BROADCASTING AND TELECOMMUNICATIONS LEGISLATIVE REVIEW

APPENDIX 2

TO

SUBMISSION OF CANADIAN NETWORK OPERATORS CONSORTIUM INC. TO THE BROADCASTING AND TELECOMMUNICATIONS LEGISLATIVE REVIEW PANEL

11 JANUARY 2019

Report on:

COMPETITION ISSUES IN FACILITIES BASED VERSUS SERVICE BASED COMPETITION AND DISAGGREGATED WHOLESALE HSA TRANSPORT

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Introduction

Facilities-based competition in Canada

What does it mean?

1. The term "facilities-based competition" (FBC) has evolved in the context of the regulation of telecommunications markets[1] and later high-speed Internet services. The basic idea is that in order to create healthy competition in industries providing services of this kind, competitors should be encouraged to provide "end-to-end" service on their own facilities rather than supplying part of the service through leasing inputs from other suppliers, who are typically much larger and vertically integrated. Unless otherwise noted, the term "competitors", when used throughout this report, refers to those Internet Service Providers ("ISPs") that are not affiliated with any of the Incumbent Local Exchange Carriers ("ILECs") or large incumbent cable companies in Canada, as those companies are defined by the Canadian Radio-television and Telecommunications Commission (hereafter "Commission").

2. The Commission has recognized that the "end-to-end" type of facilities-based competition is not an immediately achievable goal.[2] However, the Commission has increasingly moved to a position that facilities-based competition is the most sustainable form of competition.[3] To be considered a facilities-based service provider, a firm must provide services by using solely or predominantly its own facilities.[4] In the telecommunications industry, these facilities could include but are not limited to "copper, coaxial, and fibre connections that connect households and businesses, fibre-optic cables connecting communities, and the various routers, switches, and interfaces located within incumbent carrier data centres".[5] Since incumbents have significant advantages over competitors in building these facilities, facilities-based entry is often difficult, which has handicapped the flourishing of competition in the retail market.[6] A recurring issue for policymakers has been to strike a balance between encouraging investment in facilities and incentivizing entry by competitors at the retail level.

3. The idea of facilities-based competition was discussed extensively by economists and telecom policy analysts after the passage of the US 1996 Telecommunications Act (hereafter "USTA"), which enshrined a right of access

[1] An early statement of such policy by the CRTC was in Telecom Decision CRTC 2002- 34 at [99]: "In light of the above, the regulatory framework set out in this Decision is designed to achieve the following objectives: … (c) to foster facilities-based competition in Canadian telecommunications markets."
[2] Telecom Decision CRTC 2008-17 at [62].
[3] Telecom Regulatory Policy CRTC 2015-326 at [5].
[4] Telecom Decision CRTC 2008-17 at [61]; Telecom Regulatory Policy CRTC 2015-326 at [5].
[5] Telecom Regulatory Policy CRTC 2015-326 at [5].
[6] Telecom Regulatory Policy CRTC 2015-326 at [3]; Middleton, Catherine A. and Van Gorp, Annemijin F., "The Impact of Facilities and Service-Based Competition on Internet Services Provision in the Canadian Broadband Market", Dec. 9, 2009, p.220.

for small telecommunications companies in the United States and prompted a vigorous policy debate. This statute was enacted as a response to the perceived advantage that incumbent local exchange carriers had over potential competitors.[7] The main objective of the USTA was to promote facilities-based competition.[8] However, whether the goal was achieved by the statute raised controversy. For example, Blondeel and Kiessling recommended that unbundled network elements should be mandated only if they are considered essential.[9] In their opinion, the USTA mandated access to elements that were not essential for new entrants to compete.[10] While there were heated debates about the unbundling and resale provision of the USTA, Shelanski argued that other provisions of that legislation favoured a trend of increasing facilities-based competition, thereby accomplishing the objective of opening the market to competition.[11] Many policy analysts pointed out that the wholesale price was also an important factor that was critical to investment in facilities. If the wholesale price is too low, it will disincentivize investments, thereby undermining facilities-based competition.[12]

4. In any other industry, the term facilities-based competition would seem odd to say the least. Why would policy makers and regulators want to influence which inputs a private firm would buy and which ones they would produce themselves? Why would policy makers choose to force an increased level of vertical integration on firms when efficiency, at least static efficiency[13], dictates the opposite? While it may in some circumstances be correct to say that mandating connection at a wholesale price that is "too low" will discourage investment by the competitors, and mandating connection at a wholesale price that is "too high" will make it difficult for competitors to offer retail service on fair competitive terms, there is no logical connection between this observation and the conclusion that facilities-based competition is always and everywhere preferred. A better solution would likely be focused on ensuring access by competitors at optimal wholesale prices and under equitable terms and conditions (Dynamic efficiency may not be best served by insisting on facilities-based competition either, as I argue subsequently in my report).

5. The answer given to these questions usually amounts to a vague belief that forcing firms that do not provide end-to-end competition to invest in their own "facilities" will lead to a greater degree of competition in the long run, if not in the short run. But the evidence for this conclusion is weak and of course must be balanced against

[7]Meyerson, Michael, "Idea of the Marketplace: A Guide to the 1996 Telecommunications Act", Federal Communications Law Journal, Vol. 49, Issue 2, Feb. 1997 (hereafter "Meyerson"), p.257.
[8] Blondeel, Yves and Kiessling, Thomas, "The impact of regulation on facility based competition in telecommunications, Sept. 3, 1998 (hereafter "Blondeel and Kiessling"), p.3.
[9] Blondeel and Kiessling, p.10.
[10] Blondeel and Kiessling, pp.11-12.
[11] Shelanski, Howard A., "A Comment on Competition and Controversy in Local Telecommunications", Hastings Law Journal, Vol.50, Issue 6, Jan. 1999, p.1618, 1631-1633.
[12] Meyerson, p.258.
[13] Economists refer to static efficiency as the goal of maximizing total surplus (consumer surplus plus producer surplus), given the existing production framework and capital stock. Dynamic Efficiency refers to longer term goals involving growth and innovation.

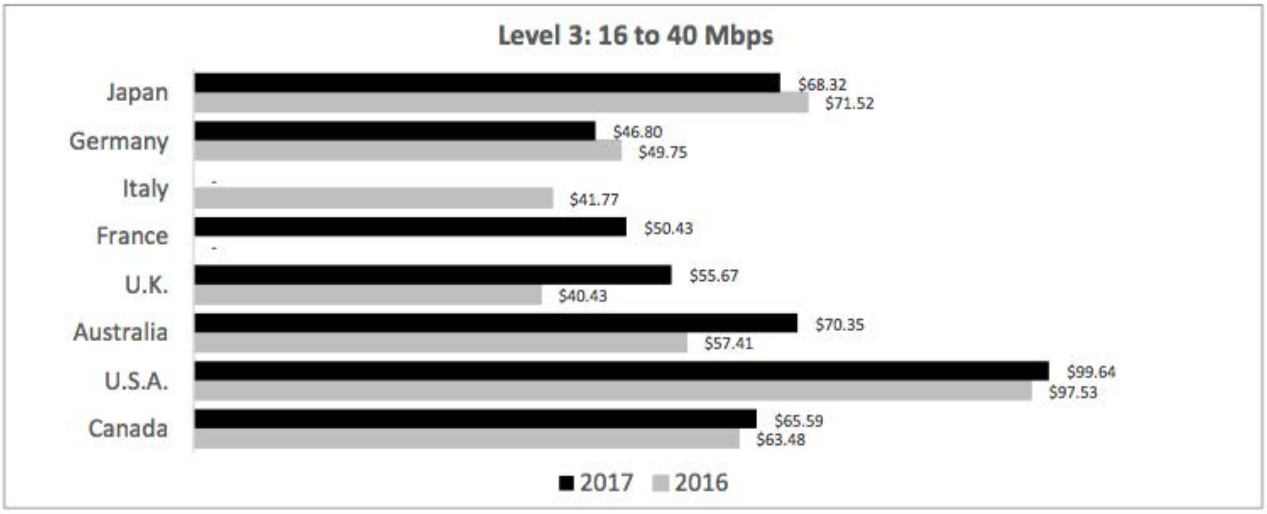
evidence that the focus on facilities-based competition could harm static efficiency. For instance, the United States has been promoting investment by focusing on facilities-based competition.[14] However, the US has the highest price for fixed broadband Internet when compared to other developed countries (See figures below).[15] Moreover, the US has lower FTTP coverage than OECD countries' average coverage.[16] Both of these statistics are further evidence that US policy is not leading to long run dynamic efficiency. As for Canada, the price for high speed Internet remains fairly high relative to other developed countries, although lower than the price level in the US. Canada's FTTP coverage was at 2% in 2013, which was also significantly lower than OECD countries' average coverage of 16%. In addition, a 2015 report prepared for the UK regulator, OfCom, by WIK Consult on Next Generation Access ("NGA") deployment did not find evidence that regulatory forbearance, such as limiting unbundling and regulated access, was helpful to NGA deployment.[17]

