Mandated Access to Fibre
Lessons for Canada from Europe

Report provided by Dr. Georg Serentschy (SERENTSCHY.COM) as part of TELUS’ Petition to the Canadian Government in relation to Telecom Regulatory Policy CRTC 2015-326, Review of wholesale wireline services and associated policies, 22 July 2015

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Table of Contents

1. Introduction
2. Executive Summary
3. The Macro-Economic context of fast and ultra-fast wireline broadband coverage and take-up
4. Challenges in deploying fast and ultra-fast wireline broadband in Canada
5. Relevant learnings from the EU Policy choices – which regulatory policies worked and which not
6. Conclusions and Recommendations for Canada
7. Appendix I.: Biography Dr. Georg Serentschy
8. Appendix II.: References
9. Appendix III.: Background information
1. Introduction


In November 2015 Dr. Georg Serentschy (SERENTSCHY.COM) was asked by TELUS to provide this report “Mandated Access to Fibre - Lessons for Canada from Europe”, covering important learnings from the European wireline broadband rollout and relevant recommendations for Canada before the background of CRTC’s TRP decision.

This report is structured in three layers

- Top layer 1 (Executive Summary, Chapter 2) is aimed at providing a ‘helicopter view’ on the content to provide a quick read highlighting Chapters 3 – 6 from the starting point to the recommendations and conclusions for Canada without going into detail. Reference is made to the Annexes where necessary.
- Layer 2 provides a more in-depth discourse (but still not too technical) of the case structured in Chapters 3 – 6.
- Finally, layer 3 provides an ‘expert-view’ on different parts of the analysis, assumptions and conclusions, providing the empirical and underlying evidence for the analysis, conclusions and recommendations.

This layered structure reflects the ambition of the author to deliver bespoke language and targeted messages for different interests and audiences. More and detailed information is provided by footnotes, references to Annexes and highlighted [Explanations] in the main text of the document.

2. Executive Summary

This Chapter provides a quick overview of the storyline of this paper (see Exhibit 1), starting with a description of the initial situation in Canada including some supportive data points, charts and a wrap up of the CRTC decision 2015-326. Having in mind the cautionary tale of European landline fast and ultra-fast broadband regulation, relevant conclusions and recommendations for Canada are presented and why implementing this CRTC decision would be detrimental for Canadian citizens and businesses.
Exhibit 1: Logical flow of the report: from situation and complication to recommendations (simplified perspective). [Explanation: FTTP = Fibre-to-the-Premises, meaning that a fibre line goes directly from the exchange to the customer’s premises].

How to read the infographic depicted in Exhibit 1:

**Situation:** CRTC’s decision in the TRP is a break from Canada’s so far very successful broadband rollout policy. In a critical time where operators need to be incentivised to take additional risk by investing in new infrastructure and new technologies this decision creates a sustained negative impact on the overall investment climate of Canada and the willingness for investments by the industry.

**Complication:** Due to its geographic setting, Canada is facing a more difficult challenge than other geographies to build and maintain a leading edge broadband environment. Thus, a focused broadband policy motivating investments is even more critical for Canada and its society and economy going forward.

European experience (telling examples are explained in more detail below in the report) shows that the set of policies now taken up by CRTC will create unstable and unattractive investment conditions. These examples are demonstrating that enforcing mandatory access to entirely new infrastructure is counterproductive for building a future proof and broadband infrastructure.

In summary, three recommendations are critical for Canada’s future broadband and FTTP evolution
- A **stable investment environment**, especially for recent investments not yet recouped and for additional investments in new infrastructures and technologies
- A focused **strategy to leverage the infrastructure investments** of the existing
market players to reap the benefits for Canada’s society and economy

- **A differentiated approach** for urban and rural areas acknowledging Canada’s geographic challenges by enabling focussed rural investment.

**Brief wrap-up of this report:**

- **Canada’s initial positioning in the e-communication sector is promising**: The country holds an excellent rank 11 in the World Economic Forum “Networked Readiness Index” just behind Singapore (#1), US (#7) and Japan (#10) and some non-EU European countries. Canada’s outstanding broadband supply has been driven by a lively and healthy competition between physical networks (“facilities based competition”), which led to intensive investments in the country’s communication infrastructure.

- **Broadband demand in Canada is well developed, internet affinity and e-skills** (ability to work with computers and smart-phones, access the internet, managing emails, etc.) are widely present. The NRI combines a range of indicators on digital networking, market environment, readiness, usage and impact. Although there are many other drivers, broadband infrastructure and usage are clearly one of the heavyweights of the index.

- **In the light of international developments, the CRTC decision 2015-326 is an unforeseen, disruptive change** of a well proven set of policies of the country putting the successful development of broadband in Canada at risk.

- **At this point it is worthwhile to have a look on how Europe and other jurisdictions developed its broadband policies over the last two decades.** Europe started at the beginning of the ‘broadband era’, with a harsh regulatory regime by simply copy and pasting what was seen as a successful formula of mandated access to wholesale telecommunications facilities that started more then 25 years ago at the beginning of the telecom liberalization and the break-up of the legacy telecom monopolies. The old rules were for now legacy telecommunications networks, and this interventionist approach turned out as the wrong toolset for the broadband era and for attracting investors. Recognizing that Europe was lagging more and more in terms of fast and ultra-fast broadband coverage and confronted with the fact that potential investors walked away from the telecommunication sector, Europe began to adapt its policies with often hesitating ‘trial-and-error’ type of steps towards a more investment friendly regulatory regime.

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1. For more details, see Appendix III-A
3. EU countries among the first 10 (Finland, Sweden, Netherlands, Luxembourg) are “the usual suspects” top EU countries, to phrase it bluntly, despite EU policies (not because of).
4. For more details, see Appendix III-B
5. For more details, see Appendix III-C
6. For a more in-depth description of the cautionary tale of European fast and ultra-fast broadband regulation, see Annex III-D

Report in response to the Telecom Regulatory Policy (TRP) CRTC 2015-326
In the light of the CRTC decision 2015-326, ironically the policy trajectories in Canada and Europe are going in different directions; While Europe – recognizing its policy failures - is heading towards a more investment friendly environment, Canada has put in place a decision that would adopt failed European policies. This route would obviously be detrimental for the country.

Exhibit 2 – Canada, moving in the wrong direction?

- Sustainable competition between physical networks (“facilities-based” competition) is the key to economic growth, job creation, investment and innovation. However, the CRTC decision in TRP 2015-326 detracts from facilities-based competition.

Most of the consumer benefits from using electronic communications comes from so-called dynamic efficiency gains and not from more static forms of competition. Dynamic efficiency gains are most prevalent when regulatory regimes focus on facilities-based competition, because service providers then compete by investing in new technologies that enable more innovative services for consumers.

**Explanation:** Leveraging dynamic-efficiency gains means that most of the consumer benefits arise from investments in new technologies, not in making existing technologies a little bit more efficient, and even less in making small incremental improvements of the retail market (i.e. the consumer view on the market).

- Richard Feasey, an internationally renown telecom expert, stated recently “…let me underline that I think the aim [of any regulatory intervention] should be to minimise network monopoly, not maximise retail competition. They sound like the same

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thing, but the focus is very different. In my experience, the additional benefits from injecting a fourth or fifth retailer into a market are trivial in comparison with the benefits that could be realised from moving from monopoly to duopoly at the network level. Yet more focus has been given to the former than to the latter in recent years. It is time for all regulators to change the focus.9

• Conclusions and recommendations for Canada: After a long and successful history of an investment friendly wireline broadband regulatory regime in Canada based on competition between physical networks on broadband quality and availability ("facilities based competition"), CRTC has taken an unexpected and disruptive step by adopting policies which have been proven to be detrimental for European citizens and business, harmful for the innovation climate ("LTE wireless broadband ("4G") network rollout was a disaster in Europe"10, to give only one example) and negative for the investment climate. The irony of this story lies in the fact, that at a time, when Europe has recognized the failure of these policies and takes steps to correct them, the Canadian regulator obviously takes exactly the opposite route. The Cabinet should move away from the CRTC's decision and re-commit to facilities-based competition.

