

MEMORANDUM

VIII. #1

TO: UTILITIES ADVISORY COMMISSION

FROM: INFORMATION TECHNOLOGY AND UTILITIES DEPARTMENTS

DATE: September 2, 2015

SUBJECT: Staff Recommendation that the Utilities Advisory Commission Recommend that the City Council Defer Issuing a Request for Information on Partnership Opportunities for a Fiber-to-the-Premise Network; Issue a Request for Proposal(s) to Expand Wi-Fi Coverage to City Facilities and Public Areas, and Improve Wireless Communications for Public Safety and Utilities

Recommended Motion:

Staff recommends that the Utilities Advisory Commission recommend that City Council consider the following recommendations:

1. Defer issuing a Request for Information (RFI) until after December 31, 2015 to determine interest from the private sector in partnering with the City to build and operate a citywide fiber-to-the-premises (FTTP) network. The intervening time between now and the end of the year should enable emerging gigabit broadband services from the private sector to be settled.
2. Issue Request for Proposal(s) (RFP) to expand Wi-Fi coverage in additional City facilities and public areas, in addition to deploying dedicated wireless facilities to improve communications for Public Safety and Utilities departments.

This memorandum also provides an update about the City's ongoing discussions with Google Fiber to build a fiber-optic network in Palo Alto, in addition to AT&T's plan to deploy its gigabit-speed Internet service called "GigaPower" in Palo Alto.

SUMMARY

On February 2, 2015, the Council approved and authorized the City Manager to execute two Professional Services contracts in amounts not-to-exceed \$144,944 and \$131,650 to Columbia Telecommunications, dba CTC Technology & Energy (CTC), for a FTTP Master Plan and a complementary Wireless Network Plan respectively (Reference CMR ID # 5443).

The FTTP Master Plan evaluated the following:

- Maintaining the viability of the existing dark fiber network offerings;
- Evaluation of potential uses of the existing dark fiber network to support citywide FTTP deployment;

- Information for City staff, City Council, Utilities Advisory Commission, Citizen Advisory Committee, and other stakeholders on benefits, risks, and challenges of a network deployment in a competitive business and residential telecommunications market dominated by two large incumbent service providers;
- Outline of the incumbent service providers' likely reactions to a municipal FTTP overbuild;
- Anticipating the influence of public and private FTTP offerings on market structure, including potential business models that may include a public-private partnership;
- Consideration of the use of existing City and Utilities assets to encourage FTTP deployment;
- Outline of the impact FTTP might have on the usability of City and Utilities assets;
- Based on a high-level engineering study, a realistic estimate of the cost to deploy and operate a citywide FTTP network.

The complementary Wireless Network Plan evaluated the following:

- Deployment of public Wi-Fi and secure City enterprise network access at City buildings and other facilities not already served;
- Deployment of a point-to-multipoint network for secure City enterprise access for first responders and Utilities;
- Deployment of a citywide mobile data network for public safety users.

The key recommendations from CTC in the FTTP Master Plan and Wireless Network Plan are as follows:

FTTP Master Plan¹

1. Recommends the City not directly pursue provision of retail services through FTTP;
2. Recommends exploring a partnership model where the City builds, owns and maintains fiber with services provided by one or more private sector Internet Service Providers (ISPs);
3. Recommends issuing a Request for Information (RFI) to explore private sector interest in a viable partnership and develop a framework and documentation for FTTP deployment and a subsequent competitive solicitation.

Wireless Network Plan²

1. Recommends expanding the City's existing Wi-Fi coverage to additional City facilities and adjoining public areas such as parks;
2. Recommends installing dedicated wireless facilities to address the needs of the City's first responders and Utilities;
3. Recommends considering a citywide broadband wireless network for use by the general public.

