Mobilitás és szélessáv – avagy a vezeték nélküli technológiák fejlődési trendjei

Korsós András
műszaki igazgató

SCI-Network Távközlési és Hálózatintegrációs zRt.

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Nem tudtuk, hogy lehetetlen, ezért megcsináltuk.

TÜV CERT EN ISO 9001:2000 Zertifikat: 75.100.7470 TÜV Rheinland EUROQUA

Tartalomjegyzék

- IP alapú pont-pont gerinchálózati mikrohullámú megoldások a Ceragon termékválasztékában
- Pont-multipont szolgáltatói access hálózatok (WiMAX – Alvarion)
- Intelligens WiFi rendszerek (HP-Colubris)

FibeAir® IP-10

Wireless Mobile Backhaul Solution for Risk-Free Migration to IP

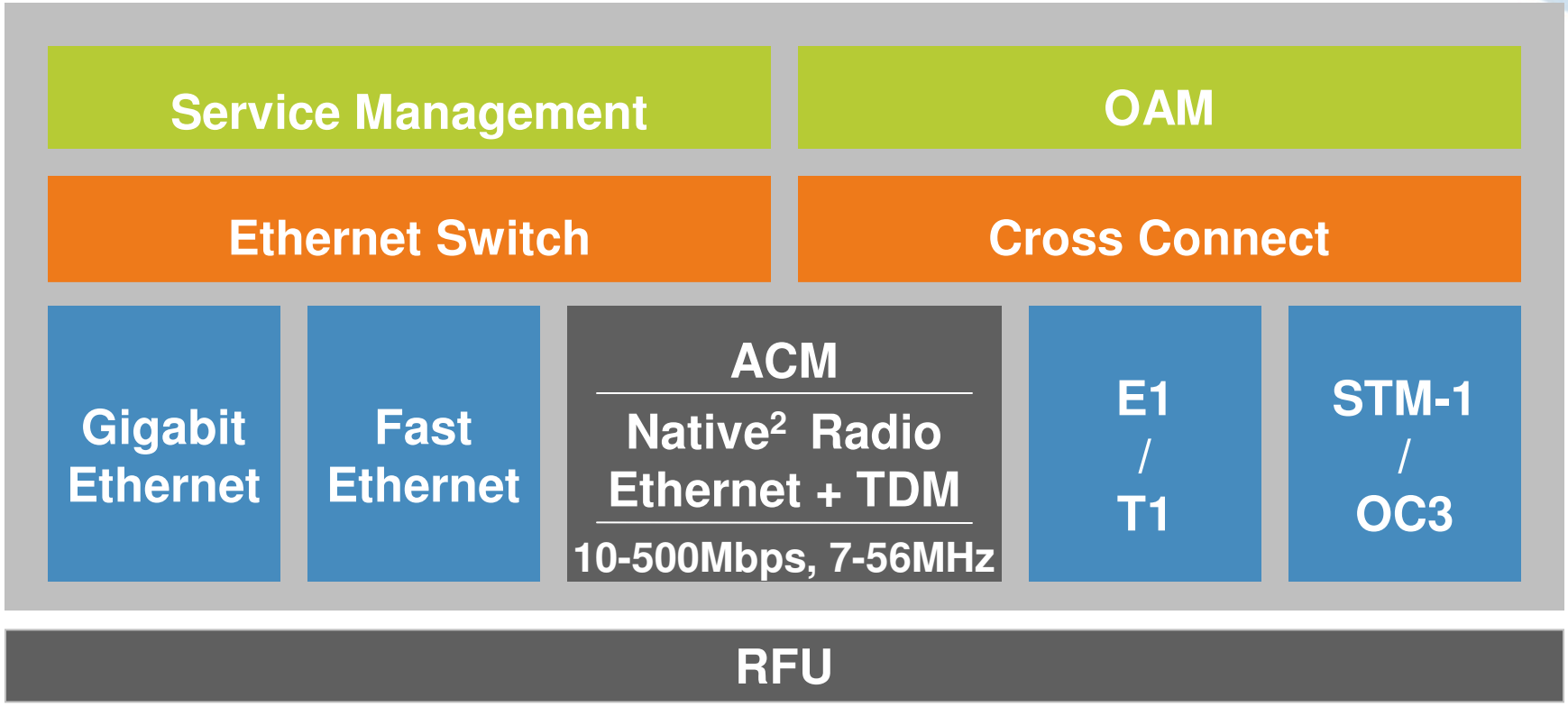
Introduction & Overview

FibeAir IP-10

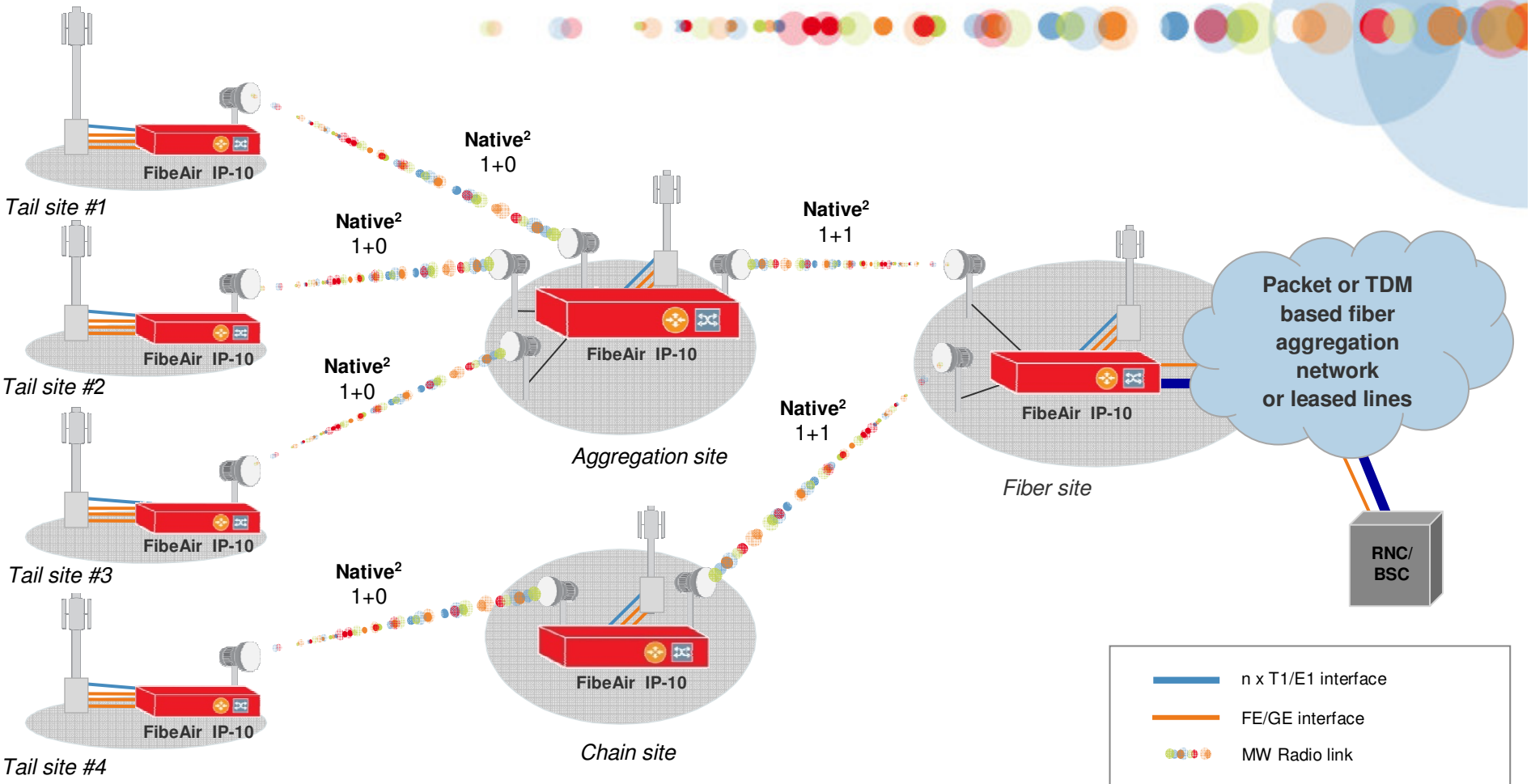
Risk-Free mobile backhaul migration
with the **highest possible capacities**
at the **lowest overall cost**

IP-10 Product Architecture

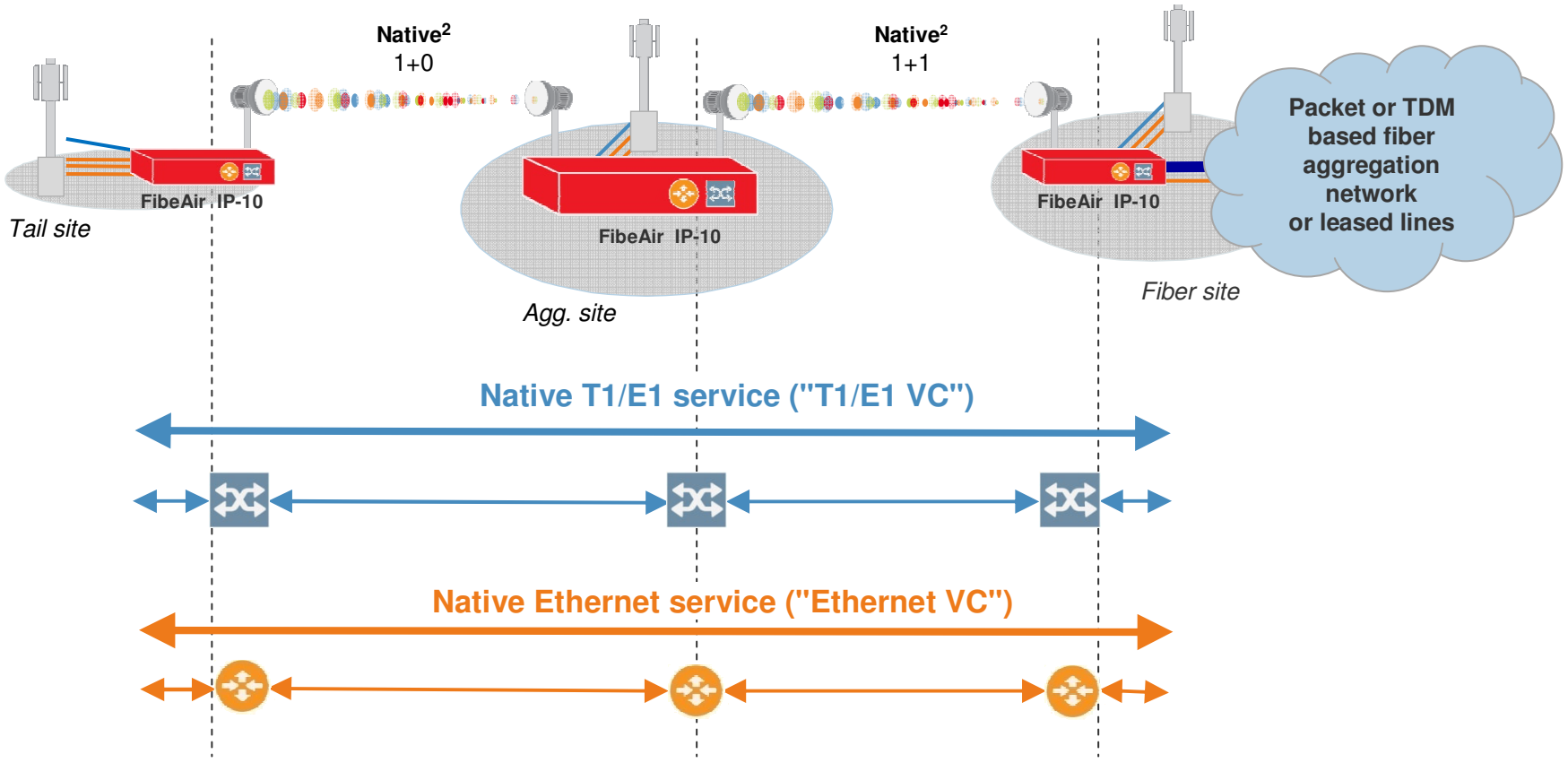
FibeAir IP-10 Family
For Migration and Beyond



Cellular backhaul based on IP-10 Native² devices (with integrated switching/XC/nodal capabilities)



FibeAir IP-10 – Native Ethernet and TDM service management



Support service provisioning, OA&M and SLA assurance

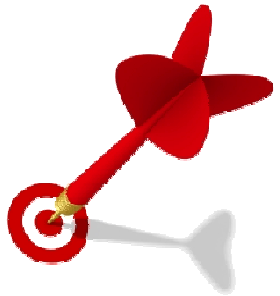
FibeAir IP-10 – Key Features

- Next-Generation **Native²** MW radio platform optimized for mobile backhaul migration to IP
  - Combines **native Ethernet** with optional **native TDM**
  - Flexible bandwidth sharing between TDM and Ethernet traffic
- Highest radio capacity and flexibility
  - **10 - 500Mbps** per radio carrier
  - **7MHz** - **56MHz** channel bandwidth
  - **6GHz** - **38GHz** bands
- Unique Adaptive Coding & Modulation (ACM) – **QPSK - 256QAM**
- Integrated advanced Ethernet switching, TDM cross-connect and nodal capabilities
- MEF-9 & MEF-14 certified
- Full redundancy support

Optimized for mobile backhaul – all-IP and TDM-to-IP migration

FibeAir IP-10 – Benefits

- Advanced Adaptive Coding & Modulation (ACM) for best spectrum utilization
- Native^2 allows for optimal hybrid TDM/IP as well as "all-IP“
- Highly integrated design
  - Simplifies network design and maintenance - reducing Capex and Opex
  - improves over-all network availability/reliability - enabling support of services with stringent SLA
- Strong economic value with pay-as-you-grow concept to reduce network costs
  - Widest capacity range (10-500 Mbps) to deliver all capacity needs
  - Optimize each network node for today’s deployments
  - Future capacity growth and additional functionality enabled with upgrade licenses using the same HW!

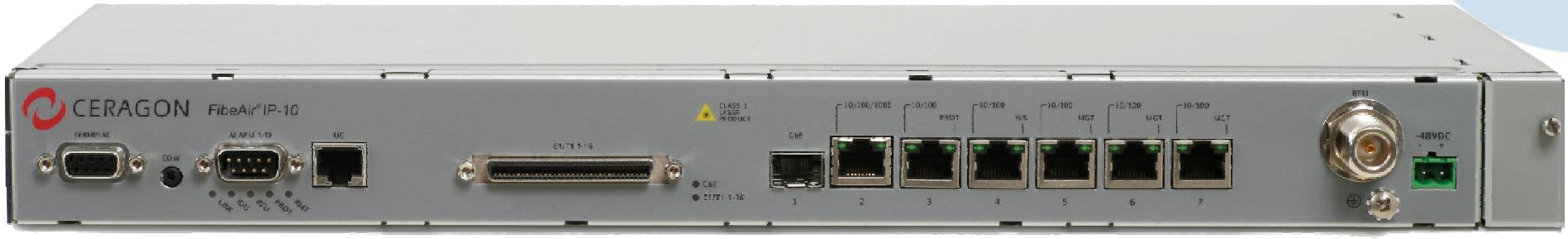


FibeAir IP-10 offers risk-free mobile backhaul migration with the highest possible capacities at the lowest overall cost

FibeAir IP-10 – Interfaces and assembly options

Split-mount architecture - Compatible with all Ceragon RFUs.

Dimensions: Height - 1RU , width < 19" , Depth <12" (ETSI)



Craft Terminal (DB9)

Engineering order-wire

External Alarms (DB9)

V.11/RS-232 User Channel (RJ45)

16 x E1/T1 (MDR69)

1 x GE optical 1000baseX (SFP)

1 x GE copper 10/100/1000BaseT (RJ45)

5 x FE copper 10/100BaseT (RJ45)

RFU interface (N-Type)

GND

Power -48V DC

Hot-swappable fans tray

Assembly options:

- **Ethernet only**
- **Ethernet + 16 x E1**
- **Ethernet + 16 x T1**

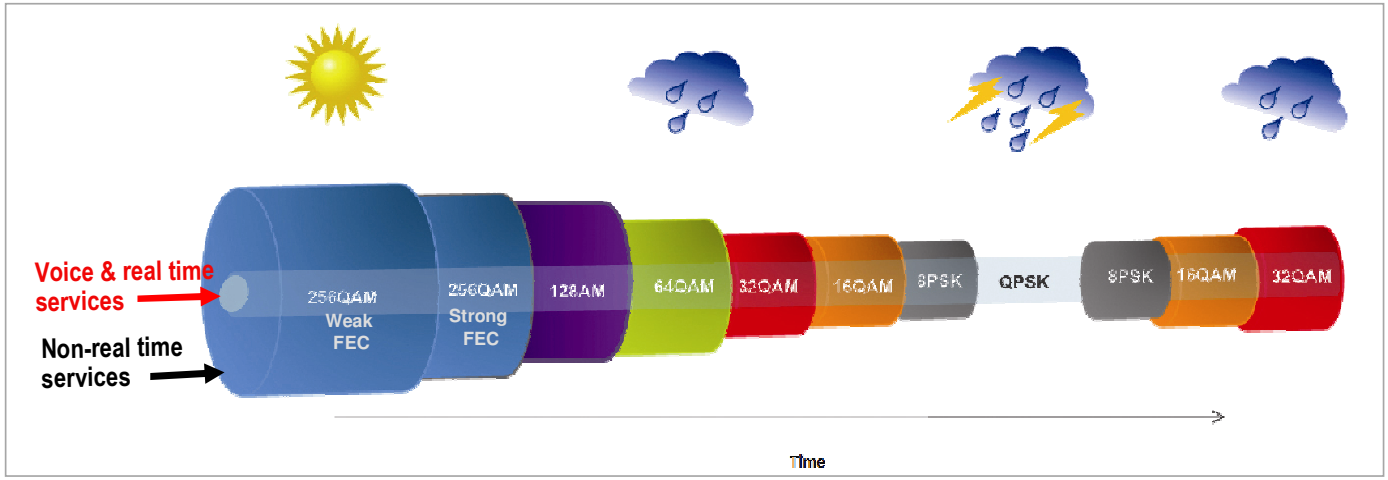
Optional AUX package

FibeAir IP-10 – Main features

- **Unique** Adaptive Coding & Modulation (ACM)
- Enhanced radio efficiency and capacity for Ethernet traffic
- Integrated Ethernet switching functionality
- 1+0 & **fully-redundant** 1+1 HSB configurations
- Enhanced QoS for differentiated services
- Extensive set of radio capacity/utilization statistics

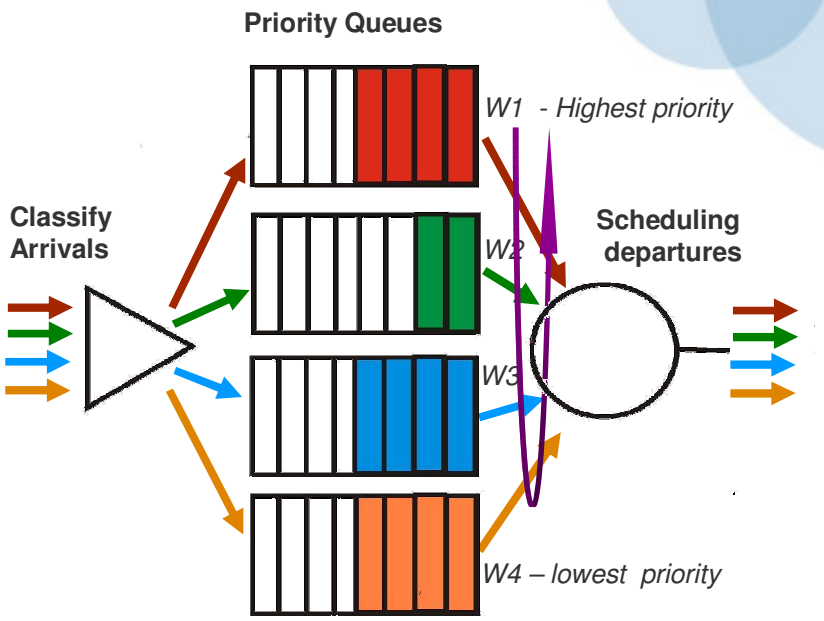
What is Adaptive Coding and Modulation?

