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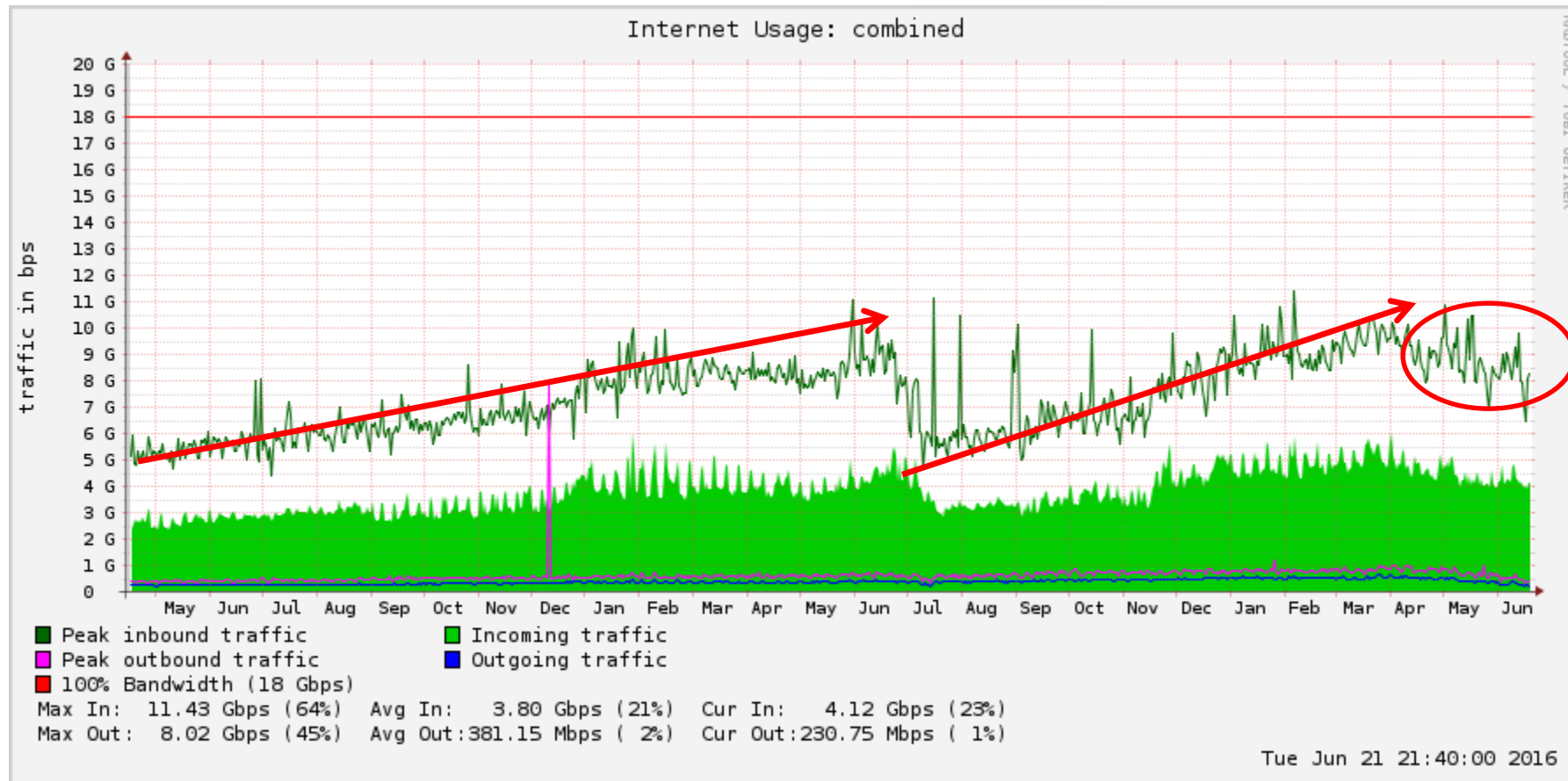
The Evolution of Broadband
Technologies, Speeds and
Capacity Challenges in
Rural and Remote Areas



