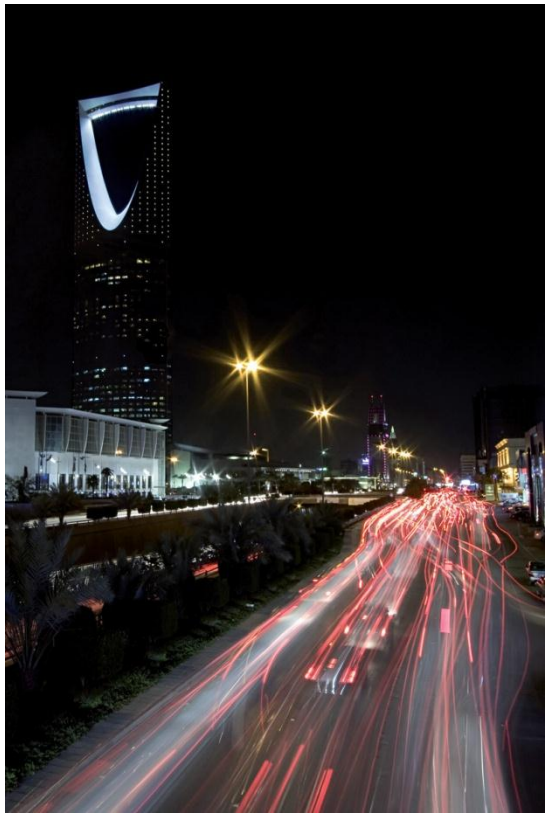
Cisco Connect

Riyadh, Saudi Arabia

Feb 3rd, 2013

Introducing Converged Wired/Wireless Access



cisco

Agenda

- Unified Access Architecture
- Technology Differentiators and Unified Access Strategy
- Cisco 3850 Unified Access Switch
- Deployment Scenario

Evolving User Workspace
Megatrends

BYOD
- Secure access
- Customized experience
- Guest access

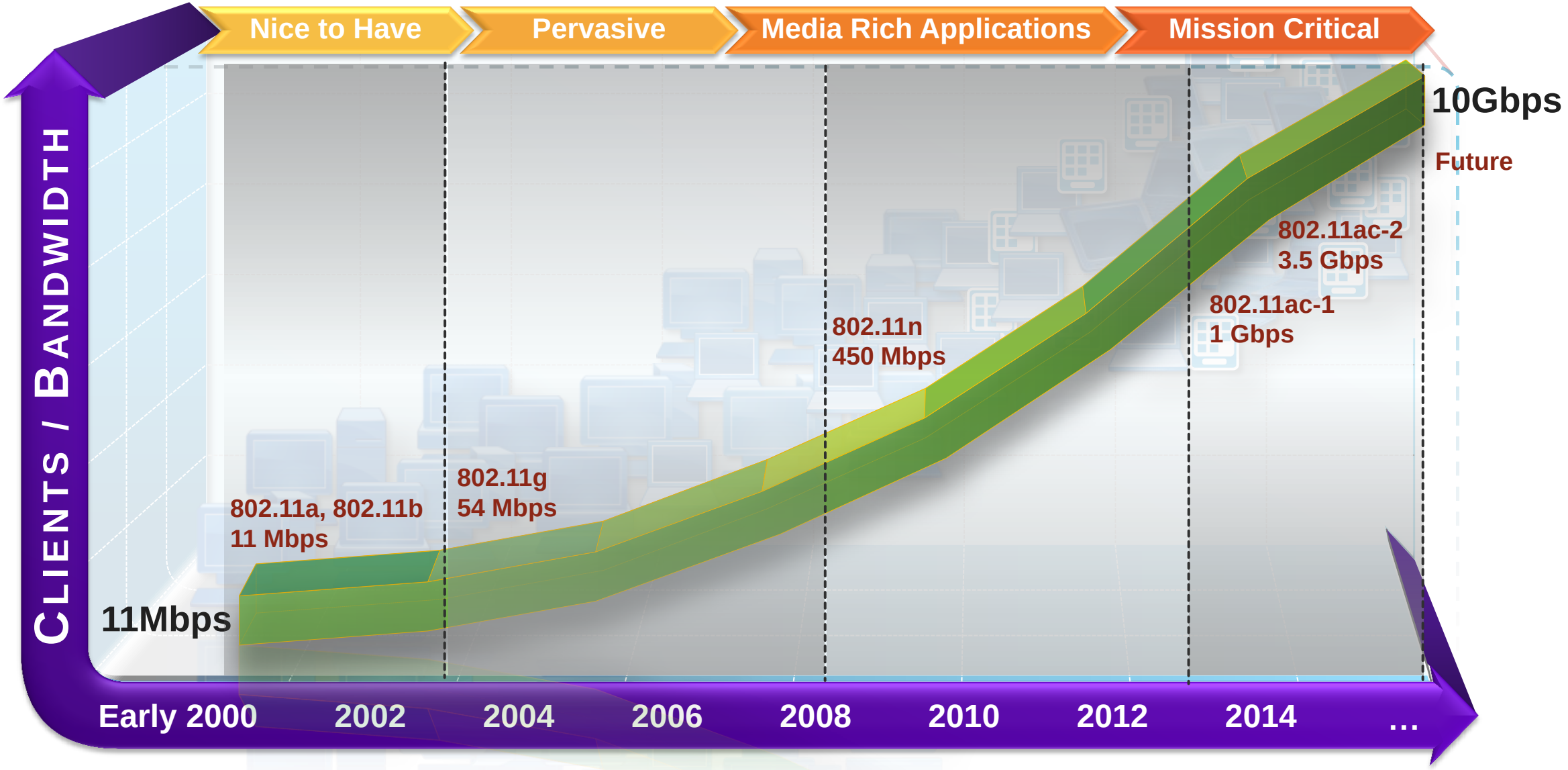
Mobility
- Seamless roaming
- Optimal client performance
- Cloud access/VXI

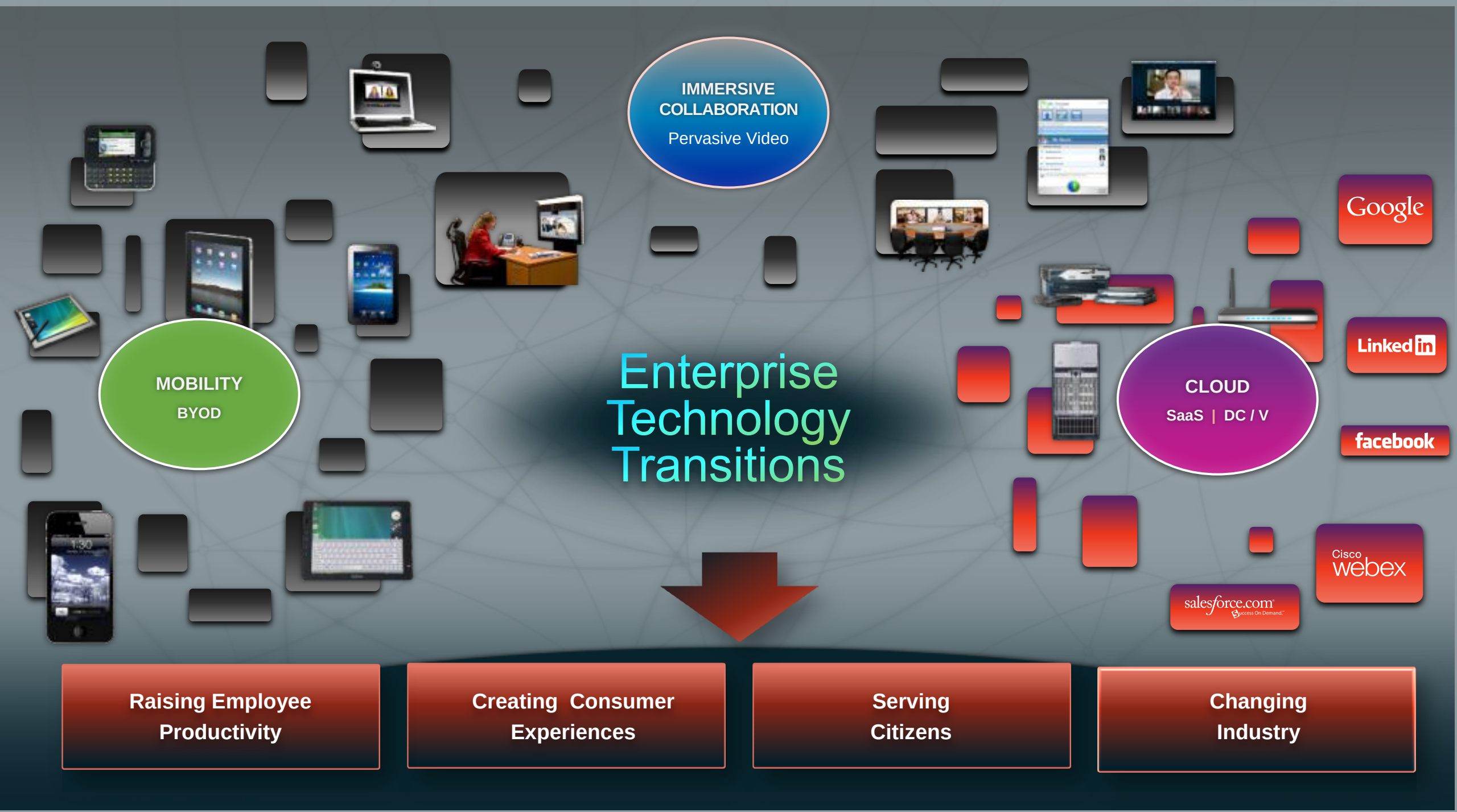
Video
- Multicast streaming
- Video conferencing
- Reliable performance

IT Requirement

Deliver an Uncompromised User Experience on Any Workspace

Wireless Standards – Past, Present, and Future



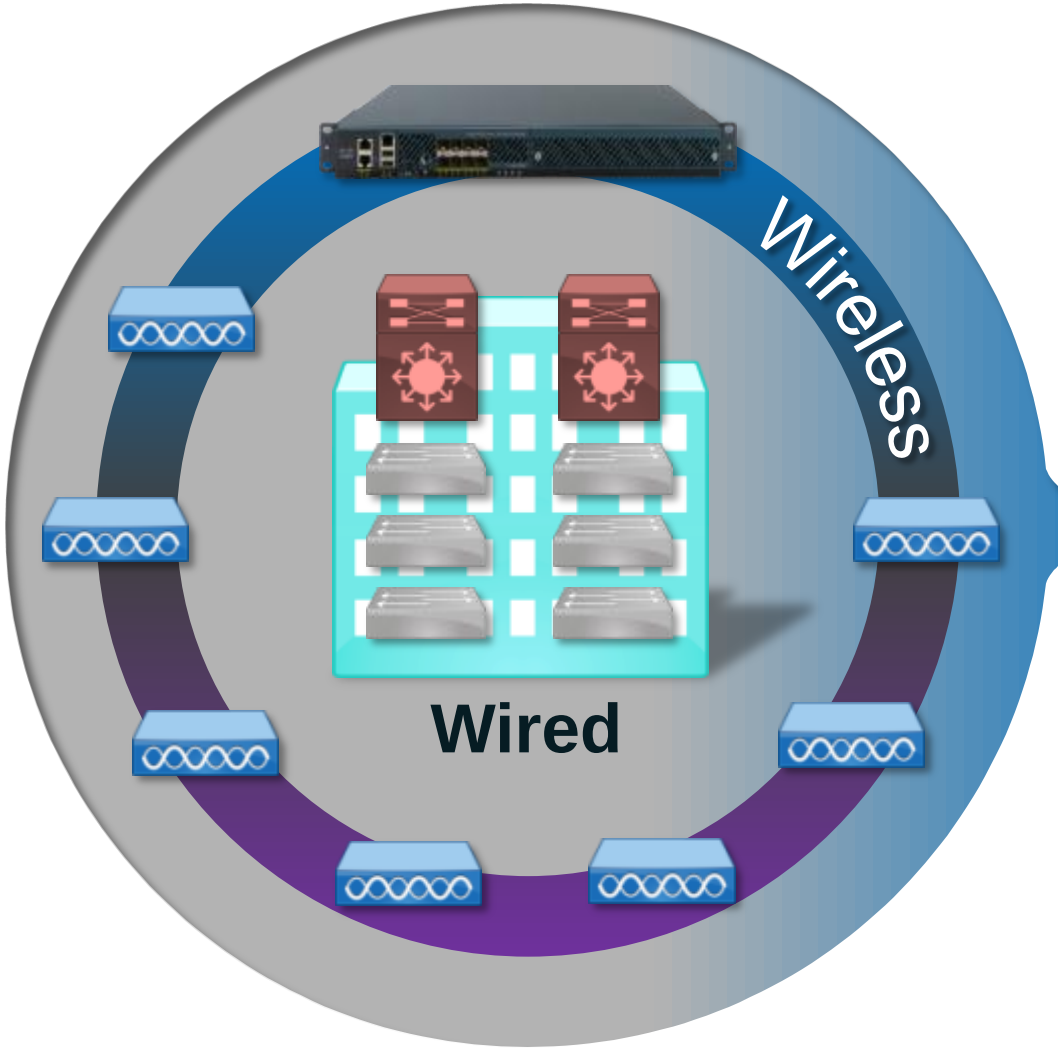

IMMERSIVE COLLABORATION
Pervasive Video
MOBILITY
BYOD
CLOUD
SaaS | DC / V
Enterprise Technology Transitions
Google
LinkedIn
facebook
Cisco webex
salesforce.com
Raising Employee Productivity
Creating Consumer Experiences
Serving Citizens
Changing Industry

IT Top of Mind

1. How do I manage complexity to reduce costs?
2. Can I offer secure, mission critical wired/wireless access services?
3. Am I investing in an architecture future-proofed for scale?

Is Your Network Ready?

Managing Complexity



Wired and Wireless

- Business Policy
- Single Pane of Glass
- User/Device Centric
- Fewer Administration Points
- Reducing TCO

Which Workspace You Want to Deliver?

