



# Wi-Fi MESH Solution & Evolution

**Mr. Nitin Kawale, [nkawale@cisco.com](mailto:nkawale@cisco.com)  
Vice President, World Wide Mobile Operations  
Cisco Systems Inc.**

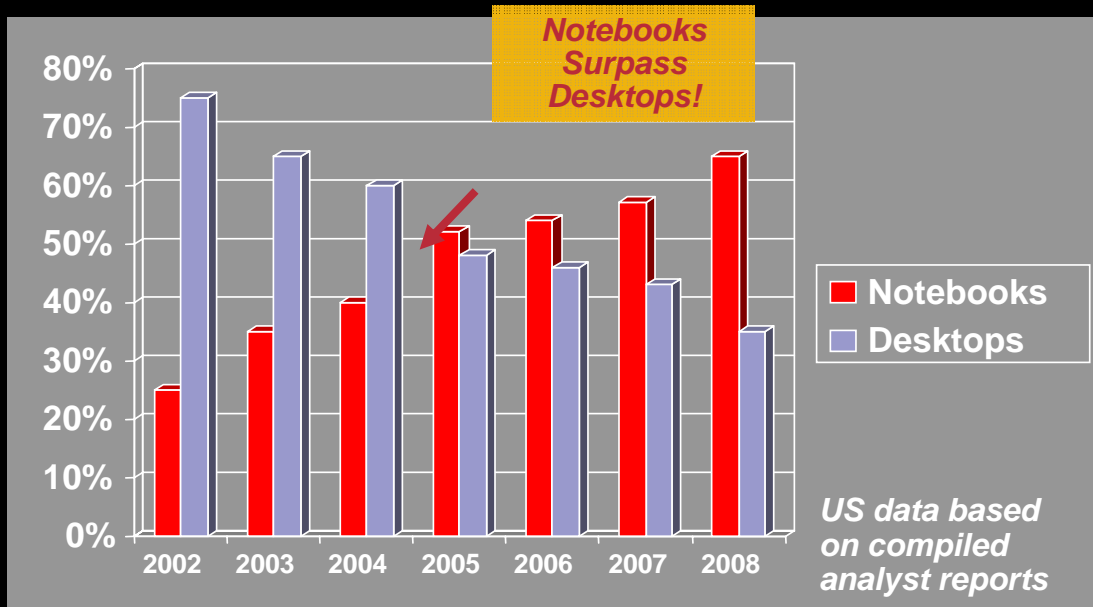


# Agenda

- **Wireless Market Overview**
- **Wi-Fi MESH overview**

# Market Overview

# Wi-Fi Devices Are Driving the Market *marching towards \$0 CPE cost*



**95% of Today's Notebooks Ship Wi-Fi Enabled**  
**90% of Wi-Fi chips Are Cisco CCX Compatible**  
**From 1999 it took Cisco 51 months to sell one million access points.**  
**From 2004 it took Cisco 14 months to sell one million access points**  
**For 2006, it's projected to take Cisco only 10 months to sell one million access points.**

**Wi-Fi Enabled Dual Mode Handset/PDA Drives the next Revolution**

# Key Market Segments for Outdoor Wireless

## Enterprise Outdoor *Moving Indoor WiFi Outside*

**Universities & Healthcare**  
Extending WiFi coverage throughout the campus

**Hospitality**  
Indoor/Outdoor mesh can open up new hospitality markets (EMEA)

**Manufacturing - Shipping & Receiving**  
Inventory applications, hand-held scanner, RFID, etc.

**Large Corporate Campuses**  
Creating "blanket" coverage for access and asset tracking

**Utilities**  
Vehicle Fleets and Sensor Networks

## Defense *Secure Communications and Sensor Networks*

### Outdoor Wireless Perimeter

Utilize Secure Wireless for Video and Sensor Equipment

### On-demand Wireless Networks

Ruggedized equipment in vehicles, transit cases, and outdoors

### Security Certifications

FIPS Certification Meeting Military Requirements for Security

## Service Provider *Managed WiFi Services*

"Hot Zones"  
Expanding the concept of Hot Spot coverage into Hot Zone coverage

Wireless SPs  
Competitive Last-mile access providers using WiFi for Broadband service

