“The Broadband of the Future”

Wireless Infrastructures
for
New Applications and Services

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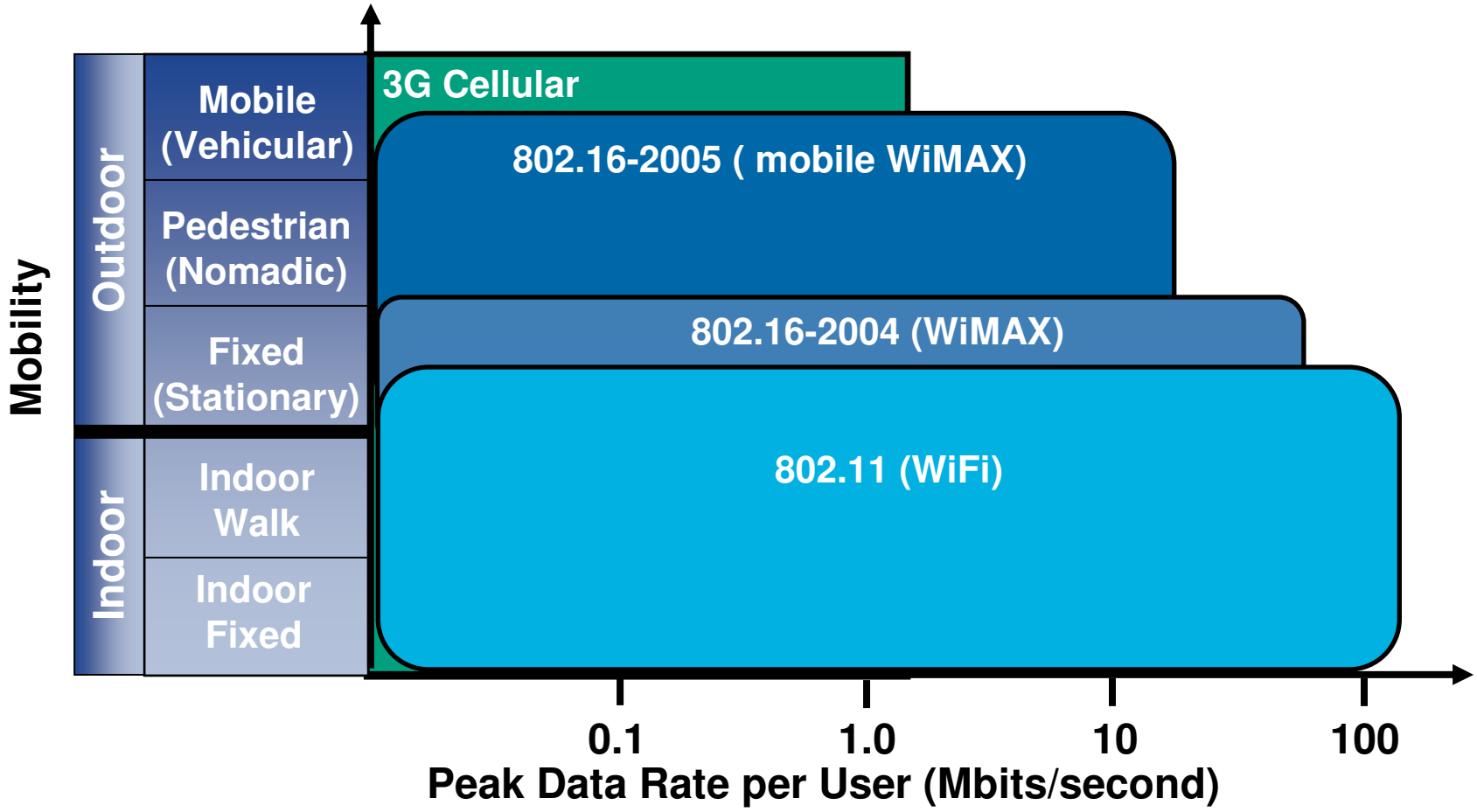
Agenda

- The Wireless Technologies?
- The Benefits of Wireless Technologies?
- Wireless Infrastructures for New Applications and Services?