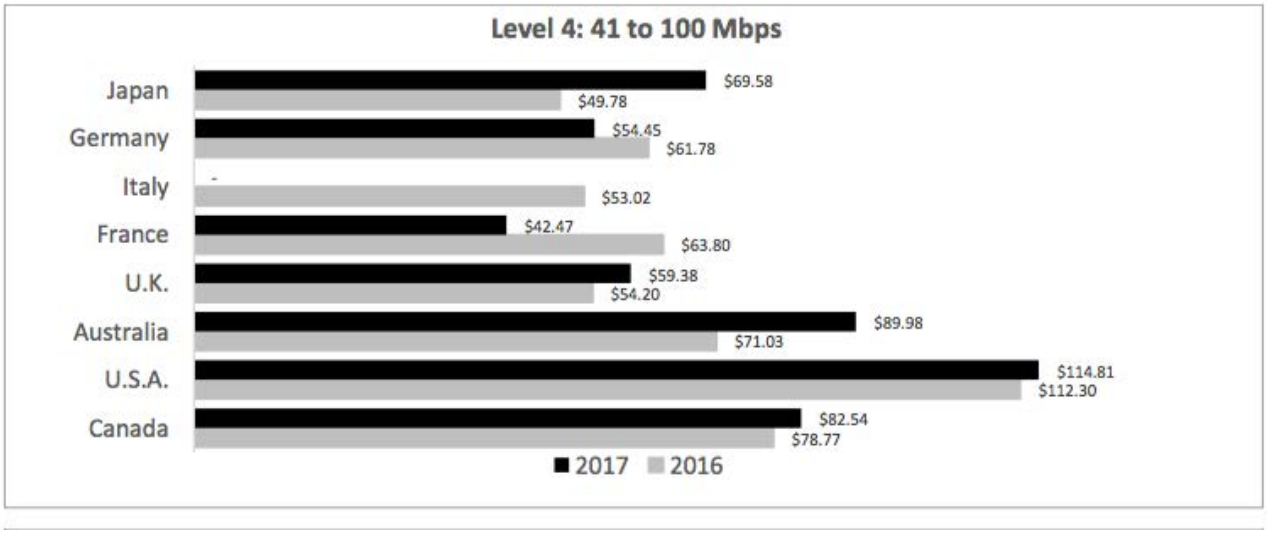
[14] Blondeel and Kiessling, p.12. See also, Analysis Group, Economic Review of the Provision of Wholesale Telecommunications Services and Associated Policies in Canada, June 27, 2014, submitted by Canadian Network Operators Consortium Inc. to the Commission in the proceeding initiated by Telecom Notice of Consultation CRTC 2013-551, CRTC File No. 8663-C12-201313601 (hereafter "Analysis Group Report") at [94]. See also, Picot, Arnold and Wernick, Christian, "The role of government in broadband access", Telecommunications Policy 31, 2007, 660–674, pp.669-672: "With regard to its future development, there is much that indicates that the US will concentrate on its deregulatory efforts and thus head for a duopoly of incumbent telecommunications and cable network operators." at [671].

[15] 2017 Price Comparison Study of Telecommunications Services in Canada and Select Foreign Jurisdictions, NGL Nordicity Group Ltd., Oct. 5, 2017 (hereafter "Nordicity Report 2017"), p. 50.

[16] Analysis Group Report at [94].

[17] WIK Consult, Competition & Investment: an analysis of the drivers of superfast broadband, July 2015 at [1].





Essential Facilities

6. Another key concept is that of an Essential Facility. The Commission has stated that the best way to encourage facilities-based competition is to mandate incumbents to only grant access to "essential" facilities, sometimes referred to as bottleneck facilities. This is a simple idea with rather complex and difficult implications. In essence, it means that if one competitor possesses an input that is essential to compete in the industry, and the input cannot be duplicated, then in order to generate competition, the input must be shared. In the United States, an Essential Facilities Doctrine has evolved over many decades, but was first set out in Canada by the Commission in Telecom Decision 97-8. In Telecom Decision 2008-17, the Commission modified these conditions for essentiality to the ones that hold today. These are:

a. The facility is required as an input by competitors to provide telecommunications services in a relevant downstream market.[18]

b. The facility is controlled by a firm that possesses upstream market power such that withdrawing mandated access to the facility would likely result in a substantial lessening or prevention of competition in the relevant downstream market.[19]

c. It is not practical or feasible for competitors to duplicate the functionality of the facility. [20]

7. This definition is largely consistent with the views of the Competition Bureau expressed at the hearing leading to Telecom Decision 2008-17.[21] Subsequently, in its June 2014 submission to the proceeding that led to Telecom Regulatory Policy 2015-326, the Competition Bureau endorsed this framework and suggested further that regulatory measures should be focused on the outcomes in the retail market.[22] The original monopoly standard established in Telecom Decision 97-8 would have prevented competitors from obtaining access to some essential facilities even if downstream competition was limited and inefficient.[23]

8. In Telecom Regulatory Policy 2015-326 the Commission also added policy considerations to its objectives in mandating wholesale services, most notably the objectives of promoting innovation and investment.[24]

[18] The Commission uses this criterion as a basis to evaluate the essentiality of an input. If the input is not needed to compete in the downstream market, then access should not be provided since the input might be used by a company as part of a firm's business strategy.
[19] The condition was changed from monopoly power to market power because the Commission believes that possessing market power in the wholesale market is a sufficient condition to create negative effects (i.e. substantial lessening or prevention of competition) in the downstream market.
[20]The Commission considers duplicability to be a key factor in determining essentiality because it is directly linked to the degree of market power in the upstream market. Telecom Decision CRTC 2008-17 at [28-36].
[21] Telecom Decision CRTC 2008-17 at [8-11].
[22] Second Intervention of the Competition Bureau to the Commission in the proceeding initiated by Telecom Notice of Consultation CRTC 2013-551, June 27, 2014, CRTC File No. 8663-C12-201313601, (hereafter "Competition Bureau Submission") at [9].
[23] Competition Bureau Submission at [9].
[24] Telecom Regulatory Policy CRTC 2015-326 for example at [51]

An Economic Analysis

How should broadband markets be defined in terms of substitutability (based on geography and service characteristics (the main one being speed)?

A. Wholesale HSA markets

9. The first element of the Telecom Decision 2008-17 test for Essentiality is that the upstream suppliers of the scarce input must possess significant market power. Although not a direct test, the conventional way to establish market power is to delineate product and geographic markets using the hypothetical monopolist test from competition law.[25] As the Commission stated in Telecom Regulatory Policy 2015-326, "The first step in applying the Essentiality Test is to define the relevant markets for the wholesale service in question, which include product and geographic components"[26].

