

**Board of County Commissioners  
Leon County, Florida**

**Workshop  
on  
Wireless Broadband Initiative Requirements**

**1:30 pm - 3:00 pm  
Tuesday, February 28, 2006**

**Leon County Courthouse  
Commission Chambers  
5<sup>th</sup> Floor**

# Board of County Commissioners

## Workshop Item

Date of Meeting: February 28, 2006

Date Submitted: February 22, 2006

To: Honorable Chairman and Members of the Board

From: Parvez Alam, County Administrator  
Kim Dressel, Management Services Group Director

Subject: Wireless Broadband Initiative Requirements

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### **Statement of Issue:**

This workshop is to inform the Board of County Commissioners about wireless broadband initiative requirements and seek further direction for the issuance of a Request for Information (RFI).

### **Background:**

At the October 25, 2005 Workshop regarding Internet Access for Leon County's Rural Areas, the Board directed staff to release a RFI for high-speed broadband wireless network solutions.

### **Analysis:**

A draft RFI for wireless broadband solutions is provided as Attachment 1. Several recently issued municipal and county RFIs and RFPs for wireless broadband solutions and technical sources regarding wireless technology were used to prepare the draft RFI for Leon County. Reference sources were:

City of Philadelphia, PA  
City of San Francisco, CA  
City of Houston, TX  
City of Portland, OR  
City of Miami Beach, FL  
York County, PA  
San Diego County, CA Indian Tribal Villages  
Houston County, GA  
Allegany County, MD  
San Diego County, CA  
Benton County, WA  
Macomb County, MI  
The Wireless Internet Institute (W2i)  
[www.muniwireless.com](http://www.muniwireless.com)  
<http://www.govtech.net/digitalcommunities>  
[www.civitium.com](http://www.civitium.com)

Digital Community and Drivers

The Board's initiative to introduce a community wide high-speed wireless broadband capability is also a vision of creating a Digital Community. The Digital Community Best Practices White Paper by the Wireless Internet Institute (W2i) and Intel (Attachment 3) defines a Digital Community as, "a connected community that combines broadband communications infrastructure; flexible, service-oriented computing infrastructure based on open industry standards; and innovative services to meet the needs of governments and their employees, citizens, and businesses."

An important theme from the research on Digital Communities and broadband services technology is ensuring a broad-based return on investment, which requires a thorough evaluation of local community and government needs. Once the goals and objectives or the primary driver of the initiative are understood, the success factors for implementation can be defined and understood and return on investment is justified.

As noted by W2i, developing a Digital Community usually begins with a first-stage infrastructure deployment for a single application or mobile communication need that was seen as a primary driver and justification for technology investment. Examples of primary drivers for some Digital Communities are:

<b>Municipality</b>	<b>Primary Driver</b>
Chaska, MN	Digital divide for schools, businesses, and residents
Cheyenne, WY	Traffic-signal management
Corpus Christi, TX	Automated meter reading
Lewis and Clark County, MT	T1 replacement; access to remote county buildings
Medford, OR	CDPD replacement for public safety
San Mateo, CA	Public safety mobile data communications
St. Cloud, FL	Lack of affordable service and economic development
Philadelphia, PA	Digital divide
Hartford, CT	Quality of life
Macomb County, MI	Economic development
Fayetteville County, NC	Digital divide
Spokane, WA	Government efficiency for mobile workforce

A survey of local government entities published in December, 2005 from Government Technology Magazine (Attachment 4) asked the question, "Which of the following are most likely to deliver the greatest public VALUE through an outdoor wireless network and mobile workforce in your locality? Responses were:

<b>Service</b>	<b>Greatest Value</b>
Police, Fire and Emergency Response Reporting	61%
Public Safety	46%
Public Internet Access	35%
Police, Fire Information Lookup	34%
Social Services Mobile Case Management	28%
Land Management (permitting and inspections)	26%

Automated Meter Reading	26%
Traffic Management and Control	24%
Criminal Justice	18%
Video Surveillance	16%
Tourism	15%
Asset Management	12%
Parking Enforcement	10%
Port Security	6%

Most of these the governmental drivers are of value to municipalities rather than counties, such as automated meter reading, traffic management, utility asset management, and parking enforcement. Therefore, broadband initiatives have been more prevalent in municipalities because of utility and police needs, existing infrastructure such as utility poles and water towers, and existing municipal office billing and customer service centers which make implementations more viable and cost effective.

Drivers will dictate technical solutions which will influence the cost, infrastructure requirements, and scope. For example, the technical solution to address a digital divide driver may entail a site specific area to cover low income communities; whereas, a government efficiency driver for public safety or mobile workforce will require a solution to cover the entire community and or require more equipment to provide enhanced security. Also, the cost benefit analysis will be determined differently for addressing a specific driver. The cost benefit analysis for public safety will be different than a cost benefit analysis for economic development. Additionally, addressing one driver may or may not address other drivers. Further, some drivers may conflict with other drivers such as public safety requiring high security and closed access whereas the digital divide driver allow open access and little or no security.

#### Costs

Based on the research of implementations and initiatives from other Digital Communities, start-up costs range from \$10,000 to \$100,000 per square mile. Philadelphia's implementation is costing approximately \$132,000 per square mile because of heavy radio frequency interference issues and building density. The wide range in cost is based on many factors, such as the primary driver and audience, existing infrastructure, terrain, population density, square mile coverage, radio frequency interference, and access and location of wired backend service. Thus, the initial cost for a comprehensive solution covering the populated areas of the County (about 488 square miles) with approximately 96,000 households could be in the range of \$4.8 million to \$48.8 million. Allocating that range per household finds the low end to be \$51 per household and the high end to be \$508 per household.

A major component of those start-up costs is the amount of infrastructure that needs to be built. In Leon County's case most existing infrastructure in the populated areas belongs to the City of Tallahassee and Talquin Electric. In order to minimize costs, agreements with the City and Talquin Electric would need to be made to use existing infrastructure such as utility poles. Otherwise, the County would need to build or access other poles, towers, or buildings to place equipment.

Additionally, other infrastructure would be needed to access the “wired base.” All wireless systems tie into a wired service. In most cases that wired service exists in Leon County through providers such as Sprint, Comcast, KMC, or the City and the solution would need to contract services with those providers. Areas that have no wired service would require laying fiber to another wired service. The distance in meeting that connection dictates the amount of labor, materials, and equipment required and impacts cost. Finally, any potential radio frequency interference or line of sight issues will dictate the number of antennae or access points needed, which adds to the costs.

Other start-up costs will be incurred in satisfying legal requirements. Florida law requires certain criteria to be met when a local government decides to offer broadband internet services. The Florida League of Cities’ synopsis of the legislation is provided as Attachment 5. In summary, government entities seeking to implement wireless broadband services must conduct at least two public hearings, must allow private service providers to make a case for providing services, must provide a written business plan with financial details for review, and must pass appropriate ordinances. Funding options for the initiative are to be provided for public review, too.

On-going operational costs will need to be considered for infrastructure maintenance, billing, and technical and customer support to monitor quality of service and bandwidth delivery and maintain equipment. These on-going operational costs have not been estimated for Leon County, yet it is evident that creating or buying an automated billing system, providing technical staff, and creating a customer service group will be costly additions. As explained earlier, this is one reason why municipalities are prevalent in wireless initiatives as they have existing utility billing and servicing resources that can be scaled up to support the on-going operational needs for a wireless broadband initiative.

However, it is recognized that implementation costs may begin to decrease within the next twelve to eighteen months as emerging technologies are coming into “prime time” production. The Wi-Max solution will have a major impact on lowering the cost of wireless solutions because the range of service provision is 30 miles compared to 300 feet with Wi-Fi technology. Thus, any proposed solutions would need to consider Wi-Max as a potential component to the implementation strategy.

Implementation Models or Strategies

There are several business models or strategies for implementing wireless broadband services.

Government owned public utility	Totally government funded, built, and managed with tiered services for citizens and businesses.
Government owned “walled garden”	Government funds and builds the solution specifically for its needs. Excess government bandwidth is leased to wireless ISPs who manage and disperse services, generating revenue for the government from the fees for use of government owned infrastructure
Government owned free access	Free access to government infrastructure with no guarantees on speed, service, and quality. <i>Leon County uses this model by providing limited access with its current wireless services in the Libraries and the Courthouse.</i>
Private-sector partnership	A private company deploys the infrastructure, provides a tiered level

	of service for government, citizens, and businesses at no or little cost to the government, and manages all on-going costs.
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These models or strategies range from total government funding, implementation, and management to total private business funding, implementation, and management. Government funding can come in the form of general revenue capital expenditures and/or grants and/or "utility" or subscription revenue. In some models the start-up and on-going costs are borne completely by a private-sector provider who provides basic service at a free or low rate to citizens, free access to the government mobile workers, and cost effective services to businesses with faster services for higher rates (tiered offerings). Then the provider is granted the rights to offer other high-end services to consumers, to sell advertising on the internet, and/or to access and collect user's search habits for advertising.

### Leon County's Interests

In Leon County's case, the interests which were expressed by Board members previously in the October 25, 2005 workshop were digital divide concerns, affordable cost, speed, additional competition for service providers, economic development, and government operational efficiencies on a County wide scope. Any one of these interests as a primary driver for Leon County's initiative will require a specific implementation strategy and cost. Consideration of these interests as a primary driver find the following potential benefit or cost or justification in regards to estimated start-up costs in the range of \$4.8 million to \$48.8 million.

<b>Interest</b>	<b>Leon County's Situation</b>	<b>Potential Benefit/Cost/Justification</b>
<b>Digital Divide</b>	Density of a digital divide is relatively sparse and is located in specific areas and not county wide.  Libraries have wireless connections and approximately 150 public PCs.	Delivery and access are not the total solution. There are other considerations such as desire, equipment, and training. Cost may be more than other solutions for addressing a digital divide, such as by increasing the number of public use PCs in the Libraries.
<b>Affordable Cost</b>	Current vendor rates are in range with national rates.	Analysis would be needed to determine if investment and on-going monthly maintenance and servicing costs are justified in providing free or very low cost services.
<b>Speed</b>	High speed services are available with current fixed wired and cellular providers, but at higher rates.	Wireless services do not necessarily match fixed wired services because wireless users are sharing resources. The number of users at any point in time and their location to an access point will effect their speed. Therefore, specific speeds can not be guaranteed at all times.
<b>Competition</b>	2 major providers exist with several smaller providers as well as national providers. Additionally, the universities and colleges with a potential subscriber base of 50,000 have wireless internet services available for their students.	Analysis would be needed to assess the value of taking market share from existing businesses and impacting tax revenues. Also, the potential subscriber/user base is diluted by the universities' services to its student population.
<b>Economic</b>	Digital Canopy exists in the downtown area	The area currently promotes itself as a

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<b>Development</b>	and the airport.	digital community. Additional business services will require more investment costs for infrastructure and operational needs and the City has decided the return on investment is not justifiable.
	Commercial providers exist for county wide over the air service and for cable and DSL services in populated areas.	There can be economic consequences with existing providers if market share is diluted by a government sponsored service.
<b>Government Operational Efficiencies</b>	Leon County currently uses wireless technology for its mobile workforce.	Expansion of wireless technology is planned through the use of commercial cellular providers. That annual cost is currently less than \$10,000 and will grow to about \$50,000 within two years.
	Hotspots for EMS, Sheriff's Office and other County employees	Expansion of hotspots is planned within the current County IT infrastructure and budget.
	AVL technology for EMS is implemented. The Sheriff's Office is finalizing its research for a solution.	Current expenses with commercial providers are less than \$10,000 per year for EMS. Costs for the Sheriff's Office solution is unknown at this time.
	120 Mobile Data Terminals (MDTs) for the Sheriff's Office are handled by the Sheriff's system.	Expansion of data bandwidth to handle images and maps is needed. Technical solutions are being researched either through the 800 Mhz system or the Florida Highway Patrol's state system. Costs are unknown at this time.

Staff Assessment

It should be noted that most of the wireless broadband initiatives throughout the nation are in the beginning phases. Those that are operational are for areas far smaller in scope and size than Leon County's initiative and have very specific objectives. Large community solutions are planned but have yet to be fully implemented; therefore, the true value and justification of expenditures and knowledge of all the ongoing costs have yet to be documented. It was found that those County implementations that have been declared successful and complete had very specific drivers, were devoid of existing technical services, had agreement on the business model, strong justification and/or return on investment and were smaller scale (i.e., Fayetteville County, NC and Macomb County, MI).

Where Leon County government has seen the most need for wireless broadband services has been for governmental operations. Therefore, the potential primary driver for Leon County's initiative could be defined for government operational efficiencies. However, the mobile work force need is being met with current in-house services and commercial providers and growth in the County's mobile work force should be met effectively for the future with the partnership of commercial providers. Additionally, the lion's share of that driver is within the public safety arena. Efforts are underway to address the wireless needs for public safety through the City/County 800 Mhz program. The City has under contract a consultant to develop requirements from the Tallahassee Police Department and

the Sheriff's Office and assess emerging technologies for the upgrade of the 800 Mhz program. Also, the Sheriff's Office is reviewing the State's system for the Florida Highway Patrol as a possible solution for wireless data communications.

Without a specific primary driver for this initiative staff prepared a draft RFI that included a broad sweep approach of drivers, goals, and objectives and solicited solution options covering all model types. The draft RFI does not provide any technical information such as a radio frequency study, terrain issues, or inventory of assets that could be used in a deployment. Staff are not qualified to prepare this aspect of a feasibility study.

Although other jurisdictions have released RFIs and RFPs without these components, staff are concerned the draft RFI will not provide respondents complete information to provide a tailored response with accurately reflected costs and/or may not provide an appropriate solution based on what the County desires or needs, which may impair or impede the Board's decision making for future steps in this initiative. Staff believes that consultant services will help the County refine its vision, motivation, and objectives and will address assessments of technical issues and legal requirements. As mentioned above there are state mandated legal requirements which will need to be addressed as well as concerns from existing commercial providers. Justification of this initiative will be necessary to show value to the government, citizens, and businesses.

Most of the jurisdictions that pursued wireless initiatives have used a consultant firm to analyze the feasibility of government owned/supported wireless broadband initiatives, to assess any technical issues with a RF study and inventory of assets, to address any legal requirements, to devise a viable business case, to build community and business consensus, to establish the management model, to develop the RFI or RFP, and to conduct the analysis and selection of respondents. Civitium, LLC is the firm that seems to be the forerunner in providing these services having been the project consultant for many of the recent municipal initiatives such as Philadelphia, Houston, TX; Portland, OR; Miami Beach, FL; San Francisco; and New Haven, CT.

Civitium, LLC was contacted to learn what value there is in having project consultant services and was very helpful in providing guidance as to what other jurisdictions have done and why. For example, a feasibility study helps determine citizen, business, and government needs and how technology can support those needs effectively, perhaps with low or no cost. Additionally, technical issues regarding radio frequency interference, line of sight issues, terrain issues, and infrastructure requirements need to be determined. This is accomplished with a RF study (radio frequency) and site analysis. Having these factors known upfront will allow for a tailored RFI/RFP that will provide accurate and realistic responses relative to costs, technical solutions, and business model solutions.

Civitium, LLC provided two quotes for two types of services. The first quote of \$92,600 is for an engagement that will cover 20 weeks and will provide the following services:

- Assist the County in refining its vision, motivations, objectives, and policy for this initiative,
- Conduct a business model workshop with key stakeholders,

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- Perform an inventory of County assets that may be used for infrastructure,
- Conduct a technology workshop to educate key stakeholders and technical staff on current state-of-the-art wireless broadband technologies and trends,
- Develop the architecture requirements,
- Conduct a radio frequency study,
- Facilitate the development of a communications strategy for the County to define, communicate and gain community support for its vision with internal and external stakeholders,
- Project high-level costs, benefits, and return on investment by the County for an initial deployment of the system, unless a private-sector financed and owned network is pursued.
- Prepare a report to include:
  - An executive summary
  - A review of all data collected from the above efforts
  - A summary of recommendations
  - A preliminary, phase project plan (based on recommendations)
  - A description of identified risks and mitigation strategies
- Author a Community Broadband RFI/RFP and facilitate the peer review process with the County's stakeholders,
- Define the process and criteria to be used by the County to evaluate responses received in connection with the RFI/RFP issuance,
- Perform a detailed evaluation of all responses received in connection with the RFP issuance, considering both technical and business aspects,
- Participate in various planning meetings, pre-bid conferences, and conference calls to provide advice to the County as requested throughout the entire engagement.

A second quote of \$48,300 for an engagement lasting approximately 9 weeks would provide a phased approach that addresses the visioning, business model determination, and feasibility study. This alternative provides all the services mentioned above except the development of the RFI/RFP and analysis of the respondents. This would allow the County to work through the process of understanding their goals and objectives, defining a business model, and learning the technical feasibility of the initiative. After this effort the Board can decide if it wants to continue with additional services for the next steps for the RFI or RFP.

### Summary

In summary, staff provided additional information about local government wireless broadband initiatives to assist the Board in its decision making and visioning. It was shown that many of the drivers other local governments have pursued for community wireless broadband initiatives are less relevant to Leon County or may produce a minimal return on investment because the needs are not as great or are being met (i.e., digital divide, governmental operational efficiencies, and access). Many small scale and focused wireless solutions are in place and are in use at this time between the County, the City, and the universities and colleges.

It was explained that start-up costs for a county wide broadband internet service are expected to be high because Leon County has little of the existing infrastructure assets and would need to lease or build its own. Ongoing costs will be high as Leon County will need to add billing, maintenance and customer service resources to support a solution. Additionally, the potential user base is diluted by the current wireless services provided by the universities and colleges to its students. Finally, any potential technical issues regarding radio frequency interference and line of sight access are unknown

at this time, which can impact costs greatly when overcoming those issues.

However, if the Board continues to pursue a County wide wireless broadband initiative, it is recommended that consulting services be procured for refining the County's objectives and formally analyzing the feasibility of implementing a solution, and developing a tailored RFI that will ensure viable responses.

Should the Board consider consulting services, there is no funding and Board direction will be needed for allocation of funding.

**Options:**

1. Direct staff to finalize the draft RFI and authorize issuance.
2. Direct staff to secure consulting services to conduct the feasibility studies and/or develop the RFI and evaluate responses.
3. Direct staff to prepare the appropriate budget action to reallocate the necessary funds from the General Fund contingency account for consulting services.
4. Finds it in the best interest of the County to waive the Purchasing Policy requirement for consultant selection and direct staff to negotiate a contract with Civitium, LLC for consulting services and return to the Board for contract approval.
5. Direct staff to develop a RFP for consulting services for the services mentioned above.
6. Do not further pursue a County led wireless broadband initiative.
7. Provide Board direction to staff.

