

Municipal Wi-Fi  
aka  
Municipal Wireless

Dewayne Hendricks  
Dandin Group

# Overview

- Preamble
- Survey of Municipal Wireless
- Case Study
- Conclusions & Recommendations

# Preamble

# Wi-Fi Arrives

- Enables low cost, anywhere, anytime communications
- Unlicensed kicks into high gear



# First TAC Meeting

- First meeting in 1998
- FCC created U-NII Band in Jan. 1997
- Early discussions of spectrum sharing, noise floor, spectrum measurement and monitoring
- Premise: Reality is always under reported!

# TAC Presentation

## April, 2004

- “Real World Issues, Practical Pitfalls and Opportunities”
- Wireless networks can be built in a cooperative manner where the whole is greater than the parts
- Using spectrum as a commons can work through the use of simple rules
- Innovation occurs when driven by needs

# Wireless Broadband Access Task Force

- Created in 2004
- Survey licensed and unlicensed wireless broadband
- Final report in March, 2005
- [www.fcc.gov/wbatf](http://www.fcc.gov/wbatf)

# WBATF

## Recommendations

- Promote voluntary freq. coordination
- Promote industry 'best practices'
- Work with WISPs on proactive basis
- Increase power limits in selected bands
- Consider annual WISP forum



# WBATF on Municipal Wi-Fi

- Covered city wide Wi-Fi in Grand Haven, MI
- Other Wi-Fi discussions was WISP oriented
- Estimate of 6000 WISPs at that time in U.S.

# TAC Presentation

## July, 2005

- Overview of major unlicensed wireless project: HPWREN, SFLAN, etc.
- Same basic recommendations as 2004
- Addition: FCC could repeat the experimental partnership that took place with amateur radio community during spread spectrum rulemaking history

# Survey of Municipal Wireless

- Reality still is under reported
- No longer just cities, but counties
- Rhode Island is the first state
- As of June, there are 281 city/county wide wireless broadband networks in operation
- See:  
[www.muniwireless.com/reports/docs/Sept-10-2006summary.pdf](http://www.muniwireless.com/reports/docs/Sept-10-2006summary.pdf)

# Suffolk & Nassau Counties, NY

- Just issued RFI/C in July
- 1200 square mile, 2.7 million people
- Affordable or free broadband access for all residents
- [www.nassaucountyny.gov/wireless](http://www.nassaucountyny.gov/wireless)

# Case Study

# Sandoval County, NM Broadband Project

# The County

- 110,000 people
- 3700 square miles
- Rio Rancho, fastest growing city in U.S. (Forbes)
- Largest Intel plant in the world
- Large Native American Community



# The Implementation

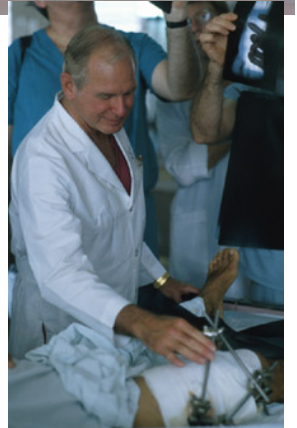
- Commodity Wireless
- National Lambda Rail (NLR) use for peering and transit
- Phase I now complete - 100 Mbps backbone into rural areas in the County
- Started second year of project in October
- Governor Richardson gave the project \$1M
- [www.ollagrande.net](http://www.ollagrande.net)



# Sandoval County Broadband Project



Leveling the Playing Field in  
Healthcare, Education & Business



# What Is It?



- *The most advanced municipal wireless broadband deployment in the United States.*
- The accepted axiom is that broadband access will be to the 21<sup>st</sup> century what railroads were to the 19<sup>th</sup> century and highways were to the 20<sup>th</sup> century.
- Throughout the country, there are cities which rose to influence because of positioning of railroads, or conversely, dwindled due to railroads or highways being placed at a distance.
- The “digital divide” is a re-enactment of this same infrastructure boom or bust cycle: those communities with access, prosper, those without access, atrophy and will be left further and further behind.
- Sandoval County has determined that access to high speed telecommunications infrastructure should be available to every County resident.
- While some 380 municipal wireless projects are currently underway in the United States, none approach the amount of bandwidth, nor the size, diverse topography and rural nature of the Sandoval County project.
- Eliminating geographic access barriers to medical services, quality education and business/marketing opportunities will improve the quality of life for all New Mexicans.
- The most dramatic changes and the most incredible opportunities will, however, happen in rural New Mexico, by bridging the digital divide.



