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# *WHY FIBER?* SHOULD SAN FRANCISCO DEPLOY A FIBER BROADBAND NETWORK?

*San Francisco Blue Ribbon Panel on Municipal Fiber  
Subcommittee on Technology & Infrastructure*

Panel Co-Chairs: Professor Susan Crawford and Supervisor Mark Farrell

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## The Municipal Fiber in San Francisco Reports

These reports evaluate the prospect of deploying a fiber-optic network citywide, in support of San Francisco's longstanding effort to guarantee every single resident of San Francisco affordable, world-class high speed internet service.

In "Why Fiber?" our panelists seek to establish, first, why the City and County of San Francisco should consider playing a greater role in the delivery of internet access to its residents, and second, if it decides to take that step, why it should choose to build out a fiber-optic network to every home and business across the entire city. As a shorthand, "Why Fiber" captures the main idea.

In forthcoming documents, to be published in serial after this one, each panel subcommittee will address important questions that drive this conversation forward. Whether internet access should be treated as a public utility. What business models are available to San Francisco to ensure any potential fiber-optic network is self-sufficient in the long term? What financing mechanisms are available to San Francisco? What privacy, governance, net neutrality, and security protocols will ensure ISPs that operate in San Francisco using such a fiber-optic facility deliver services that live up to San Francisco values? These topics will help frame the consideration of whether and how to improve internet connectivity across the city.

Informed with the panel's input, San Francisco will better understand how to assess the policy challenges and opportunity costs it faces as the entire city decides whether to move forward with the overall project.

# SHOULD SAN FRANCISCO DEPLOY A FIBER BROADBAND NETWORK?

*Blue Ribbon Subcommittee on Technology & Infrastructure*



## Topline Recommendations from The Subcommittee

**San Francisco Should Build a 21st Century Network to Connect Every Resident, Business, and Civic Institution in the City.** San Francisco has a unique opportunity to build out world-class, 21<sup>st</sup> Century high speed internet access to every home, business, and civic institution in the city, including non-profits. Fiber-optic cables have a proven track record of delivering the highest available speeds, quality of service, data capacity, and upgrade opportunities – which are, as far as we can tell, virtually infinite once the fiber-optic wires are installed.

**Upgraded, Affordable, High Speed Internet Access Will Benefit City Residents Across Virtually Every Dimension of Civic and Economic Life.** Better, cheaper connectivity that respects privacy and protects net neutrality will improve life for city residents. A new fiber network, made available to competing private providers at a reasonable and uniform cost, will drive down the costs of connecting to the internet at home and upgrade internet capacity for all of San Francisco. The new network will lower costs, improve choice of providers, and increase access to information.

**A San Francisco Network Must Embody San Francisco Values: the Network Must Be Inclusive and Equitable.** San Francisco's buildout must prioritize connecting every home and premise in low adoption neighborhoods. Residents and local businesses simply cannot afford to remain on the wrong side of the digital divide. Revenues from leasing should be targeted to reinvesting in San Francisco's local connectivity solutions, in particular by helping low income families connect and improving overall tech literacy. The network must facilitate competition and consumer choice.

## The Digital Divide is Real in San Francisco

**San Francisco Residents Need Affordable Internet Access.** We begin the discussion with an unmet demand. Data shows many San Francisco residents are priced out of the internet access market, despite high demand. "Unaffordability of telecommunications services" is the most important barrier to internet access for low income Californians. [1]

**High Speed Internet Access Isn't Reaching All of San Francisco.** Does affordability matter? Some observers suggest low income residents cannot or do not want to use advanced technology, and so they do not need affordable, fast connections to the internet. Survey data proves otherwise. Californians across income subgroups rely on home internet access to search for jobs, help kids with homework, and stay connected with family. [2]



**Students in San Francisco Lack Equal Access to the Internet.** Who lacks affordable home internet access? Students born and raised in San Francisco, especially public school students. Fifteen percent (15%) of San Francisco public school students lack home access to the internet. [3]

**Students Can Achieve Across the City With Better, More Reliable, Affordable Access.** Improving internet access for young San Franciscans will improve school achievement. Among students without home access nationwide, up to 50% report lower grades on school work completed without Internet access. [4] Connectivity strengthens parent-to-school connections, which improves grades and, for English-learners, speeds successful language development. [5]

**Students and San Francisco Families Deserve World-Class Access.** Fiber access to the internet has become the global standard. A new fiber network would ensure that no young person growing up in San Francisco, and no one living, working, or considering whether to open a business in San Francisco is held back by second-rate internet access.

**Panelist Insight**



“It’s important to address the device divide; not just the connection divide. Families and individuals who rely solely on smart phones often face data caps and plan terms that constrain Internet use. Wired connections in the home can support multiple connections and don’t suffer from the same limitations.”

Professor Catherine Sandoval, Santa Clara University Law School

**San Francisco Should Choose Proven Technology**



**What is Fiber?** Fiber wires, or “fiber optic” strands, are a type of wire made of glass and used to transport data. To build out a fiber-optic network, engineers will connect fiber strands to the city’s utility poles in some neighborhoods and in others lay wires beneath sidewalks (in underground “conduits”), with community input through local processes.

