

Implementing an Equivalence of Inputs Regime in Canada's Telecommunications Market

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**Canadian Network Operator's Consortium Inc.
(CNOC)**

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About Nordicity

Nordicity (www.nordicity.com) is a leading consulting firm specializing in policy, strategy, and economic analysis for the public and private sector client in the media, creative, telecommunications, and information and communications technology sectors.

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Glossary

ADSL	Asymmetric Digital Subscriber Line
ANC	Access Network Company
ANS	Access Network Services
ASD	Access Services Division
ATM	Asynchronous Transfer Mode
B2B	Business-to-business
ComReg	Commission for Communications Regulation (Ireland's telecom regulator)
CRTC	Canadian Radio-television and Telecommunications Commission
CSG	Carrier Services Group
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
EAB	Equality of Access Board
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
EOI	Equivalence of Inputs
EOO	Equivalence of Outputs
FMO	Future Mode of Operations
FTTC	Fibre-to-the-Curb
HSA	High-speed Access
ILEC	Incumbent Local Exchange Carrier
IOG	Independent Oversight Group
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
KPI	Key Performance Indicator
NGA	Next Generation Access
NGB	Next Generation Broadband
NGN	Next Generation Network
OAo	Other Authorized Operator
OECD	Organization for Economic Cooperation and Development
PLV	Primary Line Voice
PTS	Swedish Post and Telecom Authority
PSTN	Public-Switched Telephone Network
QoS	Quality of Service
RAP	Regulated Access Product



SG&A	Selling, General and Administration (expenses)
SLA	Service Level Agreement
SLG	Service Level Guarantee
TPIA	Third Party Internet Access
UBA	Unbundled Bitstream Access
UCLL	Unbundled Copper Local Loop
ULL	Unbundled Local Loop
Undertakings	Legally binding commitments made to a regulator
VDSL	Very-high-bit-rate Digital Subscriber Line
VoIP	Voice over Internet Protocol
VUA	Virtual Unbundled Access
WBA	Wholesale Broadband Access
WLR	Wholesale Line Rental
WPNIA	Wholesale Physical Network Infrastructure Access

Executive Summary

1. One of the core principles of Canada’s telecommunications regulation is non-discriminatory access to essential bottleneck facilities. Over the years, the Canadian Radio-television and Telecommunications Commission (CRTC or Commission), has adopted a variety of regulatory policies meant to yield fair and reasonable pricing of wholesale services and prevent discriminatory behaviour by incumbents. Indeed, regulation of prices has been an important feature of the CRTC’s approach, as has been (limited) regulation of quality of service.
2. The existing regulatory framework has, however, failed to deliver a fully competitive market for broadband communications services in Canada. Canada is now lagging other industrialized countries in some leading industry indices – especially percentage of fibre connections in total broadband subscriptions – for which Canada ranked 24th among members of the Organization for Economic Cooperation and Development (OECD) (see Figure A - 2, Appendix A).
3. In light of this evident lack of sufficient competition and innovation in the Canadian broadband market, Canadian Network Operators Consortium Inc. (CNOC) commissioned Nordicity to explore and recommend changes to Canada’s telecommunications policy and regulatory framework, which will promote greater competition in the broadband market.
4. Many advanced industrial countries have pro-actively developed regulatory frameworks to foster competition in retail markets by implementing a range of measures to ensure that third party service providers are treated equitably with respect to essential facilities. New Zealand, the United Kingdom (UK) and other European Union (EU) countries, for example, have adopted **equivalence of inputs (EOI)** regulation in order to address competition concerns.
5. EOI refers to the regulatory concept whereby incumbent local exchange carriers (ILECs) and cable companies (cablecos) that control essential facilities provide wholesale services to internal and third party clients at the same price, quality, terms and conditions, and timescale, using the same systems and processes. When implemented and enforced effectively, an EOI regime can promote downstream competition and improve market outcomes for consumers. Indeed, The European Commission (EC) has identified EOI as the “surest way to achieve

- effective non-discrimination.”¹ A robust EOI regime, therefore, should represent the next stage in Canada’s telecom regulatory framework.
6. A robust EOI regime would include a number of key features, which are crucial to its enforcement and effectiveness; these include:
 - i. compliance monitoring;
 - ii. service level agreements (SLAs) and service level guarantees (SLGs);
 - iii. transparent reporting;
 - iv. legal commitment;
 - v. appropriate incentives; and
 - vi. open access.
 7. The experience of other countries shows that EOI can stimulate competition, investment, innovation and market development. In the UK, for example, the share of the ADSL/FTTx market held by BT (38%)² was one-half that held by Canadian ILECs (77%)³ in 2012. In France, entrants have also gained over 50% market share in the DSL market.⁴ In New Zealand, the implementation of EOI appears to have had a positive impact on competition in the telecommunications market, as TelecomNZ’s share of fixed-line retail revenues dropped from around 80% in the 2005-2008 period to 65% in 2010/11.⁵
 8. EOI is not something new to Canadian telecom regulation. Indeed, many of the CRTC’s regulatory policies already in place are designed to achieve EOI. Regulation of wholesale pricing of essential and interconnection services, mandated speed-matching and the QoS

¹ European Commission (2013) “Draft Commission Recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment,” June 26, 2013, p. 18.

² Ofcom, *Communications Market Report 2013*, pp. 339-340. In 2012, BT held a 30% share of the overall fixed broadband market in the UK. Virgin Media (i.e. cable) held a 21% market. Therefore, BT effectively held a 38% ($30\% \div [100\% - 21\%] = 38\%$) of the ADSL/FTTx market.

³ CRTC (2013) *Communications Monitoring Report 2013*, p. 143. In 2012, ILECs held a 37% share of the overall Internet access market in Canada. However, cable accounted for 52% of the market. Therefore, ADSL accounted for 48% of the market and ILECs held a 77% ($37\% \div 48\% = 77\%$) share of that market.

⁴ The Berkman Center for Internet & Society at Harvard University (2010) “Next Generation Connectivity: A Review of Broadband Internet Transitions and Policy from Around the World,” available online at <http://cyber.law.harvard.edu/pubrelease/broadband/>, p. 153.

⁵ Commerce Commission’ (2013) *2012 Annual Telecommunications Monitoring Report* (and earlier issues).

reporting by ILECs are all key elements of an EOI regime. As a result, the CRTC would not be starting from scratch, but there is not yet a sufficiently coherent and comprehensive regime in place to achieve all of the benefits of EOI.

9. For example, for the purpose of promoting the orderly development of a competitive marketplace, the CRTC should require that, concurrently with the introduction of any new retail service by an ILEC or cableco, that carrier must file a wholesale access tariff that is based on EOI principles, if such a tariff that supports the new retail service does not already exist. EOI wholesale tariffs should specify the terms, conditions and prices applicable to the corresponding wholesale services, and provide for SLAs and SLGs for these services.
10. Furthermore, in order to ensure that an EOI regime will function properly, it must be possible for wholesale customers of an incumbent to have access to the specific network elements that are available to the incumbent's own retail operations. Otherwise, despite all of the other features of the EOI regime, competitors of the incumbent will not be able to offer a full range of retail services that both compete with and are differentiated from those of the incumbent's retail operations. Therefore, EOI-compliant wholesale tariffs must permit competitors to buy access only to those network elements that they require from the incumbent and to interconnect at any technically feasible point in an incumbent network.
11. Among other things, a robust EOI regime would require that the CRTC expand its financial reporting requirements for incumbent ILECs and cablecos. At a micro level, incumbents already compile and submit service costing data to the CRTC as part of the Phase II costing regime in place for regulated wholesale services. So it is likely that their existing accounting systems should be able to accommodate this reporting. Furthermore, incumbents are already accustomed to tracking quality of service (QoS) indicators. And at a macro level, they already submit financial and operating-performance data as part of the data collection process for the CRTC's annual Communications Monitoring Report
12. The CRTC could implement the EOI regime and monitor its outcomes, using the building-block approach adopted by New Zealand (see Figure 2, Section 4.2.2). The CRTC could also fashion appropriately selected key performance indicators (KPIs), corresponding to the legal obligations of ILECs and cablecos to comply with the EOI regime. The KPIs would be tracked by the CRTC, as well as incumbents in a transparent manner. In order to ensure that these



incumbents are further motivated to comply with the EOI regime, the CRTC should require them to develop new incentive structures for the managers who will supervise the carriers' delivery of wholesale services, so that their compensation is aligned to the success of the wholesale operations, rather than that of the parent company or entire group enterprise.

13. Overall, the adoption of an EOI regime in Canada has the potential to deliver significant benefits in terms of competition and innovation in Canada, and can be readily overlaid on existing elements of the Canadian wholesale regulatory system.

1. Introduction and Background

14. Globally, the telecommunications market has traditionally been characterized by high barriers to entry due to large capital requirements and constantly evolving technology. While in North America, cable television services have provided a second wire line to most consumers, the duopoly of incumbent cable company (cableco) and incumbent local exchange carrier (ILEC) infrastructure to deliver telecommunications signals to the premises is likely to endure for the foreseeable future. Such being the case, access to essential facilities at competitive prices and levels of service is critical to third party service providers in the development of their retail services.
15. Unless counterbalanced by a strong regulatory regime to foster competition, the dominance of the market for the delivery of access to telecommunications service by a relative few large wire line incumbents (whether ILEC or cableco) can lead to less than optimal market outcomes for third party service providers and consumers alike. Many players and many service options bring about lower prices, consumer choice and quicker access to new, innovative services. In the larger macro-economic context, enabling competition in the telecommunications sector fosters innovation and growth in the economy as a whole.
16. One of the core principles of Canada's telecommunications regulation is non-discriminatory access to essential bottleneck facilities. Over the years, the Canadian Radio-television and Telecommunications Commission (CRTC or Commission), has adopted a variety of regulatory policies meant to yield fair and reasonable pricing of wholesale services and prevent discriminatory behaviour by incumbents. Regulation of prices has been an important feature of the CRTC's approach, as has been (limited) regulation of quality of service.
17. The existing set of regulations has, however, failed to deliver a fully competitive market for broadband communications services in Canada. Canada is now lagging other industrialized countries in some leading industry indices – especially percentage of fibre connections in total broadband subscriptions – for which Canada ranked 24th among members of the Organization for Economic Cooperation and Development (OECD) (see Figure A - 2, Appendix A). Indeed, leading economists specializing in telecommunications have observed a lack of competition in the Canadian broadband market that has been described as follows:



Though it was among the first nations in the world to provide widespread, retail broadband service, Canada's recent broadband development has lagged behind other developed nations. Canada's broadband penetration rates are often lauded, but the country is a poor performer on price and speed and a declining performer in penetration.⁶

While it is the case that Canadians living in urban centres have easy access to what can be described as 'first generation' broadband services (those provided over existing cable and copper networks), some observers suggest that the dominance of incumbent telephony companies and large cable companies has resulted in a nominally competitive environment that does not actually encourage innovation in broadband services, or enable market entry of new competitors.⁷

18. In light of this evident lack of sufficient competition and innovation in the Canadian broadband market, Canadian Network Operators Consortium Inc. (CNOOC) commissioned Nordicity to explore and recommend changes to Canada's telecommunications policy and regulatory framework, which will promote greater competition in the broadband market.
19. Many advanced industrial countries have pro-actively developed regulatory frameworks to foster competition in retail markets by implementing a range of measures to ensure that third party service providers are treated equitably with respect to essential facilities. New Zealand, the United Kingdom (UK) and other European Union (EU) countries, for example, have adopted equivalence of inputs (EOI) regulation in order to address competition concerns.
20. EOI refers to the regulatory concept whereby ILECs and cablecos that control essential facilities provide wholesale services to internal and third party clients at the same price, quality, terms and conditions, and timescale, using the same systems and processes. When implemented and enforced effectively, an EOI regime can promote downstream competition and improve market outcomes for consumers. Indeed, The European Commission (EC) has identified EOI as the "surest way to achieve effective non-discrimination."⁸

⁶ The Berkman Center for Internet & Society at Harvard University (2010) "Next Generation Connectivity: A Review of Broadband Internet Transitions and Policy from Around the World," available online at <http://cyber.law.harvard.edu/pubrelease/broadband/>, p. 247.

⁷ Catherine Middleton (2011) "Structural and functional separation in broadband networks: an insufficient remedy to competitive woes in the Canadian broadband market," in Marita Moll and Leslie Regan Shade (eds.) *The Internet tree – The state of telecom policy in Canada 3.0*, pp. 61-72 (Ottawa: CCPA).

⁸ European Commission (2013) "Draft Commission Recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment," June 26, 2013, p. 18.



21. In this report, Nordicity argues that a robust EOI regime should represent the next stage in Canada's telecom regulatory framework. The risk of discriminatory behaviour by either ILECs or cablecos remains one of the biggest threats to the development of a competitive telecom market beneficial for consumers and small businesses in Canada. Indeed, Canadian consumers and businesses will only be able to truly experience a competitive broadband market when an effective EOI system is implemented.

22. In Section 2, this report begins by reviewing the development and features of the current telecom regulatory system in Canada. In Section 3 we review the key features of EOI. In Section 4, we discuss how EOI regimes have been adopted in certain countries and how they yielded benefits in those countries. In Section 5, we discuss how an EOI regime could be applied in the Canadian context. In Section 6, we summarize the findings of our research and analysis.

2. Current Regulatory System in Canada

23. In this section, we review the historical development of the regulatory framework that governs competitor access to the local loop network in Canada. We also review the recent developments of the current features of the regulatory framework that governs the access by independent Internet Services Providers (ISPs) to essential facilities.

2.1 Historical development

24. In line with the *Telecommunications Act*, the revised regulatory framework adopted by the CRTC in September 1994 (i.e. Telecom Decision CRTC 94-19) placed “greater reliance on market forces”⁹ while attempting to ensure effective regulation where necessary. The CRTC recognized that vertical integration of ILECs offered opportunities (as well as incentives) for anti-competitive conduct, but saw divestiture and structural separation as potentially harmful to Canada’s telecommunications system.

Divestiture could be damaging to the competitiveness of Canada in global markets and could dampen the emergence of integrated services evolving from the convergence of the communications, information, computing and entertainment industries. Similarly, the Commission is not convinced that structurally separate affiliates are necessary (...). While such a solution does have merit in a new and distinct market such as wireless, it is generally a static solution that reduces economies of scope and still requires regulation to oversee intercorporate transactions.¹⁰

25. Instead, the CRTC opted to adopt “other, more flexible regulatory alternatives”, which should be “as effective as structural separation in safeguarding against anti-competitive abuses associated with the vertically integrated structure of the Stentor companies, but without many of the associated problems.”¹¹ One of such alternatives was the regulation of wholesale access to telecommunications services in an attempt to ensure effective service-based competition and limit incumbents’ market power.¹²

⁹ CRTC, Telecom Decision CRTC 94-19, pp. 12-13.

¹⁰ CRTC, Telecom Decision CRTC 94-19, pp. 29-30.

¹¹ CRTC, Telecom Decision CRTC 94-19, p. 30.

¹² There are two types of competition in the provision of high-speed Internet services: facilities-based and services-based competition. Facilities-based competition happens between firms that use different infrastructures to provide their broadband services, such as ILECs and cablecos. Service-based competition, on

26. A guiding principle of the CRTC's current approach to the regulation of wholesale Internet services and access of third parties to incumbents' networks has been the *essentiality* of a service. This idea was already present in Telecom Decision CRTC 94-19, where the Commission considered that bottleneck services, along with services "subject to dominant supply," should be unbundled. The concept was then made explicit in the CRTC's 1997 decision regarding local competition (Telecom Decision CRTC 97-8), and updated in the 2008 revised regulatory framework for wholesale services (Telecom Decision CRTC 2008-17). Under this guiding principle, the CRTC has mandated incumbents to allow third-party access to their networks and set rates for wholesale Internet services. Access to unbundled local loops, for instance, was first mandated in May 1997 (Telecom Decision CRTC 97-8), while the requirement of open access to cable networks was mandated in September 1999 (Telecom Decision CRTC 99-11).
27. Currently, to be considered an essential service (or function or facility), three criteria must be satisfied:¹³
- i. The facility is required as an input by competitors to provide telecommunications services in a relevant downstream market;
 - ii. 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; and
 - iii. It is not practical or feasible for competitors to duplicate the functionality of the facility.¹⁴
28. Using the above definition as a basis, the CRTC classified existing wholesale services into six categories: (1) Essential; (2) Conditional Essential; (3) Conditional Mandated Non-essential; (4) Public Good; (5) Interconnection; and (6) Non-essential subject to phase-out. Table A - 4 (see Appendix A) lists the main services in each category. Note that the unbundled local loop is considered a conditional essential service – that is, an essential service that could, at some point in the future, stop being essential due to changes in market conditions.

the other hand, happens when a third party uses an incumbent's network to provide retail Internet services. Since this section discusses issues linked to third-party access to incumbents' networks, our focus is on services-based competition. For more on the state of facilities-based and services-based competition in the Canadian broadband market, see Middleton and van Gorp (2009).

¹³ CRTC, Telecom Decision CRTC 2008-17, ¶36.

¹⁴ CRTC, Telecom Decision CRTC 2008-17, ¶48.



29. For the first five categories, Telecom Decision CRTC 2008-17 required that services be priced using a cost-based approach. Essential (and conditional essential) services were required to be priced at company-specific Phase II costs plus a mark-up of 15 per cent. The mark-up for other services varied. Due to concerns that incumbents would lock competitors into unfair negotiated agreements, non-essential services subject to phase-out were the only category where off-tariff negotiated agreements between incumbents and competitors were allowed. Less than a year later, however, this restriction was loosened, and the CRTC amended Telecom Decision 2008-17, allowing negotiated agreements between incumbents and competitors for conditional essential and conditional mandated non-essential services on a forbore basis (Telecom Regulatory Policy CRTC 2009-19), although tariffs remain in place for these types of services. In the case of Essential, Public Good and Interconnection services only tariffed rates apply.

30. In parallel with clarifying the application of the essentiality of service principle, in CRTC 2002-76, the CRTC also clarified the affiliate rule to prevent incumbents from circumventing regulation to foster competition. This is described in the Nexxia Case Study described in the Box 1 (below):

BOX 1: The Bell Nexxia case: An incumbent's attempt to self-regulate

In the early 2000s, Bell Canada's wholesale activities were conducted by its wholly-owned subsidiary, Bell Nexxia. Bell Canada even transferred its Carrier Services Group (CSG) – a functionally separate group within an ILEC created to liaise with competing service providers – to its subsidiary. In practice, however, Bell Nexxia was being used by Bell Canada to circumvent regulation.

In January 2002, Group Telecom filed an application with the CRTC requesting the investigation of the activities of Bell Nexxia. Group Telecom raised two main concerns:

- (1) Whether activities involving Bell Canada and Bell Nexxia constituted violations of existing regulatory requirements.
- (2) Whether additional safeguards with respect to the activities of in-region ILEC affiliates were required.

