Good intentions: A public good analysis of government (dis)investment in three Los Angeles community broadband projects

Abstract: At a time when internet access is increasingly perceived as a basic utility—on par with necessities such as water and electricity—the commercial market has failed to bring broadband to low-income, urban communities in the United States. About 30% of Los Angeles residents lack a broadband connection at home. While this statistic is in-line with national broadband adoption rates, Los Angeles is unique among U.S. cities in another aspect. Both local and state agencies have made attempts to expand residential internet access by subsidizing community broadband networks. Specifically, the city of Los Angeles and the state of California have funded three peer-to-peer network initiatives in geographically and ethnically diverse L.A. communities. Using a public goods framework, this study examines the role public agencies played in implementing these community broadband projects. The research found that the amount of support and types of resources made available to each project varied considerably—exposing a lack of strategic planning when it comes to expanding internet connectivity. All three networks proved unsustainable over the long-term. The study analyzes the challenges faced by these community mesh networks and offers recommendations for future efforts.

Introduction

Research overview and background

Several high-profile incidents involving entire communities cut off from broadband access—the result of natural disasters such as Superstorm Sandy in the Northeastern United States in 2012, to totalitarian governments in Egypt and Tunisia shutting down infrastructure

in 2011—have raised awareness of the vulnerabilities inherent in a centralized internet. Policymakers are increasingly interested in the potential of community mesh networks (Harvard University, 2012), which rely on a decentralized architecture. Still, community WiFi initiatives in U.S. cities rarely receive public funding. Three grassroots mesh networks in Los Angeles are distinct, however, because both local and state agencies subsidized their efforts. This study, grounded in a public goods framework, examines the role state and city agencies played in implementing and maintaining these projects. Specifically, the research examines Little Tokyo Unplugged; Open Mar Vista (and the network's attempt to expand to the Hollywood Studio District); and a cluster of mesh networks spearheaded by the non-profit Manchester Community Technologies (MCT). Each of these networks proved unsustainable over the long-term, despite a combined $700,000 in government funding.

Rationale for the research

The wealth gap is, perhaps, more pronounced in Los Angeles than any city in the country. White households in Los Angeles have an estimated median net worth of $355,000. By comparison, Mexicans and U.S.-born blacks are estimated to have a median net worth of $3,500 and $4,000, respectively (De La Cruz-Viesca, Chen, Ong, Hamilton and Darity, 2016). This disparity is evident within the context of broadband access, as well. Local film studios such as Paramount, Universal, and Twentieth Century Fox possess enormous fiber capacity. Yet about 30% of Angelenos lack a broadband connection at home (CityLinkLA, 2016). Previous studies suggest that internet access has the potential to address inequalities by expanding opportunities for low-income Americans (Shapiro, 2015; Pepper and Garrity, 2015; Howard, Busch and Sheets, 2010). A residential broadband connection makes it possible to take online courses, to work from home, and to communicate with government

officials. In 2015, nearly 70% of Americans indicated that not having a home high-speed internet connection would be "a major disadvantage" to finding a job, obtaining health information or accessing other key information (Horrigan and Duggan, 2016). In June 2016, a federal appellate court upheld net neutrality rules that classify the internet as a utility, on par with electricity and landline phone service.

In 2007, then-Mayor Antonio Villaraigosa prioritized digital inclusion when he announced plans to deploy a municipally owned wireless network covering all 500 square-miles in Los Angeles. However, a feasibility study concluded that the city's budget shortfall, combined with technical challenges, made it impractical to build a citywide WiFi network (Citivum, 2008). Soon after, local and state agencies invested in several community wireless initiatives, which relied on peer-to-peer networking. Public subsidies for community mesh networks in the United States are rare—despite that these networks are comparatively low-cost to deploy, and that a peer-to-peer model of connectivity fosters community and boosts civic engagement (AUTHOR, 2011). However, recent developments suggest a shift in governmental attitudes toward funding community wireless broadband networks. In 2015, the New York City Economic Development Corporation (2015) selected the Red Hook Initiative to share $30 million with 10 other projects to expand its community WiFi network. Over the past few years, the U.S. government has awarded more than $7 million to the Open Technology Initiative to build mesh networks in Tunisia and Cuba (Brandom, 2014).

These developments suggest government agencies are likely to fund more grassroots wireless initiatives in the future. Therefore, it is critical to understand the successes and failures of previous projects. This study analyzes three community broadband projects awarded public funds—totaling more than $700,000 between 2008 and 2015—to launch or

operate in Los Angeles. The networks were in geographically and socio-economically diverse neighborhoods. Still, each was motivated by a desire to increase civic engagement, to spur economic growth and to improve quality of life. The research casts light on the vast discrepancies in public funding for community wireless initiatives in Los Angeles, as well as the lack of a long-term strategy for sustaining projects. At the same time, this study highlights the potential for community broadband networks to expand digital inclusion when adequate funding is accompanied by political support and technological know-how.