**Fiber Means Faster, Better Internet Access.** A new fiber-optic network can outcompete older, slower internet access networks made up of copper material or coaxial material (owned by telephone and cable companies). Fiber carries pulses of light rather than electric signals: nothing moves faster than the speed of light. Compared to these older networks, fiber provides the highest speeds and the greatest data capacity, and the gains will increase exponentially, all without having to rebuild a new network in the future. Upgrades to the electronic equipment that connects to either end of the wires (and therefore, equipment that is installed without digging up the fiber) will improve what the network will do once it is installed.



## Technology Comparison: Fiber is the Technology Standard Around The World

**Fiber is Future Proof.** Fiber-optic networks are made up of light and glass: fiber-optic glass strands move data from one part of the internet to another as high speed pulses of light. With a citywide fiber network, the speed of light will be the upper bound for how fast data can move both for uploads and downloads. The coaxial cable networks and copper telephone networks that right now handle internet access service for San Francisco residents simply cannot move data at that speed and cannot be upgraded to carry the capacity of data that fiber can.

**Copper Can't Compete with Fiber.** The copper networks buried underground and strung along the street poles of San Francisco have a speed limit. Copper networks originated as the medium to send telephone signals across the country. Even with network upgrades, copper networks in San Francisco cannot handle ever increasing demand for affordable high speed internet.

**Coaxial Cable Can't Compete with Fiber.** Unlike fiber networks, cable ("hybrid fiber coaxial" or "HFC") networks carry electrical pulses instead of light. These networks cannot carry the virtually unlimited amount of data that fiber can carry.

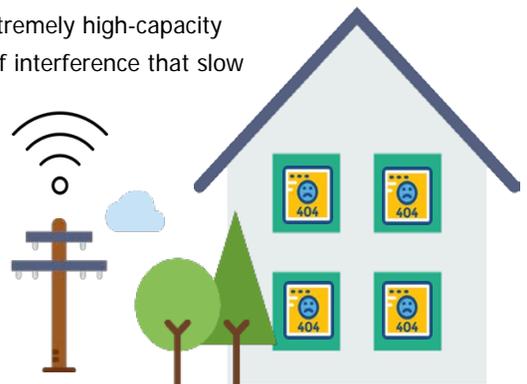
## The Limits of Smart Phones with Data Plans

**The Quality Gap Between Mobile and Wired Internet Access.** Mobile dependence is growing in the U.S.: households whose only affordable means of home internet access is a smart phone data plan. Where that plan is subject to caps, exceeding these caps will trigger substantial fees. And access through mobile plans is often downgraded or slowed when usage moves past a certain level. Data plans are not a substitute for having a wired home connection.



**Mobile Reliance Limits Internet Access.** Mobile dependence is a consequence of economic inequality, not consumer choice. On one side of this divide, just 1% of Americans nationwide who earn more than \$75,000 per year rely solely on smart phones for home internet access. [6] On the other side, almost half (48%) of mobile dependent households have had to cancel data plans at least once due to financial hardship. [6]

**San Francisco Homes Deserve Wired Internet.** Can wireless internet replace in-home routers and deliver the same internet experience? Not for the foreseeable future. Even with extremely high-capacity wireless signals located on street poles, internet signals are susceptible to sources of interference that slow down or disrupt the connection. <sup>1</sup>



<sup>1</sup> Depending on spectrum



## Fiber Will Strengthen San Francisco's Economy

**Boost Small Business and Local Nonprofits.** A stronger, more inclusive local economy requires faster, more affordable internet. Fiber will make small businesses and nonprofits more productive and more connected. Local businesses in San Francisco will gain efficiencies that spur job growth and greater private sector investment. The city's nonprofits will broaden their presence across the country and the world, expanding their impact.

**Equip San Francisco's Workforce.** Fiber deployed citywide would enable workers in every neighborhood to stay connected to the office through seamless video conferences and through cloud applications like online email. Home internet access dramatically expands job training access. Real-time traffic and commute data saves time and resources for those who can use it instantaneously. Mobile banking is a safer alternative for many retail customers.



**Open Opportunities for Home Businesses and Flextime for Families.** Fiber unlocks new potential in San Francisco's workforce. The flexibility of working online will directly support dual income households with small children, homebound elders, and workers with disabilities. High speed internet usage was shown to foster a 4.1 percentage increase in married women's workforce participation, with gains amongst college-educated women with children. [7]

**Improve Life for Job Seekers.** Job seekers rely on the internet to achieve their employment goals. Research shows using online job search leads to better labor market outcomes, including faster re-employment for the unemployed. [8]

### Panelist Insight



"The structure of the broadband market isn't incentivizing companies to build out new bandwidth for their customers but rather to profit from scarcity. A fiber project would make sure customers don't have to settle for scarcity. Bandwidth becomes abundant. The business models will factor in a new sense of abundance – new online services and ways to access data-heavy content that do not come close to taxing the capacity of a fiber network."

