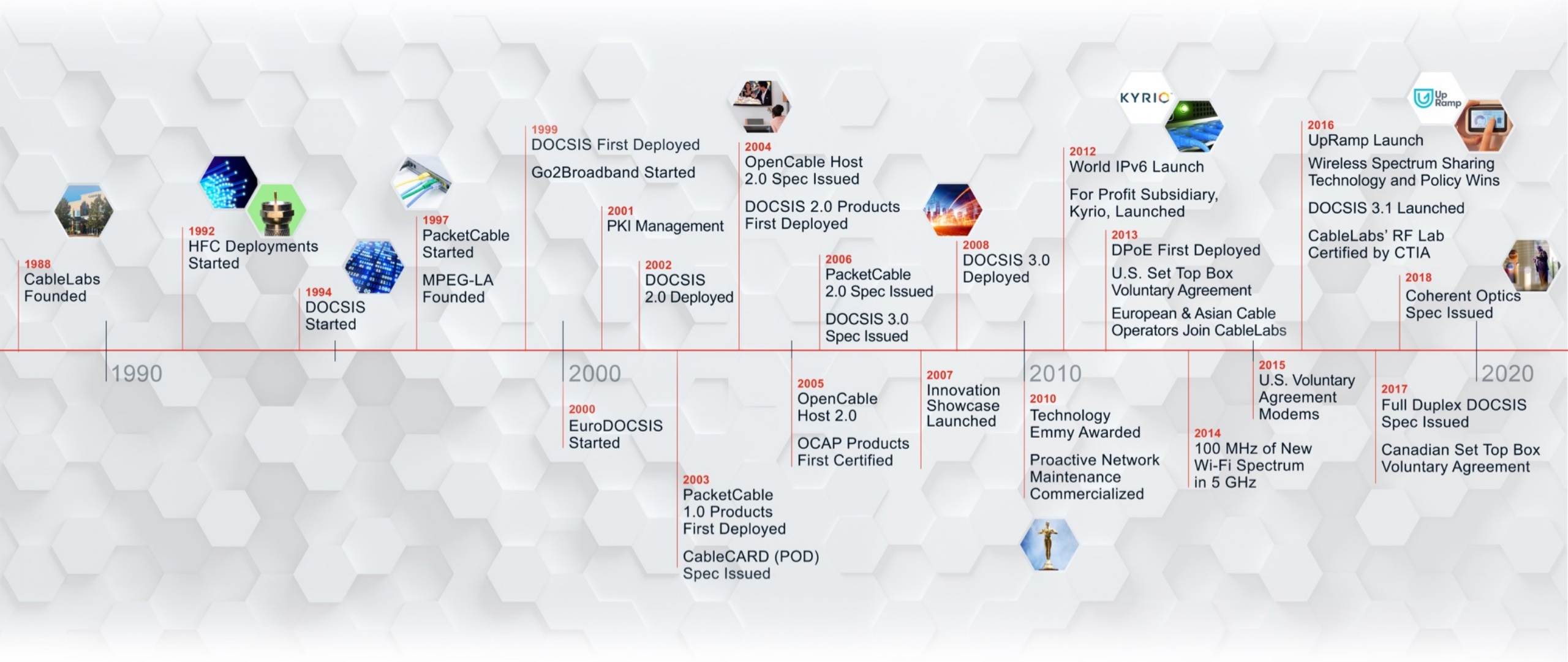


Innovation and Global Broadband

Chris Lammers | COO & SVP International Business Development
CableLabs

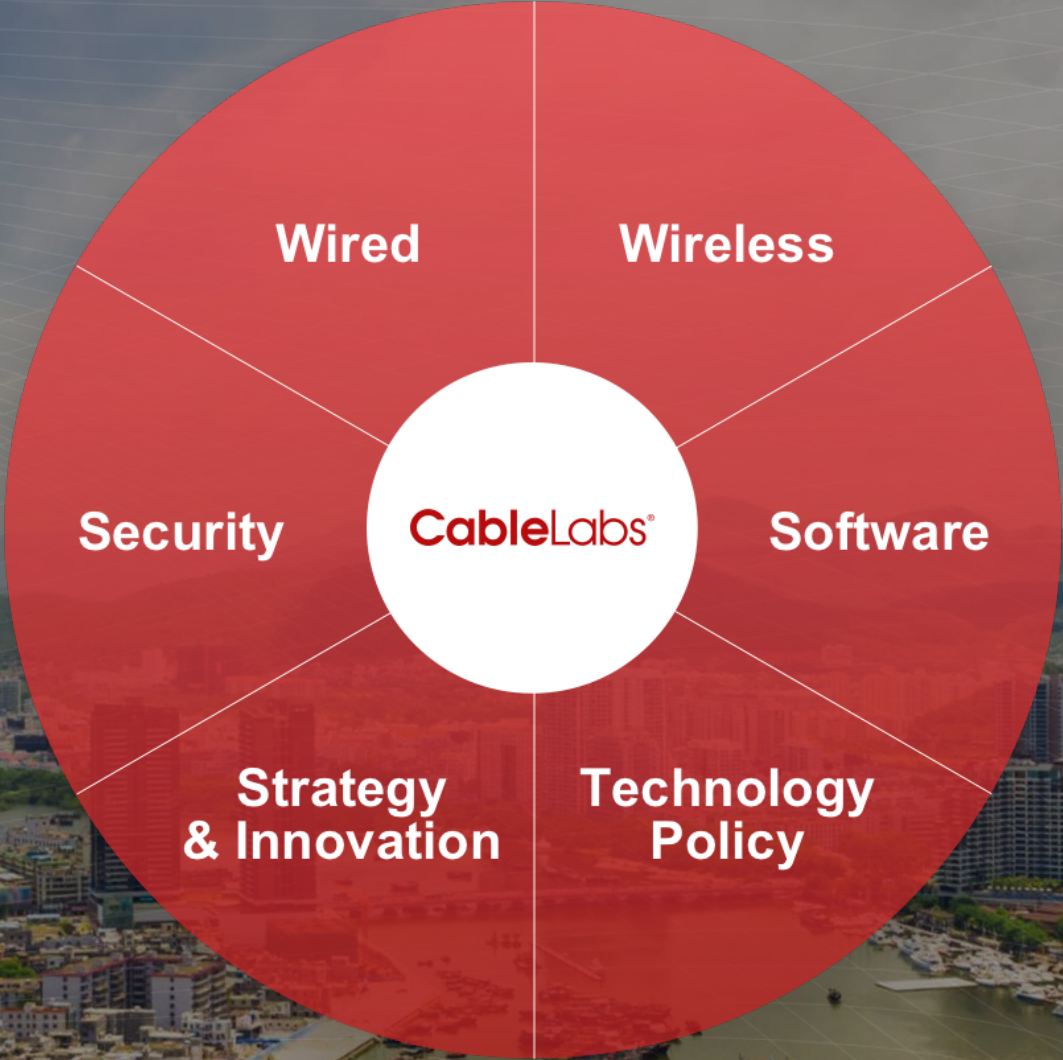
APOStech
July 5, 2017

A History of Innovation