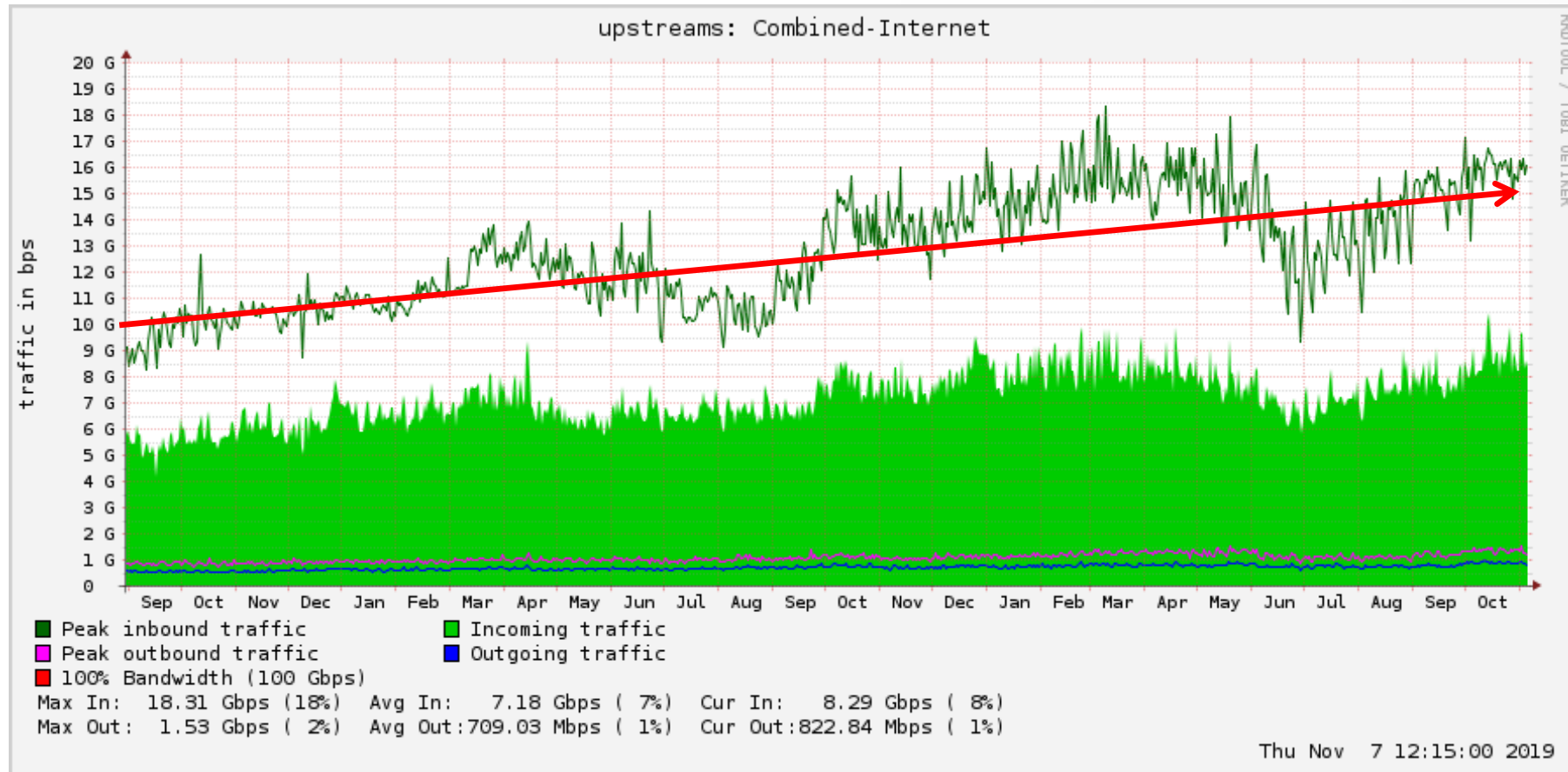
Building Better Broadband for Communities of all sizes

