
Connected City
Smart City

Presenting Sponsor: GraybaR

This workshop focuses on the process of "Getting to Smart" and specifically how networks enable the operational efficiencies and quality of life outcomes desired by cities and counties.

We will focus on Broadband, Digital Equity and the many new Federal and State funding sources available. We will look at innovations using 5G, Wi Fi, IoT and CBRS/Private Networks.

www.densenetworks.com

CONNECTED CITIES

TOUR 2022

Smart Cities Council

"GETTING TO SMART"

Dense NETWORKS
The Social Think Tank™

Fiber Optic Network Deployment

When: November 10, 11 am Eastern

Scott Jackson
National Market Manager
Graybar

Charles Baker
Executive Director
OnLight Aurora

Greg Spraetz
CRO, Network Connex

Presenting Sponsor: GraybaR

www.densenetworks.com

9:15	Welcome	Peter Murray, Executive Director, Dense Networks
9:25	Federal Grant Funding	Andy Lipman, Lead Attorney, Telecom, Morgan Lewis
9:50	State Broadband Programs	Thomas Tyler, Deputy Director, Broadband, Louisiana
10:05	Digital Equity and Broadband	Clayton Banks, CEO, Silicon Harlem Walter Cannon, VP, ZenFi Networks Thomas Tyler, Deputy Director, Broadband, Louisiana
10:50	Break	
11:20	Network Innovations-IoT/LoRaWAN	Noelani McGadden, VP, Senet John Rusk, President, ProSentry
11:45	Network Innovations-CBRS/PLTE/5G	Eric Toenjes, Market Manager, Graybar Dean Bogdanovic, CTO, Alef Brendan Delaney, Director, ANS

12:15 Lunch

Thank You!!


Signify


Smart
Cities
Council
Infrastructure
Innovation
Forum


GraybaR


OnGo
alliance


ALEF


ANSI
A CHARGE COMPANY
ENTERPRISES, INC.

2023

The 2023 will focus on how Network Technology and the Cloud are enabling innovative new capabilities and services. Broadband, Fiber, 5G, Private LTE, Wi Fi, LoRa, and IoT are key enabling technologies we will explore.

We will look at successful Use Cases, Technology Architectures, Business Models and Funding mechanisms for Cities, Schools, Building Owners, Utilities and Transportation.

For More Information Contact:
PeterMurray@DenseNetworks.com
267-237-5907

March	23	Las vegas
March	28	Los Angeles
April	26	Washington DC
May	09	New Orleans
June	08	Cary
August	17	Colorado Springs
September	13	Dallas
October	14	Fort Myers
December	07	Phoenix

www.densenetworks.com

2023

The Smart Cities Council is the leading organization working with Cities and Communities to help accelerate innovation through collaboration, education and experience.

In 2023, our Smart Cities Academy is producing a series of workshops with a focus on Sustainability and Energy, Connectivity and Networks, and Built Environment and Data. These workshops will share use cases, business models, technology architectures, and best practices in a focused interactive environment.

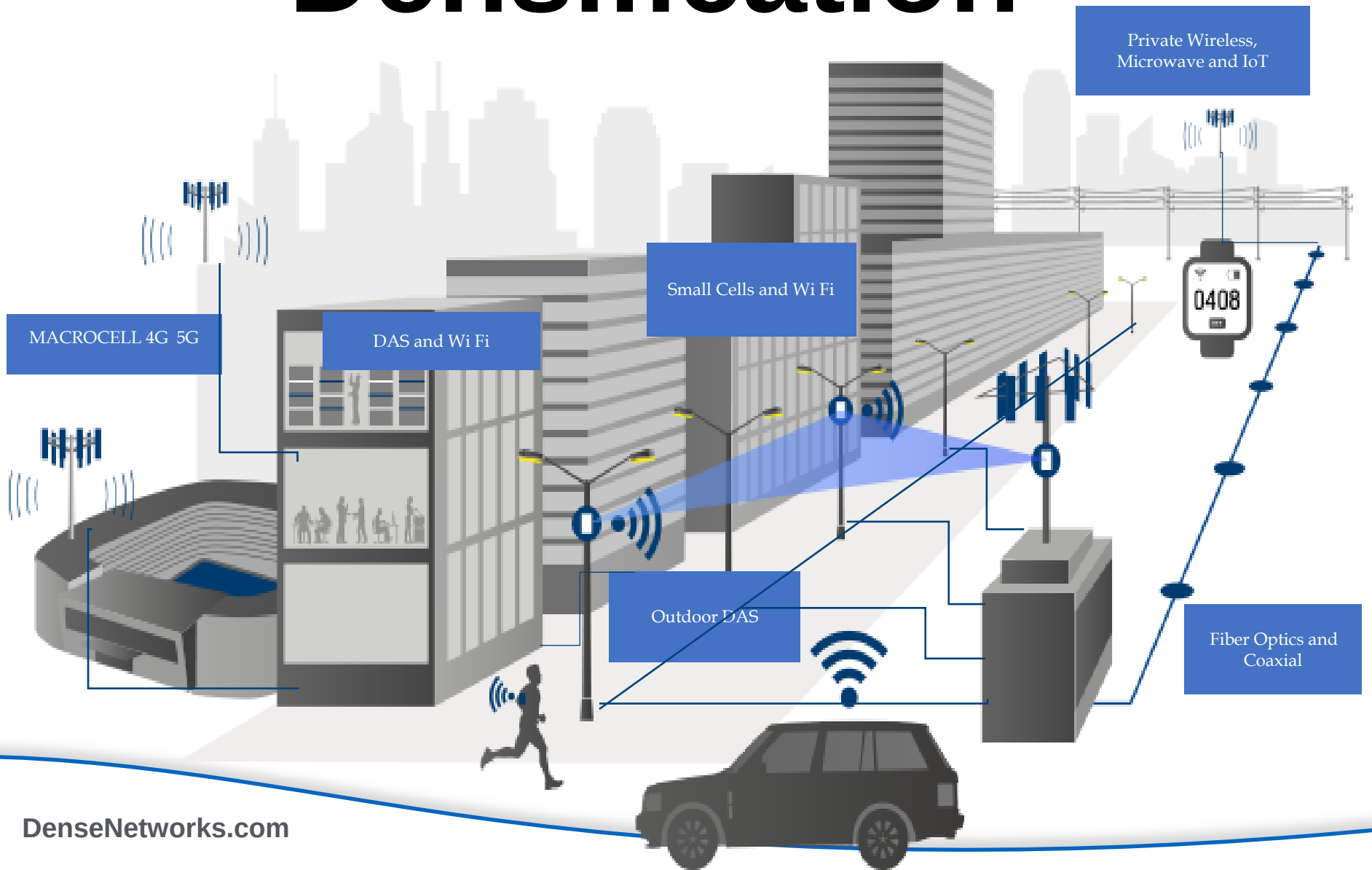
The workshops will also explore the best methods to fund projects through grants and PPP's. To learn how to join us on the road or to become a sponsor, please contact:

Philip.Bane@smartcitiescouncil.com
703-201-5746

January	18/19	Scottsdale	Digital Twin
Februrary	1/2	Orlando	Digital Twin
Februrary	16	Coral Gables	Sustainable Innovation
March	22	Las Vegas	Sustainable Innovation
March	23	Las Vegas	Connected City
March	28	Los Angeles	Connected City
April	26	Washington DC	Connected City
April	27	Washington DC	Sustainable Innovation
May	09	New Orleans	Connected City
June	06	Cary	Connected City
June	07	Raleigh	Sustainable Innovation
June	21/22	Austin	Digital Twin
August	17	Colorado Springs	Sustainable Innovation
September	13	Dallas	Connected City
September	14	Dallas	Sustainable Innovation
October	6/7	TBD	Digital Twin
October	14	Fort Myers	Connected City
November	03	Orlando	Sustainable Innovation
December	07	Phoenix	Connected City

www.smartcitiescouncil.com

Densification



SmartBlockPHL: Midtown Village

A collaborative effort among Comcast, US Ignite, and Philadelphia to deploy a multi-pronged solution designed to meet the needs of several stakeholders. The demonstration project entails retrofitting luminaires and sensors onto pre-existing streetlight poles. This project will deliver new insights to Philadelphia, its residents, and its partners in the business and the community.

