Connected City
Smart City

Agenda

9:15   Welcome   Peter Murray, Executive Director, Dense Networks

9:30 Smart Cities Equity and Technology

        Moderator, Alby Bocanegra, CEO, Urban Futurist

        Dawn Comer, Director, Technology Inclusion, City of Los Angeles

        Lea Eriksen, CIO, City of Long Beach

        Rob Silverberg, Chief Innovation and Strategy Officer, Dell

10:30   Break

11:00   Connected Cities Wireless Innovations

        Moderator, Peter Murray, Dense Networks

          Jim Jacobellis, SVP, Alef

          Jamaal Smith, VP, Kajeet

          Scott McCarley, Signify

          Noelani McGadden, VP, Senet

11:50   Lunch

1:00   Adjourn

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
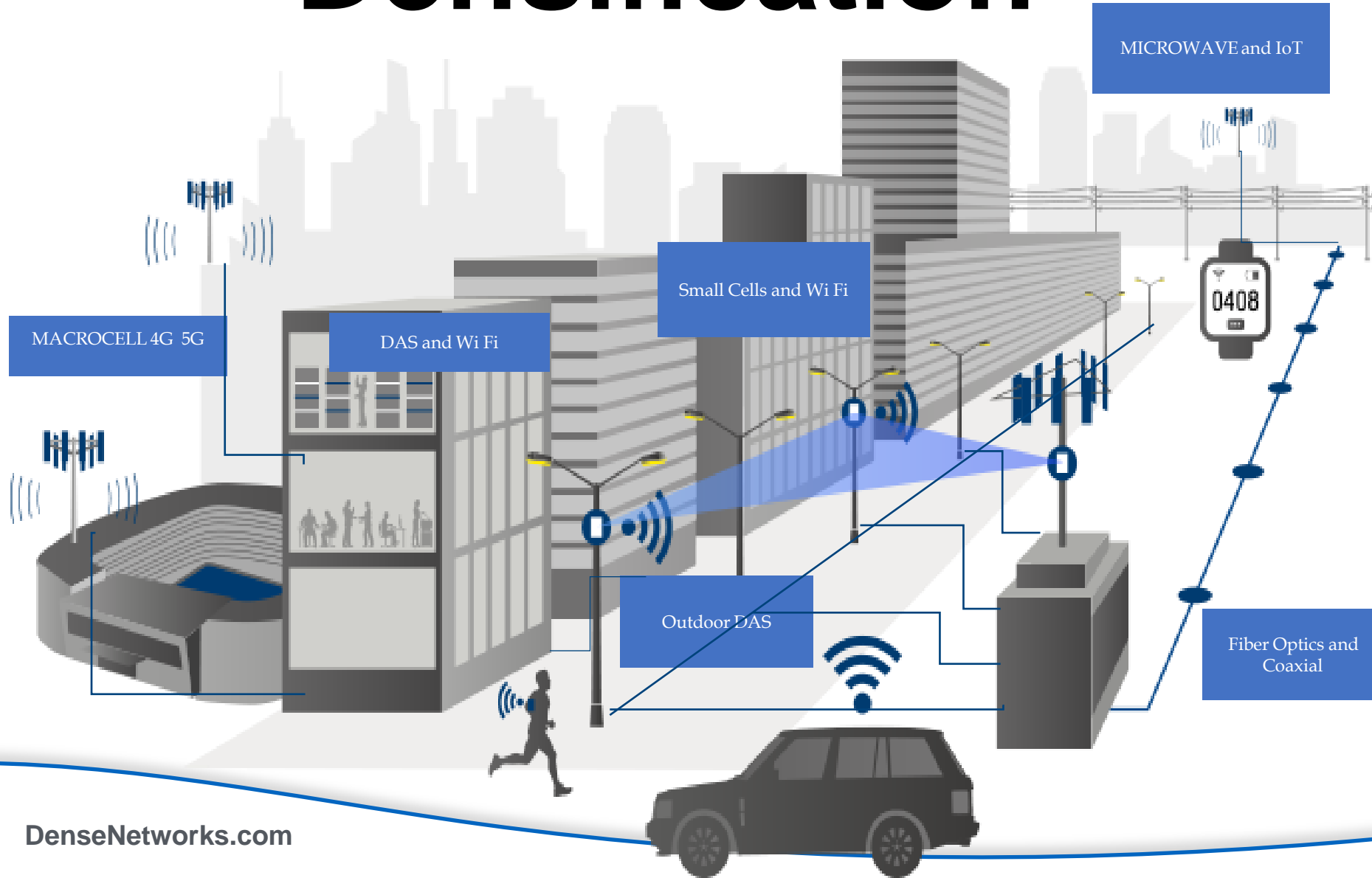- Community College of Philadelphia

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**

NB-IoT

LTE

LoRa

Lighting +
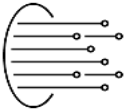
Cameras

Kiosks

Computers/Tablets

Sensors

San Jose Broadband Strategy

STREETLIGHT
Light/Safety
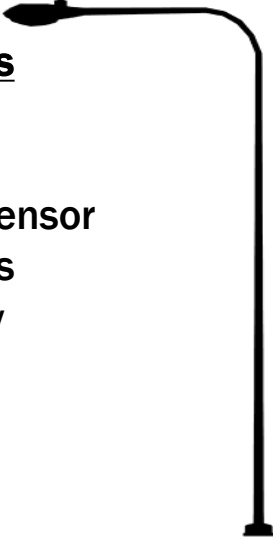
SMALL CELLs
Broadband Digital Infrastructure

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
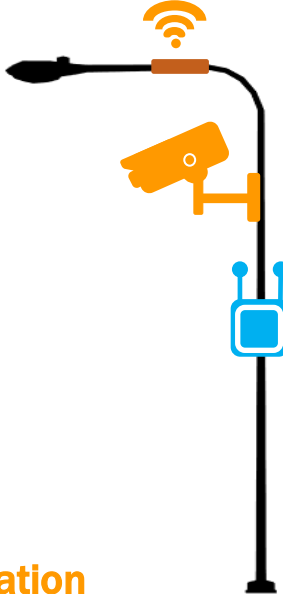
Maturity: | Mature | Emerging | Extremely Immature