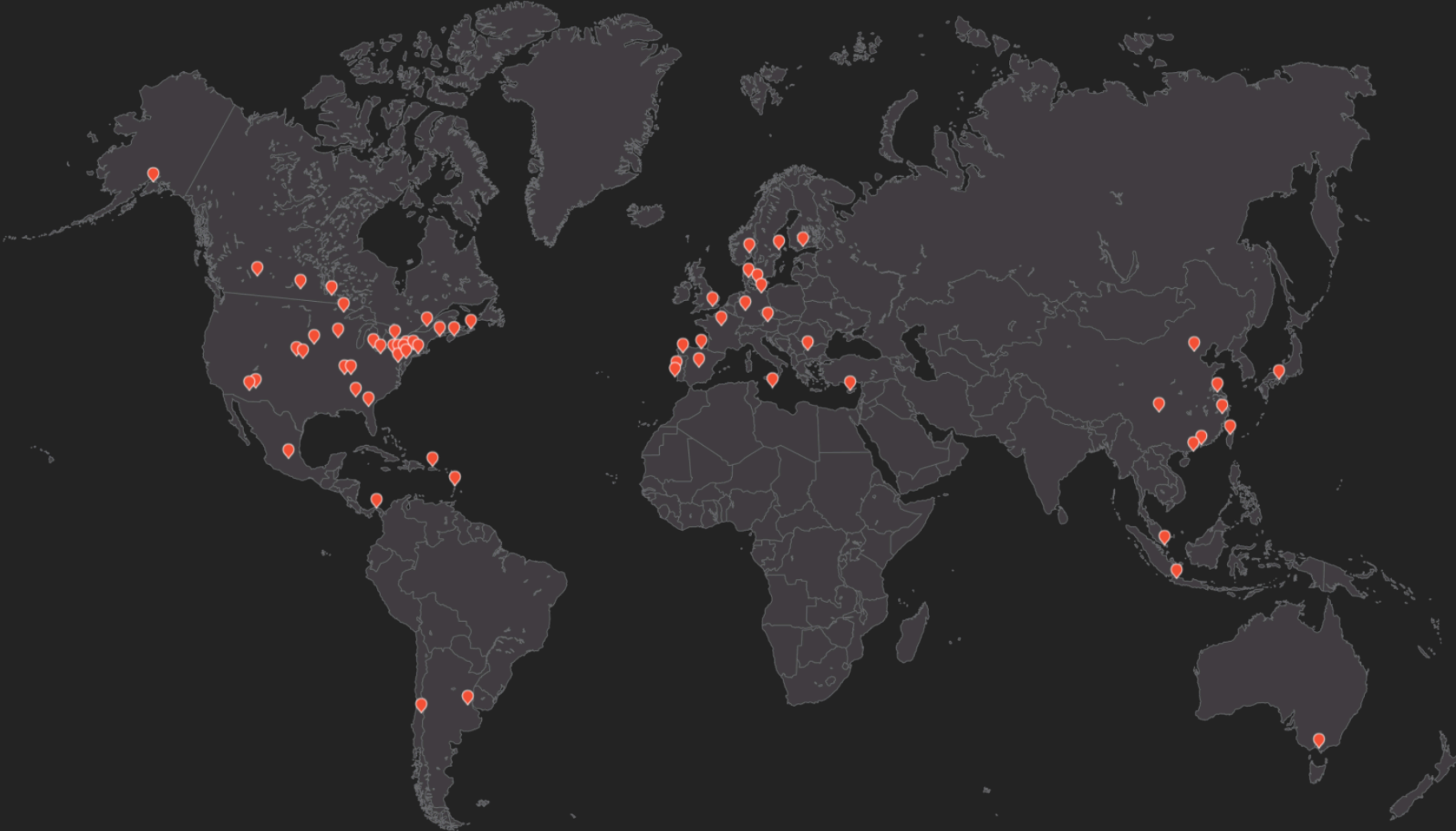
Our Focus

CableLabs®



59 Member MSOs Around the World

CableLabs®



Gigabit Competition in US

CableLabs®



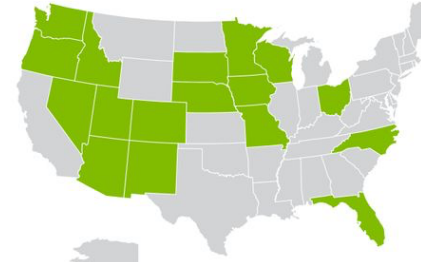
A different kind of Internet.



Google

CenturyLink 1 Gigabit Service Offerings:

CenturyLink offers gigabit service to residential and business customers in select locations* in 17 states, delivering symmetrical broadband speeds up to 1 gigabit per second through CenturyLink's ultra-fast fiber network.



