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Source: *Journal of Information Policy*, Vol. 5 (2015), pp. 32-66

Published by: [Penn State University Press](#)

Stable URL: <http://www.jstor.org/stable/10.5325/jinfopoli.5.2015.0032>

Accessed: 13/04/2015 09:27

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PUBLIC INTEREST IN THE REGULATION OF COMPETITION

Evidence from Wholesale Internet Access Consultations in Canada

Reza Rajabiun and Catherine Middleton

ABSTRACT

How do private interests try to shape public interest competition regulations? Focusing on debates about the design of wholesale Internet access obligations, the authors employ Natural Language Processing (NLP) tools to evaluate a multi-stakeholder policymaking process in Canada. Using NLP, they analyze 40 formal interventions in the CRTC's 2013–551 review of its wholesale broadband policy. They classify major interest groups, map key concepts, and quantify asymmetries in stakeholders' influence. They conclude that by reducing the costs of regulatory participation, deploying NLP technologies can help offset the advantages large incumbent organizations already have in shaping law and policy. Keywords: broadband, Canada, Internet, political economy, regulation

Introduction: Policy Formation in the Transition to Next Generation Broadband

As telecommunications services migrate to Internet Protocol (IP)-based networks, questions arise as to the appropriate infrastructure to enable this transition. Demand for wireless services continues to grow, and fiber optical networks are replacing existing copper and coaxial cable wireline

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This research was undertaken, in part, thanks to funding from the Canada Research Chairs program and was supported by the Social Sciences and Humanities Research Council (Canada), the GRAND NCE, and Ryerson University. We also thank participants at the Federal Communications Commission Institute for Information Policy workshop on the Future of Broadband Regulation for their valuable comments.



JOURNAL OF INFORMATION POLICY, Volume 5, 2015

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networks.¹ It is not yet clear how business models will evolve to provide consumers with ubiquitous connectivity that seamlessly incorporates wireline and wireless services, but it is clear that fiber optical networks will be the wireline technology of choice in the medium to longer term. Copper and coaxial cable technology evolved to enable broadband provision over networks built for voice and television transmission, allowing competition between these two physical platforms. But as these old technologies are replaced by new, there is an impetus to search for new rules and institutions for defining the boundary of permissible competitive conduct in an industry where infrastructure competition is not necessarily feasible or desirable and structural dominance is the norm. This article analyzes a sample of interventions submitted to the Canadian Radio-television and Telecommunications Commission (CRTC) as part of a public consultation process on the design of Canada's wholesale Internet access regime² to investigate how actors with competing economic interests attempt to shape public competition regulations to their own advantage.

The experience with the evolution of broadband access regulations in Canada offers a unique window into broader international debates about the role of regulation in the transition to next generation fiber networks. Canada was one of the first advanced economies to adopt unbundling obligations for incumbent telephone companies,³ but competition between platform operators has dominated the broadband market. These operators have invested in their legacy platforms but the market has not fostered a competitive wholesale regime for access to these legacy platforms nor has it promoted diffusion of next generation fiber networks⁴ (~3% of Canadian broadband subscriptions are for fiber services as compared to ~17% OECD average as of December 2013).⁵ Concerns

1. These trends are evident in the OECD broadband statistics, <http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm>.

2. Canadian Radio-television and Telecommunications Commission, Telecom Notice of Consultation CRTC 2013-551: Review of Wholesale Services and Associated Policies, <http://crtc.gc.ca/eng/archive/2013/2013-551.htm>.

3. Review of Regulatory Framework, Telecom Decision CRTC 94-19, <http://www.crtc.gc.ca/eng/archive/1994/dt94-19.htm>.

4. For a more detailed analysis of the Canadian experience with broadband network development see Reza Rajabiuni and Catherine Middleton. "Multilevel Governance and Broadband Infrastructure Development: Evidence from Canada." *Telecommunications Policy* 37, no. 9 (2013): 702-714.

5. OECD. "Percentage of Fibre Connections in Total Broadband among Countries Reporting Fibre Subscribers, December 2013." (2014a).



about competitive discipline on dominant platform operators and the pace of transition from legacy to next generation broadband technologies are at the center of the wholesale access market consultation process analyzed in this article.

This article analyzes the metadata⁶ and content of approximately 40 formal interventions to the CRTC.⁷ Using Natural Language Processing (NLP) software we map the content of stakeholders' written submissions in order to better understand their arguments and positions, identify and classify major interest groups and stakeholders in the broadband ecosystem, and analyze key concepts emphasized by particular types of interests (e.g., incumbents, resellers, consumer advocacy groups, etc.) in their efforts to influence regulatory design. The analysis quantifies asymmetries in stakeholders' capacities to influence public policy, characterizes their strategies for convincing regulators that their positions will serve the "public interest" and discusses the challenges faced by regulators when approaches to serving the public interest are contested. The article concludes with observations on how Canadian efforts to preserve and advance the public interest in regulating wholesale access to fiber networks may inform the development of next generation broadband networks in the United States and beyond.

Private Interest Support for Public Interest Competition Regulations

Economic history and theory is replete with examples in which public regulations of competition, trade, and investment purportedly in place to promote the "public interest" in fact function as instruments of incumbents to limit the scope for entry, redistribute market surplus from consumers to producers or from more to less efficient firms, and frustrate the pace of creative destruction from sunset to sunrise

6. In this context, metadata refers to data that describes the structure and size distribution of formal interventions to the regulator, the content of which we then analyze using quantitative text analytics methods.

7. For a list of submissions by parties to the process analyzed here, see the table in the Appendix.



technologies.⁸ Although the primary objectives of regulation may serve the public interest (e.g., protecting uninformed consumers, reducing pollution, maintaining health and safety, risk regulation, etc.), history and theory suggest that regulation has the capacity to reduce innovation and dynamic efficiency in market processes. Consequently, if the social costs of regulation in terms of innovation are larger than the gains from achieving its primary objectives, then it might be in the public interest for policymakers to do nothing at all. In such a case forbearance from regulation might appear to be an optimal policy strategy as it would limit the potential for state power to prevent efficiency enhancing private transactions that are ultimately socially beneficial (i.e., false positive errors).

Recognizing the potential for false positive errors from regulation is important for understanding why policymakers may choose not to exercise their discretion to impose particular regulations for constraining particular types of undesirable behavior by market participants, even when the costs of the primary problem are apparent. Nevertheless, the idea that regulation and innovation are substitutes stands in sharp contrast to the global experience with the evolution of governance institutions and economic development. Higher income countries that have developed a broader and more restrictive set of legal and political mechanisms for constraining corruption and regulatory capture are now more prosperous because they succeeded in developing regulatory institutions that supported innovation.⁹ This suggests regulations that address the primary policy concern (i.e., reduce false negative errors) while minimizing the potential for state action to prevent efficiency enhancing private transactions (i.e., false positive errors) in fact complement the development of market systems

8. See e.g., Joseph Schumpeter, *Capitalism, Socialism, and Democracy*. New York and London: Harper & Brothers Publishers (1947). George Stigler. "The Theory of Economic Regulation." *Bell Journal of Economics* 2, no. 1 (1971): 3–21. Gene Grossman and Elhanan Helpman. "Rent Dissipation, Free Riding, and Trade Policy." *European Economic Review* 40, no. 3 (1996): 795–803. Philippe Aghion, Nick Bloom, Richard Blundell, Rachel Griffith, and Peter Howitt. "Competition and Innovation: An Inverted-U Relationship." *The Quarterly Journal of Economics* 120, no. 2 (2005): 701–728.

9. Dani Rodrik, Arvind Subramanian, and Francesco Trebbi. "Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development." *Journal of Economic Growth* 9, no. 2 (2004): 131–165.

