NTTA Fiber Day

TribalBroadbandBootcamp.org

August 28, 2023

#TribalBroadbandBootcamp

info@tribalbroadbandbootcamp.org

Instagram?

QR Code – Download Slides

What are we doing here?

- Build Confidence
- Demystify Technology
- Build Community
- Be Aggressively Informal
- Who We Are
- Tribal Broadband Bootcamp Overview

TribalBroadbandBootcamp.com

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Propane
1075

Agenda

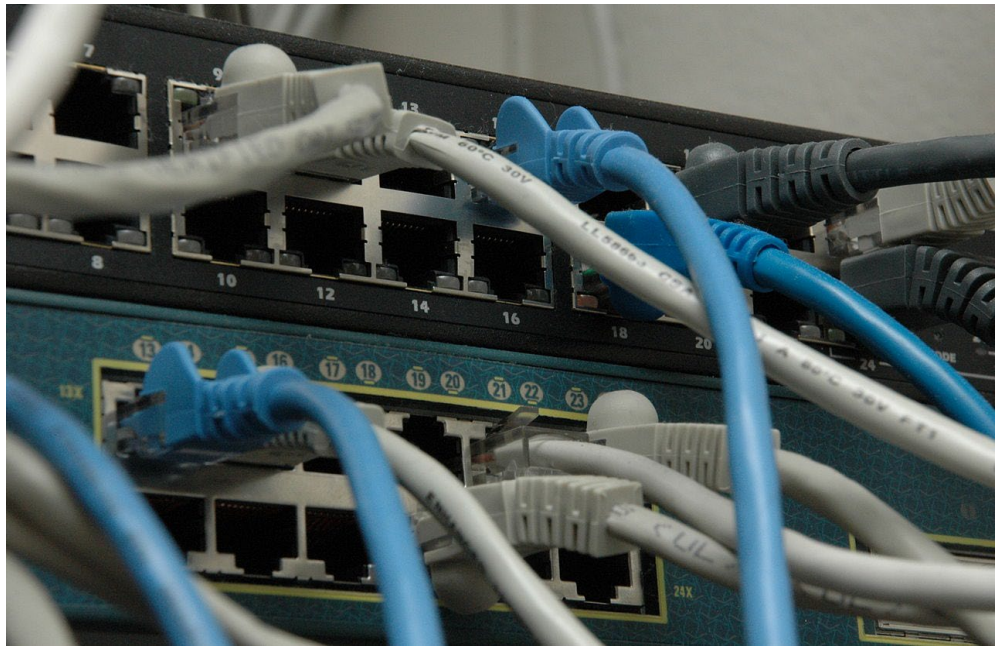
- Broadband 101
  - Why Fiber?
  - Networking Basics
- Fiber Network Planning
- Lunch
- Fiber Network Technologies – Stations
- Hoopa Valley Network Discussion
- Working with Vendors / Consultants
  - (How to Not Get Screwed)

Upcoming Tribal Broadband Bootcamps

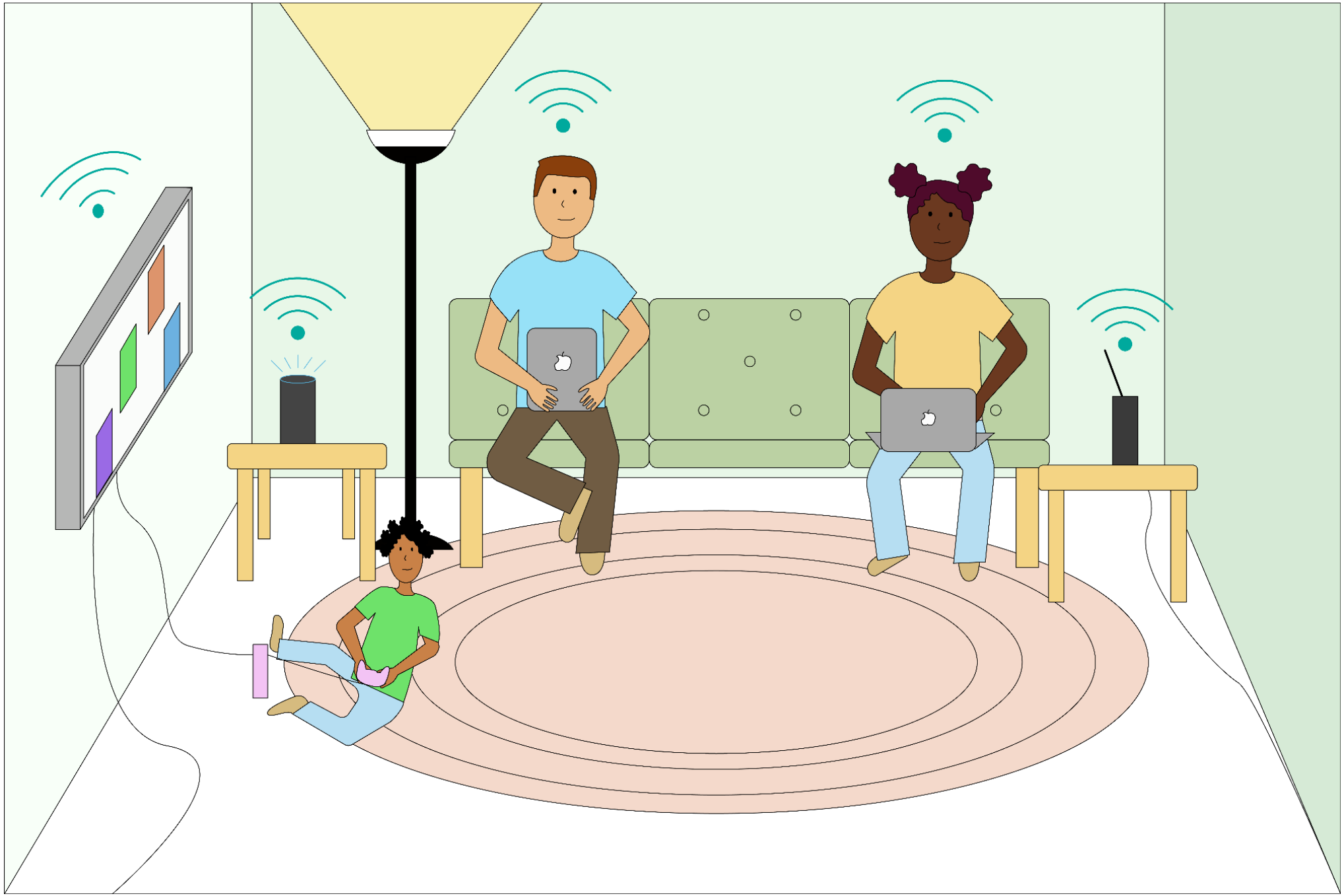
- Oct 24-27, Cheyenne River Sioux Tribe
- Nov 28-30, California TBD

Sign up for more information – TribalBroadbandBootcamp.org

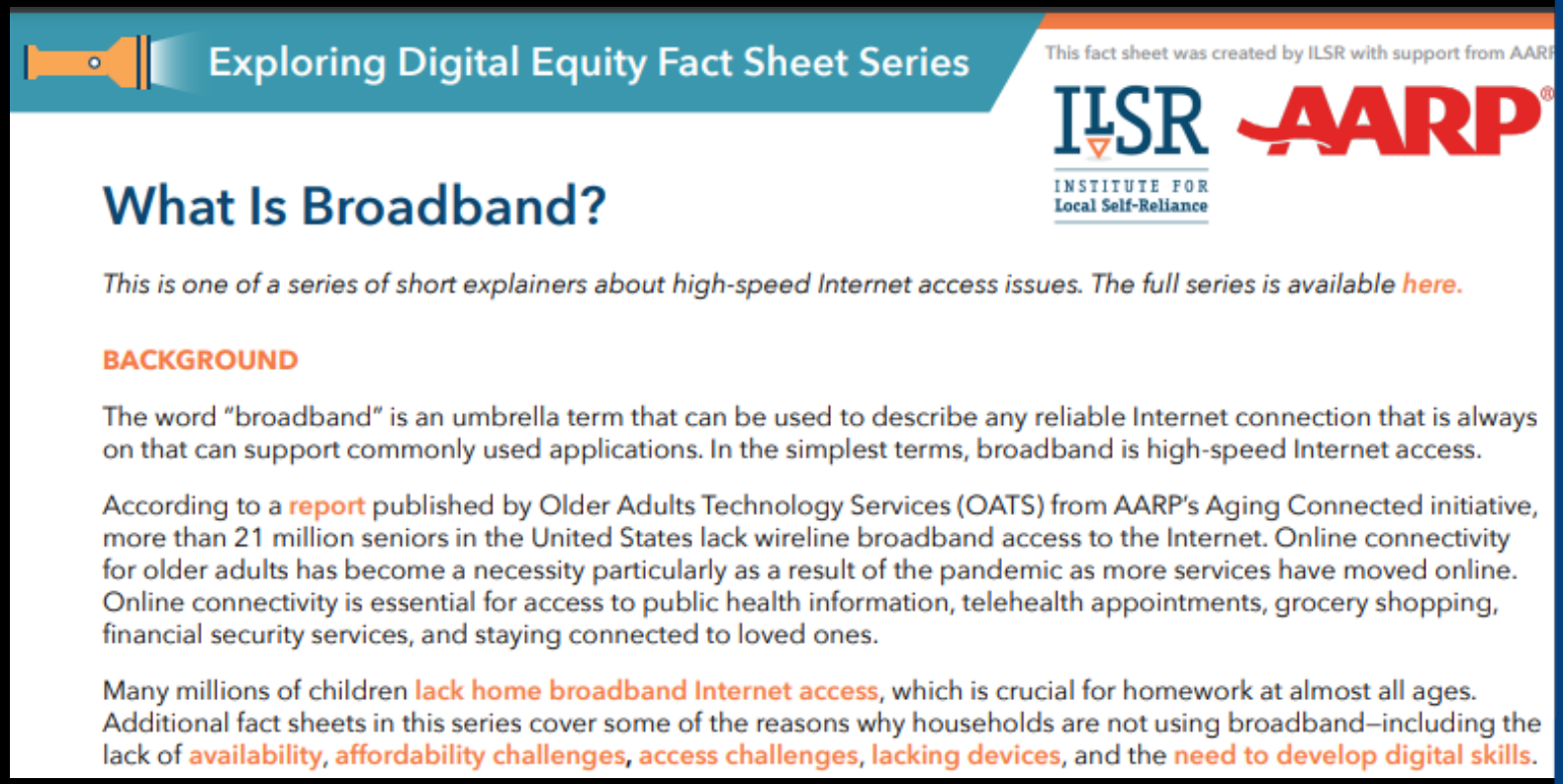

A.O. Smith
EnergySaver



What is Broadband?



Fact Sheets!



Exploring Digital Equity Fact Sheet Series

This fact sheet was created by ILSR with support from AARP

ILSR INSTITUTE FOR Local Self-Reliance

AARP

What Is Broadband?

This is one of a series of short explainers about high-speed Internet access issues. The full series is available here.