In its reports, CTC notes the importance of recognizing that wireless technology is not a competitor to FTTP technology in a market such as Palo Alto; rather, they work together and complement each other. Wireless provides a mobility component to the City's fiber-optic

¹ [Exhibit A \(FTTP Master Plan\)](#); [Exhibit B \(Existing Market Assessment\)](#); [Exhibit C \(FTTP Financial Models\)](#)

² [Exhibit D \(Wireless Network Plan\)](#); [Exhibit E \(Wireless Financial Models\)](#)

backbone. Fiber-optics, in turn, provides the high capacity backhaul³ extension needed to create a robust, high-capacity, low-latency wireless broadband network.

BACKGROUND

At the February 2, 2013 City Council retreat, the Council chose “Technology and the Connected City” as one of its three top priorities for 2013. A Council Committee was formed for this initiative and on June 24, 2013, the Council approved a Council Committee recommendation to develop a work plan to evaluate the feasibility of building a citywide FTTP network and requested the City Manager to appoint a Citizen Advisory Committee (Advisory Committee) to assist in the evaluation (Reference CMR ID #3914). On October 28, 2013, the Council approved the Council Committee recommendation (Reference CMR ID #4203) to develop a FTTP Master Plan to build out the City’s dark fiber backbone system to provide Fiber-to-the-Premises and develop a complementary Wireless Network Plan with a near-term focus on Wi-Fi, and a long-term consideration of other wireless technologies.

In February of 2014, the City Manager appointed nine (9) Palo Alto residents to the Advisory Committee. The committee has met nine times since the committee was established and meets approximately every two months. At this time, there are six active members remaining on the committee. The committee members are: Richard Brand, Bob Harrington, Andrew Kau, Donn Lee, Christine Moe and Andy Poggio. The most recent Advisory Committee meeting occurred on August 20, 2015.

The City’s Chief Information Officer (CIO) is responsible for directing staff activities for the Technology and the Connected City initiative. Under the direction of the CIO, staff developed request for proposals (RFPs) to retain consulting services for the FTTP Master Plan and Wireless Network. Approximately 1.75 FTEs are assigned from the Information Technology and Utilities Departments to develop the plans.

Development of the RFP for each plan was assisted by the Advisory Committee. RFPs were issued in July of 2014. Through a competitive bidding process, four vendors were interviewed by City staff and one member of the Advisory Committee in September 2014. The interview panel selected CTC Technology & Energy to recommend to the Council to provide professional consulting services for the FTTP Master Plan and Wireless Network Plan. CTC is an independent communications and IT engineering consulting firm with more than twenty five years of experience. CTC has provided the City with professional telecommunications consulting services since 2000. CTC’s customer base includes federal, state and local government agencies and the firm has been a leader in developing “gigabit-facilitation strategies.”⁴

At the June 3, 2015 UAC meeting, Chair Foster appointed Commissioners Danaher and Schwartz to the UAC’s Fiber-to-the-Premises committee. Staff met with Chair Foster and Commissioners

³ “Backhaul” is a term used in communications to define the medium used (i.e. fiber optics, copper and coaxial cable and microwave) to transmit voice, video and data traffic to a network backbone and then back to a remote or central site.

Danaher and Schwartz on July 8, 2015, to provide background for Utilities' commercial dark fiber enterprise, the FTTP Master Plan and Wireless Network Plan and timetable to complete these plans, and also provide an update on Google Fiber and AT&T GigaPower. Staff also met with the committee on August 21, 2015, to review the draft plans prepared by CTC.

DISCUSSION

Fiber-to-the-Premises Master Plan

The FTTP Master Plan report prepared by CTC focuses on helping key stakeholders to understand the potential challenges and difficulties of operating a “for-choice” retail broadband service, an open access network model,⁵ or other variations of these models. The report also assesses the likely reaction from incumbent telecommunication service providers if the City built a citywide FTTP network.

