



# Border to Border Wireless

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# Tempe



In

Transition





# City of Tempe

- **Tempe Demographics**

- 160,000 Residents / 50,000 Students
- 40 Sq mile area in Phoenix metro area (3 Million people)
- Home to Arizona State University (single largest campus in nation)
- Mill Avenue – Valley entertainment destination
- Tempe Town Lake – 4 miles of shoreline property

- **Smart Residents**

- More than 40 percent of Tempe's residents over the age of 25 hold a bachelor's degree or higher. Another 14 % have a graduate degree.
- Software engineers, scientific researchers, photographers, marketing professionals, lawyers and venture capitalists make Tempe their city of choice.
- A recent report by economist Richard Florida titled *Rise of the Creative Class* shows that Tempe is a thriving place for this new brand of workers to reside.

- **City Employees**

- 1640 regular employees / 300 seasonal employees
- All employees have access to a computer, most use a computer to do their job
- Mayor, Council, City Manager form of government





# City-wide WiFi

## Reasons, Goals, Objectives

- **Why Do It?**
  - **Need for mobility** - Mobile computers are a big part of the lives of people in Tempe
  - **Alternative broadband** – Tempe had limited choices for broadband service
  - **Geeks** - Tempe wants its knowledge worker base to feel comfortable in Tempe
  - **Freedom** – There are many event venues in Tempe. Now they are all “wired” for Internet
  - **Service the Community** – Municipal employees can be much more efficient with mobile data
  - **Make the Community smaller** – Free access to Tempe.gov puts the Mayor in your kitchen



# Goals and Objectives

- **Project Objectives**

- Provide ubiquitous wireless broadband coverage over entire 40 sq mile area of Tempe
- Provide an alternative to DSL and Cable modem for residents of Tempe
- Offer free WiFi service in Tempe’s downtown retail corridor for visitors
- Promote usage of the Tempe City Website and Egov applications by offering free “anywhere” access to Tempe.gov
- Promote usage of ASU on-line services by offering free “anywhere” access to ASU.edu
- Build a border-to-border wireless municipal network that would provide total mobility for Tempe municipal employees
- Enhance the ability for public safety employees to protect and serve through the use of broadband wireless technology
- Promote economic development in Tempe by making Tempe a smart place to be, and the best place to live, work and play



# Possible Solutions

- Available alternatives:
  - **Build a municipal network** - totally owned, operated and maintained by the City
    - Install cost – City
    - Operational expense – City
    - Revenue – City
  - **Public/Private partnership** – The City installs the network and contracts the operation and maintenance out to a wireless provider
    - Install cost – City
    - Operational expense – WISP
    - Revenue – Shared
  - **Public/Private agreement** - Offer resources to entice the construction of a public network that could be used to deliver municipal services and enhance the community
    - Install cost – WISP
    - Operational expense – WISP
    - Revenue - WISP
- Chosen alternative:
  - **Public/Private agreement**