Fast Facts:

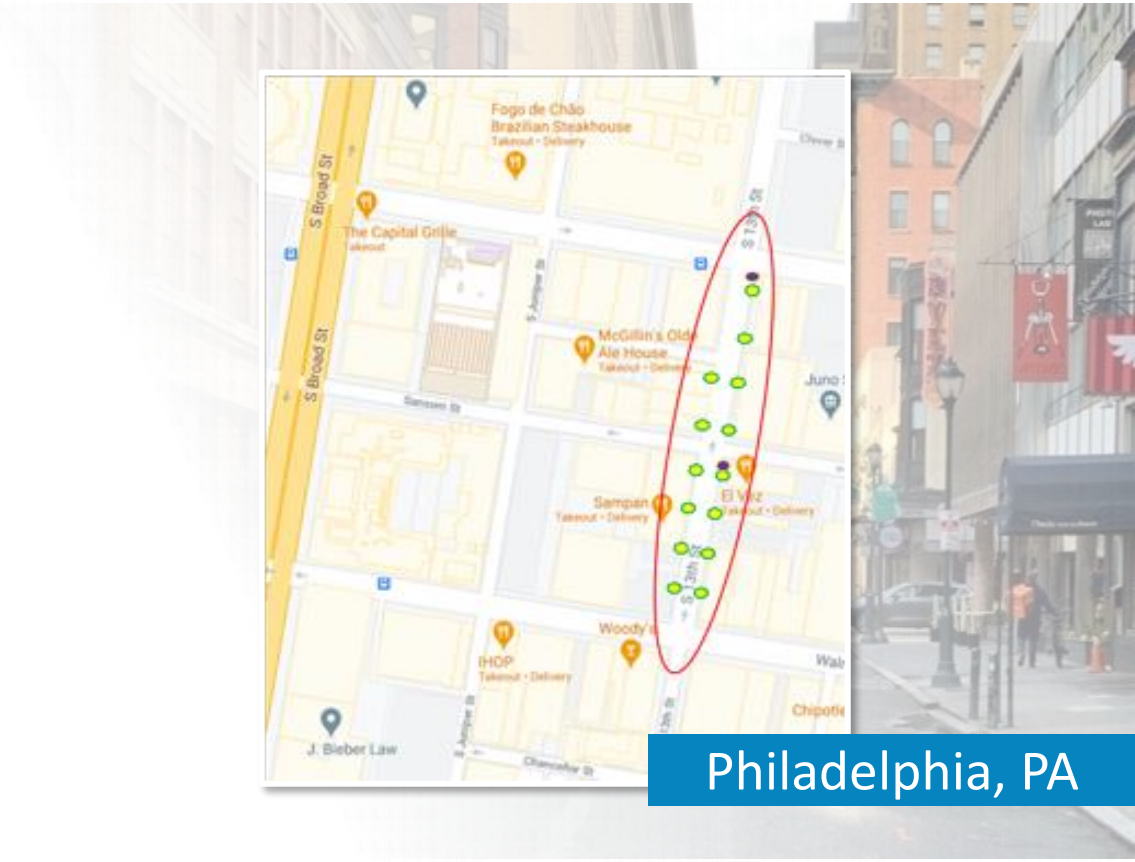
- 14 Smart Streetlights (Colonial Design) with sensors
- City owned and managed solution
- Collects meta-data about traffic, street activity and the environment
- No PPI is collected or stored
- PHL will not use data to enforce laws or issue tickets
- Uses the latest in EDGE processing
- Deliver new insights to Philadelphia, its residents, and its business partners

Use cases & Insights:

- Pedestrian occupancy
- Environment health
- Roadway Traffic
- Parking Utilization
- Managed WIFI

Technology:

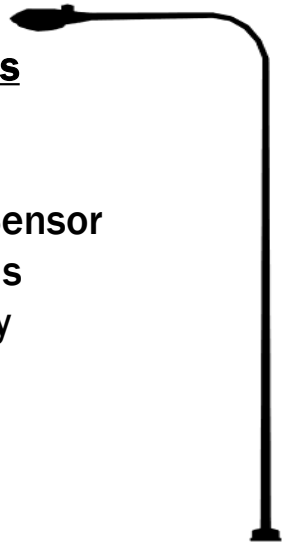
- Comcast 1Gbps EDI Circuit
- Retrofit streetlights with Partner's smart solution
- Partner's lighting management and Smart City Platform



Broadband Strategy San Jose

STREETLIGHT

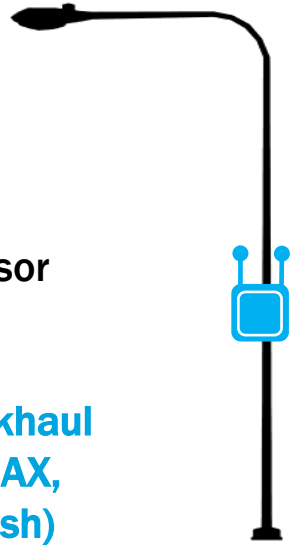
Light/Safety



Properties
- Height
- Power
- Light Sensor
- Lumens
- Density

SMALL CELLs

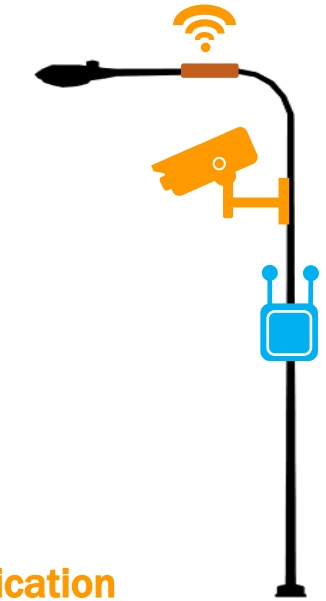
Broadband Digital Infrastructure



Properties
- Height
- Power
- Light Sensor
- Lumens
- Density
- Data Backhaul (Fiber, COAX, Radio mesh)

INTERNET OF THINGS

Smart Cities



Properties
- Height
- Power
- Light Sensor
- Lumens
- Density
- Data Backhaul
- Sensors
- Cameras
- 2-way Communication
- Banner Advertising

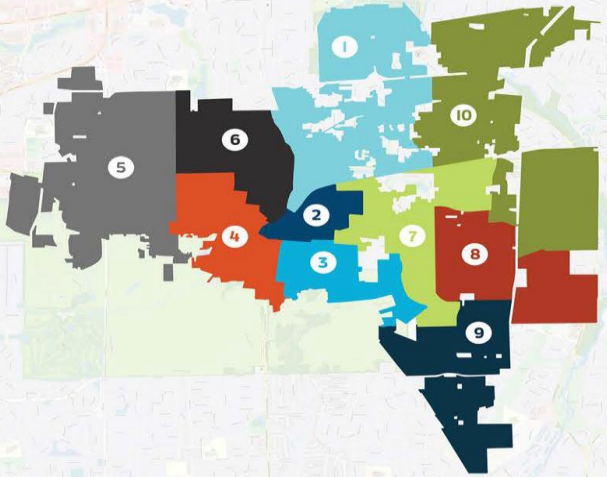
Maturity:	**Mature**	**Emerging**	**Extremely Immature**
Possible Action:	**Proceed w/ LED Light Replacement Only**	**Re-examine in Broadband Strategy**	**Seek to Understand with Knight IoT Grant**

This map represents:

- 645 total miles of fiber throughout the city
- All Aurora homes and businesses connected

A MORE CONNECTED CITY

Aurora is looking at major expansions to its high-speed fiber Internet network – including resident access to all Wards and expansion to areas like the airport, train stations and the outlet mall.



MORE ACCESS TO HIGH-SPEED INTERNET

Aurora wants to expand the city's fiber Internet network, bringing low-cost, high-speed access directly to homes in all Wards. **This service will be faster and more affordable than what's currently available.**

Examples of a high-speed Internet connection can be found along the back wall of the gallery.

Why is high-speed broadband important to Aurora?

The more information, education, and entertainment we put online, the more broadband capacity we use every day. High-speed broadband means citizens of Aurora will have access to the Internet without being restricted by local providers. Small businesses will run more efficiently, children will learn faster, and information will be at our fingertips in no time.

How would having high-speed broadband impact the community?

Access to high-speed broadband leads to economic growth. Cities become more efficient, save money, and attract new development opportunities that provide more jobs to the community.

What else would fiber provide us?

A fiber network gives the city a very attractive and reliable high-speed platform to offer businesses – one that's built for the Internet of tomorrow.

If the City offers broadband services what kind of privacy policy can be expected?

The City of Aurora takes privacy very seriously and will not collect information beyond what is required to provide service. As a current utility provider, we will maintain our commitment to protecting your privacy.

Will the City track or sell my information?

