



# Evolving Smart City Solutions

WHITE PAPER

Increasing Interconnectivity To  
Reach Digital Equity

January 2023

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# The Challenge

As the economy and society develop rapidly, traditional city management is becoming increasingly limited. In order to cope with the challenges, cities turn to intelligent technologies such as the Smart City concept and IoT (Internet of Things), seeking to develop advanced solutions to practical tasks.

The COVID-19 pandemic underlined the need for a reliable Internet connection to allow adequate operations of remote working, learning and socialization. Broadband became a lynchpin for advancement of technologies, becoming the most critical infrastructure of our time. Yet the citizens' need to upgrade their connective service is often met with constraints of their carriers, leading to inadequate service, disconnecting from Zoom calls, and struggling to overcome barriers to productivity that rely on a powerful Internet network.

With the Internet being an absolute necessity, lacking in power or missing completely in certain areas, the US Administration took an initiative to allocate \$1 trillion to bipartisan infrastructure, unlocking funds for transportation, broadbands and utilities. With the \$65 billion of grants dedicated to broadband, the funding will be provided by the NTIA (National Telecommunications and Information Administration). This will be a gamechanger for many American communities – amongst them remote, rural communities as well as seniors. The Bipartisan Infrastructure Law underlines the importance of “Internet for All” and “every American [having] access to affordable, reliable high-speed Internet through a historic investment in broadband infrastructure deployment” while covering “costs for Internet service [helping] close the digital divide” [1].

The incentive to increase connectivity will grant access to possibilities that will rapidly improve everyday lives of citizens, but also bring challenges in adopting new technologies. Evolving digital worlds bring about new smart applications, metaverse platforms, digital crypto currencies and vast amounts of virtual content that needs to be viewed and uploaded online. This will require major upgrades in Internet network technology.

With evolution occurring in our day to day lives, governments and providers have to keep up and support initiatives that enable Smart City. In simple terms, this means leveraging technology to enable better government performance, which will produce safer environments for our citizens.

This White Paper aims to identify challenges, examine possible applications of the concept and propose solutions in regard to increased connectivity that leads to equitable and profitable outcomes.

# What are Smart City Solutions / Sample Use Cases for Citizens

Smart City solutions are intelligent embedded technologies that improve accessibility and quality of services in the city. By using information and communication technologies (ICT), they increase operational efficiency. Connected to open data platforms, they share information with the public that can be used by citizens and connected devices to navigate the daily flow with an increased level of accessibility, security and assurance.

Global IoT for Smart Cities is estimated to grow from \$130,6 billion in 2021 to \$312,2 billion by 2026 [2]. In the US, two-thirds of the 50 largest US cities have a smart city strategy in place [3].

## SMART CITIES CREATE IMPACT ON

**Key urban challenges** – measurable positive impact in navigating congestion in transportation, optimization of time in public services, public health and public safety

**Equity** – creating equitable, safer communities and decrease the digital divide

**Business models** – rely on proven business models that increase business opportunities and implement new ones

**Innovation** – allow emergence of collaborative practices and cross-sector innovation

**IoT evolution** – foster further evolution towards Internet of Things, an interconnection of commuting devices embedded in everyday objects via Internet, enabling an open data collection and reception

## EXAMPLES OF IOT USE CASES FOR SMART CITIES

- Localization of available parking spots, parking authorization, bike sharing operations
- Fullness of dumpsters and trash cans, optimization of routes for dumpster collection
- Security of buildings, integrity of engineering structures and road infrastructure
- Remote monitoring of street lighting network (notifying when a lightbulb is out)
- Remote monitoring of fire hydrants, water facilities and fullness of rainwater tanks
- Air quality monitoring (for example pollution index)
- Workforce management and employee attendance monitoring

# Use cases to improve a wide range of daily services for all citizens, especially for disadvantaged groups:

## REAL-TIME NOTIFICATIONS

People can receive real-time notifications about the weather conditions, public transportation departure times or delays to decrease their waiting time.

## NAVIGATION IN THE CITY

Smart cities using IoT can provide real-time information about the environment, such as availability of shops or status of street intersections, showing the shortest routes to destinations, decreasing their physical load of unnecessarily prolonged movement.

## DECREASING DEPENDENCY ON OTHERS

Implementation of smart healthcare devices can help eliminate the need for human intermediary. For example, telemedicine offers remote diagnosis and treatment of patients, or medical dispenser devices prepare drug doses and configure pill dosage at specific times.

## TASK GUIDANCE

With the help of a specially designed smart app, the elderly with degenerative or mental disorders can get help via tablets, get reminders about tasks or receive guidance on how to perform them.

