City of Sacramento, California

# Broadband Strategic Plan

## SUMMARY REPORT

October 7, 2023

*Final Summary Report*

Magellan
An ENTRUST Solutions Group Company

www.MagellanBroadband.com

# Summary Report

## I. OVERVIEW

The transition to a digital world has accelerated, spurred by the shift to online learning, remote work, e-commerce, the increase in the automation of services, and advances in technology. The foundation enabling this transformation are fiber optic networks that can provide the high-speed, low latency connectivity required for advanced applications and uses. An engaged community with a shared technology vision and data driven mindset will enable the City of Sacramento to drive innovation, economic benefits, digital equity, and overall wellbeing for the City.

Magellan was contracted by the City to undertake a Broadband Strategic Plan to help improve access and affordability to high-speed internet service for community members, businesses, and efficient delivery of City services. Magellan's scope of work included:

(a) an ***asset inventory*** of both public and private broadband infrastructure;
(b) a ***market analysis*** that evaluated the incumbent Internet Service Providers (ISPs) and their rates, services tiers and speeds;
(c) a ***needs assessment*** that analyzed data sets and indicators of broadband need, including conducting a community survey and hosting focus groups of both City departments and community stakeholders;
(d) a ***review of the City's Capital Improvement Program*** (CIP) and opportunities for alignment with broadband expansion through utility and development coordination and broadband-friendly policies;
(e) conducting a ***wireless field survey*** that evaluated 4G and 5G signal strength, coverages, download and upload speeds along major arterials and corridors;
(f) developing a ***digital resources and services toolkit*** that would combine critical information, programs, resources, and broadband options into a user-friendly and interactive experience;
(g) developing a ***conceptual network design*** that ensured a redundant city-wide backbone fiber loop, maximized connectivity and reach into residential neighborhoods and business corridors, created a phased implementation approach, and evaluated the capital costs and feasibility of the concept;
(h) an evaluation of the different ***business and service models*** the City could consider, including public-private partnerships;
(i) identification of eligible ***grant funding opportunities*** and other financing mechanisms; and
(j) outlining ***key recommendations*** that would implement the Broadband Plan.

# II. SUMMARY OF FINDINGS

## A. Asset Inventory

Magellan identified significant infrastructure within Sacramento that can be leveraged for broadband – whether as locations in the public sphere or right-of-way to host equipment, conduit and fiber pathways to connect facilities and neighborhoods, opportunities to deploy smart city devices and applications, or integration of public and private networks in innovative partnerships.

### *City Communication Network*

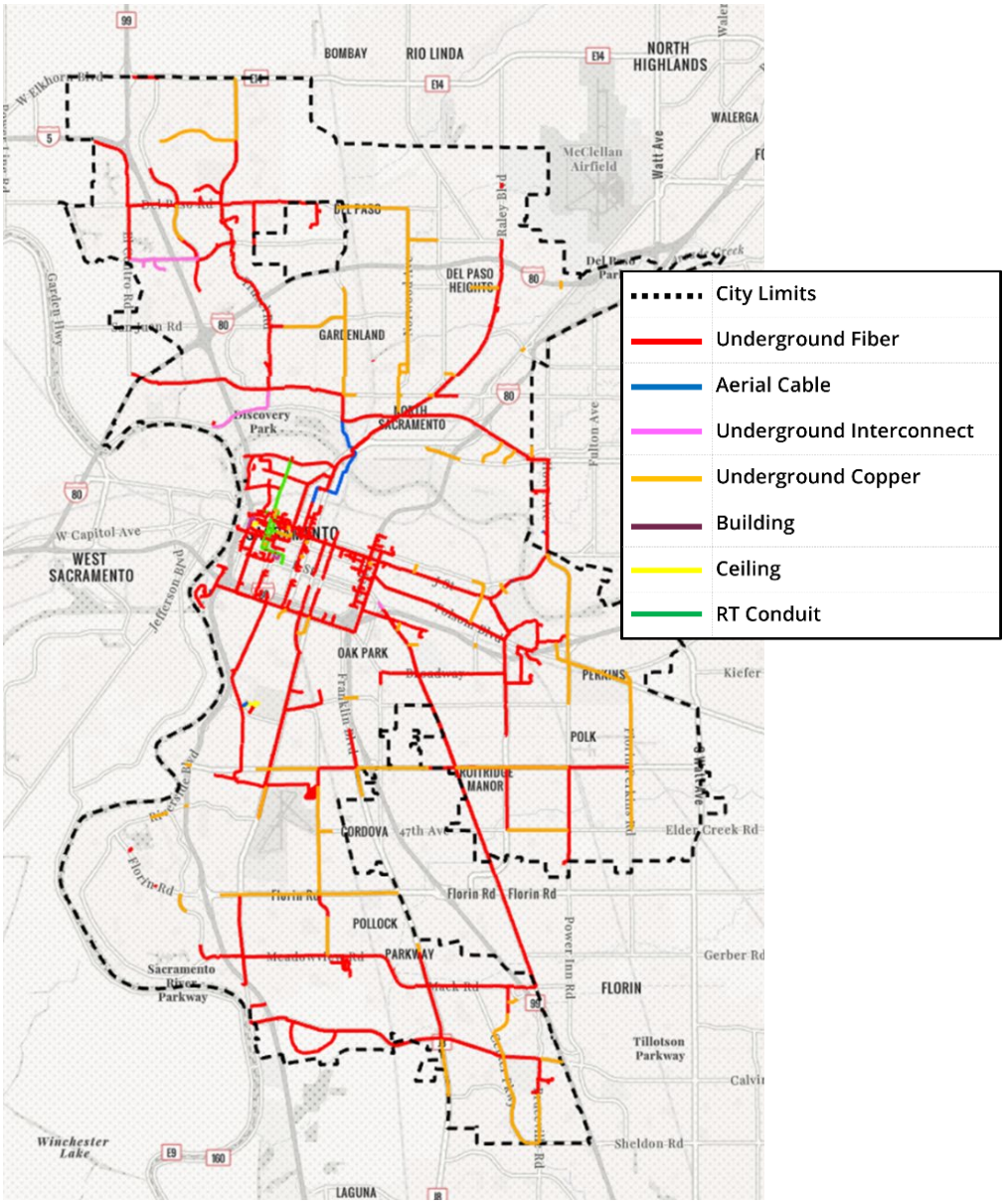


*Figure 1 - Existing City Communications Network*

The City owns and manages a substantial 217-mile communications network of conduit, fiber optic cable, and copper wire. The network is used to provide communications and data transfer between City facilities, buildings, traffic signals, and other asset connectivity.

*Table 1 - City Communications Infrastructure*

| Deployment | Cable | Length (feet) |
|---|---|---|
| Underground Conduit | Fiber Optics | 912,866 |
| Aerial Cable | Fiber Optics | 11,582 |
| Underground Interconnect | Mix of Fiber & Copper | 18,249 |
| Underground Conduit | Copper | 201,530 |
| Building | Fiber Optics | 359 |
| Ceiling | Fiber Optics | 5,339 |
| | **TOTAL** | **1,149,925** |

The network also includes 2,730+ communication boxes, handholes, splice enclosures, or vaults placed throughout the network providing the ability to expand and grow the network by interconnecting new assets or fiber networks.