### Cable & Wireline Operators

Extend the network offering beyond the cable and wireline plant

## Public Sector *State, County & City*

### Public Safety/Homeland Security

Police, fire and 1st responders

Licensed and Unlicensed Wireless Infrastructure, Vehicles & Clients

### Wireless Access for Fixed Applications

Video Surveillance, Sensors, Meters

### Public Service

Hot Spot access for city workers, utilities, inspectors

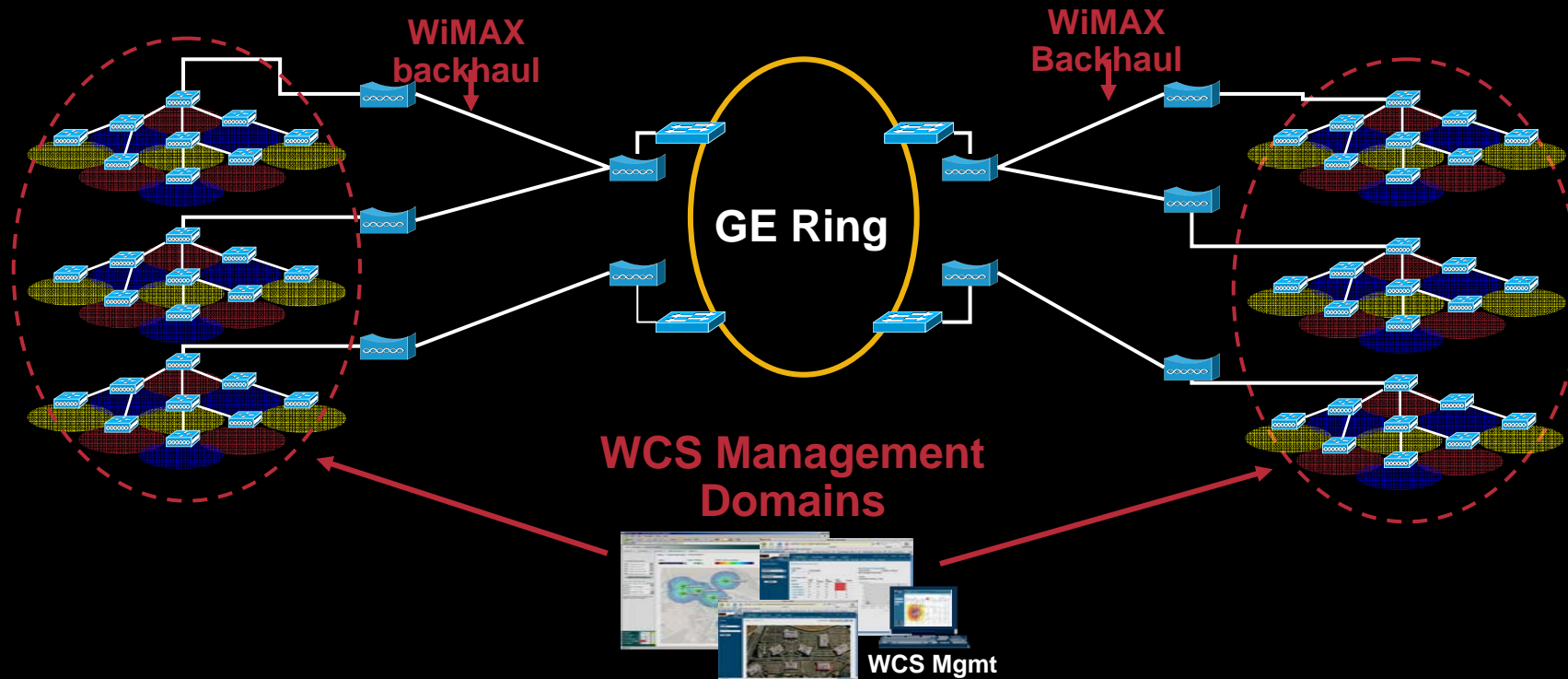
### Digital Divide & Economic Development

WiFi Broadband Access in under-served communities

Who will own the system?

