Standing Committee on Industry, Science and Technology (INDU)

SaskTel

Broadband Connectivity in Rural Canada

Submission

9 February 2018

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1.0 Introduction

1. SaskTel is a Crown corporation of the Province of Saskatchewan. In addition to the needs of the marketplace, the company's overall strategic direction is guided by the priorities of the provincial government which has an interest in the economic success of SaskTel as well as meeting the telecommunications requirements of the people of the province. It is the desire to serve the people of the province that has allowed SaskTel to provide voice services, cellular services, and internet services deeper into the province and earlier than other service providers have in their operating territories. As a result, Saskatchewan customers have access to high speed internet services in virtually all Saskatchewan communities of 50 or more homes.

2. Today there is widespread understanding that broadband internet access is a necessary element of life in Canada. It is also known that Canadians in rural Canada have less access to broadband services than do urban Canadians. What is less well understood is how geography, technology, and economics affect an individual Canadian's access to broadband internet. In fact, we suggest that there is no standard definition of rural versus urban Canada and there is no commonality in the description of wireless solutions. Both of these factors cause some confusion in the discussion.

3. In our submission, we will explain important influences that urban and rural geography have on broadband service availability. We will illustrate how different access technologies impact service availability and finally we will explore the economic factors that influence access to service. We will do this by developing a thorough understanding of the circumstances of Canadians living in deep rural communities of only a few residents inhabiting several dozen homes clustered together, likely near an access road. We will also describe the different circumstances of Canadians living on the farms outside of these deep rural communities. The requirement these Canadians have for broadband internet is the same as their neighbors in the large urban centres with thousands of people, but the business model required to support the continued delivery of that solution differs.

2.0 Acceptable High Speed Internet

4. For this discussion, we are not talking about the minimum speed required to participate in the digital economy as was explored by the CRTC in its review of the Basic Service Obligation. We are addressing what constitutes an acceptable high speed service. That speed is higher than the minimum speed needed for dealing with government and economic necessities. It is a speed that will allow those interactions plus enable multiple residents living in the home to have multiple devices on line at the same time some of which are streaming video while others are simply surfing the web. We suggest that in this context, acceptable high speed service is what the customers want and are willing to pay for. Currently the CRTC has set an aspirational target of 50 Mbps down and 10 Mbps up and presently only small numbers of customers in urban centres in SaskTel's

market, who have access to these speeds, purchase that speed or higher. So, it appears that 50/10 is currently an acceptable speed. However, as internet-connected applications and devices in the home proliferate, the acceptable speed is likely to increase over time.

3.0 Geographic Considerations

5. There needs to be an understanding of the impact rural geography has on the technology choices and the economic costs to serve rural areas. Truly rural communities consist of a small number of houses in relatively close proximity to each other. There may or may not be a school, business, or government institution within the community boundaries. Farms, ranches and acreages are found outside of these small pockets of residents and outside of larger communities. The density in the communities and the distances between these residences and businesses on the farms, ranches and acreages varies, and is much less than their eastern counterparts. For instance, in Saskatchewan farms are on average 7 times the size of those in Ontario, and a much larger portion of southern Saskatchewan is comprised of farmland interspersed with small rural towns and villages.

6. In Saskatchewan, the vast majority of these communities are served by a transport network including fibre rings that form part of SaskTel's core network. It is easier and more economic to deliver high speed internet to rural communities than it is to deliver high speed internet to the farms outside of these communities. In other provinces, many of these communities that are not already connected via fibre backbones are being connected under the Federal Government's Connect to Innovate program. Most communities in Saskatchewan in these rural areas do not have access to 50/10 Mbps speeds, but are served with Digital Subscriber Line (DSL) technologies that deliver between 5 and 10 Mbps today. But as these communities are on fibre routes they can be upgraded to 50/10 Mbps to each home with a comparatively smaller investment than is required to serve the farms, ranches and acreages, although the existing copper and internet technology will need to be replaced. While comparatively smaller, even in these communities, the investment required per customer is large.

7. Farm country is found outside of these communities. The families that live on farmsteads or in rural areas need high speed internet for personal and business uses even if they are not farmers. Their children need high speed for school. Modern health care is increasingly reliant on high speed internet. Modern farms are businesses. They need high speed internet in the home and in the out buildings where they work and store their produce and equipment. Farmers need access to the internet to market their products, buy and sell equipment, order parts and for many other activities that once were done in more traditional manners. More and more farms need high speed internet coverage in the field in addition to their home and outbuildings. Modern farm machinery connects to the broadband internet for maintenance repair and efficient operations.