- Utilize **highest possible modulation** considering the changing environmental conditions
- **Hitless & errorless switchover** between modulation schemes
- **Maximize spectrum usage** - Increased capacity over given bandwidth
- Service differentiation with **improved SLA**
- Increased **capacity** and **availability**



Integrated QoS support

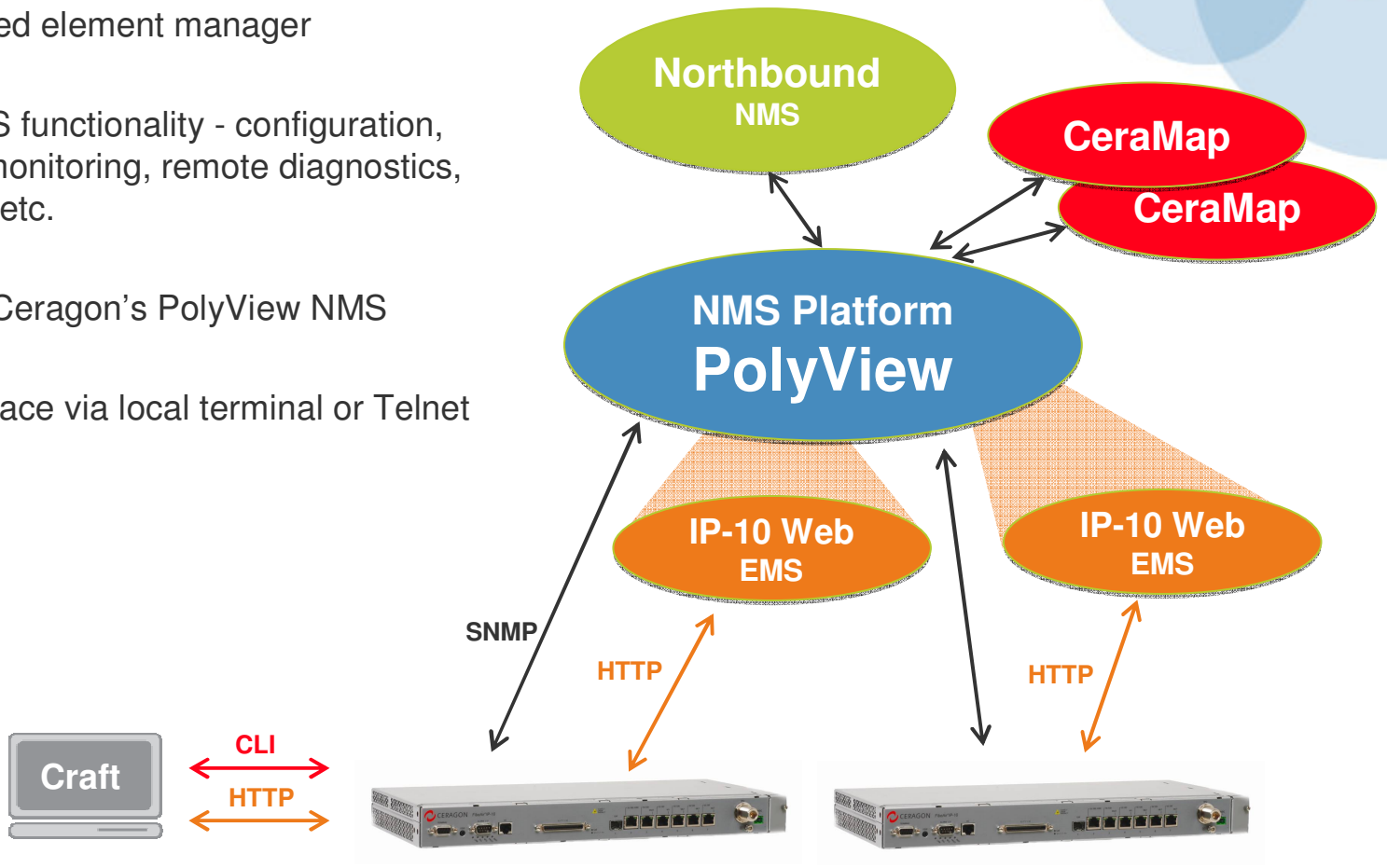
- Similar to IP-MAX family
- Four CoS (priority) queues per switch port
- Advanced CoS classification based on L2/L3 header fields:
  - Source Port
  - VLAN 802.1p
  - VLAN ID
  - IPv4 TOS/IPv6 TC
  - Highest priority to BPDUs
- **Advanced ingress traffic policing/rate-limiting per CoS**
- Flexible scheduling scheme per port
  - Strict priority (SP)
  - Weighted Round Robin (WRR)
  - Hybrid – any combination of SP & WRR



Support differentiated Ethernet services with SLA assurance

Management Overview

- Integrated web based element manager
  - HTTP based
  - Full set of EMS functionality - configuration, performance monitoring, remote diagnostics, alarm reports, etc.
- SNMP interface to Ceragon's PolyView NMS
- Extensive CLI interface via local terminal or Telnet



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Alvarion WIMAX System
4Motion Solution Overview

Alvarion 4Motion™ Solution

4Motion is a complete open WiMAX end-to-end solution

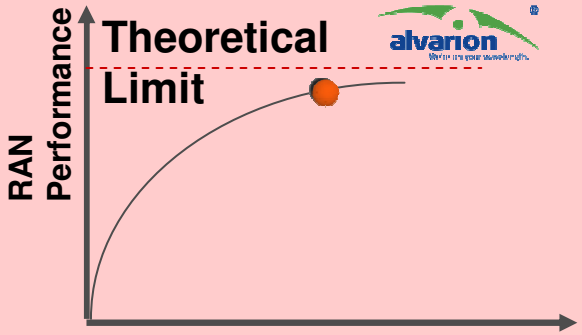
- Fully complies with mobile WiMAX (IEEE 802.16e-2005)
- Employs an open, standard all-IP architecture enabling a Best-of-Breed multi-vendor solution
- Delivery of mobile and fixed video, voice, and data services
- Supports the full range of business, residential, and Personal Broadband services

What Makes 4Motion Unique?

- **Open WiMAX™**
  - No entry barriers for new vendors
  - IP Innovation and implementation creativity
  - Freedom to choose combination of vendors
  - Leverage on consumer electronics

- **Use the world's most deployed WiMAX RAN**
  - #1 WiMAX vendor selected by worldwide leading operators
  - 220 deployments in over 80 countries

- **Superior WiMAX RAN technology**
  - Broadest radio coverage
  - Best spectral efficiency

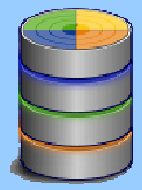


Alvarion 4Motion Solution

Core network equipment

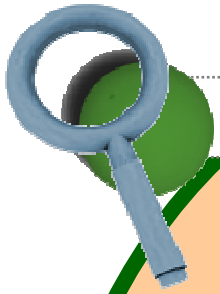
Accounting Authentication And Authorization Server

Home Agent Server

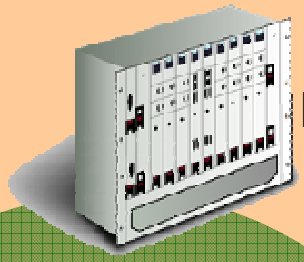


AlvariSTAR™ Network Management System

Alvarion 4Motion Solution



Radio Access Network Equipment



Macro

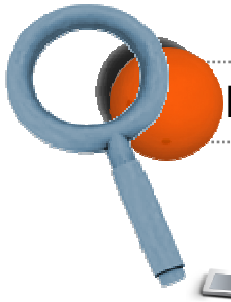
BWG-IS

BreezeMAX 2300
BreezeMAX 2500
BreezeMAX 3300
BreezeMAX 3500
BreezeMAX 3600

BWG-LS

Micro

Alvarion 4Motion Solution



End-user equipment

Ultra Mobile PC*

Consumer Electronics*

Smart Phone*

BreezeMAX™ Si
Keep it Simple!

BreezeMAX NA

BreezeMAX PRO

* Provided by Alvarion partners and CE manufacturers

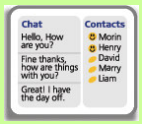
Alvarion 4Motion Solution

Service enabling platforms

Voice (VoIP)

Mobile TV

oadband



Instant Messaging

Locati on Based Servic es

Interactive Gaming

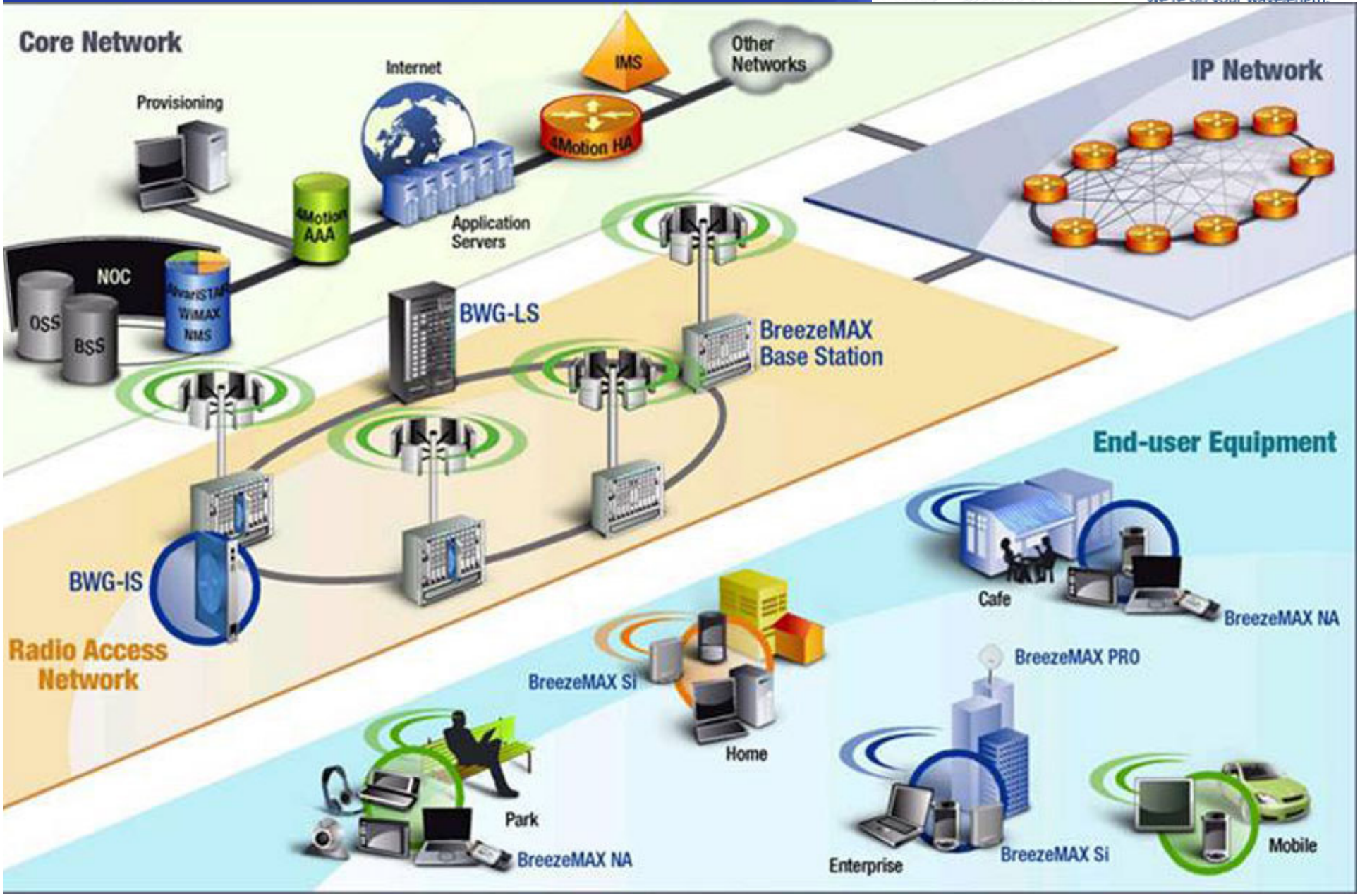
email

Video Conferencing

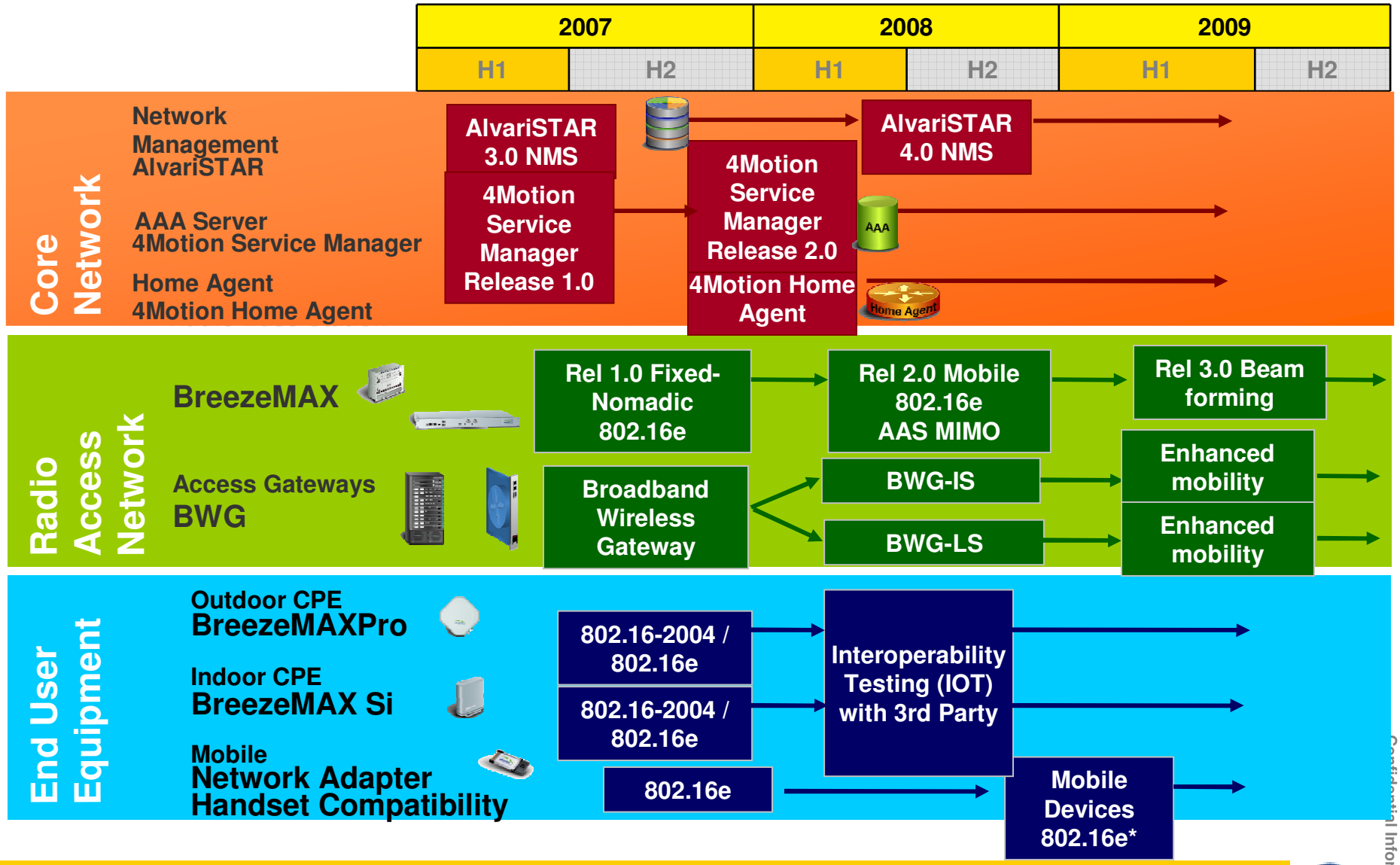
File Transfer

VPN

4Motion – Open WiMAX™ Architecture



4Motion Solution Roadmap



* Provided by Alvarion partners

Alvarion WiMAX Time Frames

SCI-NetWork

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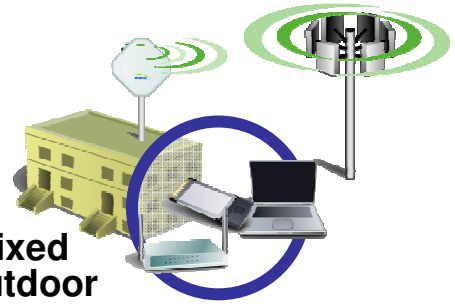
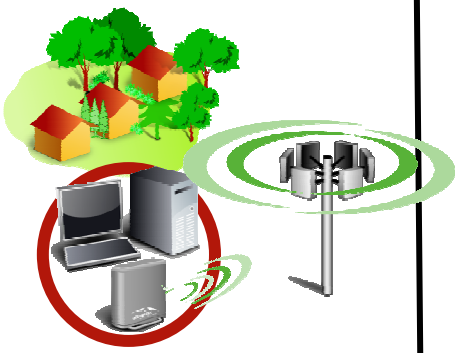
Going Forward….

Fixed & Nomadic 2006-2008

Portable/Mobile 2008/2009-



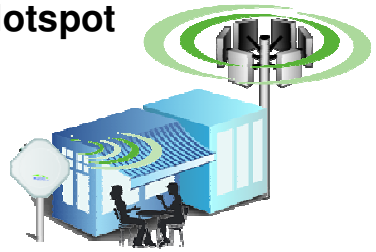
Fixed Outdoor



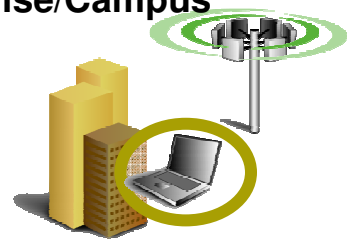
Fixed Indoor

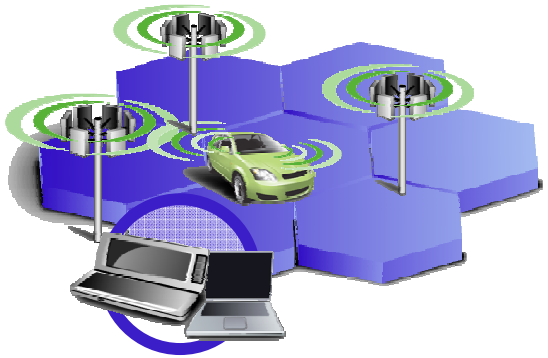
Backhaul

WiFi Hotspot



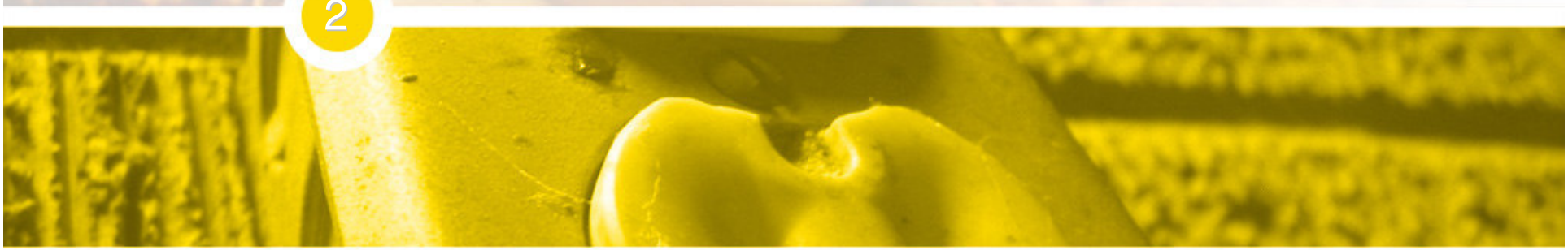
Enterprise/Campus





Mobile

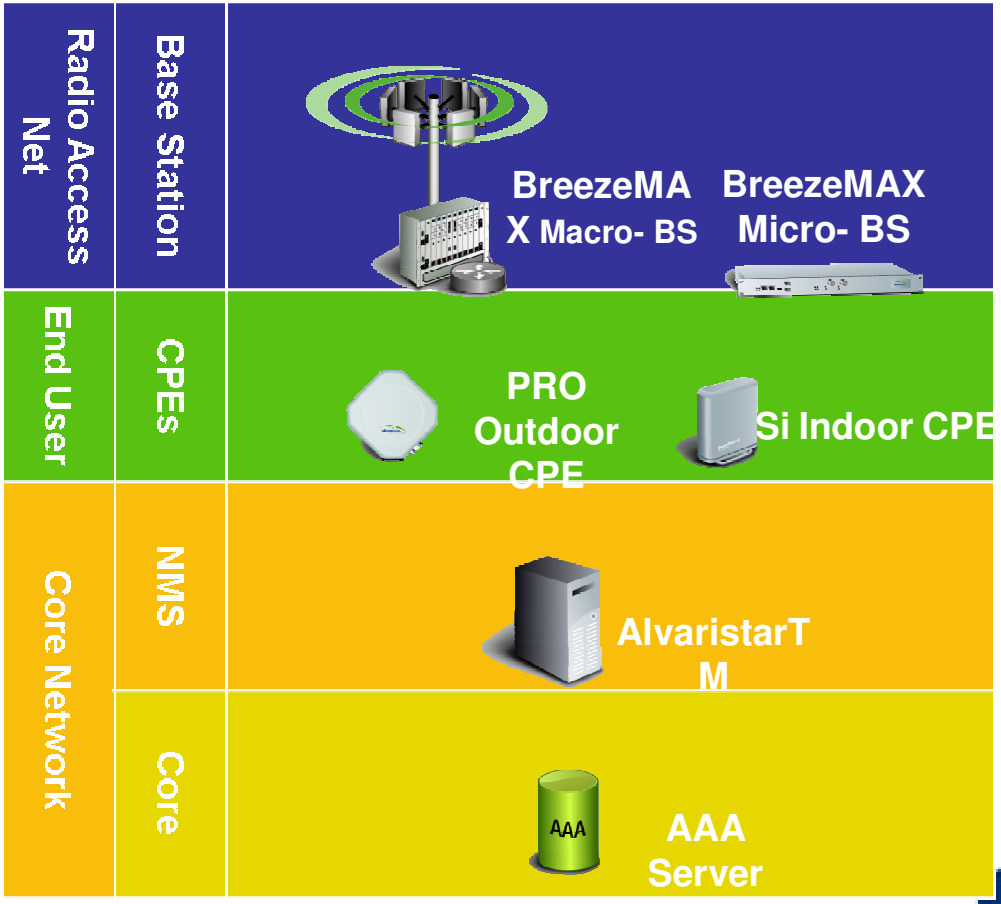
Fixed Access	Nomadicity	Portability	Simple Mobility	Full Mobility
	Stationary BB Access wherever you are	Pedestrian mobility BE HO – Latency tolerant TCP/IP applications	Up to 60 KMH Guaranteed HO for non RT services Sleep/Idle mode	Up to 120 KMH Guaranteed HO for all services