In December 2002, the CRTC released Telecom Decision CRTC 2002-76, describing the results of its investigation, and making some significant regulatory changes. By and large, the CRTC agreed with the concerns raised by Group Telecom. Below, a summary of issues is provided:

- The CRTC mandated that Bell's CSG be transferred back to Bell Canada. Among other reasons, because the ILEC should be "directly responsible for the protection of confidential information relating to the use of ILEC tariffed services by competitors".
- Bell Canada used its affiliate Bell Nexxia to circumvent regulation designed to foster competition. CRTC found that: 1) Bell Canada, through Bell Nexxia, provided customers with numerous services that should have been tariffed on an untariffed basis, thus breaching the CRTC's bundling rules; and 2) The CRTC expressed concern that Bell Canada was providing Bell Nexxia certain telecommunication services – such as engineering, technical support, help-desk and back-office services – at preferred, untariffed rates. Regarding (1), the CRTC ordered Bell Canada to file tariffs for all untariffed arrangements; with respect to (2), the CRTC determined that Bell Canada should provide a list of services offered to Bell Nexxia, along with a proposed tariff for all services identified as telecommunications services.
- The CRTC implemented important changes to the affiliate rule. To prevent other ILECs from using their affiliates in a similar way, the CRTC changed the affiliate rule, deciding that ILECs
(...) may not provide an ILEC affiliate with non-forborne services which the affiliate uses to provide telecommunications services to the public, except pursuant to an approved tariff which identifies the rates, terms and conditions under which the relevant telecommunications services are provided by the affiliate to the public

The CRTC determined that there should be no distinction between the actions of an ILEC and its affiliates, "since the actions of both entities are ultimately subject to control by a single person".

Shortly after the CRTC's decision, on 1 April 2003, Bell Nexxia was subsumed by Bell Canada.

2.2 Regulatory system in place for independent ISPs

31. In practice, the service-based competition currently provided by independent ISPs is limited by a number of different factors, including (but not limited to):

- *Financial, technical and procedural barriers.* Even though the CRTC mandates and regulates access to co-location, for instance, in practice independent ISPs require a “critical mass of subscribers to justify investment in any given exchange.”¹⁵ To make matters worse, competitors face technical barriers such as the risk of stranded investments.
- *Price and non-price discrimination.* Over the years, independent ISPs have filed several complaints with the CRTC regarding the abuse of market power by ILECs and cablecos. These complaints refer not only to price discrimination – i.e. incumbents setting wholesale prices higher than the prices charged to their own customer base for the same service – but also to non-price discrimination tactics such as traffic throttling and slower connection speeds.¹⁶
- *Less room for product differentiation.* Independent ISPs are typically not able to provide the full suite of services offered by ILECs and cablecos (e.g. “triple play” or “quad play” bundles for residential retail customers), leaving less room for product differentiation except through looser contractual agreements, better customer service and more efficient uses of technology.

¹⁵ Middleton and van Gorp (2009) “How competitive is the Canadian residential broadband market? A study of Canadian Internet service providers and their regulatory environment,” paper presented at the 37th Research Conference on Communication, Information and Internet Policy, Arlington, VA, September 25-27, available at http://www.broadbandresearch.ca/ourresearch/middleton_vangorp_TPRC2009.pdf, p. 25.

¹⁶ For details, see Middleton (2011) “Structural and functional separation in broadband networks: an insufficient remedy to competitive woes in the Canadian broadband market,” and van Gorp (2011) “Barriers to competition in Canada’s residential broadband market,” in Marita Moll and Leslie Regan Shade (eds.) *The Internet tree – The state of telecom policy in Canada 3.0*, pp. 61-72 (Ottawa: CCPA).

2.3 Evaluation of current regulatory regime in the Canadian telecommunications market

32. While the current regulatory framework adopted by the CRTC does try to address the barriers highlighted above, it does so in a manner that, so far, has yielded lacklustre results, leading to several problems:

- *Delaying tactics by incumbents and regulatory backtracking*, as can be exemplified by the CRTC's decisions on the speed-matching requirement for wholesale Internet services. This requirement was first mandated by the CRTC in 2006 for cablecos (Telecom Decision CRTC 2006-77) and in 2007 for ILECs (Telecom Order CRTC 2007-21/25). It was then rescinded for ILECs in August 2007 (Telecom Decision CRTC 2007-77), and later reinstated in 2008 (Telecom Decision CRTC 2008-117 and Telecom Order CRTC 2009-111) after incumbents were found to be offering lower speeds to independent ISPs. In practice, however, the speed-matching requirement was only adopted by ILECs in 2010, after Telecom Decision CRTC 2010-632. (See box 2 below.)
- *Regulatory catch-up*. The CRTC has been slow to acknowledge new business realities. As an example, in 2011, the CRTC initially declined CNOC's request that the mark-up for wholesale business high-speed access services be the same as the mark-up for wholesale residential offerings (Telecom Regulatory Policy CRTC 2011-704), only to acknowledge in 2013 that CNOC had raised a fair point (Telecom Regulatory Policy CRTC 2013-73).
- *Gradual loosening of regulation referring to non-essential wholesale services*, without definitive evidence that it would lead (or has led) to increased services-based competition. In the CRTC's revised framework for wholesale services (Telecom Decision CRTC 2008-17), there was originally no room for off-tariff negotiated agreements between incumbents and competitors, except for services classified as non-essential subject to phase-out. This decision has been gradually loosened, with negotiated agreements now allowed for conditional essential and conditional mandated non-essential services on a forbearance basis (Telecom Regulatory Policy CRTC 2009-19) and the filing requirements for such agreements reduced (Telecom Regulatory Policy CRTC 2012-359).

BOX 2: Use of delay tactics by ILECs: the speed-matching rulings

Following an application by Cybersurf Corp. (Cybersuf) on June 19, 2008, Telecom Decision CRTC 2008-117 (issued on December 11, 2008)¹⁷ directed ILECs to file speed-matching tariffs within 45 days of the decision, i.e. 26 January 2009. On January 13, 2009, Cybersurf made an additional application – which resulted in Telecom Order CRTC 2009-111 on March 3, 2009 – requesting that the CRTC direct Bell Canada to file wholesale tariffs for any “ADSL access service speeds provided to Bell Canada’s retail Internet customers.” On separate letters dated January 15/16, 2009, the ILECs requested a 45-day extension to file the proposed tariffs, and the CRTC complied.¹⁸

On March 11, two days before the proposed deadline for the tariffs, Telus and Bell filed an application with the Governor in Council to vary Telecom Decision CRTC 2008-117 and rescind Telecom Order CRTC 2009-111. In addition, the ILECs submitted to the CRTC separate applications for stay of those two rulings, pending resolution of the application to the Governor in Council.¹⁹

By March 13, 2009, the required tariffs had not been filed. Several parties – including Distributel Communications Limited (Distributel) Yak Communications Canada Corp. (Yak), Primus Telecommunications Canada Inc. (Primus), Cybersurf, and the Canadian Association of Internet Providers (CAIP) – vehemently protested the ILECs’ actions. Distributel *et al.*, for instance, stated on a letter to the CRTC that “Bell Aliant, Bell Canada and Telus Communications have deliberately chosen to flout the Commission’s directives by failing to file the required tariffs on 13 March 2009 as ordered.”²⁰ CAIP went even further, accusing the ILECs of using “legal and procedural trickery in their attempt to thwart competition and manipulate the laws of Canada in their favour”.²¹ In response, the CRTC, on a letter dated 31 March 2009, noted that it would reach a decision on the stay applications “as soon as possible after the close of record date of 6 April 2009.”²²

On December 10, 2009, the Governor in Council issued Order in Council P.C. 2009-2007,²³ requiring the CRTC to reconsider its speed-matching rulings and conduct a consultation on the issue to be completed no later than 1 September 2010. The consultation was incorporated to

¹⁷ Available at <http://www.crtc.gc.ca/eng/archive/2008/dt2008-117.htm>.

¹⁸ Available at <http://crtc.gc.ca/eng/archive/2009/lt090123.htm>.

¹⁹ The applications for stay submitted by Telus and Bell are available at http://www.crtc.gc.ca/PartVII/eng/2009/8680/t66_200904807.htm and http://www.crtc.gc.ca/PartVII/eng/2009/8680/b54_200904822.htm.

²⁰ Correspondence between Distributel Communications Limited *et al.* and the CRTC dated 24 March 2009, paragraph 3, available at http://www.crtc.gc.ca/public/partvii/2009/8680/t66_200904807/1047395.pdf.

²¹ Correspondence between CAPI and the CRTC dated 24 March 2009, paragraph 4, available at http://www.crtc.gc.ca/public/partvii/2009/8680/t66_200904807/1047488.pdf.

²² Available at <http://www.crtc.gc.ca/eng/archive/2009/lt090331b.htm>.

²³ See the Appendix of Telecom Notice of Consultation CRTC 2009-261-7, available at <http://www.crtc.gc.ca/eng/archive/2009/2009-261-7.htm>.

the already ongoing consultation on the appropriateness of mandating certain wholesale high-speed access services (Telecom Notice of Consultation CRTC 2009-261).²⁴

On August 30, 2010 – more than two years after Cybersurf’s original request – the CRTC finally published Telecom Regulatory Policy CRTC 2010-632,²⁵ in which it reiterated the need for speed matching, and determined the application of speed matching to both cablecos’ TPIA services and to ILECs’ DSL services.

2.4 Pricing of wholesale access

33. Since November 2011, Canada’s independent ISPs have operated within a regime whereby ILECs and cablecos could utilize flat-rate or capacity-based tariffs for the pricing of access to wholesale residential high-speed access (HSA) (Telecom Regulatory Policy CRTC 2011-703/4). Under the flat-rate tariff, ILECs and cablecos may charge a single monthly rate per retail customer. These rates vary by download speed. They are generally set on the basis of Phase II (causal) costs plus a 30% mark-up to cover common costs.²⁶ ILECs and cablecos may also offer capacity-based tariffs that consist of a lower monthly baseline per-customer charge, plus a monthly capacity charge offered in 100 Mbps increments.
34. While the CRTC has determined that this wholesale pricing regime is fair and reasonable and designed to promote competition and innovation, there is no assurance that the rates struck do not have an anti-competitive effect. In particular, there is no assurance that ILECs and cablecos incorporate the same wholesale cost into their own retail residential HSA offerings.

2.5 Summary

35. In the past 20 years, the CRTC has approached wholesale regulation with the objective of fostering service-based competition. To curb anti-competitive behaviour and prevent unjust discrimination by incumbents, the CRTC has regulated access and prices of telecommunication services. While those are necessary conditions for a strong regulatory framework, they are far from sufficient conditions. International experiences in EOI, in particular, may provide an important alternative model to the CRTC’s current approach.

²⁴ Available at <http://www.crtc.gc.ca/eng/archive/2009/2009-261.htm>.

²⁵ Available at <http://www.crtc.gc.ca/eng/archive/2010/2010-632.htm>.

²⁶ Fibre-to-the-node (FTTN) services offered by ILECs are subject to a 10% supplementary markup.

3. Equivalence of Inputs Regulation

36. In the following section, we outline the main features of EOI and discuss the case for its adoption in the Canadian market, including its potential role in stimulating investment and innovation.

3.1 Principles of EOI regulation

37. At the core of the EOI regime is the principle of non-discriminatory practice. Under this principle, when ILECs and cablecos offer or plan to offer to their retail operations network access or other services or products for which they may exercise significant market power – or which may permit them to exercise significant market power downstream – they must offer service or product on a wholesale basis to third party competitors and their own retail arm based on the same parameters with respect to:

- i. Service offering;
- ii. Timescales;
- iii. Terms and conditions (including price and service levels); and,
- iv. Using the same systems and processes.

38. They must also offer the same commercial information about such products and services to third party competitors and their own retail arm.

39. A robust EOI regime also includes a number of other features that underpin its effectiveness and enforcement.

40. **Compliance monitoring:** Robust EOI regimes display comprehensive compliance reporting systems, whereby a set of pre-determined key performance indicators (KPIs) are tracked. These KPIs measure the incumbents performance with respect to:²⁷

- i. Ordering processes;
- ii. Provision of service;
- iii. Quality of service (i.e. faults);

²⁷ European Commission (2013), p. 19.

- iv. Fault repair times; and,
 - v. Migration between regulated wholesale inputs.
41. **Service level agreements (SLAs):** Alongside KPIs, robust EOI regimes also require incumbents to enter into SLAs with wholesale customers. These SLAs should specify clear quality-of-service (QoS) requirements and indicators.²⁸ These SLAs should also include service level guarantees (SLGs) that stipulate the financial compensation that ILECs and cablecos would pay to third parties for violation of SLAs.²⁹
42. **Transparent reporting:** Under EOI, there is the need for a much higher degree of transparency in financial information and reporting. This transparency is often achieved through functional separation and separate financial reporting, but it could also be achieved through changes to internal accounting systems (i.e. accounting separation) and confidential reporting to the regulator.
43. **Legal commitment:** The EOI regimes in the UK and New Zealand require ILECs to make regular (e.g. annual) and legally binding commitments to adhering to the principles of EOI. This ensures that ILECs have a clear understanding of their obligations and give regulators and other parties legal recourse if past violations are discovered.
44. **Appropriate incentives:** Perhaps the most important yet challenging aspect to EOI regulation is setting up a system in which strong incentives exist for the ILECs and cablecos to adhere to the principles of EOI. Separate management structures and KPIs go some way to establishing such an incentive structure. The entity managing the wholesale network should establish training as well as incentives for its management and staff that clearly reward consistent service standards regardless of the downstream client. Furthermore, the incentive system must be decoupled from concerns for the overall profitability of the parent entity. In the absence of functional separation, the enforcement of appropriate incentives may require the review of management contracts and compensation practices – a practice that may not be typical of telecom industry regulators.

²⁸ *Ibid.*

²⁹ *Ibid.*

45. **Open Access:** An open access policy permits competitors to buy access only to those network elements that they require from the incumbent and to interconnect at any technically feasible point in the incumbent network. That is to say, in purchasing specific elements needed, the competitors are not required by the incumbents as part of the transaction, to also purchase other undesired services in a service bundle. In order to ensure that an EOI regime will function properly, it is also necessary that wholesale customers of an incumbent have access to the full range of specific network elements that are made available to the incumbent's own retail operations. Should this not be so, despite all of the other features of the EOI regime, competitors of the incumbent will not be able to offer a full range of retail services that both compete with and are differentiated from those of the incumbent's retail operations. Open access is essential to the creation of a competitive telecommunications market.

3.2 The case for EOI in Canada

46. Since the introduction of the local competition in Canada, the CRTC has been reluctant to implement structural or functional separation. In part, this reluctance was due to the relatively smaller size of the Canadian telecom market – versus other OECD countries – and thus a wish to avoid eroding any economies of scale or scope already enjoyed by ILECs and cablecos.³⁰
47. The separation of assets has been thought to preclude – or make it more difficult for – ILECs or cablecos to offer bundled communications services to consumers and businesses – something that is an important factor in market competition.³¹ All other things being equal, it also results in companies that are smaller than they would otherwise be. As a result, ILECs and cablecos have to duplicate certain overhead functions and distribute them over a smaller revenue base.³² With structural separation, therefore, there is a risk that average costs will increase and consumer prices will follow.³³
48. By adopting a robust EOI regime, the CRTC can achieve competitive outcomes without having to erode economies of scale or scope. Because only wholesale and not retail services are

³⁰ OECD (2003) "The Benefits and Costs of Structural Separation in the Local Loop," November, available at <http://www.oecd.org/sti/ieconomy/18518340.pdf>, p. 6.

³¹ OECD (2003) p. 29.

³² *Ibid.*

³³ OECD (2003) p. 6.

- affected by EOI, ILECs and cablecos are not restricted from offering communications bundles, so long as competitors can also access any essential inputs incorporated in those services.
49. Under a robust EOI regime, resources are focused on enhanced financial accounting, KPI tracking and compliance, and information sharing as opposed to carving out a standalone access services division. The impact on average costs would not be zero, but it is very likely to be much lower than under an EOI regime accompanied by structural or functional separation.³⁴
 50. From a benefit-cost perspective, therefore, a robust EOI regime offers the CRTC an opportunity to stimulate competition, and generate benefits for consumers and the economy, while at the same time preserving incumbents' economies of scope and scale – i.e. by minimizing the impact on incumbents' average costs.
 51. A robust EOI regime will promote increased competition in the Canadian broadband market as the risks of discriminatory practices and anti-competitive behaviour wane, thereby creating an environment where entrants (e.g. independent ISPs) can better assess the financial returns from market entry, investment and expansion. It is important to note that EOI does not eliminate risks nor guarantee market performance for entrants, but simply means that they have more certainty regarding the rules and environment under which they must compete.
 52. This increased level of competition can also spur increased investment, particularly investment in service quality.
 53. Incumbents will often argue that there is a direct negative relationship between service-based competition promoted by mandated access to bottleneck facilities and levels of investment. This relationship (depicted Figure 1 in by the downward dashed line) takes a somewhat static view. It posits that monopoly power gives businesses the greatest incentive for investment and

³⁴ Martin Cave (2006) "Six Degrees of Separation: Operational Separation as a Remedy in European Telecommunications Regulation," *Munich Personal RePEc Archive*, available at http://mpra.ub.uni-muenchen.de/3572/1/MPRA_paper_3572.pdf, p. 95.

- innovation because it furnishes them with monopoly rents from which to invest.³⁵ This is often referred to as the Schumpeterian Effect.³⁶
54. However, the relationship between competition and investment is not as linear and straightforward as the Schumpeterian Effect would suggest. Theoretical research and empirical studies indicate that a second effect, the Escape Effect, also affects the relationship between competition and investment. Under the Escape Effect, businesses increase their investment and levels of innovation in order to *escape* competition.³⁷
55. The presence of both the Schumpeterian and Escape Effects means that the relationship between competition and investment is more likely to resemble the inverse-U shaped curve in Figure 1.³⁸ This means that as competition increases, investment and innovation should increase up to an optimal point, where the Schumpeterian Effect begins to outweigh the Escape Effect and more competition leads to reduced levels of investment.