Farm and ranch animals can have radio frequency identity tags inserted onto their skin which allows them and their life cycle to be effectively tracked and managed, and remote soil sensors monitor soil conditions. While the physical layout of geography of farm country in Saskatchewan (and Manitoba and Alberta) may differ from the farm country in the rest of Canada, the fact is that for purposes of high speed internet service, farms share an essential feature. They are found in single farmsteads some distance from any other farmstead.

8. First Nations communities south of the Saskatchewan tree line resemble acreages in many ways as many of the residences are widely dispersed. SaskTel has worked with Indigenous and Northern Affairs Canada over the last several years to bring fibre to the First Nations' Band Offices, schools, and health facilities. All are now capable of receiving 10 Mbps Dedicated Internet, but due to the large distances between homes, the cost to provide residential internet service at acceptable speed is prohibitive and few homes are served. On reserves south of the tree line, residents frequently use their cellular data devices for high speed internet service. First Nations residents north of the treeline benefitted from the Connecting Canadians program under which SaskTel installed minimum 5/1 Mbps service in 26 communities covering over 2,700 homes.

9. As bandwidth demands increase, acceptable high speed internet will be best provided via fixed wireline service with cellular coverage of the lands being farmed. Fixed wireless solutions can provide acceptable high speed internet for a period of time and possibly permanent solutions in less dense areas, but it is only a matter of time before bandwidth demands exceed the cost-effective capabilities of today's wireless technologies and the spectrum available.

4.0 Spectrum Considerations

10. SaskTel's fixed wireless high speed internet service uses a point-to-point connection delivering up to 10 Mbps download and 1 Mbps upload to rural subscribers living within a 20 km range of a tower. The technology exclusively uses 20 MHz of the 2.5 GHz "unpaired" frequency band that SaskTel has within its spectrum assets. The demand for this service is such that several locations experience network congestion requiring SaskTel to "stop selling" to that local market and the implementation of surcharges on excessive downloading to govern high network usage of this shared network.

11. To mitigate this congestion, more spectrum is key as SaskTel's service uses exclusively the 2.5 GHz "unpaired" spectrum. Deploying more of the same spectrum on a tower footprint is the most economic means of serving up more bandwidth at a congested site. The last remaining block of 2.5 GHz "unpaired" spectrum is to be auctioned by sealed bid this May 2018. SaskTel is not eligible to bid in this auction due to its current holdings of 40 MHz of "paired" 2.5 GHz spectrum, which can only be used for mobile cellular service, which puts SaskTel over the spectrum cap rules. ISED chose to apply spectrum

caps on the combined 2.5 GHz frequency regardless of the different purposes for the paired and unpaired bands. This measure shuts SaskTel out of the auction and it will certainly have an impact on SaskTel's fixed wireless product in Saskatchewan as it is now forced to augment the network through more costly means e.g. more towers and equipment.

12. Although the fixed wireless 2.5 GHz spectrum auction rules are a disappointment, SaskTel commends ISED's proposal to set aside 30 MHz of the 70 MHz in the 600 MHz band for smaller/regional operators to bid on in the pending 2018 600 MHz auction. This is good policy as it supports those carriers that have demonstrated the commitment to build out networks to serve deep rural residing customers. The 600 MHz spectrum is ideal for both rural coverage and building penetration and once deployed, it will have a very positive impact on cellular service in rural Saskatchewan.

13. Consistent with ISED's proposed rules for the 600 MHz auction, policy priority should be to support the most logical and effective deployment of the spectrum for the benefits of the provincial residents. As evidenced in recent spectrum auctions, the Government of Canada's goal to optimize the return on spectrum came at the expense of the regional providers who were either shut out of the auction or were unable to acquire the spectrum best suited for rural wireless service delivery. These past auctions have clearly been detrimental to the regional competitor already challenged in its marketplace and in its capacity to meet rural service targets.

