

Phase One Broadband Assessment

The Corporation of the Municipality of Temagami and Temagami First Nation Broadband Assessment

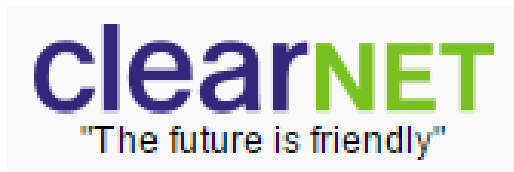
Monday, November 4, 2019



Overview

- Amedeo Bernardi Background
- Regional Study Overview
- Current Facilities
- Types of Services
- Gaps & Needs
- Estimates
- Observations
- Recommendations
- Interim Solutions

Amedeo Bernardi Consulting Inc.





Regional Study Overview

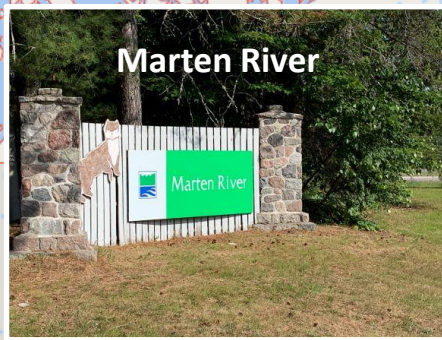
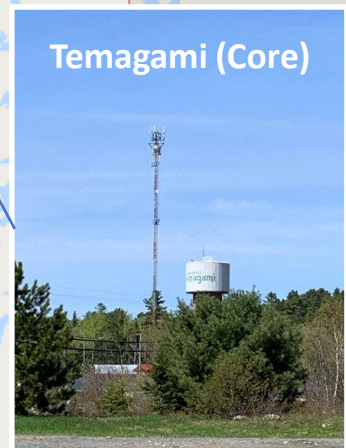
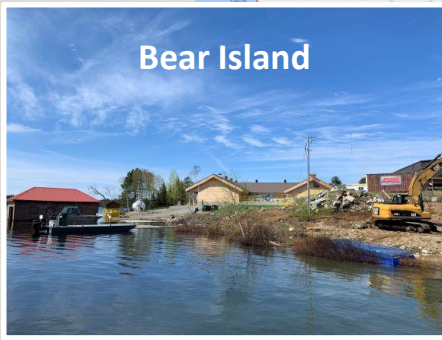
Study Communities

Municipality of Temagami:

- Temagami (Core)
- Temagami North
- Marten River


Temagami First Nation

- Bear Island

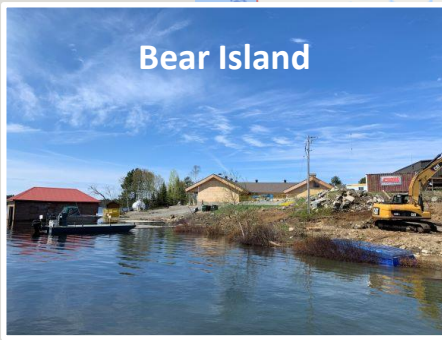


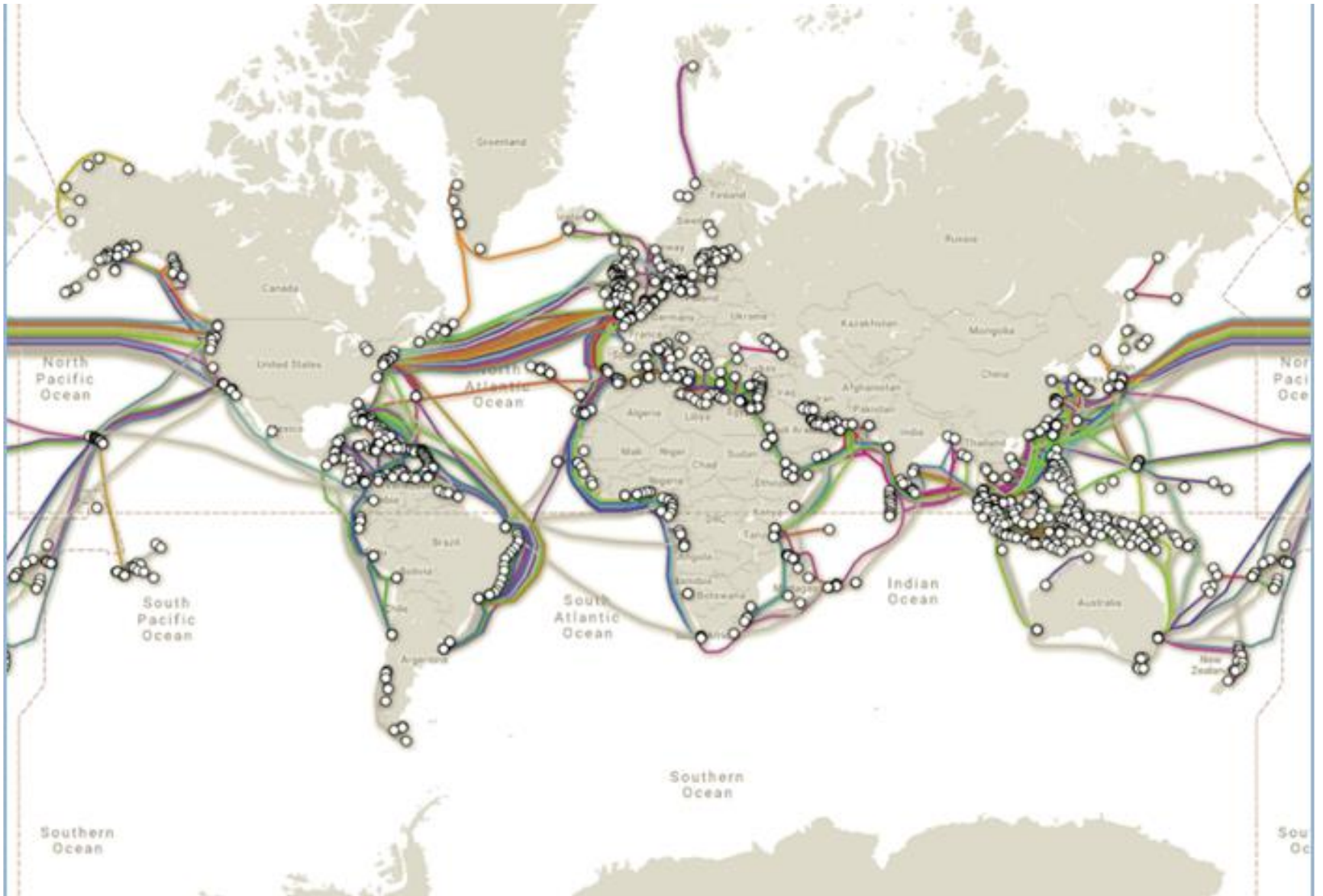
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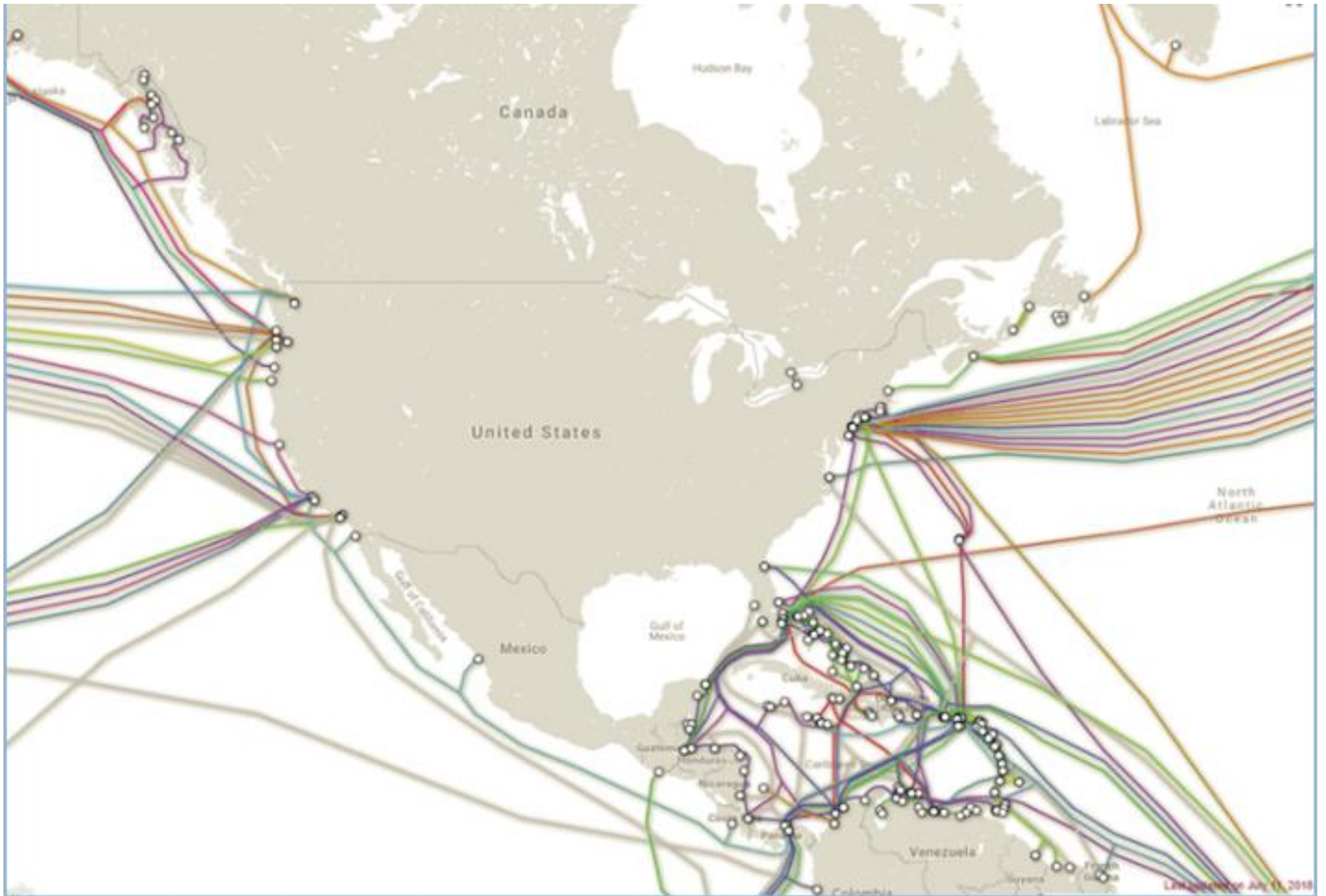
Regional Fibre Routes

