Cisco Systems

Technologie a produkty bezdrátových sítí

CISCO SYSTEMS

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The New Enterprise: Mobility

Voice/Data Collaboration · **Intelligent Contact Management** · **E-Commerce** · **Unified Messaging** · **E-Learning** · **IP Telephony**

Mobility

**New Network Services
Anytime, Anywhere Access
New Network Infrastructure Requirements**

www.cisco.com

Mobility Becoming a Requirement

- **People on the move**
  - **Business travel**
  - **Nomadic sales force**
  - **7x24x365 availability**
  - **The "extended" Enterprise**
- **Anywhere access to services and business applications**
- **Plethora of mobile devices and technologies available**
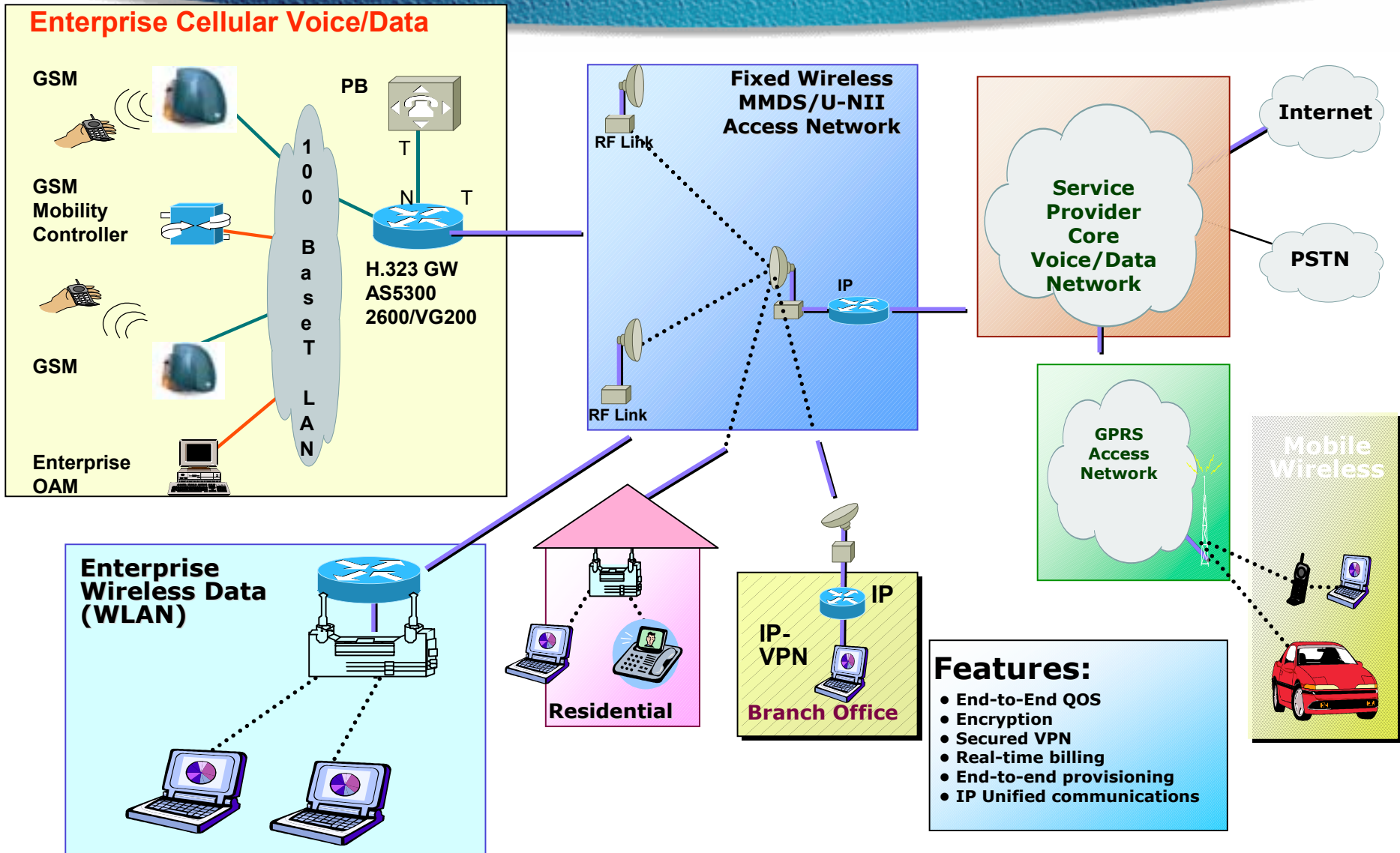 - **Notebooks, hand-helds, cell phones, pagers**

www.cisco.com
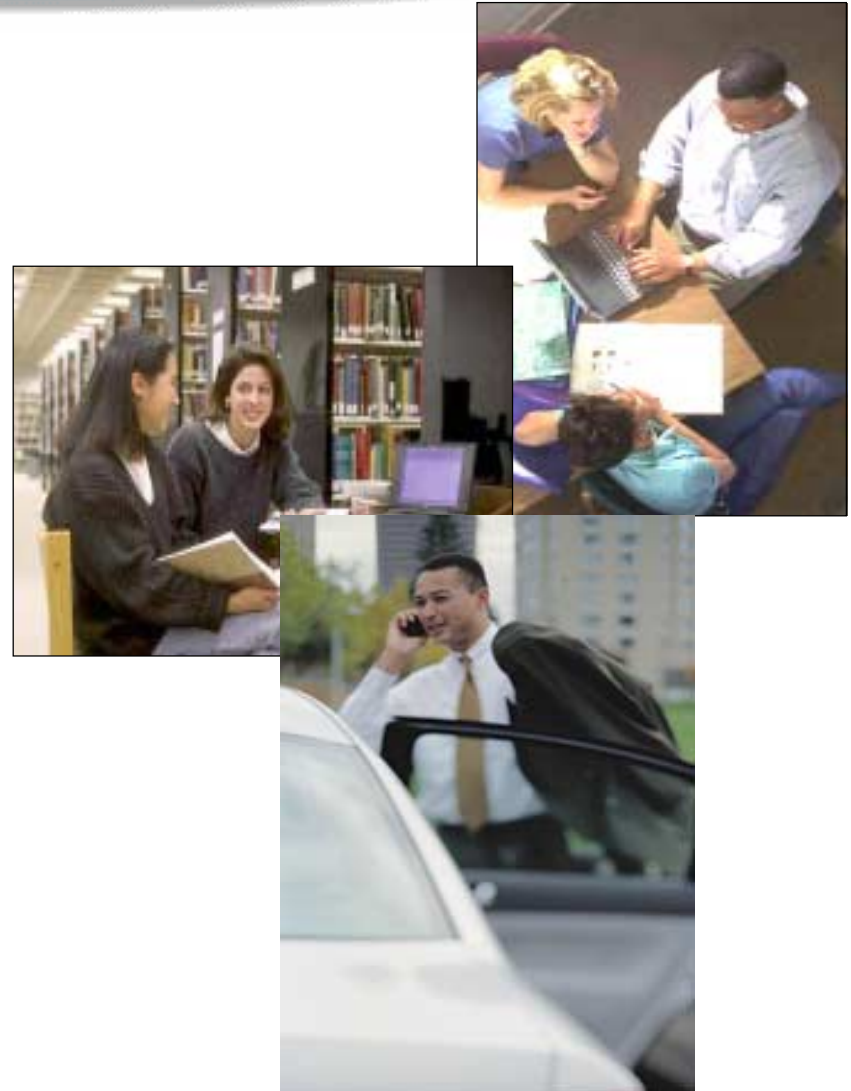
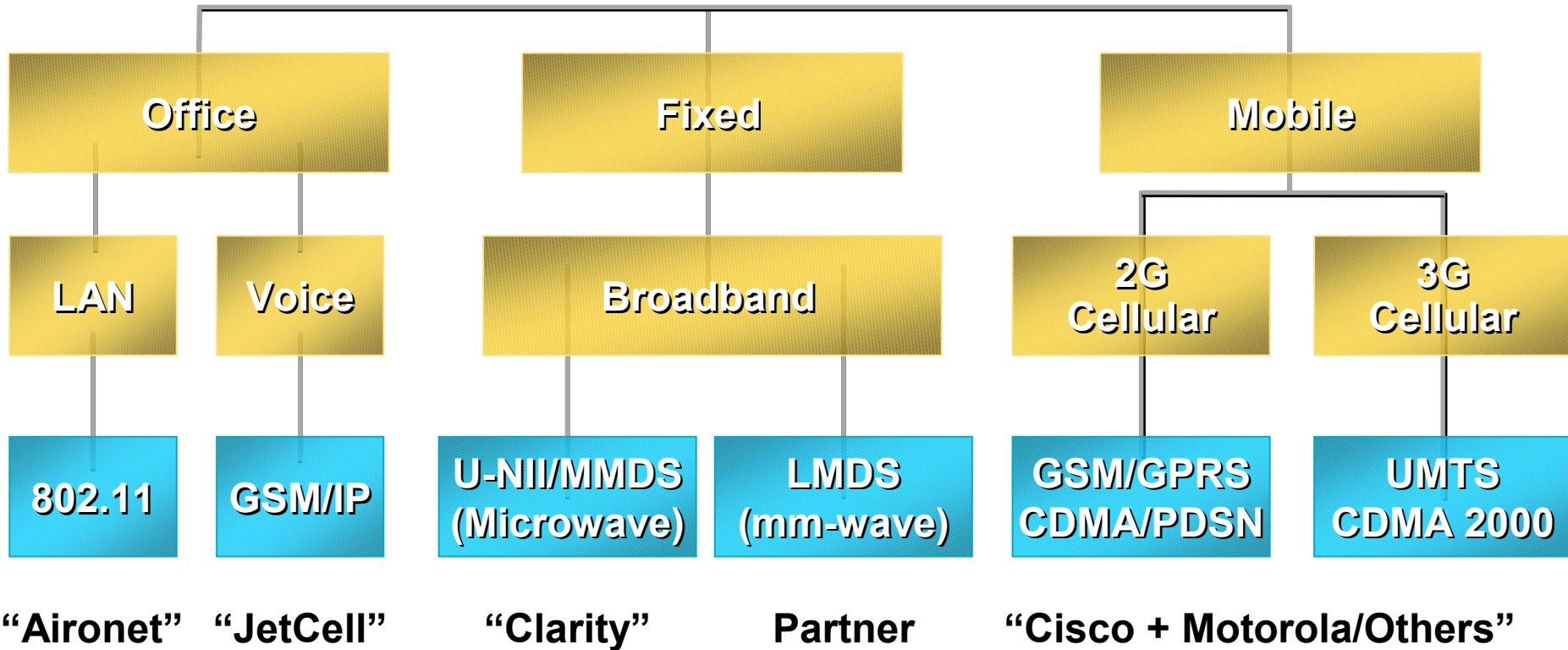# Rich Portfolio of Mobile Applications