CenturyLink

Google Fiber broadband subscribers are estimated at ~1M, ~1% of US broadband subscribers (MoffettNathanson, DSL Reports - June 19, 2017)

Gigabit Competition in US

CableLabs®

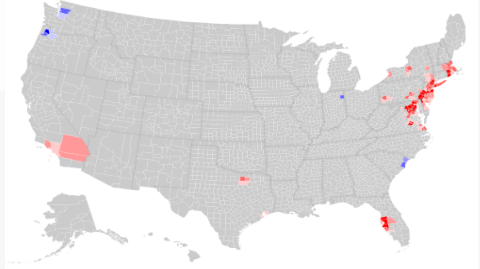


AT&T FIBER TO REACH AT LEAST 75 METROS

AT&T will offer a 1 gigabit connection* to more homes, apartments and small business locations. Ultra-fast internet speeds let you instantly access the latest online movies, music, games and more. It can also improve your experience when connecting to the cloud and videoconferencing, and gives you the speed you need to power all of your devices.

Check out the metro areas:

- Metros available now (52)**
 - Atlanta
 - Austin
 - Baltimore
 - Boston
 - Charlotte
 - Chicago
 - Columbus
 - Dallas
 - Denver
 - Fort Lauderdale
 - Fort Worth
 - Greater New Orleans
 - Houston
 - Indianapolis
 - Los Angeles
 - Memphis
 - Minneapolis
 - Mountain View
 - Nashville
 - New York
 - Phoenix
 - Portland
 - Raleigh-Durham
 - San Antonio
 - San Diego
 - Seattle
 - St. Louis
 - St. Paul
 - San Francisco
 - Washington
 - Wash. DC Metro
 - Wichita
 - Winnipeg
- Metros under way (23)**
 - Albuquerque
 - Boston
 - Charlotte, NC
 - Chicago
 - Dallas
 - Denver
 - Fort Worth
 - Greater New Orleans
 - Houston
 - Los Angeles
 - Memphis
 - Minneapolis
 - Mountain View
 - Nashville
 - New York
 - Phoenix
 - Portland
 - Raleigh-Durham
 - San Antonio
 - San Diego
 - Seattle
 - St. Louis
 - St. Paul
 - San Francisco
 - Washington
 - Wash. DC Metro
 - Wichita
 - Winnipeg



Fios Gigabit Connection

A high speed connection enables you to do so much more as you get a higher bandwidth.

[Check to see if Fios Gigabit Connection is available at your address](#)



Fios Gigabit Connection.

The most powerful internet at the most revolutionary price.



Verizon FiOS

Gigabit Competition in US

The Internet is now the NextNet.
Introducing residential service up to 10 Gigs!



NextNet™



ROCKET FIBER

Detroit-based Rocket Fiber announces 10-gigabit residential Internet service in Detroit and up to 100-gigabit Internet service for businesses on November 12, 2015 - #10GintheD



fibrant
INTERNET
UP TO 10 G

Catawba College is the first to take advantage of Fibrant's 10 gigabits per second Internet connection!

"The future is all about rich immersive digital media and being able to communicate and collaborate with others in real-time regardless of where people are in time and space.

It is exciting that a small college like Catawba can now experiment with high-speed technology we believed to be years away.

To put the speed change in perspective, having 10 Gbps gives us the potential to be 10 times faster on campus."