2019

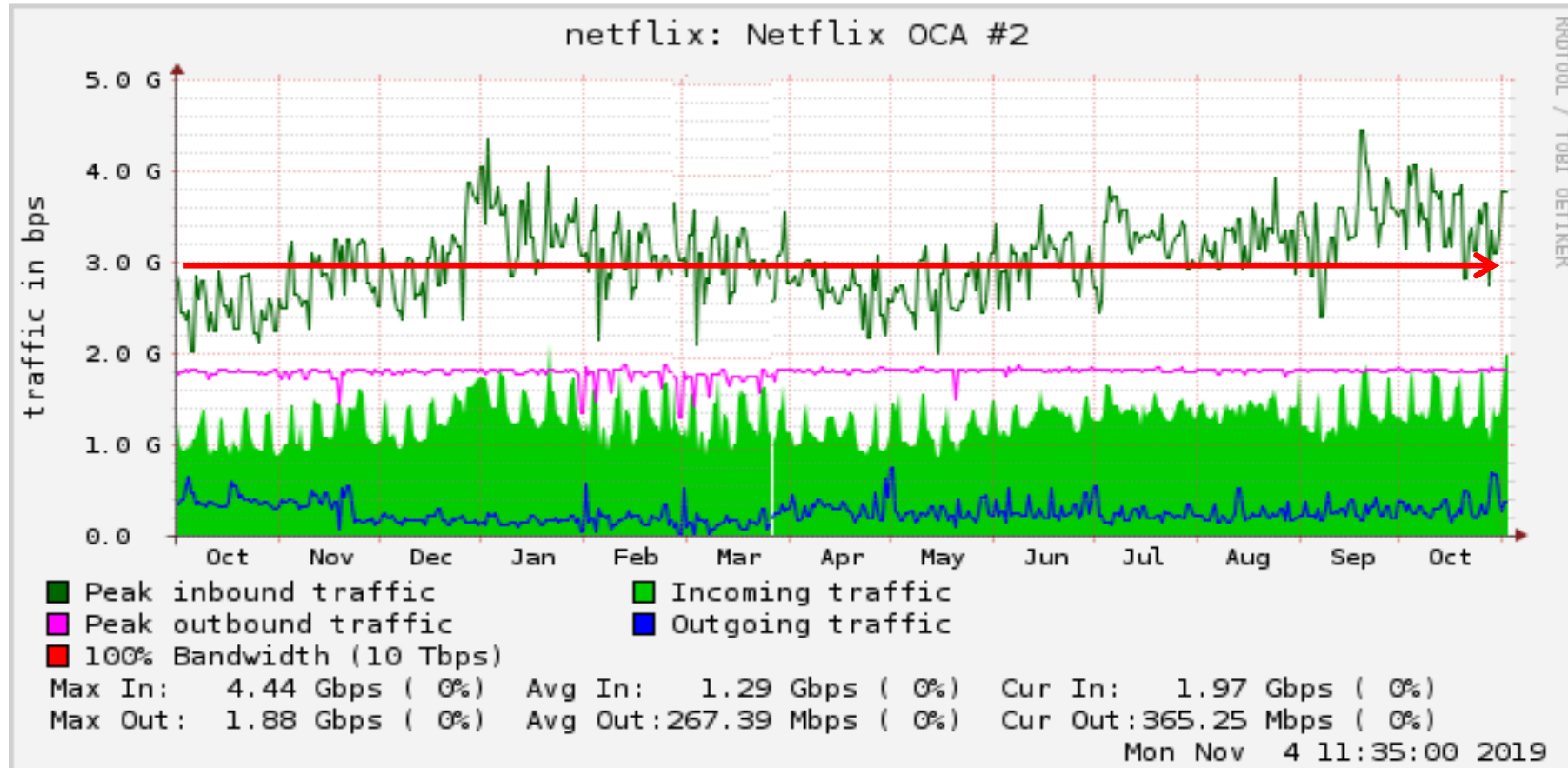
Start back with 2016...



