

The promise of municipal WiFi and failed policies of inclusion: The disability divide

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Abstract. Wireless technologies, especially those deployed by municipalities, have been offered as one way to enhance access to society at large, including people with disabilities and others on the wrong side of the digital divide. One of the promises of municipal WiFi, is free or low-cost service promised in the public interest of citizens. This paper presents research on the current state of municipal wireless network design and policies with regard to people with disabilities in the United States. A comparative analysis was undertaken of a sample of 48 municipalities to ascertain the degree of accessibility to, or sensitivity of, municipal wireless systems, and three case studies were examined for the unforeseen effects of deploying municipal WiFi in different locations. Secondly, the effectiveness of goals toward eradicating the “disability divide” are analyzed to see if policies toward people with disabilities fair well as systems are deployed, and we discuss legal implications of municipal WiFi models. Because many people with disabilities are already affected by disparities in education and income, further marginalization of their communication and information access creates a greater barrier to their access to critical information needs, and participation in a community.

Keywords: Disability divide, compliance, municipal wireless (muni WiFi), accessibility, policy

1. Introduction

Municipal Wireless systems, often referred to as municipal WiFi, or muni WiFi, have been promoted as an approach to the provision of widespread wireless connectivity with associated benefits. Municipal officials, telecom providers, and concerned citizens in cities and regions around the United States and abroad have rushed to develop plans to deliver WiFi systems. Bridging the digital divide has been cited by many municipalities as part of their rationale for deploying these networks [1].

According to a recent *Ars Technica* article, as of 2008, more than 300 systems in the United States were implemented or planned, though a good number of initial start-up projects had been downsized or abandoned, even before the beginning of the economic recession [12]. While muni WiFi systems can potentially bridge the digital divide, significant policy, economic, and technological barriers to access technologies still exist for the more than 51.2 million Americans (about 18 percent of the population), who have some kind of long-term or conditional disability, including sensory, physical, mental, or self-care needs [4]. Properly designed WiFi systems offer increased access to information and services for

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the disabled, either in their homes or public places. A review of the literature suggests that few WiFi systems specifically address the disability community. The Americans with Disabilities Act of 1990 (ADA) mandates equal opportunity and benefit of municipal programs and services for people with disabilities [7], and as a matter of crafting equitable policy and legal compliance, it is important that the needs of people, particularly with disabilities, are considered.

A lack of attention to the needs of the disability community, inefficiencies in policing compliance with Project Civic Access (PCA) guidelines, and the relative paucity of municipalities that have taken this population into consideration, may inadvertently further the digital divide. An unintended consequence of this oversight can exacerbate rather than remedy the problem of access for individuals with disabilities and undermine the fundamental objective of social inclusion in planning and executing municipal wireless systems. Furthermore, some models of muni WiFi implementation may prove to be in violation of the ADA.

Mobile wireless technologies can deliver specialized information services in multiple formats for people with disabilities, offering enhanced employment opportunities, access to health care information and on-line services, emergency preparedness, and greater participation in a community. Access may be limited by a general lack of awareness of technologies or accessible options, as well as economic, technological and regulatory restrictions [13]. For individuals with disabilities, equal access to accessible content, services information, and telecommunications technologies including wireless Internet remains a major concern [28,32].

Does the implementation of an accessibility policy/program (i.e., compliance stipulation) in a municipality impact the level of awareness of the needs of individuals with disabilities in other matters, in this case the wireless network design or proposal? In Section 2 we review the background to the digital divide for people with disabilities and the possible role of WiFi in providing a solution. Section 3 presents the research methodology for a comparative analysis of 24 municipalities that have entered into compliance agreements with the Department of Justice's Project Civic Access (PCA) and 24 control municipalities (i.e., not under compliance agreements), that have implemented, planned or proposed a wireless network. Section 4 provides the results of this study, and Section 5 addresses increasing the social participation of people with disabilities and the legal implications of muni WiFi implementation under the ADA. Section 6 concludes with policy implications for muni WiFi initiatives and future directions for research.

We assumed that municipalities under PCA agreements would be compelled to take specific remedial actions to reach ADA compliance and therefore manifest a heightened sensitivity towards the concerns of people with disabilities in all municipal service provision. In three case studies, we found that this was not the result, and in fact, the three studies actually demonstrated how some models of WiFi implementation further marginalize the disabled. The discussion examines the impact and implementation of these policies, and the resulting effect on the disability community.

