



Options and Opportunities

Deploying Municipal Broadband Networks



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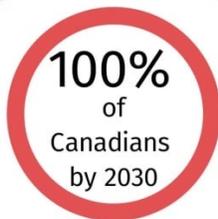
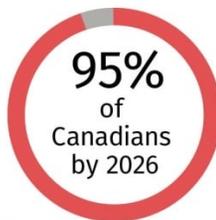
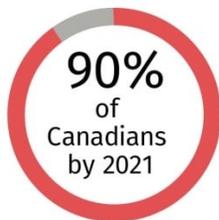
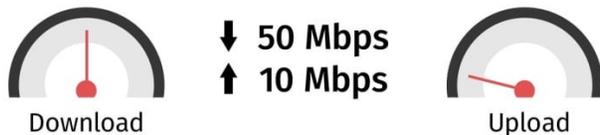
CAMA Professional Development - 50th Anniversary Webinar Series

The Canadian Digital Divide

Government of Canada broadband commitment

\$1.7 billion

committed in budget 2019 toward new broadband infrastructure for all Canadians



Median internet speeds in Canada, August 2020

Rural:



↓ 5.96 Mbps
↑ 1.49 Mbps



Urban:



↓ 63.72 Mbps
↑ 8.18 Mbps



CBC NEWS

Source: CIRA Internet Performance Test

According to the CRTC, nearly 86 per cent of households overall have that level of service currently, but in rural areas only 40 per cent do. In First Nation communities, it's estimated that just 30 per cent of households have internet connections with the recommended speed.

CBC NEWS

Source: CIRA Internet Performance Test

Ensure the Socio-Economic Future of Your Community

Broadband services are essential to preserve the lifestyle your community cherishes

Your community needs you

With access to critical broadband services, you can ensure the socio-economic future of your community.



Attract new companies

Broadband is a key decision factor for startups and companies that are relocating.



Enable telecommuting

The number of work-at-home employees has grown 103% since 2005.



Create new, high-paying jobs

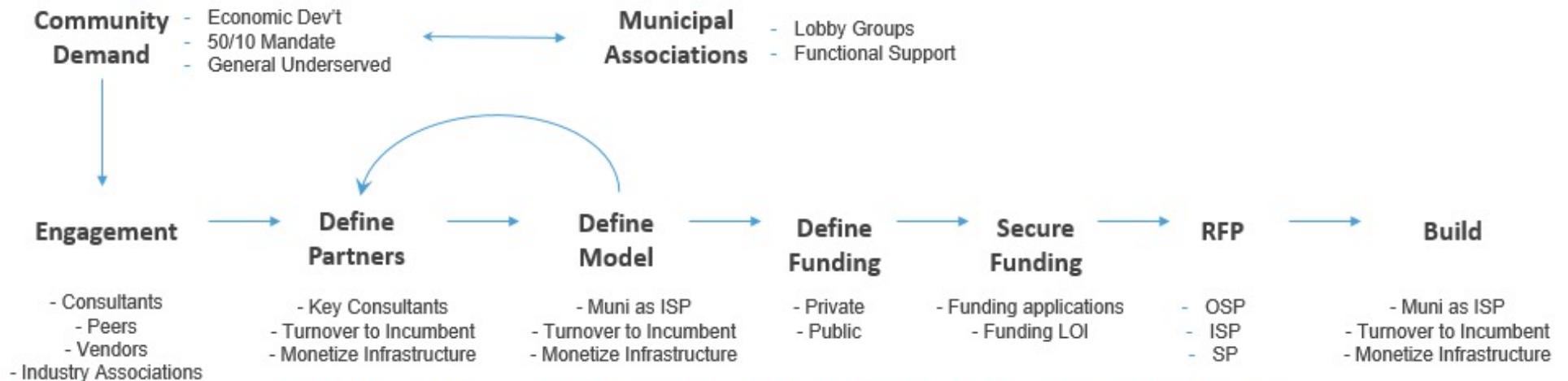
Broadband helps to create additional, high-paying job opportunities in the community.



Increase home values

Access to fiber adds 3.1% to the value of a home.

Addressing the challenge – High Level Process



Broadband Considerations

- **What operating model makes sense for you?**
 - Build and operate yourself as a full Internet Service Provider
 - Public/Private Partnership (partner with an existing Service Provider)
 - Build an “Open Access” infrastructure and let 3rd party ISPs offer services
 - A Hybrid approach