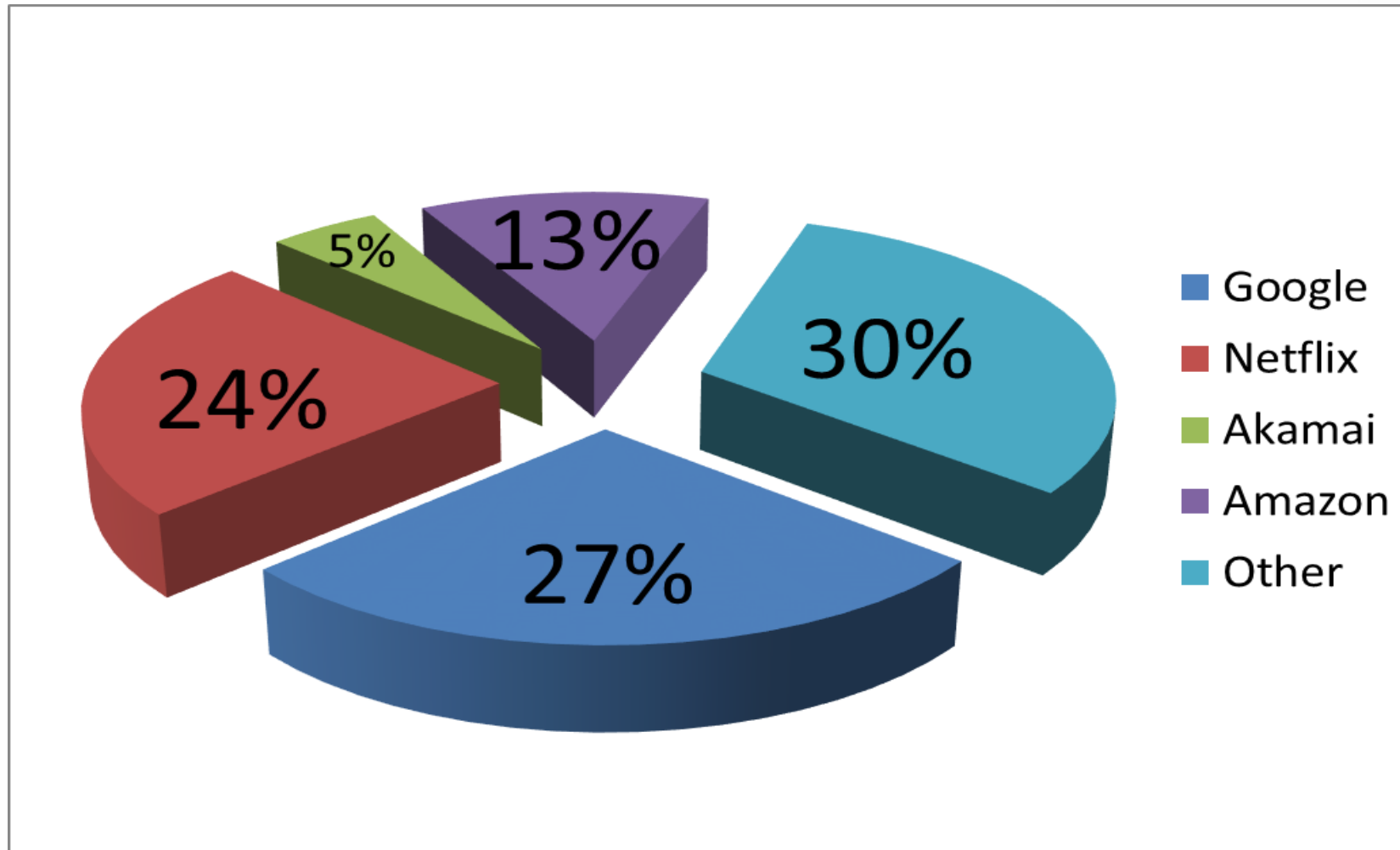
Slower growth in consumption 2016-2019



Netflix usage isn't growing



2019 Video Still Most Important Application



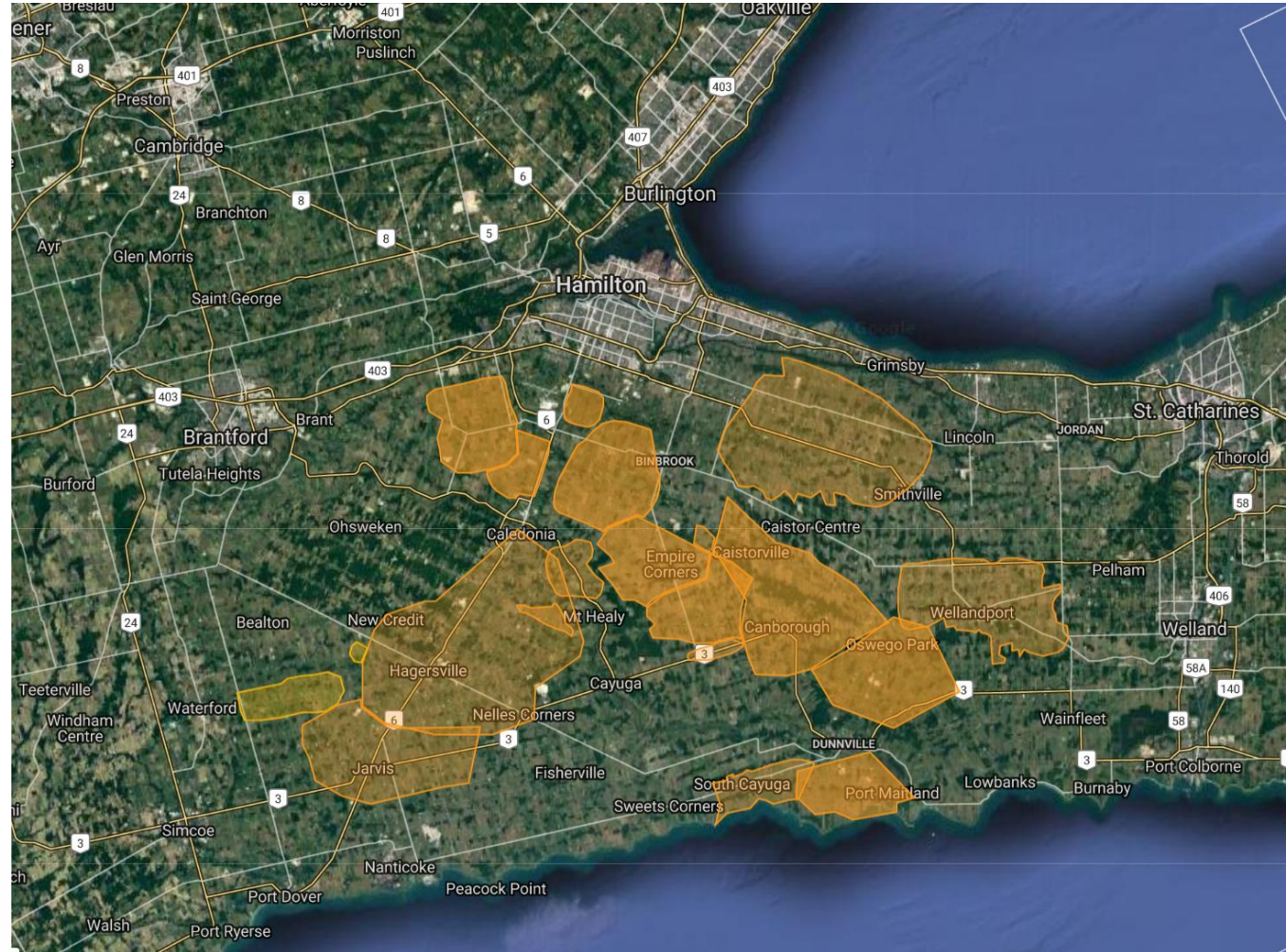
Why does this matter?