The Wireless Technologies ?

2G, 3G, WiFi and WiMAX positioning



- Market is converging onto the 802 standards
- WiMAX extends the coverage of Wi-Fi
- 3G best suited to high mobility/low data rate applications

The Benefits of Wireless Technologies?

Why Wireless?

- High Performance and Security:
  - Throughput, Speed: up to 1 Gbps (PTP) and 240 Mbps (Access – 11N)
  - Security: AES encryption end to end
  - QOS
- Enables “nomadicity” and mobility NOW!
- In areas without infrastructure, wireless capex a fraction of wireline
- Flexibility
  - Easy to evolve wireless to fit changing needs and environment
  - Enables rapid setup and teardown for special events, emergencies, etc
- Interoperable: Wimax Forum, WiFi Alliance…..

- **More 400 million Wi-Fi clients shipped to date. All the latest WiFi phones have Wifi built-in**
- **Dual-mode handsets accelerating Wi-Fi client shipments - 200+ million dual-mode handsets expected to ship by 2010 (In-Stat)**

Unlicensed Spectrum Benefits

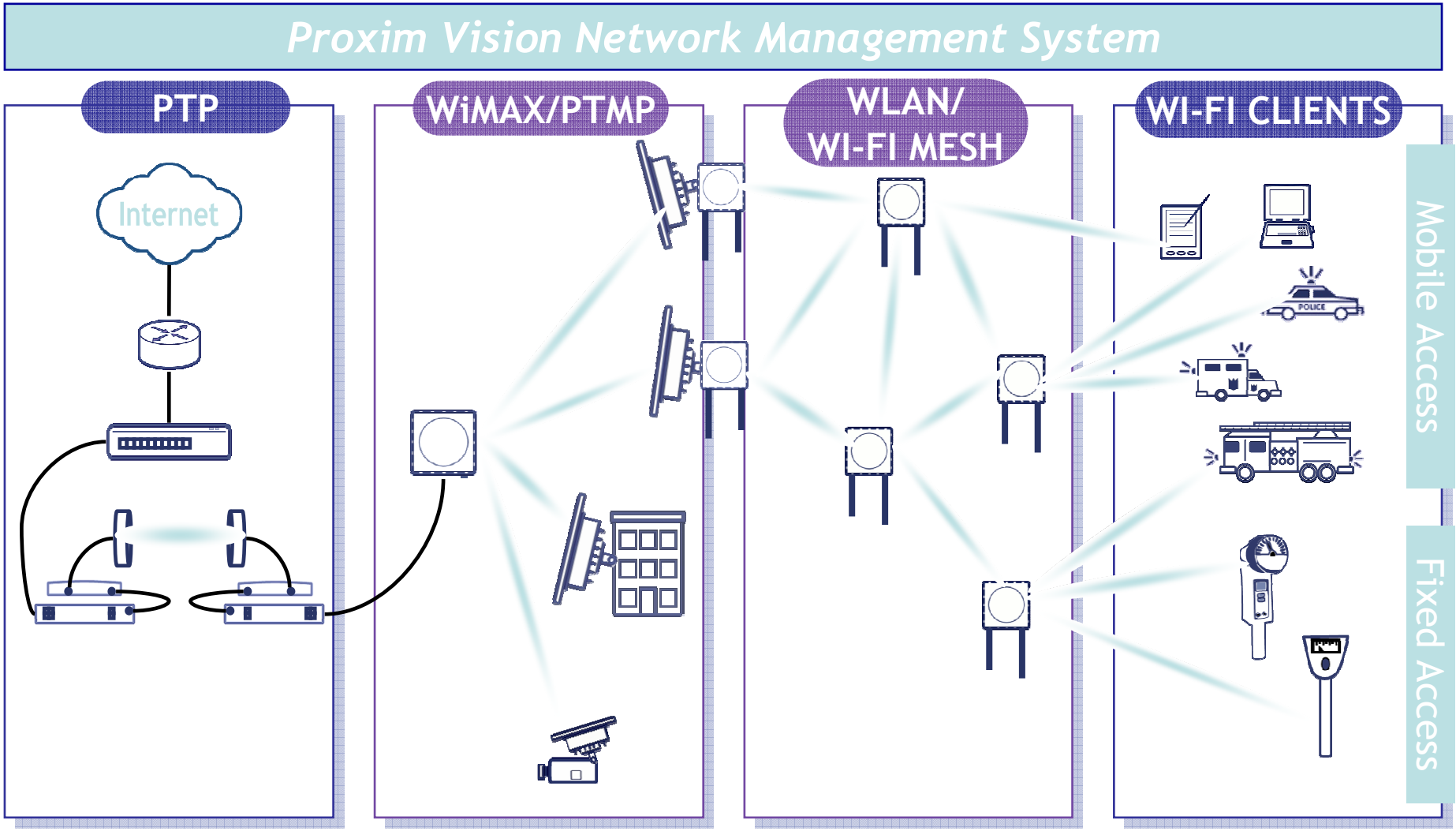
- No license fees
- No administrative costs or delays
- Deployment and configuration flexibility
- Interference concerns mitigated by intelligent radio technology