There is no need, desire, or intent for the City of Aurora to collect or sell resident information. The City takes privacy very seriously and is committed to maintaining resident confidence.

How will the City provide INTERNET security?

Securing our network is vital to the success of the platform. The City will work with its highly experienced partners—including Nokia and Jacobs Engineering—to ensure proper network security.

"A CONNECTED AURORA IS **A PROSPEROUS AURORA**"

CHUCK NELSON, CITY OF AURORA DEPUTY MAYOR

SMART CITY

LEARNING TO BE THE SMARTEST CITY IN AMERICA

It's Aurora's turn. Next year, the City of Aurora gets the opportunity to leap ahead of every other city in America. With $300 million in smart city upgrades, we could redefine the standards for public safety, for city services, for inclusive internet access, and for innovative businesses.

This is our chance. Now is our time to lead. And it could only happen in Aurora.

Mayor Richard C. Irvin,
City of Aurora, IL

Cities earn the label "smart" when they use **information, communication and technology** to make city services run better and to improve life within a city. Aurora's journey **to become one of the smartest cities in America** includes embarking on public-private partnerships through the Smart Aurora Opportunity. This opportunity aims to infuse $300 million on smart city projects in Aurora and establish a synergistic working relationship with technology vendors that will enable the City to enact major initiatives in a short time and without incurring new expenses or increasing taxes.

The Smart Aurora Opportunity aims to achieve the following four goals within the first 1-2 years:

This page provides highlights from the Smart Aurora Opportunity. **Visit the Appendix B for more information**.

- **Make city services more effective**
- **Make the city safer**
- **Expand high-speed internet access for residents and organizations**
- **Ignite economic growth**

INNOVATION DISTRICT

NO CHILD LEFT OFFLINE










THE CITY OF AURORA, ILL. INCORPORATED FEB. 17TH A.D. 1857.

scientel SOLUTIONS
THE UNIVERSAL INTEGRATOR

ONLight aurora

Despite the infrastructure, Philadelphia has some work to do

16%

of Philadelphia households lack high-speed internet

56% said the **cost of monthly fee** was a problem and **50%** said they could **not afford the cost of a computer.**

- **29%** of low-income Philadelphians and **33%** of seniors lack home braodband internet

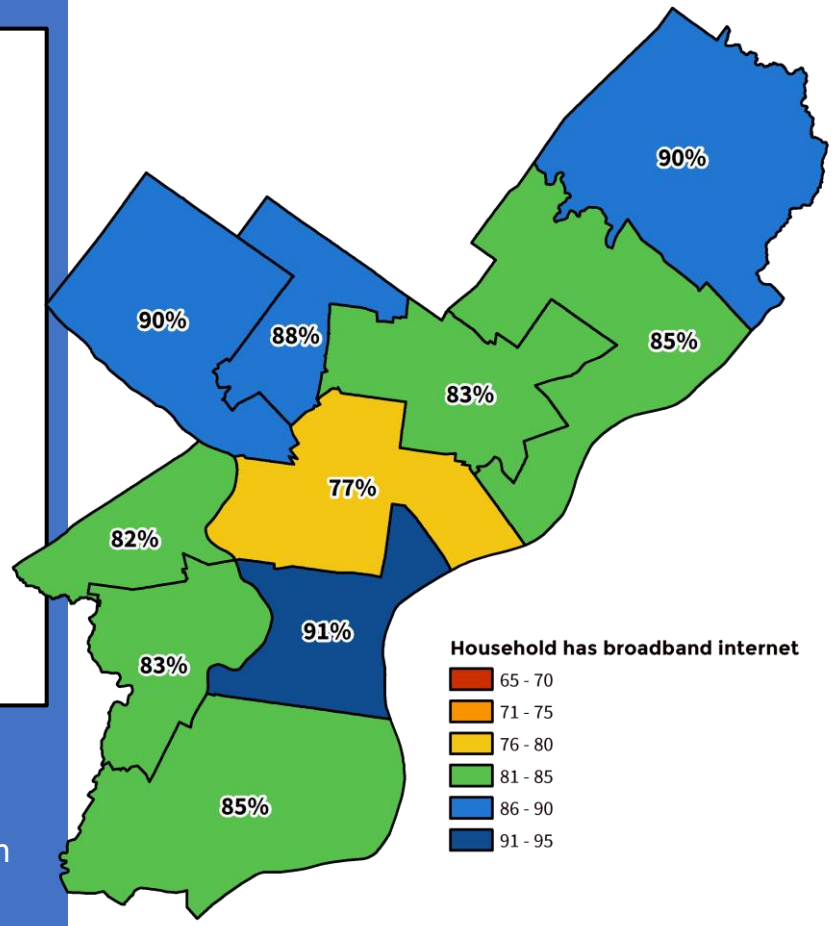
32%

of Philadelphia households are considered "subscription vulnerable."

31%

have heard of discount programs for Internet & devices

More than 90% of those with broadband subscriptions in Philadelphia say a monthly fee of over $20 per month is too expensive.

