Las Vegas has been a leader at using network technology to address citizen needs. This workshop will focus on how Fiber Optics, 5G, IoT, Wi Fi and CBRS have enabled innovation. We will specifically look at how Private Cellular 5G has expanded broadband and IoT solutions as well as the latest on the Federal and State Broadband Funding programs.

Keynote Speakers

MICHAEL SHERWOOD
Chief Innovation Officer
Las Vegas

BRIAN MITCHELL
Director Governor's Office of Science
Las Vegas

PRESENTED BY:

GraybaR®

Connected City
Smart City

The 2023 calendar 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

2023 CALENDAR

MARCH 23	Las Vegas, NV
MARCH 28	Los Angeles, CA
APRIL 27	Washington D.C.
MAY 09	New Orleans, LA
JUNE 07	Cary, NC
SEPTEMBER 14	Colorado Springs, CO
SEPTEMBER 21	Dallas, TX
OCTOBER 12	Fort Myers, FL
DECEMBER 7	Phoenix, AZ

9:05	Welcome	Peter Murray, Executive Director, Dense Networks
9:15	Keynote:	Michael Sherwood-Chief Innovation Officer, Las Vegas
9:35	Connected Cities Innovation	Peter Murray, Moderator

Michael Sherwood, Chief Innovation Officer, Las Vegas

Bart van Aardenne, CEO, Terranet

Josh Broder, CEO, Tilson

Bill Baver, VP, NTT Data

Brett Lasher, AVP, Cox Communications

10:25	Break	
10:45	Nevada Broadband Program	Brian Mitchell, Broadband Manager, State of Nevada
11:15	Federal Broadband Funding-BEAD	Andy Lipman, Lead Attorney, Morgan Lewis
11:40	Wireless Network Innovations	Peter Murray, Moderator

Jamaal Smith, VP, Kajeet

Oren Binder, Director, OnGo Alliance

James Jacobellis, SVP, Alef

Cindy Malinchak, Strategic Advisor, Signify

39 Years Network Deployment and Operations

- Verizon, Level 3, Peco/Adelphia
- Constructed 800 Mile Fiber Network to Schools, Hospitals, Carriers and Enterprise Customers in Philadelphia Region