10. The Commission has concluded that wholesale wireline HSA has sufficiently few substitutes that it does constitute a relevant product market. [27] In addition, the Commission stated that, "in general, wholesale HSA services have not been provided voluntarily by the industry, requiring regulatory intervention to do so, and there is no convincing basis upon which the Commission could conclude that this will change in the foreseeable future."[28]

11. Wireless Internet access has been the one feature to change the landscape over the past decade or so, with the advent of 3G and 4G access speeds, and increasing consumer use of mobile devices for accessing the Internet. Of course, wireless services are generally offered as *retail* services, there is practically no wholesale market for wireless access, e.g. for purchase by the existing competitors. If wireless has become an important competitor to wireline services this would impact the upstream wholesale market through an effect on the elasticity of demand for wholesale HSA. Wholesale HSA demand is a derived demand from downstream retail demand and the more substitutes that are available at the retail level, the greater will be the elasticity of retail demand for retail broadband services and hence the greater will be the elasticity of the derived demand for wholesale

[25] The Hypothetical Monopolist test is articulated in the Competition Bureau's Merger Enforcement Guidelines, Section 4.3 but is applied in other areas of competition law, including conspiracies and abuse of dominance.
[26] Telecom Regulatory Policy CRTC 2015-326 at [34].
[27] The relevant market "includes aggregated and disaggregated wholesale HSA services offered over various technologies, including DSL over copper or over a hybrid of copper and fibre (including FTTN), HFC cable, and FTTP access facilities". See Telecom Regulatory Policy CRTC 2015-326 at [114-115].
[28] Telecom Regulatory Policy CRTC 2015-326 at [121].

wireline HSA also. This is the mechanism by which wireless Internet access could in theory impact the degree of market power exercised upstream by the ILECs and cable companies.

12. Wireless speeds are in the order of 30 Mbps for 4G where it is available. However, landline speeds are increasing at least as fast as wireless speeds, and speeds of greater than 100 Mbps are now widely available.[29] Roughly speaking, wireline speeds are maintaining a ratio of ten times faster than wireless speeds. I would conclude therefore that wireless services are still too slow and too expensive, except in rare cases, to affect market power in wholesale HSA, although this may change in the future. [30]

13. Additionally, geographic markets relevant to the identified product must also be defined before any determinations of market power can be made. Geographic markets identify the location of suppliers who compete for a given set of buyers. The most appropriate geographic market for wholesale HSA is likely the point-of-interconnection ("POI") between a competitor and an incumbent, whether that incumbent be an ILEC or cable company, because the only rival that an ILEC has at the POI is the cable company and vice versa for the cable company. There is no alternative supply of wholesale HSA other than these two alternatives. To the extent that the coverage areas (i.e. the geography and customer base that can be served from these POIs via wholesale HSA) of two POIs overlaps, then the overlapping area covered by incumbent telephone and cable company POIs would constitute the relevant geographic market. Another rival supplier who wished to compete for wholesale customers would require a prohibitive investment in network infrastructure so that possibility can be safely excluded. It should also be noted that if the geographic market coincides with the POI it will vary with the degree of disaggregation i.e. under an aggregated wholesale HSA system, for example, one POI supplies the whole of Ontario and Quebec, so that the geographic market would be much larger.[31]

14. The lack of substitutes at the wholesale level can facilitate the exercise of market power when the number of upstream suppliers is limited. The Commission found in Telecom Regulatory Policy 2015-326 that "together, the incumbent carriers are the sole suppliers of the underlying wholesale services available to competitors, and together have the entire upstream market".[32]

[29] Average wireless download speeds in Canada are approximately 35 Mbps and average wireline download speeds in Canada are approximately 60 Mbps according to http://www.speedtest.net/reports/canada/.
[30] "Based on the significant disparity in price, quality, speed, and capacity, reliance on wireless wholesale alternatives would not enable competitors to effectively compete with the wireline broadband services offered by the incumbent carriers within their serving regions." See Telecom Regulatory Policy CRTC 2015-326 at [122].
[31] My conclusion on geographic markets differs somewhat from that of the CRTC, who deemed the incumbent carriers' serving region to be "the appropriate basis upon which to make decisions with respect to the mandated provision of wholesale HSA services. See Telecom Regulatory Policy CRTC 2015-326 at [116].
[32] Telecom Regulatory Policy CRTC 2015-326 at [121].

15. With only two suppliers available in most wholesale HSA markets, standard oligopoly theory from economics would predict an outcome where significant market power is exercised, at the expense of competitors who are the direct wholesale customers and also ultimately to the detriment of the final retail customers of high speed Internet services, who suffer higher prices and less diversity, choice and innovation in their choice of retail options. In addition, such highly concentrated markets are conducive to coordinated behaviour, which does not need to involve explicit agreements between dominant firms because of the ease of monitoring competitors' actions and detecting deviations (e.g, price cutting) due to the limited number of competitors. For example, Firm A can decide to raise its price knowing that Firm B will follow since the price increase is beneficial for both dominant firms in a given industry. Neither firm will undercut each other's price because doing so would lead to a price war which would not be profitable for either dominant firm. The effects of such behavior could include higher price levels, lower product quality or lower service levels. It is not surprising that the Commission concluded that "there is limited competition for wholesale HSA services between the ILECs and the Cablecos, and what competition that does exist today is largely, if not entirely, a result of regulatory intervention. Consequently, there is limited rivalrous behaviour to constrain upstream market power."[33]

16. The large incumbent telecom companies, such as Bell Canada (including Bell Canada in Ontario, Quebec, the Atlantic provinces, and Manitoba), Rogers Communications Canada Inc. ("Rogers"), TELUS Communications Inc. ("TELUS"), Shaw Communications Inc. ("Shaw"), Cogeco Communications Inc. ("Cogeco"), Saskatchewan Telecommunications ("SaskTel"), Bragg Communications Inc. operating as Eastlink ("Eastlink"), and Quebecor Media Inc. on behalf of its affiliate Videotron Ltd. ("Videotron") compete with each other on a recurring basis in many markets, including wireless, Internet, voice and video/TV services. In such a market environment, the exercise of market power due to coordinated effects is highly likely, in addition to the standard unilateral effects analysis that derives from oligopoly theory. Essentially this means that repeated interactions of large competitors in many markets will facilitate them behaving in a collusive manner, at least partially, but without recourse to any tangible collusive agreements.[34] The consequences for wholesale customers and ultimately for retail consumers are that unilateral effects analysis will *underpredict* the degree of market power that will likely result from any given market environment.[35] In the wholesale HSA markets the implication is that greater

[33] Telecom Regulatory Policy CRTC 2015-326 at [123].

[34] "Coordinated effects" was recently defined by the Competition Bureau in "Competition Bureau statement regarding Bell's acquisition of MTS", February 15, 2017: "Coordinated effects involves interaction by a group of firms (including the merged firm), that is profitable for each firm, because of the firms' accommodating reactions to the conduct of the others. In essence, firms who repeatedly compete in the same market can develop an unspoken understanding that each firm will respond cooperatively to the behaviour of the other firms. While the coordinating firms may not explicitly communicate with each other, this behavior facilitates higher market prices. For instance, a firm may raise its price if it expects others to follow, even if it would not have been profitable to do so independently." <http://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/04200.html>

[35] Unilateral Effects analysis is the term used by competition economists to describe firm behaviour that takes advantage of market power in order to raise prices and restrict output, but not as a result of collusive behaviour with its rivals.

market power is being exercised than would be predicted by a standard unilateral effects model of duopoly. Both the Competition Bureau and the Commission have endorsed this view in the telecom industry. For example, in reviewing the proposed acquisition by Bell Canada of MTS Allstream, the Competition Bureau concluded that as a result of coordinated behaviour among Bell, TELUS and Rogers, mobile wireless prices in Canada are higher in regions where Bell, TELUS and Rogers do not face competition from a strong regional competitor.[36]

17. In sum, there is little doubt that wholesale HSA constitutes a product market, because there is very little substitutability between wholesale HSA services and other products. Although wireless Internet services are creating some competition at the retail level for the wireline broadband industry, such competition is relatively ineffective at present and unlikely to increase the elasticity of demand significantly for the wholesale HSA market.