- Period of slower growth may continue for some time
- Traffic is likely to stay asymmetrical
- 50M DS x 10M US is likely more than sufficient for now
- Potentially takes heat off incumbent providers
- Could offer more investment in remote areas
- Means current technology will likely be sufficient

Likely Architectures

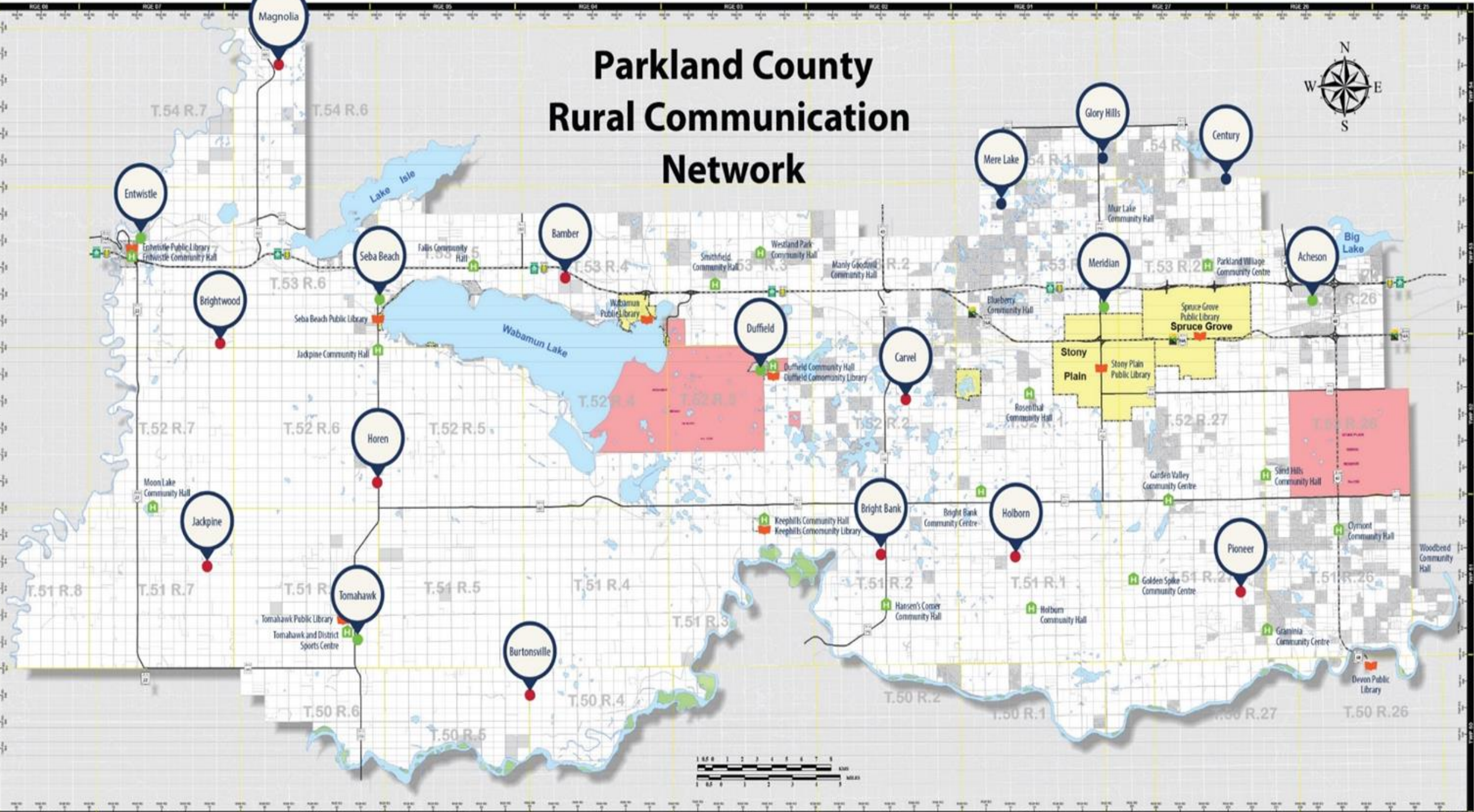
- **Wireless**
 - WiMax/LTE licensed and unlicensed
 - Blending 3G, LTE, WiFi moving toward 5G
 - Making investments in physical tower infrastructure
- **FTTH**
 - GPON/EPON moving to NG-PON2, XGS-PON, and 10G-EPON
 - Making investments in intensive terrestrial infrastructure
- **Hybrid Approaches**