BACKGROUND

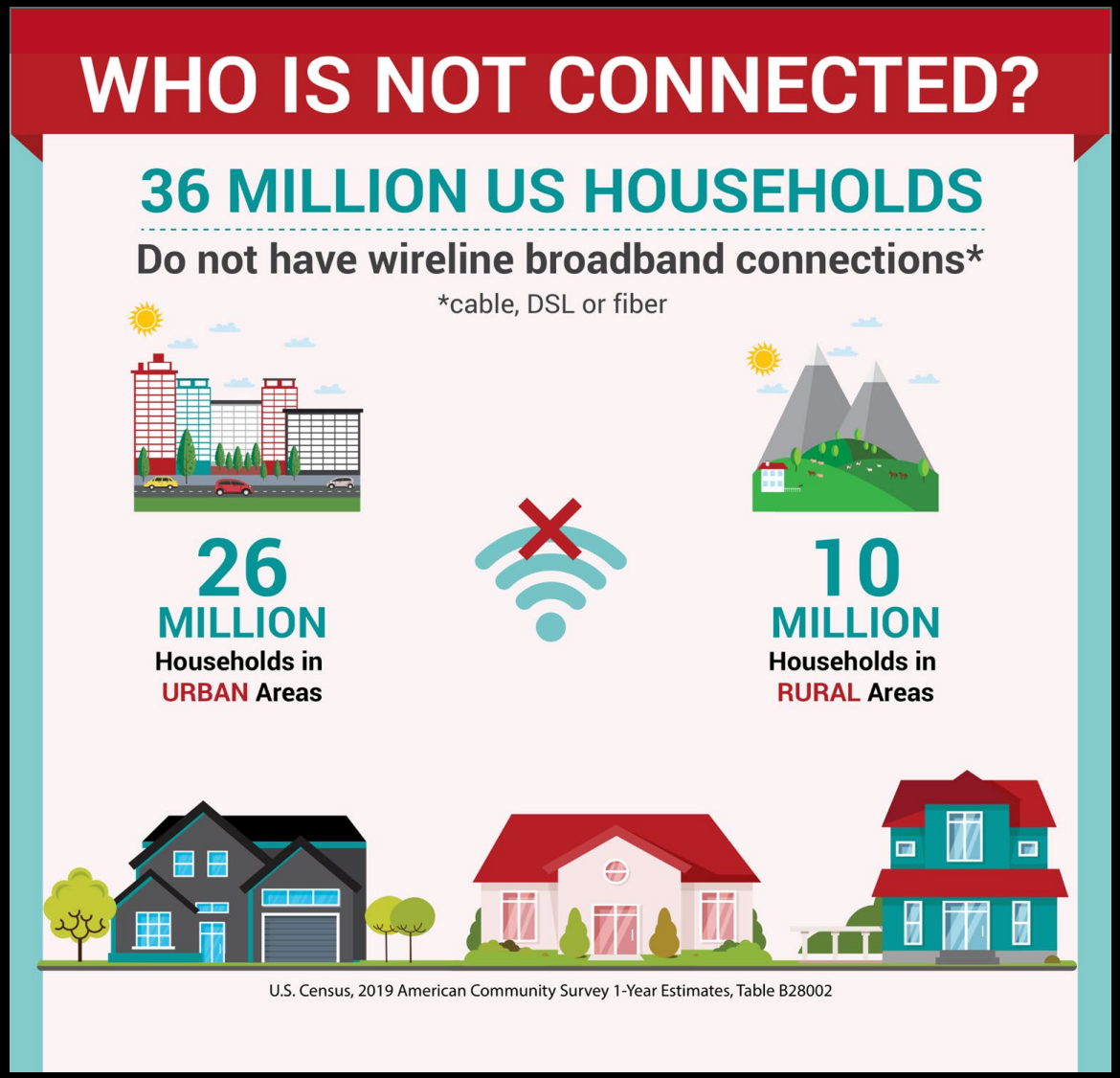
The word "broadband" is an umbrella term that can be used to describe any reliable Internet connection that is always on that can support commonly used applications. In the simplest terms, broadband is high-speed Internet access.

According to a report published by Older Adults Technology Services (OATS) from AARP's Aging Connected initiative, more than 21 million seniors in the United States lack wireline broadband access to the Internet. Online connectivity for older adults has become a necessity particularly as a result of the pandemic as more services have moved online. Online connectivity is essential for access to public health information, telehealth appointments, grocery shopping, financial security services, and staying connected to loved ones.

Many millions of children lack home broadband Internet access, which is crucial for homework at almost all ages. Additional fact sheets in this series cover some of the reasons why households are not using broadband—including the lack of availability, affordability challenges, access challenges, lacking devices, and the need to develop digital skills.

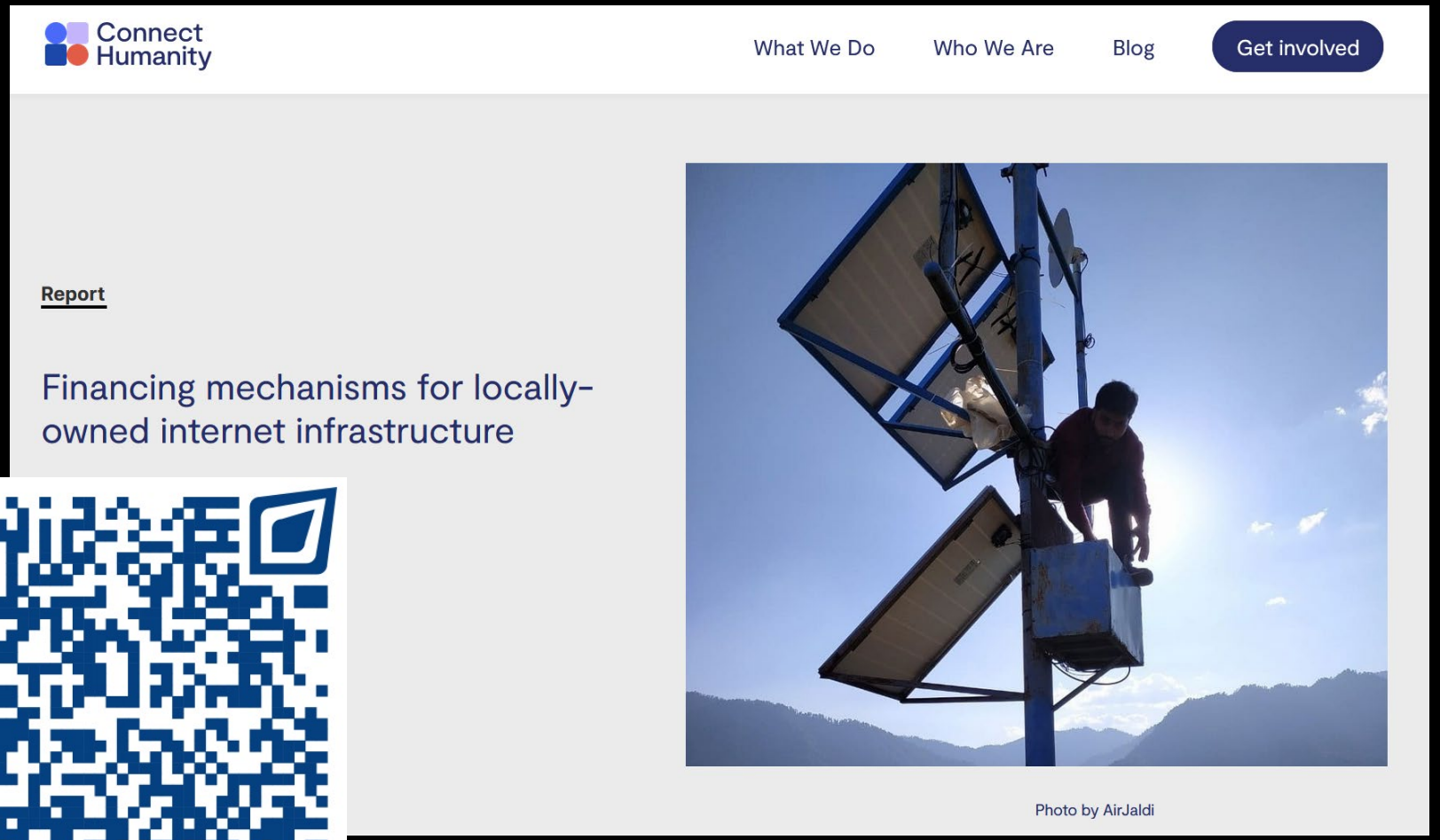
ILSR.org/exploring-digital-equity-fact-sheets/

Access or Availability?



NDIA
NATIONAL DIGITAL INCLUSION ALLIANCE
digitalinclusion.org

Power and Poverty, not Technology



ConnectHumanity.fund/report-financing-ccps/

Half of humanity is connected to high-quality Internet access.

The other half will not be connected by the business models that connected the first half.

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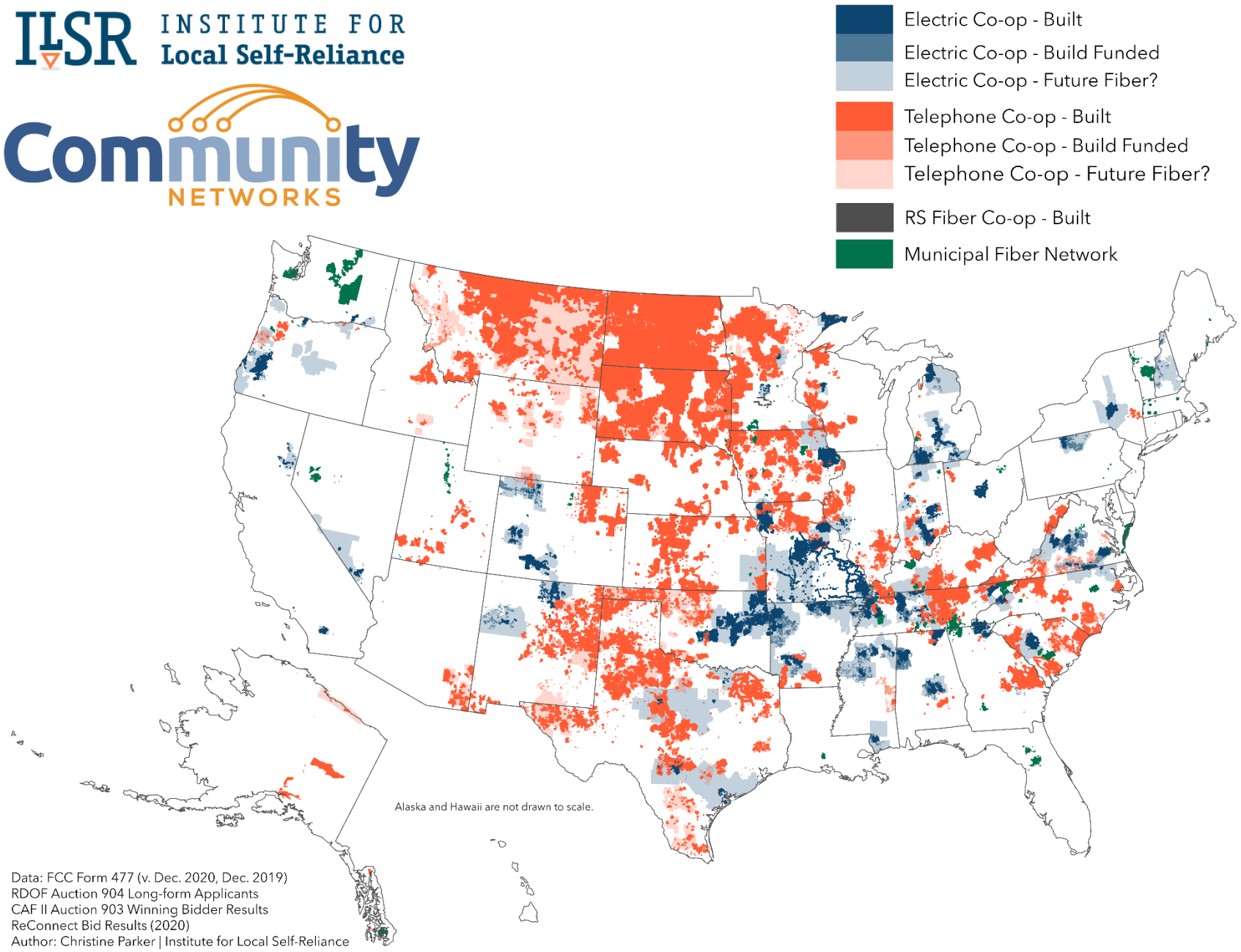
Community NETWORKS



