entrance / Exit detection
  - Indicate unauthorized asset movement or removal
- Trigger status change or other action
  - Auto at entry gate triggers entry procedure
  - Truck at exit gate triggers exit procedure
  - Retrieve vehicle fuel data passing through gate
- Detect direction of movement through gates
  - Distinguish entry from exit at a combined bi-directional gate*
- Find individual asset among many identical
  - Blinking tag LED can identify an individual asset
- Sequence or workflow enforcement
  - Enforce proper workflow progression
- Enforce association between two entities
  - Worker at workstation, patient and room, etc.

* Bidirectional gate requires compatible location client (i.e. MobileView)
<table>
<thead>
<tr>
<th>Function</th>
<th>Component</th>
</tr>
</thead>
</table>
| Wireless Infrastructure          | Cisco Unified Wireless infrastructure (Cisco AP’s, Cisco WLC)  
                                        Cisco MSE  
                                        CCX tags                                                                                                                                 |
| Location Engine                  | Context Aware Engine for Tags software (purchased separately), software license (based on tag count)                                      |
| Network/Device Management        | **Cisco WCS**: manages Cisco wireless infrastructure and Cisco MSE  
                                        **AeroScout System Manager**: configuration and management of partner engine, exciters, calibration, displaying tags on floor maps |
## Solution Components Outdoor/Outdoor-Like

<table>
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<th>Function</th>
<th>Component</th>
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<tbody>
<tr>
<td>Wireless Infrastructure</td>
<td>Wi-Fi TDOA receivers (does not require Cisco Unified Wireless infrastructure)</td>
</tr>
<tr>
<td></td>
<td>Cisco MSE</td>
</tr>
<tr>
<td></td>
<td>CCX tags</td>
</tr>
<tr>
<td>Location Engine</td>
<td>Context Aware Engine for Tags software (purchased separately), software license (based on tag count)</td>
</tr>
<tr>
<td>Network/Device Management</td>
<td><strong>Cisco WCS</strong>: manages Cisco MSE, displaying tags on maps</td>
</tr>
<tr>
<td></td>
<td><strong>AeroScout System Manager</strong>: configuration and administration of partner engine, Wi-Fi TDOA receivers, calibration, displaying tags on maps</td>
</tr>
</tbody>
</table>
RFID Solutions From Cisco and Oat Systems

Oat Systems to Integrate with the Cisco Context Aware Open API to Enable Asset Tracking Solutions in Manufacturing

Why Cisco and Oat Systems
- Market leadership in the enterprise WLAN and RFID space
- Faster implementation by integrating with existing business processes
- Flexible, standards based solution

OAT Manufacturing Solutions
- Work In Process (WIP) Tracking
- Asset Tracking

Solution Components:
- OATaxiom™: RFID data management & reporting
- OATdesigner™: RFID scenario builder GUI
- OATexpress™: RFID data capture, filtering and management

Middleware – OAT FOUNDATION SUITE
- Telemetry Alerting
- SCM
- CRM
- Assembly Line Monitoring
- Inventory Management
- ERP

Open API
- Mobility Services Engine
- Context Aware Software

Open Protocol: CAPWAP
- Active RFID
- Unified Wireless Network Controllers

Unified Mobility Client

OAT

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**Why Cisco for Context Awareness**

<table>
<thead>
<tr>
<th>Breadth and Integration</th>
<th>Beyond regular location</th>
<th>Open Eco-System</th>
<th>Future Extensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only industry solution with outdoor and indoor offers</td>
<td>Unmatched scalability with up to 18,000 clients and devices</td>
<td>Integration with business applications via Cisco open API</td>
<td>Flexible architecture that allow a fast and seamless integration of a variety of access technologies such as UWB, passive RFID, or GPS</td>
</tr>
<tr>
<td>Choice of techniques (RSSI, TDoA, Chokepoint)</td>
<td>Telemetry information such as temperature, humidity, motion, pressure…</td>
<td>Increasing vertical integration for healthcare, manufacturing, retail and education with best-in class partners</td>
<td>Integration with other Cisco applications already demonstrated with Unified Communications</td>
</tr>
<tr>
<td>Central management for both context awareness and WLAN</td>
<td>Based on existing WLAN infrastructure</td>
<td>Broad tags choice and application independence with Cisco Compatible Extensions Program</td>
<td></td>
</tr>
</tbody>
</table>

Only industry solution that can answer to any of your needs today and evolve as you integrate contextual information more and more into your business processes.
Q&A