Ontera/Bell fibre optics 

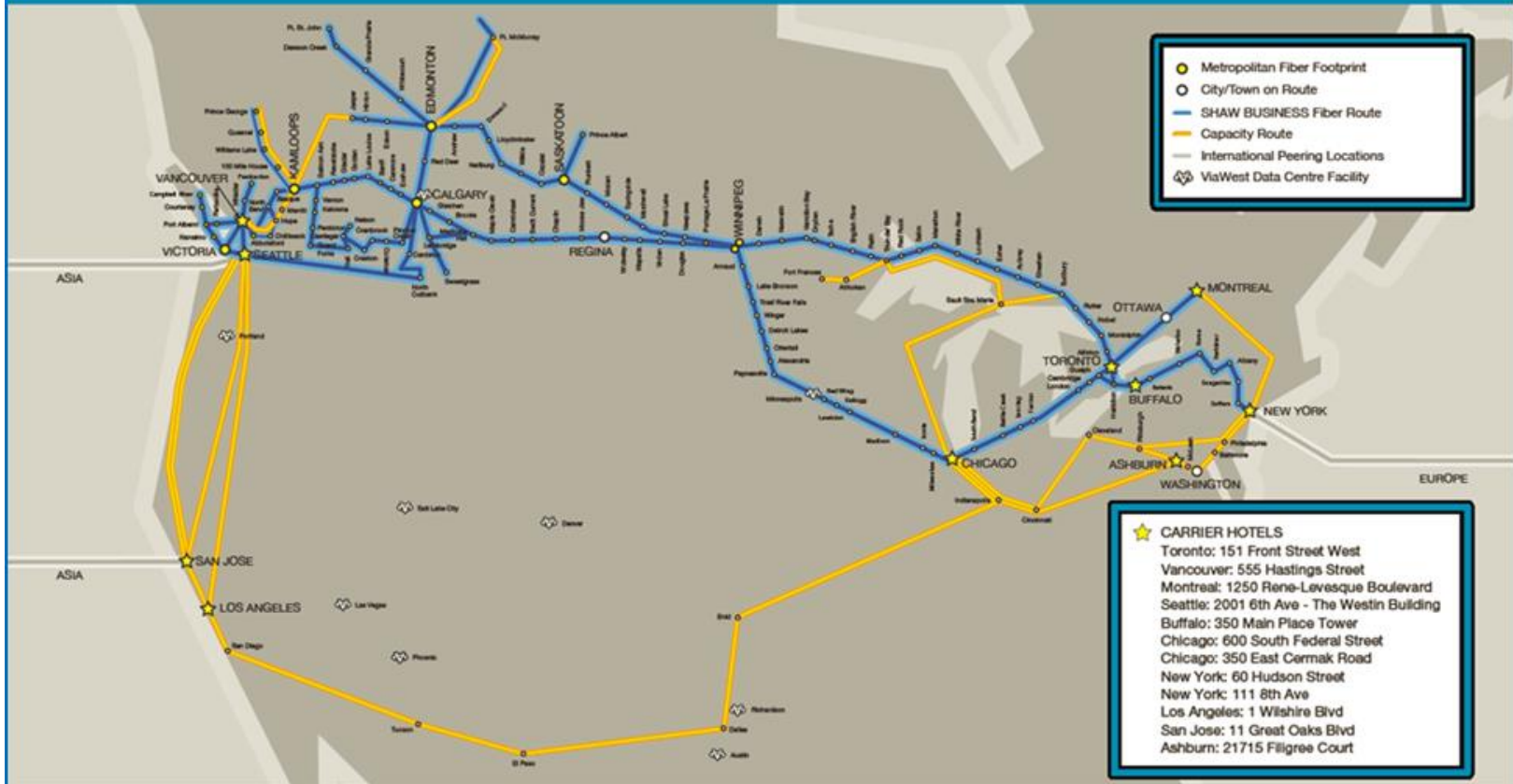
Underground fibre optic routes within rail or pipeline Right of Ways (ROW) not shown on the map.







Shaw Business Network

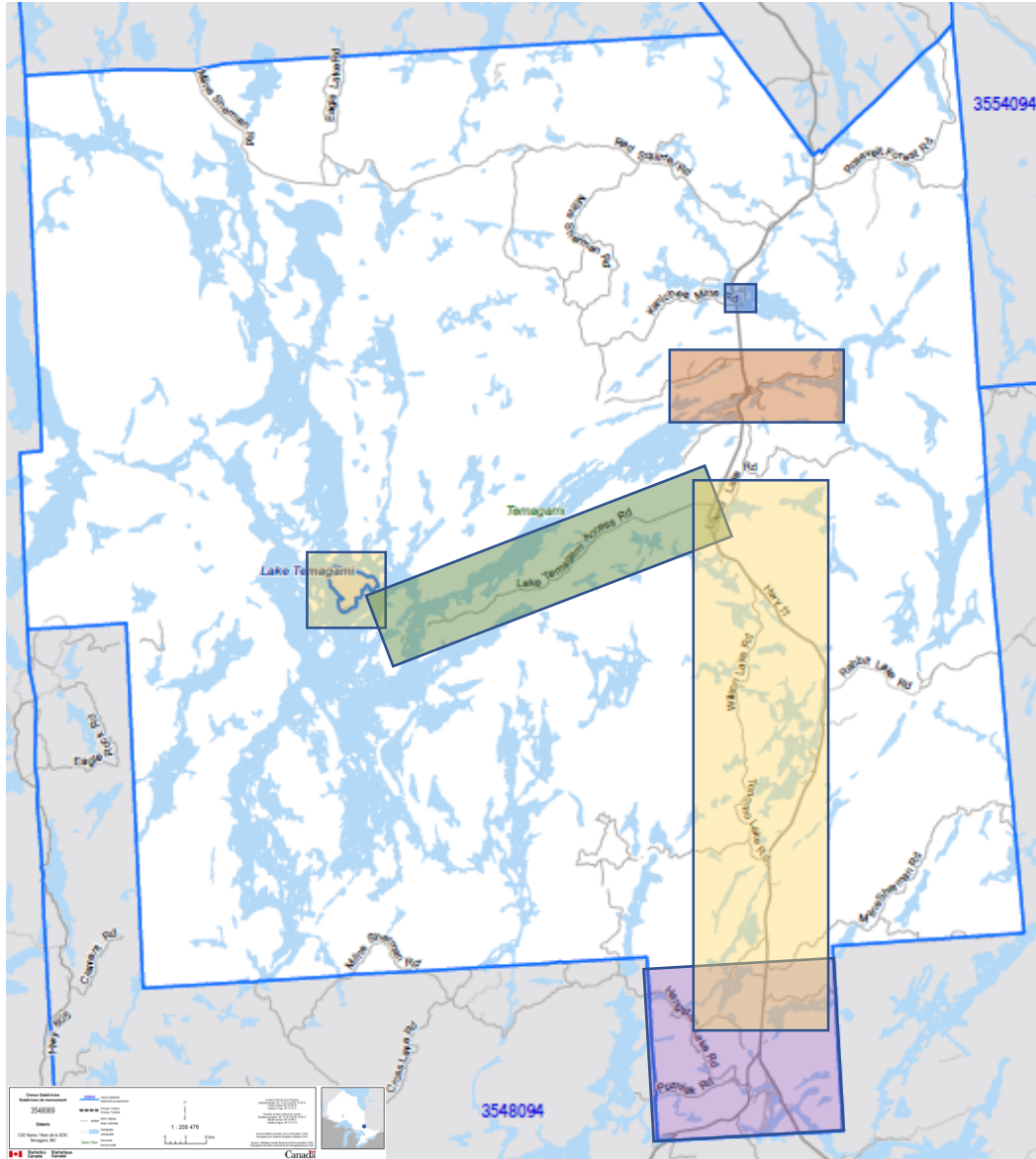


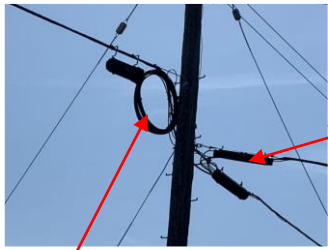
For more information, call 1-877-678-3567 or visit shaw.ca/wholesale

Shaw) Business

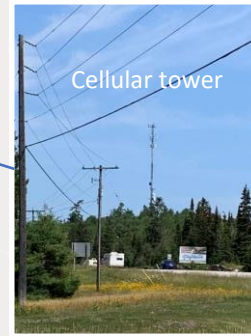
Community visits
May 27 & August 2,
2019

Current Facilities





Copper telephone lines

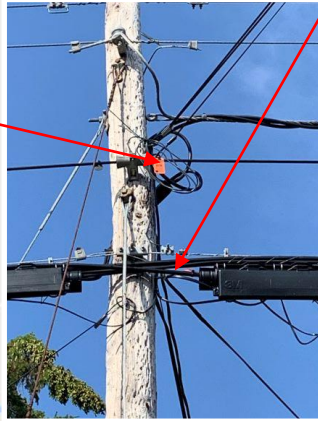


Cellular tower

Rogers transceivers at N46.7578 W79.8078

Freq (MHz)	RF Power (W)	Acq (dBm)	Hot (m)	Elev (m)	
700	5M	994.01	150	97	306
700	5M	994.01	220	97	306
700	5M	994.01	Omni	97	306
850	200k	134.89	Omni	97	306
850	5M	554.66	Omni	97	306
1900	200k	229.6	180	97	306
2100	10M	2089.22	Omni	97	306
2100	10M	2089.22	150	97	306
2100	10M	2089.22	220	97	306

Aerial fibre optic cable



Copper Telephone Line

Bell transceivers at N46.7578 W79.8081

Freq (MHz)	RF Power (W)	Acq (dBm)	Hot (m)	Elev (m)	
700	5M	778.09	5	73	330
700	5M	778.09	185	80	330
850	1.25M	478.67	5	80	330
850	1.25M	478.67	185	80	330
850	4.15M	1786.73	185	73	330
850	4.15M	1786.73	5	73	330
850	4.15M	1786.73	185	73	330
850	4.15M	1786.73	5	73	330
850	4.15M	1786.73	185	73	330

Aerial fibre optic cable



Trapper Trading Post



Fire Station

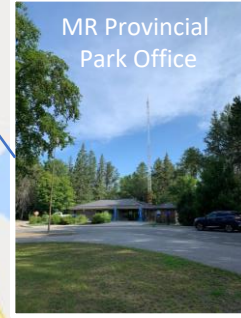


Marten River

Land O'Lakes Lodge



Ontera payphone booth



MR Provincial Park Office



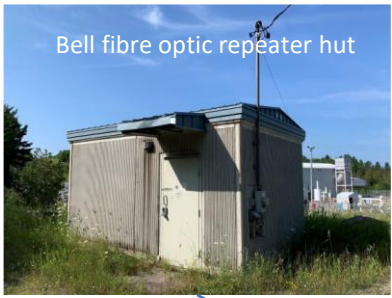
Copper telephone lines



Marten River Provincial Park

Aerial Fibre Optic Cable

Temagami Island



Rogers transceivers at N46.8453 W79.8031

Freq (MHz)	BW (kHz)	Power (W)	Arm (°)	Hot Elev (m)	Elev (m)
700	5M	994.01	35	109	332
700	5M	994.01	175	109	332
700	5M	994.01	305	109	332
850	5M	1124.68	175	109	332
850	5M	1124.68	305	109	332
850	5M	1124.68	35	109	332
850	5M	1124.68	175	109	332
850	5M	1124.68	305	109	332
850	5M	1124.68	35	109	332
2100	10M	2089.22	35	109	332
2100	10M	2089.22	175	109	332