2. Background

Accessible technologies can have a remarkable effect on empowering persons who have functional limits, and the Internet holds a great promise for connections to a range of people regardless of location. Judy Brewer, an advocate for adaptable policy frameworks, has encouraged organizations in every country to "try to make sure that those solutions are relevant locally [8]." Municipal WiFi directly addresses the concept of locality by focusing on service provision to geographically delimited areas and regions. System implementation typically involves public and private interaction, and innovative funding mechanisms. The socially relevant policy questions then, require socially relevant answers and effective policy development.

2.1. *The disability divide*

There is well documented research to show the existence of a “digital divide” in our society in terms of access to, availability, and usage of ICTs [21,24,50]. This divide also exists for individuals with disabilities [5,7,10,18,32]. The term “disability divide,” “is meant to refocus awareness of how the digital divide . . . affects people with disabilities specifically, and to address the gap that remains between able-bodied and disabled people despite advances in assistive technologies and more widespread awareness of implementing universal design” [4].

Recently, Jaeger [25] compared and analyzed existing national surveys used in collecting data on this issue, and suggests that within the US, economic, political, and social participation depends increasingly on the ability to use information technology. People facing barriers to access and use of ICTs are also often educationally, economically, and politically disadvantaged [21]. Statistics reflecting access to the internet and use of computers by people with disabilities is sparse. Literature supports the perception that people with disabilities have use, or access to information and communication technologies at rates below that of the general population. Fox [13] noted that 51% of the population with “disability, handicap or chronic disease” go online compared to 74% of those who report no chronic conditions. Another study attributes this to the fact that people with disabilities are more likely to live in places without access to the Internet or computers. In this case Internet use is 5 to 8% lower than the general population [10]. These studies suggest that some progress has occurred since a report by the National Telecommunications Infrastructure [46] noted that as of 2003 less than 30% of persons with disabilities over age 15 use the Internet, compared to 60% of persons without disabilities.

Title II of the ADA requires state and local governments (i.e., public entities) to ensure that “no qualified individual with a disability shall, by reason of such disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of a public entity, or be subjected to discrimination by any such entity [44].” This mandate is construed broadly to include most “anything a public entity does [28].” For instance, “programs, services, or activities” is “a catch-all phrase that prohibits all discrimination by a public entity, regardless of the context [54].” A more narrow analysis employed by some courts is determining whether the program, service or activity is “a normal function of a governmental entity [6].” The functions of municipalities held accountable under Title II include sidewalk maintenance, zoning decisions, public access cable stations, public meetings, municipal wedding ceremonies, park facilities, and public transportation among others [7]. Furthermore, public entities generally may not provide a program, service or activity to a qualified person with a disability that is unequal to, not as effective as, or separate from that provided to persons without disabilities [30]. Finally, private entities, such as telephone and cable companies, waste removal and recycling services, even when privately-owned, may be considered public entities subject to Title II if they receive funds from the city and benefit from the use of city property or equipment [26].

Project Civic Access is a program of the US Department of Justice which aims to assist communities to come into full compliance with the ADA. PCA has conducted compliance reviews in all 50 states, Puerto Rico and the District of Columbia, largely on its own initiative though also in response to complaints. PCA selects communities for compliance reviews based upon factors including the “desire to visit every state,” local population, and proximity to resources such as universities and tourist attractions [44]. Following the review of programs, services, and activities (e.g. real-time transcription services, emergency preparedness plans, voting), DOJ encourages Title II entities to enter into settlement agreements with a time table for remediating violations. Though PCA agreements have not addressed muni WiFi systems, they regularly require cities to ensure effective communication and accessible information for people with disabilities,

and more commonly are requiring accessible websites [42]. Communities under PCA agreements that are implementing muni WiFi services have a vested interest in proactively ensuring equal access to, and benefit from, these services for all citizens, in part, because they are under the DOJ spotlight and have the opportunity to become a model community for attracting business and tourism. There have been some attempts by the federal government to address the accessibility of information technology, such as the Section 508 amendment to the Rehabilitation Act of 1973, which requires that all electronic and communications technology developed, used, and procured by the federal government (including websites) is accessible for those with disabilities [18]. However, there remains no general federal mandate for Internet accessibility, or for narrowing the disability divide. People with disabilities face additional technological and social barriers that need to be mitigated to ensure full equal access, and while they may fit within socioeconomic categories defined as disadvantaged, they may have particular needs that compound their social exclusion [10].