NTIA Grant Reviewer

- Broadband for All
- Tribal
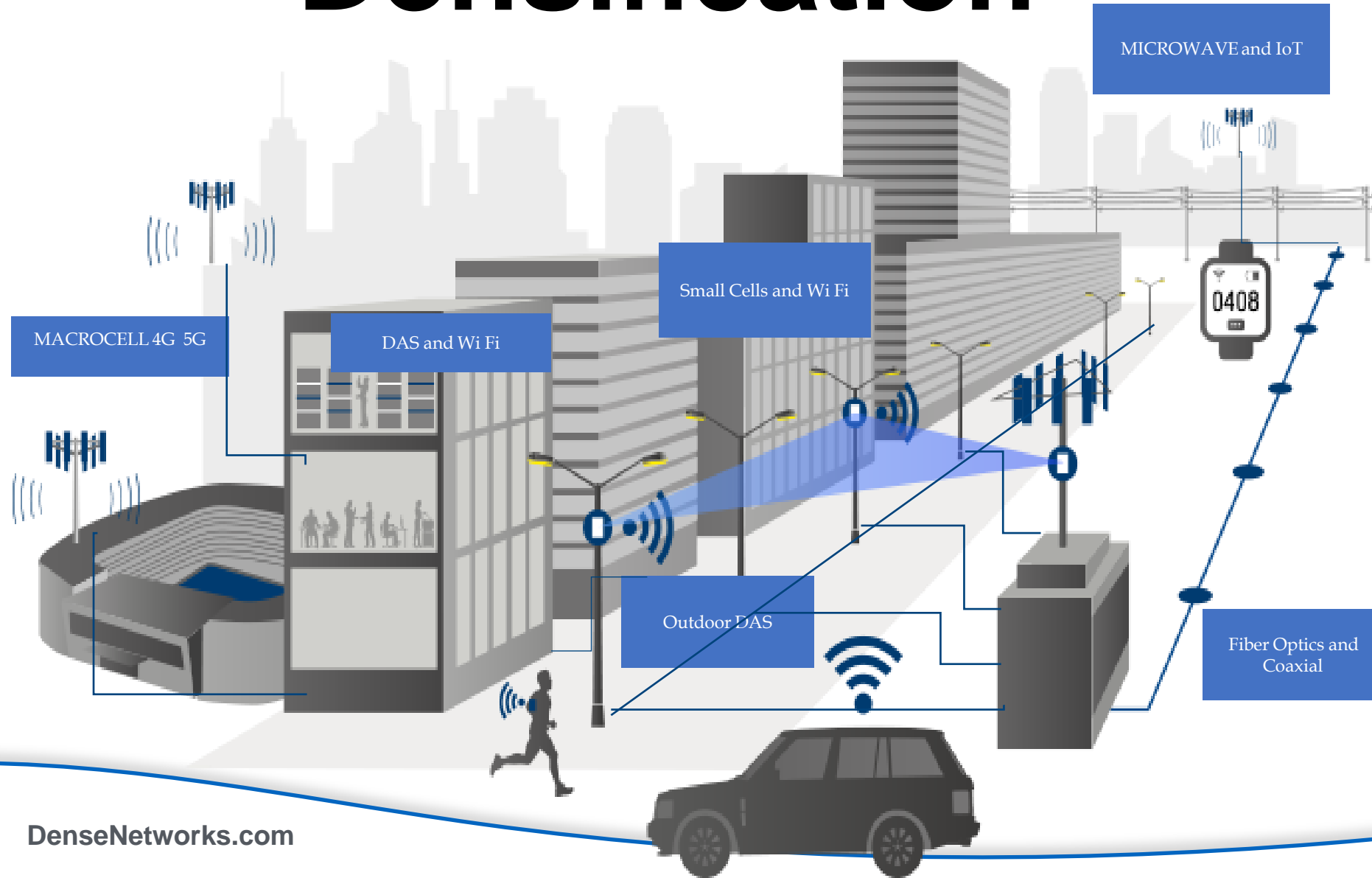- Connecting Minority Communities

Professor

- Temple University
- Community College of Philadelphia

2023-5 Grants out of 5 Grants awarded.

- Lee County-Total Grants and Match=$20 million
- Osceola County-Total Grants and Match=$15 million
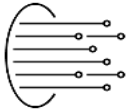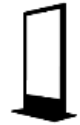- Orange County-$16.1 ARPA funding committed

Densification

MICROWAVE and IoT

Small Cells and Wi Fi

MACROCELL 4G 5G

DAS and Wi Fi

0408

Outdoor DAS

Fiber Optics and Coaxial

Dense NETWORKS

DenseNetworks.com

Digital Infrastructure

Scalable/Interconnected

Fiber	IoT	Cell-Macro, Small & DAS	Wi Fi	Private LTE & 5G	Smart Poles	Devices

Cameras

NB-IoT

LTE

Lighting +

Kiosks

LoRa

Computers/Tablets

Sensors

San Jose Broadband Strategy

STREETLIGHT
Light/Safety
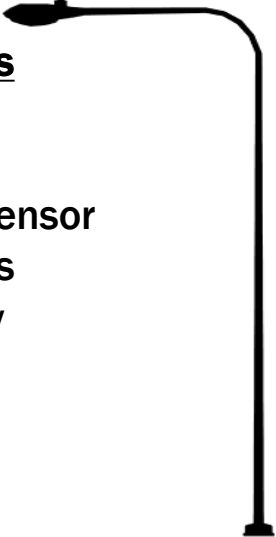
SMALL CELLs
Broadband Digital Infrastructure