Aerial Fibre Optic Cable

Marte River

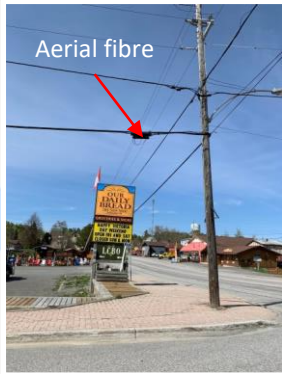
Kenny Forest Provincial Park



Ontera aerial fibre



Aerial fibre



Aerial fibre



Buried fibre marker

Leisure Island Houseboat Rentals



Ontera copper



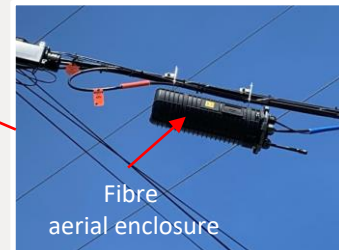
Ontera distribution cabinet



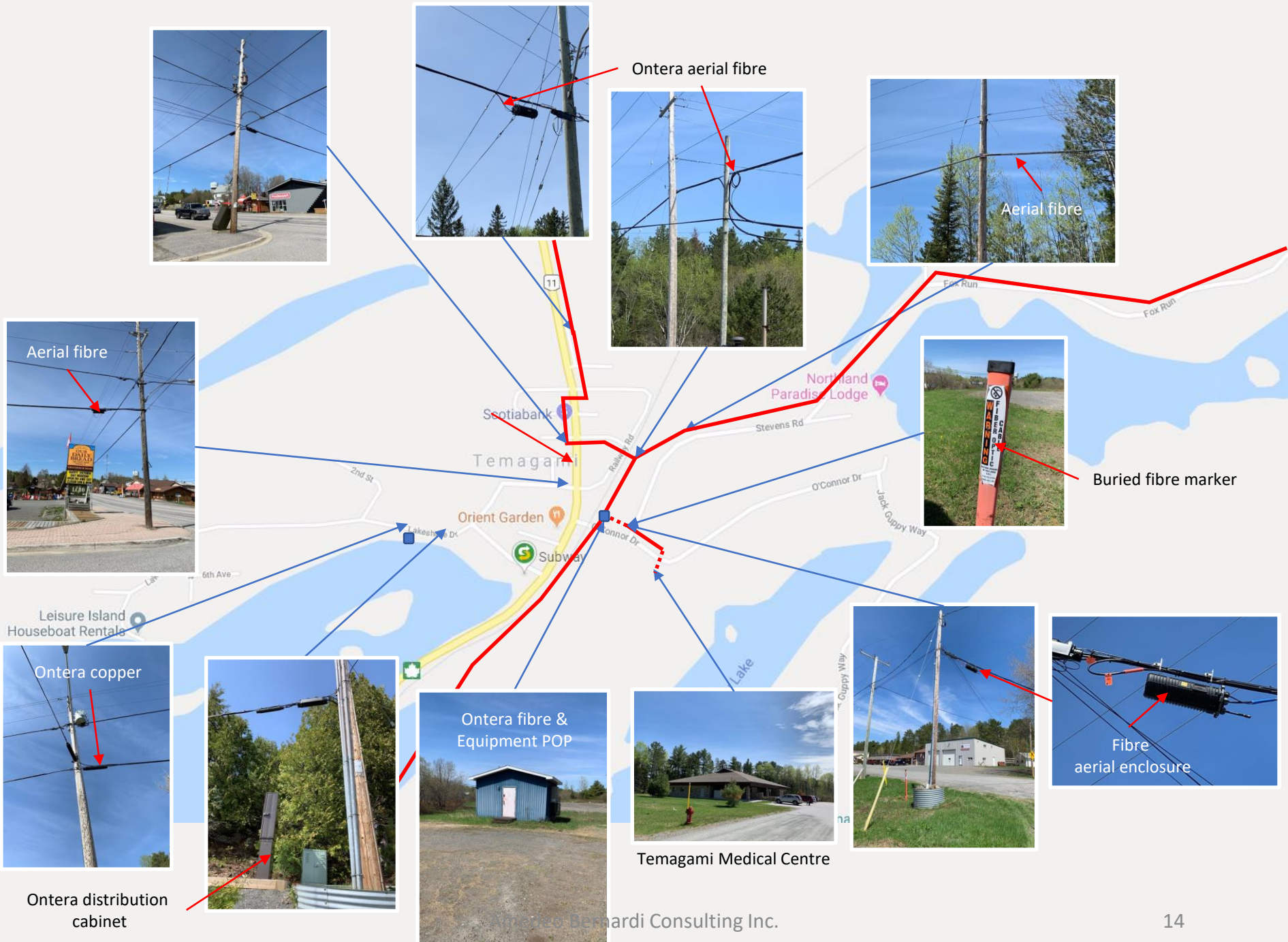
Ontera fibre & Equipment POP



Temagami Medical Centre



Fibre aerial enclosure

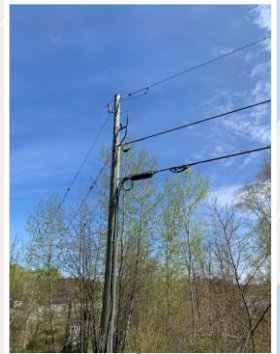
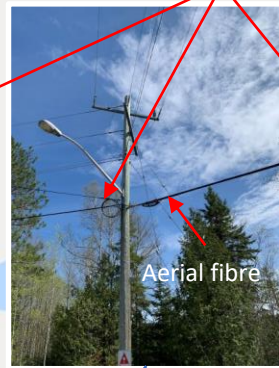


Rogers transceivers at N47.0686 W79.7881

Freq (MHz)	BW (Hz)	Power	Azim (°)	Hot (m)	Elev (m)
700	5M	791.39	5	84	309
700	5M	791.39	100	84	309
700	5M	791.39	210	84	309
850	5M	368.15	Omni	84	309
850	5M	368.15	Omni	84	309
2100	10M	2728.88	5	84	309
2100	10M	2728.88	100	84	309
2100	10M	2728.88	210	84	309

Bell transceivers at N47.0686 W79.7882

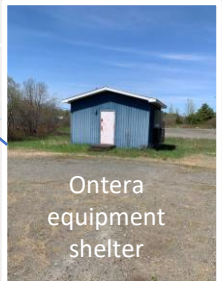
Freq (MHz)	BW (Hz)	Power	Azim (°)	Hot (m)	Elev (m)
700	5M	563.68	180	91	327
700	5M	563.68	270	91	327
850	4.15M	1786.73	180	97	327
850	4.15M	1786.73	Omni	97	327
850	4.15M	1786.73	270	97	327
850	4.15M	1786.73	270	97	327
850	4.15M	1786.73	180	97	327
1900	4.15M	1959.12	270	89	327
1900	4.15M	1959.12	Omni	89	327
1900	4.15M	1959.12	180	92	327



Ontera aerial fibre coil (slack cable)

Aerial Fibre Optic Cable

Cellular tower
Municipal Water tower



Amedeo Bernardi Consulting Inc.



Copper Telephone Line

Milne Sherman Rd.

Industrial Park

Aerial Fibre Optic Cable



Abandoned rails



MNR facility



Temagami



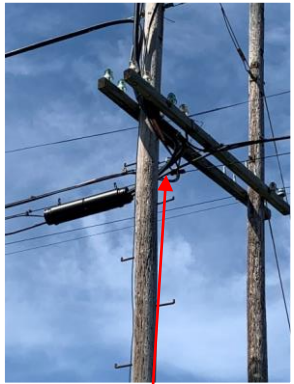
Buried Fibre Optic Cable



Arena

Ontera tower

Ontera Central Office



Aerial fibre



Aerial fibre to
Ontera CO



Ontario Clean Water Agency

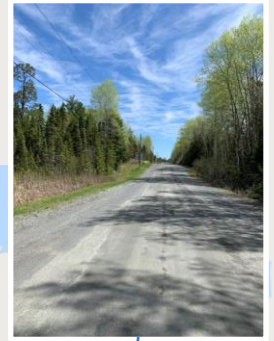
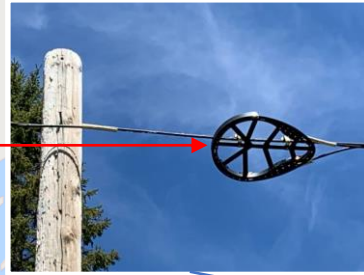


Aerial Fibre Optic Cable

New Administration Building



Ontera aerial fibre coil (slack cable)

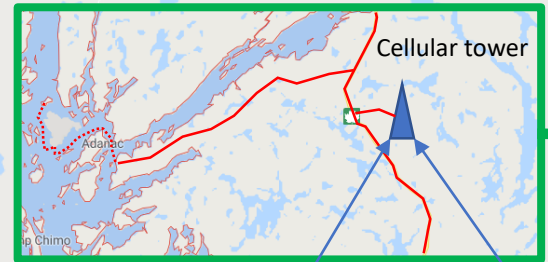


Underwater Fibre Optic Cable



Aerial Fibre Optic Cable

Ontera tower



Cellular tower

Bear Island

Adanac

Boatline Bay Marine

Temagami Island



Ontera telephone booth

Rogers transceivers at N46.9609 W79.7703

Freq	BW	Power	Azim	Hot	Elev
(MHz)	(MHz)	(W)	(°)	(°)	(m)
700	5M	994.01	210	113	390
700	5M	994.01	330	113	390
700	5M	994.01	110	113	390
850	200k	123.87	Omni	113	390
850	5M	554.66	Omni	113	390
1900	200k	112.19	180	113	390
2100	10M	2089.22	110	113	390
2100	10M	2089.22	210	113	390
2100	10M	2089.22	330	113	390

Bell transceivers at N46.9608 W79.77

Freq	BW	Power	Azim	Hot	Elev
(MHz)	(MHz)	(W)	(°)	(°)	(m)
700	5M	778.09	180	84	390
700	5M	778.09	335	84	390
850	1.25M	478.67	335	94	390
850	1.25M	478.67	180	94	390
850	4.15M	1786.73	180	84	390
850	4.15M	1786.73	180	84	390
850	4.15M	2680.1	335	84	390
850	4.15M	1786.73	335	84	390

Thunder Pipe Lodge

**Underwater Fibre
Optic Cable**

TemagEco Lake
Temagami Ice Fishing

Elders Building



Laura Mackenzie
Learning Centre



Tillie Missabi Family Centre



Bear Island



Water Treatment
Plant



Doreen Potts Health Centre



Police Station



Aerial Fibre Optic Cable

Amedeo Bernardi Consulting Inc.

New Administration
Building



**Underwater Fibre
Optic Cable**

Construction trailers c/w Xplornet Internet dishes



Outdoor rink

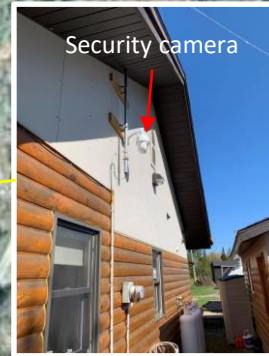


Wireless Internet mast



Ontera payphone

Buried Fibre Optic Cable



Security camera



Aerial Fibre Optic Cable



Aerial fibre optic cable



Ontera patch panel inside health centre

Underwater Fibre Optic Cable

Ontera POP building



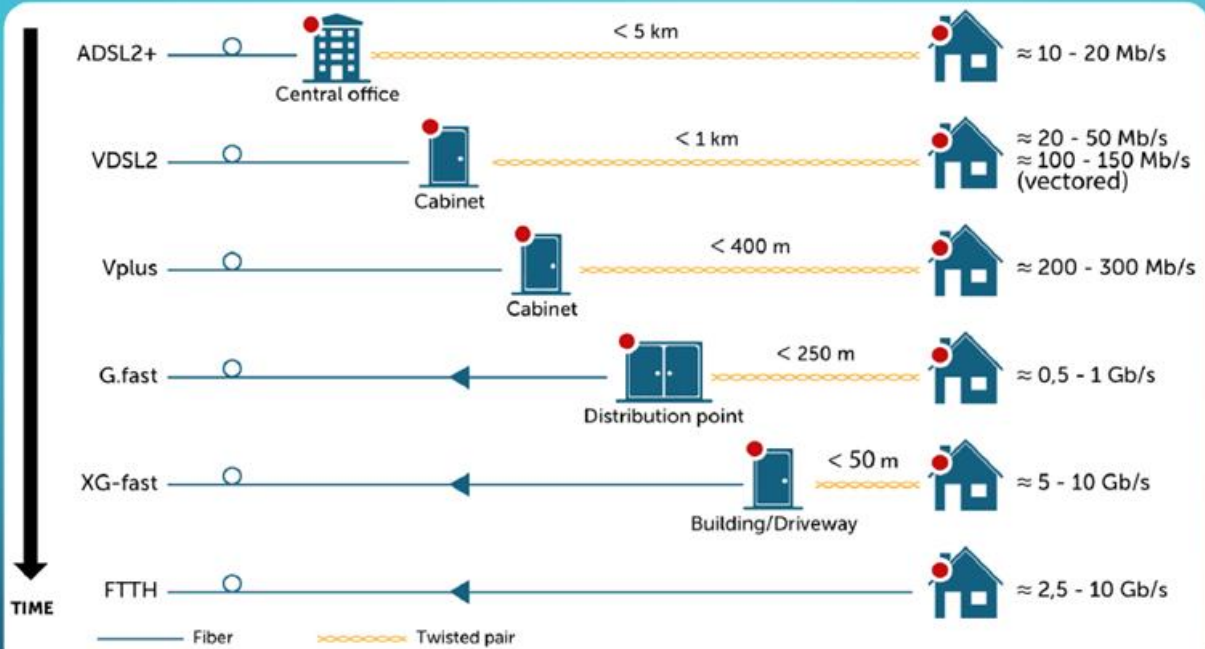
Buried Fibre Optic Cable

Service Providers

Types of Services

	FTTH	FTTN	DSL	Dial-up	HFC	Coax	4G/LTE	2G/3G	Fixed wireless	satellite
Ontera		X	X	X						
Xplornet									X	X
Galaxy Broadband										X
Bell Mobility							X	X		
Rogers							X	X		
Does not include cellular flanker brands (ie: Virgin, Koodo), satellite TV (ie: ExpressVu), telecom resellers (ie: Distributel)										