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
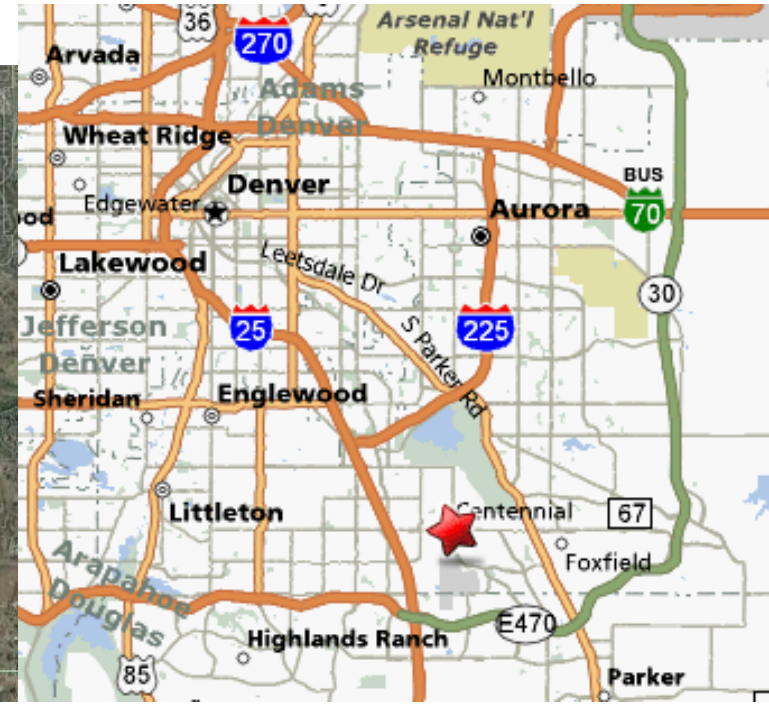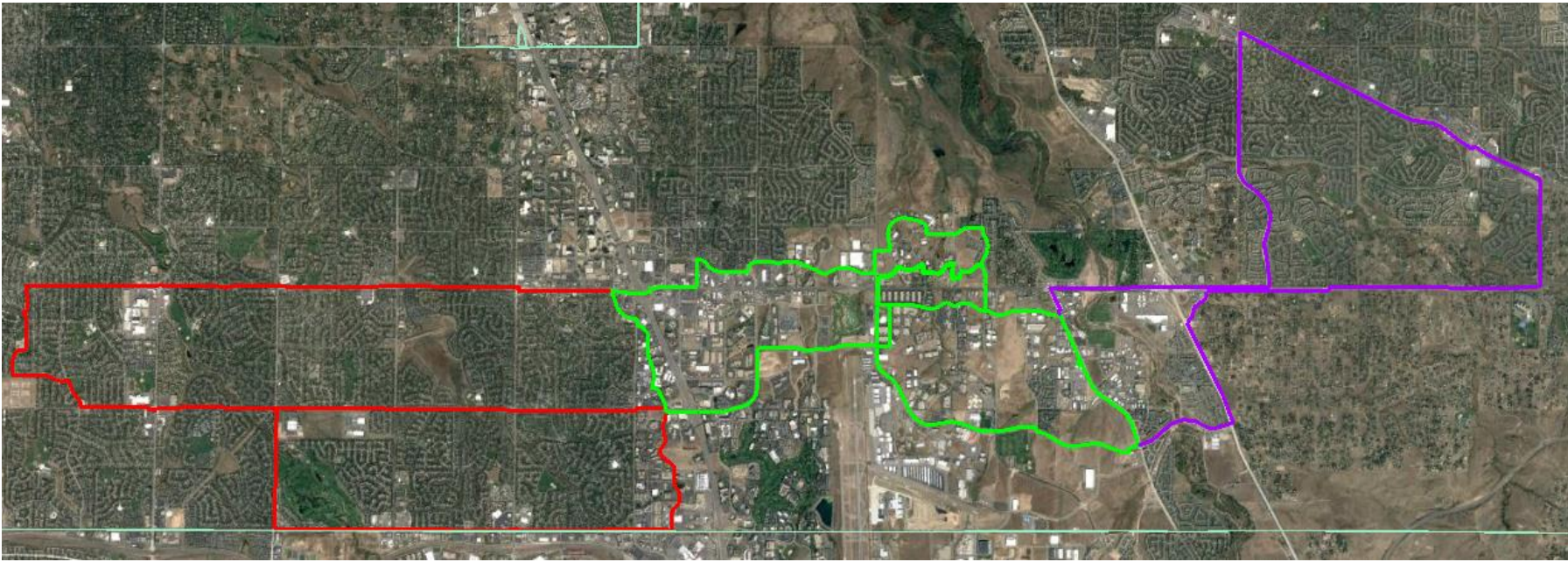
CENTENNIAL
FiberWorks

Fiber Backbone – Rings and Status

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

Centennial

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

T-MOBILE FOR GOVERNMENT

Consumer Fixed Downstream Deployment

- ⬛ >= 2 Gbps
- 🟪 >= 1 Gbps < 2 Gbps
- 🟦 >= 500 Mbps < 1 Gbps
- 🟦 >= 100 Mbps < 500 Mbps
- 🟩 >= 50 Mbps < 100 Mbps
- 🟩 >= 25 Mbps < 50 Mbps
- 🟩 >= 10 Mbps < 25 Mbps
- 🟫 >= 6 Mbps < 10 Mbps
- 🟧 >= 3 Mbps < 6 Mbps
- 🟧 >= 1 Mbps < 3 Mbps
- 🟨 >= 200 Kbps < 1 Mbps
- ⬜ < 200 Kbps
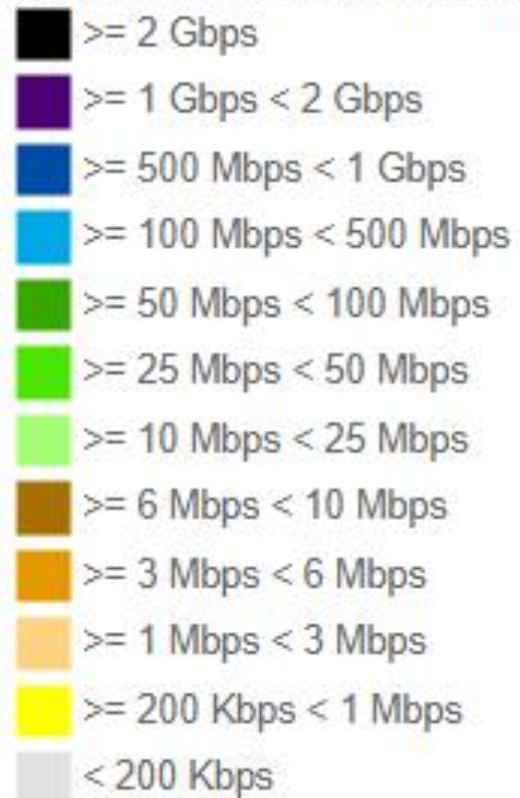
View on map:

Tools

🏠 Address Search
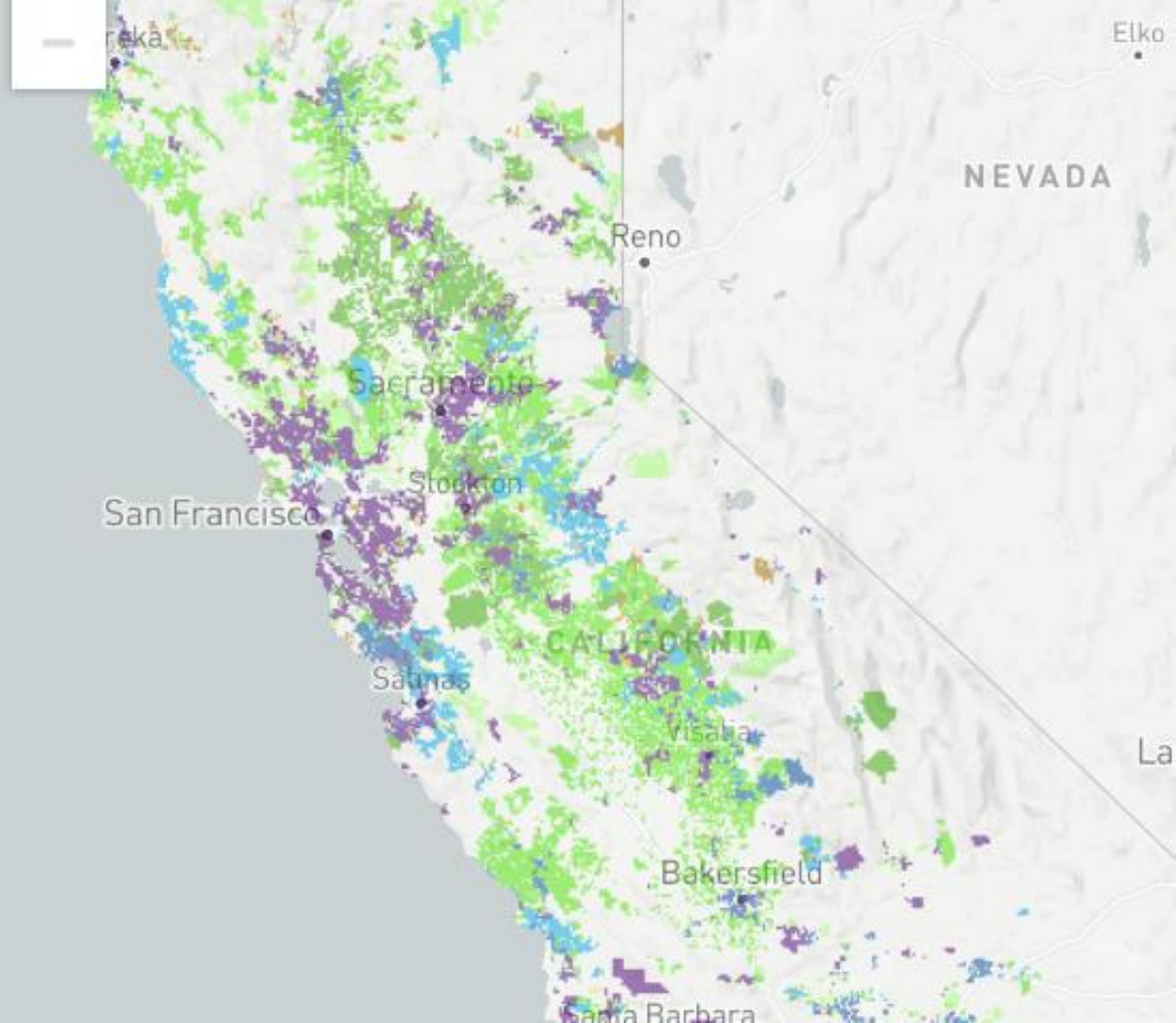
ARPA funds

	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

DenseNetworks.com
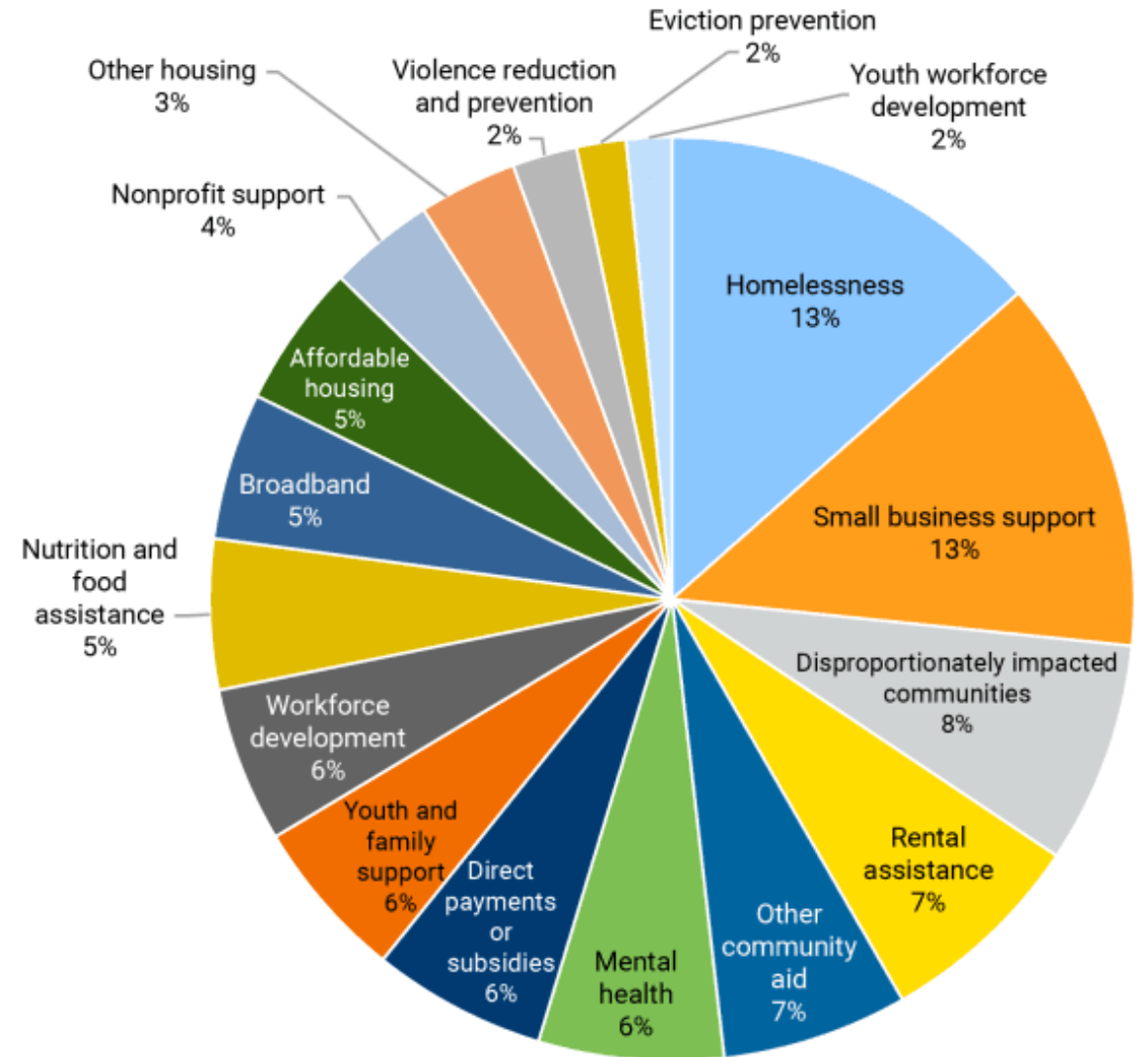
Coronavirus Capital Projects Fund – ARPA

Funds Allocated	Administering Agency	Eligible Recipients	Timeline
$10 billion	**U.S. Treasury Department**	Grants awarded to states No restrictions on eligibility for subgrantees at federal level	• State Grant Plans and Program Plans were due September 24, 2022 • Treasury has been approving and releasing funds on a rolling basis (first award on June 7, 2022; most recently, February 21, 2023) • All funds must be expended by end of 2026

- Program allows states and municipalities to draw CPF funds for capital asset projects designed to address critical community needs and directly enable work, education, and health monitoring.
- Broadband infrastructure projects are one of few presumptively eligible projects and almost all CPF funding expected to go to state broadband deployment programs.
- As of February 21, 2023 (latest award announcement from Treasury), approximately $4.85 billion has been released by Treasury across 33 states.
- Like SLFRF, subgrantees must offer last-mile service with speeds of symmetrical 100 Mbps, unless an exemption applies, but even then, required to provide 100/20 Mbps but scalable to symmetrical 100 Mbps.
