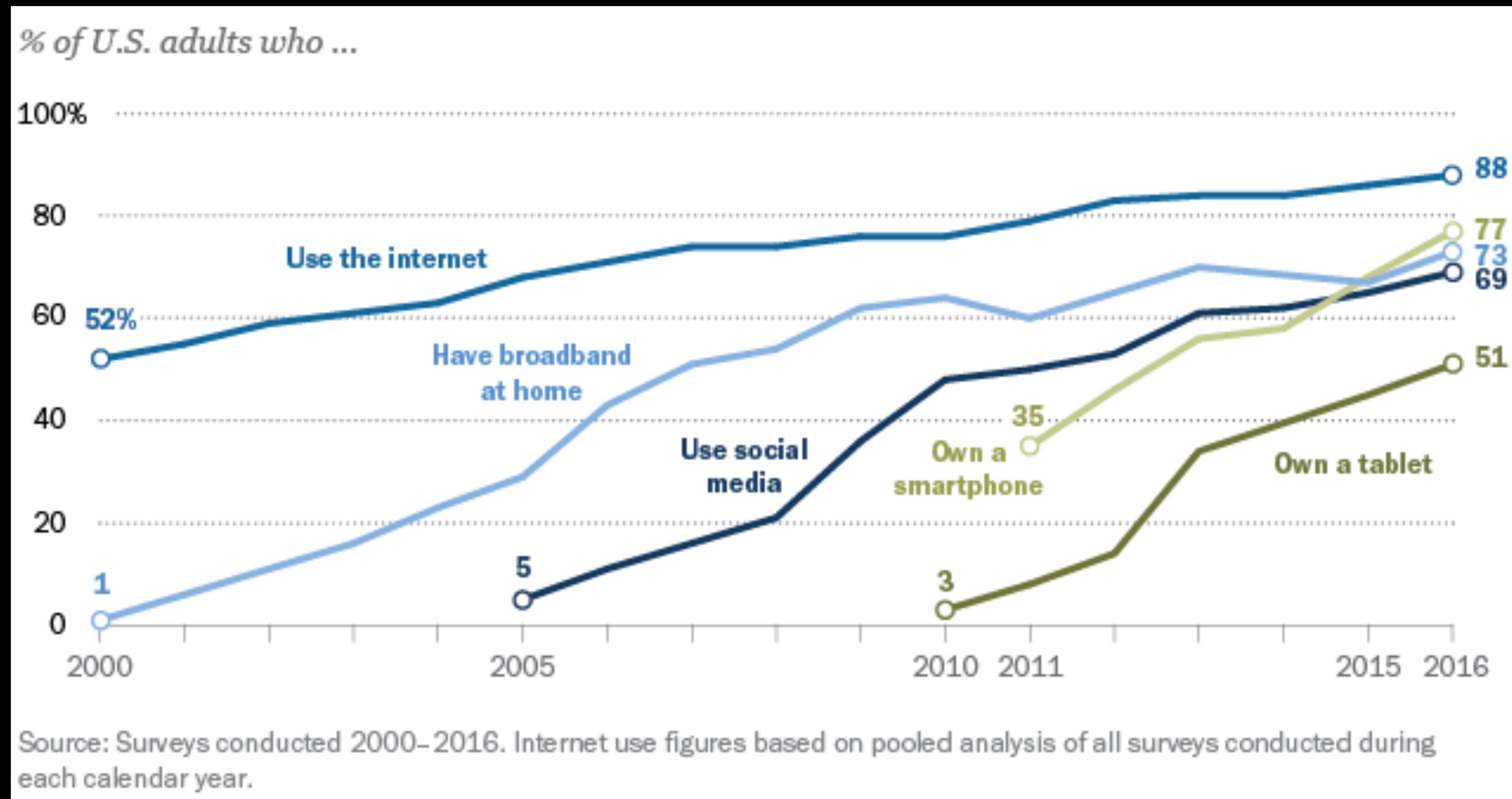


# The Evolution Of Our Internet

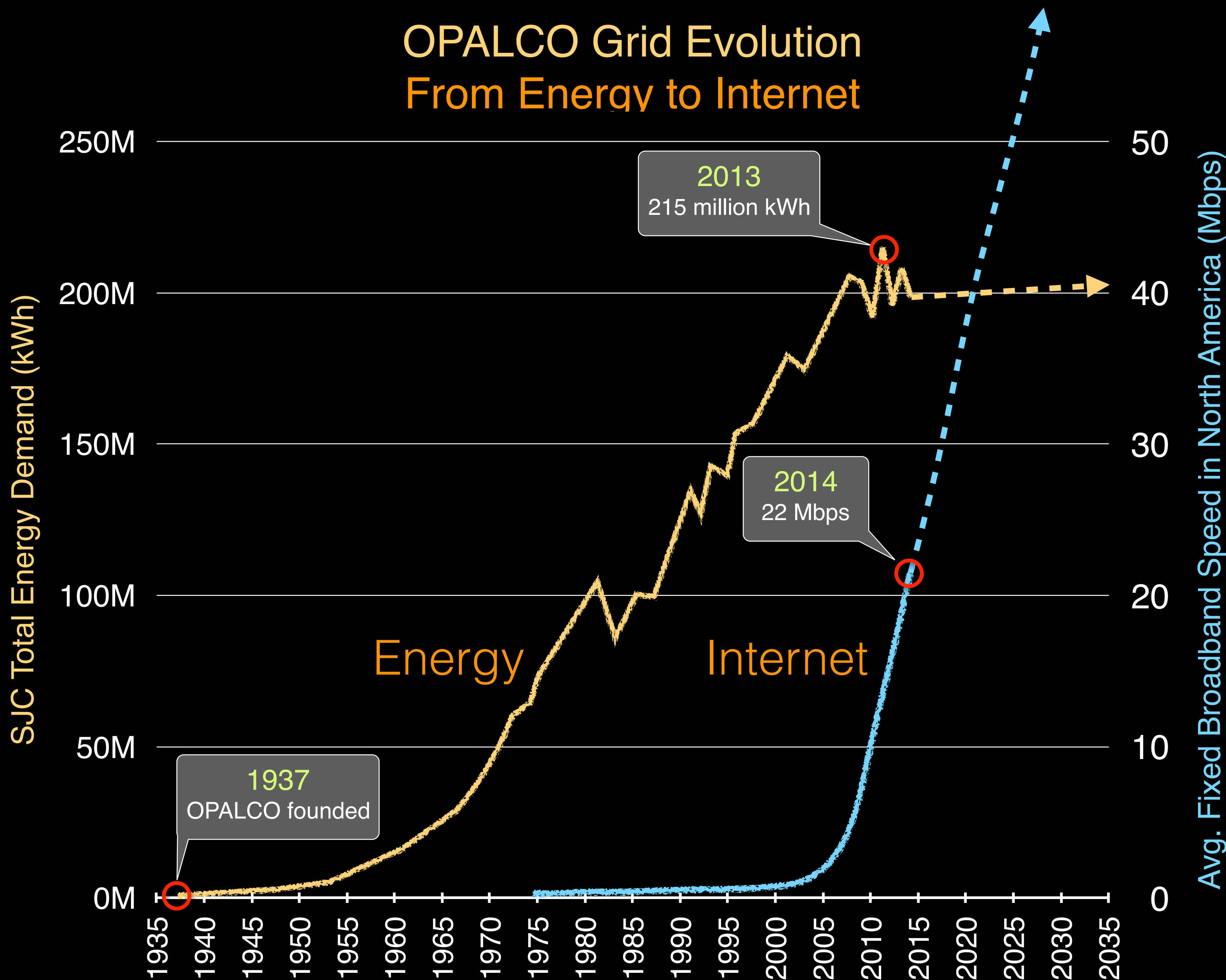
## From Copper to Fiber Optics and Wireless

# The Evolution of Technology Adoption and Usage in the US

US adoption of high speed broadband has been growing rapidly.  
Though, in rural areas like San Juan County, Internet speeds  
typically lag behind the rest of the country.



# OPALCO Grid Evolution From Energy to Internet



# Internet is the Energy of the 21st Century

Founded in 1937, OPALCO built a grid that has supported an exponential growth in energy use by co-op members.

In the 21st Century, energy use (and revenue) is flattening, due to slowing growth and steady achievements in efficiency.

Rural electric co-ops are transitioning to a hybrid model - providing energy and Internet services - that diversifies and stabilizes co-op revenue.

Internet speed is the new exponential growth engine – driven by a transition from text to multimedia (pictures, video), mobile smartphone growth, telemedicine, first responder communications, streaming media, telecommuting, and much more...