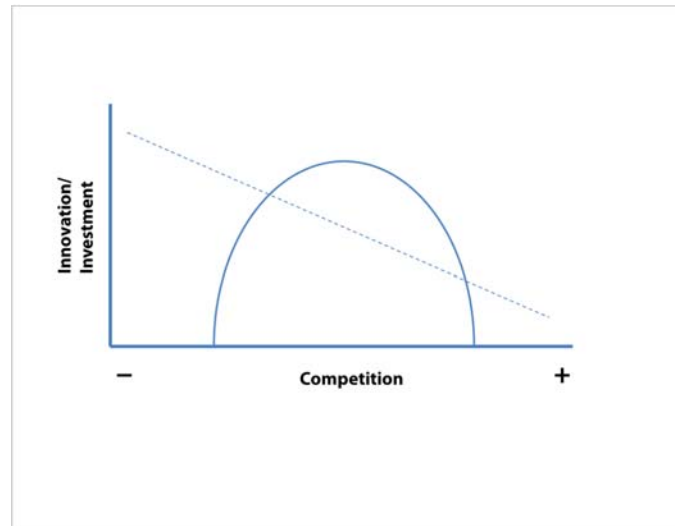
³⁵ Hans Friederiszick, Michal Grajek and Lars-Hendrik Röller (2008) "Analyzing the Relationship between Regulation and Investment in Telecom Sector," available at http://www.wu.ac.at/iqv/mitarbeiter/gugler/reg_fgr_esmt.pdf, p. 4; Françoise Jeanjean (2013) "Incentives to invest in improving quality in the telecommunications industry," prepare for France Telecom Orange, available at http://crem.univ-rennes1.fr/Documents/Docs_sem_eco_appliquee/2012-2013/13-04-11_Jeanjean.pdf, pp. 3-4.

³⁶ *Ibid.*

³⁷ *Ibid.*

³⁸ Jeanjean (2013), p. 4.

Figure 1 Relationship between competition and investment



Source: Based on Friederiszick, Grajek and Röller (2008); and Jeanjean (2013).

56. The implication of the inverse-U shaped relationship is that at relatively low levels of pre-existing competition – such as Canada has displayed in recent years in relation to other OECD markets such as the UK – investment and innovation should increase with the level of competition.³⁹
57. In a market such as broadband access service where there are regulated wholesale prices and generally transparent retail pricing, competition is largely based on the quality of service – i.e. the customer experience. In the case of the broadband access, quality of service is often viewed in terms of download speed. In markets such as broadband service where competition is based on quality rather than price, economic theory and empirical analysis suggests that the Escape Effect will prevail.⁴⁰ In such a market, any type of sustainable competitive advantage is hard to attain. Companies are in constant competition and must make regular investments in quality improvement in order to stay competitive. In such an environment, company profits (i.e.

³⁹ Jeanjean (2013), p. 4; Friederiszick et al. (2008), p. 3.

⁴⁰ Jeanjean (2013), p. 4.



producer surplus) are held in check,⁴¹ although consumer surplus, and thereby overall social welfare, increases.

⁴¹ *Ibid.*

4. International Experience with Equivalence of Inputs Regulation

58. In this section, we summarize the experiences of five countries – the UK, New Zealand, Ireland, Sweden and France– which provide valuable lessons as to how to implement EOI in Canada.

4.1 United Kingdom

59. In this section, we describe the development and operational aspects of the EOI regime in the UK, which was implemented as part of the functional separation of BT Openreach from BT Group plc.

4.1.1 Historical background

60. In April 2004, Ofcom launched Phase 1 of its Strategic Review of Telecommunications. Among the various policy and regulatory issues within the remit of the Strategic Review, Ofcom asked stakeholders to consider the policies and regulations required for achieving **equality of access** in fixed telecoms.

61. On June 30, 2005, Ofcom issued a notice in which it concluded that the combination of BT's upstream market power and vertical integration meant that it had both an incentive and ability to discriminate against downstream competitors.⁴² Ofcom further noted that it believed that BT had, in fact, engaged in anti-competitive behaviour.⁴³

62. In light of these findings, BT offered a set of undertakings to avoid reference to the UK's Competition Commission.⁴⁴ A minority of industry stakeholders felt that the undertakings did not go far enough, and only structural separation would remedy the potential for anti-competitive behaviour in bottleneck facilities. Ofcom, however, considered that structural separation would not be a proportionate remedy and opted for a combination of EOI and functional separation.

⁴² Ofcom (2005a) "Notice under Section 155(1) of the Enterprise Act 2002: Consultation on undertakings offered by British Telecommunications plc in lieu of a reference under Part 4 of the Enterprise Act 2002," June 30, available at <http://stakeholders.ofcom.org.uk/binaries/consultations/sec155/summary/sec155.pdf>, ¶1.4.

⁴³ *Ibid.*

⁴⁴ Ofcom (2005b) "Strategic review of telecommunications, and undertakings accepted from BT: plan English summary," available at [http://stakeholders.ofcom.org.uk/consultations/statement_tsr_pes](http://stakeholders.ofcom.org.uk/consultations/statement_tsr/statement_tsr_pes).

63. In 2005, Ofcom, the UK's national regulatory agency, took the bold step of enforcing a regime of functional separation on the national ILEC, British Telecom (BT). Ofcom required BT to set up BT Openreach, encompassing its access network as a functionally-separate division, to ensure equality of access and competitive pricing as well as transparency in regulatory reporting.
64. BT Openreach was established by BT plc on January 21, 2006, as part of undertakings (i.e. legally binding remedies) it committed to in lieu Ofcom having to refer the case of monopoly control of the access network to UK Competition Commission.
65. While the operational separation was a core feature of BT's undertakings – and was seen as a tool for ensuring that those responsible for overseeing BT's bottleneck facilities had real incentives for treating third parties clients – EOI was also a pivotal element in Ofcom's objective of introducing equality of access to the UK market. Under EOI, **BT's own downstream operations would use the same products, processes and prices as those used by its rivals.**

4.1.2 The formation of BT Openreach and EOI

66. The entity that now comprises BT Openreach was formed through BT's adoption of a schedule of undertakings. Table A - 1 (see Appendix A) lists several of the elements of these undertakings (note that prior to the branding of BT Openreach, it was referred to as the Access Services Division [ASD]).
67. At the heart of the equality of access regime in the UK was, and is, EOI. BT's undertakings thus included the requirement that BT apply EOI to certain wholesale products and services. In the context of BT's undertakings, EOI was defined in the following manner:

"Equivalence of Inputs" or "EOI" means that BT provides, in respect of a particular product or service, the same product or service to all Communications Providers (including BT) on the same **timescales, terms and conditions (including price and service levels)** by means of the **same systems and processes**, and includes the provision to all Communications Providers (including BT) of the **same Commercial Information** about such products, services, systems and processes. In particular, it includes the use by BT of such systems and processes in the same way as other Communications Providers and with the same degree of reliability and performance as experienced by other Communications Providers.⁴⁵

⁴⁵ Ofcom (2005c) "Undertakings given to Ofcom by BT pursuant to the Enterprise Act 2002," available at <http://stakeholders.ofcom.org.uk/binaries/telecoms/policy/bt/btundertakings.pdf>, pp. 5-6.

68. The implementation of EOI has, however, not obviated the need for Ofcom to continue to regulate the rates for certain network access services that it finds are subject to significant market power. As a result Ofcom imposes charge controls (i.e. price caps) on unbundled local loops and wholesale line rentals.⁴⁶ In the wholesale broadband access (WBA) market, Ofcom imposes charge controls for 8 Mbps IPStream Connect services.⁴⁷

4.1.3 Market outcomes

69. The adoption of EOI in the UK has contributed to several positive market outcomes in terms of competitive entry, consumer pricing and investment.
70. In 2012, incumbent carriers⁴⁸ in the UK held a 46% share of all ADSL broadband connections; competitive ISPs – which use unbundled local loops – accounted for the other 54%.⁴⁹ Incumbents' share of DSL connections fell from 69% in 2007.⁵⁰ In 2012, BT held a 38% share of the ADSL/FTTx connection market in the UK.⁵¹ BT Openreach clients, including Sky, TalkTalk Group, O2 and EE, accounted for the 62%.
71. In contrast, in Canada, the ILECs held 77% of the ADSL broadband connection market in 2012.⁵² In the residential segment in Canada, ILECs accounted for 82% of ADSL broadband revenue.⁵³ In the business-access segment, they accounted for 58%.⁵⁴
72. The EOI regime has not had any adverse effects on investment in next generation networks (NGNs). At the end of 2012, the percentage of UK population with access to Fibre-to-the-

⁴⁶ Ofcom (2012) "Charge control review for LLU and WLR services," March 7, 2012, available at <http://stakeholders.ofcom.org.uk/consultations/wlr-cc-2011/statement-march2012/>.

⁴⁷ Ofcom (2011) "WBA Charge Control - Charge control framework for WBA Market 1 services," July 20, 2011, available at <http://stakeholders.ofcom.org.uk/consultations/wba-charge-control/statement>.

⁴⁸ BT is the incumbent carrier in the vast majority of the UK.

⁴⁹ Ofcom, *Communications Market Report 2013*, pp. 339-340.

⁵⁰ *Ibid.*

⁵¹ Ofcom, *Communications Market Report 2013*, pp. 339-340. In 2012, BT held a 30% share of the overall fixed broadband market in the UK. Virgin Media (i.e. cable) held a 21% market. Therefore, BT effectively held a 38% ($30\% \div [100\% - 21\%] = 38\%$) of the ADSL/FTTx market.

⁵² CRTC (2013), p. 143. In 2012, ILECs held a 37% share of the overall Internet access market in Canada. However, cable accounted for 52% of the market. Therefore, ADSL accounted for 48% of the market and ILECs held a 77% ($37\% \div 48\% = 77\%$) share of that market.

⁵³ CRTC (2013), p. 144.

⁵⁴ *Ibid.*

Cabinet (FTTC)⁵⁵ networks stood at 48%⁵⁶; this was comparable to the rate of 56% in Canada.⁵⁷ And while the UK did trail Canada in terms of Fibre-to-the-Premises (FTTP) deployment – 0.7% vs. 5% - the proportion of broadband connections with superfast download speeds (over 30 Mbps) was 15% in the UK vs. 9% in Canada.⁵⁸

4.2 New Zealand

73. This section describes New Zealand’s experience with the development of an EOI regime, which was accompanied by functional separation, and ultimately structural separation.

4.2.1 Historical background and adoption of EOI

74. TelecomNZ was created in 1987 out of the telecom arm of the New Zealand Post Office. Initially a state-owned enterprise, the company held a statutory monopoly of the country’s telecommunications up until March 1989. Shortly after the statutory monopoly ended, the company was privatized (September 1990). From 1990 to 2000, New Zealand’s telecom regulation strategy relied on generic competition law (i.e. no industry-specific regulation) and the courts. In 2001, however, the Fletcher inquiry concluded that, with significant barriers to entry and little competition, better regulation was a necessity. This led to the enactment of the 2001 *Telecommunications Act*, the creation of the position of Telecommunications Commissioner and introduction of industry-specific regulation.⁵⁹

75. In 2005/06, New Zealand’s Commerce Commission conducted a stocktaking of the country’s telecom regime. This investigation concluded that there were still several problems with the existing regime, including:⁶⁰

- Reliance on an arbitration model that was not easily accessible to small players;

⁵⁵ Which is equivalent to Canada’s fibre-to-the-node (FTTN).

⁵⁶ Ofcom, *Infrastructure Report 2013*, p. 42.

⁵⁷ *Ibid.*

⁵⁸ Ofcom, *Infrastructure Report 2013*, p. 42.

⁵⁹ Patterson (2010) “Operational Separation: New Zealand’s Experience,” Vertical Separation in Telecoms: International Conference 23 November, available at http://www.wik.org/fileadmin/Konferenzbeitraege/2010/Separation_Conference/Patterson.pdf, slides 3-5.

⁶⁰ Patterson (2010), slides 6-7.

- Price and non-price discrimination by the incumbent, which supplied wholesale services on unfavourable terms to retail competitors and frequently trapped small players into sub-optimal agreements; and
 - Weak enforcement provisions.
76. Limited competition and insufficient incentives to innovate were seen as factors behind New Zealand's low broadband penetration (compared to its OECD peers).⁶¹ This led to the *Telecommunications Amendment Act No. 2* in December 2006, which introduced industry-wide processes; new regulated services;⁶² and accounting separation. In addition, influenced by the UK experience with functional separation, the New Zealand Commerce Commission mandated the functional separation of TelecomNZ under Part 2A of the *Telecommunications Amendment Act*.

4.2.2 Summary of undertakings and implementation of EOI

77. After negotiations, TelecomNZ submitted its final Telecom Separation Undertakings on March 25, 2008. The undertakings were approved by the Minister on March 30, 2008.⁶³
78. The undertakings established arm's length separation between retail and wholesale units, and arm's-length and standalone separation between the access network services (ANS) unit and the other two units. As part of the undertakings, TelecomNZ was split into three business units: Telecom Retail, Telecom Wholesale and Chorus. TelecomNZ's local access assets were transferred to Chorus. While Telecom Retail was consumer facing, Telecom Wholesale was given the mandate to resell telecom services to other service providers. Both Chorus and Telecom Wholesale were required to have separate management and reporting lines, and employees from one unit were not allowed to work at other units. Table 1 summarizes the principal elements of TelecomNZ's functional separation undertakings, including EOI.

⁶¹ At the time, New Zealand ranked 22nd out of 30 OECD countries.

⁶² New regulated services included: local loop and sub-loop unbundling; naked DSL; unbundled bitstream access; and co-location in cabinets and exchanges.

⁶³ TelecomNZ's Separation Undertakings are available at <http://www.med.govt.nz/sectors-industries/technology-communication/pdf-docs-library/communications/telecom-separation/telecom-separation-undertakings.pdf>.

Table 1 Summary of TelecomNZ Functional Separation Undertakings

	<i>Description</i>
Equivalence of Input (EOI)	<p>- If required to provide service providers with a relevant service, TelecomNZ must provide itself and service providers: 1) with the same service; 2) on the same timescales and on the same terms and conditions; 3) by means of the same processes; and 4) in the same way, and with the same degree of reliability and performance.</p> <p>- A migration path to EOI with a series of milestones was included in the undertakings.</p>
Non Discrimination	<p>- Regarding all relevant services – and including both commercial and regulated services – Chorus and Telecom Wholesale are prohibited from discriminating between service providers and other TelecomNZ business units, or between service providers.</p>
Information Flow Restrictions	<p>- Physical separation: 1) Chorus employees are located in access-controlled accommodation separately secured from the rest of TelecomNZ; 2) Telecom Wholesale employees are located in access-controlled accommodation separately secured from Telecom Retail.</p> <p>- Behavioural controls: Processes, systems and training were put in place so that TelecomNZ employees, agents and contractors comply with all undertakings requirement.</p> <p>- System separation: Access to customer confidential information contained in TelecomNZ's system is adequately protected.</p> <p>- Confidential Chorus and Telecom Wholesale customer information can only be accessed by the business unit who "owns" the information and by defined groups listed in the undertakings.</p>
Transparency	<p>- TelecomNZ must establish an independent oversight group (IOG) to monitor compliance with the undertakings. The responsibilities of this group include: 1) processing complaints; 2) carrying out investigations; 3) reviewing Telecom's performance against service-level agreements in respect to Relevant Services; 4) and developing and monitoring of compliance performance measures.</p> <p>- Information disclosure regime introduced to improve transparency of the financial performance of TelecomNZ's separated business units.</p>
Fibre-to-the-Node (FTTN)	<p>- Determination provided that existing legacy PSTN services either be: 1) migrated to EOI; or 2) that those services be moved to EOI compliant infrastructure. TelecomNZ chose the latter.</p> <p>- FTTN rollout to 80% of lines (all towns 500+ people) to a minimum 10Mbps by end of 2011.</p> <p>- Transition from PSTN to VoIP services.</p>

Source: Patterson (2010, slides 15-23).

79. The Commerce Commission was responsible for enforcing the undertakings. Breaches could lead to penalties of up to NZ\$10 million (plus NZ\$500,000 for continuing breaches). In addition,

- there were several other mechanisms in place to guarantee that the undertakings were being honoured:⁶⁴
- i. **Graduated complaint process**, where a third party would first complain directly to TelecomNZ, then to the IOG and finally to the Commerce Commission;
 - ii. **KPIs**, which were used by IOG to monitor TelecomNZ's compliance to the undertakings. Indicators included staff training and undertaking milestones; and
 - iii. **Annual certification process**, where the Board, the CEO, and relevant managers had to certify that, to the best of their knowledge, TelecomNZ was complying with the undertakings.
80. Overall, the implementation of EOI and functional separation of TelecomNZ was deemed a success. There were, however, cost and implementation difficulties in specific areas. Costs of migrating legacy services to the EOI system, for instance, were underestimated; the migration to VoIP infrastructure also proved more challenging than first anticipated.⁶⁵ These and other circumstances led to variations to the original undertakings; these variations are summarized in Table A - 2 (see Appendix A).
81. Before discussing non-discrimination and EOI in New Zealand's telecom regime, it is important to introduce the concept of relevant services, which are defined in TelecomNZ's Separation Undertakings as:
- i. Relevant network access services, which include all current or future telecom services that are "delivered exclusively or mainly by use of assets that form part of Telecom's Access Network."⁶⁶
 - ii. Relevant wholesale services, which include the following:
 - a) some resale services;
 - b) all other designated access services and specified Services;
 - c) fixed asset services that are subject to a Telecom Registered Undertaking;

⁶⁴ Patterson (2010), slides 29-31.

⁶⁵ Mosby and Purre (2010) "Toward Universal Broadband Access in New Zealand," Case Study, International Telecommunication Union.

⁶⁶ TelecomNZ (2008) "Telecom Separation Undertakings," p. 31.