- Subgrantees must also (a) participate in the FCC's ACP or equivalent; and (b) comply with BABAA requirements.

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Broadband Equity, Access, and Deployment (BEAD) Program

Funds Allocated	Administering Agency	Eligible Recipients	Expected Timeline
$42.45 billion	**NTIA**	Grants awarded to states No restrictions on eligibility for subgrants	• NOFO released May 13, 2022 • All planning grants issued to states in 2022 • States likely to receive funds for deployment projects beginning 2024

- Project objective is to close the availability gap as "access to affordable, reliable, high-speed broadband is essential to full participation in modern life in the United States"
- Last mile broadband infrastructure deployment, with some middle mile deployment allowable
- Eligible uses of funds:
    - Deployment to unserved and underserved areas
    - Connecting community anchor institutions
    - Data collection, broadband mapping, and planning
    - Installation of broadband equipment or providing reduced-cost broadband to multi-family residential buildings
    - Broadband adoption programs

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Broadband Equity, Access, and Deployment (BEAD) Program

State Bead Allocation Estimate

Morgan Lewis
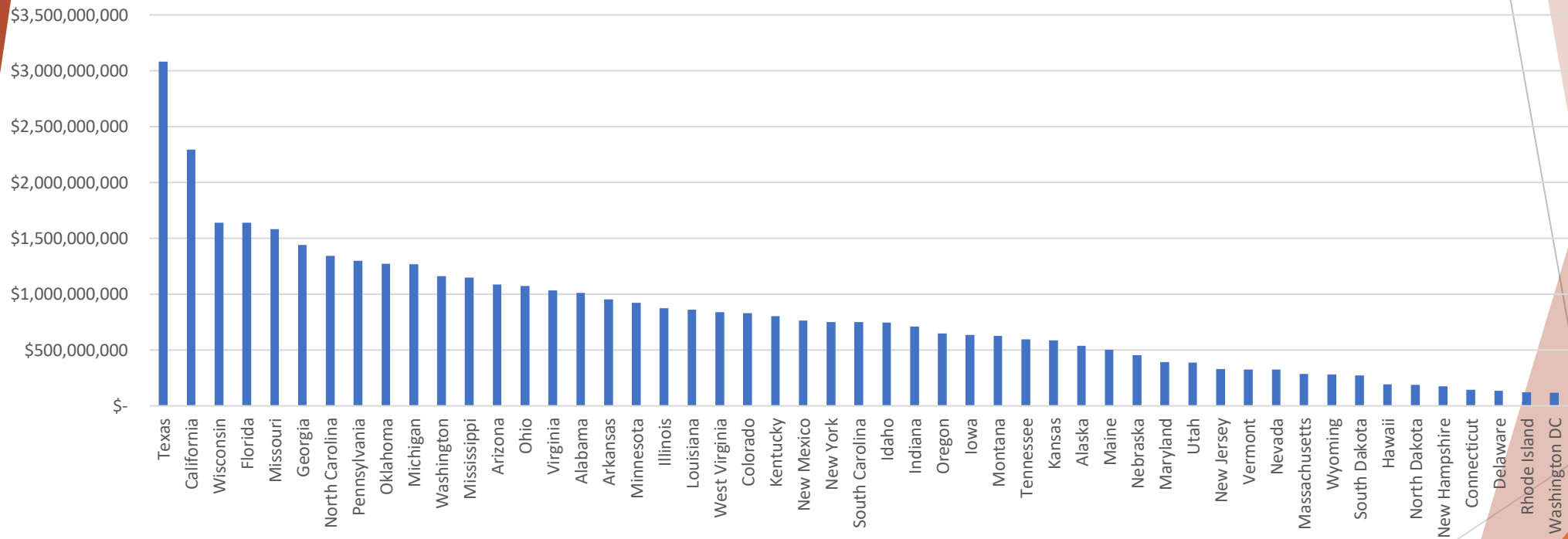
Broadband Equity, Access, and Deployment (BEAD) Program

