The Internet of Everything is changing Everything
Enterprise WLAN: Evolution, Trends & Future Challenges

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The Explosion of Wireless Data

- Always Online
- More Mobile Than Ever Before
- Hungry for Bandwidth

2.7 GB /month in 2017
The Explosion of Wireless Data

- More Users
  - 7 Billion Mobile Devices (more than 1 per capita)
  - More than 10 Billion Mobile M2M Devices in 2016

- New Services
  - BYOD in the Enterprises
  - Internet of Everything

- More Bandwidth
  - Social Networking
  - Mobile HD Video
The Explosion of Wireless Data

“Enterprise WLAN used to be a luxury. It has evolved to a need.”
The Evolution
The Protocols

- **802.11b**
  - 2.4GHz
  - 20MHz Channels
  - 11Mbps

- **802.11g**
  - 2.4GHz & 5.4GHz
  - 20MHz Channels
  - 54Mbps

- **802.11a**
  - 2.4GHz & 5.4GHz
  - 20MHz Channels
  - 54Mbps

- **802.11n**
  - 2.4GHz & 5.4GHz
  - 20/40MHz Channels
  - 300/450Mbps
  - MIMO
  - Beamforming

- **802.11ac**
  - 5.4GHz
  - 80/160MHz Channels
  - 1.3Gbps
  - Mu-MIMO
  - Beamforming
The Architectures

**Autonomous**

- **Standalone APs**

  **Benefits / Considerations**
  - Simple to implement
  - Cost-effective for SMBs
  - Hard to manage
  - Limited advanced features
  - Ineffective roaming

**Central Controller**

- **Local WLC**

  **Benefits / Considerations**
  - Centralized management of the WLAN
  - Control over the traffic
  - Advanced features support
  - High quality roaming
  - Potential single point of failure

**Branch**

- **Flex WLC**

  **Benefits / Considerations**
  - Split Control & Data Plane
  - Flexible deployment for branches
  - Expandability
  - BW on WAN lines
  - Limitations on authentication methods

**Converged Access**

- **WLC-capable Switch**

  **Benefits / Considerations**
  - Wired and wireless integration
  - Traffic visibility at every layer
  - Less control traffic on higher layer infrastructure
  - Higher cost on access layer
The Architectures

### Cloud Controller

- **Local APs - Cloud Controller**

**Benefits / Considerations**

- Scalability
- Easy to manage
- Less HW footprint on site
- Easy deployment

- Relies on WAN interconnection for management / control
- Relies on vendor for security & high availability issues
- Lock-in on vendor

### WLAN-as-a-service

**Managed Service**

**Benefits / Considerations**

- No Capex – Provided as a service
- Split Control & Data Traffic
- Outsourced management & control
- No need for specialized IT personnel
- Upgrades on latest HW & SW

- Relies on the reliability of the Managed Service Supplier
The Services

- Data
- Voice
  - Smartphone Communications
- Video
  - Telepresence / Video Conference
- Location
  - Active RFIDs
  - Analytics
- M2M
  - Smart TVs, Projectors
  - Printers, Security Cameras
  - IoE
The Services

Location Based Services

- **Focus:**
  - ✓ Retail (Shops, Malls, etc)
  - ✓ Hospitality
  - ✓ Venues (Airports, Stadiums, etc)

- **Monetize:**
  - ✓ Generate revenue from the Enterprise WLAN
  - ✓ Location based advertising

- **Customer Engage:**
  - ✓ Provide valuable insight in customers’ behavior
  - ✓ Personalized Services
  - ✓ Better in-store experience
The Trends
The Trends

- **Enterprise WLAN adopts 802.11ac**
  - Gigabit Wi-Fi
  - New Services / New Revenues

- **Cloud Solutions for WLAN Management**
  - Less specialized IT personnel needed
  - Less TCO

- **Social Wi-Fi**
  - Customer behavior analysis
  - Customer loyalty
The Trends

- Location Analytics
  - Monetization of the WLAN
  - New site-specific applications

- BYOD
  - WLAN – UC Integration

- Internet of Everything
  - RFID Deployments
The Challenges
The Challenges

"The signal is not good enough."

"I could use one access point to cover the entire area."

"Wi-Fi radiation is dangerous."

"Low cost equipment is ok for me."
The Challenges

- Lack of knowledge from majority of IT staff & employees

- Fear of:
  - Radiation
  - Security
  - Reliability
  - Control

- Lack of perception of WLAN’s necessity & benefits

- Cost driven approach
The Challenges

- More mobile devices than IT resources
- Blurred borders between Partner & Workforce
- Negative reputation for WLAN
  - Wrong design & implementation
  - Low cost, unreliable equipment
The Answer

- Excellent Design & Implementation
- High Quality Equipment
- Reliable Support Services
“If you fail to plan, you plan to fail.”

Benjamin Franklin
The Design

- Requirements Identification
  - Type of services
  - Users
  - Coverage Areas

- RF Site Survey
  - Simulation on floor plans
  - Actual Measurements
  - Interference Detection
  - Optimization of coverage
The Design

- Capacity Planning
  - Type of service (Data, Voice, Location)
  - Required Signal Strength Limits
  - SNR
  - Cell Overlapping
  - Number & Type of Clients (e.g. laptops, smart phones, etc)

- RF Planning
  - Type of obstacles (e.g. walls, elevators etc)
  - What-if scenarios (e.g. moving obstacles)
  - Type of antennas required
  - Installation conditions
The Design

- Reliability / High Availability Design

- Advanced Features by Cisco
  - RRM
  - Dynamic Channel Assignment
  - Automatic Transmit Power Control
  - Coverage Hole Detection
  - CleanAir
  - ClientLink
  - BandSelect
  - VideoStream
The Security

- Advanced Encryption
  - CAPWAP
  - WPA2 – AES & 802.1x

- Authentication Methods
  - Active Directory Integration
  - Digital Certificates
  - Web Authentication (Captive Portal)

- Wireless IPS
  - Wireless Sensor Mode
  - Sensor Modules
  - Rogue AP Detection & Mitigation
  - Integration with Cisco MSE

- Corporate vs Guests
  - Traffic Segregation
The Management

- One Platform to Rule them All
  - Central Management
  - Configuration
  - Planning
  - Statistics Collection
  - Fault Management & Alarms
  - Location Tracking
  - wIPS
Thank You