The analytical framework for this study is grounded in the economic theory of public goods. The following section examines relevant literature.

Treating broadband as a public good when crafting policy

In his landmark 1954 paper *The Pure Theory of Public Expenditure*, economist Paul Samuelson (1954) defined public goods as entities "which all enjoy in common in the sense that each individual's consumption of such a good leads to no subtractions from any other individual's consumption of that good..." (p. 387). Public goods are non-rivalrous, meaning that one person's use of a good or service does not detract from another person's use of the same product, and nobody can be prevented from using it. Public goods are also non-excludable, meaning it is impossible to pinpoint which aspects of the commodity benefit individual members of the community. As an illustration, city governments routinely install street lighting. A visitor could stand under the lamppost and use the light to study a map at night. This activity would not detract from another person simultaneously taking advantage of the light to read a book while waiting for the bus. An example of a public good benefit relevant to media is over-the-air broadcasting. An infinite number of people can pick up the

signal for a particular radio program, and it does not undermine anyone else's ability to hear the same program. While geography limits the benefits of some public goods, such as air conditioning at a municipal library, others "accrue to everyone in the world," (Stiglitz, 1999, p. 310). Specifically, Stiglitz (1999) identifies five global public goods: international economic stability, international security (political stability), the international environment, international humanitarian assistance and knowledge.

Public goods often produce positive externalities, or beneficial side effects, that are not reflected in the investment cost. Returning to the street lamp analogy, governments typically install this infrastructure for the practical purpose of providing light. But, as a side benefit, well-lit streets increase neighborhood safety (Welsh and Farrington, 2008). News broadcasting is characterized as a public good because the media inform the public about current events. But positive externalities emerge from the news media's function as a watchdog over elected officials; as a forum for the exchange of diverse views; and as a source of information for voters (Pickard, 2014).

The converse of a public good is a private good. A private good is rivalrous because multiple people cannot use it simultaneously—or its use by one person reduces the quantity and/or quality of the good available for others. A pizza is an example of a private good. The person who baked it can deny requests from others to sample a slice. Once the pizza has been consumed, it can never be eaten again. An example germane to telecommunications policy is the ability to receive landline calls. You must own or have access to a fixed device associated with a particular number, and that line is available to just one caller at a time (with the obvious exception of conference calls).

This study characterizes government-subsidized community broadband networks as a public good. Assuming adequate physical infrastructure—including fiber, switches and routers—is deployed, and that protocols route and direct traffic efficiently through the network, the internet is non-rivalrous and non-excludable. Government support of the internet also produces what is known as "merit goods." Governments usually provide merit goods for free, for the benefit of an entire society, because the market would not step up to do so (Musgrave, 1959; Leys, 2001; Ali, 2013). Merit goods address situations where the social weight or concern of an issue differs from what individual members of society may want or realize. For instance, the social benefits associated with one man receiving a measles vaccination exceed the personal benefits to him. One individual is helped by another individual's vaccine, even if each is unaware of that fact (Koch, 2008). Chettiar and Holladay (2010) point out that the internet "produces billions of dollars of free value for the American public: information is shared, reused, and reconfigured without fees or penalties" (p. vii). Because private firms rely on infrastructure to be productive, the internet is inherently a public good that produces positive externalities. In contemporary society, broadband networks generate external effects that enable the production of goods and services, which are fundamental to a capitalistic economy. The technology creates jobs in entirely new industries, bolsters global competitiveness, and enhances quality of life for Americans (Rodriguez, 2006). Broadband has positively impacted education, medical treatments, public safety, community ties, and how information spreads (Federal Communications Commission, 2010).

Communication scholars have repeatedly urged policymakers to conceive of broadband access as a public good, "just as essential as access to affordable housing and

health care" (Smith, Rhea and Meinrath, 2012, p. 54). In a democracy, all people have the right to participate in policy debates and civic engagement now requires broadband access. More than 60% of Millennials report getting political news on Facebook (Mitchell, Gottfried and Matsa, 2015); public meeting notices are posted to government websites; elected officials are most easily contacted via email; community issues are deliberated in blogs; City Council meetings are live-streamed; and public comments on legislative proposals are submitted electronically. For each of these aspects of democratic participation, one relies on the internet.