Wireless Infrastructures

for

New Applications and Services ?

End-to-End Wireless Solution



Emerging vs. Established Markets - Drivers for Wireless

Emerging Market Drivers

In emerging markets, wireless is the more cost-effective solution for connectivity

Primary applications are:

- Last mile connectivity
- Security & surveillance
- VoIP

Access is the primary driver

Established Market Drivers

Due to heightened concern around terrorism, security applications are in demand

Primary applications are:

- Video surveillance
- Emergency communications
- Wireless security

Backhaul is the primary driver

Applications and Case Studies

- 1. Bridging the Digital Divide
- 2. Security and Surveillance
- 3. Municipal Network
- 4. Emergency Networks
- 5. Education
- 6. Health Care
- 7. Transportation

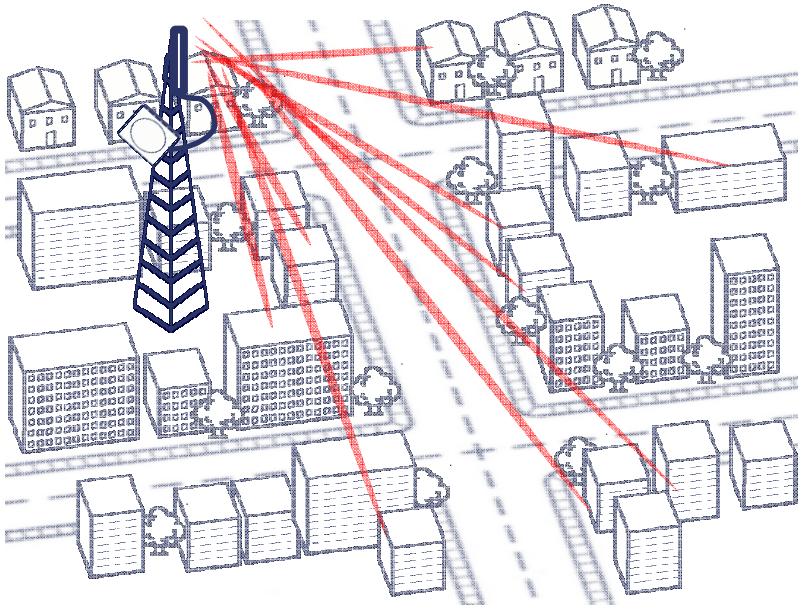
1. Bridging the Digital Divide

Digital Divide: Did you know that..?