Jan Fagerberg and Martin Srholec. "National Innovation Systems, Capabilities and Economic Development." *Research Policy* 37, no. 9 (2008): 1417–1435.



and promote dynamic efficiency. This broad global trend is apparent in the design of regulations for the governance of telecommunications that have evolved around the world over the past couple of decades. On average, higher income countries have developed a more intensive and broader set of formal rules and mechanisms for the governance of the telecom industry than lower income countries that have only more recently adopted sector specific regulations.¹⁰

Understanding how policymakers weigh a diversity of interests, balance tradeoffs between different types of errors, and arrive at their conception of the public interest represents a general problem in political economy. It is also a question of particular relevance in the context of ongoing debates about the design of telecommunications regulations intended to support technological convergence to IP-based networks and private sector incentives for the provision of broadband access infrastructure. Attempts by policymakers to adopt rules and procedures for addressing particular problems (e.g., protect consumers, promote competition, stimulate innovation, etc.) are likely to generate responses by an increasingly complex set of players in the broadband ecosystem. Of these, the most influential responses tend to be from incumbent operators that control existing network facilities with sufficient size to convince or threaten policymakers (e.g., by reducing capital expenditures, offering support for political opposition, etc.) to define public interest in terms of their private ones.

Possible differences in the degree of risk aversion to false negative/positive errors from regulation provide a useful framework for exploring variation and determinants of telecom policy at both macro and micro levels.¹¹ The framework helps explain why some countries have adopted relatively strong open access obligations for operators of legacy and next generation fiber networks, while others have emphasized forbearance. Both Canada and the United States represent examples of the latter class of advanced economies where policymakers have decided to signal their

10. Leonard Waverman and Pantelis Koutroumpis. "Benchmarking Telecoms Regulation—The Telecommunications Regulatory Governance Index (TRGI)." *Telecommunications Policy* 35, no. 5 (2011): 450–468. Susan Perkins, "Cross-National Variations in Industry Regulation: A factor analytic approach with an application to telecommunications." *Regulation & Governance* 8, no. 1 (2014): 149–163.

11. For a broader analysis of the interplay between micro level bargaining processes and macro level features of legal constraints against anticompetitive agreements and abuse of dominance in the evolution of US antitrust system, see Reza Rajabian, "Private Enforcement and Judicial Discretion in the Evolution of Antitrust in the United States." *Journal of Competition Law and Economics* 8, no. 1 (2012): 187–230.



commitments not to impose regulatory obligations on platform operators to connect with third parties requiring access to fiber networks and transport facilities. In contrast, open access rules and structural separation policies are central elements of broadband market governance infrastructures in a number of countries in East Asia and Europe that are leading in terms of fiber diffusion and where end users achieve connectivity speeds that are two to three times higher than averages in the United States and Canada.¹²

The forbearance strategy in the United States and Canada has been relatively successful in expanding access to broadband, but has been associated with growing concerns about the pace of progress in increasing average connectivity speeds and incenting legacy DSL and cable operators to invest in next generation fiber-to-the-premises (FTTP) networks.¹³ While fiber diffusion is substantially higher in the United States than in Canada (~8% and ~3%, respectively),¹⁴ the two countries have generally similar average network speeds,¹⁵ and incumbents' incentives to incur the fixed costs of deploying FTTP outside of urban centers appear relatively limited.

The experience with forbearance, platform competition, and network development in the two countries is particularly interesting in the context of broader international evidence on the interplay between public policy and telecom infrastructure development.¹⁶ Previous research has found that capital expenditures at the aggregate level and by individual incumbents tend to be lower in countries with more intensive/dense regulatory regimes.¹⁷ Some interpret this evidence to mean that in order to maximize investment inputs into network development legal obligations to

12. OECD, 2014a. Ookla Net Metrics/Speedtest, 2014. Retrieved from <http://www.ookla.com/>. Akamai Technologies, 2013. "State of the Internet Reports." Retrieved from <http://www.akamai.com/stateoftheinternet/>.

13. Berkman Center for Internet and Society, 2010. *Next Generation Connectivity*. Cambridge, MA: Harvard University. Retrieved from <http://cyber.law.harvard.edu/pubrelease/broadband/>. Reza Rajabiun and Catherine Middleton. "Regulation, Investment and Efficiency in the Transition to Next Generation Broadband Networks: Evidence from the European Union." *Telematics & Informatics* 32, no. 2 (2015): 230–244.

14. OECD, 2014a.

15. Ookla Net Metrics/Speedtest, 2014; Akamai Technologies, 2013.

16. Filippo Belloc, Antonio Nicita, and Maria Alessandra Rossi. "Whither Policy Design for Broadband Penetration? Evidence from 30 OECD Countries." *Telecommunications Policy* 36, no. 5 (2012): 382–398.

17. Michał Grajek and Lars-Hendrik Röller. "Regulation and Investment in Network Industries: Evidence from European Telecoms." *Journal of Law and Economics* 55, no. 1 (2012): 189–216.



provide third-party access/interconnection to essential network facilities should be minimized.¹⁸ However, fixed capital expenditures are just one input into the network development process and not a good standalone measure of broadband market outcomes. In fact, there is some evidence that despite lower investment levels, countries with relatively restrictive and simple third party access rules have developed relatively high quality broadband networks in terms of the service quality end users actually achieve (i.e., relative to advertised rates in retail contracts).¹⁹ As such, higher investment does not always result in better network quality, presumably because there is some efficiency loss due to a lack of competitive discipline (i.e., due to the absence of open access obligations to promote service-based competition) and/or too much duplication in fixed network fixtures that might be better managed by one party and shared by many (e.g., last mile links, local switching, and backhaul/transport; i.e., too little cooperation/coordination failures).

Policy adjustments that might help reduce inefficiencies from duplication or a lack of competitive discipline might be optimal from a total welfare (consumer plus producer surplus) perspective, and therefore serve the public interest from an economic perspective. However, they will have implications for incumbent operators of legacy platforms and future investors in new technologies. Some of these entities might choose to support the adoption of efficiency enhancing regulations that make it easier to build cooperative business arrangements with competing access, content, and application providers. Others who privately value status quo arrangements may instead feel that the adoption of public interest regulations will harm them substantially, and therefore invest in ensuring that efficiency enhancing rules for the operation of the market are not adopted and/or enforced by the public sector. For example, dominant operators may threaten to withhold their future investments if particular regulations are adopted or others are not. In contrast, access seekers (e.g., competing service providers, content and application delivery companies, consumer and business groups, and local governments and public service institutions) might be inclined to emphasize the benefits of competitive discipline in terms of lower prices/higher service quality for end users.

18. Ibid.

19. Berkman Center, 2010; Rajabiun and Middleton, 2015. Sujin Choi. "Facilities to Service Based Competition, Not Service to Facilities Based, for Broadband Penetration: A Comparative Study between the United States and South Korea." *Telecommunications Policy* 35, no. 9 (2011): 804–817.



This article does not aim to assess which policies are or are not likely to serve the public interest, nor does it try to evaluate the dissonance between optimal and actual policies. Instead, we focus on the process of policy formation in order to learn about the diversity of interests and positions regarding the design of public interest regulations that promote economic efficiency through technological change, in this case deployment of next generation fiber optic networks. The analysis employs the body of evidence from initial submissions to the CRTC wholesale access review as a window for identifying the range of stakeholders in the increasingly complex broadband ecosystem, their investments in shaping public regulations governing the market, and strategies they employ to achieve their objectives. By developing a better understanding of micro-level interest group politics the article departs from previous cross-country studies in this area and is intended to provide a basis for identifying mutually beneficial private interest coalitions that can search for efficiency enhancing policies and convince policymakers to adopt them. Finding ways to build private interest support for efficiency enhancing competition policies might be a necessary condition for their emergence.²⁰ The analysis is relevant for private sector strategists with a lot to gain or lose from particular regulatory arrangements, as well as policymakers who are ultimately responsible for aggregating and mapping private interests into the public interest.