5.0 Fixed Solutions are Best Solutions

14. Fixed wireless solutions are one way to provide service economically to areas with dispersed population bases and low density. However, as noted above, capacity becomes an issue due to spectrum constraints on providers and customer demand that exceeds the available spectrum. Furthermore, wireless solutions themselves have inherent limitations such as shared spectrum resources, weather related outages and issues with signal quality in certain topographies that limit their ability to provide a stable, sustainable solution for many residents going forward. Ultimately, a fixed wireline solution is preferable to a fixed wireless solution in the long term.

15. Digital Subscriber Line (DSL) technologies (offering high speed internet over copper access lines) are still relevant in today's technology mix for delivering broadband infrastructure to rural communities, and are a cost-effective means of doing so. SaskTel currently utilizes Fibre to the Node (FTTN) DSL-based broadband to some 430 plus rural locations, with download speeds ranging from 5 Mbps to 25 Mbps using different vintages of DSL equipment and protocols, and ultimately, customer home distance from the nearest equipment cabinets serving the area. SaskTel's $670 Million fibre to the premise program in the 9 major centres of Saskatchewan is also contributing to increased broadband availability in rural communities as the DSL equipment being

retired from this build can be re-deployed in rural centres to increase speeds cost effectively.

16. SaskTel is also exploring the introduction of further enhancements to its current DSL infrastructure, such as pair bonding, vectoring and other developments, to potentially provide speeds of up to 50 Mbps over its current DSL infrastructure in rural Saskatchewan communities.

17. While DSL infrastructure is robust, there is one limitation that cannot be overcome regardless of innovation, – for every increase in download and upload speed, the distance that the customers' homes can be from the serving equipment cabinet decreases. In SaskTel's case, 5 Mbps down/640 Kbps up means the copper loop can be no longer than 4,000M, for 10/800 Mbps its 2,200M, 5/1 Mbps is 1,200M and 25/2 Mbps is 900M. This means that to increase speed in a community requires more fibre and remote cabinets be installed to bring the loop lengths within these tolerances.

18. While SaskTel can utilize its DSL infrastructure to cost-effectively serve these communities to the greatest extent possible, there is ultimately a tipping point in which it no longer makes economic sense to continue to utilize DSL, and the decision to move to a fibre to the premise (FTTP) based infrastructure is the next evolution. Furthermore, these loop lengths do not make DSL a feasible solution to serve those residents that live outside of a community on a farm or acreage that may lead to the copper loop being calculated in kilometres, rather than metres. Given the sparse density of these customers outside of communities, it further doesn't make sense to push DSL infrastructure closer to these customers as the investment in cabinets and copper would serve at most 2-3 customers.

19. These technical limitations in providing speeds greater than the current goal of 50/10, and the relentless increase in customer demand for speed ultimately leads to the conclusion that provision of acceptable broadband service to these communities and farms, ranches and acreages will need to use fibre-based infrastructure to the home/farm.

20. SaskTel is currently deploying a Passive Optical Network (PON) based fibre network in its 9 major centres as a future proofed next-generation broadband infrastructure. In its current architecture, the network can deliver speeds of up to 300/80 Mbps, and is not subject to the same distance limitations as its DSL predecessor. SaskTel has also deployed fibre in one community of less than 2,000 people to assess the economics of such a build.

21. It is obvious that constructing fibre to the premise is a costly, time consuming endeavor in that the company is essentially rebuilding the copper network in each city, including replacing the 'drop' to each home and business from a traditional copper pair to a single strand fibre optic cable. The economics are positive to complete this transition in these

urban areas, where there is high customer density to cover the significant capital costs of constructing a new network. The same economic business case is not necessarily present in most smaller centres in Saskatchewan, and non-existent outside of population centres to the farms and acreages that surround them.

22. In smaller rural communities, the number of households present simply do not support the required capital outlay required for the installation of FTTP infrastructure and facilities. Capital programs such as Connecting Canadians or Connect to Innovate may be sufficient to cover the shortfall in capital required to overcome the financial hurdles of moving to FTTP in some of these communities. However, many rural communities will be uneconomic to build; and even a one-time capital injection will not allow SaskTel to clear these financial hurdles.

23. The provision of services to farms and acreages surrounding these communities brings forth further challenges. As noted above, these residences are often kilometres away from the nearest community, and are generally sparsely dispersed across the countryside. Even in situations where these residences are somewhat densely contained (such as an acreage development near a major centre), the distance between residences poses challenges to FTTP deployments from a technical and economic perspective. Ultimately, the largest cost impediment to any business case to bring service to these residences is the distance of fibre that must be placed to connect their residences to the network to receive service. Currently the cost of placing 1 KM of buried cable, regardless of type or size, is approximately $20K.