BROADBAND ACCESS EVOLUTION - EXPANSION OF DEEP FIBER



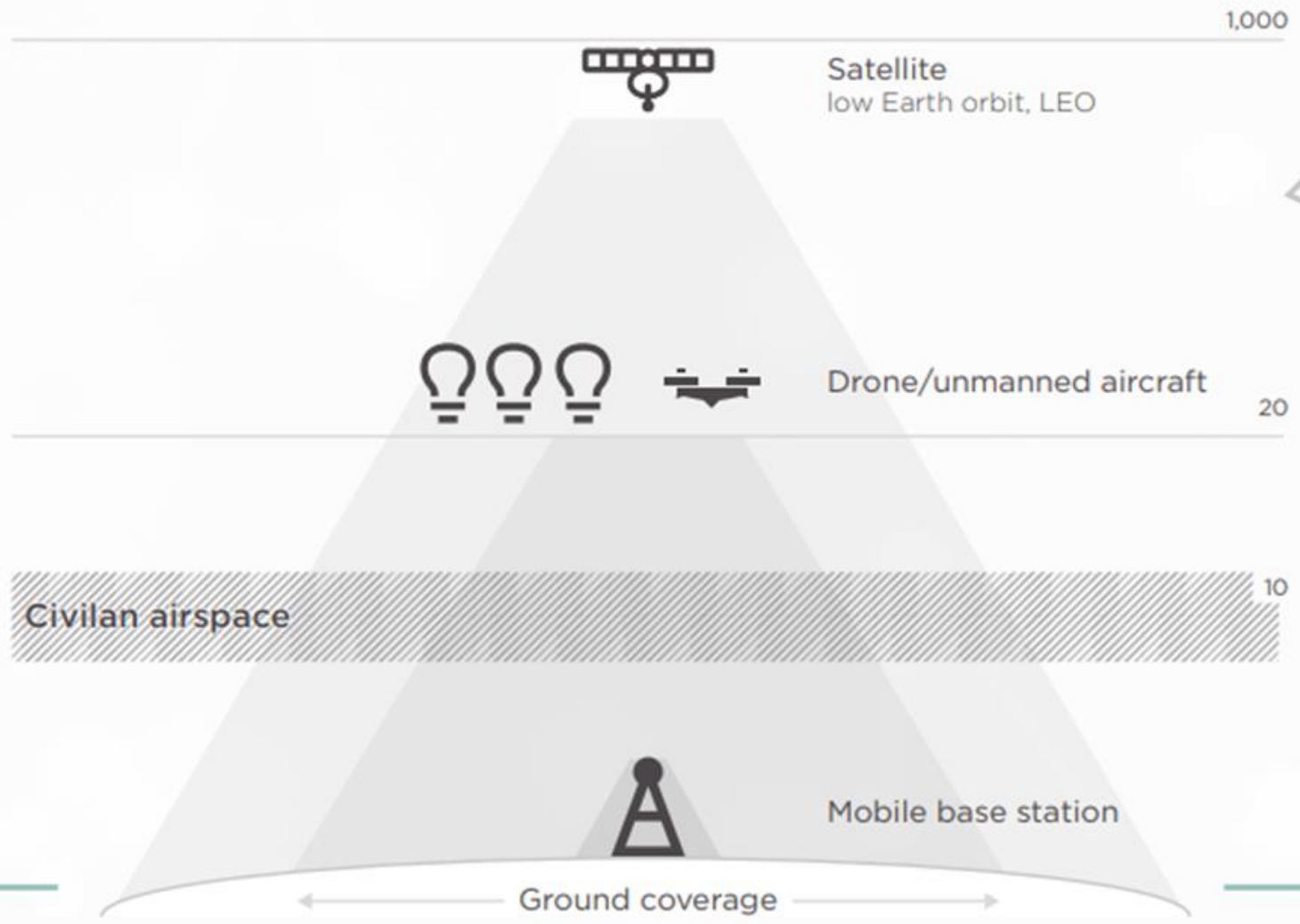
CENTRAL OFFICE CENTRIC

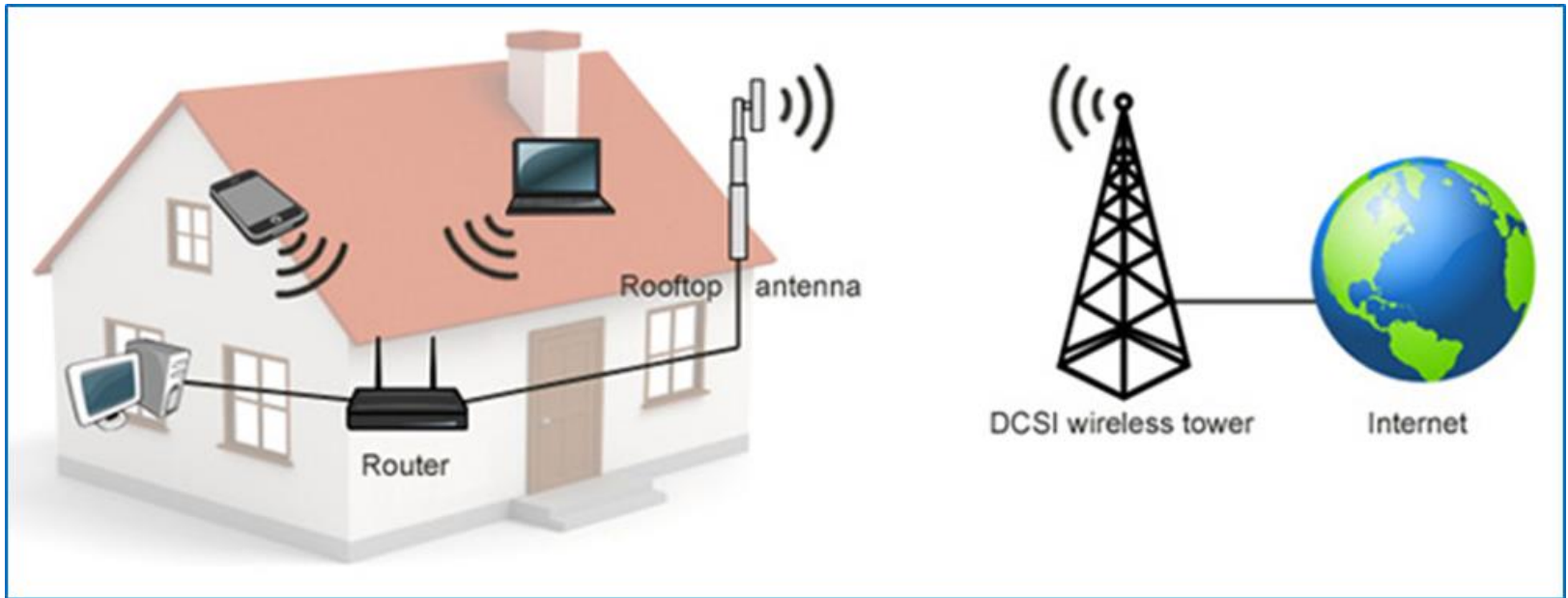
OUTSIDE PLANT CENTRIC

Higher data speeds require densification of network and expansion of network edge to outside plants

Source: The future X network, Weldon, Marcus K. 2016

Increasing area coverage, weakening sign



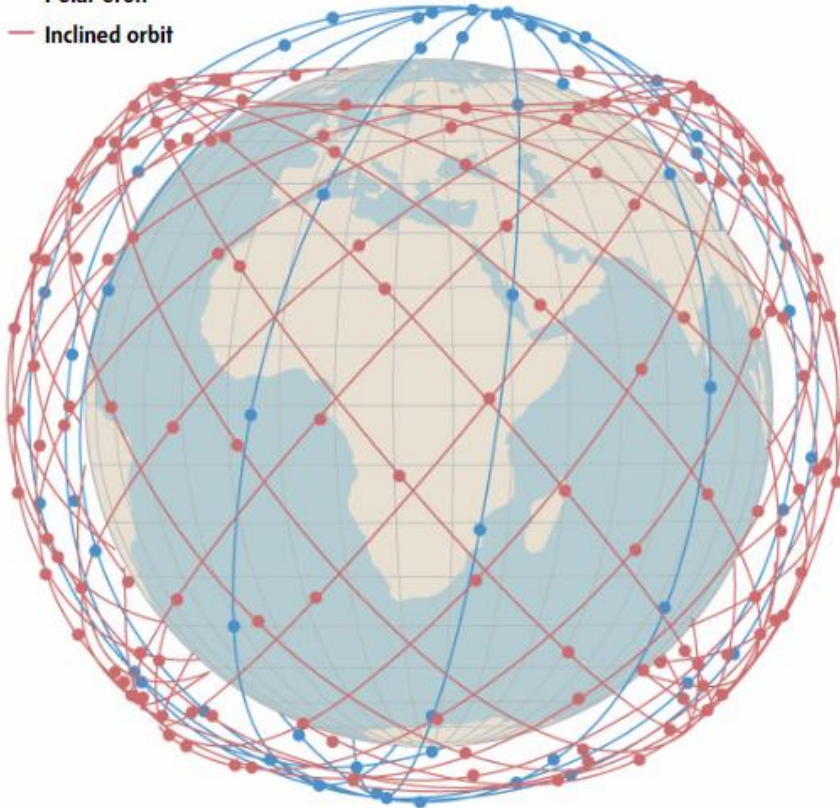




THE CONSTELLATION

Telesat's global constellation will consist of 292 satellites, 72 in polar orbit plus 220 in inclined orbit. The mix of different orbits is meant to offer global coverage, with the satellites in polar orbit giving better northern coverage and the inclined-orbit satellites covering mid-latitude regions.