### *City Facilities & Buildings*

The bulk of the City's 145 buildings and facilities are already connected to the City's network. However, there are 23 sites connected via leased circuits from private ISPs, and 31 other locations with no internet connection that predominantly are dispersed across the City. The 23 sites with leased circuits are being served by private ISPs with just 20 Mbps service, and incur an ongoing annual City expense of $105,138 that could be alleviated if these sites were transitioned to City fiber.

### *Vertical Infrastructure*

The City has an extensive network of between 806 to 903 traffic signal intersections[1] and more than 1,900 control boxes. To date, 561 of those traffic signals have been interconnected for central control through a conduit network, with 90% of those connected via fiber optic cable (the other 10% are connected via twisted copper wire).

The City's 39,641 street lights can provide the requisite vertical infrastructure to deploy wireless communication, particularly in residential neighborhoods. The City currently leases space on City property (land, water tanks, or structures) or on City vertical assets (street

[1] Magellan and the City were unable to resolve the discrepancy between GIS records (903 intersections) vs. City asset portfolio (806 intersections).

light or traffic signal poles) that host nearly 1,100 cellular antenna sites. The City also owns eight (8) communications poles.

### *Utilities*

The City has 59 water assets and 169 wastewater facilities with differing connectivity requirements; most appear to already be connected to the City's fiber and/or copper communications network. However, there are 15 sites that may require connectivity: they are either utilizing a leased circuit from a third party/private provider, connected only via wireless or radio systems, or simply do not have any connectivity.

### *Parks*

The City owns and maintains 466 parks, 27 of which currently have Wi-Fi availability through a public-private partnership with Verizon. However, that partnership is expiring in 2024, and the City will need to add those parks into its network in order to continue provision of wireless services.

### *Private Broadband Assets*

There are also significant private broadband assets within Sacramento. The City has at least three major internet service providers – Comcast/Xfinity, AT&T, and Consolidated/Fidium – that operate their networks from significant fiber backbones. The City has significant metro and long-haul private fiber networks, as well as seven (7) public or neutral data centers that provide connectivity with the rest of the state.

## B. Market Analysis

Most of the City is subject to the common telecom duopoly with limited competition: Comcast/Xfinity is the legacy cable provider with near-ubiquitous gigabit offerings to residential addresses, and AT&T offering Digital Subscriber Lines (DSL) service over their legacy copper (maximum speed of 70 Mbps, which is below the California minimum standard of 100 Mbps), and limited fiber-to-the-premises (FTTP) gigabit services. In limited sections of the City, Consolidated Communications (Fidium) offers FTTP services for a third gigabit option.

T-Mobile and Verizon offer fixed wireless services over their LTE and 5G networks, with maximum speeds between 180-300 Mbps at monthly rates of $50-60.

*Table 2 - Facilities-Based Broadband Providers in Sacramento (Residential)*

| ISP | Network | Max Download Speed | Max Upload Speed | Contract Term | Regular Monthly Rate |
|---|---|---|---|---|---|
| Comcast / Xfinity | Cable | 75 Mbps | 10 Mbps | 2 years | $ 43 |
| | | 200 Mbps | 10 Mbps | | $ 63 |
| | | 400 Mbps | 10 Mbps | | $ 73 |
| | | 800 Mbps | 25 Mbps | | $ 83 |
| | | 1 Gbps | 25 Mbps | | $ 93 |
| | | 1.2 Gbps | 35 Mbps | | $ 103 |
| | | 2 Gbps | 35 Mbps | | $ 143 |
| AT&T | DSL | 768 Kbps - 75 Mbps | 250 - 500 Kbps | None | $ 55 |
| | Fiber | 300 Mbps | 300 Mbps | None | $ 55 |
| | | 500 Mbps | 500 Mbps | | $ 65 |
| | | 1 Gbps | 1 Gbps | | $ 80 |
| | | 2 Gbps | 2 Gbps | | $ 110 |
| | | 5 Gbps | 5 Gbps | | $ 180 |
| Consolidated Communications (Fidium) | Fiber | 50 Mbps | 50 Mbps | 2 years | $ 55 |
| | | 250 Mbps | 250 Mbps | | $ 85 |
| | | 1 Gbps | 1 Gbps | | $ 95 |
| | | 2 Gbps | 2 Gbps | | $ 190 |
| T-Mobile | Wireless | 182 Mbps | 35 Mbps | None | $ 50 |
| Verizon | Wireless | 50 Mbps | 10 Mbps | None | $ 25 |
| | | 300 Mbps | 50 Mbps | | $ 60 |

## C. Needs Assessment

Databases utilized by the California Public Utilities Commission (CPUC) to identify households in the City that have no (or insufficient) broadband access shows a significant number of un-served locations[2] that overlap low-income, disadvantaged communities, and socio-economic vulnerability across the City, indicating a high need for broadband investment and eligibility for state and federal grants.

[2] The CPUC defines "unserved" as locations where access to broadband services does not exceed 25 Mbps download and 3 Mbps upload, or where DSL service is the only option.