2.2. *Broadband and WiFi Internet*

Broadband technology has been touted as key to enhancing Internet diffusion [11,32,35,48]; industry stakeholders and researchers have identified broadband access as necessary for the evolution of advanced communications services, as well as for the associated economic growth [16]. The potential benefits of this technology have led to a call by state and federal governments, public interest groups, and other stakeholders for broadband deployment throughout the country and at affordable rates. Congress also directed states and the FCC to encourage broadband deployment in a timely manner.¹ Despite these stated goals for faster broadband deployment, the US has not adopted an official policy or regulation aimed at promoting or developing broadband deployment [40]. Rationales for the development of municipal WiFi systems, range from bridging the digital divide, to strengthening economic development, reducing the cost of government; maintaining a competitive profile with other municipalities, improving the level of services provided to the public (through improved access to police and firefighting services, to creating an alternative to the expensive process of physically cabling or laying fiber optics).² WiFi systems could ideally deliver Internet access to individuals at much lower cost than traditional broadband technology, and provide coverage via a ubiquitous “cloud” model or the creation of a network of “hot-spots.”

Many municipalities are of the mindset that broadband is a new type of utility and are deploying their own networks. Deployment models can be identified as:

Public models: Under this approach-municipalities have the greatest control over services and content; however-with costs borne by local government, these systems are most likely to experience financial difficulties.

Private models: these systems offer the greatest control to businesses, and have the best chance for financial sustainability; but because they favor business models they are least likely to make design decisions that address social rather than economic concerns such as the accessibility of these systems for people with disabilities.

Private/Public models: this approach is most likely to invoke PCA guidelines; to meet the mandate of public service—the intended purpose of establishing a public/private initiative but also most likely to migrate to business models when costs become prohibitive, and lose public accountability features.

¹Telecommunications Act of 1996, Pub. L. No. 104–104 §706, 110 Stat. 153 (codified as amended at 47 U.S.C. §157 (2000)).

²David M. Shein. “Municipal Wireless: A Primer For Public Discussion,” Center for Advancing the Study of Cyber Infrastructure, Rochester Institute of Technology. July, 2005.

Wireless technologies could be a major turning point in helping people with disabilities overcome some of the barriers to access that they face [15]. A key design objective of many municipal wireless networks has been the digital inclusion of “disadvantaged” communities. However addressing the digital divide optimally includes the provision of access to people with disabilities, as well as other disadvantaged populations.

3. Research methodology

The initial research project examined a sample of 48 out of 320 municipalities where wireless networks exist, are being planned, or considered, to determine how well local governments considered the needs of people with disabilities in developing municipal wireless networks. Twenty-four wireless systems with compliance agreements under the Department of Justice’s Project Civic Access (PCA)³ were compared with 24 control (municipalities not under ADA compliance agreements) systems to explore whether the impact of a general policy instrument (such as PCA) extends beyond the specific application to the larger community context. Project websites and online documentation (including secondary sources) of the projects were evaluated for indicators of system designs addressing accessibility for people with disabilities and usability of system information. Subsequently an analysis was conducted of a subset of projects (10) to see what decisions were made in the process of implementing plans for such municipal WiFi systems, and the impact (if any) on the disability divide. One follow-up interview was conducted, as noted, in the GoMoorhead case to clarify some inconsistencies, which appeared in published accounts.

3.1. Research questions

1. Has Project Civic Access actually been used to enforce the Americans with Disabilities Act mandate for preventing barriers to people with disabilities in situations of Municipal WiFi projects?
2. Do municipal WiFi projects support policies designed to create more access for, and accountability to people with disabilities?
3. Are people with disabilities well serviced by municipal WiFi projects?

3.2. Objective

This research explores the extent to which accessibility concerns are being included in the planning and deployment of municipal wireless networks, the impact of Project Civic Access on municipal wireless project design parameters, and the policy implications of PCA awareness and accountability for WiFi accessibility for the disabled.