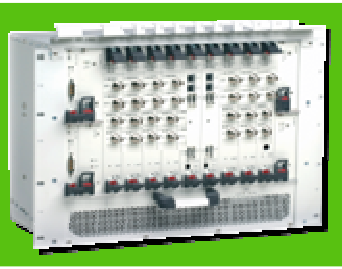
Phase 1: Fixed/Nomadic Solutions

Phase I - Introduction

- The solutions in year 2007 addressed fixed and nomadic services
- Solutions comprised of the following elements:
  - RAN (BreezeMAX):
    - Macro and Micro BST
  - End User Equipment
    - Variety of outdoor and indoor CPEs
  - Network main components:
    - Integrated or external AAA Server
    - AlvariSTAR



RAN Building Blocks

Component	Description	
Scalable, high capacity Base-Station architecture offerings	Modular (Macro) BST	
	Micro BST	
High Power radios	Outdoor unit – 34/36dBm	
Antenna	Single or Dual slant, 60°, 90° or 120°	
GPS	Outdoor and Indoor units For TDD synchronization	

RAN – Base Station Installation Example

Antenna
2-4 per sector

RF

High Power Radio
2-4 per sector

IF

GPS
Receiver & Antenna

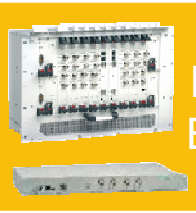
CAT 5

Outdoor

Power Feeder & GPS Adaptor

IF

48VDC



Macro/Micro Base Station

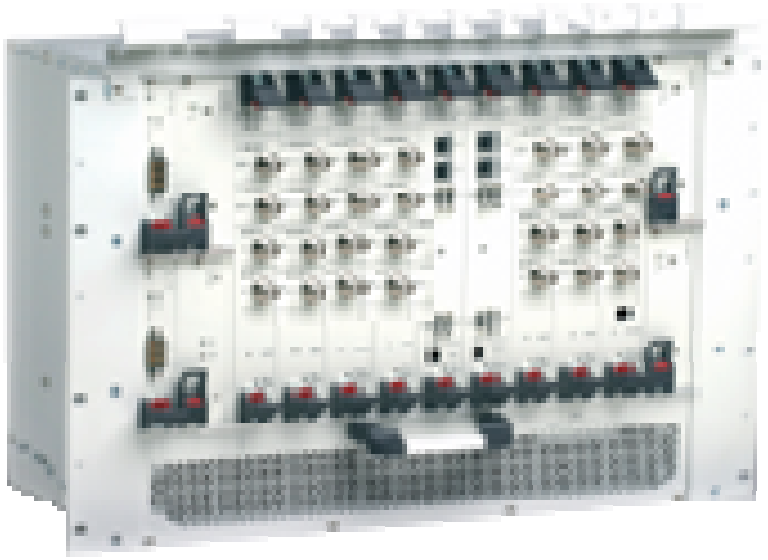
Alvaristar

100/1000 Ethernet

Indoor

Modular BST – Dense Populated Area

- **Suited for dense Urban/Suburban deployments**
- **Modular, supporting up to:**
  - 3 sectors with two carriers or 6 sectors with one carrier
- **4 channel AU-IDU**
- **Support 2nd and 4th order diversity**
- **NPU for GPS support**
- **Scalable, Carrier class platform**
  - Hot swappable functionality
  - Centralized management
- **Standard based Radius interface for operation with AAA server**
- **Local and remote management**



Micro BST – Sparsely Populated Areas

- Suits for low dense rural deployments
- Based on similar hardware components and provides similar functionality as the Modular BST
- A compact 1U 19” shelf
- Single carrier for low density rural area
  - Single sector using directional antenna or OMNI antenna
- Support 2nd and 4th order diversity
- -48VDC model
- Can operate with all types of HP-ODUs
- Standard based Radius interface for operation with AAA server
- Local and remote management

Outdoor unit – High Power ODUs

- **Designed to support world wide frequencies**
- **Detached antenna**
- **1RX / 1TX, 34-36dbm, up to 10Mhz, models:**
  - 2.3GHz – 2 models, ROW / WCS for NA
  - 2.5Ghz - 2 models, each is 100MHz
  - 3.5Ghz - 4 models, each is 50Mhz
  - 3.3Ghz - 2 models, supporting 50Mhz
- **Optional an add-on H bracket for easy deployment**

Outdoor WiMAX Quad Mode CPE

- Robust and durable outdoor WiMAX CPE
- Intel® WiMAX Connection 2250 chip (R2)
- Dual mode FDD/TDD duplex (3.3, 3.5, 2.5, 2.3GHz)
- Designed for WiMAX 802.16-2004 and 802.16e-2005 air interfaces
- Integrated vertical/horizontal antenna or external antenna
- IDU to ODU communication via cat 5 cable
- Variety of indoor units –
  Data, Voice & Wi-Fi interface

Outdoor Radio

IDU data

IDU Voice Gateway

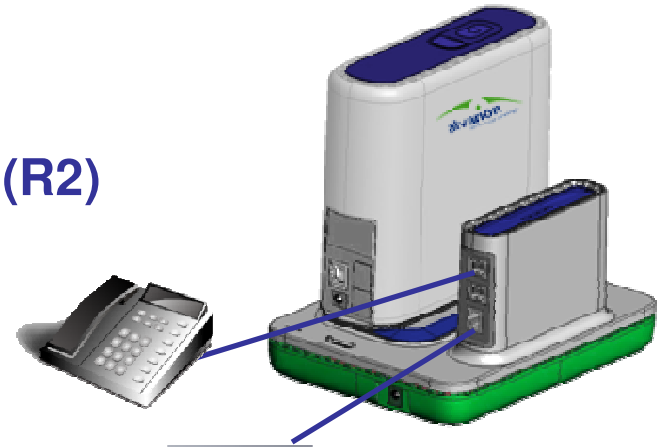
IDU Voice Gateway + Battery back up

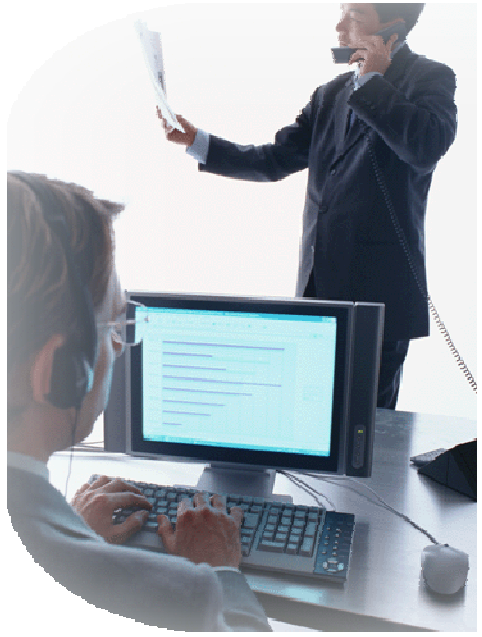
IDU Networking Gateway

Outdoor WiFi

BreezeMAX Self-Install (Si) WiMAX Quad Mode CPE

- **Compact, single box, indoor CPE**
- **Dual mode FDD/TDD duplex**
- **Utilize Intel WiMAX Connection 2250 chip (R2)**
- **Designed for WiMAX 802.16-2004 and 802.16e-2005 air interfaces**
- **Data – Ethernet or *USB* interface**
- **Optional integrated 1 or 2 voice**
  - Battery back up option
- **Self-install**
  - ***Zero*** installation fees
  - Installation with smart card/software CD utility
  - Simple and easy for all type of users
- **Connect anywhere**
  - Instant broadband services
  - Nomadic type of services





Enabler for Mass Broadband Residential Market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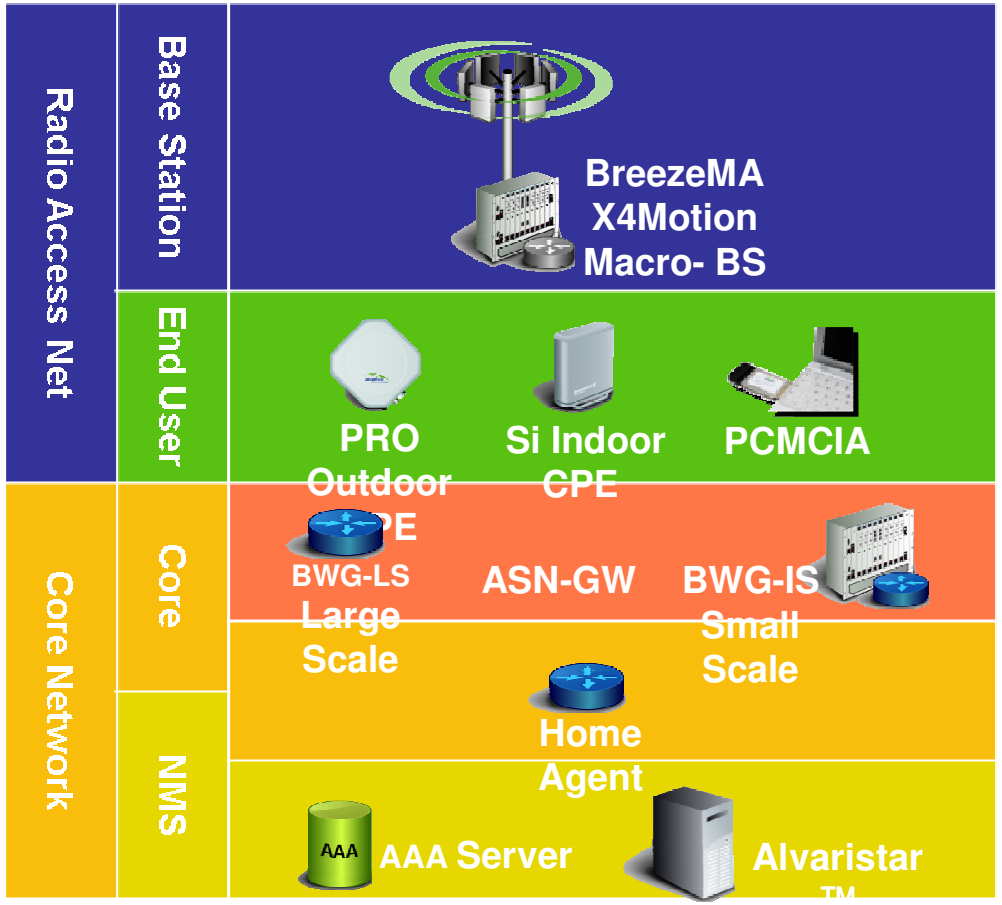
3
Phase II: Personal Broadband WiMAX

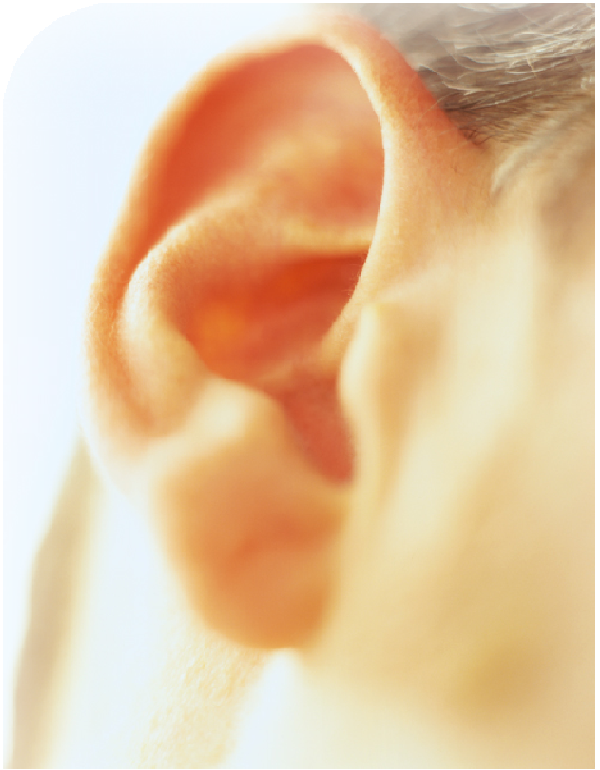
Phase II - Introduction

- **The solution in H1/08 addresses Mobile solutions**
  - Greenfield mobile broadband operators
  - Early adopters of Mobile WiMAX technology
- **Comprised of the following elements:**
  - RAN (BreezeMAX-4M):
    - Macro BST
    - New Antenna Arrays [Tx+Rx] – 2+4, 4+4
  - CPE
    - Fix ODU CPE and SI
    - Mobile Station (MS) – PCMCIA, Handset
  - Network main components:
    - ASN GW (Network Gateway)
      - Small Scale Integrated in BMAX-4M
      - Large Scale third partners
    - AAA Server
      - Integrated or external
    - Home Agent (Roaming Agent)
    - AlvariSTAR

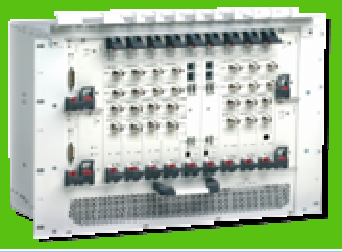
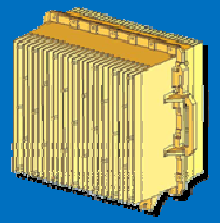


Phase II - RAN Main Messages

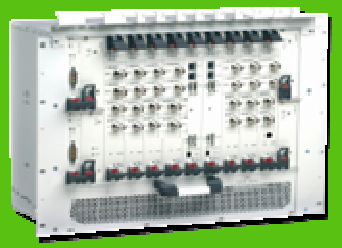
- **Support Mobile WiMAX service**
  - Intra and Inter BST Handoff
- **4Motion 802.16e Certified Solution**
  - Can upgrade Phase I 4Motion TDD BST
- **Open WiMAX architecture**
  - Standard WiMAX Interfaces offers Best of Bread Network Core devices
- **World Wide WiMAX frequencies coverage (masks)**
  - 2.3, 2.3 WCS, 2.5, and 3.5GHz frequencies
  - At 5,7,10Mhz
- **Investment protection**
  - Migration path using variety of CPEs, upgradeable to 802.16e
  - Future proof migration to AAS technologies (MIMO, Beam Forming)



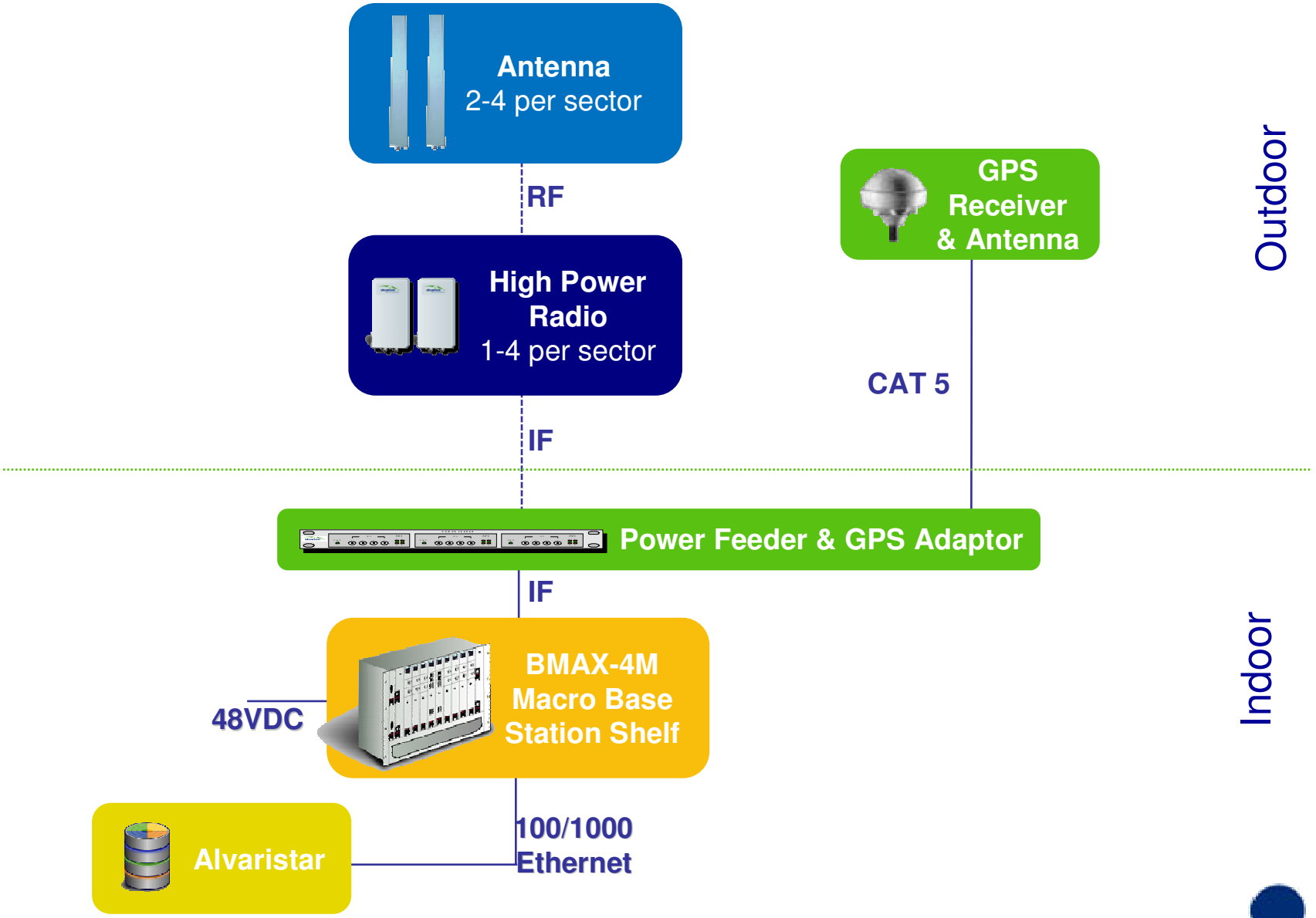
Phase II - RAN Building Blocks

Component	Description	
Scalable, high capacity Base-Station architecture offering	Modular (Macro) BST	
New High Power Radio	> 38dB 2Tx and 4Rx	
Antenna	New Antenna Arrays: 2Tx + 4Rx, 4Tx+4Rx Single, Dual slant, 120°	
GPS	For TDD synchronization Location Based Services	