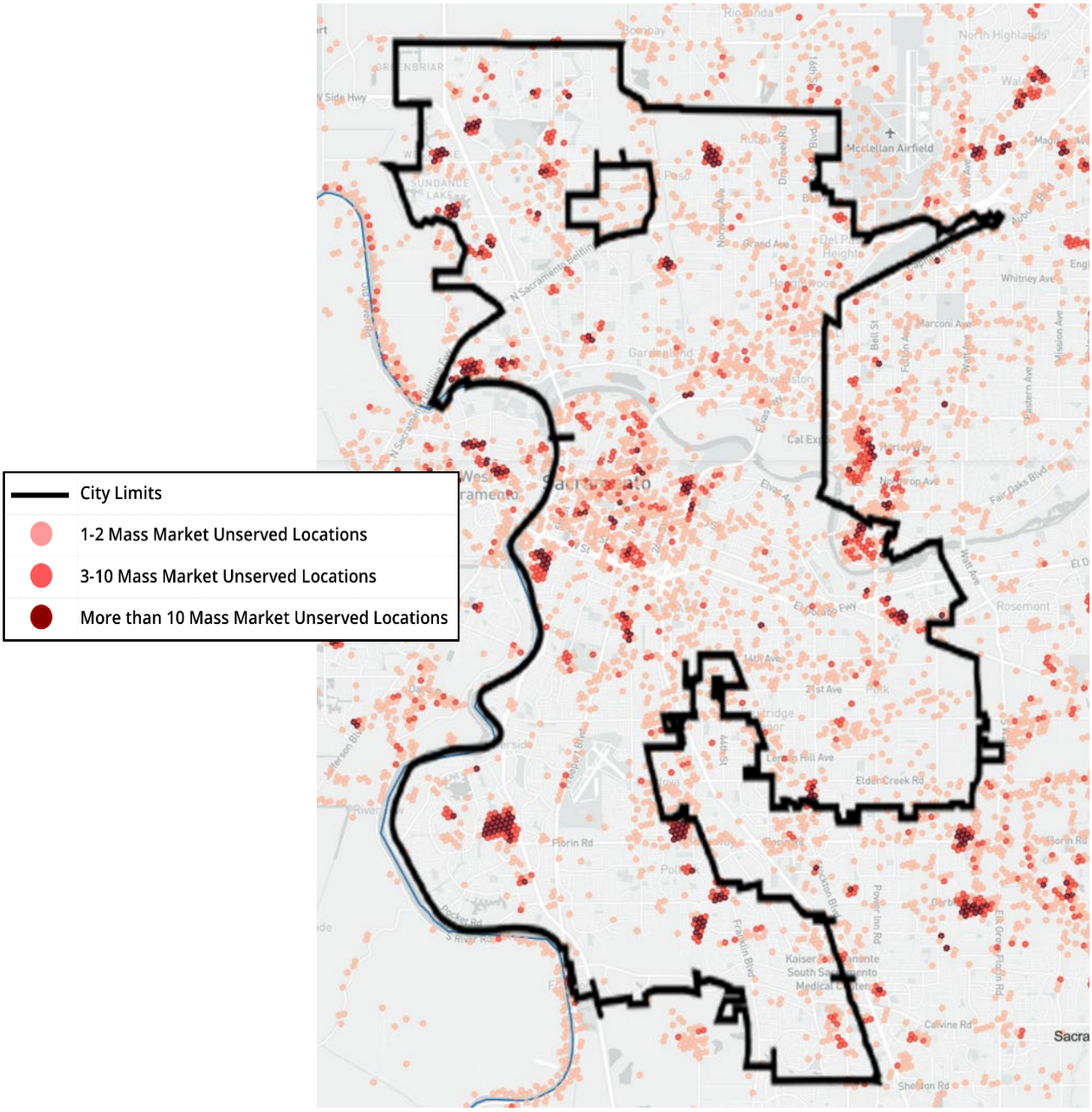


*Figure 2 – CPUC-designated Unserved Locations without Broadband Access*

Additionally, more than 88,000 households qualify for the federal Affordable Connectivity Program (ACP) that subsidizes monthly internet, yet only 33% of eligible households are currently receiving the benefit. Notably, current projections estimate that the federal funding for ACP will be exhausted in the Summer of 2024; there are state and federal efforts underway to provide additional funding to extend the program.

The community survey received more than 780 partial or full responses; more than three-quarters of respondents subscribed to either AT&T or Comcast.

The survey included an embedded speed test to determine actual speeds of the survey respondent; 47% of respondents failed to achieve the California minimum standard throughput (download + upload) of 125 Mbps. Yet at the same time that many cannot achieve the minimum standard speed, about half the households surveyed reported that they regularly use the internet for critical services such as education or remote work.

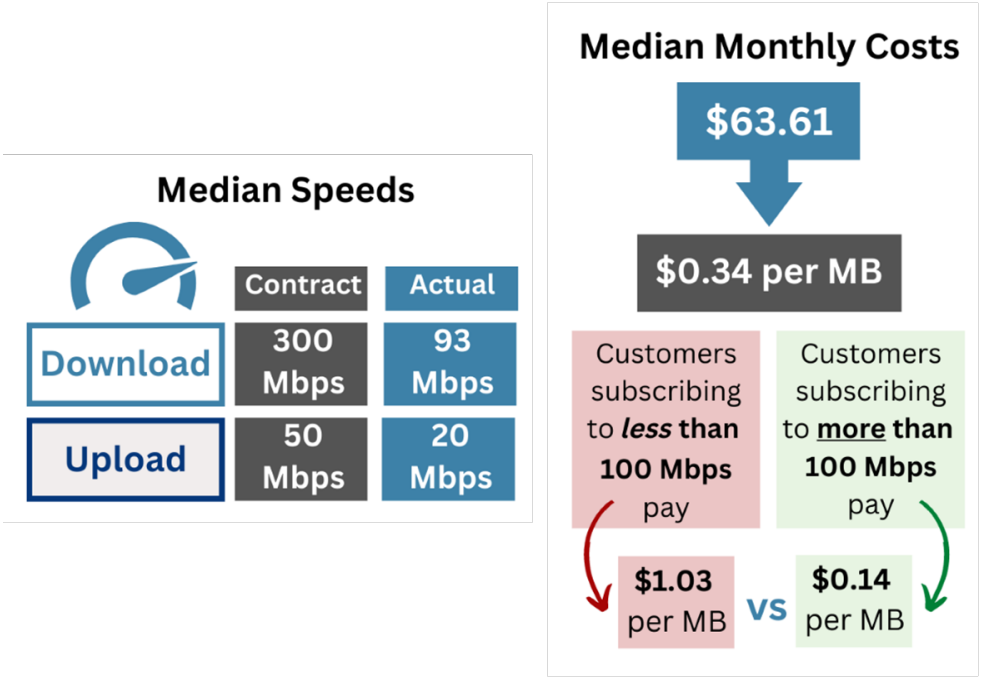


*Figure 3 - Median Speeds & Pricing Based on Survey Results*

Respondents indicated price was the main source of dissatisfaction, yet the median price per megabyte (MB) of data per month was $0.34 – an amount competitive with other urban areas within California. However, breaking down the price per MB between subscribers who purchase lower-bandwidth packages (<100 Mbps) and those customers who purchase higher-end packages (>100 Mbps) illustrates how existing conditions reinforce the Digital Divide by providing sub-par speeds and higher pricing for households with lower discretionary income.

Magellan also conducted a series of community stakeholder focus groups to solicit input and first-hand experiences from 22 different organizations. These participant-led discussions further highlighted concerns around digital equity and the essential nature of high-speed broadband access. Particular focus in these discussions was on the systemic nature of the Digital Divide, and the need for digital navigators within targeted communities, equipment and access, costs, and job training in high-tech industries. There were many community-based organizations already working on digital literacy within the Sacramento community, but they were in need of additional resources and funding to expand their programs and impact.

Digital navigators – particularly if recruited and trained from within the community – could help make more families aware of ACP and assist with their program applications – as well as provide other digital assitance with use of technology and devices, accessing and utilizing the internet for employment, education, and healthcare, and generally raising the level of digital literacy in disadvantaged and marginalized communities. There are state and federal grants available for digital literacy programs that the City could secure and implement through partnerships with the commnity-based orgaizations already active in the City.

The needs assessment also included departmental meetings to better understand the needs of the various City departments and how a broadband strategic approach could best support City services. Utilities is challenged by the tree canopy and existing wireless/antenna connectivity to key sites; Community Development envisioned incorporating broadband needs into private entitlement and development applications; Economic Development was particularly focused on digital literacy, especially since COVID; SHRA is looking to expand the pilot wireless program to other affordable/deed-restricted housing sites; and IT continues to work closely with Public Works and Public Safety to create an interconnected network of traffic, cameras, and emergency communication that can be aided by new technology and smart city devices and applications.

A city-wide broadband policy – similar to an ordinance in place for North Natomas – could ensure that every development project assesses, plans for, and implements broadband infrastructure as part of the development and/or entitlement process. Working closely with SMUD on utilization of poles and/or fiber cables could open up possible regional projects and initiatives.

All participants – including the Sacramento Area Council of Governments (SACOG), Regional Transit, and Sacramento County – identified utility coordination and joint build as opportunities to install new broadband infrastructure at reduced cost through taking advantage of planned excavations.