Data: FCC Form 477 (v. Dec. 2020, Dec. 2019)
RDOF Auction 904 Long-form Applicants
CAF II Auction 903 Winning Bidder Results
ReConnect Bid Results (2020)
Author: Christine Parker | Institute for Local Self-Reliance

Bits

- **The base unit of information (data)**
- A bit represents a choice between 2 states or categories

  1 and 0

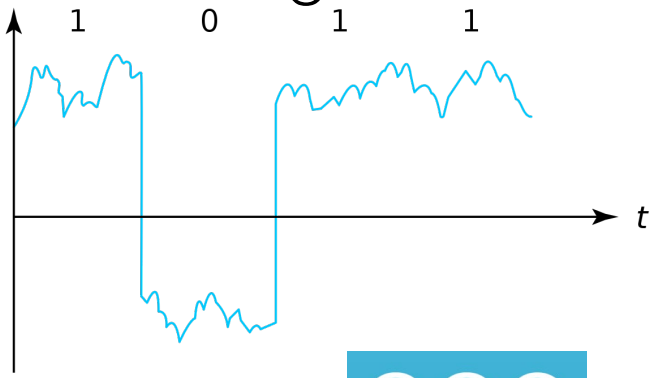
  light and dark

  Yes and No

- **Using an electrical signal (on and off)**

Ideal signal

Real signal



Bits: How computers send data

Human-readable **data**

Bits

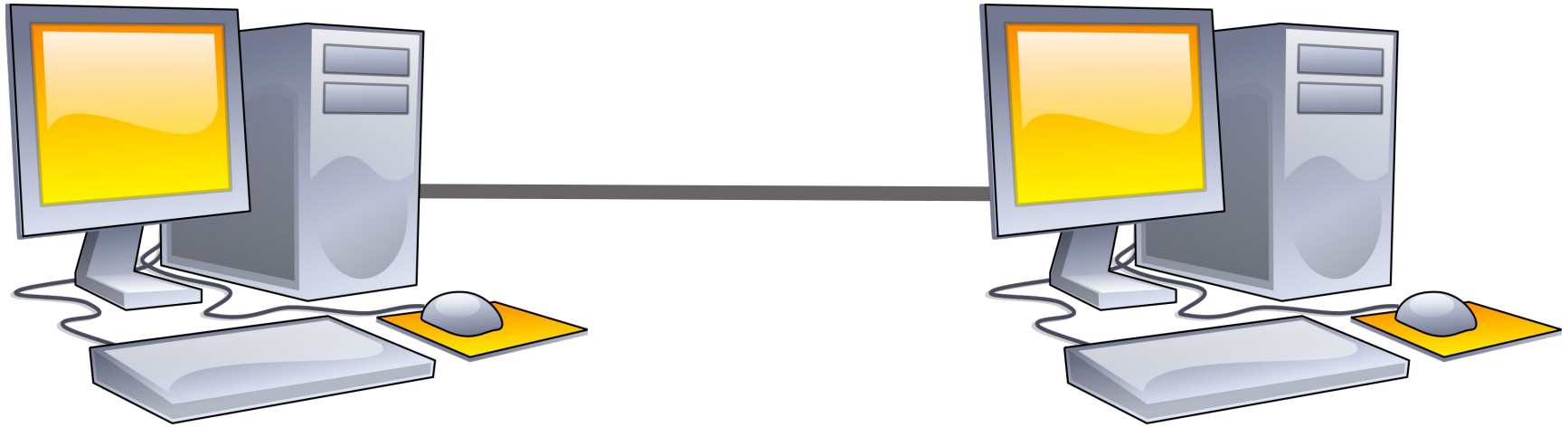
Physical signals

Physical signals

Bits

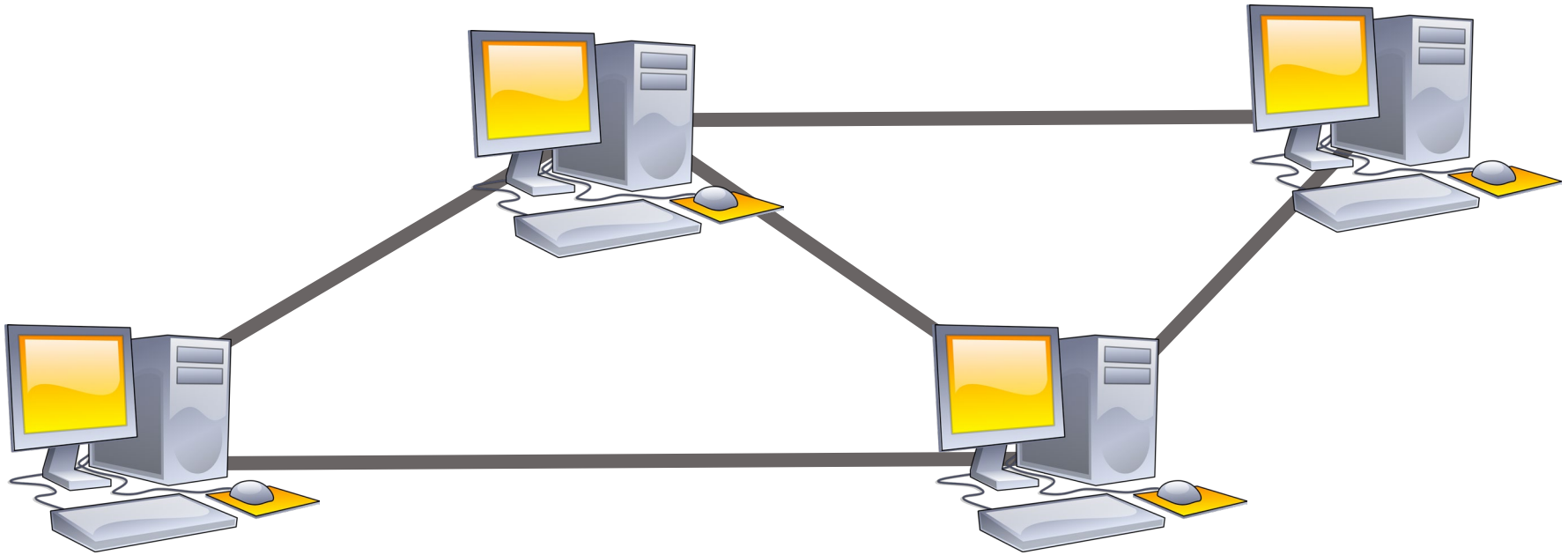
Human-readable **data**

What is a “network”?



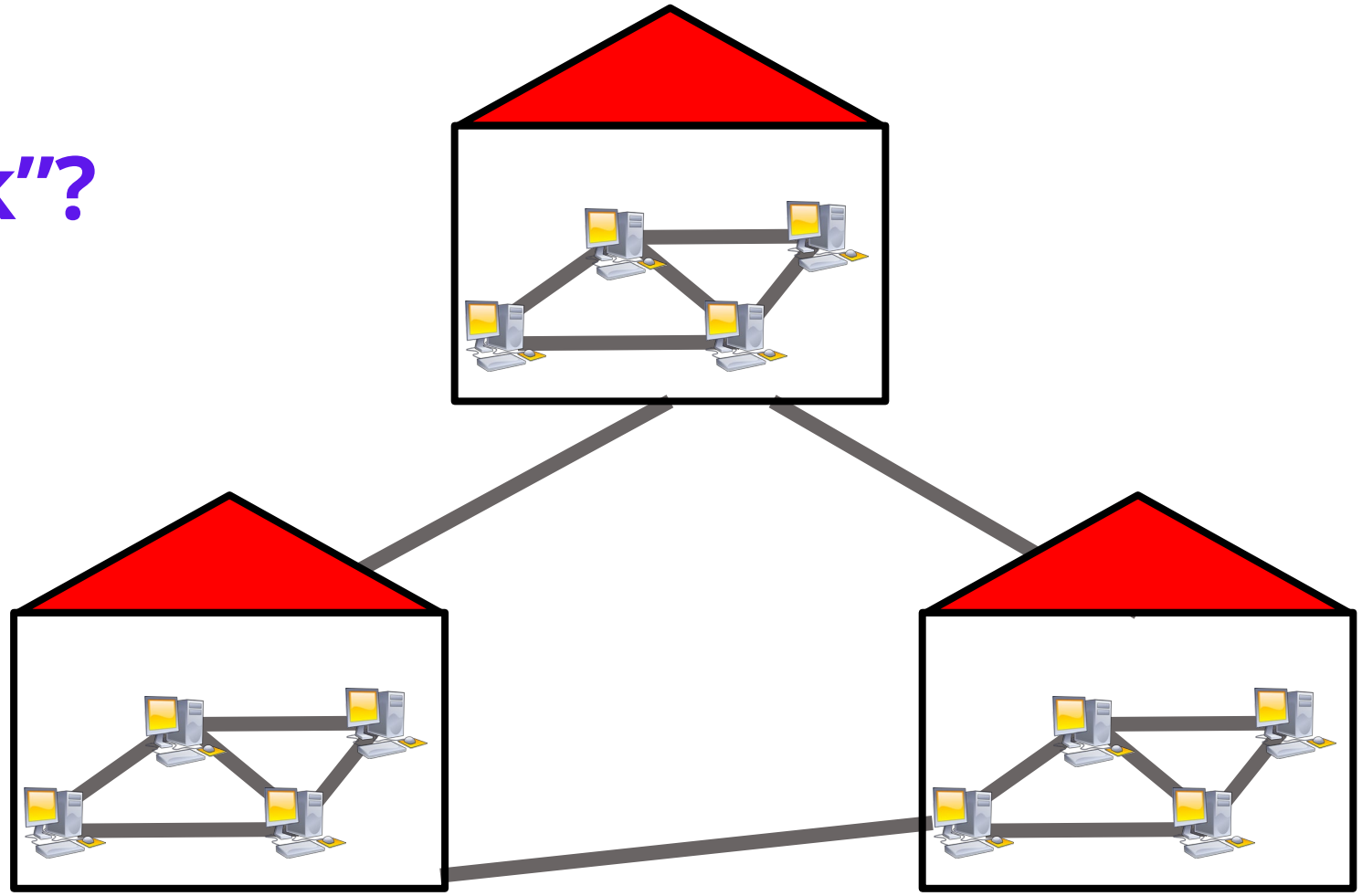
A **network** is a **connection between devices** that allows them to **communicate** and send information to each other.

What is a “network”?



A network can be very big or very small.

What is an “internetwork”?