Deployment Subgrant Projects

- Funding to subgrantees will be prioritized in this order:
  - (1) Unserved Service Projects (i.e., projects where at least 80% of broadband-serviceable locations lack at least 25/3 Mbps speeds)
  - (2) Underserved Service Projects (i.e., projects where at least 80% of broadband-serviceable locations are not unserved and lack at least 100/20 Mbps speeds)
  - (3) Connecting eligible community anchor institutions without gigabit connections

- Once state certifies that it will ensure coverage of all unserved and underserved locations, only then can states fund non-deployment projects

- Unserved/Underserved Service Projects may:
  - (1) Consist of a single unserved/underserved location;
  - (2) Include middle mile infrastructure if required to reach interconnection points or otherwise ensure technical feasibility/financial sustainability of a Project;
  - (3) Not count as "unserved" or "underserved" any location already subject to a public funding commitment to deploy broadband, unless the commitment is not for qualifying broadband (i.e., 100/20 Mbps or 1/1 Gbps for anchor institutions)

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Affordable Connectivity Program (formerly Emergency Broadband Benefit)

Funds Allocated	Administering Agency	Eligible Recipients	Expected Timeline
$14.2 billion	**FCC**	Broadband providers designated as an ETC or approved by FCC to participate	• Transitioned from EBB to ACP on December 31, 2021 • For existing EBB consumers, will continue to receive $50 subsidy during 60-day transition period

- Qualifying subsidy recipient expanded from low-income households making up to 135% above federal poverty line, to now 200% above line
- Participating providers must allow subsidy to apply to any service offering and notify customers renewing or subscribing about program and enrollment
- Subsidy amount reduced from $50 to $30

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State Digital Equity Act Programs

Funds Allocated	Administering Agency	Eligible Recipients	Expected Timeline
$2.75 billion	**NTIA**	State agencies, non-profits, community anchor institutions, local education agencies, entities that carry out workforce development program	• NOFO for Planning Grant released May 13, 2022 • Planning grants all awarded in 2022

- Purpose of Digital Equity Act programs is to support the closure of the digital divide & promote equity and digital inclusion: (1) Planning Grant; (2) Capacity Grant; and (3) Competitive Grant Programs
- Target demographic includes households with income no more than 150% above the poverty level, senior citizens, incarcerated individuals, veterans, rural residents, racial or ethnic minorities, and individuals with disabilities or a language barrier
- $60 million first granted for state to develop the State Digital Equity Plan
- 2 years after planning grants awarded, $1.44 billion to be disbursed to implement Plans and other digital inclusion activities
- Competitive Grant Program to be established within 30 days after Capacity grants begin being awarded
- Technology-neutral basis, "to the extent practicable"

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TYPES OF PRODUCTS

Electrical

DataComm

Lighting & Controls

Power Distribution

Industrial Control & Automation

Conduit, Raceway & Cable Support

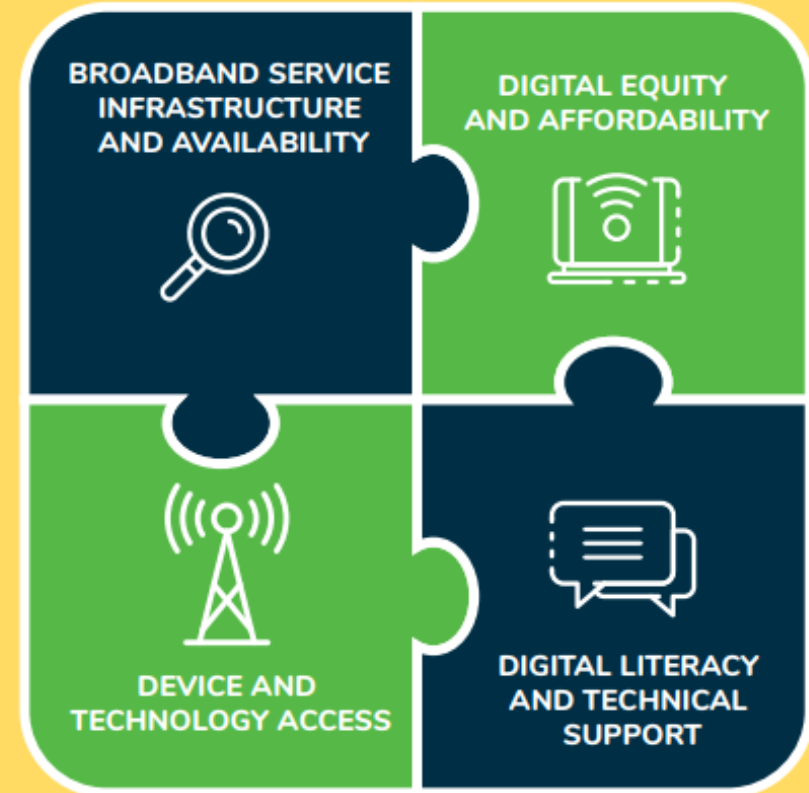**Wire, Cable & Wiring Devices**

Power Protection & Maintenance Supply

GraybaR

Pennsylvania Broadband Office Focus Areas

This Plan focuses on four challenge areas and opportunities for universal broadband access in Pennsylvania:

- BROADBAND SERVICE INFRASTRUCTURE AND AVAILABILITY
- DIGITAL EQUITY AND AFFORDABILITY
- DEVICE AND TECHNOLOGY ACCESS
- DIGITAL LITERACY AND TECHNICAL SUPPORT

Philadelphia

Office of Innovation & Technology

DEVICES	CONNECTIVITY	TRAINING & WORKFORCE	ECOSYSTEM
Philadelphians can access appropriate and affordable technology devices.	Philadelphians can access and afford the internet connectivity they need.	Philadelphians develop the digital skills necessary for work and life.	Philadelphia grows and sustains the capacity and infrastructure required to increase digital equity.