The Public Interest in Canadian Wholesale Telecommunications Regulation: Context and Data

Data presented here are drawn from public interventions in a CRTC consultation on Canada's wholesale access regime (CRTC 2013–551).²¹ In framing this process, the CRTC's Notice of Consultation indicated a willingness to explore a wide range of issues including the scope of access and interconnection obligations to fiber access and transport networks. However, it explicitly excluded issues relating to the regulation of wireless wholesale access from the scope of this more general proceeding. The consultation was a multistage regulatory process in which market participants and other

20. James Buchanan and Dwight Lee. "Private Interest Support for Efficiency Enhancing Antitrust Policies." *Economic Inquiry* 30, no. 2 (1992): 218–224.

21. Notice of Consultation and links to documents available at: <http://www.crtc.gc.ca/eng/archive/2013/2013-551.htm>.



interested parties had the right to request information from others, submit written interventions to the Commission, answer questions posed by other parties in written form, and request an appearance at an open hearing to explain their positions. Subject to the statutory objectives of telecommunications policy as stated in Section 7 of Canada's *Telecommunications Act* and a 2006 Policy Direction by the government to ensure that regulations are technologically and competitively neutral, the CRTC has the regulatory discretion to adjust various elements of the wholesale regime.²²

Before characterizing the range of participants in this review, it is useful to consider what could motivate some parties with a stake in the process to choose not to invest in policymaking in such a setting. From an economic perspective, there are fixed costs to engaging in regulatory contests (e.g., lawyers/consultants) that some parties with potential interest in the process may not be able to afford (e.g., diffuse bodies of end users such as individuals and smaller firms). Some interested parties that cannot overcome the fixed costs problem individually may manage to overcome this problem by organizing to form associations that enable them to share the private costs of engaging in regulation making. Large entities can similarly collect their resources in an effort to accentuate their comparative advantage in shaping how regulators define the public interest. Beyond the usual asymmetries in collective action capacity and incentives, there are also strategic reasons not to participate in such processes. As the literature on strategic behavior surrounding rent seeking contests highlights, generally only a small number of parties with a relatively high valuation of the "prize" tend to have sufficient incentives to invest heavily in such contests while others with relatively lower valuations will choose not to enter because of a low (or zero) probability of winning.²³ Broadband market specific considerations are also important for explaining choices about participation: Some parties with very high stakes in regulatory design also depend on other broadband platform operators to reach their customers and may fear retaliatory measures if they publicized their views (e.g., resellers, content and application providers).

The analysis here focuses on the first interventions which provide a baseline for capturing the initial level of effort and investment various parties

22. See CRTC 2013–551 Notice of Consultation for details. The retail market for Internet access services is not regulated by the CRTC. Questions about direct subsidies (e.g., to buy cooperation of incumbent operators of essential facilities) or some form of accounting/structural/functional separation are also beyond the purview of this wholesale proceeding.

23. For a general characterization of strategic theories of rent seeking, see Chapter 2 and Supplements S2A and S2B in Arye Hillman, *Public Finance and Public Policy: Responsibilities and Limitations of Government*. Cambridge University Press, 2009.



directed to the consultation and allow for identification of the strategies of particular types of interest groups. Although, it is beyond the scope of this article to look at subsequent stages of the process,²⁴ it is relevant to note that multistage regulatory processes such as those operated by the CRTC offer a unique empirical window for evaluating how positions and strategies evolve as a result of bargaining processes, how coalitions rise and fall, and which strategies are indeed more effective in achieving private and public interests. The manner in which interest group positions evolve over extended periods or how they compare across jurisdictions can also have useful implications for broadband policy design and strategies of market participants.²⁵ Future research could address these issues. The rest of this section presents higher level data on the structure of the submissions to the CRTC to identify key interests and positions (i.e., the metadata). The subsequent section employs content analysis software to explore concepts and themes from the corpus of participants' written positions in this contest to define the public interest in the design of Canada's essential facilities regime.

Diversity of Interests and Strategies

More than forty individuals and organizations intervened in the CRTC 2013-551 wholesale access review.²⁶ Around half of the total interventions were from firms or industry associations of entities directly involved in the wholesale market as incumbents or resellers, including firms that operate as incumbents in some local markets and as access seekers in others. Among the interventions from public interest and consumer advocacy organizations was one from advocacy network OpenMedia.ca.²⁷

24. The process was still underway when this article was in preparation.

25. For example, incumbents, access seekers, content and application providers, etc.

26. We exclude a small number of interventions where we had technical difficulties extracting texts from electronic documents from our analysis.

27. OpenMedia.ca defines itself as a "community-based organization that safeguards the possibilities of the open Internet". Its "Stop the Meter" campaign raised public awareness of, and fought against usage-based billing practices. Arguing that "Big Telecom" wants "to block Canadians from having affordable, independent access to high-speed, fibre-optic Internet networks," the organization once again called on the public to express their concerns to the CRTC about wholesale Internet access rules. Submissions were generated by individuals using a standardized template and online submission tool hosted at OpenMedia.ca. These submissions emphasized the need to adopt a structural separation policy, stating: "It's past time and common sense to split Internet infrastructure off from big telecom companies to ensure digital networks are open for a range of providers to service residents of Canada unencumbered." <https://openmedia.ca/news/future-affordable-internet-hangs-balance-canadians-tell-crtc-ditch-deadweight-big-telecom-giants>.



This submission contained 25,797 separate letters from individual end users, representing an innovative effort in using the Internet as a tool for mitigating collective action problems facing diffuse bodies of interests who will ultimately pay for policy errors and market failures. Beyond this effort however, interventions by individual end users and academics made up only around 10% of total submissions.²⁸ The rest of the interventions were from a diverse set of organizations, including public sector entities such as the Canadian Competition Bureau, municipal and territorial governments, a few content and technology companies, and a business advocacy association.

Table 1 provides our categorization of organizational types involved in the process and a quantification of their investment/effort levels in regulation making. As a proxy for effort we took the number of pages submitted by each party to the CRTC and aggregated the results across five categories of interest groups.²⁹ The estimated effort/investment levels are presented as a percentage relative to the highest spending category for comparison.³⁰

Differences in the intensity of efforts across the groups document traditional insights about asymmetries in resources and strategic incentives of those who could gain or lose most from the outcome of the policy process. Although incumbents and access seekers make up only around half of the total number of submissions, their investments in shaping public policy are significantly more intense than others representing diffuse consumer, business, and public policy interests. The analytical framework in telecom policy debates which assumes the existence of a tradeoff between investment and competition reflects the dominance of these two classes of entities in policy discourse. The volume of information about the current state of the market and conjectures about what should/should not be done about it submitted by businesses involved in building and managing access infrastructure is significantly larger than information provided by the incumbents' retail market competitors who are trying to enhance their

28. The authors of this article were among these interveners; note that we have not received any funding from any of the market participants for our research in this area or for our intervention in the regulatory process.

29. To the extent that submitting this type of intervention requires internal or external legal and consulting services, the size of the intervention represents a reasonable proxy for its costs to the party that submits it.

30. In other words, the group with the highest number of pages (treated as a proxy for investment in the process) is set at 100% by definition. Investment/effort levels of other groups are represented as a percentage of this maximum.