# OPALCO: 100 Years of Innovation

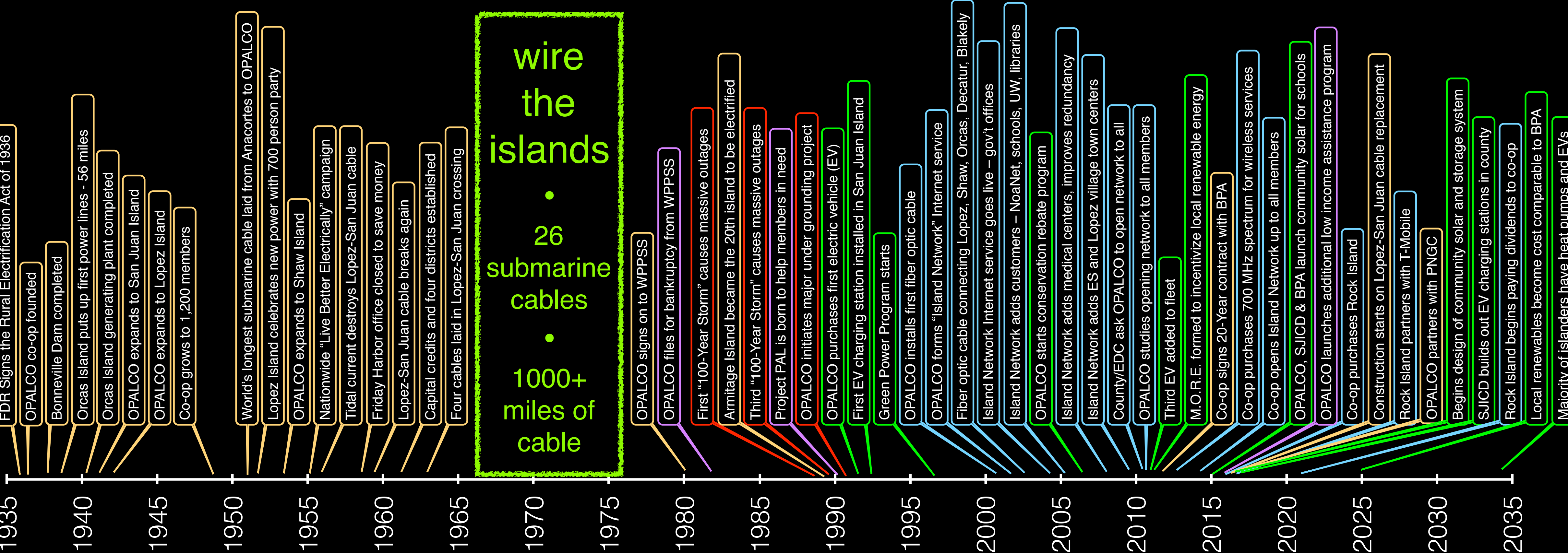
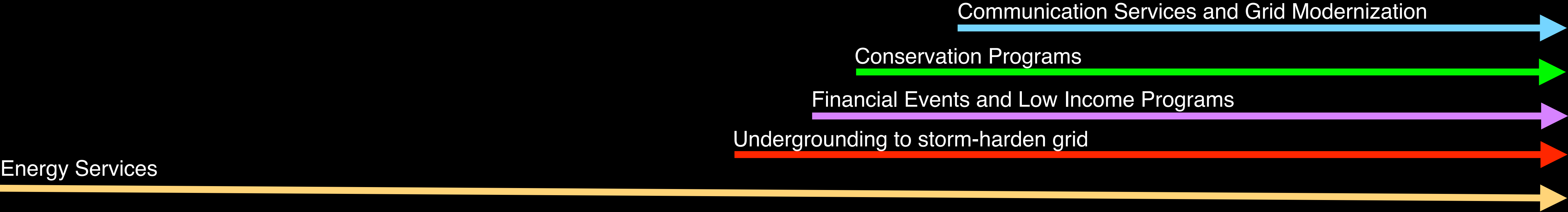
Historically, rural areas have been the last to benefit from innovation common to mainland urban areas.

Though this is as true for our 20 island rural community, OPALCO founders and members responded with islander grit and determination, leading to a remarkable legacy of innovations.

The next slide highlights the numerous innovations of the co-op, in areas of *energy and communications services, energy efficiency, finance, and support of those that need a helping hand.*