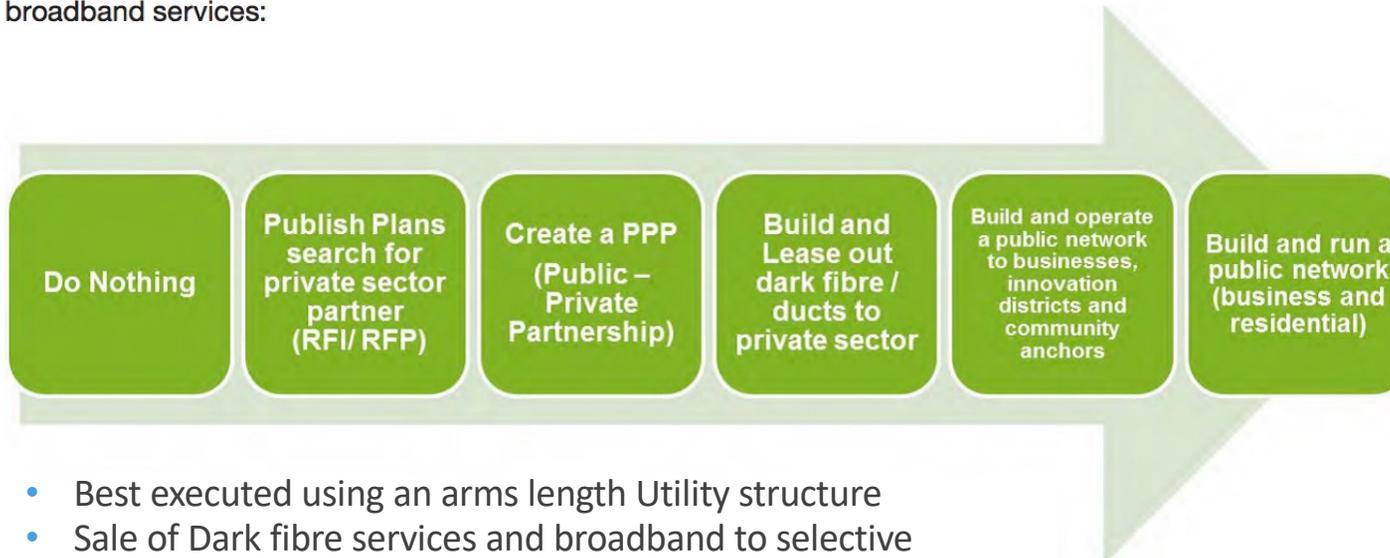
- **What technology makes the most sense?**
 - Wireline – HFC/Coax, DSL
 - Fixed Wireless
 - Fibre Optics

- **Who are the Ecosystem Partners you will likely involve?**

Build and Operate Example - Town of Canmore / IBI Group

Best Practices

The Town of Canmore has various options for playing a role in the future of the Town's broadband services:



- Best executed using an arms length Utility structure
- Sale of Dark fibre services and broadband to selective business/residential
- Move from current state of 16/7 Mbps to 100/20 to 1000/1000 (Gig)
- Construct fiber infrastructure to connect town facilities

Broadband Strategic Plan – Town of Canmore

<https://canmore.ca/documents/2357-broadband-strategic-plan>

tbaytel

CochraneTel
YOU'RE AT HOME

Bruce Telecom
Connecting our Community

CityWest

Partner With A Service Provider – Public/Private



“Southwestern Integrated Fibre Technology (SWIFT) is a non-profit regional broadband project initiated by the Western Ontario Wardens’ Caucus to subsidize the construction of high-speed broadband networks across Southwestern Ontario.”



EORN

EASTERN ONTARIO
REGIONAL NETWORK

From 2010 to 2015, EORN built a \$175-million network that improved broadband access to about 90% of Eastern Ontario. The innovative public-private partnership was funded by the federal, provincial and municipal governments, and private sector service providers.



[Home](#) / [Projects](#) / [EORN Gig Project](#)

The EORN Gig Project

AAA

Partner With A Service Provider – Public/Private



Internet for Nova Scotia Initiative

“Connection matters. Delivering Internet for Nova Scotians is a priority and we’re making progress. As of January 2021, we have announced projects to connect more than 87,000 homes and businesses in rural Nova Scotia. This is good progress, but we’re not done yet. We haven’t forgotten about the people and places that remain underserved, and we continue to work to reach as many of them as we possibly can.”



Canada–Quebec Operation High Speed

“In the context of the global COVID-19 pandemic, when access to quality Internet service has become even more critical, it is imperative to think outside the box in order to accelerate the implementation of this service. By working with ISPs, establishing a deadline and penalties for these new contracts, and covering 100 per cent of the homes in the project area, we will ensure that the operation is completed quickly.”