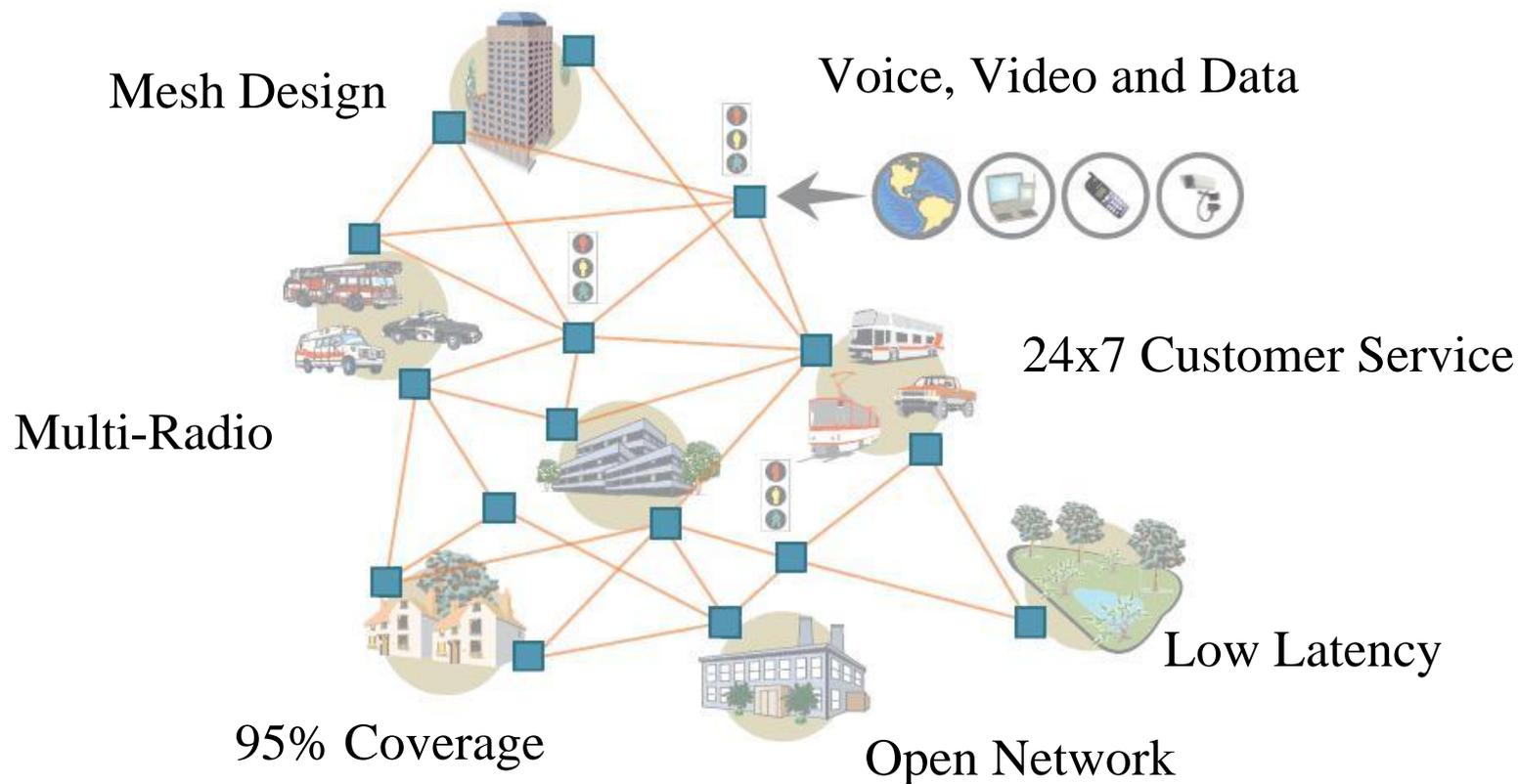


# Business Model

- **Key Elements:**
  - Agreement provides for the creation of a virtual private municipal network deployed on the same infrastructure as the Public network.
  - The agreement provides for free services in designated areas of the community and access to specific government and education sites for free from anywhere.
  - for the creation and operation of the municipal network and other in-kind services, the City will agree to grant limited use of the municipal-owned street light infrastructure and existing antenna locations for the Service Provider to deploy its network.
  - Service Provider markets its wireless services to Tempe residents, students, visitors and businesses.
- **Benefit to the City:**
  - The wireless network will be used by municipal workers to enhance the delivery of services to the community.
  - Every Police Officer, patrol car and Fire truck on the street can be equipped (at the City's expense) with a laptop computer that is Wi-Fi enabled giving them the ability to access information that has never before been available in the field due to limited bandwidth.
  - Access to the City's website from a free "landing page" will provide an unprecedented two-way communication tool for residents and public officials. It will promote the use of electronic government services in Tempe
  - A wireless community is a smart community, and a destination for smart companies
- **Benefit to the Service Provider:**
  - Easy access to vertical assets and electricity to quickly and cheaply deploy a Wireless mesh network



# Vendor Selection





# Applications: Current/Future

- Police
  - Uploading reports / Downloading graphics / Access to email
  - ACIC / NCIC access from patrol car or beat
  - Special Event communications and monitoring
  - On-the-fly Incident Command Center setup
- Fire
  - On-scene cameras and Telemedicine
  - GIS information on Trucks
  - Hazardous materials database access
  - Traffic intersection cameras
  - Bio-hazard sensors
- Water Utilities
  - Well and tank monitoring (SCADA)
  - Security Cameras
  - Meter reading
  - GIS information available in field
  - Infrastructure inventory and service ticket updates live