- **Access to email and business applications**

  In meetings, at home, and on the road

  Collaboration with customers and suppliers

- **Mcommerce**

  Commerce via mobile devices

- **Asset tracking**

  Keeping track of more devices in the enterprise

  Traditional logistics and warehousing

- **Shopping**

  "Scan and Shop"

www.cisco.com

Cisco's Wireless Initiatives

Enterprise Cellular Voice/Data

GSM

GSM Mobility Controller

GSM

Enterprise OAM

PB

100 BaseT LAN

T

N   T

H.323 GW
AS5300
2600/VG200

Fixed Wireless MMDS/U-NII Access Network

RF Link

RF Link

IP

Service Provider Core Voice/Data Network

Internet

PSTN

GPRS Access Network

Mobile Wireless

Enterprise Wireless Data (WLAN)

Residential

IP-VPN

IP

Branch Office

Features:
- End-to-End QOS
- Encryption
- Secured VPN
- Real-time billing
- End-to-end provisioning
- IP Unified communications

Cisco Wireless Solutions Strategy

```
                    ┌──────────────────┼──────────────────────────┐
              ┌──────────┐       ┌──────────┐              ┌──────────┐
              │  Office  │       │  Fixed   │              │  Mobile  │
              └──────────┘       └──────────┘              └──────────┘
```

Office		Fixed	Mobile	
LAN	Voice	Broadband	2G Cellular	3G Cellular
802.11	GSM/IP	U-NII/MMDS (Microwave) · LMDS (mm-wave)	GSM/GPRS CDMA/PDSN	UMTS CDMA 2000
"Aironet"	"JetCell"	"Clarity" · Partner	"Cisco + Motorola/Others"	

Cisco Aironet Series

LAN Wireless Solutions

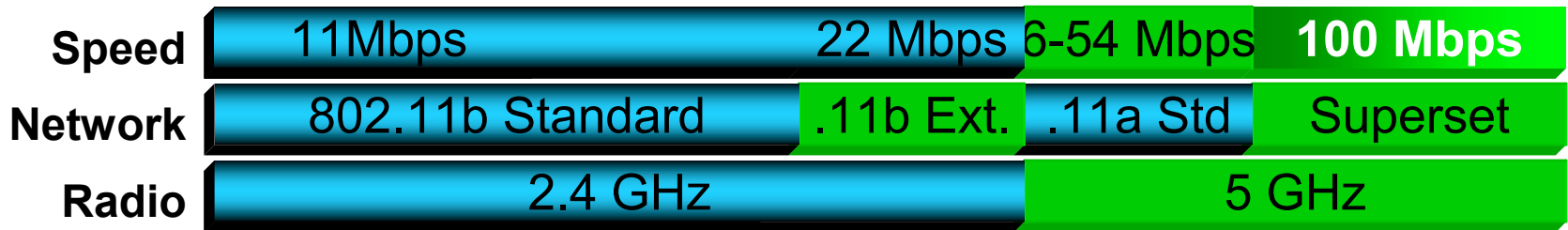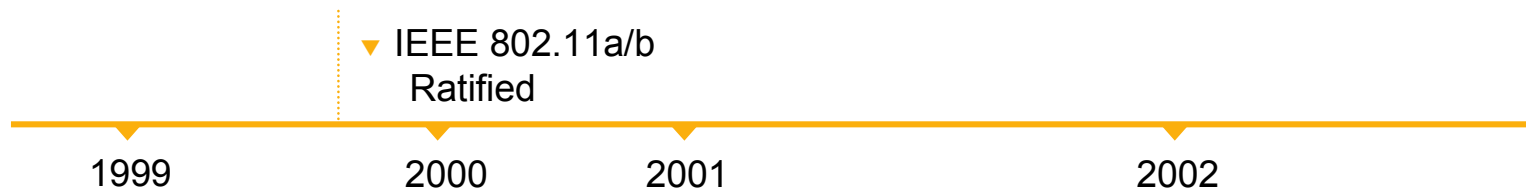CISCO SYSTEMS

WLAN Vision: Performance

- **Small, Medium and Large Enterprises**
  - **High power and performance**
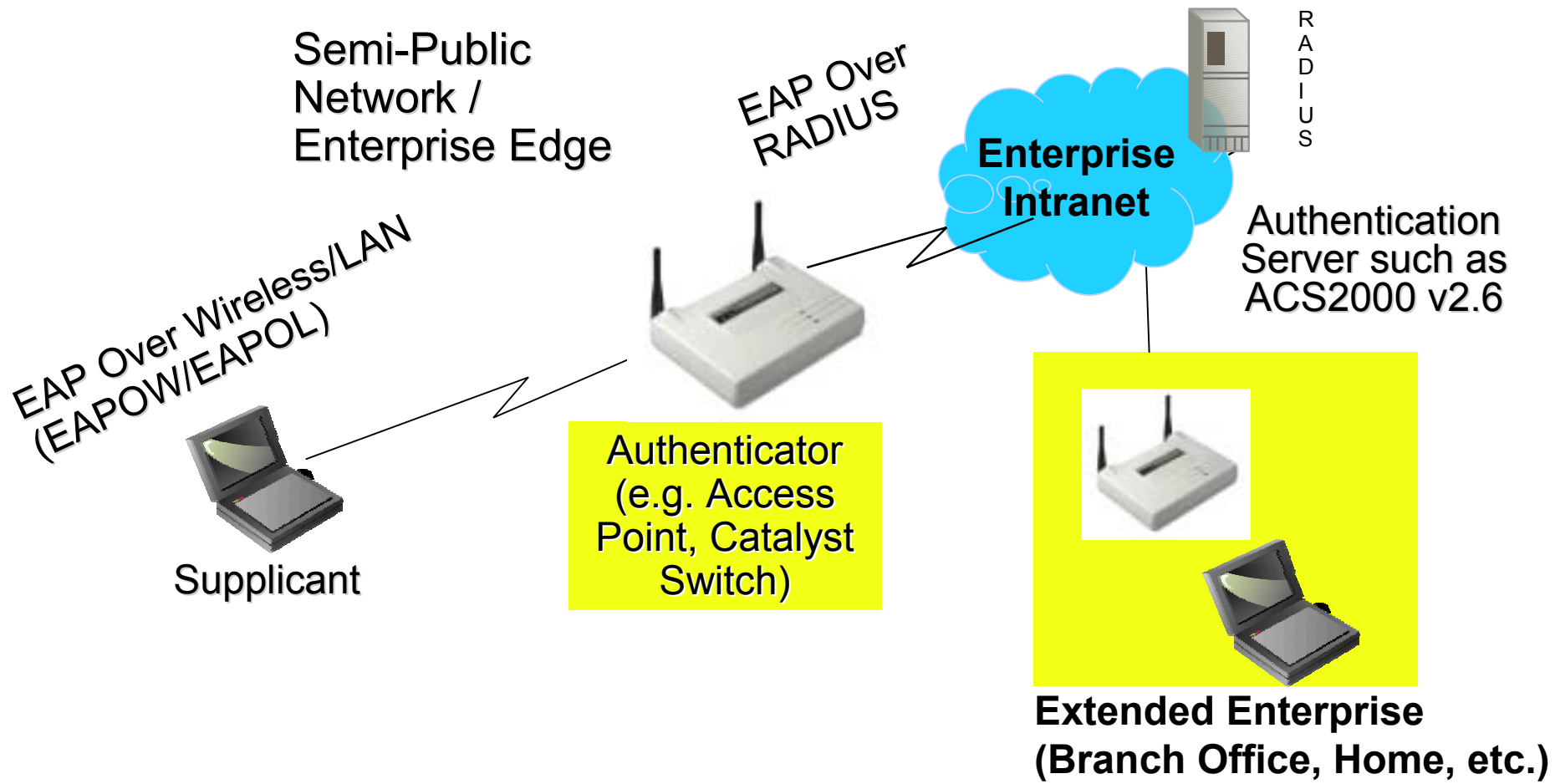- **Telecommuter**
  - **Cost and Manageability**

Speed	11Mbps	22 Mbps	6-54 Mbps	**100 Mbps**
Network	802.11b Standard	.11b Ext.	.11a Std	Superset
Radio	2.4 GHz		5 GHz	

▼ IEEE 802.11a/b
Ratified

| 1999 | 2000 | 2001 | 2002 |

Cisco Aironet Network Services

- **Scalable, Extensible Security**

- **Load Balancing and Redundancy**

- **WLAN Management**

- **WLAN Roaming**

- **QoS**

Centralized User-Based Authentication

Semi-Public
Network /
Enterprise Edge

EAP Over
RADIUS

R
A
D
I
U
S

**Enterprise
Intranet**

EAP Over Wireless/LAN
(EAPOW/EAPOL)

Authentication
Server such as
ACS2000 v2.6

Supplicant

Authenticator
(e.g. Access
Point, Catalyst
Switch)

Extended Enterprise
(Branch Office, Home, etc.)