**Recommendation:**

Option #7

**Attachments:**

1. Draft RFI
2. Wireless Broadband: *The Foundation for Digital Communities* – Civitium's Community Guidebook
3. Digital Community Best Practices – 2005 White Paper by Intel
4. Government Technology's Survey Report on Digital Communities
5. New Rules for Local Governments Providing Communications Services by the Florida League of Cities

PA/kd/pc

**Leon County, Florida  
Board of County Commissioners**

***DRAFT***

**REQUEST FOR INFORMATION (RFI)**

***Leon County  
Wireless Broadband Initiative***

## 1. INTRODUCTION

The Board of County Commissioners of Leon County, Florida (the County) is requesting expressions of interest, information and comments (RFI) from commercial vendors, service providers, non-profit organizations, community groups and/or other interested parties ("Respondents") for the design, integration, deployment, operation, and maintenance of a wireless high-speed broadband network (Network) throughout the County. The County welcomes information and comment from both interested parties as well as organizations with a commercial interest in the project.

## 2. PROJECT BACKGROUND

Leon County, Florida is a charter county located in the Florida Panhandle area with a population of 245,000 residents and 96,500 households (2000 U.S. Census) residing in roughly 671 square miles. The County is dominated economically and demographically by the Florida State Capital, the City of Tallahassee, which is the only municipality located in the center of the County covering about 97 square miles. The County also is home to four universities/colleges - Florida State University, Florida A & M, Tallahassee Community College, and Keiser College.

The County is exploring the feasibility of deploying a community wireless broadband network to promote digital inclusion for all citizens, stimulate economic development, and improve the efficiency of government service delivery. The County tentatively plans to accomplish this goal by evaluating and selecting a business model which best accomplishes the County's objectives and recommending suggested next steps to the Community.

The County understands there are various options for the deployment of a community-wide wireless broadband network. These options include, but are not limited to:

- Providing the Network as a County service
- Providing the Network as a new utility through a partnership with the City of Tallahassee
- Providing the Network as a consortium with the City of Tallahassee, the Leon County School Board, and institutions of higher learning
- Engaging in a public-private partnership
- Supporting another alternative that ensures universal, affordable wireless broadband internet access for all residents and businesses in Leon County

## 3. GOALS

The County has identified the following critical goals for this initiative:

- Ensure universal, affordable wireless broadband access for all residents of Leon County, especially low-income and disadvantaged residents

- Ensure in-home access to the greatest extent possible for all residential subscribers
- Improve the efficiency of government service delivery
- Promote job creation, business growth and economic development
- Streamline the interaction between government and constituents
- Enhance education and improve the interaction between teachers, students and parents
- Stimulate private investment and competition for all broadband services
- Assure continuity in the event of any vendor default or breach of contract and protect the Network from obsolescence over time.

In addition, the County anticipates that this initiative will provide the following benefits:

- Improve public safety through better communications and interoperability
- Enhance healthcare through telemedicine and remote patient care
- Improve the experience for visitors to the County
- Reduce existing or avoid future government telecommunications costs
- Promote the County's brand/image
- Provide backup/contingency measures for disaster response/recovery
- Promote more innovative solutions for consumers

The County invites information and comments regarding these goals and objectives.

#### 4. STANDARDS

The County has defined the following standards for this initiative.

- The Network must provide universal service for both indoor and outdoor usage. Providing access in only parts of the County that may be more densely populated or commercially attractive is not an option.
- Fees for access to the Network must be priced lower than existing alternatives and must be affordable for low-income and disadvantaged residents and businesses
- The Network must support fixed, mobile and portable usage scenarios
  - o The term *fixed* refers to a service that supports broadband connectivity by a stationary subscriber at a single, designated location

- o The term *mobile* refers to a service that supports broadband connectivity by a stationary subscriber at a variety of locations
- o The term *portable* refers to a service that supports broadband connectivity by an in-motion subscriber at a variety of locations throughout the County
- The Network must support use by residents, businesses, institutions and government agencies. Examples of usage scenarios for these groups may include:
  - o Residents using the Network for universal, affordable wireless access to applications such as E-mail, web browsing, instant messaging, entertainment and voice services
  - o Businesses using the Network for remote office connectivity, supply chain integration, customer relationship management and inventory control
  - o Institutions such as universities and nonprofits using the Network for increased interaction between their institution and students/constituents
  - o Government agencies using the Network for automatic vehicle location, access by field staff, remote inspections, and remote camera/video surveillance
  - o Visitors using the network for remote access applications and local information.
- Wi-Fi technology (802.11b/g) must be a component of the solution. This is due to its ubiquity in user devices, standardization, low cost and ease of provisioning
- Wi-Max technology must be considered as a component of the solution. This is due to its upcoming availability, viability, and potential cost savings in the implementation
- The County expects “open access” principles to be adhered to (e.g., multiple, competing commercial and institutional service providers not affiliated with the Network owner can gain access to and provide services using a single, common infrastructure)
- The County anticipates the deployment of a “state of the art” Network that is simple to maintain and inexpensive to upgrade. A plan for protecting the Network from the effects of obsolescence is required
- The County anticipates a Network that protects the privacy of users, respects consumer choice, and fosters diversity of information and ideas

The County invites information and comments regarding these standards.

## 5. RFI SCHEDULE

The schedule for this RFI process is provided below. Responses must be submitted to the

address of the Primary Contact, as provided in Section 6, by the time on the Submission Date indicated below.

<u>Date</u>	<u>Activity</u>
15 March 2006	County issues RFI
29 March 2006	Pre-RFI Meeting for questions and clarifications (not mandatory) 10:00 am – Commission Chambers
5 April 2006	County posts answers to any questions on the County website
28 April 2005	Responses due

Attendance at the Pre-RFI meeting is encouraged, but not mandatory.

All questions, requests for clarification, and requests for additional information regarding this RFI must be submitted to the County's Purchasing Director not later than the Respondent Questions Due Date above. All such questions and requests must be submitted by e-mail. Responses to such questions and requests shall be at the County's sole discretion and nothing in this RFI shall create an obligation by the County to respond to the submitting party at all. Responses may, in the County's sole discretion, be by published addenda, posted on the County's website.

The dates provided in the schedule are estimates only and the County reserves the right, in its sole discretion, to alter this schedule, as it deems necessary or appropriate. Notice of changes to the Pre-RFI Meeting date/time or location, the due date/time for Respondent submission of questions, and the date/time for Submission Date will be posted on the County's website at [www.leoncountyfl.gov](http://www.leoncountyfl.gov). The other dates/times listed may be changed without notice to prospective Respondents.

Responses must be received by 2:00 p.m. on 28 April, 2006.

#### 6. PRIMARY CONTACT

The name, address, and contact information for the County's Primary Contact for this RFI are as follows:

Keith Roberts  
Leon County Purchasing Director  
2980 Micosukkee Rd.  
Tallahassee, FL

No oral response by any employee, consultant or agent of the County shall be binding on the County, or shall in any way constitute a commitment by the County. If a Respondent finds any inconsistency or ambiguity in the RFI, the Respondent is requested to notify the County.

**7. DEFINITION OF BASIC REQUIREMENTS**

Through this RFI/C, the County has elected to define basic assumptions and requirements for the Network, while encouraging maximum flexibility and creativity by Respondents. Therefore, the requirements below are defined at a summary level, and Respondents are encouraged to propose (and elaborate on) a solution that best meets the County's stated goals and adheres to the County's stated standards. The County's basic requirements are:

- Wireless access throughout the County from desktop PCs, laptops, handheld devices, mobile phones and other manned or unmanned devices equipped with a minimum of an IEEE 802.11b/g ("Wi-Fi") interface.
- Support throughout the County for "best-effort" service over the Wi-Fi network, with an average minimum throughput of 1Mbps (symmetric).
- 95% in-street (outdoor) coverage for the devices referenced above with no additional hardware required beyond the device's standard wireless interface.
- 90% in-building (indoor) coverage for residences and businesses throughout the County. A residence or business is assumed covered under this requirement if a single, first or second-floor room—which is adjacent to an exterior wall in the residence or business—can access the Network at the stated best-effort service levels. Should additional customer premise equipment ("CPEs") be required or assumed in order to deliver this in-building coverage, Respondents are expected to state this in their response and elaborate on this requirement and their assumptions. Respondents should also describe how this coverage can be expanded within the residence or business through a wireless bridge or other mechanism. The County's ultimate goal is 100% in-building coverage; Respondents should describe impediments to in-building coverage beyond the 90% level and describe how these impediments will be addressed.
- Coverage in rooms above a second-floor residence or business. The County understands that creative approaches using Wi-Fi or other technology may be needed to meet this requirement, particularly in multi-dwelling-units (MDUs). Respondents should elaborate on how they propose to address this requirement.
- Support for the following types of services:

<b>Service Types</b>	<b>Definition</b>	<b>Examples</b>
<b>Residential Fixed/Mobile/Portable</b>	Access for a single device, provisioned for primary use at a residence, with access throughout the County	Residential user with single desktop or single laptop, with support for use throughout the County

<b>Government Mobile/Portable</b>	Access by County agency users from mobile computing devices.	Inspectors, public safety officers, field workers, surveyors, etc.
<b>Government Fixed</b>	Fixed access for County agency locations.	T-1 like service alternative.
<b>Standard Business Fixed</b>	Access for multiple devices, provisioned for primary use at a business location.	Businesses with less than 20 employees.
<b>Premium Business Fixed</b>	Same as Standard Business service plus higher speeds and guaranteed service levels.	Businesses with more than 20 employees.
<b>Occasional Use Mobile</b>	Basic internet access for a daily or weekly fee.	Tourists, business travelers.

- Support for a mixed wireless and wired backhaul solution to aggregate Wi-Fi network traffic back to an Internet point of presence (“POP”). The County anticipates that the majority of these backhaul requirements could be met using a fixed, multipoint wireless solution; however, Respondents may suggest the most appropriate, reliable and cost-effective solution (wired or wireless) for their specific response.
- Support for the logical segmentation of the Network to support different “domains” of users (e.g., secure access by government agency personnel, secure and/or open access for public users, residential users, business users, etc.). This must include the ability to define and manage different profiles for authentication, encryption and other service characteristics based on the requirements of each user domain.
- Support for state-of-the-art, multi-layer security standards.
- The option for the County to designate certain parks, common areas and other residential and business zones within the County to allow any user with a Wi-Fi device to gain free and open access to the Network while in these areas.
- Support for seamless connectivity by in-motion Wi-Fi or Wi-Max subscribers/devices throughout the County.
- Scalable to support additional users, capacity, and functions throughout the life of the Network.
- Fault tolerance mechanisms to mitigate and/or eliminate single points of failure and ensure high reliability.
- Support within any proposed fixed wireless backhaul solution to also provide advanced subscriber services beyond the level(s) of service available through the Wi-Fi or Wi-Max tier of the Network.

- Optional Localized content publishing and management
- Optional content filtering and parental control
- Optional virus, spam, popup and other protective services
- The following service and solution components :
  - o Architecture and Design Services
  - o Installation Services
  - o Telecommunications Provisioning and Services
  - o Network Monitoring and Management Services
  - o Network Maintenance and Upgrade Services
  - o Business and Operations Support Systems (BSS/OSS) Services
  - o Customer Service and Technical Support Services
  - o Software Hosting and Facilities Services
  - o Program and Project Management Services

The County invites information and comments regarding these basic requirements.

#### 8. RFI RESPONSE FORMAT

Respondents are requested to provide the following:

- One signed original and five (5) copies of a transmittal letter, on the Respondent's letterhead.
- One original and five (5) copies of an Executive Summary of the solution/approach proposed by the Respondent.
- One original and five (5) copies of a document describing the Respondent's experience, which must be labeled on the cover with "Leon County Wireless Broadband Network, Volume 1: Company Experience." The required contents of Volume 1 are:
  - Name, street address, mailing address if different, email address, and telephone and facsimile numbers of the Respondent.
  - Year established. Identify the country and state in which the firm was incorporated or otherwise organized.
  - A narrative description and organization chart depicting the management of the Respondent's organization and its relationship to any larger business entity.
  - A description of the overall operations of the Respondent, the number and scope of other similar projects currently ongoing or set to begin in the near future.
  - A narrative description of Respondent's familiarity with and prior operating experience in Florida that might be relevant to a community wireless broadband

network, especially as it relates to legislation.

- Provide, at Respondent's option, any additional information not specifically listed above which shows any experience of the Respondent that might be relevant to a community wireless broadband network.
- One original and Five (5) copies of a document describing the type of solution proposed to meet the goals defined in this RFI, which must be labeled on the cover with "Leon County Wireless Broadband Network, Volume 2: Solution Overview." The required contents of Volume 2 are:
    - A description of the business model and any basic terms proposed by Respondent.
    - A summary-level description of the proposed solution, along with any diagrams and technology assumptions.
    - A summary-level description of the architecture for the proposed solution, including any justification for the architecture selected.
    - Information correlating each component of the proposed solution to the Basic Requirements defined in Section 7 of this RFI.
  - One original and five (5) copies of a document answering the questions outlined in Section 9 of this RFI, which must be labeled on the cover with "Leon County Wireless Broadband Network, Volume 3 – Answers to RFI Questions."
  - An electronic copy of all submitted materials, on a CD ROM disk, in Microsoft Word, read-only format.

## 9. QUESTIONS TO RESPONDENTS

The County expects Respondents to provide answers to the following questions. Respondents are encouraged to elaborate as much as possible and address any relevant issues that are not expressly stated below.

### Business Model and Policy Questions

1. The County is committed to the goal of ensuring universal, affordable wireless broadband access for all residents. How can the County best accomplish this goal?
2. How does your proposed solution/approach specifically address the County's stated Goals and Standards defined above?
3. Given the goals of the County, what business model do you believe best accomplishes this, while best protecting the County's financial interests?

4. Please describe key business terms that might be required to support your proposed solution/approach (e.g., compensation for the use of County or other organizational assets, revenue sharing, etc.)
5. To make your proposed solution/approach viable, what commitment periods would be necessary?
6. The County seeks to complement universal, affordable wireless broadband access with other social programs to facilitate affordable PCs in the home, training, technical support and on-line content for low-income and disadvantaged residents. How does your proposed solution/approach support these broader goals?
7. The County seeks to leverage the Network to streamline the interaction between government and residents and to better connect the community. What ideas do you have to accomplish this goal?
8. What privacy policies and security standards will you put in place to protect the privacy of and information transmitted by users?
9. What terms do you propose to ensure continuity of the Network in the event of a default and/or material breach of contract by one of the participants?

#### Technical Requirements Questions

10. Describe the architecture proposed by your organization to meet the Basic Requirements defined in Section 7 above.
11. Provide a summary of your proposed solution/approach for the following solution elements:
  - Architecture and Design Services
  - Installation Services
  - Telecommunications Provisioning and Services
  - Network Monitoring and Management Services
  - Network Maintenance and Upgrade Services
  - Business and Operations Support Systems (BSS/OSS) Services
  - Customer Service and Technical Support Services
  - Software Hosting and Facilities Services
  - Program and Project Management Services
12. What solution/approach can be used to ensure interior-room access for residences, multi-dwelling units (MDUs), apartments and/or businesses?
13. How does your solution/approach specifically address the need for indoor coverage above the second floor of residential, business and government locations?
14. How does your solution/approach mitigate or eliminate the risk of unintentional self-interference with (and promote cooperation between) other commercial Wireless ISPs, community wireless groups or other services using unlicensed spectrum?

15. How does your solution/approach address the need to provide different levels and qualities of service, security and other characteristics for multiple "domains" of users over a single physical network (e.g., municipal employees, public safety, public access, etc.)?
16. The County anticipates leveraging the Network for existing and new internal County needs, including automatic vehicle location, access by field staff, inspectors, remote camera and video surveillance. How would your proposed solution/approach enhance the capabilities of the County?
17. Describe the multi-layered security capabilities of your proposed solution/approach and how it might address the need for advanced levels of authentication and encryption required for residents, businesses, institutions and government agencies.
18. Describe the way in which prioritization of traffic for municipal use (e.g., public safety) is accomplished with your solution, especially in the event of an emergency.



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**Wireless Broadband:**  
*The Foundation for Digital Communities*

**Community Guidebook**

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## About the Authors

Greg Richardson is the Founder and Managing Partner for Civitium LLC. Prior to founding Civitium, he served as the Director of Wireless Consulting for Siemens. Prior to Siemens, Greg was a founder and VP of Professional Services for Wireless Knowledge, a pioneering joint venture between Microsoft and QUALCOMM. He is also a regular speaker at industry conferences and events.

Matt is a Co-Founder and Senior Partner with Civitium LLC. He has worked with government leaders at every level as a Warner Robins, Georgia City Council member, former speechwriter and advisor to now Georgia Governor Sonny Perdue, and Wireless Coordinator with the Georgia Department of Education. Matt has testified before the New York City Council and at other technology conferences about using wireless and other technologies as the foundation for Digital Communities.

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## Introduction

One year ago, Civitium released the first Wireless Broadband “cookbook” for community leaders. At that time, only a handful of communities had launched municipal wireless initiatives. Today, some of the largest cities in the US have announced plans to deploy a metro-scale wireless broadband network including Philadelphia, San Francisco, Boston, Portland, and many others. State legislators across the country have debated the proper role (if any) for municipalities who want to provide broadband service to residents and four similar bills have been introduced in US Congress.

Clearly, the momentum for municipal wireless networks is building. However, the motivations by communities are the same as they have always been – to deploy wireless broadband infrastructure to:

- Promote digital inclusion through lower prices and universal availability
- Strengthen economic development by offering businesses the infrastructure necessary to compete in a global economy
- Streamline government services and increase efficiency through Digital Community applications

This new guidebook includes lessons learned by Civitium through our work with some of the most high profile municipal wireless initiatives. The format of the guidebook has shifted to reflect what we have identified as the four major stages of a successful initiative:

- Feasibility
- Procurement
- Network Deployment
- Enhancement

Wireless broadband networks are making a powerful difference in communities across the U.S. In west Philadelphia, low-income residents have access to broadband for only \$5 per month. In San Mateo, California, police officers have a public safety network that allows them to spend their entire shift on the street, increasing visibility in the community and decreasing crime. In Scottsboro, Indiana, nearly 100 citizens were able to keep their jobs at a Chrysler plant because the city deployed the broadband infrastructure necessary to keep the plant operational. As community leaders launch new initiatives to impact their citizens’ quality of life, Civitium hopes this guidebook will provide a framework for strategic planning based on the best practices and lessons learned from other Digital Communities.