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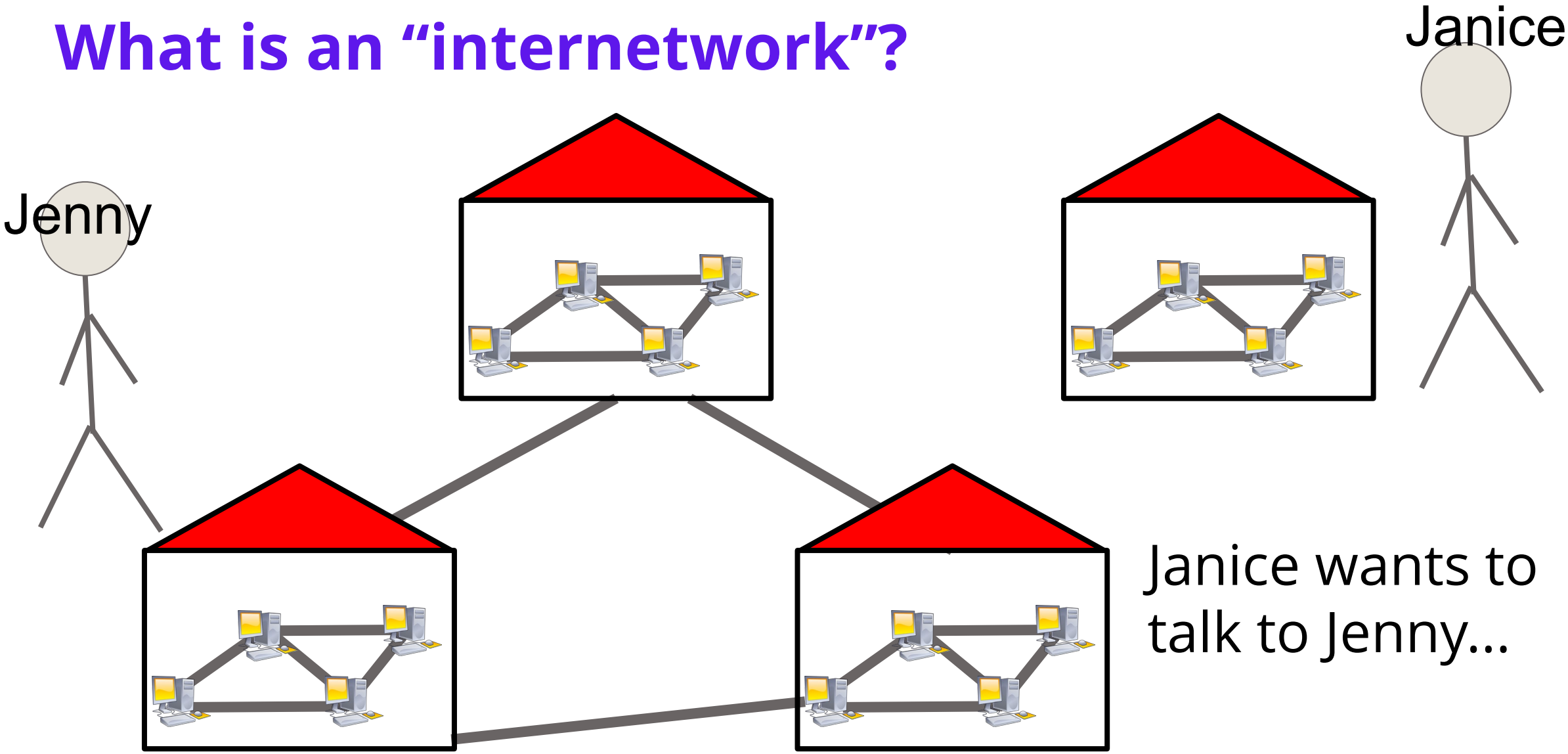
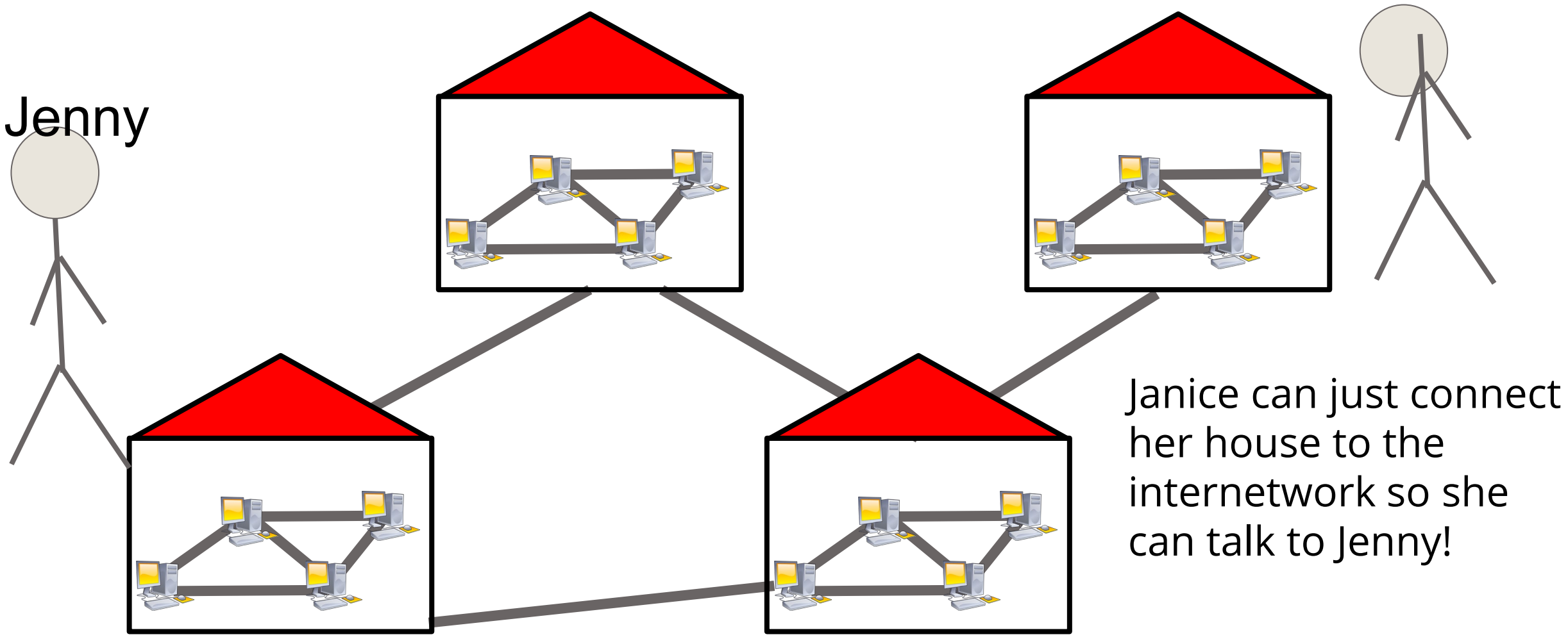


Janice wants to talk to Jenny…

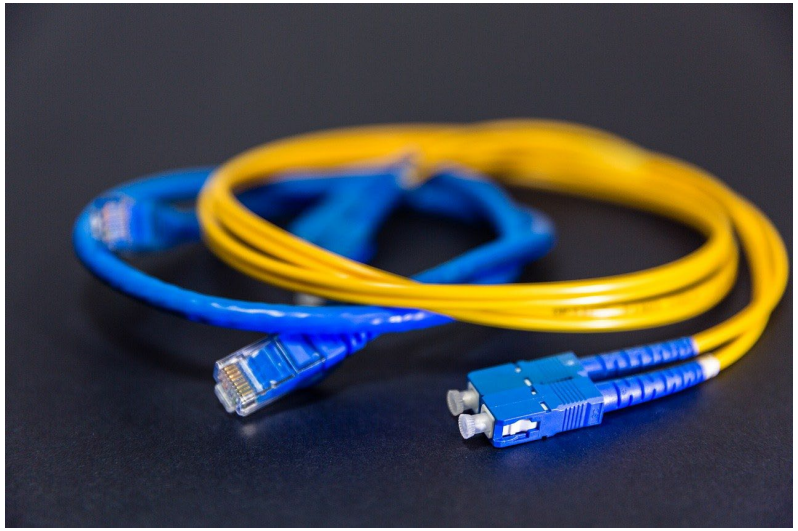
What is an “internetwork”?



Janice can just connect her house to the internetwork so she can talk to Jenny!

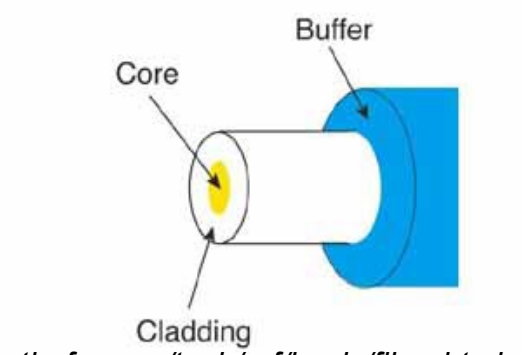
Wired Technology – Quick History

- DSL – 1-30 Mbps
  - Unreliable
  - Slow
  - Mostly Rural
- Cable – 100-1200 Mbps
  - Decent Download speeds
  - Expensive
  - Monopoly Problem
  - Urban
- Fiber optics – 100-10,000 Mbps
  - Building
  - Topology!

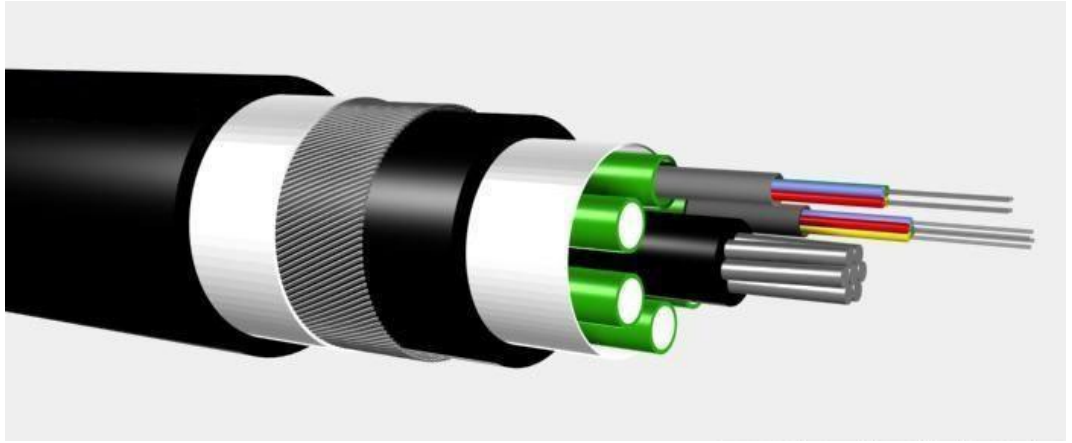


Fiber optics

- Virtually unlimited speed, limited only by the equipment you place on the ends of the fiber
- Can carry signals for long distances
  - Undersea fiber cables go all the way across the oceans (1000s of miles)
  - Will need to re-generate the signal every 60 miles or so
- Low weight
- Very Reliable