Regulators attempt to ensure a competitive telecommunications market by, primarily, enforcing anti-trust laws. However, governments also subsidize infrastructure projects (freeway construction is a key example) because they view these initiatives as public goods that create jobs and stimulate long-term economic growth. Policymakers embrace the idea of treating broadband networks as public goods to ensure affordable and widespread access to the technology—as well as to attract innovative, high-tech companies with the potential to create jobs and boost the economy. In 2009, at the height of a global recession, Australian Prime Minister Kevin Rudd announced plans to build a national fiber network that would connect 93% of homes, schools and businesses to the internet (Australian Government, 2016). Closer to home, in July 2009 President Obama allocated more than $4 billion for broadband grants and loans, as part of a massive economic recovery package (The White House, 2009). In 2014, India's federal government announced plans to invest about $5.4 billion in broadband networks as part of an ongoing effort to improve connectivity in rural villages (Arakali, 2014).

Another argument for approaching broadband connectivity as a public good is the internet's role as a massive commons. Not only does the internet provide access to information, it is a virtual space for participation, creativity, and communication (Holman and McGregor, 2010). The logical layer, encompassing non-proprietary protocols such as TCP/IP and open source software, is mutual property of the entire online community (Solum and Chung, 2004; Hofmokl, 2009). The content layer, comprised mostly of information anyone can access, is also delineated as a public good (Hofmokl, 2009). Finally, the internet functions as an information commons in the sense that it empowers consumers to create, produce, and distribute knowledge. As a result, neither producers nor consumers of content must rely on publishing companies or the media to disseminate their ideas and work. This concept is exemplified by the popular mobile app Waze (2016). Some users share real-time traffic and road hazard information. Other drivers plan their commutes based on this data—a non-rivalrous public good that is free and collaboratively produced.

Not all communication scholars and economists agree with the characterization of the internet as a pure public good. They note that broadband deployment is inequitable, with large segments of the population excluded from access. Barriers to connectivity include a lack of access to computers or infrastructure, as well as poor digital literacy skills. And, of course, certain people lack motivation to use the internet, as they fail to see how it would enhance their lives (McKensey and Company, 2014; Anderson and Perrin, 2015; Zickuhr, 2013). Another argument against characterizing broadband as a public good is that it can, in fact, be rivalrous. When a network is congested, one person's online activity (i.e. streaming video) might diminish another's use. Raymond (2012) suggests the internet functions as "a set of nested clubs," rather than as a commons. Although club goods involve non-rivalrous

consumption, excludability is rampant. Specifically, not everyone can afford internet access; access varies depending on an individual's ISP; and people living in particular countries are granted varying access to online content (Raymond, 2012). Proprietary software and subscription-only databases are additional examples of club goods associated with the internet.

This research relies on a public good framework to examine several Los Angeles mesh networks that received government funding. The following section discusses the research questions, as well as the methodology used to explore them.

Research questions and methodology

Community wireless networks as a public good

Community wireless initiatives rank as potentially the most significant public goods to emerge from networked culture. Their peer-to-peer architecture provides ideal conditions for fostering civic engagement and eliminating the need to rely on telecommunications companies for connectivity. Instead of information passing from "one to many," it may travel from "many to many." The primary internet relies on centralized access points and ISPs for connectivity. By contrast, in a viral communications architecture, components are both independent and scalable. Wireless mesh network design includes at least one access point with a direct connection to the internet—via fiber, cable or satellite link—and nodes that hop from one device to the next. As the popularity of these networks grows, new users add nodes. Signals then have shorter distances to hop and more redundancy is built into the system, ultimately strengthening the network (Rowell, 2007). By examining public investments in peer-to-peer networking initiatives, this study aims to better understand how

government agencies can help ensure broadband access for all Americans. When neighbors share bandwidth, other public goods emerge such as stronger community ties, self-reliance and opportunities for democratic deliberation (AUTHOR, 2011). In this sense, WiFi signal sharing is more than a promising "last mile" technology able to reach every home for a fraction of the cost required to lay fiber, DSL and cable (Martin, 2005).

Research questions

Grassroots mesh projects strive to serve a function beyond providing connectivity. They aim to create "a radically different public sphere" (Burnett, 1999) by situating themselves outside of commercial interests. Typically, one *joins*, as opposed to *subscribes to*, the services. With viral communications, "the definition and ownership of services" is separate from data transmission itself, and internet users are empowered to create new services on their own. As Lippman and Reed (2003, p. 1) observed, "Communications can become something you do rather than something you buy." This was certainly a key ideology driving the launch of three community mesh initiatives in Los Angeles, including Little Tokyo Unplugged; Open Mar Vista (and the network's attempt to expand to the Hollywood Studio District); and a series of mesh networks proposed by MCT. Samuelson (1954) chose the term "collective consumption goods" to emphasize their non-rivalry aspects and the diffusion of benefits across entire communities. As the researcher viewed these L.A. community mesh projects through a public goods framework, two primary research questions emerged:

RQ1: How, if at all, did each government-supported wireless initiative benefit network users by providing new opportunities for internet access?