3.3. Approach

A comprehensive survey of existing, planned and proposed municipal network deployments was conducted, resulting in an inventory database of municipal wireless projects to date, including location, type

³Project Civic Access is an effort to make sure towns, cities, and counties are compliant with the Americans with Disabilities Act (ADA) by eliminating physical and communication barriers to people with disabilities. A number of municipalities have been found to be noncompliant with the ADA and have entered into agreements with the Department of Justice (DOJ) under this program as a means of amelioration (US DOJ 2008).

of network (citywide, hot zones, or public safety), and project status. The study was largely composed of projects where the wireless network had already been implemented, chosen from a representative group of projects in a variety of cities, based on size. 56.2% of the total projects were in the final phase of deployment. The target sites were cities that had municipal wireless projects as well as having entered into a compliance agreement under Project Civic Access. The 24 control projects were picked based on their geographical location and population size.

Websites and online documentation (including secondary sources) for all projects within the two subsets were examined. In the cases where there was no website,⁴ information was gathered from secondary sources such as online articles from newspapers, magazines and sites that keep track of municipal wireless projects.⁵ This survey evaluated the level of consideration/awareness of the needs of disadvantaged populations in general as well as specific discussion of people with disabilities (PWD). The following consideration level (CL) scale was developed to catalog the type or level of awareness (consideration of disability issues) that went into each network design and deployment policy.

- Little/no consideration (1) = No mention of PWDs or disadvantaged populations;
- Moderate consideration (2) = Briefly mentions underprivileged groups; No detailed goals or intended impacts;
- Substantial consideration (3) = Detailed discussion of disadvantage communities with specific goals and ideals but nothing specific to PWDs;
- High consideration (4) = Specific discussion of PWDs and the benefits of municipal wireless for this community.

A number of external factors could impact the level of accessibility of these projects. One key characteristic is the phase of deployment of the project. A typology was developed in order to place all projects in the population within four categories according to their stage of deployment. The projects were classified using the following typology of project status:

- Status 1 (Planning) – Made announcement about possibly deploying a network, made an official statement, collecting RFP/RFQ;
- Status 2 (In Process) – RFPs submitted & provider chosen; in the process of building out.
- Status 3 (Implemented) – Network exists and is in use.
- N/A (Discontinued) – Project was cancelled at some phase of the project.

4. Results

Of the 48 projects, 2 were discontinued. The following scale was used to categorize the population size of all cities within the study population:

- Very Large (VL): 500,000 & higher;
- Large (L): 100,000–500,000;
- Medium (M): 50,000–100,000;
- Small (S): 10,000–50,000;
- Very Small (VS): 10,000 & lower.

⁴8 of the PCA cities had no specific project related website, as was the case with 10 of the non-PCA (control) cities.

⁵Two good sources for current information on wireless municipal projects are [<http://www.muniwireless.com>] and [<http://www.wi-fiplanet.com>].

Table 1
Municipal project deployment phase

Deployment Status	Total Population (%)	When PCA = 1 (%)	When PCA = 0 (%)
Planning	22.73%	22.73%	22.73%
In Process	18.18%	15.91%	4.55%
Implemented	56.82%	40.91%	72.73%
Discontinued	2.27%	4.55%	0

Table 2
Summary of consideration level information

Consideration of disadvantaged (web survey)	Total Population (%)	When PCA = 1 (%)	When PCA = 0 (%)
None (CL = 1)	70.45%	63.64%	77.27%
Moderate (CL = 2)	18.18%	18.18%	18.18%
Substantial (CL = 3)	11.36%	18.18%	4.55%
High (CL = 4)	0.00%	0.00%	0.00%

The Project Civic Access variable is a nominal dichotomous variable, where the existence of the policy has PCA = 1, otherwise PCA = 0.

The extent to which system accessibility is addressed was determined by analyzing the level of consideration given to disadvantaged members of the community evidenced in the stated objectives/goals of the project. Analysis of the secondary source material, either from the project websites, proposal and bid materials or other public documents, as noted above, was ranked using a five point Likert scale ranging from “no consideration” to “high consideration” to rate each project’s information affecting the disabled population. It is important to note that this rating was done for all wireless projects including those that had no official webpage.

A summary of the consideration level (CL) of information from the web survey was generated. One critical finding is that *none* of the 48 projects received a high ranking (CL = 4); that is, no projects explicitly mentioned or discussed people with disabilities as a community that could potentially benefit from this technology. This is pertinent in that it suggests that while these municipalities *might* be taking into account the needs of people with disabilities as *part* of the broadly disadvantaged, they are not making evident, specific efforts to address concerns that may be unique to this particular community.