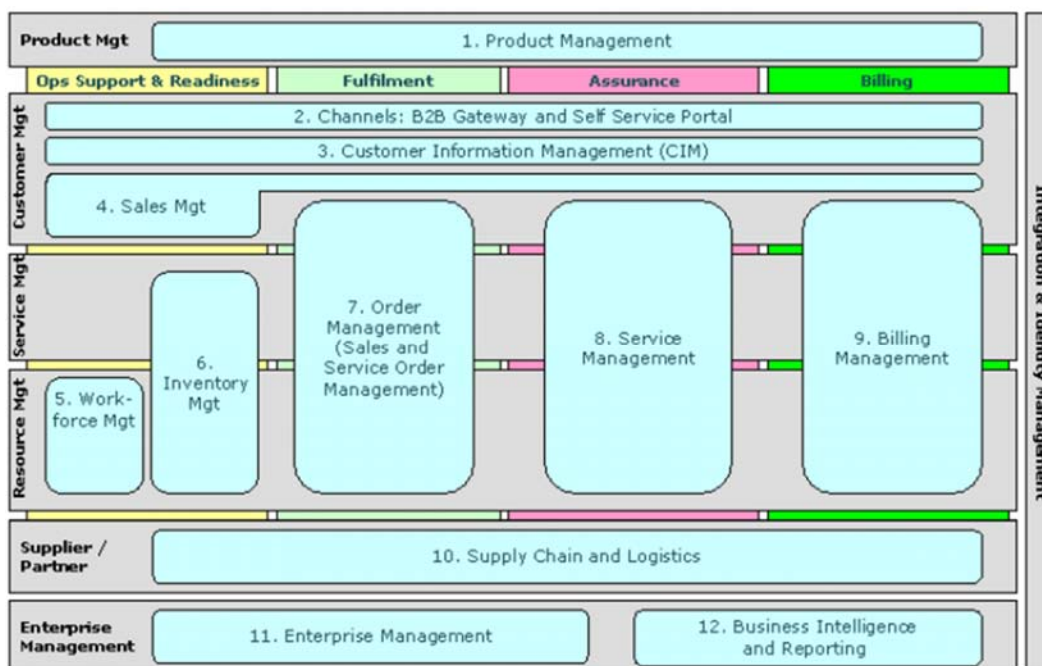
- d) packet-based bitstream services that “enable access to, and interconnection with, that part of TelecomNZ’s NGN that connects the end-user’s building to TelecomNZ’s first aggregation switch other than a DSLAM,”⁶⁷ and
 - e) IP interconnection for Voice Services and IP interconnection for Virtual Private Network Services.
82. Although most of these services are regulated services – that is, services that must be provided by the ANS or wholesale units at predetermined prices (see Table A - 3, Appendix A) – commercial services can also fall under the relevant service category
83. The principle of non-discrimination means that Chorus and Telecom Wholesale are prohibited from discriminating between service providers and other TelecomNZ business units, or between service providers (Clauses 31 and 56 of the Undertakings). Non-discrimination applies to all relevant services, regardless of whether they are regulated services or commercial services (Clause 40).
84. In New Zealand, therefore EOI can be seen as a stronger form of non-discrimination regulation, and means that if TelecomNZ is required to provide service providers with a relevant service (Clause 1.2):⁶⁸
- i. It must provide itself and service providers with the same service;
 - ii. It must deliver that service to itself and the service providers on the same timescales and on the same terms and conditions (including price and service levels);
 - iii. It must deliver that service to itself and the service providers by means of the same systems and processes (including operational support processes);
 - iv. It must provide itself and the service providers with the same commercial information about that service and those same systems and processes; and
 - v. When providing a service to itself, TelecomNZ must use systems and processes that service providers are able to use in the same way, and with the same degree of reliability and performance.
85. TelecomNZ identified 12 building blocks that needed to be completed and integrated in order for the EOI requirements in the undertakings to be met. These building blocks are shown in

⁶⁷ TelecomNZ (2008), p. 45.

⁶⁸ TelecomNZ (2008), pp. 15-16.

Figure 2. The undertakings detailed migration plans to reach EOI standards for relevant services, including: unbundled copper local loop (UCLL); UCLL backhaul; UCLL co-location; Basic unbundled bitstream access (UBA) and Enhanced UBA; UBA backhaul; resale services, among others. Migration plans had not only enforceable milestones, but also tracking milestones.

Figure 2 Implementation plan for EOI in New Zealand



Source: TelecomNZ (2008), p. 138.

86. One of the main features of New Zealand's EOI regime was the establishment of an IOG. The purpose of the IOG was to monitor, report and advise on TelecomNZ's compliance with the undertakings. The responsibilities of this group included:
- i. processing complaints;
 - ii. carrying out investigations;
 - iii. reviewing TelecomNZ's performance against service-level agreements in respect to relevant services; and
 - iv. developing and monitoring compliance performance measures.



87. As part of the undertakings, TelecomNZ also put in place a whistleblowing system, the Honesty Box, so that employees could report any suspected breaches to the undertakings. All Honesty Box submissions were processed by the IOG.⁶⁹
88. The IOG and TelecomNZ developed jointly a set of KPIs to evaluate compliance of TelecomNZ to the undertakings. These indicators were reported by TelecomNZ quarterly, and covered five broad areas:⁷⁰
- i. **Customer surveys**, in which customers were asked if they believed their confidential information was being protected and if they believed other business units were influencing the commercial policies of Chorus or Telecom Wholesale;
 - ii. **Employee questions**, to measure understanding and perception of TelecomNZ's compliance with the undertakings;
 - iii. **Employee training**, measured as the percentage of TelecomNZ's employees who had completed online undertakings training;
 - iv. **PSTN migration**, measured by two indicators: 1) the total number of distribution cabinets connected to telephone exchange; and 2) the percentage of PSTN lines available with enhanced UBA without plain old telephone service (POTS) (or alternative equivalent service);
 - v. **Resale product equivalence**, with TelecomNZ reporting on five product streams: 1) PSTN; 2) broadband; 3) smartphone; 4) ISDN; and 5) complex voice. Each product stream was measured against four performance areas, namely: 1) provisioning commitments met; 2) time to provision; 3) time to restore faults; and 4) fault appointments met (except for smartphones, which do not require fault appointments as they are remotely provisioned).
89. In addition to these indicators, the IOG monitored closely the transition to EOI milestones.
90. The IOG was disbanded on December 1, 2011 as a result of the Chorus-TelecomNZ demerger (i.e. structural separation).

⁶⁹ Independent Oversight Group (2010) "Annual Report 2009," p. 35-38.

⁷⁰ Independent Oversight Group (2010), pp. 29-34.

4.2.3 Structural separation

91. In May 2011, Crown Fibre Holdings (CFH) chose Chorus to roll out the bulk of the country's FTTN network under the Ultra Fast Broadband (UFB) initiative, awarding it contracts covering 24 urban areas, including Auckland and Wellington. As part of the agreement with CFH, TelecomNZ agreed to structurally separate its ANS unit, Chorus, from the rest of the company. A resolution to demerge Chorus was approved by TelecomNZ's shareholders in October 2011, and the separation took place on 30 November 2011, resulting into two entirely separate, publicly listed companies. Chorus is now a nationwide, fixed-line, access network operator that offers services on an **open-access** basis, while TelecomNZ focuses on fixed, mobile and ICT operations for retail and wholesale markets.⁷¹

4.2.4 Market outcomes

92. Several competition indicators attest the positive impact of EOI and functional separation on New Zealand's telecom industry:⁷²
- i. The number of UCLL connections increased from around 2,500 in June 2008 to almost 70,000 in June 2010, a 28-fold increase in just two years. The number of UCLL has continued to grow and reached 125,000 as of the end of 2012.
 - ii. During the 2008-2010 period, competitors were responsible for over 50% of growth in retail DSL connections.
 - iii. The number of wholesale broadband lines increased from 165,000 in 2007/08 to over 400,000 in 2011/12.
 - iv. TelecomNZ's share of fixed-line retail revenues dropped from around 80% in the 2005-2008 period to 65% in 2010/11. In comparison, ILECs in Canada accounted for 77% of the ADSL broadband connection market in 2012.⁷³ In the residential segment in Canada,

⁷¹ Additional details on the structural separation can be obtained on TelecomNZ's website at http://www.telecom-media.co.nz/releases_detail.asp?id=3792&page=1&pagesize=10.

⁷² Most estimates in this section were taken from the Commerce Commission's *2012 Annual Telecommunications Monitoring Report*, released on May 3, 2013. Some estimates were obtained from earlier issues of this report.

⁷³ CRTC (2013), p. 143.

ILECs accounted for 82% of ADSL broadband revenue.⁷⁴ In the business-access segment, they accounted for 58%.⁷⁵

4.3 France

93. France provides another example where robust regulation of wholesale access services has led to the fast development of competition in the broadband market.
94. In 2001, France was one of the laggards among OECD countries in terms of the development of its broadband Internet market. Its Internet penetration rate was only equal to one-third of the OECD average and the ILEC, France Telecom (through its Orange brand) held three quarters of the DSL market.⁷⁶
95. In light of the lagging market development and pressure from the European Commission, France's national regulatory authority, Autorité de Régulation des Communications Electroniques et des Postes (ARCEP)⁷⁷ introduced a wide range of reforms to the regulation of unbundling of France Telecom's access network. ARCEP reduced the wholesale tariff by approximately one-third.⁷⁸ It also addressed non-price obstacles to equal access by introducing quality of service indicators, a migration protocol for unbundled local loops and precise time limits and costing for work completed by France Telecom for third parties.⁷⁹
96. Very soon after ARCEP introduced this EOI regime in 2003, Iliad (now operating as Free) and Neuf Telecom entered the Paris broadband market. By 2009, these two entrants had captured nearly 50% market share for DSL broadband access, and had started to exert pricing discipline

⁷⁴ CRTC (2013), p. 144.

⁷⁵ *Ibid.*

⁷⁶ Berkman Center for Internet & Society (2010), pp. 267-269.

⁷⁷ At the time, the national regulatory authority was known as Autorité de Régulation des Telecommunications (ART).

⁷⁸ Berkman Center for Internet & Society (2010), p. 272.

⁷⁹ Berkman Center for Internet & Society (2010), pp. 271-272.

- on Orange.⁸⁰ Free, for example, has maintained a standard monthly customer charge of €29, while gradually offering faster speeds and more features.⁸¹
97. France's 2003 reforms gradually helped to transform France's broadband market into one of the most competitive among OECD countries. By 2007, France had moved to 13th out of 30 OECD countries in terms of broadband penetration; and by June 2013, it was ranked fifth among OECD countries on this measure (Figure A - 1, see Appendix A). Between 2002 and 2009, the share of the DSL market held by the incumbent France Telecom (through its Orange brand) fell from 74% to 50%.⁸²

4.4 Ireland

98. This sub-section describes Ireland's EOI experiences, looking both at measures undertaken by Eircom – the Irish telecom incumbent – and regulatory decisions by ComReg – the Irish regulator. Timeframe and issues regarding the implementation of an EOI regime, as well as its relative success and monitoring, are also discussed.
99. In July 2007, the Australian private equity firm Babcock & Brown Capital, then the majority shareholder of Eircom unveiled a plan to sell Eircom's fixed and mobile phone service businesses. In effect, this would entail the structural separation of Eircom, with the company reduced to a pure network operator.⁸³ By April 2008, however, structural separation plans were abandoned due to poor market conditions, economic uncertainty, and unclear regulatory processes.⁸⁴
100. In mid-2011, Eircom announced its intent to conduct voluntary wholesale reforms. On December 9, 2011, Eircom released its proposed programme for consideration of industry

⁸⁰ Berkman Center for Internet & Society (2010), p. 153.

⁸¹ Nick Russo, Patrick Lucey, Danielle Kehl, and Hibah Hussain (2014), "Reining in the Cost of Connectivity: Policies for Better Broadband in 2014," p. 9.

⁸² Berkman Center for Internet & Society (2010), p. 269.

⁸³ O'Brien (2007) "Breakup of Eircom Could be Opening for Rivals," The New York Times, Sunday, December 23, available at <http://www.nytimes.com/2007/12/23/technology/23iht-EIRCOM24.html?pagewanted=all&r=0>.

⁸⁴ Telecompaper (2008) "Eircom Drops Structural Separation Plans, Favours Functional Separation – Report," Monday, April 21, available at <http://www.telecompaper.com/news/eircom-drops-structural-separation-plans-favours-functional-separation-report-615768>.

participants.⁸⁵ Eircom’s plans were in no way binding or legally enforceable. Failure to implement their programme would not result in sanctions from ComReg (unless specific aspects of their programme coincided with ComReg decisions). Neither Eircom nor ComReg considered the incumbent’s voluntary wholesale reforms as functional separation.

101. Eircom’s proposal for wholesale reforms rested on four pillars.⁸⁶ These four pillars are listed in Table 2 along with the core deliverables for each pillar.

Table 2 The four pillars of Eircom’s voluntary wholesale reform

Pillars	Deliverables
Organization Structure and Internal Process	<ul style="list-style-type: none"> - Separated Regulated Access Product (RAP) unit - Strengthened account management function for all Eircom Wholesale customers, including Eircom retail businesses - Agreed interfaces to other Eircom business units - Separate wholesale business unit, with separate accommodation areas with restricted access - Customer service improvements
Systems	<ul style="list-style-type: none"> - Key Performance Indicators (KPIs) to measure provision/repair/service quality, and to monitor non-discrimination and reforms progress - Real-time access for customers to B2B web services via the Unified Gateway (UG) - Further systems improvements to support Equivalence of Outputs for current RAPs - Transition path for migration of Eircom’s retail businesses to UG for next-generation access (NGA) products
Culture Change	<ul style="list-style-type: none"> - Interim guidance - Enhanced wholesale customer engagement programme - Code of Practice - Revised incentive and compliance arrangements
Governance	<ul style="list-style-type: none"> - Package of enhanced internal compliance measures, and external controls. Ideas under consideration were: <ol style="list-style-type: none"> (1) The possibility of independent audits of actual performance against KPIs and product development milestones during an initial trial period. (2) The establishment of an external governance body that would be chaired by an independent expert.

Source: Eircom (2011).

⁸⁵ Eircom’s voluntary wholesale reform programme is available at <http://www.eircomwholesale.ie/About-Us/Wholesale-Reforms/>.

⁸⁶ Eircom (2011) “Voluntary Wholesale Reforms – Overview of Proposals to Industry,” presentation on 13 December, available at <http://www.eircomwholesale.ie/About-Us/Wholesale-Reforms/>.

102. According to the proposal, Eircom Wholesale would occupy a separated position within Eircom, so the wholesale arm could operate at arm’s-length from the retail arm. Eircom proposed the following approach for its wholesale unit:⁸⁷

- i. A separated business unit under the Wholesale Managing Director;
- ii. Relocation to a separate area;
- iii. Glass walls and independent access control;
- iv. Eircom Wholesale website, intranet space and email domain; and
- v. New branding.

103. Figure 3 shows Eircom’s target organization structure for Eircom Wholesale by June 2012. Particularly relevant in Eircom’s proposed organization are the Managed Network Services Unit (MNS) – responsible for unregulated wholesale products – and the RAP unit – responsible for regulated access wholesale products.

Figure 3 Target organizational structure



Source: Eircom (2011) “Proposed Programme of Voluntary Wholesale Reforms,” Discussion Document for Industry.

104. Eircom described how the RAP unit would function and effectively ensure non-discriminatory access for third party users of its network:⁸⁸

- i. Product management of RAPs will be in a self-contained unit under a Director of Regulated Access Products;
- ii. Information in relation to RAPs will be managed and safeguarded appropriately;

⁸⁷ Eircom (2011), p. 16.

⁸⁸ Eircom (2011), p. 13.

- iii. Development of RAPs will be separate from other value-added products;
- iv. A Code of Practice will govern compliance;
- v. RAP unit will include business analyst capability to translate business requirements into technical solutions;
- vi. RAP processes are under review and will be redesigned as needed to ensure safe information flows and interactions with internal and external customers.

105. Eircom identified three implementation challenges to its reform plans.⁸⁹

- i. Legacy systems and processes;
- ii. Necessity for cross-functional transformation;
- iii. Demands on organizational capacity and resources.

106. According to Eircom, implementation of voluntary wholesale reforms is still under way.⁹⁰ Objectives, such as a separate wholesale unit and the RAP unit within Eircom Wholesale have already been attained. In addition, Eircom Wholesale has provided detailed roadmaps for a number of products/services, including:

- i. NGN Ethernet, Leased Lines, Partial Private Circuits and Interconnect Paths;
- ii. Bitstream;
- iii. Next Generation Access Products;
- iv. Local Loop Unbundling;
- v. Single Billing through Wholesale Line Rental;
- vi. Geographic/Non-geographic Number Portability.

⁸⁹ Eircom, (2011), p. 4.

⁹⁰ Eircom Wholesale website, <http://www.eircomwholesale.ie/About-Us/Wholesale-Reforms/>.

109. Several industry participants remain skeptical about Eircom's voluntary wholesale reform programme. ALTO (Alternative Operators in the Communications Market), for instance, notes that:

eircom remains a single trading entity for the purpose of the Next Generation debate. No legal, regulatory or undertaken approach to formal functional separation has occurred within eircom. In fairness to eircom, they have at least cosmetically endeavoured to create a perception of separation between its Wholesale and Retail units. ALTO waits in anticipation to see whether any tangible change arises without more formal legal or regulatory intervention.⁹¹

110. Furthermore, the effects of Eircom's voluntary reforms on competition appear to be minor so far. Eircom continues to dominate the retail DSL broadband market, for instance, with a market share of approximately 71%. Even though DSL lost ground to cable over the years, it continues to be the main form of broadband access in Ireland, accounting for 66% of fixed broadband subscriptions in the 3rd quarter of 2012.

111. In January 2013, ComReg issued Decision D03/13, introducing new regulation on next generation access (NGA) products, with stricter non-discrimination and transparency requirements and explicit reference to EOI. Box 3 summarizes the central aspects of Decision D03/13 with respect to EOI.

⁹¹ ComReg (2012) "Next Generation Access (NGA) Proposed Remedies for Next Generation Access Markets: Non-confidential Submissions Received from Respondents, 31 August, Consultation 12/27, available at <http://www.comreg.ie/fileupload/publications/ComReg1297.pdf>, p. 7.

BOX 3 Obligation of non-discrimination⁹²

Eircom shall have an obligation of non-discrimination, in particular:

Standard of Equivalence

- In respect of Next Generation WBA products, services and facilities, Eircom shall provide pre-ordering, ordering, provisioning, fault reporting and repair on an Equivalence of Inputs basis;
- All other forms of Access, including Associated Facilities, to Next Generation WBA services and facilities other than those provided in respect of VUA and NGB, shall be provided on at least an Equivalence of Outputs basis;
- EoO for Next Generation WPNIA services and facilities;
- Consequently, Next Generation products, services and facilities, sold with access and voice, provided over legacy technology, must be provided to at least the standard of EoO.

Application and Monitoring: Statement of Compliance

- Eircom shall submit to ComReg a written Statement of Compliance demonstrating its compliance with its non-discrimination obligations:
 - (1) No later than 30 September 2013 or;
 - (2) For any offer of a new Next Generation WBA or WPNIA product, service or facility, seven months in advance of launch;
 - (3) For any change to an existing Next Generation WBA or WPNIA product, service or facility, three months in advance of changes being made available.
- The Statement of Compliance shall include a written statement confirming compliance;
- The Statement of Compliance shall include documentation disclosing material facts regarding compliance and how it has been achieved in particular by reference to:
 - (a) Systems and processes;
 - (b) The governance and control environment policies and procedures in place for both Eircom's downstream operations and OAOs; and
 - (c) An explanation as to how appropriate controls and governance are maintained over time.
- The Statement of Compliance shall include an explanation and justification of minor differences as between systems and processes in the case of EoI and in the case of EoO the explanation shall include a description as to how and what controls are in place to ensure an EoO standard, notwithstanding the differences in systems and processes used.

Other non-discrimination obligations

- Publication of KPIs; and
- Confirmation of compliance for co-investment arrangements.

⁹² ComReg (2013) "Next Generation Access (NGA): Remedies for Next Generation Access Markets," ComReg Decision D03/13, available at <http://www.comreg.ie/fileupload/publications/ComReg1311.pdf>, pp. 82-83.