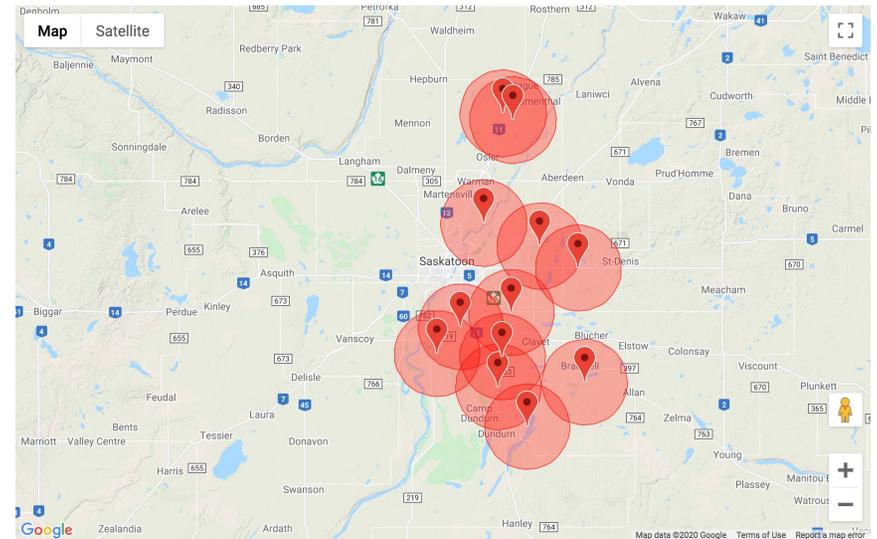
Other Funding Examples

- **Universal Broadband Fund - \$2.75B**
 - Rapid Response Stream (RRS)
- **Improving Connectivity for Ontario (ICON) - \$1B**

Partner with a Service Provider



Redbird Communications was established in 2008 with the goal of providing enhanced broadband internet services to rural communities. We believe that everyone should have access to the same level of service, no matter where you live, which is why we invest in technologies and expertise to ensure we can deliver superior products and service to all our customers.



RESIDENTIAL • BUSINESS • COVERAGE • SUPPORT

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Wireless

Fibre Optic

”Open Access”

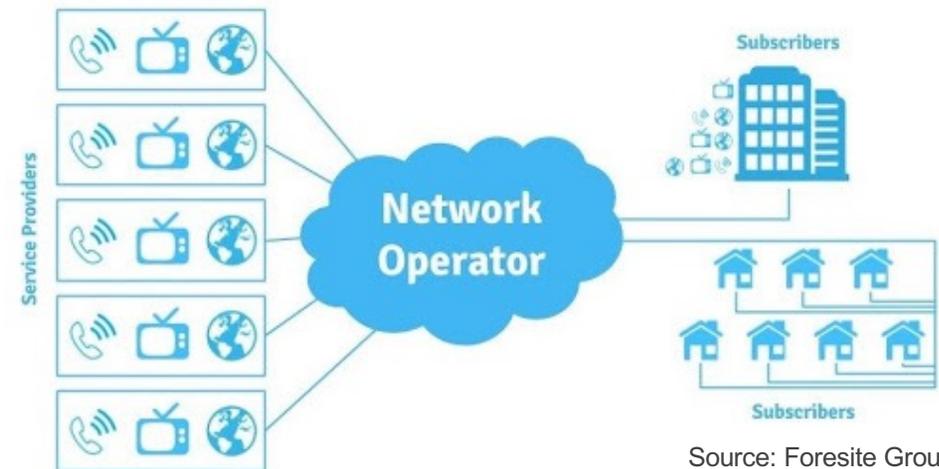


With the objective to efficiently support social and economic development and greater autonomy of the region, the Eeyou Communications Network has developed a unique business and operational model suited to the northern characteristics and needs of the populations, businesses and public administrations.

The Eeyou Communications Network is a northern telecommunications highway **accessible to all**, interconnecting the regions and at the best possible prices while providing access to services and modern contents similar to large urban areas.