# How Is It Different From State Initiative “Wire New Mexico?”

- The microwave approach of “Wire NM” is an old technological paradigm
- The Sandoval County Broadband Project is a new technological paradigm
- Broadband is an internet facilitated technology, enhanced by reduced bandwidth cost and the most expansive access possible.
- The technology of “Wire NM” has no mechanism
  - for reducing access costs, nor is it an open access system.
- The Sandoval County project is leading the municipal wireless trend that is sweeping the country.
- Innovations are taking place in the unlicensed spectrum arena, not in the licensed spectrum arena, because of worldwide competition which is driving incredible innovation.



# How Much Bandwidth?

- **The bandwidth currently available in Zia Pueblo, Jemez Pueblo and the Towns of Bernalillo & Cuba is GREATER than any municipal wireless project in the United States.**

- We have 100 megabits in Bernalillo, Cuba and the Pueblos of Zia & Jemez
- Other US sites (*Philadelphia, Denver, San Francisco, Houston New Hampshire, & Vermont*) have a target of 1 megabit vs.
- Sandoval County's target of 1 gigabit.
- Comparable deployments of wireless broadband are only to cities (*Houston, 250 sq. miles vs. Sandoval County's 3700 sq. miles*)

- *Japan, Korea & Hong Kong have 1 gigabit available to citizens now...*
- *Japan has a deployment goal of 10 gigabits by 2010.*



# What Does It Cost?

- The US is YEARS behind Europe & Asia in both available bandwidth & affordability:

- (Retail Cost)

- Paris: 50 megabits= \$35/month (starting 2007)
- Rotterdam: 30 megabits=\$8.50/month
- Hong Kong: 1 gigabit=\$240/month
- San Francisco: 1 megabit=\$30/month

- **IN NEW MEXICO**

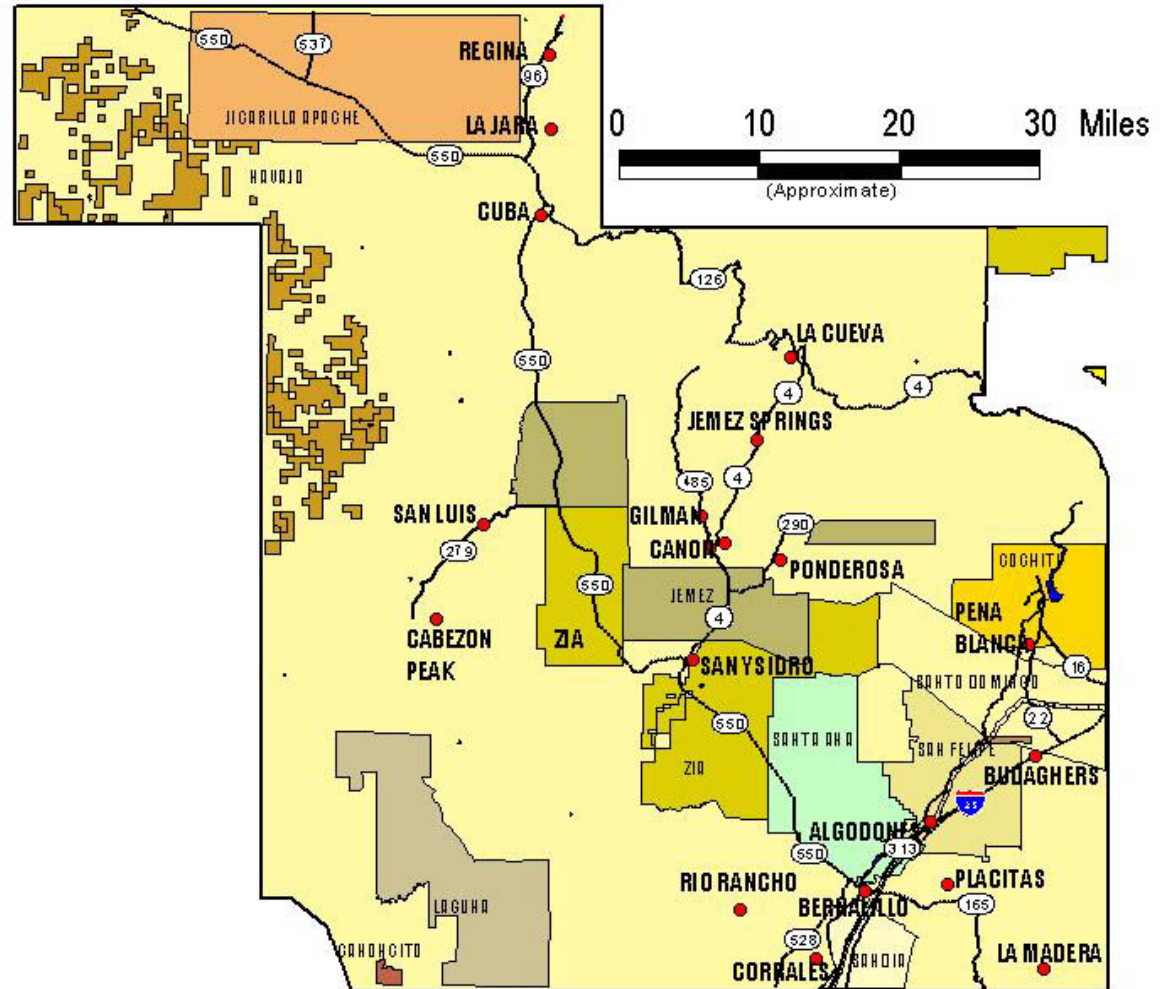
- UNM: 1 megabit = \$80/month
- Jemez: 1.5 megabits = \$1,000/month
- Navajo Chapters: 1.5 megabits = \$2,500/month