# OPALCO: 100 Years of Innovation

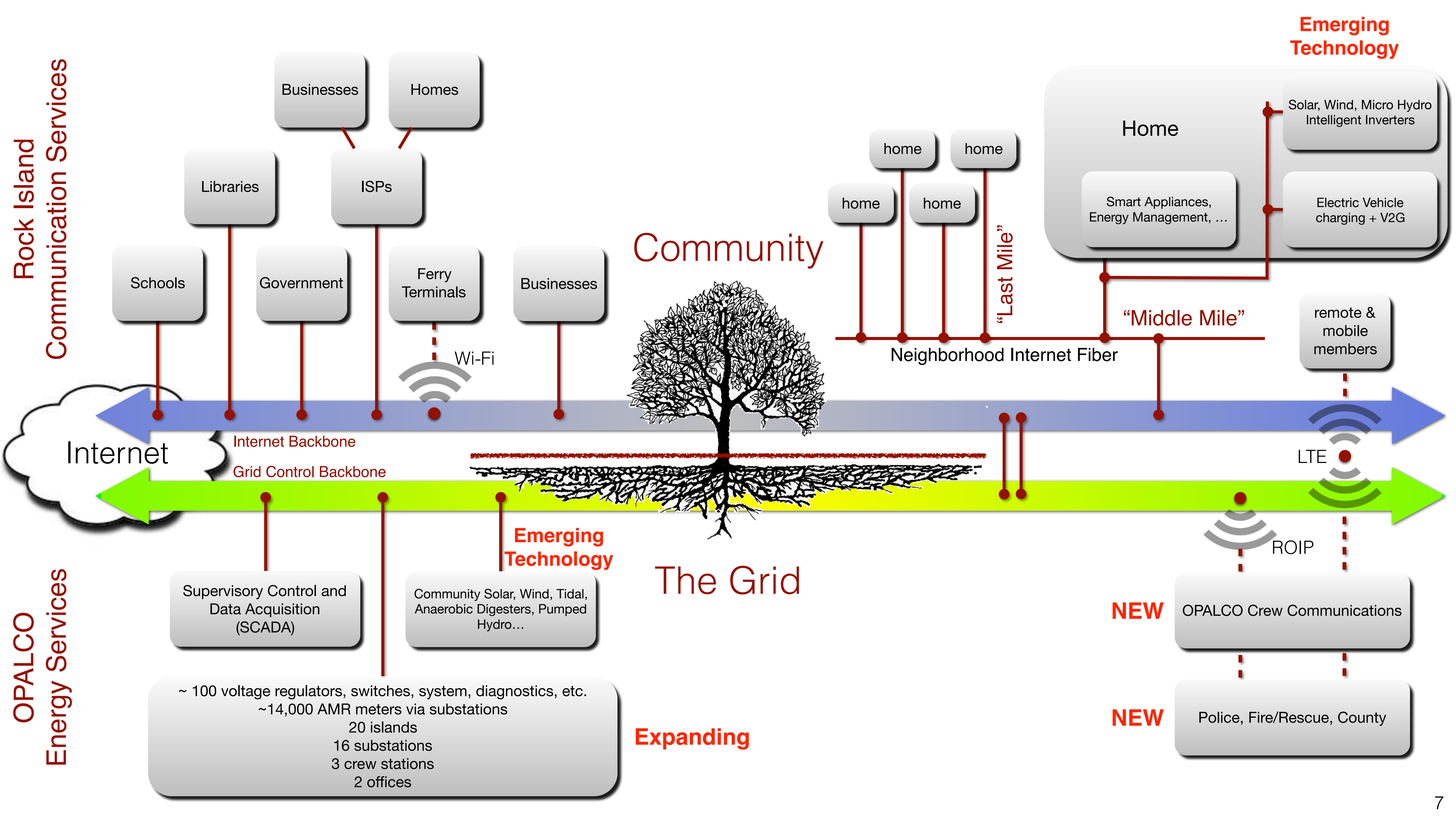


# Grid Modernization Empowers Communications

As seen from the previous slide, innovations in communication services began in earnest in about 2000, when OPALCO began installing fiber optic cable throughout the grid.

The next slide shows how that fiber grew – like a tree; roots to trunk to branches – initially serving the operational needs of the co-op, but eventually helping meet the exponentially growing demand for *fast reliable* Internet for government, schools, libraries, first responders, medical providers, and eventually all co-op members.





# Accelerating the Rollout of Communication Services

In 2013, CenturyLink's submarine fiber cable failed, impacting the county, emergency services, and local economy for weeks.

The next slide lays out a year-by-year record of how the co-op responded to this emergency with numerous innovations, expanding OPALCO's existing infrastructure, to help ensure a *local solution* to provide much more *reliable, faster* communications services for co-op members.



2013

- County Internet speeds a **small fraction of national average**
- CenturyLink submarine fiber cable fails
- Board directs staff to solve the Internet problem in the county, using an incremental approach. The first phase, to break-even, was slated to serve 35% of the county.

2014

- Purchase 700 MHz wireless spectrum for LTE
- Co-op initiates expanding county-wide communication systems
  - accelerates fiber backbone expansion to support grid
  - offers Internet to members, and first responders

2015

- OPALCO forms Internet subsidiary, with \$7.5M loan
- Acquires Rock Island with 1,700 existing DSL subscribers
- OPALCO accelerates potential service area to **90% of county** through T-Mobile partnership, with completion in 2017.