RQ2: Did government investment in community networking initiatives further over-arching public good goals, such as economic development and civic engagement?

Methodology

Qualitative methods work best to illuminate questions involving the political and social realities of broadband use and policy. The flexible nature and depth of semi-structured interviews, specifically, made them ideal for this project. During interviews, answers evoked by the initial questions directly shaped subsequent ones. The format also made it possible to ask follow up questions and to re-frame queries as interviews progressed. Qualitative interviews enable the researcher to ask participants to elaborate on points of particular interest and, conversely, the researcher can guide the conversation to more relevant themes when informants veer off topic. As conversations continue, participants are more inclined to reveal their true feelings and beliefs (Bryman, 1988), a process that increases both the richness and validity of the data. Interviews also provide a level of detail that may be obtained only through qualitative research. Between January 2015 and February 2016, the researcher conducted interviews with 11 key stakeholders. Informants included network founders; network users; city of Los Angeles staff; a local mesh networking advocate; and a California Public Utilities Commission (CPUC) representative. The types of questions asked varied depending upon each informant's role and relationship to mesh networking. However, each interview focused on how the three Los Angeles mesh networks were implemented; the significance of government support or inadequate support; oversight of public funds; and community impacts resulting from the free wireless networks. Ten interviews conducted over the telephone lasted between 30 and 60 minutes. The face-to-face interview lasted 90 minutes, and took place in the informant's office. The researcher followed up with five informants, asking clarifying questions via email or during brief phone conversations.

Additionally, the researcher conducted a document analysis that encompassed reports submitted to state grant-making agencies; news media coverage; and neighborhood council meeting agendas and minutes. Document analysis is particularly applicable to qualitative case studies (Bowen, 2009). Various types of documents can help "uncover meaning, develop understanding, and discover insights relevant to the research problem" (Merriam, 1988, p. 118). The documents examined for this study provided background information and perspective. The information extracted from documents also helped contextualize data collected during informant interviews.

The following case studies—analyzed through a public goods framework—focus on the relationship between government agencies and three L.A. community wireless initiatives they funded.

Little Tokyo Unplugged

The Little Tokyo section of downtown Los Angeles is a significant center of culture and history for Japanese Americans. Little Tokyo's population of 5,800 residents skews older (Local Initiatives Support Corporation, 2013) and poorer than Los Angeles as a whole. The community's annual median household income is about $17,500, compared to the citywide median income of more than $48,400 (City-Data.com, 2016). The Little Tokyo Service Center (LTSC)—founded in 1979 to serve Asians and Asian Pacific Islanders—provides social services, job training, youth programs, and mental health counseling. It also partners with other non-profits to develop affordable housing.

Recognizing a need to increase internet access for area residents, the LTSC launched a community wireless network dubbed Little Tokyo Unplugged in 2008. At the time, no cable

companies offered broadband connectivity in Little Tokyo, and many residents could not afford the available DSL service. The LTSC (2010) aimed to narrow the digital divide in underserved areas of Los Angeles by deploying broadband infrastructure and running education projects. From the start, the LTSC focused on generating public goods. The center hoped to use broadband "to stimulate community development with literacy training, small business education, workforce development, and public safety improvements" (LTSC, 2010, p. 1). In addition to enabling area residents to get online, the LTSC envisioned the WiFi network as an "outreach tool," according to an informant who worked on the project from its inception. When users logged onto the network, they landed on a splash page with information about events and issues impacting Little Tokyo. "We wanted a way to connect people and help them feel they are part of a community," this informant said. LTSC perceived fostering community as a merit good. WiFi was meant to create benefits not only for individuals who gained internet access, but for the entire Little Tokyo neighborhood.

Multiple public agencies supported Little Tokyo Unplugged. The L.A. Department of Water and Power allowed the LTSC access to its dark fiber (fiber it owned but did not use) to provide high-speed connectivity. The L.A. Community Redevelopment Agency—one of about 400 agencies throughout California that worked to create jobs and affordable housing—subsidized a commercial ISP subscription that provided the "gateway" to the internet, the informant said. CRA money was also used to purchase about 10 mesh nodes, which the LTSC placed on the rooftops of buildings it owned. Mesh repeaters extended the network signal throughout the community. Finally, the LTSC (2010) generated revenue by providing bandwidth to a network of L.A. Police Department security cameras in Little Tokyo and adjacent Skid Row.