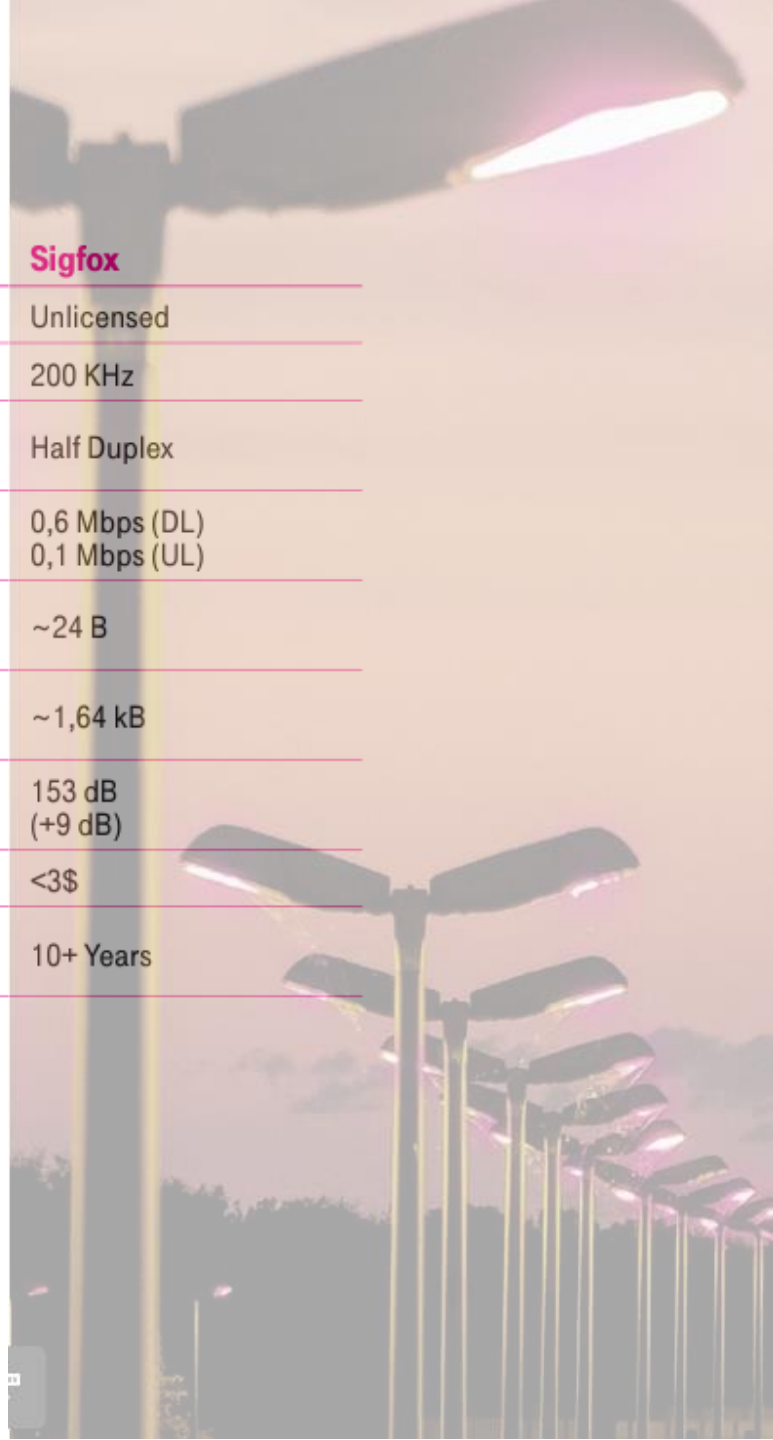


Tech Talk: Types of IoT Connectivity

	LTE Cat-1	LTE-M	NB-IoT	LoRa	Sigfox
Spectrum	Licensed	Licensed	Licensed	Unlicensed	Unlicensed
Bandwidth	20 MHz	1.4 MHz	180 KHz	125-500KHz	200 KHz
Biodirectional Data Transfer	Full Duplex	Half Duplex & Full Duplex	Half Duplex	Half Duplex	Half Duplex
Peak Data Rate	10 Mbps (DL) 5 Mbps (UL)	1 Mbps (DL) 1 Mbps (UL)	250 Kbps (DL) 230 Kbps (UL)	50 Kbps (DL) 50 Kbps (UL)	0,6 Mbps (DL) 0,1 Mbps (UL)
Typical Downlink Daily Throughput	Limited only by battery power, radio signaling condition and commercial terms (e.g. monthly data volume, amount of messages/size per period)			~200 B	~24 B
Typical Uplink Daily Throughput				~200 kB	~1,64 kB
Max Coupling (vs. GSM)	144 dB (0 dB)	156 dB (+12 dB)	164 dB (+20 dB)	157 dB (+13 dB)	153 dB (+9 dB)
Expected Module Cost	>10$	<10$	<5$	<7$	<3$
Epected Max. Battery Lifetime[1]	3-5 Years	5-10 Years	10+ Years	10+ Years	10+ Years

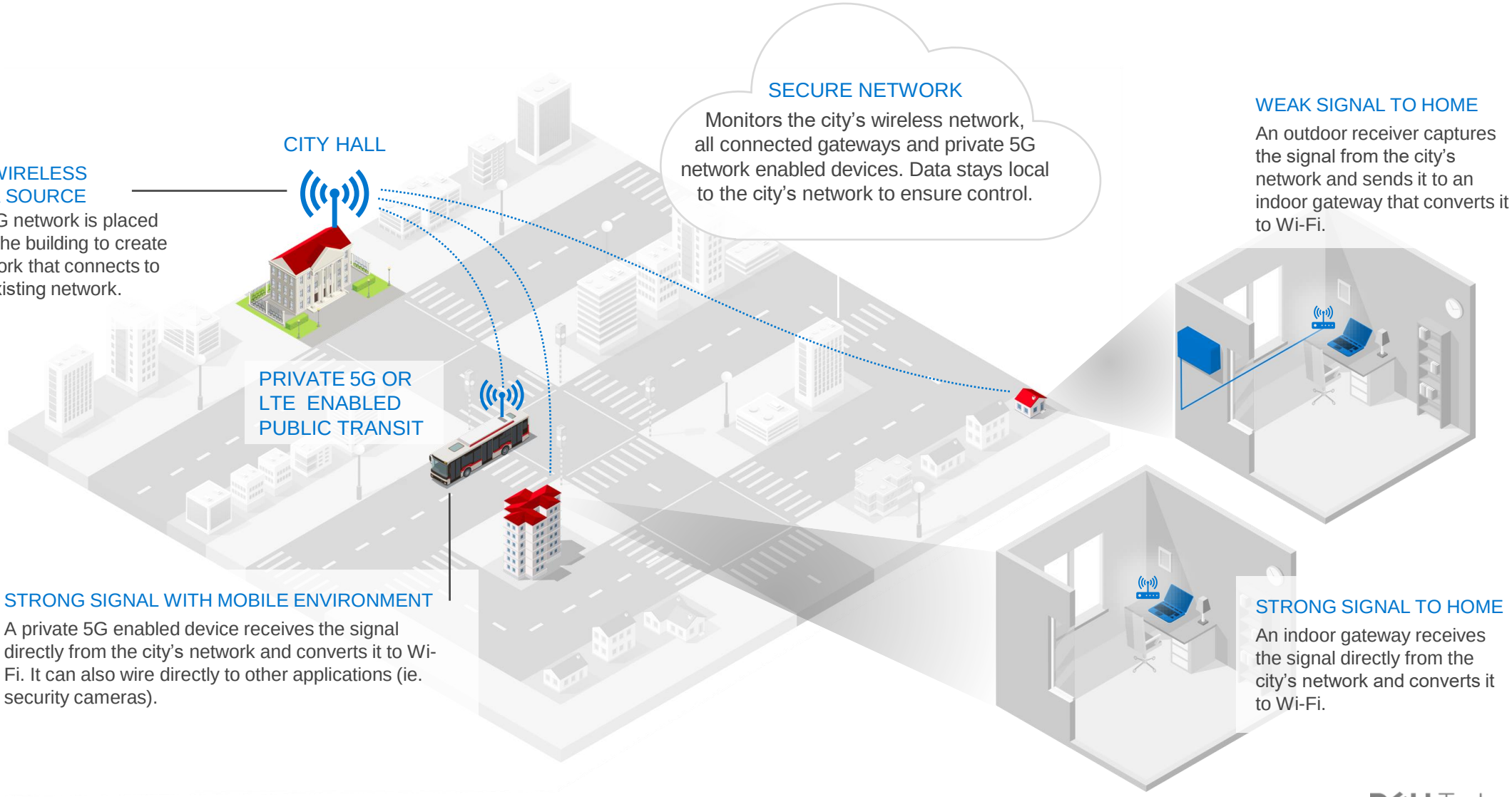
[1] Assuming typical traffic pattern and battery size