B. Retail Broadband markets

18. In addition to the wholesale markets, there are also retail markets for high speed broadband service. As well as Internet access, high speed broadband also supports other services such as Internet Protocol Television ("IPTV") and Voice over Internet Protocol ("VoIP") telephone service. Both the Commission and the Competition Bureau believe that policy decisions should aim at creating a competitive market in the downstream market.[37] Thus, it is crucial to understand the retail markets. Following from the wholesale product market analysis, the retail wireline broadband market has limited substitutes as well. Given users' usage and speed requirements, wireline broadband is the preferred option for most consumers. Wireless and satellite services generally have a lower bandwidth for a higher price relative to wireline services.[38] Further, the Competition Bureau suggests that residential and business users should be classified into different markets. Generally, the bandwidth required by business users is higher than the one chosen by residential users.[39] In the Commission's 2017 Communications Monitoring Report, services for business and residential users are analyzed separately. Some services, such as "Business Transport", are generally used by large business customers.[40] Thus, I conclude that wireline broadband is a well-defined competition product market, possibly subdivided further into residential and business services.

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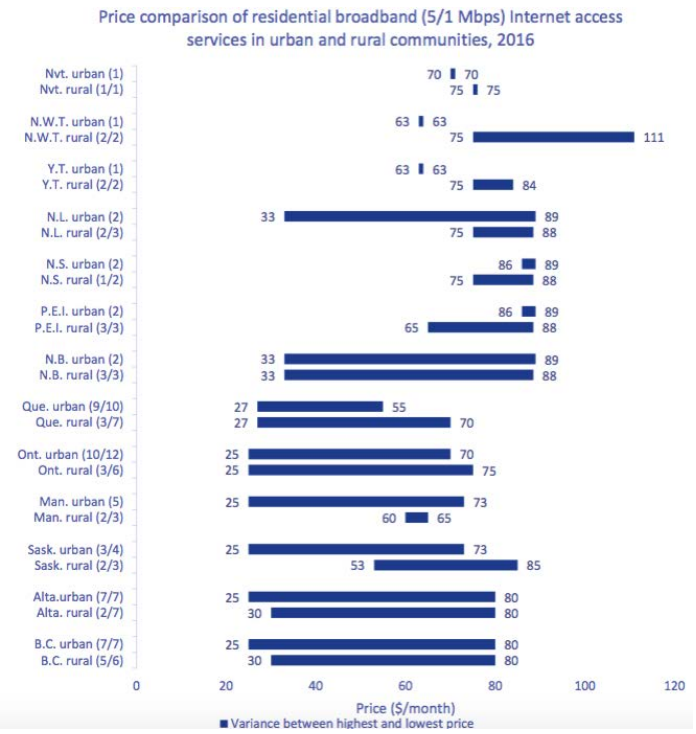
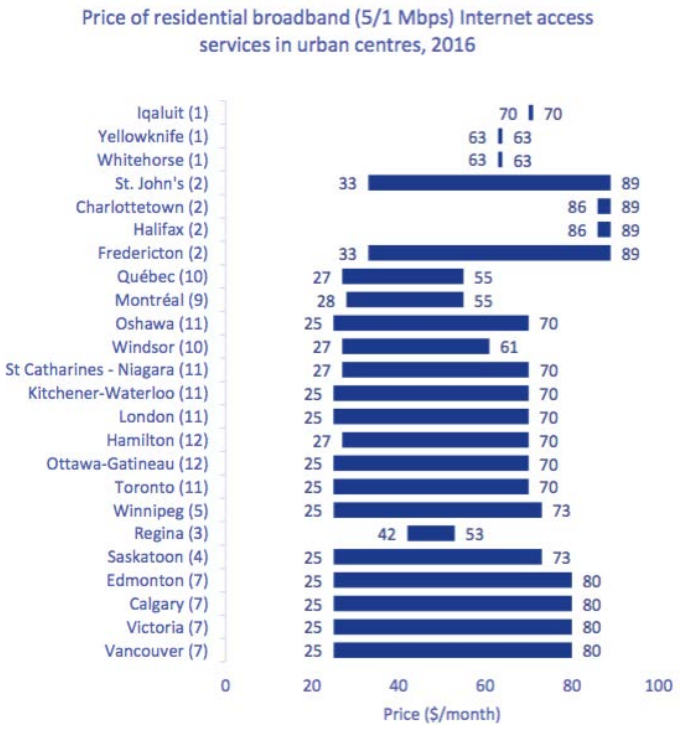
[36] See "Competition Bureau statement regarding Bell's acquisition of MTS", February 15, 2017, at http://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/04200.html.
[37] Telecom Decision CRTC 2008-17 at [8], [30-32].
[38] Telecom Regulatory Policy CRTC 2015-326 at [126].
[39] Competition Bureau Submission at [15-16].
[40] Canadian Radio-television and Telecommunications Commission, *Communications Monitoring Report 2017*, pp.256-257 ("CMR 2017").

19. Turning to the geographic market for retail broadband service, competition is available to retail customers from the ILECs, the cable companies, from competitors, and to a lesser extent from satellite and wireless providers. In particular, a geographic market can be defined "around the network of an ILEC based on its overlapping footprint with competing networks".[41] The relevant geographic boundary is likely no smaller than the provincial level.

20. In its annual Communications Monitoring Reports, the Commission analyzes the price range for a given speed in urban and rural parts of each province and territory.[42] A more detailed price analysis is performed in selected urban centres of Canada.[43] These analyses are presented in the following diagrams. The number(s) between the parentheses represent how many Internet service providers are present in that region. We can see that, in a given urban centre, the number of providers is approximately the same for all locations within that region, which confirms that people living in that region have similar options. Therefore, these locations can be aggregated into one relevant geographic market.



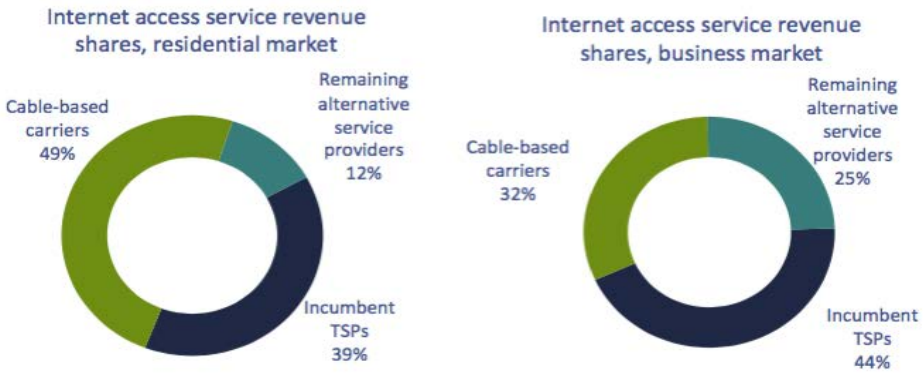


21. Currently, incumbent carriers' market power at the retail level is mitigated to some degree by competitors who purchase wholesale HSA services from them. The withdrawal of mandated wholesale access would release the potential market power because incumbents would have the ability to raise the wholesale rates, which would

[41] Competition Bureau Submission at [17-18].
[42] CMR 2017, pp.266-268.
[43] CMR 2017, pp.263-265.

squeeze competitors out of the retail HSA market.[44] The Commission concluded that "without the mandated provision of wholesale HSA services, most retail customers in Canada would eventually be left with a very limited choice of Internet service providers."[45] As illustrated below, ILECs and cable companies dominate the retail market, especially in residential markets. Without mandated access, the market share of what the Commission refers to in the diagrams below as alternative service providers, which includes competitors to the incumbent telecom companies, would gradually decrease.[46]

Figure 5.3.10 Internet access service revenue shares, by market and type of service provider, 2016 (%)



Source: CRTC data collection

When is facilities-based competition not sufficient to maximize economic welfare?

Circumstances when forced construction of facilities leads to economic inefficiency

22. It is a trivial task to construct a theoretical example in which an insistence on facilities-based competition will *lower* economic efficiency rather than increase it. Suppose that a vertically integrated incumbent possesses an input that is essential for operating in the industry, but has unlimited capacity (or just a very large amount of excess capacity). The input can feasibly be duplicated, but has a large fixed cost ("F1") that is incurred annually.