But the most significant public support arrived in 2008, when a non-profit corporation established by the CPUC awarded the LTSC a $250,000 grant. With this money from the California Emerging Technology Fund (CETF), the LTSC (2010) planned to deploy several wireless networks in Little Tokyo affordable housing communities; launch a demonstration WiFi project in South Los Angeles; and expand existing WiFi coverage to the neighboring Arts District. When the CETF grant period began, expensive galleries and trendy bars had yet to replace the Arts District's shuttered factories and abandoned citrus warehouses (L.A. Conservancy, 2016).

The LTSC spent a year planning and deploying networks in an area that ran for about 3 blocks east and west, as well as 3 blocks north and south. "The location of the nodes was dictated by where we had access to rooftops," the informant explained. The CETF funding had an immediate positive impact. The money enabled LTSC (2010) to deploy multiple community wireless networks that reached 2,479 housing units. Of those, 321 residents connected to the networks and obtained internet access in their homes. The free mesh network became the main internet connection for businesses and non-profits in the community, the informant said, adding that it was "not unusual" for about 100 people to log onto the network daily. Ultimately, more than 2,200 unique users accessed the center's 12 free WiFi networks (LTSC, 2010), and "Little Tokyo Unblogged" (2014) evolved into an important source of community news. Wireless connectivity allowed the LTSC to install six touchscreen kiosks, informing tourists about the neighborhood's businesses and history. An AmericaCorps volunteer recruited residents living in the center's affordable housing developments to serve as "network caretakers," capable of providing technical assistance to

Little Tokyo Unplugged users. The AmericaCorps volunteer also created a reference manual for residents willing to help monitor and maintain the mesh networks (Niiya, 2009).

As the network's accomplishments mounted, however, so did its challenges. The increasing popularity of smartphones meant more mobile devices began accessing Little Tokyo Unplugged. This required the LTSC to deploy additional access points, which caused signal interference. Network users also overwhelmed LTSC staff with complaints about everything from lost connections to computer viruses. "We ended up being IT support for the entire community," the informant said. Around the same time, the economic recession sapped foundation funding, and the LTSC (2010) was unprepared for the funding and process delays that accompany working with municipal agencies. In addition, the L.A. Community Redevelopment Authority, a primary financial supporter of Little Tokyo Unplugged, could no longer commit resources after the California Legislature made moves to dissolve it. To generate revenue, the LTSC toyed with charging $10/month to access the wireless network. When that plan was met with tepid interest, the center looked into selling ads. "It got very complicated, and we weren't set up to be an ISP," the informant noted.

By 2010, hundreds of community members and organizations relied on Little Tokyo Unplugged for connectivity, and the LTSC (2010) had invested nearly $3 million in the project—including money spent on related technology initiatives such as operating computer centers and offering computer literacy classes. Even so, the LTSC shut down the network that year. "The decision was made that we couldn't sustain it," the informant said. Today, remnants of Little Tokyo Unplugged remain. Broken nodes and cameras dot rooftops, and non-functioning kiosks remain. The LTSC's once-thriving Diskovery Community Technology Center has been repurposed as an activity center for seniors.

Discussion and public good analysis

Free networks like Little Tokyo Unplugged are "paving the way for economic revitalization," (p. 18) according to an Obama administration (2015) report. This analysis finds that Little Tokyo Unplugged generated not only economic benefits, but also social and educational public goods. While just several hundred people relied exclusively on Little Tokyo Unplugged for connectivity, all of Little Tokyo's 5,800 residents made indirect gains from the free network. Specifically, the splash page raised awareness of community issues; business owners could better serve existing customers and attract new ones; and non-profits could redirect money previously spent on ISPs. Individual network users produced merit goods, as well. For instance, using the internet to search for a job reduces time unemployed by about 25% (WebJunction, 2013), and low unemployment clearly benefits the entire community. The housing development residents trained as network caretakers could transfer the technical knowledge gained in professional situations.

However, the positive impacts of public investments in Little Tokyo Unplugged—including a $250,00 grant from the CETF and support from the L.A. Community Redevelopment Authority—were ephemeral. As noted, Little Tokyo Unplugged thrived for three years but collapsed when public support disappeared. LTSC administrators never developed a long-term strategy for sustainability, or a carefully thought-out management plan. As a result, decisions were made in reaction to challenges, as opposed to in anticipation of likely problems. As LTSC (2010) staff acknowledged, that some of its planned programs were "under-resourced and time consuming due to less-than adequate planning, coordination, and staffing." Additionally, wireless mesh technology relies on network users to act as nodes and expand signals. Therefore, as more people participate in

the network, it becomes more robust. However, according to both the network informant and grant reports, the LTSC did not use the government award in hire a staff person dedicated to community outreach. The findings suggest that, in order to achieve public good goals, local and state grant-making entities must invest in grassroots mesh networks that possess strategic plans and adequate staffing.