Sample Rural Wireless Operator

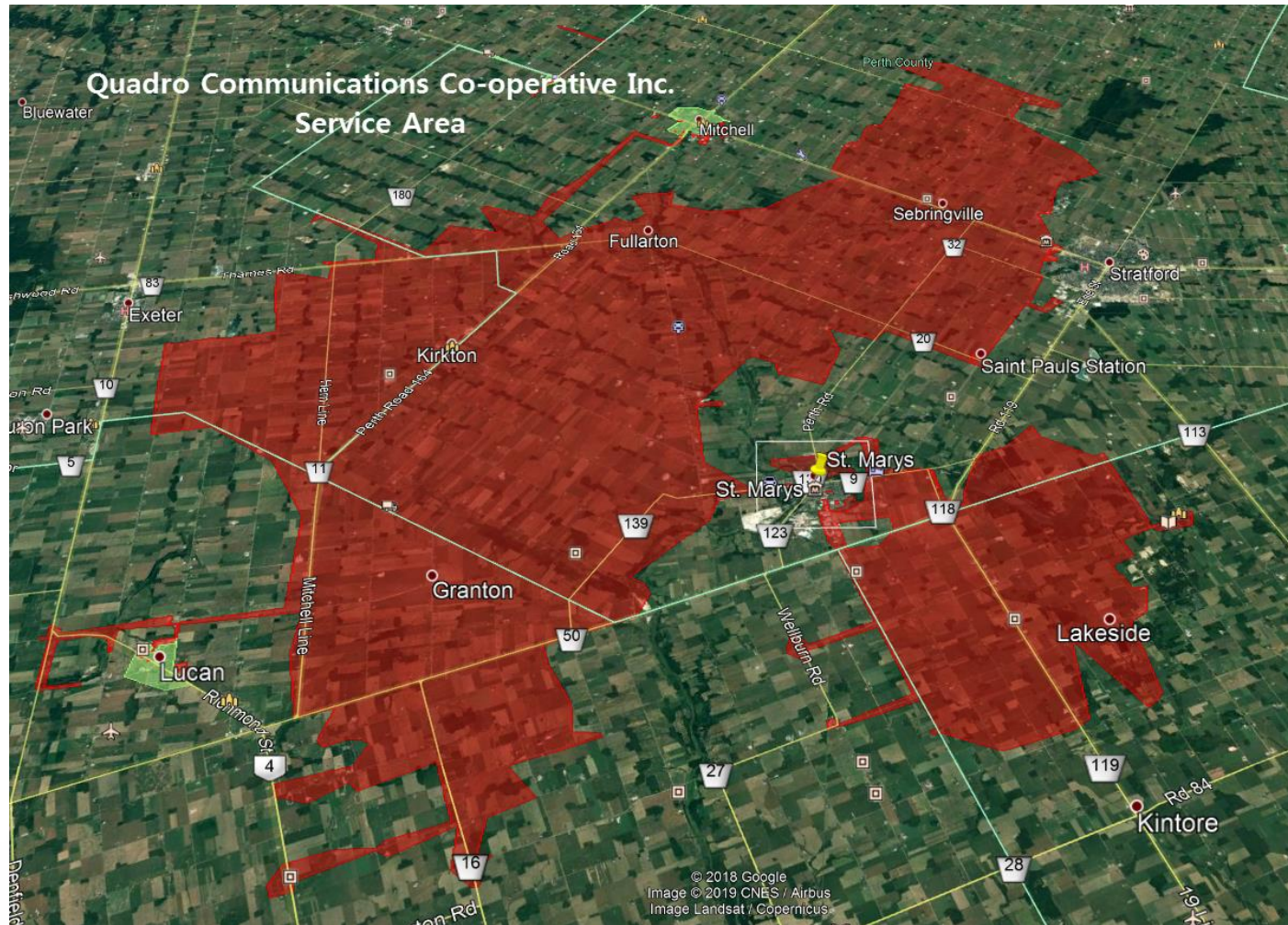




Parkland County Rural Communication Network



Sample Rural Fibre Operator





What about 5G?