# More Applications

- Public Works
  - Access to GIS data in the field
  - Fleet management (AVL)
  - Trash Truck Cameras
  - Bus Stop/ Light rail kiosks
  - Signal light control and cameras
  - Parks maintenance / Ball field lighting
- Development Services
  - Building inspections and field reports
  - Code Compliance and inspections
  - Submit applications and print permits in the field
- General Government
  - Network access for Sales Tax Auditors
  - Inventory and work-order access for Technicians
  - Telecommuting from anywhere
  - Off site meeting rooms





# Project Economics

- City has no out-of-pocket capital expense
- Ongoing expense to the City is limited to electricity charges from pole-top radios
- Wireless Provider responsible for all maintenance and upkeep, including relocation of units as needed
- Funding for project comes entirely from Service Provider capital.
- Service agreement provides guaranteed use of Municipal network for life of agreement
- Service Provider revenue source comes from residential and business subscribers





# Deployment



- Deployment specifics
  - In 2004 Tempe and ASU staff deployed a proof-of-concept wireless network in the Downtown corridor adjacent to campus.
  - “Pilot” involved 15 access points placed on buildings along Mill Avenue and was offered free of charge to anyone in the coverage area courtesy of ASU.
  - Phase II was an RFI and RFP for City-wide wireless access
- Sustainability and Scalability of the project
  - Tempe’s contract is written such that additional light poles can be added to the network.
  - The agreement calls for total build-out of the network in 180 days from contract signing.
  - The project includes coverage for all of Tempe (40 sq mi).
  - The agreement is renewable for two (2) additional 5-year terms to help ensure a healthy return on the capital investment.