Alby Bocanegra
The Urban Futurist

Dawn Comer
Los Angeles

Lea Eriksen
Long Beach

Rob Silverberg
Dell Technologies

How can we address digital enablement?

Availability, Adoption, Affordability and Ability

Broadband and Digital Equity Planning Matrix

How

Functional Locations	Devices	Networks	Programs	Funding
· Community Centers	· Computers	· Fiber Government	· Literacy	· State-BOP
· Hospitals and Clinics	· Tablets	· Fiber Service Provider	· Individual Devices	· Federal-State-CPF
· Libraries	· Smart Phone	· Cellular	· MDU Infrastructure	· Federal-State-BEAD
· Senior Centers	· Wi Fi	· Wi Fi	Workforce and Skills	· Federal-State-Digital Equity
· Parks	· Telehealth Booth	· Private	· Telehealth	· Federal Digital Equity
· MDU & Group Homes	· Digital Boards	· LAN	· Helpdesk/Navigators	· E-Rate

Orange County, Florida

$16.1 Million in ARPA Funds

Broadband Infrastructure and Digital Equity Programs

- Residential Broadband-Eliminated Unserved Homes
  - Availability, Adoption, Affordability, Ability

- **Innovation Lab-Leased Services, Dark Fiber, Wi-Fi, Routers, Telehealth**

- Digital Devices, Connectivity, Helpdesk
  - 3rd Party Non-Profit-New and Repurposed Devices
- Programs-Digital Equity, Telehealth, Workforce Development

  - Digital Literacy Courses

  - Telehealth Station with Orlando Health

  - Workforce Development Program for fiber optic and wireless technicians.
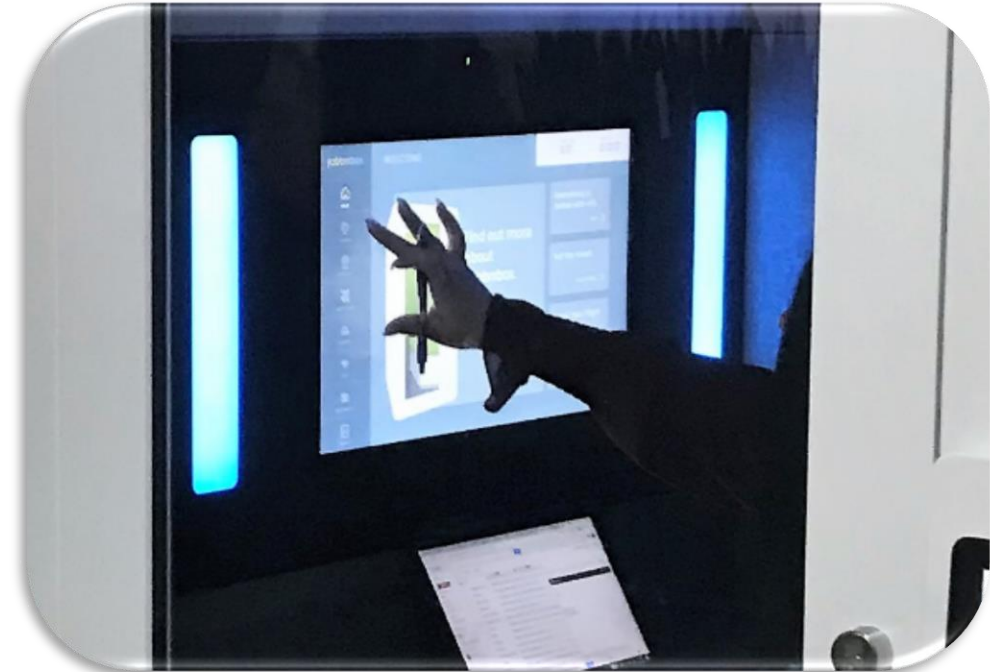
  - STEM Support

Digital Super Center
Fiber Optics, Wi Fi, Devices, Programs

Telehealth and Social Services
Support existing Social Services Leaders
Non-Profits/Community Centers/Clinics

Workforce Development
Skills, Literacy, Job Applications, Partners

Sample Broadband Plan
Seeking Funding

www.leegov.com/broadband

3 BOP Applications Awarded
Cover 14,000 Homes
$8 million grant + $10 million in matching funds

Lee Broadband-Christine Brady, Kevin Loucks and Kevin O'Malley

Evaluating Local Broadband Capabilities (leegov.com)