TABLE I Private Interest Diversity and Investments in Regulation

Organization Type	Incumbent Platform Operator	Access Seeker/ Reseller	Public Interest Advocacy	Public Sector & Education	Misc.
Proportion of Interventions(% of total)	25%	25%	13%	12%	25%
Effort/investment level (% relative to highest)	100%	50%	6%	6%	2%

Source: CRTC 2013–551; additional information on identity/types from organizations' websites. Supplementary reports to first interventions are included.

capacity to deliver broadband connectivity to households and businesses by reforming the regulatory regime.³¹

There is relatively more diversity in the concerns and insights of participants who are not directly involved in the wholesale market but given the high volume of information/noise from self-interested parties with high investment levels, it can be difficult for regulators with limited processing power to recognize signals from these other participants. These more novel perspectives are particularly important to understand because they may provide a basis for developing innovative responses to the adversarial perspectives of the two primary interest groups that dominate the regulatory discourse.

In addition to variations in strategies and effort intensity across interest groups, there are also significant differences within groups. These are particularly interesting to explore for capturing the diversity of concerns about the development of broadband access infrastructure, how wholesale access regulations can help mitigate them, and the range of potential options available to policymakers interested in constructing an efficiency enhancing institutional framework for the operation of the market:

- Incumbent platform operators: Investments in the regulatory process by regional DSL platform operators, as assessed by the size of their submissions, are substantially higher than those of cable platform operators.³² To some extent this might be a reflection of technological

31. Regional duopolies of DSL and cable platform operators control around 90% of residential and 80% of business markets for Internet access services in Canada (CRTC, 2014).

32. By a magnitude of around 4; see for example interventions by Bell and TELUS versus those by Rogers and Shaw.



capabilities of the two types of entities.³³ It is also possible that firm level differences other than technology make some platform operators more concerned about the regulatory process than others, including differences in their size/resources and other strategic choices they make in trying to shape the regulatory framework in which they operate.³⁴

- Wholesale access seekers: A wide range of parties that require interconnection to broadband access and backbone infrastructure intervened in the process, including industry groups representing firms who wanted access/interconnection to essential facilities. In classifying interest groups we allocated general interest advocacy groups to the public interest advocacy category, but included special purpose industry associations made up of either incumbents or access seekers/resellers in the incumbent or access seeker categories. In broad terms, the intensity of investments and effort by access seekers is about half of those of the incumbents (see Table 1). Within the access seeker sub-group, the largest submission is from the Canadian Network Operators Consortium (CNOOC), an association representing a variety of firms that rely on regulated access to DSL and cable to offer retail services to households and businesses. As in the case of OpenMedia.ca's efforts to organize end users to promote change in the regulatory environment at the wholesale level, CNOOC provides a mechanism for relatively smaller firms with limited resources to reveal their private positions and conception of public interest to policymakers. What is also particularly interesting about the identity of entities within the access seeker sub-group is the peculiar absence of large multinational content and application delivery companies from the public consultation process.³⁵
- Public interest advocacy: Even though their effort/intensity of involvement was small relative to incumbents and resellers, a variety of entities that endeavor to represent general consumer and business interests were involved in the process. The most substantive contributions within this category of interest groups are the joint intervention by the Public Interest Advocacy Centre and Consumers' Association of Canada,

33. Cable broadband platforms are usually capable of delivering higher download connectivity speeds than legacy DSL platforms, but are not able to offer end users symmetric connectivity required for more advanced and network intensive Internet applications (e.g., IPTV, cloud computing, multimedia, etc.).

34. For example, the largest operator's (Bell/Bell Aliant) submission makes up for more than half of the total of number of pages submitted by the incumbent platform operator sub-group.

35. For example, Google, Amazon, Akamai, Netflix, etc.



as well as the noted effort by OpenMedia.ca. Effort/investment levels by organizations that represent the general business community are minimal, with the Canadian Federation of Independent Business (CFIB) submitting a short three-page note. Importantly though, the CFIB documents a growing dissatisfaction by Canadian business with their competitive options for Internet access services since the CRTC last reviewed its own wholesale access policies in 2008. To the extent that high-speed broadband access represents an essential business input, this type of signal might be informative to the CRTC in deciding if the status quo strategy is optimal or if it should be adjusted. However, in practice the relatively large volume of information/noise by incumbents and resellers is likely to overshadow such signals from the general business community.

- Public sector and education: None of the provincial governments in Canada submitted an intervention in this matter, which is somewhat surprising given that some provinces have entered into contractual arrangements with operators of essential facilities to motivate them to provide third party access to wholesale backhaul facilities (e.g., British Columbia, Alberta). The Yukon Territory government did make a submission explaining unique problems with connectivity in Canada's North and the particular importance of an effective wholesale access regime for high cost remote and rural communities. A small number of municipal governments that are trying to address market failures by rolling out their own fiber access and backhaul facilities, national and provincial research and education networks, educational institutions, as well as the Competition Bureau also contributed brief interventions.

Categorizing participants in regulation making into predefined groups and evaluating their relative efforts is useful as it provides a simple methodology for capturing asymmetries in collective action capacity across private interests and predicting subsequent decisions by the regulator. The subsequent section uses content analysis software to systematically map arguments by parties involved in the wholesale market as well as other interveners, extracting simple core concepts relevant for policy discussions from the complex, large submissions. Nevertheless, it is important to recognize the significant heterogeneity in the concerns and positions expressed by interveners who are not directly involved in the wholesale market. These nuanced positions are likely to be subsumed by noise from the key players during the regulatory process, as well as in the analysis that follows in the next section due to the same problem. Insights from entities



that are one step removed from the wholesale market can be a particularly valuable tool for policymakers as they may offer innovative approaches for building efficiency enhancing regulations. For example, if policymakers find a way to allocate gains from efficiency enhancing reforms among groups of stakeholders, private interest coalitions of sufficient size can emerge during the process that support the adoption of those reforms.

Table 2 summarizes primary and secondary arguments presented by individual interveners in the process based on our reading of their submission summaries. Needless to say our choices about which points are primary and secondary are somewhat subjective, particularly for larger and more complex interventions which address various aspects of the wholesale broadband market and its regulation. Differences across and within interest groups noted above are apparent, as is the complexity of the broadband ecosystem and views about the types of regulatory infrastructures that could support its future development. We identify the types of arguments emphasized by different interest groups, but in order to avoid the potential for misrepresenting others' views and to provide a more general picture of interest group themes we do not associate specific arguments with the names of individual entities. Interested readers can turn to the original documents publicly available at the CRTC website for further details.

Analysis of Concepts, Themes, and Strategies

With the aid of a general purpose textual analysis tool, this section employs NLP techniques to map the content of formal submissions to the CRTC wholesale review process.³⁶ Such advanced techniques allow for the extraction of concepts and themes from large amounts of unstructured textual data. Consequently, they can be particularly useful for automating information extraction and analysis by resource-constrained policymakers required to process large amounts of stakeholder feedback.³⁷ This type of

36. For an overview of the state of the art and limitations of NLP technologies see: Nitin Indurkha and Fred Damerau, eds. *Handbook of Natural Language Processing*. Vol. 2. CRC Press, 2012. There are a variety of open source and commercial software NLP and text analytics packages available in the market with distinct capabilities and user learning curves, a review of which is beyond the scope of this article.

37. These tools are also useful for assessing other sources of unstructured data relevant for policy analysis; for instance drawing reliable and actionable inferences from consumer/end users complaints to an operator's service center or to government agencies.