- Joanna Jasper,
Catawba College CIO

Catawba College - Salisbury, NC

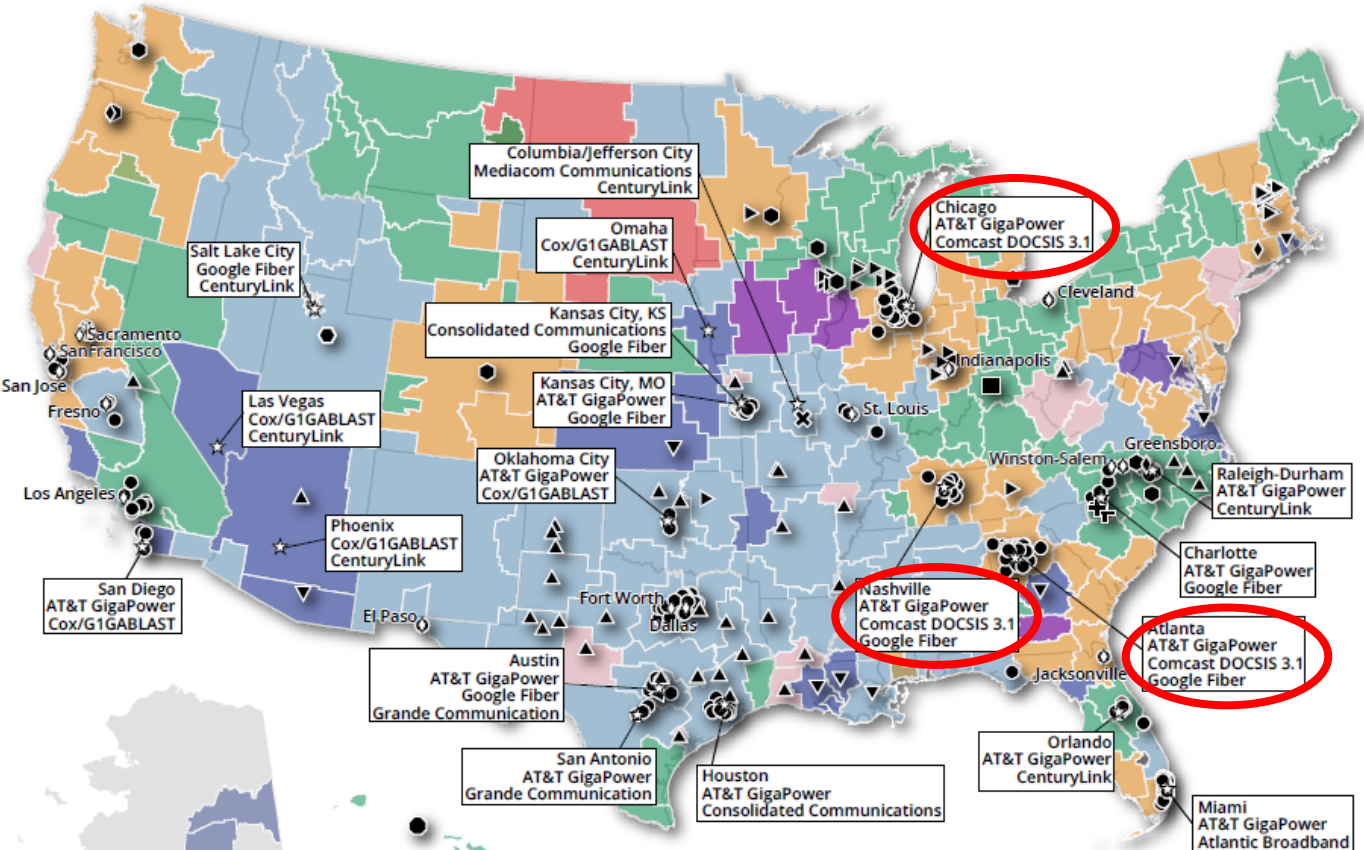


MSOs Deploying DOCSIS 3.0/3.1 for Gigabit Services

CableLabs®



Gigabit Competition in US



- Providers**
- AT&T GigaPower
 - ⊕ Comporium
 - Google Fiber
 - △ Suddenlink
 - CenturyLink
 - ⊗ Consolidated Communications
 - ◀ Grande Communication
 - Hawaiian Telcom
 - ◻ Cincinnati Bell
 - ▽ Cox/G1GABLAST
 - Comcast DOCSIS 3.1
 - ◇ Frontier Communications
 - ⊞ Mediacom Communications
- Top operators by DMA Q1 2016**
- AT&T Inc.
 - Charter Communications Inc.
 - General Communication Inc.
 - Midcontinent Communications
 - Alice US
 - Comcast Corporation
 - Mediacom Communications Corp.
 - TDS
 - Cable One Inc.
 - Cox Communications Inc.
 - Mid-Rivers Telephone Coop
 - Verizon Communications Inc.