INTERNET OF THINGS
Smart Cities

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

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

Properties
- Height
- Power
- Light Sensor
- Lumens
- Density
- Data Backhaul
- Sensors
- Cameras
- 2-way Communication
- Banner Advertising
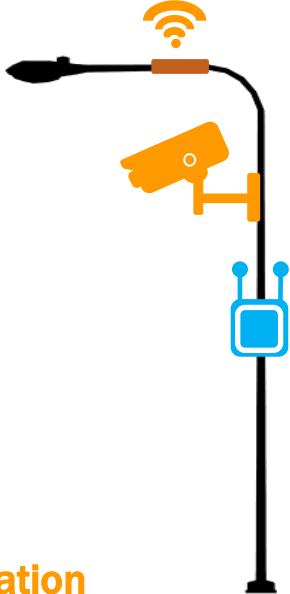
Maturity: Mature — Emerging — Extremely Immature
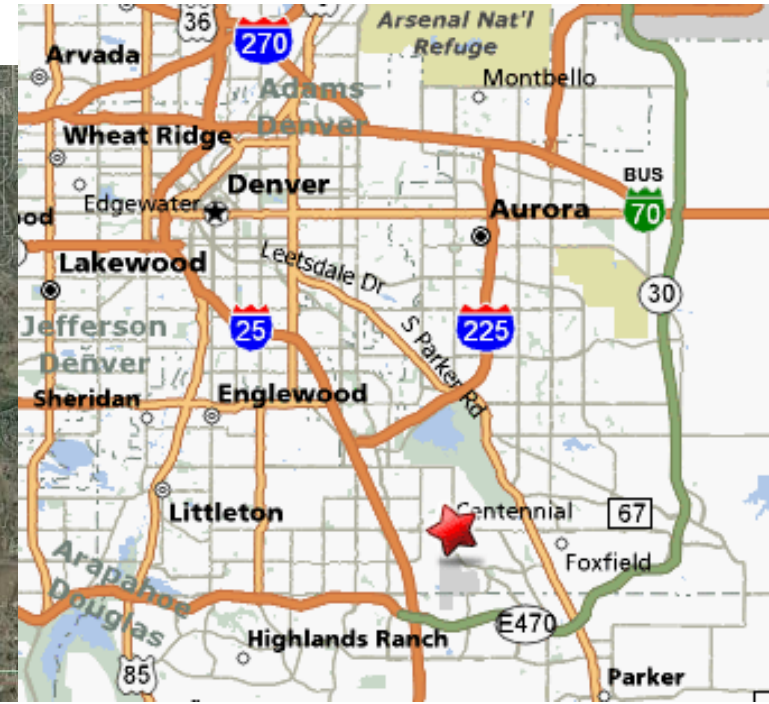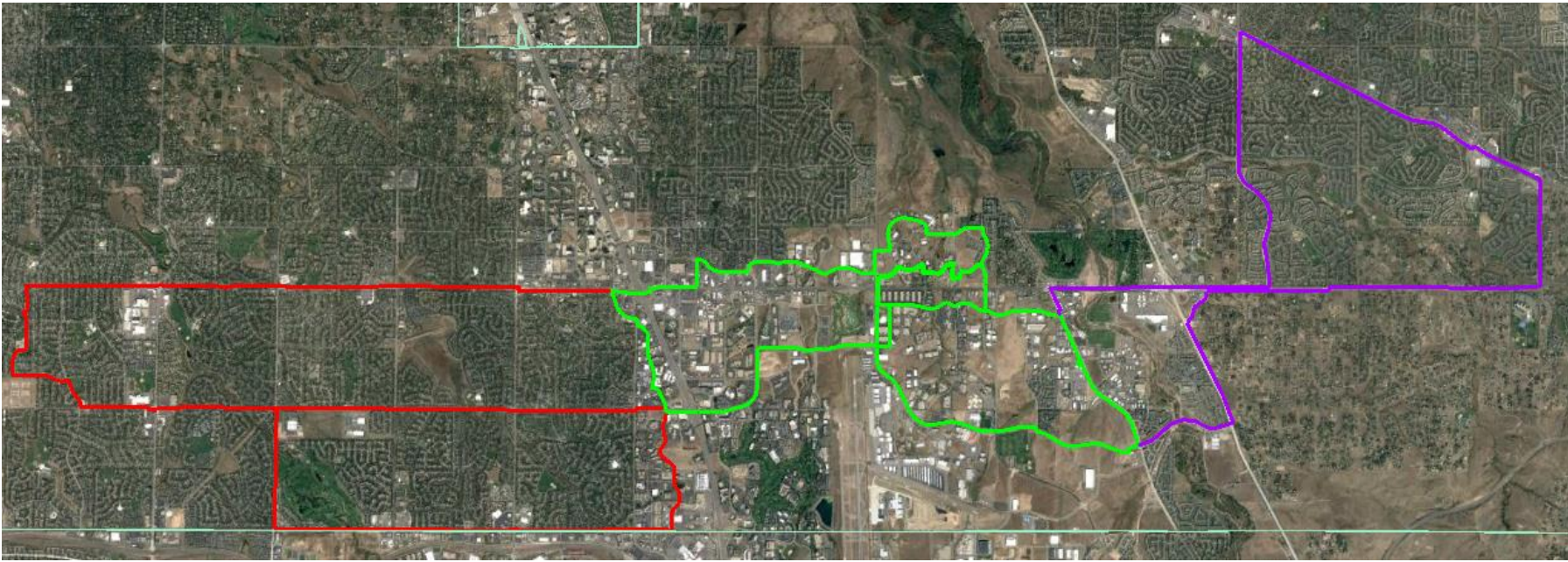
Possible Action: Proceed w/ LED Light Replacement Only — Re-examine in Broadband Strategy — Seek to Understand with Knight IoT Grant