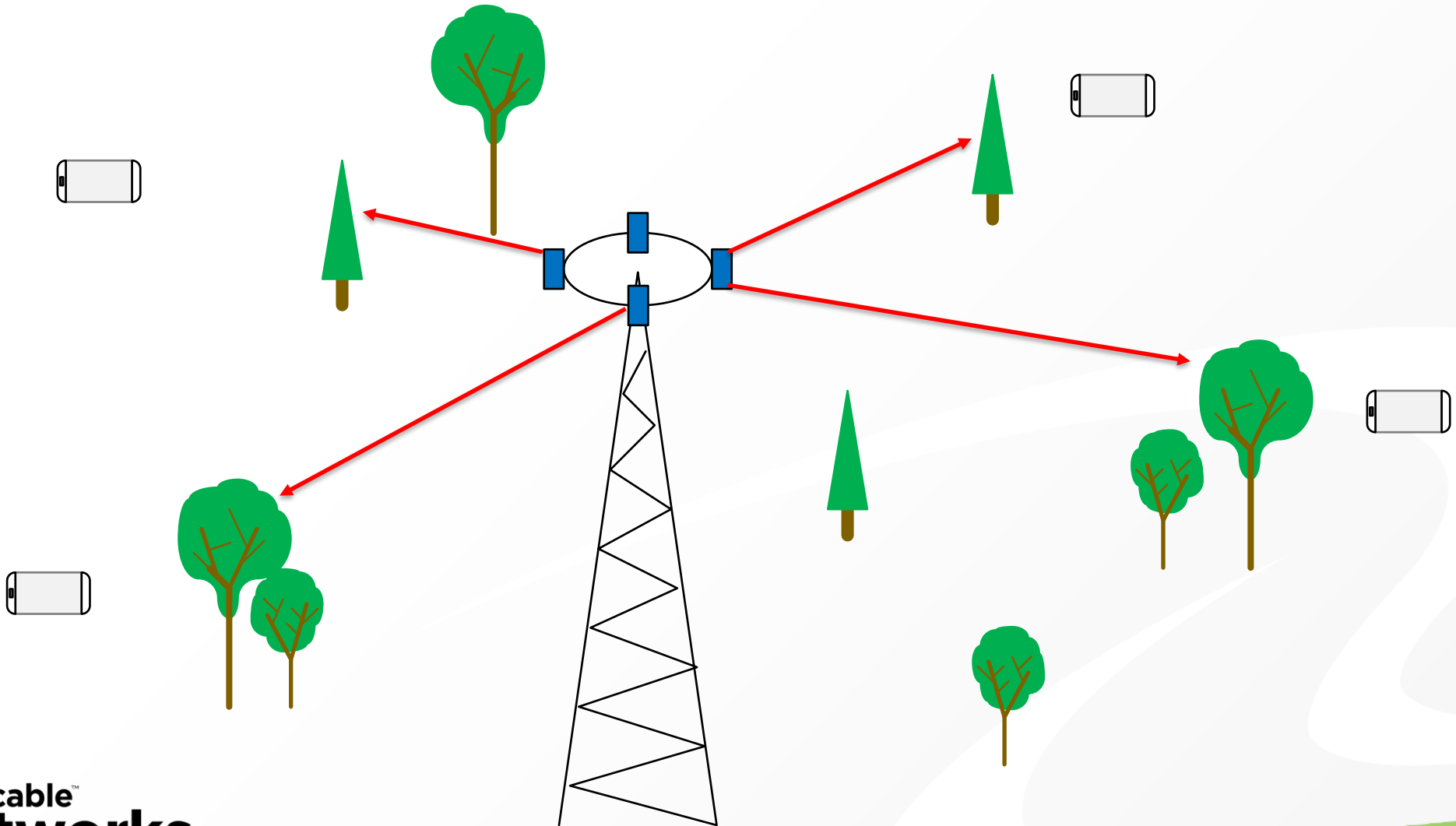
- Fifth generation “standard”
- Two frequency ranges:
 - < 6 GHz (5 to 100 MHz channel bandwidths) ←FR1
 - > 24 GHz (50 to 400 MHz channel bandwidths) ←FR2 (AKA mmWave)
- Massive MIMO
- Beamforming Technology
- FR1 is being licensed and deployed today but it is already VERY crowded spectrum!