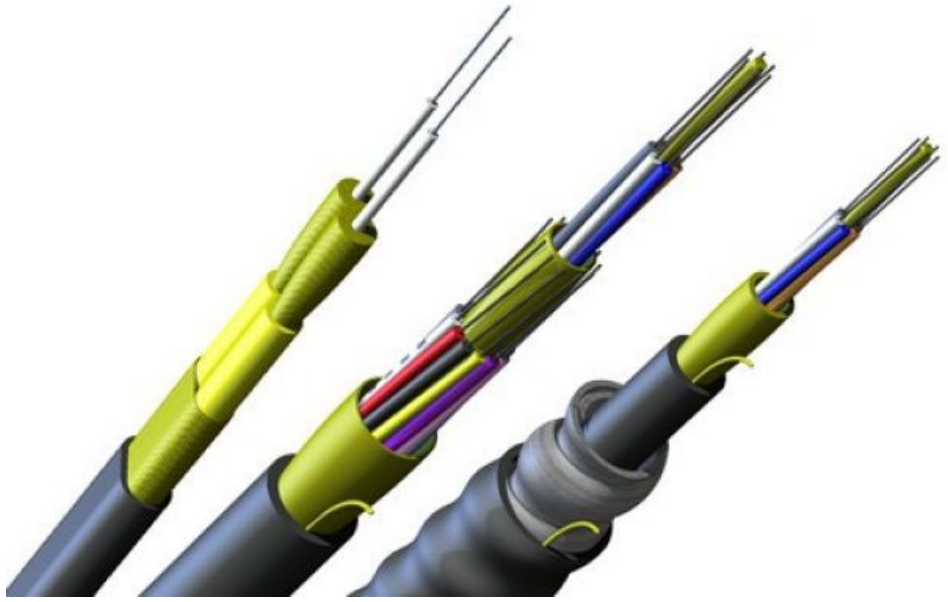


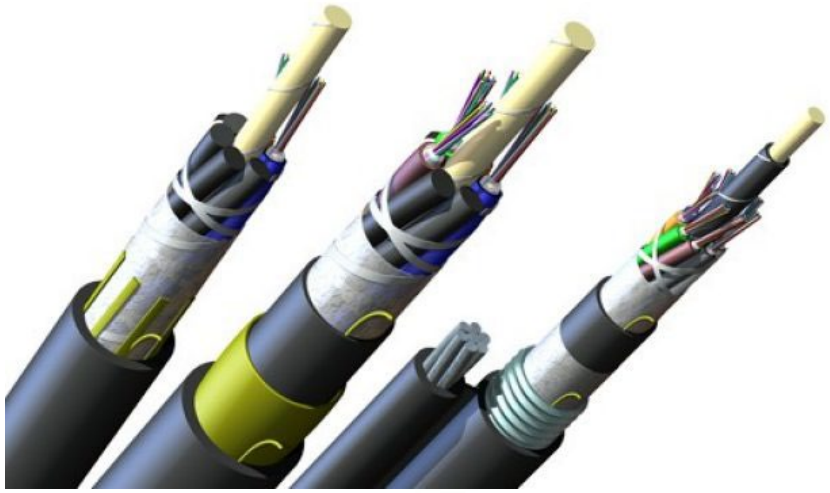
thefoa.org/tech/ref/basic/fiber.html

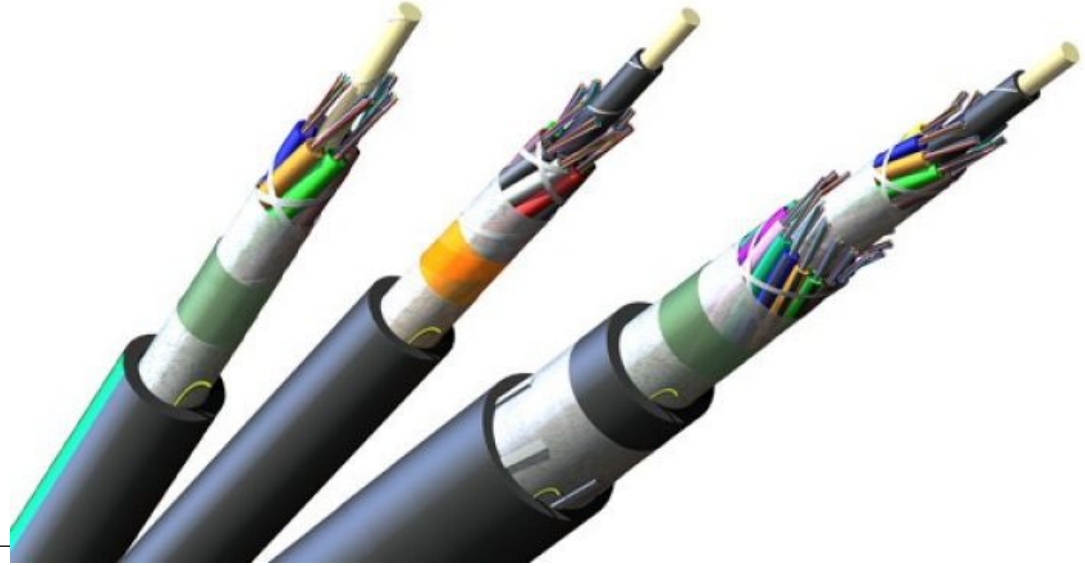


commons.wikimedia.org/wiki/File:Optical_fiber_cable.jpg

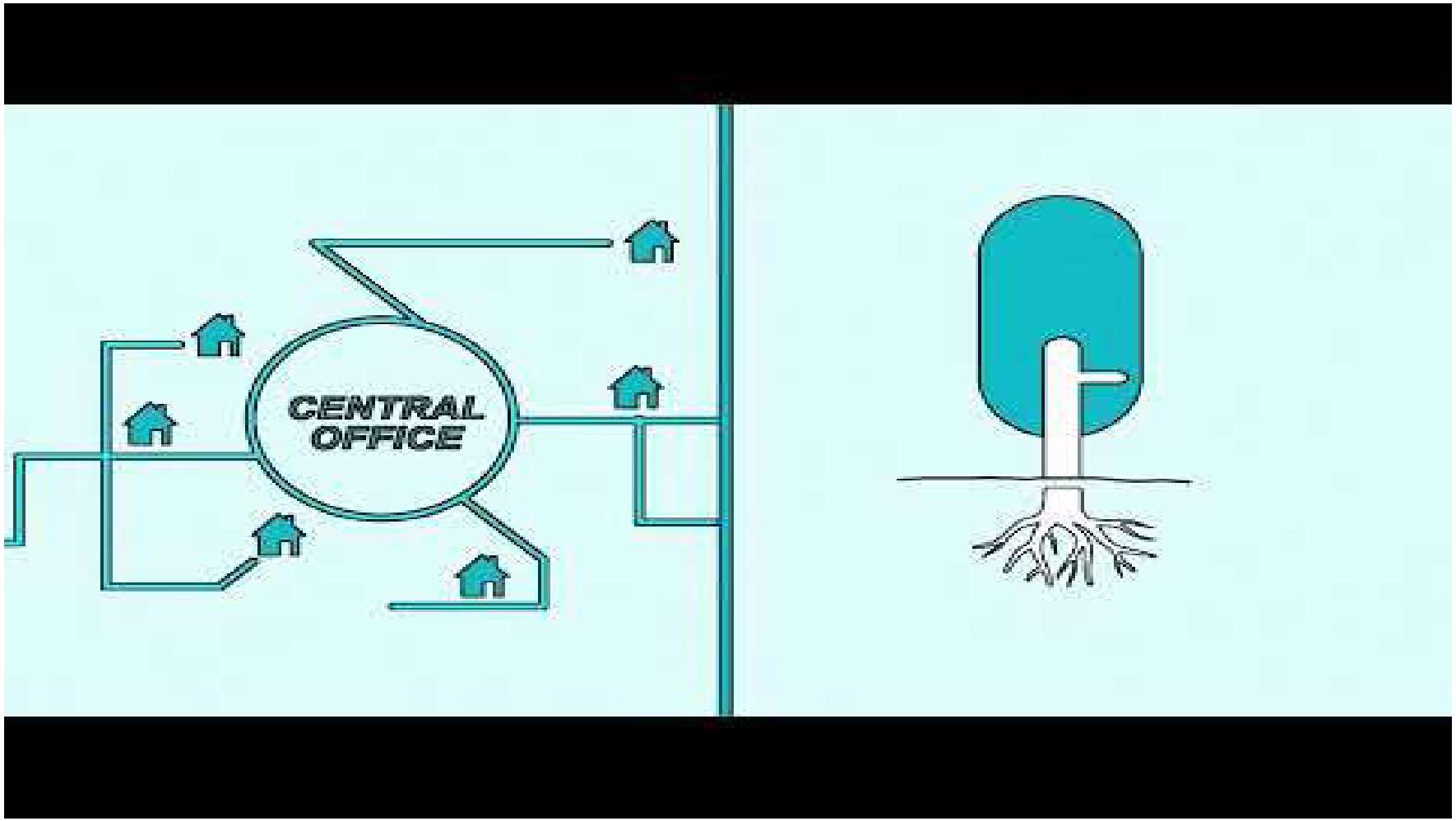
Fiber Optic Cables



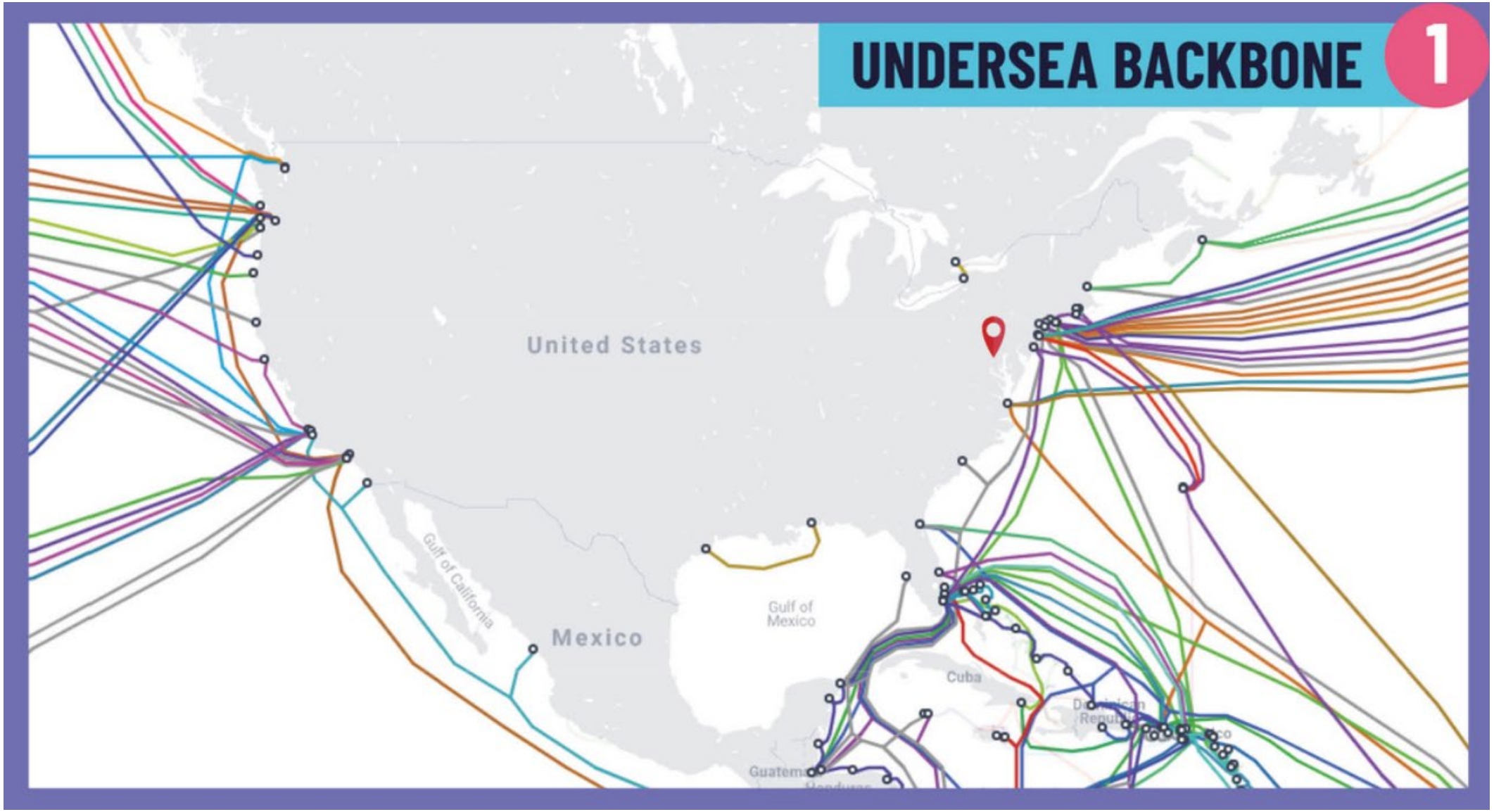




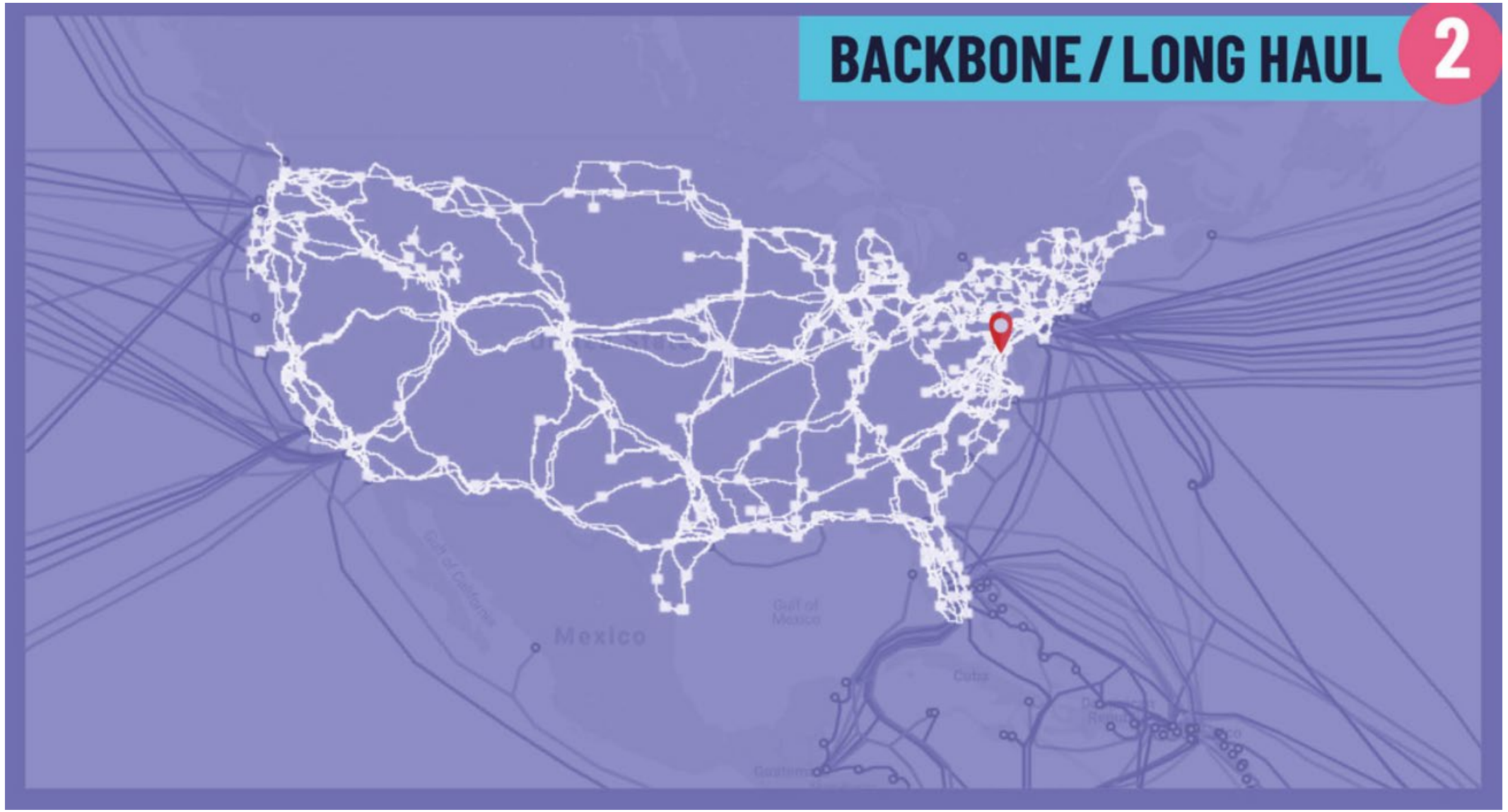