The following section examines a community broadband network launched by social entrepreneurs in the Mar Vista section of Los Angeles. The case study focuses on the founders' attempts to secure financial and institutional support from local policymakers.

Open Mar Vista

In 2008, two social entrepreneurs living in Mar Vista— an ethnically and economically diverse neighborhood in Los Angeles with about 37,500 residents (L.A. Times, 2016)—identified a need for a social media platform dedicated exclusively to community issues. Three years before the launch of NextDoor, they created Open Mar Vista as a virtual space for residents to connect. The site quickly caught on, with posts covering everything from art exhibits to car thefts. At the time, nearly 100,000 San Francisco residents were using a free open mesh network deployed by Meraki (2008), a start up that developed wireless routers. An informant said the founders of Open Mar Vista viewed San Francisco's Free the Net initiative "as the new library," and decided to emulate it. They "recognized the challenge of trying to meet both civic and corporate needs and wanted to create a broadband network for the greater good," the informant said. The Open Mar Vista founders developed a business plan and began deploying mesh nodes throughout Mar Vista.

They envisioned the network as extending the "last mile" and helping close the digital divide, the informant added.

Los Angeles has a system of nearly 100 neighborhood councils meant to provide residents with a venue to engage in policymaking (L.A. Department of Neighborhood Empowerment, 2016). The Mar Vista Community Council purchased outdoor wireless antennas for about $200 each, and installed them along Venice Boulevard, a main corridor in the neighborhood. The antennas had a range of up to 1,000 feet. Open Mar Vista created a continuous network along Venice Boulevard by installing mesh routers that extended the antenna signals. Area businesses contributed bandwidth in exchange for publicity on the network's splash page. In spots where no host could be found, Open Mar Vista itself purchased bandwidth, according to another informant involved in the WiFi initiative. By mid-2009, more than 8,000 people had accessed the free internet service, and an estimated 1,000 users logged on weekly (Argonaut, 2009).

The network founders restructured Open Mar Vista to include a free tier for users content with speeds of 1 megabit per second (mgps), while charging $10/month for a 5 mgps connection. An informant who purchased a subscription recalled paying $200 for a Meraki router, which Open Mar Vista installed on the roof of her home. She retained her ISP subscription and contributed bandwidth to Open Mar Vista in exchange for the opportunity to "market" her parenting blog on the splash page. This informant said personal ideology motivated her to participate. "It meant a lot to me to be part of Open Mar Vista. Even in Mar Vista, where there are $5 million homes, some people lack internet access," this informant said. She noted that "there's always a wait for computers at the Mar Vista library" and that "a broad spectrum of people" use them.

In 2010, the L.A. Department of Neighborhood Empowerment (DONE) recommended that neighborhood councils reduce paper correspondence with constituents and, instead, shift communication to email blasts and website posts (City of Los Angeles, 2010). Soon after, the L.A. Neighborhood Council Coalition recommended online voting for future elections (DONE, 2016). The confluence of these two developments spurred neighborhood councils throughout the city to explore deploying mesh networks in their own communities. At the time, each council received an operating budget of $45,000 (Kercher, 2010). Open Mar Vista determined that if each neighborhood council contributed at least $5,000 toward a WiFi initiative, it could deploy "50 to 100 mesh networks in key locations" and expand into "Open Neighborhoods," one informant said.

In 2011, the Hollywood Studio District Neighborhood Council (HSDNC) voted to invest $6,500 of its budget to purchase high-power antennas for Open Mar Vista to deploy a mesh network capable of providing WiFi to nearly all 30,000 people living within its boundaries. Although HSDNC board members believed free WiFi would enable them to reach more people, an informant said "the main issue" was digital inclusion. "The reality is that poor, working class Latino members of our district have limited access to the internet. A lot of people have cell phones, but we see gaps," this informant said. More than 65% of all Hollywood Studio District residents are Hispanic, and the neighborhood's median household income of $35,300 is significantly below the $57,000 median income for L.A. County as a whole (Find the Home, 2016). Following the HSDNC's vote to invest in a wireless network, key pieces of the project fell into place. Paramount Studios agreed to contribute bandwidth and Mayor Eric Garcetti—then an L.A. City Council member representing the Hollywood

Studio District—offered to host an antenna on his office roof, an informant said. A non-profit offered to donate refurbished laptops for local students, this informant added.