CTC does not recommend offering conventional cable television or landline telephony services. This is due to continuing consumer migration away from traditional cable offerings in favor of “over-the-top” (OTT)⁶ video content (e.g. Netflix, Hulu, Amazon Instant Video, YouTube, Sling TV and iTunes). Another important trend is the estimated 40-50% of U.S. households now without a landline telephone service, relying instead exclusively on cellular phones and other OTT telephony services such as Voice over Internet Protocol (VoIP). These trends will continue as more non-traditional video content and voice services emerge and greater programming variety becomes available via OTT. This trend is commonly known as consumer “cord-cutting” which appears to be happening at a more accelerated pace than most telecom industry analysts anticipated.⁷

The FTTP Master Plan report presents an assessment of existing City infrastructure and assets, evaluation of recommended technologies, detailed financial modeling and cost projections, and additional considerations for the City. The report includes financial considerations, including market variables that may affect market share, cash flow, and other fundamental aspects that might affect the FTTP offering and its long-term financial sustainability. The following outlines the highlights of the key findings and recommendations in the report:

1. Obtaining market share and acquiring new customers is necessary to the FTTP offering's sustainability, as long as this does not interfere with the established revenue stream and customer base for the commercial dark fiber enterprise. Maintaining the viability of the

⁴ CTC is not affiliated with equipment manufacturers or cable operators and has no relationships with firms or individuals who may submit proposals in response to future RFPs that may be developed through this engagement. CTC's responses to the FTTP and Wireless RFPs states that “we can provide independent guidance; we have, as a policy, no financial stake in the strategies you choose and will not bid on any resulting construction work.”

⁵ An open access network model has historically been defined as one network infrastructure over which multiple, separate providers can offer service.

⁶ OTT refers to delivery of audio, video and other media over the Internet without the involvement of multi-channel pay-TV providers such as cable TV and direct broadcast satellite companies in the control or distribution of the content.

⁷ Reuters, August 7, 2015: U.S. pay TV cord-cutting accelerates in second quarter - analysts
<http://www.reuters.com/article/2015/08/08/television-cable-idUSL1N10J00P20150808>

existing dark fiber offering is important to Utilities to avoid erosion of the customer base and existing revenues (approximately \$2 million in net revenues each year). Note, however, that the dark fiber enterprise will likely see competition from planned services from AT&T, Comcast and other providers.⁸

2. **Cost and Financial Analysis for FTTP Deployment:** Section 8 of the report provides the anticipated costs and financial analysis associated with an FTTP deployment. All assumed costs used in this analysis were vetted with City staff for accuracy. This analysis is a snapshot projection based on certain assumptions, and represents a range of potential outcomes, which depend on a variety of factors. CTC's analysis shows that, assuming the network achieves the take rate⁹ required to cash flow the enterprise, the City will require an estimated overall capital investment of approximately \$77.6 million¹⁰ to build the network over a three year period (take rate projections for this report are explained in item #8 below). The components of this capital investment include network equipment, outside plant and facilities, last mile and customer premises equipment and miscellaneous implementation costs. This cost and the anticipated startup costs associated with initial network deployment are subject to change based on real-world variables.
3. **Inventory and Assessment:** In Section 3 of the report, CTC conducted preliminary research into the City's existing infrastructure and assets as an initial step toward planning how best to deploy FTTP infrastructure. CTC notes that existing infrastructure is not always an asset in the pursuit of FTTP; for example, if barriers to the infrastructure are too many or the cost to "ready it" for FTTP is too great. CTC also considered the existing dark fiber optic backbone system, and what role it might have in an FTTP network, if any. Utility poles and conduit were also evaluated. One obstacle to leveraging an asset is getting it "cleaned up" to the point of being usable in the course of a citywide FTTP network build.¹¹ A primary example of this is the "make-ready" process that must occur for a utility pole that does not have enough space for the attachment of new facilities for FTTP. In some cases utility poles may need to be replaced entirely if there is not enough space.
4. **Comparison of FTTP Technology:** Section 4 of the report describes the primary types of FTTP technology deployed today. From a purely technical standpoint - independent of a given network's design or goals - each of these technologies has strengths and weaknesses. CTC recommends using Gigabit-capable Passive Optical Network (GPON) technology, which is the most commonly provisioned FTTP technology due to its inherent economies as compared with other technologies evaluated in the report. The network design and GPON