Table 1: Overview of IoT transmission technologies



T-MOBILE FOR GOVERNMENT

SLG Private LTE / 5G Wireless Concept



Walter Cannon

VP, ZenFi

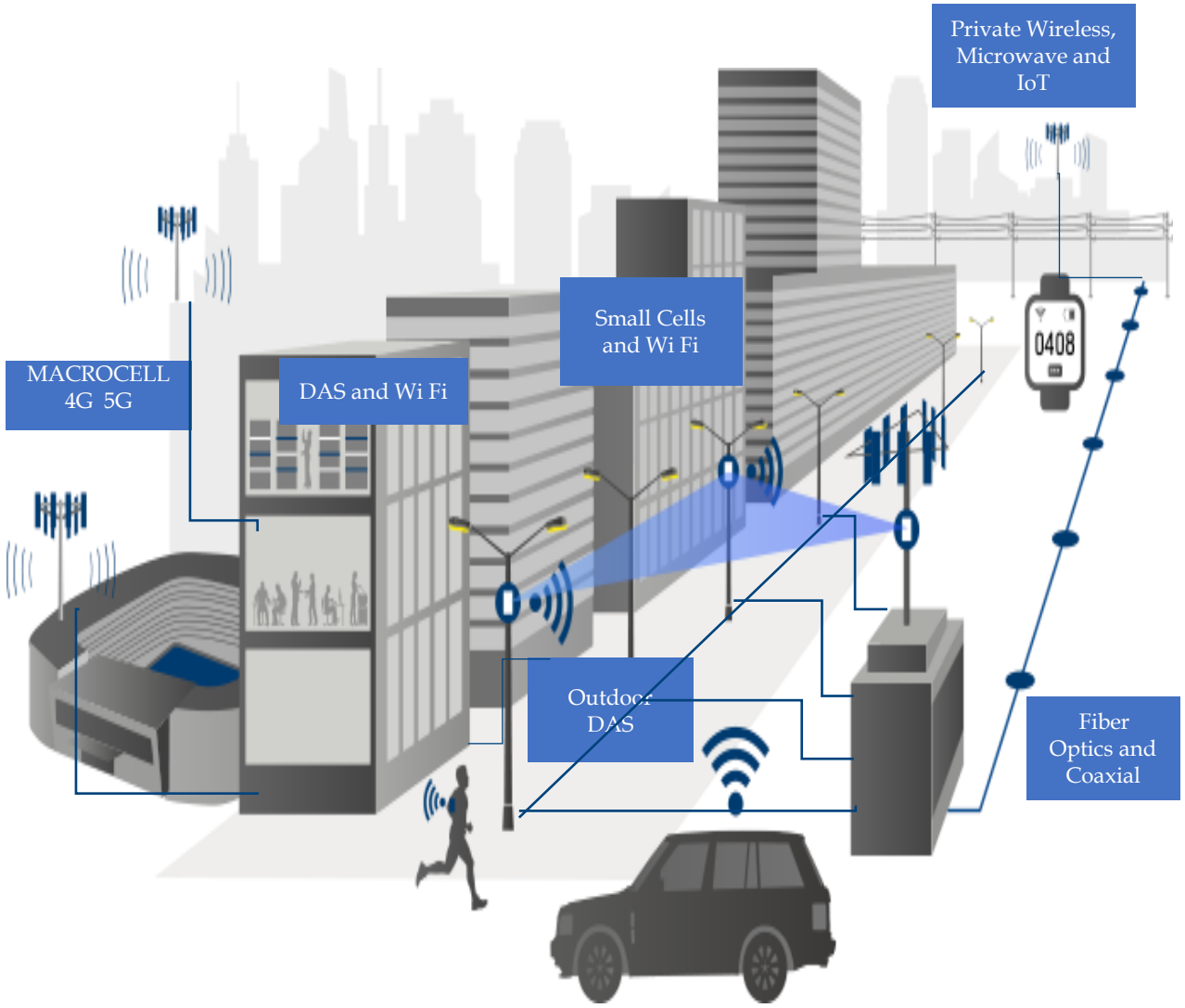
Clayton Banks

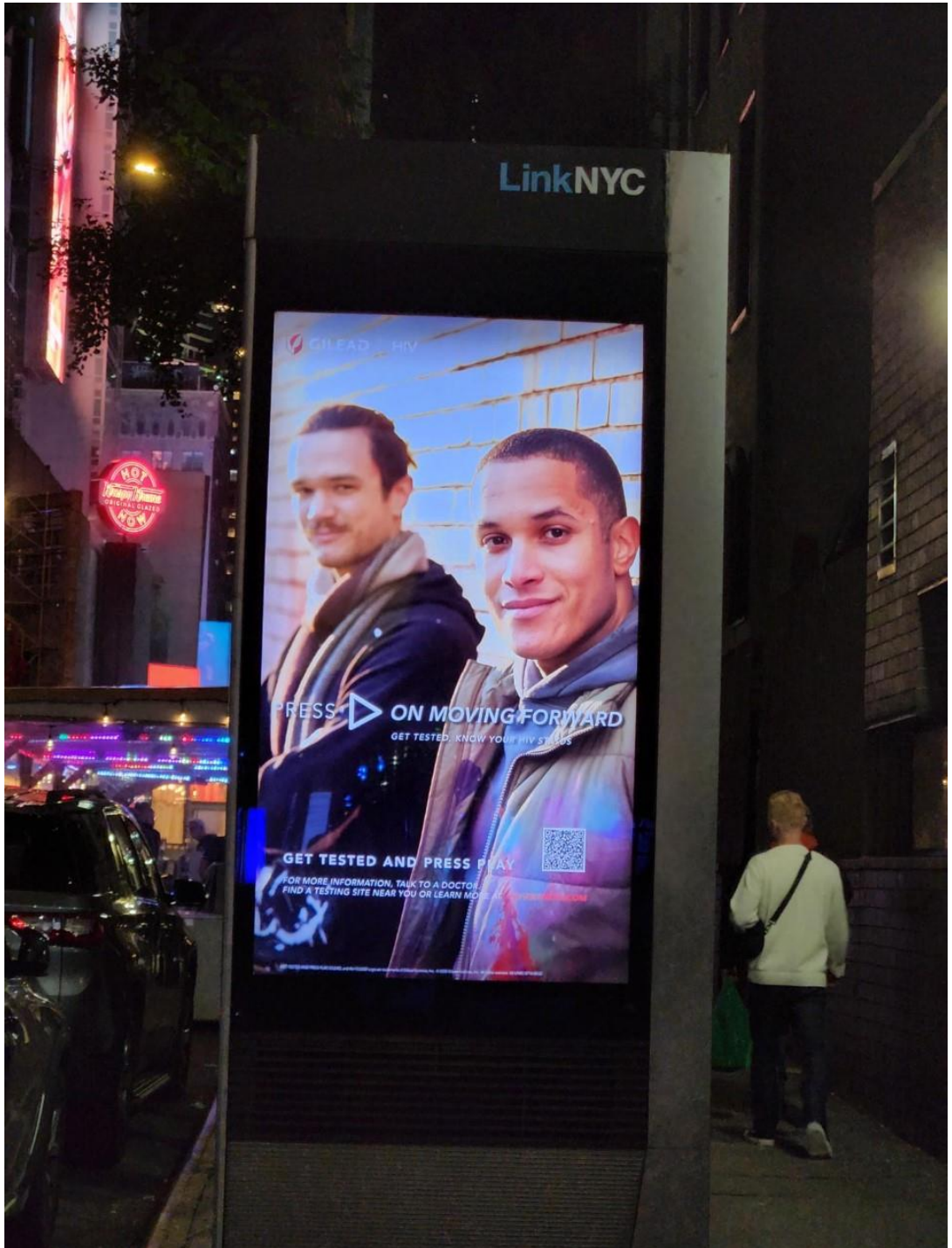
CEO, Silicon Harlem

Thomas Tyler

State of Louisiana
Deputy Director, Broadband

Densification



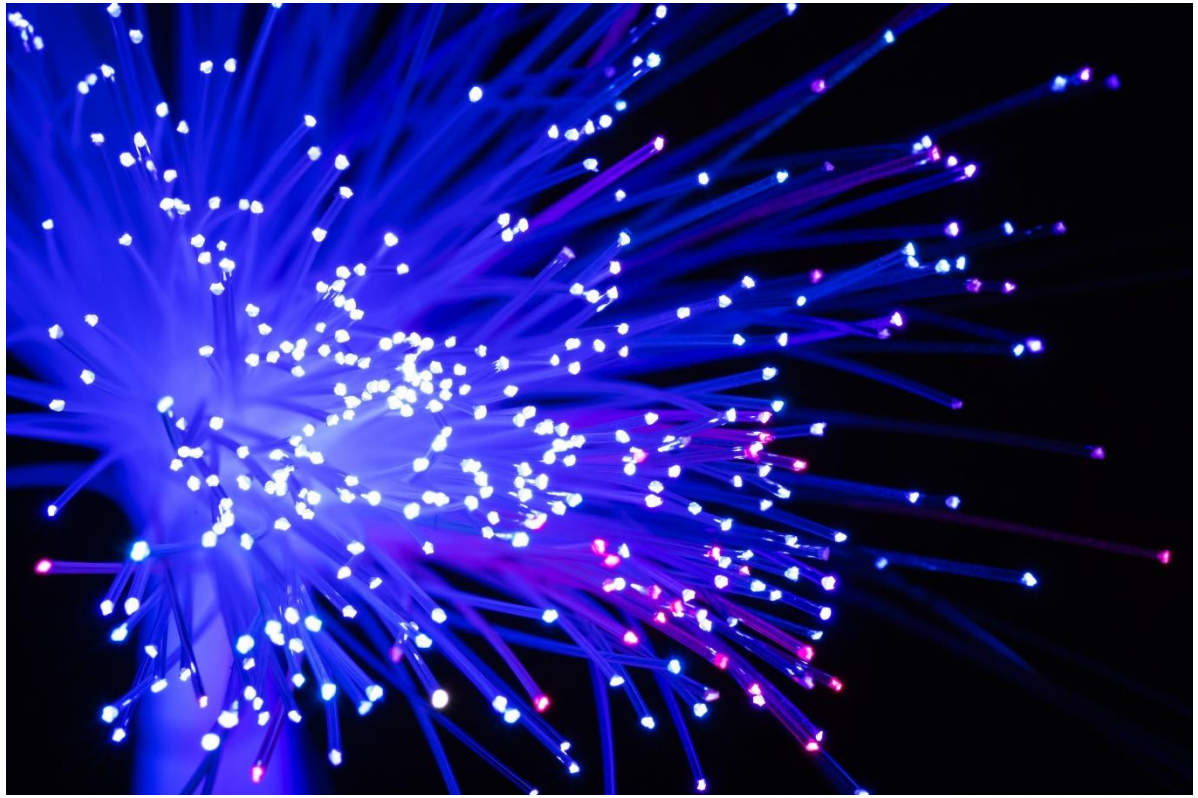



PRINCETON
ENTREPRENEURSHIP
COUNCIL
Photo by Melvin McCray


LinkNYC
FRIDAY, OCTOBER 18, 2019
SILICONHARLEM.COM


GIGABIT INNOVATION CENTER
IN HARLEM
GRAND OPENING
2.22.22 @ 2PM
LIVESTREAM BY
Internet Society
US New York Chapter