- State average wholesale cost for 1 megabit is \$120/month

- SANDOVAL COUNTY IS OFFERING WHOLESAL  
BANDWIDTH FOR \$50 PER MEGABIT

# Where Will It Be Available?

**The Entire  
COUNTY**  
(rural  
communities,  
pueblos, & Navajo  
chapters included)  
and Replicable  
Throughout the  
State





# What Is Being Done With It?

- **Elimination of geographic boundaries will allow healthcare, education and business to leap frog from where we are today to the forefront in technology and opportunity**





# EXAMPLE:

## Jemez Valley Schools

- **NEED MORE BANDWIDTH**

- Currently on T-1 line / 1.5 megabits @ \$1,000/month
- 350 PCs far exceed capacity of one T-1
- Distance Learning Programs
  - Need 10 megabits
- School-based medical clinic needs connectivity
- Two new portables need to be connected



- **CAN'T AFFORD TO PAY**

- **\$12,000 /YR FOR NEW T1 LINE**
- **\$10,000 TO TRENCH 400 FT.**



- **COUNTY OFFERING FREE BANDWIDTH TO SCHOOLS**

# EXAMPLE:

## Jemez Pueblo Health Clinic

- Now using T-1 line to transmit X-ray info to UNM
- So slow – patient must come back next day for diagnosis
- Many patients don't come
- back the 2<sup>nd</sup> day
- Cannot afford to pay
- for 2<sup>nd</sup> T-1



- **COUNTY OFFERING FREE BANDWIDTH TO MEDICAL PROGRAMS**

# EXAMPLE: Cuba, NM

## Area Code Change & High School Needs

- Dial-up from Cuba will now be long-distance to Abq
- Current ISP has shut down
- What will residents, businesses & schools do?
- Cuba High School has 700
- computers accessing a T1 line
- The High School campus is a
- wireless environment, but
- limited bandwidth has never
- allowed any video streaming applications.