⁸ *Comcast Ethernet V. Dark Fiber - The Dark Side of Dark Fiber*
http://business.comcast.com/docs/default-source/white-papers/cb_ethernetvsdarkfiber_whitepaper_3-14.pdf?sfvrsn=0

⁹ Take rate is the percentage of subscribers who purchase services from an enterprise - and is an important driver in the success of an FTTP retail model. If the required take rate is not met, the enterprise will not be able to sustain itself and its operational costs will have to be offset through an alternative source.

¹⁰ See FTTP Master Plan Report Table 10, page 130, "Capital Additions."

¹¹ The existing fiber infrastructure is approximately 54 percent overhead and 46 percent underground. The majority of the underground infrastructure is placed in commercial areas - only approximately 15 percent of it is underground in residential areas. The majority of new fiber for the FTTP network will be placed in residential areas and will likely follow aerial routes.

technology proposed by CTC represents the current state of the art within the framework of financial feasibility.

5. The term “overbuild” refers to deploying a network where incumbent telecommunication service providers already serve customers. A new FTTP network competes directly with existing local cable, DSL, and other incumbent ISPs to offer services to customers. Fiber overbuilds generally do not offer a high rate of return, which is why there are not many private sector providers seeking to build fiber networks where customers are already served. Private and public sector entities that opt to overbuild usually consider alternative reasons and benefits for deploying a network and focus on other value drivers that make business sense. Examples of these drivers are communities seeking to enhance economic development by providing access to ultra-high speed Internet to serve businesses and research parks. An example of a private sector overbuilder is Google Fiber, which has the financial resources to disrupt the market and push the other providers to improve their data offerings to remain competitive.
6. The potential reaction from large incumbent telecommunication and ISPs to competition from a municipal FTTP network should not be overlooked. CTC encourages the City to come to internal agreement on its public messaging. Incumbents in Palo Alto would likely respond to the City’s market entry by running pricing promotions and other specials to target consumers and attempt to lock them into long contracts. They may also launch politically slanted campaigns fraught with scare tactics, claiming that the City is already well-served with broadband and has no reason to develop a municipal offering.
7. An alternative to traditional overbuilding is to “cherry pick”, or build to areas of a community where the provider is most likely to obtain a high number of subscribers willing to pay for service with a resulting high rate of return on capital investment. This approach is similar to Google’s “fiberhood” strategy where they only build if a certain percentage of residents sign up. Nevertheless, this approach is often not feasible for a public entity due to the political pressure to provide fiber access to all premises in the community irrespective of future rate of return on capital investment.
8. If the City built and operated a FTTP network and provided for-choice retail services there are inherent challenges that the City would face. These challenges include high costs compared to other metropolitan areas for labor and materials. Moreover, the cost of outside plant (OSP)¹² and drop cables¹³ will be greater than other metropolitan areas because Bay Area costs, particularly labor and overhead for employees, tend to be higher.¹⁴
9. As a result of these high build and staffing costs, the required take rate is 72 percent, which is significantly higher than private and public overbuilders have been able to obtain. In

¹² OSP is physical assets like overhead and underground fiber, accompanying ducts and splice cases, and other network components.

¹³ Drop cables connect the fiber optic backbone to the customer premises.

¹⁴ Labor will be more costly than in other metropolitan areas because salaries in the Bay Area tend to be higher on average, and overhead for City employees is calculated at an extremely high 65 percent. As a comparison, CTC has usually calculated this rate at approximately 35 percent in other recent studies CTC conducted. The model assumes that all debt service and network replenishments would be covered, which factors into the necessary take rate.

comparison, CTC's recent analyses conducted for other municipalities have shown a required take rate in the mid 40 percent range in order to maintain positive cash flow."