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## Feasibility

Before most community governments launch an infrastructure project, a feasibility study is often conducted. In a municipal wireless broadband initiative, the following areas of feasibility need study:

- Political and regulatory feasibility: What is the motivation for this initiative? Do stakeholders throughout the community share the local government's vision and motivation for a citywide wireless broadband network? Are there legal and/or regulatory restrictions that would limit, influence, or prohibit the initiative?
- Economic feasibility: What type of business models should the community consider? How can the community fund the initiative?
- Technical feasibility: What are the current technologies available now to meet objectives? Can the physical and RF environment support a metropolitan area network?

A comprehensive feasibility study will answer the above questions and allow leaders to decide whether to proceed with the wireless initiative, while also providing local leaders with a blueprint to follow.

### Political & Regulatory Feasibility

#### **□ Define Project Vision & Objectives**

The deployment of a municipal wireless network is complex and challenging. Elected leaders and appointed executives are motivated to launch such an initiative only when a network can be used to achieve certain policy objectives, including:

- Promoting Digital Inclusion
- Strengthening Economic Development
- Streamlining the Delivery of Government Services

These visionary motivations often convince a local leader of the need for wireless broadband infrastructure. However, after the decision to launch an initiative is made, countless other objectives must be clarified. One approach is for community leaders to rank potential objectives in order of important to their unique initiative. Potential objectives could include:

- Improve public safety through better communication and interoperability
- Lower broadband prices for low-income, disadvantaged residents
- Reduce existing or avoid future government telecom costs

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- Generate new revenues for community
  - Streamline interaction between citizens and government
  - Promote community image/brand
  - Enhance health education, telemedicine, patient monitoring, etc.
  - Improve efficiency of government service delivery
  - Enhance education; improve interaction between teacher/student/parent
  - Stimulate more private investment and competition for broadband services
  - Promote job/business growth, economic development
  - Improve experience for visitors to community, tourists, business travelers
  - Provide backup/contingency for disaster response/recovery

These objectives can be achieved using a number of different business models. However, each community is driven by different philosophical and political principles that must be recognized prior to evaluating business models. These principles deal with issues including:

- What is the proper role of local government in relation to municipal wireless broadband networks? Catalyst? Provider? Competitor with private sector? Cooperative partner?
- How important is a return on investment for the business model? How important is generating free cash flow?
- Should the priority be to provide access to mobile government employees or citizens and visitors? Can access be provided to both?
- Should the network provide universal access or be located in areas with certain characteristics? Commercial areas? Tourist venues? Low income neighborhoods?

By stepping through a qualitative process to understand the community's vision, objectives, and principles, the leadership team is able to better understand what is most important for the initiative to accomplish and what options will support the initiative.

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### □ Conduct Stakeholder Analysis

As the leaders consider the project vision and objectives, it is important to have dialogue with stakeholders both internally and in the community. Local government department heads may eventually be responsible for enrolling and training their employees to use the network for mobile connectivity so their input and thoughts are important. Likewise, community organizations may have assets that can support the network deployment and operation and may have demand for wireless broadband services. Therefore, local leaders should have dialogue with the following stakeholders:

Government
Residents
Tourists
Business Travelers
Foundations
Non-Profits
Universities
Schools
Businesses
Agencies/Utilities
Vendors
Healthcare Agencies

Collecting feedback from numerous stakeholders is a tedious process, but can be accomplished by:

- **Focus group sessions** – Facilitated meetings with representatives from various community groups (e.g. government agencies, education, healthcare, chambers of commerce, nonprofits, incumbent service providers, etc.)
- **Town hall meetings** – Open sessions whereby the public can learn about the initiative, provide feedback on the process, voice any concerns they may have and ask questions.
- **Surveys** – By far the most complex and expensive approach for gathering stakeholder input, surveys can be used to produce statistically-valid, quantitative results, particularly for harder-to-reach parts of the community.

Method	Type of Stakeholders	Type of Feedback	Directness
Focus Groups	Representatives	Mixed	Indirect, by proxy
Town Hall Meetings	Open public	Qualitative	Mixed
Surveys	Hard to reach	Quantitative	Direct

By taking a close, objective look at the needs of various stakeholder groups, it allows the community to:

- Uncover needs that may exist with one group in the community that may not be common across all groups
- Demonstrate the community's goal of making their municipal wireless initiative a "community initiative" instead of another government project
- Identify and consider objections and concerns from those who may not be supportive of the project
- Educate the community about new technologies, and the steps being taken to improve the community

**□ Conduct Regulatory Analysis**

Once community leaders have consensus about the project vision and objectives, legal staff should conduct a regulatory analysis. In the last two years, over fourteen states have considered regulations or prohibitions on municipal wireless broadband networks. The legislative initiatives make use of a variety of tools that ostensibly aim to insure that:

- A majority of local residents are behind the initiative
- The broadband project will not negatively affect a community's finances
- The broadband deployment does not compete or competes on a level playing field with private carriers

Policy makers accomplish these objectives by legislating the process municipalities must use to plan and deploy a wireless broadband network. The regulations range from holding public hearings or referenda to complete prohibition of fee based services. The table below illustrates the regulatory tool used by proposed and passed legislation:

States	Hearings	Referenda	State level authorization	LEC right of first refusal	Prohibit Fee Based Service
ALEC Template	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Florida SB 1322	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> *			
Oregon HB 2445	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Indiana HB 1148	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
Ohio HB 188	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
Iowa HF 861		<input checked="" type="checkbox"/>			
Louisiana SB 126		<input checked="" type="checkbox"/>			
Colorado SB 152		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Tennessee HB 1403/SB 1760			<input checked="" type="checkbox"/>		
Texas HB 789			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Pennsylvania HB 30				<input checked="" type="checkbox"/>	
Virginia HB 2395				<input checked="" type="checkbox"/>	
West Virginia SB 740				<input checked="" type="checkbox"/>	
Illinois SB 499					<input checked="" type="checkbox"/>
Michigan HB 4600					<input checked="" type="checkbox"/>
Nebraska LB 157					<input checked="" type="checkbox"/>

\* - Depending on use of bonds for financing purposes

In addition to the state bills, four similar pieces of legislation have been introduced at the federal level. Two of the Congressional bills would prohibit state prohibitions of community wireless broadband network while the other two would regulate – and even prohibit - municipal wireless deployment.

The regulatory analysis should indicate whether the municipality is able to move forward, take extra steps required by statute, adjust the project vision and objectives, or stop the initiative. Civitium is not a law firm and recommends that every municipality considering a wireless broadband network consult with an attorney to review any applicable state law.

**☐ Develop a Marketing & Communications Plan**

At some point, each community planning a wireless initiative must publicly announce their plans. This point often comes shortly before a community releases a Request for Proposals or other public document welcoming input from the private sector. A well

executed communications plan can strengthen an initiative by helping it gain momentum among community leaders and the public.

The marketing campaign should reinforce the project vision and objectives and explain the effects of the network in a way that easily gains support. For example, a network designed for public safety use could be positioned as a network to increase police visibility in high crime areas and decrease crime. Not many people will express opposition to a goal of this nature.

Once the message has been crafted, it must be distributed through various channels including:

- Creating of frequently asked questions
- Launching a website and update it regularly
- Holding press conference(s) to update the community on milestones
- Conducting seminars targeted to special groups about the network (students & teachers, healthcare, large employers, unions, etc.)
- Favorable newspaper articles and editorials

## Economic Feasibility

### □ Evaluate Business Models

Choosing a business model that provides sufficient funding and allows the community to meet its project objectives is critical – and can be very difficult. Approximately six business models are being used in community wireless broadband deployments with success. Each model has a different focus, can be funded in different ways, and is driven by different objectives.

### Community Network

There are at least two hybrid community network models. The first involves the community or a non-profit entity obtaining funding from taxpayer funds, foundation grants, donations from citizens and businesses, and advertising revenue from a splash page. The community or non-profit entity then builds the network and provides marketing and customer service. This model is being used in Hermosa Beach, California.<sup>1</sup>

The second model involves a non-profit or government entity that acquires funding to educate business owners about the benefits of deploying a Wi-Fi hotspot. The community or entity acts as a catalyst to encourage the organic build-out of a Wi-Fi network in highly populated areas. Since the community or non-profit organization is not funding the network deployment, the capital and operational costs that require community funds are substantially lower. The network, however, may not be ubiquitous. This model is being used in Austin, Texas.<sup>2</sup>

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## Cooperative Wholesale

The Cooperative Wholesale model provides two options for local political leaders. The first is a community-owned model in which the community makes a 'build versus buy' decision regarding broadband service. The community builds a broadband network to provide its broadband and telecommunications needs.

Funding for the network comes from taxpayer dollars, state and federal grants, foundation grants, and/or bonds. After securing funds, the community issues an RFP for the design, deployment, and management of the network.

After the network is deployed and the community has completed in-sourcing its broadband needs, the excess capacity is sold to private providers (WISPs, ILECs, CLECs, MSOs, dial-up ISPs) at wholesale prices. The providers then compete for business and residential subscribers and provide marketing, technical support, customer care, and billing. Free cash flow generated from the wholesale fees can be used to fund a number of programs including economic development and digital divide initiatives.

While the first model meets many municipal leaders' needs, it still requires taxpayer dollars and community employees to be successful. For communities interested in deploying wireless broadband networks but adverse to spending public dollars, another approach can be used. Instead of the community funding and managing the network, the community creates a non-profit organization to accomplish the following tasks:

- Raise funding for the wireless broadband network deployment
- Outsource network design, deployment, and management to a private sector company
- Provide broadband service directly to community agencies and employees (fixed and mobile)
- Market wholesale service to WISPs, ILECs, CLECs, MSOs, and dial-up ISPs
- Develop and administer social and/or economic development programs funded by free cash flow

The local government provides access to light poles and other assets for the network deployment and acts as an anchor tenant for the network. With a social and/or economic development charter, the non-profit is able to secure funding for the network deployment from state and federal grants and private foundation donations. Additional monies can be obtained through bank loans, which are easier to obtain with a secure anchor tenant like a community government.

The non-profit partners with private companies to both build and manage the network, resulting in a smaller staff. The non-profit's focus is to monitor network management, develop effective social and/or economic development programs, and attract and develop relationships with retail providers.

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### Internal Government Use

The Internal Government Use model allows the local government to in-source its broadband needs instead of using privately owned fee-based network services. The community provides funding from general or enterprise funds and potential grant monies from the state or federal level to support the network deployment costs. The network can be designed, built, and maintained by a private sector company chosen through a competitive RFP process, thereby allowing the private sector to be involved in the value chain. The wireless network uses community infrastructure including street and traffic lights, and can provide mobile wireless broadband service to community agencies. The City of Miami Beach is using this model.<sup>3</sup>

Depending on the community's objectives and security requirements, the same physical network can also provide public access.

By building the network instead of buying it, the community may realize a costs savings for their mobile broadband needs. Depending on the community's project vision and objectives, the community may dedicate some or all of the cost savings to Digital Divide or Economic Development programs.

### Private Consortium

The private consortium model involves one or many private sector provider(s) offering broadband service to end users. Funded by private investment, the provider offers access to both the community and to subscribers for a monthly fee. The provider is responsible for operating and maintaining the network and providing technical support, customer service and billing. A number of communities have encouraged private broadband deployment by offering low cost access to community assets including utility poles in exchange for low-cost wireless broadband for government employees and/or low-income neighborhoods. The City of Minneapolis has pursued this model.<sup>4</sup>

However, deciding where to deploy broadband networks under this model is based on building business cases and return on investment models. Such profit-driven decisions can limit the addressable markets for broadband providers and prevent the deployment of a ubiquitous broadband network.

### Public Utility

The public utility model requires that a local government establishes a new community department or combines with existing water, gas, and/or electric utilities to deploy, operate, and manage broadband service for citizens. The broadband utility's capital cost is funded through the use of taxpayer dollars and revenue bonds. The public utility installs the network, markets the service, and provides customer support and billing. In addition, the local government may choose to provide both fixed and mobile broadband to its agencies. The City of Chaska, Minnesota, has used the public utility model to deploy a citywide Wi-Fi mesh network.<sup>5</sup>

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Most states allow municipalities to form enterprise funds for utility projects. Unlike a general fund, which must be balanced each fiscal year, enterprise funds are able to show annual profits or losses.<sup>6</sup>

### **□ Develop Financial Models**

Once a community has decided which business model will meet their objectives, then the leaders must create a viable funding model that answers the following questions:

- How much will the proposed network cost to deploy?
- How much will the proposed network cost on an ongoing basis?
- How much should the community set aside for network upgrades to avoid obsolescence?
- What will the community's costs savings be if in-sourcing broadband needs?
- What is the return on investment for this initiative?

In order to build a relevant financial model, one must make assumptions based on past performance or industry accepted figures. Assumptions made can be classified into the following categories:

- General Assumptions
- Capital Expense Assumptions
- Operating Expense Assumptions
- Revenue Assumptions

Communities building a financial model will benefit from making the following assumptions:

#### **General Assumptions**

- Level of service to be provided to end users
- Network architecture including backhaul strategy and peering point
- Any objectives that affect the community's ability to provide financial resources

#### **Capital Expense Assumptions**

- Coverage area
- Capacity required within the coverage area
- Density of access points
- Amount of backhaul capacity required
- Cost of Network Operations Center (NOC) & network management tools
- Cost of Operational Support Systems (OSS)
- Amount of money reserved to support network upgrades and expansion
- Amount of spare equipment

#### **Operating Expense Assumptions**

- Personnel requirements

- Technical Support
- Sales & Marketing
- Administration
- Level of technical support required
- Annual cost for mounting rights and electrical costs
- Equipment maintenance
- Annual costs for backhaul and public Internet peering
- Marketing & communication expenses
- General expenses

Revenue Assumptions

- Different classes of service to be offered and respective price points
- Fee charged to end users and/or retail service providers
- Churn rates
- Penetration rate defined as the percentage of potential customers that will subscribe to the newly offered service over time

Assigning numbers to this list of assumptions will allow a community to create an order of magnitude estimate for the capital and operational expenses and revenue projections. Once the community understands how much the network will cost and how much money will be generated, the leadership team can develop a funding strategy.

**□ Create a Funding Strategy**

Depending on a community's unique characteristics, a number of funding sources exist to support a metro-scale wireless broadband initiative. Federal and state grants, loans, bonds, and general fund reserves can all be used to fund a wireless broadband deployment. Grants, loans, and bonds all have requirements that must be met so communities should make sure they are qualified to pursue these opportunities. A number of federal grants exist to promote broadband access in rural or low-income areas including:

<u>Grant Opportunities</u>	<u>Program Outline</u>	<u>Requirements</u>	<u>Contact</u>
<b><u>Rural Utility Service (RUS)</u></b>	The U.S. Department of Agriculture's Rural Broadband Access Loan and Loan Guarantee Program made \$2.1 billion in loans and loan guarantees available in 2005 to provide broadband services in rural communities. These	“The Rural Broadband Access Loan and Loan Guarantee Program will offer three types of loans:  (1) A direct cost-of-money loan, bearing interest at the cost of borrowing to the Department of the	Kenneth Kuchno, Director, Broadband Division, Telecommunications Program, RUS/USDA (202) 690-4673

	<p>loans can be used to facilitate deployment of technologies to provide two-way data transmission of 200 kbps or more, in communities with populations up to 20,000.<sup>7</sup></p>	<p>Treasury for obligations of comparable maturity;          (2) a direct 4 percent loan; and          (3) a private lender guaranteed loan."<sup>8</sup></p> <p>RUS gives priority to rural communities who:</p> <ol style="list-style-type: none"> <li>1) do not have broadband access</li> <li>2) have broadband access that is more expensive than more urbanized areas</li> </ol> <p>However, cities can only apply for RUS funding if no private provider has committed to provide broadband service.<sup>9</sup></p>	
<p><b><u>Technology Opportunities Program (TOP)</u></b></p>	<p>The U.S. Department of Commerce's TOP Program is designed to fund grants for state, local and tribal governments, health care providers, schools, libraries, police departments, and community-based non-profit organizations. To date, the TOP program has awarded 583 grants, totaling \$218.9 million and leveraging \$297</p>	<p>The TOP Program did not receive funding for FY 2005 and the program is not accepting applications at this time.</p>	<p>Amy Borgstrom,          Program Officer,          Technology Opportunities Program, U.S. Department of Commerce          202.482.8338  <a href="mailto:aborgstrom@ntia.doc.gov">aborgstrom@ntia.doc.gov</a></p>

	million in local matching funds. <sup>10</sup>		
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In addition to federal grants, a small number of states have programs to promote broadband network deployments at the community level including:

- Michigan's Broadband Authority
- Rhode Island Wireless Innovation Network
- ConnectKentucky

In order to finance a community-wide broadband deployment, additional funds from the community are sometimes required. A number of options exist for communities to finance the capital cost including:

<u>Bank Financing</u>	<u>Background</u>
<u>General Bonds</u>	Cities can use general bonds to incur debt for infrastructure and capital projects. Bonds are then repaid over a period of years based on the total debt service.
<u>Revenue Bonds</u>	Cities can issue revenue bonds to incur debt for an infrastructure or other capital project that will provide a future revenue stream. Commonly used for water, sewer, and gas projects, revenue bonds can also be used for municipal wireless broadband networks that will provide public access for a fee.
<u>Loans</u>	Cities can secure loans from private institutions to provide capital expenses for a project.

If additional revenue is required, then communities can look within their general fund reserves or capital improvement fund for the infrastructure rollout. Communities should seek advice from their accounting and legal departments when considering which funding options will work best for them.

Depending on the business model selected, public monies need not be used. A number of companies exist who deploy, own, and operate community wireless broadband networks in exchange for favorable terms from the community regarding infrastructure assets and

anchor tenant agreements. This type of funding approach is being tried by Portland and Minneapolis.