Broadband and Digital Equity



FCC Internet Benchmarks

Qualifies for Federal & State Investment

Date Adopted	Minimum Download	Minimum Upload	FCC Commissioner
2015	**25 Mbps**	**3 Mbps**	Tom Wheeler, D
2010	4 Mbps	1 Mbps	Julius Genachowski, D
1996	200 Kbps	200 Kbps	William Kennard, D

Federal Construction Requirements

Reliable 100/20 Mbps scalable to 100/100 Mbps (symmetric)

Allocation	Amount	Agency
Federal Broadband Infrastructure Funding	*$65 Billion allocated ($.06 billion for other)*	NTIA
Middle-Mile Broadband Deployment Grant Program	*$1.0B*	NTIA
Digital Equity Competitive Grant Program	*$1.25B*	NTIA
State Digital Equity Capacity Grant Program	*$1.5B*	NTIA
Distance Learning, Telemedicine, and Broadband (DLT) Program & ReConnect Program	*$2.0B*	USDA
Tribal Broadband Connectivity Program	*$2.0B*	NTIA
Affordable Connectivity Program	*$14.2B*	FCC
Broadband Equity, Access, and Deployment Program	*$42.45B*	NTIA

Philadelphia Designs a Digital Equity Plan

GOAL 1: DEVICES

PHILADELPHIANS CAN ACCESS APPROPRIATE AND AFFORDABLE TECHNOLOGY DEVICES

GOAL #2: CONNECTIVITY

PHILADELPHIANS CAN ACCESS AND AFFORD THE INTERNET CONNECTIVITY THEY NEED

GOAL #3: TRAINING & WORKFORCE

PHILADELPHIANS DEVELOP THE DIGITAL SKILLS NECESSARY FOR WORK AND LIFE

GOAL #4: ECOSYSTEM

PHILADELPHIA GROWS AND SUSTAINS THE INFRASTRUCTURE AND ECOSYSTEM TO INCREASE DIGITAL EQUITY

Broadband and Digital Equity Planning Matrix

Who	Healthcare	Child Teen Focused Housing	Child Teen Focused Support	Homeless and Shelter	Seniors	Disabled	Language
What							
Literacy	x	x	x	x	x	x	x
TeleHealth	x	x	x	x	x	x	x
Remote Work		x	x	x		x	x
Workforce Development		x	x	x		x	x
Engagement	x	x	x	x	x	x	x
Services (Pay bills, email, forms)		x	x	x	x	x	x
Why							
Availability	Functional Locations	Devices	Networks	Literacy and Skills	Workforce	Health	
Affordability		Devices	Networks	Literacy and Skills		Health	
Ease of Use	Functional Locations	Devices	Networks	Literacy and Skills	Workforce	Health	
How							
Functional Locations	Community Centers	Hospitals and Clinics	Libraries	Senior Centers	Parks	MDU	
Devices	Computers	Tablets	Smart Phone	Mi Fi	Telehealth Booth	Digital Boards	
Networks	Fiber Government	Fiber Service Provider	Cellular	Wi Fi	Private	LAN	
Programs	Literacy	Individual Package	MDU Infrastructure	Workforce and Skills	Health	Helpdesk	
Funding	State-BOP	Federal-State-CPF	Federal-State-BEAD	Federal-State-Digital Equity	Federal Digital Equity	E-Rate	

Eric Toenjes
National Mkt. Mgr.
Graybar

Dean Bogdanovic
CTO
Alef

Brendan Delaney

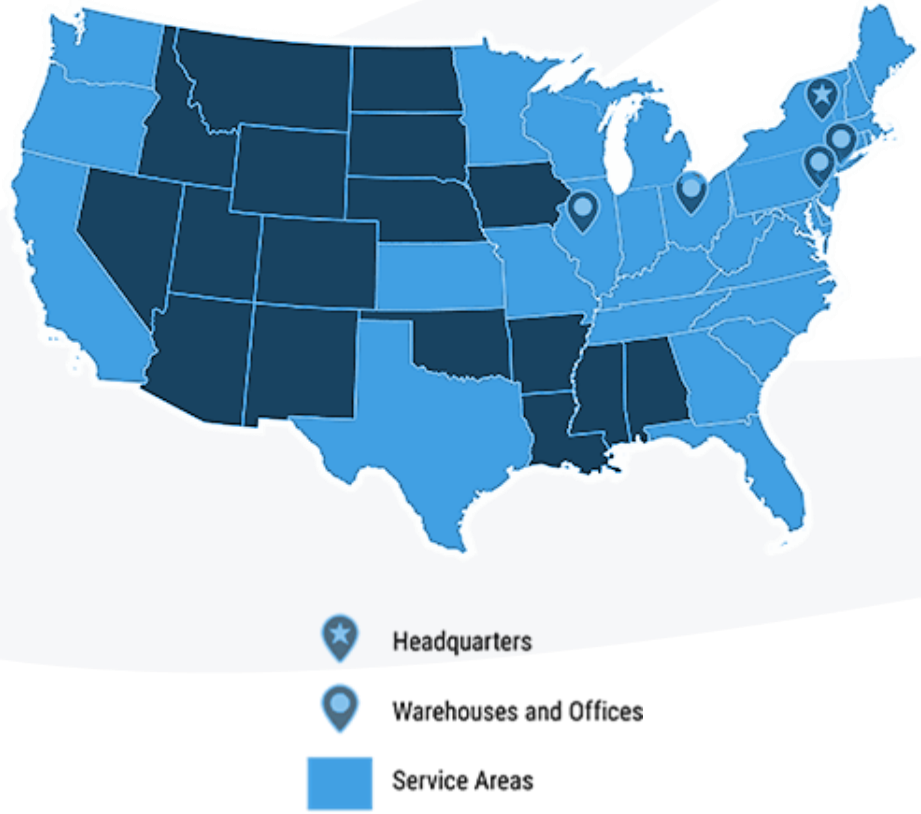
ANS

ANS Advanced Network Services

Headquartered in **NY since 1991**

Regional operations centers –
Northeast, Midatlantic, Midwest

Suite of services include - In-Building Wireless, Tower Services, Network Infrastructure, DC Power Systems, AC Electrical, Monitoring & Maintenance and EV Charging Solutions

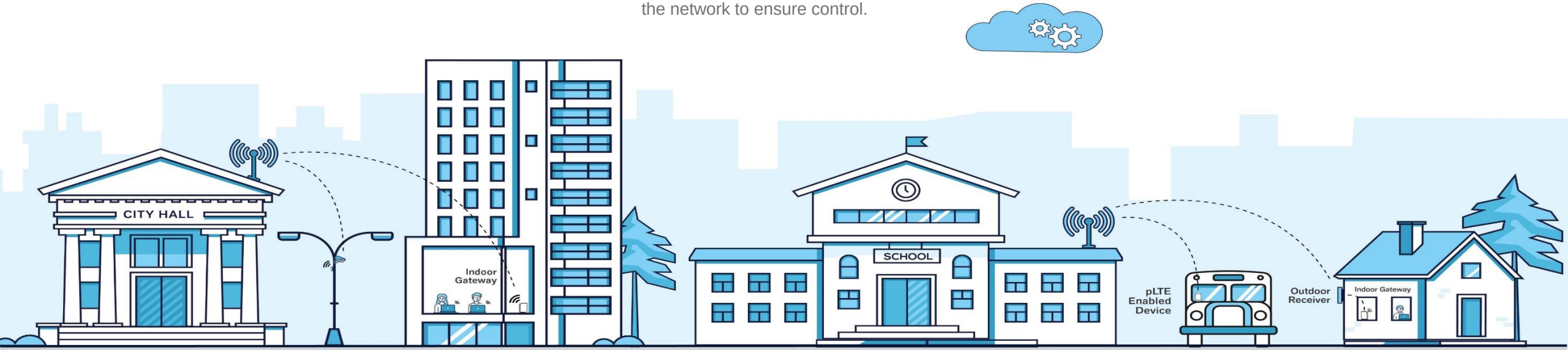


Fiber, Power & Poles are the Foundation for a Smart City

Bridge the Digital Divide & Extend the Smart City Foundation

Build a private LTE/5G wireless network broadcast from city and school facilities

Secure Network
Monitors the wireless network, all connected gateways and private LTE enabled devices. Data stays local to the network to ensure control.