Phase II - Network Building Blocks

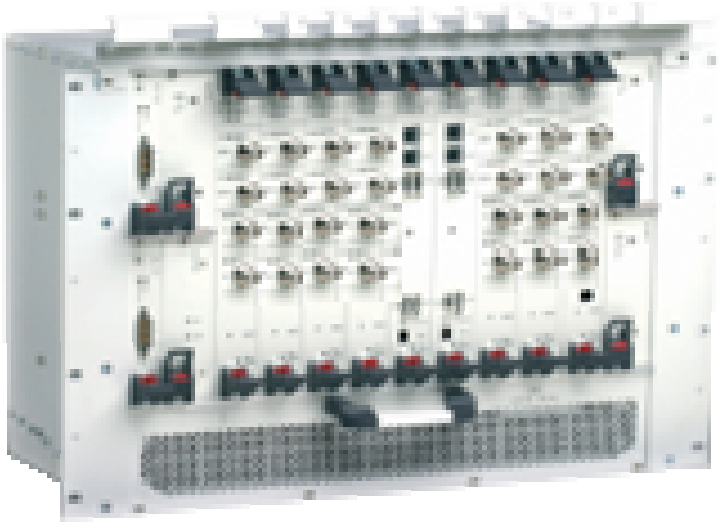
Component	Description	
ASN GW	Network Gateway Enables Mobility	 BMAX-4M with BWG-IS Integrated ASN-GW
BWG-IS	Small Scale Integrated into BreezMAX BST	
BWG-LS	Large Scale ASN-GW From IOT partners (i.e. Cisco)	 BWG-LS Cisco 7600 Multiple ASN GW with Integrated HA and Integrated AAA
Home Agent (HA)	Enables Roaming between WiMAX networks From third party (i.e. Cisco)	
AAA server	Enables Network Entry Authentication, Authorization, Accounting Complementary to BWG-IS	 Third Party AAA From Bridgewater For BWG-IS

BMAX-4M Base Station Installation Example



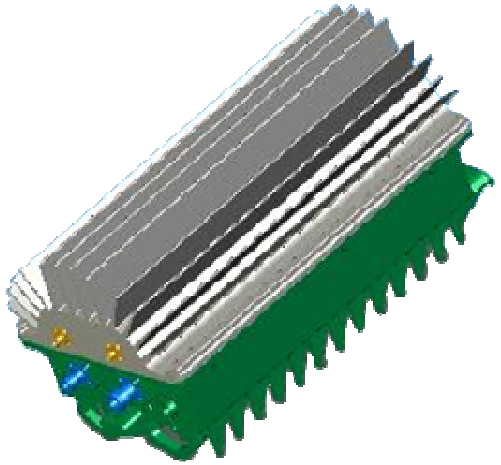
Scalable BMAX-4M Modular BST

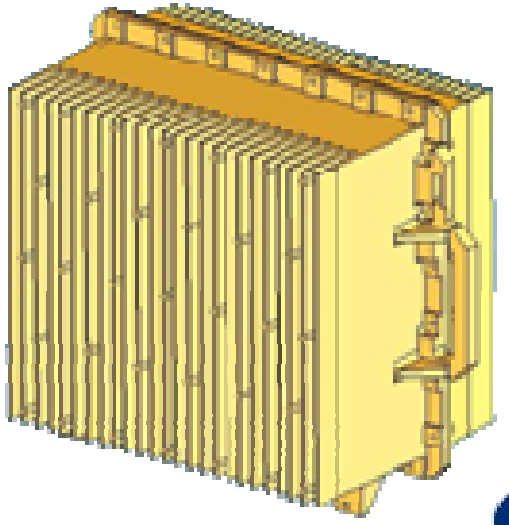
- **Suits for Mobile WiMAX deployments**
  - Dense-Urban / Urban / Suburban / Rural
- **Modular, supporting up to carriers:**
  - 3 sectors w/ 2 carriers
- **Always Support 2nd and 4th order diversity**
- **Carrier Grade Resiliency**
  - Hot swappable functionality
  - Centralized management
  - Design for full redundancy
- **Local and remote management**



Outdoor unit - ODU

- **Designed to support world wide frequencies**
- **Attached or detached antenna**
- **1RX / 1TX, 34-36dbm, up to 10Mhz, models:**
  - 2.3GHz ROW / WCS for US
  - 2.5Ghz , 2 models, each is 100MHz
  - 3.5Ghz, 4 models, each is 50Mhz
- **2 Rx /1TX 37-39dbm, up to 10Mhz, models:**
  - 3.5Ghz – 1 model, supporting 200MHz
- **4 Rx /2TX 37-39dbm, up to 20Mhz variety of models:**
  - 2.3GHz ROW / WCS (future)
  - 2.5Ghz, BW
  - 3.5Ghz, BW
- **Fully outdoor**
- **Optional an add-on H bracket for easy deployment**





802.16e Certified CPEs

- **Mobile devices are no longer at Customer Premises**
  - Hence CPE is now MS – Mobile Station
- **Three main products**
  - PCMCIA – WiMAX Network Card
  - RGW - Residential Gateway
    - Integrated WiFi AP
    - VOIP services
  - **ODU CPE – MIMO capable**
    - Supports High BW requirements
    - Supports High Coverage requirements
- **Backward compatibility with BreezeMAX Si**

PCMCIA

RGW

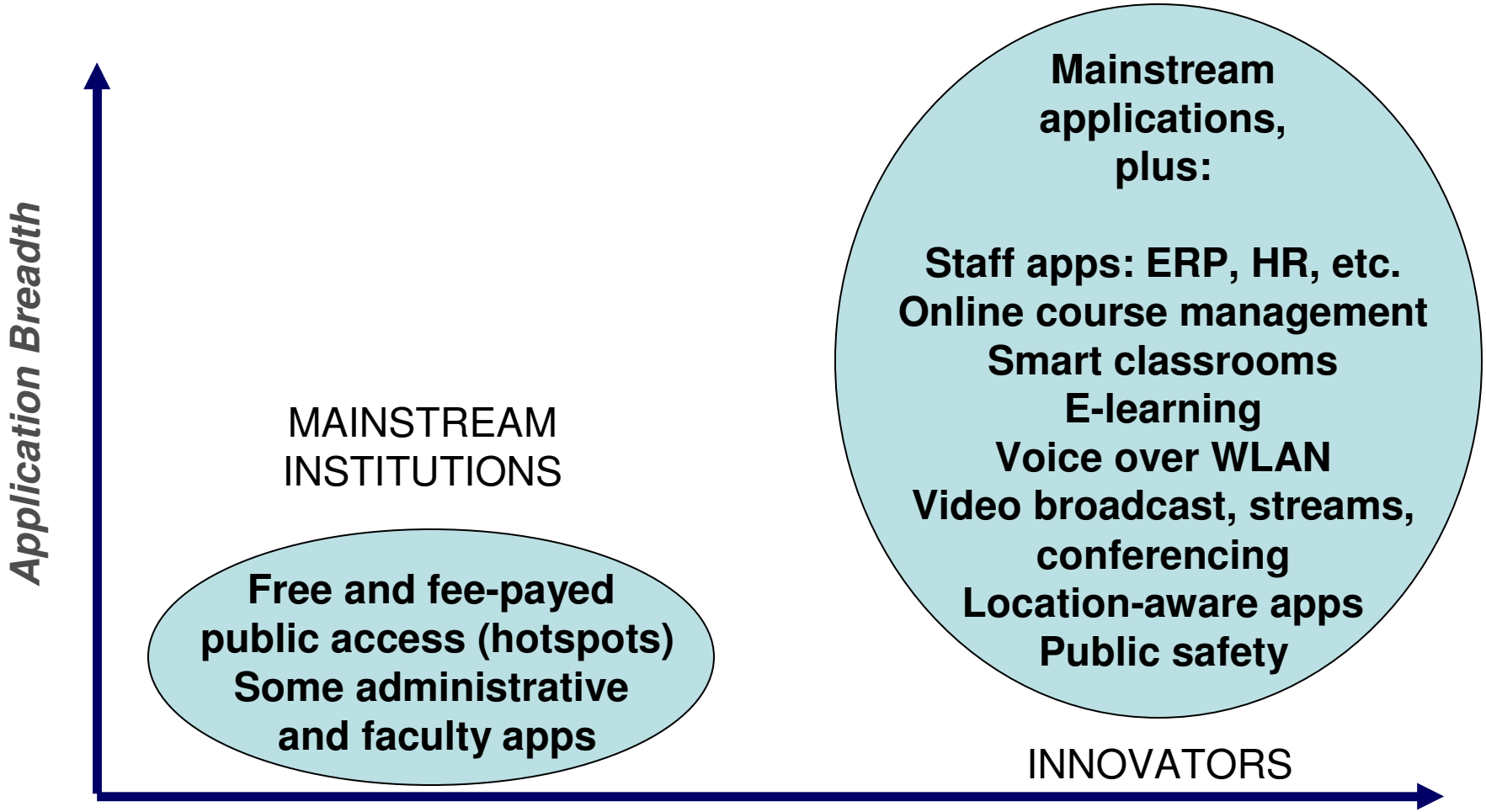
Dipole Outdoor Radio For CPE MIMO

University Wireless LAN Solutions

System overview

The Intelligent Wireless Networking Choice™

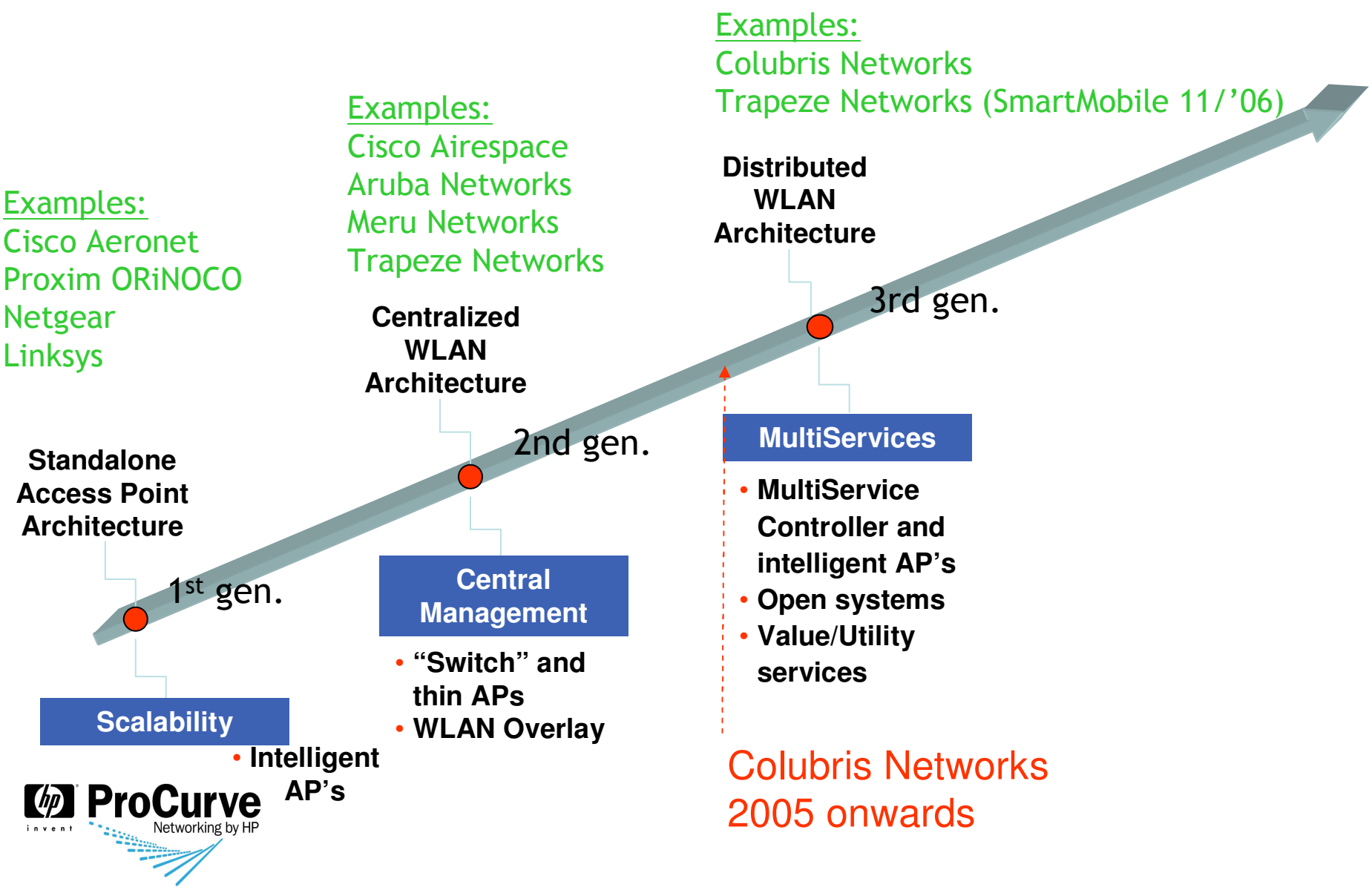
Evolution of University Wireless LANs



Wireless Applications for Students & Faculty

- Campus hotspot access
  - Best-effort for students
  - Priority for faculty, staff
  - Fee-paid for visitors, conferences
- New classroom/lab applications
  - Online course management
  - Smart classrooms
    - Multimedia, online research
    - Handheld polling, quizzes
  - E-learning / distance learning
  - Laptop language lab
  - Location/presence awareness

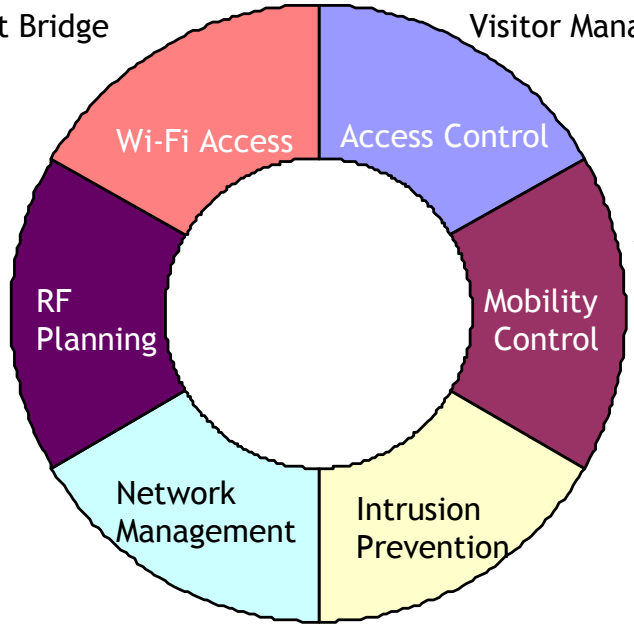
Wireless LAN Architecture Evolution



HP Intelligent MultiService System (CIMS)

Multiservice Access Points
Indoor / Outdoor
Wireless Client Bridge
Local MESH

Guest Access AAA
End user PC zero configuration
Visitor Management Tool

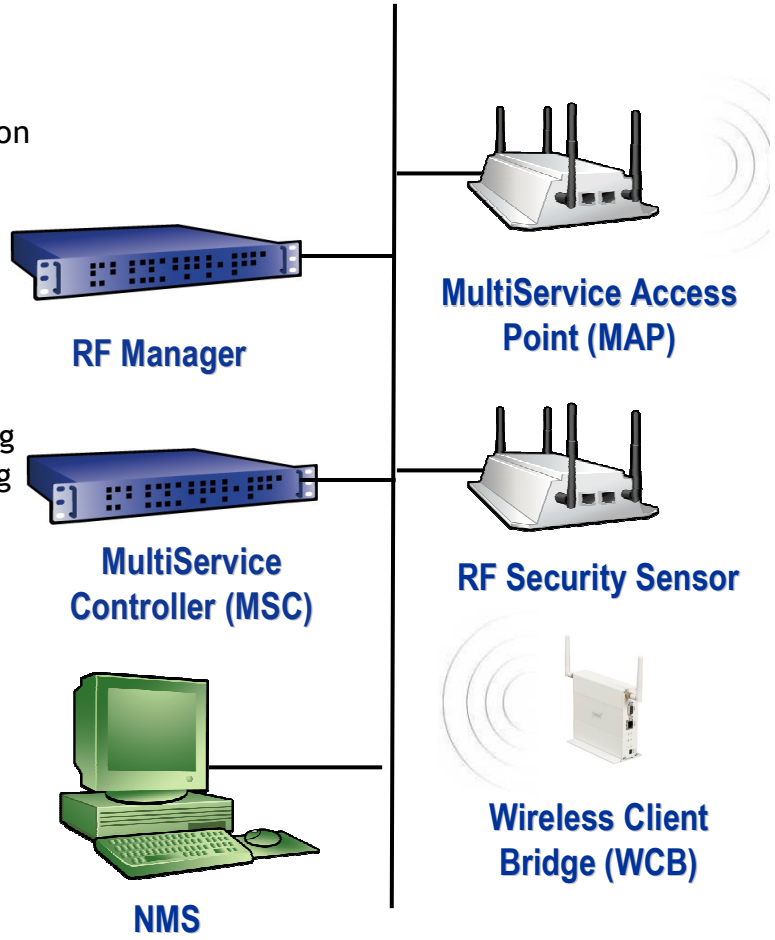


Predictive RF cell planning
(PC software)

Voice over IP
Seamless Roaming
IP subnet roaming

Central management
for medium/large networks

24 x 7 Security shell
Wi-Fi Location tracking



ProCurve Networking by HP

TriPlane Access Layer

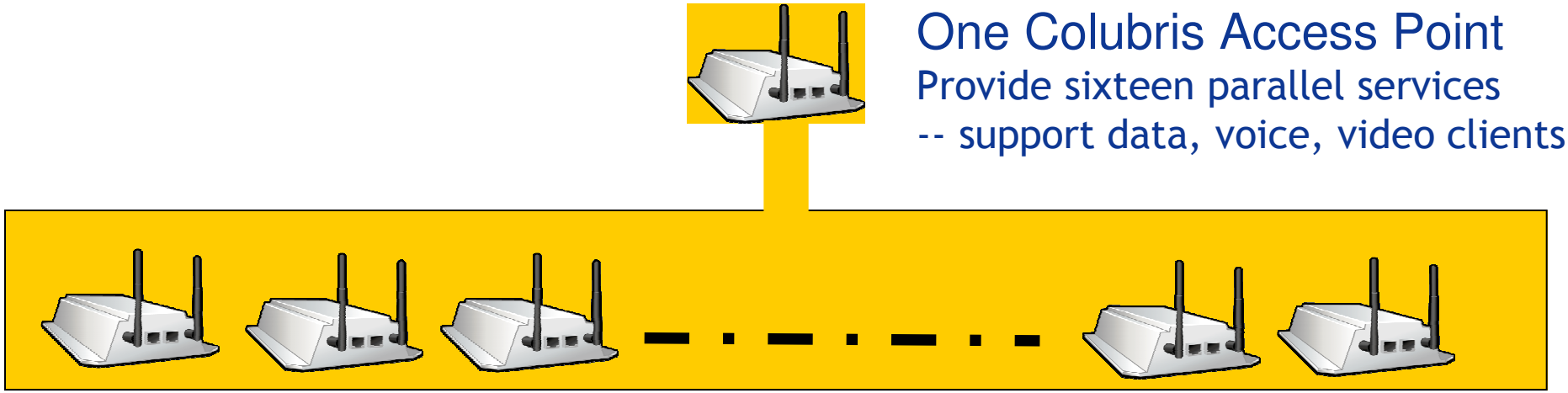
Multiservice access points

The Intelligent Wireless Networking Choice™

Multiservice Access Points

- Software configurable radio
  - IEEE 802.11 a/b/g/n
  - Transmit Power
  - Automatic RF Channel set-up
  - Auto-Power set-up
- MultiService Groups
  - 16x SSIDs
  - 16x MAC addresses
  - Data, IP Voice, IP Video
- Data encryption
  - Open, WEP, WPA, WPA2 (802.11i)
  - Configurable per SSID
- Security
  - VLAN per SSID
  - VLAN per User (max 4096)
  - L2 isolation per SSID
  - IP Filter per SSID
  - MAC address filter per SSID
- Power over Ethernet
  - 802.3af mode A and B
- Quality of Service
  - 4 levels
  - Automatic detection for SVP, WMM
- Diagnostics (SNMP)
- Device Management (web, XML)