- **Fixed**
  - Africa has an average of 3 fixed lines per 100 people.
  - The Americas region has an average of 34 fixed lines per 100 people.
  - Europe and the CIS has an average of 40 fixed lines per 100 people.
- **Mobile**
  - The G8 countries (14% of the world's population) accounts for 34% of the world's total mobile users.
- **Internet**
  - There are the same number of Internet users in the G8 countries than in the whole rest of the world combined,
  - The entire African continent has fewer Internet users than France alone.
  - More than 40 countries have less than 10Mbps of international Internet bandwidth, whereas in France, a 8 Mbps high-speed Internet package is available for just EUR 35 a month.
  - There are still 30 countries with an Internet penetration < 1%.

Last Mile Access - Applications

- Residential and business services
  - Replacement/alternative for Cable/DSL
- Delivery of triple play services
  - Internet, VoIP, IPTV
- Serving the under-served
- Basis for a multi-use network
  - Combine last mile and backhauling for other edge applications



Case Study: *Sify*

Customers

- Serves residential, business and cyber cafe users in India
- Owned and operated by Sify

Solution

- Unlicensed band point-to-multipoint network

Applications Enabled

- Broadband access
- VoIP

2. Security and Surveillance

Security and Surveillance Applications

- Perimeter security for military, restricted areas
- Monitoring public entry/exits
- Monitoring sensitive areas
  - ATMs, etc
- Monitoring high traffic area
  - Highway, Bridges, Tunnels
- Monitoring public areas
  - Parks, Walkways
- Monitoring gathering area
  - Cafeteria, Halls, Library
- Securing buildings and sensitive areas
  - Runways, Waterways
- Anti-terrorist surveillance systems for national security
- Reducing crime and violence in troubled areas

California Department of Transportation
Asset Surveillance

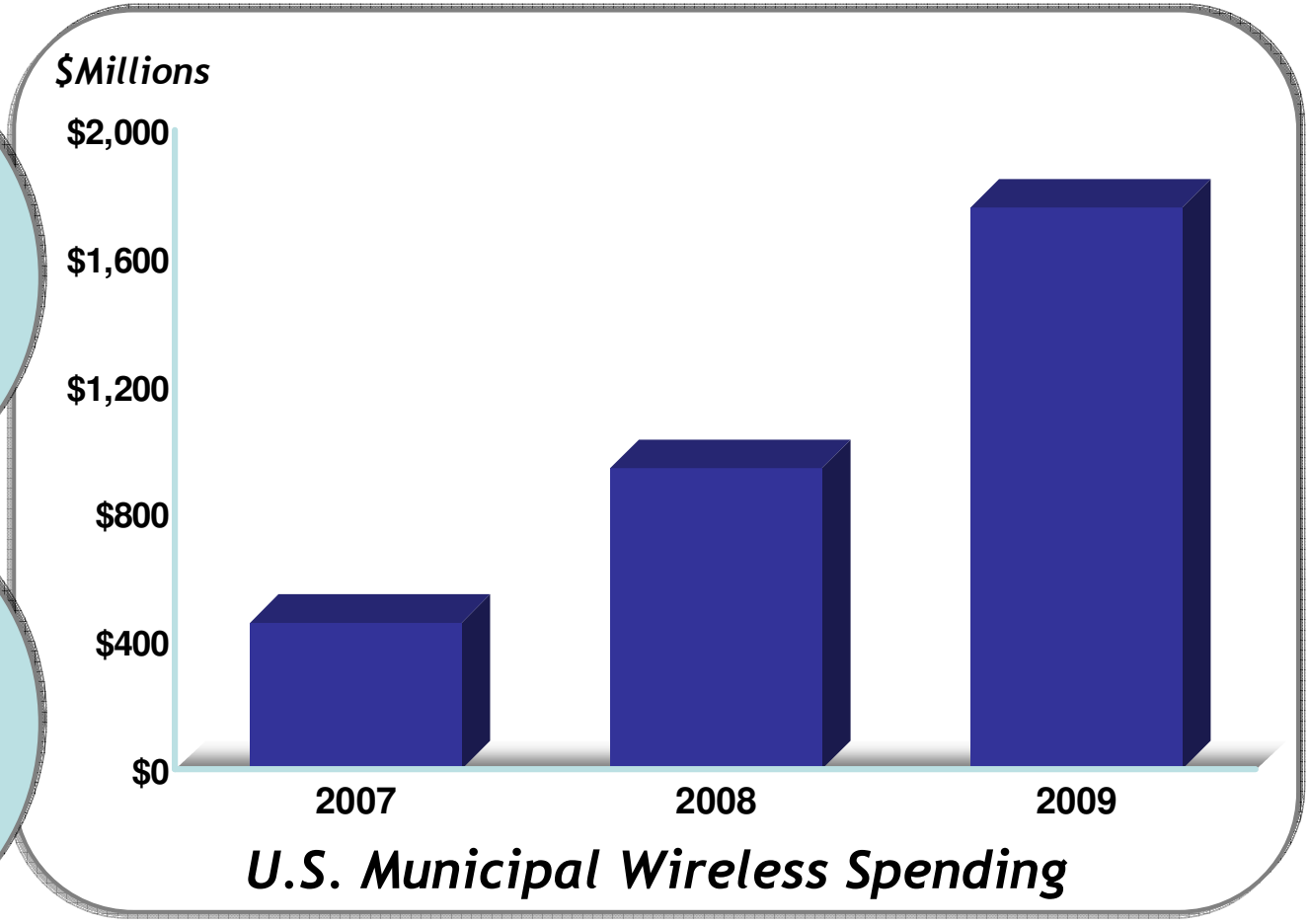
- Problem
  - Protect Bay Area's transportation infrastructure consisting of 7 bridges and 2 tunnels
- Solution
  - Multipoint Subscriber Units connect IP cameras to Multipoint Base Stations
  - Redundant Point-to-Point from bridges to Caltrans office
  - Constant, reliable surveillance that can survive harsh outdoor environments
  - Cost and time savings vs. fiber, designed for outdoors