Services-based

Or Parties
3rd party ^ delivers the Service layer



Facilities-based

Community Owns and Operates the Broadband infrastructure

Source: Foresite Group

Ecosystem Partners

Consulting Feasibility and Planning



Outside Plant Design/Install



Network Engineering



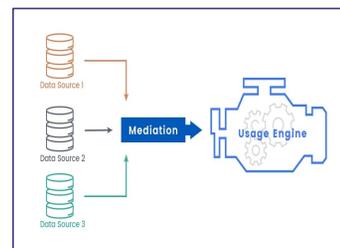
Internet Service Provider



Technology Partner



OSS/Mediation Partners



Funding Provider or Partner

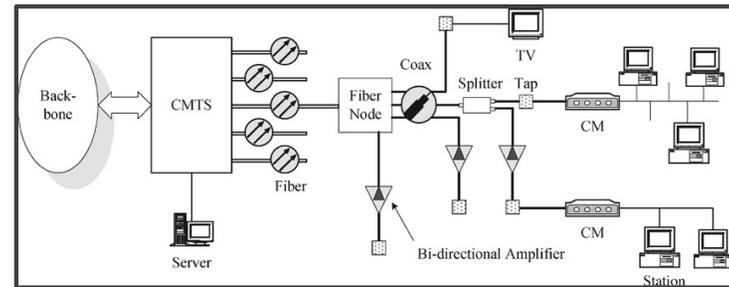


Technology Options

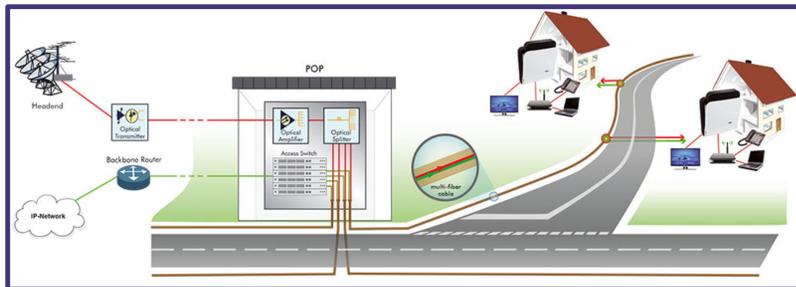
Fixed Wireless



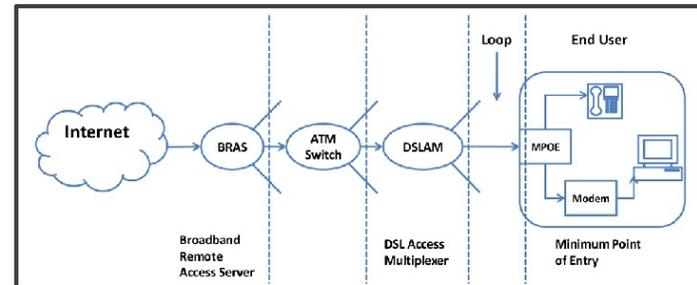
HFC – Hybrid-Fibre Coax - “COAX”



Fibre To The Home

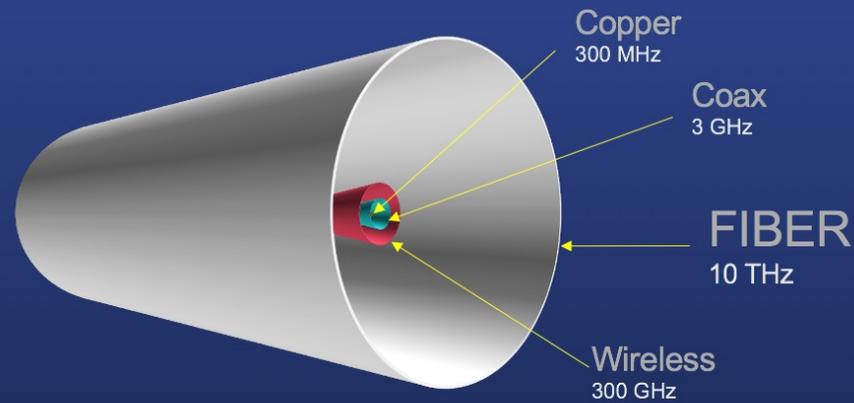


DSL – Digital Subscriber Line



The Physics of Broadband

Fibre has **over 300x** the capacity of Wireless and **over 3,000** the capacity of Coax



Is the 50/10 Universal Service Objective Enough?

 June 1, 2021  6 days ago 

50/10 may already be outdated, according to feds' recent rural roundtable

“The 50/10 standard will soon be eclipsed by the need for additional speed and capacity, if it hasn’t been already,” the meeting notes said, citing stakeholders. “50/10 isn’t always sufficient to support multiple activities during lockdown.”

“Wireless has limits; fibre does not”

“The trade-off between fibre and wireless tends to change over time and depends on available capital, local priorities, and the relative importance of off-balance benefits. **A common misconception is that wireless systems are less expensive. While they may be so over a 3 to 5 year period, their ability to expand is limited and, over a ten year timeframe, can prove to be even more expensive than fibre networks.**”

“**The issue is that client’s usage and the bandwidth required to run increasingly sophisticated applications increases over time – and not by a little.** As mean usage is increasing by 21%/yr, a premise that’s happily using a 5 Mb/s connection today will likely require 30 Mb/s within 10 years. Of course, if the family expands from two parents to include 3 children, the bandwidth requirements will be 3 or 4 times that. When the overall cost of scaling wireless systems to meet that demand is compared to the higher upfront cost of deploying fibre in the first place, fibre will win almost every time.”

Dobson, C. (2016). Regional Broadband Investigation: Needs, Opportunities, and Approaches at the Local Level and for the Calgary Region - Landscape Issues (Rep). Sherwood Park, AB: Taylor Warwick Consulting Ltd.

Why Fiber?

- **In service since the 1970s**
- **Widely deployed by a growing number of Service Providers**
- **Massive bandwidth capability**
- **Future Proof and Scalable**
- **Reliable / Predictive**
- **Secure**
- **Lower OPEX**
- **Global Standards-based**

What bandwidth is needed to stream?