## D. CIP Analysis

Magellan evaluated the City's 2022-2027 Capital Improvement Program (CIP) for broadband opportunities: to deploy new communications conduit in open trenches (joint trench), connecting new or existing City assets, expanding community Wi-Fi or wireless distribution points, install smart city devices or applications, or to take advantage of critical bridge, creek, or freeway crossings. More than 30 projects were identified as possible coordination opportunities.

Each of the projects identified provides some opportunity – typically to jointly install communications conduit at the same time that a trench or other excavation takes place

(also known as “dig once”). The engineering and labor of digging a trench (or, even more costly, directional boring) accounts for 35-65% of the total cost of deploying underground conduit; open excavation allows conduit to be placed simultaneously at a fraction of the normal cost.

## E. Wireless Field Survey

Magellan conducted city-wide field survey on June 27, 2023., utilizing three android phones connected to each of the three major cell carriers (AT&T, Verizon, T-Mobile). The phones conducted more than 28,000 individual tests and recorded relevant coverage data

Magellan surveyed major road arterials and corridors, organized into 3 areas: North, Business District (between 3rd & 19th Streets Downtown), and South.

Citywide, all three carriers showed similarities in average signal strength and download/upload speeds.

*Table 3 - Citywide Wireless Results*

| | AT&T | Verizon | T-Mobile |
|---|---|---|---|
| **Signal** | | | |
| 5G | 99.6% | 54.3% | 92.2% |
| 4G | 0.4% | 45.7% | 7.8% |
| **Signal Strength** | | | |
| Excellent | 36.7% | 41.0% | 39.1% |
| Good | 29.3% | 30.4% | 29.0% |
| Average | 31.7% | 28.2% | 30.4% |
| Poor | 2.3% | 0.4% | 1.4% |
| **Download Speed** | | | |
| 100+ Mbps | 7.7% | 3.5% | 5.9% |
| 25 – 99 Mbps | 41.7% | 31.7% | 25.6% |
| Less than 25 Mbps | 50.6% | 64.9% | 68.6% |
| Average (Mbps) | 37.0 | 26.8 | 27.9 |
| Peak (Mbps) | 266.4 | 255.8 | 415.0 |
| **Upload Speed** | | | |
| 100+ Mbps | 11.9% | 5.6% | 9.6% |
| 25 – 99 Mbps | 6.8% | 8.2% | 5.4% |
| Less than 25 Mbps | 81.3% | 86.2% | 85.0% |
| Average (Mbps) | 7.2 | 4.6 | 6.4 |
| Peak (Mbps) | 89.5 | 91.1 | 132.0 |

However, when looking at the three geographic areas, there were some stark differences in download speed between carriers. Despite having 99% 5G coverage, AT&T's download speeds lagged behind Verizon & T-Mobile, particularly in the Downtown Business District.

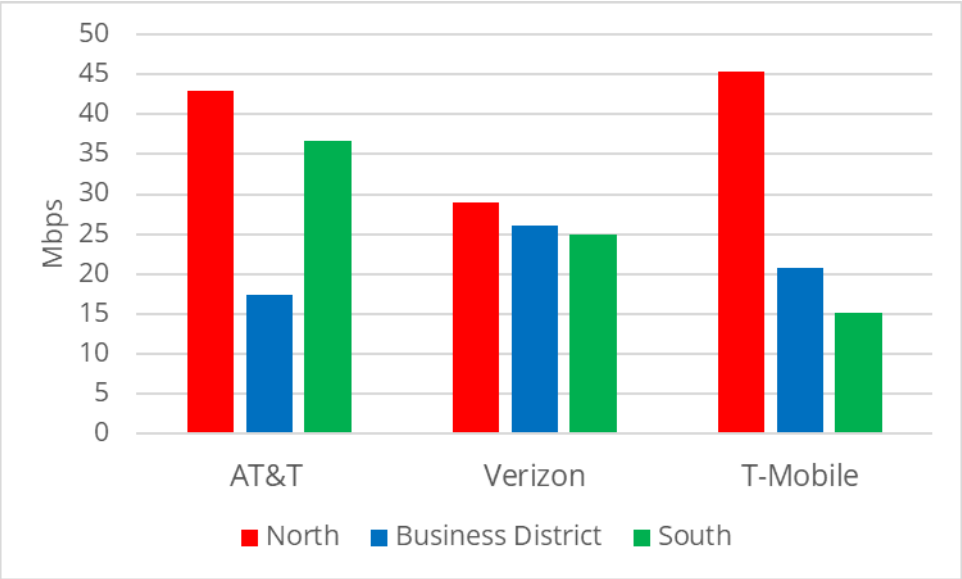


*Figure 4 - Average Download Speed (Mbps) by Area and Carrier*

For all three carriers (AT&T, Verizon, T-Mobile), upload speeds were below 10 Mbps across the City; the majority of download speeds were below 25 Mbps. Both of these fall well short of the California minimum standard broadband throughout (download + upload) speed of 125 Mbps. Given the growing number of people, particularly from socio-economically vulnerable communities, that rely solely on their mobile phones for internet connectivity, this suggests inadequate speeds that could have impacts on employment, education, healthcare, and other quality of life issues.

A majority of signal strength (RSRP) tests were in the excellent range; high RSRP but low download speeds may indicate capacity issues at the time the test was performed. Since the field survey was performed on a single day and collected only information from a particular point in time, it could be subject to fluctuating network use and demands. Crowdsourced data from Ookla aggregates download speeds from all three carriers across a much larger sample size, and suggests, on average, higher download speeds across the City that data from the field survey. However, limited network capacity at peak hours – when the field survey was conducted – suggests a physical limitation of the existing private cellular carriers.

## F. Digital Resources Toolkit

Much of Sacramento is served by the local incumbents, yet there are geographic and socio-economic gaps within the City where broadband adoption rates lag behind state and

national averages. When a community has broadband coverage but low adoption rates/usage, the cause is usually one or more challenges related to the Digital Divide. Digital Divide is the division between households, individuals, and businesses where there are disparities in the access to the internet – usually caused by affordability, access to devices, digital literacy, geographic limitations, and/or language barriers.

Magellan developed a product requirement document that outlines instructions to build a resource database that residents and businesses can use to access, utilize, and secure broadband resources, including, but not limited to:

- Broadband Service Provider search/comparisons, allowing users to compare pricing, speed tiers, and service area maps
- Mobile phone providers and coverage maps
- FCC Broadband Map
- Affordable Connectivity Program (ACP)
- Digital navigators
- Device access, including public WiFi areas, public computers, and low-cost/refurbished donated devices
- Digital job training programs
- Employment search assistance, including remove/virtual interviews and applications

The portal could be funded through the California Advanced Services Fund (CASF) Broadband Adoption grant, and the City could partner with Valley Vision on implementation.

## G. Conceptual Network Design

In order to create a redundant backbone loop that prevents service interruptions, connects City facilities, buildings, parks and utility assets, and expands opportunities for greater community broadband access, the existing City communications network would require improving 25.2 miles of the existing traffic control network from copper to fiber, upgrading 15.8 miles of fiber cable with new high strand-count cable, and construction of approximately 62 miles of new backbone fiber and 7.2 miles of laterals, in addition to interconnecting 53.3 miles of the existing City fiber network with splice points, handholes, cabinets and supporting infrastructure.