Dynamic WEP Key Management

Laptop computer

Fast Ethernet

R A D I U S

Access blocked

802.11 Associate	**802.11**		**RADIUS**
EAPOL-Start	**EAPOW**		
EAP-Request/Identity			
EAP-Response/Identity		Radius-Access-Request	
EAP-Request			Radius-Access-Challenge
EAP-Response (credential)		Radius-Access-Request	
EAP-Success			Radius-Access-Accept
EAPW-Key (WEP)			

Access allowed
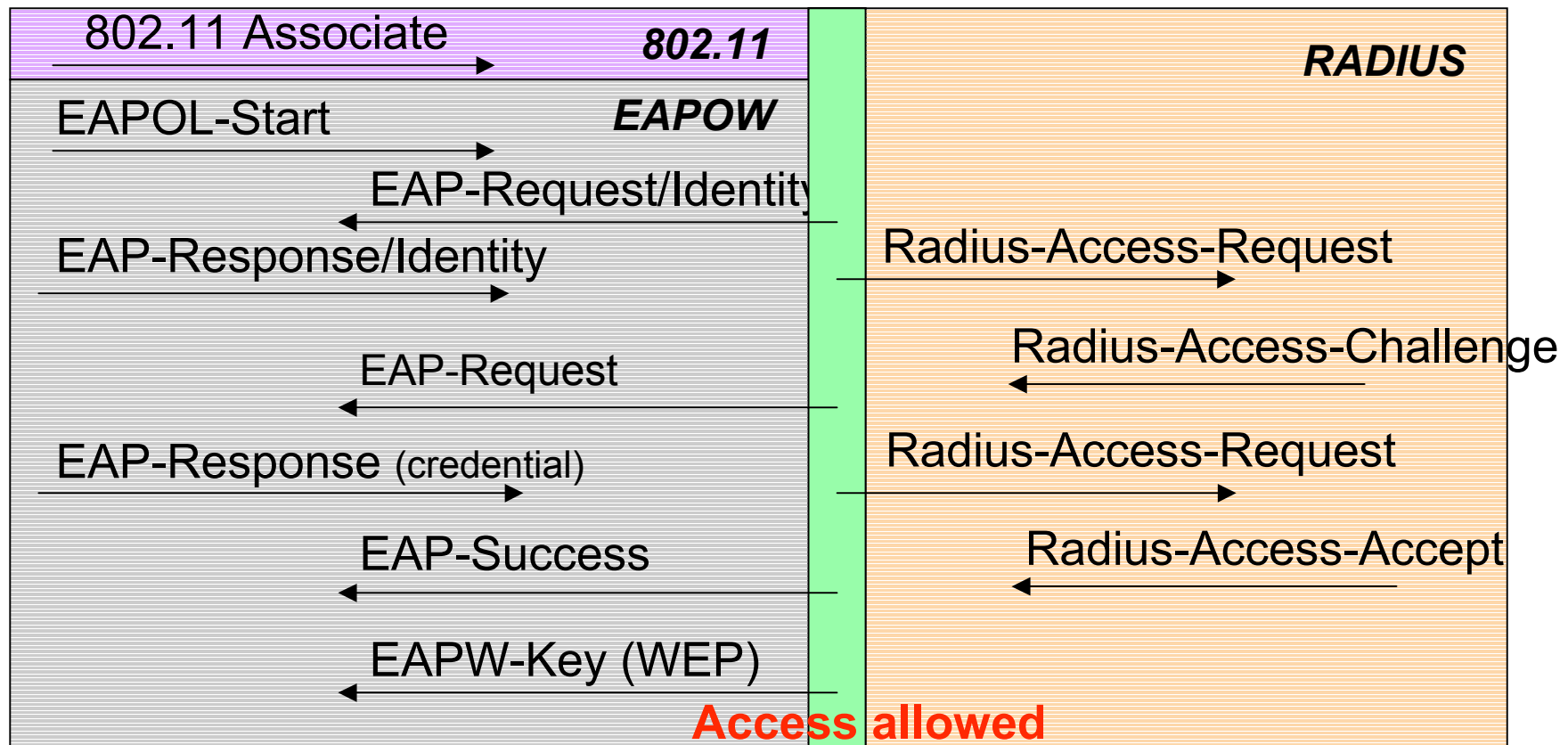
Additional Network Services: Load Balancing
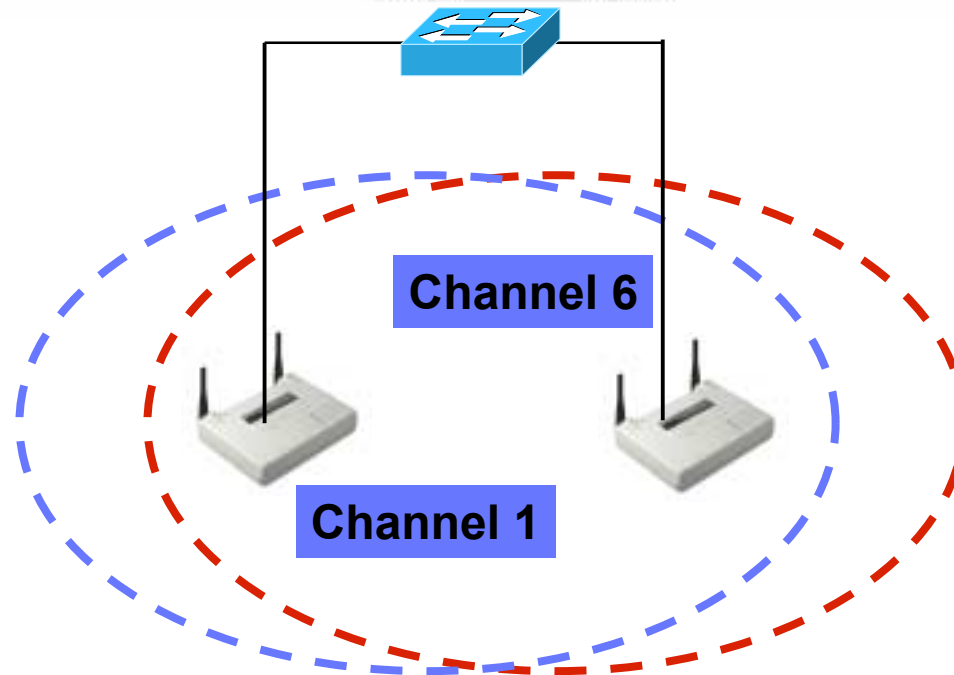
Channel 6

Channel 1

- **AP's configured for load sharing use different RF channels in coverage area**

- **Policy based on number of users, bit error rate, or signal strength**

# Additional Network Services: Hot Standby

Channel X

Active
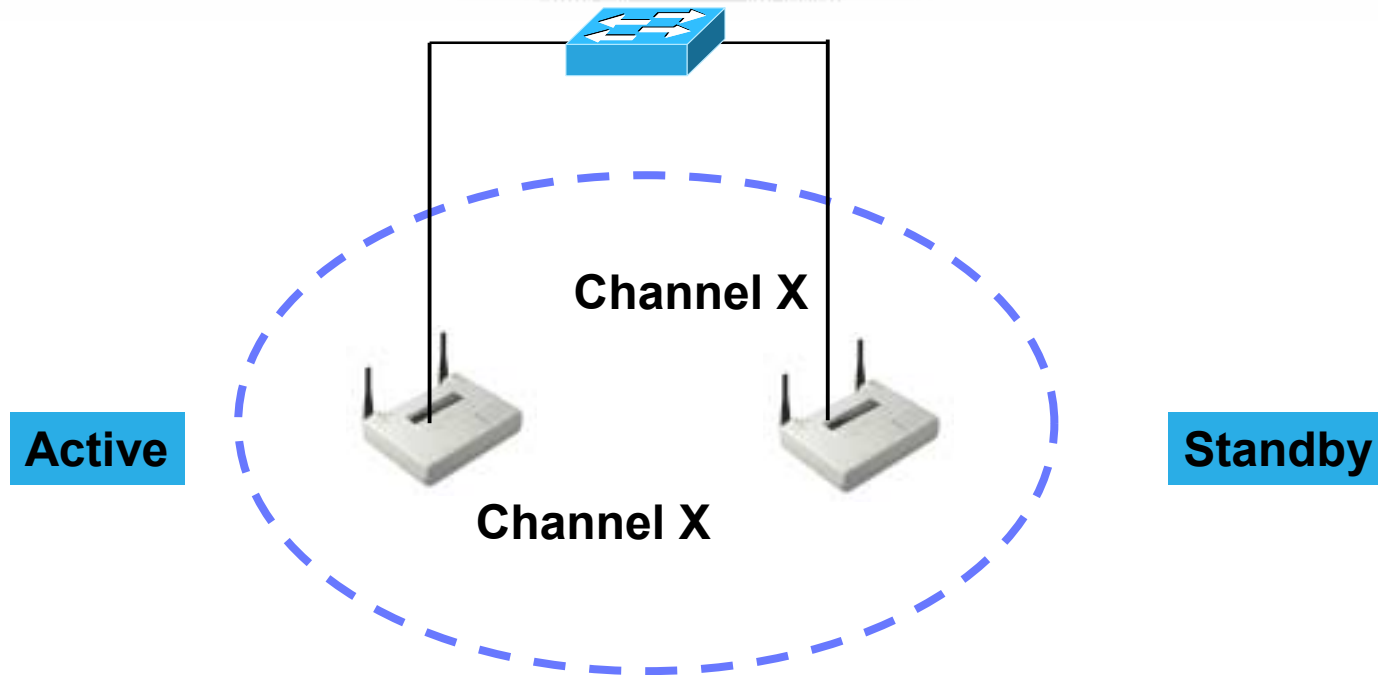
Channel X

Standby

- **AP's co-located for hot standby use SAME RF channel in coverage area**

- **Standby AP acts as probe for monitoring and management**

www.cisco.com

Powerful Diagnostics and Troubleshooting tools

- **Web-based WLAN Management**

- **Support for Std MIBs CDP MIB, and 802.11 MIB**

- **Site-survey tools**

- **Client-side utilities**

- **Auto-localization and channel agility**

- **Integration with CiscoWorks 2000**
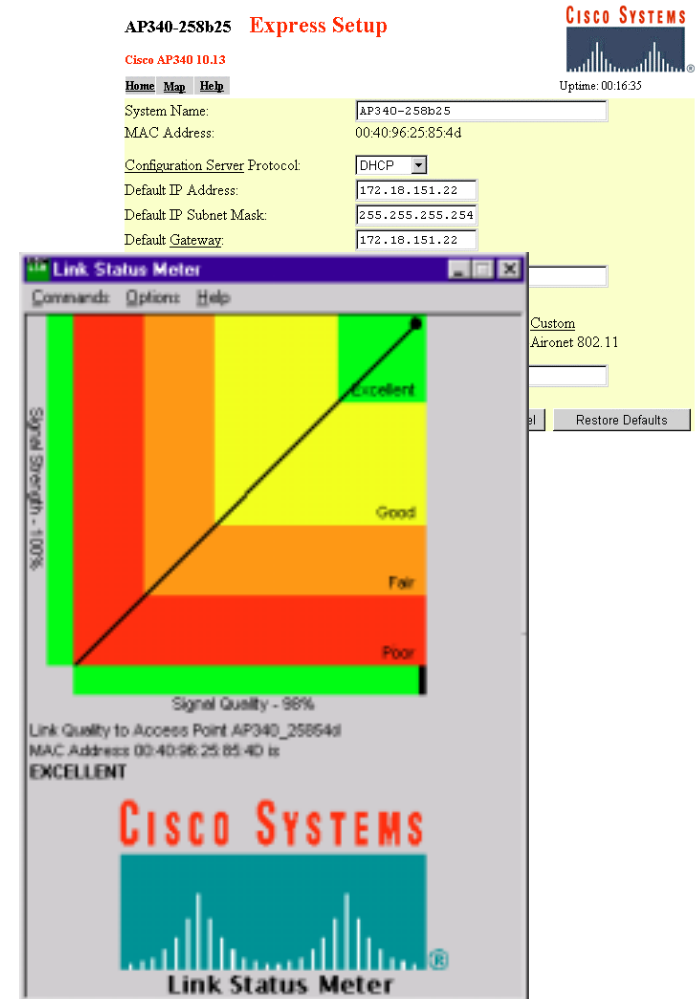
WLAN L2 Roaming Services

