Executive Summary

The Wireless Comparative Analysis and Best Practices Education Project was initiated in 2007 to provide reliable information to policymakers (particularly local government officials), community leaders, and industry about: (a) the experience with government-led wireless projects; and (b) best practices for Digital Inclusion within these projects. It was a collaborative effort among Community Partners, California Community Technology Policy Group, and BroadBand Institute of California funded by the California Emerging Technology Fund (CETF). The Project Team was concerned that there were an increasing number of local jurisdictions becoming involved in one way or another with "government-led" wireless projects throughout California without the benefit of comprehensive information about best practices and lessons learned from previous efforts, particularly how best to achieve Digital Inclusion as an integral component of these projects instead of regarding it as a "mitigation" for the opportunity to do business in the jurisdiction.

For many, the story of government-led wireless networks begins and ends with the challenges reported in the popular press. When viewed both in a larger market and regulatory context that same story proves to be far more complex and nuanced. There are many reasons why local governments have become directly involved in the deployment of wireless technology, including the cost of wired broadband, lack of broadband availability, emergence of new technologies, importance of mobility, and local constraints. Within this context, the number of government-led wireless networks in the United States grew significantly between 2004 and 2007. A decision by several broadband service providers in late 2007 to re-evaluate their involvement in government-led wireless networks resulted in a "reality check" on the initial enthusiasm for these types of projects. This research helps to answer questions about what was actually occurring and what can be learned.

A *government-led wireless network* refers to a network that is implemented, solely or partly, for public benefit, and in which the local government determines the objectives of the project and/or plays a significant role in the financing, implementation, and operation. The public benefit may be direct, such as affordable access to the Internet and improving the delivery of government services, or indirect, such as supporting educational achievement and generating economic development opportunities.

Written for representatives of communities, local governments, and industry, this research on government-led wireless networks provides guidance and lessons for further application and advancement towards the greater goal of Digital Inclusion. In communities across California and the United States, political, community, and business leaders are looking to address some of their community needs with the use of wireless technology.

Methodology

The Project employed the following research methodologies and produced results which are synthesized in the Summary Report:

- *Literature Review:* A comprehensive review and annotated bibliography of articles on broadband and government-led wireless projects.

- *Regulatory Review:* A review of wireless regulations to identify incentives and barriers that might support or constrain wireless implementation.

- *Survey:* An online survey of cities and counties in California on the role of wireless networks in their broadband deployment strategies. The survey was sent to all 478 cities and 52 counties; 104 unique responses collected between January 24, 2008 and April 4, 2008 from across the state are incorporated into the findings.

- *Case Studies:* A comparative analysis of 26 case studies of government-led wireless projects — 20 from California, and six from outside of the state. This Summary Report reflects data collected as of June 30, 2008.

- *Panel of Expert Advisors:* A group of experts was engaged to advise and guide the research process and to provide feedback on the various components of the Project. The panel brought a depth of experience across such topics as Digital Inclusion, municipal networks and contracts, wireless technology, public safety, the needs of people with disabilities, and policy.

- *Stakeholder Engagement:* A series of meetings, teleconferences, and videoconferences with stakeholders from community, government, and industry to advise and inform the Project efforts.

The Summary Report and the underlying research are available at www.CommunityPartners.org/wireless-documents.html and www.cetfund.org/resources/information. The Summary Report contains the following sections:

- *The Foundation for Digital Inclusion* discusses the need for all individuals to have access and know how to use technology effectively to fully function in society, and the current extent of the Digital Divide that exists in the United States.
- *The Pursuit of a Digitally Inclusive California* defines the core elements of Digital Inclusion strategy.
- *The Rise of Government-Led Wireless Networks* analyzes the rise of these networks as a strategy by local governments to deploy broadband and to enable better, cheaper government services.
- *Characteristics of Government-Led Wireless Networks* describes the core characteristics of these networks, including objectives, project administration, business model, technology, scope of deployment, and network management.
- *Lessons Learned and Promising Practices* summarizes the successes and challenges of broadband deployment and government-led wireless networks.
- *Recommendations* present a series of recommendations for community, government, and industry stakeholders in the planning and deployment of broadband projects.
- *Conclusion* presents a summary of the findings and a look to the future of broadband networks.