Public Enterprise  
Public/Private Partnership

# Wi-Fi Mesh and WiMAX co-existence

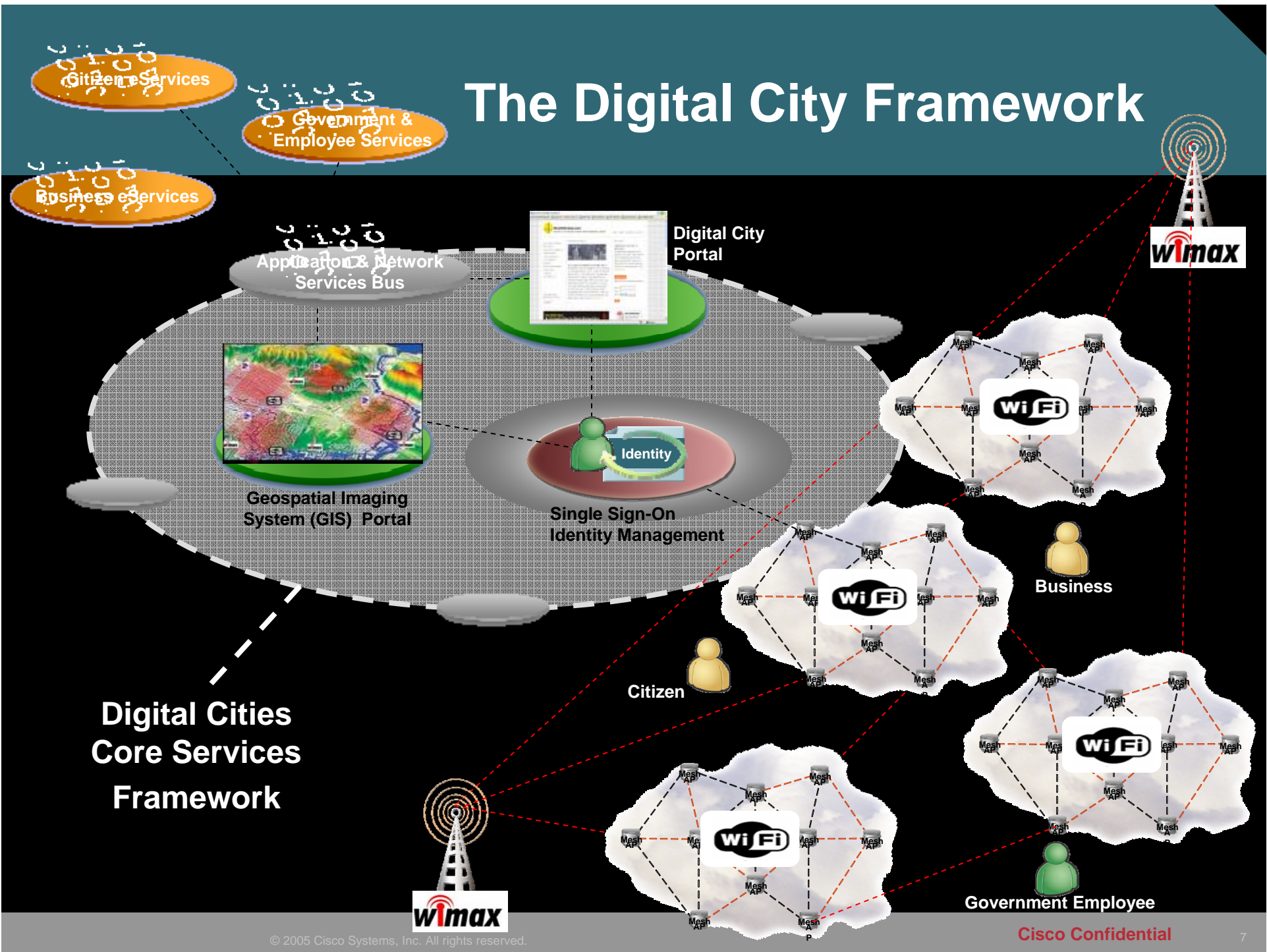


**Wi-Fi has huge CPE base and supports full mobility**

**WiMax is fixed solution today**

**Combined solution enables flexibility for services and applications**

# The Digital City Framework



**Digital Cities  
Core Services  
Framework**

# Potential Metro Applications

## Common Wireless Infrastructure



**Automatic Meter Reading**



**Voice over IP**



**Public Safety**



**Parking Enforcement**



**Permitting Licensing Inspection**



**City Services Portals**



**Mobile GIS**



**Asset Management**



**School Connectivity**



**Video Monitoring**



**Internet Access**



# MESH Objectives for Customers

- **Miami Beach – service for meter reading, secure access for public workers and for citizens (paid)**
  - VoIP is not realistic today (as a service – tariffs)**
- **Dayton - Paid services (no advertisements), selling to existing customers of Cable Co., government telecom customers of SPs, and enterprise customers**
  - Video Surveillance (MPEG 3 for high quality and low bandwidth)**
  - Revenue from advertisement, content, premier (tiered) services,**
  - Indoor coverage – for only small community for residential area (2<sup>nd</sup> floor and below). Not commercial building**
  - Use indoor repeater mesh (only support single hop for now)**