24. These impediments need not be insurmountable. These small communities and farms and acreages have copper-based voice services today, which is the result of decades of development and cross-subsidization of services. Starting in 2001, with the decline of long distance revenue cross subsidies, the CRTC introduced a program under which the ILECs serving these households in High Cost Serving Areas began receiving subsidy dollars to cover the cost of providing voice service. A similar model could be instituted to fund the transition to FTTP for these areas.

25. Providing Fibre to the Farm Premise or a cellular service to the farms, ranches and acreages is the only way to ensure that an acceptable high speed internet is available throughout Canada, including truly rural areas. The cost to provide high speed service to these areas is akin to providing individual line voice services as was accomplished in the past. It requires a significant up-front investment and ongoing funds to install, maintain, and upgrade the network and to install new service drops as people build new residences on the land. In considering the revenue contribution to the business case, service providers look at the contribution they can receive from multiple services using the same infrastructure over the life of the services. In fact, competitors look at the revenue streams they might derive from access to this infrastructure and that creates problems for the business case.

26. No service provider will be able to develop a business case that justifies the investment required to serve these areas. A contribution to construction costs is needed. Customers will not be able to pay the price required to justify the investment and continued obligation to provide acceptable service. Therefore, a contribution to ongoing costs is needed. And the business case is made poorer when a service provider's fibre to those rural communities that have a positive business case is made available to competitors who if they take that fibre will take some of those few customers who have a positive contribution out of the service providers area. This is why service providers are reluctant to expand their fibre services to smaller (though not necessarily rural) communities outside of the urban centres. Many of these communities would justify an investment in FTTP if the service provider could be assured that they would receive a multi-product return on their investment. Resale of fibre access and transport will need to be rethought if there is going to be an investment in farm, ranch and acreage FTTP.

27. There are government and regulatory initiatives to bring broadband to unserved and underserved areas. The federal government's Connect to Innovate program will disburse $500 Million in capital contributions to businesses to build backbone connectivity to underserved areas. The CRTC's broadband build fund will contribute a total of $750 Million to underserved areas over the next 5 years. While the geographic focus of the build priorities has not been determined, the priorities in the decision to establish the fund seem to be on underserved communities. The decision also suggests that funding will be made available for the rest of Canada after that, and contemplates the build program ending in 15 years. Looking at the needs of farms, ranches and acreages in rural areas and the funding available for underserved areas it is apparent that there is a gap between the cost to provide acceptable internet service and the funding available. There is not enough funding set aside or in the pipeline, and there is too long a time frame to meet the needs of rural Canadians. Canada should be looking at funding needed to accelerate the build.

28. Without these issues being addressed, it is unlikely that truly rural communities and farms, ranches and acreages will ever be served by an acceptable high speed internet. It would therefore make sense to create a system of ongoing subsidy to be paid to the service provider for building to, and serving homes/businesses in these areas.

6.0 Conclusion – to go beyond wireless to a FTTP solution

29. In summary SaskTel answers the referred questions in the following manner.

    1) Acceptable high speed internet is customer specific and will increase over time. 50/10 Mbps throughout Canada is an aspirational target that should be viewed as a stepping stone towards something bigger, especially given that this speed is already exceeded in the urban areas of Canada.

2) Current funding programs such as ISED's Connecting Communities and the CRTC's Broadband Fund initiative will help bring backbone to areas that need service and will help provide a higher speed of service than exists now, but will not enable ubiquitous and affordable acceptable high speed internet throughout Canada. Only a program aimed at high cost internet serving areas and a subsidy directed specifically at the very small communities, and the farms, ranches and acreages that is akin to the subsidy developed for providing voice services in high cost serving areas will suffice.

3) Regulatory changes are needed to make spectrum that will serve small communities, farms, ranches and acreages more affordable and more readily available to companies that will take on obligations to provide an interim wireless solution in those areas. In addition, it will be necessary to make changes to the regulatory framework to permit the creation of a subsidy fund and continuing levy and payment to support the delivery of acceptable high speed internet over fibre or other suitable technology.