Video – Fiber Network Overview!



YouTube.com/watch?v=qr9zjtfHR-w



www.rwdfoundation.org/dell - *Courtesy of Robert W. Deutsch Foundation*



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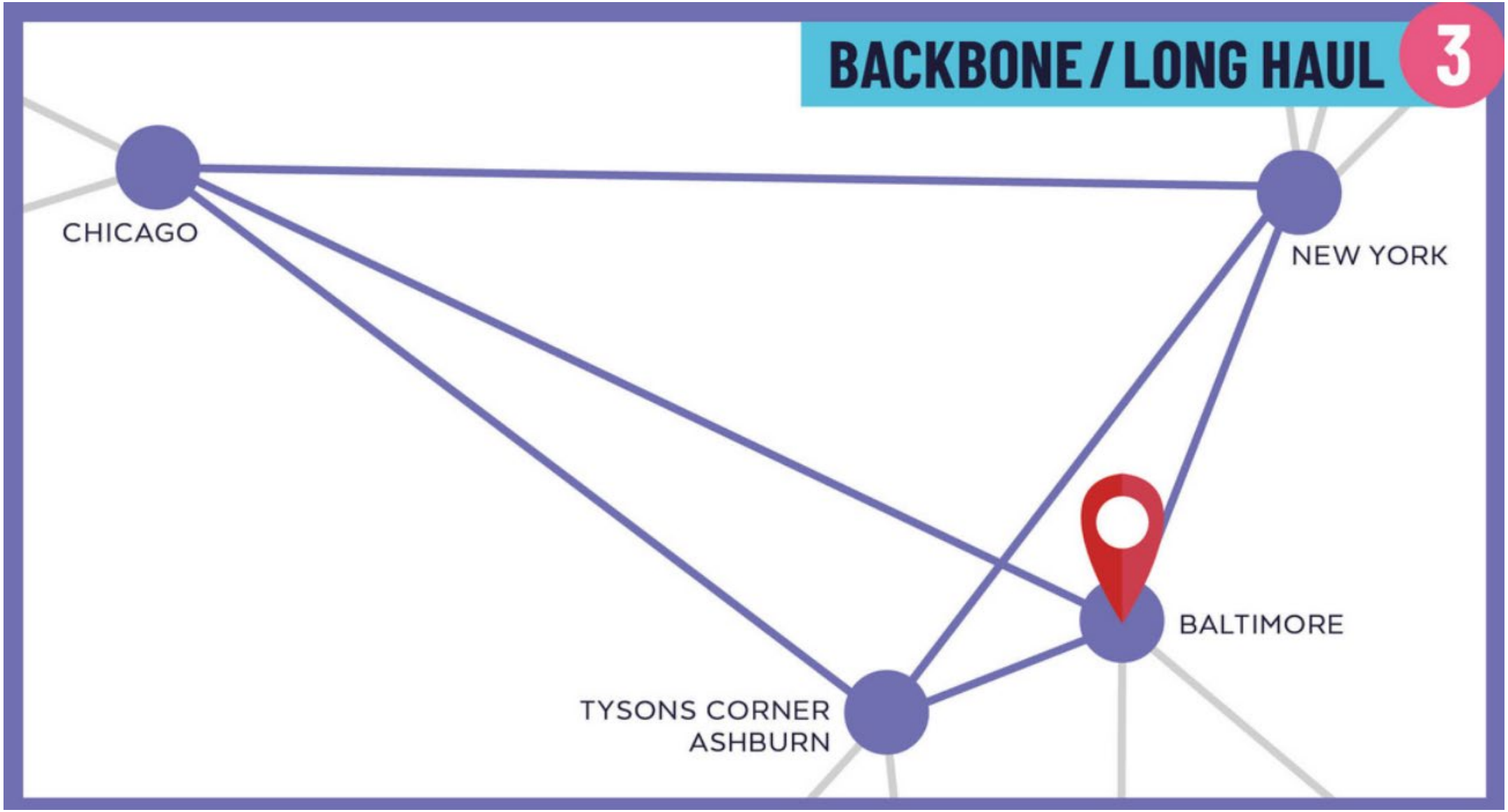

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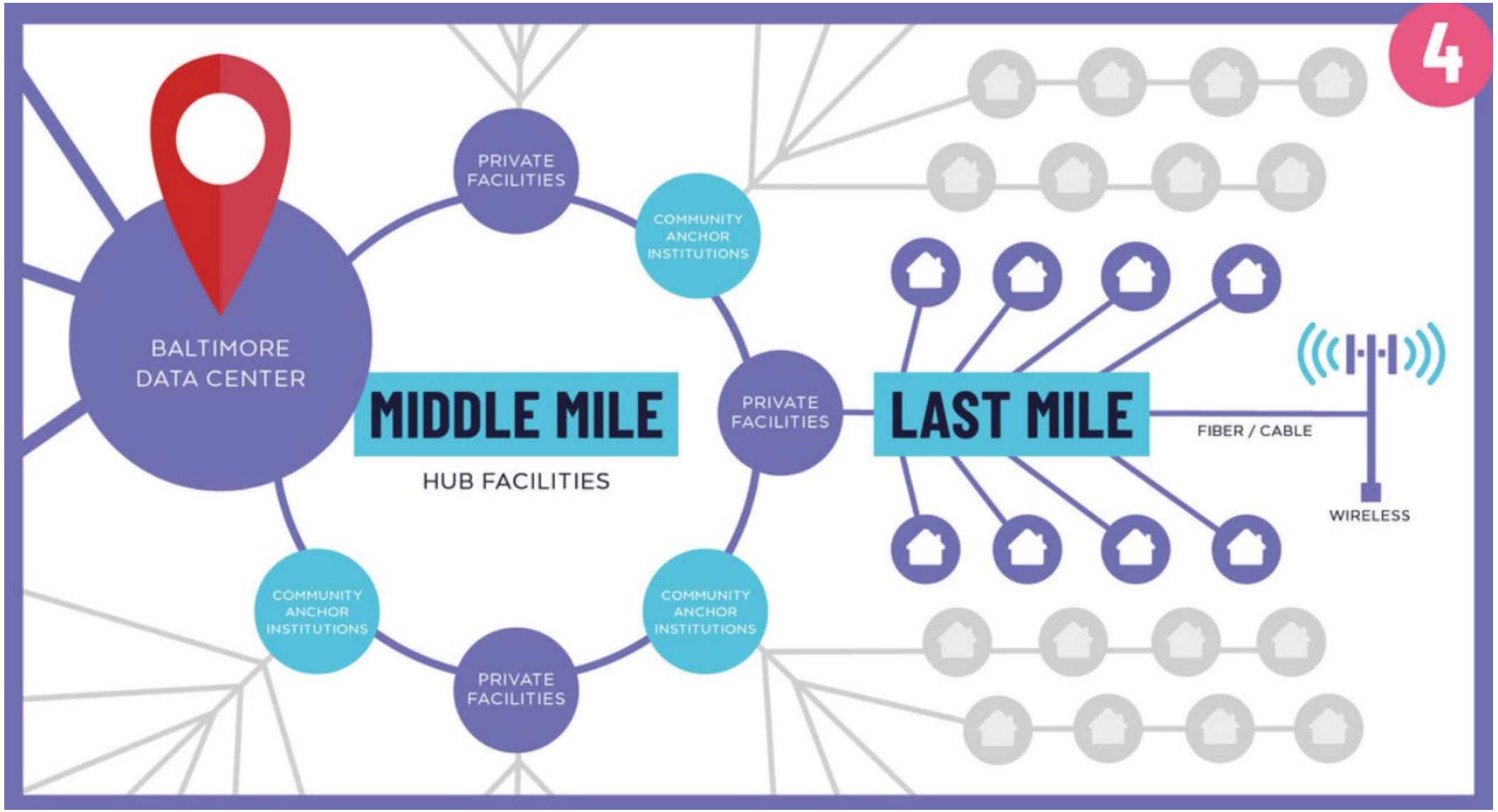