4.5 Sweden

112. The developments leading up to the adoption of a form of functional separation for TeliaSonera, the Swedish telecom incumbent, are described in this section along with details of the corresponding regulatory regime adopted by the Sweden's Post and Telecom Agency (PTS) – the Swedish regulator.
113. In April 2007, the Swedish Government assigned PTS to investigate “the preconditions and opportunities for introducing a remedy into the electronic communications legislation to promote non-discrimination and transparency in access to the local loop.”⁹³
114. The PTS identified several problems with the country's existing telecom regime, including:⁹⁴
- i. Dependence on TeliaSonera's fixed access network (almost 100% coverage), with TeliaSonera dominating 58% of the DSL retail market;
 - ii. Mistrust between TeliaSonera and its wholesale customers;
 - iii. Repeated disputes and long court proceedings, refusal to supply certain regulated wholesale products; and,
 - iv. Difficulties in enforcing existing non-discrimination regulations.
115. In addition, the PTS noted that the TeliaSonera discriminated against wholesalers in a number of different ways:⁹⁵
- Denial of ULL from incumbent, with subsequent establishment of incumbents' own xDSL operations;
 - Incumbents' retail services offered with shorter lead times than for wholesale customers;
 - Plans for xDSL roll-out made without consulting access seekers;
 - Doubled delivery period for competitors' end-users compared with incumbent's own retail arm;
 - Shorter timeframes for service and migration of incumbents' own end-users;

⁹³ Teppayayon and Bohlin (2010), p. 379.

⁹⁴ Andersson, (2008), p.5.

⁹⁵ Andersson (2008), pp. 7-8.

- Ordering systems – 50% of all orders placed were not accepted;
- Refusal to supply bitstream access during 2.5 years; and,
- Gradually shutting down ADSL ATM resale product (provided on commercial terms).

116. In mid-June 2007, the PTS issued its report, arguing for regulation that would give it power to impose EOI and functional separation, but also opening the possibility of accepting voluntary undertakings by the incumbent (PTS, 2008:28-29). Aspects of the PTS's proposal included:⁹⁶

- Bottleneck access resources should be transferred to an independent entity, the Access Network Company (ANC), within the TeliaSonera group;
- Obligation for the ANC to treat all wholesale customers equally, including TeliaSonera's retail arm;
- Obligation for the ANC unit to have a separate IT system from the rest of the organization;
- Obligation for the ANC to provide all broadband operators with access to the same services, routines for ordering, information and support systems etc.;
- Independent board and managing directors;
- Financial audit and compliance control to be revised by an external auditor; and,
- Creation of rules referring to the exchange of information, employment bonuses, incentive programs, etc.

117. Consultations followed the launch of the proposal, with several affected parties submitting responses (for more on the parties' submissions and the government's response.⁹⁷

118. As a reaction to the PTS's proposal, a voluntary dialogue between the PTS and TeliaSonera started in the spring of 2007 to address the issue of functional separation.

119. On January 1, 2008, TeliaSonera established its wholly-owned, functionally separate access network company, Skanova Access AB. Skanova's main purpose is to sell access to copper-related infrastructure on equal terms, so that all broadband operators have access to the same

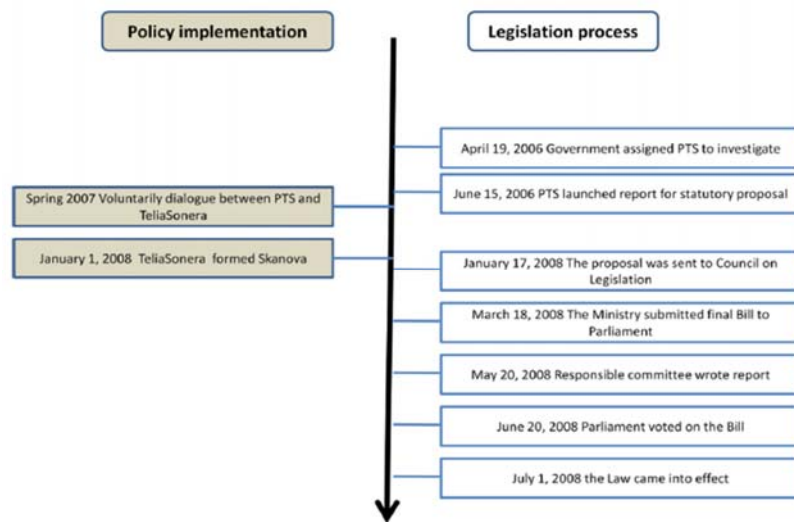
⁹⁶ Andersson (2008), pp. 10-11.

⁹⁷ Teppayayon and Bohlin (2010), pp. 380-381.

service, information, and support. Skanova also manages TeliaSonera’s fibre network, and is required to provide unbundled access to dark fibre local access networks. Compliance is monitored by an independent Equality of Access Board (EAB).

120. The legislative process continued in parallel with the negotiations between the PTS and TeliaSonera. The Swedish Parliament voted on the final bill on 20 June 2008, and the law came into effect on 1 July 2008.

Figure 5 The Functional Separation Process in Sweden



Source: Teppayayon and Bohlin (2010: 379).

4.6 Summary

121. Over the past decade, several OECD countries have implemented EOI regimes as a means to achieving the goals of non-discrimination and equality of access within their telecommunications markets. These EOI regimes have transparent reporting, independent oversight and the creation of a corporate environment – with appropriate training and incentives for the promotion of equality of access over discriminatory practices. In some cases, the EOI regimes have been enforced by way of functional or structural separation.



122. The data available for the UK, New Zealand and France suggest that their EOI regimes have contributed to stimulating competition in their broadband markets. In the UK, for example, BT's share of the retail ADSL/FTTx market in 2012 (38%)⁹⁸ was half the share of the ADSL/FTTx market in Canada held by the ILECs (77%).⁹⁹
123. As we noted earlier in this report, the introduction, EOI represents the logical next step in telecom regulation. In particular, an EOI regime should be adopted in Canada in manner that can deliver similar incentives and outcomes as equality of access accompanied by functional separation has in other countries. In the next section, we outline the most important features of this EOI regime and how it can be implemented in Canada.

⁹⁸ Ofcom, *Communications Market Report 2013*, pp. 339-340.

⁹⁹ CRTC (2013), p. 144.

5. Application of Equivalence of Inputs Regulation in Canada

124. As noted in the previous section, several countries have opted for EOI regulation. In this section, we examine how an EOI regime can be adopted in Canada without the need to resort to functional separation.

5.1 Application of EOI regime for current services

125. Equivalence of Inputs is not a new notion in the context of the Canadian regulatory regime. Over the past several years at the CRTC, there have been several proceedings initiated on how to deal with newer technology introductions by the ILECs and cablecos. As network technologies evolve, so too do the services that make use of these newer technologies. For a robust EOI regime to be in place, there must be mechanisms to ensure timely introduction of new services to wholesale competitors.

126. An example of this is the treatment of the fibre-to-the-node (FTTN) deployments being made by incumbent ILECs. With changes in technology, for example from ADSL to ADSL 2+ to VDSL, ILECs have been able to increase the retail speeds being offered to their retail customers. However, these speeds have not readily been offered to the incumbents' competitors on a wholesale basis. This lack of service parity led to several contentious hearings before the CRTC, where the regulatory policy had to be crafted such that as new speeds were introduced to retail customers, there had to be a corresponding wholesale service introduced. This series of hearings is what ultimately led to what is known as the 'speed-matching' decision¹⁰⁰, in which the FTTN facilities of the incumbents was required to ensure competitors access to services on a non-discriminatory basis. A similar policy governing wholesale speed matching was established for incumbent cablecos as well, to ensure an orderly development of the competitive supply of high-speed broadband Internet access.¹⁰¹

¹⁰⁰ Telecom Regulatory Policy 2010-632 is an important policy decision in this matter, and can be found in its entirety here: <http://www.crtc.gc.ca/eng/archive/2010/2010-632.htm>.

¹⁰¹ The speed-matching decision for cable companies is articulated in Telecom Decision CRTC 2006-77 found here: <http://www.crtc.gc.ca/eng/archive/2006/dt2006-77.htm>

127. Moving towards a more robust EOI regime, will ensure more timely access to new technologies by the competitors of the ILECs and cablecos.
128. Contrary to the market structure in many industrialized countries, Canada is fortunate in having two competing technologies: cable and telephony and the network infrastructure for each is generally available to the vast majority of homes and businesses. Thus, for equity and competitive purposes, the EOI regulatory regime should apply to both types of carriers.
129. While there is currently no explicit regulatory obligation on incumbents to offer a wholesale service for new services or unbundled elements used to support new retail services that they provide using new technologies, this should change.
130. For the purpose of promoting the orderly development of a competitive marketplace, the CRTC should require that, concurrently with the introduction of any new retail service by an ILEC or cableco, that carrier must file a wholesale access tariff that is based on EOI principles, if such a tariff that supports the new retail service does not already exist.
131. In order to ensure that an EOI regime will function properly, it must be possible for wholesale customers of an incumbent to have access to the specific network elements that are available to the incumbent's own retail operations. Otherwise, despite all of the other features of the EOI regime, competitors of the incumbent will not be able to offer a full range of retail services that both compete with and are differentiated from those of the incumbent's retail operations. Therefore, EOI compliant wholesale tariffs must permit competitors to buy access only to those network elements that they require from the incumbent and to interconnect at any technically feasible point in an incumbent network.
132. EOI wholesale tariffs should specify the terms, conditions and prices applicable to the corresponding wholesale services, and provide for SLAs and SLGs for these services. In particular, we note that the adoption of EOI has not obviated the need for wholesale price regulation in the countries included in this analysis – UK, New Zealand, France, Ireland and

Sweden – where the regulators have found that the incumbents still exercise significant market power.¹⁰²

133. This leads to one of the more complex areas of any wholesale-regulation regime or EOI regime: determination of the costs and wholesale prices for such services/inputs. As part of the process associated with the review of wholesale prices, the CRTC is rightfully examining the best approach to arrive at service costs. A discussion on these is beyond the scope of this report, but is nonetheless a critical aspect of establishing an EOI regime.

5.2 Mandatory criteria of an EOI regime and monitoring compliance

134. The design of an EOI regime requires definitions of the mandatory characteristics of the system, and the ways in which to compliance will be monitored. This section will examine what sorts of mandatory criteria might exist, as well as how such criteria could be monitored.

135. Turning our attention now to what the mandatory criteria could be for an EOI regime, one of the most comprehensive collection of criteria would be captured by the regime which has been implemented in New Zealand as part of its regulatory reforms since 2008 (as explored in Section 3). The basis of all EOI regimes is that, when providing competing providers with a service deemed to be part of the EOI, the selected carrier must provide itself and competing providers:

- i. with the same service;
- ii. on the same time-scales and on the same terms and conditions;
- iii. by means of the same processes; and
- iv. in the same way, and with the same degree of reliability and performance.

136. The same criteria outlined above have also been adopted by Ofcom when defining EOI for BT.

¹⁰² For UK, see Section 4.1.2; for New Zealand, see <http://www.comcom.govt.nz/regulated-industries/telecommunications/standard-terms-determinations/unbundled-copper-local-loop-service/>; for Ireland, see <https://www.comreg.ie/telecoms/wholesale.564.464.html>; for France and Sweden, see Wall Communications Inc. (2012) *A Study of Wholesale Costing Methodologies in Selected Countries*, prepared for CRTC, October 2, 2012, available at <http://www.crtc.gc.ca/eng/publications/reports/rp121002.pdf>.

137. A similar approach could be adopted in Canada, with the CRTC implementing the regime and monitoring its outcomes, using recourse to appropriately selected KPIs, corresponding to the legal obligations of ILECs and cablecos to comply with the EOI regime. In order to ensure that these incumbents are further motivated to comply with the EOI regime, the CRTC would require them to develop new incentive structures for the managers who will supervise the carriers' delivery of wholesale services, so that their compensation is aligned to the success of the wholesale operations, rather than that of the entire enterprise.

5.3 Industry measurements – macro measurements of competition (by regulator/ministry)

138. In the previous section, we examined some of the building blocks to EOI, as well as timelines and auditing of progress by the CRTC. In this section, we touch on a more fundamental measurement area, that of examining the market from a macro perspective in the context of competition. The purpose of, and need for, the introduction of a robust EOI regime is to ensure that there exists a competitive telecommunications service market, including both incumbent players and competitors. To achieve this, the CRTC will have to undertake additional monitoring of industry conditions.

139. The CRTC already produces a comprehensive Communications Monitoring Report which, in part, reports on the state of competition in the industry through the production of figures related to market share and revenue share of competitive service providers.

140. As part of the overall reporting responsibilities of the ILECs and cablecos subject to the EOI regime, the CRTC could require that they report on their KPIs related to the macro-economic goals of competition and consumer choice and pricing as well as their progress towards full compliance with the EOI regime. This aggregated information would be helpful in assessing the true state of competition in Canada.

141. Amongst the macro-economic goals – as evidenced by the application of EOI regulatory regimes in other jurisdictions such as the UK and New Zealand – one important KPI would be the shift in the number of customers being served by competitive service providers.

5.4 Roadmap for implementation of EOI

142. With respect to a complete implementation of EOI in the Canadian context, it is evident that accomplishing such a broad-reaching task would not occur in a short timeline, but rather would need to be defined through a gradual approach, with monitoring and reporting along the way to validate that it has been completed in the manner expected by the CRTC.

5.4.1 Timetable and milestones for migration to EOI

143. In Section 4.2, above, we explored the essential criteria for transitioning to an EOI regime using the New Zealand model as a template. The criteria created can further be enhanced by the introduction of milestones and timelines in which to implement these criteria for each selected service. While it is premature to fully articulate the full breadth of technical and regulatory milestones that would need to be achieved in Canada to realize an EOI regime, we can once again examine some of the undertakings from the New Zealand experience to get a sense of the scope and breadth of these timelines.¹⁰³ Worth noting is the fact that New Zealand started this process much more recently than other jurisdictions, as the introduction of a telecoms regulator did not even exist until 2001. The changeover to a functional separation regime – centred on EOI was announced in 2006 and implemented within two years.

144. New processes and structures would need to be developed for the transition to EOI.

145. A useful way to create such a timeline is to think of a transition to an EOI regime as a set of building blocks. These building blocks generally would consist of a business group that would be tasked with a common set of goals with the creation or introduction of any new service that is part of the EOI regime. As such, some of the key building blocks could include the creation of:

- Product Management Organization Creation
- Billing Management Group Creation
- Sales Order Management Group Creation
- Customer Information Management Group Creation

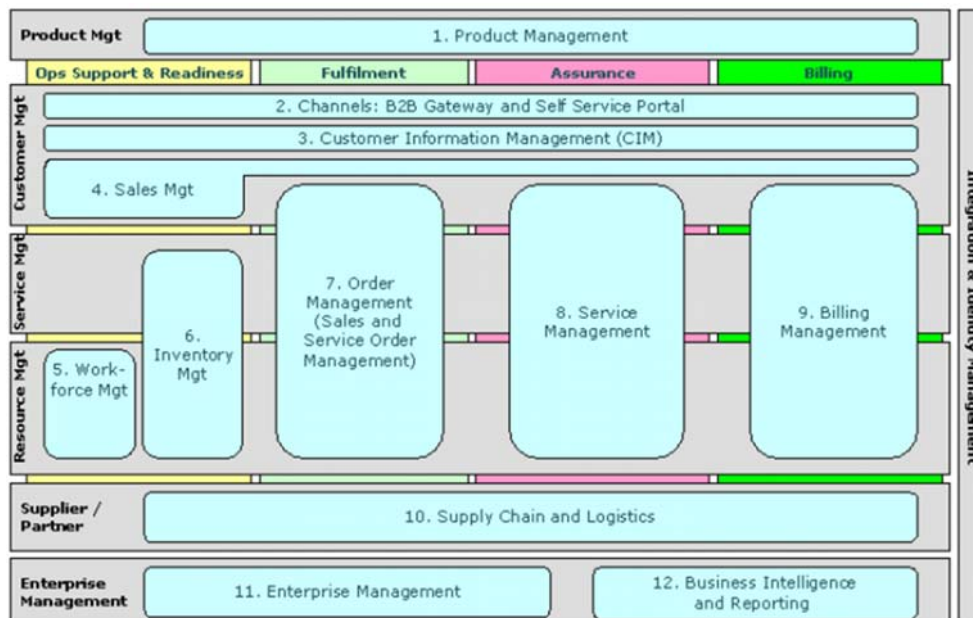
¹⁰³ A full description of the undertakings that Telecom NZ underwent as part of the 'Telecom Separation Undertakings' is found in this document: <http://www.med.govt.nz/sectors-industries/technology-communication/pdf-docs-library/communications/telecom-separation/telecom-separation-undertakings.pdf> In particular, it is worth examining *Schedule 1 – Transition to Equivalence* of that particular document.

- Service Desk / Management Group Creation
- Inventory Management Group Creation
- Workforce Management Group Creation
- A Quality Assurance / Verification Group Creation

146. To better illustrate the notion of the building-block approach, the New Zealand example (prepared by TelecomNZ and cited previously in Section 4.2.2) provides a helpful approach in identifying the building blocks envisioned as part of this transition to an EOI regime (see Figure 6).

147. A key feature of this building-block approach applied by the New Zealand Commerce Commission is the identification of the underlying business processes that drive the incumbent's internal cost allocations. This provided the Commerce Commission with a better understanding of the incumbent's operations and enabled it to set a timetable for implementation.

Figure 6 Application of the New Zealand Building Block Approach for Implementing EOI in Canada



Source: TelecomNZ (2008), p. 138.

148. In the New Zealand context, taking unbundled local loops as an example of a migration to EOI, the timescale for full migration was approximately three years, with over 20 unique milestones listed for this transition.
149. A similar building block approach with a number of milestones would be reasonably straightforward to implement in Canada. In that respect, the migration to a more comprehensive EOI regime would be a step-wise change rather than a radical introduction of a new regulatory construct.
150. In Canada, incumbents should have, to varying degrees, already undertaken cost identification and reporting of services and/or business units for their own internal financial-performance reporting. In addition, the CRTC already requires incumbents to provide Phase II cost studies for their wholesale services when changes are proposed for these tariffs. Incumbents' costing of wholesale services necessarily includes the identification of many of the same key elements listed in Figure 6 such as business-to-business (B2B) gateway and self-service portal, order management, billing management and sales management.
151. While the New Zealand undertakings detailed milestones for each service being considered as part of the EOI regime, the unbundled local loops example cited above was one of the most comprehensive and detailed transitions. For services that were new, or relatively new, the transition period was much less onerous, and involved only slight changes, or re-introductions of the services as EOI-ready instead of purely retail services.
152. We note that while New Zealand's telecom market is only one-tenth the size of Canada's market, at the high level illustrated, the process flows are similar amongst carriers in the globalized telecoms market; thus the same generic building blocks are pertinent to the Canadian operators.
153. The CRTC could use these building blocks as the basis for implementing a robust EOI regime in Canada. The CRTC could use these proceedings to establish the steps and associated timelines for requiring incumbents to make changes to existing corporate systems for the implementation of an EOI regime. It would also enable the development of an associated

compliance regime consisting of reporting on various monitoring and mandatory parameters that would enable the CRTC, policy-makers and stakeholders to track progress towards the realization of the EOI regime.