A majority (70.45%) of the projects had a CL = 1, meaning they had no explicitly stated goal or discernable effort to use this technology to bridge the digital divide for people with disabilities. While people with disability were not specifically mentioned, 18.8% of “PCA project cities” had substantial consideration of disadvantaged populations, as compared to only 4.5% of non-PCA project cities. Projects that had CL = 3, in general, used low socioeconomic status as their indicator for disadvantaged. This does have some policy implications as people with disabilities tend to fall within lower socioeconomic groupings than the population without disabilities.

Note that 61.29% of the projects, which had no consideration for disadvantaged populations, were in the final phase of deployment. The data gathered suggests that there may be some association between the deployment status and the amount of consideration information that is available on the web.

Of those projects that were under PCA compliance stipulations, and characterized as using public/private models in their initial phases of implementation, there was an absence of any recognition of the additional accessibility needs of people with disabilities. For instance, hot spots remained limited to business areas and generally failed to extend to residences. Three such projects are described below.

They have been chosen to outline the range of potential problems in the public/private model and include (1) lack of planning for frequency allocation and piggybacking services on overloaded wireless platforms; (2) lack of consideration for content and services needed; and (3) over-reliance on private stakeholders to deliver when profits are not forthcoming. The three cases that follow, show how plans for municipal WiFi deployment often go awry, or create problems for the disabled:

1. *Moorhead Minnesota*: The GoMoorhead muni WiFi system [<http://www.gomoorhead.com/>] was intended to blanket residential customers and businesses in areas of the city, thirteen square miles, consisting, in part, of over 370 Tropos MetroMesh radio transceivers. As one of the PCA compliant muni WiFi systems, adaptive technology and assistive technologies were made part of the WiFi package, with appropriate tiering of price points for those who qualify for the lowest tier of payment. GoMorehead is a service of the Moorhead Public Service (MPS), a community-owned utility, but even when service is made available to the disabled, the problem of sustainable service can be a problem. In February, 2007, service was disrupted for 1,000 of the 3,800 users when the system unexpectedly failed [39], and no back up plan was in place for those who might rely on the service. According to the *Minneapolis Star-Tribune*, something jammed the system, which was operating on the same RF frequency as many other devices, therefore, canceling each other out. Subsequently, according to the MPS, the system has been reconfigured, and problematic components replaced. Currently the system has 4200 subscribers, including dorm users at Moorhead State University, and the system is approaching sustainable levels of users.⁶

2. *Foster City, California*: The public/private venture in Foster City developed a muni WiFi system that the *San Francisco Examiner* cited as an effective system for those in its range, but the choice of location made PCA compliance almost a non-issue. In this relatively young community, additional construction outside of the muni WiFi system accounted for the lack of coverage; the plans were not scalable to serve the geographic region in development for new residential homes and businesses [37]. While the system was generally well received, with some 1800 unique users in March, 2008, it fell victim to the collapse of the service provider, MetroFi, and ceased service in June, 2008. Unlike Philadelphia, which was able to resurrect the Wi-Fi system, as of July, 2008, backhaul infrastructure had been removed and light pole access points were scheduled for decommissioning in Foster City.⁷ Most notably, the Foster City experiment was targeted to a specific locality in which few disabled people were likely to benefit from service. Perhaps if a location with greater population differentiation in age, ability, and type of profession were made the target, PCA compliance would have been a greater factor in the approval (and success) of the program.

3. *Philadelphia, Pennsylvania*: The most ambitious municipal network in the United States to date is the Wireless Philadelphia Project in a metropolitan area in which 25% of the population is under the federal poverty level⁸, and almost 15% of the population is classified as having one or more disabilities.⁹ The original plan for Wireless Philly would have included training, access, and affordable technology for those with socioeconomic problems, and those with disabilities. The partnership, originally undertaken with EarthLink, Inc., had the key mission of making wireless broadband widely available and affordable, and in the beginning, much attention was given to how muni WiFi could improve the culture and

⁶Interview with Douglas Rogness, MPS communications director, September 16, 2008.

⁷Foster City ITAC Meeting Minutes, July 8, 2008.