TABLE 2 Interests and Arguments

Intervener Type	Primary argument/concern	Secondary argument/concern
Individual/ End user	High prices for retail services	Data caps are restrictive
	Traffic management practices of platform operators	CRTC should audit traffic management practices
	It is time for structural separation	Separation would increase speeds/ reduce prices
	Transit price variation	Regulate wholesale transit
Academic	Letter of support for the position of another intervener	Open access necessary for innovation
	Regulatory regime too complex and not technologically neutral/ simple open access rules	FTTP/FTTN access at more than a reasonable price to promote investment/minimize duplication
Rural co-operative	Lack of backhaul access	Difficulties in discovering wholesale market prices, rural backhaul access, QoS guarantees
Public technical agency	Lack of FTTP	FTTP wholesale access essential to cloud computing and advanced services
Research network	Open backhaul to competition	CRTC categorization scheme limits third party access
Regional board of education	Digital/personal learning needs affordable and high quality broadband infrastructure	In BC schools have to pay a per student fee for connectivity and Internet services; need for competition/options; CRTC should require operators to provide wholesale pricing to educational institutions
College serving students from remote/rural areas	Limited wholesale access for connectivity between school facilities	The need for an open and competitive wholesale market
Municipal government with own fiber networks	Limited scope for competition; need for wholesale access to dark fiber	Potentially also structural separation to reduce duplication
	Non-dominant wholesale fiber	Concerned about application of obligations

(Continued)

TABLE 2 Interests and Arguments (Continued)

Intervener Type	Primary argument/concern	Secondary argument/concern
Territorial government	Importance of niche competitors/ elimination of competition in the North by Northwest	Wholesale access obligations and service-based competition can enhance incumbents' incentives to upgrade/invest
Competition Bureau	CRTC should assess market power/ex-post study of policy impact	CRTC should provide the Competition Bureau with market data provided privately to the CRTC by dominant operators
Small business & consumer advocacy	Time for structural separation	Increase speeds/reduce prices
	Need for more retail market competition	Reverse 2008 FTTP/ FTTN decisions; threat of underinvestment by incumbents exaggerated
	Growing dissatisfaction of members with Internet service quality/lack of market options since 2008	Need for policies that enhance competition and innovation
Wholesale access seekers	Competition and service innovation/fiber access and transport	Difficulties with negotiated agreements
	Simplify essential facilities regime	FTTP access will come; delaying it allows incumbents to delay investment and limit service based competition
	Limited/discretionary FTTP/ FTTN access	Limits the scope for fiber diffusion
	Northwestel wholesale pricing unjust	CRTC should set just and reasonable prices
	Regional variation in market conditions	Patchwork of regulatory and competitive conditions; no entry incentives under the current regime
	Competition/pricing concerns on the content delivery side (IPTV, etc.)	Congestion and de-prioritization of competitors' QoS
	FTTP/FTTN duplication not in the public interest	Adopt the Equivalence of Inputs (EoI) approach to access/ interconnection



TABLE 2 Interests and Arguments

Intervener Type	Primary argument/concern	Secondary argument/concern
Access and transport network operators	Mandated access will reduce FTTP investment	Canada should replicate the US approach to defining the public interest and forbearance
	Members should be exempt from wholesale access regime	Incumbents' foreclosure of competition in rural areas via control/pricing of inter-community bandwidth to third parties
	Enough retail competition/no new regulations	Need to access to FTTN/FTTP for competitive/technological neutrality
	Enough facilities-based competition, investment, and great service	CRTC should continue status quo rules and wholesale pricing model
	A lot of competition; access to cable should be defined as non-essential	If not, forbear from regulating new TPIA/FTTN so as not to reduce our investments
	Quality and prices are great	Maintain status quo
	Investment primary policy objective	Essential facilities are duplicable
	Is not subject to regulatory framework and will not respond to CRTC	
	Regulations should not apply to non-dominant local incumbents/if yes: how to cost/no staff?	No mandated FTTP access but investment incentives for rural fiber
	Competition has increased since 2008 (Canadians served by 500 carriers according to the CRTC)	Forbearance on DSL, cable & FTTP; encourage private negotiations
	Position and evidence same as parent/sister incumbent operator	We have invested a lot in FTTP which will be curtailed if CRTC extends FTTP/FTTN wholesale access

Source: CRTC 2013–511.

Note: Platform operator and access seeker categories include interventions by related industry associations.

automation can also be valuable for organizations involved in such contests by allowing them to evaluate the positions of their potential adversaries or allies, enabling them to make better strategic decisions to serve their



own interests.³⁸ In addition to reducing the costs of analyzing large and complex bodies of information, NLP/quantitative content analysis tools provide a basis for building systematic pictures of what others are trying to convey for decision makers.³⁹

To analyze stakeholder submissions to the wholesale proceedings we employed Leximancer's general purpose software tool for extracting unstructured qualitative text data and analyzing higher level concepts and patterns in it.⁴⁰ In addition to useful visualizations that help simplify diverse concepts and evaluate their complex interactions, Leximancer provides a platform for exploring multiple levels of meaning in texts based on concrete quantitative indicators of the frequency of co-occurrence of words and iterative numerical models for discovering links among a complex network of lower level "concepts" to build higher level "themes" from them.⁴¹

To evaluate the data provided by the Canadian wholesale review process we start from the most general perspective and then analyze variations within and across interest groups by narrowing our focus.⁴² The analysis focuses only on the relative statistical frequency of concepts and linkages among them in order to document the range of perspectives and strategies across the interest groups. We do not explore the sentiment of individual

38. For an example of the application of advanced NLP tools in the analysis of Internet governance institutions see Dmitry Epstein, Merrill Roth, and Eric Baumer. "It's the Definition, Stupid! Framing of Online Privacy in the Internet Governance Forum Debates." *Journal of Information Policy* 4 (2014).

39. There are, however, limits to the capabilities of existing NLP tools, for instance those that are currently available for assessing sentiment in human language data or reconstruct quantitative linguistic data back into human language. Indurkha and Damerou, 2012 provide a thorough overview of the strength and limitations of NLP tools.

40. See <https://www.leximancer.com/>.

41. A "theme" represents a cluster of concepts as determined by the frequency of their co-occurrence in the text and is named after the most frequent concept in that cluster. Please note that there are tradeoffs in using different stochastic clustering models (e.g., linear, Gaussian) and this approach to extracting higher level themes from concepts is not always stable. To the extent possible we have tried to check for the stability of the results presented here and evaluate their robustness to different algorithms for discovering interconnectedness of concepts in the texts.

42. We exclude interventions that are very short (less than three pages) from the analysis in this section as there is too little content in these texts to allow for a consistent extraction of their themes and concepts, which would create biases and anomalies with respect to relative positions of organizations with more substantive and complex submissions. References to the 'corpus' from this point forward exclude these short interventions. For key arguments in shorter submissions the reader can turn to Table 2 above or the original documents available from the CRIC. We also include only the text of the primary intervention by individual interveners and exclude supporting material such as consulting reports on particular aspects of the regime in order to focus on the main arguments by the parties.



interveners or interest groups regarding particular concepts, which the reader should be able to infer from the discussion in the previous sections and Table 2 above.⁴³

As a first step, we conducted simple text searches for the term “public interest” to better understand which entities tend to associate their private positions with the public good.⁴⁴ Other than the Public Interest Advocacy Centre (PIAC), an advocacy group that has the term public interest in its name and emphasizes it frequently in its submission, very few of the participants employed this hard-to-define term in the language of their written interventions. In fact, most stated their positions in terms of their own private interests without appealing to higher level concepts and ideals about the public good (i.e., were speaking on their own behalf).⁴⁵ The handful of interventions that include explicit reference to the term “public interest” tend to employ it to demonstrate why their private positions should be adopted by the CRTC. Examples of the manner in which the concept is deployed by different types of wholesale market participants help frame the more systematic analysis of the submissions that follows in the rest of this section:

- As a warning to the CRTC by a dominant operator of a sunset DSL platform in Western Canada promising to build FTTP in the future: “An unbundling remedy for a network that never gets built is a hollow victory and one that fails to advance the broader public interest that is served by the deployment of advanced networks.”⁴⁶
- As a motivation to move away from a regulatory strategy that emphasizes platform competition and incentives to invest in essential facilities through forbearance: “Such investments will occur when it makes economic sense for competitors to deploy their capital in that manner. Where it does not make sense for them to build such facilities,

43. There are some automated techniques for sentiment analysis. However, the language of the regulatory discourse tends to be too subtle to be a good candidate for exploring with existing sentiment analysis tools we know about.