- *Appendices* contains additional resources and references for the reader, including: a Checklist that provides some guidance to representatives of community and local governments in California interested in a government-led wireless network, a draft of the lessons learned and promising practices as they were presented to the Board of Directors of the California Emerging Technology Fund in June 2008, a list of government-led wireless networks in California as of June 2007, and other reference materials.

Digital Inclusion

Digital Inclusion means that everyone — regardless of who they are or where they live — can participate in and take advantage of the economic, educational, health, and civic opportunities afforded by broadband and related information technology. As documented in multiple studies and reports, broadband and related information technology are being used for a range of important civic and public policy goals. These goals can be categorized into five general areas:

- Educate and train people for 21st Century employment.
- Improve the quality of health care.
- Enable economic and community development.
- Support civic engagement.
- Promote public safety and delivery of government services.

More than just access to the Internet, Digital Inclusion means that all stakeholders are engaged in the planning and implementation of technology systems; that all potential users can access the technology and know how to use it; and that with these technologies come more services, increased information, and greater community access. As digital technology is increasingly used for educational, employment, health, commercial, and informational purposes, Digital Inclusion is critical for full engagement, participation, and opportunity in the social, economic, and civic life of society. This Summary Report argues that to truly pursue a comprehensive Digital Inclusion strategy, consideration must be given to Stakeholder Engagement and Adoption. In order to reach high adoption rates it is necessary to focus on five components: Availability, Applications, Affordability, Accessibility, and Assistance. These key aspects provide a framework for assessing government-led wireless networks implemented to meet the needs of communities.

Characteristics

In the Characteristics of Government-Led Wireless Networks section of the Summary Report, the Project Team identifies some key characteristics of government-led wireless networks.

- *Objectives.* Local government objectives fall into three categories: to enhance government services and operations, to achieve public policy goals, and to provide public and affordable access to the Internet as a way to bridge the Digital Divide.

- *Project Administration.* Project administration refers to the way the overall project is coordinated. Although most of the case study projects were directly administered by the local government, some were working through a non-profit organization to coordinate the work. In looking at the cases, the use of a non-profit to administer the project seems to foster greater stakeholder involvement and transparency.

- *Business Models.* The business model refers to the way the project generates revenue to secure implementation and sustainability. Based on the case studies, the provider financed model was most commonly used (16 out of the 26 case studies), especially among local governments wanting to provide Internet access to its residents without having to make any monetary investment in the project. In six of the cases, local governments combined the provider financed model with the anchor tenant business model by committing funding for using the network to conduct government and public security services. Four business models were identified: *Provider Financed, Anchor Tenant, Sponsorship,* and *Government Financed.* The provider financed model was the most commonly used, especially among local governments because the cost of deploying a city-wide wireless network can be very high.

- *Technology.* Local governments are looking primarily at WiFi technology for their wireless networks. The case studies reveal that this technology is most commonly used by jurisdictions intending to provide wireless Internet access. In the Project survey, 66% of the local governments implementing or considering a wireless network identify WiFi as their technology choice.

- *Scope of Deployment.* The scope of deployment is the intended coverage area of the network at full implementation. Not all government-led wireless networks intend to provide coverage throughout the jurisdiction. Based on 28 responses in the Project survey, only 11 plan on covering their entire jurisdiction as part of the project, while seven will cover smaller areas, and 10 are undecided. The case studies revealed a close relationship between the provider financed business model and a jurisdiction-wide scope of deployment.

- *Network Management.* Network management refers to the day-to-day operation and maintenance of the network. According to Project survey respondents, 30% of the wireless networks in place or planned will be managed by a private party, while 70% will be managed by local governments. The case studies revealed a relationship between network management and the network objective and business model. The local governments that sought to use the networks solely for conducting government and public services chose to own and manage the network.

Findings

The Lessons Learned and Promising Practices section of the Summary Report goes on to identify the key findings of the Project. The most important findings are summarized here and detailed in the full report.