## Technological Feasibility

### □ Examine Technology Options

When a community is planning a wireless broadband network, a certain level of understanding about the broadband landscape (both wired and wireless) is important to understand how wireless will better meet the community's objectives. The following describe the characteristics of broadband service:

	<b>Fixed</b>	<b>Nomadic</b>	<b>Portable</b>	<b>Mobile</b>
<b>Scenario</b>	Res/Bus	Hot-spot	Cruiser	Cell phone
<b>Provisioned</b>	Address	Subscriber	Subscriber	Subscriber
<b>Motion of Subscriber Unit</b>	None	Little/None	<30 Mph	<100 Mph
<b>Handoff (persistence)</b>	None	None	Slow	Fast
<b>In Motion Quality of Service</b>	N/A	N/A	Degrading	Minimum Degrading

The terms fixed, nomadic, portable, and mobile can be interpreted in many different ways. Below are standard characteristics of these different types of broadband connectivity:

- The term *fixed* refers to a service that supports broadband connectivity by a stationary subscriber at a single, designated location
- The term *nomadic* refers to a service that supports broadband connectivity by a stationary subscriber at a variety of locations
- The term *portable* refers to a service that supports broadband connectivity by an in-motion subscriber at a variety of locations throughout the community
- The term *mobile* refers to a service that supports broadband connectivity by an in-motion subscriber in nearly all locations throughout the community

Currently, two standardized wireless broadband solutions exist and can be used across the metro scale.

### Wi-Fi

Wi-Fi solutions adhere to at least three approved standards. The Wi-Fi designation means that a certain vendor's Wi-Fi product is interoperable with other vendor's Wi-Fi products and that the solutions meet certain theoretical throughput speeds and coverage areas. The following chart summarizes the current Wi-Fi standards:

<b>Standard</b>	<b>Throughput Speed</b>	<b>Coverage Area</b>
802.11b	11 mbps	<300 feet
802.11a	54 mbps	<60 feet
802.11g	54 mbps	<300 feet
802.11n	108 mbps	<1000 feet

Only the 802.11 b/a/g standards are ratified. The 802.11 n standard is in the process of ratification by the IEEE. The 802.11 b and g standard use the 2.4 GHz unlicensed band while the 802.11a standard uses the 5.8 GHz unlicensed band.

Unlicensed bands are open to any user and interference is possible. Usage of a wireless broadband device on unlicensed spectrum cannot be prioritized by user and there are no legal penalties for causing interference or jamming the band. However, unlicensed spectrum is free to the public. In contrast, licensed spectrum can be purchased by telecommunications providers or set aside for special government purposes.

Though Wi-Fi solutions were originally created for local area networks in a building, cities have been using the technology to create metro-scale wireless broadband networks since 2002. However, since each Wi-Fi access point requires a wired connection to the Internet (via DSL, cable, Ethernet, or fiber), deploying a traditional Wi-Fi network across a community can drive capital and operating expenses quite high.

As a response to this need, Wi-Fi mesh solutions were created. Wi-Fi mesh solutions use standardized technology combined with proprietary mesh protocols to reduce the number of access points with a wired backhaul connection to the Internet. Only a certain number of "gateway nodes" with wired connectivity to the Internet are required as the mesh technology allows regular access points to route traffic to the "gateway nodes."

While mesh technology decreases capital and operating expenses associated with a metro-scale network, both Wi-Fi and mesh have advantages and disadvantages:

**Advantages**

**Disadvantages**

- |                   |   |  |
|-------------------|---|--|
| <b>Wi-Fi</b>      | <ul style="list-style-type: none"> <li>▪ Standardized equipment</li> <li>▪ Supports portability</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Each AP requires connectivity to Internet</li> </ul>  |
| <b>Wi-Fi Mesh</b> | <ul style="list-style-type: none"> <li>▪ Coverage area &amp; speeds similar to Wi-Fi</li> <li>▪ Uses mesh technology to allow access points to communicate with each other</li> <li>▪ Decreases the number of access points that require backhaul to the Internet</li> <li>▪ Works with Wi-Fi standardized CPE</li> </ul> | <ul style="list-style-type: none"> <li>▪ Intermesh technology is proprietary so different mesh solutions cannot be mixed together</li> <li>▪ Slight loss of throughput due to mesh "overhead"</li> </ul> |

**WiMAX**

Since Wi-Fi has been ratified by the IEEE, it has become an extremely popular solution for broadband access. However, Wi-Fi is limited by a short coverage area usually limited to 300 feet. The IEEE has been working to standardize another wireless broadband technology, WiMAX, to address this challenge. The two most prevalent WiMAX standards are:

	<b>Speeds</b>	<b>Coverage</b>	<b>Service</b>	<b>Status</b>
<b>802.16 2004</b>	72 mbps	Up to 10-15 miles	Fixed	Ratified by IEEE
<b>802.16e</b>	72 mbps	Up to 5-7 miles	Portable & Mobile	In ratification process

Only the 802.16 2004 standard has completed the ratification process. However, very few if any WiMAX products made to operate on U.S. spectrum are available as of October, 2005. Vendors are in the process of submitting potential WiMAX certified products to the WiMAX Alliance for interoperability testing. Once a product is shown to be both interoperable with other solutions and meet the standard's requirements for throughput speeds and coverage area, WiMAX certified products will be available.

Currently, the 802.16 2004 standard only supports fixed wireless broadband connectivity. A WiMAX base station is installed (often on a tower or rooftop) and it provides omnidirectional point-to-multipoint coverage to subscriber units installed at the customer premise. WiMAX products are used to provide backhaul connectivity to the Internet for mesh "gateway nodes" or Wi-Fi access points in a citywide network. WiMAX can also be used to provide T1-like service to fixed government buildings or businesses.

**□ Measure Existing RF Environment**

Communities should measure their existing RF environment to identify levels of interference. The RF study should include the following:

- Spectral analysis in the 2.4 GHz band and the 5.0-6.0 GHz band to measure the level of noise generated by all devices in these bands including existing wireless network services, baby monitors, garage door openers, cordless phones, consumer electronics, toys, keyless entry, and security systems.
- Site survey conducted in both indoor and outdoor areas to measure the existing noise generated by Wi-Fi devices throughout the community.

These tests should yield valuable information about the:

- Number of access points located in the community
- Channels in use by access points
- Signal noise levels
- Signal strength
- Areas with peak noise levels that may present challenges to the network

This information, when shared with prospective bidders seeking to configure, deploy, and maintain the network can assist them in designing the network in a way that minimizes interference and maximizes network performance.

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## Procure a Solution

### **□ Define Requirements**

One of the most effective ways to define detailed technical requirements specific to a community's project is to first outline categories of requirements. Some of the most common categories are listed below:

- Network Infrastructure
- Security Infrastructure
- Network Management
- Business Support Systems (BSS)
- Operations Support Systems (OSS)
- Leased Telecommunications Services
- Architecture and Design Services
- Deployment and Installation Services
- Warranty, Maintenance and Upgrades Services
- Software Hosting and Data Center Services
- Customer Service and Technical Support Services
- Program and Project Management Services

In each of these categories, communities should outline specific requirements that result in a network that meets the project vision and objectives. A number of resources exist to help communities define appropriate requirements including [muniwireless.com](http://muniwireless.com)'s RFP Heaven, which provides actual RFPs issued by communities. The Wireless Philadelphia RFP also outlines basic requirements for the sections outlined above.

While developing the RFP requirements, communities should consider the level of specificity used for technical requirements. The definition of technical requirements for the network is a delicate issue, mainly due to the need for the community to communicate architecture, design and other assumptions, while at the same time not dictating a "hard coded design" to the vendor community that limits flexibility and creativity in vendor responses. However, the purpose of the RFP process is to allow the community to measure the expertise of the vendor community.

So, the trick in defining requirements is to state *what* is needed, but not *how* it is to be achieved, allowing the vendor community the flexibility to architect and propose a solution.

### **□ Conduct Asset Inventory**

One of the outputs from a thorough stakeholder analysis process should be an inventory of assets that are owned by the community government and relevant stakeholders. This inventory plays an important part in the procurement process as prospective proposers consider a community's assets including:

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- City-owned utility poles
- City-owned street lighting
- City-owned buildings where rooftop rights may be available
- Water towers and/or tanks
- City-owned fiber optic cabling
- Community (and/or county) owned communications towers
- Existing conduit and/or duct work
- Existing public works initiatives (e.g. a new sewer project)
- Geographic Information Systems (GIS) data showing multiple layers of data
- Information on community ordinances governing the use of all assets
- Information on established prices for lease rights to all assets

In addition to an inventory of these assets, detailed information about each asset is also required in most cases. For example:

- For utility poles, valuable data might include the GIS coordinates, street intersections, height above ground level, characteristics of power availability and connections, statement as to whether power is supplied 24x7 (or only at nighttime), etc.
- For communications towers, valuable data might include GIS coordinates, ground elevation, height of the structure above ground level, availability of mounting rights at various heights, availability of facilities at the base, physical security of the tower, etc.

#### **□ Develop Procurement Strategy**

Communities have great flexibility regarding the procurement process. However, a poorly executed procurement process can give private sector companies an unfavorable impression and result in a legal challenge to the process or the community's vendor selection decision. Communities should consider the following when developing their procurement strategy and schedule:

- Will the community disclose the names of vendors who register during the RFP process? Attend the pre-proposal conference? Submit bids?
- Will attendance at the pre-proposal conference be mandatory?
- Will the community publish their evaluation criteria for proposals?
- Will the community require a proposal bond? If so, how much?
- Will the community consider counter proposals for a business model (e.g. ownership of the network) that differs from the community's plan/assumption?
- Will the community disclose a contract template and ask bidders to agree to general terms and conditions during the RFP process?
- Does the community plan to invite finalists for an oral interview/presentation?

- 
- Does the community plan to “short list” more than one bidder and move to a “best and final” negotiation with multiple bidders?
  - Will the community require a winning bidder to deploy a pilot network before proceeding to a larger deployment? If so, how will milestone payments be negotiated for the pilot?

Fortunately, the procurement process for a wireless broadband initiative will be similar to the community’s procurement process for other items. A successful procurement process creates a level playing field for all prospective proposers and reduces the likelihood of challenges to the process.

### **□ Evaluate the Proposals**

Though each community’s RFP is different, some general guidelines exist for evaluating proposals submitted by private firms. The first level of evaluation should include reviewing all proposals for responsiveness to basic requirements outlined in the RFP including:

- Signed cover letter
- Completion of any required forms
- Attachment of any required financial consideration (proposal security)
- Response meets required formatting guidelines

Once the first round of evaluations is complete, the community should review the responses based on the following non-technical and technical criteria:

#### Non Technical Review Criteria

- Project understanding and soundness of approach
- Respondent’s financial qualifications
- References provided by Respondents
- Compliance to applicable minority-owned, women-owned and disable-owned business participation ranges
- Commitment to meet RFP start/complete/schedule
- Cost of proposal

#### Technical Review Criteria

- Soundness of proposed technical proposal
- Respondent’s technical qualifications
- Compliance to RFP requirements

Based on the above evaluation process, the community should then be able to eliminate the majority of proposers and short list to between one and three finalists. The

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community must then decide how to further evaluate or negotiate with the finalists. The following options exist to help a community make a final decision:

- **Bakeoff:** The community has the finalists deploy pilot networks to be tested for performance, coverage, and reliability.
- **Dueling Negotiations:** The community begins parallel negotiations with the final two vendors to reach a best and final offer.
- **Final Selection:** The community selects a vendor to move forward with network deployment and requests the runner up extend the terms outlined in their proposal should the selected vendor not meet the community's requirements.

Through these steps, the community can provide a fair procurement process that promotes competitive bids and meets the community's unique project requirements. However, state and local laws regulate the procurement process for most communities. Therefore, each community should involve their procurement and legal departments during the procurement process.

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## Manage Network Deployment

Once a vendor is selected and begins the network deployment process, the community needs to project manage the deployment. Of greatest concern to a community during the deployment phase are the following:

- Deployment schedule agreed to by vendor is met
- Network is built to meet the community's requirements

### Assign a Project Manager

Since the community has a large interest in making sure the wireless broadband deployment is successful, the leadership team should assign a project manager to oversee the deployment. While each project manager has a unique approach, their responsibilities should include:

- Constructing and executing a day level schedule for the deployment with the selected vendor
- Insuring that the selected vendor has access to community assets based on terms and conditions
- Working with community department heads to assist with deployment
- Providing weekly updates to the leadership team on project progress

### Validate Network Architecture

The selected vendor will be responsible for developing the network architecture in a manner that meets the community's requirements, and the community should validate the proposed network architecture. The following have the greatest effect on network performance across a metro-scale:

- Access point density
- Backhaul capacity injected
- Backhaul strategy (wired vs. wireless)

### Assist Vendor with Government Processes

Before and during deployment, the project manager should assist the selected vendor in accessing community assets and acquire the required permits including:

- Access to utility poles
  - Access to rights of way
  - Permits for towers if required
  - Business permits & licenses
-

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These issues can cause substantial delays in the deployment process. However, with the assistance and guidance from the community leadership team, these processes can be sped up.

**□ Perform Network Validation Testing**

Once the network is completely deployed and configured, the community should perform network validation tests to insure the network meets the community's requirements for performance, coverage, and reliability.

The community's acceptance of the wireless broadband network should be made contingent upon satisfactory test results.

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## Enable Digital Community Applications

Once the network is deployed and operational, the value of the network is generated by the number of users and the value of the content delivered over the network. Therefore, a community benefits the most from a wireless broadband network when it supports applications to increase efficiency of government employees and streamline the cost of delivering government services.

From the stakeholder analysis work completed by the leadership team in the feasibility phases of the broadband initiative, the community should know the government departments that have the greatest need for Digital Community applications.

### □ Explore potential Digital Community applications

For the last two years a number of communities have experimented with Digital Community applications that utilize a metro-scale wireless broadband network. The following applications have been developed:

<u>Government Responsibilities</u>	<u>Digital Community Solutions</u>	
<u>Public Safety</u>	<u>Police</u> <ul style="list-style-type: none"> <li>• Mobile broadband access in police cars to allow real-time intelligence sharing and remote access to records.</li> <li>• In-car video to allow real-time streaming back to police station.</li> <li>• Remote controlled cameras placed in high crime areas.</li> <li>• Use Voice Over IP (Internet Protocol) to replace costly cell phone/push to talk services.</li> <li>• Easily set up a mobile command station with wireless connectivity during emergencies.</li> <li>• Support "smart" parking meters &amp; mobile enforcement officers in metropolitan areas.</li> </ul>	<u>Fire</u> <ul style="list-style-type: none"> <li>• RFID technology to track firefighters in burning buildings.</li> <li>• Mobile, high throughput broadband to download GIS, building blueprints in route to emergency calls.</li> <li>• Computer Aided Dispatch to coordinate proper and timely emergency unit response.</li> </ul>

<b><u>Education</u></b>	<ul style="list-style-type: none"> <li>• Support 1:1 laptop initiative with broadband connectivity</li> <li>• Track buses and install streaming video cameras in buses to monitor safety and student behavior.</li> <li>• Use WiMAX network to provide inexpensive backhaul to schools.</li> </ul>
<b><u>Healthcare</u></b>	<ul style="list-style-type: none"> <li>• High bandwidth allows telemedicine programs for rural communities who need specialists.</li> <li>• Wireless cameras in ambulances so ER doctors can monitor patient in transit to hospital.</li> <li>• Mobile access allows nurses and EMTs to enter vital information into networked patient database in real-time.</li> <li>• Replace expensive T1 broadband service.</li> </ul>
<b><u>Intelligent Transportation</u></b>	<ul style="list-style-type: none"> <li>• Provide mobile connectivity to buses and trains.</li> <li>• Monitor buses during the day and wirelessly share real-time schedules over wireless network.</li> <li>• Install wireless remote controlled cameras at high traffic intersections for monitoring and information sharing.</li> <li>• Wirelessly control stop lights and other traffic controls during emergencies or evacuations.</li> </ul>
<b><u>E-Government</u></b>	<ul style="list-style-type: none"> <li>• Provide online bill pay for citizens</li> <li>• Increase transparency of government by allowing anytime, anywhere access to government meeting agendas, minutes, studies, and city/county government information.</li> <li>• Allow government inspectors to use mobile technology in the field.</li> </ul>
<b><u>Public Works</u></b>	<ul style="list-style-type: none"> <li>• Install automated meter reader technology that saves time and increases accuracy.</li> <li>• Wirelessly monitor water and sewer plants and major pipeline infrastructure using SCADA systems.</li> </ul>

**□ Review Best Practices from Existing Digital Communities**

A number of communities have been recognized for their use of wireless broadband to enable Digital Community applications. Case studies exist about the best practices and lessons learned through such deployments. The community leadership team should strongly consider learning more about the following communities:

Community	Applications Used
Cleveland, Ohio	Education Public Safety Telemedicine
Corpus Christi, Texas	Automated Meter Reading Public Safety
Houston, Texas	Smart Parking
Philadelphia, Pennsylvania	Public Safety

The OneCleveland initiative and the City of Corpus Christi have been recognized for their use of Digital Community applications by Intel Corporation. Both networks are currently operational and applications are increasing government efficiency. Houston and Philadelphia are in the final planning stages before network deployment and have already developed a strategy for Digital Community applications.

**□ Provide Training for Employees**

After the application has been integrated into existing government systems, employees must be trained to use the mobile computing devices and wireless broadband to access the Digital Community applications. During this stage, it is imperative for the network and applications software to work – otherwise employees will get frustrated and never fully trust or use the solution.

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## Conclusion

As more communities launch wireless broadband initiatives, a process has emerged whereby the following steps are taken:

- Feasibility
- Procurement
- Network Deployment
- Enhancement

Each of these steps provide communities the opportunity to develop and clarify their objectives while retaining maximum flexibility to pursue their unique vision. Of the four sections, one may notice that the feasibility portion is the longest in this document. Rightly so. An initiative based on a clearly defined vision broken into smaller goals, confirmed through stakeholder analysis, and grounded in an understanding of the political & regulatory, economic, and technological realities of wireless broadband will most likely succeed.

Just as community leaders had a responsibility to build the infrastructure of paved roads and water systems in the last century, today's local leaders recognize their responsibility to compete on a global level – and understand that wireless broadband infrastructure is the foundation of the Digital Community.