Roaming

Wireline Infrastructure

Internet

www.cisco.com
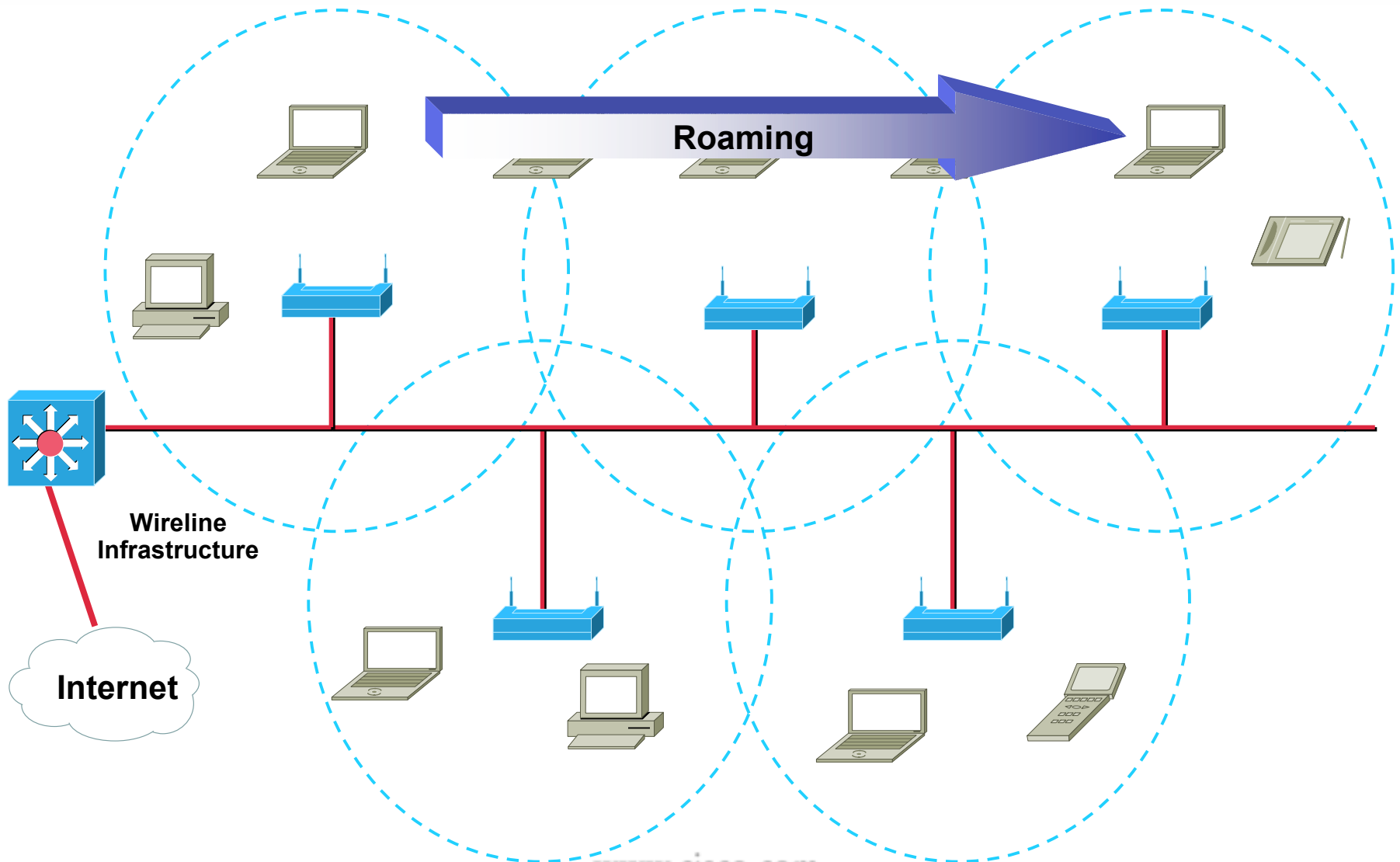
Wireless QoS Services

- **Cisco differentiators**
  - **Support for Spectralink 802.11b phones**
  - **Extensive filtering capabilities**
  - **End-to-end Differentiated Services**
- **Future plans**
  - **Standards efforts on QoS (PCF, DCF)**
  - **Support for 802.1p/Q and spanning tree per VLAN**
  - **802.11 IP phones integrated with Cisco Call Manager**
  - **Inter-subnet roaming and mobile IP services**

Additional Network Services: Inter-subnet (L3) Roaming

Enterprise Intranet

L3 Roaming Services

Proxy Client 1.1.1.X

Proxy Client 1.1.2.X
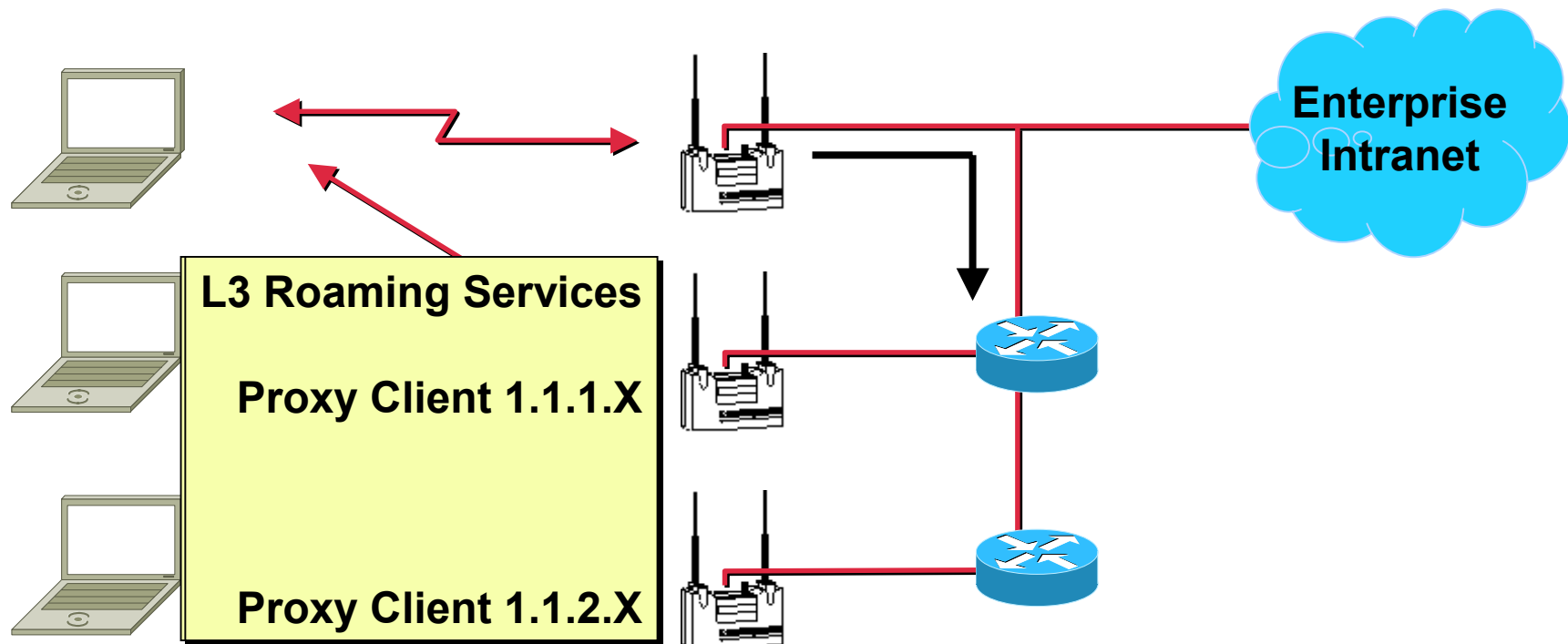
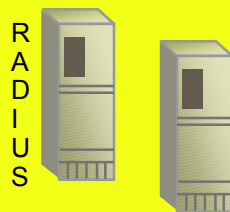**Fast subnet roaming through Inter Access Point Protocol (IAPP)**

Proxy Mobile Services (AP, Upstream switch/router)

Session maintained for critical applications (voice, video, etc .)