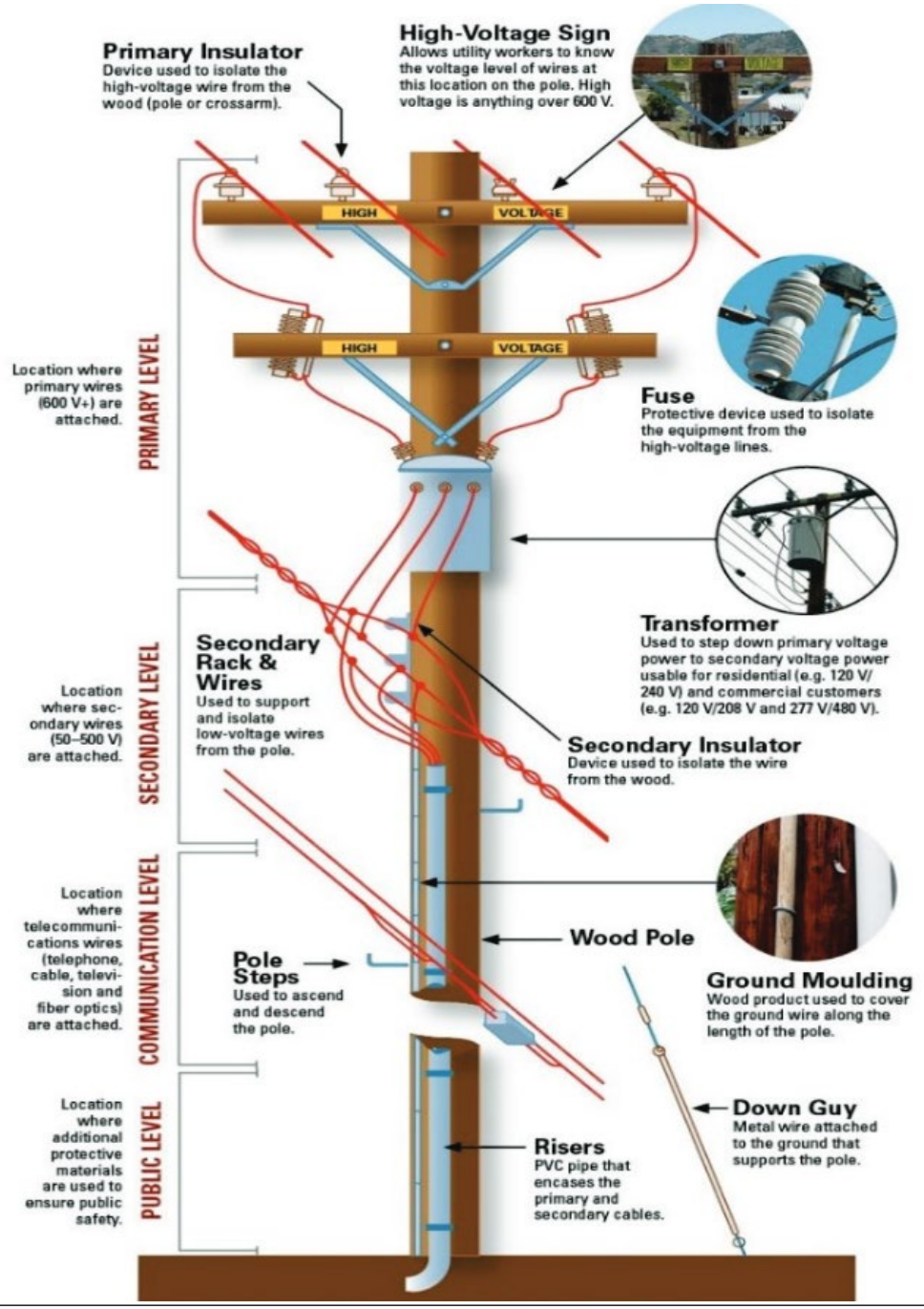
www.rwdfoundation.org/dell - *Courtesy of Robert W. Deutsch Foundation*

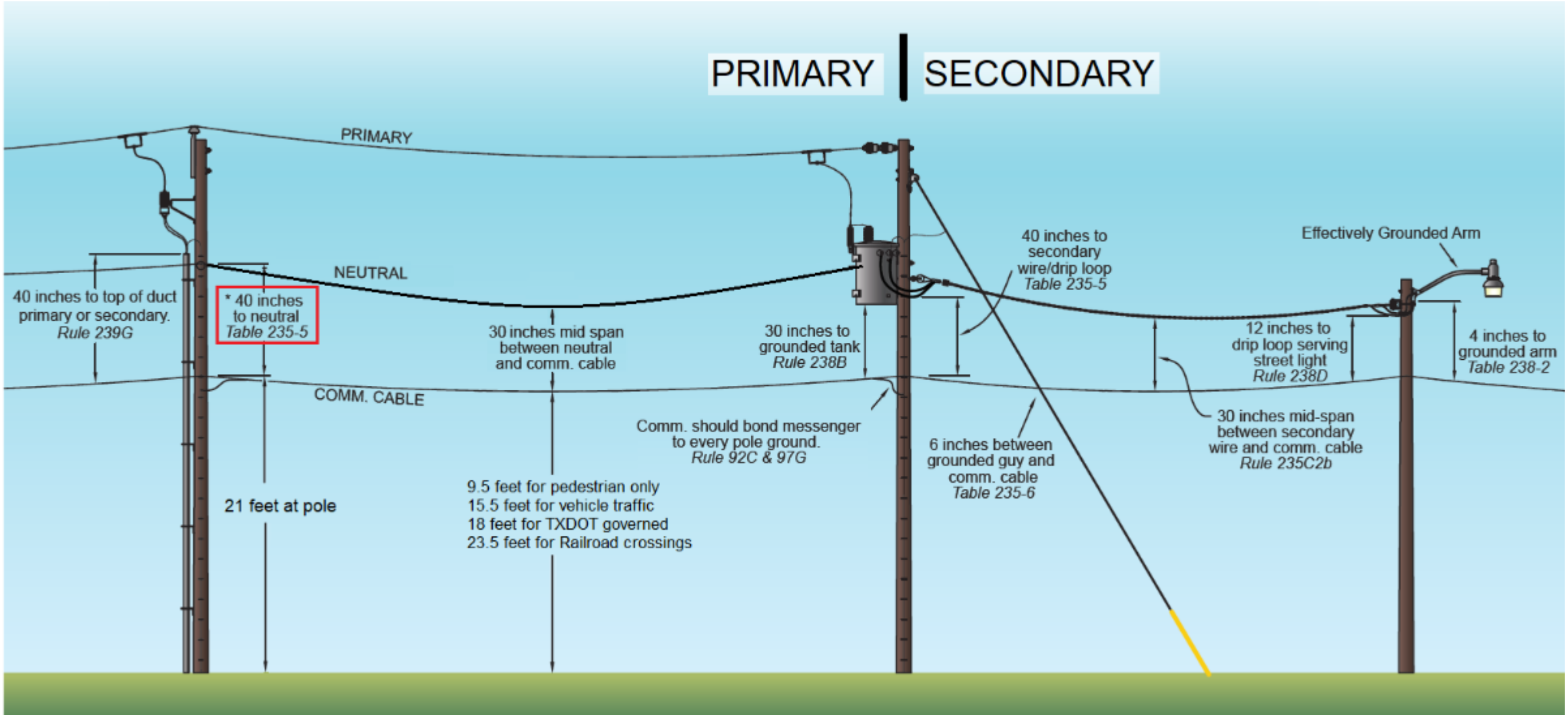
Central Office Fiber

- Nestled in a south Minneapolis neighborhood…

Aerial Fiber Construction

Courtesy, Dale Smith, NSRC, University of Oregon


Primary Insulator
Device used to isolate the high-voltage wire from the wood (pole or crossarm).
High-Voltage Sign
Allows utility workers to know the voltage level of wires at this location on the pole. High voltage is anything over 600 V.
HIGH VOLTAGE
HIGH VOLTAGE
Location where primary wires (600 V+) are attached.
PRIMARY LEVEL
Fuse
Protective device used to isolate the equipment from the high-voltage lines.
Transformer
Used to step down primary voltage power to secondary voltage power usable for residential (e.g. 120 V/240 V) and commercial customers (e.g. 120 V/208 V and 277 V/480 V).
Secondary Rack & Wires
Used to support and isolate low-voltage wires from the pole.
Location where secondary wires (50–500 V) are attached.
SECONDARY LEVEL
Secondary Insulator
Device used to isolate the wire from the wood.
Location where telecommunications wires (telephone, cable, television and fiber optics) are attached.
COMMUNICATION LEVEL
Wood Pole
Pole Steps
Used to ascend and descend the pole.
Ground Moulding
Wood product used to cover the ground wire along the length of the pole.
Down Guy
Metal wire attached to the ground that supports the pole.
Location where additional protective materials are used to ensure public safety.
PUBLIC LEVEL
Risers
PVC pipe that encases the primary and secondary cables.



TAYLOR ELECTRIC COOPERATIVE

Summary of NESC Clearances to Communications Cables

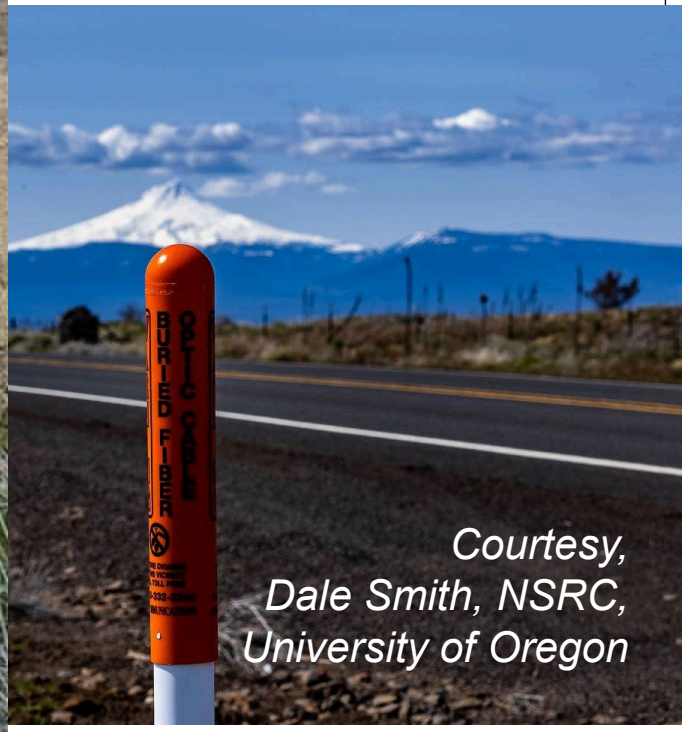
Underground Fiber Construction

Courtesy,
Dale Smith, NSRC,
University of Oregon

Video – Microtrenching!