Source: Parks Associates, 360 View: Digital Media and Connected Consumers



CORONAVIRUS | News

Netflix reduces video quality in Canada to lower internet bandwidth use

Netflix

- 3 Mbps SD
- 5 Mbps HD
- 25 Mbps 4K UHD

Disney+

- 5 Mbps HD
- 25 Mbps 4K UHD

YouTube TV

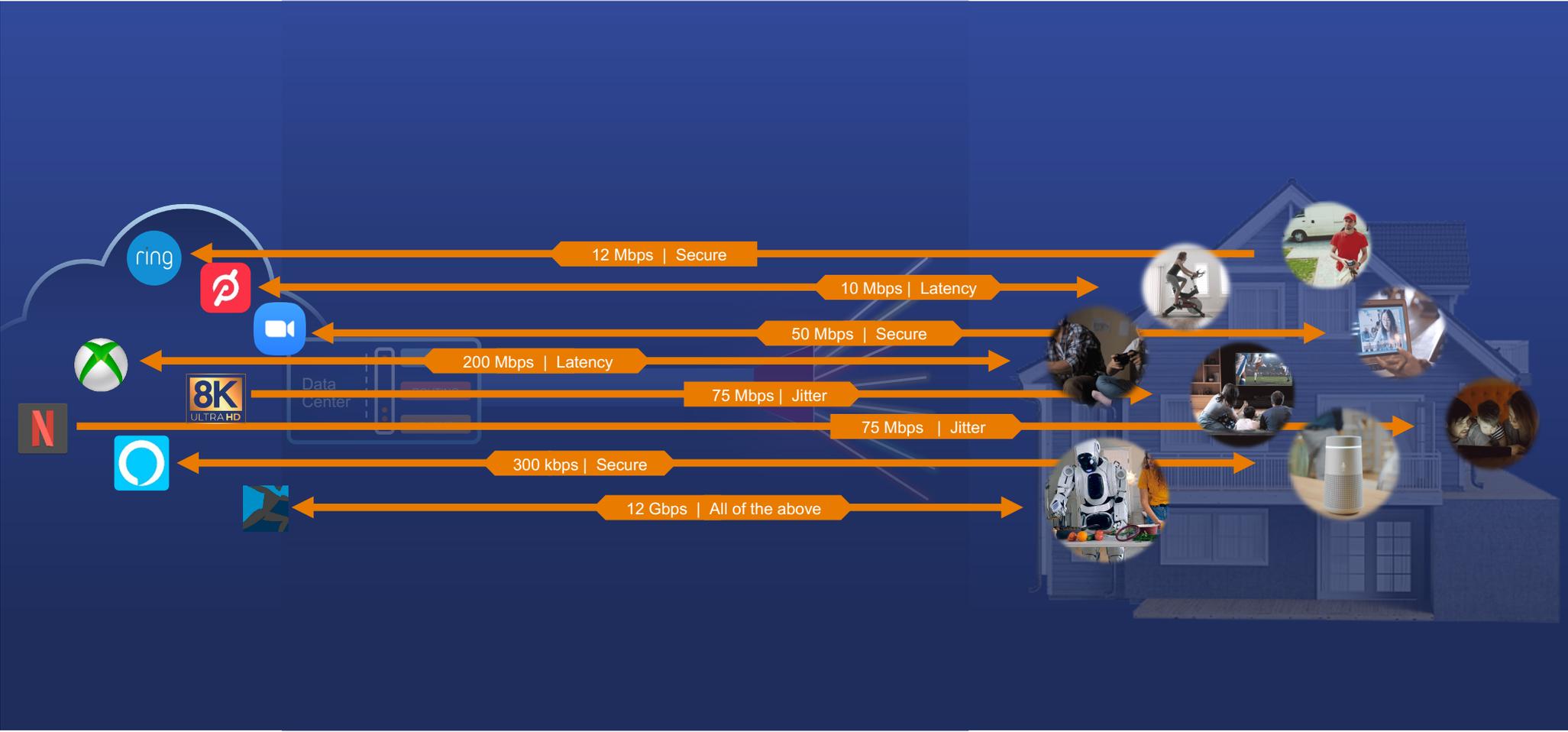
- 3 Mbps SD
- 7 Mbps HD

Amazon Prime

- 15 Mbps 4k UHD

Stadia