10. CTC evaluated using initial funding that does not need to be paid back, such as using the Fiber Optic Fund Rate Stabilization Reserve¹⁵ to help cover implementation costs to reduce the required take rate. In Section 8.3.2 of the report, Figure 30 shows the impact of funding amounts to \$20 million in \$5 million increments. For each \$5 million in funding, there is approximately a 3.8 percentage point drop in required take rates.¹⁶ Nonetheless, the possibility that an overbuilder can obtain a 57 percent take rate as shown in the graph in Section 8 of the report (Cost and Financial Analysis for FTTP Deployment/page 143/Figure 30) in a competitive telecommunications market with two dominant providers (AT&T and Comcast) and several smaller providers is unlikely.
11. In light of the high cost to build and the extremely high take rate required, it may seem that there is little incentive for any public or private overbuilder to pursue a FTTP deployment in Palo Alto; however, the public and private sectors have unique advantages that may impact their ability to undertake a standalone overbuild. A private and public entity could complement one another by developing a partnership that can take advantage of each entity's strengths, and may significantly reduce risk.
12. Many private providers have certain cost advantages that a public entity simply cannot replicate, like buying power with vendors for decreased electronics costs and the potential to reduce or entirely avoid maintenance fees for electronics. Large private providers will often maintain their own inventory of core electronics and share use of electronics over deployments in multiple markets. This is a cost savings and an advantage with which the City is unable to compete.
13. Many private providers already possess internal technical capabilities, and they may share staffing with other deployments. Technical support, sales, customer service, and other personnel may simply be reallocated to support deployment in a new market, with little to no impact on overhead costs and no need to hire additional staff. As an example, a large provider like Comcast does not necessarily have to hire additional staff to support an influx of 20,000 new customers. It can leverage its existing staff pool, which is already supported by its customer base in other markets.
14. The private sector can also avoid some of the staffing challenges the City faces by locating staff in other regions. As noted, Bay Area salaries are high, and the overhead for City employees is especially costly. If the City wanted to directly provide retail service, it could potentially reduce overhead costs by outsourcing to local firms, but for political reasons it will likely not be in the City's best interest to contract with entities outside Palo Alto. The private sector is at an advantage because it does not have to manage the same political considerations as the City. The operational costs that the City can expect to face are thus greater and more complex than what an established, private-sector entity with economies of scale might incur.

¹⁵ The Projected Ending Reserve for FY 2016 is \$22.4 million.

¹⁶ Note the individual data points in Figure 30 will vary from the 3.8 percent average since the resulting cash flow balances and projected Internal Rate of Return (IRR) vary from case to case.

15. Absent a private entity building and operating an FTTP network with unfettered data access, CTC recommends that the City consider pursuing a public-private partnership that leverages each party's strengths, shares financial risks, and provides unfettered data access to the community. CTC's report evaluates the numerous advantages and disadvantages of the various public-private partnership models in its report.
16. In light of the high costs the City will face for labor and overhead and the high necessary take rate, CTC does not recommend that the City directly pursue an FTTP model in which it provides retail services. The City simply does not have the same buying power as the private sector, and it is not particularly skilled at operating a for-choice competitive business. However, it may make sense for the City to deploy, own, and maintain the fiber infrastructure, and to engage a private provider to manage the FTTP enterprise's operations. This would allow the City to focus on the long-term fiber investment and to leverage a private partner's operational efficiencies to potentially create a strong enterprise and reduce the take rate necessary to make the enterprise cash flow.
17. As a next step in FTTP planning, CTC recommends the City develop and distribute a Request for Information (RFI): a potential key step toward exploring the interest of the private sector in developing viable partnerships is to develop a framework and documentation for a request for information (RFI) process. This will help the City clearly articulate its goals and inform the private sector of the City's existing assets (e.g. rights-of-way, utility poles, conduit and fiber) and its desire to deploy FTTP. CTC recommends that the City undertake this process to help inform its own needs, and to clearly break down its expectations for itself and a potential partner.
 - a. Note: Staff agrees with CTC's recommendation to issue an RFI, but recommends postponing the issuance until emerging gigabit broadband services from the private sector are settled.