As of August 2016.
 Hawaiian Telcom 1 Gbps service available statewide.
 Charter footprint includes Time Warner Cable and Bright House.
 Alice US footprint includes Cablevision and Suddenlink.
 AT&T footprint includes DIRECTV.
 ©2016 SNL Kagan, an offering of S&P Global Market Intelligence, estimates. All rights reserved.
 Map Credit: Alip Artates

◇ AT&T Market
 ☆ Cities with multiple providers

2016 Broadband Growth

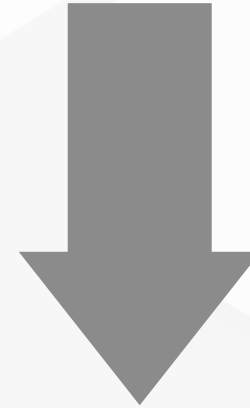
CableLabs®

Cable



+3.3M

Telco



-0.6M

Cable has 63% of the broadband subscribers in the US market

HFC networks remain highly flexible for future growth.

DOCSIS 3.0



Downstream
1 Gbps



Upstream
100 Mbps



DOCSIS 3.1

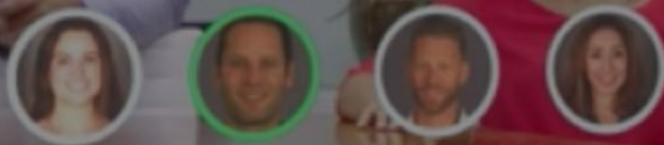
Downstream
10 Gbps

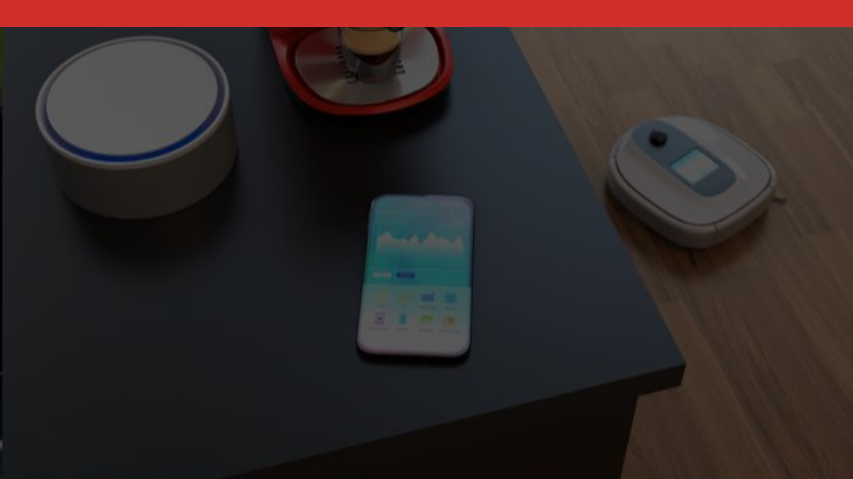
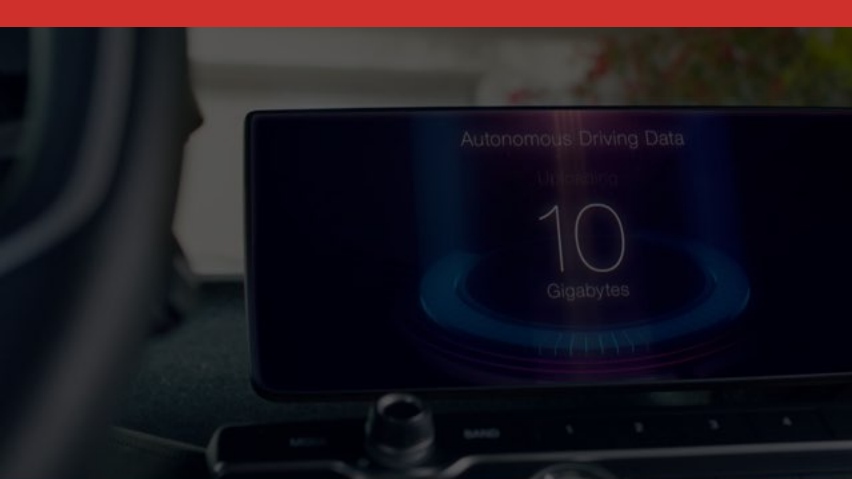
Upstream
1 Gbps