⁸Contrast this rate with the estimated poverty level of 4.6% in the suburban Philadelphia Bucks County, PA. See: Table 10, *Income, Earnings, and Poverty Data From the 2006 American Community Survey*.

US Census Bureau ACS-08200 (Issued August 2007) [<http://www.census.gov/prod/2007pubs/acs-08.pdf>].

⁹S1801. Disability Characteristics, 2005 American Community Survey, US Census Bureau.

employment potential of the poor and disabled. The system as originally envisioned was a collaboration of Wireless Philadelphia, a nonprofit organization with the primary mission of Digital Inclusion; EarthLink, which was to build the network at its own expense; and the City of Philadelphia, which created the initiative and leased streetlamps to EarthLink for placement of devices required to create the network. On June 17, 2008, network ownership was transferred from EarthLink to the Network Acquisition Company (NAC), a local Philadelphia company. NAC plans to finish the network build out, currently approximately 80% complete, within the next 12-18 months. Broadening the support bases as part of the revised business model, currently, Wireless Philadelphia has 30 funding sources and more than 30 community partners.¹⁰ EarthLink originally promised to pay \$12–\$15 million, but claims to have already spent \$20 million [29]. According to Greg Goldman, Chief Executive of Wireless Philadelphia, though several phases of the project have been partially completed, the \$1 million allocated to serve the poor with discounted and free WiFi service has had only 613 subscribers, to date [29].

The results of this research suggest that the existence of a remediating policy instrument, in this case, PCA agreements, can be positively associated with increased awareness of disadvantaged populations, in general. However, there is a specific lack of awareness or even recognition of individuals with disabilities *as a group* that face barriers to digital inclusion.

Specifically we find that:

- None of the 48 wireless projects had any *specific* recognition of people with disabilities.
- PCA related WiFi networks were more than three times as likely to evidence consideration of disadvantaged populations as the control cities (18 percent versus 5 percent).
- 64% of all municipal wireless projects that provided detailed goals and information via a website were associated with cities under PCA compliance agreements.
- In those cities where system evolution favored migration toward business models, location related deployment factors frequently result in patchy or uneven coverage, which adversely impacts access for disadvantaged populations including people with disabilities.

While wireless projects in PCA cities evidence a higher sensitivity to disability issues than locations without PCA agreements, the difference is minimal. These cities are not going beyond the specific scope of the agreements. Municipal wireless projects are not considering all components of the digital divide within their communities. Furthermore, the costs associated with public/private roll-out have become sticking points in what otherwise may be admirable attempts to enhance services and social inclusion for all. According to Arrison, Rizzuto and Vasquez, “municipal broadband systems invariably costs more and deliver less than promised . . . 77 percent of the time, muni networks can’t pay their way [38].”

These models of muni WiFi implementation further raise issues of potential violation of ADA Title II. Purely private endeavors, such as a consortium of retail stores in a business district collaboratively funding and operating a local WiFi network, would not be subject to Title II. In contrast, a purely municipal program, easily falling within the gambit of “anything a public entity does,” must consider in developing its WiFi implementation plan, how the program may exclude participation or deny the benefits of the program to people with disabilities (even unintentionally). Hypothetically, if the city plans to establish wireless nodes for free public access in and on all city properties open to the public (e.g., libraries, parks, city hall), it may be important to ensure that the availability, strength, and range of the wireless signal is not unequal to or less effective in more impoverished areas of the city compared to

¹⁰ *CNET Wireless*: “Was EarthLink’s failed citywide Wi-Fi a blessing in disguise?” by Marguerite Reardon, September 5, 2008. [http://news.cnet.com/8301-1035_3-10033386-94.html].

middle class and affluent areas. This scenario could raise Title II violations by having a disparate impact on people with disabilities, who tend to live in impoverished areas at greater rates than other areas of the city. This scenario also could raise equal protection violations, by providing an unequal service in neighborhoods having greater numbers of people of different races or ethnicities than in more middle class or affluent neighborhoods [21].

If a private service provider contracts with a city to provide a muni WiFi service, and uses both city funds and property for locating and maintaining the network equipment, by virtue of the contract alone, as well as the use of city funds and property, the private provider may be subject to Title II. If the private provider enters into an agreement with the city to implement a WiFi program, sharing resources, and perhaps with oversight by a publicly elected or appointed board, the two entities likely will be viewed as one Title II entity [26]. In both of these scenarios, the city's involvement in providing a WiFi service is substantial and part of "anything a public entity does," thus subjecting it to Title II. In sum, municipalities must be aware of the manner in which it provides a WiFi service, perhaps especially with regard to the availability, strength, and range of the wireless signal, and perhaps also regarding any costs borne by public citizens to participate that may have a disparate impact on people with disabilities.