The Conceptual Network Design (*Figure 5*) can be implemented in phases in order to prioritize immediate needs and provide flexibility relative to grant availability and resource constraints.

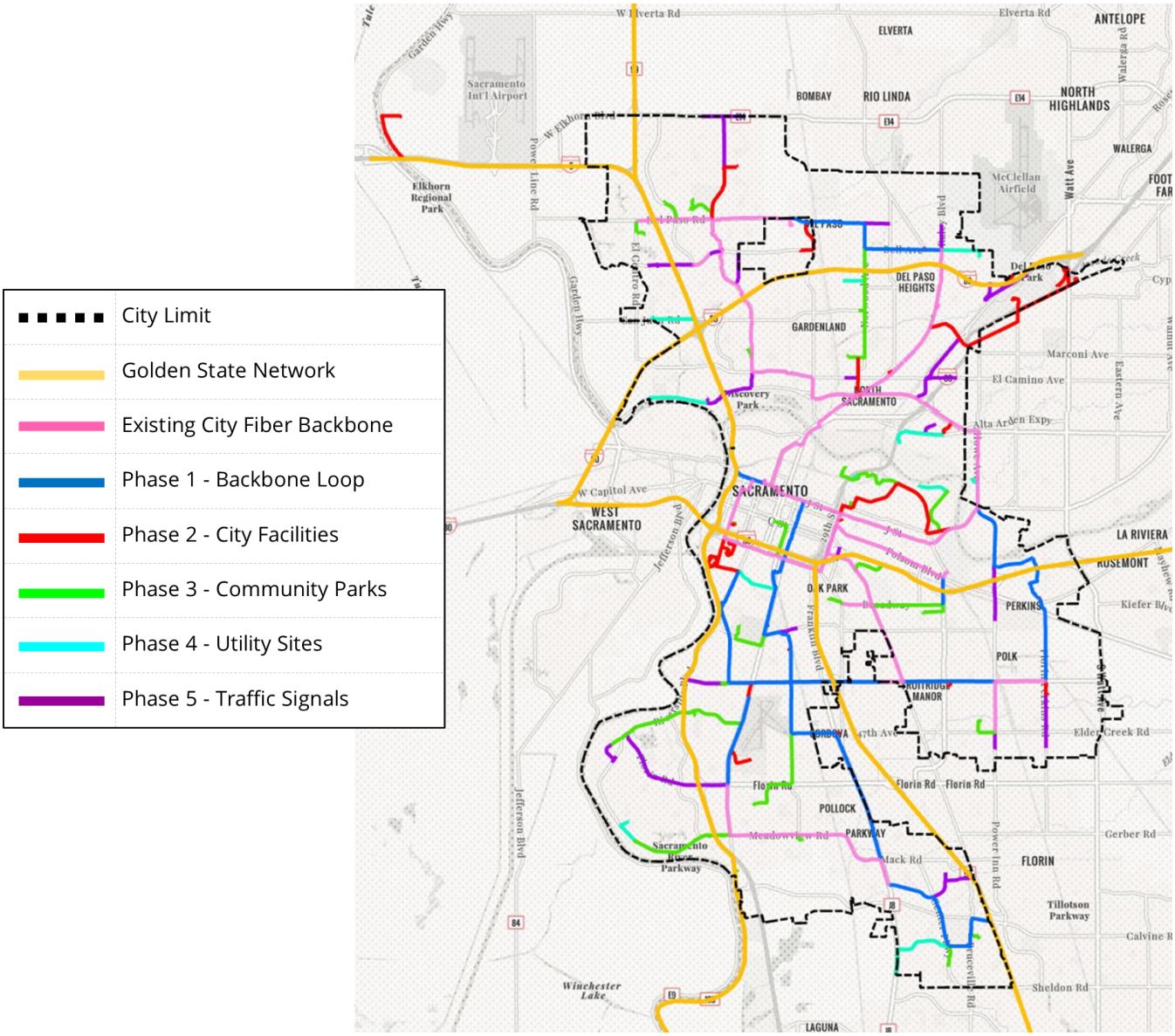


*Figure 5 - Conceptual Network Design*

Each phase would address a specific component of the City's needs to improve internal communications and external services to residents, while expanding the City's fiber presence into more neighborhoods to expand community broadband access.

*Table 4 – Phased Implementation & Assets Connected by Phase*

| Phase | City Assets Connected |
|---|---|
| 1 | City-wide Backbone Loop |
| 2 | City Facilities (25) |
| 3 | City Parks (27) |
| 4 | City Utility Sites (15) |
| 5 | Traffic Signals (146) |

The upgrades to the existing City network and new construction of all phases of the Conceptual Design are estimated at $50.3 million, as shown in *Table 5*.

*Table 5 - Construction Cost Estimates - Conceptual Network*

| | Length (feet) | Length (Miles) | $ per foot | Estimated Cost |
|---|---|---|---|---|
| **Phase 1 - Citywide Backbone Loop** | | | | |
| Existing Fiber Backbone (96+ strands) | 281,360 | 53.3 | $ 2.00 | $ 562,719 |
| New Backbone Construction | 68,492 | 13.0 | $ 120.00 | $ 8,219,000 |
| Copper Upgrades to Fiber Backbone | 75,517 | 14.3 | $ 40.00 | $ 3,020,667 |
| 48-Ct Upgrade to 96-Ct Backbone | 36,404 | 6.9 | $ 25.00 | $ 910,091 |
| 12-Ct Upgrade to 96-Ct Backbone | 7,006 | 1.3 | $ 25.00 | $ 175,149 |
| Laterals | - | 0.0 | $ 80.00 | $ - |
| ***TOTAL PHASE 1*** | ***468,778*** | ***88.8*** | | ***$ 12,887,627*** |
| **Phase 2 - City Facilities** | | | | |
| New Backbone Construction | 70,136 | 13.3 | $ 120.00 | $ 8,416,357 |
| Copper Upgrades to Fiber Backbone | 6,520 | 1.2 | $ 40.00 | $ 260,792 |
| 48-Ct Upgrade to 96-Ct Backbone | 5,077 | 1.0 | $ 25.00 | $ 126,930 |
| 12-Ct Upgrade to 96-Ct Backbone | 5,783 | 1.1 | $ 25.00 | $ 144,577 |
| Laterals | 20,748 | 3.9 | $ 80.00 | $ 1,659,857 |
| ***TOTAL PHASE 2*** | ***108,265*** | ***20.5*** | | ***$ 10,608,513*** |
| **Phase 3 - Community Parks** | | | | |
| New Backbone Construction | 66,020 | 12.5 | $ 120.00 | $ 7,922,346 |
| Copper Upgrades to Fiber Backbone | 28,142 | 5.3 | $ 40.00 | $ 1,125,662 |
| 48-Ct Upgrade to 96-Ct Backbone | 19,256 | 3.6 | $ 25.00 | $ 481,396 |
| 12-Ct Upgrade to 96-Ct Backbone | 6,900 | 1.3 | $ 25.00 | $ 172,501 |
| Laterals | 12,372 | 2.3 | $ 80.00 | $ 989,768 |
| ***TOTAL PHASE 3*** | ***132,689*** | ***25.1*** | | ***$ 10,691,672*** |
| **Phase 4 - Utility Sites** | | | | |
| New Backbone Construction | 52,628 | 10.0 | $ 120.00 | $ 6,315,306 |
| Copper Upgrades to Fiber Backbone | 306 | 0.1 | $ 40.00 | $ 12,248 |
| 48-Ct Upgrade to 96-Ct Backbone | - | 0.0 | $ 25.00 | $ - |
| 12-Ct Upgrade to 96-Ct Backbone | - | 0.0 | $ 25.00 | $ - |
| Laterals | 3,040 | 0.6 | $ 80.00 | $ 243,233 |
| ***TOTAL PHASE 4*** | ***55,974*** | ***10.6*** | | ***$ 6,570,787*** |