Coexists with DHCP and static addresses schemes

Comprehensive Wireless LAN Solutions for Large-scale Deployment

- **Centralized Cisco Access Control Server**
- **Web-based Mgmt**
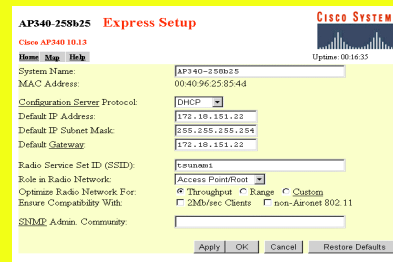
- **Access Points**
- **Bridges**
- **Advanced Network Services**

- **Cisco NICs**
- **Xircom Partnership**
- **3rd Party 802.11 clients**

Cisco WT2750

WAN Broadband Fixed Wireless Solution

Advantages of Multi-path

- **VOFDM (Vector Orthogonal Frequency Division Multiplexing) technology employs both frequency and spatial diversity to create a robust processing technique for multipath fading and narrow band interference**

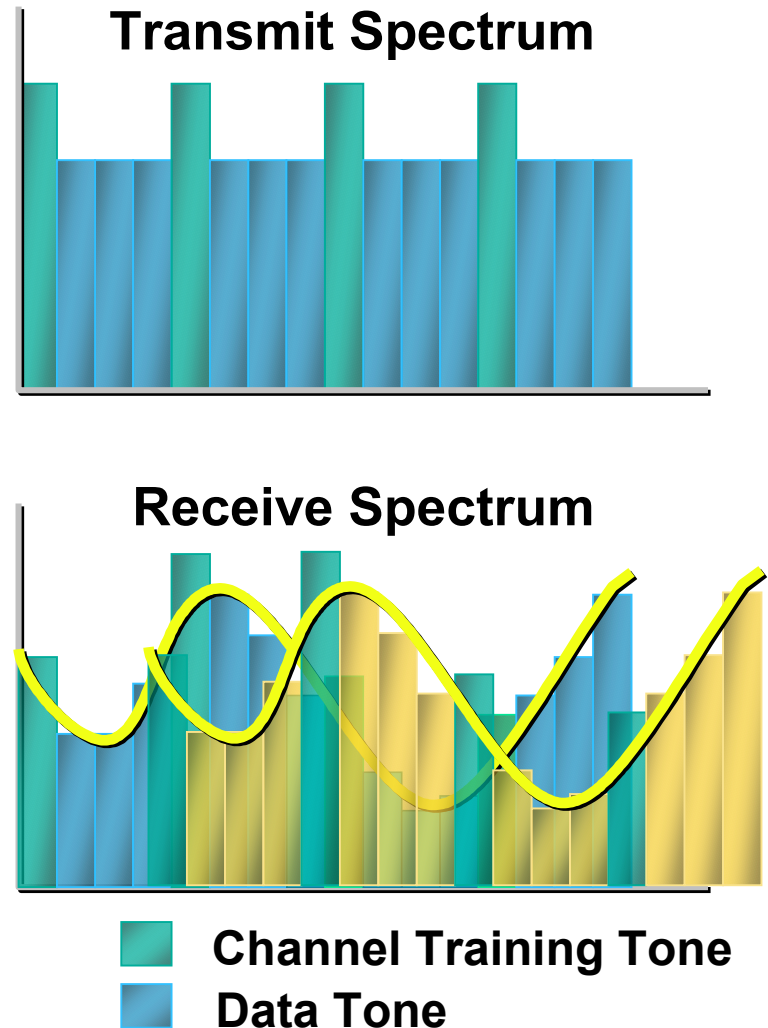- **VOFDM enables greater coverage and substantially reduces LOS limitations**

Paths

···

Base Station

Subscriber
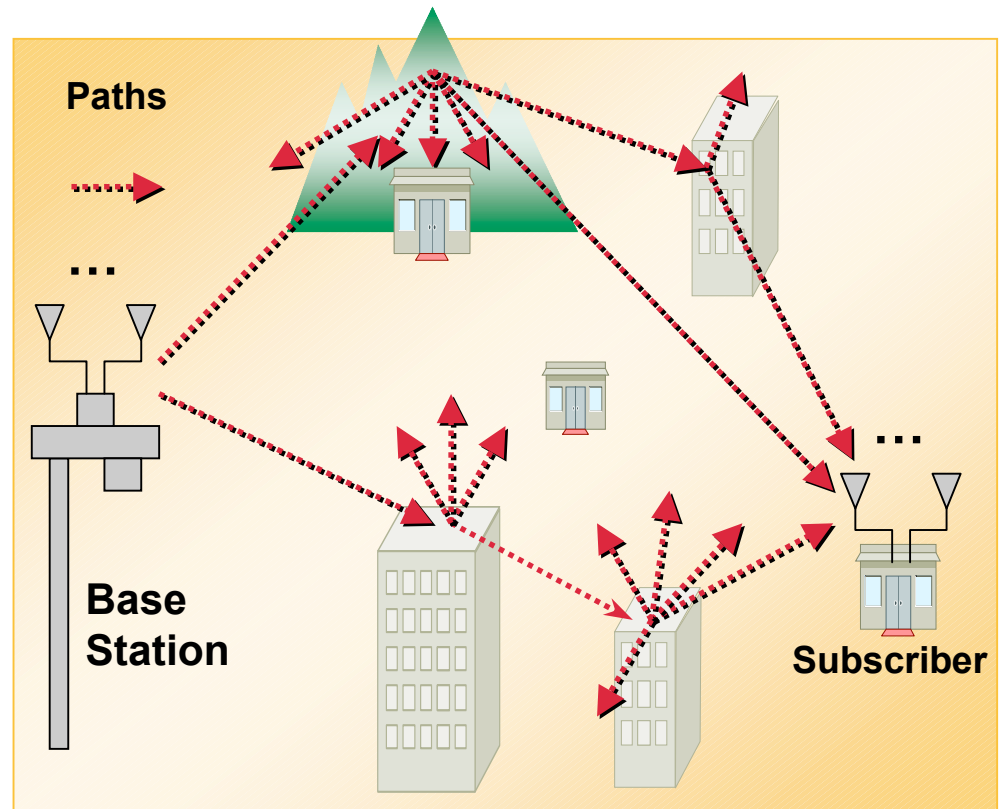
Multi-Path Wireless Communication

- **Transmitted signals follow several propagation paths from a transmitter to a receiver**

- **Multi-path is the total collection of signals reflecting off multiple objects prior to arriving at the receiver**
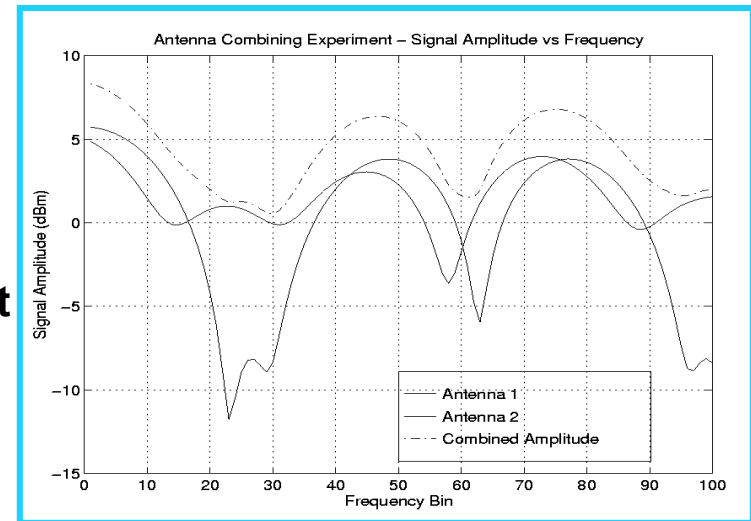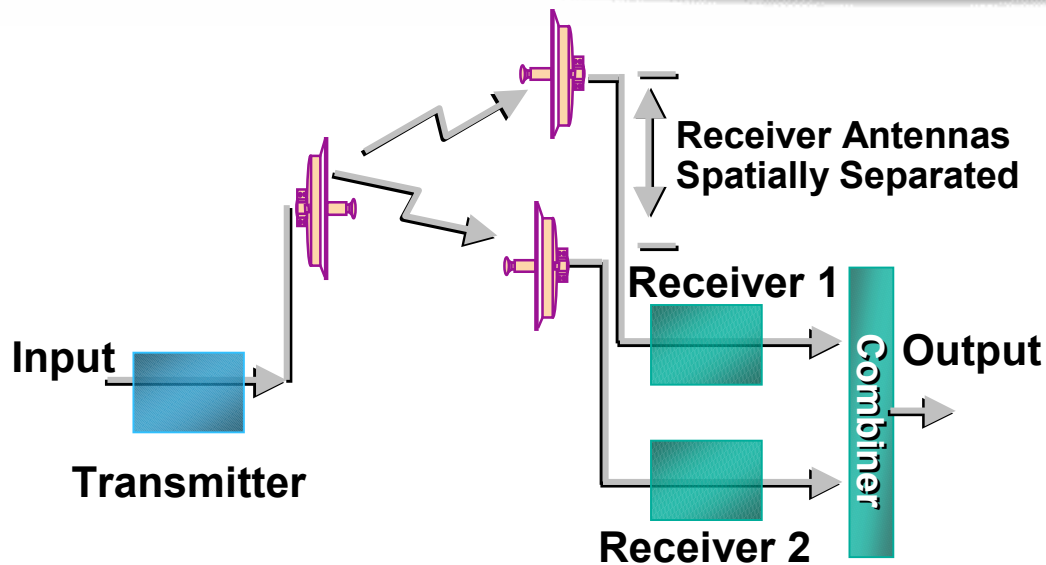
www.cisco.com
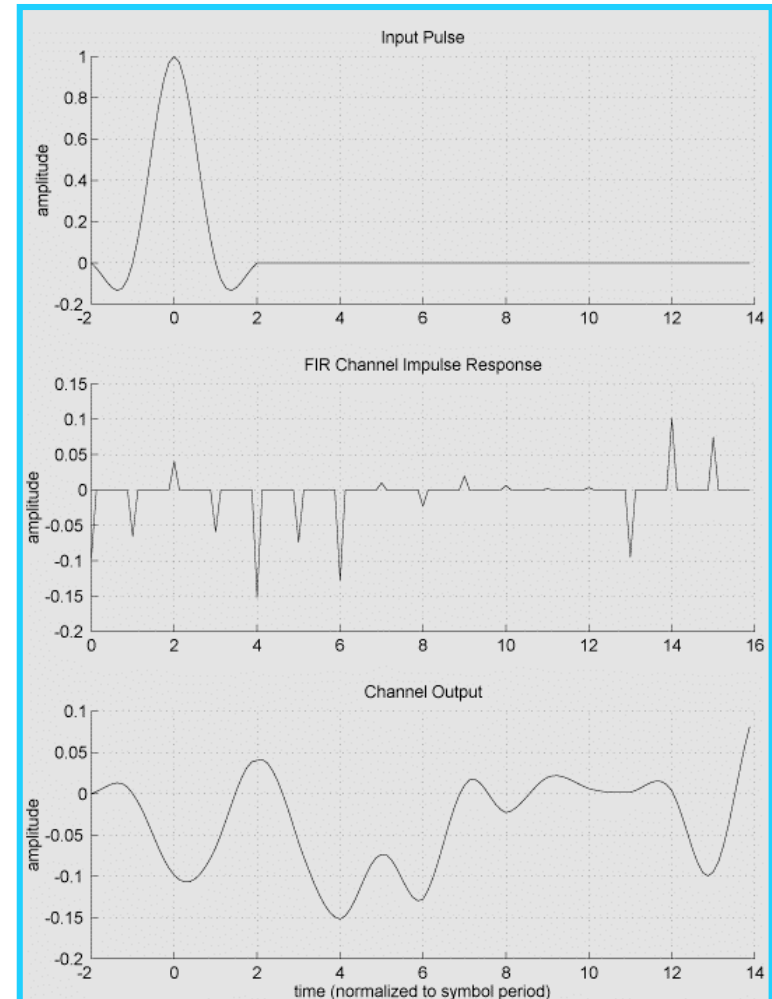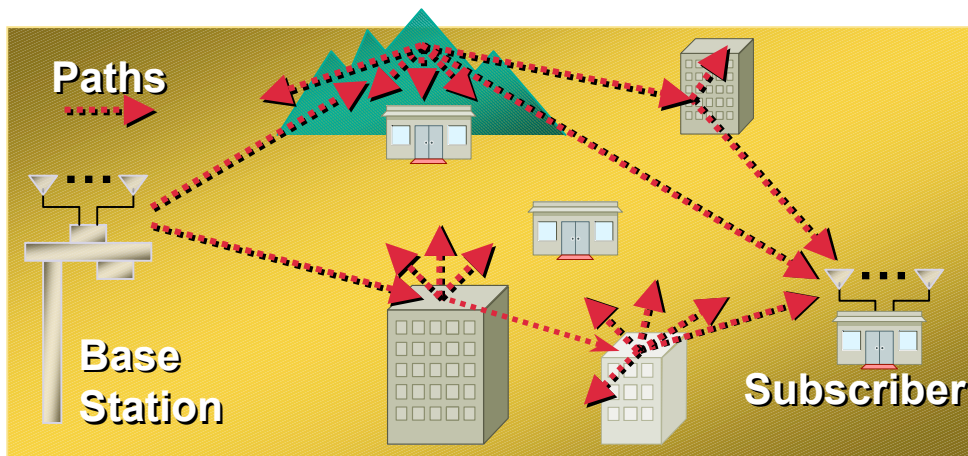
Frequency Diversity