Virtual Service Communities for Service Differentiation



One Colubris Access Point

Provide sixteen parallel services
-- support data, voice, video clients

VSC #1 provide

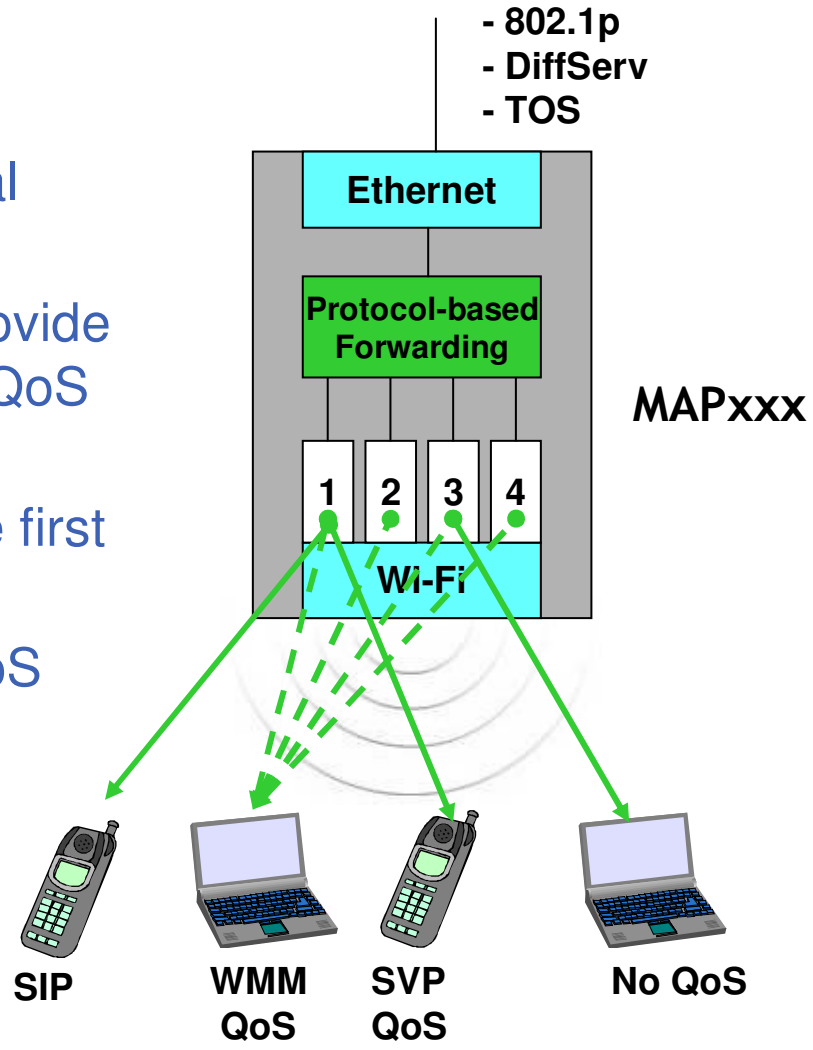
-- own encryption
-- own prioritization
-- own battery mgt (DTIM)
-- own min/max Data Rate
-- own unique BSSID
-- own unique MAC address
-- own client filters
-- own VLAN

VSC #16 provide

-- own encryption
-- own prioritization
-- own battery mgt (DTIM)
-- own min/max Data Rate
-- own unique BSSID
-- own unique MAC address
-- own client filters
-- own VLAN

QoS embedded in MAPs

- Priority queuing on Wi-Fi interface
  - QoS Forwarding Engine per Virtual Services Community (VSC)
  - Four Transmit/Receive queues provide flexibility to implement a range of QoS policies
  - Prioritized services always receive first access to limited Wi-Fi bandwidth
  - Complies with WMM (802.11e) QoS standards



TriPlane™ Architecture – Data Plane
MultiService Access Points

	MSM310	MSM310-R	MSM320	MSM320-R	MSM 335	MSM410	MSM422
802.11 Radio	Single a/b/g	Single a/b/g	Dual a/b/g	Dual a/b/g	Dual a/b/g +sensor	a/b/g/n	a/b/g +a/b/g/n
VSC	16	16	16	16	16	16	16
QoS	4 levels	4 levels	4 levels	4 levels	4 levels	4 levels	4 levels
System	Controller / Aut	Controller / Aut	Controller / Aut	Controller / Aut	Controller / Aut	Controller / Aut	Controller / Aut
Enclosure	Plenum-rated indoor	Outdoor	Plenum-rated indoor	Outdoor	Plenum-rated indoor	Plenum-rated indoor	Plenum-rated indoor
Power Inputs	802.3af PoE or external DC	802.3af PoE	802.3af PoE or external DC	802.3af PoE	802.3af PoE	802.3af PoE	802.3af PoE
Operating Modes	AP, WLAN Monitor, WDS	AP, WLAN Monitor, WDS	AP, WLAN Monitor, WDS	AP, WLAN Monitor, WDS	AP, WLAN Monitor, WDS	AP, WLAN Monitor, WDS	AP, WLAN Monitor, WDS

ProCurve Networking by HP

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TriPlane Control Layer

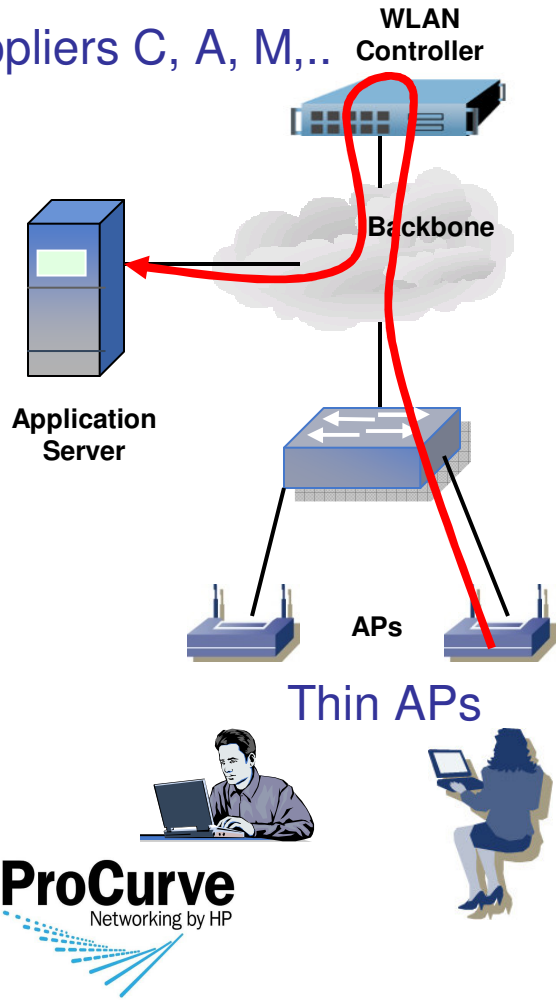
WLAN Controller Architecture

The Intelligent Wireless Networking Choice™

Optimized WLAN Controller Architecture

Central WLAN Controller
Central control and “thin”/“light” APs

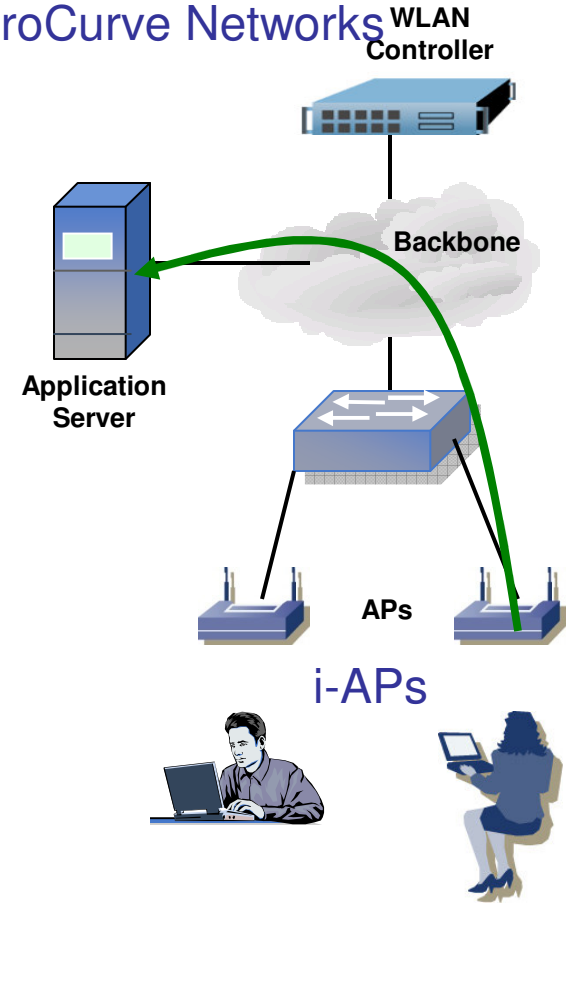
Suppliers C, A, M,..



Thin APs

Optimized WLAN Controller
Central control and intelligent APs (Distributed)

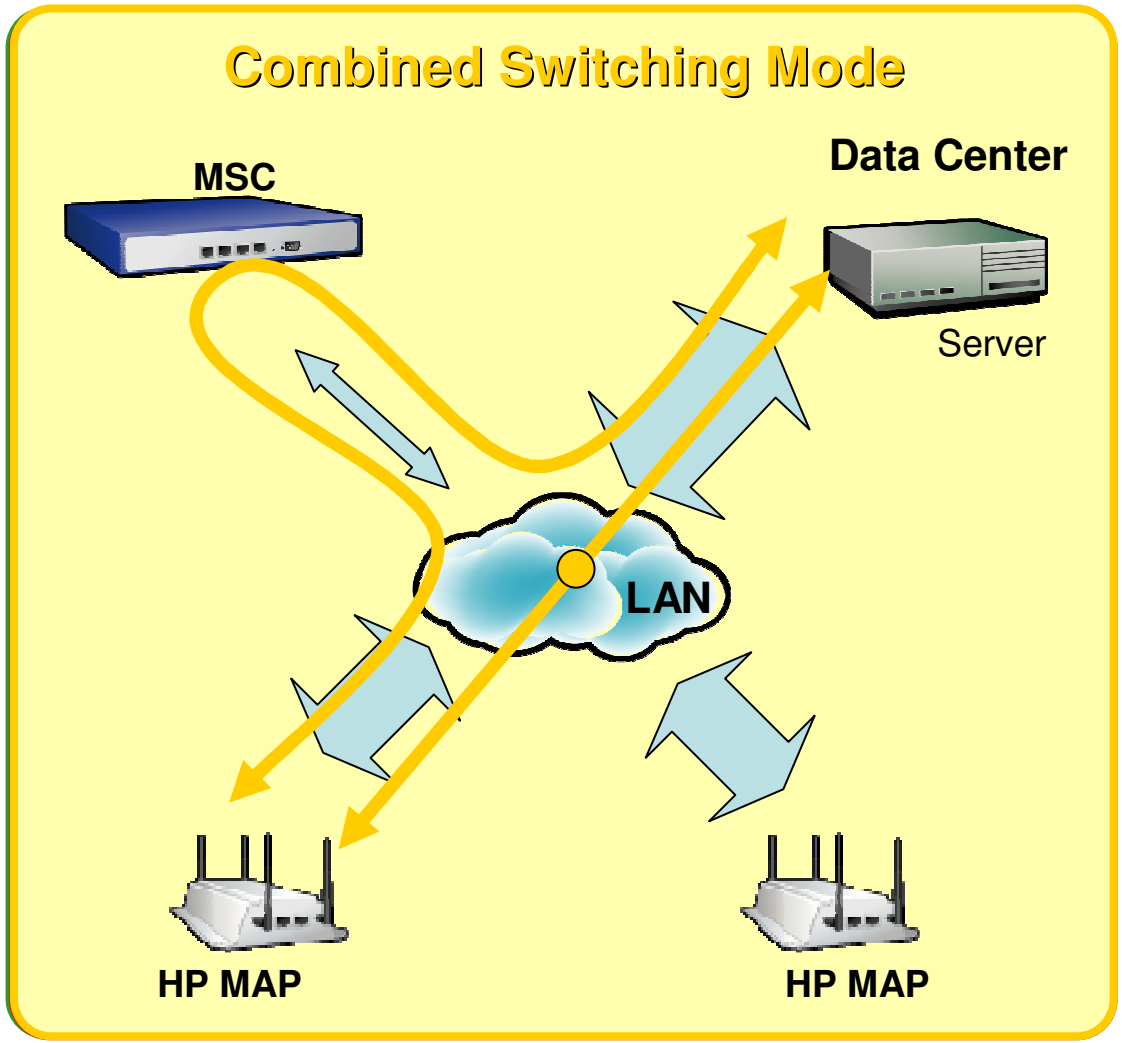
HP ProCurve Networks



i-APs

TriPlane™ – Optimized for Business

- Optimized for Performance
- Optimized for Scale
- Optimized for Control
- Optimized for Security



MSM7xx - Access Controllers

MSM710 – Internet Access (100 users)
(10 MAPs for Automatic AP config)

MSM730 – Internet Access (500 users)
(40 MAPs for Automatic AP config)

MSM750 – Internet Access (2,000 users)
(200 MAPs for Automatic AP config)

- Access Control
  - Home Page Redirect
  - White and Black List URL
- End User 'zero configuration'
  - DHCP
  - Fixed IP address
  - Web proxy settings
- Authentication
  - Full RADIUS, WISPr
  - 802.1x, SmartClient
- VPN pass-through
  - Multiple VPNs to same VPN termination point
- Tiered Service Levels
  - Welcome Page, Goodbye Page
  - Bandwidth management
- Stateful Packet Inspection
- IP Router
- AP configuration

MSM7xx - Mobility Controllers

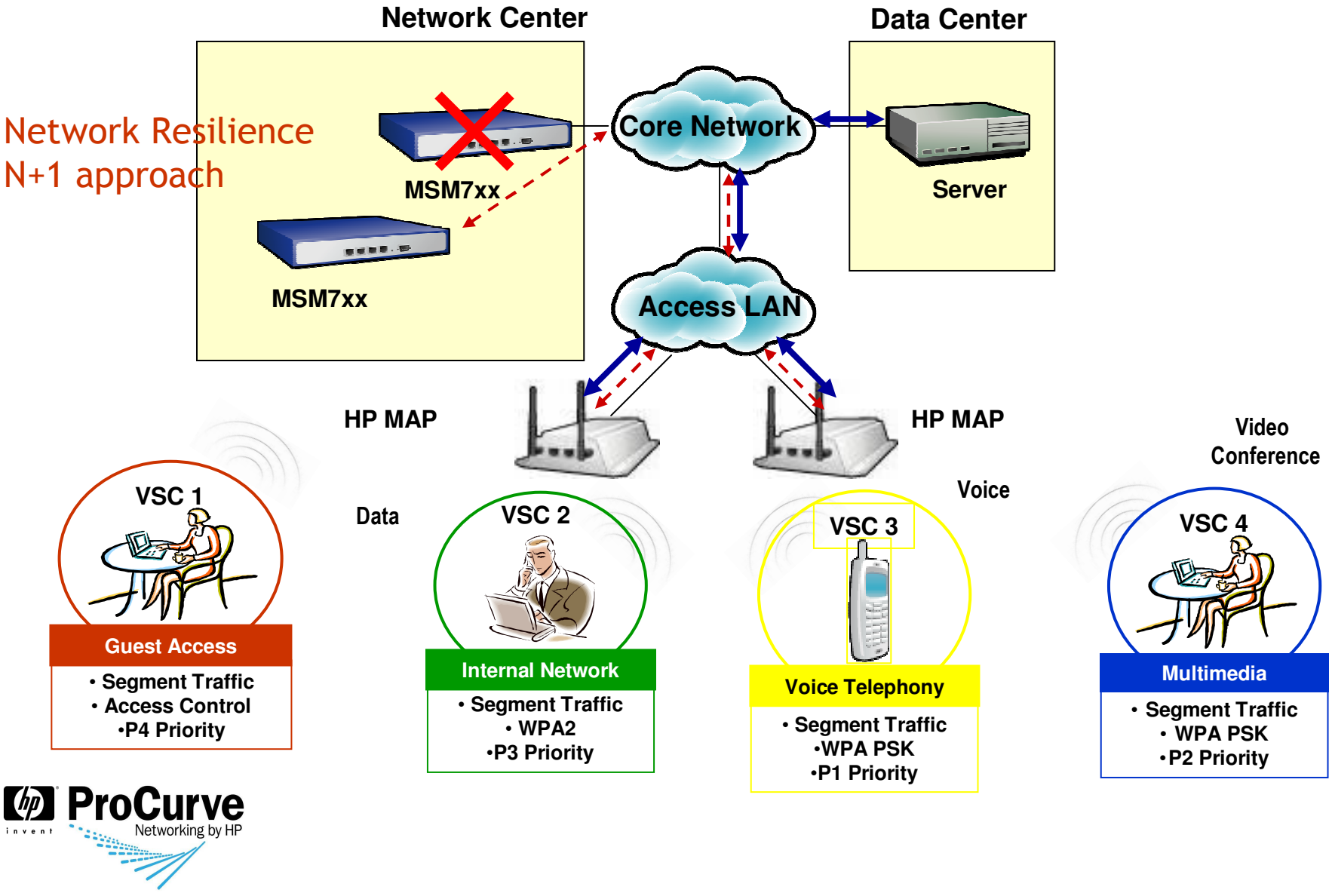
MSM710 – Mobility Controller (10 MAPs)

MSM730– Mobility Controller (40 MAPs)

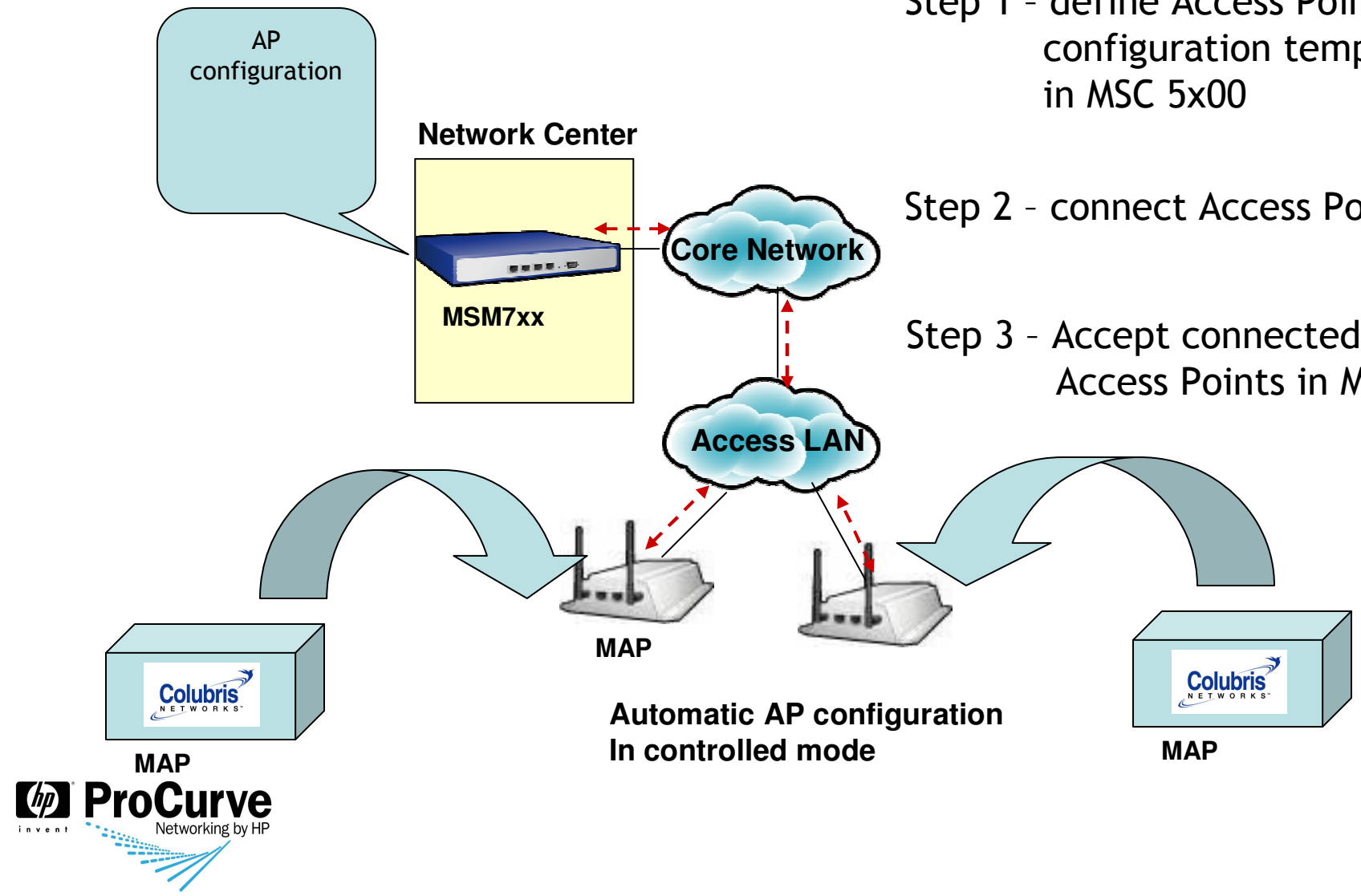
MSM750 Mobility Controller (200 MAPs)