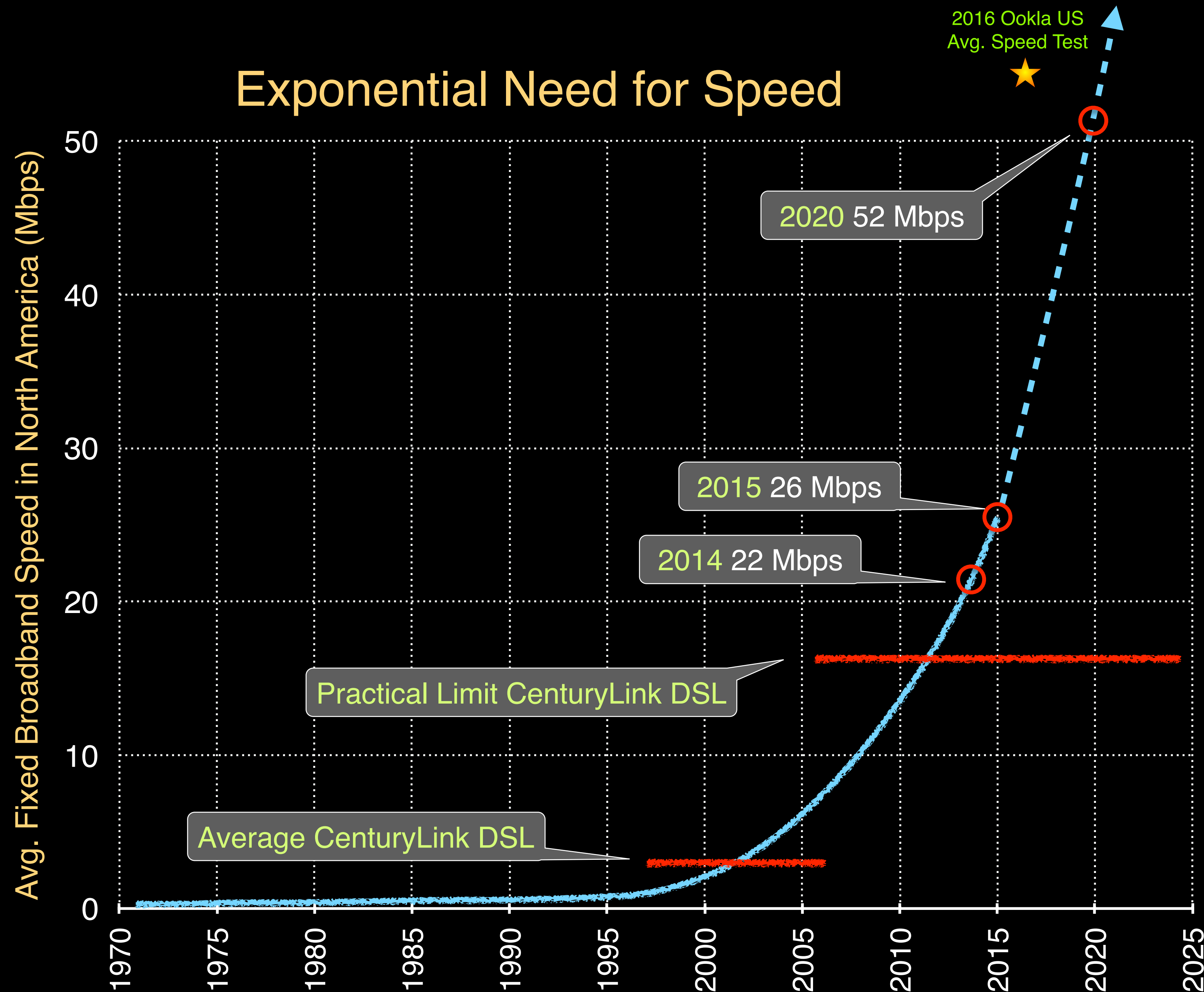
2016

- Wireless deployment using T-Mobile LTE wireless systems with OPALCO fiber backbone
- Rock Island pays back \$7.5M loan and becomes **financially sustainable**

2017

- **Rock Island overtakes CenturyLink** in subscribers to broadband services
- Average Internet speeds in county **now better than nationwide averages**
- Rock Island Internet, first responder communications, and T-Mobile cell service available to **90% of county**.

## Exponential Need for Speed



## 21st Century Internet

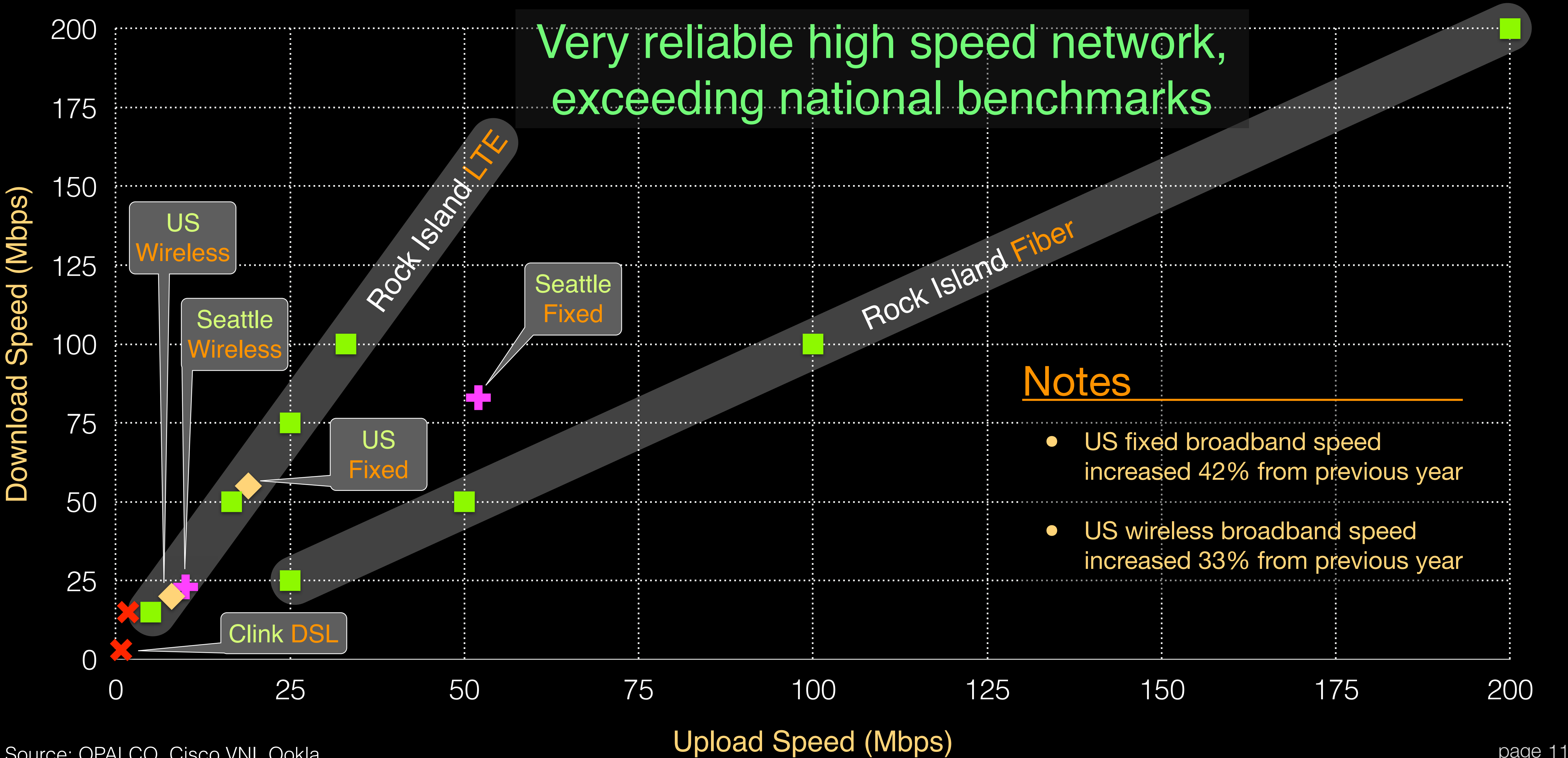
Today, Rock Island, OPALCO's subsidiary, is rolling out a hybrid of fiber optic cable and LTE wireless systems that provide a very capable mix of both fixed and wireless services, for home, business, and mobile needs.