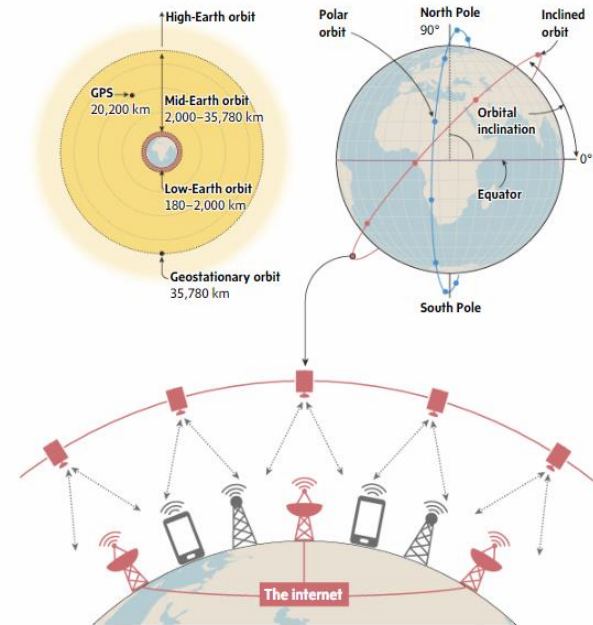
- Polar orbit
- Inclined orbit



Canada's Telesat takes on U.S. giants in 'low-Earth orbit' internet space race

CHRISTINE DOBBY • TELECOM REPORTER
PUBLISHED JANUARY 31, 2019

TRENDING



MURAT YUKSELIR / THE GLOBE AND MAIL, SOURCE: NASA; TELESAT; THE ECONOMIST

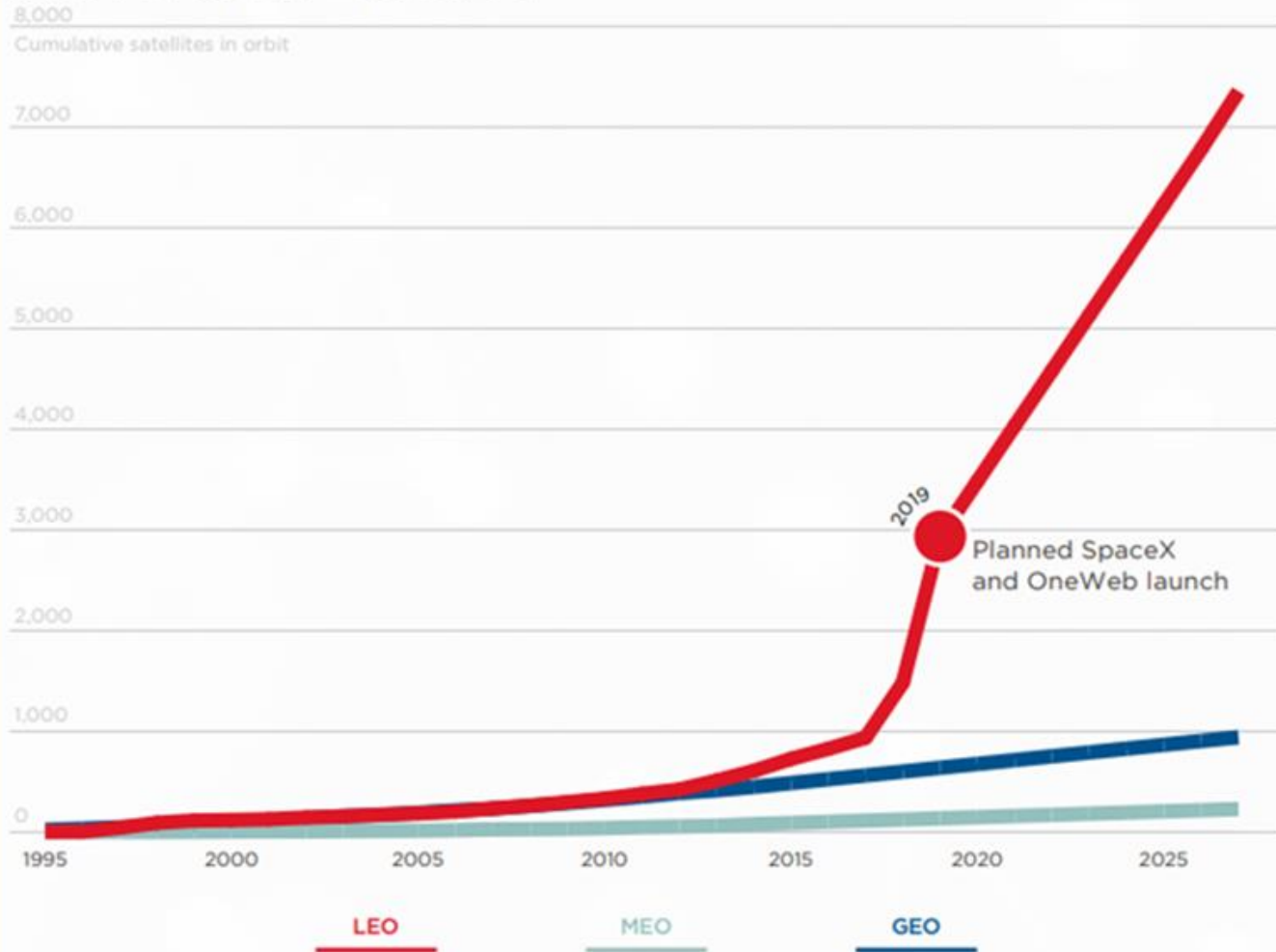
In its 2018 budget, the Canadian government committed \$100-million over five years to LEO projects, and Telesat has been lobbying for more. The company, along with other players in the aerospace industry, wrote a letter to Finance Minister Bill Morneau in January urging Ottawa to allocate funding to its LEO project. Telesat argues it will help Canada remain a leader in space technology and also "bridge the digital divide" by bringing high-quality internet to an estimated 4.5 million Canadians who do not currently enjoy such access.

Broadband access for rural and remote residents – many of whom are Indigenous – is a key promise found in most of the large LEO constellation proposals, although Mr. del Portillo is skeptical. "They always mention rural internet, but I think it's more like PR [public relations]," he said, adding that enterprise customers are likely to be the primary clients.

Since the satellites are constantly moving and handing off traffic as they pass over users, on-Earth receivers need multiple antennas controlled by electronics to work. It's expensive technology and Mr. del Portillo added that it likely needs to be cheaper before consumer broadband is a viable LEO market.

Telesat said a "direct-to-consumer" model will not be its initial focus as it believes further development of low-cost terminals is necessary, but said it plans to offer service from day one that would improve network capacity for less densely populated communities through the use of data centres that would then connect to individual users using existing land-based technology.


PROJECTED SATELLITES IN ORBIT WORLDWIDE (POST SPACEX + ONEWEB)



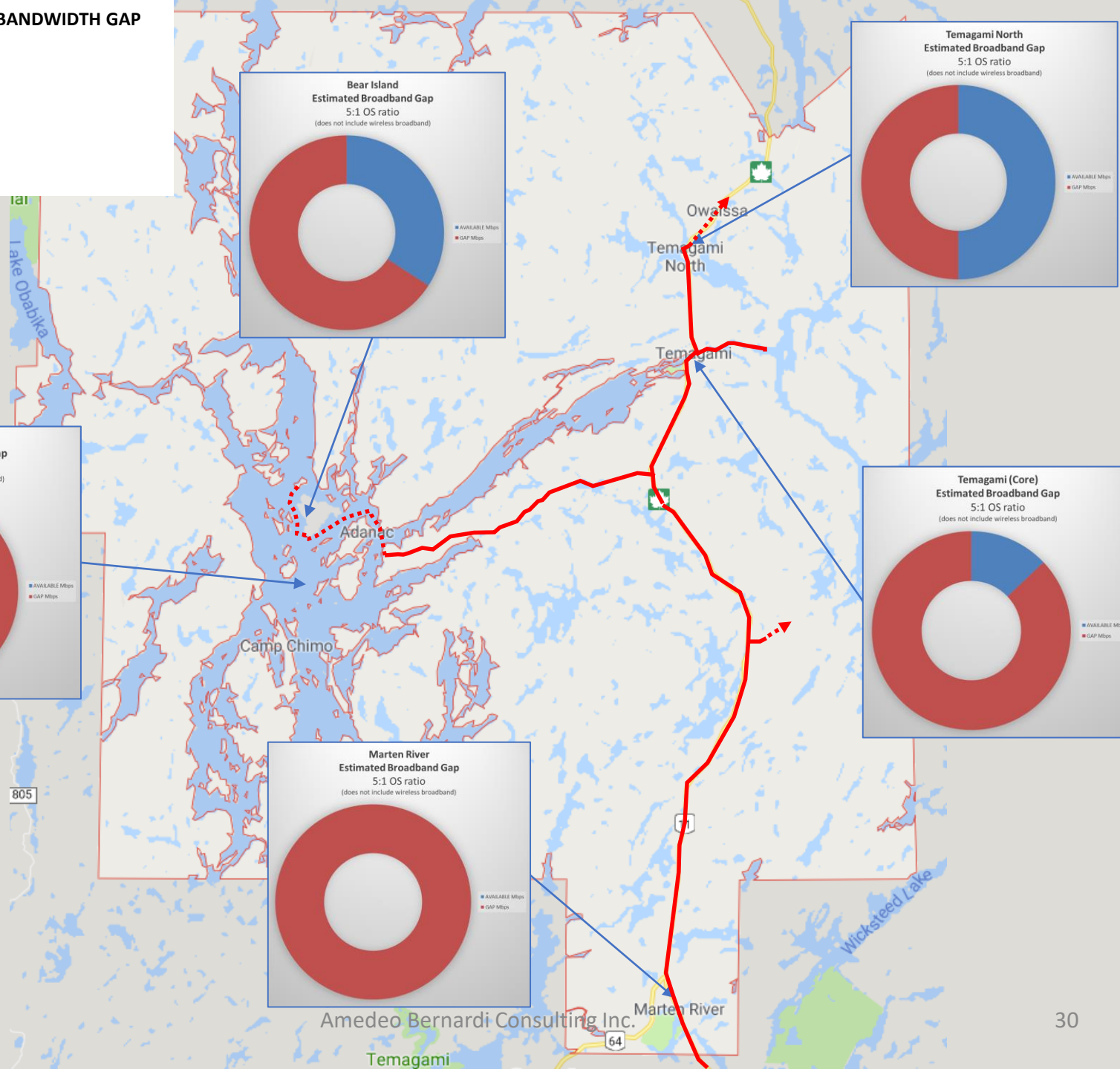
Analysis

Gaps & Needs

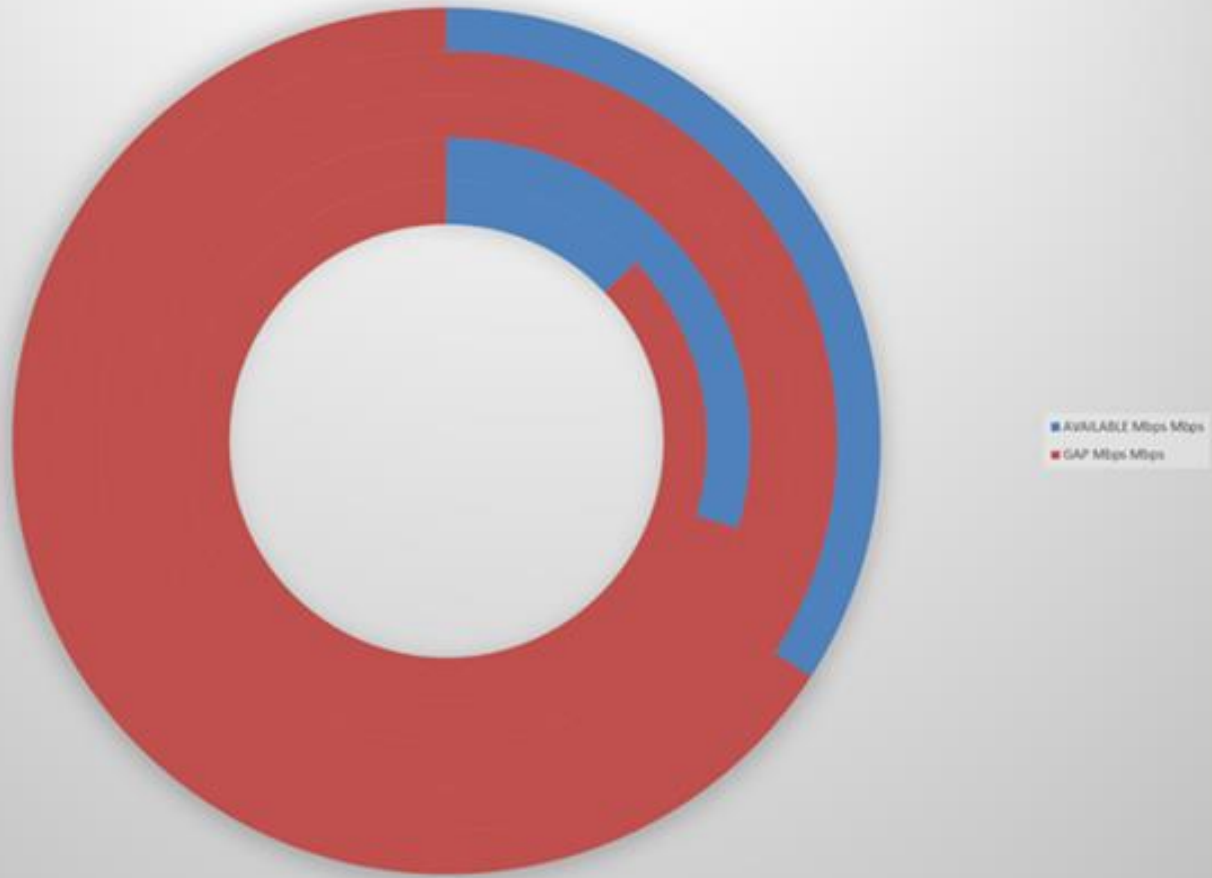
ESTIMATED COMMUNITY BANDWIDTH GAP

 Available Mbps
 Gap Mbps

5:1 OS ratio
 No broadband wireless included



**Estimated Broadband Gap
Combined Study Group Communities
(5:1 OS ratio)**



Premises Type	Mbps
Dwellings	25
Businesses	100
Hospitals/Clinics	100
Schools	100
Student	1

TEMAGAMI MASTER DATA - NEEDS ANALYSIS

Community Broadband Gap Analysis	STATISTICS						DATA (Mbps)					NEED	OS ratio 5:1	AVAILABLE Mbps	GAP Mbps
	POP	Dwellings	Businesses	Hospital/ Clinics	Schools	Students	Dwellings	Businesses	Hospital/ Clinics	Schools	Students				
							25	100	100	100	1	Mbps		Mbps	Mbps
Temagami (core)	520	220	20	1	1	24	5500	2000	100	100	24	7724	1545	200	1344.8
Temagami North	242	115	5	0	0	0	2875	500	0	0	0	3375	675	200	475.0
Lake Temagami	2100	908	5	0	0	0	22700	500	0	0	0	23200	4640	0	4640.0
Marten River	40	20	5	0	0	0	500	500	0	0	0	1000	200	0	200.0
Bear Island	244	110	14	1	1	44	2750	1400	100	100	44	4394	879	300	578.8
STUDY AREA TOTALS	3146	1373	49	2	2	68	34325	4900	200	200	68	39693	7938.6	700	7238.6

Assumptions

Temagami (core) base population of 802 taken from 2016 stats can census, then adjusted by approx 2 people per dwelling

Temagami North counted visible dwellings on Google Map - subtracted this from the Tem total and adjusted Temagami core (along with MR estimate)

Lake Temagami population taken from statement in Temagami 2011 EcDev document

Marten River counted visible dwellings on Google Map - subtracted this from the Tem total and adjusted Temagami core (along with MR estimate)

Bear Island taken from 2019 ecdev document

Business counts are estimates

Participation by Premises Type	#	%
Home or primary residence	144	37%
Seasonal residence/cottage	213	55%
Business (not including tourist camp)	10	3%
Tourist camp/resort	11	3%
Other	7	2%
Total	385	100%

Participation by Community (Cumulative)	#	%
Bear Island	49	13%
Temagami North	35	9%
Temagami	63	16%
Lake Temagami	223	58%
Marten River	15	4%
Total	385	100%

Surveys Completed	385
Total Dwellings*	1408
Percentage Completed	27%
*Total Dwellings based on 2016 Stats Can census, TFN Community Profile Feb 2019 (110), Connected North parcel 2019 information (1298)	

92% of the respondents were residential/seasonal.