Exhibit 3: Canada’s FTTP penetration needs to be further increased

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The low percentage number for fibre-to-the-premises (FTTP)\(^{11}\) penetration in Canada in comparison with the US and EU (in the EU, FTTP penetration was driven by some of the EU countries not following the old EU rulebook!) shows clearly the demand for action in the right direction. In the light of these numbers and the sobering European learnings, implementation of CRTC’s recent decision 2015-326, introducing mandated wholesale access to fibre-to-the-premises (FTTP) and DOCSIS 3.1\(^{12}\) would be a counterproductive measure for Canada at a stage where the respective rollouts are just beginning and far from complete. In TRP 2015-326, the CRTC imposed “mandated access”, i.e. ruled that the largest internet providers must provide their smaller rivals with wholesale access to their FTTP networks\(^{13}\).

**Bottom line recommendations in the light of the analysis provided in this report are**

I. That the Governor in Council vary the TRP by striking paragraphs 137 to 143 inclusive

II. To create political awareness that competition between physical networks (“facilities based competition”) on quality and availability has proven to be the most effective and sustainable form of competition which enables investments and innovation instead of blowing up artificial competition by injecting additional retailers based on mandated access to incumbent networks

III. To create and maintain a stable and predictable regulatory environment which attracts investors and enables competition between networks

IV. To create awareness of the Macro-Economic effects of fast and ultra-fast broadband penetration, quality and take-up

V. To create awareness of a few basic principles for an investment-friendly Regulatory Policy – for more details see Chapter 6.

3. **The Macro-Economic context of fast and ultra-fast broadband coverage and take-up**

3.1. **Importance of ultra-fast broadband rollout for growth, productivity and jobs – a macro perspective**

As a recent OECD broadband statistic\(^{14}\) shows there is a positive correlation (of 0.63) between broadband penetration and GDP per capita. This means that a 1%-point  

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\(^{11}\) fibre-to-the-premises (FTTP) means, that the copper connection traditionally used to carry phone services is not used at all in a FTTP broadband service. So the speed of a connection is not slowed down according to the distance from the local street cabinet. A fibre cable runs from the exchange all the way to the home or office. It terminates at a fibre optic modem internally. The result is a fast, future-proof and stable internet connection that will not only deliver all broadband needs today but will continue to do so for many years to come.

\(^{12}\) DOCSIS 3.1 technology enables a new generation of cable services and helps operators continue to meet consumer demand for high-speed connections and sophisticated applications, positioning them to be the providers of choice in their markets.

\(^{13}\) For more details on the CRTC decision, see Appendix III-B

increase in broadband penetration triggers a 0.63%-point increase of GDP per capita.

This general influence of broadband on economic development is well known and has been investigated extensively. In short, broadband - as a general purpose technology – works as a catalyst for all economic and social activities, and a key driver for the overall prosperity and wellbeing of the economies of developed nations. This underscores the importance of continued broadband investment because these networks serve to drive important economic and social benefits to a country and its citizens.

The discussion in many developed countries is now moving beyond this baseline and focuses on available broadband speed rather than penetration, assuming that at the best there would be general availability of maximum bandwidth with fibre-to-the-premises (FTTP)., there are so far only few investigations that differentiate between different characteristics such as speed of transmission, type of connection, quality of service etc. One of those analyses was done by Rohman/Bohlin, investigating for OECD countries. The results are depicted in the following charts:

Exhibit 4: The relationship between broadband download speed and GDP per capita (based on data from US-Communities) - absolute

\[ R = 15.8\% \]

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\[ \text{For an overview on relevant studies, see Appendix III-E} \]
Exhibit 5: The relationship between broadband download speed and GDP per capita (based on data from US-Communities) – in growth rates in log form

The figure in Exhibit 4 shows clearly a positive correlation between broadband speed and GDP per capita, whereas the correlation is even stronger when the data is measured for speed and GDP per capita growth (Exhibit 5). This means that an increase in broadband speed correlates to an increase in GDP per capita.

Overall Rohman/Bohlin conclude in their study on the effects of broadband speed on GDP growth that:

I. there is a statistically significant impact of broadband speed on GDP growth, and

II. that the size of this effect depends on the broadband speed level and the economic growth in a country.

The authors recommend that initiatives to foster ultra-fast broadband deployment are even more important in times of an economic slowdown because investment might bring about aggregate spill-over effects which can improve the productivity throughout different sectors and thus in the overall economy. The government’s job is simply to get out of the way but not imposing regulatory rules on new networks, so that network operators continue to invest in ultra-fast broadband networks.

Explanation and background of NGA\textsuperscript{16} vs. FTTP\textsuperscript{17}: Wireline network rollout strategies can be either follow a stepwise “evolutionary” path by replacing parts of the legacy copper line from the exchange (Central Office) to the customer’s premises more and more by fibre (fast broadband - NGA) or taking a quantum leap by replacing the entire copper loop in one step by FTTP = Fibre-To-The-Premises is based on an end-to-end fibre connection technology

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{16} NGA (“New Generation Access”) is a mix of access network technologies of existing copper and new fibre rollout – more details see in the explanation
\item \textsuperscript{17} FTTP = Fibre-To-The-Premises is based on an end-to-end fibre connection technology
\end{itemize}
\end{footnotesize}
fibre (ultra-fast broadband - FTTP). Investment cases for both approaches are different, depending on many different factors. Whereas NGA offers end user bandwidth\textsuperscript{18} of at least 24Mb/s\textsuperscript{19}, the more capital expenditure intensive FTTP rollout offers 100Mb/s bandwidth and more. Choice between one or the other rollout strategy is also influenced by the long-term perspective. While copper based infrastructure will continue to require further investment to follow increasing bandwidth demands by shortening the remaining copper part more and more (both legacy HFC\textsuperscript{20} and PSTN\textsuperscript{21} networks are – partly - copper based), FTTP enables a step change, offering significantly better bandwidth, scalability and lower latency\textsuperscript{22} without further network investment. This also reflects the nature of FTTP as a completely new network while alternative technologies like DSL\textsuperscript{23} over PSTN and DOCSIS\textsuperscript{24} over HFC are both based on the upgrading of legacy copper infrastructure. To sum up, NGA refers to a gradual, evolutionary improvement of legacy copper networks aiming at exploiting the existing copper parts of the network to a maximum extent on offering reasonable quality for the time being, whereas FTTP based on end-to-end fibre represents a future-proof quantum leap in network scalability and overall quality.

While the dividing line between a NGA and FTTP scenario may make limited practical difference for the supply at a given point of time, it is certainly a significant competition and differentiation factor for a market over time.

Broadband speeds not only impact economic development but also translates into employment: For Canada, Singer et.al\textsuperscript{25} have investigated the effect of FTTP rollout on employment on the basis of the deployment experiences in 39 regions between 2009 - 2014. By using a fixed effects regression model they estimate that fibre deployment to 100 percent of a region is associated with an increase in employment of about 2,9% - even if the region had already before a broadband infrastructure.

\textsuperscript{18} Data transfer speed is measured in Megabit (Mb) per second (Mb/s) meaning one million bits per second
\textsuperscript{19} Jackson, M. (2010) The Definition of UK Superfast Next Generation Broadband, ISP Review
\textsuperscript{20} HFC = Hybrid Fibre Coax is a combination of fibre lines and coaxial copper lines
\textsuperscript{21} PSTN = Public Switched Telephone Network, the traditional telephone network with twisted copper-pairs
\textsuperscript{22} Latency: Network latency is an expression of how much time it takes for a packet of data to get from one designated point to another. Ideally latency is as close to zero as possible
\textsuperscript{23} DSL / Digital Subscriber Line refers to a range of technologies utilized to provide internet access and other IP services (services based on the Internet Protocol) over traditional copper landline networks (PSTN), standardized in ITU-T (G.991f) and ETSI
\textsuperscript{24} DOCSIS / Data Over Cable Service Interface Specification refers to a range of technologies (primarily) utilized to provide internet access and other IP services over cable TV networks, standardized in ITU-T (J.112)
To summarize, both theoretical and empirical analysis shows, that broadband - and particularly broadband speed - is of great importance to the social and economic welfare including job creation and a precondition for a fast moving innovation system, driven by the pace of Moore’s law\(^\text{26}\).

Against this background, national policies should encourage FTTP infrastructure deployments. On the other hand – as proven by the telling European example – regulatory interventions aiming at artificially increasing the amount of retail competitors with tools designed for the pre-fibre era (like mandated access to FTTP) will create a negative impact on investments in FTTP deployment. The CRTC’s decision 2015-326 represents a significant departure from the economics research that demonstrates that less regulation is necessary for encouraging FTTP infrastructure investments.