| | Length (feet) | Length (Miles) | $ per foot | Estimated Cost |
|---|---|---|---|---|
| **Phase 5 - Traffic Signals** | | | | |
| New Backbone Construction | 70,081 | 13.3 | $ 120.00 | $ 8,409,692 |
| Copper Upgrades to Fiber Backbone | 22,821 | 4.3 | $ 40.00 | $ 912,837 |
| 48-Ct Upgrade to 96-Ct Backbone | - | 0.0 | $ 25.00 | $ - |
| 12-Ct Upgrade to 96-Ct Backbone | 2,993 | 0.6 | $ 25.00 | $ 74,829 |
| Laterals | 1,984 | 0.4 | $ 80.00 | $ 158,739 |
| ***TOTAL PHASE 5*** | ***97,879*** | ***18.5*** | | ***$ 9,556,097*** |
| **TOTAL - ALL PHASES** | **863,585** | | | **$ 50,314,697** |

Phase 1 would create the redundant, looped architecture across the City capable of supporting carrier-grade services; Phase 2 would connect 25 critical City facilities currently leased and eliminate more than $100,000 in recurring annual expense; Phase 3 would connect the 27 parks to continue providing Wi-Fi; Phase 4 would connect 15 sensitive utility sites; and Phase 5 would connect prioritized traffic signal intersections. Each of these phases can be further broken down into sub-phases, or built incrementally and opportunistically through effective CIP and utility coordination.

Placing a 750-foot buffer around the conceptual backbone network and cross-referencing various databases provides the ability to quantify the potential reach of the conceptual network to locations that can be economically connected into the City's network (typically addresses falling within 750 feet is a reasonable distance that can be bridged by a private ISP through last mile service drops). Magellan assessed the following data as part of the buffer analysis:

1) Residential addresses
2) City's current business license list (excluding areas zoned residential)
3) Public housing sites owned/operated by the Sacramento Housing & Redevelopment Agency (SHRA)
4) The State of California's Public Utility Commission (CPUC) broadband map of unserved locations eligible for SB 156 and/or CASF grant funding

*Table 6* identifies the number of locations within the 750' buffer for each of the four categories above, broken down by phase (including the number of individual units for locations for multi-family buildings).

*Table 6 - Sites located within 750' of Conceptual Backbone Design*

| | # of Sites | # of Units |
|---|---|---|
| **Phase 1 - Citywide Backbone Loop** | | |
| Residences | - | 61,190 |
| Businesses | - | 3,211 |
| SHRA Housing | 54 | 4,270 |
| CPUC "Unserved" Locations | 892 | 2,073 |
| **Phase 2 - City Facilities** | | |
| Residences | - | 11,923 |
| Businesses | - | 271 |
| SHRA Housing | 5 | 356 |
| CPUC "Unserved" Locations | 194 | 622 |
| **Phase 3 - Community Parks** | | |
| Residences | - | 19,603 |
| Businesses | - | 561 |
| SHRA Housing | 16 | 1,458 |
| CPUC "Unserved" Locations | 194 | 480 |
| **Phase 4 - Utility Sites** | | |
| Residences | - | 5,930 |
| Businesses | - | 93 |
| SHRA Housing | 1 | 188 |
| CPUC "Unserved" Locations | 94 | 299 |
| **Phase 5 - Traffic Signals** | | |
| Residences | - | 13,008 |
| Businesses | - | 522 |
| SHRA Housing | 3 | 580 |
| CPUC "Unserved" Locations | 226 | 703 |

All 5 phases of the Conceptual Design would pass more than 111,000 residences, 4,600 businesses, 6,800 public housing units, and 4,177 "unserved" locations within 750' of the backbone. However, individual service drops to connect each address to the City's backbone will still be required, which will generate significant need for start-up capital.

## H. Business & Service Models

The various business models involve different levels of investment and control that come with varying risks and rewards. The City of Sacramento has numerous options – from a

laissez-faire, public policy-only approach all the way across the spectrum to the City owning and operating a full retail internet business.

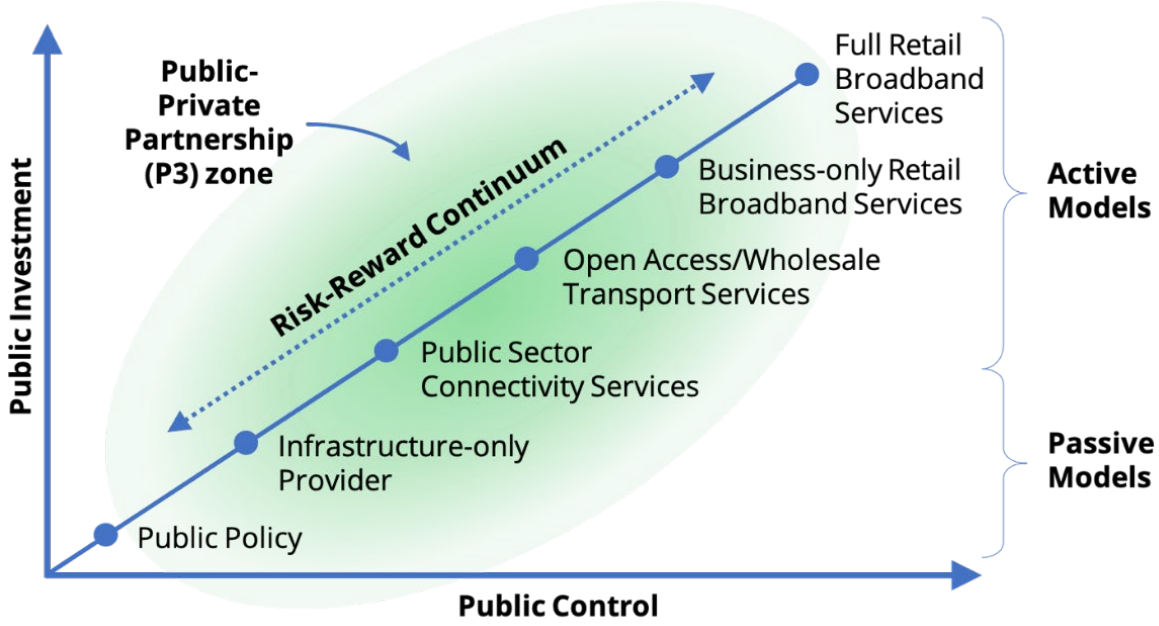


*Figure 6 - Broadband Business Models Spectrum*

Public-private partnerships (P3s) are an emerging business model that provides an innovative solution to broadband expansion. The key factors that define a public-private partnership, as opposed to simply a customer-vendor relationship, are that: (a) all parties contribute, (b) each party's benefits are shared based on their contributions, and (c) one partner does not pay another; there are few or limited transactions between partners.