23. Economic efficiency requires that the input be shared between the two firms. Forcing the entrant/competitor to duplicate the fixed input is a dead weight cost to society, and pure economic inefficiency. But forcing the competitor to build their own version of the input is precisely what facilities-based competition requires. This simple economic logic seems to have become lost, or at least neglected, in the more recent emphasis on encouraging exclusively facilities-based competition.

[44] Telecom Regulatory Policy CRTC 2015-326 at [127].
[45] Telecom Regulatory Policy CRTC 2015-326 at [129].
[46] CMR 2017, p.273.

24. Incumbents have argued that forcing them to share facilities reduces their incentives to invest. For instance, Bell Canada claimed that mandated access will reduce its incentives to invest in Fiber-to-the-Premises ("FTTP") networks.[47] There is very little empirical evidence to support this claim. Economist and analyst views in support of Bell Canada's claim have for the most part been highly theoretical and hypothetical.[48] However, even as a theoretical proposition, it could easily be false. Consider the previous example but now suppose that the entrant requires a fixed investment of F2 incurred annually in order to offer service, whether or not they connect to the incumbent's fixed input. If the entrant is forced by a requirement for facilities-based competition to incur both fixed costs F1 and F2 in order to offer service and compete, then it is perfectly possible that entry is *unprofitable* because of the prohibitive additional costs, and thus competitive entry will not occur. In such a case, the consequence will be *reduced* investment and less competition than if the regulator facilitated access to the essential input. With mandated access, total investment, including the incumbent, will be F1 + 2F2 (or twice the F2 investment); without mandated access, total investment will be only F1 + F2.

    The additional cost of a facilities-based investment policy in this example is of course that we would have a persistent monopoly, and no competition in retail service, along with the additional dynamism and innovation that retail competition featuring service-based competition would bring.

Are conditions in Canada such that it is worthwhile to incur the costs of promoting service-based competition?

What is the current status of retail broadband competition in Canada?

25. In 2016, the retail Internet industry generated 23% of total retail telecommunications industry revenue.[49] In Telecom Regulatory Policy 2016-496, the Commission recognizes the importance of broadband availability and quality for Canadian consumers.[50] As a result, the Commission set several criteria to achieve its service objective of providing all Canadians with broadband Internet access services. For example, the speed offered to all Canadians should be at least 50 Mbps download and 10Mbps upload with unlimited data allowance. By the end of 2016, 84% of Canadian households could access services meeting Commission's criteria. The disparity between urban and rural areas of Canada is however significant. This service level was available to 96% of urban households, but only accessible by 39% of rural residents.[51] For a given speed, urban users have a larger

[47] Petition of Bell Canada to the Governor in Council to Vary Telecom Regulatory Policy CRTC 2015-326, Review of wholesale wireline services and associated policies, Oct. 20, 2015 (hereafter "Bell Petition"), pp.23-24.
[48] Bell Petition, pp.24-26.
[49] CMR 2017, p.253.
[50] Telecom Regulatory Policy 2016-496.
[51] CMR 2017, p.254.

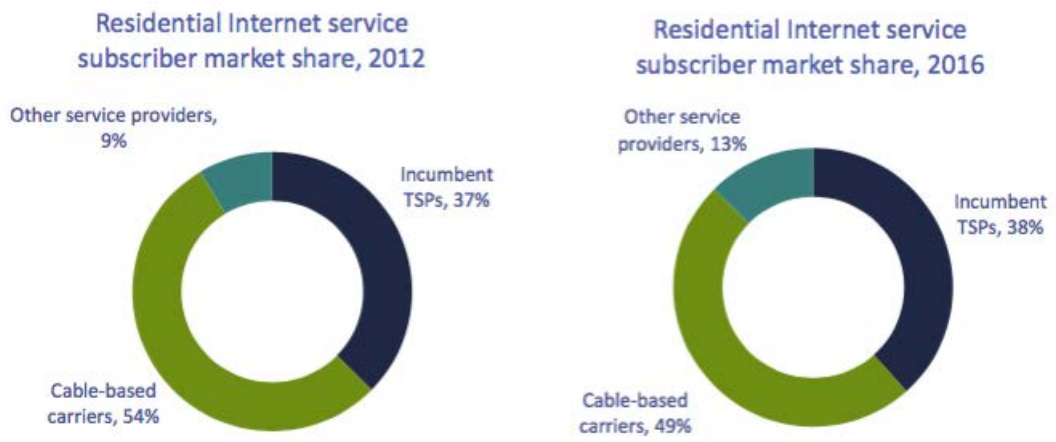
number of suppliers than rural users. On average, urban users can choose from 6.6 providers, whereas rural subscribers can choose from 3.7 providers. Some higher speeds are not even available in rural areas.[52]

26. Consumer data confirmed that Canadian consumers have been demanding faster Internet speed. Demand for speeds between 5 to 9 Mbps declined from 41.3% in 2012 to 19.9% in 2016. Meanwhile, subscriptions to speeds of 50 Mbps and higher increased from 3.6% in 2012 to 26.2% in 2016.[53] Additionally, 15.8% of residential users are subscribed to Internet services that have advertised download speeds of 100 Mbps or more.[54] These subscribers could be affected by the speed cap imposed on aggregated wholesale HSA in Telecom Regulatory Policy 2015-326.[55] Along with the increase of demand in speed, consumers also demand more bandwidth that could be attributed to higher-intensity Internet activities, such as video viewing. This is evidenced by the increase in unlimited subscriptions from 12% in 2012 to 23% in 2016.[56]

27. As of 2016, incumbent telecommunication service providers[57] and cable-based carriers[58] dominated the retail Internet industry with 88% of its total revenue. Although the residential market share for other service providers[59] has increased from 2012 to 2016, they still only provided for 13% of Canadian residential subscribers in 2016, as indicated by the following diagrams. It is worth noting that 55% of competitors' subscribers have unlimited Internet packages even though only 23% of all Canadian subscribers had unlimited Internet packages.[60]

[52] CMR 2017, pp.266-268.
[53] CMR 2017, p.254.
[54] CMR 2017, p.271.
[55] Telecom Regulatory Policy 2015-326 at [154].
[56] CMR 2017, p.259.
[57] Incumbent TSPs are the companies that provided Internet services on a monopoly basis prior to the introduction of competition via their telephone infrastructure. CMR 2017, p.256.
[58] Cable-based carriers are the former cable monopolies that also provide telecommunications services via their cable infrastructure. CMR 2017, p.256.
[59] Other service providers include fixed wireless service providers, resellers, and facilities-based non-incumbent providers. CMR 2017, p.256.
[60] CMR 2017, p.259.

Figure 5.3.1 Residential Internet service subscriber market share by type of service provider (%)



Source: CRTC data collection

Assessing the benefits of service-based competition in retail broadband markets in Canada

28. Canadians rely on high speed Internet for a variety of activities that fuel the economy. In a market study notice, the Competition Bureau pointed out that "high prices in the broadband sector can have negative spill-over effects into a wide range of economic activity".[61] In the same notice, the Competition Bureau also reported that competitors' prices can be as much as 30% lower than prices offered by the ILECs and cable companies for similar services, which indicates that competitors are constrained from offering the full competitive threat that their price advantage should indicate.[62]

29. In addition, the United States has been promoting facilities-based competition at the expense of service-based competition, and yet evidence indicates that prices in the United States for a given basket of wireline broadband service is significantly higher than the average of OECD countries as illustrated by the following table. [63] [64]

[61] Market Study Notice: Competition in Broadband Services, Competition Bureau (hereafter "Market Study Notice") at [2].
[62] Market Study Notice at [6]. As an illustration, in an average minimum price comparison between incumbents and resellers, the incumbent's price is 17.91% to 34.33% higher than the reseller's price depending on the service level. Nordicity Report 2017, p.48.
[63] Blondeel and Kiessling, p.12. See also, Analysis Group Report at [87].
[64] Analysis Group Report at Table 1.