Traditional Workspace

Data

Voice

Next-Generation Workspace

Any Device

Mobile

Immersive Collaboration

Virtual Desktop

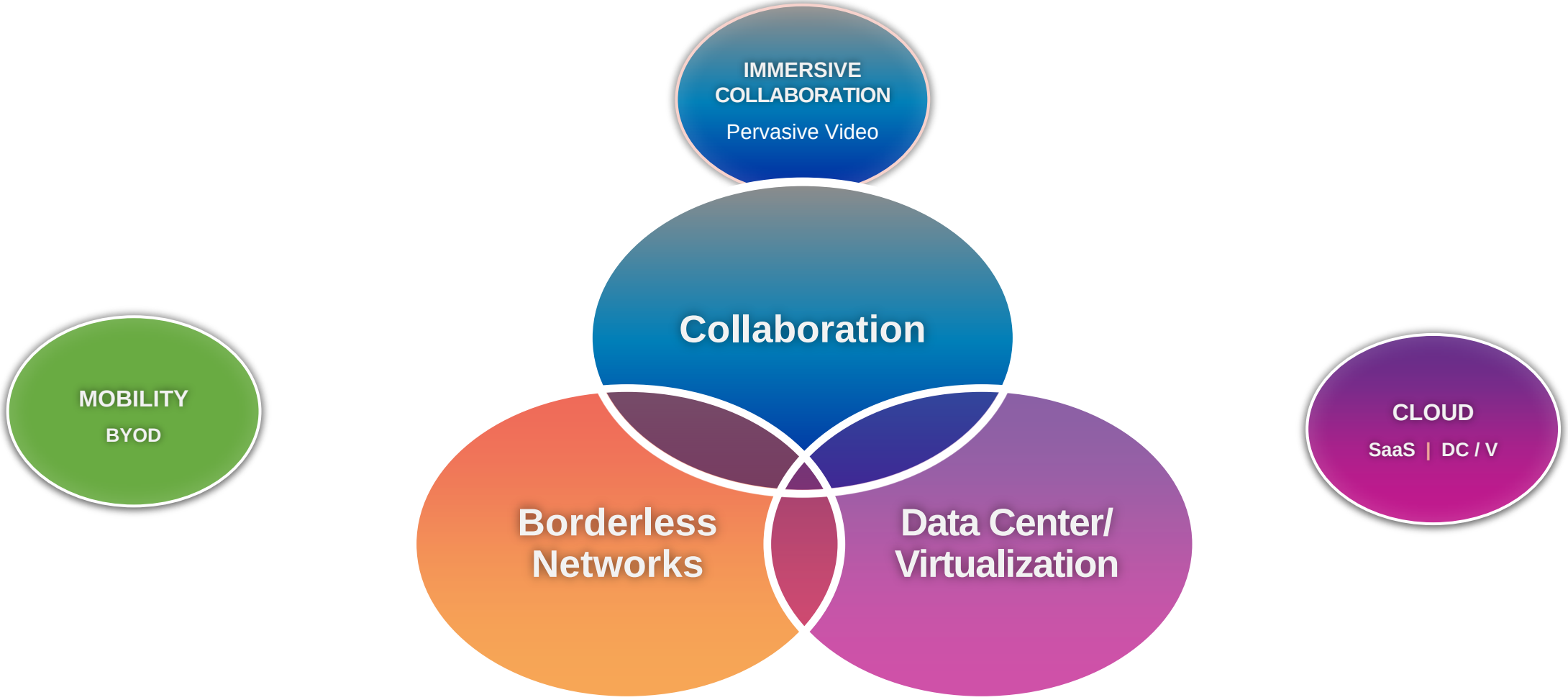
Enabled by: *'Good Enough' Network*

- Single Purpose
- Security as a Bolt-On
- Application and Endpoint Ignorant
- Basic QoS
- Standards-Based

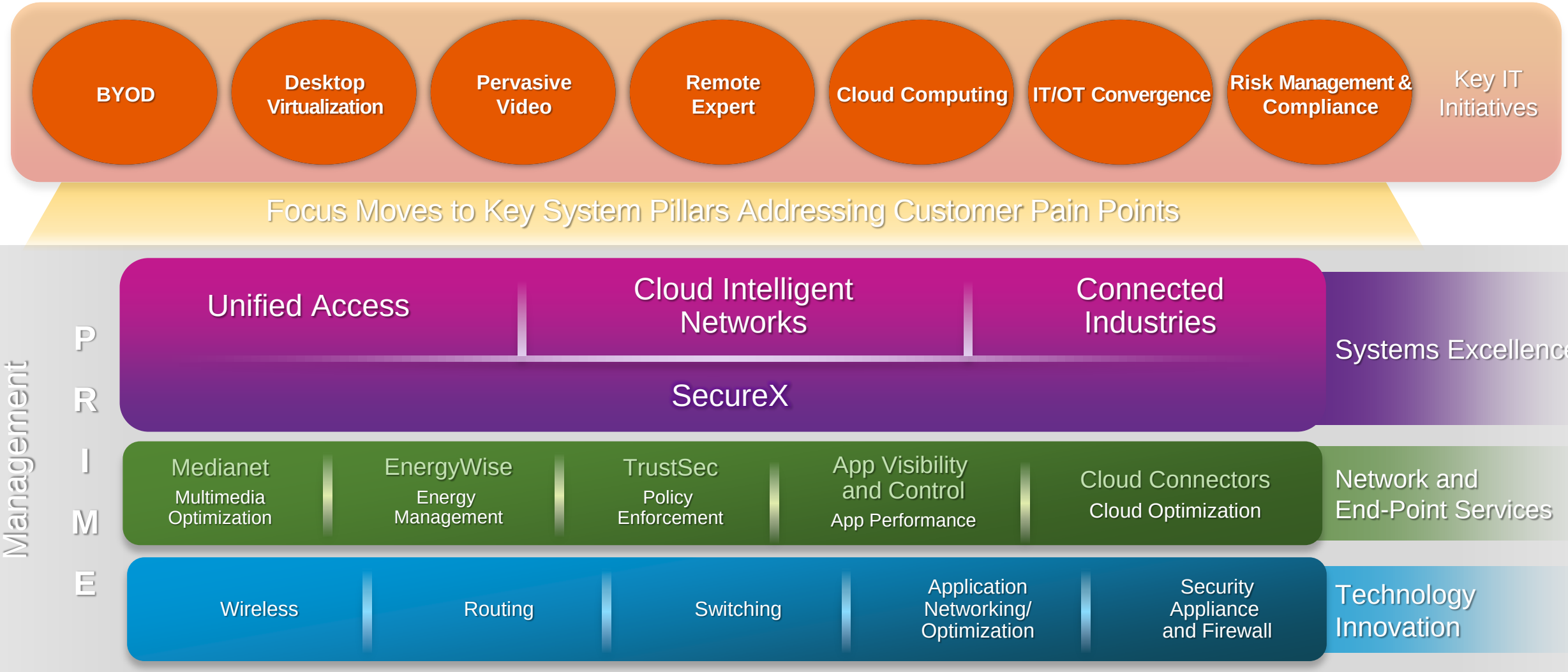
Enabled by: *Borderless Network Architecture*

- Multi-purpose: Energy Management, Building Control, Physical Security, Asset Tracking, etc.
- Integrated Security from Premise to the Cloud
- Application and Endpoint Intelligence with Policy, Optimization, and location-awareness
- Media Aware Control to Support Voice/Video Integration
- Standards + Innovations Driving Standards