Generally, P3s create a cooperative platform for a local government and one or more private organizations to plan, fund, build, and maintain a broadband network within the municipality's jurisdiction.

Operating a public-facing fiber network – whether as a transport-only network or as a retail fiber-to-the-premises service provider – will necessarily entail significant start-up and operational costs that can be challenging for organizations without access to investment capital. In addition to core network equipment costs and customer premises equipment and service drop construction costs, a serviceable network carries significant administrative and staffing costs in order to operate effectively. Many municipalities solicit private ISP partners to assume the liability of start-up and operational costs, in exchange for the ability to charge retail rates and recoup a return on their investment.

The City could consider a public-private partnership model to implement the Broadband Strategic Plan in which the City could publicly solicit and select a private ISP to operate,

manage, and sell retail internet services over publicly-owned fiber in exchange for lease payments, revenue share, new City network construction, or a combination thereof. Additionally, an experienced private ISP partner will be required if the City were to apply for SB 156 Last Mile grant funding, as the City cannot currently demonstrate experience and capacity to operate and maintain a retail internet service network.

# I. Funding Options

There are several grant programs through the state and federal government that could fund broadband expansion.

However, two grant opportunities stand out that the City should aggressively pursue to assist with construction costs of building and implementing its expanded fiber network and Broadband Plan: 1) The Senate Bill 156 Last Mile Federal Funding Account (FFA) – a one-time county-wide allocation of $38.7 million, and 2) the California Advanced Service Fund (CASF) Accounts (statewide annual allocations through 2032).

*Figure 7* shows the overlap of CPUC-targeted low-income and Disadvantaged Communities with more than 4,100 eligible "unserved" locations for these grants that fall within the 750' buffer of the City's Conceptual Network Design. The proximity to the City's backbone ad Conceptual Design make these the most cost-effective locations to target with a first round of grant funding.

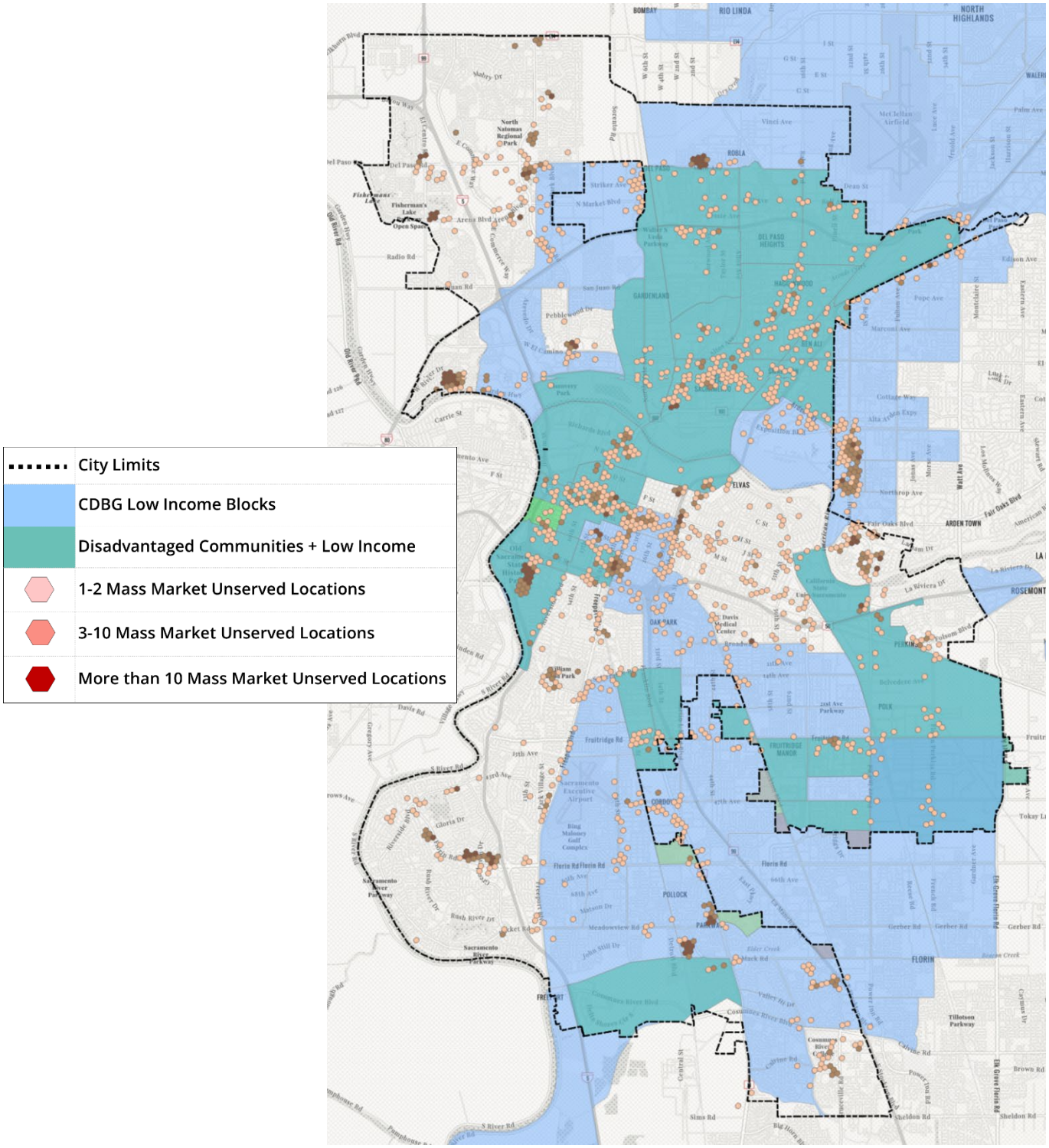


*Figure 7 - FFA Eligible Locations within 750' buffer of Conceptual Network Design*

FFA funding does allow for the funding and construction of backbone and middle-mile networks, provided that those are directly supporting last-mile distribution to eligible locations (wireless solutions are not eligible for FFA funding). The City should identify concentrations of unserved locations along the Conceptual Network Design and include

fiber-to-the-premises service drops as part of any SB 156 Last Mile funding application to ensure grant eligibility. An engineering, economic, and business case tool kit was released in June 2023, and the 90-day application window opened on June 30, 2023.

The CASF Infrastructure Account largely uses the same CPUC map of "Mass Market Unserved Locations" shown in *Figure 7* for grant eligibility, but also allows for wireless solutions, and could be a recurring funding source for the City to incrementally continue to expand its fiber backbone and enhance community access.

The City can also incrementally and opportunistically build its network at minimal cost by taking advantage of joint trenching through a CIP and utility coordination program. By implementing a "dig once" ordinance (supported by a strong road moratorium), both public and private entities excavating in the public right-of-way (City, County, RT, SMUD, Comcast, AT&T, etc.) can equally take advantage of an open trench by adding in their own underground assets at a fraction of the cost.