Table 1: Wireline Broadband Prices, by Basket, September 2012

	Basket		OECD Average	Canada	United States
	GB	Mbps			
Low Usage Profile	2	0.25	$27.20	$30.03	$27.49
	6	2.5	$30.23	$31.72	$43.95
	11	15	$35.00	$40.86	$43.99
	14	30	$44.66	$64.36	$73.32
	18	45	$52.01	$64.36	$89.82
High Usage Profile	6	0.25	$28.40	$31.72	$27.49
	18	2.5	$31.36	$36.36	$43.95
	33	15	$38.06	$40.86	$43.99
	42	30	$50.15	$64.36	$73.32
	54	45	$59.96	$64.36	$89.82

Note U.S Dollar, exchange rates based on purchasing power parity.

Source: OECD Broadband Portal, http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm.

30. More vigorous service-based competition would help the Commission to achieve the objective established in Telecom Regulatory Policy 2016-496 – to provide all Canadians with broadband Internet access services. In a recent study, Gruber and Koutroumpis used data from 167 broadband markets over a time horizon of 11 years to assess the effects of competition regulations. They found that service-based competition could accelerate the diffusion of broadband access, whereas inter-platform competition generally does not lead to faster broadband roll out.[65] Further, while full bundling (i.e. require some investments in network infrastructure) leads to higher service differentiation, they found that pure retail competition induces stronger price competition.[66] They argue that duplication of network elements could be conducive to higher retail prices as a result of higher costs.[67] Other studies have found similar results.[68] A study on broadband policies in Finland and Sweden showed that the country that relied on unregulated market forces (i.e. Finland) had slower diffusion and higher prices in the early years of broadband.[69] In addition, Lee et al. found that unbundling had a positive effect on the speed of fixed broadband diffusion.[70] Lower price and higher service availability could lead to increased consumer choices. The lower price level offered by competitors could explain why as many as 55% of their subscribers

[65] Gruber, H. and P. Koutroumpis (2013), "Competition Enhancing Regulation and Diffusion of Innovation: The Case of Broadband Networks," Journal of Regulatory Economics, 43(2), pp. 168-195 (hereafter "Gruber and Koutroumpis").
[66] Gruber and Koutroumpis, pp.191-192.
[67] Gruber and Koutroumpis, pp.191-192.
[68] Eskelinen, H., L. Frank, L., and T. Hirvonen (2008). "Does Strategy Matter? A Comparison of Broadband Rollout Policies in Finland and Sweden," Telecommunications Policy, 32(6), pp. 412-421 (hereafter "Eskelinen et al"); Lee, S., M. Marcu and S. Lee (2011), "An Empirical Analysis of Fixed and Mobile Broadband Diffusion," Information Economics and Policy, 23, pp. 227-233. (hereafter "Lee et al.")
[69] Eskelinen et al., p.420.
[70] Lee et al.

have an unlimited data allowance and 75% of them have a data allowance of 300 GB or higher.[71] Without the presence of competitors, the number of subscribers who could afford Internet subscriptions with unlimited data allowances would be limited. As the Commission indicated, only 23% of total subscribers have Internet subscriptions with unlimited data allowances when we extend the analysis to include ILECs and cable carriers.[72] Encouraging service-based competition could ensure that the increasing demand for faster and better Internet services in Canada is satisfied.

What conditions are needed to maximize the benefits of service-based competition?

31. In this section, I will suggest some recommendations that should lead to an improvement in retail competition, and in particular, greater penetration and market share by the dynamic competitive sector. The general overarching message here is that to have a flourishing, dynamic and innovative retail competitive sector the competitors must be able to compete on a level playing field with the larger, vertically integrated incumbents. In the current environment there is a significant asymmetry, to the disadvantage of the competitors, in the competitive conditions facing the two sets of firms. The proposals below are designed to help establish greater competitive symmetry.

    i. Provide the competitors access to key information possessed by incumbents. For example, Incumbents control service qualification databases that determine whether an end-user's premises can be served via retail and wholesale services. Incumbents are also privy to information regarding service provisioning intervals for installations, repairs and disconnections. The idea behind granting competitor access to these types of information is to provide a more symmetric operations basis for competitors vis a vis the dominant, vertically integrated incumbents.

    ii. Enforce a competitor quality of service regime with financial deterrents that sets standards related to order processing, installations, repair, etc. that are equivalent to those applied by the incumbents to their own retail operations with financial consequences for non-compliance.

    iii. Vertically integrated incumbents, whether ILECs or cable companies, have a significant competitive advantage over competitors in the form of access to multi-dimensional databases. For example, the information regarding the customers of retail competitors that is available to an incumbent from their wholesale business allows them to behave anticompetitively in terms of poaching or winbacks with respect to those customers. Perhaps a data barrier could be implemented between the

[71] CMR 2017, p.259.
[72] CMR 2017, p.254.

databases on Internet customers and those of TV/video customers. As an analogy, banks cannot share or sell customer information with insurance companies, even when the latter are subsidiary companies of the same bank. The concern is that banks will leverage their huge competitive advantage in terms of customer information into unfair competition with stand-alone insurance companies.[73]

iv. Prevent incumbent head starts in offering new broadband speeds until wholesale conditions are such that competitors can offer equivalent service speeds at retail.

v. Wholesale rate setting improvements including (1) Simplified costing methods; (2) accelerated rate decision-making; (3) industry costing knowledge and capacity building; and (4) ex post review of rates and cost model inputs.

vi. Focus regulatory scrutiny on whether incumbent retail bundled pricing is anticompetitive, and works to the exclusion and competitive disadvantage of competitors, including those prevented from entering because of the unfair competition from bundles.[74]

vii. Ensure that the level of disaggregation of wholesale HSA services and how such services are accessed is economically efficient. Elsewhere in this report I have demonstrated that the full disaggregation framework envisioned in Telecom Regulatory Policy 2015-326 is both inefficient and uneconomic for competitors. An intermediate level of disaggregation for Bell Canada, similar to that being implemented for the cable companies in Ontario and Quebec, would provide competitor ISPs with an efficient platform whereby they are able to provide effective competition and supply a competitive check on the market power of the ILECs and cable companies.

viii. In recognition that even a mid-layer of disaggregation imposes a costly and prolonged transition for competitors, continued access to aggregated HSA, including over FTTP facilities, without a speed cap is required to ensure that there are no gaps in wholesale service availability. This approach should persist until a market demonstrates appropriate conditions for aggregated HSA forbearance.

ix. Port and fibre sharing functionality should be made available on all disaggregated HSA platforms to allow more efficient entry by competitors.

[73] Starky (2006), pp. 1-3; Insurance Business (Banks and Bank Holding Companies) Regulations, "Prohibited Activities," available at http://laws-lois.justice.gc.ca/eng/regulations/SOR-92-330/FullText.html

[74] A standard test for exclusionary bundling is that set out by Nalebuff "Exclusionary bundling arises when a firm has market power in product A and faces competition in product B. A firm engages in exclusionary bundling when the incremental price for an A-B bundle over A alone is less than the long-run average variable costs of B. Nalebuff "Exclusionary Bundling" *Antitrust Bulletin,* 50 (2005).