Fiber Backbone Open Access Model

CENTENNIAL FiberWorks

Fiber Backbone – Rings and Status

🟩	Central Ring – Constructed
🟪	East Ring – Under Construction
🟧	West Ring – Under Construction

Centennial

The Utilities' Leverage

- Use of assets
  - Street Lighting poles – allowing small cell growth in territory
  - Data access and availability
- Expansion of our fiber network
  - Pilot opportunities
- Facilitating Conversations
  - Utility is a common stakeholder in all smart city verticals

Common Interests

City of Orlando

Developer 1   Developer 2

Focusing Attention and Effort

OUC
The *Reliable* One ®

Utility Lease Model

Colorado Springs Utilities
It's how we're all connected
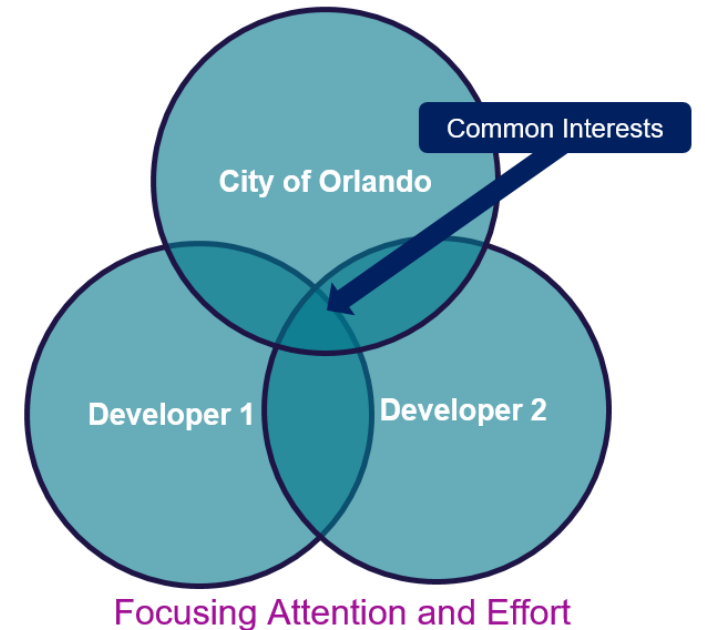
Utilities of the Future:

- Over 2,000 miles of fiber buildout over the next 6 years
- Demand Side Management
- Distributed generation
- Advanced Metering Infrastructure

Fiber connectivity available to:

- Every address
- Every signalized intersection
- Every street light

Enabling infrastructure:

- High speed
- Low latency
- Highly secure
- Highly reliable

Office of Innovation

COLORADO SPRINGS
OLYMPIC CITY USA
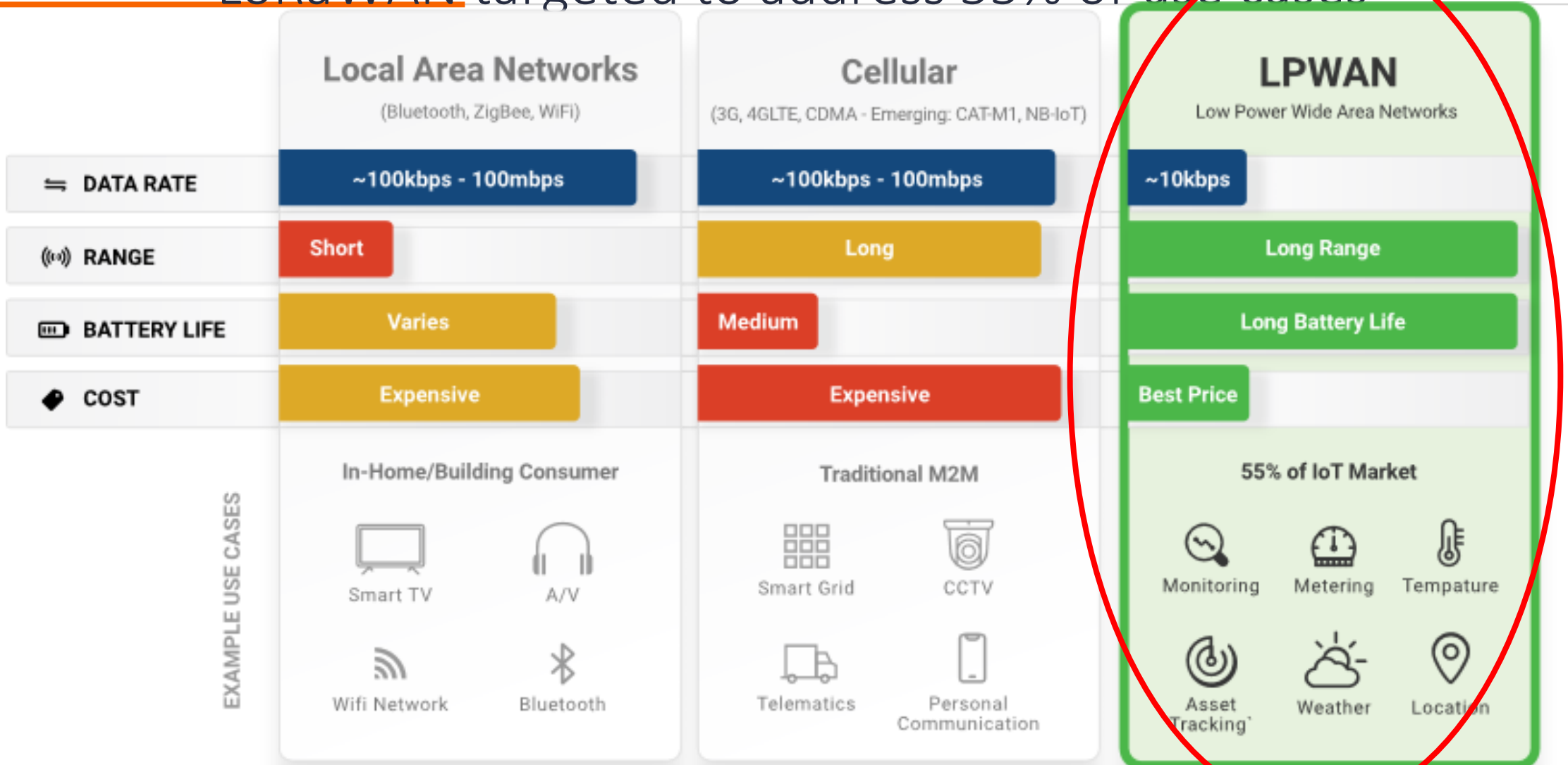
Tech Talk: Types of IoT Connectivity