The project could not proceed, however, until City Council sanctioned the HSDNC's $6,500 payment to Open Mar Vista. "The normal process was for council to approve the expenditure and write a check," an informant said. However, for the next two years, the city of Los Angeles and DONE raised a series of concerns. DONE staff insisted its rules required neighborhood councils to undertake a competitive bidding process before spending money on an ISP. When HSDNC board members pointed out that the Mar Vista council funded Open Mar Vista in 2009, DONE said that project was never "properly reviewed," according to an informant. City legal staff Angeles focused on liability: Did the neighborhood council have insurance to cover potential damage caused by antennas on private rooftops? How would the neighborhood council prevent network users from downloading child pornography and pirated music? (In reality, federal law immunizes ISPs from liability related to content transmission.) Significantly, lobbyists from Time Warner Cable pressured L.A. City Council members to reject the HSDNC's request for $6,500 to build the network, according to several informants.

During an August 2013 L.A. City Council meeting, HSDNC president Bill Zide urged lawmakers to release funds needed to deploy the WiFi network (YouTube, 2013). Although City Council staff followed up with Zide (YouTube, 2013), the funding never materialized. After literally years in limbo, the founders of Open Mar Vista concluded the city would likely never allow neighborhood councils to contribute to their project, an informant said. In 2014, they abandoned efforts to deploy WiFi networks throughout Los Angeles. Still committed to the providing free internet, the HSDNC solicited bids for a

wireless network from several technology companies. These companies estimated that blanket WiFi coverage of the neighborhood would cost at least $20,000—three times higher than what Open Mar Vista proposed charging to deploy a mesh network. Following a final unsuccessful attempt to raise money from local businesses, the HSDNC scrapped the idea in 2015. “The problem with the system is too many layers,” an HSDNC informant concluded. “We are unpaid volunteers who have to follow strict rules. And other interests have more clout—there are developers and big business concerns, and an undercurrent that the city contracts with a cable company with a sanctioned monopoly.”

Discussion and public good analysis

The failed wireless project had the potential to spur profound social and economic public goods, yet a combination of government bureaucracy and political pressure prevailed. During 2011-2012, Los Angeles’ overall budget was $6.9 billion budget (City of Los Angeles, 2011). In this context, the $6,500 allocation requested by the HSDNC is miniscule. Furthermore, the council was not asking City Council to invest new money but, simply, to approve an expenditure from the HSDNC’s own budget. Rather than treat internet connectivity as a public good, however, the city of Los Angeles clung to the status quo—a conviction that “the market” will provide access for disenfranchised residents. The effort to establish Open Neighborhoods encompassed multiple overlapping characteristics associated with public good enterprise philanthropy projects: a culture and capabilities focused on innovation and experimentation; strategic framing that coordinated targeted resources (in this case, both public and private investments) in hopes that they could collectively create systemic change; and an approach that addressed entire institutions and communities, as

opposed to individual business goals (Organization for Economic Co-operation and Development, 2014).

Ironically, the Mar Vista Community Council is working to revive the Open Mar Vista network. Affordable broadband access is a necessity not only for marginalized community members, but it is also needed by vendors at the Mar Vista farmers market who accept credit cards. Nearly 1,300 neighborhood residents continue subscribing to the Open Mar Vista (2016) blog, exemplifying community members' desire to connect.

Manchester Community Technologies

In 2012, the CPUC awarded $453,000 to a small non-profit, Manchester Community Technologies (MCT), to install free wireless internet along main corridors in low-income neighborhoods throughout Los Angeles. MCT promised a wireless "cloud" of networks that would benefit "underserved and unserved" populations, ultimately creating "a smarter more educated community" (South Bay Sub-Regional Broadband Consortium, 2012, p. 27). This seamless WiFi—to be deployed over a 3-year period, from 2013 through 2015—would enable residents to browse the web while waiting for the bus, as well as complete homework assignments and access services. MCT stressed the public good aspects of the project, asserting that the CPUC investment would boost the local economy by helping businesses attract customers (South Bay Sub-Regional Broadband Consortium, 2012). The $453,000 grant came from a fund that collects $315 million in ratepayer surcharges for capital projects in areas of California that lack connectivity. The CPUC designated a fraction of the money to regional groups, including MCT, to encourage broadband adoption (California Advanced Services Fund, 2016).