- **Each OFDM burst carries data and training signals**

  - **Allows for variation in the channel**

  - **Reduces effect of frequency offset**

- **OFDM, interleaving and coding**

  - **Create a robust processing technique for multi-path fading and narrow band interference**

Transmit Spectrum

Receive Spectrum

■ **Channel Training Tone**

■ **Data Tone**

Space-Frequency Processing

Input

Transmitter

Receiver Antennas Spatially Separated

Receiver 1

Receiver 2

Combiner

Output

Antenna Combining Experiment – Signal Amplitude vs Frequency

- Antenna 1
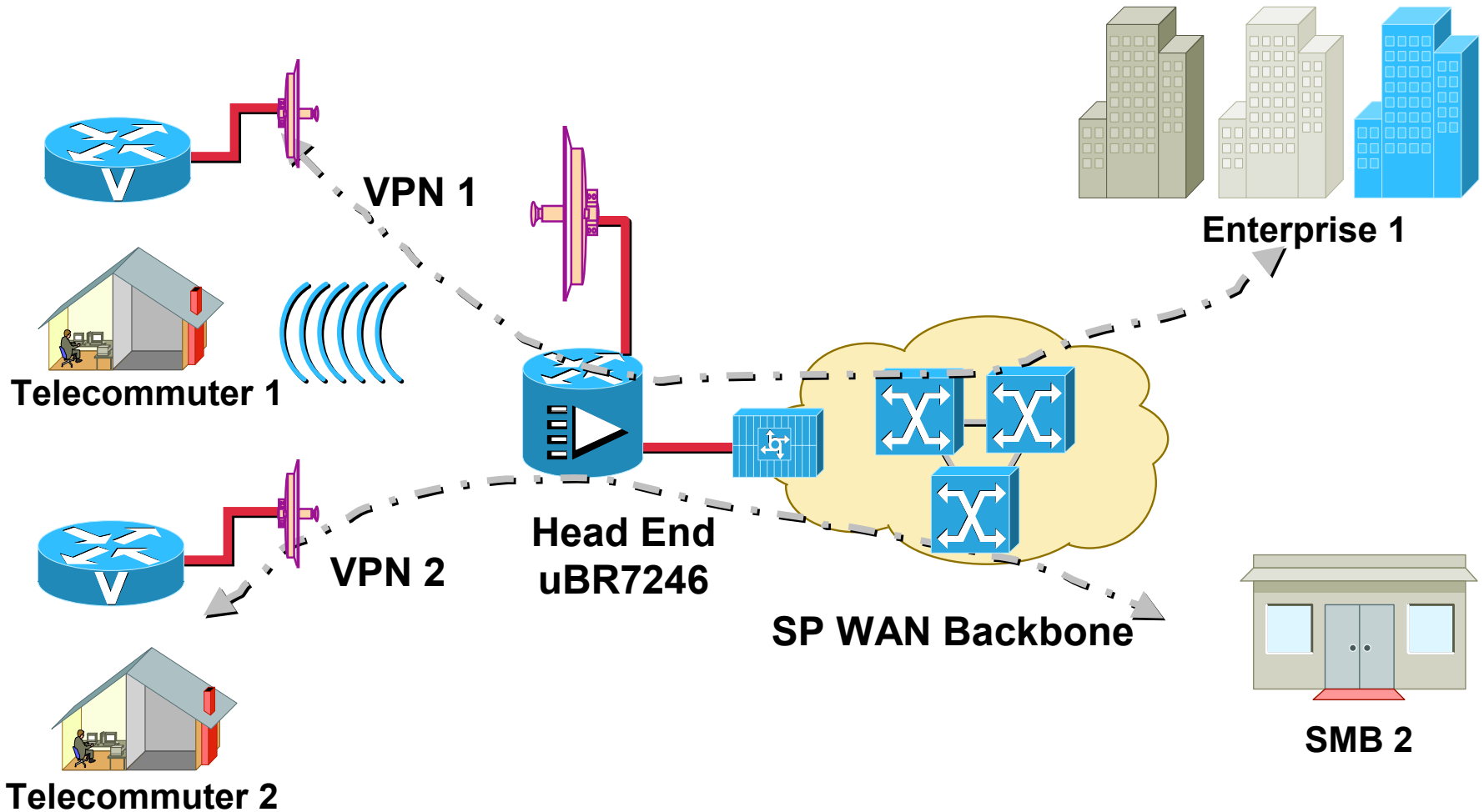- Antenna 2
- Combined Amplitude

- **Combines OFDM with spatial processing**
  - **OFDM used to exploit frequency diversity**
  - **Spatial processing exploits spatial diversity**
- **Greatest benefit comes from exploiting both frequency and spatial diversity**
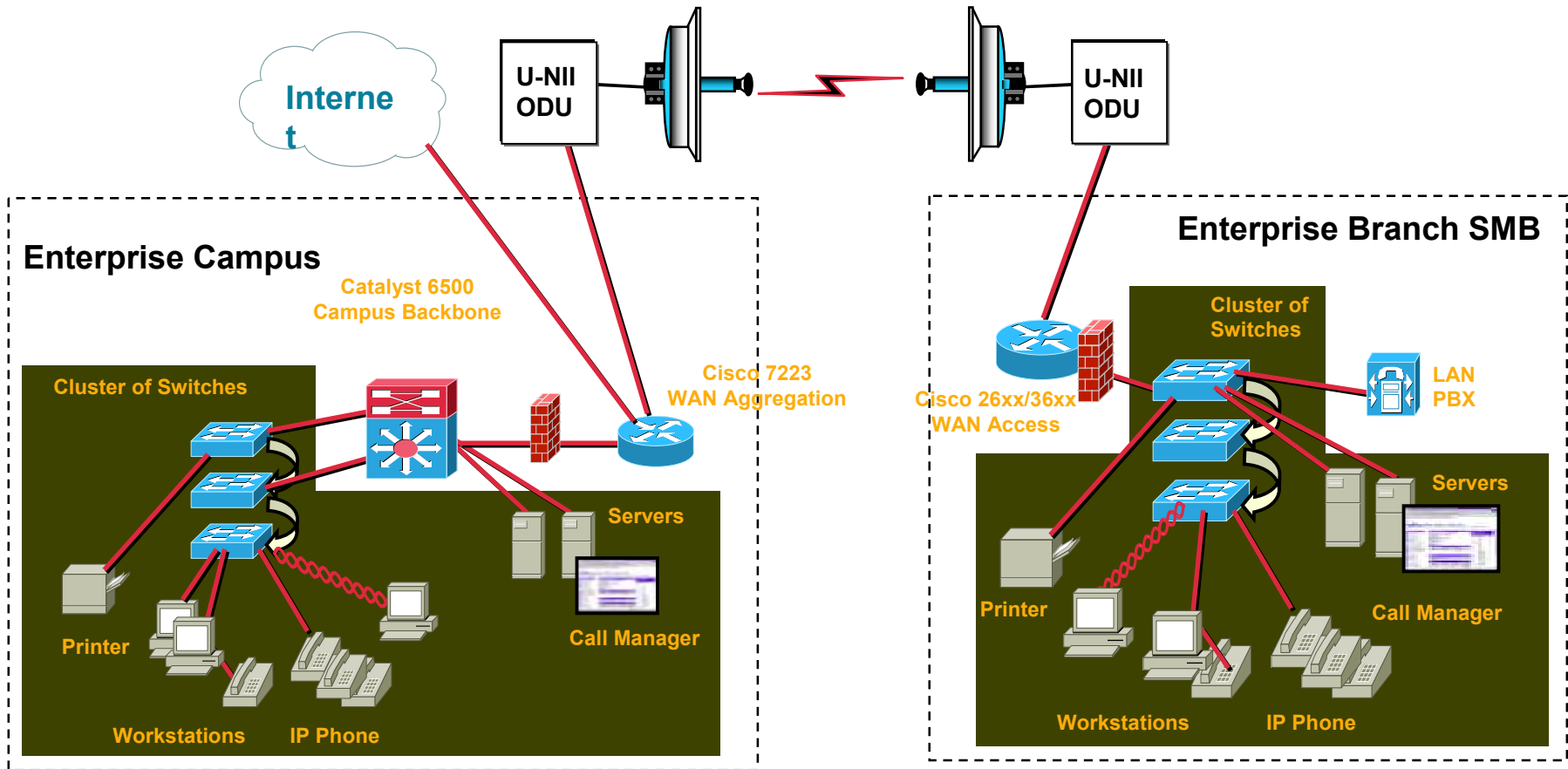
Performance