Wireless Network Plan

The Wireless Network Plan prepared by CTC included a comprehensive analysis of the long-term needs for municipal wireless services within Palo Alto. CTC examined a wide range of applications that could potentially be addressed through the implementation of one or more commercial wireless technologies. CTC also examined various deployment scenarios such as blanket citywide coverage through Wi-Fi technology, expanded targeting of Wi-Fi access at and around City facilities, and dedicated projects focusing on providing priority, high-reliability services to the City's critical infrastructure operated by Utilities and public safety agencies. The process to gather information for this analysis involved a "user needs assessment" which involved in-depth interviews with staff in several City departments (City Manager, Information Technology, Planning/Transportation Division, Office of Emergency Services, Public Works and Utilities).

In addition to the above-noted staff interviews, a community survey was also conducted on Palo Alto Open City Hall to determine the interest in public Wi-Fi potentially provided by the City. The summary for the outcome of the survey shows the following results for 275 respondents:

- Over 85 percent of respondents identified ultra-high speed Wi-Fi Internet access in Palo Alto as important;
- Almost 65 percent of respondents indicated a willingness to pay for the service;
- 46 percent of respondents believe city government should provide Wi-Fi services to the public.

The results of the City wireless survey are found [here](#).

Based on CTC’s staff interviews and analysis, the Wireless Network Plan presents an assessment of existing City infrastructure and assets, evaluation of recommended technologies, detailed financial modeling and cost projections, and additional considerations for the City. The report also includes examples of other municipalities that built Wi-Fi and wireless networks for a variety of communication needs and applications, including public access to these networks. The report includes “lessons learned” for each example.

The following provides background for the recommendations noted above and the various factors the City should consider for municipal wireless implementation scenarios that address specific communications needs within the City and the community:

1. Expand the deployment of Wi-Fi coverage to City facilities and adjoining public areas. The City successfully deployed Wi-Fi to thirty (30) City facilities for public and internal City use; CTC recommends that the City continue to deploy Wi-Fi at other City facilities, smaller City buildings, and park and recreational areas.
2. Install dedicated wireless facilities to address the needs of the City’s public safety responders and Utilities. To address the City’s high-priority internal needs, CTC recommends that the City consider deploying wireless infrastructure to support enterprise applications. For Utilities, these would include real-time monitoring and control of facilities that are not connected to the existing fiber-optic network (e.g., pump stations, electrical line monitoring).¹⁷ For public safety agencies, the wireless infrastructure would support mobile and portable communications for command and patrol vehicles, as well as incident command networks in the areas where existing commercial wireless services are often saturated due to a high concentration of public users (e.g., major events at Stanford University).
3. Consider a citywide broadband wireless network for use by the general public. A citywide public Wi-Fi deployment is technically feasible, however, only in concert with the deployment of a citywide FTTP network. The existing fiber-optic infrastructure operated by Utilities has neither the capacity nor the coverage area to support a citywide wireless deployment without a major expansion. If, on the other hand, a citywide fiber-optic network were in place, it would provide a mechanism for backhauling traffic from the individual wireless access points with transmission speeds measured in gigabits. This type of

¹⁷ Monitoring of electrical lines for voltage amplitude and phase shift. Monitoring provides a means to measure power in real time and adjust the system to achieve higher efficiency.

system would have the capability and coverage area to provide service competitive with existing 4G and future 5G commercial wireless networks.

Based on the above-noted recommendations, CTC has recommended four independent scenarios, which can be implemented singularly or in combination to address a mix of public and internal City services (including municipal operations and public safety applications):

Scenario 1

Deploy Public Wi-Fi and Secure City Enterprise Network Access at City Buildings:

In this scenario, the City would deploy Wi-Fi at all City buildings not currently served, and support both free public access and secure enterprise network access for City employees. This option is basically an expansion of the City's original deployment (thirty City locations are currently being served) to include all City buildings, parks, and recreational areas. The capital amount required for deployment at additional City sites will depend on the number of sites, and will presumably be comparable to the City's costs for its previous deployments at major City buildings. These City buildings, parks and recreational areas are identified and prioritized in Section 7.2.2 of the wireless network report.