● Home or primary residence	144
● Seasonal residence/cottage	213
● Business (not including tourist...)	10
● Tourist camp/resort (owner, n...)	11
● Other	7



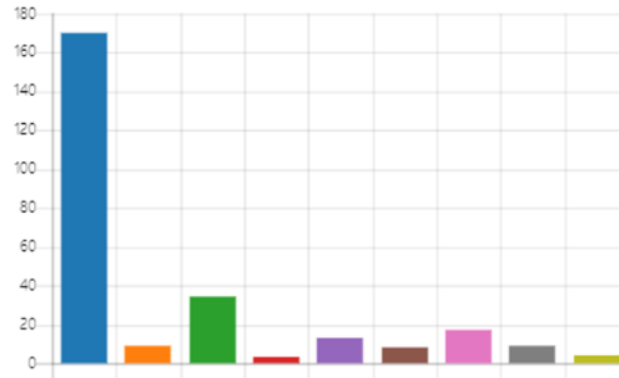
69% of all respondents have Internet access from their location.

● Yes	267
● No	118



The predominant connection type is DSL (44%) followed by satellite (9%)

● DSL (Digital Subscriber Line o...	170
● Fixed Wireless (ie: Xplornet - n...	9
● Satellite Service	34
● Fibre Optic (directly to your pr...	3
● Cellular Data (ie: Rocket Stick, ...	13
● Cable Modem	8
● Dial-Up Connection (over Tele...	17
● I don't know	9
● Other	4

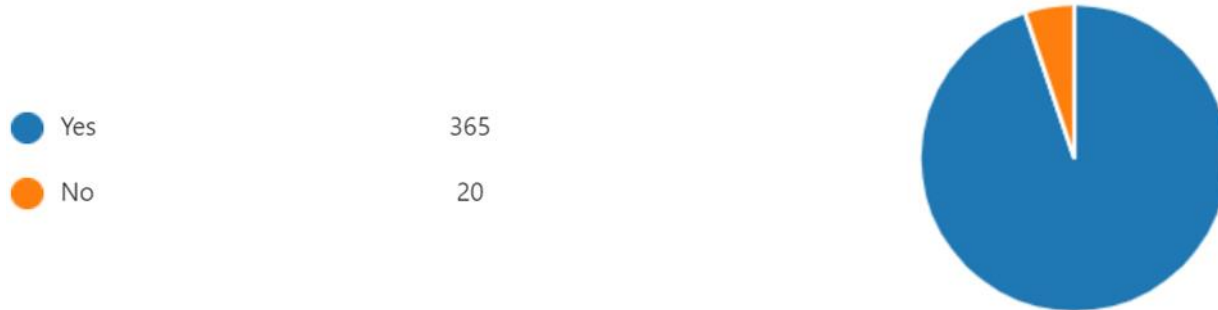


72% of respondents are dissatisfied with their current services.

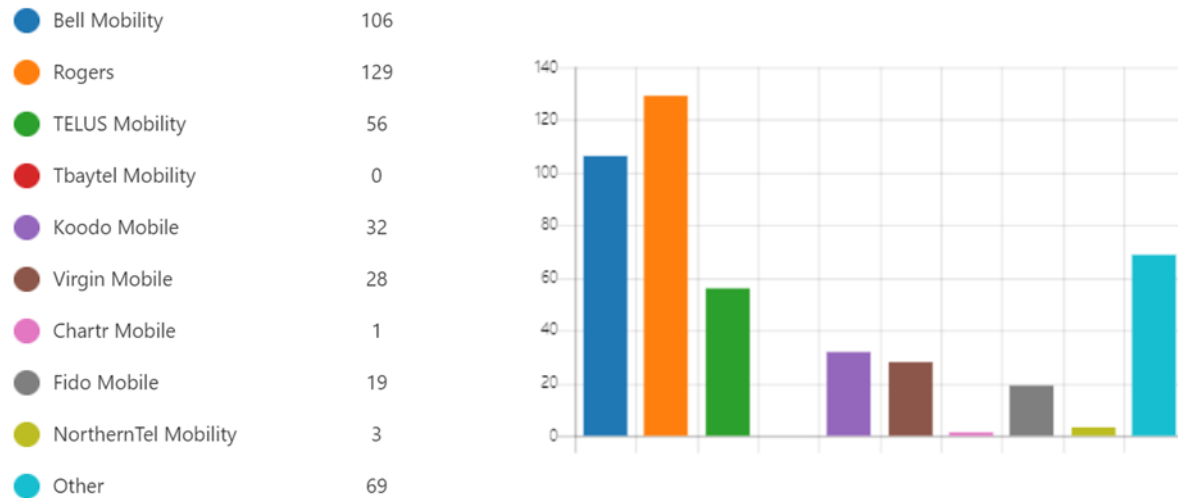
● Yes	74
● No	193



95% of households own at least one cellphone



Rogers et al account for 34% of cellular users and Bell/Telus total 51%



CAPEX

Estimates

Temagami Community Capital Projections

Communities	Premis Passed	MARKET PROJECTION		CONNECTED PREMS			TRANSPORT	DISTRIBUTION	DROPS	YEAR TWO & THREE		TOTAL FTTP COSTS			Notes
		Target Market Penetration	Target Prem Project Total	Year One Connected Premis	Year Two Connected Premis	Year Three Connected Premis	Transport + electronics	Distribution + Electronics	FTTP Drop + Prem Total Cost	Year Two PREM Capital	Year Three PREM Capital	Total Project Cost	Total Cost Per Prem PASSED	Total Cost Per CONNECTED Prem	
Temagami (Core)	240	80%	192	77	58	58	\$ 111,948	\$ 560,000	\$ 89,088	\$ 66,816	\$ 66,816	\$ 894,668	\$ 3,500	\$ 4,660	access at Ontera POP c/w upgrades
Temagami North	120	80%	96	38	29	29	\$ 111,948	\$ 280,000	\$ 44,544	\$ 33,408	\$ 33,408	\$ 503,308	\$ 4,083	\$ 5,243	access at Ontera CO c/w upgrades
Lake Temagami	913	30%	274	110	82	82	\$ 559,741	\$ 1,569,500	\$ 127,090	\$ 95,317	\$ 95,317	\$ 2,446,965	\$ 7,774	\$ 8,934	proxy for two towers on Lake (Bear Island + TBD)
Marten River	25	80%	20	8	6	6	\$ 559,741	\$ 237,500	\$ 9,280	\$ 6,960	\$ 6,960	\$ 820,441	\$ 39,862	\$ 41,022	POP undetermined, distances estimated
Bear Island	125	90%	113	45	34	34	\$ 55,974	\$ 287,500	\$ 52,200	\$ 39,150	\$ 39,150	\$ 473,974	\$ 3,053	\$ 4,213	fibre available (nodes and transport)
Total Premis	1423		694	278	208	208	\$ 1,399,353	\$ 2,934,500	\$ 322,202	\$ 241,651	\$ 241,651	\$ 5,139,357			

\$ 3,740,004 includes Years 1-3 (if applicable)

AVG	AVG
\$ 11,654	\$ 12,814

Premis Passed = # of premises that distribution cabling passes along a street, but not connecting to the premises (drop)
Target Market Penetration = estimate of how many customers would use the new service
Transport + Electronics = cost of construction backbone fibre to community + electronics, or electronics if transport fibre in place
Distribution + Electronics = cost of constructing last mile distribution fibre + electronics within the community
VDSL Per Connected Prem = cost of installing the node divided by the number of total subscribers
LOW (VDSL) = estimated low end of providing a degree of broadband in the community
HIGH (FTTP) = estimated upper end of providing a degree of broadband in the community

Overall Assumptions:

pole make ready costs not included
 % of premis connected varies, max 80% where no competitor to Ontera/Bell, max 60% where a facilities based competitor exists
 VDSL will not require distribution copper upgrades
 all values are estimates, additional accuracy requires market design and pricing exercise
 WIRELESS AND FIXED WIRELESS SOLUTIONS NOT INCLUDED EXCEPT FOR LAKE TEMAGAMI

Temagami Community Capital Projections - Estimated High - Low Ranges

	Transport		Distribution		Total Deployment	
	Low	High (+30%)	Low	High	Low	High
Temagami (Core)	\$ 111,948	\$ 145,533	\$ 351,948	\$ 894,668	\$ 463,896	\$ 1,040,201
Temagami North	\$ 111,948	\$ 145,533	\$ 351,948	\$ 503,308	\$ 463,896	\$ 648,841
Lake Temagami	\$ 559,741	\$ 727,663	\$ 799,741	\$ 2,446,965	\$ 1,359,482	\$ 3,174,628
Marten River	\$ 559,741	\$ 727,663	\$ 799,741	\$ 820,441	\$ 1,359,482	\$ 1,548,104
Bear Island	\$ 55,974	\$ 72,766	\$ 295,974	\$ 473,974	\$ 351,948	\$ 546,740
Community Totals	\$ 1,399,353	\$ 1,819,158	\$ 2,599,353	\$ 5,139,357	\$ 3,998,705	\$ 6,958,515

Deployment "Low" includes only 1 DSLAM c/w cabinet, power, installation allowance
 Deployment "High" includes full FTTP system and fibre transport (where needed)
 These estimated ranges are provided solely for planning and require detailed analysis if used for other uses.