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## Endnotes

- <sup>1</sup> "WiFi Hermosa Beach," <http://www.wifihermosabeach.com/> (11 February 2005).
- <sup>2</sup> "Austin Wireless City," <http://www.austinwirelesscity.org/about.php> (17 February 2005).
- <sup>3</sup> "Wireless Miami Beach," <http://www.miamibeachfl.gov/wifi/MB%20Internal%20Use%20Business%20Model%20-%20Public%20Version.pdf>. (22 September 2005).
- <sup>4</sup> "Broadband IP Data Access Services," <http://www.ci.minneapolis.mn.us/procurement/wirelessrfp.asp>. (22 September 2005).
- <sup>5</sup> "Chaska.net," <http://www.chaska.net/>. (16 February 2005).
- <sup>6</sup> Weeks, J. Devereux and Paul T. Hardy, eds. 1989. "Handbook for Mayors and Councilmembers," Athens: Carl Vinson Institute of Government.
- <sup>7</sup> "Rural Broadband Access Loans and Loan Guarantees," <http://a257.g.akamaitech.net/7-257-2422-01/jan20051800/edocket.access.gpo.gov/2005/05-4241.htm>. (22 September 2005).
- <sup>8</sup> Ibid.
- <sup>9</sup> Ibid.
- <sup>10</sup> "Technology Opportunities Program," [http://www.ntia.doc.gov/top/grants/briefhistory\\_gf.htm](http://www.ntia.doc.gov/top/grants/briefhistory_gf.htm). (22 September 2005).



## Digital Community Best Practices

This paper provides local government stakeholders with a process overview of the implementation stages for a Digital Community metro-area broadband solution, including core-group needs analysis, building a business case and community consensus, funding scenarios, private-sector partnering, and network management.

## Abstract

Broadband communications infrastructure is creating new cost-saving and quality-of-life capacities in cities, communities and regions. Once in place, a Digital Community infrastructure with both wired and wireline elements supports a wide range of applications and eServices for government and its employees, businesses and citizens. Creating a Digital Community can empower local authorities to accomplish more with scarce resources, enhance security, encourage business growth, and bridge the digital divide. But the technology build-out is just one part of a Digital Community plan. Ensuring a broad return on investment requires a core-group needs analysis, key political buy-in, and measurable value at each step of the way.

## Credits

Prepared with the Wireless Internet Institute, 225 Franklin St., 26th Flr., Boston, MA 02110 (w2i.org)

Founded in 2001, the Wireless Internet Institute is an independent think tank bringing together local-government technology stakeholders around the world to accelerate the adoption of broadband and wireless technologies in support of universal connectivity for economic, social and educational development. The W2i Digital Cities Convention, a global conference series, explores win-win solutions for deploying broadband networks across cities, counties and regions. It is hosted by W2i in partnership with international-development, local-government, and private-sector organizations.



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## Executive Summary

In the early 21st century, local governments everywhere are pressed with the need to:

- make high-speed Internet access available and affordable,
- lower the cost of government operations,
- enhance security and safety,
- promote local economic competitiveness,
- improve quality of life and citizen satisfaction.

Consequently, local authorities and government IT professionals are playing a greater role in developing, promoting, and managing broadband communications networks to meet these needs<sup>1</sup>. In the process, they are exploring how a scalable, cost-effective broadband-wireless infrastructure can be integrated into existing broadband, fiber optic, and IP networks to achieve a compelling return on investment for government, businesses and the community. By deploying ubiquitous, wireless-cloud communications capacities, local governments are changing the way they treat their employees and serve their constituents, deliver cost-saving applications to increase worker efficiency and citizen satisfaction, and make available a platform to enable multiple service providers to compete on an equal footing.

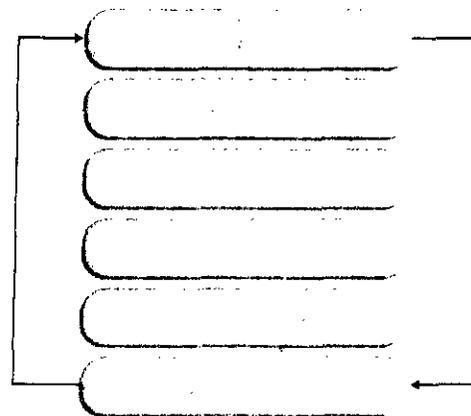
The technology build-out is just one part of a Digital Community plan. Fundamental to providing and sustaining a broad range of applications and services is a thorough needs analysis, business case and versatile management model to guide the community toward a maximum benefit from the network producing real positive change in people's lives. A series of overlapping stages addresses the brainstorming, technological and financial hurdles and enables all local stakeholders to accomplish a major portion of a desired outcome.

The stages include:

- identifying a core action group,
- reaching out to technology providers,
- devising a business case,
- building community consensus,
- locating funding sources,
- exploring partnership opportunities,
- establishing a management model.

As catalysts for building consensus, marshaling resources, and passing enabling legislation, local governments bring to bear considerable strengths in the creation of a Digital Community, most importantly the leadership to ensure that the applications and services mirror local priorities, achieve efficiencies and increase satisfaction, and deliver a broad return on investment to the community.

Figure 1. A series of overlapping stages addresses the brainstorming, technological and financial hurdles and enables all local stakeholders to accomplish a major portion of a desired outcome.



## What Is a Digital Community?

A Digital Community is a connected community that combines broadband communications infrastructure; flexible, service-oriented computing infrastructure based on open industry standards; and innovative services to meet the needs of governments and their employees, citizens and businesses.

In a Digital Community, broadband technologies enable high-speed communication from virtually every corner of the community, and wireless, Internet-enabled tablet PCs and handheld devices enable field staff on the move—from meter readers to home health nurses to emergency response teams—to communicate with the office and access mission-critical information. Citizens can access government services from civic kiosks or from the comfort of home via their Internet-connected PCs.

While wireless infrastructure is a key element of Digital Community infrastructure, it is only a first step. The Digital Community may require hard-wired broadband infrastructure, and it is much more than just the network. A Digital Community provides interoperable, Internet-based government services that enable ubiquitous connectivity to transform key government processes, both internally across departments and employees and externally to citizens and businesses. Digital Community services are accessible through wireless mobile devices and are enabled by services-oriented enterprise architecture including Web services, the Extensible Markup Language (XML), and mobilized software applications.

## Primary Drivers, Multiple Phases

While a Digital Community supports a rich palette of applications and services, it often begins with a first-stage infrastructure deployment for a single application or mobile communication need, such as the cost-saving automated meter reading now deployed in Corpus Christi, TX, or the field-force productivity improvements made by the San Mateo, CA, Police

Department. This initial need, which delivers a positive return on investment, is typically called a primary driver and can include:

- delivery of a **cost-saving municipal application** to increase government efficiency and productivity;
- replacement or enhancement of **legacy communications infrastructure** because of bandwidth undercapacity, expensive recurring costs, and insufficient upgrades;
- **economic development**, job retention, new-business attraction, and tourism;
- improved **citizen satisfaction** with high-speed data/voice/video services to remote communities and low-income areas ignored by large DSL or cable providers.

The primary driver is used to secure key political buy-in and justify an initial technology investment in the hundreds of thousands to the millions of dollars (see Table 1).

Table 1. Some Digital Communities and their primary drivers.

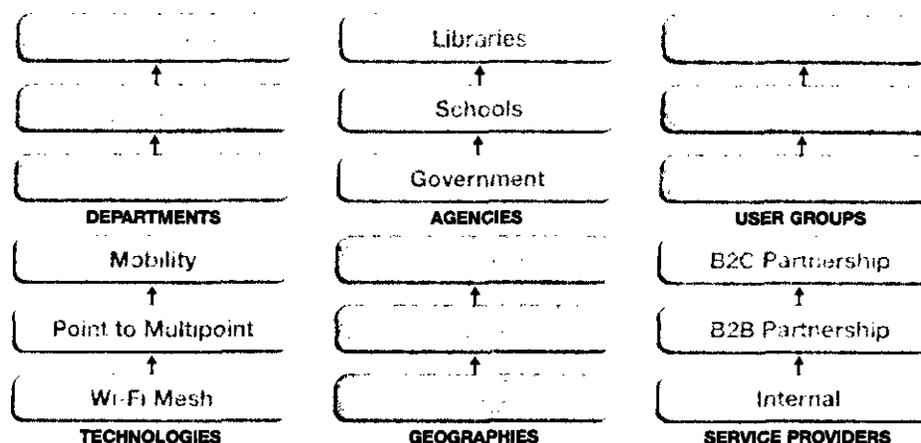
MUNICIPALITY	PRIMARY DRIVER
Chaska, MN	Digital divide for schools, businesses and residents
Cheyenne, WY	Traffic-signal management
Corpus Christi, TX	Automated meter reading for city-owned utilities
Lewis and Clark County, MT	T1 replacement; access to remote county buildings
Medford, OR	CDPD replacement public safety
Ocean City, MD	Integrated digital, voice and video for city buildings
Piraf, Brazil	Municipal field-force productivity; promotion
Portsmouth, UK	Bus passenger information dissemination
San Mateo, CA	Police field-force productivity improvement
Shanghai, China	Police field-force productivity improvement
Spokane, WA	Municipal applications and e-Government initiatives
Westminster, UK	Video surveillance and enhanced security

**The City of San Mateo, California, Police Department** installed a Wi-Fi mesh network that allows 72 officers in 40 patrol cars to take their desks on the road, helping to make the public safer and officers more effective in their jobs. "We have an intranet in San Mateo County connected to all the law-enforcement agencies, and we use it to share data, photographs, and large files," says Lt. Wayne Hoss, project leader. "In the past, officers would return to the station and use this intranet to get a DMV photograph, a report from another city, or a six-pack of mug shots to show victims, but now they can do this in their patrol cars."

Officers have secure access to the Department of Justice, Amber Alerts, Megan's Law, and the Cal Photo Database. When an officer moves to Wi-Fi coverage, he not only has access through CAD but through RMF, video server, the Internet and the intranet.

"We've just begun to play with video surveillance to see exactly what that application is for us," Hoss says. "We can monitor back to the police station and control the camera from the patrol car. Wireless surveillance gives you the extra boost that you need." Foreseeable applications include traffic monitoring, connectivity to city hall and the sewage treatment plant, and 24-hour remote monitoring of city buildings.

Figure 2. The Digital Community: A multi-directional, multi-phase process of building a digital community. The process starts with a core group of stakeholders and expands outwards to include more stakeholders, departments, agencies, user groups, geographies, and service providers. The process is iterative and ongoing, with each phase building on the previous one.



But the primary driver and first-stage infrastructure deployment are just the beginning of the Digital Community. Gradually, the network is extended and services are deployed to one or more departments as individual applications. As departments and agencies begin to interoperate more efficiently, and citizens gain convenient access to new or streamlined government services, the Digital Community expands across multiple phases and directions (see Figure 2, above).

## Digital Community Best Practices

At the heart of Digital Community planning is both a careful assessment of the technological and financial challenges of deployment as well as a thorough evaluation of local community needs to ensure a broad-based return on investment. Well coordinated planning ensures that point solutions complement and reinforce one another while:

- Curtailing competing objectives or business plans among different city agencies or within the community.
- Uncovering additional returns through efficiency and productivity gains in local-government operations.
- Ensuring that technical feasibility, market studies for new services, replacement strategies for sunk investments, and financing strategies are in the same plan.

## Core-Group Discovery

Begin by organizing the energies of diverse players through an informal brainstorming process. Invite town officials, administrators, public-safety and public-works heads, economic-development-board and Chamber of Commerce leaders to a review of the community's IT plan. Ask a few broad questions to start the discussion:

- What do you want to accomplish?
- What user groups need support?
  - Is it city operations?
  - Is it public safety?
  - Is it quality of life?
  - Is it economic development?
  - Is it education?
- What issues and opportunities do you want to address?
- What are the measurements of success?

Gather information about local demographics and population densities, broadband penetration and cost, and the hot spots for bandwidth consumption<sup>2</sup>. Conduct focus groups with local business partners, survey city residents and e-mail blast on local listservs.com for feedback to enrich the self-discovery phase. The more you know about government needs, business requirements and community desires, the better positioned you'll be when building a business case and pitching the network to decision makers. Which needs match which services (see Table 2)?

Table 2. Match needs and services with the right infrastructure technology.

SERVICES FOR CITIZENS AND BUSINESSES	SERVICES FOR GOVERNMENT EMPLOYEES
• Police accident reports	• Site locates/GIS maps
• Parking-ticket payment	• Maintenance orders
• Tax payments, ID Numbers	• Record management
• Licensing and permits	• Firefighter locator chips
• Utility payments	• Security cameras
• Emergency response	• Public-works work orders
• Tourism and recreation services	• Remote video surveillance

**The City of Corpus Christi, Texas** (population 300,000) has begun installing a \$7-million, 2,000-cell Tropos Wi-Fi mesh network to do automated reading of city-owned gas and water utility meters. The meters will transmit data to a central server, allowing customers to keep tabs online daily. The system cuts downs on misreadings as well as mishaps to meter readers accessing difficult properties. Close monitoring helps utility managers match gas usage with gas price fluctuations and control water flow to reduce system breaks.

But AMR is just the beginning for Corpus Christi. Pronto Networks'™ software-management platform provides IP-based security, the ability to manage multiple subscription services, and a "walled garden" to the public so the city can provide access to government sites and schools. Some students in Corpus Christi are beginning to receive Wi-Fi enabled laptops, and they'll go past the walled garden to check homework on the school's site.

"When we started looking at the bandwidth, there was an awful lot left over to do some things for folks who would want to be roaming about wirelessly in the city," says Leonard Scott, MIS unit manager and project leader. Of the city's 3,000 employees, the 70 percent who work in the field will benefit from dozens of planned mobile solutions. In the event of a bank robbery or remote tactical situation, public-safety responders will click on links that take them instantly to security cameras. The technology can be expanded to container operations at the city's large port and will accommodate smart-chip technology for monitoring firefighters entering burning structures.

To advise you, reach out to Internet service providers, wireless Internet equipment manufacturers, systems integrators and others with a list of requirements for throughput and geographical area. These experts can:

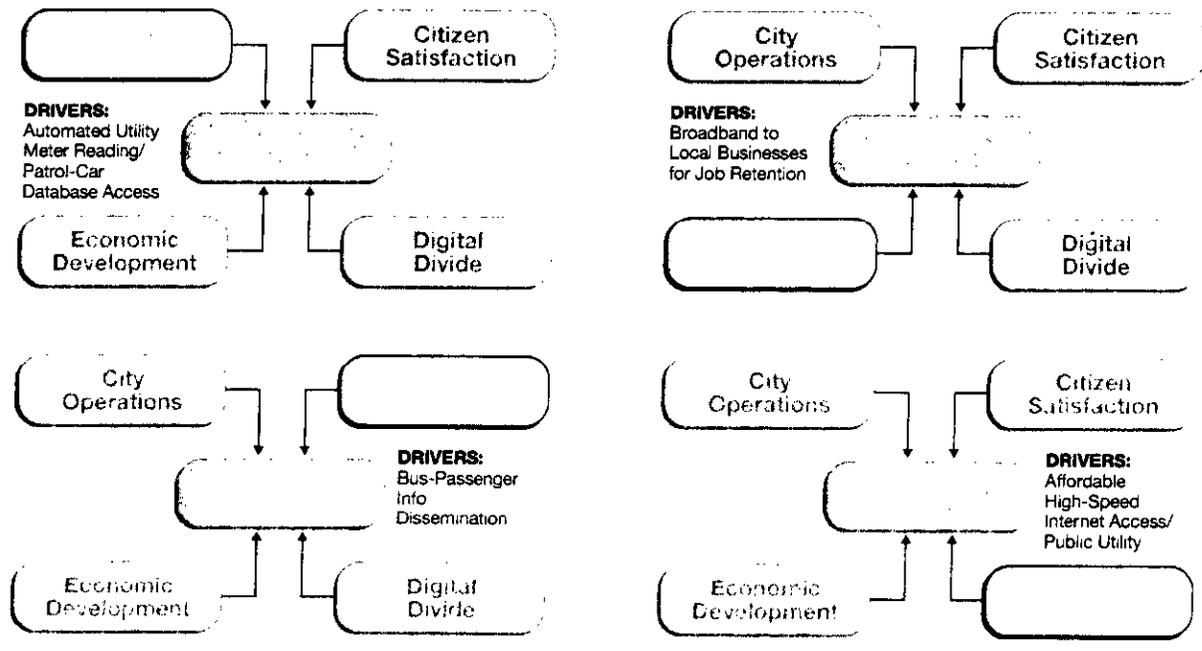
- do an initial site survey,
- explain technologies and frequencies,
- produce a scope-of-work statement,
- make a presentation to the community.

**Needs Drive the Business Case**

Local government can expect a benefit from a deployment almost from day one, with return on investment (ROI) measured in weeks, months or a small number of years rather than in decades, as it might be for a major infrastructure provider. At the same time, it runs the risk of buying into a technology that might not bring the benefits it had hoped for. To galvanize the business case and speed cost recovery, factor in savings and quality-of-life improvements from Digital Community applications and services that meet local needs and desires (see Figure 3).

**Business Case 1: City operations efficiencies**—In a Digital Community, city workers can produce more because they have high-speed access to information and databases, use tablet-size PC devices for field operations, and send fresh, detailed reports back to base immediately after each call, which means

**Figure 3.** Building the business case. Use a primary driver (gray) to justify a technology deployment, but factor in the broad range of applications and services that can make city operations more efficient, improve citizen satisfaction, enhance economic development, and bridge the digital divide.



they can carry out more inspections, repairs and visits per day while providing their colleagues with up-to-date information. Staff and officials can be more effective, and their services provide better value to the citizens who pay for them.

- Estimate the efficiency gains and increased productivity in field-based operations for public safety and public works, including the addition of portability and mobility components. Ask police officers, inspectors, engineers, and field crews about the amount of time they could save by accessing work orders, filing reports, and doing locates on site—on the whole, reporting less often to headquarters. Get the numbers on paper, and you'll be surprised how much is being spent, and how much can be saved. If video security is a foreseeable driver, factor in that broadband wireless is really the only way to enable this affordably.

**Business Case 2: Citizen satisfaction**—Whether interacting with emergency first responders, obtaining a business license, or helping their children with homework assignments, citizens of the Digital Community will perceive that government is operating efficiently and effectively, and is creatively addressing the challenges of 21st century life. Citizens can pay bills, obtain government licenses and access information about local traffic problems, events and leisure activities. Schools, hospitals, city offices, libraries and community centers leverage one another's resources and infrastructure, enabling citizens to contribute to their communities and communicate with their local governments.

- Citizens will be able to share the network, bringing themselves for the first time to the doorstep of e-Government, a bonus that may strengthen the business case through further cost savings in city operations.

**Business Case 3: Economic development**—Cities can make themselves more attractive to businesses and potential citizens through advanced communications networks and services. With a more computer-savvy populace, Digital Communities can attract more of the burgeoning services sector, replacing lost manufacturing jobs and raising the standard of living. Tourism is enhanced as well, because visitors can get online more easily.