Kit Walsh, Staff Attorney, Electronic Frontier Foundation



## Big Internet Access Companies Are Deepening The Digital Divide

### Restricting Access to Market Data

- Policymakers often suffer from an asymmetry of information about internet quality in their own cities.
  - **Unverified Data:** Accurate data about actual internet access speeds and pricing is routinely hidden from view, or fundamentally unreliable. The California Public Utilities Commission has documented that state efforts to gather accurate market information with respect to wireline home internet access is “hobbled by carriers withholding of information based on claims of confidentiality.” [8]
  - **Vague Promises:** At times, companies will promise high speed internet access to certain wealthy, high-end housing developments and falsely indicate that the upgrades apply to a much broader and more economically diverse collection of neighborhoods. [9]
  - **“Trial” Pricing:** Media reports have documented extensive use of limited-time, carefully worded pricing offers to falsely create the impression that affordable, high speed internet access is available when it is not. [10]
- For these reasons, San Francisco should be skeptical of suggestions that the private market is on track to deploy high speed internet access across the city.



### Limiting Investment in Certain Neighborhoods

- The private market has little to no incentive to prioritize communities most affected by the digital divide.
- While private companies will understandably focus on their own economic interests, local governments are more likely to consider a broader range of issues, such as ensuring service to the underserved.
- The big internet access companies generally do not take action to improve pricing or upgrade networks until market competition spurs them to action. [11] [12]

### Influencing the Federal Communications Commission

- Meanwhile, current U.S. regulators including the Federal Communications Commission have indicated they will dramatically cut federal oversight measures to protect low-income, low-access communities, including privacy and net neutrality rules, citing complaints by ISPs.
- The U.S. Congress has voted to repeal internet privacy protections. [13] Legislation repealing the FCC oversight of data privacy and network security has been signed into law by the president. [14]
- Regulators also seek the repeal of net neutrality anti-discrimination protections. FCC Chairman Ajit Pai announced in April that he plans to repeal the FCC’s legal authority to enforce net neutrality and privacy laws on ISPs, setting end of 2017 as the timeline for final repeal. [15] The FCC’s proposal to repeal net neutrality rules will allow internet providers to block access to sites and to throttle or slow user or content speeds, among other harmful effects.



## Drive Market Competition by Improving Choice

Studies show that when cities construct or offer broadband services, they enhance competition and market choices and don't eliminate the market. City broadband construction and offerings establish an affordable price as the floor for high speed, reliable broadband. With the right "open access" policy in place, ISPs could use the fiber in competition with one another. The local government provider would stay out of providing retail services itself, instead opting to control a purely "municipal" wholesale internet access service, similar to a street grid on which many trucks and buses compete.

**Table 1**

ECON 101: A New Competitor Offering 1 Gpbs, Symmetric Home Internet Access Drives Down Prices		
Plan	Decrease in Average Monthly Internet Access Bill	
Guaranteed 1 Gpbs	\$57 to \$62 per month	34% to 37% decrease
Guaranteed Speeds of 100 Mbps or Higher	\$27 per month	25% decrease
Guaranteed Speeds of 25 Mbps or Higher	\$13-\$18 per month	14% to 19% decrease
Source: Analysis Group Report, November 2016 [16]		

## Dedicate Revenues to a Digital Inclusion Fund



Prioritizing service to the underserved neighborhoods in San Francisco might increase the cost of building and operating a citywide network, but the costs will be offset by increased economic opportunities for those with the greatest needs.

Affordable high speed internet access service accessible throughout the city is an essential prerequisite to close the digital divide in San Francisco. Access to affordable equipment and training are also critical for community members to learn to use technology productively and understand the benefits of high speed Internet access. The Federal Reserve Bank of Dallas recently reported that: "in communities with limited broadband infrastructure or no broadband infrastructure, investment in computer access or skills training will not be effective until investment in broadband infrastructure is developed." [17]

In concert with the roll-out of any fiber network, the city should establish a digital inclusion fund that draws from revenues generated by service providers who lease access to the network, as well as philanthropic contributions and federal and state grants. The fund should allocate resources to equipment and training for low-access, multi-lingual, and low-income households across San Francisco.



## An Opportunity for Community Engagement

*A Message from Subcommittee Chair Santa Clara University Law School Professor Allen S. Hammond*

Once the Panel concludes its work, San Francisco must continue to be mindful of the importance of engaging the community throughout this planning and buildout process. While the city may be unified in its collective need for improved connectivity, a new, high speed fiber network must be planned, built, and operated as a community asset. That means knowing and responding to community needs.

Community engagement is best thought of as a two-way process. The city engages the community to determine ongoing connectivity needs as they manifest and shift in response to experiences with broadband technology. Through the work of San Franciscans for Municipal Fiber, community surveys asking detailed questions in multiple languages have been deployed to the city's neighborhoods. Community groups must continue to play a crucial role in creating opportunities for fruitful engagement.

The city will use community engagement to educate all of its residents about the opportunities presented by drastically improved connectivity. By continuing to listen and engage, San Francisco can determine how best to continue training and recruiting new users to expand their facility with new technology and ensure the new network is a citywide success.

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