Observations

- CRTC funding is delayed
 - Have not announced the application process yet
 - If funding approved in 2020, won't be building until 2021
- Provincial broadband funding parameters (ie: NOHFC or MOI?) have yet to be determined
 - Focus areas?
 - Totals?
 - Timing?
- Alternate funding
- Funding delay impacts the Community

Funding Program	Owner	Funding	Description
Closing the Broadband Gap	Canadian Radio-television and Telecommunications (CRTC)	\$750M fund over 5 years	To build or upgrade access and transport infrastructure in underserved areas. https://crtc.gc.ca/eng/internet/internet.htm
Strategic Economic Infrastructure Program	Northern Ontario Heritage Fund Corporation (NOHFC)	The lesser of 50% or \$1 million	Municipalities, municipal organizations, First Nations, Community Based Networks or ICT community champions (non-profit economic development / innovation centres) in Northern Ontario. https://nohfc.ca/en/pages/programs/strategic-economic-infrastructure-program
Rural Economic Development Program (RED)	Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)	Up to 50% of the project costs or a maximum \$100,000	Funding. Activities that grow the local economy and remove barriers to economic development. www.ontario.ca/page/rural-economic-development-program
Indigenous Economic Development Fund (IEDF)	Ontario Ministry of Indigenous Affairs (OMIA)	\$70 million over the next seven years to extend the fund, originally launched in 2014, for a total combined investment of \$95 million over 10 years.	The IEDF has 3 funding programs: The Business and Community Fund Program, Economic Diversification Grants Program, Regional Partnership Grants Program. www.grants.gov.on.ca/GrantsPortal/en/OntarioGrants/GrantOpportunities/PRDR012765
First Nation Infrastructure Fund	Indigenous Services Canada (ISC)	The amount of money planned under FNIFP varies from year-to-year because of time-limited, targeted funding programs.	The FNIFP was created as a complementary source of funding to the Capital Facilities and Maintenance Program and includes eight categories of eligible infrastructure projects including connectivity. www.sac-isc.gc.ca/eng/1100100010656/1533645154710
Community Investment Program	Canadian Internet Registration Authority (CIRA)	To date CIRA has contributed \$6.7 million in Community Investment Program grants.	CIRA funds innovative community projects to build a stronger, safer and more accessible internet for all Canadians - improving digital literacy, internet infrastructure, access and online services. www.cengn.ca/ontario-broadband-program
Next Generation Network Program (NGNP)	Centre of Excellence in Next Generation Networks (CENGN)	This intake has already passed; however CENGN noted that there will be future applications. In this previous intake, CENGN contributed 50 percent of eligible project costs for an approved project to a maximum contribution of \$500,000 per project.	Their mission is to accelerate the growth of the Canadian Information and Communications Technology (ICT) sector, enabling economic strength and prosperity, as well as innovation and competitiveness. www.cengn.ca/ontario-broadband-program
Rural and Northern Communities Infrastructure	Infrastructure Canada	The Government will invest \$2 billion over the next decade to support a broad range of infrastructure projects.	Investments in rural and northern infrastructure will help grow local economies, build stronger, more inclusive communities, and help safeguard the environment and the health of Canadians. Because rural and northern communities have unique infrastructure needs that require a more targeted approach. www.infrastructure.gc.ca/plan/mc-cm-eng.html

CRTC Broadband Fund

- \$750 Million over 5 years starting in 2019,
- Revised target of 25Mbps download and 5Mbps upload (vs 50/10),
- Three stages: 1) eligibility, 2) assessment and 3) selection,
- Build/upgrade access and transport infrastructure for fixed and wireless broadband; however, preference for fixed,
- Project must show that it would not be viable without Commission funding,
- Applicants can be established carriers, new entrants, and community organizations, and
- Preference to multi-regional proposals *“as well as any affected Indigenous and official language minority communities”*.

Eligibility (Geographic)

Based on 25 km² hexagons:

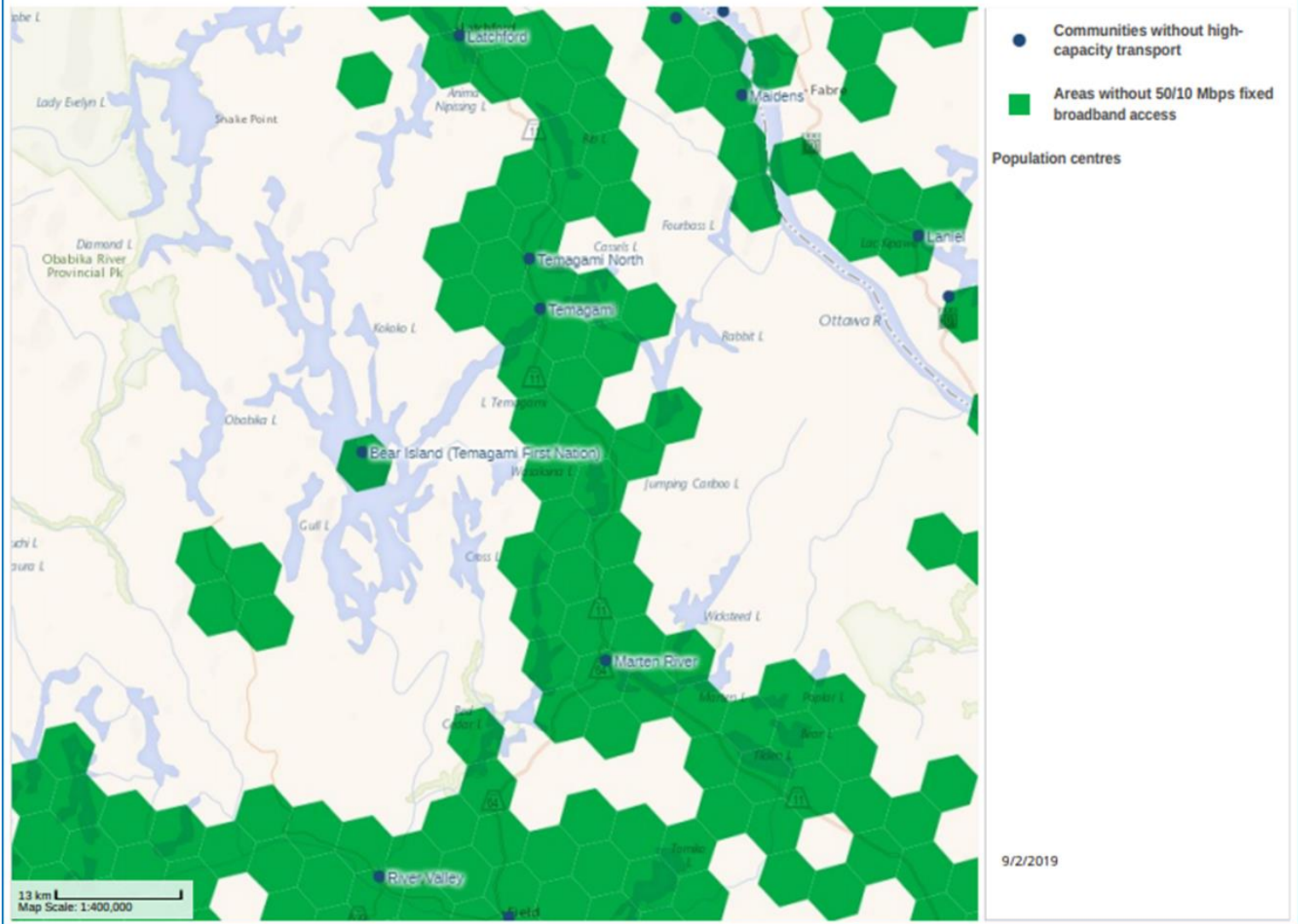
- fixed broadband Internet access service projects:
 - at least one household, but where no household has access to broadband Internet access service (i.e. 50/10 Mbps).
- transport projects:
 - build or upgrade infrastructure to an eligible community, defined as a small population centre with a population of fewer than 30,000 residents;
 - located at least 2 km away from a PoP; and
 - with a minimum capacity of 1 Gbps.
- mobile wireless service projects:
 - at least one household but no access to coverage by the latest generally deployed mobile wireless technology (currently LTE), or
 - part of a major transportation road that does not have access to coverage by the latest generally deployed mobile wireless technology (currently LTE).

Eligibility (Project Types)

Projects to build or upgrade fixed access infrastructure, transport infrastructure, mobile wireless infrastructure, or any combination of these:

- Fixed broadband Internet access service projects:
 - capable of providing a minimum download speed of 25 Mbps and a minimum upload speed of 5 Mbps.
- Transport projects:
 - new builds must offer a minimum capacity of 1 Gbps, and
 - proposed projects that would upgrade transport infrastructure must offer a minimum capacity of 10 Gbps.
- Mobile wireless service projects:
 - at a minimum the latest generally deployed mobile wireless technology, currently LTE, will be eligible for funding.

Fixed Internet Access and Transport Maps



Recommendations

- Discuss local distribution upgrades with Ontera
- Take the lead on any future funding applications, but attempt to broaden participation
 - Expand to include other communities (NSRBN, EORN)
 - Seek service provider partners
 - Review wireless (Radio Frequency) options to optimize coverage
- Consider creating a regional ISP or partnering
- Secure a resource to monitor regulatory and service providers

Interim Solutions

There are many independent service providers seeking to implement solutions such as Fixed Wireless ISP services to communities.

Typically they cannot yet meet the CRTC 50/10 bandwidth targets (technology selection, available backhaul), but can greatly provide improved service ie: up to 25Mbps (depending on distance from tower, number of users and line of sight).

Some considerations if they are looking to partner and/or seek financial contribution:

- Do they have a documented and/or planned technology path towards greater bandwidth?
- If they are not local, how will they provide technical service?
- Where are they getting their backhaul bandwidth from (ie: Bell)?
- Are they registered with the CRTC (all ISPs must now be)?
- Can they provide any other services on their network (ie: local telephone vs nomadic VoIP)?
- Are they asking or inferring any kind of exclusivity with you?

If they are not seeking to partner with you, then they are private enterprises with their own ROI and risk to consider. Other than ensuring they conform to local bylaws and/or planning requirements and Federal tower siting rules, these companies are seeking to create viable competition in the local market.

Miigwetch!
Thank you!

Amedeo Bernardi Consulting Inc.

www.amedeobernardi.ca

amedeo@amedeobernardi.ca

705-845-1005

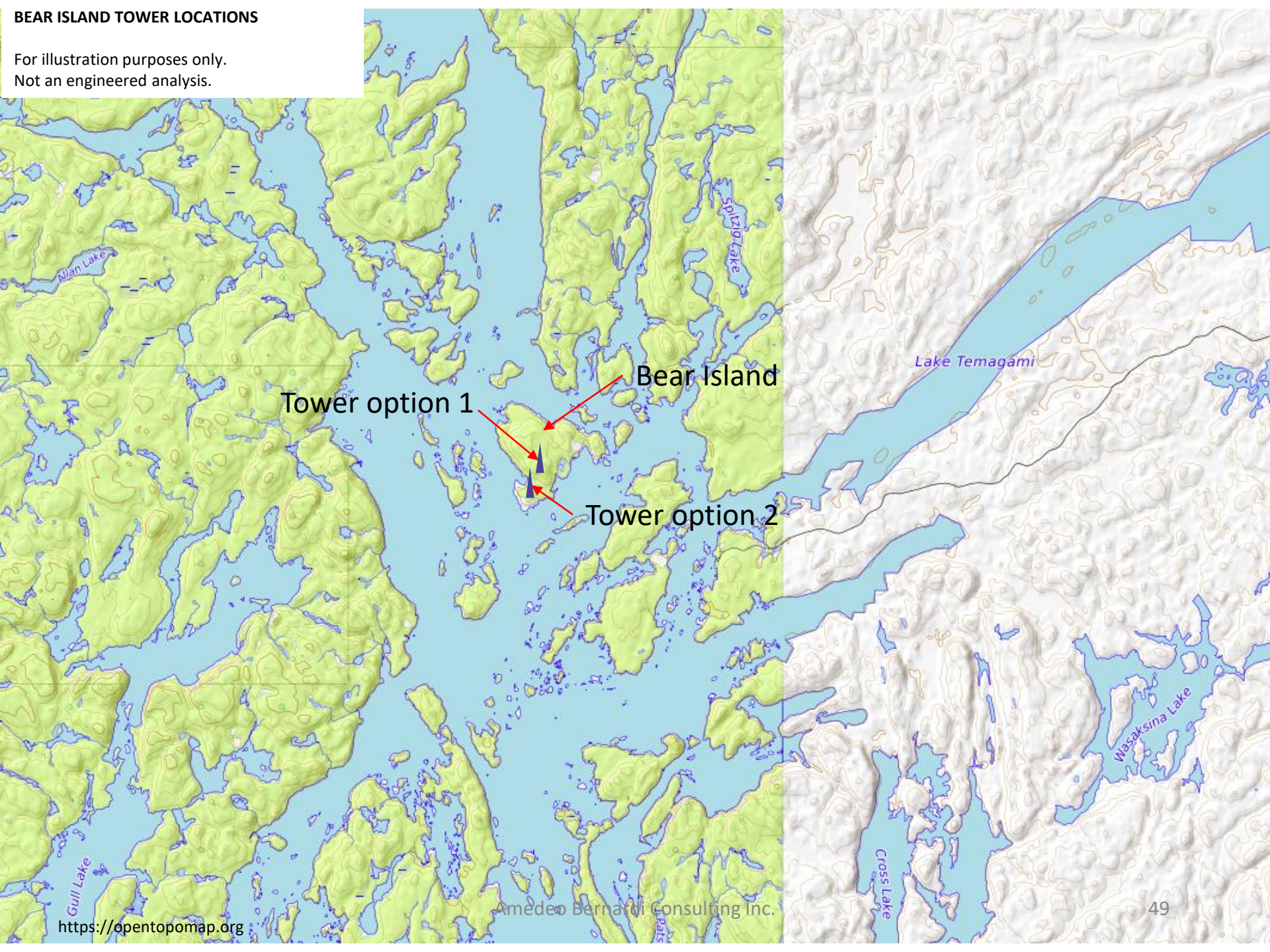
BEAR ISLAND TOWER LOCATIONS

For illustration purposes only.
Not an engineered analysis.