	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

IoT Connectivity Industry Landscape
LoRaWAN targeted to address 55% of use cases

EXAMPLE USE CASES	Local Area Networks (Bluetooth, ZigBee, WiFi)	Cellular (3G, 4GLTE, CDMA - Emerging: CAT-M1, NB-IoT)	LPWAN Low Power Wide Area Networks
DATA RATE	~100kbps - 100mbps	~100kbps - 100mbps	~10kbps
RANGE	Short	Long	Long Range
BATTERY LIFE	Varies	Medium	Long Battery Life
COST	Expensive	Expensive	Best Price
	In-Home/Building Consumer	Traditional M2M	55% of IoT Market
	Smart TV, A/V, Wifi Network, Bluetooth	Smart Grid, CCTV, Telematics, Personal Communication	Monitoring, Metering, Tempature, Asset Tracking, Weather, Location

senet

Hybrid Private Network

Smart Parking

Smart Health

Waste Management

Public Safety

Smart Buildings

Open Data

Education

Electromagnetic
Emissions

Smart Environment

Traffic Management

Internet of Things

Smart Energy

Smart Street Lights

Gas & Water
Leak Detection

Air Pollution

Electric Vehicle Charging

Smart Home

Intelligent Shopping

Water Quality

Telrad

ARPA funds

	Budgeted ($)	Economic disadvantage ($)	Percentage (%)	Total Projects
Madison, Wisc.	22,800,000	21,800,000	95.6	28
Riverside, Calif.	29,242,594	27,090,000	92.6	29
Columbus, Ohio	53,284,081	48,209,406	90.5	8
St. Louis, Mo.	123,195,020	109,650,470	89.0	70
Nassau County, N.Y.	185,350,000	163,750,000	88.3	18
San Jose, Calif.	70,562,771	61,900,771	87.7	25
Clackamas County, Ore.	28,191,637	22,684,455	80.5	11
Washoe County, Nev.	46,312,296	37,192,053	80.3	25
Minneapolis, Minn.	108,527,983	84,885,905	78.2	67
Dane County, Wisc.	94,375,082	71,662,768	75.9	16
San Joaquin County, Calif.	66,011,593	49,932,146	75.6	11
Los Angeles County, Calif.	704,851,000	521,501,000	74.0	61
Prince William County, Va.	31,200,000	22,500,000	72.1	7
Northampton County, Pa.	22,658,617	15,704,262	69.3	6
San Mateo County, Calif.	74,448,909	50,748,909	68.2	19
Nashville-Davidson, Tenn.	78,381,250	51,713,996	66.0	17
Maricopa County, Ariz.	414,987,433	273,141,352	65.8	55
Pierce County, Wash.	175,781,445	115,159,256	65.5	79
Alameda County, Calif.	142,500,000	91,500,000	64.2	15
Phoenix, Ariz.	133,365,662	85,565,662	64.2	36
St Paul, Minn.	33,630,184	21,031,000	62.5	19
Orange County, Fla.	135,830,857	82,362,846	60.6	38
Ingham County, Mich.	29,601,971	17,318,000	58.5	13
York County, Pa.	65,753,816	37,983,311	57.8	105
Mesa. Ariz.	27.800.000	16.000.000	57.6	4

Brookings Metro

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