### 3.2. Fast and ultra-fast broadband rollout as an interplay between supply and demand side – policies to optimize the equilibrium between these pillars

While the discussions in the previous section have shown that FTTP deployment is an important element for overall growth and employment, it is clear that the benefits of an FTTP rollout can only be reaped by managing an interplay between supply and demand side factors. The investigations above have taken the demand side developments as given, but of course, policy should aim at optimizing the equilibrium between these two pillars by parallel activities to increase the consumer demand for broadband services. Any private or public supply side initiative should thus be accompanied by public initiatives, thereby using the potential of higher bandwidths for the provision of educational, health and other e-services.

Nagy K. Hanna (Digital Dividends for All, former World Bank Senior Advisor) and Rene Summer (Ericsson) laid out the concept of the *Networked Society* in their book "Transforming to a Networked Society": “The Networked Society is a transformative augmentation of societies’ capabilities to shape their physical, economic, social and intellectual environments to their own ends with the power of digital networks.”\(^\text{27}\) This means, that Digital Networks and the the ability to master the underlying set of technologies and change processes becoming decisive factors for the success or failure of nations in the global competition. Managing the overall socio-economic environment, the innovation system and the regulatory framework in a given jurisdiction can be a cumbersome process because any change is facing resistance from established institutions and vested interests, as Hanna pointed out. “The ICT revolution can therefore require redesigning or building new networks of institutions, complete overhaul of regulatory frameworks and governance, new skills and competencies, and even radical changes to ideas and culture\(^\text{28}\).” This is in line with the

\(^{26}\) Moore’s law predicts that electronic chip performance would double every 18 – 24 months, being a combination of the effect of more transistors and the transistors being faster.


\(^{28}\) ibid.
thinking of Austrian-American economist Joseph Schumpeter describing such transformations as the “gale of creative destruction.”

In Chapter 3.1 evidence has been presented that broadband availability and quality like speed are directly influencing GDP growth. On top of these factors, McKinsey Global Institute study ‘The great transformer: The impact of the internet on economic growth and prosperity’ by James Manyika and Charles Roxburgh (2011) shows that a country’s internet availability also has significant impact on the economy.

Countries with a high Internet contribution to GDP correlate to those with a strong Internet supply ecosystem

Exhibit 6: A positive correlation between Internet Contribution to GDP and internet supply index means, that high internet consumption drives the entire ICT ecosystem

To wrap up the Macro-Economic effects of fast and ultra-fast broadband penetration, quality and take-up:

I. **Fast and ultra-fast broadband penetration drives GDP growth**, both factors are positively correlated

II. **Fast and ultra-fast broadband speed (quality) drives GDP growth**, both factors are positively correlated

III. **Growth of fast and ultra-fast broadband speed (quality) drives GDP growth**, both factors are even stronger positively correlated


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IV. High consumption of fast and ultra-fast broadband drives GDP growth and supports a strong ICT ecosystem. This highlights the importance of public demand-side measures like improved e-skills.

These findings can be boiled down as a clear recommendation for public policies to put a strong focus on the swift deployment of FTTP by setting the right framework for the industry and avoiding at the same time counterproductive interventions.

4. Challenges in deploying fast and ultra-fast wireline broadband in Canada

In this Chapter, specificities of Canada and related challenges for infrastructure build out are described, starting with generic factors in first instance followed by a description and evaluation of the specific situation in Canada.

4.1. Generic factors for deploying fast and ultra-fast wireline broadband:

International ‘best-in-class’ examples show clearly that the common denominator of all successful infrastructure deployment examples (see below):

I. are based on a consistent set of public policies devised over more than a decade
II. that these policies are regularly updated and managed - for instance - by a committee reporting directly to the top political sphere
III. clear cut responsibilities between the governmental sector taking care of the demand side of the market by managing overall policies, including state-aids, whereas the supply side of the market is driven by the private sector, taking care of network rollout and how to finance it
IV. Governmental part of this policy set includes the overall transformation towards a ‘Networked Society’, demand development and public awareness, about the importance of e-skills and public offerings (e-health, e-government, etc.)
V. Such a clear cut divide of responsibilities will increase the overall performance of the market and increase the citizen’s willingness to pay for access to advanced broadband networks because they enable a diverse set of new and beneficial services.

4.2. Empirical situation for Canada (based on key figures from CRTC “Communications Monitoring Report” (CMR) data section 5.3)\(^{30}\) and international benchmarking (CMR and OECD data).

The setting for the future fibre rollout in Canada is clearly challenging. Although the country benefits from a high level of urban population with 81,8% vs. 81,6% in the US and 74,7% in the EU, the vast geography (more than double the size of EU) raises the bar especially for rural rollouts and the avoidance of a digital divide within the country\(^{31}\). CRTC data on current bandwidth availability per household clearly illustrates this challenge with >90% availability of 100 Mb/s in urban areas vs. only 25% in rural\(^{32}\).

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\(^{30}\) CRTC (2014) Communications Monitoring Report, CRTC
\(^{31}\) Central Intelligence Agency (2015) The World Factbook
\(^{32}\) CRTC (2015) Communications Monitoring Report, CRTC, p. 211

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Surprisingly however, this important challenge has been widely ignored by the CRTC when formulating decision 2015-326.

Exhibit 7: Wireline broadband connections per technology in EU
Source: FTTH Council, Arthur D. Little, Ericsson 2013

This is especially critical given the significant cost difference of urban and rural rollouts (and especially such in remote areas), which demands a different set of policies.

The high share of the population living in urban areas well covered by existing broadband networks also raises a different challenge – as the additional bandwidth fibre can provide vs. existing networks is smaller than in rural areas, there is less incentive for customers to upgrade. This is especially true when facing a significant price uplift which operators frequently require to finance FTTP rollouts, especially when facing high investment risk due to regulatory uncertainty. Given that, as recent CRTC data indicates, already more than 70% of Canadian households have access to 100 Mb/s of bandwidth, this challenge is clearly significant in Canada. However, as most of this (100 Mb/s) access is provided via a single network (63% out of 71%) there is clearly a potential for further platform competition – rather than maximizing retail competition based mandated access to existing networks. As a result, the Canadian Government should be very concerned about regulatory rules that inhibit facilities-based competition, because the focus should be on ensuring that networks are being built so that there is choice between platform providers.

Report in response to the Telecom Regulatory Policy (TRP) CRTC 2015-326
To enable a future differentiating broadband infrastructure will also require to shift more policy attention towards bandwidth beyond 100 Mb/s, which is currently not even surveyed separately in CRTC materials.

Given that the choice of technology operators utilize for higher speeds, respectively their readiness to deploy FTTP, as shown in an analysis by Richard Feasey\textsuperscript{34}, is also dependent on legacy infrastructure factors such as copper loop and sub loop length a consideration of such factors in policies to promote high bandwidth rollouts would be helpful.

To enable a differentiating high bandwidth infrastructure will also require dedicated focus in underlying government policies. Given that past and current key government initiatives in Canada focusing on maximizing the coverage in the 5 Mb/s segment\textsuperscript{35} – a segment where, as Exhibit 3 indicates, Canada is already performing comparably well – there is clearly space for more focused policy here.

5. Relevant learnings from the the EU

This Chapter aims to prove an overview of the wireline regulatory development in EU (sometimes a kind of 'stop-go' policies) and the emergence of new – more investment-friendly - fast and ultra-fast wireline broadband policies.

5.1. Overview: The EU has set out an ambitious goal for its Digital Single Market (DSM)\textsuperscript{36}, however, according to a recently published study from BCG (Boston Consulting Group)\textsuperscript{37} some 216bnEUR of investment is needed to meet the EU’s digital goals. Even with assuming approximately 100bnEUR of combined public and private investment are already committed, there still remains an investment gap of 106bnEUR in Europe. Richard Feasey, an independent telecom advisor, recently repeated the goal of policy must remain focused on facilities-based competition. He commented “...Much of what happened in Europe over the last decade (in fibre rollout) has happened in spite of, not because of, anything the European Commission has done.”\textsuperscript{38} (for more details see Chapter 5.3) and “...The aim (of any telecoms) policy should be to minimize network monopoly and not to maximize competition”.\textsuperscript{39} Again Richard Feasey on effective policies for rural versus urban network build out: ”The tail of the rural dog should not wag the urban dog”\textsuperscript{40}, truly a very relevant observation for Canada.