Full Duplex DOCSIS

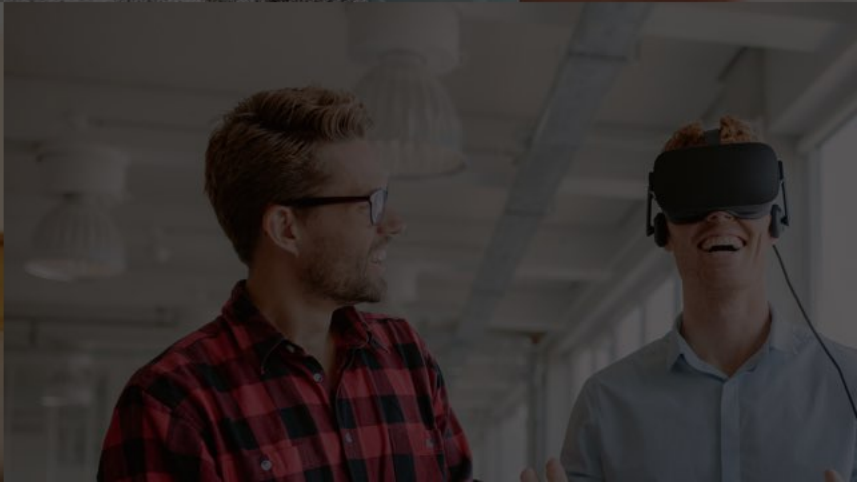
Downstream
10 Gbps

Upstream
10 Gbps



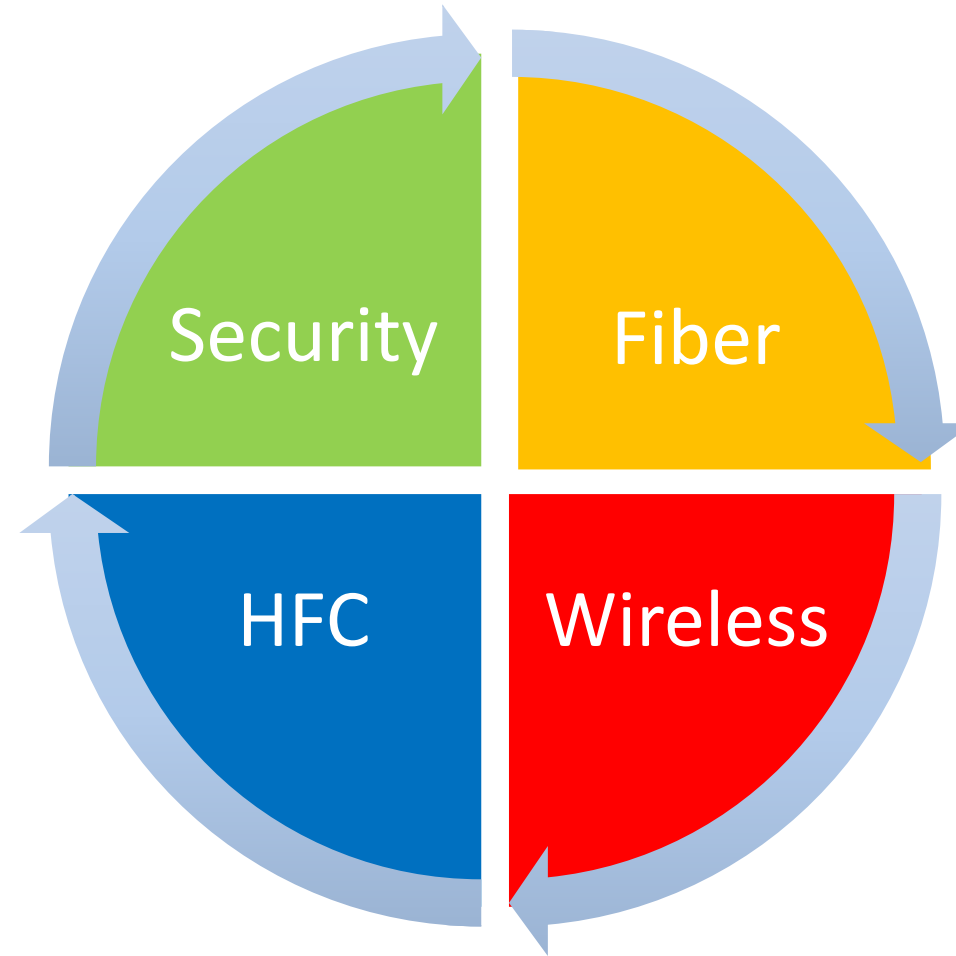


But CableLabs is not just about DOCSIS . . .



**It's also about fiber – and wireless –
and security . . .**

CableLabs®



. . . and more . . .



• **Research & Development**



• **Innovation**



• **Strategy & Policy**



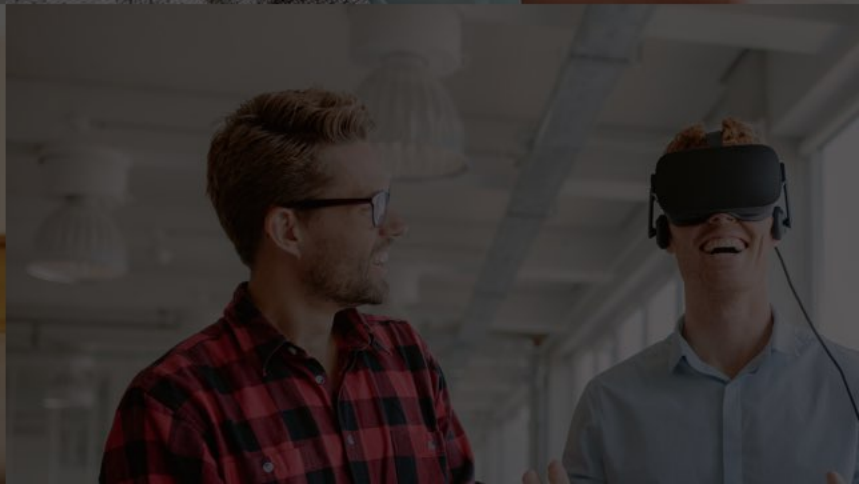
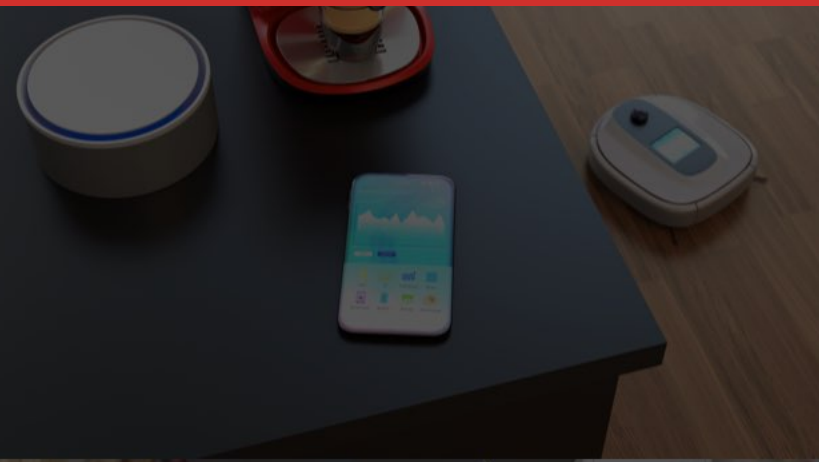
• **Kyrio/UpRamp**



• **International Support**

CableLabs®

Our technologies support the services you want to deliver.



CableLabs technologies that make a difference

CableLabs®



Respond to consumer bandwidth demands



Reduce cost of service delivery



Improve quality of user experience



Support business services



Reduce energy consumption for a green solution

CableLabs innovates the future of broadband communication.

Chris Lammers | COO and SVP International Business Development

c.lammers@cablelabs.com

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