- 35 Mbps 4k UHD



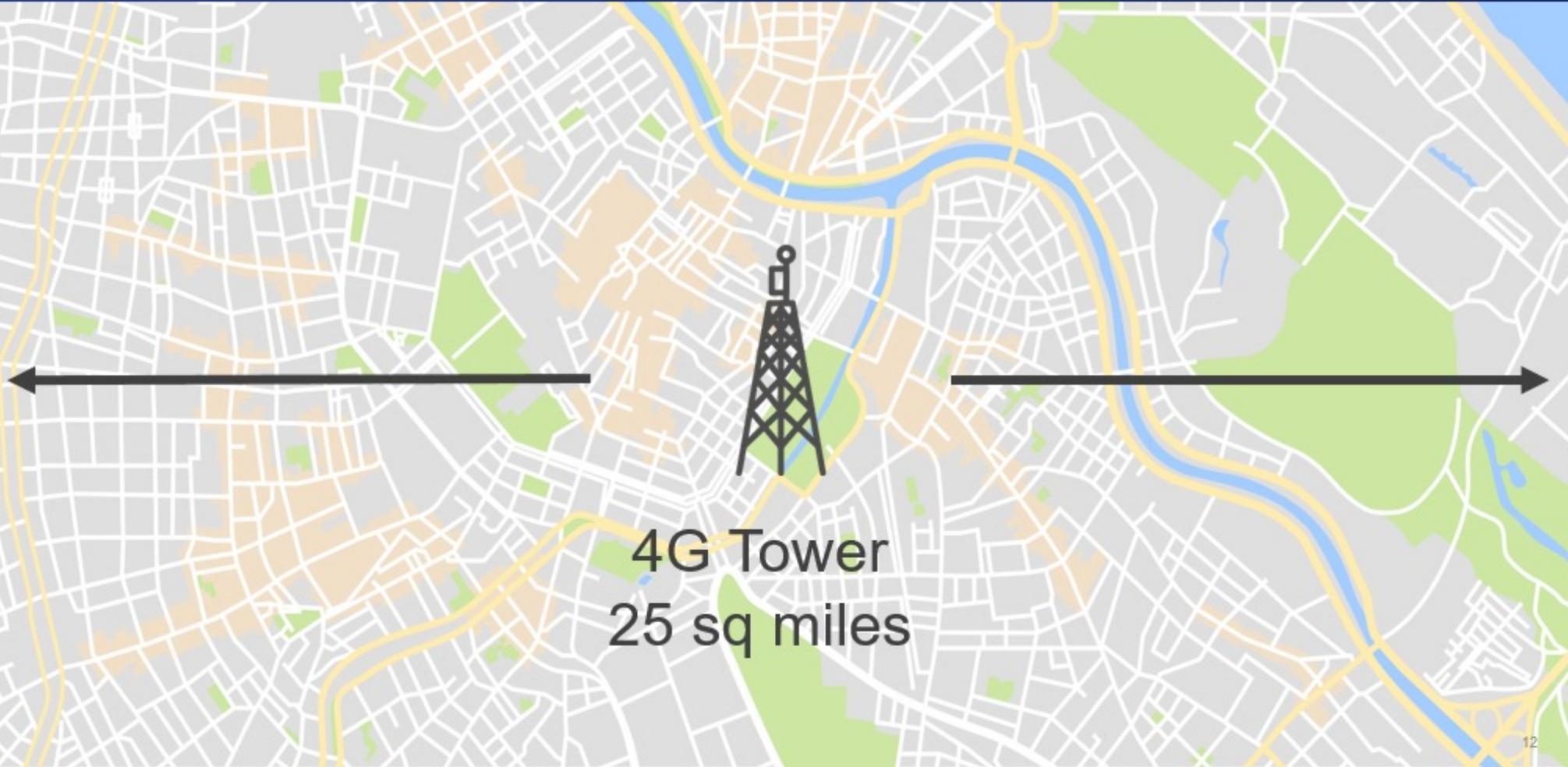
Smart City / Smart Grid Applications



Examples

- Residential/Business Broadband
- Community Wi-Fi
- **5G Wireless**
- Traffic Management
- Lighting Control
- Video Surveillance
- Distributed Energy
- Access Control
- Healthcare
- Parking Management
- Autonomous Cars

How 5G Puts More Demands on the Network..