These fiber and wireless services offer **reliability** and **speeds that far exceed the limitations of conventional copper-based DSL services**, and are ready for the future.

The chart at left shows how speeds in North America are expected to grow. Far outpacing obsolete DSL technology.

The next slide shows how Rock Island fiber and wireless service speeds compare to CenturyLink DSL, as well as Seattle and North American average Internet speeds.

# 2016 Rock Island Internet Speed Comparison: Fixed + Wireless Broadband





# LTE Wireless Improves Safety

- First responder communications are problematic in 8 dead zones across the county

- Rock Island and first responders are testing VHF Radio over Internet in South Lopez

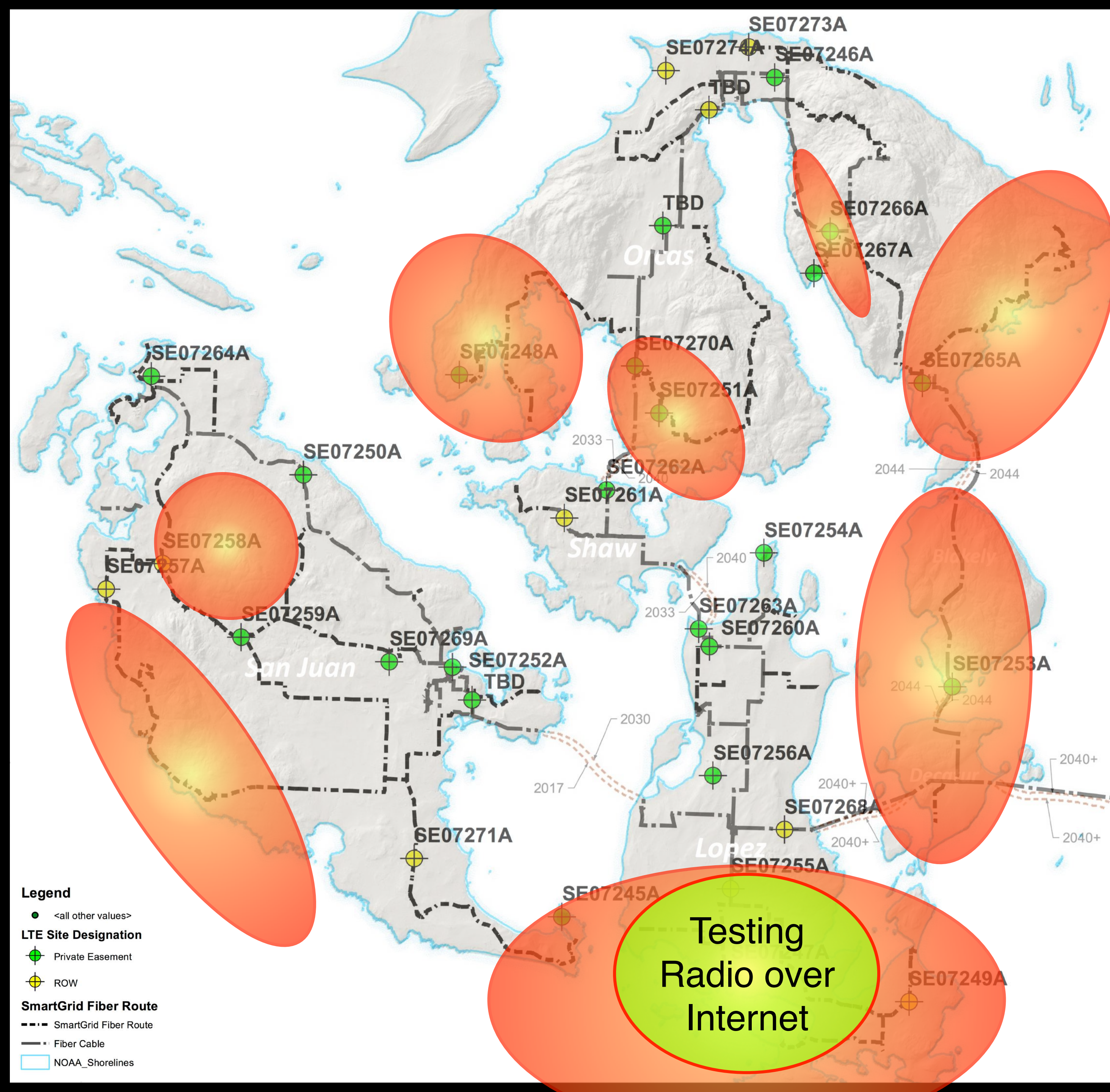
- “75% of cellular phone calls to 911 are problematic”