\textsuperscript{34} Feasey, R. (2015) Europe’s growing fibre divide, p. 2
\textsuperscript{35} CRTC (2015) Communications Monitoring Report, CRTC, p. 10
\textsuperscript{36} European Commission (2014) Digital Single Market, Bringing down barriers to unlock online opportunities
\textsuperscript{38} Feasey, R. (2015) Some Comments on European Regulation, Fronfraith Consulting
\textsuperscript{39} ibid.
\textsuperscript{40} Richard Feasey at the „Public Hearing on Evaluation and Review of the Regulatory Framework“, 11. November 2015, Brussels
Report in response to the Telecom Regulatory Policy (TRP) CRTC 2015-326
5.2. Three steps of fast and ultra-fast wireline broadband (NGA\textsuperscript{41}) regulation in Europe

Europe has devised a set of different - and sometimes - wavering strategies to push broadband supply and demand. On the one hand the quest for a harmonized approach pushed by the European Commission, on the other hand an array of different national policies reflecting different starting points in the member states, a truly conflict-laden set up starting with the "ladder of investment" theory (or stepping stone approach)\textsuperscript{42} gradually to a more investment friendly approach.

Explanation: In the telecommunications sector, the “ladder of investment” theory is a regulatory concept based on the idea that entrants in the market get access to the incumbent’s network at regulated favourable prices and investments by new entrants will be gradual by stepping up the “investment ladder” as their customer base increases, ultimately leading to a full-fledged facilities based competition. This concept never worked properly end-to-end over the whole “ladder” because of wrong incentives set by cost-oriented access prices which made investment in infrastructure unattractive.

Fast and ultra-fast broadband rollout policies in Europe went through three different phases. Europe started at the beginning of the ‘broadband era’, with a harsh regulatory regime by simply copy-and-pasting what was seen as a successful recipe at the beginning of the telecom liberalization and break-up of the old telecom monopolies. For fast and ultra-fast broadband rollout in the context of facilities based competition, this turned out as the wrong toolset because there are no monopolies. Recognizing that Europe was lagging more and more in terms of broadband coverage and confronted with the fact that investors walked away, Europe began to adapt its policies with often hesitating ‘trial-and-error’ type of steps towards a more investment friendly regulatory regime. [For more details, see Annex III-C.]

5.3. Policy choices – which regulatory policies have worked and which not?

The Big Picture: Cambini and Jiang\textsuperscript{43} (2009, pages 560-562) identified three broad policy approaches to broadband deployment. The first, exemplified by the U. S., features platform competition and a deregulatory approach to FTTP networks, which are not subject to mandated access requirements. A second approach, exemplified by East Asian nations such as South Korea and Japan, features strong policy intervention and direction from the state to promote FTTP deployment and adoption. A third approach is found in the EU where mandated access to wireline networks figures very prominently. At a broad level, these approaches reflect

\textsuperscript{41} NGA = „New Generation Access“, defined by a minimum download speed of 24Mb/s, technically a combination of fibre and traditional copper line

\textsuperscript{42} This theory, developed by Prof. Martin Cave dates back to the time of the break up of national PTT monopolies.

differing patterns of political and economic institutions among the U. S., the EU, and East Asia. In practice, broadband policies might be further differentiated and described by whether they treat FTTP as a monopoly, on the one hand, or whether the approach is to encourage or permit multiple FTTP networks. Where the approach is to treat FTTP as a monopoly, or to create an FTTP monopoly, one company is selected to construct the FTTP network and other service providers are given mandated access to this network. Australia’s National Broadband Network (“NBN”) is an example of this approach. The other approach is to encourage or permit multiple FTTP networks, or networks that can provide equivalent service, and to not mandate access to any of the networks by other service providers. The United States and Canada, at least prior to the CRTC’s 2015-326 decision, offer examples of the latter approach where fibre networks are being constructed by telephone companies, cable companies with their hybrid-fibre-coaxial (“HFC”) networks, and other private and public network operators. Of course, combinations of these policies are also possible. For example, the FTTP network might be treated as a monopoly with mandated access, but other companies would not be prohibited from constructing their own networks. Alternatively, access to some FTTP networks might be mandated, but the terms of that access might be subject to commercial negotiation, and not prescribed at cost-base by the regulator. Other policies are also possible.

**European Union (EU):** The challenges of fast and ultra-fast broadband (FTTP) deployment in the EU are driven, among others, by the structure and complex set of rule books of the EU, its internal dynamics and its often lengthy and cumbersome decision making processes.

_Explanation:_ The reason for this lies in the complicated interplay between the three European Institutions (Commission, Parliament and Council) and the fact, that political decision making powers are distributed between Commission and Parliament on the one hand and the 28 different Member States represented high level in the Council. Power distribution (“centralisation” and “harmonization” vs. “decentralisation” following the subsidiarity principle) between these poles varies over time.

Although the EU has formulated a joint ambition for fast and ultra-fast broadband in its 2020 Digital Agenda, a large part of the agenda’s implementation is in the hands of the respective Member State governments and regulators. The means employed by the member states however vary strongly – ranging from policies focused purely on market regulation instruments (such as in the UK) to clearly developmental agendas employed e.g. in France (such as the municipality orchestrated fibre rollout in Paris) and some of the Central and Eastern European (CEE) Countries, more comparable to the East Asian model of approaches mentioned above.

This is complemented by (selected) policies enacted directly by the EU, which equally employ both market regulation (enforcement of a joint regulatory framework, with joint price / cost regulation standards) as well as developmental measures such as the
direct funding of (open access) rural broadband rollouts in some parts of Europe through the EU’s regional funds.

Looking at the current development of wireline broadband penetration and the FTTP share in the EU we see the different settings at work, as the following observations show:

- The left side of Exhibit 8 shows, that the highest FTTP penetrations are achieved in Eastern European markets like Latvia, Romania, Lithuania, Bulgaria which can be characterized by a combination of weak legacy infrastructure, relaxed regulation and loose aerial / outdoor rollout restrictions. In addition, EU funds have been made available for these countries. This setting has proven effective in incentivising operators to invest. Despite this success, overall broadband penetration numbers in most of these countries remain low (see right side of Exhibit 8). In the context of this report it has to be mentioned, that the successful FTTP deployment in these countries is based on very specific circumstances and therefore cannot serve as useful benchmark for Canada.

- There are only few markets with a combination of high FTTP and high broadband penetrations in the EU – such as The Netherlands. The country benefits from a high degree of urbanization (91%) comparable to Canada as well as specific rollout approaches and settings for FTTP as seen for instance in the Reggefiber/KPN case which was not handled fully according to the EU rulebook\(^4\).

- Many EU markets, including economic heavy-weights Germany and the UK have basically not managed to deploy FTTP on significant scale independent of their overall high broadband penetration and otherwise developed ICT ecosystems.

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Report in response to the Telecom Regulatory Policy (TRP) CRTC 2015-326
The role of the heavyweight markets is especially relevant as they, due to their economic and political weight, have a strong influence within EU and on EU policies. To sum up, a quote from Richard Feasey\textsuperscript{45}, an independent telecom advisor: 

"...Much of what happened in Europe over the last decade (in FTTP rollout) has happened in spite of, not because of, anything the European Commission has done"\textsuperscript{46}, obviously a very telling description of Europe’s FTTP rollout situation. These general observations can be complemented by the following specific examples underlining why mandated FTTP access was not effective for its deployment and why zealous implementation and enforcement of the EU FTTP rollout rulebook is not a successful strategy.

**Denmark – a successful circumventor of EU mandated access:** Denmark is one of the European Member States with strict mandated access regulation and despite of this has rather high FTTP coverage and 100% broadband penetration. This surprising picture requires a closer look: Briglauer et al\textsuperscript{47} provided an interesting analysis, demonstrating that, "Denmark is an interesting example because of the unusual ownership structure of the broadband providers. The incumbent telecom operator, TDC, owns most of the cable companies. This allows TDC to deploy high-speed cable broadband, access to cable being unregulated. The mandated access to fibre on the telecom networks remains unused. Instead, the entrants, mostly energy companies, invest in ultra-fast fibre infrastructure themselves. As operators without significant market power, the entrants are not subject to the mandated unbundling. As a result, competition between cable and telecom high-speed broadband operators happens entirely outside of the regulatory framework, making Denmark similar to the US in this respect".