- **COUNTY OFFERS CUBA  
50/MEGABIT/MONTH...ISPs CAN THEN OFFER  
BETTER RATES...THE CITY IS CONSIDERING  
OFFERING INTERNET ACCESS**

# What Do We Want To Do With It?

- ***Expand and Improve Medical Services Through Telehealth***
- *Bring care to patients in their homes*
- *Aging Services to home or long-term care facility*
- *Mental Health care to veterans suffering from isolation and*  
*Post Traumatic Stress Disorder*
- *Adult Day Care in Rural, Culturally Diverse Communities*
- *School-based Medicine*
- *Provide healthcare to people who don't even have paved*  
*roads or, in some cases, electricity*
- *Provide free access to health initiatives, schools and emergency services*
  - § *Boost existing health programs and applications with free access*
  - § *Enable new medical applications to be created for NM, US and around the world.*
- **MAKE USE OF GLOBAL MEDICAL**
- **RESOURCES TO IMPROVE ACCESS FOR NEW MEXICANS**
- **TELEMEDICINE TECHNOLOGY CLOSSES THE GAP BETWEEN CITIZENS AND THE CARE THEY DESERVE**



# What are we asking from the State?

- While the Governor has been very supportive of the Sandoval County project, we are asking the State to embrace the technology as its own.
- We are asking the Governor to take advantage of this one-of-a-kind communications infrastructure and living laboratory in Sandoval County to begin new, revolutionary telehealth and distance learning initiatives available nowhere else in the United States.
- We are offering to demonstrate the
  - capacity of this infrastructure by
  - showcasing and supporting
  - several of the Governor's
  - own projects.



# **Sandoval County Broadband Project**

## ***Leveling the Playing Field in Healthcare, Education and Business***

### **WHAT IS IT?**

The most advanced municipal wireless broadband deployment in the United States.

### **HOW IS IT DIFFERENT FROM STATE INITIATIVE “WIRE NEW MEXICO?”**

The microwave approach of “Wire NM” is an old technological paradigm.

The Sandoval County Broadband Project is a new technological paradigm

Broadband is an internet facilitated technology, enhanced by reduced bandwidth cost and the most expansive access possible.

The technology of “Wire NM” has no mechanism for reducing access costs, nor is it an open access system.

The Sandoval County project is leading the municipal wireless trend that is sweeping the country.

Innovations are taking place in the unlicensed spectrum arena, not in the licensed spectrum arena, because of worldwide competition which is driving incredible innovation.

### **HOW MUCH BANDWIDTH?**

Currently 100 megabits; 400 megabits within a few months; goal 1 gigabit.

Other municipal wireless projects in the US have a goal of 1 megabit

Japan, Korea and Hong Kong already have 1 gigabit available to their citizens

### **HOW MUCH DOES IT COST?**

Far more than it does in Asia and Europe, somewhat more than many areas of the US, but much less than when the project was started.

### **WHERE WILL IT BE AVAILABLE?**

All 3700 sq. miles of Sandoval County and replicable throughout the State of New Mexico.

### **WHAT IS BEING DONE WITH IT?**

Not enough, but projects underway at Jemez Valley Schools, Jemez Pueblo Health Clinic and the Village of Cuba.

### **WHAT DO WE WANT TO DO WITH IT?**

Eliminate geographic barriers to health care and quality education.

Bring care to patients in their homes and communities no matter where they live.

Close the gap between citizens and the care and opportunities they deserve.

### **WHAT ARE WE ASKING FROM THE STATE?**

Embrace the technology

Take advantage of this one-of-a-kind communications infrastructure and living laboratory in Sandoval County to begin new, revolutionary telehealth and distance learning applications.

Take this State where no state “...has gone before.”

# Conclusions & Recommendations

# Innovation Driven by Needs

- Lots of vendors offer products for the municipal wireless market
- Major players coming in: Cisco, IBM, AT&T, Motorola
- “Commodity wireless” is now becoming a factor



# Commodity Wireless

- Single Board Computer (SBC) - multiple vendors
- miniPCI form factor radios - multiple vendors
- Operating System (OS) - multiple sources, both commercial and open source
- Enclosure
- Antenna(s)

# Ubiquiti Networks

- ‘Frequency Freedom’ technology aka transverter, maps commodity parts into anywhere in spectrum
- So far 900 MHz, 3.5 GHz and 4.9 GHz
- 900 MHz radio retails at \$160 - 54 Mbps at 700 mw

# Spectrum Commons

- Seems to be working 'good enough'
- Unlicensed wireless is going to places where no one dreamed was possible
- FCC should make effort now to act on recommendations of WBATF
- FCC & TAC should consider new task force on municipal wireless broadband