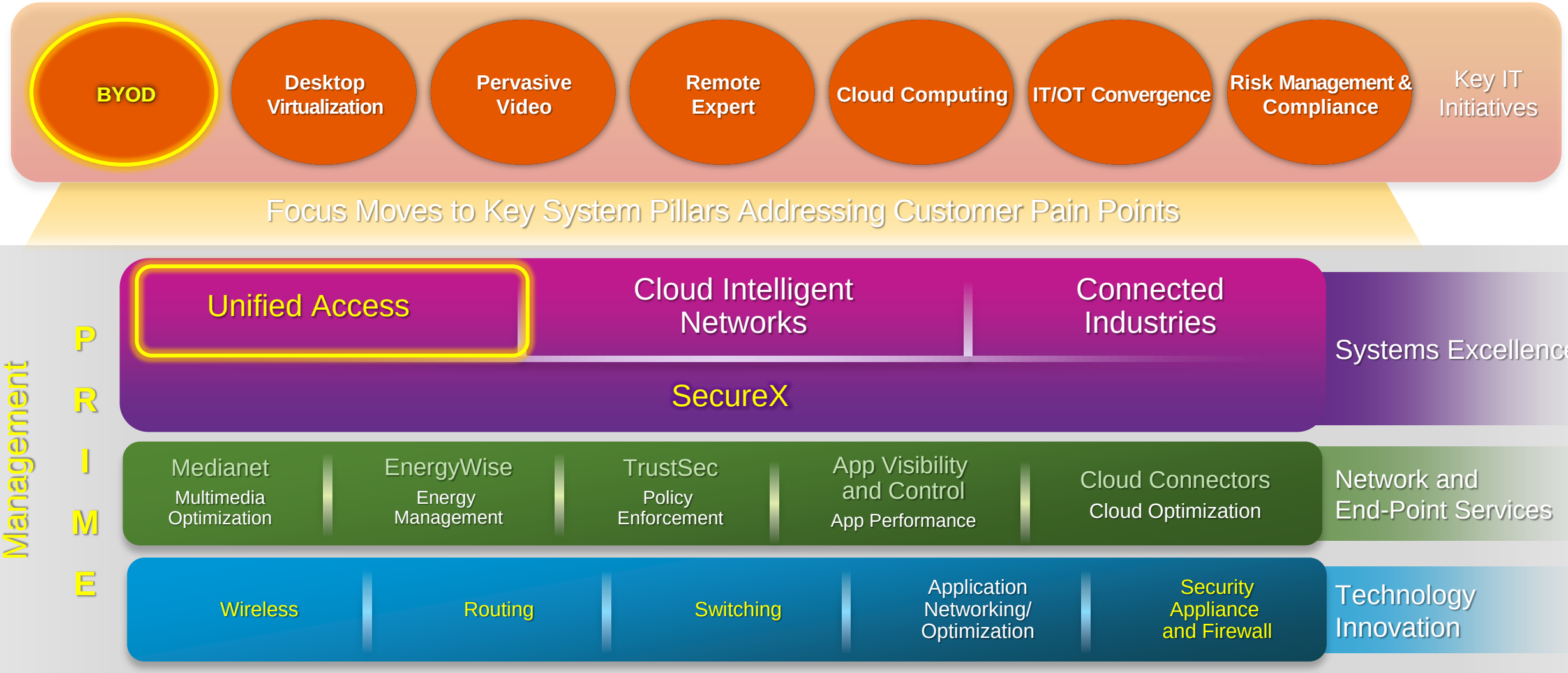
Cisco's Architectural Approach



Borderless Networks Framework

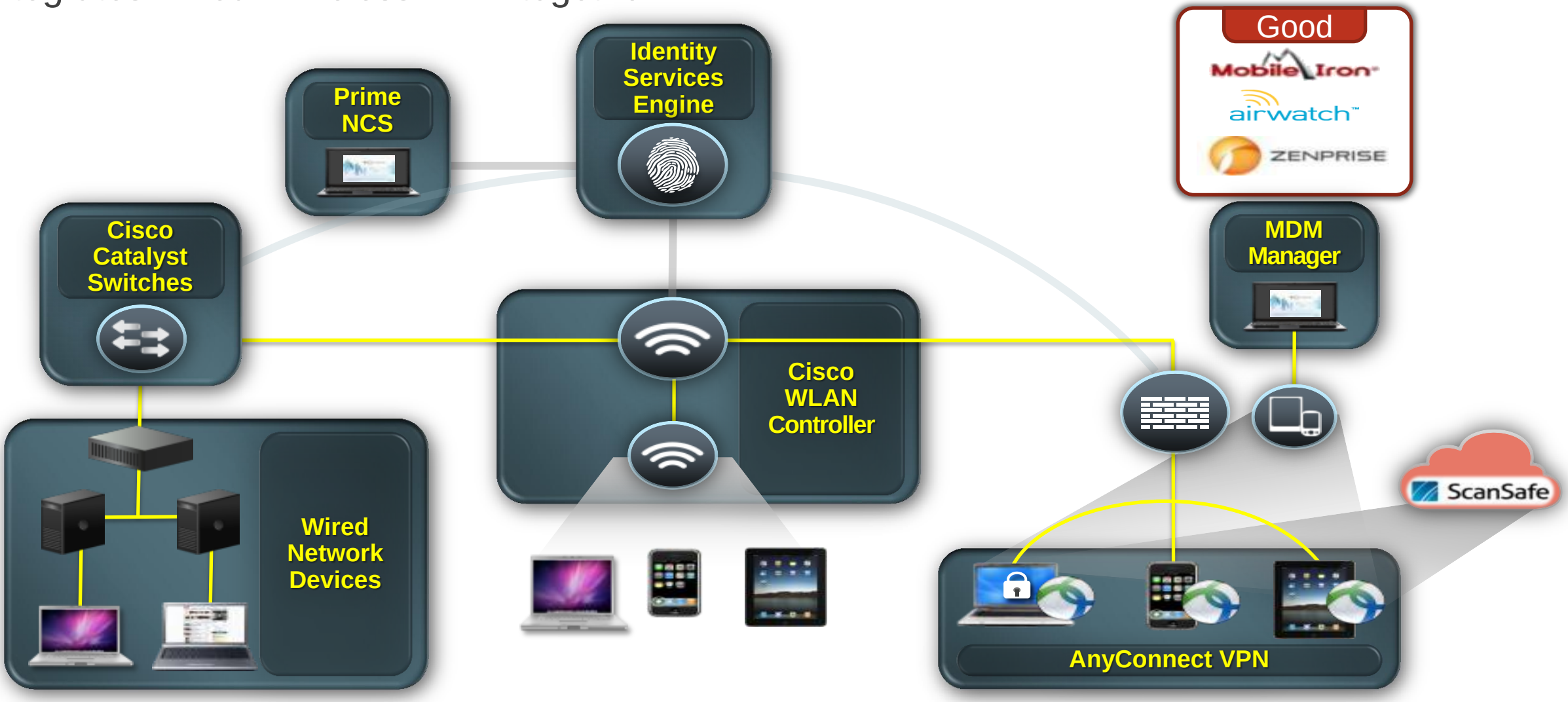


Borderless Networks Framework



Unified Access a Closer Look

Integrates Wired+Wireless+VPN together



Cisco Strategy for Converged Access

Agenda

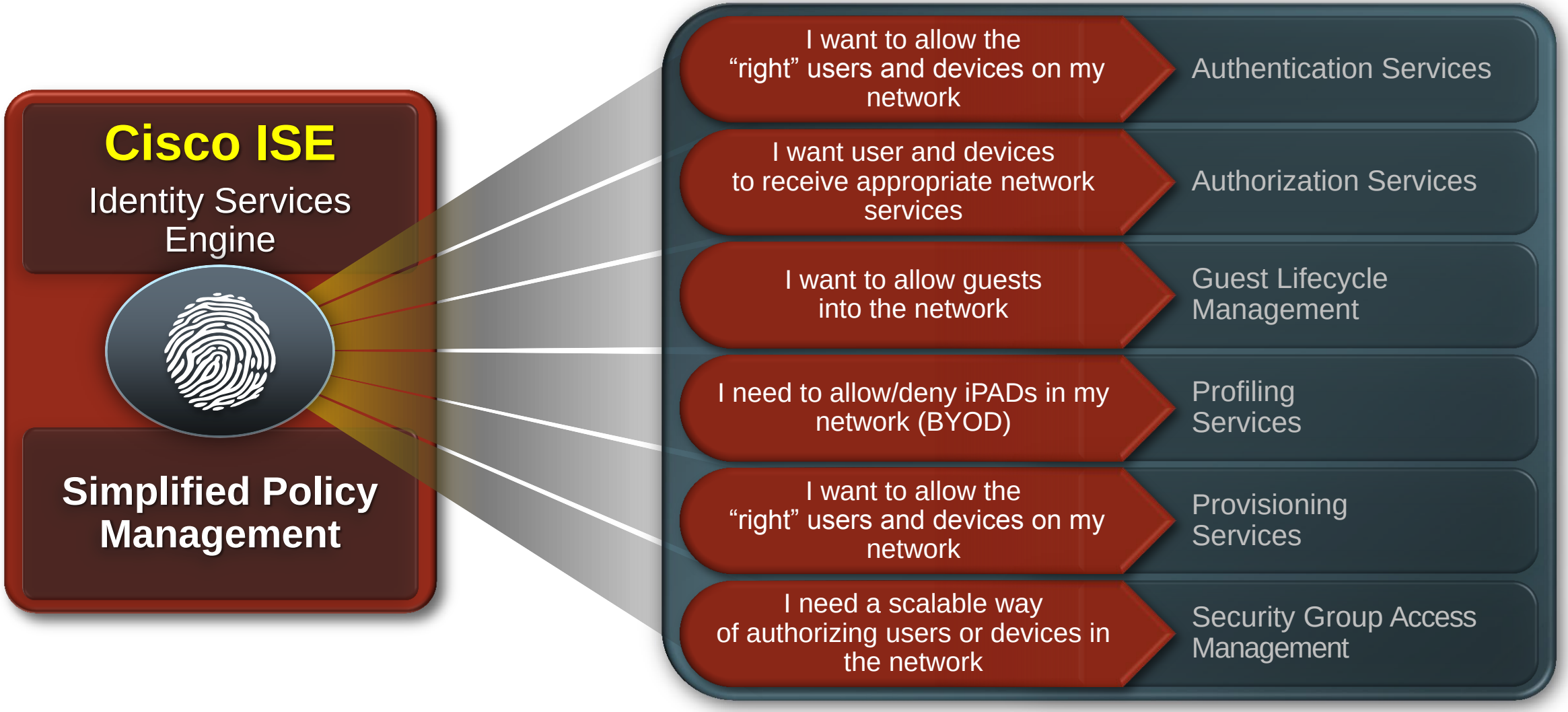
- Unified Access Architecture
- Technology Differentiators and Unified Access Strategy
- Cisco 3850 Unified Access Switch
- Deployment Scenario

Unified Access

Uncompromised User Experience on Any Workspace

Unified Access

Policy Management - A System to Implement



Unified Access – Simplified Management

Single Pane of Glass View and Management

Converged Access Management for Wired and Wireless Networks

Wireless | Wired | Security Policy | Network Services

- Converged Security and Policy Monitoring
- Contextual status and monitoring dashboards across wired and wireless networks

- Improves IT efficiency
- Provides single view of all user access data
- Advanced troubleshooting - Less time and resources consumed

- Integration with Cisco NCS Prime

Improved Network Visibility • Faster Troubleshooting • Eliminate Configuration Errors

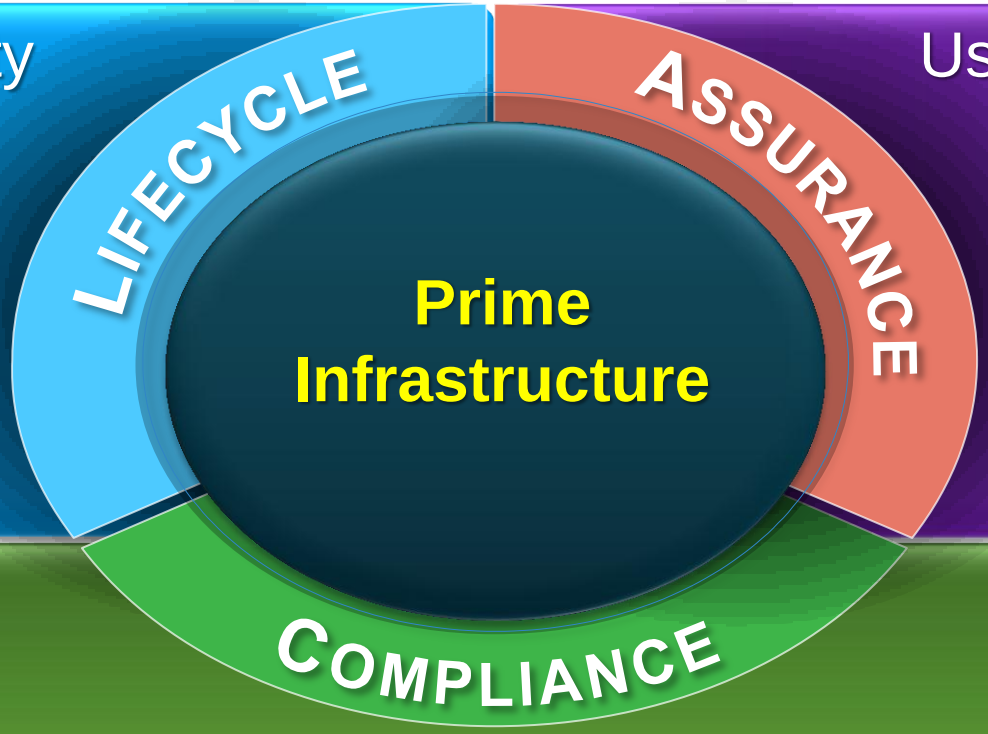
One Management with Cisco Prime Infrastructure

Integrated Wired/Wireless Lifecycle and Assurance Management

Operational Productivity

Automated Best Practices

- Wired/wireless, Branch/WAN
- Integrated lifecycle
- Cisco best practices built in
- PnP Deployment
- "Day 1" device support



User Productivity

User, Site & App Experience

- Application performance visibility
- User & site-level visibility
- Proactive monitoring
- Real-time troubleshooting
- "Prime 360" diagnostic views

- Regulatory and best practice policies
- Automated audit and reporting
- Centralized remediation

Regulatory & Operational Compliance

Unified Access

Ensuring Ubiquitous and High Quality

CleanAir

Interference Protection

Detect, Classify, Locate and Mitigate Interference
Improving Network Reliability and Performance

ClientLink

Improved Client Performance

Beam Forming = More Bars Everywhere
and a Superior User Quality of Experience

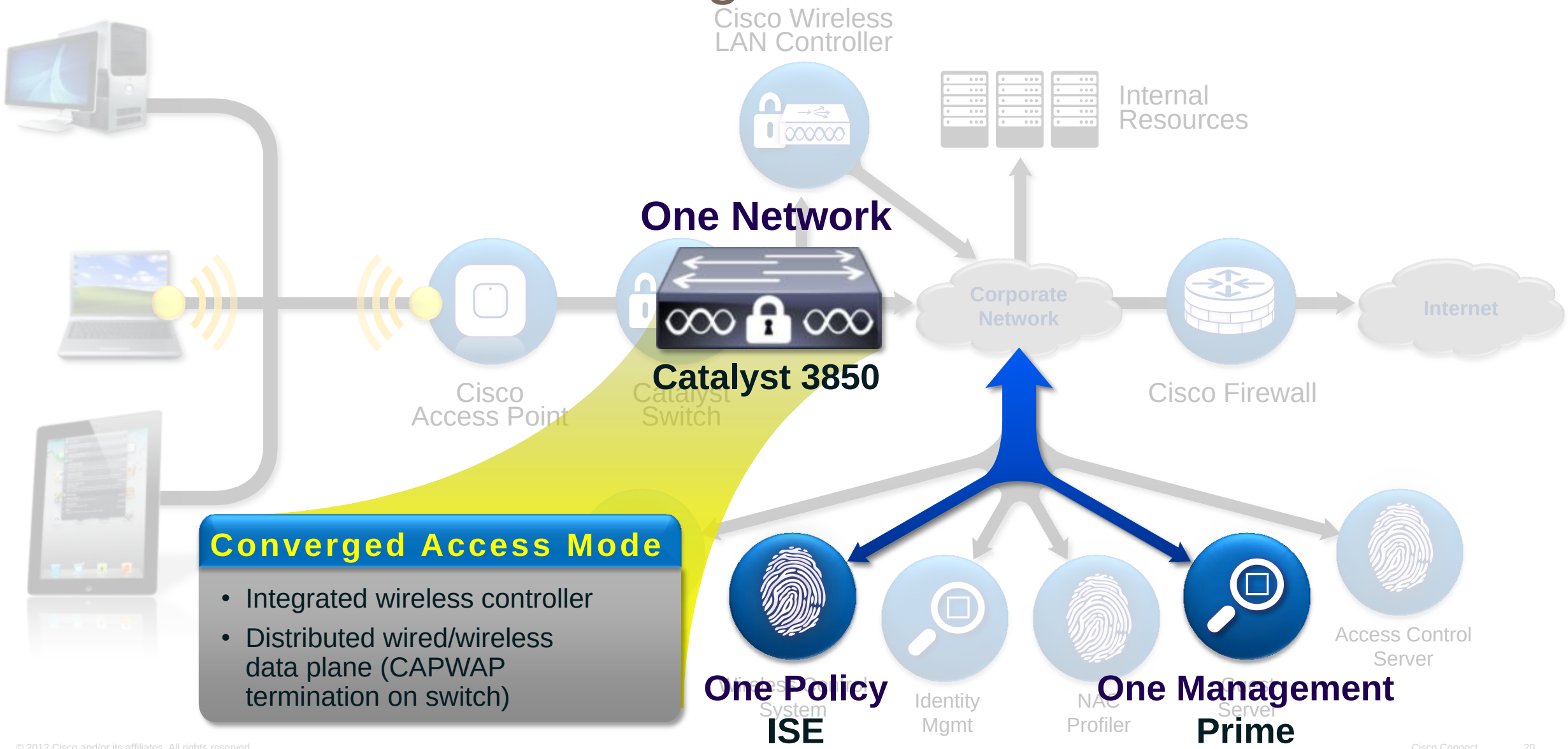
VideoStream

Superior Video Quality

Improves predictability and performance
to deliver Wired-like video experience
over Wireless

- Multicast to Unicast Conversion AP
- Selectable Stream Prioritization
- Resource Reservation Prevents Oversubscription

One Network with Converged Access



Evolution of Network Access

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Single Platform for Wired and Wireless

20+ Years of IOS Richness – Now on Wireless

Wireless

Features:

- 802.11n
- CleanAir
- VideoStream
- Radio Resource Management (RRM)
- Wireless Intrusion Prevention System (WiPS)
- 802.11ac Ready

Wired

Features:

- Stacking
- Stackpower
- Trustsec/Identity
- AVC/Medianet
- Flexible Netflow
- Granular QoS
- Smart Operations
- EnergyWise

Benefits

- Built on **Doppler** – Cisco's Innovative Flexparser ASIC technology
- Eliminates operational complexity
- Single Operating System for wired and wireless

Note: All features may not be available on new platforms at introduction but are expected to be added within 12-18 months

Catalyst 3850 Highlights

Integrated Wireless LAN Functionality

- Common features across wired and wireless

New differentiated services

- IOS XE – Extensible Modular Operating System
- Flexible Netflow
- Granular QoS
- TrustSec*
- SDN Ready (OnePK and Openflow)

Best-in-class stackable switch

- Performance – Line rate 480G Stackwise Technology
- Full POE+ support, UPOE option*
- Modular Network Modules – up to 4x10G
- High Availability with Stack SSO and StackPower
- Multi-core CPU
- EEE
- Enhanced Software Programmable (ESP) ASIC

* Roadmap

Key Highlights:

The Best-in-class Stackable Access Switch: Cisco Catalyst 3850 Switch is the most scalable and feature rich access platform with industry's highest 480 Gbps stacking bandwidth to meet current and future network demand including gigabit desktop and 802.11ac wireless. Cisco Catalyst® 3850 Switch delivers the following advanced capabilities:

- High performance 24/48 port GE switch, with 480 G stacking
- Granular, hierarchical bandwidth management
- 4X1/2X10/4X10 G uplinks
- StackPower
- Full POE+
- Multi-core CPU
- Flexible NetFlow on all ports
- FRU fans, power supplies, uplinks