5.4.2 Outline of the process that CRTC can take to implement EOI

154. Taking all of the foregoing into consideration, we now examine the process that could be employed by the CRTC to migrate from the existing wholesale-regulation regime to an EOI regime. As mentioned, this is not something that could be expected to happen instantly, but given the experience of wholesale access regulation, there should be a rapid introduction of new systems and procedures. This would no doubt also involve additional public consultation, as there are numerous operating entities that would be affected by such a regime.
155. As a first step, the CRTC would need to develop a thorough understanding of the business units, systems and processes – current and planned – of ILECs and cablecos. Additionally, the CRTC would have to develop a better understanding of the differences between these processes and those used by the retail divisions of each of the operating companies. Ultimately, these due-diligence steps would be essential to ensure there would be no disruption to the core operations of the ILECs and cablecos, and their services to their wholesale and retail customers.
156. The CRTC, in collaboration with the industry, should identify those processes and procedures that could readily be combined under the corresponding EOI model. The CRTC could then choose certain services to use as a form of first implementation of the EOI regime, and monitor the successes and/or challenges that present themselves over the course of 6 to 12 months.
157. From the lessons learned, the model and corresponding systems and processes could be modified to address any difficulties, in order to prepare for more widespread adoption of the regime. Over time, additional services would be migrated to be fully EOI-compliant, leading to a fundamental change – from a provisioning and competition perspective – in the telecommunications market. From this stage forward, the auditing and monitoring aspects of compliance would also be fully implemented by the CRTC, in order to ensure that the market continues to evolve as expected, including the automatic introduction of new services into the



EOI regime directly. **This would eliminate much of the uncertainty surrounding the provision of new technologies and their impact on competition in the industry.**

158. As the UK and New Zealand represent two of the most comprehensive and successful implementations of EOI – with New Zealand building on the strengths of the UK experience – we have in turn taken the New Zealand building-block approach as the starting point for the implementation of EOI in Canada, as shown in Figure 6 (above).

6. Summary of Findings

159. Non-discriminatory access to essential bottleneck facilities is one of the main elements of a regulatory framework for promoting competition in telecom markets, particularly the market for high speed Internet access and other applications enabled by the Internet Protocol. Several countries – including the UK, New Zealand, France, Ireland and Sweden– have implemented EOI regimes in order to promote equality of access.
160. The CRTC has historically relied on a variety of regulatory policies respecting wholesale access services including tariff filings and speed-matching regulations in order to ensure fair and reasonable access to essential facilities. As a result of the case-by-case approach adopted by the CRTC, however, Canada lags in certain respects when it comes to indicators of competition and development in broadband services.
161. The experience of other countries shows that EOI can stimulate competition, investment, innovation and market development. In the UK, for example, the share of the ADSL/FTTx market held by BT (38%)¹⁰⁴ was one-half that held by Canadian ILECs (77%)¹⁰⁵ in 2012. In France, entrants have also gained over 50% market share in the DSL market.¹⁰⁶
162. Given that the Canadian market is characterized by several regional ILECs and cablecos, as opposed to a single national ILEC, the structural or functional separation seen in some countries may not be feasible. However, by implementing a robust EOI regime, the CRTC can improve equality of access and set Canada on a course for a more competitive broadband communications market.
163. EOI is not something new to Canadian telecom regulation. Indeed, many of the CRTC's regulatory policies already in place are designed to achieve EOI. Regulation of wholesale pricing of essential and interconnection services, mandated speed-matching and the QoS reporting by ILECs are all key elements of an EOI regime. As a result, the CRTC would not be starting from scratch, but there is not yet a sufficiently coherent and comprehensive regime in place to achieve all of the benefits of EOI.

¹⁰⁴ Ofcom (2013) *Communications Market Report 2013*, pp. 339-340.

¹⁰⁵ CRTC (2013), p. 143.

¹⁰⁶ Berkman Center for Internet & Society (2010), p. 153.

164. The basis of all EOI regimes is that, when providing competing providers with a service deemed to be part of the EOI, the selected carrier must provide itself and competing providers:
- i. with the same service;
 - ii. on the same time-scales and on the same terms and conditions;
 - iii. by means of the same processes; and
 - iv. in the same way, and with the same degree of reliability and performance.
165. For the purpose of promoting the orderly development of a competitive marketplace, the CRTC should require that, concurrently with the introduction of any new retail service by an ILEC or cableco, that carrier must file a wholesale access tariff that is based on EOI principles, if such a tariff that supports the new retail service does not already exist.
166. In order to ensure that an EOI regime will function properly, it must be possible for wholesale customers of an incumbent to have access to the specific network elements that are available to the incumbent's own retail operations. Otherwise, despite all of the other features of the EOI regime, competitors of the incumbent will not be able to offer a full range of retail services that both compete with and are differentiated from those of the incumbent's retail operations. Therefore, EOI-compliant wholesale tariffs must permit competitors to buy access only to those network elements that they require from the incumbent and to interconnect at any technically feasible point in an incumbent network.
167. EOI wholesale tariffs should specify the terms, conditions and prices applicable to the corresponding wholesale services, and provide for SLAs and SLGs for these services.
168. Among other things, a robust EOI regime would require that the CRTC expand its financial reporting requirements for incumbent ILECs and cablecos. At a micro level, incumbents already compile and submit service costing data to the CRTC as part of the Phase II costing regime already in place for their regulated wholesale services. So it is likely that their existing accounting systems should be able to accommodate this reporting. Furthermore, incumbents are already accustomed to tracking QoS indicators. And at a macro level, they already submit financial and operating-performance data as part of the data collection process for the CRTC's annual Communications Monitoring Report.



169. The CRTC could implement the regime and monitor its outcomes, using the building-block approach adopted by New Zealand. The CRTC could also fashion appropriately selected KPIs, corresponding to the legal obligations of ILECs and cablecos to comply with the EOI regime. The KPIs would be tracked by the CRTC, as well as incumbents in a transparent manner. In order to ensure that these incumbents are further motivated to comply with the EOI regime, the CRTC should require them to develop new incentive structures for the managers who will supervise the carriers' delivery of wholesale services, so that their compensation is aligned to the success of the wholesale operations, rather than that of the parent company or entire group enterprise.
170. Overall, the adoption of an EOI regime in Canada has the potential to deliver significant benefits in terms of competition and innovation in Canada, and can be readily overlaid on the other elements of the Canadian wholesale regulatory system.

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Appendix A: Additional Data Figures and Tables

Figure A - 1 Fixed broadband penetration rates

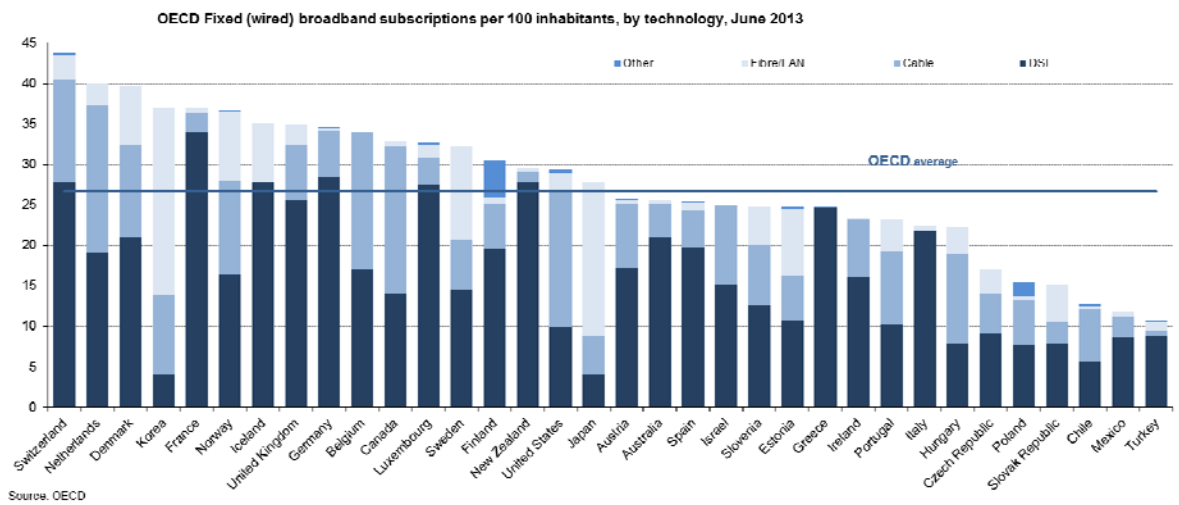
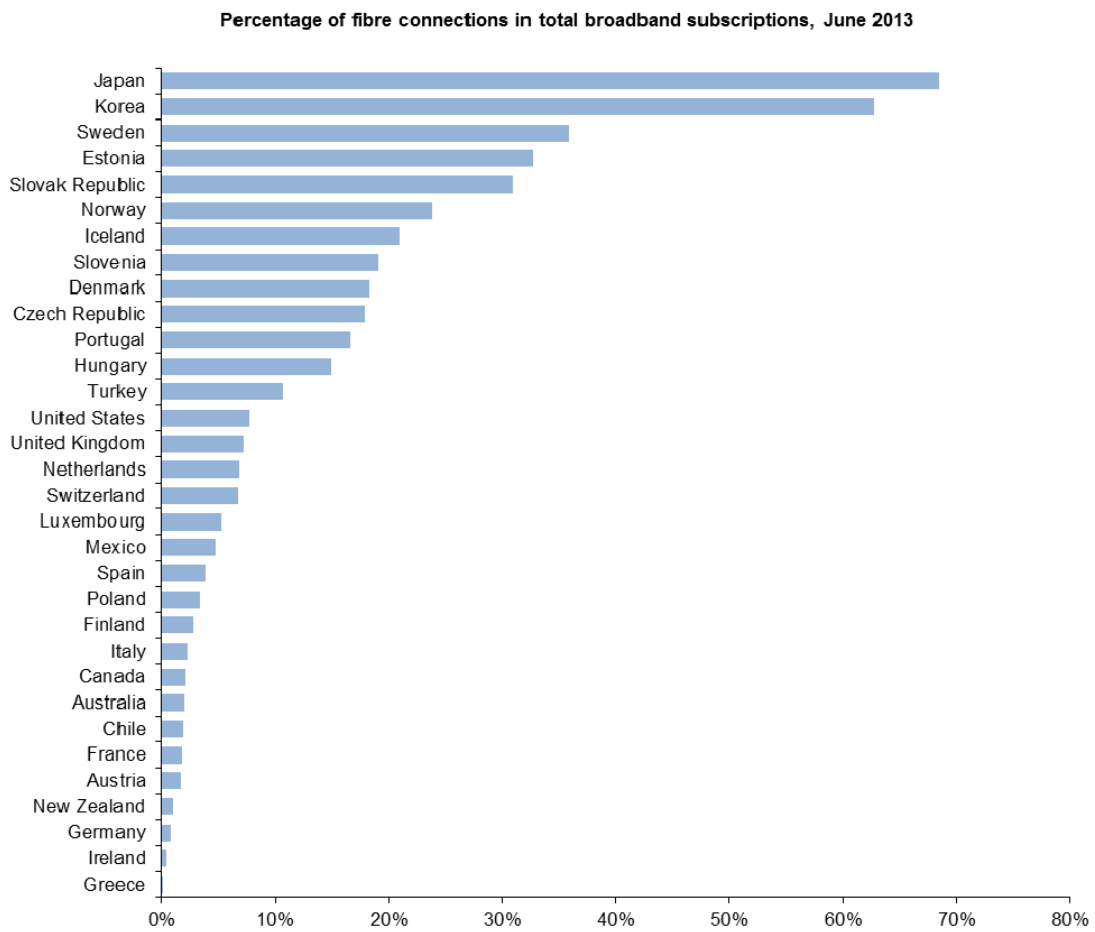


Figure A - 2 Percentage of fibre connections in total broadband subscriptions



Source: OECD

Note: OECD average is 15.75%. Canada's estimate is 2.02%.

Table A - 1 Elements of BT functional separation

Organization/ Governance:	<p>The ASD (i.e. BT Openreach) shall be a separate division within BT. It shall have a CEO who reports directly to the CEO of BT plc.</p> <p>The regulatory financial statements of BT will separately present the financial results of the ASD. These financial statements shall include: headline revenue, cost of sales (or gross margin), SG&A, EBITDA, depreciation, operating profit and capital expenditure, revenues broken down into the broad product groups that the ASD provides and further split between internal and external sales, separately identified payments to other parts of BT for products that form inputs to ASD's products.</p> <p>Within six months, the ASD's management team shall move to access controlled offices which are separately secured from BT's downstream businesses. Within 18 months, ASD's management team shall move to a separate location.</p>
Products and services:	<p>All forms of Wholesale Line Rental (WLR)</p> <p>Local loop unbundling products</p> <p>Fibre access products (including Wholesale Ethernet Service and Partial Private Circuit access products)</p> <p>Ethernet and SDH backhaul products and sub-loops specific to wholesale backhaul services</p>
Distinct branding	<p>The ASD should have a distinctive brand that reflects its operationally separate status from other BT business units.</p>
Physical assets	<p>The ASD shall control and operate the assets contained within the Physical Layer of BT's Access Network and the Physical Layer of BT's Backhaul Network.</p> <p>The ASD shall <u>not</u> control or operate the assets contained within the Transmission Layer of BT's Access Network and the Transmission Layer of BT's Backhaul Network</p>
Incentives and culture	<p>The management board of ASD will have a clear remit to deliver equality of access. It will publish annual plan, remit, mission statement and performance targets.</p>
Independent oversight	<p>An Equality of Access Board (EAB) would be formed to ensure compliance with the undertakings. The five-member board would include three independent directors, and a non-executive BT board member as chair.</p>
Future-proofing	<p>BT will ensure that the design of next generation networks (NGN) supports competition, by permitting unbundled access to key bottlenecks; will support EOI. BT can only launch new retail products when equivalent wholesale products are available.</p>

Source: Ofcom

Table A - 2 Variations of TelecomNZ undertakings

	Description
Variation 1 (June 2009)	<ul style="list-style-type: none"> - Bringing forward the date on which service providers would have access to certain systems to provision UCLL, UBA and UBA backhaul (front-end equivalence systems). - Adding new requirements for delivering equivalence using FMO systems. - Delaying the consumption by TBUs of UCLL, UBA and UBA backhaul by 6-18 months.
Variation 2 (November 2009)	<ul style="list-style-type: none"> - Delaying by nine months the separation of information systems, shared by the TelecomNZ business units, containing customer confidential information
Variation 3 (May 2010)	<ul style="list-style-type: none"> - TelecomNZ was required to compensate third parties for costs incurred on the systems upgrades (FMO) TelecomNZ had promised - Delaying the implementation of various systems used for provisioning of wholesale services (including the dates proposed by TelecomNZ in its first variation request) - Allowing TelecomNZ to meet the new extended deadlines using existing systems rather than the new FMO systems agreed in the first variation
Variation 4 (October 2010)	<ul style="list-style-type: none"> - UBA - Delaying the consumption of UBA services in the delivery of retail BB services (required to provide retail broadband services on a full EOI basis) - PLV - Resolving systems issues, expanding external trials and consulting with industry to resolve current PLV issues - Wholesale FMO - Consulting industry on the delivery of certain FMO systems
Variation 5 (May 2011)	<ul style="list-style-type: none"> - Clarified that TelecomNZ was not required to sell at subsidised prices wholesale fibre services that were not supplied using subsidised Rural Broadband Initiative (RBI) fibre network infrastructure. TelecomNZ would be able to continue selling these wholesale fibre services at commercial prices, subject to the undertakings and other relevant regulations.

Source: Patterson (2010, slides 27-28) for Variations 1 through 4. Commerce Commission website for details on Variation 5.

Table A - 3 Regulated services in New Zealand

Designated Services	Specified Services
<p><i>Designated Access Services</i></p> <ul style="list-style-type: none"> - Interconnection with fixed PSTN; - Retail services by means of a fixed telecommunications network; - Local access and calling service offered by means of fixed telecommunications network; - Retail services offered by means of a fixed telecommunications network as part of bundle of retail services; - Chorus's unbundled bitstream access (UBA); - Chorus's UBA backhaul; - Chorus's unbundled copper local loop (UCLL) network; - Chorus's UCLL network co-location; - Chorus's UCLL network backhaul (distribution cabinet to telephone exchange); - Chorus's UCLL network backhaul (telephone exchange to interconnect point); - Chorus's unbundled copper low-frequency service; - Mobile termination access services (MTAS); <p><i>Designated Multinetwork Services</i></p> <ul style="list-style-type: none"> - Local telephone number portability service; - Cellular telephone number portability service; - National toll-free telephone number portability service; - Telecom's fixed PSTN to mobile carrier pre-selection service 	<ul style="list-style-type: none"> - National roaming; - Co-location on cellular mobile transmission sites; - Co-location of equipment for fixed telecommunications services at sites used by Broadcast Communications Limited.

Source: Telecommunications Act 2001 (reprint as at 5 December 2013), Schedule 1, pp. 229-264.

Table A - 4 Classifications of wholesale Internet services introduced by Telecom Decision CRTC 2008-17

	Essential	Conditional Essential	Conditional Mandated Non-Essential	Public Good	Interconnection	Non-Essential Subject to Phase-out
Definition	Services that meet the three criteria described above.	Essential services that could, at some point in the future, stop being essential	Services that do not meet the criteria for essential services but CRTC, for various reasons, argues that they must continue to be mandated	Services that provide important social benefits	Services required to permit the interchange of traffic with PSTN customers.	Services that do not meet the definition of essential services and that CRTC has not classified in any of the other categories.
Services Included	- Subscriber listing information	- Unbundled local loop facilities - Low-speed competitor digital network (CDN) facilities - ADSL access service - Other services, including: CLEC access to OSS service; CLEC manual ER service; DAL service; and PAL service.	- Co-location and related link services; - Aggregated ADSL and third-party Internet access services	- Emergency services and message relay services; - Support structure services;	- Interconnection between local exchange carriers (LEC) networks; - Interconnection between LECs and long-distance networks; - Interconnection between wireless and wireline networks	- Low-speed CDN transport facilities - Fibre-based access and transport , and related services; - Other services, including: local number portability database services; BNS database storage; and operator services.