3. Municipal Networks

Muni Wireless Spending Growing

U.S. Municipal Wireless Spending projected to be more than $3B over next three years

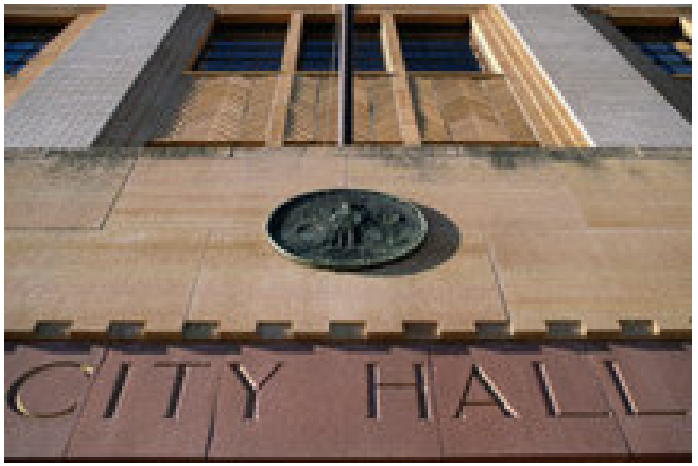
40% to 50% of the spending is for equipment

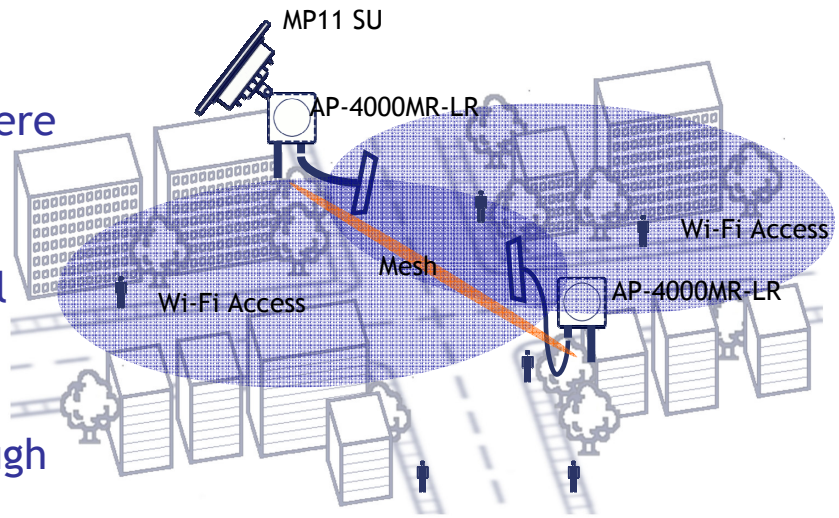


Source: MuniWireless

Muni Wi-Fi - Applications

- Last Mile Access
  - Business and residential services
- Security and Surveillance
  - Detect, solve, or deter crime
- Public Safety
  - New ways to gather data and communicate for Fire, Police and EMS
- Voice over IP
  - Low cost easy to deploy voice services
- Mobility
  - Access and communications when and where you need it
- Hot zones
  - Draw in people to key areas to boost local business or events
- Building Inspection & Public Works
  - Increase efficiency and productivity through data and communications access

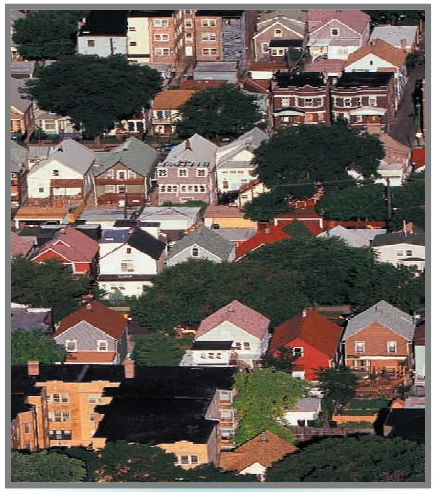




Case Study: Bellwood, IL
The "Digital City" Project

Bellwood, IL Profile

- A suburb of Chicago in Cook County, IL
- Population of 20,535
- Land area of 2.5 mi^2



Problem

- Empower public safety and enhance the quality of life
  - IP-based security and surveillance system
- Provide city-wide Wi-Fi to residents
- Increase municipal productivity
- Attract and enable commerce

Solution

- Citywide Wi-Fi mesh network with unlicensed band point-to-multipoint backhaul

Results To Date

- Crime down 15% year-over-year
- 911 calls reduced by thousands year-over-year
- Tri-fold increase in home values
- Significant increase in city revenues

4. Emergency Solutions

Greece – First "Hot Spot Country"

Challenge

- Population of over 10 million people
- Very low broadband penetration of 0.1% of the population as of January 2004
- Host of the summer 2004 Olympic games
- Needed to accelerate broadband deployment in Athens and across the country for businesses, hotels and residents.

Solution

- Phase I: Deploy 120 wireless hot spots with wireless backhaul at Athens hotels and outdoor areas for the summer Olympic games as well as to surrounding cities
- Phase II: Deliver last mile access to core business customers including hotels, vacation villages, airports, exhibitions and conference centers across Greece
- Phase III: Includes an additional 350 hot spots, wireless backhaul and last mile access to businesses and residences.