BEAR ISLAND TOWER LOCATIONS

For illustration purposes only.
Not an engineered analysis.



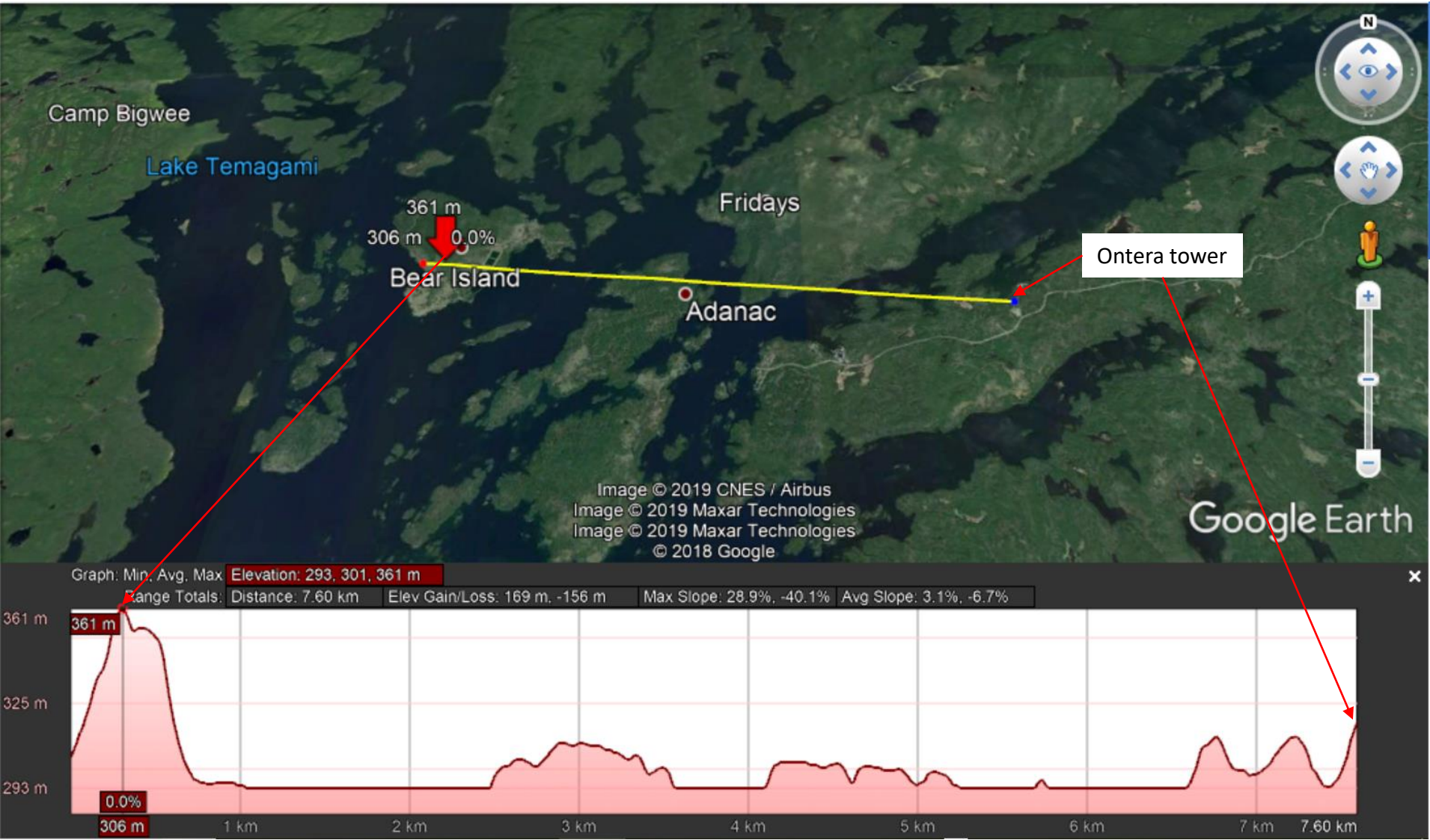
Tower option 1

Bear Island

Tower option 2

ELEVATIONS

For illustration purposes only.
Not an engineered analysis.



ELEVATIONS

For illustration purposes only.
Not an engineered analysis.

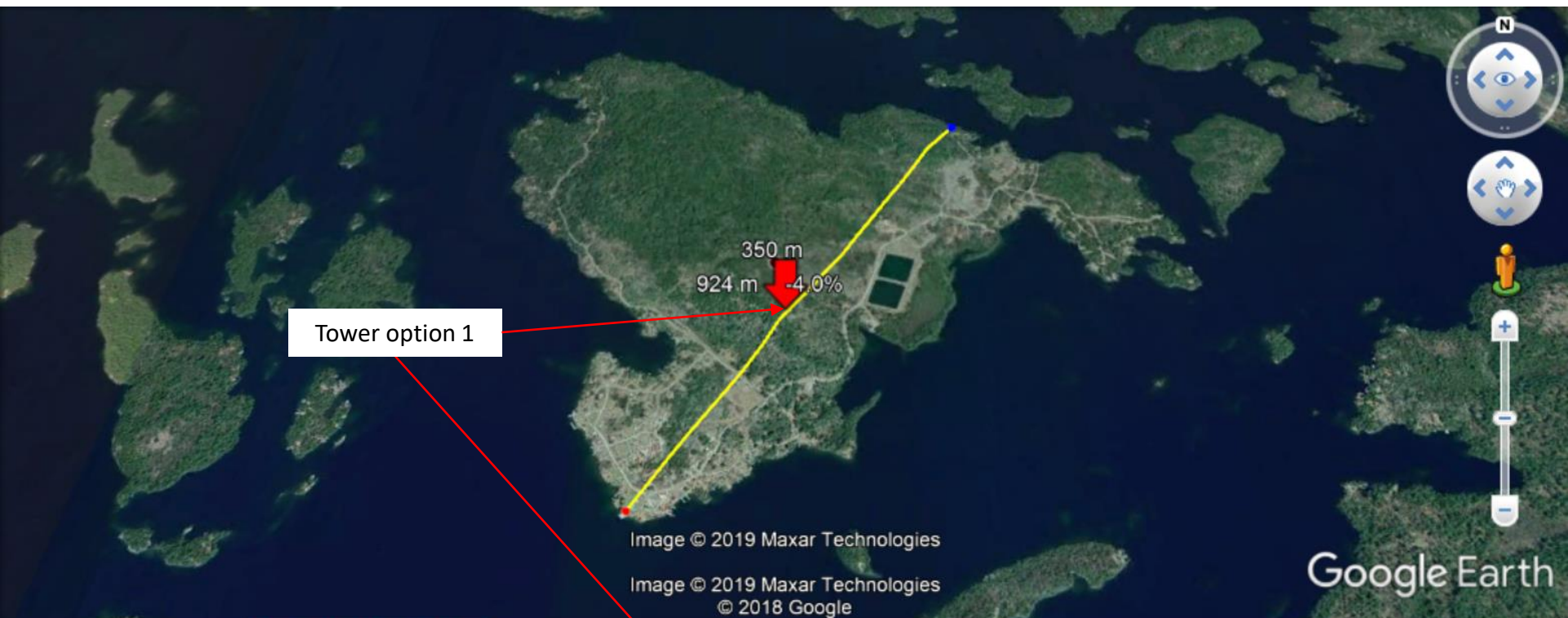


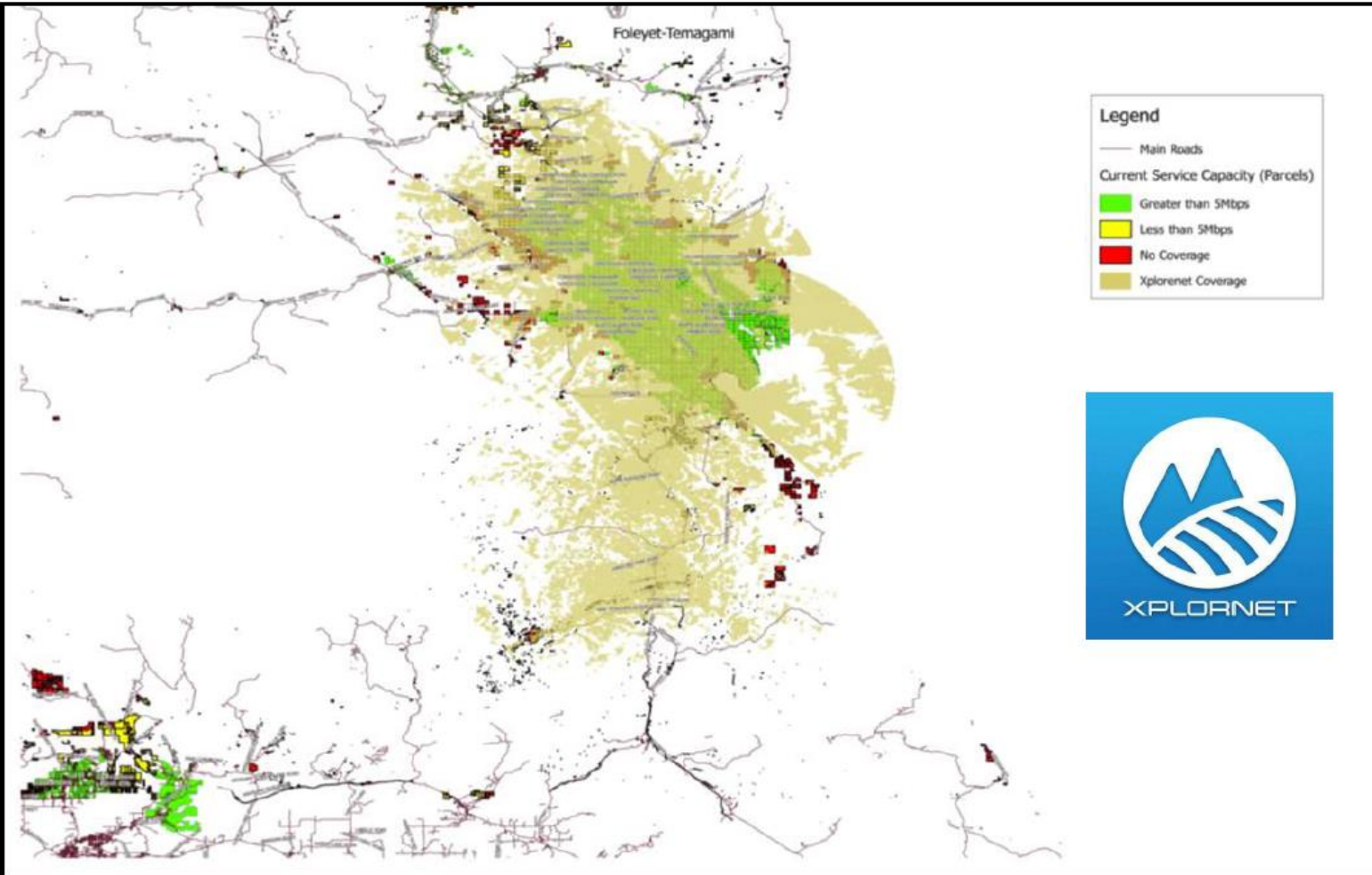
Image © 2019 Maxar Technologies
Image © 2019 Maxar Technologies © 2018 Google

Google Earth

Graph: Min, Avg, Max Elevation: 294, 316, 350 m
Range Totals: Distance: 2.20 km Elev Gain/Loss: 104 m, -104 m Max Slope: 32.2%, -31.6% Avg Slope: 7.4%, -12.1%



Xplornet Expected Coverage



NEOnet

Mobile Broadband Coverage