Catalyst 3850 – Wireless Capabilities

- CAPWAP termination and DTLS in Hardware
- 40G wireless capacity/switch
  - Capacity increases with members
- 50 APs and 2000 clients/switch stack
- Wireless switch peer group support for faster roaming: latency sensitive applications
- Supports IPv4 and IPv6 client mobility
- AP's must be directly connected to Catalyst 3850
- Requires IP Base license level for Wireless functionality

Best-in-Class Wired Switch – with Integrated Wireless Mobility functionality

TCAM/HASH availability for L2,L3, ACEs, Multicast for IPv4

Improved Hardware Resources

Field	Catalyst 3750X	Catalyst 3850
MAC addresses	4k	32k
Unicast Routes*	6k	24k
IGMP Groups and Multicast routes	1k	8k
Security ACEs	2k	3k
QOS ACEs	0.5k	2.8k
PBR ACEs	0.5k	1.2k

IPv6 consumes 2 entries in the look-up table

* - in the HASH

Comparing “Access” SDM template on 3750x with “Advanced” SDM template on 3850

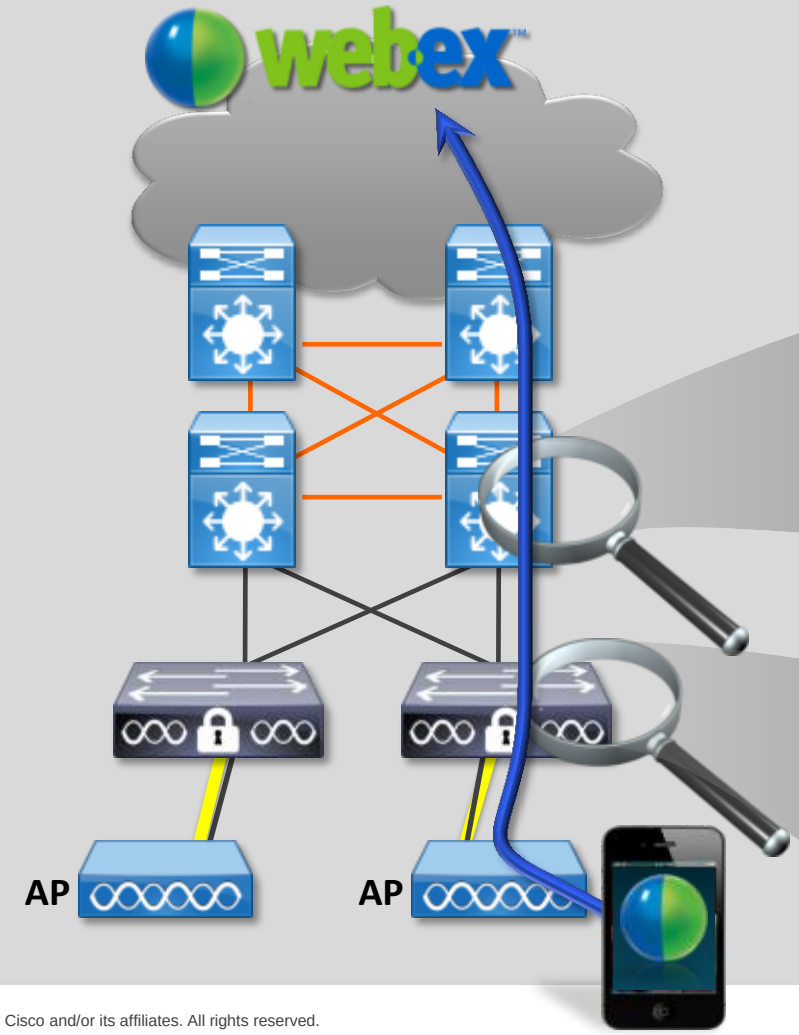
Catalyst 3750-X and Catalyst 3850

Features	Catalyst 3750-X	Catalyst 3850
Stacking	64 Gbps	480 Gbps
IOS Wireless Controller	No	Yes
Queues per Port	4	8
QOS Model	MLS	MQC
Uplinks	2 x 10 Gbps	4 x 10 Gbps
Buffers	6MB/48 port model	12MB/48 port model
Stackpower	Yes	Yes
Native Flexible Netflow Support	No	Yes
Multi-Core CPU for Hosted Services	No	Yes
Flash Size	64 Mb	2 Gb
Operating System	IOS on 15.0 release train	IOS-XE on 15.0 release train

Key Technology Differentiators

Network Wide Visibility for Faster Troubleshooting

Converged Access Deployment



Employee joins webex call on iPhone

Employee iPhone connected

Benefits

- **Track applications at every hop**
  - CAPWAP Tunnel terminated at the access switch
- **Root cause issues quickly**

- **App level visibility –** Flexible Netflow, Wireshark
- **Media Troubleshooting** – Medianet

Device Identification
- Device Profiling

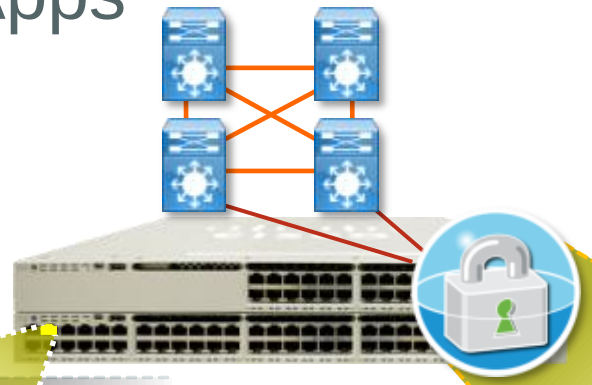
AP CAPWAP Tunnel

Consistent Security and Quality of Service Control

Support for Mission Critical Apps

Unprecedented

Hierarchical Bandwidth Management



Security

- Identity
- Device Profiling
- SGT/SGACL**
- Control Plane Policing
- MACSec Ready
- Port Security
- DHCP Snooping and IP Source Guard
- Wireless Intrusion Prevention System (WiPS)

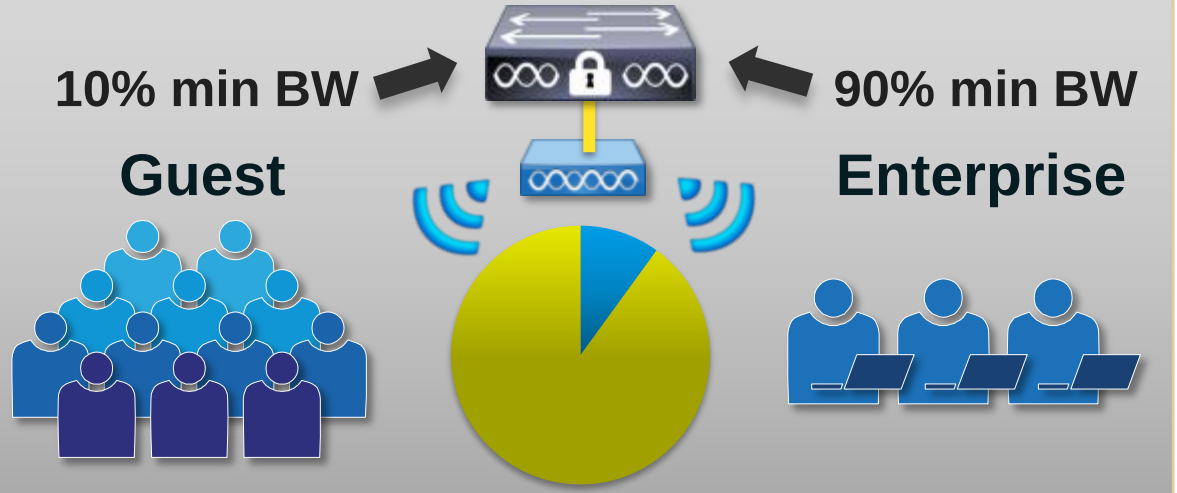
*Based on L3/4, L4-7 within 9 months after FCS

**Software roadmap – within 9 months after FCS

Hierarchical Bandwidth Management

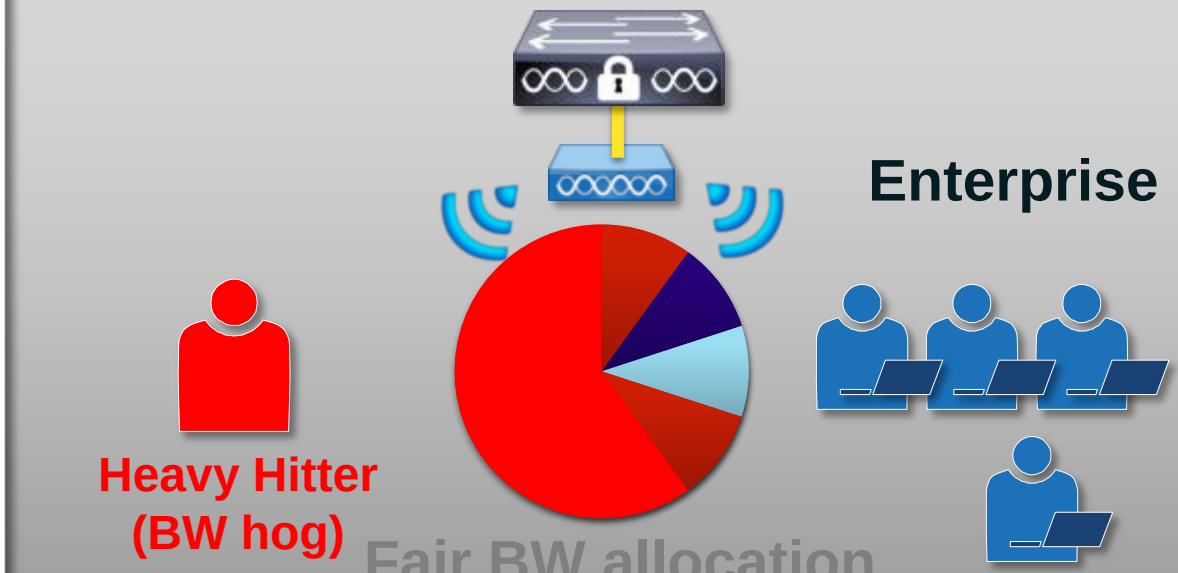
per SSID Bandwidth

Converged Access
Deterministic SSID bandwidth

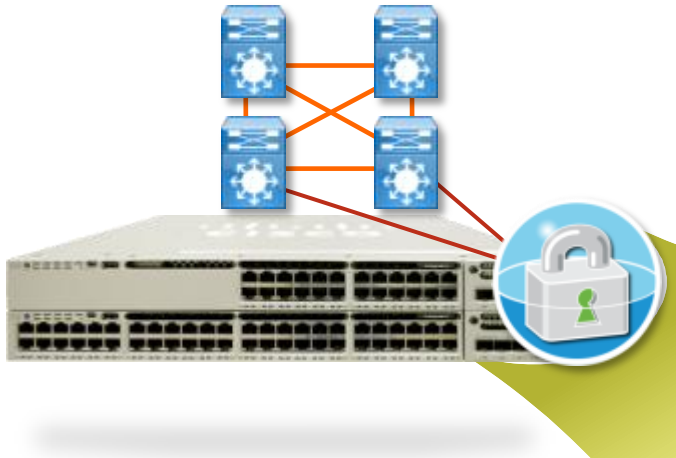


Fair Sharing

Usage based fair bandwidth allocation



Security – For Wired and Wireless

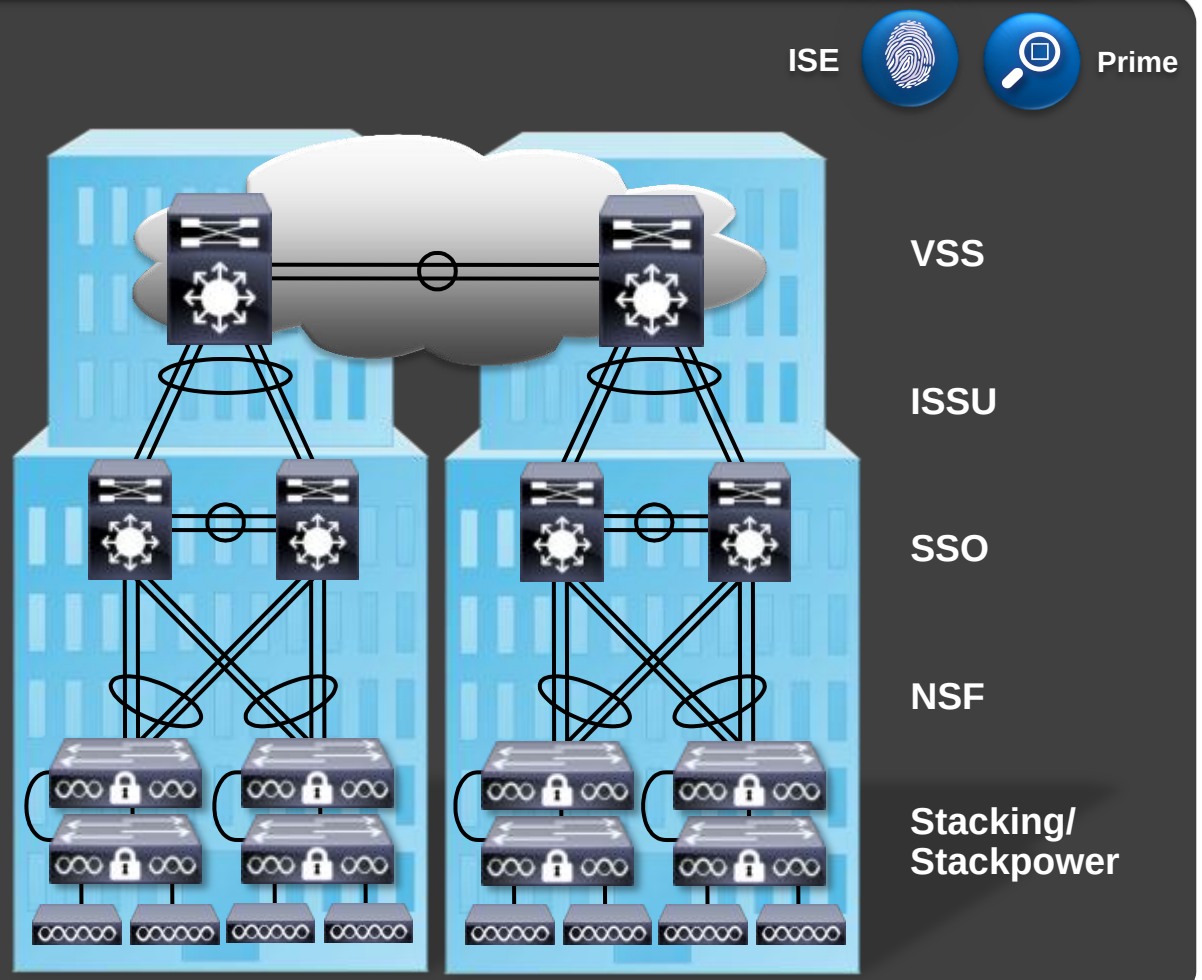


Session Aware Networking

- **Single Point of Policy Enforcement for Wired and Wireless:**
  - Session based access – simplifies on-boarding and policy application
  - Wired – Port based 802.1x authentication, Web auth, MAB. Flex-auth support available for wired.
  - Wireless – 802.1x, MAB, Web Auth
- **Wireless Intrusion Prevention System (WiPS) for protection against wireless attacks**
  - Supports integration with MSE
- **Control Plane Protection (Static configuration at FCS)**
- **Roadmap for other Trustsec features –** Device Sensor, MACSec, IPv6 FHS, SGA (12 – 18 months after FCS)