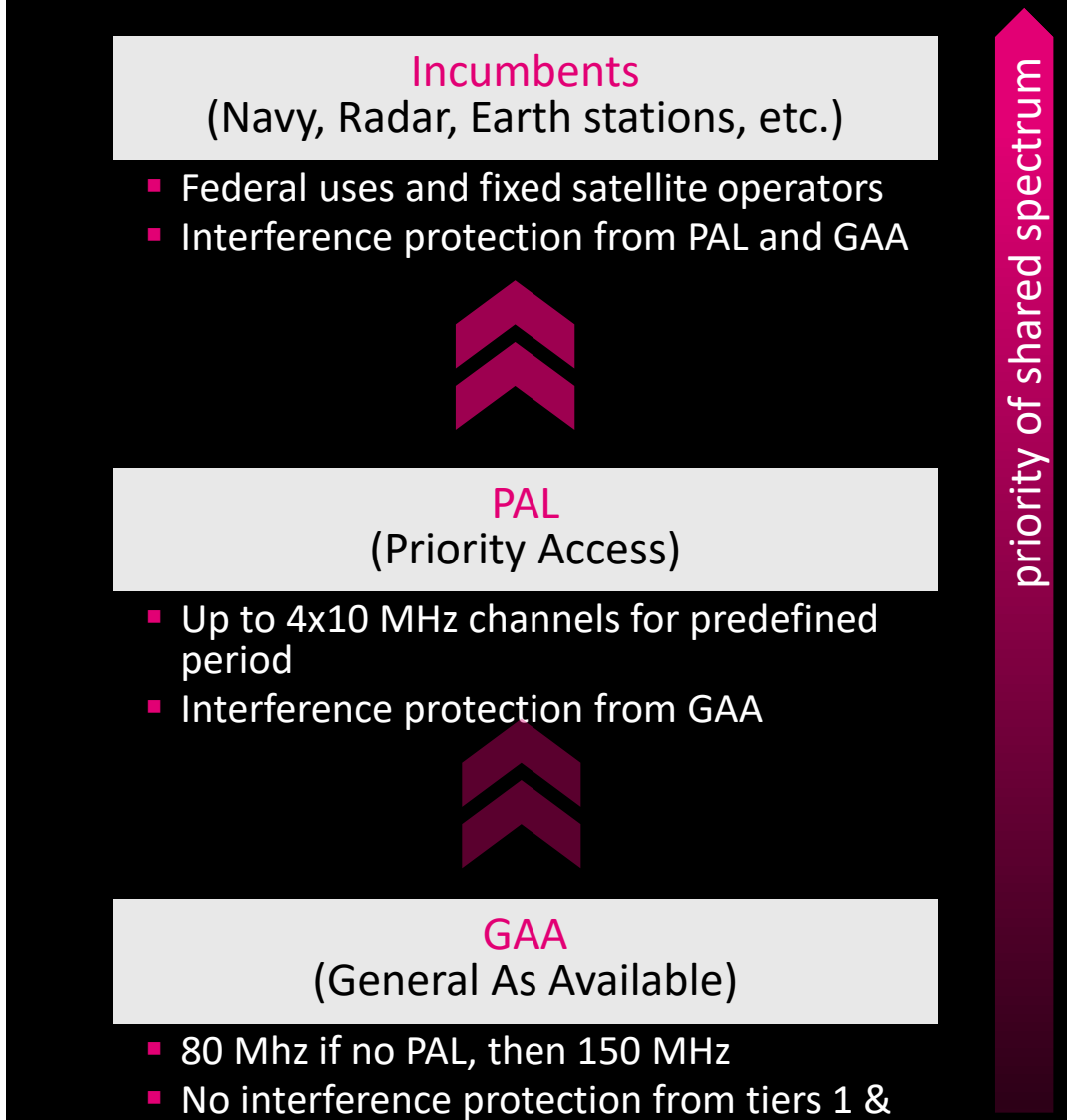


GraybaR

T-MOBILE FOR GOVERNMENT

Private LTE (CBRS)

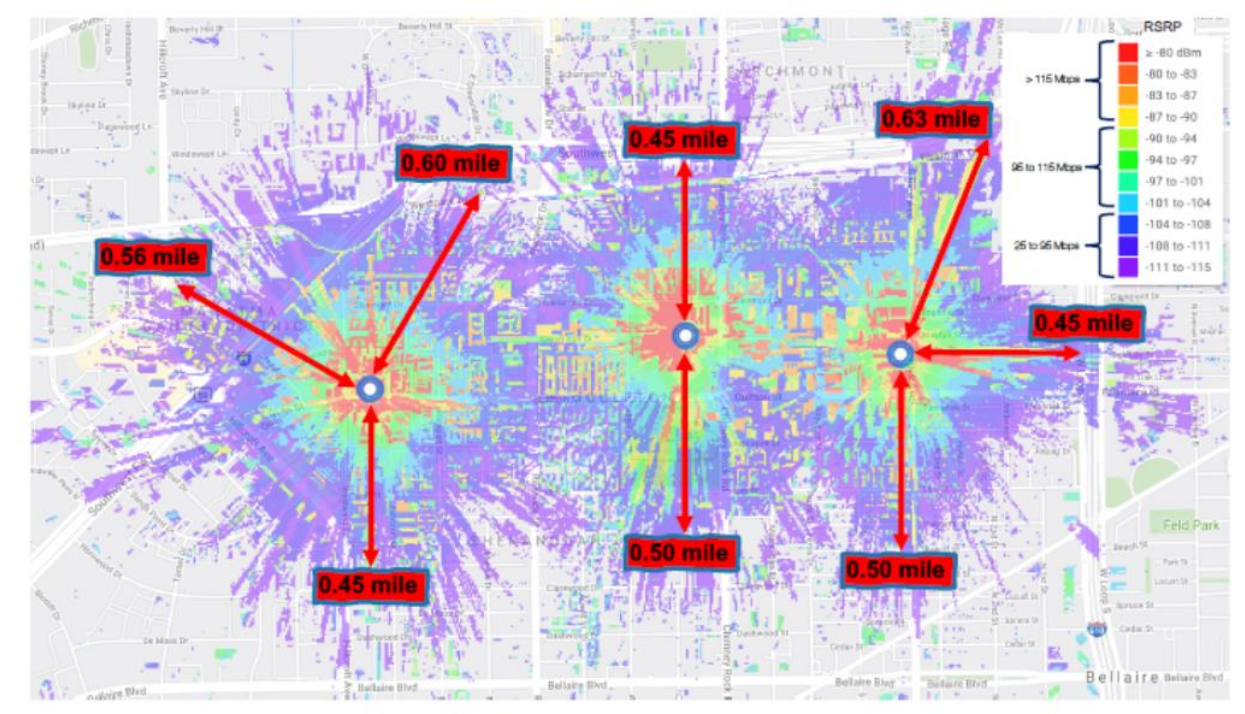
- The FCC set aside 150 MHz of 3.5 GHz band spectrum (TDD Band 48) for private cellular networks
- A portion was auctioned off for Priority Access in 2020 and the remainder will remain unlicensed for General Access
- Most suitable for indoor and short range outdoor. Why?
  - Installation cost is 1/3 less than DAS.
  - Equipment footprint is small and easier to install in commercial spaces.



The first Edge API Platform that offers edge as a service to empower cities to create, customize, and control their own private LTE/5G network, inside their firewall using programmable APIs.

ALEF

What is CBRS & How to Leverage for a Private Network?



- Allows Enterprise to use cellular technology (LTE or 5G) to enable a private network instead of connecting to AT&T/VZW/TMO
- Provides connectivity for enterprise applications using 150 MHz of spectrum in the 3.5GHz range
- SAS coordinates all frequencies to be used to ensure QOS
- SIM/eSIM at device level required for network access
- EPC can have local break out to LAN and provide devices with private IP addresses

What does a CBRS Private Network Look Like?