# Longer term services will be many and varied



- Noise Pollution Measurement
- Advertisement
- Air Quality Measurement
- Gas Monitoring (anti terrorism)
- Kiosk Services
- Supplemental CCTV
- Business/Residential Services
- Mobile work force
- Re-engineering Delivery of Service
- Mobile-enabled Public Services
- Tourism services



# MESH – Future Challenges

- **VoIP (tariff , high speed, etc.)**
- **Triply play (bandwidth, QOS)**
- **Backhaul options (WiMax (lic.), fibre, etc.)**
- **Dual Mode integration (handsets)**
- **Performance in heavy loaded environment**
- **Innovative services and applications**
- **Outdoor location Services**
- **In building solution**
- **Efficient design, implementation, site survey and deployment of network**
- **Leverage network efficiently for all users (core & Wireless)**

# Wi-Fi MESH Overview

# Why even consider a Wi-Fi Mesh?

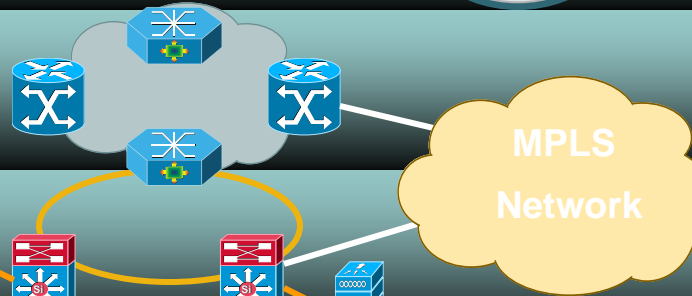
- **Resilience – e.g. Internet style model**
- **Easy of Deployment (zero-touch approach)**
- **Ubiquitous Access Capability via Wi-Fi Technology Users and Systems**
- **Cost of Wi-Fi CPE is almost \$0, bundled in by Hardware manufactures**
- **Rapid Deployment for Business/Emergency Contingency Planning (New Orleans)**

# Cisco Outdoor End to End Architecture

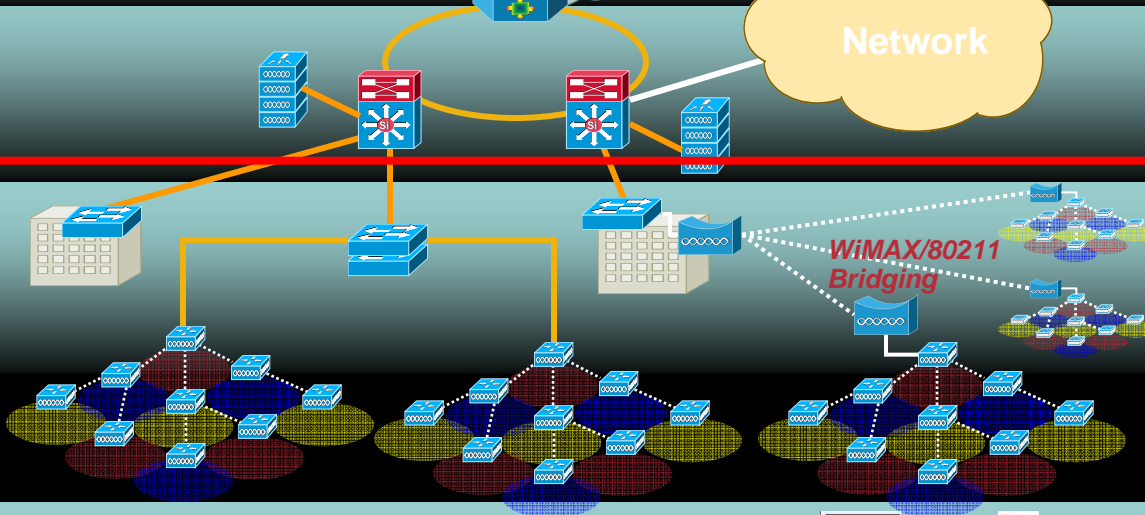
Services



Core



Aggregation



Access

**M  
E  
S  
H**

Clients



Client  
Readiness

Today



# Why Cisco for Wireless Mesh Networking?

- Cisco provides end to end solution
- Cisco developed fully integrated indoor and outdoor solution
- Cisco has developed best practice (process, resource and partner) to provide effective, scalable and timely solution
- Cisco is actively spending R&D \$ into areas for improvement to ensure further success
- Cisco is working closely with customer on business cases and developing value added services
- Cisco has flexible, scalable and self manageable solution
- Cisco's solution is based on Carrier Grade Systems
- Wi-Fi MESH is a natural extension of Cisco leading Wi-Fi solutions.
- Cisco's solution is continuously optimizing issues such as lower AP density, Higher BW, Radio Management (EIRP, self healing, auto channel selection), etc...