Source: Telecom Decision CRTC 2008-17



Appendix B: Curriculum Vitae

CV OF STUART JACK

Stuart Jack is a Partner and Director of the Ottawa Office of Nordicity Group Limited, a leading telecommunications consultancy.

Previously, Stuart held senior management positions in pre-eminent telecommunications regulatory agencies and consultancies. With PricewaterhouseCoopers, Stuart was a Director in the Information, Communications and Entertainment (ICE) Practice. With CBC, the Canadian state-owned broadcaster, Stuart was a Senior Manager in the Corporate Planning Division dealing with issues such as asset acquisition/divestiture, distribution systems and Executive Information System (EIS). With the CRTC, as Senior Manager, Marketing and Economic Analysis, Stuart provided advice to upper management and Commissioners regarding conditions of licence and competitive licensing processes and was part of the staff team in many major regulatory hearings. As Regional Telecoms Officer, he dealt with the carriers and the public and provided advice on carrier rates, QoS, etc.

EDUCATION

Stuart's academic qualifications include an MBA in Marketing and Finance from Concordia University's Business School, a M.Sc. from Institut national de la recherche scientifique (Université du Québec) and an Honours B.A. from Queens University.

AREAS OF SPECIALIZATION

Stuart specializes in advising policy and regulatory agencies and firms on frameworks, procedures and processes in the ICT, telecommunications and media industries. In the wider context, he has deep understanding of technology, market and financial issues that drive investment and competition strategies.

Stuart has led numerous project teams which have advised spectrum regulators, incumbents and new entrants on spectrum valuation and pricing, spectrum swaps, market demand, capacity, licensing obligations, impact of new technology, launch of new services, competitive licensing processes, and competitive positioning. Stuart has consulted extensively in the global market in telecommunications.

PROJECT EXPERIENCE

Examples of consulting work in which Stuart assumed key responsibilities:

Projects for Regulatory Agencies and Policy-makers

For Industry Canada, Stuart led a project team in the comprehensive review and assessment of the mandatory tower and site sharing, and roaming provisions implemented for Cellular, PCS and AWS



spectrum licensees in late 2008. The purpose of the assessment was to what extent the framework was achieving its stated policy objectives, namely: to provide all players the opportunity to offer national service coverage to their subscribers; to encourage facilities-based competition; to limit the social impacts of the proliferation of new towers; and to facilitate new competitive entry by endeavouring to speed up network deployment.

The assessment was based on a multi-staged methodology, including:

- A literature review of the Industry Canada policy and its objectives;
- File review of quantitative and qualitative information on tower sharing and roaming experiences to date provided by Canadian licensees;
- International benchmarking of other tower sharing and roaming frameworks; and
- A review of other mandated Canadian governmental or agency processes.

The assessment was incorporated into the Ministry's assessment of the current framework and preparation for potential consultation with stakeholders on the tower sharing and roaming framework.

For Industry Canada, Stuart led a project team in the study of the competition in global satellite markets, practices for assigning satellite licences and setting the economic value of licenses. The team examined the potential benefits (setting market prices, coverage requirements, administrative efficiency, etc.) of auctions, first-come-first serve and comparative reviews as licensing processes as well as their pertinence for Canada. The study results were used by IC to assess its current licensing processes and in consultation with stakeholders.

For Industry Canada, Stuart led a project team in the study on the market value of fixed and broadcasting satellite spectrum in Canada.

The purpose of this assignment is to establish market-based valuation and fee-structure for Canadian satellite spectrum. Industry Canada (the "Department") recognizes that the existing apparatus-based fee regime for satellite spectrum licensees is no longer adequate. The status quo, (i.e. continuing with the current fee structure) is not a realistic option for various reasons. The structure – originating in the 1970s and codified in 1978 – is based on the implicit value of a terrestrial voice telephony circuits. The last update to the fees was completed in 1994 and the fee levels are neither the equivalent of existing administrative costs nor the market value of the satellite spectrum governed by these licences. The basis for setting the licence fees was raised as an issue during the Department's recent consultation on the revisions to the Framework for Spectrum Auctions.

The study results were used by IC to prepare for the transition towards a transparent, equitable, market-based spectrum licensing regime and to determine the applicability of corresponding revised fee structure going forward.

For Industry Canada, Stuart led a project team in the valuation of Point-to-Area (PTA) radiocommunications spectrum. Nordicity led the assignment along with a partner consulting firm, Network Strategies Ltd. As part of the assignment, a comprehensive review of Industry Canada's Technical and Administrative Frequency Lists (TAFL) database was undertaken to identify:

- o The utilization rate of each of the PTA bands
- o Identification of bands with excess demand or congestion



- o Identification of uses and users in each of the PTA bands
- o Identification of the current equipment in use and the estimation of current equipment's age
- o Visual map representation of each of the license assignments across Canada

The output of the data analysis was used to develop an economic model for the valuation of the congested PTA bands and a \$/kHz/year valuation was derived for these bands. The purpose of this exercise is to implement a regime of Administrative Incentive Pricing (AIP) for radio-communication spectrum and implement a fee schedule that will encourage the highest economic use of the spectrum for the un-auctioned bands.

Nordicity's report was incorporated into the Ministry's assessment of the current framework and preparation for potential consultation with stakeholders on the spectrum valuation.

For Public Safety Canada, Stuart led the study team in the analysis of the technical, financial and governance requirements for new 700MHz regional and national public safety agencies operating over LTE networks. The report completed in April 2012 has been released to provincial, first responders and spectrum stakeholders.

For the CRTC, the Canadian telecommunications and broadcasting regulator, Stuart has led project team in a number of projects

- o Analysis of competition in the Canadian and international distribution markets.
- o Analysis of the impact of additional advertising inventory on market rates and broadcasters' profitability

For Telus, Stuart led a study on Competition and Incumbency An analysis of Canada's Communications. The study examined the methodology used by the OECD in its benchmarking study on Competition in the Global Wireless Industry, Canada's ranking and applicability of parameters (number of devices, plans, intensity of usage, number of service providers). Telus filed this report as evidence with the Industry Canada. and the report was also referenced by other carriers.

For CITC, the Saudi telecommunications regulator, Stuart undertook a reference interconnection offer (RIO) study including benchmarking of interconnection tariffs in 18 best practice jurisdictions, analysis of STC's original interim and revised RIO proposals including costing data and other justification, analysis of interveners' submissions to the Public Consultation process and drafting recommendations for the RIO tariff decision. The results of this study enabled CITC decisions on interconnection pricing and future requirements for costing information from applicants. In addition, Nordicity provided support to the CITC during its negotiations with the incumbent, in arriving at its final decision on interconnection tariffs.

For CITC - the Saudi telecommunications regulator, Stuart undertook a benchmarking analysis of Quality of Service parameters and values / thresholds required of service providers by National Regulatory Agencies (NRAs) in 15 best practices countries as well as the sanctions imposed by NRAs on service providers if they fail to meet the QoS targets. The results of this study enabled CITC decision on the selection of appropriate QoS measures and sanctions.



For BTA- Botswana Telecommunications Authority, Stuart led project teams to:

- o Analyze the consumer equity and competitive impacts of the incumbent's per second billing proposal to the Regulator,
- o Prepared an industry consultation on competition and service obligations and,
- o Develop the organizational structure, process flows a new Consumer Affairs Department (CAD) within the BTA
- o Recommend the appropriate division of roles & responsibilities between the new CAD and the operators.

For the Bahamian Public Utilities Commission, Stuart led project teams on a number of projects:

- o Review a number of wireless ISP applications to determine the appropriate technical, economic and legal conditions for licensing and corresponding fee structure for licensees;
- o Review and rank technical, marketing and financial aspects of applications for a fixed wireless licence in the 2100 & 2500MHz bands.
- o Study of the Potential Wireless Market in the Bahamas and Benchmarking to Comparable Markets.

For the IBA, the South African broadcasting regulator, Stuart undertook a number of projects to assist the Regulator

- o Evaluate the viability and growth in the broadcasting market and identify key parameters for a competitive licence hearing
- o Expert advisory to the regulator during the competitive licensing process (public hearing) for new off air conventional broadcaster and setting of licence terms.
- o Evaluation of competitive bids.

For the Spectrum Management Authority of Jamaica, Stuart led study teams in a number of projects:

- o Development of a fee structure and schedule for fixed and mobile satellite services. A comparative analysis of satellite fees in best practice jurisdictions was undertaken and data was normalized and adjusted for the Jamaican market conditions, cost of service, GoJ revenue objectives and best regulatory practices.
- o Assessment of the mobile market and corporate values of specific cellular frequencies from the perspective of the GoJ and the operators in order to provide a valuation range. The data was used by the regulator for negotiation of spectrum 'swaps' as well as setting benchmarks for spectrum management. The project team also examined the likely impact of new technological and consumer trends on spectrum demand.



For USAID and the Jamaican Ministry of Posts, Telegraphs and Telecommunications, Stuart led a project team to build the technical, financial, legal and strategic planning functions for a new Spectrum Management Agency.

For the Cyprus Ministry of Communications and Works – responsible for telecoms policy and regulatory functions, Stuart led project teams in a number of assignments:

- o Undertake market capacity study to identify the optimal number new cellular (GSM_ operators,
- o Prepare tenders for the licensing of new operator(s).
- o Provide the technical data and advice for the design of a Frequency Allocation Table (data derived from consultation with key current and potential users, ITU, neighbouring jurisdictions and best practices)
- o Advise on the design of a spectrum monitoring network and provide system specifications. The Project Team defined short and long term spectrum monitoring and direction finding requirements; provided measurement procedures and reports that the spectrum monitoring system should generate; and, recommended enforcement practices for the spectrum monitoring program.
- o Recommend a reserve price for the auction of new cellular license concessions.

For MPA&I - the Trinidad & Tobago Ministry of Public Administration and Information and TATT - the new telecommunications authority, Stuart led the project team, which provided:

- o Audit of current usage of wireless usage,
- o Comparison of existing usage with licensing data base,
- o Consultation with key stakeholders on current and potential spectrum technologies and business plans,
- o Advice on market and financial evaluation in licensing and licensing processes,
- o Advice on the design of the frequency allocation table based on consultations with current and potential users, neighbouring jurisdictions, ITU and global best practices,
- o Advice on monitoring system specifications, evaluation criteria, procurement and technical evaluation of bids,
- o Advice on integration of monitoring into full AAFMS system (including engineering, licensing and billing software and hardware components).

For the South African Department of Communications, Stuart undertook a number of projects:

- o Analyze and provide policy guidance for the 'convergence' of IT, telecom and broadcasting industries. This process included benchmarking international policy and regulatory initiatives, technological developments, evaluation of current and potential business models of the SA industry under various policy scenarios.



- o Advise on financial, competitive, technical aspects in the Green/White Paper process for the preparation of new broadcasting legislation.
- o Feasibility study regarding the development of a dedicated educational channel for South Africa. The study involved: a benchmarking study of international educational initiatives, a situation analysis of technology enhanced educational initiatives in South Africa and Africa, an overview of the country's access technologies and infrastructure, an assessment of potential sources of income and proposed conceptual financial models. The purpose of the channel was to address issues of access and equity of quality education throughout South Africa, specifically its rural and underprivileged communities.
- o Stuart appeared before the CRTC as an expert witness on the economic impacts of simultaneous substitution for the Writers Guild and Directors Guild, as part of a joint submission with the Canadian Film and Television Producers Association (CFTPA)
- o For CanWest Global - now Shaw Communications, Stuart assisted in the development of the business plan and appeared before the CRTC as an expert witness for on the economic impacts of licensing new conventional broadcasting stations in British Columbia and Quebec.
- o For UK DCMS, Stuart was part of the project team hired by the Department responsible for Ofcom to validate costing data and evaluate the economic and financial impacts of alternative regimes for rights of way ('wayleaves') on landowners and telecoms operators.

Projects for Governments, Associations, Operators and Service Providers with Regulatory and/or Policy Focus

For Canada's 3 territorial governments: Yukon, NWT & Nunavut, Stuart led the project team in a major study of connectivity in the three territories: Yukon, NWT and Nunavut. This required modeling of the network backbones and access to the 75 northern communities and determination of connectivity standards that meets the user group needs. The dynamic optimization model developed in the course of the project enabled the team to identify the costs and least cost solution for any connectivity standard, size of community and user group profile.

In parallel, the Consultant's study team undertook primary (survey and focus groups) and secondary research (literature review and benchmarking) in order to provide an overview of broadband connectivity in Canada's North and in other best practice northern jurisdictions. The study team has identified key issues with respect to access and use of broadband-enabled information and communication technologies (ICTs) by northerners and northern organizations. The Consultant's team identified sustainable financial models for the suggested connectivity and well as strategies for implementation and stakeholder engagement.

The study will be used by the territorial and federal policy-makers and funders to better understand connectivity needs, impacts of connectivity on economic development and quality of life in the 3 territories, to evaluate alternative connectivity strategies, identify related costs and benefits as well as to evaluate various project proposals. Lessons learned from this project are expected to help guide



future initiatives in expanding the availability of broadband ICTs, in developing and delivering relevant content, and in ensuring that northerners have the capabilities and local support services to harness these technologies.

For the Katimavik Regional Government (KRG), Stuart is leading a project team in the evaluation of economic and social impacts of current service and changes in connectivity in Nunavik. The study incorporates primary (focus groups, interviews, survey) and secondary research (literature review and benchmarking). The study results will be used by KRG agencies in planning for enhancements in health, education, justice and other services, for economic development, preparation of briefs to upper levels of government for funding and partnerships and negotiations with current and potential service providers.

For the Regional Municipality of Ottawa Carleton, Stuart led a project team to identify strategies to extend the local calling area in the region in cooperation with Bell Canada. The project team provided technical and financial analysis of various options and recommended a preferred solution.

For CIEL, a satellite services provider, Nordicity assisted CIEL in the preparation of its application for a new satellite with bandwidth in the C, ku, and ka frequency bands. The team assessed Canadian demand for two distinct market segments: broadcasting services, primarily the launch of and conversion to HDTV; and broadband Internet services to the underserved communities in Canada. Stuart led the study of the broadband Internet. He provided demand and costing forecasts, regulatory and policy scenarios, examined the potential impact of competitive, technological and consumer trends. A business model encompassing costs (including spectrum bandwidth) and revenues was developed.

For Midi-Sat, an applicant for a South African pay satellite license as part of the Nordicity team, Stuart assisted in the preparation of its bid for satellite-based subscriber television service. Nordicity was involved in all aspects of the application-development process, including the preparation of the technical plan, subscriber forecasts, and business plan. Stuart led teams in the study of the satellite and ground facilities, costing of the spectrum (transponder capacity), data market applications and competing technologies such as broadband over power line (BPL).

For Midi-Sat, an applicant for a South African pay satellite licence, Stuart as part of the Nordicity team, assisted in the preparation of the submission to the ICASA – the telecom and broadcasting regulator. This brief recommended a cautious approach to licensing new satellite pay TV providers in the country based on a benchmarking study.

For Vodacom, the South African GSM operator, Stuart led a project team to analyze the operator's wireless distribution network, compare wireless operators' efficiencies and usage of spectrum capacity enhancing techniques and the need for additional spectrum in congested areas. This study was subsequently incorporated into the operator's brief to ICASA, the regulatory agency to make the case for the release of additional spectrum in congested areas.

For the Israeli cable association, Stuart analyzed and prepared a regulatory brief on issue of vertically-integrated ownership and bundling of programming as potential barriers to entry in Israel and foreign markets.



Projects for Operators and Service Providers with Technical, Market and Business Analysis as Primary Focus

For CWTA - the Canadian Wireless Telecommunications Association, Stuart leads the project team in the analysis, and the publication of the annual report on the economic impacts (direct, indirect, induced and spill-over) of the Canadian wireless industry in the Canadian economy.

For Tbaytel, an incumbent operator providing communication services across northwest Ontario, Stuart led the project team in the analysis of the capacity of the existing network to handle current and projected traffic, the migration strategy to HSPA and LTE and the analysis of alternative spectrum acquisition strategies (auction, sublicensing, and acquisition). The report completed in April, 2012 provided Tbaytel management with critical information for their capital investment plans and corporate strategy. Stuart is also leading a follow on study of the proposed auction rules announced by the CRTC for the upcoming 700MHz auction.

For EastLink a Halifax-based communications service provider with holdings across the country, Stuart led the project team in the analysis of existing infrastructure held by EastLink's (fiber, cable plant) and Rogers - its cellular services partner in the Maritimes, the adaptation of EastLink's sales network to new cellular services, the roll out of AWS wireless services and the negotiation of tower sharing versus build options.

For Stentor Resource Centre Inc., the Canadian consortium of telecom operators, Stuart provided market and financial analysis as part of the business case for the provision of cable-type services.

For Craig Broadcasting, Stuart provided advised on the business case and auction strategy in the development of the firm's new fixed wireless network (MDS / MCS) in Manitoba and British

For Sentec, the South African wireless and broadcasting signal distributor, Stuart helped identify the demand and valuation of wireless services and potential strategic business lines and partnerships for the repositioning of Sentec's distribution assets for wireless services.

For Ericsson, Stuart provided primary research for the strategic positioning of new health services delivered through broadband technologies.

For Nortel Networks, a global telecommunications equipment supplier, Stuart provided analysis of key ISP and cable ISP market sectors for the firm, its principal clients and its competitors. This analysis was used by Nortel to help train its sales force and to validate marketing strategies.

Regulatory Projects with Focus on Auction and Other Licensing Processes

For TbayTel (project in progress), Stuart is project director to develop a bid simulation and tracking tool (BSTT) to model the impact of combinatorial clock auction rules in the upcoming 2014 Industry Canada 700MHz auction under various competitive bidding scenarios, in order to assist the regional telecommunications firm in preparing and in implementing its bid strategies prior to, and during the auction event respectively. Nordicity and its subcontractor Carleton University's Centre for Quantitative Analysis and Decision Support (CQADS) worked together to develop the BSTT. Nordicity's proprietary software and analytical framework is based on Industry Canada's rules and algorithms, and factors in the potential bid strategies of competing bidders and the complex interaction of bidders, the auction manager, and the auction framework.



For EastLink, a new entrant in the Canadian wireless telecommunications market, Stuart led the auction advisory team in preparation of its auction strategy, the development of bid tracking and forecasting model as well as bidding support during the 2008 Canadian Auction of Spectrum Licences for Advanced Wireless Services and Other Spectrum in the 2 GHz Range. The bid team analyzed data from previous AWS and cellular auction results in the US and Canada. The impact of various potential causal factors on bid prices (\$/Mb/pop) were considered: market size, spectrum band, economic cycle and whether the winning bid was by a newco or an incumbent. As well, we examined bid behaviour (number of rounds, increments to decisive and final bids) in various markets. The auction team developed various gaming strategies to best exploit the auction rules and minimize the impact of competitors' strategies. Overall, there were some two dozen competitors bidding on hundreds of blocks of spectrum over 331 rounds of bids in the May 27th – July 21st 2008 period.