- While the impact of broadband networks on economic development can require a long term measurement over years, the need for high-speed Internet connectivity can present itself overnight. The business case will include a range of projections for job retention, job creation, new-business attraction and increasing the tax base. Survey local businesses for their broadband infrastructure needs and promote the network to attract IT and service-sector employers.

**Business Case 4: Digital divide**—Digital Communities bring the worldwide community to its citizens through Internet-based communication and education. The increased availability of information and services online drives demand for PCs and mobile computers. The local economy benefits as more households invest in a PC and Internet access. This not only increases citizen satisfaction but creates new job opportunities by raising workforce skills and equipping workers for success in the global knowledge economy.

- What are your community's needs? Conduct a market assessment and outline availability and affordability gaps. Local governments and stakeholders are poised to develop new models that could also guarantee high-speed connectivity as a new essential good of the 21st century.

The business case will include the selection of appropriate technologies and a thorough examination of deployment and maintenance costs. Prepare a cost-benefit analysis, examine cash flows, funding, financing requirements, and external sources of revenue, including leasing bandwidth across the city-owned architecture to local service providers (see Table 3).

Table 3. High-speed Internet access to the public sector: a framework for analysis

<b>City-owned public utility</b>	A municipality may compete on the market like a true public utility, providing affordable broadband service to businesses and residents, managing subscriptions and billing as it would for water, gas and electricity. This model can simultaneously raise protests about unfair competition on the part of local government and accolades for affordable Internet access in the long tradition of municipal utility service provision.
<b>City-owned "walled garden"</b>	A "walled garden" delimits public access to the city-owned infrastructure so that excess bandwidth may be leased to wireless ISPs who manage subscriptions and billing, generating revenues to pay for the city-owned infrastructure.
<b>City-owned free access</b>	Local governments seeking to provide free community access to the Internet may publicly differentiate between the city network, which serves the public space, and local ISPs, which can penetrate interiors of businesses and residences and normally provides quality of service (QoS) guarantees.
<b>Private-sector partnership</b>	In a private-sector partnership, a broadband entrepreneur deploys the infrastructure and manages revenue flows and much of the network's destiny. The city may take a share of revenues while easing implementation and expansion for the entrepreneur.

## Building Community Consensus

Ultimately, it's the collaborative spirit in which government departments, agencies, businesses and the broader community work together that can make a broadband communications infrastructure flourish over the long term. Approach city councilors and county commissioners and begin to explain primary drivers, scalable infrastructure, multiple-phased rollout, ubiquitous connectivity and mobility components. A Digital Community transforms key government processes, both internally across departments and employees, and externally to citizens and businesses. Show how the business case uplifts the entire community, and that when everyone plays together it gets more cost effective. The focus should be on bringing a measurable benefit to the city and community as much as on new wireless infrastructure.

As questions arise, arrange teleconferences between city administrators and solutions providers. Citizens will invariably be curious, officials will want to polish the local image, and the media will report on the meaning of a ubiquitous high-speed Internet access. For public-safety-specific deployments, expect special attention from the press.

## Funding for Deployments

Local government may seek a variety funding solutions both within local coffers and through external sources to get a first-phase deployment off the ground. Wealthier communities may make the lion's share of the investment up front, while resource-poorer communities will need to get creative. Try searching for redevelopment funds within city budgets. How does the broadband budget fit into the municipal budget?

**Ocean City, MD**, (population 8,000) chose an Alvarion point-to-multipoint WiMAX-like solution with a five- to six-year payback to replace expensive switching equipment and integrate a hodge-podge of telephone networks in government buildings. The city council approved \$1.2 million to bring data, voice and video (DV2) to 19 city buildings, allowing all staff to connect over the same phone system, and workers to ship large GIS maps around the community.

In a second phase, the installation of 900-MHz base stations on five tower locations in the town will allow remote dissemination of maps to public-works and public-safety in case of emergency, as well as Automatic Vehicle Location (AVL) and security cameras on buses, reducing public-safety overtime hours during the tourist-heavy summer months. In a third phase set for 2006, Wi-Fi access points in vehicles and a mobile command center will enable connectivity to PDAs and laptops in the neighborhood of field-force vehicles, giving the look and feel of countywide Wi-Fi.

How does it compare with the roadwork budget? Which one gets priority? Consider promoting a set-aside fund for Digital Community initiatives.

With a convincing business case and community consensus, the core group can make the case for funding to a range of government-operations and technology agencies supporting homeland security and intelligent transportation systems, port security and firefighting. Look into the Department of Commerce's Technology Opportunities Program and the Department of Agriculture's Rural Broadband Access Loan Guarantee Program. The more people with a stake in the project, the better: Partnerships among diverse governmental agencies at the local, state, and federal levels can mean a sharing of the financial burden and speed the magic point of cost recovery.

Try hiring a consultant to identify grants that best fit your situation. When applying, remember the phased aspects of deployment and moderate your initial expectations. A first phase showing an immediate benefit can build momentum for future funding. (Because Ocean City, Maryland, paid entirely for phase one, later grants for adding mobile data and Wi-Fi access were easier to obtain.) Look at grants that connect Parks & Recreation, libraries, schools, and transportation. Here, again, sharing the network among different community agencies can make monies go farther. Additional sources may include venture-capital firms, equipment bonds, interagency loans, and private-sector partnerships. Consider a wholesale leaseback model or private financing. And be creative with capital and operational expenditures. With a broadband-wireless solution, you can make the case for a one-time capital expenditure versus the recurring costs of telecom leased lines.

**The City of Medford, OR**, (population 65,000) deployed a MeshNetworks\* (Motorola) Wi-Fi network primarily to replace public-safety's CDPD network. At the same time, project leaders evaluated the potential benefit to all city departments to galvanize their business case. Doug Townsend, Director of Technology Services for Medford, says: "When we first began to build our business case, public works came back with initial numbers that made them the largest beneficiary from being mobile—the work that they could perform in the field without having to return to headquarters. They calculated it would save them about an hour a day per crew. Inspections are part of it, repair, traffic, different crews dispatched for different reasons, and all of them needing to do locates and access work orders in the field. After we deployed, the second in command in the Building Department came up with a list with about 20 other benefits that we did not anticipate. Initially, they were one of the lower in terms of an ROI anticipated, and now they are realizing significant advantages."

Finally, look for unique organizations that leverage local experimentation and innovation for economic development. Entities like the Georgia Research Alliance provide technology funding in exchange for research projects that can bring jobs to Georgia.

## Private-Sector Partnerships

Local governments who have tight purse strings, are risk averse or don't want the responsibility of owning and maintaining their own broadband deployment should be willing to consider entering into infrastructure, revenue- and risk-sharing models with private industry.

The public and private sectors bring complementary assets to the table. Local government can create enabling environments, maintain continuity of vision, leverage a variety of funding mechanisms, and promote the infrastructure to the community. The private sector can provide innovative solutions, entrepreneurial drive, service-level agreements, and private capital.

At the same time, local government and the private sector work on different time lines, and a partnership should examine how to accommodate the pace and style of both. Any negotiation will carefully consider who controls the network, which can affect the flow of investment dollars and revenues. Private-sector service providers simply seeking a service-provision agreement with local government will need to listen carefully to the latter's expectations. For local governments not intending to spend a dollar, the destiny of the network will be left to the entrepreneurial entity and its financial and technical wherewithal.

In the event that multiple partners are corralled together, who gets the revenues? If the service runs short and must be subsidized, who pays? Who tells Partner A that it's being inefficient because it's spending its money unwisely, when Partner B is pulling its own weight? Which neighborhoods come first, and who gets the next-highest improvements?

Among the range of public-sector/private-sector partnership models, local governments may:

- license out operations to a solutions provider, which then sets the benchmarks to meet the basic requirements of the license agreement;
- lease out capacity on existing wireline infrastructure (fiber) to local ISPs;
- partner with service providers who have already laid fiber;
- deploy across city utilities with existing wireline and wireless infrastructure.

**The City of Spokane, WA**, (population 200,000) has deployed 5 Vivato® Wi-Fi base stations and 12 outdoor bridge/routers throughout the downtown area to provide wireless connectivity to a 100-block core, with additional deployment phases planned. The wireless network includes two domains serving private and public user groups. The private domain is for exclusive use of the city to facilitate operational and municipal communication applications to improve city services, allowing workers wireless access to the city's computing resources and database information, including building floor plans, fire inspection reports, mug shots and equipment repair manuals. This domain serves the police department, fire department, computer-aided dispatch services, downtown parking violations department, sewer treatment plant, etc.

The second domain is public access within the wireless coverage area, primarily providing internet surfing and, gradually, access to e-Government services. From a commercial perspective, the city is gathering data to determine site traffic and is designing an advertising campaign to drive retail traffic into the city's core.

## Managing the Network Infrastructure

The network makes available infrastructure to enable multiple service providers to compete on an equal footing, which:

- lowers costs,
- ensures diversity and breadth of services,
- addresses a broad range of constituencies' needs.

Moreover, how the network is managed links directly to how it has been planned. A basic operations support system will allow Internet access with very simple authentication procedures. But a more sophisticated platform enables greater control and the layering of services like voice-over IP, video downloads, gaming, and the Internet.

A sophisticated software-support solution is where Digital Community planning comes full circle as applications and services are integrated and rolled out across a single software platform to support:

- mixed use for public and private users, where public-safety personnel access their own separate network requiring only a MAC laptop address or USB authentication key while residents and visitors share the same infrastructure through a login page;
- bandwidth monitoring, allocation and prioritization, which is especially important during emergency first response, and for providing the best bandwidth service to the most preferred customers;

- back-office billing to monthly subscribers and 24-hour visitors or, in a public-utility model, for bandwidth delivery;
- city-government, local-business and community splash pages tailored for different user groups and city functions (utilities, zoning, public safety, etc.);
- SSL-encrypted registration and authentication for secure, encrypted access to one's local-government LAN'.

The software should enable smooth communication across the network, including auto-provisioning capabilities and remote upgrades when new features are added. These can be sent remotely to upgrade any of the gateways or controllers in the field, which reduces operating expenses and the amount of staff needed to maintain the system. While most of the cost analysis is in bringing wireless hardware into the city, don't forget to drill down into operations and maintenance to find more cost savings.

## State Regulatory Hurdles

Typically, states make their own laws concerning the provision of telecommunications services. In recent years, phone companies and cable providers have actively lobbied local and state governments to stop public agencies and municipalities from building their own communications networks, arguing

that city-managed networks operate under different rules than those for private providers, offering the city regulatory and economic advantages over industry.

Today, some 15 U.S. states prohibit municipalities from rolling out broadband infrastructure, and in nearly a dozen legislatures bills are pending that may seriously slow deployment plans, if not prohibit them outright. Many of these bills make requirements on the municipality to undertake feasibility studies, long-term cost-benefit analyses, public hearings, and referendums, all of which may slow local implementation while, ironically, providing useful market data to private industry.

While some of these bills have grandfather clauses for existing municipal deployments, and allow exemptions for underserved areas, on the whole, incumbent service operators want to retain the option to expand to underserved areas if and when it can become profitable no matter current local needs. Several years into the broadband revolution, this state of affairs has begun driving a serious search at the local level for low-cost alternatives.

Is there a middle ground? Municipalities have long played a valuable role in providing necessary services for citizens and in stimulating local economies. Could incumbent service operators begin sharing in the responsibilities of broadband

**The City of Portsmouth, UK**, (population 200,000) has installed a combination Wi-Fi mesh and GPRS system to track and provide passenger information for more than 300 buses on 47 routes across the city and up to 40 miles outside. Information about bus arrival and departure times is broadcast on LCD displays in stainless steel and glass bus shelters. Ultimately, the system encourages more use of public-transport infrastructure and reduces reliance on the car. The network also tracks driver identification, journey number and attack-alarm status back to the central Automatic Vehicle Location, or AVL, server. Each of the 36 bus stops and 9 freestanding information points has Internet and e-mail facilities that feature services to citizens such as local job listings. With the citywide mobile broadband network in place, Portsmouth is well prepared to continue deploying a raft of applications to support government operations and increase citizen satisfaction.

**For the City of Scottsburg, IN**, (population 6,000) economic development emerged overnight as an urgent primary driver of a broadband-wireless solution. Fiber runs through this small town outside Louisville, and town fathers had been requesting service for four years, but the incumbent service operator could not economically justify rolling out last-mile connectivity to the community. As a result, businesses in Scottsburg were contemplating leaving or expanding elsewhere.

An owner of a local car dealership approached the mayor detailing the bad news: Because his franchise was now required to have two T1 lines to download manufacturer repair manuals, his business and the 72 jobs it supports were on the verge of relocating.

So the city made a \$385,000 investment in a broadband-wireless solution to be managed by the town's electric utility. The result? Scottsburg provides broadband service to local businesses at half the cost of nearby Louisville. It sets its own rate structure, and two employees do the billing in a local office while utility workers maintain the network. Backhaul is derived from three different T1 providers, including one from the original incumbent. Thanks to the new infrastructure, employees have held onto their jobs, at least one business is expanding into e-commerce, the town has maintained its tax base, and the infrastructure is now available to support the expansion of eServices to town employees and citizens.



## Additional Resources

Center for Digital Government, A Strategic Guide for Local Government: On Wireless and the Community Infrastructure.  
[www.cdg.gov/whitepaper0405.pdf](http://www.cdg.gov/whitepaper0405.pdf)

Civitiium, Wireless Broadband: The Foundation for Digital Cities: A Cookbook for Communities.  
[www.civitiium.com/](http://www.civitiium.com/)

Intel Corp., 1. Creating the Digital Community.  
2. Understanding Wi-Fi and WiMAX as Metro-Access Solutions.  
[www.intel.com/go/digitalcommunity](http://www.intel.com/go/digitalcommunity)

Muniwireless, First Anniversary Report.  
[www.muniwireless.com/](http://www.muniwireless.com/)

Pronto Networks, Corpus Christi, TX, Pioneers Metro-Wide Wi-Fi Mesh Net: A Case Study  
[www.prntonetworks.com/](http://www.prntonetworks.com/)

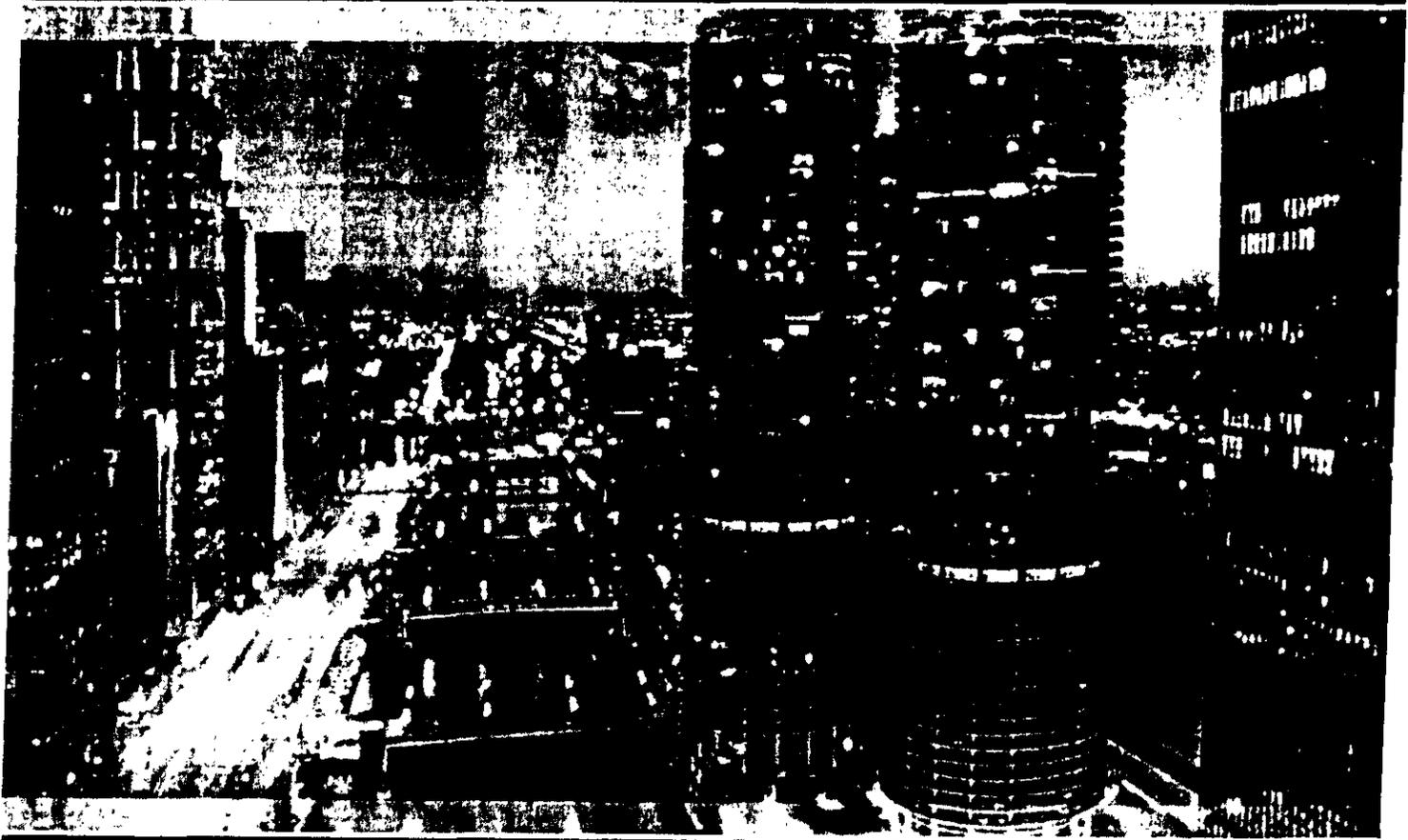
Wireless Internet Institute, 1. The Wireless Internet and Municipal Government. 2. The Wireless Internet and Municipal Public Safety.  
[www.wirelessinternet.org/](http://www.wirelessinternet.org/)

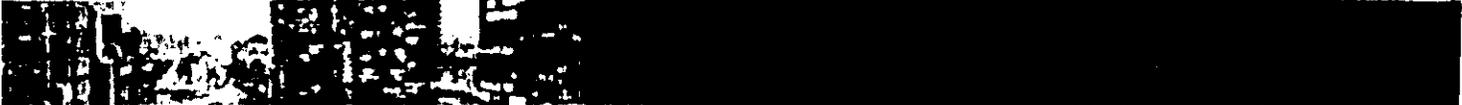
\* In the first quarter of 2005, some 110 city and regional broadband networks (US and non-US) had been deployed for public access and municipal/port./public safety, with a dozen more in planning stages. See March 2005 Report by Esmie Vos, MuniWireless.com  
\* See Wireless Broadband: The Foundation for Digital Cities: A Cookbook for Communities by Matt Stone, Government Strategist, Civitiium, LLC (September 2004) [civitiium.com/](http://civitiium.com/)  
\* Adapted from Pronto Networks "Solutions for Municipalities/Metro-Scale Hot Zones" [www.prntonetworks.com/pronto\\_solutionsMunicipalities.html](http://www.prntonetworks.com/pronto_solutionsMunicipalities.html)  
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# Digital Communities

Transforming the way communities live, work and play





# Introduction & Objectives

*Government Technology* magazine was commissioned in November 2005 to conduct an online survey amongst its subscribers.