Maximum Resiliency with Stateful Recovery

Converged Access Deployment



Benefits

- Sub-Second AP Stateful failover (no SSID outage)
- Rich resiliency features available across switch and controller
- Works seamlessly with Cisco's Resiliency Best Practices

Proven Cisco Resiliency Design across wired and wireless

Deployment Models

Agenda

- Unified Access Architecture
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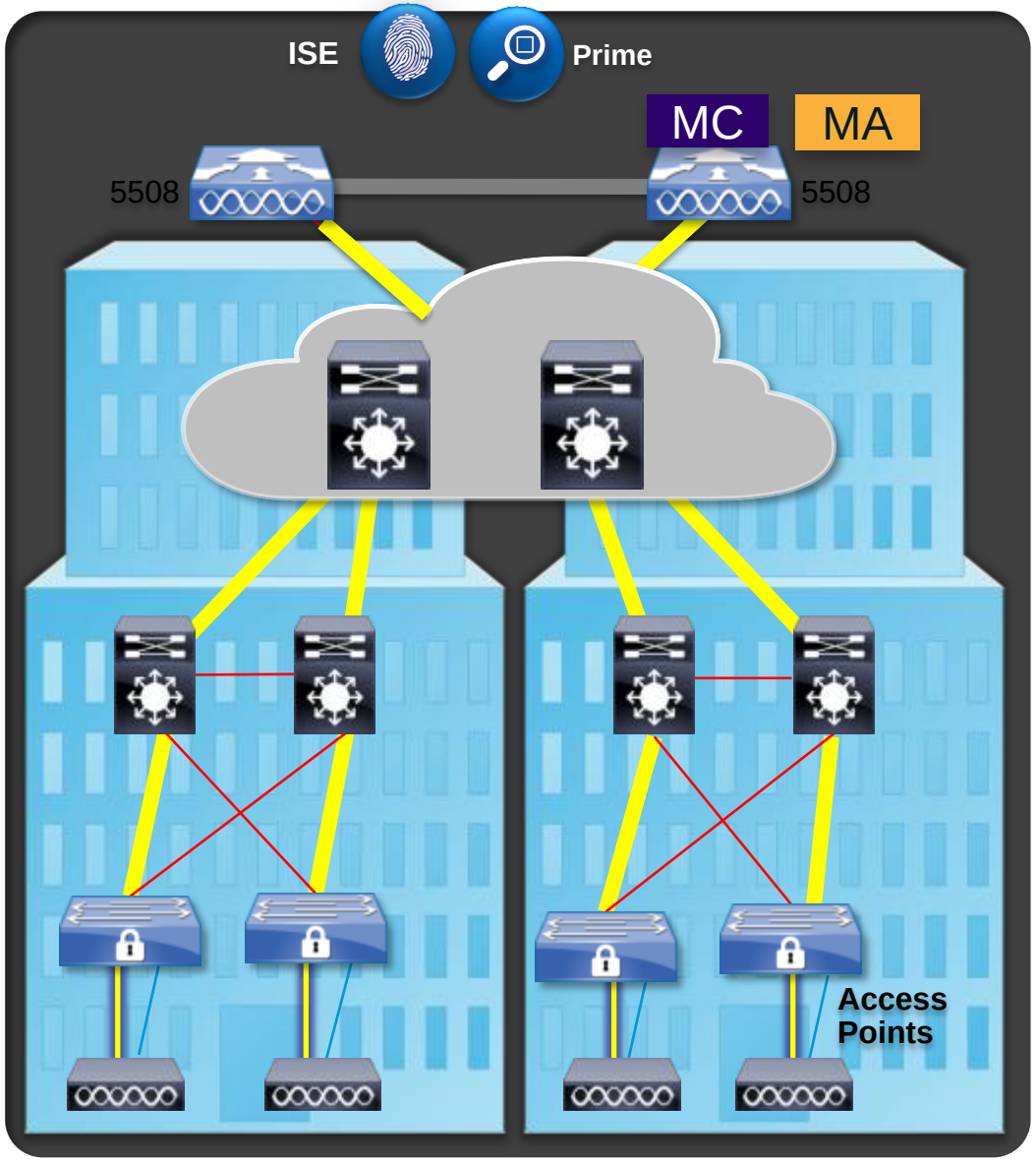
Current Deployment Model
The Wireless LAN Controller



Known Deployment Model

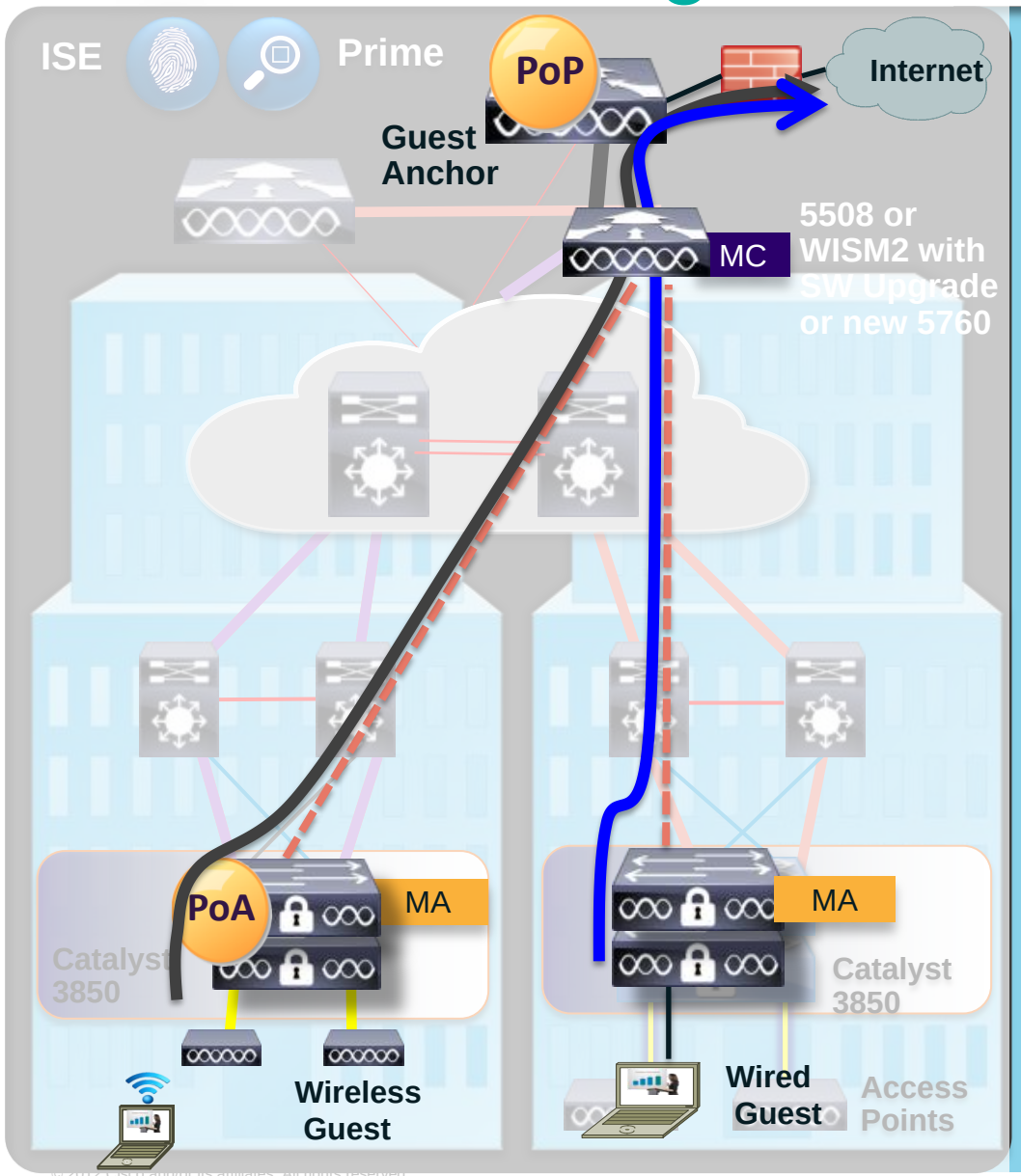
Software components within the Wireless LAN Controller today:

- **Mobility Agent (MA) is responsible for:**
  - AP CAPWAP termination
  - Maintaining client database
  - Policy enforcement
- **Mobility Controller (MC) is responsible for:**
  - Client Mobility
  - Radio Resource Management (RRM)
  - WiPS, Spectrum Management

Inter--Controller EoIP/CAPWAP tunnel

AP-Contoller CAPWAP tunnel

Guest Tunneling – Wired* and Wireless



Wireless Guest Tunneling:

- PoA for wireless guest is at MA
  - Client QoS is done here
- PoP for wireless guest is at the Guest Anchor
  - ACL enforcement is done here

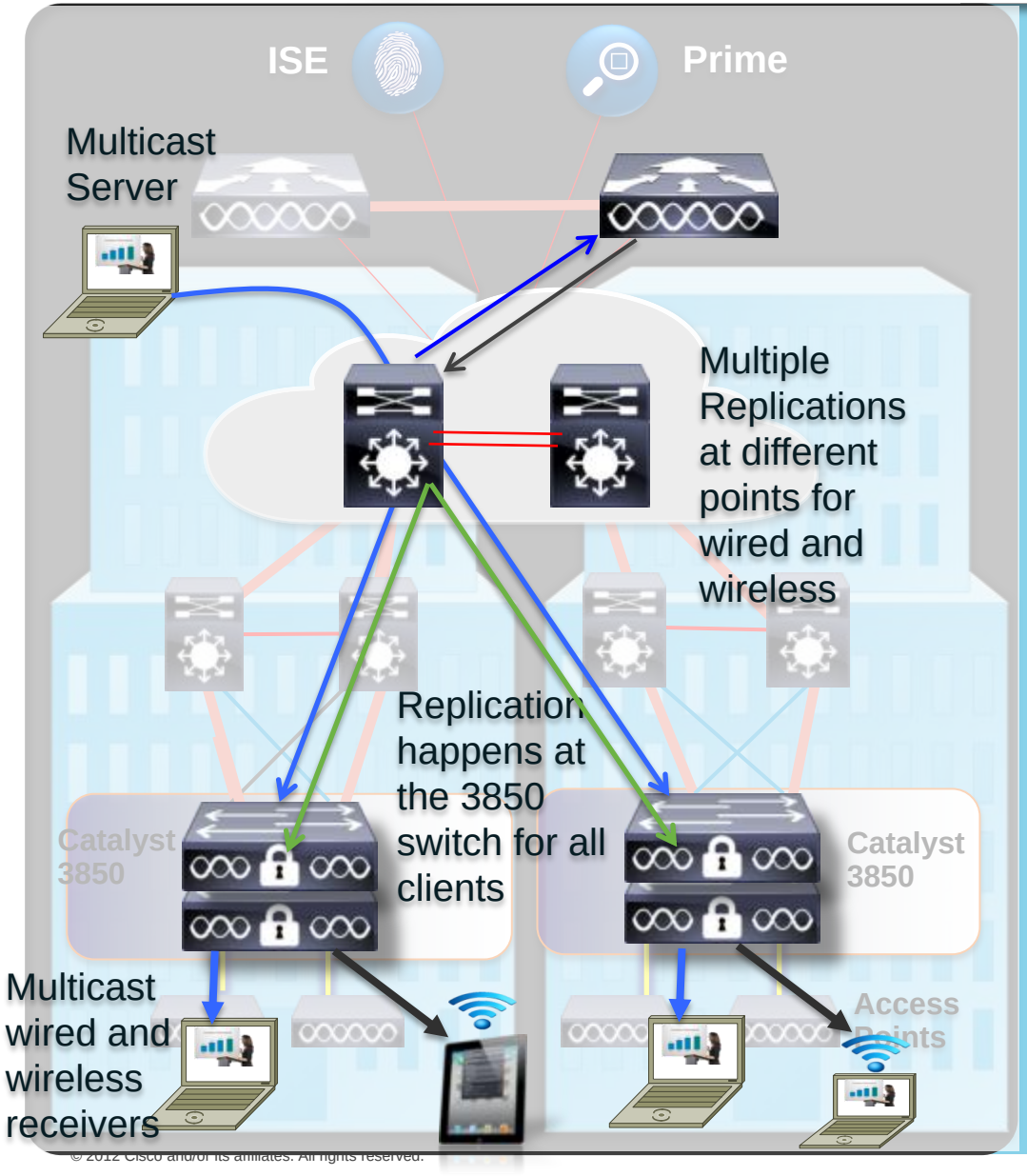
Wired Guest Tunneling*:

- Wired Guest Traffic is mapped to guest VLAN and is tunneled to the Guest Anchor

* - SW Roadmap (12 – 18 months after FCS)

Guest Tunnels
Mobility Tunnels
AP Capwap Tunnels

Multicast Optimization for Scalable Deployments



Multicast with Traditional Deployments (Multicast-Multicast mode)

- Wired Multicast Replication happens at the switch
- Wireless Multicast Replication happens at the Controller

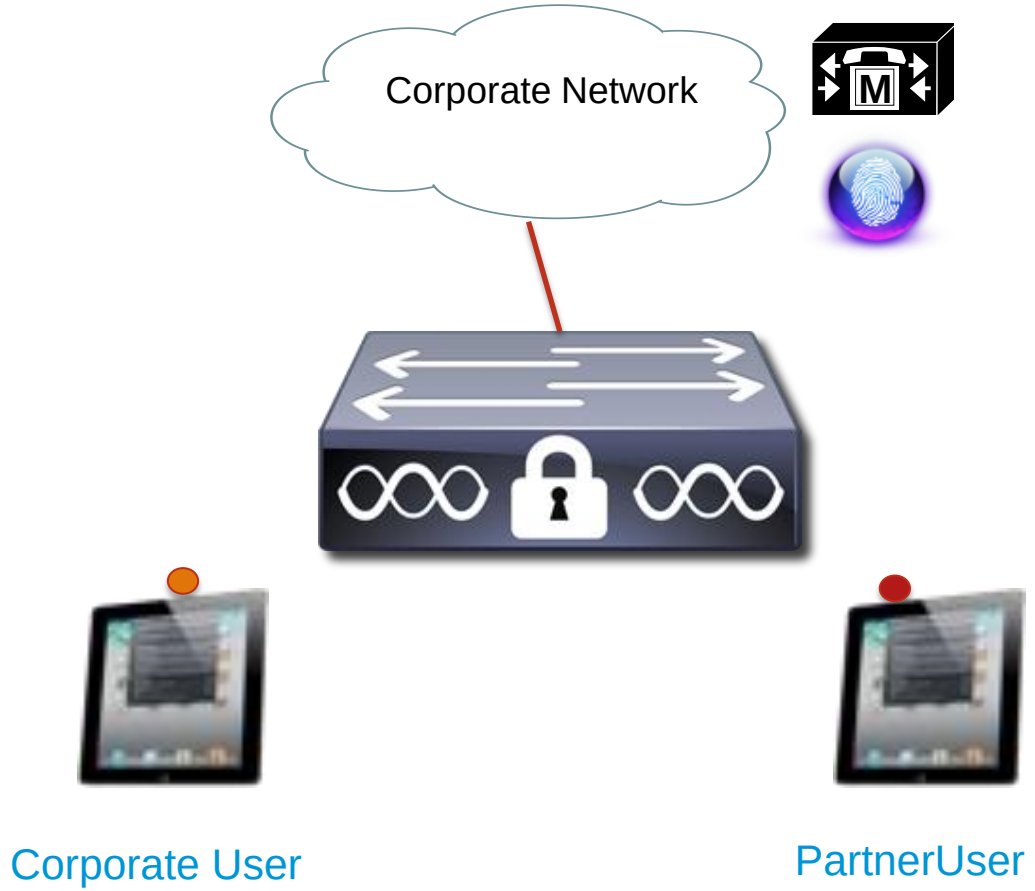
Multicast Optimization with Converged Access

- Wired and Wireless Multicast Replication happens at the 3850 switch
- Reduces the number of streams for the same traffic type in the network

Wired Multicast Traffic **Wireless Multicast Traffic**

Integrated Controller

- Single Platform
- Differentiated Policies per client
- Collaboration takes best available path



Network Topology

Corporate Network

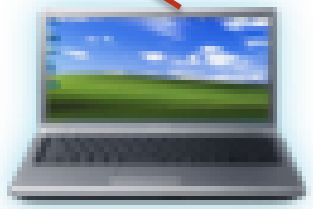
Mobility Coordinator / Mobility Agent

Common VLAN for Wired and Wireless

GLOBAL_HAWK - Corporate SSID

Corporate User

Partner User



Wired Corporate User

Converged Access –
Components – Physical vs. Logical Entities

Physical Entities –

- **Mobility Agent (MA)** – Terminates CAPWAP tunnel from AP
- **Mobility Controller (MC)** – Manages mobility within and across Sub-Domains
- **Mobility Oracle (MO)** – Superset of MC,
  allows for Scalable Mobility Management within a Domain

Logical Entities –

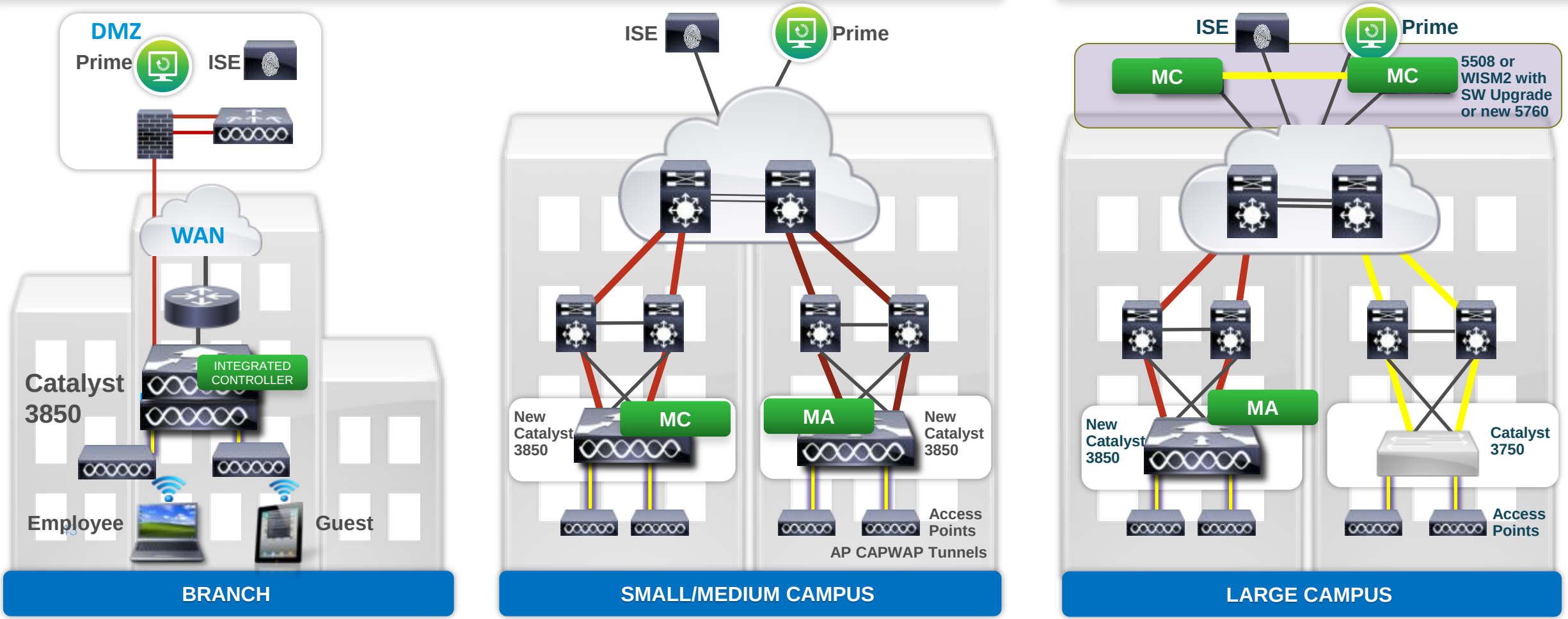
- **Mobility Groups –** Grouping of Mobility Controllers (MCs)
  to enable Fast Roaming, Radio Frequency Management, etc.
- **Switch Peer Group (SPG) –** Localizes traffic for roams within its Distribution Block

MA, MC, Mobility Group functionality all exist in today's controllers (4400, 5500, WiSM2)