The results of this research suggest that, despite the passing of more than 17 years' since the implementation of the Americans with Disabilities Act, 10 years after the enactment of the Section 508 amendment to the Rehabilitation Act, and other efforts to improve social inclusion, accessibility challenges for people with disabilities still remain in a number of areas. There is still a digital divide faced by people with disabilities in the United States, related to economic, social and technological barriers directly, as well as being a consequence of a general lack of awareness of the needs of people with disabilities.

5. Policy implications

Municipalities are in a great position to take steps towards providing digital inclusion as they can do it on a community level and ensure specialized accessibility for their citizens, but all too often, despite policy mandates, the poor and disabled are the forgotten citizens.. Municipalities interested in deploying their own wireless networks should assess their community and ascertain the needs of the different populations that may experience barriers to the new technology, going beyond a minimal focus on income level as the sole evaluation criterion. Policy initiatives need not necessarily be complex; for instance, a simple effort to ensure website accessibility and the availability of accompanying information regarding the wireless project can significantly enhance disability inclusion, but these goals must be revisited and refocused when system deployment begins to undergo change.

It may be helpful for city attorneys to view the implementation of a muni WiFi program like the provision of any other service that generally must be equally available and beneficial to all citizens and people with disabilities must be considered at all stages of the project. Accountability measures must be developed so that the disability community is not differentially disenfranchised in the process of changes that occur as systems undergo roll-out and diffusion.

Future research should focus on network usability testing/evaluation to determine technical/physical access, including determining what technology is required to access the wireless network and whether it presents barriers. PCA guidelines enforcement throughout deployment stages should also be monitored and evaluated so that persons with disabilities are not inadvertently left out of project deployment.

While federal intervention-based approaches, such as mandating full accessibility of all public sector websites is one possible solution, it raises a host of ancillary policy issues. State governments could take initiatives in addressing this component of the digital divide by legislatively directing accessibility

compliance of municipal websites and systems, in a manner similar to the application of Section 508 to federal ICT. While this kind of policy could place additional burdens on system designers and content developers, various types of subsidies, grant programs and tax incentives could be included as a part of this initiative, as long as accountability measures are spelled out and completed.

Standard types of approaches that can be undertaken to better address accessibility of ICT services by people with disabilities including basic awareness campaigns, market based development of legislative and regulatory measures, and hybrid approaches such as licensing and public/private partnerships. Municipal WiFi accessibility may be addressed first by developing a baseline awareness campaign, as many of the accessibility issues faced by people with disabilities come from a lack of understanding or are a reflection of how certain design parameters (unintentionally) act as barriers to access for people with disabilities.

Policy initiatives such as market-based approaches, rulemaking, and awareness/outreach campaigns may be combined with focused research to foster the inclusion of individuals with disabilities in this arena. The federal government could enhance its effort to work with disability advocates and interest groups to gain understanding of ICTs and disability. ICTs, in general, and wireless mobile communications, more specifically, are key to social mobility and the facilitation of increased community participation. Individuals lacking access to these technologies and services may face increased difficulties in participating fully in society, in communities, and even in the workplace.

As society becomes increasingly dependant on the use of telecommunication devices, accessibility to information and services is essential for all members of society; especially for those with disabilities for whom ICTs represents a bridge to social engagement. With the added social pressure of so many individuals with disabilities further marginalized by income and education, the situation of using municipal WiFi to level social inequality becomes all the more important.

Acknowledgements

The authors wish to acknowledge the research and editorial assistance of Nathan Moon, the work of Avonne Bell in the preparation of an earlier version of this paper, and the research assistance of Janelle Frias. The research was supported by the Rehabilitation Engineering Research Center for Wireless Technologies, the SEDBTAC, and "IT Works," sponsored by the National Institute on Disability and Rehabilitation Research (NIDRR) of the US Department of Education under grant numbers H133E060061, H133A060094 and H133A011803. The opinions contained in this paper are those of the authors and do not necessarily reflect those of the US Department of Education or NIDRR.

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