The Ladder of Investment theory and its role in the policy shift towards Disaggregated Wholesale HSA

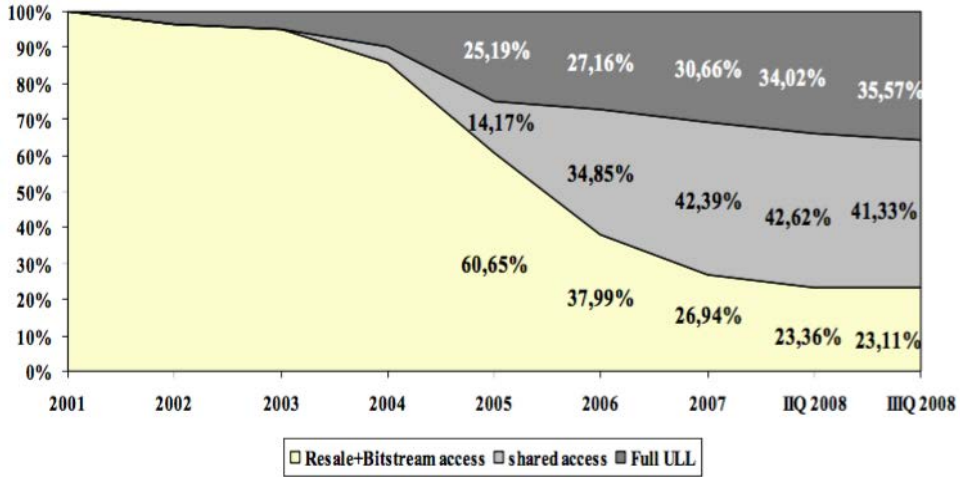
The Ladder of Investment theory

32. The Ladder of Investment theory (LOI) is a regulatory approach that consists of gradually decreasing the level of access to incumbents' infrastructure for new entrants. Starting from service-based entry at the resale level, new entrants would progressively invest in their own infrastructure. For instance, after a certain period of time, the resale level access to incumbents' infrastructure would be deregulated or denied. Then, the new entrants would be obligated to build their own infrastructure to a certain level in order to stay in the market. This process continues until the new entrant becomes a facility-based competitor. Such process can be compared to rung lifting. First, regulators should create access to progressively higher level of the incumbents' infrastructures (i.e. higher rung). Second, they must find a way to "burn the preceding rung".[75]

33. In Telecom Regulatory Policy 2015-326, the Commission decided to phase out aggregated wholesale HSA and to require disaggregated wholesale HSA instead.[76] The Commission's decision may have been motivated by the LOI theory. By removing access to aggregated wholesale HSA, the Commission's goal may have been to burn the preceding rung. Additionally, the requirement to implement disaggregated wholesale HSA would consist of an attempt to create access to a higher rung. Prior to the decision, competitors could run through the high-speed path that includes access, transport, and interface and aggregation components. That path could reach the premises of end-users through a limited number of interconnections with the incumbents' interfaces. Whereas disaggregated wholesale HSA only includes an access component thereby requiring that each competitor supply their own transport and establish a presence at a much larger number of POIs, either being ILEC local central offices or cable head-ends.[77] As a result, the coverage of competitors compelled to use disaggregated wholesale HSA will be largely dependent on the expected profit that a given region can generate. If a region has low density, I would not expect competitors to build transport facilities if prohibitive investments have to be made to do so. Therefore, only incumbents will be present in such regions.

[75] Bourreau, Marc, Pinar Doan, and Matthieu Manant. 2010. A Critical Review of the "Ladder of Investment" Approach. Telecommunications Policy 34(11):683-696., Feb. 17, 2010 (hereafter "Bourreau et al."), pp.4-6.
[76] Telecom Regulatory Policy 2015-326 at [143].
[77] Telecom Regulatory Policy 2015-326 at [56-57].

34. Attempts have been made by economists to test the validity of the LOI theory. However, this is a challenging task because of the difficulty in implementing a perfect LOI system. [78] A number of empirical studies confirm the hypothesis that service-based competition could serve as a stepping stone to achieve facilities-based competition, while others reject it. For instance, many resale services have evolved into full Unbundled Local Loops in the Spanish broadband market.[79] Another study on 15 European countries suggested that shorter ladders from bitstream to Unbundled Local Loops are more successfully accomplished than complete ladders that lead to "end-to-end" competition.[80]



35. **Figure 1: Evolution of wholesale accesses for broadband in Spain**

36. Some economists have suggested that the success of LOI is dependent on external factors. In a conference paper, Herrera-Gonzalez has put forth the idea of complementary goods. A competitor can buy access to incumbents' regulated wholesale services. However, products that are complementary to the regulated service have to be accessible to achieve successful competition. The main idea is that new entrants will not "climb the ladder" if complementary goods are too expensive. Unlike the wholesale access services, the new entrants need to obtain the complementary goods from an unregulated market, which may reduce the appeal for the new entrants to invest.[81] This would result in the failure of LOI. In the context of Telecom Regulatory Policy 2015-326, the transportation investment would consist of a complementary product that is required to use the regulated disaggregated wholesale access. If the price of building transportation facilities is too expensive, LOI will not be effective.

[78] Bourreau et al., p.13.
[79] Herrera-Gonzalez, Fernando, How Many Ladders of Investment, 22nd European Regional ITS Conference September 2011 (hereafter "Herrera-Gonzalez"), section 2.2.
[80] Bacache, Maya, Bourreau, Marc, and Gaudin, Germain, Dynamic Entry and Investment in New Infrastructures: Empirical Evidence from the Fixed Broadband Industry, July 31, 2013, pp.207-208.
[81] Herrera-Gonzalez, section 3.4.

Disaggregated Wholesale HSA

What are the conditions that determine the appropriate level of disaggregation for wholesale HSA services?

37. The Commission in Telecom Regulatory Policy 2015-326 forced the competitors to move from an aggregated wholesale HSA model to a disaggregated wholesale HSA model. In the aggregated model, competitors connect at a single POI, either an ILEC central office or cable company head-end) and the incumbent undertakes to provide transport of the competitor's data to the end-user's location, which could be as far as several hundred kilometers away from the location of the POI. Tariffed charges apply for access and for Capacity Based Billing (CBB) service elements.

38. The basis for the Commission's push towards disaggregated wholesale HSA appears to be twofold:

(i) First, to follow the Policy Direction and policy considerations in encouraging investment and innovation[82].[83]

(ii) To deregulate the transport sector, which the Commission believed to be competitive.

39. In the disaggregated model, competitors must connect at numerous POIs, either supplying their own transport services to these many geographically dispersed POIs or contracting those transport services from a third party. In addition, competitors must also pay various tariffed charges in addition to building a co-location or establishing an outside-meet-me point and related infrastructure.

40. In the case of cable companies, the competitors must connect to a cable head-end POI, where in the disaggregated model proposed for Ontario and Quebec a connection would be required to each cable head-end for each of the three cable companies operating in Ontario and Quebec (Rogers, Cogeco and Videotron) comprising 149 head-ends in total.

41. In the case of Bell Canada, the FTTP incumbent in Ontario and Quebec, in order to obtain full coverage, the competitor would have to connect to approximately 1000 separate central offices dispersed throughout the province, so the additional connection costs involved in the disaggregated model are substantial (see the further discussion of costs below).

[82] Order Issuing a Direction to the CRTC on Implementing the Canadian Telecommunications Policy Objectives, P.C. 2006-1534, December 14, 2006, and Telecom Regulatory Policy 2015-326 at [51].
[83] The underlying rationale for the push towards disaggregated HSA in Telecom Regulatory Policy 2015-326 may well be an interpretation of Ladder of Investment Theory. See my discussion earlier in this report.

42. Connection at a Bell Canada central office can take the form of “co-location” which means sharing the physical central office facilities of the incumbent (and paying a fee to the incumbent in order to do so), or of a “meet-me” connection, which conceptually at least involves a connection point outside of the incumbent’s physical central office facilities.

43. In order to illustrate the cost magnitudes that are involved for competitors in moving to the full disaggregated wholesale HSA framework, with assistance from CNOC and its member companies, I set out below cost estimates for operation by competitors under the different disaggregated and aggregated scenarios.