City Hall

Convention Center Or Library

Fire Stations

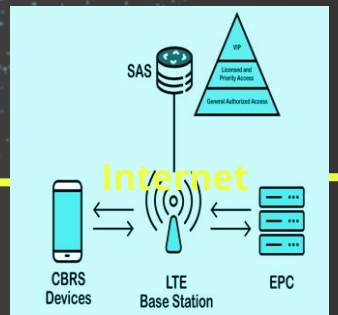
Transportation Buildings

Police Station

School Buildings

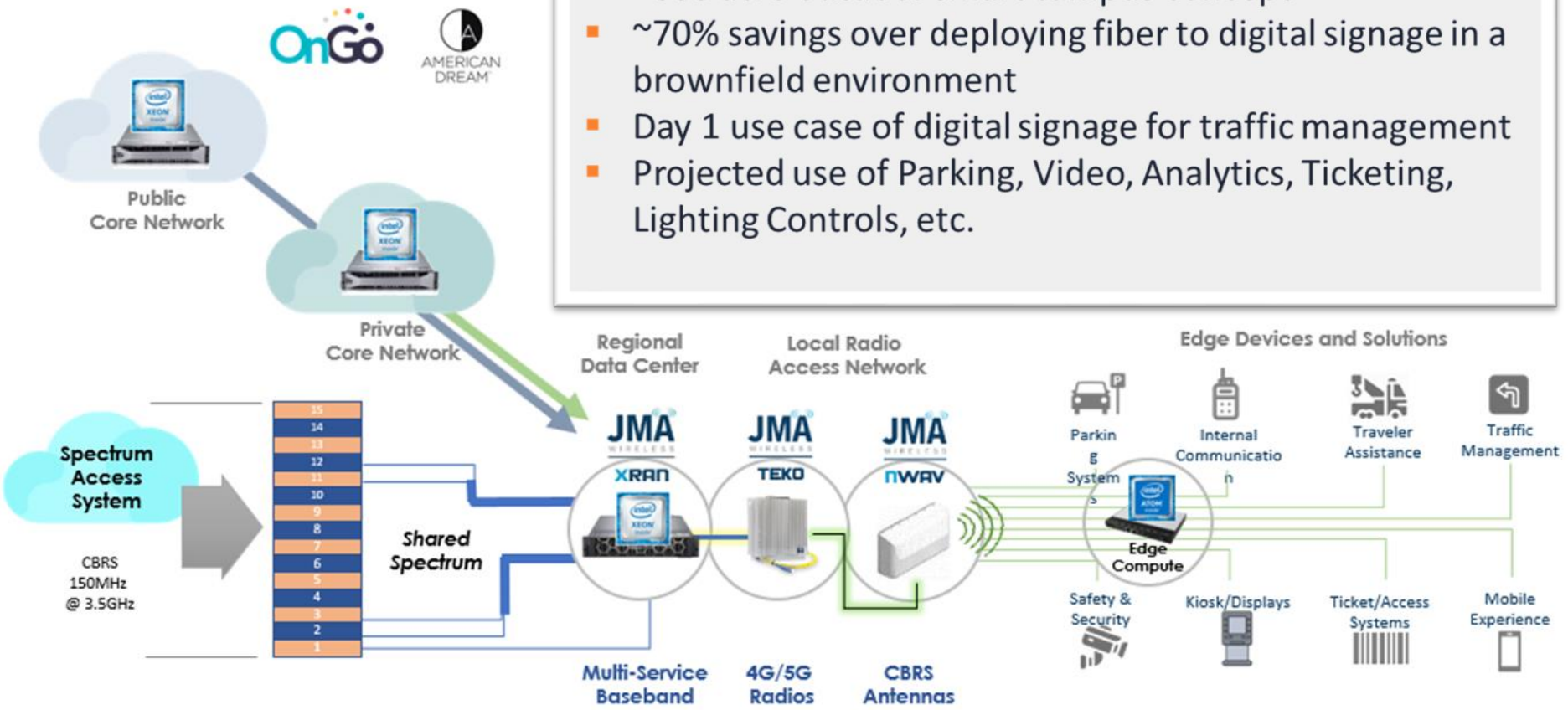
Street Lighting

City Fiber Network



American Dream
Entertainment & Retail Experience

- ~600 acre outdoor smart campus concept
- ~70% savings over deploying fiber to digital signage in a brownfield environment
- Day 1 use case of digital signage for traffic management
- Projected use of Parking, Video, Analytics, Ticketing, Lighting Controls, etc.



CBRS versus Wi-Fi

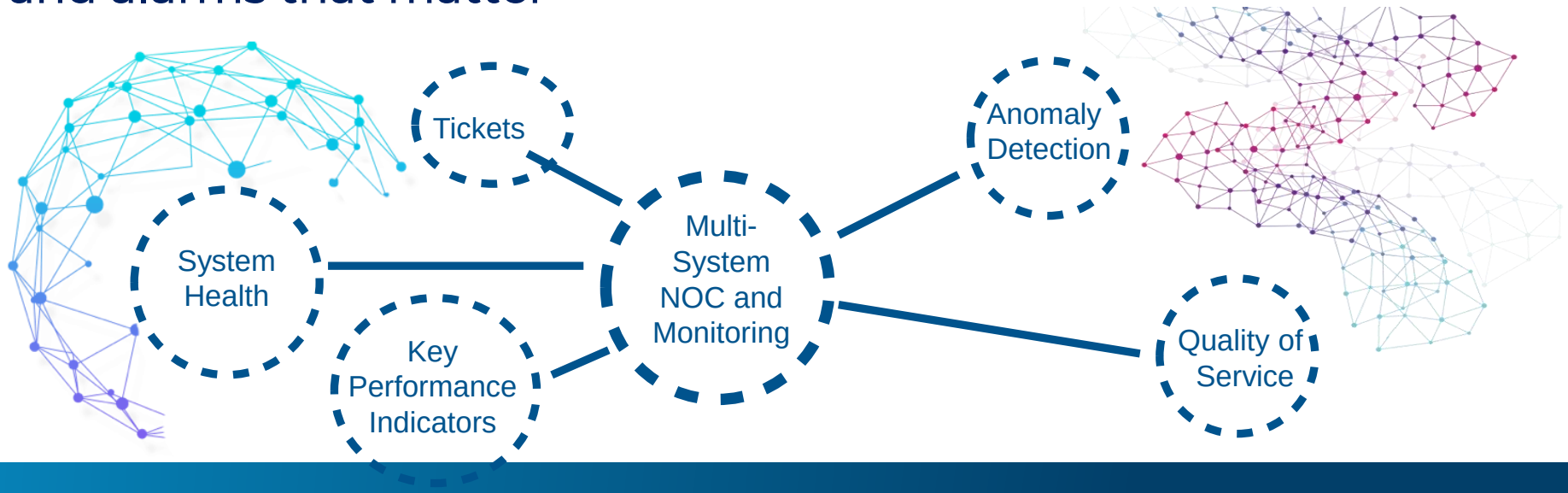
	CBRS	Wi-Fi
Devices	Handles many	System performance unpredictable as devices added
Infererence	Greatly reduces	Prone to interference from signals in most unlicensed bands
Authentication & Encryption	End-to-end SIM based	Requires proprietary / conflicting coordination
Security	Channel monitoring and coordination of spectrum	Poorer security vs LTE/5G
Handover	Controlled between devices managed by standards	Proprietary best effort for roaming
Latency	Consistently Lower	Unpredictable
Radio	Works well in complex environments with many wireless clients/devices	Works well in simple environments with a moderate number of devices

Smart Building Private 4G and 5G Networks

- CBRS based private 4G LTE and 5G networks
- Fiber-like connectivity and quality of service with the ability to deploy flexibly
- Network segmentation to support
  - Security for heating, lighting, sensors, building automation
  - Video and communications
  - Point of sale and tenant services
  - Path to carrier roaming

Systems Monitoring and Visibility

- System agnostic monitoring and maintenance to ensure uptime and business continuity across platforms in the smart building
- Knowledgeable NOC with tight processes and a flexible monitoring platform
- Proactively identify issues before customer complaints
- Single-pane of glass for multiple systems with the key performance indicators, tickets, and alarms that matter



OMNIA PARTNERS

POWER. ACCESS. TRUST.

OMNIA PARTNERS PUBLIC SECTOR COOPERATIVE PROGRAM

GraybaR

OMNIA PARTNERS | Public Sector

- Competed Contract satisfies Public Solicitation Process
- 23 years and 20,000 cities / agencies
- Kansas City – Lead public agency
- No Cost / Non-Binding
- Products & Services eligible
- Best in Class Vendors
- National Volume
- Best Overall Value

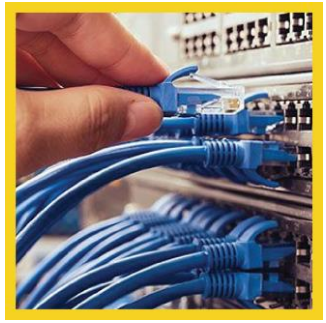
Key Benefits:

- **No RFP or Solicitation required**
- **Flexibility to choose suppliers and installation partners**
- **Shorten timeframes from concept to completion**
- **Great pricing resulting from competed contract**

GraybaR

TYPES OF PRODUCTS

Electrical



DataComm

Lighting & Controls

Power Distribution

Industrial Control & Automation

Conduit, Raceway & Cable Support

Wire, Cable & Wiring Devices

Power Protection & Maintenance Supply

GraybaR