Planning

- *California local governments report they are moving ahead with wireless networks.* California cities and counties continue to pursue government-led wireless networks, though many are still in early stages. Of the 104 survey respondents, 29 stated that they are implementing a government-led wireless network. Of those 29 respondents, two classified themselves in the *Fully Functioning* stage, six in the *Proof of Concept* stage, four in the *Build-Out* stage, and two in the *Contract* stage. The remaining 15 are still in the initial stages of the project. Of those 15, 11 classified themselves in the *Exploration* stage, two in the *Request for Proposals* stage, one in the *Awaiting Approval* stage, and one in the *Re-Evaluating Plans* stage. These findings are based on survey data collected from January 24, 2008 to April 4, 2008. As this publication was going to print, new developments revealed that some jurisdictions have changed their original plans.

- *Leadership is needed to establish broadband policies that support strategic planning and implementation.* Leadership is needed to develop policies that foster the ubiquitous deployment of broadband and its effective use. Such policies establish a clear goal for policymakers, local government staff, industry representatives, and community members to work toward. The Project survey indicates that local governments in California are not setting such policies.

- *Partnerships make a difference.* An effective approach to Digital Inclusion may be successfully achieved through partnerships. Libraries have played a role in training people to use technology, and now over 600 library systems in California offer their own local wireless networks. Community-based organizations have also provided training and technical expertise to residents and are well positioned to provide services that are linguistically and culturally relevant.

- *Information technology departments are evolving and need greater coordination and involvement with other government leaders and departments.* The pursuit of new technologies by cities and counties requires complex institutional coordination, community outreach, technical training, and other skills which may go beyond those traditionally required of information technology (IT) department staff. In addition, it is important for IT departments to have adequate data in order to plan their broadband deployment strategies.

Business Model and Sustainability

- *Business models that involve local government investment are more successful.* While the business model is not the only reason many wireless networks have not been successful (technological and political challenges have also played a role), it is clear that in order for government-led wireless networks to work they require a sustainable business model, which in most cases requires investment from the local government.

Technology

- *Wireless networks are effectively supporting government operations and services.* Wireless technology is being used for a large range of government tasks: traffic light control, meter reading, data transport from regional offices to headquarters, video surveillance, communication between emergency vehicles, and much more. These projects have proven successful when jurisdictions commit funding toward the deployment and maintenance of the network.

- *Broadband is available in most but not all areas.* Project research indicates that many local governments in California pursued or are pursuing a wireless network in order to bring broadband access to underserved communities. In most of these cases, the wireless networks were intended to enhance or fill in gaps left by existing deployment.

- *WiFi technology is most prevalent but has limitations.* WiFi is the technology most broadly used in government-led wireless networks. However, WiMax and other new technologies face fewer limitations than WiFi and are more promising for challenging applications. To be most effective, wireless networks may employ a combination of technologies—WiFi where practical, combined with more robust technologies where necessary.

- *Several new technologies on the horizon show promise.* New technologies are making it easier for communities to deploy wireless networks. A new approach to building wireless networks is represented by what is called a peer-to-peer (P2P) or viral network which can evolve organically, leverage existing infrastructure, and build on other networks. P2P networks use diverse connectivity between participants rather than connecting to a centralized server. In California this approach is exemplified in an urban area where the city is facilitating the development of a network using equipment from a private provider.

- *Next generation broadband technology is not accessible to everyone.* Optical fiber is used to transmit a large amount of data at very high speeds over long distances. However, this resource is less common in rural and inner-city areas. The survey data indicates that while 71% of all respondents have optical fiber in their jurisdictions, only 44% of those that are in rural areas have this resource. This discrepancy is important to recognize since the almost infinite capacity of fiber makes it essential for some advanced applications and a good way to connect local wireless networks to the Internet.

Digital Inclusion

- *The number of jurisdictions likely to provide public Internet access is decreasing.* Although there is strong public support for governments to provide Internet access, the Project survey suggests that local governments currently exploring the use of wireless are less likely than earlier adopters to use their network to provide Internet access to their community.

- *Stakeholder engagement is limited.* As a component of Digital Inclusion, stakeholder involvement is essential in defining the objectives, identifying the assets, and building awareness and support for wireless projects. However, Project data indicates that jurisdictions are only seeking limited stakeholder involvement that falls short of effectively engaging the entire community. The local governments in the case studies used a range of different strategies to engage stakeholders. Regardless of network purpose, stakeholder engagement will result in more responsive, innovative, and effective public-purpose networks.