DISAGGREGATED

Bell Canada Disaggregated HSA Service Via Co-location

Costs per central office:

- One-time costs: $80,000 - $229,000
- Recurring costs: $4,000 - $12,000

Total Costs for 1016 central offices:

- One-time costs: $81,280,000 - $232,664,000
- Recurring costs: $4,064,000 - $12,192,000

Bell Canada Disaggregated HSA Service Via Outside-meet-me-point

Costs per central office:

- One-time costs: $145,500 -$372,500
- Recurring costs: $3,500 - $12,000

Total Costs for 1016 central offices:

- One-time costs: $147,828,000 - $378,460,000
- Recurring costs: $3,556,000 - $12,192,000

Cable Carrier Disaggregated

Costs per Head-end

- One-time costs: $90,500 - $205,000
- Recurring costs: $4,000 to $12,000

Total Costs for 36 Rogers Head-ends

- One-time costs: $3,258,000 - $7,398,000
- Recurring costs: $144,000 - $432,000

Total Costs for 60 Cogeco head-ends

- One-time costs: $5,430,000 - $12,330,000
- Recurring costs: $240,000 - $720,000

Total Costs for 53 Videotron head-ends

- One-time costs: $4,796,500 - $10,891,500
- Recurring costs: $212,000 - $636,000

AGGREGATED

Bell Canada Aggregated HSA Service

- One-time costs:* $91,500 - $206,500
- Recurring costs:* $4,000 - $12,000

Cable Carrier Aggregated HSA Service

- One-time costs:* $90,500 - $205,500
- Recurring costs:* $4,000 - $12,000

(* these costs include the cost of building a single Point of Presence or "POP")

44. The overwhelming conclusion from the above data is that the move from aggregated to disaggregated wholesale HSA implies an enormous increase in costs for the competitors and one that would render their service totally uneconomic. Drawing from the figures given above, the increase in one-time charges is from a figure in the order of $100,000 to a figure in the order of $200 million, an increase of *two thousand fold.*

45. The issue for policy is under what cost conditions a shift from aggregated to disaggregated wholesale HSA would actually be efficient i.e. would imply an increase in economic welfare. In order to answer this, one would have to divide the answer up according to the effect on short term static efficiency versus the effect on long term dynamic efficiency.

46. As regards short term static efficiency, the criterion is simply that total net surplus should increase.[84] This is less complicated than it perhaps sounds. If we assume to begin with that the total amount of service is held constant (i.e. the move to disaggregated service has no effect at the retail level on the volume of services offered), then the comparison is simply one of costs. The more efficient configuration, in terms of aggregated versus disaggregated, is the configuration which offers the same service levels at the lowest total cost. The move to a disaggregated model implies a dramatic and substantial increase in total costs for competitors, an increase that will itself be larger the wider is the coverage (the more CO or head end connections) that is required.

47. Although this was not envisioned by the Commission in Telecom Regulatory Policy 2015-326, it is important to consider *intermediate* or middle levels of disaggregation, especially for competitor fibre connections. What is envisioned here is that instead of the competitor connecting at a single central office for all of its wholesale HSA

[84] Total net surplus is the same thing as the sum of consumer and producer surplus.

requirements or at all of the approximately 1000 disaggregated central offices in the case of Bell Canada, the competitor would be able to connect to a similar number of central office connection points as for cable connection, which would reduce costs considerably for the competitor. Moreover, the transport responsibilities would be shared between the competitor and the incumbent, which should mitigate at least some of the market power currently being exercised over the transport industry by incumbents. I note also the recommendation in paragraph 31 viii and ix above, for continued access to aggregated HSA in conjunction with the removal of the 100 Mbps speed cap and also port and fibre sharing functionality for all disaggregated HSA platforms.

48. In addition, if port and fibre sharing among competitors were allowed, there would be a further cost savings, and a commensurate increase in the viability and dynamism of the competitive sector. The cost savings from port and fibre sharing is analogous from the point of view of economic efficiency to the cost savings from mandated access to incumbent facilities, and would imply an increase in overall economic efficiency.

Evidence on competition in transport services

49. Disaggregated service requires the competitors to provide their own transport of data (either self-supplied or leased from another provider) to a POI closest to their customer's premise. The transport service required by the competitor does not necessarily require a build out of new transport facilities. In fact, the intention by the Commission was that at least initially the competitors would be able to purchase transport services in a competitive marketplace, and only in a longer time frame might they choose to build out their own transport facilities.[85] The problem with the Commission's approach is that the hypothesised competitive market place does not exist. Except for a very few densely populated urban areas, ISPs have either one or two options available to meet their transport requirements, and one of these will likely be the incumbent wholesale HSA provider, who has been allowed to adopt a monopoly position over what under the aggregated case would in effect be a regulated service. An important reason for having disaggregated services is the principle of not regulating services that are duplicable by reasonably efficient competitors, but in the case of transport services, this would not appear to be a correct application of this principle.

50. Although the Commission in Telecom Regulatory Policy 2015-326 found that transport services were competitively supplied, and they in effect decided on forbearance of regulation of those services going forward, the evidence indicates that there are very few suppliers of transport services actually available to competitors requiring them under the fully disaggregated HSA framework. Depending on various factors, only one or two transport providers might be present at a given POI.[86] This suggests that under the fully disaggregated model

[85] Telecom Regulatory Policy CRTC 2015-326 at [149].
[86] For example, these conditions are likely to manifest where the POI is located in a remote area. Other factors might include socio-economic characteristics of different POI regions.

most competitors' connections to a local central office or cable head end would be made with a seller who was exercising market power, in many cases a monopolist. This would be a perverse outcome of the disaggregated HSA model, which was surely intended to encourage more competition rather than less.

51. A more gradual and measured move towards disaggregation could be achieved by continuing to make aggregated HSA service available, without the 100Mbps speed cap, but to apply a forbearance test to the transport sector. Only when transport is deemed to be widely available at competitive prices would the aggregated HSA service be gradually withdrawn.

52. Towards the goal of achieving a more competitive transport sector, a new regulatory initiative is needed towards more streamlined, efficient and effective regulation of support structures. Easy support structure access is a prerequisite to more choices in transport, which is itself a prerequisite to making the disaggregated HSA model economically viable.

Dynamic Efficiency

53. The intended move of competitors to a disaggregated wholesale HSA model was also intended to improve long term or dynamic efficiency. An interpretation of this is the goal of stimulating investment and innovation and presumably setting the industry on a more competitive and higher growth path than would otherwise be the case. I have demonstrated above that investment without additional context is not a coherent policy goal. Forcing competitor facilities to invest in transport and connection facilities which add to total costs and reduce total efficiency is not an investment that should be a desired policy goal. And if the net outcome is to prevent the entry of some competitors or to induce the exit of others both investment and innovation could actually be reduced in the long run.

Conclusions

54. There is only weak evidence to validate the popular belief that facilities-based competition leads to more sustainable competition in the telecommunication market. Empirical studies in the United States and European countries have shown that, in some cases, promoting facilities-based competition at the expense of service-based competition is detrimental to end customers. The prevalence of service-based competition can bring a series of benefits that include faster broadband diffusion, lower prices, and larger service selection. On the other hand, emphasis on facilities-based competition can decrease economic efficiency by increasing the total costs of

providing HSA services, which will be passed down to end consumers. Moreover, such high costs can lead to a persistence of monopoly, and little or no retail competition.

55. In recent years, Canadian consumers have been demanding faster speeds. In order to make these requests more affordable to a larger portion of Canadian consumers, service-based competition needs to be encouraged. As evidenced by Canadian data, competitors lower the price level and increase product variety for consumers. Therefore, I would support a series of measures that will allow incumbents and competitors to compete on a level playing field. These measures are aimed at creating symmetry between the retail operations of the competitors and the incumbents, and include information sharing, information barriers between different product divisions of the incumbent operations, and restoration of aggregated access, including the removal of the 100 Mbps speed cap. In addition, there should be increased monitoring for anti-competitive behavior by the incumbents.

56. Consistent with LOI theory, the disaggregated wholesale HSA proposed in Telecom Regulatory Policy 2015-326 was meant to create a higher degree of competition, innovation, and investment. However, the lack of competitively supplied transport facilities, which is required in the disaggregated wholesale model, lessens competition by allowing the limited number of transport facility providers to exercise market power. Forcing competitors to purchase their own transport, which is not available competitively, would harm innovation and investment.

57. An intermediate level of disaggregation for Bell Canada, involving a smaller number of central offices for FTTP connections, similar to the number required for cable head-end disaggregation, would imply a much greater level of economic efficiency and encourage a greater level of dynamism, innovation and investment brought by a flourishing and competitive broadband sector.