The objective of this survey was to help assess and better understand the priorities and challenges jurisdictions face when moving towards a digital community transformation. The survey also provided valuable insight into the short-range mobile technology procurement plans of *Government Technology* subscribers.

# Methodology

The objectives of this survey have been met through utilization of Internet survey techniques. The universe for this study was selected by a random interval, systemic sampling procedure to develop a representative cross selection of *Government Technology's* subscriber base. Subscribers received an email directing them to the online questionnaire at [www.govtech.net/surveys/dc1/](http://www.govtech.net/surveys/dc1/).

All aspects of this survey, including hosting, sorting, editing, tabulation, and report preparation was completed by *Government Technology* magazine.

Total number of emails sent	10,000
Completed surveys	314
Surveys tabulated for this report	100

# Executive Summary

## **Knowledge of Digital Communities**

Awareness is high. Over 74% of subscribers have heard of "Digital Communities."

## **Understanding the opportunities of a Digital Community**

The concept is still gaining acceptance. A wide variety of the respondents could see some obvious opportunities, but have not had much time to think about them.

## **BARRIERS to moving forward with a wireless or mobile deployment as part of a Digital Community**

More information is needed for implementation. 47% of respondents are concerned about security of wireless technology, and 40% are unclear on return on investment (ROI) or how to document it to win budget approval.

## **Greatest public VALUE through an outdoor wireless network and mobile workforce in your locality**

Emergency response ranks first. Over 60% of respondents thought the greatest public value through outdoor wireless networks would be for police, fire and emergency response reporting. Public safety came in close behind at 46%. Public Internet access and police and fire information lookup closely followed public safety.

## **Essential to have in place before sending a mobile workforce into the field**

80% of respondents say that authenticating and protecting the data when users are syncing over public networks (data in motion) are essential elements. Protecting data on the device, including when a device is lost, stolen or misplaced followed closely behind at 77%.

## **Devices prefer using, or plan to purchase, for delivering solutions to mobile field workers**

Laptops are most preferred but many also use handhelds. While most mobile field workers are using laptops (72%), 54% are also using a wireless hand-held device. While using these devices, 46% prefer these devices to be ruggedized.

## **Justifying a wireless initiative in support of a mobile workforce**

Most respondents (42%) reported data communication as "very important" in justifying a wireless initiative. 30% said GIS/location-based services was "very important." VoIP also ranked high.

## **How likely to be deploying a wireless infrastructure**

Only 12% have deployed services. 28% of respondents are evaluating the opportunities wireless has to offer. 26% are waiting for technologies to mature before making a decision.

## **Job Titles**

91% of respondents hold a management or supervisory title.

# Detailed Results

## Have you heard about Digital Communities

No knowledge	13%
Heard of it	74%
Evaluating its applicability to our community	5%
Currently involved in creating a Digital Community	8%

## Which of the following best describes your understanding of the opportunities of wireless and mobile technologies in creating Digital Communities?

Not on my radar	21%
Can see some obvious opportunities-not much time to think about it	49%
Keeping a clipping file — beginning to think about how they could change service delivery	13%
Convinced — actively involved in pursuing next steps in building a Digital Community	17%

## Which of the following best describes the BARRIERS to moving forward with a wireless or mobile deployment as part of a Digital Community initiative? (select all that apply)

Too busy to do anything new	30%
Do not know where to start or who to work with	21%
Unclear on return on investment (ROI) or how to document it to win budget approval	40%
Concerned about security on wireless technology	47%
Concerned about uncertain legal and/or policy environment	34%

## Which of the following are most likely to deliver the greatest public VALUE through an outdoor wireless network and mobile workforce in your locality? (select all that apply)

Social Services Mobile Case Management	28%
Land Management (licensing, permitting, inspections)	26%
Public Safety	46%
Police, Fire and Emergency Response Reporting	61%
Police, Fire Information Lookup	34%
Traffic Management and Control	24%
Parking Enforcement	10%
Video Surveillance	16%
Criminal Justice	18%
Port Security	6%
Tourism	15%
Public Internet Access	35%
Asset Management	12%
Automated Meter Reading (gas, water, parking and electric meters)	26%

**Which of the following are ESSENTIAL to have in place before sending a mobile workforce into the field with wireless connected laptops, tablets, PDAs, or smartphones? (select all that apply)**

Remotely managing and patching systems which are not connected or controlled by local network	39%
Authenticating and protecting the data when users are syncing over public networks (data in motion)	83%
Protecting the data on the device, including when a device is lost, stolen, misplaced, etc. (data at rest)	77%
Ensuring the devices are being used for company business	31%

**Which of the following devices are you using today, would you prefer to use or plan to purchase for delivering solutions to mobile field workers?**

**a. Car-Mounted Laptop**

Are using today	39%
Prefer to use	39%
Plan to purchase within 12 mths	22%

**b. Laptop**

Are using today	72%
Prefer to use	14%
Plan to purchase within 12 mths	14%

**c. Tablet PCs**

Are using today	30%
Prefer to use	41%
Plan to purchase within 12 mths	29%

**d. Wireless Hand-Held Device (Smartphones or PDAs)**

Are using today	54%
Prefer to use	29%
Plan to purchase within 12 mths	17%

**e. Ruggedized Devices**

Are using today	23%
Prefer to use	46%
Plan to purchase within 12 mths	31%

**On a scale of 1 to 5, how important are the following in justifying a wireless initiative in support of a mobile workforce?**

(1 being not important, 5 being most important)

**a. VoIP Services**

1	23%
2	13%
3	34%
4	20%
5	9%



**b. DATA Communication**

1	4%
2	4%
3	16%
4	34%
5	42%

**c. VIDEO/ Remote Monitoring**

1	15%
2	19%
3	31%
4	23%
5	12%

**d. GIS/LOCATION Based**

1	9%
2	6%
3	27%
4	28%
5	30%

**In thinking about getting started, which of the following best describes when your locality will likely be deploying a wireless infrastructure?**

We have no intention to use wireless as part of our local government strategy	11%
We are waiting for technologies to mature before making a decision	26%
We are currently evaluating the opportunities wireless has to offer	28%
We are intending to run pilots in the next 6-12 months	7%
We are already running a pilot	16%
We are already live and have deployed services	12%

**What is your job title?**

Adm/Policy Mgmt or Supv	13%
Consultant Mgmt or Supv	1%
Financial/Procurement Mgmt or Supv	4%
Info Sys/Technical Mgmt or Supv	33%
Law Enforcement	8%
Marketing/Sales Mgmt or Supv	9%
Operations/Project Mgmt or Supv	23%
Professional Mgmt or Supv	9%

# Communities Step Up to Challenges with Wireless Technology-based Strategies

The challenges communities face today don't have simple solutions. Deploying a community-wide wireless infrastructure opens options for new strategies for addressing these challenges. "Going wireless" offers many potential benefits for communities—from increased productivity to lower costs to greater citizen satisfaction—while being practical and cost-effective.



Metro-scale wireless broadband solutions bring community-wide benefits to Tempe, Xi'an, Portland and North-Rhine Westphalia—through support from Intel® Solution Services.



With more than 35 years of technology experience and an end-to-end commitment to the wireless industry, Intel Corporation has developed the knowledge and expertise to deliver next-generation wireless technologies designed specifically for mobile computing. Intel's professional services organization, Intel® Solution Services, can help communities fully understand the potential of their environment and provide the best solutions to meet their needs.

Businesses can be more competitive and profitable. A community-wide wireless infrastructure helps attract new businesses and support existing businesses. Community-wide wireless access brings expensive technologies within financial reach of smaller companies, reducing barriers to expanding their markets and lowering the costs of growing their business—making them better able to compete with larger businesses. A strong economy attracts and retains quality jobs and qualified people.

Schools and universities can better teach tomorrow's digitally literate workforce. Online information, resources and learning tools are more readily available to students with wireless access to the Internet; they can collaborate and share information with teachers and fellow students from anywhere at anytime. Providing affordable network services to under-served families helps address socio-economic gaps (often referred to as the "digital divide") between communities that have access to computers and those that do not.

Citizens are more satisfied with government services and their communities. Providing all residents with access to affordable network services opens a gateway to the information and computer skills they need to take advantage of the full range of educational and employment opportunities available today. A community-wide wireless network enables more flexible work models, such as telecommuting, that allow people to better balance personal lives and work. It helps create an environment in which everyone in the community can work and play more safely and effectively.

## Familiar Challenges, New Options

The challenges communities face today—increasing productivity, lowering costs, bringing improved performance to business and government, and delivering greater citizen satisfaction—do not have simple solutions. However, deploying a community-wide wireless infrastructure opens options for new strategies for addressing these challenges, while meeting criteria set forth by stakeholders. A wireless network can:

## Making the Vision a Reality

Many communities have a clear vision of what they want their community to be. "A diverse, sustainable community with healthy neighborhoods, a vibrant urban core, a strong regional economy and quality jobs for all citizens" is how one U.S. city describes their vision. Wireless and mobile technologies can provide the foundation for strategies to achieve such a vision. Some benefits are:



Emergency workers can be better informed, enabling them to respond more quickly—saving lives and property. For example, ambulances can link instantly to the hospital, fire crews to hazardous materials databases and police cars to full records and photos. Wireless cameras can be used to monitor potential terrorist targets, high-traffic intersections and high-crime locations.

City government agencies can better serve their citizens and improve efficiency of services while decreasing costs.

- **E-Government.** Citizens can access government services online, such as searching for a property deed, making a tax payment or renewing a fishing license. At the same time, governments can take advantage of new options for communicating with citizens and reducing costs.
- **City Field Workers.** Wireless mobile technology can play a significant role in increasing the efficiency of field workers. In-car connectivity allows officers to send intelligence to headquarters over the Internet and complete paperwork in the field for transmission to the station. Maintenance workers can file reports from the field, reducing the time spent completing paperwork at the office. On-site inspection results can be filed immediately from the site, reducing approval delays.
- **Intelligent Transportation.** Wireless tracking devices complement cellular and Global Positioning System (GPS) technology to enhance capabilities for monitoring public bus and subway locations and updating schedule information at boarding point kiosks. Traffic signal schedules can be remotely adjusted in the field based on traffic delays or emergency evacuation needs.
- **Public Services.** Deploying wireless devices, such as interactive kiosks and cameras, in public spaces and government buildings can reduce service costs—from security and traffic monitoring to parking fine payments to tourist support—while improving services.

• **Align with organizational business goals.** Many communities want to provide affordable access to all citizens while supporting viable strategies for long-term funding and support. Constrained budgets make it difficult to justify using taxpayer dollars to build and support a new network. Some cities are finding that partnering with the private sector is the answer. The city facilitates deployment of the network and then becomes an anchor tenant, while one or more commercial operators provide services and maintain the network.

• **Meet needs for community-wide network coverage and fast, secure connectivity.** Providing universal wired broadband service to everyone in a metro area is expensive. The cost of extending cables the "last mile" from a routing switch to individual homes and businesses can be prohibitively expensive, particularly in areas where the density of usage is low. A wireless network can be more cost effective and flexible. For example, a single wireless base station can cover a radius of 3 to 5 miles without the cost of deploying cables to provide last mile connections. Deploying wireless services is also more practical in rural towns that currently do not have access to broadband services.

Recent developments in wireless standards led to the availability of strong encryption methods, highly secure authentication mechanisms, intelligent algorithms to reduce interference and data integrity protection. Fast, secure wireless connections can now be made available as a part of a standards-based wireless infrastructure deployment.

## SEAMLESS ROAMING FOR COMMUNITY ACCESS

Wireless connectivity allows people to access the Internet with a device such as a laptop or personal digital assistant (PDA) without physically connecting it to a network with a cable. An end-to-end wireless solution is often based on the Wi-Fi and WiMAX standards and technologies described below.

Wi-Fi (short for "wireless fidelity") refers to a wireless local area network (WLAN) based on the IEEE 802.11\* set of specifications. It is effective indoors and outdoors over a short distance of up to about 300 feet.

A Wi-Fi network enables a person with a Wi-Fi-enabled computer or PDA to connect to the Internet when in the proximity of an access point. An access point is the point of interconnection between the WLAN and a core network or Internet

service provider's connection to the Internet. The geographical region covered by one or several access points is called a hotspot. Hotspots are typically found near restaurants, train stations, airports, cafes, libraries and other public places.

WiMAX (short for "Wireless Interoperability for Microwave Access") refers to a wireless metropolitan area network (MAN) based on the IEEE 802.16\* specifications. A WiMAX network offers longer ranges—up to 30 miles—and greater transfer speeds than a Wi-Fi network.

WiMAX provides a secure wireless network that can be deployed across metropolitan-sized areas using cost-effective, standards-based technologies. WiMAX and Wi-Fi technologies complement each other and are often used together in a community-wide wireless solution.

• **Provide powerful network performance and superior quality of service.** A wired broadband connection to the Internet provides excellent data transmission capabilities, but only for a user at a fixed location. Cellular services provide mobility but do not support the high bandwidth data transmission rate needed for rich media applications. Digital wireless solutions are providing a bridge for this gap.

New standards for wireless implementations are now becoming available to support affordable, highly secure, high bandwidth service, as well as voice service, from fixed locations and will soon be available for mobile services. Quality of Service (QoS) is defined by these standards to ensure full integrity of data and near real-time voice transmission comparable to that provided by a land-line phone service.

• **Be scalable and compatible with legacy networks.** A wireless network infrastructure can be expanded quickly and inexpensively to scale the network to meet increasing demands. New equipment can be installed quickly and efficiently without the expense and time to dig trenches and run cables from one location to another. At the same time, wireless technologies can be fully integrated with existing wired networks to extend the capabilities of wired networks while preserving investments in wired technology.

Intel® Solution Services consultants can help define the best strategies for a community to develop an optimal wireless solution using standards-based technologies.

Backhaul refers to the technology used to get data from a Wi-Fi access point back to a core network or ISP's connection to the Internet. Last mile or last kilometer refers to the technology used to connect from the core network to a Wi-Fi access point. Wi-Fi networks can be deployed using high-gain antennas to provide backhaul and last-mile connectivity. However, WiMAX solutions that offer greater scalability and better QoS at a lower cost are now becoming available.

A number of Wi-Fi access points can be interconnected in a mesh configuration to provide a wider area of coverage called a hot zone. The scalability of a Wi-Fi mesh topology is limited by the expense of large numbers of cables and connections. WiMAX technology complements Wi-Fi mesh technology by

eliminating the wires that connect the gateway mesh nodes to the core network and replacing them with affordable WiMAX customer premise equipment (CPE) that backhauls wirelessly to the core network. Using standards-based wireless technologies to *unwire* a community can reduce the total cost of network ownership and time to market while improving return on investment.

Outdoor wireless transmissions can easily be monitored using widely available and relatively inexpensive equipment. Strong encryption is essential if the privacy and integrity of transmitted information is to be protected. In addition, the use of firewalls, authentication, anti-virus software and intrusion detection systems (IDS) should be considered for mobile devices, such as laptops or PDAs.

## Wireless Solutions Enhance Police Communication

A broadband wireless infrastructure offers solutions to two challenges faced by police officers in the field—immediate access to detailed data and dependable, high-quality, real-time communications within a department, between agencies and between jurisdictions.

Police departments often rely on proprietary trunk-based radio systems for communication in the field. Trunk-based radio systems typically provide connectivity using Cellular Digital Packet Data (CDPD) technology. Data rates are slow—no more than 19.2 Kbps—limiting data exchanges to text. With high-speed (1 Mbps or better) broadband wireless connectivity and a mobilized laptop or a handheld device, police officers can quickly access photos, drawings and audio or video clips, as well as written reports and data, from any location. For example, officers dispatched to a call could receive pertinent background data en route, such as weapons registered to an address or the prior call history of the complainant.

Police officers can file reports from the field using a handheld electronic notepad. Information is entered directly into the department's record management system, making it quickly available to anyone requiring access to it—while at the same time keeping the officer on the street rather than in the office filing paper reports.

CDPD technology-based police systems are offered by a variety of vendors. However, incompatibility between different vendor's systems often prevents police in two neighboring police jurisdictions—or even police and other emergency workers within a jurisdiction—from communicating wirelessly. A regional standards-based wireless infrastructure can enable cross-jurisdictional real-time communication and information sharing—securely and affordably.



A WiMAX-based metro-scale solution supports high-speed mobile access to multimedia data. WiMAX-compliant voice-over-IP (VoIP) technologies will provide secure voice communication with high priority connections assigned to police officers and emergency services. The first interoperable products are expected in the near future with full deployment of the WiMAX standard to follow soon after.

## Making Wireless a Reality

Wireless technology and standards have developed to the point where end-to-end wireless networking on a city-wide scale has become practical and cost effective. Forward-thinking communities are now beginning to explore their options. To ensure success, they will need to:

- Identify opportunities for which wireless mobility can deliver immediate value.
- Begin with manageable pilot programs to validate benefits and refine solutions prior to wide-scale deployment.
- Take a cost-effective, phased approach to building a wireless infrastructure.
- Use standards-based technologies and certified products to provide a scalable solution that can grow as needs and technologies evolve, with particular emphasis on Wi-Fi and WiMAX certified products.

When it is time to deploy a wireless network, the municipal government IT department, or other responsible technical organization, will need to make critical choices about requirements to meet their network needs today and tomorrow. They will need to consider how to do this while controlling costs, reducing risk and speeding time to market. Arrangements will need to be made with incumbent Internet service providers (ISPs) and issues will need to be addressed related to state and local ordinances, codes and legislation.

Individual vendors often develop complementary technology to enhance and support end-to-end wireless solutions.