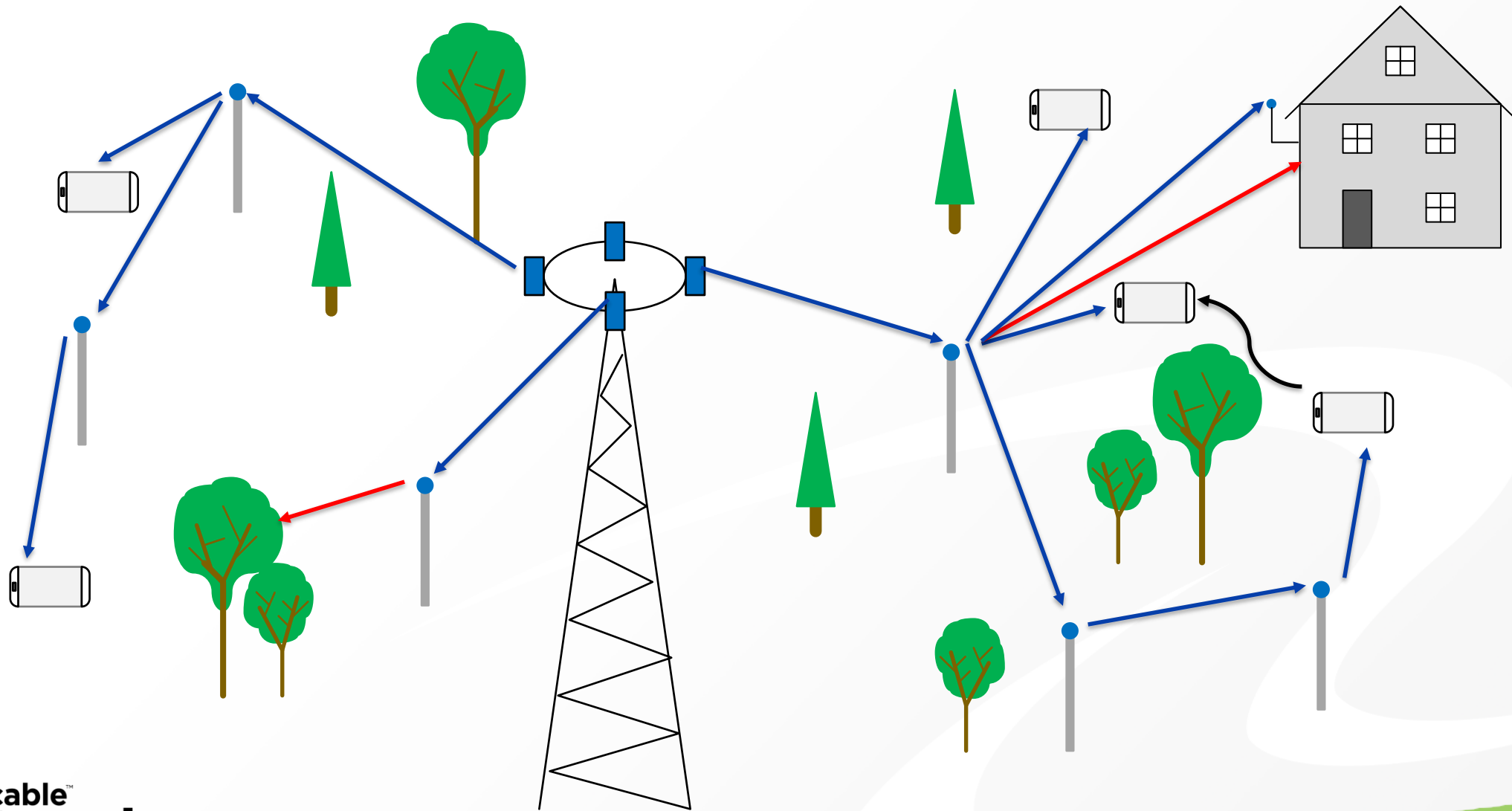
Real World

- FR1 allows for larger channel bandwidths and theoretical real world performance that is better than 4G.
 - Not 100X better.
 - 40 Mbps to 100 Mbps (anticipated real world user experience).
 - Similar operating frequencies and therefore RF limits.
 - Same or slightly smaller cell sizes.
- When we hear about > Gbps services, we are talking about the anticipated performance of FR2 deployments.

Rural Specific Challenges for FR2

- Higher frequency, lower range
- Purely Line of Sight
- Weather has a significant impact
- Foliage is a big problem
- Building construction
 - A fixed antenna on the side of the house will be required as it cannot (usually) get into the house.
- Ongoing debate over health impacts
- Foliage is a big problem





Where does that leave you?

- More Diverse networks mixing fibre and wireless
 - One single solution will not fit everywhere
- More investment and continued growth in networks

- Must prioritize the investment
- # START BUILDING!
- More people and more training!
 - An opportunity for good local jobs
 - Simplify and facilitate access for service providers
 - Consider community assets, or build yourself

THANK
YOU!