YouTube.com/watch?v=ObM_bDnf9Lc

Fiber Optic System Locates



Courtesy,
Dale Smith, NSRC,
University of Oregon

Fiber Optic Systems Outages

Fiber Optics Economics

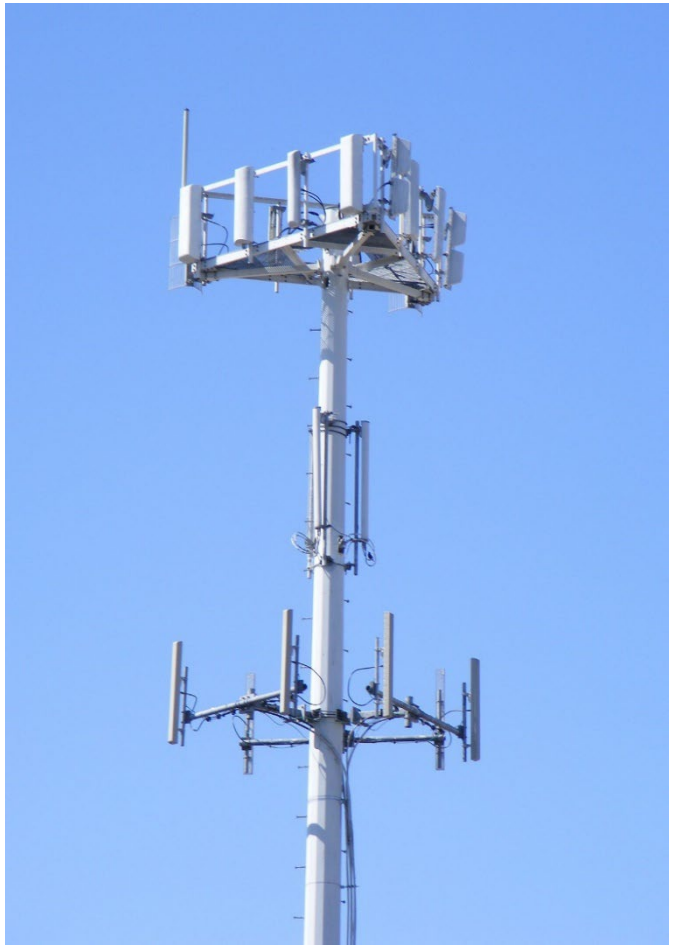
- High Upfront Costs
  - Cost to build in midwestern city, single family homes, directional boring in $/foot
    - Conduit $1
    - **Labor** $9-12
    - Fiber $1-$2
    - Permitting $2
    - Handholds, Couplers, splicing misc, locate wire $2.5
    - **Total**: $16-20 (roughly – this is a lower bound)
- Low Operating Costs
- Additional Cost to Connect a Home:
  - $1000 - urban single family
  - $500 – apartment / condo
  - $3,000 - $5,000 for many rural

UNITED STATES FREQUENCY ALLOCATIONS

THE RADIO SPECTRUM

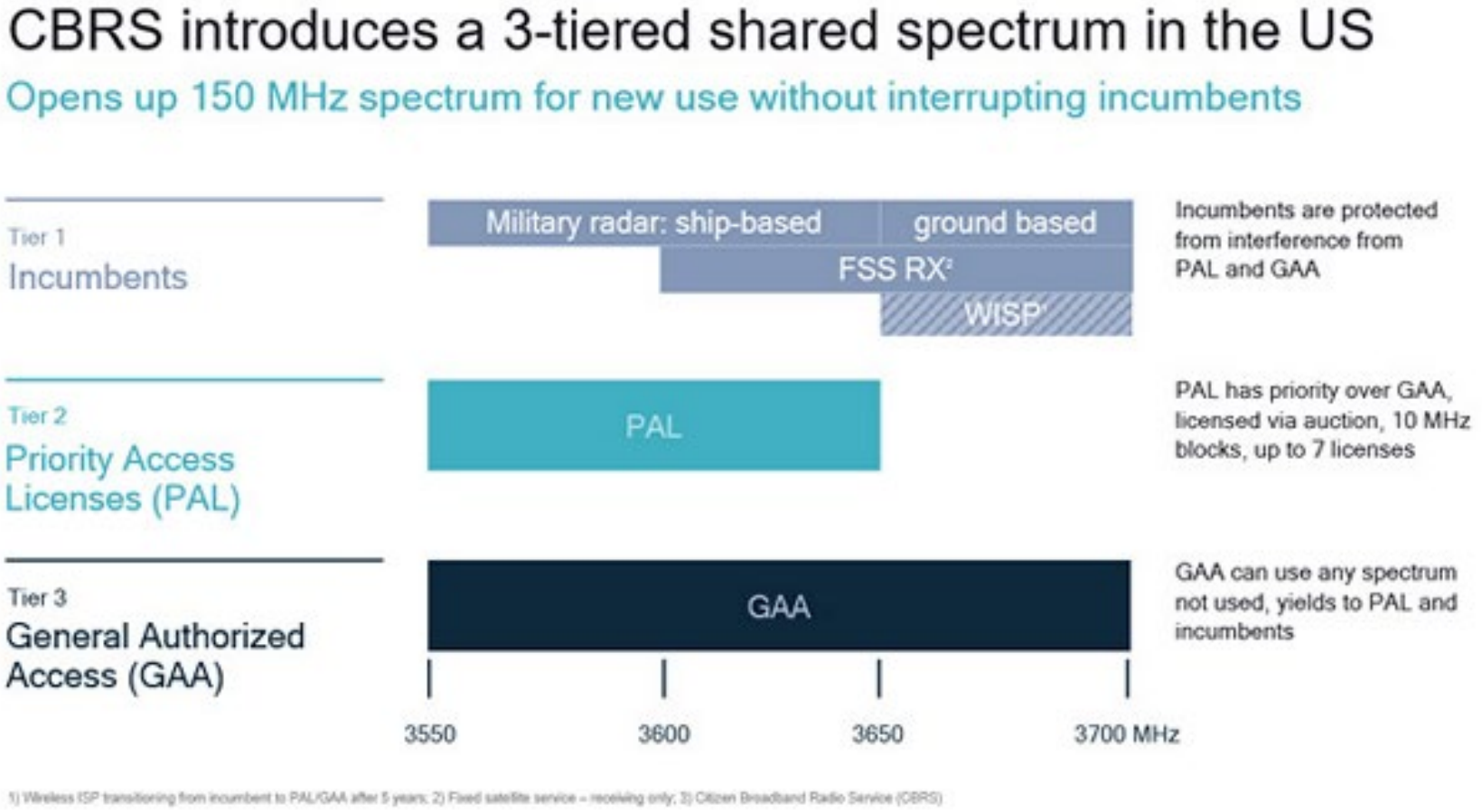
Wireless Technology

- (Still mostly wired)
- Mobile
  - 4G LTE and 5G
- Fixed
- Wi-Fi
- Satellite
  - Geostationary
  - Low Earth Orbit

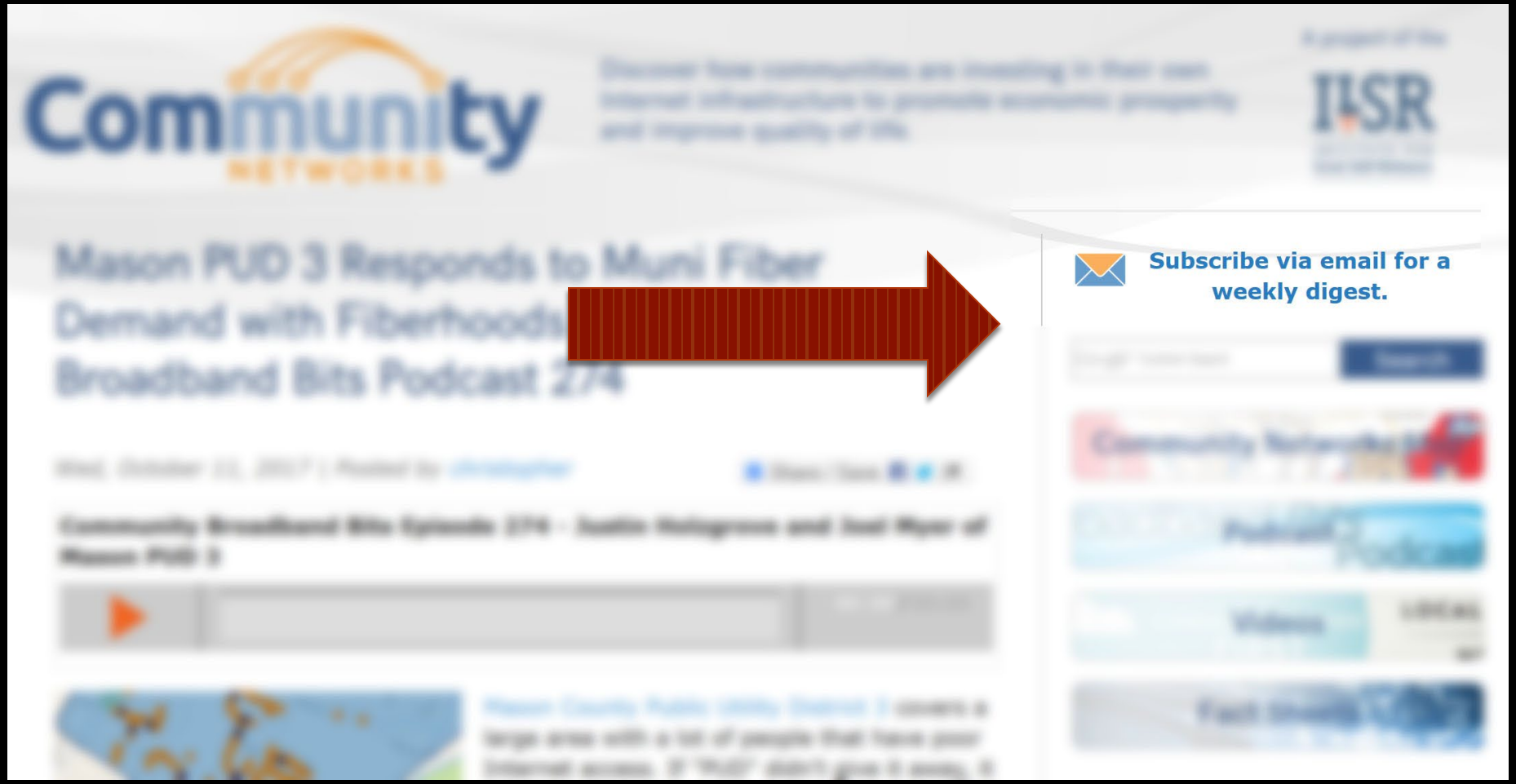


CBRS – Citizens Band Radio Service

- Cost
  - Home Installation
- Quality of service
  - Varies Significantly
- Long term costs
- Community Broadband Bits Podcast Episode 500



https://www.qualcomm.com/news/onq/2020/04/qualcomm-technologies-propels-cbrs-commercialization-platforms-devices-and



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