Scenario 2

Deploy Public Wi-Fi and Secure City Enterprise Network Access Citywide:

Scenario 2 would deploy "blanket" wireless coverage for public and City users. CTC envisions a two-phase deployment approach:

Phase A: Leveraging *existing fiber*, provide public Wi-Fi to core City business and residential areas.¹⁸ CTC estimates the capital cost to construct the infrastructure for this deployment to be approximately \$4.7 million, and the yearly operating expenses to be \$600,000 (assuming operation on a subscription basis at \$20 per month, with a minimum of 2,550 customers).

Phase B: Contingent on the City *upgrading fiber* as part of a Utilities upgrade or FTTP deployment provide public Wi-Fi to core business and residential areas.¹⁹ CTC estimates the capital cost to construct the infrastructure for this deployment to be approximately \$3.3 million, and the yearly operating expenses to be \$433,000 (assuming operation on a subscription basis at \$20 per month, with a minimum of 1,880 customers).

Residents and visitors would be able to access the network with any consumer-grade smartphone, tablet, or computer. The network would deliver Gigabit service at each access point, and would be IEEE 802.11/b/g/n/ac compatible.²⁰ Nationally, many communities have deployed citywide Wi-Fi either under municipal funding or in partnership with a commercial provider. These services are generally well-received by the public, *but* CTC states it has been unable to find any municipal implementation projects that represent an economically viable

¹⁸ Phase A: 100 Mbps shared among all users, 400+ wireless access points, light pole mounted, wireless mesh technology.

¹⁹ Phase B: 1 Gbps shared among all users, 600+ wireless access points, light pole mounted, fiber connected to each wireless access point, three to five years after Phase A completion.

²⁰ IEEE 802.11 is a set of media access control (MAC) and physical layer (PHY) specifications for implementing wireless local area network (WLAN) computer communication in the 2.4, 3.6, 5, and 60 GHz frequency bands.

standalone business opportunity. The public will clearly use available free Wi-Fi; however, when asked to pay for the service in a public space, many consumers have little interest. Consumers often will pay for such services in confined/restricted facilities such as an airplane, at an airport, or in a hotel. In contrast, blanket coverage often referred to as “amenity communication services” are generally expected to be provided free of charge.

Scenario 3

Deploy a Point-to-Multipoint Network for Secure City Enterprise Access:

In this scenario, the City would deploy a citywide high-reliability, dedicated, critical-infrastructure broadband wireless network to support public safety, Utilities, Public Works, and Traffic Engineering needs. As in the Police Department’s Mobile Emergency Operations Center (MEOC) incident deployment, City Hall would serve as the core site for a point-to-multipoint deployment.²¹ CTC estimates the capital cost to construct the infrastructure for this deployment to be approximately \$370,000. It is anticipated that the annual operational cost to support this scenario will be low. Staffing will be supported by Public Safety and Utilities as a minor add-on to their current operation of radio, fiber-optic, and other communications equipment. Hardware maintenance will likely be outsourced to equipment manufacturers/vendors. For this scenario CTC estimates a maximum annual expenditure of \$10,000.