- **Access Controller (previous slide)**
- **Mobility for real-time applications**
  - AP to AP hand-offs: less than 50 milliseconds
  - Supports superior VoWLAN performance
  - Secure WPA2 hand-offs: less than 50 milliseconds
- **IP Subnet Roaming Service**
  - Seamless Mobility from IP subnet to IP subnet
- **Automatic AP configuration**

Network Resilience



Centralized WLAN configuration



Step 1 – define Access Point configuration template in MSC 5x00

Step 2 – connect Access Points

Step 3 – Accept connected Access Points in MSC 5x00

ProCurve Networking by HP

WLAN Controller Product Range

Specifications	MSM710		MSM730		MSM750	
Positioning	Entry		Mid-Range		High-end	
Maximum MAPs (controlled/autonomous)	10/unlimited		40/unlimited		200/unlimited	
Max. Public/Guest Access Users	100		500		2,000	
COS Configuration	Access Service	Mobility Pack	Access Service	Mobility Pack	Access Service	Mobility Pack
Fast Roaming & VoWiFi		✔		✔		✔
Plug & Play Operation	✔	✔	✔	✔	✔	✔
Public/Guest Access	✔	✔	✔	✔	✔	✔

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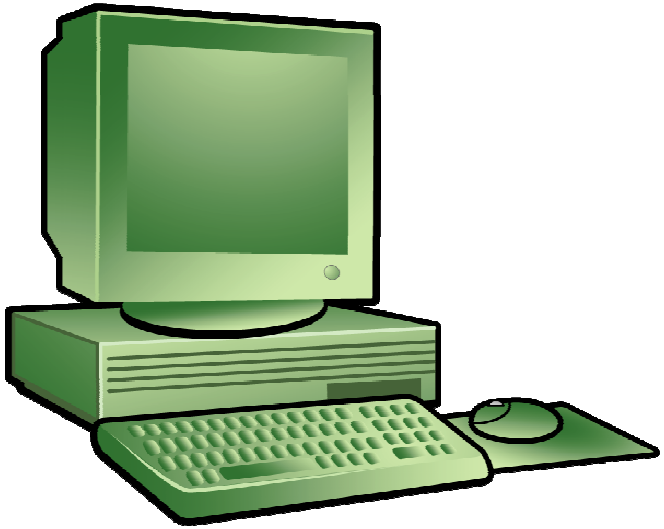
TriPlane Management Layer

Centralized Management

The Intelligent Wireless Networking Choice™

Network Management

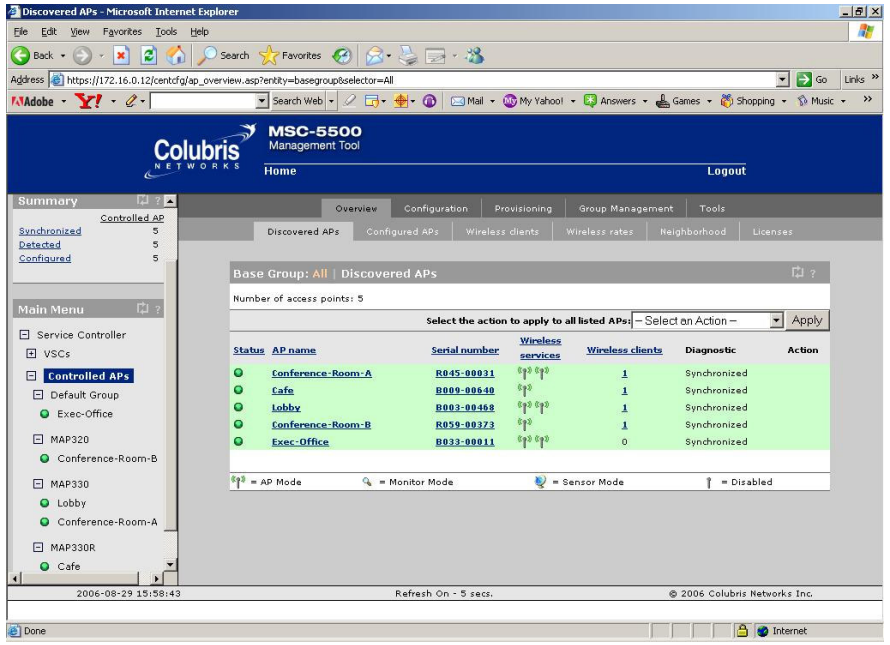


- AP Configuration
- Performance monitoring
- Fault management
- Troubleshooting functions

  - CNMS is a standalone, WLAN management system designed to minimize network operational costs.
  - To manage large, geographically-distributed IP networks that span thousands of locations.

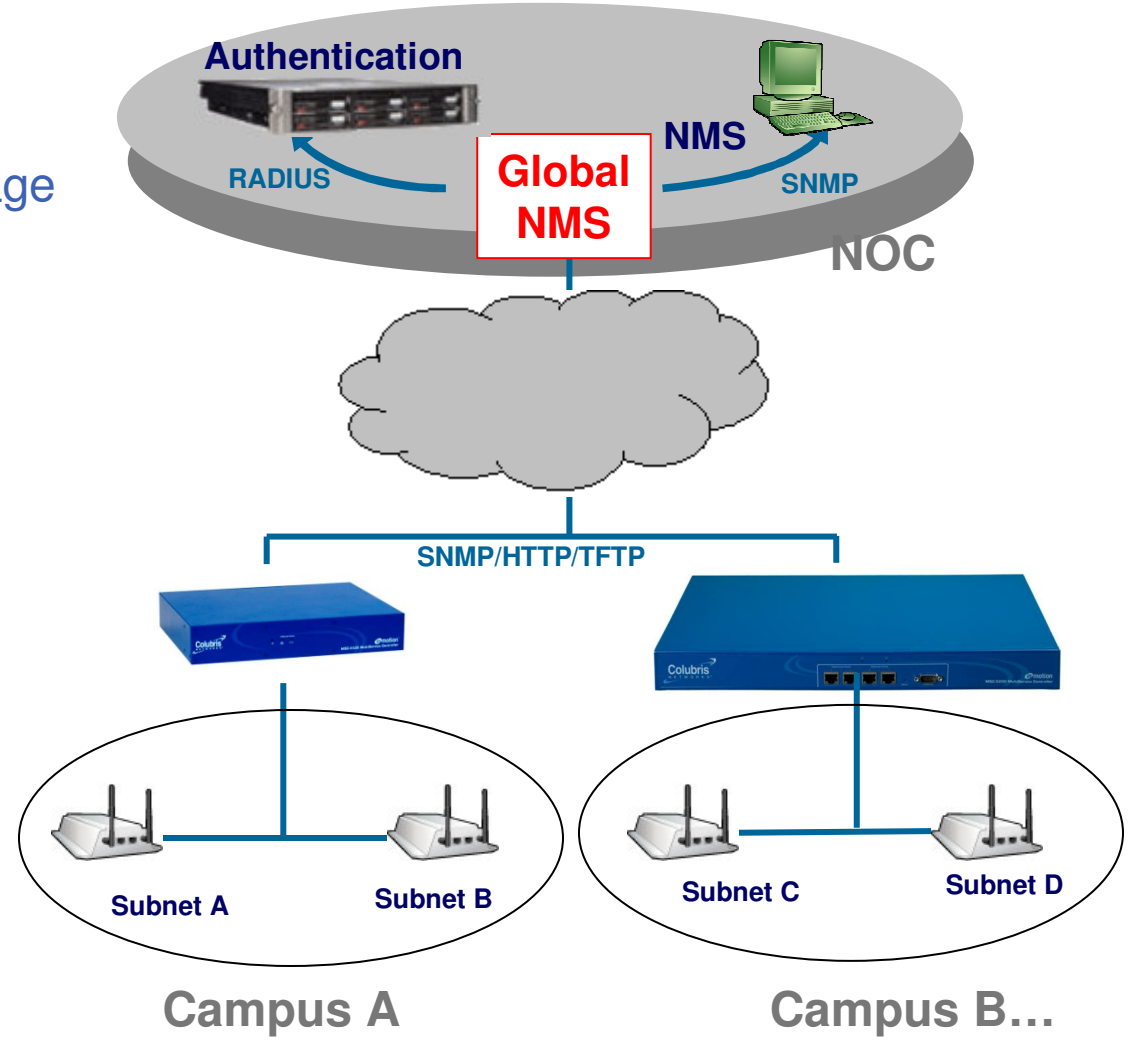
Venue Network Management

- Embedded in MSM 7xx series WLAN controllers
  - MSM 710 (manage up to 10 Access Points)
  - MSM 730 (manage up to 40 Access Points)
  - MSM 750 (manage up to 200 Access Points)
- Centralized WLAN management
  - Easy to use MSM GUI
  - Configure, monitor, troubleshoot and update software for MAPs and MSM
- MSM/MAP authentication eliminates theft/security risk



Global Network Management

- NMS models
  - NMS 1300 Entry (manage up to 200 devices)
  - NMS 1500 Enterprise (manage up to 1,000 devices)
- Monitor
  - AP discovery
  - User monitoring
  - NMS & AAA integration
- Analyze
  - Alerts & diagnostics
  - Performance reports
  - RF event correlation
- Act
  - Multi-vendor config mgt
  - Firmware distribution
  - Grouping & scheduling



ProCurve Networking by HP

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SCI-NetWork

TriPlane Security Layer

Colubris security system

The Intelligent Wireless Networking Choice™

Intrusion Prevention
RF Manager + MAP AP/Sensor

RF Manager 1300 Entry (max 50 sensors)
RF Manager 1500 Enterprise (max 200 sensors)

MSM 335 AP + RF Security Sensor
2x IEEE 802.11a/b/g radios
MSM 630 2AP + RF Security Sensor

Security - Intrusion detection and prevention (IDS/IPS)

- Capture all wireless activity and automatically and instantaneously block wireless threats without disrupting authorized activity or neighbor networks

Integrated RF Location Detection

- Provide location information for permanent removal of threats
- Integrate location information into RF heat map display

Three security levels to protect WLAN

- Level 3 - Wi-Fi IP Intrusion Prevention
  - Colubris offers a 24x7 protection for Wi-Fi IP intrusion
- Level 2 - Network Access Control
  - Colubris offers an extra authentication layer between the Wi-Fi and/or wired End User and the network.
- Level 1 - Encryption, VLAN and L2 isolation
  - Colubris offers a choice of Wi-Fi encryption methods, VLAN and L2 isolation

ProCurve Networking by HP

Level 1 – Traffic Streams Security

- Choice of Wi-Fi Encryption
  - OPEN (no encryption)
  - WEP
    - Fixed or dynamic key (64 of 128 bits), RC4 method
  - WPA
    - Fixed or dynamic key (128 bits), TKIP method
    - 802.1x + RADIUS to generate dynamic keys
  - WPA2 (IEEE 802.11i)
    - Fixed or dynamic key (128 bits), AES method
    - 802.1x + RADIUS to generate dynamic keys
- VLANs keep traffic flows separated
  - from Access Point up to and including Ethernet Switch. Each group or each user can have its own VLAN.
- L2 isolation keeps users in same group isolated

ProCurve Networking by HP

Level 2 – Network Access Control

- LAN for Employees (Private LAN)
  - 802.1x and RADIUS
    - End Users credentials stored in SQL, LDAP or Active Directory
    - Method to generate dynamic key for WPA and WPA2
    - Part of Industry standard client Network Access Control
  - Embedded RADIUS server in WLAN Controller
    - comprehensive roles-based User Authentication and policies (VLAN, QoS, Bandwidth, ...)
- Secure Guest Users / Student Users (HotSpot)
  - HP offers Access Controller as an extra security layer between guest user / student user and network
    - Wired and Wi-Fi Access
    - Home Page Redirect (Welcome Web Page)
    - Log-in name / password or 802.1x
    - Bandwidth management per user (managed through RADIUS)

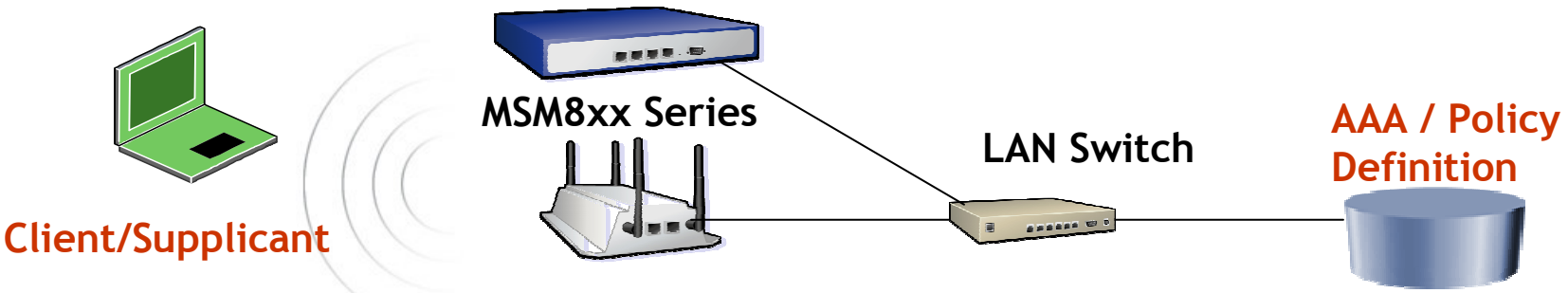
Network Access Control & Wi-Fi Integration

Step 1: Identity Verification (802.1x/EAP)

Step 2: Integrity Measurement to assess and communicate System Posture

Step 3: Determination of Security Policy
→ Quarantine or User VLAN?

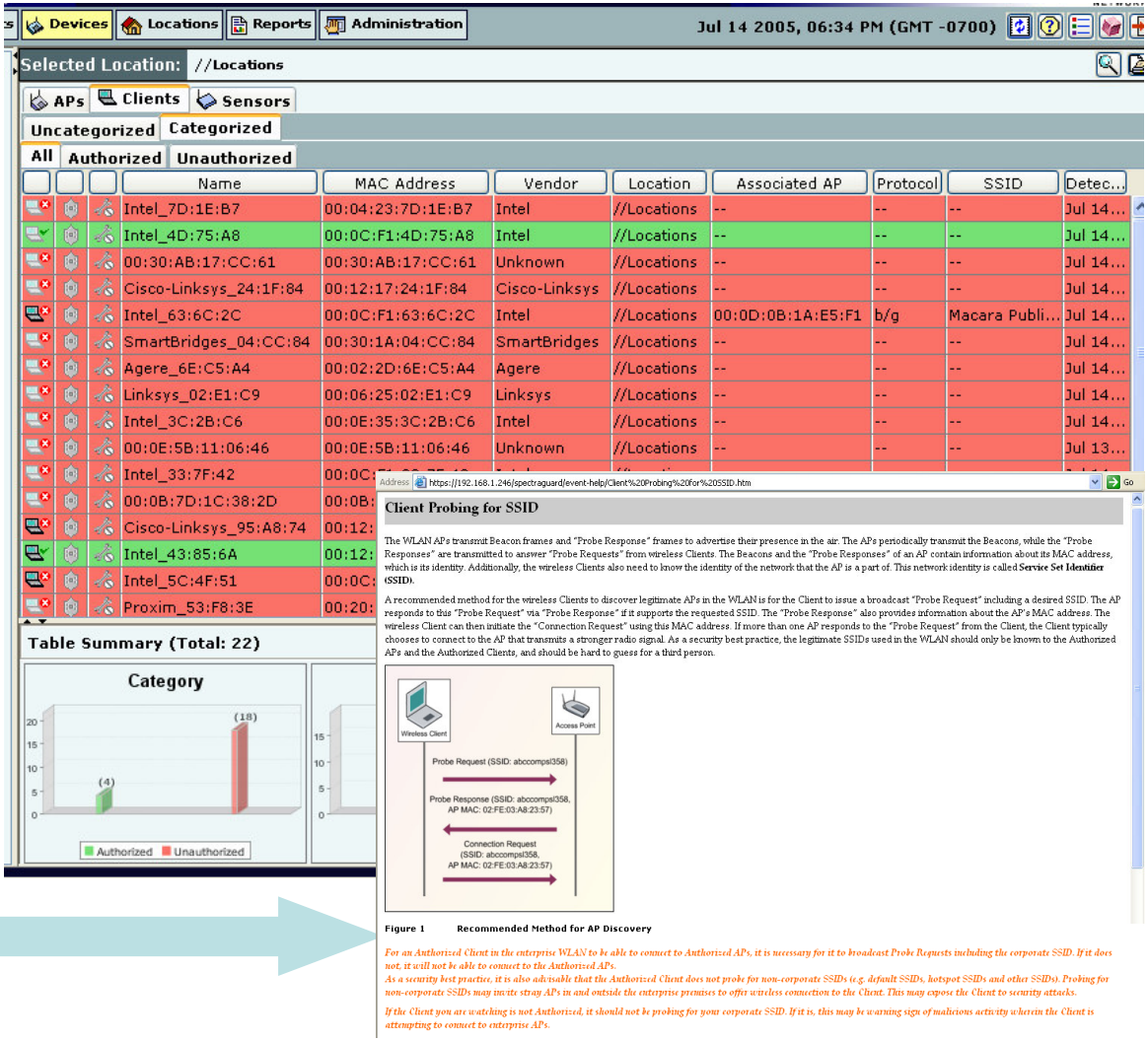
Step 4: MAP 3x0 enforces Security Policy via VLAN selected by AAA Server



ProCurve Networking by HP

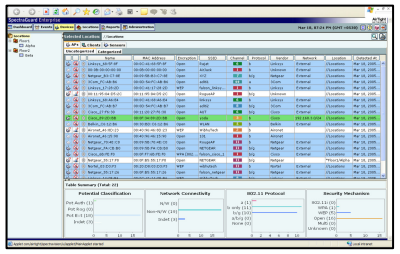
Set Security Policies and Monitor Compliance

- Configurable security policy and threat response
- Reporting for Sarbenes-Oxley, Gramm-Leach-Bliley, PCI(credit cards) HIPAA (Hospitals), Dep. Of Defense
- Monitor and alert for over 140 security and performance events
- Sensors scan all channels in all regulatory domains
- Details and remedies provided for each event