Converged Access Deployment Mode

INTEGRATED CONTROLLER OPTIONS

EXTERNAL MOBILITY CONTROLLER NEEDED



BRANCH

UP TO 50 ACCESS POINTS
UP TO 2,000 CLIENTS
ALL WAN SERVICES AVAILABLE

SMALL/MEDIUM CAMPUS

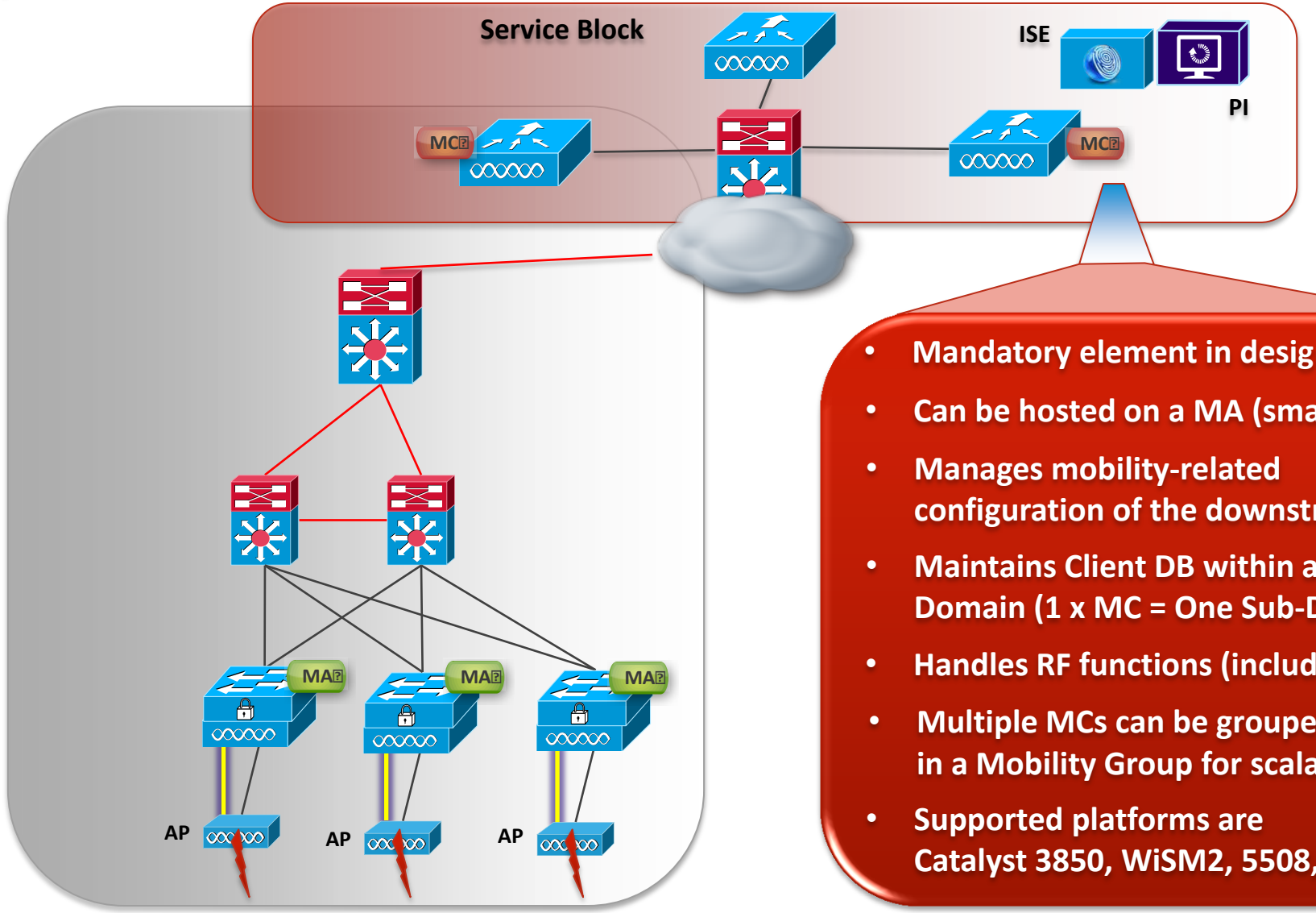
UP TO 250 ACCESS POINTS
UP TO 16,000 CLIENTS
VISIBILITY, CONTROL, RESILIENCY

LARGE CAMPUS

UP TO 72,000 ACCESS POINTS
UP TO 864,000 CLIENTS
LARGEST LAYER 3 ROAMING DOMAINS

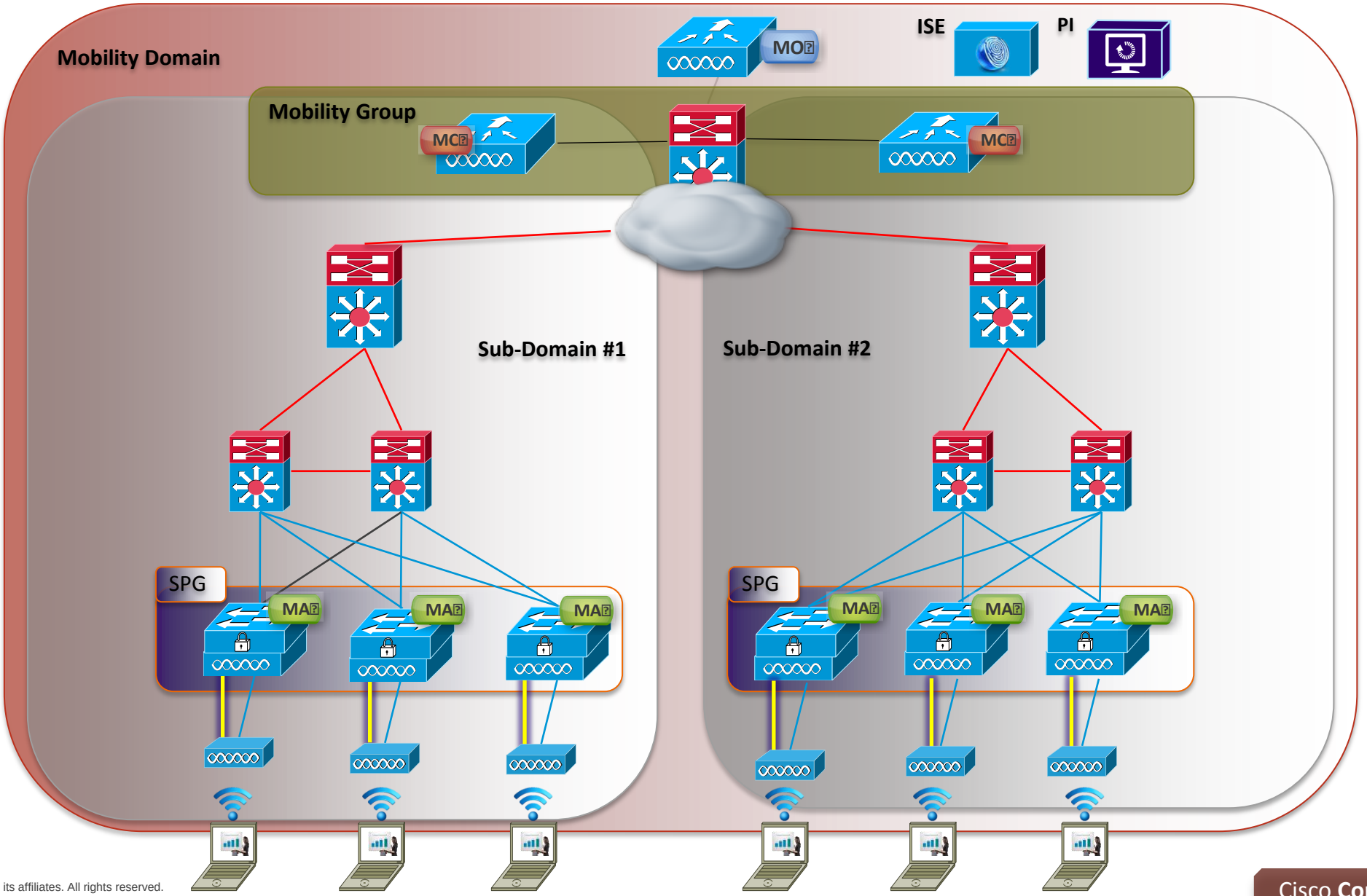
Capwap Tunnel
Standard Ethernet, No Tunnels
Guest Tunnel from Switch to DMZ Controller

Converged Access –
Physical Entities – Mobility Controllers (MCs)

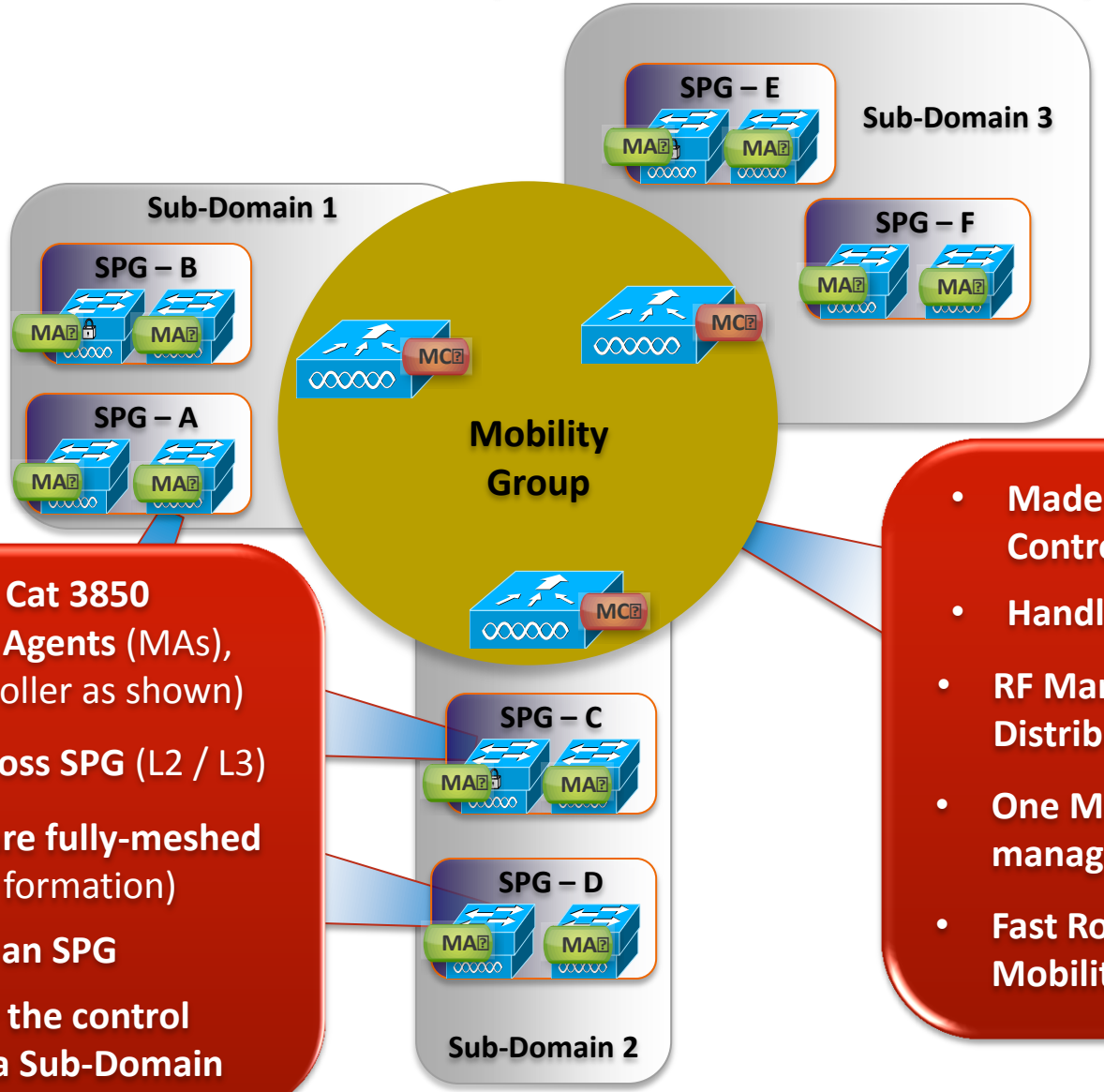


- Mandatory element in design
- Can be hosted on a MA (smaller deployments)
- Manages mobility-related configuration of the downstream MAs
- Maintains Client DB within a Sub-Domain (1 x MC = One Sub-Domain)
- Handles RF functions (including RRM)
- Multiple MCs can be grouped together in a Mobility Group for scalability
- Supported platforms are Catalyst 3850, WiSM2, 5508, and 5760

Converged Access – Deployment Overview



Converged Access –
Logical Entities – Switch Peer Groups and Mobility Group

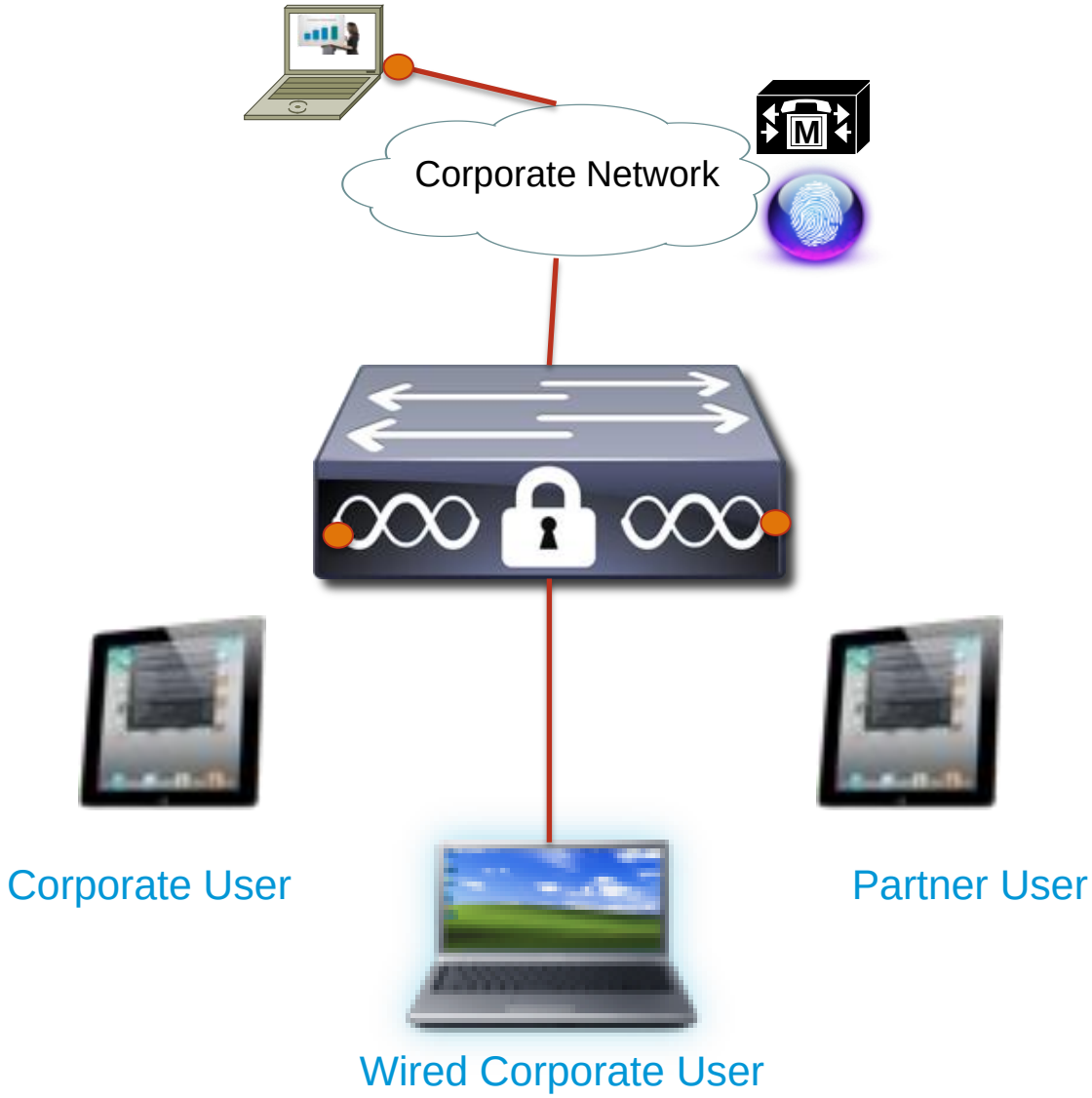


- **Made up of multiple Cat 3850 switches as Mobility Agents** (MAs), **plus an MC** (on controller as shown)
- **Handles roaming across SPG** (L2 / L3)
- **MAs within an SPG are fully-meshed** (auto-created at SPG formation)
- **Fast Roaming within an SPG**
- **Multiple SPGs under the control of a single MC form a Sub-Domain**

- **Made up of Multiple Mobility Controllers (MC)**
- **Handles roaming across MG** (L2 / L3)
- **RF Management (RRM) and Key Distribution for Fast Roaming**
- **One Mobility Controller** (MC) **manages the RRM for entire Group**
- **Fast Roams are limited to Mobility Group member MCs**

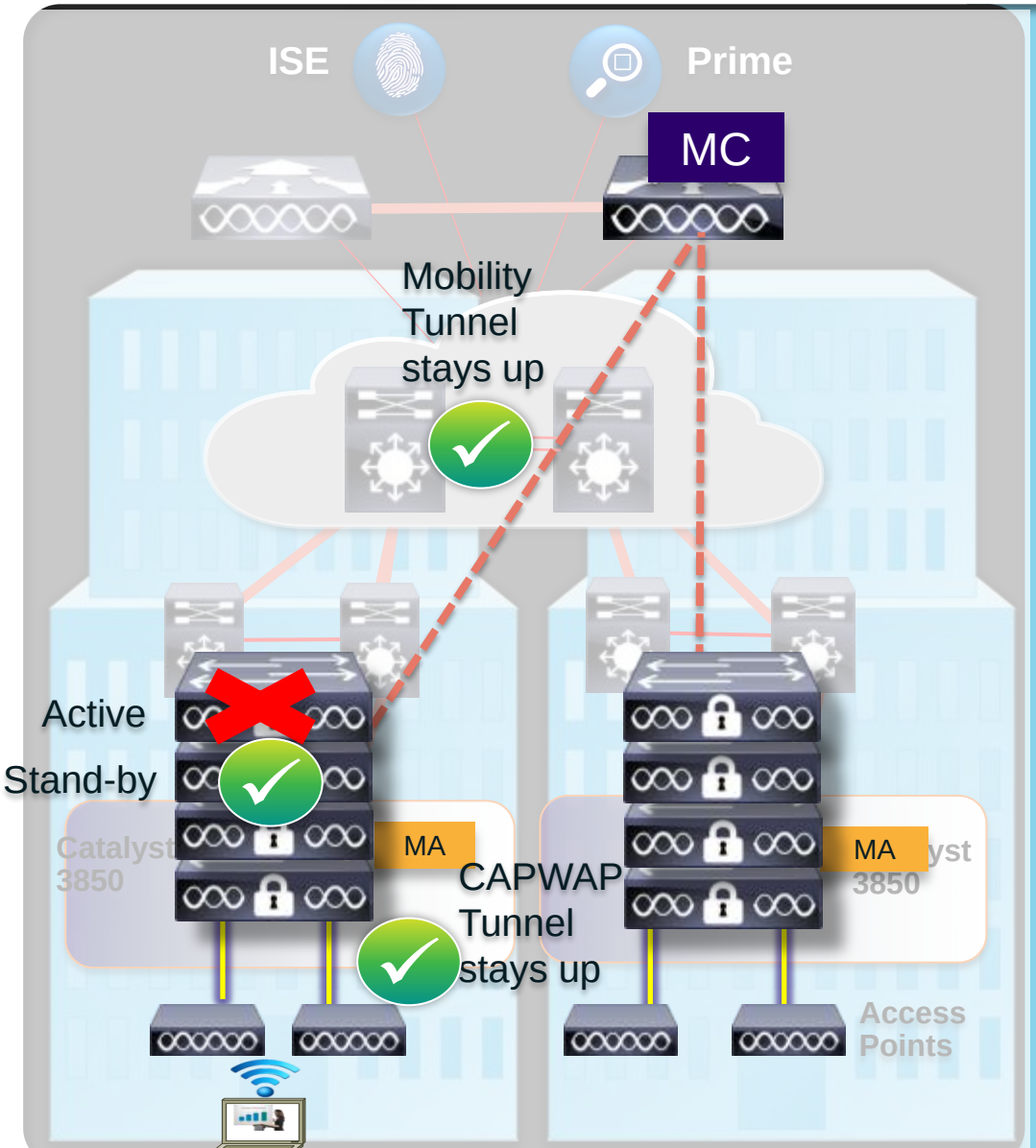
Multicast Optimization

- Multicast Replication happens at the switch – wired & wireless
- Seamless user experience for Wired & Wireless