**UK – stuck in the middle of the 'ladder of investment':** The UK has always been a market with a well elaborated and complex set of regulatory measures to develop the telecommunications market – be it via the separation of the incumbent BT’s wireline and mobile operations in 2001, the structural separation of the incumbent’s access network in its subsidiary openreach\textsuperscript{48} in 2005 or the step wise regulation of the wireline access network market following the ‘ladder of investment’ approach ever since.

This approach enabled, together with a ~50% TV cable / PSTN overbuilt, the country to reach a high broadband penetration with reasonable speeds (80% of broadband lines with >10 Mb/s)\textsuperscript{49}. While the ‘ladder of investment’ (as described in Chapter 5.2) in UK has worked up to a certain point, as depicted in Exhibit 9, the outcome for FTTP rollout was negligible as shown in Exhibit 8. As a result, the UK’s FTTP policies can


\textsuperscript{46} Feasey, R. (2015) *Some Comments on European Regulation*, Fronfraith Consulting

\textsuperscript{47} [http://bruegel.org/2015/10/why-is-europe-lagging-on-next-generation-access-networks/](http://bruegel.org/2015/10/why-is-europe-lagging-on-next-generation-access-networks/)

\textsuperscript{48} [https://www.openreach.co.uk/orpg/home/index.do](https://www.openreach.co.uk/orpg/home/index.do)


Report in response to the Telecom Regulatory Policy (TRP) CRTC 2015-326
be seen as a major failure (deterrent) for investment in FTTP.

Exhibit 9: UK DSL share by wholesale share
Source: EC Implementation reports, in (Lemstra W. and Melody W.H., The Dynamics of Broadband Markets in Europe)

The decisive factor at this point was the strict wholesale price regulation on high speed DSL based broadband which enabled a (PPP\textsuperscript{50} adjusted) price level for a 100 Mb/s connection (assuming 400GB\textsuperscript{51} traffic) of less than half of the US (or close to half of Canada)\textsuperscript{52}; this led to a no-go situation for investments in FTTP, another example that the 'ladder of investment' concept failed half-way.

**Germany – regulatory holiday, cancelled:** The situation in Germany is close to the UK in terms of outcome, however different in reason.

Here the need for investment in the local loop (although via the means of FTTC\textsuperscript{53} / VDSL\textsuperscript{54} rather than FTTP – also driven by the comparably short copper sub loops in Germany\textsuperscript{55}) was recognized and – more directly than in the UK – addressed by defining regulatory forbearance (so-called 'regulatory holiday') in the German telecoms act of 2004.

\textsuperscript{50} PPP = Purchasing Power Parity
\textsuperscript{51} GB is a measure of digital information or computer storage defined as a multiplier of one billion bits
\textsuperscript{52} OECD, Broadband Portal, www.oecd.org/sti/broadband/oecdbroadbandportal.htm September 2014
\textsuperscript{53} FTTC = Fibre-to-the-(Street)Cabinet, a network architecture representing a mix of fibre and legacy copper
\textsuperscript{54} VDSL = a technology belonging to the DSL-family of technologies, offering data transmission over legacy copper lines
\textsuperscript{55} Feasey, R. (2015) Europe’s growing fibre divide, p. 2
Report in response to the Telecom Regulatory Policy (TRP) CRTC 2015-326
Incumbent Deutsche Telekom (DT) leveraged this as a basis for a approximately 2 billion EUR investment, pushing its VDSL coverage to close to 50% of households within 18 months of the law taking effect – one of the prime reasons why today more than 90% of broadband lines in Germany offering >10 Mb/s\(^{56}\).

Unfortunately, regulation has since hampered what was a German success story. The European Commission overruled the German law in 2009 and enforced mandatory access to be granted on the new network (independent from the fact that a voluntary wholesale agreement with key entrants like Vodafone had been achieved in 2008).

In consequence, DT cut its wireline broadband expense in Germany by 15%, while (leveraging its flexibility as an international operator) at the same time upping international CAPEX spending\(^{57}\) - and has since then been very cautious in pursuing any aggressive infrastructure investment in Germany. The same holds true for DT’s international peers Vodafone and Telefonica O2 invested Germany. This is clear evidence that regulatory rules that mandate wholesale access have direct impact on the capital investment decisions, and such rules cause immediate and lasting reductions in investment.

The limited degree of fibre rollout in Germany indicated in Exhibit 8 has instead been conducted by local municipalities not having “Significant Market Power” (SMP), as defined by general competition law and therefore not subject to regulatory measures. This way, they were in the position to leveraging their beneficial cost structure for limited local (municipal) rollouts.

**Croatia – FTTP full stop:** Another example for the consequences of such a regulative approach is the (small Eastern European market of) Croatia. Here incumbent *Hrvatski Telekom* (HT), a subsidiary of Deutsche Telekom, started to invest in FTTP in 2009, covering more than 100k households. Croatian national telecom regulator HAKOM, obediently following the EU rulebook, imposed an aggressively (low) calculated wholesale obligation on the just finished network as a condition for approving the operator’s pricing scheme. The resulting stalemate not only led to a multi-year delay of the network launch (until 2012) – HT also refocused its investment approach on less risky investments.

Again, the other large operator VIPnet (a Telekom Austria Group subsidiary) was effectively discouraged from pursuing any fibre invest, leaving any investment in fibre to a limited number of financially weak entrants.

The wide discouragement reached as far that even investment into rural open access networks heavily funded by EU, which had worked very successfully in neighboring Slovenia, did take off in Croatia, although it was promoted via various public entities.

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Report in response to the Telecom Regulatory Policy (TRP) CRTC 2015-326
In summary, the examples illustrate how effectively and with clearly measurable impact a retroactive and disruptive regulation of infrastructure investment can destroy the investment climate in a market. It also shows that the role of leading operators (who, by the way, in Canada represent an 80% share of the market\(^{58}\)) in this endeavor cannot readily be replaced by other parties such as new entrants, municipalities and alike – even with policies explicitly promoting that such as in the UK.

Besides these rather dramatic examples, EU faces another challenge in form of the numerous markets that are 'stuck in the middle' in terms of both broadband and FTTP – which indicate a weakness in aggressively leveraging positive experiences from one market in another with a comparable setting (which is still quite frequent regardless of the diverse history of EU). Canada needs to recognize the importance of the real-world experience in Europe and choose a the path that accelerates FTTP investment. Loud and clear, that path requires no mandated access, which means that the CRTC decision needs to be overturned.

5.4. Qualitative success factors:

The 'Big Picture' (see above) and examples from the EU are demonstrating clearly that regulatory policies and the way how they are applied are the single most important factor for companies' success or failure in the market. In a society depending strongly and increasingly on widely available ultra-fast broadband connections for all kind of applications and services ("Networked Society") it is imperative that telecom regulation goes hand in hand with overall governmental policy goals. Three basic principles can be derived from the above:

I. **Regulatory predictability and stability** is key to avoid disruptive effects in the market. Investors hate uncertainty and ‘surprises’; the decline in network investments in Europe is a telling example for the outcome of regulatory instability. The lack of predictability and stability is negative for the investment climate.

II. **Regulation** should **support a positive investment climate**, for instance by applying the right cost accounting standards: cost-oriented (access) prices are in many cases deterring network investments and leading to the absurd situation that running an operation based on mandated access turns out to be more profitable then investing in its own network infrastructure. This is by the way the main reason, why the ‘ladder of investment’ theory failed widely.

III. **Regulation** should be **aligned with infrastructure investment cycles**: when new technologies are arriving on the market like 4G (LTE) for mobile networks or FTTP for wireline networks, regulators should be very careful how – and if at all (!) – regulate new technologies. **Beware of applying the old ("proven") principles for new technologies and network architectures.**

Policy makers and regulators alike are strongly advised to take this success factors serious.