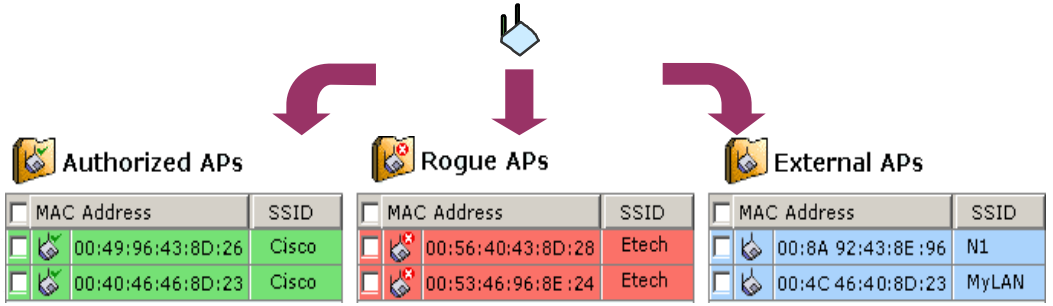
Colubris Intrusion Detection and Prevention

- Accurately classifies eight categories of threats
- Blocks up to twenty simultaneous WLAN security attacks per sensor
- High resolution location tracking
- Real-time RF coverage visualization
- Configurable policy enforcement



Monitor and Detect

RF Security Manager

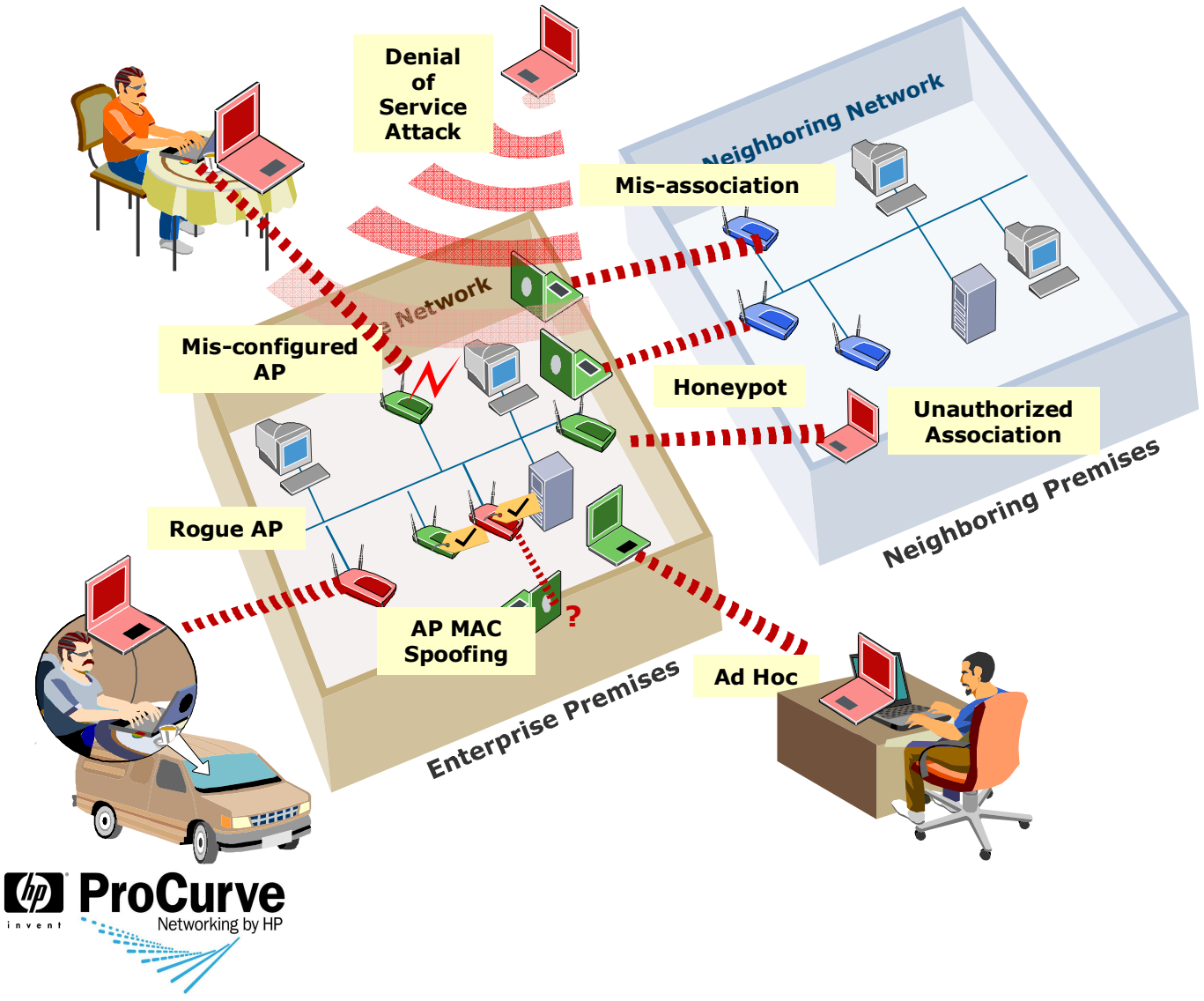


ProCurve Networking by HP

TriPlane™ Architecture – Management Plane
InCharge™ WLAN Intrusion Prevention System

Specifications	RF Manager Entry		RF Manager Enterprise	
Software Configuration	basic	basic + upgrade 50	basic	basic + upgrade 100
Manages up to # MSM 335/625 Sensors	50	100	100	200

Level 3 – Protection against Wi-Fi threats (optional extra security layer)



- Accurately detect and classify all threat types
  - Eliminate false positives
- Block threats without disrupting normal traffic
  - Maintain high network availability
- Complements wired IDS security systems

Tolly Test Results - Detection & Classification

29 threat scenarios		HP MSM	Cisco	Aruba
Single rogue APs	14	14	4	8
Multiple rogue APs	3	3	3	3
Honeypot AP	1	1	0	0
Mis-Configured APs	2	2	0	1
Client Mis-association	3	3	0	3
PC Ad-Hoc networking	3	3	2	3
WLAN DoS attack	1	1	1	1
AP Mac Spoofing	2	2	1	2
Total Detected Threats	29	29	11	21
False Alarms		0	14	11

HP caught 100% of the threats

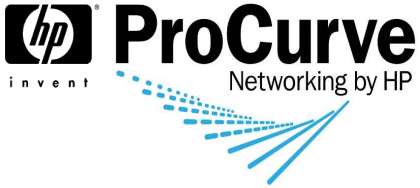
Cisco missed 66% of the threats
Aruba missed 23% of the threats

Tolly Test Results - Prevention

29 threat scenarios		HP MSM	Cisco	Aruba
Single rogue APs	14	14	4	8
Multiple rogue APs	3	3	0	1
Honeypot AP	1	1	0	1
Mis-Configured APs	2	2	0	1
Client Mis-association	3	3	0	1
PC Ad-Hoc networking	3	3	1	3
WLAN DoS attack	1	1	0	0
AP Mac Spoofing	2	2	0	0
Total	29	29	5	15

HP stopped
100% of the threats

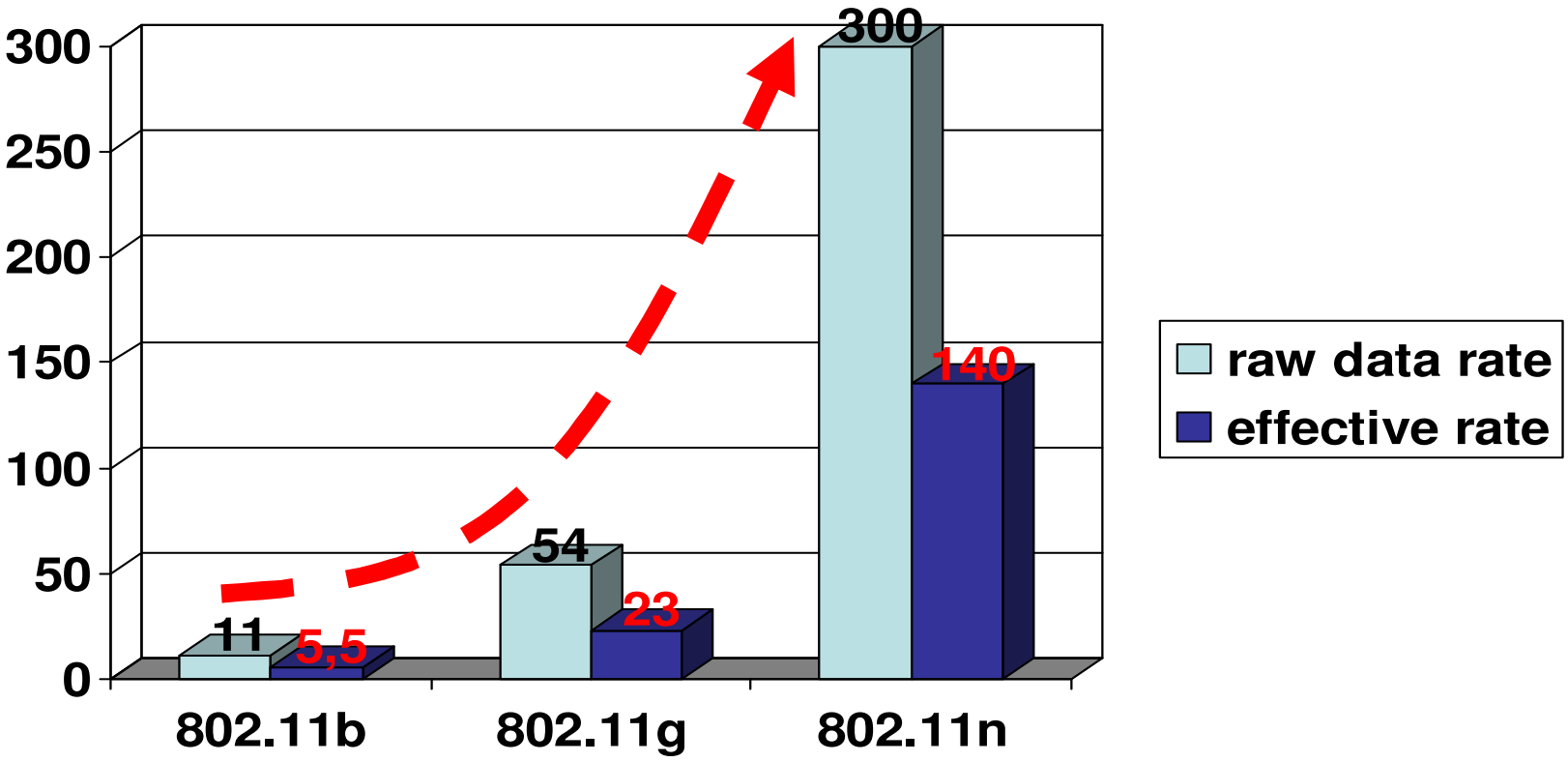
Cisco could only stop 17% of the threats
Aruba could only stop 52% of the threats



Colubris Migration to 802.11n

The Intelligent Wireless Networking Choice™

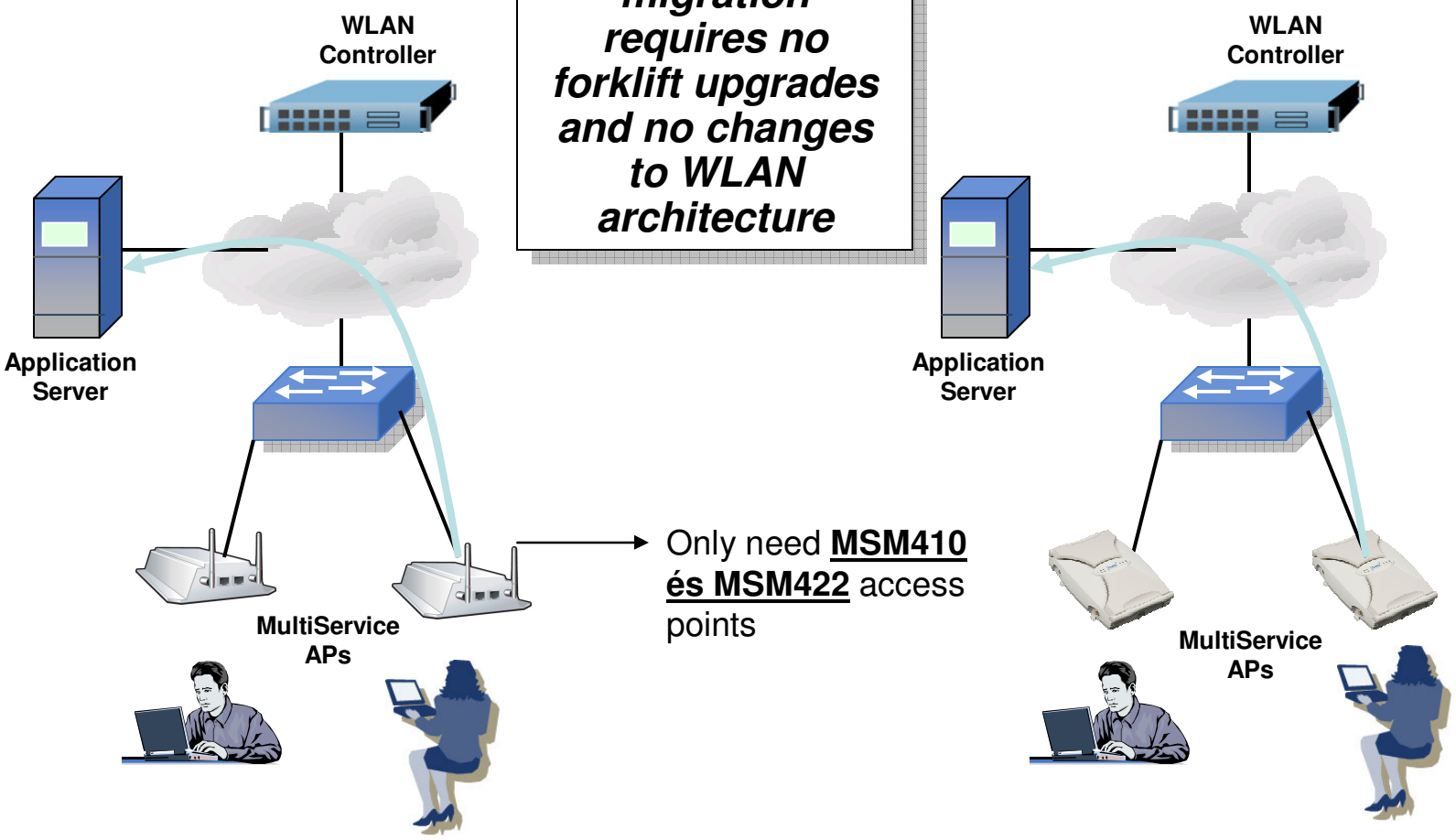
New Wi-Fi technique – 802.11n



ProCurve Networking by HP

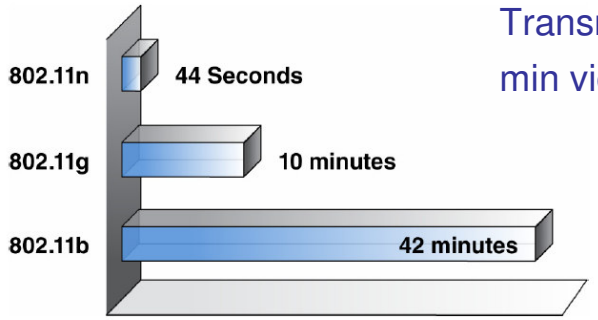
Colubris' Smooth Migration to 802.11n

With HP, 802.11n migration requires no forklift upgrades and no changes to WLAN architecture



Benefits 802.11n

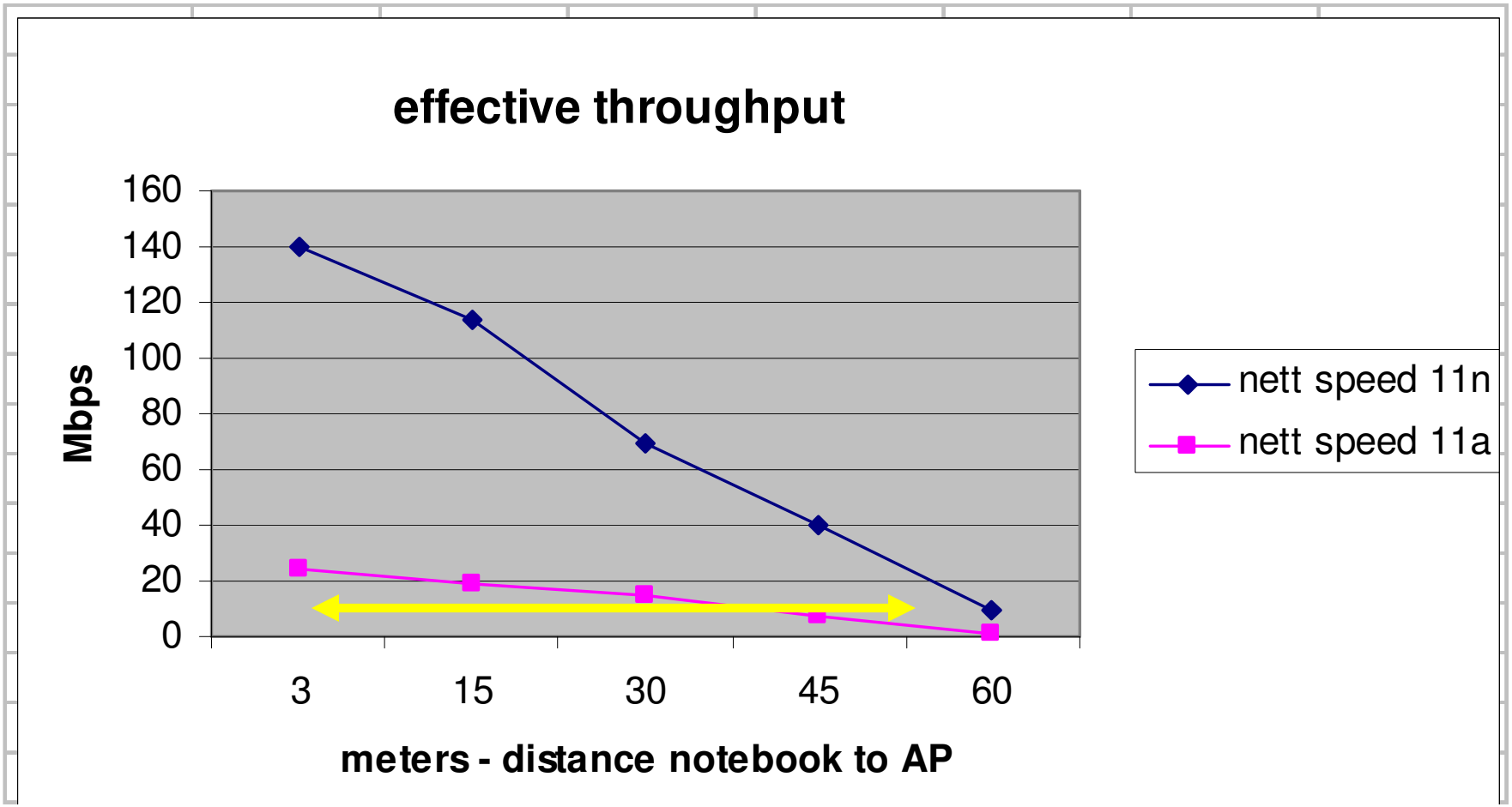
- Higher data rate
  - 550% higher data rate per Access Point
  - from 54 Mbps max for 11g → 300 Mbps max for 11n (3x3 MIMO)



Transmit a 30 min video file.