Dr. Bob Wilson, emergency medical services on-call doctor, Lopez Island

- Emergency services personnel use cell phones as backup for their VHF radios

- OPALCO is installing state of the art LTE wireless service on 38 OPALCO poles

- Most of county should have quality cellphone reception by end of 2017 via T-Mobile network on OPALCO fiber backbone

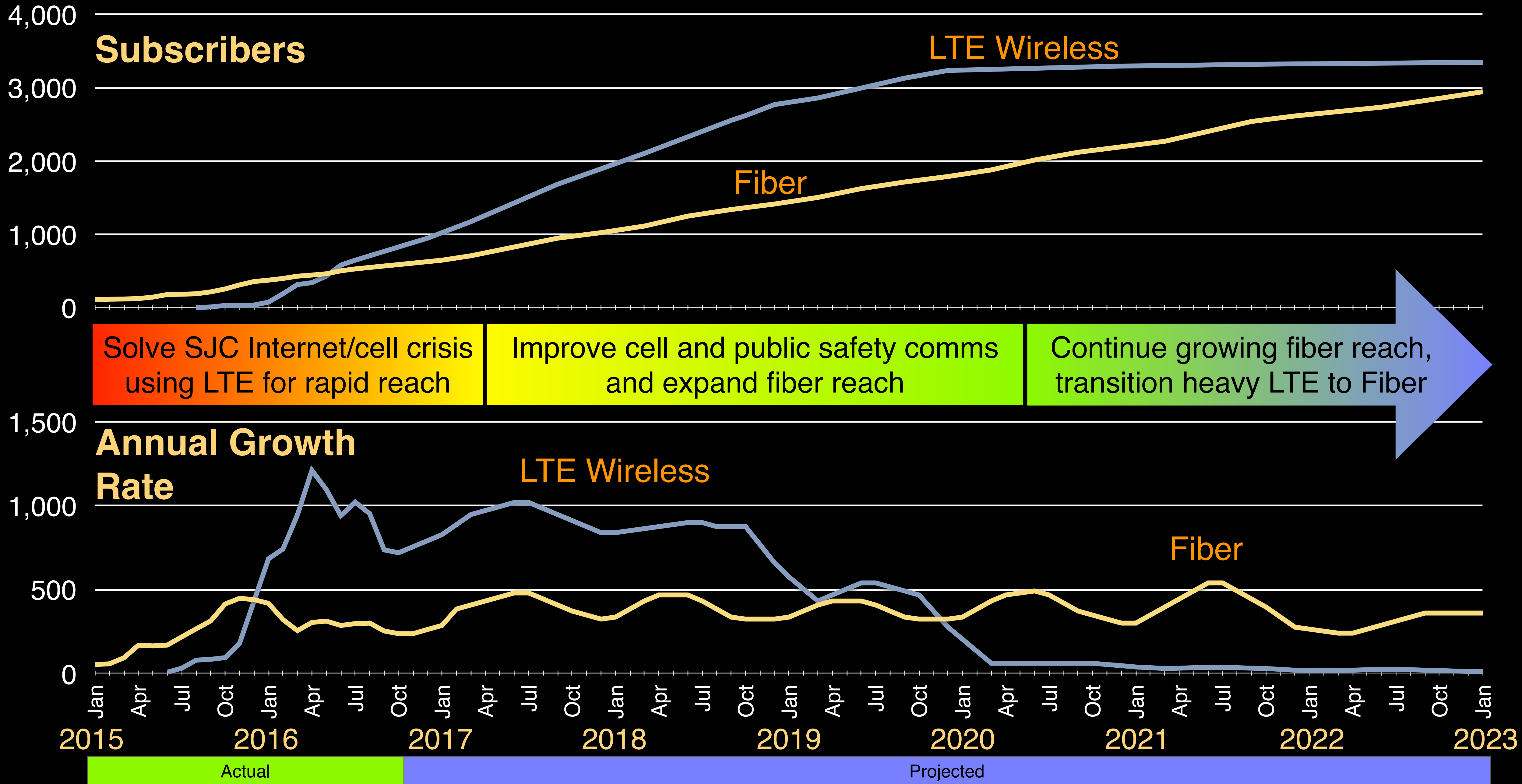




# Appendix

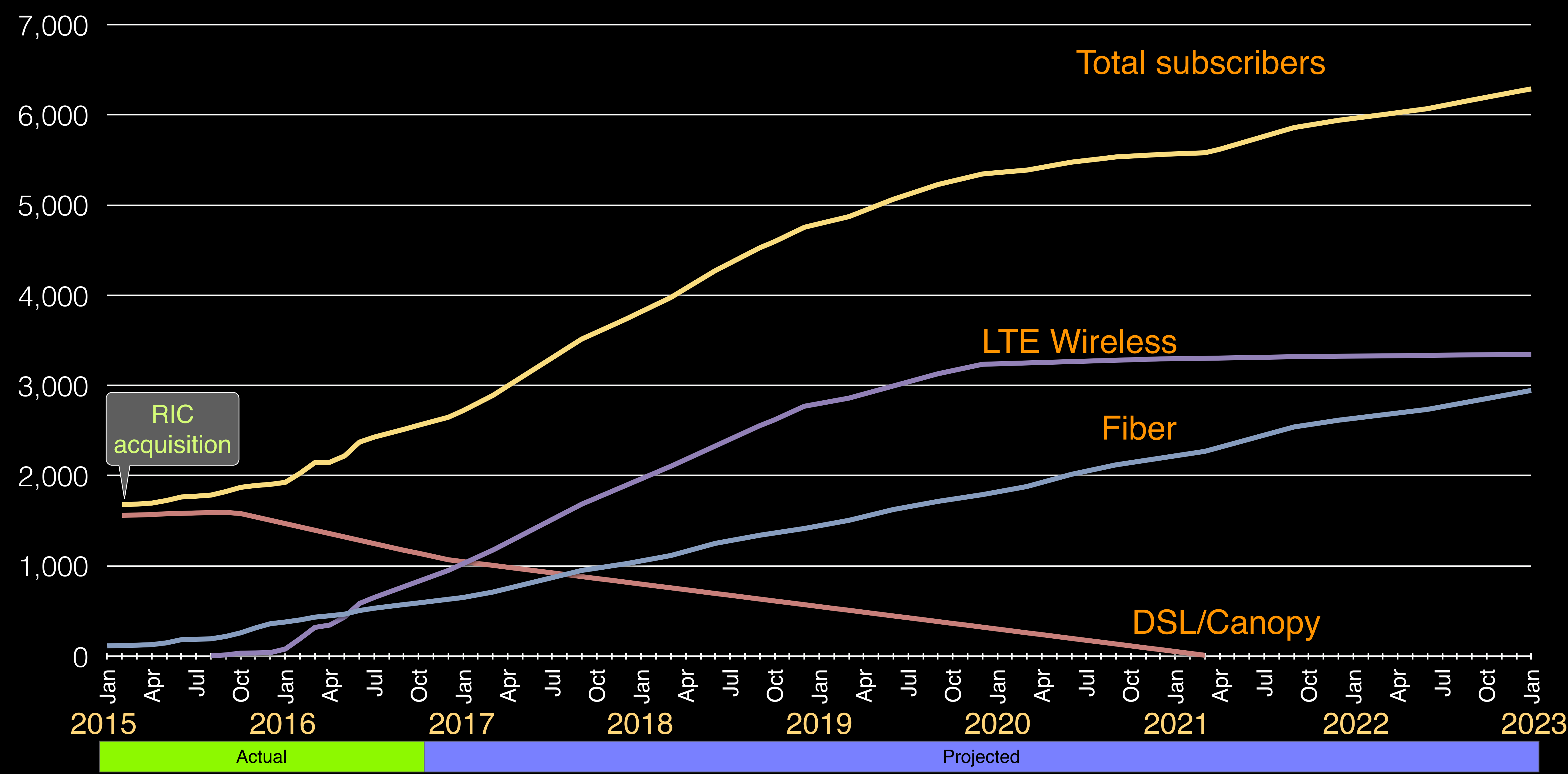
The following slides provide additional data related to rollout of fiber and wireless services in the county, as well as a strategic roadmap through 2021.

# Rock Island: Subscriber Growth





# Rock Island: Total Subscriber Growth



# Rock Island: Strategic Roadmap

	2017	2018	2019	2020	2021
Themes	meet burning demand with LTE wireless continue improving reliability	meet burning demand with LTE wireless continue improving reliability	transition high demand LTE wireless to fiber	transition high demand LTE wireless to fiber	Robust fiber and LTE network supporting 90% of county
US Avg. Fixed Speed	30 Mbps	36 Mbps	43 Mbps	52 Mbps	60 Mbps
Fiber (avg. speed)	focus on members near backbone 75 Mbps	focus on members near backbone 125 Mbps	grow footprint throughout county 250 Mbps	grow footprint throughout county 500 Mbps	grow footprint throughout county 750 Mbps
LTE (avg. 25+ Mbps)	rapid growth	slower growth	transition high demand to fiber	transition high demand to fiber	transition high demand to fiber
Infrastructure	complete LTE rollout add generators	continual improvement of resilience	continual improvement of resilience	continual improvement of resilience	continual improvement of resilience
Public Safety	first responders switching to RIC wireless voice and data network	increase mobile connectivity remote tele-medicine	increase mobile connectivity remote tele-medicine	increase mobile connectivity remote tele-medicine	increase mobile connectivity remote tele-medicine
Finance	financially sustainable	cashflow positive end loan draws	invest in expansion	invest in expansion	pay dividends to OPALCO, pay down RIC loans
CenturyLink	DSL problematic for many, obsolete for heavy users	DSL increasingly obsolete for average users	Not competitive for majority of subscribers	OBSOLETE	OBSOLETE