- *Equipment, training, and maintenance are areas for growth.* One of the most common objectives of government-led wireless networks is to promote Digital Inclusion. However, local governments view this objective as being accomplished primarily by providing access to the Internet. The literature makes a strong argument that digital literacy is essential. It is an argument echoed by the stakeholders involved in this Project, who said repeatedly that training and coaching are critical for community members to learn to use technology productively and understand the benefits of broadband. Stakeholders also stressed the need for maintenance and technical support.

Recommendations

For local governments and communities currently pursuing technology solutions to their local needs, the Project Team identified eight overarching recommendations. Whether the solutions are government-led or not, these recommendations can enhance the likelihood of successfully deploying information networks and implementing Digital Inclusion programs.

- Map and evaluate government and other local assets that exist. For existing services, determine areas of deployment, consumer cost, and the type and speed of the technology in use.

- Develop broadband policies, determine specific goals and objectives, and adopt plans that meet resident, local business, non-profit, and local government needs.

- Understand the relationship between the local government's network plans and state and federal regulatory realities. Market entry and longevity are affected by regulatory as well as technological and market realities.

- Develop public-private partnerships, yet be prepared to invest monetary and human resources into the projects.

- Ensure a level playing field for both wireline and wireless broadband providers, making the use of public assets available to all providers on a competitive basis, commensurate with their public benefit provisions.

- Review available technologies and applications of a wired and/or wireless network that meet local government needs. Consider how these technologies can be used together most effectively.

- Analyze the security of wireless technology and new encryption technology that can allow a single network to be used for internet access as well as for public safety tasks. Technological developments in these areas may significantly increase the utility of wireless networks.

- Engage stakeholders in determining public need and planning for implementation of wireless networks.

- Address barriers to Digital Inclusion beyond availability, including adaptive technologies, equipment, content, training, and technical assistance.

Next Steps

The reader pursuing a government-led wireless project is strongly encouraged to read the Summary Report and then use the Checklist which can be found in Appendix A. The document is intended for representatives of community and local governments interested in implementing a government-led wireless network. The Checklist is divided into four sections: Fact Finding, Decision Making, Request for Proposals (RFP), and Implementation. The Checklist concludes with references to additional guides and toolkits produced by other organizations.

Like many emerging technologies and systems, it is clear that government-led wireless networks are in a period of transition. Looking back, the first generation of government-led wireless can be characterized by well-intentioned efforts to deploy jurisdiction-wide networks using WiFi technology and the provider financed business model. During the same timeframe, private sector investment in expanded broadband infrastructure also increased significantly. In some cases, the private sector may have been motivated to invest in a given community by the interest of the jurisdiction in a government-led wireless project.

The second generation of government-led wireless networks — wireless 2.0 — has focused on applications that enhance government functions such as public safety, traffic control, and other forms of government services. These efforts have been successful to an extent but do not address Digital Inclusion objectives as a primary focus and suffer from a lack of vibrant stakeholder engagement.

The third generation of government-led wireless networks — wireless 3.0 — provides an opportunity to build stakeholder consensus of digital needs and opportunities, develop a robust, high capacity network, and emphasize integration of current and future wired and wireless technologies in areas of greatest need. In doing this, government-led 3.0 networks can be digitally inclusive and transformative. In rural areas, local governments can look at a combination of wireline and wireless technology to achieve ubiquitous broadband where it is not available. In urban areas, local governments can augment existing infrastructure with wireless technology to expand access for public facilities (such as libraries, convention centers, and transportation hubs) and affordable housing for lower-income families.

Certainly, the demand for broadband access only continues to grow among consumers who increasingly expect affordable, convenient, ubiquitous broadband access. Yet, the Digital Divide in California is as big as it was at the beginning of the new century. Therefore, the imperative for Digital Inclusion is as important as when the first generation government-led wireless projects were launched.

Today, the ability to be connected instantly to the Internet through broadband technology is increasingly critical for access to and success in education, jobs, and economic opportunity. Hopefully, this Summary Report will help stakeholders (government agencies, community organizations, and industry providers) collaborate at the beginning of any well-intentioned wireless project to develop a sound business model and to achieve successful Digital Inclusion for a productive, healthy, and prosperous California.