3 Focus Areas

Determine Fundability

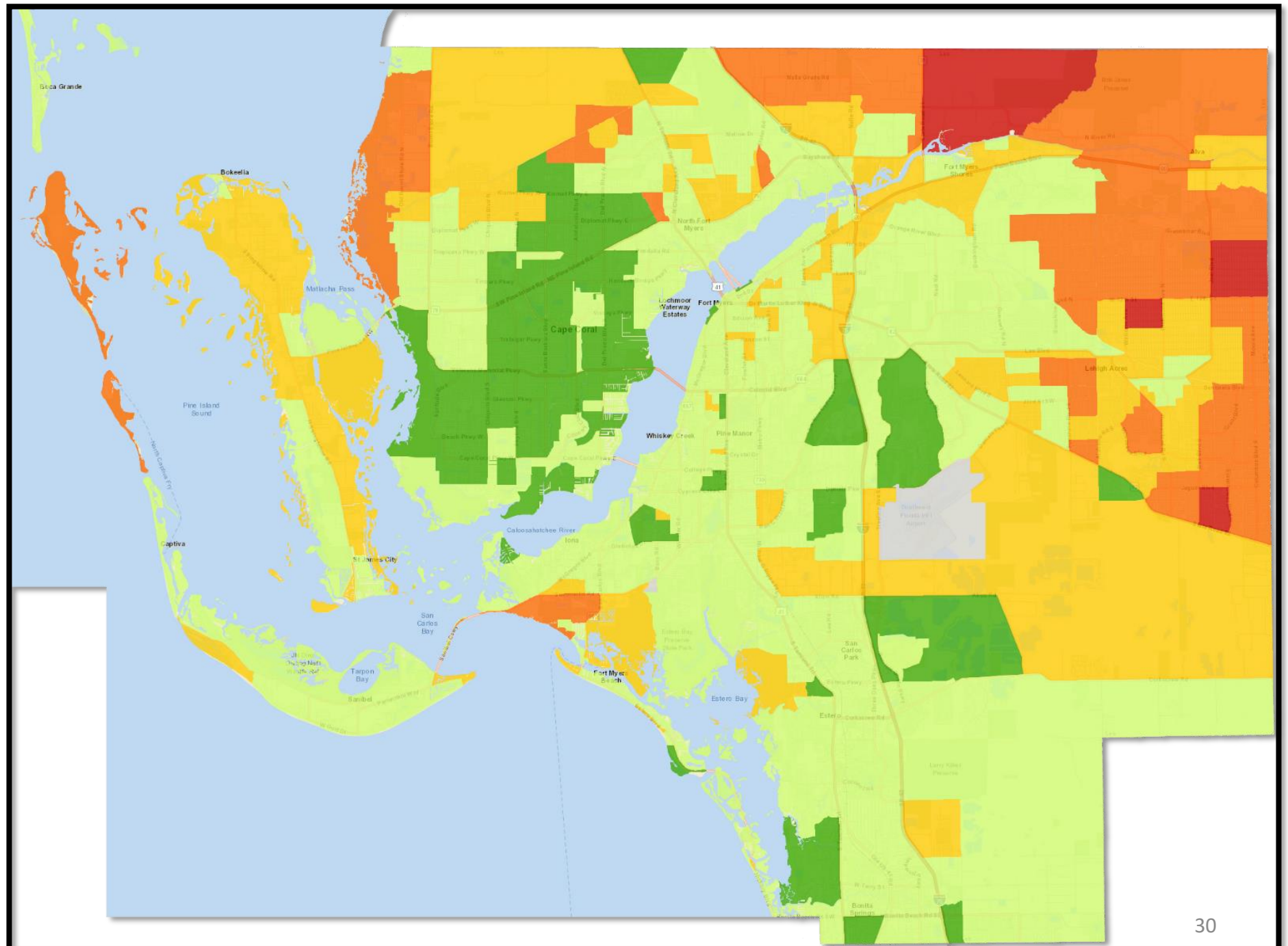|	
Unserved Areas-Residential Focus	**Broadband Service Provider** • Availability • Affordability • Adoption
Programs-Digital Equity, Telehealth, Workforce development	**Enablement through broadband:** • Devices • Literacy and skills • Wireless • Fiber optic infrastructure
County Anchor Institutions	**County or Providers** • Fiber Optic • Wireless