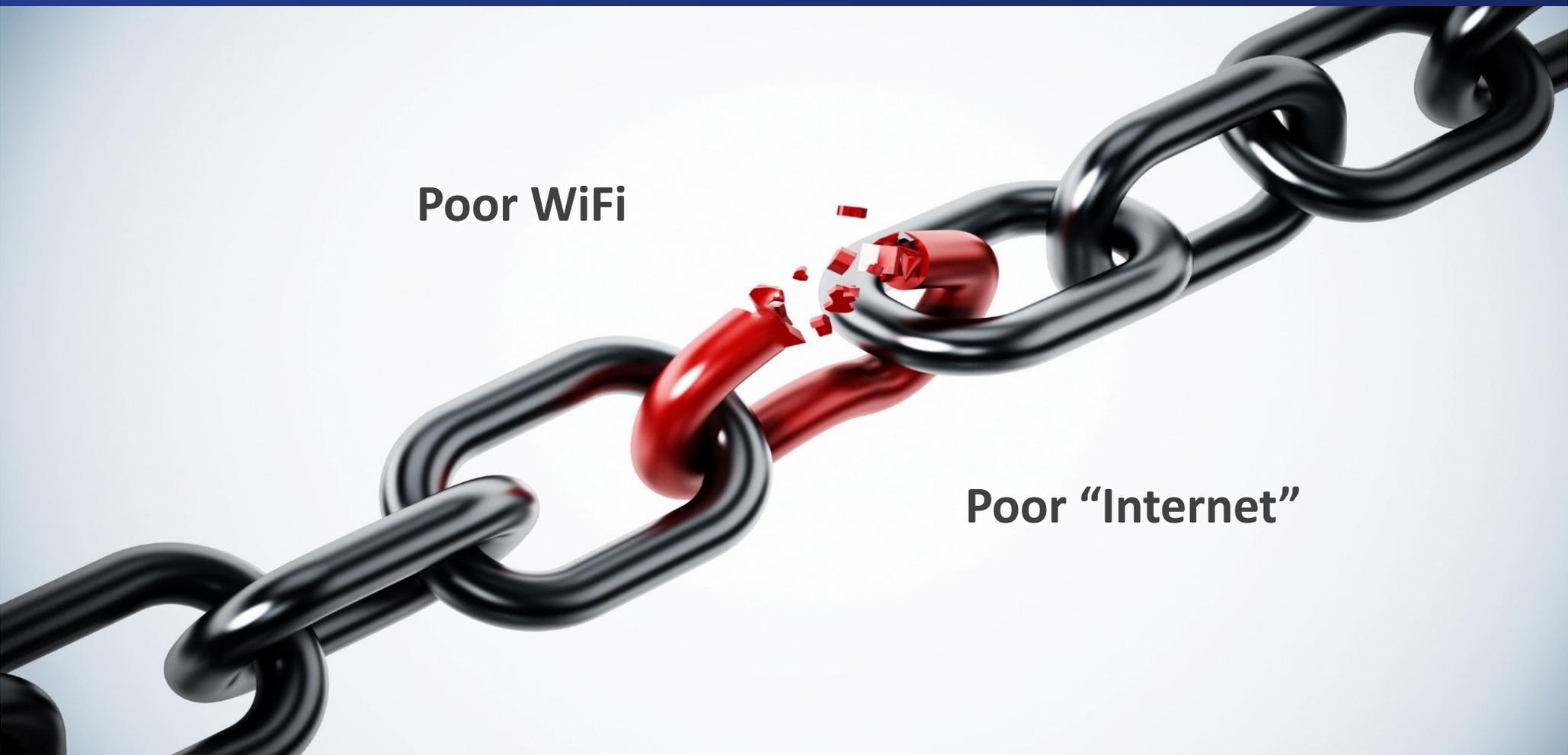
5G – Cell Densification

How does Fibre affect the community as a whole?

People Assume WiFi = Internet

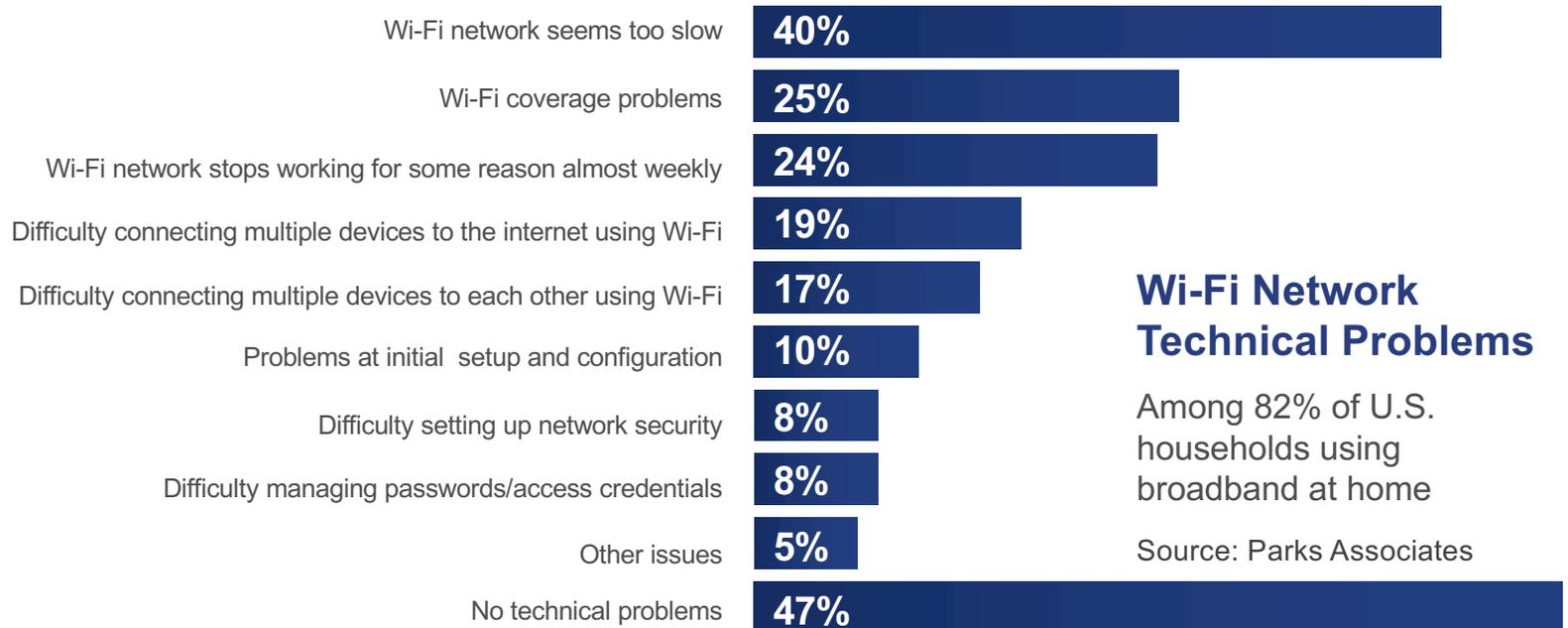
Poor WiFi

Poor "Internet"