44. For a discussion of various “public interest” discourses and the institutional environment for its advocacy at different levels of telecom policymaking in Canada, see Tamara Shepherd, Gregory Taylor, and Catherine Middleton. “A Tale of Two Regulators: Telecom Policy Participation in Canada.” *Journal of Information Policy* 4 (2014).

45. The CRTC 2013-551 Notice of Consultation also does not employ the term “public interest” for framing the review, which is consistent with the institutional conceptions of the Commission as a quasi-judicial administrative tribunal designed for private interest bargaining by market participants and “co-management” of the industry. See Liora Salter and Rick Salter. “The New Infrastructure.” *Studies in Political Economy* 53 (1997).

46. Intervention by TELUS Communications Company, CRTC 2013-551, page 3.



a regulatory policy aimed at incenting infrastructure deployments will be economically inefficient (i.e., wasteful, and not in the public interest).⁴⁷

In order to benchmark the analysis, it is useful to compare the CRTC's language in framing the scope and objective of the proceedings with interveners' responses. Table 3 presents quantitative measures of the most relevant concepts in the CRTC 2013-551 Notice of Consultation and compares them with those extracted from the corpus of subsequent interventions.⁴⁸ The central and most interconnected concept in both texts is "services,"

TABLE 3 Key Concepts: Crtc versus The Interveners

CRTC Notice of Consultation			Corpus of all submissions		
Concepts	Count	Relevance	Concepts	Count	Relevance
Services	102	100%	Services	1894	100%
Framework	95	93%	Wholesale	854	45%
Appropriate	93	91%	Access	839	44%
Regulatory	88	86%	Provide	736	39%
Subject	74	73%	Market	733	39%
Issues	66	65%	Competition	722	38%
Provide	31	30%	Network	662	35%
Carriers	29	28%	Investment	561	30%
Proceeding	29	28%	Incumbents	542	29%
Retail	28	27%	Costs	535	28%
Mandated	27	26%	Facilities	491	26%
Access	24	24%	Competitors	462	24%
Phase-out	21	21%	Mandated	409	22%
Market	20	20%	Retail	355	19%
Consider	20	20%	Customers	346	18%
Competitors	19	19%	Deployment	317	17%
Associated	18	18%	Rates	302	16%

47. Intervention by the Canadian Network Operators Consortium (CNO), CRTC 2013-551, page 51.

48. The "relevance" statistic represents the percentage of context blocks in each corpus coded with a particular concept as a percentage of the most frequent concept in the text. The relevance of the most frequent concept is set at 100% and the others follow in descending order based on their frequencies relative to the most relevant concept. For this analysis a context block is defined as two sentences and "count" is the number of context blocks associated with a particular concept. For more details, see <https://www.leximancer.com/>.



which is not surprising. There are however some notable differences that are useful to highlight for interpreting the more detailed analysis that follows:

These quantitative measures capture the statistical relevance of particular concepts, as determined based on their co-occurrence relative to other words in the text of the interventions. To evaluate the relationships among these concepts the Leximancer system further provides tools for a second stage relational mapping of quantitative concept statistics into higher level “themes.”⁴⁹ Figure 1 provides a map of links between the discovered concepts in the corpus of interventions. Clusters of discovered concepts, or themes, are indicated by text of the same color. The “concept cloud” is “heat-mapped” in order of the importance of the concepts (red and orange being the most relevant, and blue and green less relevant, etc.).

This mapping appears to present a realistic and intuitive perspective on core issues in this multidimensional regulatory process, including the implications of wholesale access for competition in the retail market (red), concerns about available broadband speeds (orange), and the potential impact of unbundling on network investments and fiber deployment (in green). These clusters of concepts represent higher level themes common in submissions by all parties. Some of the more specific technological and regulatory aspects of the debate appear more in the periphery of the map, such as the relevance of the mandated wholesale regulatory framework (in light blue), the process for setting regulated wholesale rates (upper right), and capital investment requirements of deploying next generation fiber networks (upper left). The lines depict some of the key connections among frequent concepts. For example, within the primary theme (in red) competitors’ access to essential facilities is highly connected to the provision of services and prices in the retail market.

To better understand interest group positions surrounding the role of wholesale Internet access regulations, the following sections decompose this general picture and document differences in emphasis among and within wholesale market participants, as well as other interveners in the process. Before this disaggregation of interests it is important to have

49. A “theme” represents a cluster of concepts that tend to co-occur with each other. Leximancer employs a variant of the spring force model for the many-body problem of assessing attraction/repulsion among concept clusters and discovering linkages among them. For a detailed discussion of the underlying methodology see Andrew E. Smith and Michael S. Humphreys. “Evaluation of Unsupervised Semantic Mapping of Natural Language with Leximancer Concept Mapping.” *Behavior Research Methods* 38, no. 2 (2006): 262–279.



large investment/effort levels in the regulatory process.⁵¹ DSL platform operators and access seekers appear to be more distant from the center (e.g., Bell, TELUS, FTTH Council of Americas which has both Bell and TELUS as its members, CNOOC, SSi) than cable platform operators (e.g., Rogers, Shaw, and Cogeco).

Evidence from interveners who are not directly participating in the wholesale market may not include as much detail as market participants' evidence does, but appears to provide a more central/balanced view relative to the positions of incumbent operators and wholesale access seekers. Adopting combinations and permutations of recommendations by entities closer to the core may be more likely to serve the general public interest than those emphasized by loud but peripheral voices of organizations that want to employ state regulatory authority for their own competitive advantage. From a political economy perspective however, adoption of public interest focused efficiency enhancing regulations may not be feasible due to the asymmetrically large effort/investment by entities with a direct financial interest in how the CRTC chooses its future broadband regulatory strategy. This is nevertheless a very high level view of a complex issue and it is necessary to explore layers of diverse positions underlying key concepts and the central theme of the debate depicted in Figures 1 and 2.

Legacy Platform Operators

As detailed earlier, the largest effort/investment in the regulatory process has been made by operators of sunset DSL platforms who are promising to deploy FTTP networks in the future. Investment levels, as proxied by the volume of submissions by this group, are significantly larger than those of cable broadband operators, wholesale access seekers and others. Given the wide availability of cable networks in Canada, cable operators have been relatively successful over the past decade in taking broadband market share from DSL operators, and Canada now has one of the highest cable broadband penetration rates in the world.⁵² Despite the CRTC's clear long term commitment to forbearance from mandating third party

51. Please note that the exact place where the intervention texts settle around the circle does not necessarily capture the sentiment of particular parties about the concepts they emphasize in their submissions as some incumbents and access seekers tend to settle near each other.