In October 2015, MCT submitted a quarterly report to the CPUC claiming to have launched 16 community WiFi networks, with coverage areas ranging "from ¼ mile to 1 square miles, enabling over 100,000 community based unique end-users the opportunity to connect to the Internet" (South Bay Regional Broadband Consortium, 2015). The report also stated that MCT deployed WiFi hot spots at 13 L.A. parks, as well as dozens of businesses, community centers and non-profits. It describes MCT's community broadband initiative as providing "economic advantages" to small business owners by giving them "a private network," applications, and banner ads to promote their businesses (South Bay Regional Broadband Consortium, 2015). The researcher spent months attempting to interview community organizations, local business owners, and residents using MCT's free community networks—and failed to reach even one person aware of their existence. The researcher conducted two phone interviews with MCT's director during Fall 2015 to determine how the $453,000 grant had been spent. When asked how MCT publicized the networks, the director replied, "People who use the networks know." She said she didn't "have time to get into" details of how the mesh technology was deployed. When the researcher requested links to the splash pages for each network, the MCT director said they were "not quite done." The researcher also attempted to reach multiple organizations cited as partners in the South Bay Regional Broadband Consortium (2012) grant application: Family Love Outreach, United Latinos in America, ByParents4Kids, IACInc., and Making a Difference Together Foundation, among others—ultimately determining these organizations do not exist. It is also unclear how several "core members" of the South Bay Sub-Regional Broadband Consortium (2012) contributed to the project. For instance, the grant proposal identifies Kimberly Kinermon as an "instructor/consultant," while the MCT homepage lists

Kinermon as "associate VP" of MCT (2016). Kinermon owns an L.A. shop specializing in hair weaves.

In summer 2015, a CPUC staff person overseeing MCT's $453,00 award told the researcher that "no one from the CPUC" could answer questions because the commission was "not involved in the grantee work." *Los Angeles Times* writer Doug Smith investigated the wireless networks and hotspots MCT claimed to have deployed. Smith (2016) reported that he found no working WiFi signals at dozens of locations cited by MCT in its quarterly reports. In response to Smith's queries, the CPUC visited MCT sites in January 2016 and determined that service was available at just two of the locations where the organization was paid to provide free WiFi (Smith, 2016). In its defense, MCT asserted that a lack of community buy-in prevented it from delivering on commitments made in the grant proposal (Reicher, 2016).

Discussion and public good analysis

The potential public good benefits of the networks MCT was funded to deploy cannot be overstated. Studies demonstrate that broadband is a critical tool to achieving educational success; enabling economic development; improving health care; and maintaining social ties (FCC, 2010). However, because MCT never built the "mesh cloud" it promised, the CPUC's $453,000 investment failed to fulfill the commission's public good goals—strengthening digital literacy skills and increasing broadband adoption among Los Angeles' most marginalized residents and small business owners. These failures can be attributed to a combination of weak leadership, unrealistic goals and lax state oversight. As the head of the CETF told the *L.A. Daily News*, the CPUC erred when it "approved a consortium to do something that was maybe out of its league" (Reicher, 2016). Certainly, an

organization with a single full-time employee and no apparent experience seems an unlikely choice for leading a complicated, publicly funded WiFi initiative. Had the CPUC fact-checked MCT's grant proposal in 2012, it would have realized that most of the non-profits listed as "core members" of the South Bay Regional Broadband Consortium were fabricated. After the award was granted, a routine audit by the CPUC would have revealed that MCT exaggerated the number of sites hosting nodes, as well as the number of network users. Instead, the CPUC accepted MCT's figures and published them as "accomplishments" (CPUC, 2013, p. 42; CPUC, 2014) in annual reports.

The loss of potential public goods is, perhaps, the most troubling outcome of this case study. Specifically, government officials familiar with the MCT project are likely to draw the conclusions that it is foolish to subsidize community wireless networks. In reality, when competently run, these projects can meet community needs. As seen in the Little Tokyo and Mar Vista case studies, peer-to-peer networking goes beyond providing a commodity—that is, internet access. Viewed from a public good perspective, those who join signal-sharing communities are making a deliberate choice to challenge the existing telecommunication model and push for digital democratization.

Conclusion

Insert Table 1 and Table 2 here.

As Kaul and Mendoza (2003) asserted, public and private realms are defined not by natural law, but by "deliberate policy choices" (p. 80). Community WiFi networks possess

demonstrated potential to foster public interest goals relevant to telecommunications policy (De Filippi and Tréguer, 2014), yet government agency support for Los Angeles' community networks has not been incorporated into a comprehensive digital inclusion strategy (*see Tables 1 and 2*). These case studies highlight the need for a "big picture" approach. The absence of an actual strategy is partially evidenced by vast discrepancies in funding amounts. L.A. City Council denied a modest request for $6,500, while the CPUC granted $453,000 for a similarly structured project. Little Tokyo Unplugged thrived for three years, but proved unsustainable when public funding disappeared. In the case of Open Mar Vista/Hollywood Studio District, local policymakers erected logistical hurdles that blocked social entrepreneurs from deploying low-cost networks throughout the city. Finally, the failures surrounding the CPUC funds awarded to MCT make it clear that simply throwing money at mesh initiatives is not enough, either. While grants and subsidies help community groups purchase servers and antennas, stakeholder buy-in and technical expertise are key to accomplishing the ambitious objectives community wireless projects set for themselves. Community mesh networks require all these elements in order to produce economic and social public goods.

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