## MENTAL STIMULATION

To avoid further decline of cognitive abilities, seniors can download designated applications to stimulate their mental activity and sharpen their focus.

## LEARNING ABOUT TECHNOLOGIES

Seniors can learn how to leverage technology by using smart apps, view digital content or join virtual platforms and communities. This will decrease the feelings of being left out and lonely, even in cases of physical disability or illness that makes moving around the city difficult or impossible.

# Implementation of Smart City Technologies – The Journey

A thorough implementation of Smart City Technologies requires an attentive and responsible approach. It is a collaborative journey among many actors on multiple levels of the city management and various service providers.

These are the foundational stones of a successful implementation:

**SEEKING A RELIABLE NETWORK PROVIDER** – It all starts with a strong network, because the city is only as smart as its connectivity to the citizens.

**CREATION OF A SMART CITY PLAN** – Define allocation of implementation efforts, burning issues and sensitive groups. Prioritize needs for interventions, focus on goals and functions that match the horizons the city planning is aiming to reach.

**CREATION OF COOPERATIVE NETWORK** – Collaborate with stakeholders, develop strong partnerships and detect sources of funding.

**TESTING** – Testing out solutions on a smaller scale before roll-out.

**DEPLOYMENT** – Launch initiative, inform, market and provide education to citizens.

## Our Mission

Avatar Tech is a High Speed Broadband Internet Connection provider, delivering 1 to 10 Gigabytes of bandwidth to a single-family, multi-dwelling unit, commercial properties, and the community at large. We intend to construct a nationwide fiber network and deliver Internet and IoT services that will allow the communities to have equity.

To address the possibilities of broadband in application of Smart City solutions, our Open Access Network would enable connectivity for municipal neighborhoods to bridge the digital divide.

Key US Government Infrastructure Programs, such as **BEAD (Broadband Equity, Access and Deployment)** [4] or CPF (Capital Projects Fund) [5] are put in place to bridge the digital divide and provide affordable alternatives. But oftentimes, large carriers place secondary importance on underrepresented communities, providing them with inadequate solutions and thus waste the allocated funds. According to analysis [6], poorer city neighbourhoods were offered worse Internet plans.

Our mission is to implement an Open Access Municipal Fiber Optic Broadband Network (FTTX – Fiber to the X) to support the Smart City solutions and further IoT development. By providing FTTX solutions, we are capable of “future proofing” the country for 5G/6G, IoT and Smart City.

# Key US Government Infrastructure Programs

Funding Program	Fed. Agency	Amount	Role of States	Timing of Funding Release
RDOF	FCC	\$20B	N/A	Round 1 In process
Middle Mile Program	NTIA	\$1B	Eligible Applicant	Expected by February of 2023
Tribal Broadband Connectivity	NTIA	\$1.98B	N/A	2022 – until funds expended
BEAD	NTIA	\$42.5B	Recipient	2022 - 2026
Capital Projects Fund (CPF)	Treasury	\$10 B	Recipient	Current -2023
ARPA	Treasury	\$20 B	Recipient	Current and ongoing
Reconnect Round 4	USDA	\$1.15B	N/A	2023

\$97B of funding released over the next 5 years

## BEAD - Prioritization and Mechanics

**PRIORITIZATION** – NTIA is set on prioritizing Fiber. The minimum speeds are 100/20 and have a low-cost option for purchase by subscribers with no data usage caps. Projects will be prioritized in this order:

- 1 – Unserved (under 25/3)
- 2 – Underserved (under 100/20)
- 3 – Community Anchor Institutions (that lack Gigabit connectivity)
- 4 – Digital Equity considerations and adoption programs only after the other three are met

Locations are currently served by satellite, using entirely unlicensed spectrum or other technology that is not specified by Broadband DATA Maps, which will be considered unserved. States will develop a cost estimate that will serve as an “extremely high-cost location threshold.” Applicants will need to meet or come under threshold for buildout costs.

**MECHANICS** – States are the grant recipients and the Service Providers will be subrecipients. All types of entities and partnerships are eligible to be subrecipients as well: e.g. non-profits, universities. BEAD program has strict requirements to follow:

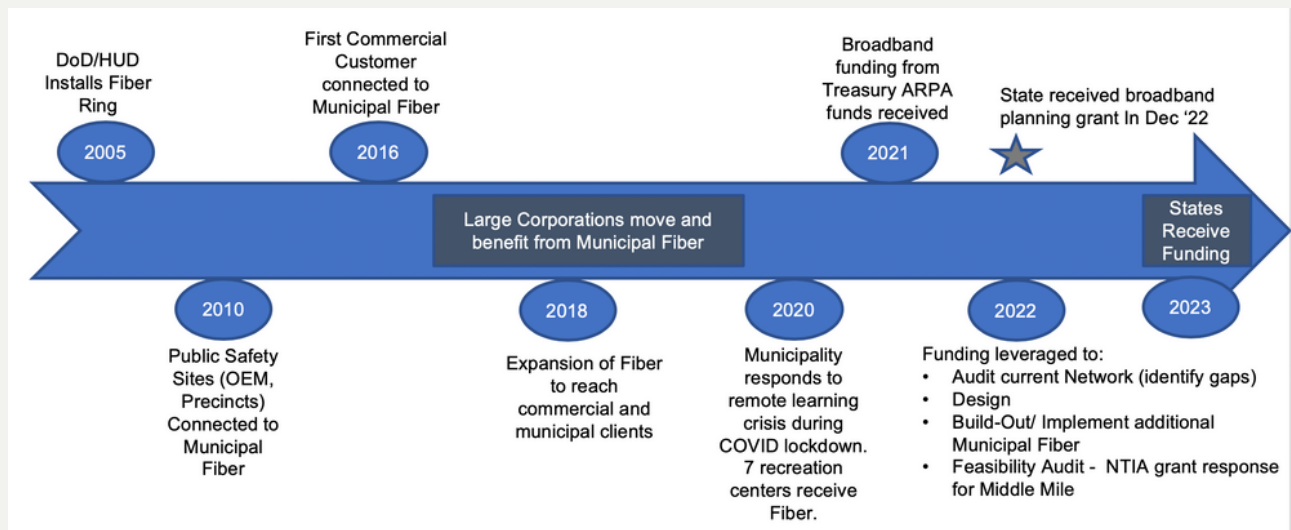
- Cyber risk management plan
- Low-cost service option
- Supply chain risk management plan
- Climate plan
- Local Coordination Requirements & documentation
- Supplier Diversity requirements
- Labor and workforce development requirements
- Other certifications and disclosures
- Significant post-award reporting
- Letter of Credit Requirement for ISPs

# Matching Funds

## IMPORTANT TO CONSIDER

- States are encouraged to rigorously explore ways to cover costs outside of BEAD funding
- There is a minimum of 25% match comprised of cash or in-kind
- Projects will be incentivized to provide more match capital
- Matching funds can be provided by a partner
- Preference for funds not be to other federal/state/local program funds
- ARPA, Cares Act and other Coronavirus funds can be used for cash match, but not other programs (i.e. RDOF)

## Evolution of Fiber 2005-2023



# BEAD Timeline - Best Case Estimates

## November 18th 2022

FCC Initial Maps Published

Challenge process commences and ongoing



## January 13th 2023

Deadline for submitting data and challenges to FCC for BEAD program



## June 30th 2023

- BEAD Allocation Date (TBD)
- Notification to states of funding amounts
- Invitation for states to submit Initial Proposal aka 5-year plan (due 180 days)



## July/August 2023

- Early actor state(s) will submit Initial Proposal
- State-based challenge process commences (90-120-day process)



## November 2023

- NTIA approves Initial Proposal(s) for first states and distributes 20%. • Final proposals due in 365 days



## December 2023

- Remaining states submit Initial Proposals
- State challenge process commences (90-120-day process)



## Q1-Q3 2024

- NTIA approves remaining Initial Proposals and distributes 20%
- Final state proposals due in 365 days



## Q4 2024 into 2026

- NTIA approves remaining Final Proposals on a rolling basis and distributes remaining 80% to each state
- State sub-grant programs roll out plans are approved



## References

[1] The Bipartisan Infrastructure Law: <https://www.usda.gov/media/press-releases/2022/09/22/biden-harris-administration-announces-502-million-high-speed#:~:text=The%20Bipartisan%20Infrastructure%20Law%20provides,investment%20in%20broadband%20infrastructure%20deployment>)

[2] World Reimagined: The Potential of Smart Cities:  
<https://www.nasdaq.com/articles/world-reimagined%3A-the-potential-of-smart-cities>

[3] The Evolution of Smart Cities:  
Delivering on the Promise: <https://www.verizon.com/business/resources/whitepapers/the-evolution-of-smart-cities-delivering-on-the-promise/>

[4] BEAD: <https://broadbandusa.ntia.doc.gov/broadband-equity-access-and-deployment-bead-program>

[5] CPF: <https://home.treasury.gov/policy-issues/coronavirus/assistance-for-state-local-and-tribal-governments/capital-projects-fund/cpf-fund-for-tribal-governments>

[6] The Markup Analysis of AT&T, Century Link, Verizon; US Census Bureau

Title picture: Freepic Stock