- More WLAN capacity
  - 9x 300 Mbps = 2,7 Gbps WLAN capacity in the same room
  - use 9x independent 40 MHz RF channels in 5.170 - 5.710 GHz band

Effective throughput and achievable distance (meters)

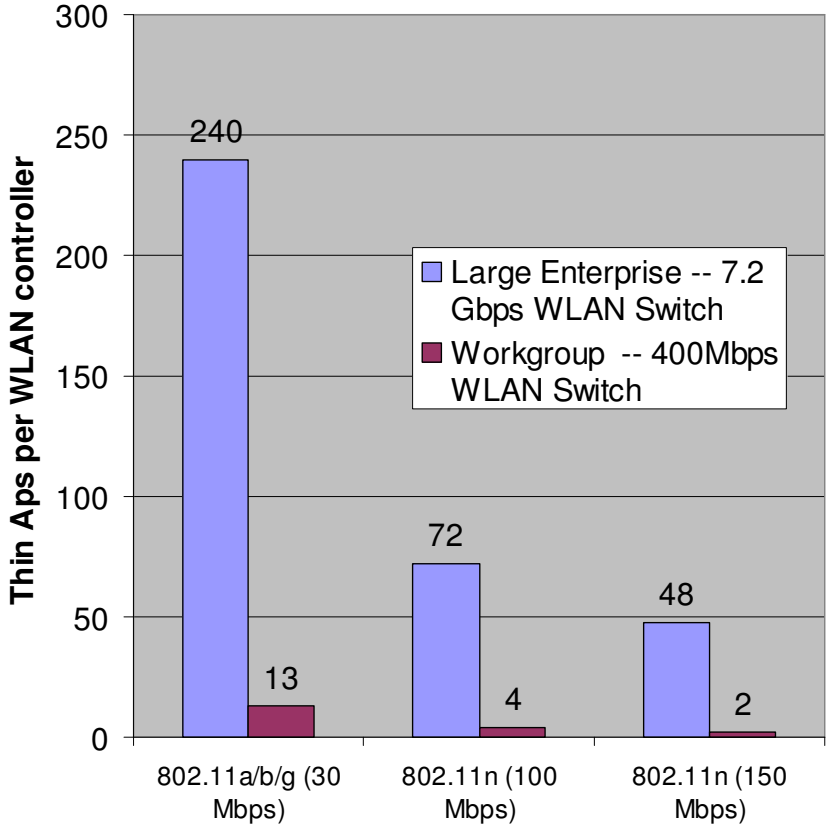


What are the tricks to achieve 300 Mbps ?

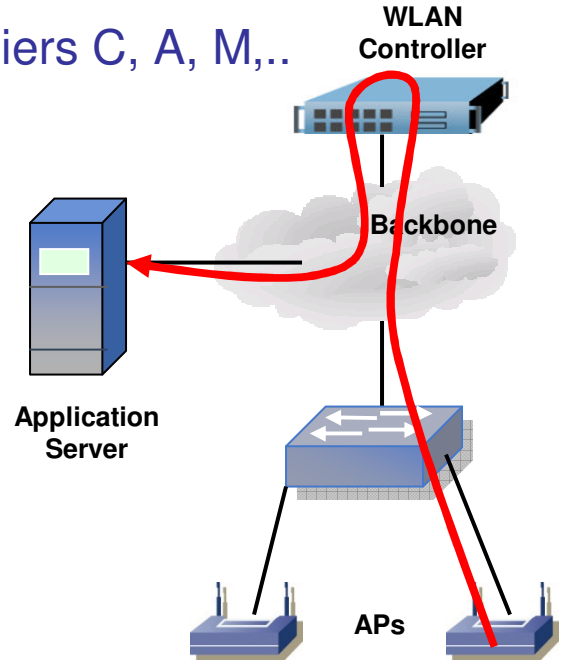
1. Improved modulation technique
   - An improved OFDM gives a 20% higher data rate (65 Mbps) compared to OFDM as used for 11g en 11a (54 Mbps)
2. Use of reflection and multiple parallel streams
   - Parallel streams by using MIMO (Multiple In, Multiple Out) in which space-division multiplexing is used to create independent spatial streams
   - Each spatial stream is send through an independent antenna
     - MIMO 2x2 = 2 transmit antennas and 2 receive antennas
     - MIMO 3x3 = 3 transmit antennas and 3 receive antennas
   - The addition of a spatial stream gives 50% higher data rate
3. Doubling of the available frequency band per RF channel
   - from 20 MHz → 40 MHz gives a100% higher data rate

Impact of 802.11n increased throughput

Max number of (thin) AP per WLAN Controller



Suppliers C, A, M,..



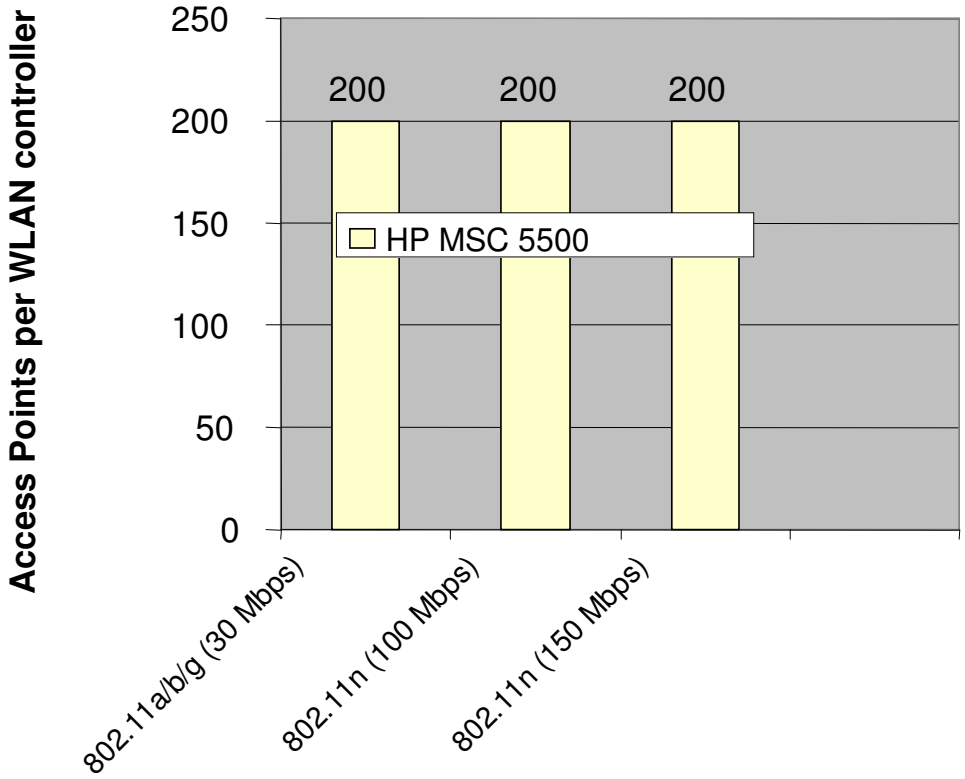
thin Access Points

Source: Burton Group

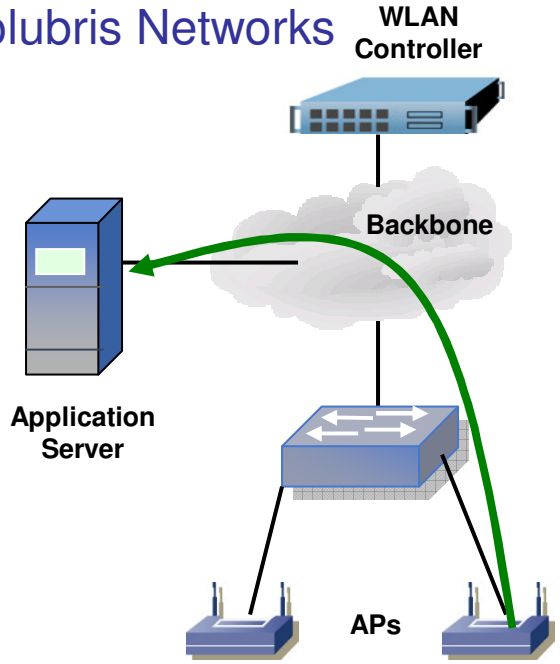
Impact on using 11n Thin AP

Impact of 802.11n increased throughput

Max number of HP AP per WLAN Controller



Colubris Networks

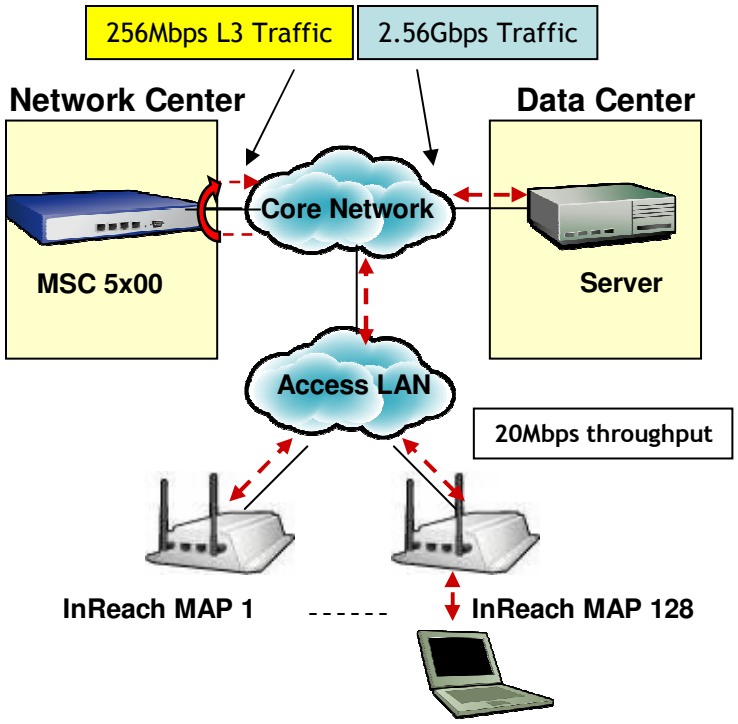


intelligent Access Points

Migration path towards 802.11n
HP TriPlane™ Architecture

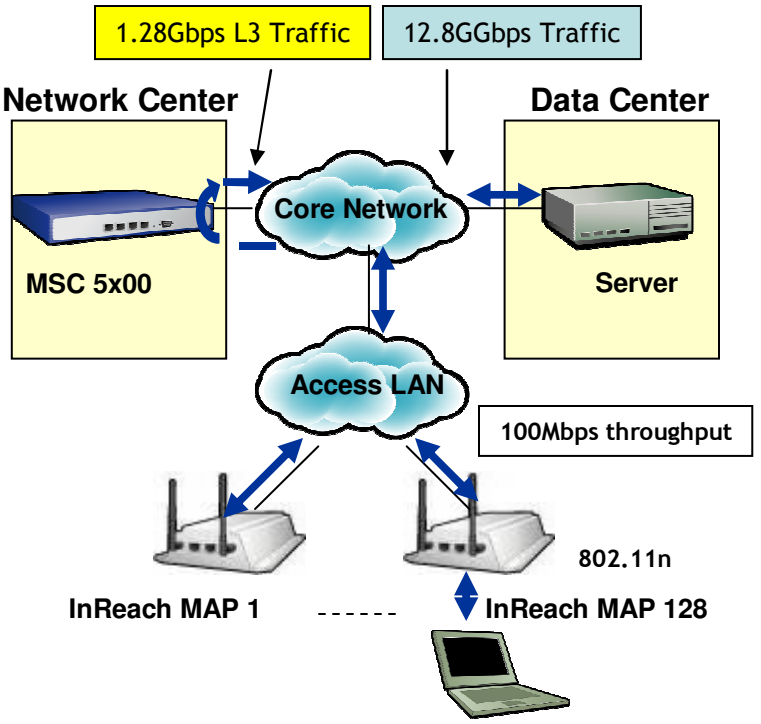
SCI-NetWork

- MAPs forward traffic directly to destination
- Only L3 roaming traffic traverses MSC ≈ 10% of total traffic



- Dual 11g radio at 40Mbps throughput per AP
- 50% utilization per AP = 20Mbps
- Colubris MSC supporting128 APs
- 128 x 20Mbps = 2,560 Mbps or 2.56Gbps total throughput
- L3 traffic through MSC = 10% of 2.56Gbps = 256Mbps

Today's Network
11a/b/g

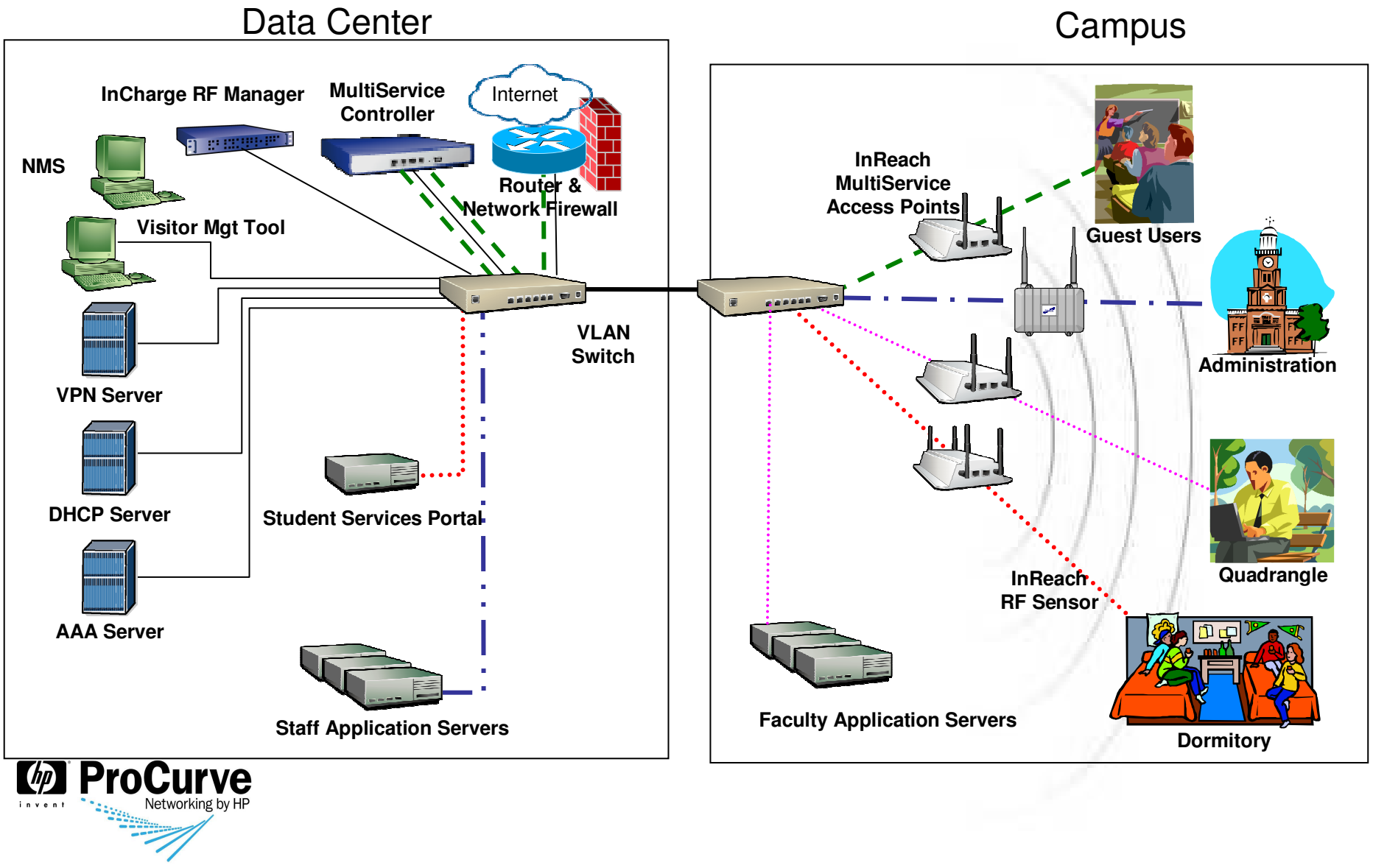


- Dual 11g radio at 200Mbps throughput per AP
- 50% utilization per AP = 100Mbps
- Colubris MSC supporting 128 APs
- 128 x 100Mbps = 12,800 Mbps or 12.8Gbps total throughput
- L3 traffic through MSC = 10% of 12.8Gbps = 1.28Gbps

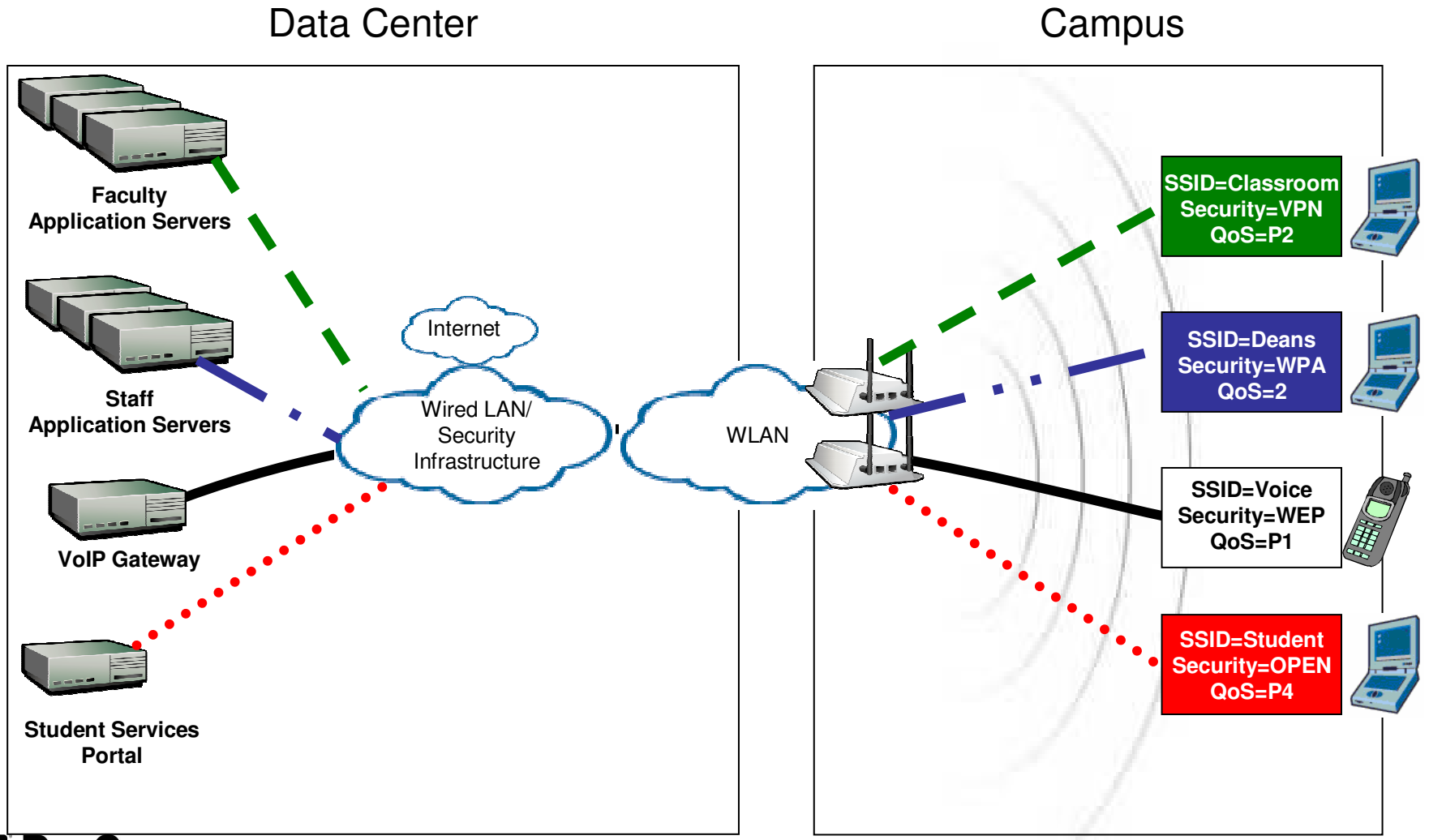
Tomorrow's Network -
11n

ProCurve Networking by HP

University Colubris WLAN Solution



University Colubris WLAN Solution



ProCurve Networking by HP

Referencies

Összegzés

- Pont-pont mikrohullámú gerinc összeköttetések
  - Cél a költséghatékonyság radikális növelése: direkt IP átvitel, nagyon jó spektrumkihasználás, az átviteli kapacitás növelése (jelenleg: > 1 Gbps)
- Pont-multipont WiMAX access hálózatok
  - További versenyfutás az LTE és a mobil WiMAX között
  - A fix és nomadikus alkalmazás felfutása várható
  - Szigetszerű mobil alkalmazások
  - Új frekvenciák (2,5 GHz, 5,8 GHz)
- Intelligens WiFi rendszerek
  - Egy hálózaton belül várható az összes (802.11 a/b/g/n) szabványú hozzáférési pont megjelenése
  - A hálózatbiztonsági kérdések legnagyobb prioritáson való kezelése

Köszönöm a figyelmüket!

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