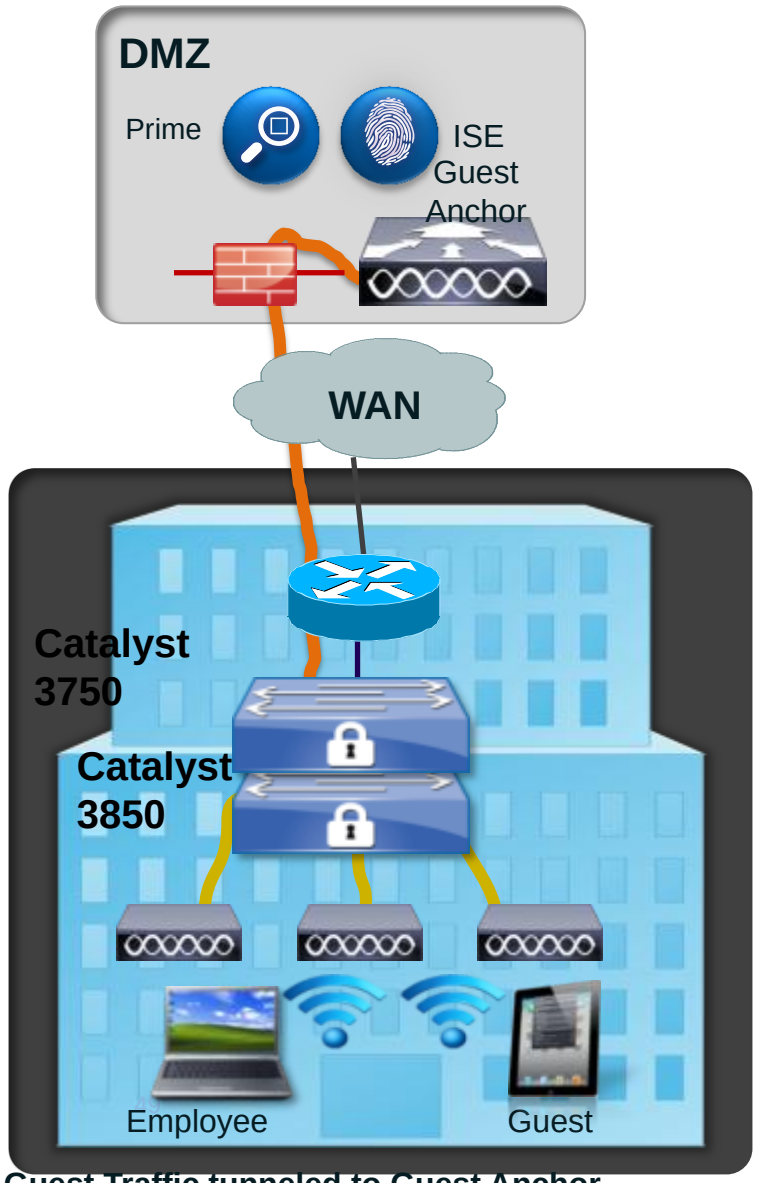
Resiliency

With Stacking, Stateful Switch-over and Stackpower,



- **Stacking: 480 Gbps**
  - Built on IOS SSO – Active/Stand-by
  - Utilizes the destination strip algo (like 3750X)
  - 4 member stack at FCS. 9 member in roadmap
  - No backward compatibility with 3750 series
  - Identical license on all members required
- **Stateful Switchover in Stacking:**
  - Improved state synchronization - forwarding information, Mobility, AP CAPWAP tunnels
  - 1:N redundancy for MC and MA
- **Stackpower:**
  - Power Supply Redundancy across stack
  - Zero footprint RPS

Branch Deployment with Converged Access



Guest Traffic tunneled to Guest Anchor

Scale:

- Up to 16k clients and 250 APs

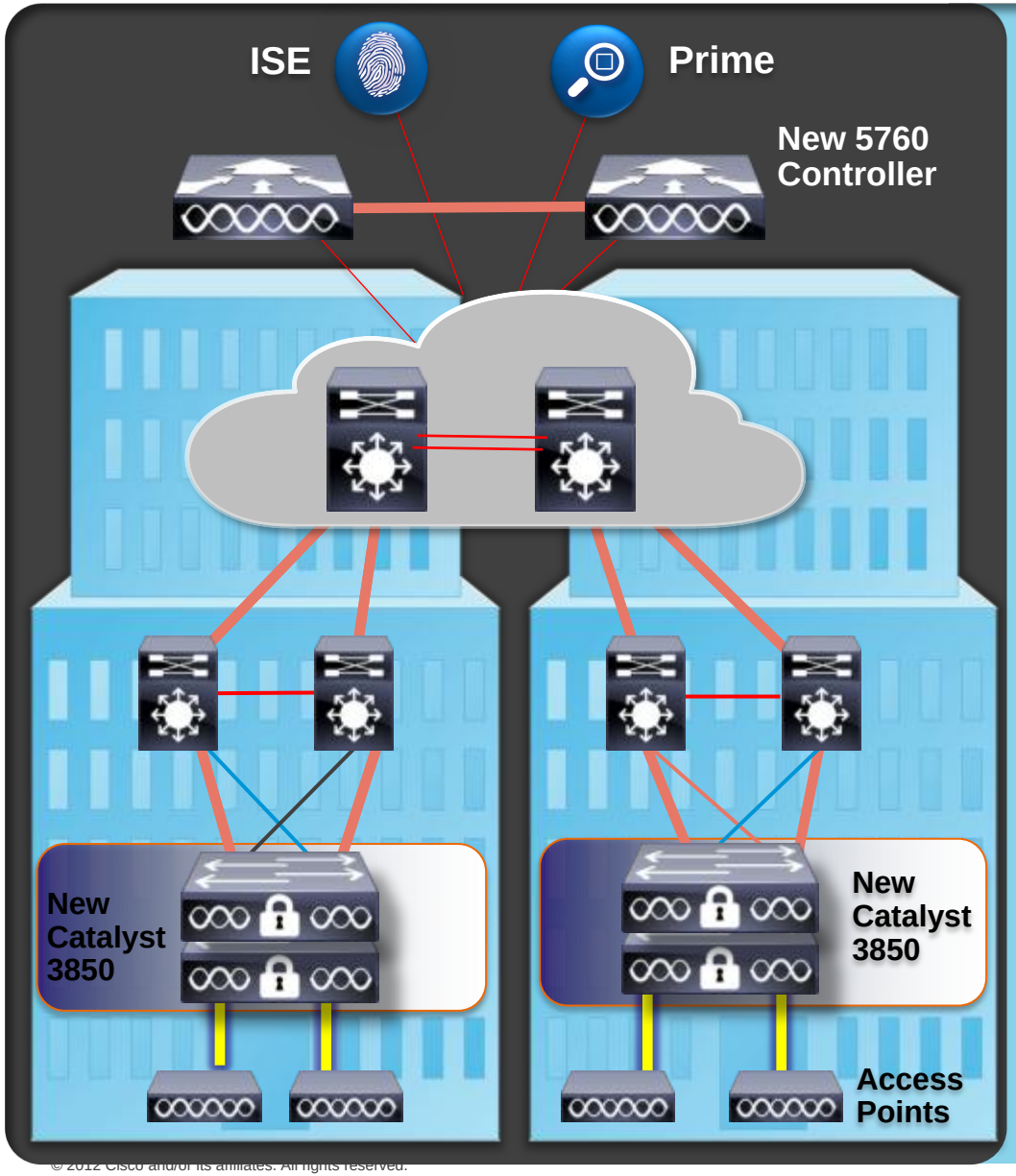
Migration:

- Access Layer Switch – Refresh using Catalyst 3850
- Guest access tunneled to DMZ
- Alternate guest segmentation with separate SSID

Benefits of Converged wired/wireless

- Integrated Controller – Catalyst 3850
- WAN dependency removed
- All WLAN features available locally
- WAN optimization, NetFlow, optimized multicast, Videostream, granular QoS
- Increased resiliency via next-generation stacking

Delivering Converged Access – Green Field



Catalyst 3850:

- Integrated wireless controller
- Distributed wired/wireless data plane (CAPWAP termination on switch)

WLC 5760:

- First IOS Based Wireless LAN Controller

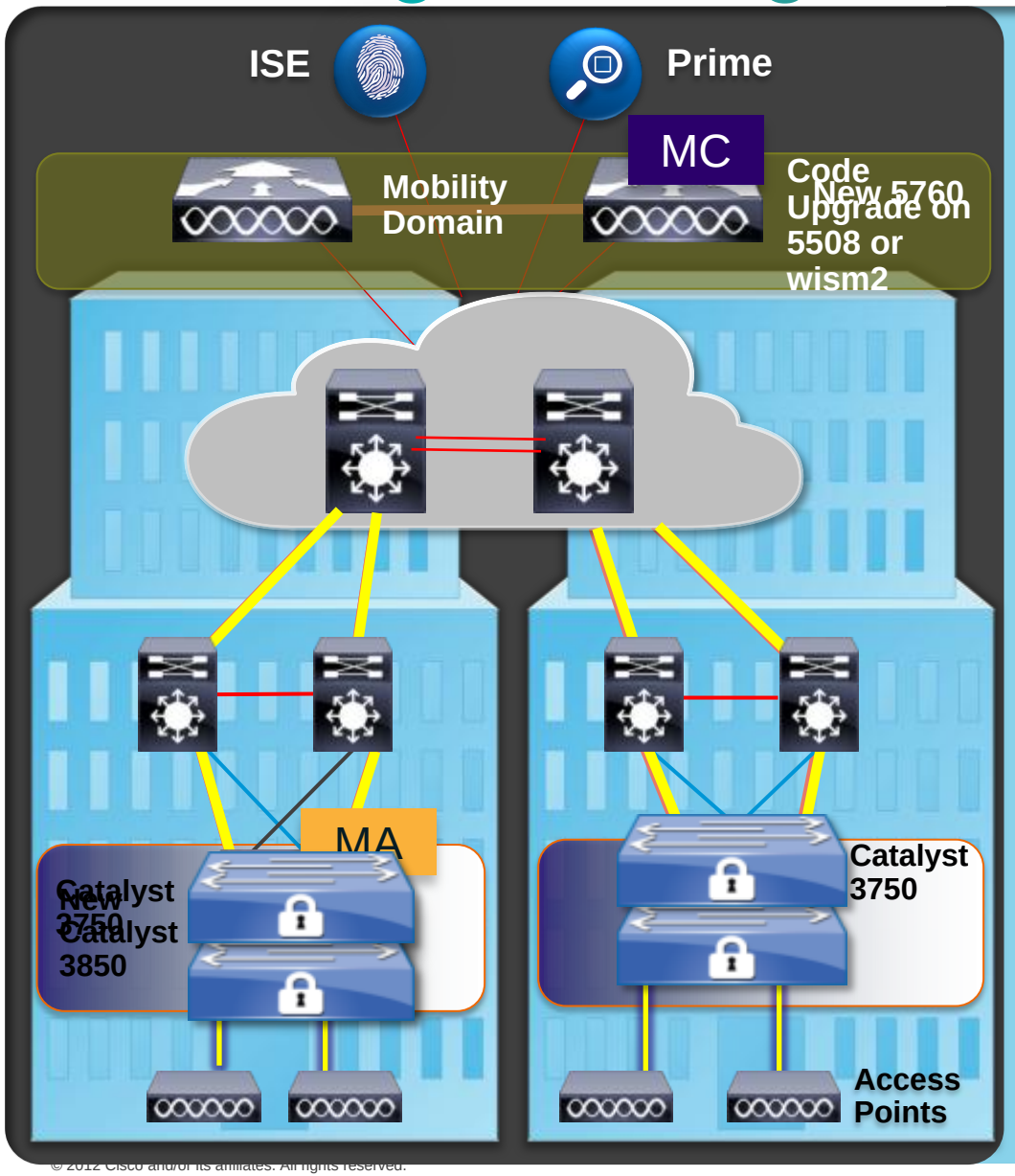
Benefits of Converged Access:

- Single Platform for wired and wireless
- Network wide visibility for faster troubleshooting
- Consistent security and QoS control
- Maximum resiliency with stateful recovery
- Scale with distributed wired and wireless data plane

AP Capwap Tunnels

Mobility Tunnels

Delivering Converged Access – Brown Field



Scale:

- Deployments greater than 16k wireless clients and 250 APs
- Up to 72k APs, 864k clients within a Mobility Domain.

Migration:

- Software Update on existing 5508 or Wism2 to release 7.3
- Access Switch Refresh – Catalyst 3850
- Wireless Controller Replacement

Benefits:

- Investment Protection with existing WLC code update
- Works seamlessly with Cisco's Campus Deployment Best Practices
- Phased Adoption : Interoperable with existing deployment

Thank you.