# D. KEY RECOMMENDATIONS

## 1) Expand the City's Fiber Backbone to Improve City Facility Connectivity and Expand Community Broadband Access.

The City can complete a carrier-grade backbone loop necessary for a qualified operator to provide competitive, reliable retail internet services to the community and business at an estimated cost of $12.8 million. The backbone loop design can subsequently be further expanded in phases: Phase 2 ($10.6 million) would connect 25 City facilities savings more than $100,000 annually in recurring costs; Phase 3 ($10.7 million) would connect the 27 parks with Wi-Fi services expiring in 2024; Phase 4 ($6.6 million) would connect 15 critical utility sites; and Phase 5 ($9.6 million) would connect priority traffic signals.

## 2) Initiate Design & Engineering for Phases 1, 2, & 3.

The first three phases of the Conceptual Design – Citywide Backbone Loop, City Facilities, and Wi-Fi in City Parks – simultaneously would provide exponential reach into the community, passing more than 92,000 households, 6,000 public housing units, and 3,100 CPUC-designated "unserved" locations.

The estimated construction costs for Phases 1, 2 & 3 - $34 million – falls within the FFA allocation for Sacramento County, and demonstrating a commitment to moving forward with these high-impact phases would help ensure the City can submit a competitive SB 156 FFA grant application and/or a CASF Infrastructure Account grant.

Design engineering would include field surveying and verification, identifying additional usable assets that may not be recorded in City maps, value engineering to reduce the overall cost, confirming the final routing and design, and compiling a Bill of Materials. This work will demonstrate to the State and the CPUC that the City is "shovel-ready" to begin construction.

## 3) Target Unserved Locations & Public Housing Sites for Connectivity.

The Digital Divide has multiple causes – and requires different solutions. However, running fiber optic backbones to CPUC-designated "unserved" locations and public housing units addresses one of the biggest challenges to digital equity by making public investments in broadband to lower the cost of entry for new providers. Ensuring that a fiber backbone exists creates a level playing field, and enables ISPs to target data services and pricing without the requirement to meet private returns on investments for construction capital. Moreover, the availability of state and federal grants specifically for unserved and public housing sites can alleviate much of the financial burden from the City's general fund.

## 4) Solicit & Negotiate a Public Private Partnership.

The City is in a favorable position to leverage an expanded, looped backbone network through a public-private partnership, which could secure: (a) a qualified network operator(s) needed for grant eligibility, (b) match funding or in-kind contributions for SB 156 FFA grant application, (c) a partner willing to construct all or a portion of the Conceptual Network in exchange for rights to sell retail internet services utilizing City fiber, (d) one or more ISPs willing to pay the City a lease fee or revenue share in exchange for utilizing the City backbone network to sell retail data services, or a combination thereof.

The City should publicly solicit ISPs for a partnership through an transparent RFP process, select a qualified partner, and negotiate a partnership agreement in concert with a SB 156 FFA grant application. City IT staff should lead this effort, and consult with applicable City departments and Council per City purchasing policies.

## 5) Pursue Competitive Grant Opportunities through SB 156 Federal Funding Account and the CASF Broadband Grants.

The State of California and the CPUC have designated more than $38 million in broadband construction grant funding for Sacramento County through the SB 156 FFA grant process, and CASF has annual allocations (through 2032) for broadband grants for infrastructure, public housing, and adoption programs. The City is eligible for both of these funding

sources and should pursue these grants to provide for construction of the Citywide Conceptual Network, for the marginal costs to connect CPUC-designated unserved households and other at-need neighborhoods, and to assist with digital literacy and navigation programs in the community. Other municipalities – and the County itself – will be competing for these grant funds, which will require the City to demonstrate commitment, completed planning, and readiness for implementation in order to secure a grant award.

## 6) Inter-departmental Coordination and Partnerships with Community Based Organizations can Secure Grant Funds to Close the Digital Divide.

Much of the City's Economic Development Division already works to break down barriers for disadvantaged or vulnerable populations – including partnering with local non-profit and community-based organizations to implement digital navigators, job training programs, distributing refurbished devices, and remote learning skills and access. The City is also already working with SHRA on a wireless pilot program at Marina Vista & Alder Grove to roll out low/no-cost internet services.

These programs are directly related to closing the Digital Divide, and are eligible for grant funding – particularly the CASF Broadband Adoption Account and the CASF Public Housing Account. Coordinating between City departments and divisions to secure resources and funding ,and partnering with CBOs who can implement these programs, will improve and expand existing, successful programs that work toward digital equity.

## 7) Build a Digital Resource Database

In addition to working with community partners on digital literacy, equity, and adoption, the City should build and maintain a digital resource website, hosted on a City URL. The resource database would allow residents and businesses to easily compare internet carriers, plans, pricing, comparisons unique to their home or business, search and identify relevant digital resources such as job trainings, digital navigators, telehealth assistance, and refurbished devices, and share broadband resources and best practices. Building this website could be eligible for grant funding through the CASF Broadband Adoption Account.

## 8) Coordinate Joint Build for CIP and Utility Projects

Coordinating infrastructure expansion through joint utility work is the most cost-effective strategy to expand City broadband assets, particularly into under-served areas and new developments. Effective coordination on all projects that require excavation will ensure that all utilities—public and private—can economically expand their broadband footprint in Sacramento. The City can incrementally and opportunistically build its own fiber network,

connect key City facilities, and enable Smart City applications. Effective joint build and utility coordination requires a "dig once" ordinance, a strong road moratorium, a curated master project list that aggregates all public and private excavation work in the public right-of-way, and organized, regular meetings between the various agencies and utilities.

## 9) Establish a Technology Enterprise Fund

Many cities create dedicated funds for revenues generated from leases of City assets by private telecommunications companies. A dedicated fund with ongoing revenues—separate from the General Fund—prioritizes new City/public technology deployment for future build opportunities (funding for fiber network expansions through incremental builds/joint trench coordination or for locating new smart city devices concurrent with expansion of private wireless connectivity).

Creating an enterprise fund helps plan strategically for the years to come when use of public assets/ROW will increase and could create significant new City revenues. The unscheduled nature of joint trench/dig once opportunities means cities need a dedicated funding source outside of the normal budgeting process to take advantage of open trenches. The City should consider holding revenues generated by the City through lease or other agreements for use of City broadband infrastructure – including cellular antennas on street light poles, placement of cabinets or vaults in the ROW, leasing land or towers for cell tower installation, dark fiber or conduit occupancy leases, or other telecom-related/ROW revenue generating activities – in a separate account to offset maintenance and expansion costs.

## 10) Leverage the City's Inventory of Street Light Poles to Expand Wireless Coverage, Speeds, & Services.

The City has an expansive inventory of more than 39,000 street lights which can be leased to private cellular companies to locate small cell antennas and equipment. The wireless survey revealed many areas with limited download/upload capacity that could be mitigated by adding small cell sites. Lease revenues for these poles could be dedicated to the Technology Enterprise Fund to fund future City network expansion, joint trenching opportunities, installation of smart city devices, or other technology upgrades.