\(^{58}\) CRTC (2015) *Communications Monitoring Report*, CRTC, p. 10
Report in response to the Telecom Regulatory Policy (TRP) CRTC 2015-326
6. Conclusions and Recommendations for Canada derived from European and international cases

**Overall policy setting:** Looking at the rankings in the World Economic Forum “Networked Readiness Index (NRI)”\(^{59}\) and its underlying parameters there is vast empirical evidence that countries with a consistent, long-term set of Information and Communication Technology (ICT) policies which are regularly updated are among the global leaders in many areas, like education, research, “Industry 4.0”, innovation, smart cities and many others. Ultimately productivity and attractiveness as a place for business, headquarters and investment are depending strongly on these factors. My book “*The Virtuous Circle: New Regulations, Innovation and Investment – How to Bring Europe Back to the Top*” highlights the interdependencies of smart regulation (“Regulation 2.0”) as an enabler for innovation and investment\(^{60}\). Investments in new technologies and network rollout are most important drivers for initiating and driving such a “virtuous circle”, consumer benefit and public welfare. In contrast to an economic model described here is a policy aiming at short-term consumer interest and the ambition to make the retail market more effective by injecting a few more retailers based on mandated access to incumbent networks\(^{61}\). There is ample of evidence that this type of policy is not sustainable and ends up in high sunk cost, value destruction and a series of merger cases between companies that are commercially not viable.

**Industry structure and competitive landscape:** It has to be taken into account that telecom markets are driven by rapid innovation cycles based on Moore’s law

*Explanation:* Moore’s law predicts that electronic chip performance would double every 18 – 24 months, being a combination of the effect of more transistors on a single electronic circuit (chip) and the transistors being faster.

requiring regular massive investments in upgrading the network quality and coverage to satisfy the growing customer demands for more and more bandwidth\(^{62}\). This requires a certain size of the industrial operation and a minimum EBITDA level to shoulder these investments. In such a market, driven by competition between networks on quality and coverage sometimes the arguing comes up, that competition between a few physical networks would form a kind of oligopoly (with a negative notion). In this context it seems worthwhile to remind (according to an earlier quote), that the aim of any telecoms policy should be to minimize network monopoly and not

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\(^{60}\) Serentschy, G. (2013) *The Virtuous Circle: New Regulations, Innovation and Investment – How to Bring Europe back to the Top*, RTR

\(^{61}\) Stephen Howard, Global Head of HSBC Telecom Research, Supercollider Study, 2014

to maximize retail competition, based on mandated access at preferential access conditions; ultimately ex-post competition oversight has to take care about such cases.

There is strong evidence, that the existing European Regulatory Framework has not led to the investment levels needed to meet the European targets of the Digital Agenda. A review in 2012 found that 9 out of 13 empirical studies from 2003 to 2011 failed to find a positive correlation between mandated access to wireline broadband and broadband penetration. This is a strong evidence that the "ladder of investment" theory has not proven effective and the current EU framework does not provide sufficient investment incentives. This framework has increased – alas non sustainable – competition and reduced incentives for access seekers to invest63.

In a recently published paper from BRUEGEL Policy Contribution (Sept 2015), the point was made, that the underlying differences between copper based ('old') and fibre based ('new') infrastructures should lead to a revision of the EU regulatory framework64. This study delivers again evidence that mandated access to the local loop has not incentivised entrants to move up beyond the “higher rungs of the ladder” and to invest sufficiently in ultra-fast broadband. Bottom line is that the EU regime regarding mandated access might have even reduced total industry investment, meaning that investment from entrants has not been sufficient to offset the unrealized investments of incumbents.65 The fact, that mandated (ex-ante) access obligation did not result sufficient investment in access networks by service-based competitors can be seen as the "natural outcome of the economics of wireline broadband access" (Vogelsang: The Endgame of Telecommunications Policy? A Survey)66.

Conclusions for Canada based on international experience, data and facts:

After a long and successful history of an investment friendly wireline broadband regulatory regime in Canada CRTC has taken an unexpected step by adopting policies which haven proven to be detrimental for European citizens and business, harmful for the innovation climate ("4G rollout was a disaster in Europe"67, to give only one example) and negative for the investment climate. The irony of this story lies in the fact, that at a time, when Europe has recognized the failure of these policies and takes steps to correct them, the Canadian regulator obviously takes exactly the opposite route.

65 ibid.
Report in response to the Telecom Regulatory Policy (TRP) CRTC 2015-326
**Bottom line recommendations for Canada** in the light of the analysis provided in this report are to

I. That the Governor in Council vary the TRP by striking paragraphs 137 to 143 inclusive

II. Create political awareness that competition between physical networks ("facility based competition") on quality and availability has proven to be the most effective and sustainable form of competition which enables investments and innovation instead of blowing up artificial competition by injecting additional retailers based on mandated access to incumbent networks

III. Create and maintain a stable and predictable regulatory environment which attracts investors and enables competition between networks

IV. To create awareness of the Macro-Economic effects of fast and ultra-fast broadband penetration, quality and take-up:
   - Fast and ultra-fast broadband penetration drives GDP growth, both factors are positively correlated
   - Fast and ultra-fast broadband speed (quality) drives GDP growth, both factors are positively correlated
   - Growth of fast and ultra-fast broadband speed (quality) drives GDP growth, both factors are even stronger positively correlated
   - High consumption of fast and ultra-fast broadband drives GDP growth and supports a strong ICT ecosystem. This highlights the importance of public demand-side measures like improved e-skills.

V. To create awareness of a few basic principles for an investment-friendly Regulatory Policy:
   - **Regulatory predictability and stability** is key to avoid disruptive effects in the market. Investors hate uncertainty and ‘surprises’; the decline in network investments in Europe is a telling example for the outcome of regulatory instability. The lack of predictability and stability is negative for the investment climate.
   - **Regulation should support a positive investment climate**, for instance by applying the right cost accounting standards: cost-oriented (access) prices are in many cases deterring network investments and leading to the absurd situation that running an operation based on mandated access turns out to be more profitable than investing in its own network infrastructure. This is by the way the main reason, why the ‘ladder of investment’ theory failed widely.
   - **Regulation should be aligned with infrastructure investment cycles**: when new technologies are arriving on the market like 4G (LTE) for mobile networks or FTTP for wireline broadband networks, regulators should be very careful how – and if at all (!) – regulate new technologies. Beware of applying the old ("proven") principles for a new technology.
7. Appendix I.: Biography Dr. Georg Serentschy

EXPERIENCE in brief:

02/2014 – present: Managing Partner, Serentschy Advisory Services GmbH
Advising the C-level and top experts in the Telecom, Media and Technology sector in the areas of strategy, policies, regulatory & spectrum issues, innovation and communication
http://www.serentschy.com
Twitter: @GSerentschy
Linkedin: http://www.linkedin.com/pub/georg-serentschy/5/111/966

10/2015 – present: Senior Advisor at Squire Patton Boggs Public Policy Practice
http://www.squirepattonboggs.com

03/2014 – present: Structural Advisor at EUTOP International GmbH
http://www.eutop.com/eu
EUTOP is a system supplier for its clients and bundles various competences on an EU-wide basis and provides the process structure-, perspective change - and process support competences.

02/2014 – present: Senior Director at Arthur D. Little http://www.adlittle.com
Core member of ADL’s Global Competence Centre SASCAR - Strategic Advisory Services for Competition and Regulation.

02/2014 – present: Senior Advisor to SPECURE GmbH https://www.specure.com
SPECURE is an international spectrum consulting company specializing in spectrum auctions and monitoring of internet connectivity quality.

11/02 - 01/14: CEO, Austrian Regulatory Authority for Broadcasting and Telecommunication (RTR) Telecom and Postal Section https://www.rtr.at/
Managed all aspects of a National Regulatory Authority and a public think tank developing ICT strategies for Austria (Broadband Strategy 2003; ICT Master plan 2005; Facilitated development of ICT lead projects).

2012 BEREC Chairman (Body of European Regulators for Electronic Communication); 2011 and 2013 BEREC Vice Chairman http://berec.europa.eu
Gained in-depth experience with all aspects of telecom regulation on European and international level and interaction with European Institutions.