- **Point-to-Point data speeds up to 44 Mbps**
- **Point-to-Multipoint data speeds up to 20 Mbps**
- **Routed Network performance**
- **Standardized architecture**
- **Integrated End-to-End Solution**
  - **Cisco IOS**
  - **Full SNMP management via Cisco View**

Enterprise VPN Service

VPN 1

Telecommuter 1

VPN 2

Telecommuter 2

Head End
uBR7246

SP WAN Backbone

Enterprise 1

SMB 2

Integrated Broadband Solution

Cisco delivers wired and wireless end-to-end solution for voice, video and data

Cisco's Wireless Technology Enables

- **Wireless operation in obstructed environments**

- **Greater coverage**

- **Robust wireless links**

- **Enables Microcellular deployments**
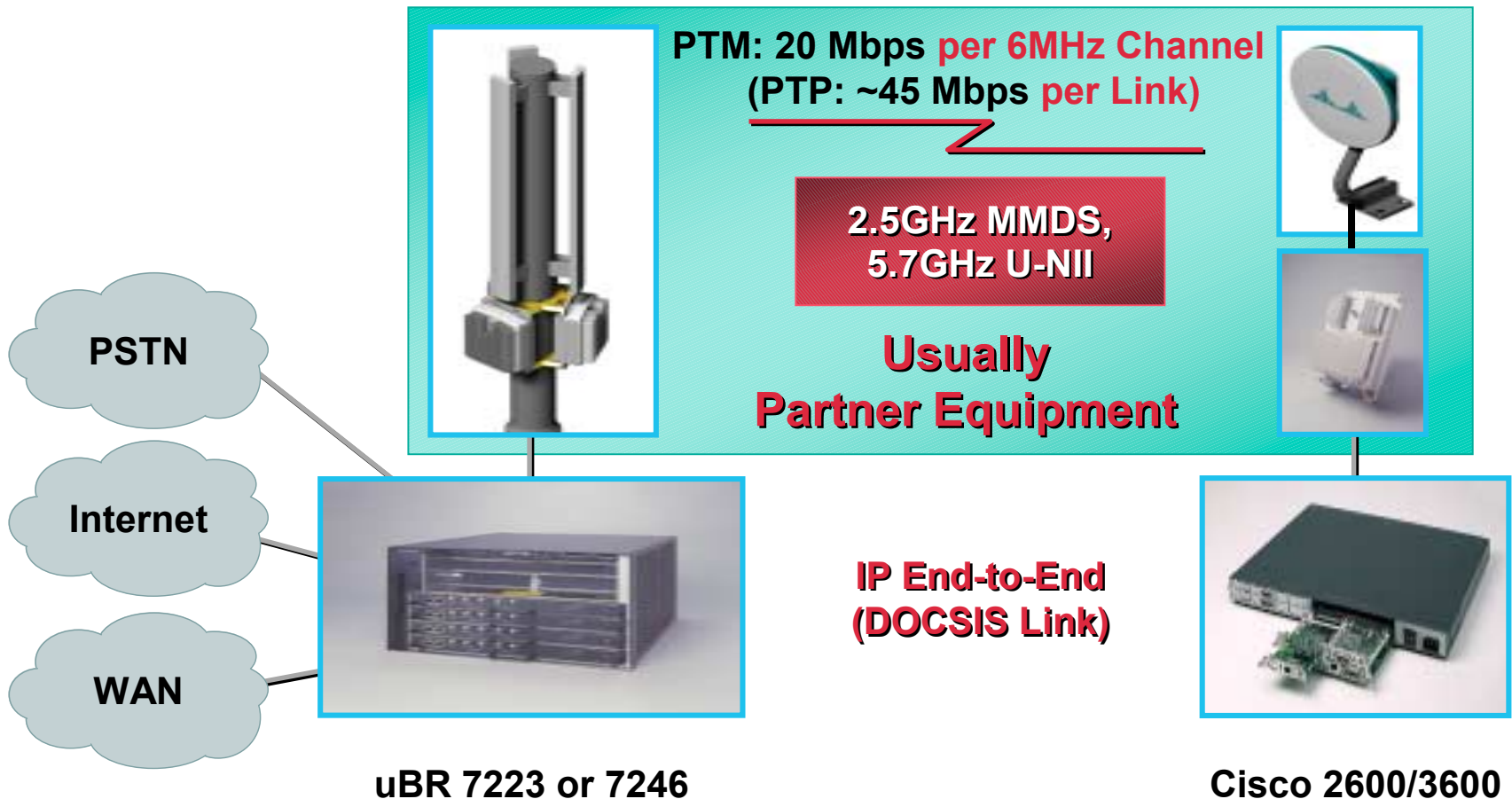
  Increase total capacity

  Increase total return

Microwave (IP) Solution Overview

Hub

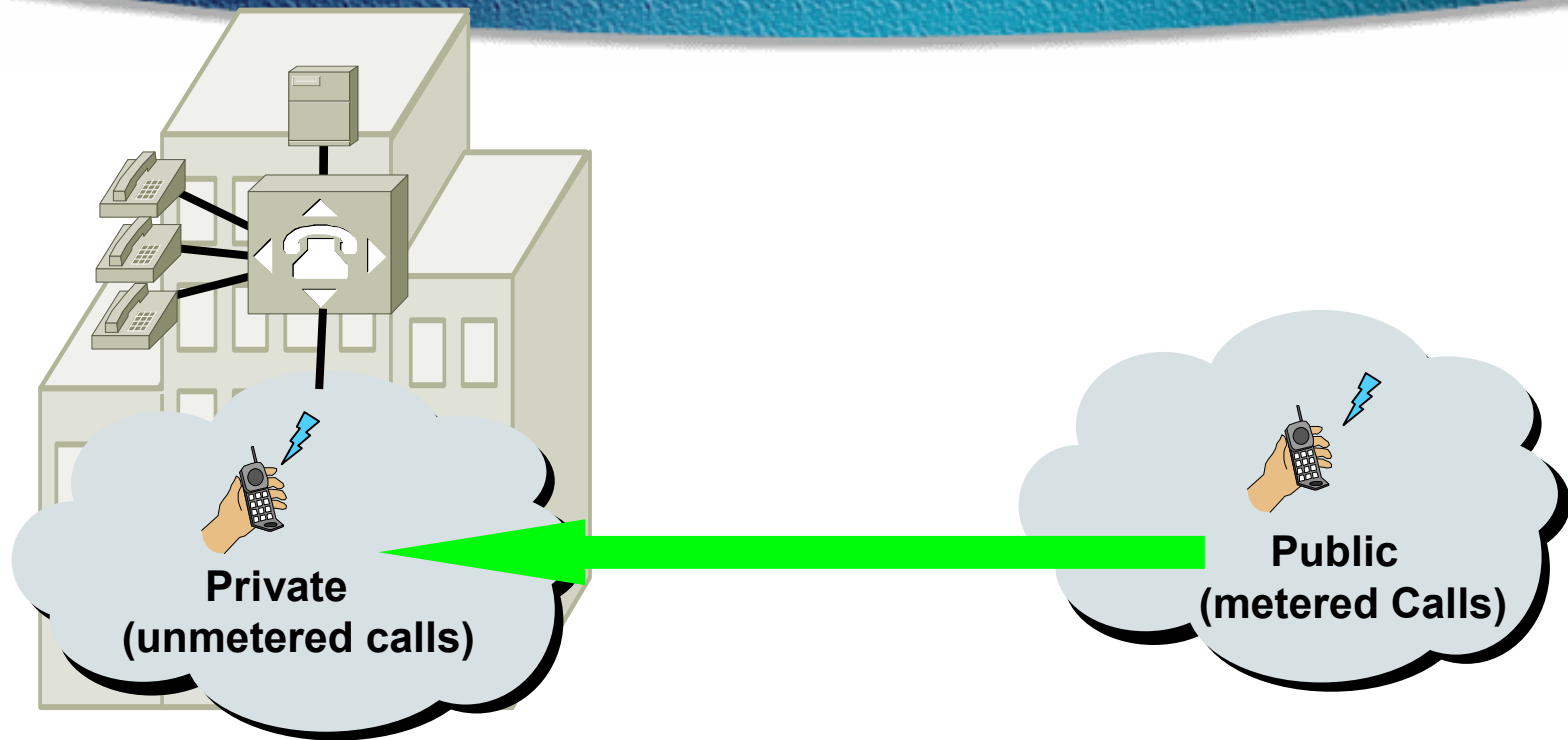**Customer Premise**

SMB, Enterprise, MDU

PTM: 20 Mbps per 6MHz Channel
(PTP: ~45 Mbps per Link)

2.5GHz MMDS,
5.7GHz U-NII

PSTN

Usually
Partner Equipment

Internet

IP End-to-End
(DOCSIS Link)