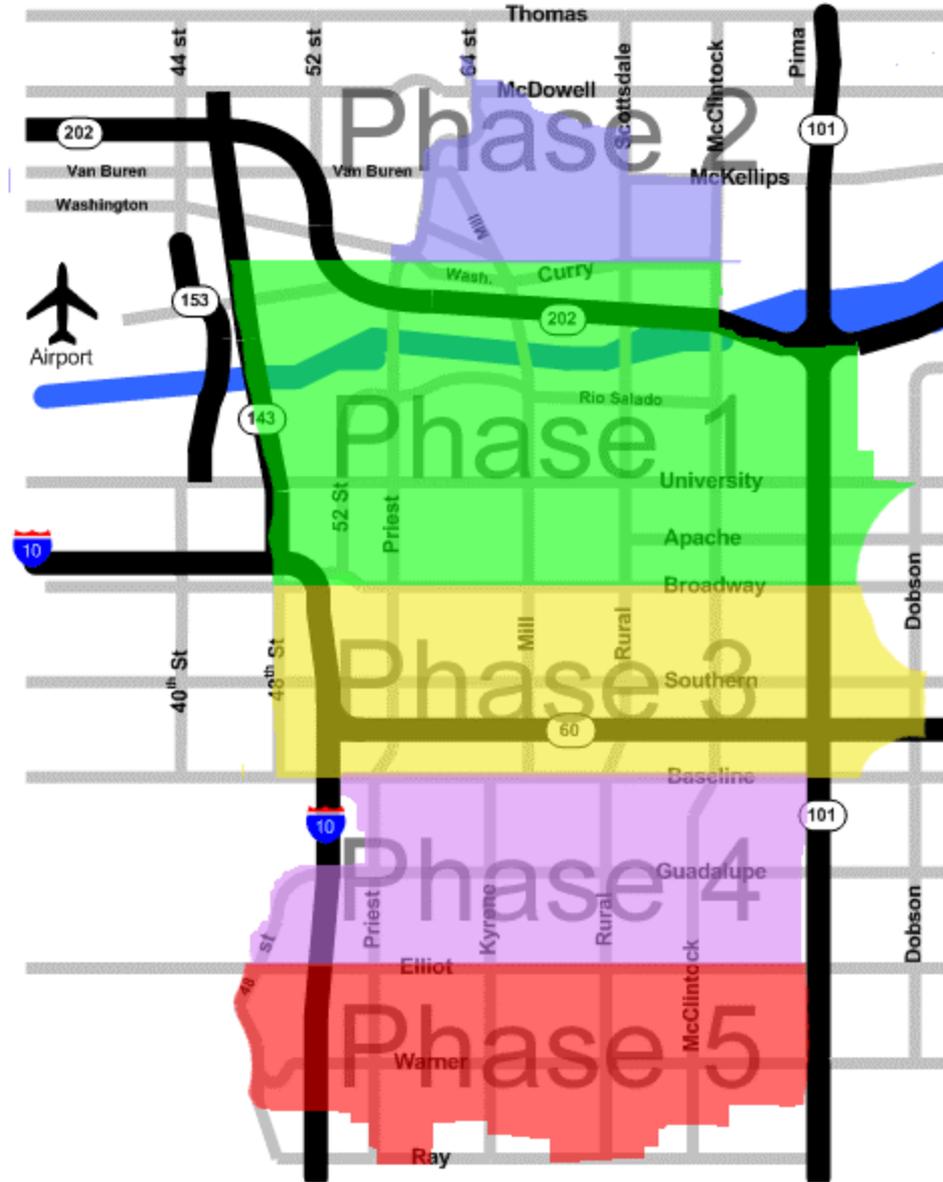
# Timeline

- **Jan 2004:** Project begins with Council briefing by staff on benefits of WiFi
- **Feb - Mar 2004:** Feasibility study / Mesh technology research
- **April - July 2004:** Discussion with ASU and Tempe on “Proof of Concept”
- **Sept 2004:** Prepare and release RFI
- **Oct 2004:** Free WiFi offered in 5 block area of Downtown Tempe
- **Oct - Dec 2004:** Review responses to RFI and preparation of RFP
- **Jan 2005:** RFP for City-wide WiFi released
- **Mar - Apr 2005:** RFP evaluation and selection
- **April 22, 2005:** Council Awards 5 year contract (pending agreement)
- **May - July 2005:** Contract negotiations
- **Aug 18, 2005:** Contract signed by Mayor Hugh Hallman
- **Aug 29, 2005:** First Mesh radios deployed in downtown area on street lights
- **Oct 21, 2005:** Phase I complete (80 radios deployed)
- **Nov 28, 2005:** WazTempe Media event and Ribbon Cutting (Town Lake)
- **Dec 21, 2005:** Sun Devil Stadium added to WiFi coverage
- **Dec 31, 2005:** Phase two complete (140 radios deployed)



# 5 Phases

The deployment was planned in a phased approach. The City was broken up into 5 zones. Each zone representing 1/5 of the total area or about 8 sq miles per phase.





# Deployment Status

- First 80 Nodes were installed in two months. The NOC was constructed and Fiber backhaul appropriated during Phase one



- Goal is to deploy 30 new nodes every two weeks
- Network Status and Sign-up information available at:  
**[www.waztempe.com](http://www.waztempe.com)**
- Customers in completed phase can begin using the network
- Free service is available in Downtown



# Impact Analysis

- Actual impact
  - The impact thus far has been an overwhelming positive response from citizens, students, and businesses.
  - Incumbent telcos have been silent.
  - Over 600 users have subscribed to the network since Nov 2005.
  - 20 to 30 calls and/or emails a week asking for information
- Impact compared to original goals
  - From the City perspective, all of our goals have been met and the project is considered to be a success. National recognition as an early technology adopter and pacesetter is a feather in the cap of the Tempe Mayor and Council



# Lessons Learned

- Being one of the first medium-sized cities to roll out border-to-border WiFi presented a few challenges especially considering the model that Tempe had chosen. (That being a model of “minimal public investment”).
- Key lessons Learned:
  - It is difficult for a WISP to see the vision of “build it and they will come”. Hopefully we will change that!
  - Light pole ownership is critical to the success of a City rolling out Mesh technology, especially if you wish to leverage your assets in the negotiation of service.
  - Gang-switched power for streetlights, as well as overhead power, present problems.
  - Having up-to-date GIS information regarding your City infrastructure readily available will speed the design process.
  - Including a *proposed contract* in the RFP speeds up the finalization of the agreement. All of the major terms and conditions have already been agreed to.
  - Support from the Mayor and Council is not only critical for success, but helps greatly to unify City Departments that need to cooperate in the logistics of deployment.



# Questions ?