EDUCATION

8. Appendix II.: References


Available from: http://bruegel.org/2015/10/why-is-europe-lagging-on-next-generation-access-networks


Central Intelligence Agency (2015) *The World Factbook*

CRTC (2014) *Communications Monitoring Report*, CRTC
Available from: http://www.crtc.gc.ca
[Accessed 12/3/2015]

Ericsson, Arthur D. Little and Chalmers University of Technology (2013) *Socioeconomic Effects of broadband speed*

European Commission (2014) *Digital Single Market, Bringing down barriers to unlock online opportunities*

Available from: http://www.fronfraithltd.com/home/articles

Available from: http://www.fronfraithltd.com/home/articles


Howard, S. (2014) *Supercollider - European mobile consolidation is win-win for operators and citizens alike*, HSBC
Available from: https://www.research.hsbc.com/R/20/QwKEJII5xmsz


Report in response to the Telecom Regulatory Policy (TRP) CRTC 2015-326
Available from: http://www.ispreview.co.uk/articles/10_Definition_of_UK_Superfast_NGA_Broadband/02.php


Available from: http://dx.doi.org/10.1787/5jrqdl7rvns3-enb

Lesca, V. (2015) *A symmetrical regulation for an intensified very high broadband deployment*, Orange


Available from: http://dx.doi.org/10.2139/ssrn.2034284


Available from: http://www.serentschy.com/the-virtuous-circle/


Report in response to the Telecom Regulatory Policy (TRP) CRTC 2015-326
9. Appendix III.: Background information

Appendix III-A: Initial Situation in Canada

Canada is in a good starting position with regards to both internet usage as well as basic broadband coverage: With an internet usage penetration of more than 90% of the population, Canadians are clearly very online-affine, even ahead of both the US (87%) and EU (78,5%). Also from the perspective of basic wireline broadband coverage of households, Canada is well positioned with 91,4% vs. US with 86,3% and EU with 82,5%.

The development going forward is however likely to be significantly more challenging: While Canada in the past has benefitted from a strong infrastructure competition between PSTN and cable networks – both of which were basically completed, reaching to almost every household, by the mid 1990ies, and required mere upgrade to enable basic broadband services – significant further bandwidth improvements will often require the rollout of fibre infrastructure to the customer premise – a type of investment which has not been required in Canada in the last 20 years.

The current status already illustrates the challenge of this endeavour: with only 4,9% of wireline broadband lines using FTTP, Canada lags behind not only the US (with 10,7%) but also the EU (with 7,9%) (all data based on Analysys Mason figures for EoY 2014).

History of Canadian wireline broadband investments: The history of wireline investments in Canada dates back well into the 19th century, with the first Telegraph Act passed already in 1852. A broader rollout of wireline commenced under the Bell System (aligned with the US) from 1880. By the end of this setup in Canada in 1975, wireline voice lines had already been extended to almost every household in the country (Rideout Vanda, Continentalizing Canadian Telecommunications: The Politics of Regulatory Reform, based on Statistics Canada, Household Facilities and

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68 internetworldstats.com for EoY 2014
69 Telegeography, June 2015
70 European Commission Digital Agenda Scoreboard in combination with Eurostat data for EoY2014
71 Analysys Mason figures for EoY 2014
Equipment). While the competitive post-Bell system opened the market for wireline voice esp. in long distance, digitalization of the network continued and was largely completed in 1997. Cable TV rollout commenced in 1952 and accelerated rapidly in the 1970ies. In the mid 1990ies, more than 90% of Canadian households were passed by cable networks (Van Tassel Joan, Digital TV Over Broadband: Harvesting Bandwidth, P266).

From the mid 1990ies broadband rollouts commenced on both infrastructures, evolving from the beginning on via a competition of upgrading existing networks. The 2010 start of fibre based broadband offerings thus marks a watershed in the industrial development – for the first time in more than 20 years, actual network rollouts will be required to achieve the targeted innovation.

**Appendix III-B: OECD’s Networked Readiness Index (NRI)**

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<th>Value</th>
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Exhibit 10: Networked Readiness Index 2015 Top 20 economies
The World Economic Forum annually calculates an index for the networked readiness of 143 member states – which is a useful indicator of the competitive positioning of the respective economies in terms of digital networking technologies.

The index is built from 4 sub-indices, each containing 3-4 pillars, which are driven by a total of 53 individual indicators, as Exhibit 9 indicates. Broadband infrastructure impacts a number of indicators, but has only a limited weight in the overall index.

Exhibit 11: Networked Readiness Index, calculation structure

Appendix III-C: Wrap up of the CRTC decision 2015-326

In a decision issued on 22 July 2015 (Telecom Regulatory Policy CRTC 2015-326), the CRTC ruled that the largest internet providers must provide their smaller rivals with wholesale access to their fibre-to-the-premises (FTTP) networks. Another aspect of the CRTC’s decision scrapped the currently mandated ‘aggregated’ wholesale high speed access (HSA), which has enabled smaller competitors to lease a package of both the access facilities they need to connect to customer locations, and transport facilities, from larger incumbents, without requiring the smaller players to invest substantially in their networks. In the July 2015 decision, the CRTC stated that: ‘The large incumbent companies will continue to be required to provide access to wholesale HSA services throughout their region and transition this access to a disaggregated architecture. The provision of wholesale high speed access services on a disaggregated basis will be implemented in phases across Canada, starting with Ontario and Quebec.’ The regulator indicated that it will take up to three years to phase out aggregated access, which is expected to result in independent/alternative ISPs being required to invest more in core infrastructure. Furthermore, under the July 2015 policy, the provision of copper mandated access (in

72 Telegeography
EU terminology: “unbundled local loops (ULLs)”) will no longer be imposed. The regulator also confirmed that Ethernet access and high speed competitor digital network (CDN) services, which are primarily used to support retail competition in the business data services market, will remain forborne from price regulation and not mandated.

Appendix III-D: Three steps of fast and ultra-fast wireline broadband (NGA) regulation in Europe – an incremental approximation towards a more investment-friendly regime in Europe

**Step 1:** The need to spur NGA Investment was identified, however, the approach was rather conventional copy-pasting existing models of legacy regulation for existing copper-based networks.

In the first phase (2010) it was quite common to include fibre regulation into the standard access regulation, meaning heavy cost-oriented regulation. At this time the European NGA Policy was still very much rooted in the tight regulation that was originally developed and applied for legacy networks. However, NGA was already recognised as a priority field for telecommunication policy. Under this regime access to wholesale physical network infrastructure (Market 4) was strictly regulated. Where the market includes operators in a dominant position (SMP), NRAs should put in place remedies which must take into account:

- access to civil engineering infrastructure of the SMP operator which should be mandated at cost-oriented prices;
- access to the terminating segment in the case of FTTH (Fibre to the Home) deployment which must include access to the wiring inside buildings and, if applicable, horizontal wiring up to the first distribution point;
- unbundled access to the local fibre loop in the case of FTTH deployment which should be accompanied by appropriate measures for co-location and backhaul. In addition, this access should take place at the most appropriate point in the network, which is normally the Metropolitan Point of Presence (MPoP);
- obligatory unbundled access to the copper sub-loop in the case of FTTN (Fibre to the Neighbourhood) deployment which should be supplemented by backhaul measures and ancillary remedies.

The European Commission has adopted a Recommendation indicating how NRAs (national telecoms regulators) should regulate third-party competitive access to ultra-fast fibre networks (also known as ‘next generation access – NGA – networks) delivering high-speed broadband connections to homes and workplaces.

The EU's telecoms rules require national telecoms regulators to encourage efficient investment and promote competition. When competition is not effective, regulators can impose ex ante regulatory measures on dominant (SMP) players to address this market failure following a thorough market review as set out in the EU's telecoms Framework Directive (2002/21/EC). The new Commission Recommendation gives

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Report in response to the Telecom Regulatory Policy (TRP) CRTC 2015-326
guidance to regulators on how they should do this (comment by the author: how they should regulate) fibre-based 'next generation access’s markets.

The NGA Recommendation gives national regulators the tools to support new entrants to the NGA market, and to support infrastructure-based investment from established market players. For example, when setting cost-oriented access prices for companies with dominant positions in national broadband markets, regulators will also have to take properly into account any investment risk occurred, by means of a risk premium. At the same time, the Recommendation aims to facilitate market entry and competition by alternative operators, allowing them to climb the ‘ladder of investment’ and gradually to deploy their own network infrastructure.

In practice the core of the Recommendation where the statements given in Para 22-24 (under the header: “Unbundled access to the fibre loop in the case of FTTH”)

Para 22 “In accordance with the principles provided for in Directive 2002/19/EC (1), where the SMP operator deploys FTTH, NRAs should in principle mandate unbundled access to the fibre loop. Any exception could be justified only in geographic areas where the presence of several alternative infrastructures, such as FTTH networks and/or cable, in combination with competitive access offers is likely to result in effective competition on the downstream level. The imposition of unbundled access to the fibre loop should be accompanied by appropriate measures assuring co-location and backhaul.”