# City Categorization



**Tier 1**  
**NFL/NBA Cites**  
**- 500,000 +**

- **Almost all RFP's looking for a private or public/private solution**
- **Sweet spot for large SP's, ISP's & content providers**
- **Very political**



**Tier 2**  
**Medium Cites**  
**100,000 to 499,000**

- **Almost all RFP's looking for a private or public/private solution**
- **Sweet spot for Tier 2 ISP's**



**Tier 3**  
**Small Communities**  
**99,999 and below**

- **Private or public/private solution as well as Public funded**
- **Relatively quick deployment timelines**

# St. Cloud City, US

- Glenn Sangiovanni
- Mayor of St. Cloud

**“Ubiquitous high-speed wireless will bring lifestyle, educational and economic advantages to St. Cloud. With HP's help, St. Cloud is set to become one of a handful of cities with a city-wide municipal wireless network offered free to our citizens as a public service, which will enrich our education system, grow local commerce and better equip our local law enforcement and emergency response teams.”**



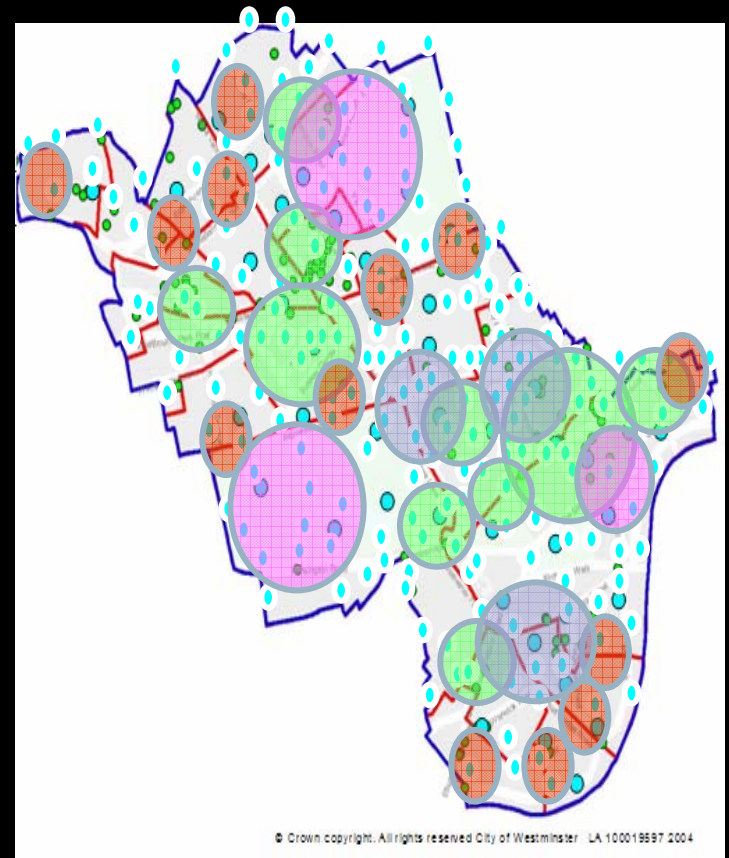
# City of Franklin, US

**“Wireless broadband will mean faster, more comprehensive first response units and wireless access for departments across the city.”**

- **Fred Banner,**
- **Director, Municipal Information Technology,  
City of Franklin**

# Westminster City Council - Deployment Benefits

- **Proven that Wireless CCTV is significantly cheaper than fixed CCTV**
- **Five Wireless cameras for the price of one fixed line camera**
- **Considerably enhanced flexibility and use of wireless enabled solutions compared to conventional solutions**
- **Enables improvements for customer services efficiency**
- **Enables a mobile, multi-tasked, workforce for real productivity gains**



**Wireless Coverage extended  
across the City**

# CitiLAN Wi-Fi Project @ Adelaide, Australia

- **Capital of South Australia**
- **1 million people**
- **Central Business District (CBD)**
- **10 sq km – wireless coverage**
- **50 to 70 Access Points (Phase 1)**
- **Located on Lamp posts near intersections**
- **Users include City Council, Local and State Government Agencies, University students, Store Owners, Coffee Shops and Tourists**



# CISCO SYSTEMS



EMPOWERING THE  
INTERNET GENERATION