For the Telecoms Authority of Trinidad and Tobago (TATT) Stuart lead a combined PwC-Nordicity-Fasken project team to assist the regulator in running the April 09, auction of broadband wireless access (BWA) spectrum. Nordicity provided the key technical, auction process and management professionals, PwC Trinidad client liaison and Fasken-Martineau (legal). Stuart was overall lead of the auction team, and assisted the Authority in the preparation of the auction rules, bidders' agreements, and other documents; In the preparation phase, starting November, 08, Stuart reviewed and improved upon rules, procedures and documentation (bidders' agreements) developed for the previous October, 07 AWS auction, and provided training on auction rules to bidders and legal advice to the Authority on bidders' challenges. In designing the auction rules, care was taken in the design to minimize potential 'gaming' of the auction rules and to favour robust bidding strategies by bidders. In managing the auction, the Auction Manager monitored bidders' competitive bidding strategies and advised the Authority on bid increments, bidders' behaviour, and challenges to rules and transition from Phase 1 – price-based bidding to Phase 2 – allocation of spectrum blocks. At the conclusion of the auction, 26 blocks in 3 bands: 700MHz, 2.3GHz and 2.5GHz were successfully auctioned to Digicel (Ireland), TSTT (government & C&W) and Green Dot (Trinidad).

For the Telecoms Authority of Trinidad and Tobago (TATT) in the context of the October 07 auction of broadband wireless access (BWA) spectrum, a combined project team of PwC Trinidad (project lead, audit), Nordicity (technical, auction process and manager) and Fasken-Martineau (legal) provided advice. Stuart provided advice on the organization and management of the auction including the reserve price (benchmarking analysis of spectrum auctions in other jurisdictions), likely winning bid prices, minimum bid increments and bidder behaviour. This successful auction event resulted in the licensing of new players Telstar Cable System Limited in the 12 GHz band, and Green Dot Limited in the Lower 700 MHz band.

For the October 07 auction of broadband wireless access (BWA) spectrum, the Telecoms Authority of Trinidad and Tobago (TATT) hired PwC Trinidad (contract prime, audit), Nordicity (technical, auction process and manager) and Fasken-Martineau (legal). Stuart provided overall management of the auction team, and assisted the Authority in the preparation of the auction rules, bidders' agreements, and other documents; providing advice on the reserve price and minimum bid increments and during the auction event, managed the auction process and provided regulatory expertise. This successful auction event resulted in the licensing of new players Telstar Cable System Limited in the 12 GHz band, and Green Dot Limited in the Lower 700 MHz band.



PROFESSIONAL MEMBERSHIPS & ACTIVITIES

Stuart is a Board member of the Canadian Telecommunications Consulting Association (CTCA) and a member of the Community of Telecommunications Consultants (CTC). He is actively involved with Ottawa University's MBA program, Concordia's John Molson School of Business (alumnus). He has successfully completed courses offered by the Professional Management Institute (PMI) and the Canadian Evaluation Society (CES).

Stuart has presented, participated in panels on ICT, telecoms and broadcasting issues at industry conferences (Insight Canada, CTCA, CTC, CTU - Caribbean Telecommunications Union), Commonwealth Telecoms Association, Commonwealth Broadcasting Association, RABC - Radio Advisory Board of Canada, Conference Board of Canada, etc. He has also led numerous workshops and presentations to industry associations and provided training seminars to foreign telecoms regulators overseas and in Canada (for Industry Canada).

LANGUAGES

English written and oral: native.

French written and oral: excellent



CV OF DUSTIN CHODOROWICZ

SUMMARY

Dustin Chodorowicz is a Partner at Nordicity. He has 15 years of international experience as an economist, financial analyst and management consultant.

At Nordicity, Dustin leads consulting teams that provide communications and media sector clients with financial analysis, valuation and economic-modelling solutions, which enrich their understanding of the impact of market developments and government policy.

Dustin has appeared as an expert witness at the Federal Court of Canada, Copyright Board of Canada, and Canadian Radio-television and Telecommunications Commission (CRTC) where he has provided testimony on the economics of the television broadcasting industry, and the valuation of copyright licensing in the book publishing and music industries.

Prior to joining Nordicity, Dustin was a consultant at PricewaterhouseCoopers (PwC). He has also held positions with the Government of Canada and Statistics Canada, where he supported the development of economic indicators and government policy for the communications sector.

EDUCATION

M.A. in Economics, University of Toronto

B.Sc. (with High Distinction) in Economics, University of Toronto

PROFESSIONAL DESIGNATIONS and CERTIFICATION

Dustin Chodorowicz is a Chartered Financial Analyst (CFA) charterholder.

AREAS OF SPECIALIZATION

With academic training in economics, finance and statistics, Dustin is often called upon to apply concepts of economic theory, finance and statistical analysis to Nordicity's consulting projects.

PROJECT EXPERIENCE

Expert Reports and Testimony

Modelling the Economic Impacts of Alternative Wayleave Regimes (Department for Culture, Media and Sport, UK): An economic analysis of different options for regulated and unregulated rates for broadband rights of way.

Oligopsony Power in the Canadian Program Acquisition Market (Canadian Media Production Association): Application of the Herfindahl-Hirschman Index (HHI) to the Canadian television programming market.

Analysis of Vertical Integration in the Canadian Broadcasting Sector (Independent Broadcast Group): Application of the Four Firm Concentration Ratio (CR4) to the Canadian media and telecommunications sector.



Preparation of Responses to Local Forbearance Interrogatories (EastLink): Researched the state of competition in Atlantic Canada’s local exchange market in order to support EastLink’s interrogatory response.

Financial Analysis of Canadian Broadcasting Distribution Undertaking and Broadcaster Profitability Trends (Bell Canada, Rogers Communications Inc., and TELUS Communications Company): Financial analysis prepared as evidence for CRTC hearing on carriage fees for local TV signals.

Dustin was part of a Nordicity team engaged by the Council of Ministers of Education Canada (CMEC) to prepare an economic valuation of textbook photocopying in Canadian schools. Nordicity’s analysis was presented as evidence in the Copyright Board of Canada hearing to set a tariff for textbook photocopying in schools. Dustin appeared as an expert witness at the Copyright Board in relation to Nordicity’s evidence.

For the Audio-Visual Licensing Agency (AVLA), Dustin led an economic valuation of the right to reproduce sound recordings at commercial radio stations in Canada. Dustin co-authored the economic valuation report and provided expert-witness testimony at the Copyright Board of Canada hearing on the matter.

For Major League Baseball, Dustin was part of a Nordicity team that prepared a report on the relative valuation of different genres of programming carried on distant signals in Canada. This report was filed as evidence in relation to a Copyright Board proceeding to determine the distribution of retransmission royalties.

Dustin appeared in the Federal Court of Canada as an expert witness for the Crown on the issue of Part II Licence Fees in the *Canadian Association of Broadcasters and Videotron Ltée and CF Cable TV Inc. v. Her Majesty the Queen*. The Crown engaged Nordicity to prepare a report on “Part II” Licence Fees, which were paid annually by broadcasters and distribution undertakings. Nordicity’s report related the Part II Licence Fees to the economic value of the privilege of holding a broadcasting licence in Canada.

Financial and Economic Valuation

Dustin was part of a consortium of consultants from Nordicity and PricewaterhouseCoopers engaged by the Department of Canadian Heritage to prepare a report on methodologies for the financial valuation of Canadian broadcasting licences. Dustin conducted the secondary research related to the approaches for the valuation of various broadcasting-licence privileges.

Dustin was part of a Nordicity team engaged by the Board of Directors of MDU Communications International Inc. to prepare a valuation analysis and executive-compensation analysis. Dustin led the financial valuation component of the project. He prepared a discounted cash-flow valuation of MDU, as well as a break-up-scenario valuation, and a liquidation-scenario valuation. He also prepared a review of the valuation impact of a share buyback.

Dustin was part of a Nordicity team engaged by an alliance of Canadian broadcasting distribution undertakings (BDUs) to undertake an economic valuation of the impact of a proposal by the World Intellectual Property Organization (WIPO) to promulgate a World Broadcasting Treaty (WBT) that would require broadcasting distribution undertakings in Canada to make copyright payments for the distribution of foreign broadcast signals.



Spectrum Valuation

Dustin was part of a PwC team that prepared the bidding strategy for Barak ITC's (Israel) participation in an auction to acquire fixed wireless spectrum in Israel. As part of the strategy development process, PwC was asked to estimate the value of the spectrum to both the client and the competing bidders. Dustin was involved in the construction of a financial model to estimate the value of the spectrum licences to both the client and the competing bidders.

For the Spectrum Management Authority (Jamaica), Dustin conducted a benchmarking analysis to assist in deriving a financial valuation for certain spectrum blocks in Jamaica.

For the Bahamas Public Utilities Commission, Dustin prepared a benchmarking study that compared radio spectrum pricing policies in Canada, the U.S., and Australia.

For the Cyprus Ministry of Communications and Works, Dustin was part of a PwC team that conducted an international benchmarking exercise to set the reservation prices for 3G spectrum subject to a competitive licensing process.

Dustin has led PwC teams in the valuation of Canadian media properties, including a Canadian specialty television station and Radio Nord Communications Inc.'s FM radio stations. In both engagements, Dustin conducted the research and financial modelling that comprised the valuation analysis.

Media sector analysis

For the CMPA, Association des producteurs de films et de télévision du Québec (APFTQ) and Department of Canadian Heritage, Dustin co-authored *Profile 2010*, an economic and statistical profile of the Canadian film and television production industry. The CMPA released *Profile 2010* in January 2010. Dustin also co-authored each addition of *Profile*, beginning with *Profile 2002*.

Also for the CMPA, Dustin prepared a statistical and economic profile of the film and television production in the drama genre in Canada. The CMPA included this report in its submission to the CRTC on the issue of incentives to promote Canadian drama on Canadian television.

Dustin co-authored four editions of a statistical and economic profile of the documentary film and television production industry in Canada for the Documentary Organization of Canada (DOC).

For the CMPA, Dustin prepared two editions of an economic report on children's and youth television production in Canada. The first edition of *A Case for Kids Programming: Children's and Youth Audiovisual Programming in Canada* was released in February 2007. A second edition was released at the 2009 Banff International Television Festival.

For the Alberta Media Production Industries Association (AMPIA), Dustin prepared an analysis the Canadian private broadcasters' record in financially supporting independent television production in the Prairie Provinces. The analysis drew upon data from CRTC and Canadian Audio-Visual Certification Office to assess if private broadcasters met their licence commitments. It also assessed if independent producers in the Prairie Provinces received a proportionate share of national spending on independent production.

For North West Vision + Media, Dustin was part of a Nordicity team engaged to assist in the development of an application for European Commission funding for a usability testing lab and analytics service for video games companies in North West England and throughout the UK.



For the Writers Guild of Canada and ACTRA, Dustin prepared an analysis of job creation intensity of different types of film and television production in Canada.

For the Department of Canadian Heritage, Dustin prepared a statistical analysis of the historical impact that Telefilm Canada had on the growth and development of the Canadian audiovisual industry.

For Nordicity's review of the Department of Canadian Heritage's international treaty co-production policy, Dustin prepared a quantitative analysis of trends in Canadian co-production activity. This quantitative analysis was based on data supplied by Telefilm Canada and the Canadian Audio-Visual Certification Office.

For the Department of Canadian Heritage, Dustin co-authored two editions (2004/05 and 2007/08) of the Canadian Audio-Visual Certification Office's Activity Report. The Activity Report examined the trends in production activity, which received financial support from the Canadian Film or Video Production Tax Credit (CPTC) or the Production Services Tax Credit (PSTC).

Economic studies

For the Department of Canadian Heritage, Dustin led the research and analysis for a profile of small and medium-sized enterprises in the cultural industries (film and video production and distribution, sound recording, book publishing, periodical publishing, interactive digital media, and commercial art galleries). Dustin led the design of the research, and had a primary role in the online survey, executive interviews, and secondary research for this project.

Dustin led a Nordicity-PwC team engaged by the Cultural Human Resources Council to prepare a profile of large and medium-sized employers in the cultural industries. This report included a statistical profile of employment among large and medium-sized employers and an assessment of the human resources challenges they face.

Dustin was part of the Nordicity team that prepared *Snapshot 2009* for On Screen Manitoba. The report analyzed the statistical trends in indigenous, offshore and co-production activity in Manitoba between 2003/04 and 2007/08 and provided an estimate of the overall economic impact (direct and spin-off impacts) of the film and television production industry in Manitoba.

Dustin led an analysis of the economic benefits of CANARIE. This economic benefits analysis complemented the evaluation of CANARIE, which Nordicity also prepared. The economic benefits analysis used program data, survey data, a meta-analysis and economic modelling to assess and quantify the role that CANARIE has played in improving research output and innovation, and the impact this has had on productivity and economic growth in the Canadian economy.

For the Canadian Independent Music Association (CIMA), Dustin led a team of Nordicity consultants in the preparation of an evaluation of the impact of the Ontario Sound Recording Tax Credit (OSRTC). This project included a roll-up and analysis of program data, an online survey, and an estimate of the overall economic impact of the program.

For the Department of Canadian Heritage, Dustin was the project manager and lead analyst for the Economic Analysis of the Canadian Film or Video Production Tax Credit (CPTC). The project team included Nordicity consultants and academic economists; together they developed an econometric model for testing the incremental impact of the CPTC on Canadian film and TV production. The consulting team also used qualitative data from a survey of Canadian producers to assess the impact of the CPTC on corporate development and financing stability within the Canadian film and video



sector. The Economic Analysis of the CPTC was a key component in the Department's summative evaluation of the CPTC programme.

For the Film Nova Scotia, Dustin completed a study of the economic impact of film and television production in Nova Scotia. This study included an estimate of the number of jobs and total tax revenues generated by film and television production activity in the province. In conjunction with the Nova Scotia Department of Finance, an input-output model was used to model the spin-off impacts of film and television production in the province. Dustin also coordinated the research (online survey, key informant interviews) that contributed to an analysis of the socio-cultural impact of film and television production in the province, and the development of a five-year industry strategy.

Dustin completed a study for the CMPA, which quantified the economic impact of the removal of the Canadian Television Fund (CTF) in order to provide an economic rationale for its preservation. To quantify the impact of removing the CTF, Dustin used Statistics Canada and industry data to model the reduction in television production and employment that would occur if the CTF were removed. Dustin also conducted industry interviews to gauge the non-quantitative aspects of the CTF's removal.

Dustin was part of a Nordicity team that prepared a report for the Government of Nunavut on the economic impact of film and television production within the territory.

Broadcasting

For the CRTC, Dustin prepared an economic model of Canadian television broadcasting in order to test the impact of the proposed incentives (promulgated in the *McQueen Report*) to increase audiences to Canadian television programming.

For the Independent Broadcast Group, Dustin led a Nordicity team that prepared an analysis of market concentration and vertical integration in the Canadian broadcasting and communication sector. The analysis compared the levels of market concentration and vertical integration in broadcast programming, broadcasting distribution (cable and satellite), Internet services and mobile communications in Canada to levels in the United States, United Kingdom and Australia.

Dustin was part of a consortium of consultants from Nordicity and PricewaterhouseCoopers engaged by the Department of Canadian Heritage to prepare a report on methodologies for the financial valuation of Canadian broadcasting licences. Dustin conducted the secondary research related to the approaches for the valuation of various broadcasting-licence privileges.

In August 2007, Dustin was part of a Nordicity team engaged by the CBC to prepare an analysis that investigated whether the costs of producing Canadian television programming exceeded the revenues of such programming, and thereby warranted the subsidy programs in place to support Canadian programming. As a corollary, the CBC asked Nordicity to determine whether or not financial subsidy is essential to stimulate the creation and exhibition of Canadian television programming.

Dustin led a Nordicity team that prepared a report for the CBC looking at public funding for broadcasters in Canada and other Western countries. The report included a comparison of public funding for public broadcasters across several Western countries. It also included updates to estimates (originally prepared by Arthur Donner and Fred Lazar) of the value of simultaneous substitution and section 19.1 of the *Income Tax Act*.



For the CMPA, Dustin prepared a study entitled, *Analysis of Canadian Broadcaster Financial Performance and Programming Expenditures*, which analyzed trends in Canada's large broadcasting groups' revenues, profits and expenditures on Canadian programming.

For the CMPA, Dustin prepared an analysis of monopsony power among Canadian broadcasters in the market for independently produced Canadian television programming. Dustin applied the Herfindahl-Hirschman Index to gauge the risk of monopsony power.

For the CMPA, Dustin prepared a report entitled, *Analysis of the Economics of Canadian Television Programming*, which analyzed the economics of Canadian television programming from the perspective of Canadian broadcasting groups. The report demonstrated that Canadian programming can be profitable for Canadian broadcasting groups when achieves certain audience levels.

PUBLICATIONS/SPEAKING ENGAGEMENTS

"Public service broadcasting: An international comparison of funding models and performance," presentation to the Westminster Media Forum, London, United Kingdom, June 22, 2011.

"Fiscal support for the screen-based industries in the digital age: the Canadian experience," Presentation to the Kulturforum, Nordic Games Conference, Malmo, Sweden, April 28, 2010.

"Production Tax Credits for the UK Video Games Industry: Lessons from the Canadian Experience," presentation to the Westminster eForum on UK Computer and Video Games Industry, London, United Kingdom, January 21, 2010.

"Foreign Ownership and Consolidation in Canadian Broadcasting," presentation to the Telecommunications and Broadcasting Current Regulatory Issues and Policy Conference, Ottawa, Ontario, May 1, 2007.

Panel moderator, "The Future of Commercial Canadian Animation," Ottawa International Animation Festival September 21, 2006.

"Economic Profile of the Canadian Documentary Production Industry," presentation to the Canadian Documentary Summit, Toronto, Ontario, April 23, 2003.

International Communications Forecasting Conference, St. Louis, Missouri, June 10, 1998.

"The Canadian Cellular Telephone Industry: Birth, Evolution, and Prospects," with George Sciadas, *Canadian Economic Observer*, August 1998.

Canadian WIRELESS 1998, Toronto, Ontario, May 22, 1998: Dustin was part of panel of telecommunications industry consultants and investment analysts offering their views on the future of the Canadian cellular/PCS market.

PREVIOUS WORK HISTORY

PricewaterhouseCoopers (PwC Consulting)

Information, Communications and Entertainment & Media Practice.

Position: Consultant

Industry Canada

Telecommunications Policy Branch.

Position: Economist



Statistics Canada

Telecommunications Statistics Section.

Position: Analyst

Export Development Corporation

Credit Surveillance and Analysis Department.

Position: Risk Analysis