Para 23: NRAs should mandate unbundled access to the fibre loop irrespective of the network architecture and technology implemented by the SMP operator.

Para 25: The price of access to the unbundled fibre loop should be cost-oriented. NRAs should duly take into account additional and quantifiable investment risk incurred by the SMP operator when setting the price of access to the unbundled fibre loop. In principle, this risk should be reflected in a premium included in the cost of capital for the relevant investment.

Conclusion – Step 1: While the ambition of the NGA Recommendation was clearly to contribute to European harmonization in SMP-based NGA Regulation, it still relied on tight regulation, access to passive infrastructure and - with that - on the ladder of investment approach. Virtualisation of access products (although by then already recognized as an option to bring in line competition and investment goals) was only considered as a temporary exemption from the rules spelled out above.

Step 2: After lengthy and sometimes cumbersome discussions between the Commission, NRAs and the industry complaining about overregulation, the Commission

Para 21 of the Recommendation states: “NRAs should be able to adopt measures for a transitional period mandating alternative access products which offer the nearest equivalent constituting a substitute to mandated access, provided that these are accompanied by the most appropriate safeguards to ensure equivalence of access and effective competition (1). In any event, NRAs should in such cases mandate physical access as soon as technically and commercially feasible.”
launched in October 2011 two public consultations “regarding regulated wholesale access to telecoms networks, on cost methodology and non-discrimination, to ensure consistency throughout Europe, develop the single market in communications, and help achieve our high-speed broadband goals. The approach is not far-reaching, but provides elements of a more investment friendly NGA climate in the sense that it

a) re-evaluates (from an investors perspective) the approach to copper-pricing. Up to this point the European Commission was of the view that the lower the copper prices are set the more incentives would exist for incumbent operators to switch from copper to fibre and to increase the speed of fibre deployment. The European Commission then admitted that “… after examining all the evidence, and given the significant competitive relationship between copper and NGA networks, we are not convinced that a phased decrease in copper prices would spur NGA investment. Indeed, we now see fibre investment progressing relatively well in some Member States where copper prices are around or above the EU average.”

b) it acknowledged that regulatory stability and consistency over time is a value in itself, attracting investors and creating an overall positive climate for investments.

This policy statement on new NGA priorities became effective more than a year later when the EC released their “Recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment” Rec. 3 sets out the scenery of a new approach when it states: One of the core objectives of the Digital Agenda for Europe is the deployment of next generation access networks (NGA Networks). The Digital Agenda for Europe aims to support the substantial investments, which will be required in the coming years. ... The present Recommendation seeks

a) to ensure a level playing field through the application of stricter non-discrimination rules,

b) to establish predictable and stable regulated wholesale copper access prices, as well as

c) to increase certainty on the circumstances which should lead to the non-imposition of regulated wholesale access prices for NGA services. Increasing legal and regulatory predictability in this manner should further help to trigger the investment needed in the near to medium-term future.”

In Rec. 49 the EC further explains: Due to current demand uncertainty regarding the provision of very-high speed broadband services it is important in order to promote efficient investment and innovation, in accordance with Article 8(5)(d) of Directive 2002/21/EC, to allow those operators investing in NGA networks a certain degree of pricing flexibility to test price points and conduct appropriate penetration pricing. This would allow SMP operators and access seekers to share some of the investment risk

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76 C(2013) 5761 final, 11.09.2013
by differentiating wholesale access prices according to the access seekers’ level of commitment.

Conclusion - Step 2: As can be seen by then, the European Commission was still committed to the idea that the regulatory approach can cover both areas of policy interest – competition and infrastructure investment in wireline broadband networks at the same time. However, there are already significant differences compared to the approach outlines in the NGA Recommendation from 2010. Still a mandated access – as suggested by CRTR - was the desired approach, however accompanied by much more pricing flexibility.

Step 3:

Chapter 5.3 shows that - despite of the common framework provided by the European Commission and a strong ambition to harmonize - there are significant differences in the approaches of EU’s Member States, as the situation with respect to competition, alternative technologies, typology of access networks etc. differ. Nevertheless, there is a contour of a new approach already visible on the horizon, which – according to our view – could also serve as a model for Canada. At the core of this approach there are the following elements:

I. Increasing doubts about the applicability of the ladder of investment theory for NGA rollout
II. Dynamic vs. static competition considerations
III. Existence of different NGA roll-out strategies (relying on copper – FTTC, GPON architectures etc.)
IV. Leap-frog jump to a straightforward FTTH-rollout often not economically feasible (insufficient willingness to pay, pressure from copper prices, Cable and even mobile)
V. Problems with a more gradual NGA roll-out. As an increase in bandwidth requires flexibility for incumbent operators (eg. for deploying vectoring technologies from the MDF) it seems that alternative solutions may be more appropriate in the long run. (regional/central Layer 2 access products which could be regarded as an alternative to mandated access that could be more attractive for other operators – even mobile in a world in which bundled services become increasingly relevant)
VI. This might be even further supported by a development towards SDN and NFV

2013 after lengthy discussions between the EC, regulators and industry about reasons for a slow take-up of investment and NGN roll-out, there was a change in the EC’s policy towards infrastructure investment in fibre, and the regulatory approach became

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77 Software-defined networking (SDN), network functions virtualization (NFV), and network virtualization (NV) are all complementary approaches. They each offer a new way to design deploy and manage the network and its services.
The new approach (that is still applicable and has to be applied) now follows the idea, that in case of sufficient competition from either mandated access to copper and or alternative infrastructure, only an access obligation could be imposed without any further specification of a price regulation. Yet, for the time being it is unclear whether this shift would be sufficient to stimulate fibre investment, but there are still complaints that only in case that there was no access regulation at all, a significant increase in investment could be expected. This is a discussion that is still going on, and in we can observe quite different regulatory approaches throughout Europe tailored to the specific national circumstances. (Description of differences? Cable competition, ducts, city networks, symmetric regulation ...).

As a result of these fragmented and contradicting strategies Europe lags behind, the ladder of investment theory has not proven successful and instead of fostering competition in the access network (against increasing technology induced natural monopoly characteristics), virtual, active layer 2 access products in many cases fit better to bring in line competition and the ambition to foster NGA rollout.

Appendix III-E: Econometric analysis of the relation between broadband penetration and GDP


Rohman/Bohlin\textsuperscript{79} summarized existing literature on the direct and indirect economic impacts\textsuperscript{80} of broadband in the following Table:

<table>
<thead>
<tr>
<th>Author</th>
<th>Location</th>
<th>Type I</th>
<th>Type II</th>
</tr>
</thead>
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<td>Crandall et al. (2003)</td>
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<tr>
<td>Atkinson et al. (2009)</td>
<td>United States</td>
<td>NA</td>
<td>3.6</td>
</tr>
<tr>
<td>Katz et al. (2009b)</td>
<td>United States</td>
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<td>3.43</td>
</tr>
<tr>
<td>Liebenau et al. (2009)</td>
<td>United Kingdom</td>
<td>NA</td>
<td>2.76</td>
</tr>
<tr>
<td>Katz et al. (2009c)</td>
<td>Germany</td>
<td>1.45</td>
<td>1.93</td>
</tr>
</tbody>
</table>

Table 1: Rohman/Bohlin: The multiplier effects of broadband: previous studies.

The multipliers found in this study indicate, that of 1 CAD spent on end user demand of broadband, overall economic output will increase between 1.45 and 3.6 CAD.

Empirical investigations like those quoted have contributed to the common understanding that investment in fast and ultra-fast broadband is crucial for the economic and social development but also the competitiveness of a nation.

\textsuperscript{79} Rohman, I.K. and Bohlin, E. (2012) \textit{Does Broadband Speed Really Matter for Driving Economic Growth?} Investigating OECD Countries, Division of Technology and Society, Department of Technology Management and Economics, Chalmers University of Technology, Gothenburg, Sweden

\textsuperscript{80} Direct economic effects are for example jobs and welfare related to the deployment of infrastructure, whereas indirect effect are network externalities on productivity of the other sectors on the economy or on households, benefits in terms of consumer surplus, benefits through other sectors such as access to the public, entertainment, education, health care and banking services. See also reference: ITU (2012) \textit{Impact of broadband on the economy}, Broadband series, Telecommunication Development Sector, ITU, Geneva