Block-Group Ratings

- Below 10/1
- Below 25/3
- Below 50/10
- Below 100/20
- Above 100/20
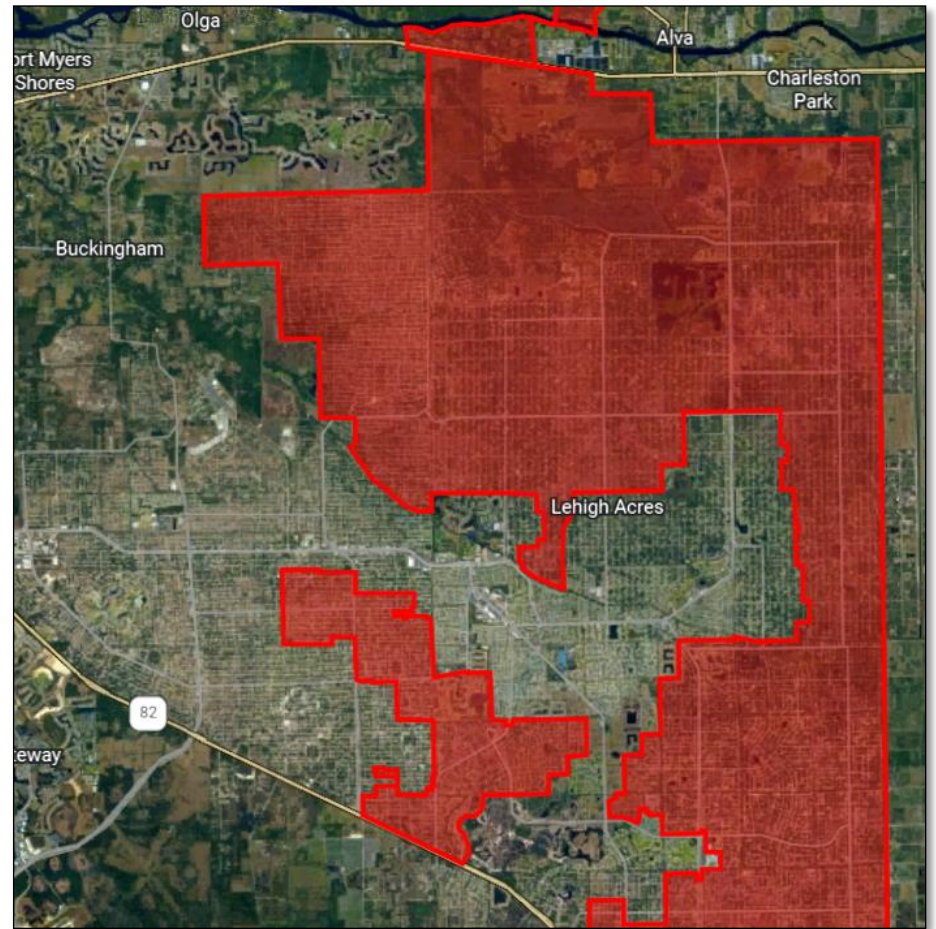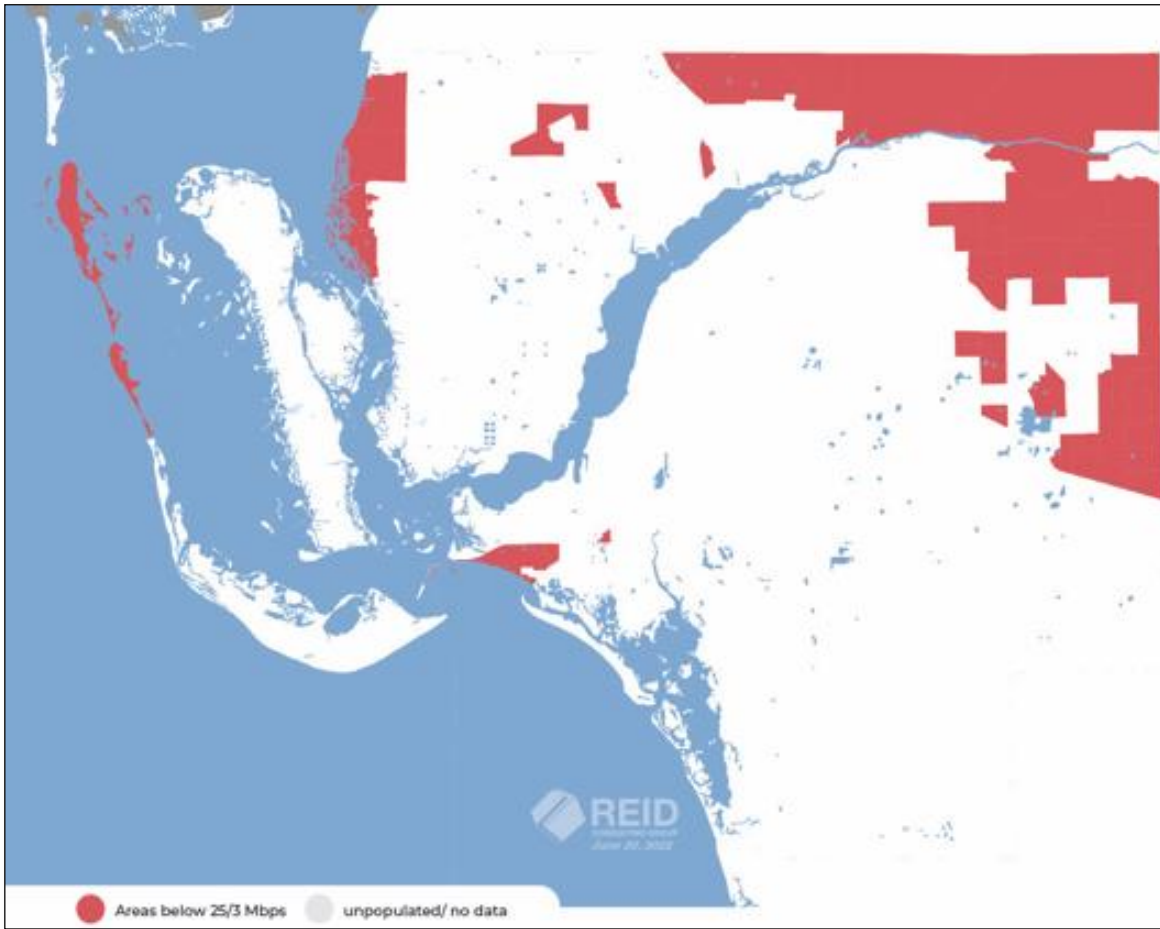
Unserved Comparison with Comcast

Library Inventory and Speeds

Library Broadband - Inventory and Speeds										
Branch	Bandwidth per IT	Staff PC - Download	Staff PC - Upload	Public PC - Download	Public PC - Upload	Staff Wi-Fi - Download	Staff Wi-Fi - Upload	Public Wi-Fi - Download	Public Wi-Fi - Upload	Provider	Result from PC Test
Boca Grande	20M	17.37	18.2	16.89	17.34	10.71	17.87	10.62	10.18	Lumen	
Bonita Springs	100M	35.17	73.22	53.75	71.86	17.59	37.91	23.53	22.89	Lumen	85
Cape Coral	50M	20.05	39.11	13.14	37.81	15.71	41.83	26.49	26.9	Lumen	120
Captiva	10M	8.58	8.1	9.02	8.05	8.1	7.43	4.78	7.71	Lumen	15
Dunbar	50M	86.48	88.78	45.81	41.43	131.9	163.03	75.9	74.15	Lee County	40
East County	50M	86.69	95.46	78.6	87.96	64.12	62.68	10.85	10.07	Crown Castle	115
Fort Myers	100M	619.84	530.37	620.02	400	190.26	187.84	182.73	187.63	Lee County	160
Lakes	100M	658.1	489.71	89.15	78.14	66.63	62.37	68.98	72.4	Lee County	100
North Fort Myers	150M	68.28	77.47	53.73	88.21	77.21	84.32	80.78	77.89	Lee County	80
Northwest	100M	44.87	86.52	44.09	86.02	35.61	83.09	42.11	75.37	Crown Castle	110
Pine Island	50M	48.33	47.14	49.54	46.05	46.44	38.48	47.6	41.64	Crown Castle	20
Riverdale (Closed)	50M	-	-	-	-	-	-	-	-	-	-
Alva (RL Temp Site)	200M	n/a	n/a	n/a	n/a	234.34	22.74	234.34	22.74		
South County	100M	790.41	295.25	91.87	92.23	10.56	10.4	10.74	10.23	Lee County	85
Library Admin	1G	699.37	238.78	n/a	n/a	177.64	208.27	146.52	197.49	Lee County	35
		Legend ===>	Strong	Moderate	Weak						

Potential Structure

Private	**Third Party:** A service provider owns the network and provides retail and wholesale services
	Wholesale (i): A private operator builds and operates a wholesale network
Public-Private Partnership	**P3 Open:** Network owned by PPP, has an open wholesale network and may provide retail services
	P3 Not Open: Network owned by PPP, not necessarily an open wholesale network but must provide retail services
Public	**Wholesale (ii):** A public entity owns or funds part of the infrastructure
	Wholesale (iii): A public entity completely owns the network infrastructure