52. OECD. "OECD Fixed (Wired) Broadband Subscriptions Per 100 Inhabitants, by Technology, December 2013." (2014b).



interconnection to fiber access and transport networks over the past decade, investment in fiber access networks by most legacy platform operators has remained relatively limited (as of late 2013 FTTP penetration in Canada was ~3% versus almost 17% for the OECD).⁵³ The Canadian experience suggests that forbearance alone is not a sufficient incentive for investment, and that under-investment and technological sclerosis can occur without the clear and predictable third party access/interconnection obligations on operators of essential network facilities.⁵⁴ Despite forbearance from mandating third party access/interconnection to new platform technologies for a number of years, high incomes, and high demand for advanced applications, fiber connectivity remains unavailable to most businesses and households even in relatively densely populated urban areas where the fixed costs of network deployment can be allocated across a large number of users.⁵⁵

As the fixed costs of DSL and cable networks were amortized long ago, and these networks generate substantive free cash flows to their operators, the operators appear to have few incentives to invest in more advanced technologies. To the extent that a move away from forbearance and imposing open access obligations on next generation technologies could increase investment incentives of incumbents and/or potential competitors, operators of sunset technologies would have strong incentives to resist such reforms as they would disturb their current business models' reliance on legacy last mile copper and cable networks. As noted above, the situation further creates incentives for this class of interests to act as if, or even threaten that, the adoption of access/interconnection rules that may encourage risk sharing and cooperation in deploying advanced broadband technologies will likely reduce their incentives to invest in network capacity upgrades and more advanced technologies. The extent to which the regulator considers this threat to be credible is likely to have an impact in shaping the ultimate policy outcome.

To capture the incumbents' strategies in a systematic manner using only the texts they have submitted to the CRTC, we examine primary interventions by the subset of dominant DSL and cable platform operators and explore some of the key themes they emphasize in their submissions. Figure 3

53. OECD, 2014a.

54. Rajabiun & Middleton, 2013.

55. The exception to this observation is in Atlantic Canada where the dominant DSL operator Bell Aliant has deployed relatively more FTTP than other regional DSL and cable platform operators.



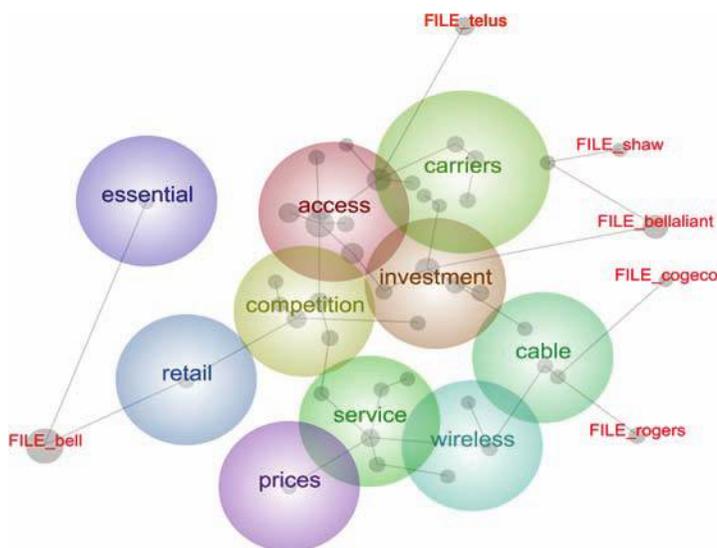


FIGURE 3 Conceptual emphasis by dominant operators.

provides a picture of the intensity of key themes common in the dominant legacy DSL and cable access network operators' submissions (these operators also control much of the backhaul transport capacity in urban and rural Canada). The figure is also "heat-mapped" with the more relevant themes represented by colors closer to red. From a three dimensional perspective the hotter colors can be viewed as higher peaks of meaning that are closer to the reader looking down at the simulated topology of the network of concepts from the top of the two dimensional visualization. Beside general concepts such as "services" and "access" common in the texts submitted by most parties to the process, "investment" and "competition" are emphasized in the interventions by incumbent operators. This purely text-driven view captures the emphasis this interest class tends to place on the impact of regulation on investment decisions.⁵⁶ Given that this class values regulatory outcomes more than others and therefore has strong incentives to invest in regulation making, it is not surprising that the usual theoretical framework in telecom policy debates also emphasizes the potential for wholesale access

56. The incumbents also tend to emphasize potential competition from wireless in justifying their positions about the regulation of fixed wholesale access regulations under consideration in CRTC 2013-551. Notably, dominant fixed network operators in Canada also dominate the wireless market.

regulations that promote retail market competition to reduce incentives of operators to invest in network infrastructure.⁵⁷

Wholesale Market Access Seekers

Figure 4 documents higher level themes emphasized by interveners who hope to influence regulation to improve their ability to access legacy and next generation infrastructure to provide services and potentially reduce wholesale prices that incumbents can charge them. General themes around which the language of the proceedings converges such as “services” and “access” remain relevant. The largest intervention within the subset, by CNOC, stands out relative to shorter contributions not necessarily because it is different in its ultimate recommendation, but because it includes a substantive discussion on wholesale services costing methods in the transition from legacy platforms to FTTP. The scope for competition, costs, and third party access in a technologically neutral manner across legacy and next generation platforms appear central to arguments emphasized by this class of interveners. This interest class hopes to use public regulation as an instrument for accessing essential facilities regardless of the underlying technology and for reducing their wholesale costs for provisioning competitive services to resell to households and the business community. Since technological and competitive neutrality is a key element of the Policy Direction that frames this proceeding and constrains the CRTC, evidence and recommendations by this group provide the regulator with a perspective that is likely to be closer to its legal mandate for designing Canada’s future broadband policies.⁵⁸

57. Although most of the interventions by incumbents appear to settle near each other, the one from Bell stands out in this picture. This is not necessarily due to a lack of emphasis by Bell on the potential for wholesale access obligations to reduce its future investments in fiber networks. Instead, it reflects the fact that text of the intervention by Bell is substantially longer than those of other incumbents and touches upon more detailed aspects of the same general strategy for inducing regulators to forbear from wholesale access/interconnection regulation (i.e. emphasizes regulation will reduce their investment incentives). Bell’s intervention includes a larger variety of relevant concepts to extract and stands out in the visualizations relative to submissions by other incumbents.

58. For the operative legal and policy directives framing the wholesale access review see CRTC 2013-551 Notice of Consultation: <http://www.crtc.gc.ca/eng/archive/2013/2013-551.htm>.



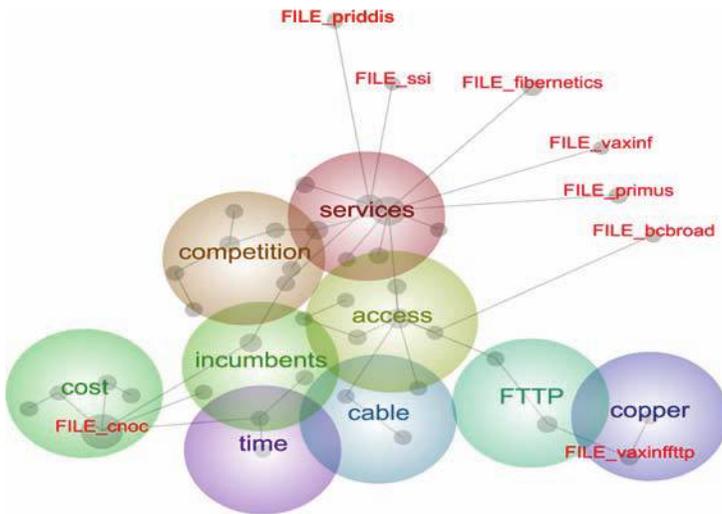


FIGURE 4 Conceptual emphasis by wholesale access seekers.