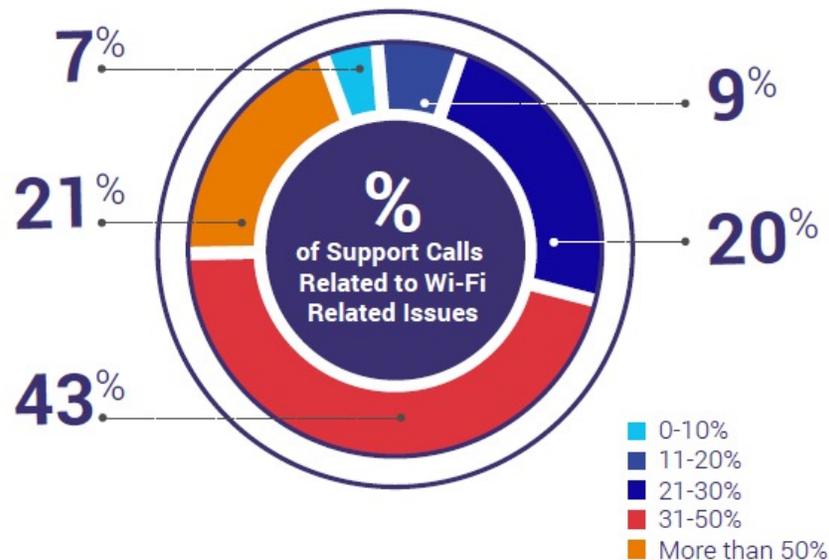


Wi-Fi is the foundation of the connected home; but also a source of consumer frustration

More than 50% of subscribers report having Wi-Fi issues



Many Support Calls Related to Wi-Fi Issues



Q: What percentage of your help desk calls are driven by Wi-Fi related issues?

Source: Poll of 104 service providers during two recent Calix webinars.

64% of service providers surveyed reported that Wi-Fi issues are driving between **31-100%** of their **Help Desk calls**

Where does Calix fit in?

Ecosystem Partners

Consulting
Feasibility and Planning



Outside Plant
Design/Install



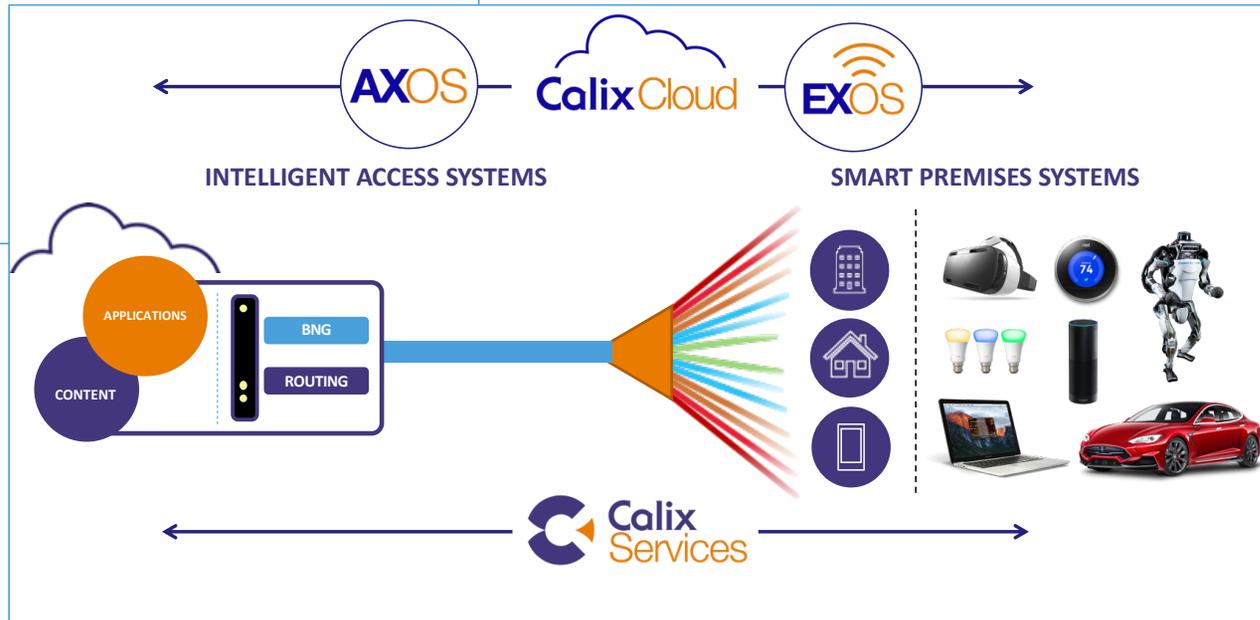
Network
Engineering



Internet
Service Provider



Technology
Partner



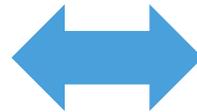
OUR FOCUS

Two Customer Challenges:

- Build next generation networks
- Make the promise of an experience-based smart, connected home a reality

Calix in Canada

Over 100 CSP Customers



Rural and Remote Focus



40+ Municipalities and growing!



Calix has helped over 180 communities like yours deliver high-speed fiber broadband. The need is greater now, more than ever. **We can help.**

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Calix is the leading provider of the cloud, software platforms, systems and services required to deliver the unified access network and smart premises of tomorrow. We enable the winning Communication Service Providers to turn relentless subscriber demand into new revenue streams by deploying software defined access networks and smart premises platforms to connect everyone and everything.