5. Education

Education - Applications

- Campus mobility/anywhere, anytime learning
  - Mobile labs
  - Campus wide indoor and outdoor wireless access
- District-wide networks & last mile connectivity
  - Interconnecting school buildings, campus or district wide
- School or campus wide security and surveillance system
- School or campus wide voice over Wi-Fi

Case Study:
Indian Business Academy

Customers
- Serves students, faculty and visitors
- Owned and operated by Indian Business Academy

Solution
- Unlicensed band point-to-multipoint network and indoor Wi-Fi access points

Applications Enabled
- Campus-wide broadband access

Results
- Dramatic improvement in student productivity

6. Health Care

Health Care - Applications

- Real-time data entry for patient data
  - In room electronic look-up and modification of patient chart
- Prescription Automation and e-pharmacy
  - Electronic transmittal of prescription to pharmacy
- Materials Management
  - Wireless inventory and supply shipment verification
- Patient Registration
  - Patient admittance in emergency or treatment rooms
- On-Demand Communication
  - Communicate across a hospital instantly
- Connecting Satellite Clinics
  - Bridge satellite clinics into main hospital LAN

Case Study: *Kadlec Hospital*

Customer

- Serves hospital staff and patients
- Owned and operated by Kadlec Hospital

Solution

- Wi-Fi access points and clients with 802.1x security

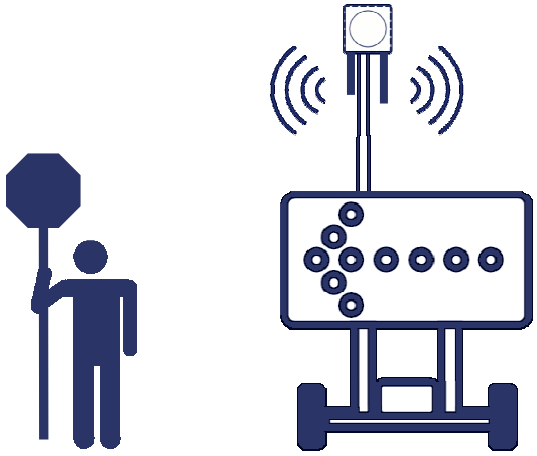
Applications Enabled

- Broadband access while maintaining compliance with U.S. health care record privacy regulations (HIPAA)

7. Transportation

Transportation - Applications

- Mobile data access
  - Vehicular, nautical and rail roaming
- Add-on services for travel
  - Wi-Fi services on public and private transportation
- Security and surveillance
  - IP camera use in public and private transportation
- Road crew data access
  - Mobile access equipment deployed in work zones
- Road crew communications
  - VoIP over mobile access equipment



Case Study - Rail Transit in KyeongSan

- **Challenge**
  - Required the surveillance tool for the passenger car with no driver
  - Roaming at high speed
- **Solution**
  - MP.11a BSU/SU's roaming feature
  - Integrated with IP camera and application servers for IP surveillance application
- **Why Proxim?**
  - Passed the test of MP.11a BSU/SU's roaming feature in real KyeongSan site
  - Great price/performance

Passenger car with no driver

Conclusion: How can Wireless Help to Implement Innovative Applications?

- License or License Free
  - Giving chances to everyone to step in: 2.4 GHz & 5 GHz (mostly unlicensed) , 3.5 GHz, 4.9 GHz & 6 GHz(mostly licensed)
- Fast and secured Deployment
  - Can start from “green-field” or interface with existing networks (Satellite, Fiber etc…)
  - End to End Solutions
    - Indoor and Outdoor Applications
  - Pico cell approach, low consumption (< 12 W/BS) and Higher throughput efficiency
    - Can use alternate power sources (Solar, wind), No rack mounting, No air conditioning required
  - Highly secured (AES, Encryption…..)
  - Can connect up to 50 new subscribers per day per team

Conclusion: How can Wireless Help to Implement Innovative Applications?

- Quick Return on Investment
  - Typical Capex per Indoor Subscriber is @ 300 USD for Wimax
  - Typical Capex per Outdoor Subscriber is @ 450 USD for Wimax
  - Typical Payback on a turnkey network (WiFi and Multipoint):
    - Between 5 to 10 months (expected revenues per subscriber $25/Mbps) for developed countries
    - Between 10 to 15 months in countries under development

Thank you !

Questions?

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