The Others

In addition to enterprises with a direct private financial interest in how the regulator defines the public interest in the design of future wholesale access/interconnection regulations, a variety of other entities also provided their opinions to the CRTC in this matter. These included public or general business interest advocacy groups, as well as a small number of researchers and public sector organizations including us. As documented in previous sections, this class of participants had a much lower investment/effort level in terms of the volume of their submissions than organizations with direct stakes in the design of wholesale access regulations. However, as Figure 2 highlighted, the language used by this class of interveners tended to settle somewhere in the middle of the adversarial perspectives of incumbents and wholesale market access seekers. Figure 5 maps these relatively more diverse opinions that may provide regulators with ideas about how to build private interest coalitions among high value/investment entities (i.e., incumbents/wholesale market access seekers). The key focus of submissions from this group appears to be on the impact of the wholesale regime on the retail markets and the importance of fiber connectivity for the adoption of more advanced services. Concerns about particular challenges Canada's current wholesale regime creates for delivering connectivity to rural and remote areas, the broader business community and consumers also take a relatively

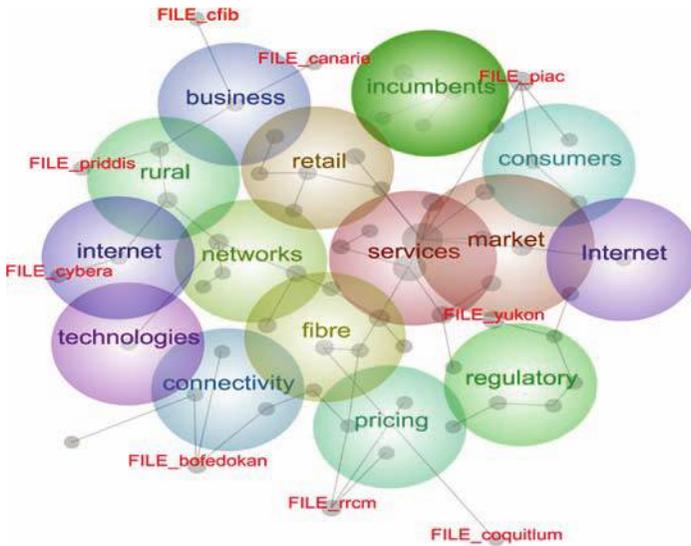


FIGURE 5 Conceptual emphasis by other interveners.

prominent place for these interveners. The fact that the concepts such as “rural” and “pricing” emerge in this body of texts further captures the broader public interest concerns expressed by this group. Evidence and recommendations from this class of interveners is likely to be closer to the theoretical ideal of public interest than inputs from entities with a direct private interest in institutional design and asymmetrically large investments in regulation making.

Summary and Implications

Understanding concerns by potentially divergent private interests and fashioning efficiency enhancing regulations from them represents a key challenge for policymakers and regulators charged with promoting the public interest. This article integrates old insights from economic literature on the impact of asymmetric capabilities across interest groups to influence public policy with new tools for extracting and analyzing large amounts of unstructured textual data in order to provide researchers and policymakers with a novel perspective on this issue. Debates about future policy approaches to motivate dominant operators to provide third parties with access/interconnection to essential Internet infrastructure facilities provide

the empirical context within which we study this fundamental issue and highlight how advanced information extraction and analytics tools might be employed to balance public and private interests in regulation making.

In terms of international debates about the design of essential facilities regulations and their implications for Internet infrastructure development evidence from this regulatory process in Canada is instructive. Forbearance from mandating third party access to fiber access and transport facilities has not been very effective in promoting operators' incentives to deploy next generation fiber access networks. Despite relatively high investment levels, concerns about prices, quality of service, and the pace of creative destruction from sunset to sunrise broadband technologies remain at the center of the wholesale consultation process analyzed in this article. In addition to the potential for forbearance to fail as an instrument for promoting investment in new technologies, it may not be economically rational for public policy to encourage the development of competing fiber networks when there are regulatory options available that would allow competition among service providers on a single physical fiber network. Nevertheless, asymmetries in collective action capacity and relatively large investments in regulation making by a small number of dominant market participants tend to limit the scope for the emergence of efficiency enhancing institutional arrangements that increase innovation and the pace of creative destruction from sunset to next generation broadband. This lesson from debates surrounding the design of the wholesale Internet access market in Canada is relevant for other advanced countries such as the United States, where broadband regulation continues to emphasize forbearance and platform competition, as well as other countries where innovative policies that promote private sector cooperation and risk sharing in deploying Internet access infrastructure are in high demand.

Available tools and the methodology adopted here are not perfect and are open to various criticisms with respect to their ability to reduce large amounts of complex data into simple concepts that can be employed in policy and strategic management by players in such contests. Nevertheless, they help build systematic and relatively unbiased picture of private interest positions and challenges facing policymakers uncertain about their options for pursuing the public interest. By helping identify core evidence and recommendations that span a middleground between parties engaged in a war of attrition about the design of market regulations, the approach we present here has the potential to enable policymakers to design and implement Solomonic private interest bargains by splitting expected gains from the adoption of efficiency enhancing regulations among high value/



investment participants. While some of these bargains may not serve the public interest as they will imply too much private collusion and the utilization of public power to limit the potential for entry, more subtle solutions that serve the public interest might be feasible.

Quantitative NLP techniques and content analysis tools are increasingly employed by business and government organizations to monitor and evaluate large volumes of human communications. The application of these tools to analyze interventions to the wholesale access consultation process in Canada illustrates that these technologies can also provide a realistic and intuitive perspective into complex and often highly technical legal documents. While there are certain tasks that available NLP technologies cannot yet perform very well and human supervision remains key, such tools have the potential to also revolutionize various areas of legal, public policy, and strategic analysis.⁵⁹ For example, parties involved in policymaking contests such as the one studied in this article or third party observers (e.g., financial market participants, the press) can potentially automate how they monitor concerns and positions of other parties, identify adversaries and allies, and adjust their own strategies accordingly. By reducing the costs of participation in the public discourse, deploying available and emerging NLP technologies can help counter the advantages that large and resourceful organizations already have in shaping law and policy.

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59. For example, in patent law increasing reliance on automated information retrieval procedures and content analysis has the potential to both reduce costs and improve accuracy. Applications of NLP and visualization tools employed here is therefore on the cutting edge of bringing these technologies into legal analysis. For an overview see Mark Oliver Giereth, "An Architecture for Visual Patent Analysis." PhD dissertation, Stuttgart, Universität Stuttgart, Diss. (2013). For an example with application to network neutrality debates in the United States, see Reza Rajabiun, "Content Mapping of the FCC 14-61 Notice of Proposed Rulemaking and Formal Submissions by Stakeholders using Natural Language Processing (NLP)." Submission to the Federal Communications Commission. Washington, DC (2014). <http://apps.fcc.gov/ecfs/comment/view?id=6019160552>.



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APPENDIX: TEXT FILES IN THE CORPUS	
Organization	File abbreviation
Aurora College	Aurorac
British Columbia Broadband Association	Bcbroad
Bell Canada	Bell
Bell Aliant	Bellaliant
Board of Education, School District #67, Okanagan Skaha	Bofedokan
City of Calgary	Calgary
Canadian Advanced Research & Innovation Network	Canarie
Canadian Independent Communications Association	Ccsa
Canadian Federation of Independent Business	Cfib
Canadian Network Operators Consortium	Cnoc
Cogeco Cable	Cogeco
Competition Bureau	Combur
City of Coquitlam/QNET	Coquitlam
Cybera	Cybera
Brag Communicaitons/Eastlink	Eastlink
Fibernetics Corporation	Fibernetics
Fiber to the Home Council Americas	Frttham
Canadian Independent Telephone Company Joint Task Force	Itpa
Public Interest Advocacy Centre/Consumers Association of Canada	Piac
Priddis Greens Service Co-op	Priddis
Primus Canada	Primus
Rogers Communications	Rogers
Reza Rajabiun & Catherine Middleton	Rrcm
Shaw Cablesystems	Shaw
SSi Group	Ssi
Telus Communications	Telus
Vaxination Informatique	vaxinf & vaxinfftp
VMedia Inc.	Vmedia
Government of Yukon	Yukon

Source: CRTC 2013-551 consultations documentation retrieved from: <http://www.crtc.gc.ca/eng/archive/2013/2013-551.htm>