**IRAP framework pilot project.** The Cloud, a United Kingdom (UK) company, is undertaking a project to provide secure, seamless Internet service at hotspots throughout Sweden. When they wanted to test a new network access architecture and International Roaming Access Protocols (IRAP) framework

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Using the expertise of the Intel Solution Services consultants, municipal IT departments can create a roaming access strategy that works for them and get assistance in identifying potential partnerships when ready to implement their new networks.

**Residential gateway proof of concept.** DOVADO, a company headquartered in Dubai, United Arab Emirates, offers a portfolio of communications products with a focus on wireless broadband products. DOVADO asked Intel Solution Services to assist in testing their residential gateway product in a WiMAX network. A residential gateway, which serves as a central communication point in the home for services such as phone calls, TV, Web surfing and video-on-demand. WiMax provides a last-mile connection between a public wireless network and a wired or wireless network inside a home or business.

The testing was done using a wireless network operated by MobileCity in Skellefteå, a town in northern Sweden. Skellefteå provided an ideal venue for the testing as it is a wireless community and hub for research and development for wireless computer communications.

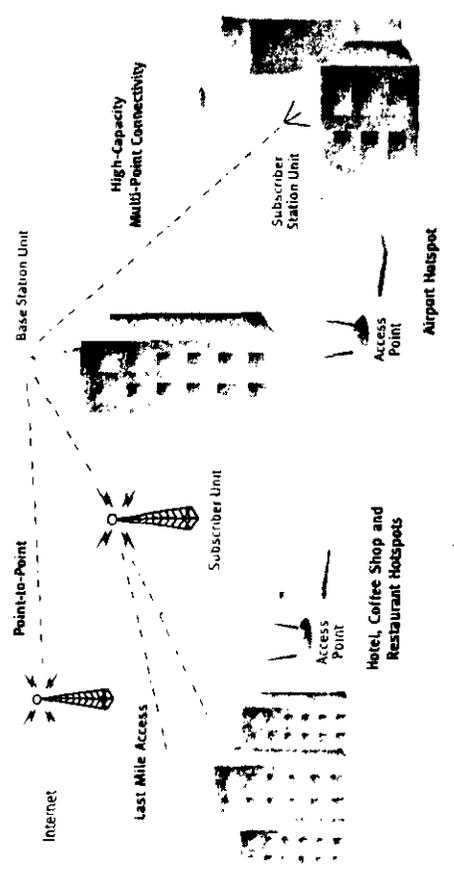
Intel Solution Services worked with DOVADO to rigorously examine the compatibility between the residential gateway and WiMAX technology for the delivery of voice services. The residential gateway provided full service and quality for VoIP traffic over the WiMAX network with calls routed and connected into GSM, 3G and standard fixed-line phone systems. The Intel Solution Services consultants provided network setup, voice quality verification and WiMAX optimization, using proven methodologies, tools, diagnostic software and comprehensive reporting.

## SUPPORTING COMPONENTS OF A DIGITAL COMMUNITY

**Mobilized applications** enable seamless productivity as workers move between the office and the field. These interruptions need not disrupt productivity, as long as applications have been optimized for mobile use. In simple terms, applications should allow mobile workers to perform all their key functions, even when a network connection is not available. Reconnection and data synchronization should then be automatic, seamless and secure when the wireless signal is once again available.

**Location-based services (LBS)** present specific content, services and applications to a user, depending on the user's location. LBS can provide wireless access to local maps, street directions, restaurant and movie information, points of interest and contact information. Examples of LBS business applications include location sensitive billing, traffic updates, fleet management and asset tracking.

**Streaming media** is audio or video content that is transmitted on the Internet in a continuous or "streaming" fashion, so that it can be listened to or viewed as it downloads to the local device. Streaming media can be used in applications ranging from providing on-line training and workshops, to making video recordings of meetings and events available to the public, to presenting visual and audio information about local points of interest to tourists.



In several Swedish railway stations, Intel® Solution Services helped them design, test and optimize the architecture. Intel Solution Services provided The Cloud with a proof-of-concept for their new access network solution architecture and an IRAP compliance assessment.

IRAP is a wireless network interface standard that allows the user to access the global Internet from compliant hotspots serviced by different service providers without acquiring credentials from each provider. A user can use the same login and authentication procedure at each hotspot and all charges are billed on a single invoice from that user's personal or business provider. IRAP also allows the user to access the wireless network with a higher security level than is available on a public Wi-Fi network.

The Cloud offers national wireless coverage in nearly 6,000 hotspot locations throughout the UK, Sweden and Germany. Service offerings include enterprise and corporate secure connections via public access points at a security level specified by the company. This service effectively expands the corporate wireless network out in the public for business people on the road.

A variety of supporting technologies are used within a wireless infrastructure. Mobile notebooks and handheld devices are designed for wireless mobility applications. In addition to notebook computers, tablets and similar form factors, wireless handheld devices, such as PDAs and cell phones, offer useful productivity advantages for many field workers. To be effective in the field, all devices must be reliable and easy to use, with a long battery life, substantial processing power, rich-media capabilities and a streamlined design. For example, laptops designed using Intel® Centrino™ mobile technology meet all these mobility requirements.

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## Communities Are Going "Wireless"

Local communities worldwide are making the move toward providing convenient and efficient wireless broadband communications to their citizens, businesses and municipal employees.

In the southwestern United States, Arizona State University (ASU) is teaming with the City of Tempe to extend a campus-wide wireless network to provide wireless access into downtown Tempe. ASU wants to attract new students and enhance the learning experience of current students by offering superior facilities, services and tools. Tempe's goal is to extend the advantages of wireless access to businesses, government agencies and residents.

ASU and Tempe are undertaking this project in two phases. In the first phase, ASU designed and deployed a wireless network in downtown Tempe next to the main ASU campus. Easy wireless access encourages students and faculty to gather in off-campus coffee shops, restaurants and bookstores—helping generate revenue for local businesses while enabling students and faculty to collaborate more productively. Students can connect anywhere they have access to the wireless network to do research online, share information with other students and faculty members and retrieve homework assignments.

ASU is also working with the City of Tempe in a second phase, which started in early 2005, to expand the wireless infrastructure to the entire city through an open RFP process. This project will make affordable, high-quality, uninterrupted broadband wireless service available to all residents and businesses in Tempe.

ASU engaged Intel Solution Services as an independent, vendor-neutral party to review and assess an existing project design and deployment plan for downtown Tempe next to the ASU campus. The plan called for a Wi-Fi network with hotspots located throughout the area. The Intel team reviewed the overall project plan, verified bandwidth requirements, evaluated the network topology design, completed a physical inspection of proposed areas of coverage and conducted connectivity tests. They then presented their assessment and key recommendations for the wireless network design to the ASU project team.

Through its Intel® Technology Advisor Program, Intel® Solution Services is already collaborating with municipal governments and key technology alliances worldwide.

## Encouraging Economic and Technological Development

To encourage development in the inner continent (the "West") of China, the Chinese government developed a program for establishing privileged Development Zones that offer incentives, such as tax remissions, to attract multi-national and domestic companies to inland areas. Fifteen years ago, the city of Xi'an, located in the province of Shaanxi in northwest China, was a cultural and technical center with a number of universities and a highly educated work force. However, few alternatives were available locally for employment for its citizens—making it an ideal area in which to establish a Development Zone.

The Xi'an Economic and Technological Development Zone ("XDZ") was approved by the Chinese government in 1991 and provided with substantial seed funding for infrastructure development and marketing. Since then it has developed into one of the most successful economic and technological development zones in northwest China. It has attracted 5,600 firms to the area, of which 580 are foreign firms, and serves as an incubator and showcase for technology transfer. These firms are engaged in a wide variety of high-tech areas including electronics, information technology, optics, bio-medicine and software.

To make XDZ more attractive to local and foreign investment, XDZ has recently undertaken a project to turn the development zone into an advanced "e-Park."

Key to this project is the development of a wireless infrastructure covering the entire development zone. Both internal staff and tenants will be able to securely communicate and access information from a PDA, laptop or cell phone from anywhere in the development zone.

*"The Xian Hi-tech Industrial Development Zone is working closely with Intel® Solution Services to develop a wireless infrastructure for our region. The lowering of gross cost, coupled with an increase in efficiency and acceleration of information flow, are some of the benefits we're seeing by moving to wireless technology."*

—Mr. Jing Jun Hai, Director of Xian Hi-tech Industries Development Zone, China



Companies today expect to be able to securely access business information, and communicate and collaborate with others in the office and on the road. By offering secure mobile services, XDZ will be able to more effectively differentiate themselves to enterprises seeking a new location in China.

Among the benefits for XDZ to implementing a campus-wide wireless infrastructure are:

- Mobile access to business applications and data
- Reduced maintenance costs
- Ease of scalability
- Increased efficiency and productivity
- More efficient team collaboration

XDZ commissioned Intel Solution Services to provide strategic consulting services to help them develop a method for identifying and characterizing problems and then to define goals and processes for reaching solutions. The internal network infrastructure uses Wi-Fi wireless technology to complement a wired network. Wireless access to the public portal is achieved using General Packet Radio Services (GPRS) and Wi-Fi technologies.

Portland, Oregon, a major metropolitan city in the northwestern U.S., is driving the development of a city-wide wireless network to provide leading-edge wireless communications technology at low cost to all citizens, schools, small businesses and local government agencies.

The project is being pursued through an innovative public-private partnership. The three main public partners—the city, the school district and the public transit service—expect to engage a private company to install and manage the network. This company would build the network by installing wireless equipment on partners' assets, such as street lamp posts, school roof tops or radio towers. The network would be open to service providers to provide retail services to the community. Competition between service providers will result in better service to end users.

The Portland Development Commission envisions a diverse, sustainable community with healthy neighborhoods, a vibrant urban core, a strong regional economy and quality jobs for all citizens. They want to make employees more efficient and offer cost-effective service to local businesses, city employees and consumers.

Inexpensive internet connections available everywhere would attract new jobs, create new educational opportunities, keep small businesses competitive, generate administrative cost savings in both the

public and private sectors and bring new economic opportunities to disadvantaged neighborhoods.

The City of Portland and the Portland Development Commission enlisted Intel Solution Services to assist in gathering requirements, analyzing deployment options, creating a database of assets, cataloging needs and usage models, facilitating the public contracting processes, and identifying appropriate suppliers for implementation. Intel Solution Services architected a conceptual design and is assisting the city in the creation of an RFP as they move toward implementing the city-wide wireless network.



### The Digital North-Rhine Westphalia (dNRW)

To become a leading business region in Europe, the state of North-Rhine Westphalia (NRW) in western Germany is taking steps to transform its industrial-based economy into a knowledge-based economy. As one step toward this goal, NRW launched the digital NRW (dNRW) project, a public-private partnership focused on building an infrastructure to stimulate business growth.

To demonstrate how new technologies can be used to help make businesses more efficient and thus more competitive, the dNRW project initiated a pilot program demonstrating the potential benefits for mobile wireless technology. This project was undertaken at the Zollverein mine, a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage site in Essen, Germany.

For decades before it closed in 1986, the Zollverein mine was essential to the economy of the Ruhr area and its cities. Today it is a cultural attraction of national and international importance, attracting more than 120,000 visitors annually. Mobile wireless technologies enhance the tourist's experience, enable more efficient customer service and improve security at the Zollverein mine by providing:

- A mobile tour guide for visitors. A mobile, location-aware multimedia tour guide enhances the visitor experience by providing extensive information about the site through videos, drawings, photographs and text. Visitors access information specific to their current location, helping them better understand artifacts and exhibits.



- **Mobile visitor information for receptionists and visitors.** Visitors needing to know event schedules and directions frequently ask for information from service staff who happen to be passing by. A mobile visitor information support tool provides up-to-date information to staff and visitors at any location.
- **Mobile security for security guards.** Strategically placed wireless-enabled surveillance cameras monitor activities throughout the site, sending video images to a control center, where they are monitored and recorded. The system sends active-motion pictures to mobile devices carried by security guards, who can monitor activities remotely from wherever they are and respond quickly as an event happens. In addition to allowing flexible placement of cameras, this wireless solution eliminated installation and maintenance expenses related to wiring.

dNRW came to Intel Solution Services through the Intel® IT Innovation Centre for advice and guidance in how to design and develop a mobile solution for the Zollverein mine. Teaming with the consulting firm CapGemini, Intel Solution Services provided assessment, architecture design and development advice and participated in the development of the solution, which includes technologies such as Wi-Fi hotspots, location-based services, multimedia streaming and wireless surveillance cameras.

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**About Intel® Solution Services**

Intel Solution Services is Intel's worldwide professional services organization, helping communities around the world implement and manage new wireless initiatives. To help make wireless deployment a reality, Intel Solution Services consultants work with communities to:

- Assess goals and requirements through personalized workshops
- Recommend current and future standards-based wireless technologies using proven knowledge and experience
- Develop strategies for business models and short- and long-term network development

Design and deploy comprehensive solutions using state-of-the-art design and testing facilities

Intel Solution Services consultants have end-to-end expertise in designing, building, implementing and optimizing solutions on Intel® architecture. The consultants are certified network, software, database and systems engineers and are experts in optimizing the efficiency of existing computing environments and implementing leading-edge technologies.

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To learn more about how Intel Solution Services can help your community "go wireless" visit the Intel Solution Services Web site at [www.intel.com/go/intelsolutionservices](http://www.intel.com/go/intelsolutionservices).

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## New Rules for Local Governments Providing Communications Services

by Kraig Conn

After significant maneuverings by the communications industry, local government representatives and the Governor's Office, the Florida Legislature this year passed compromise language addressing local governments that provide communications services, which includes Internet access, cable service and telecommunications services.

The bill, CS/CS/SB 1322, applies to "governmental entities," which include municipalities, utility authorities, or any other authority or instrumentality, agency, unit or department of municipalities. Significantly, the provisions of the bill do not apply to municipalities providing a communications service for no fee or other consideration (for instance, when a city offers free wireless Internet access in a downtown or other area). The bill also does not apply to any communications service a governmental entity provides to itself or to another governmental entity. (Many cities offer communications services to other governmental entities, such as school districts, universities, other cities or counties, and government hospitals.) The bill also provides a broad exemption for airport facilities. Therefore, the primary scope of the legislation is governmental entities that provide communications services to private citizens and businesses for a fee or other consideration.

Under CS/CS/SB 1322, governmental entities that propose to provide a communications service must hold at least two public hearings, at least 30 days apart. Notice of the first hearing must be provided by newspaper ad, and the governmental entity must electronically provide notice of the hearing to the Florida Department of Revenue and the Florida Public Service Commission. The notice must include, at a minimum, the geographic areas proposed to be served by the governmental entity, and the services, if any, that the governmental entity believes are not being adequately provided currently. The notice must state that any dealer of communications services which wishes to do so may appear and be heard at the public hearings.

At the public hearings, the governmental entity must, at a minimum, consider a specified list of topics. These topics include whether the service proposed to be provided is currently being offered in the community; whether a similar service currently is being offered in the community; whether private service providers propose to offer the same or a similar service; and what assurances the private service providers are willing or able to offer to provide the service. The governmental entity also must consider the capital investment required to provide the communications service; estimated operational and maintenance costs; and, using a full-cost accounting method, the estimated revenues and expenses of the service and financing.

Also at the public hearings, the governmental entity must make available to the public a written business plan for the proposed communications service. The business plan must include, at a minimum, the projected number of subscribers to be served by the service; the geographical area of the service; the communications services to be provided; a plan to ensure that revenues exceed operating expenses and payment of principal and interest on debt within four years; and estimated capital and operational costs and revenues for the first four years.

Once governmental entities perform the required two public hearings and develop their written business plans, authorization to provide the communications service may be given through passage of a resolution, ordinance or other formal means of adoption.

The legislation also states that governmental entities may issue bonds to finance the capital costs for facilities to provide a communications service, with the following limitations:

- A municipality may pledge only the revenues generated from within its corporate limits, or generated within an area in which the municipality provides water, wastewater, electric or natural gas service, or within an urban service area designated in a comprehensive plan, whichever is larger.
- A municipality may pledge revenues generated outside of this geographic area, as long as the municipality obtains the consent of the governmental entity within the boundaries of which the municipality proposes to provide the service. However, the governmental entity from which consent is sought must be located within the same county as the municipality.
- Revenue bonds are not subject to approval of the electors if the revenue bonds mature within 15 years, but must be approved by the electors if the bonds do not mature within that period.

In addition, the legislation states that governmental entities providing communications services may not price any service below the cost of providing the service by subsidizing it with other revenues. The cost standard for determining cross-subsidization is whether the total revenue from the communications service is less than its total long-run incremental cost.

Also, governmental entities providing a communications service must comply with current law regarding annual financial reports, and must keep separate books and records, maintained in accordance with generally accepted accounting principles, of the communications service. To facilitate equitable distribution of indirect costs, local governments are to develop and follow a cost-allocation plan, which is a procedure for allocating direct and indirect costs.

In addition, the bill states that governmental entities must establish enterprise funds to account for their operation of communications services. They also must adopt separate operating and capital budgets for communications services. The governmental entities may not use their powers of eminent domain solely or primarily for the purpose of providing a communications service. And they must comply with specified federal and state laws, depending upon which communications service is offered.

At a public meeting, a governmental entity must conduct an annual review to consider the progress being made toward reaching its business-plan goals and objectives for providing communications services. If, after a four-year period, revenues do not exceed operating expenses and payment of principal and interest on debt, a governmental entity must take one of the following actions:

- It can approve a plan to cease providing the service.
- It can approve a plan to dispose of the communications system.
- It can approve a plan to create a partnership with a private entity to operate the system.
- It can simply approve continuing provision of the communications services by a majority vote of the governing body of the governing authority.

Finally, the bill provides broad grandfathering provisions for any governmental entity that was providing a communications service as of April 1, 2005; for any governmental entity that had issued debt pledging revenues from a communications service as of April 1, 2005; and for any governmental entity that had purchased equipment specifically to provide communications services as of April 1, 2005, and had taken formal action to provide such service as of May 6, 2005.

While the provisions of CS/CS/SB 1322 appear to be extensive, the numerous local government representatives involved in negotiating the bill determined these to be reasonable. A great deal of thanks goes to Sen. Lee Constantine, R-Altamonte Springs, and the Governor's Office for brokering the compromise language and holding the communications industry to the agreement. The House bill on this matter, which did not pass, was essentially a "barrier to entry" for local governments to provide communications services. Fortunately, it was the compromise language that passed the Legislature.

*Kraig Conn is deputy general counsel and legislative counsel for the Florida League of Cities.*