WAN

uBR 7223 or 7246

Cisco 2600/3600

Cisco Mobile Office Network

Cellular Extension to Cisco's AVVID

MNET concepts - Carrier's view

**Private
(unmetered calls)**

**Public
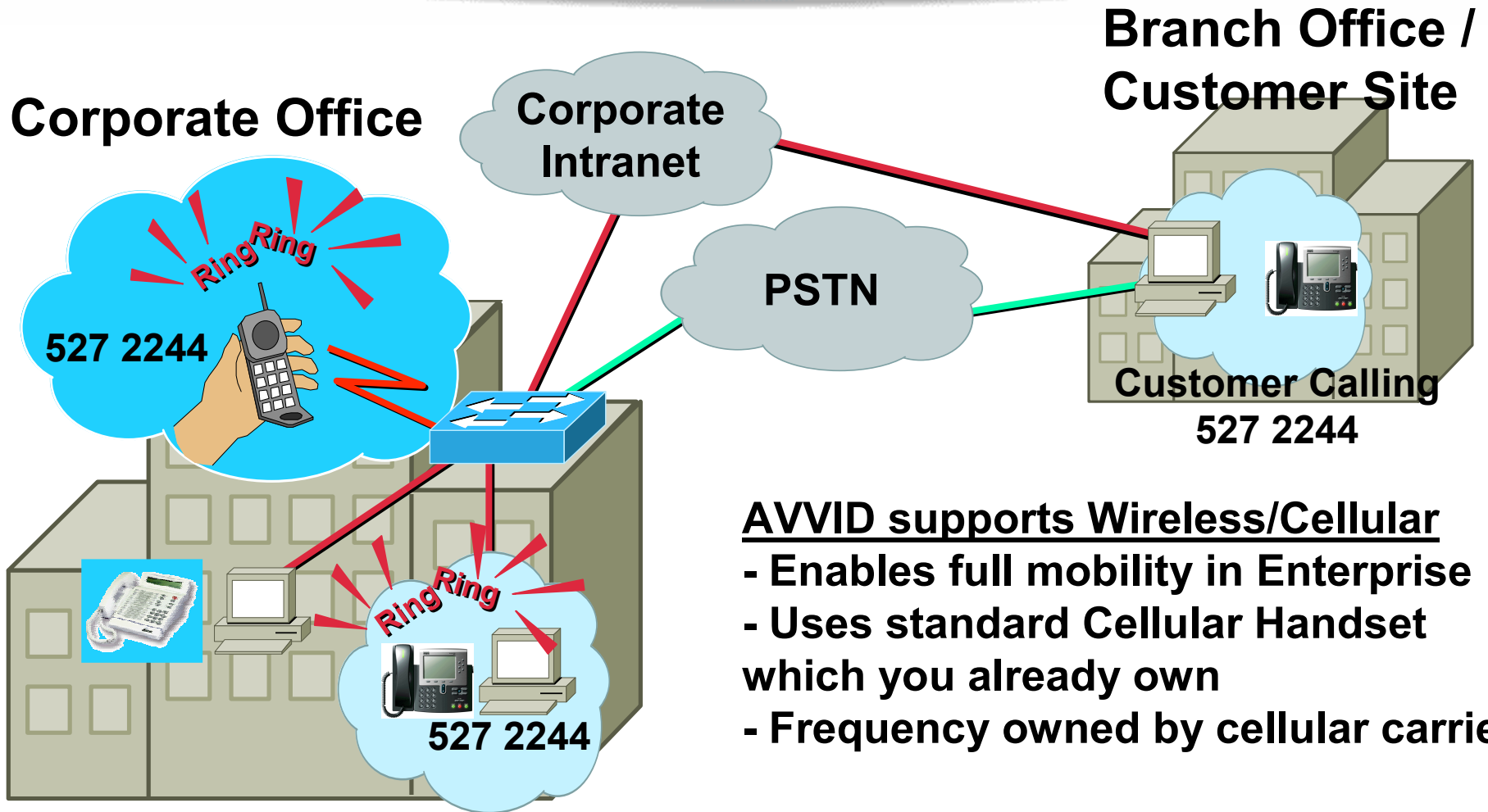(metered Calls)**

- **Mobility with GSM phones: make calls inside, outside, handoff**

- **Extends the Cellular carrier's reach into the enterprise voice network (coverage and customer satisfaction)**

- **Reduce Churn by signing long Term contract with high revenue generator - corporate**

MNET Concepts - Enterprise view

Branch Office / Customer Site

Corporate Office

Corporate Intranet

PSTN

Ring Ring

527 2244

Customer Calling
527 2244

Ring Ring

527 2244

AVVID supports Wireless/Cellular
- Enables full mobility in Enterprise
- Uses standard Cellular Handset which you already own
- Frequency owned by cellular carrier

Standard GSM handset works as extension of AVVID phone when inside, as cell phone when outside

Greenfield Corporate Wireless

Site A

Site B

Internet
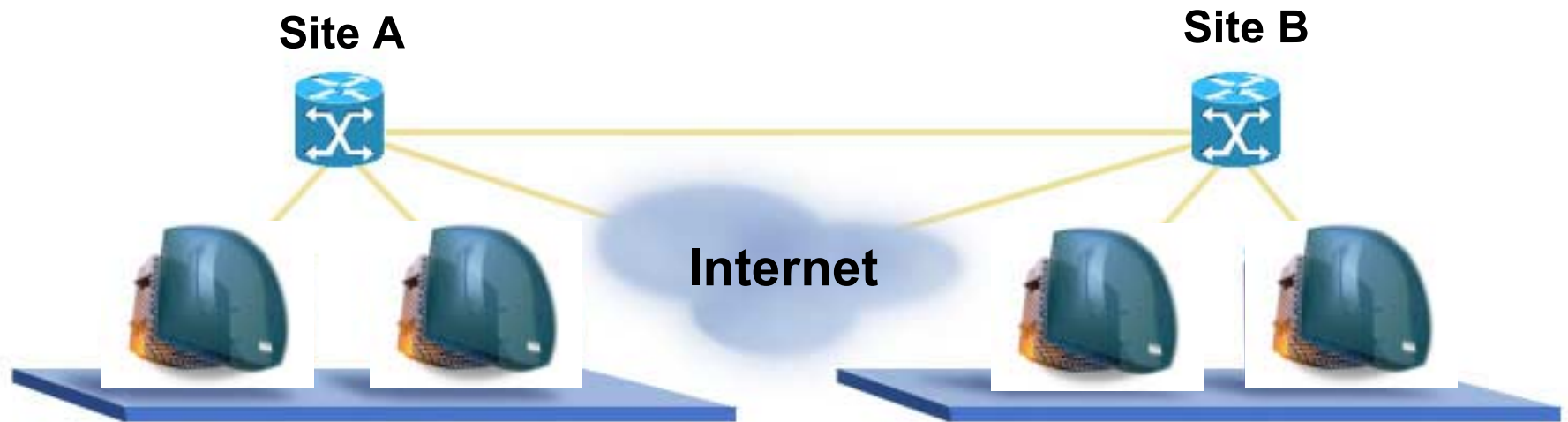
- **Standard Cellular GSM Handset**

- **Simple LAN connectivity (10/100 BaseT)**

- **Worldwide Roaming and Uniform numbering**

- **Scaleable to thousands of users**

- **Voice/Data/Fax automatic mobility on IP**

- **Frequency owned by Cellular Carriers**

Wireless Office
Voice (legacy Support)

Data

ISP

Internet

Enterprise

GSM

Voice

PBX

Switch

Mobile Operator

PSTN
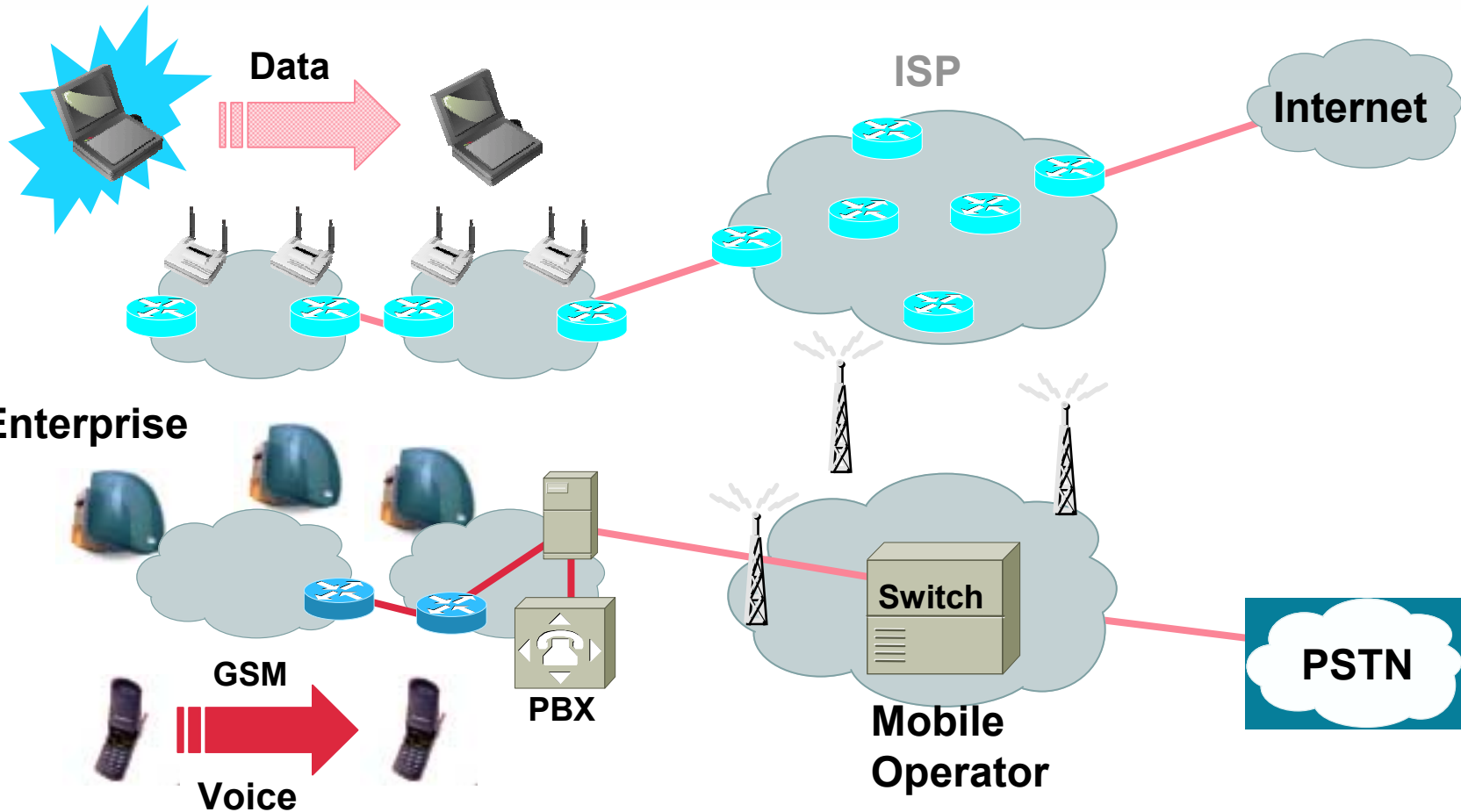
Wireless voice (VoIP) & data for in-building

Cisco Enterprise Wireless Telephony

- **Cisco AVVID enables Cellular mobility**

- **Standard GSM cellular handset**

- **Packet telephony technology**

- **Lowest cost/sub over any solution**

Summary

- **Industry leading W-LAN, W-WAN and mobile solutions**

- **New World Service Platforms**

- **Wireless open standards and standards based solutions**

- **Leading Edge N-LOS Wireless Technology**

- **Market Leading Multi-service CPE**

- **Complete End-to-End Wireless Networks**