Scenario 4

Deploy a Citywide Mobile Data Network for Public Safety Users:

In this scenario, the City would create hot spots for public safety mobile data network access to augment existing wireless operations at key facilities and routes (schools, stadiums, business areas). The hot spots would provide radial coverage to first responders and other authorized users. The City would equip its public safety vehicles with exterior mounted antennas and mobile routers capable of acting as access points. As an initial step, access points could be deployed at Utilities’ nine substations to provide coverage to a significant portion of the City. The City has more than 130 locations (including 101 fiber-connected traffic signals) that are suitable access points, so this scenario has great potential for phased deployment. CTC estimates the capital cost to construct the infrastructure for this deployment to be approximately \$337,600. It is anticipated that the annual operational cost to support this scenario will be low. Staffing will be supported primarily by Public Safety as an addition to its operation of land mobile radio and other existing communications equipment. Hardware maintenance will likely be outsourced to equipment manufacturers/vendors. For this scenario CTC estimates a maximum annual expenditure of \$30,000.

²¹ Sites to be served include: mobile public safety command vehicles, all Police/Fire radio sites, Utilities substations, Utilities facilities not connected to fiber-optic network, selected traffic engineering sites, and portable Public Works camera sites.

NEXT STEPS

On September 28, 2015, contingent on UAC feedback and approval of the above-noted motion, staff will present to the Council the findings and recommendations in the FTTP Master Plan and the Wireless Network Plan.

Google Fiber and AT&T GigaPower Update

In January, 2015, Google selected Atlanta, Charlotte, Raleigh/Durham, and Nashville as the next markets that will receive Google Fiber deployments. In March, 2015, Google announced it would be expanding Google Fiber into Salt Lake City and in early August 2015, Google announced they will also build a fiber optic network in San Antonio, Texas. Google is still evaluating expansion plans in Phoenix, Portland and the San Jose Metro area, which includes the cities of Palo Alto, Mountain View, Santa Clara, Sunnyvale and San Jose. Google has already deployed fiber optics in the Kansas City metro area and construction of a Google fiber optic network is underway in Austin, Texas. In 2013, Google bought an existing municipal fiber optic network in Provo, Utah.

City staff continues to meet with Google representatives on a regular basis. These meetings with Google representatives include discussions about the California Environmental Quality Act (CEQA) requirements, permitting processes for use of the public rights-of-way, utility pole attachments, conduit usage and dark fiber licensing. Staff anticipates that Google will make a final decision to build a fiber optic network in the San Jose metro area this fall.

In April 2014, AT&T announced their plan to bring fiber to the Silicon Valley area. Subsequently, in May 2015, AT&T approached the City with intentions to bring its gigabit Internet service to Palo Alto. This service, called "GigaPower", is an upgrade to AT&T's existing U-verse services (*Project Lightspeed*) and will be deployed to residents via the installation of twenty seven (27) new cabinets that will be placed next to existing U-verse cabinets. Initially, AT&T will select neighborhoods with high potential for adoption and will use consumer demand levels to determine further deployments in the city. AT&T plans to begin construction in the last quarter of 2015 and begin providing service in 2016.

To begin the process with the City, AT&T has provided a sample permit application to the Department of Public Works for review. Once agreement is reached on the submittal of permit applications and the process for moving the permits through the appropriate City departments, AT&T will submit the required applications for all 27 cabinets.

RESOURCE IMPACT

Approximately 1.75 FTEs are assigned from the Information Technology and Utilities Departments to work with CTC to complete the FTTP Master Plan and Wireless Network Plan. Future fiscal impacts will be addressed with the Council once the findings and recommendations from the FTTP Master Plan and the Wireless Network Plan are evaluated by the UAC and Council and further direction is provided on the City's level of involvement in the implementation of the plans.

POLICY IMPACT

Development of the Fiber-to-the-Premises Master Plan and Wireless Network Plan is consistent with the Telecommunications Policy adopted by the Council in 1997, to facilitate advanced telecommunications services in Palo Alto in an environmentally sound manner (Reference CMR: 369:97- Proposed Telecommunications Policy Statements).

EXHIBITS

[Exhibit A \(FTTP Master Plan\)](#)

[Exhibit B \(Existing Market Assessment\)](#)

[Exhibit C \(FTTP Financial Models\)](#)


[Exhibit D \(Wireless Network Plan\)](#)


[Exhibit E \(Wireless Financial Models\)](#)

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