

**‘NETWORK NEUTRALITY’ VS ‘NETWORK DIVERSITY’:
A SURVEY OF THE DEBATE, POLICY LANDSCAPE AND
IMPLICATIONS FOR BROADBAND AS AN ESSENTIAL SERVICE FOR ONTARIANS**

by

Graham Longford, PhD
Postdoctoral Research Fellow
Faculty of Information Studies
University of Toronto

**‘Network Neutrality’ vs ‘Network Diversity’:
A Survey of the Debate, Policy Landscape and Implications for Broadband as
an Essential Service for Ontarians***

ABSTRACT

This working paper provides an overview of the debate surrounding the issue of “network neutrality,” which has vaulted to the forefront of telecommunications policy in the U.S., and to a lesser extent Canada, and considers its implications in the context of the deployment and delivery of broadband as an essential service in Ontario. Although the precise meaning of network neutrality is contested, it is typically defined as the principle that all traffic on the public internet be treated equally and without discrimination, regardless of source, ownership, or destination. At issue in the current debate are business and technological practices increasingly being adopted by broadband network owners and service providers – such as traffic shaping, content blocking and “bandwidth throttling” for applications like VOIP and P2P networking – that deviate from network neutrality. The owners and operators of broadband network infrastructure and services argue that such discriminatory practices – dubbed by industry as “network diversity” - are necessary to recoup investments, meet customer demand, and enhance user experience in a broadband world. Opponents of “network diversity” argue that such discrimination violates the fundamental operating principle of the internet (net neutrality), threatens consumer access and choice, suppresses innovation, and increases costs to consumers. While the issue is complex, the conflict can be summarized as one between a proprietary and commercial vision of a two-tier internet of ‘fast lanes’ and ‘slow lanes’ accessed by users and content/application providers based on ability-to-pay (network diversity) and a non-discriminatory, neutral internet over which users and consumers have access to the content, applications and services of their choice without commercially motivated interference by network owners and service providers (network neutrality). All sides of the debate agree that how the issue is resolved will have long term impacts on broadband deployment, consumers, usage, investment, and innovation. After providing an overview of the various positions and stakeholders involved in the net neutrality the debate, as well as reviewing the academic literature, the paper provides an assessment of the implications of the issue for broadband deployment, investment and use in Ontario.

* This research paper has been prepared with financial assistance from the Government of Ontario, Ministry of Government Services. Any opinions expressed are strictly those of the author and in no way reflect official views or policies of the Government of Ontario or the Ministry of Government services.

TABLE OF CONTENTS

<u>INTRODUCTION</u>	6
1.0 <u>BACKGROUND AND DRIVERS</u>	8
1.1 THE U.S. SUPREME COURT <i>BRAND X</i> DECISION	8
1.2 “THE INTERNET IS BROKEN”: CAPACITY AND SECURITY CONCERNS	9
1.3 NET NEUTRALITY GOES TO WASHINGTON	10
2.0 <u>WHAT IS NETWORK NEUTRALITY?</u>	12
2.1 “BEST-EFFORT” AND “FIRST IN, FIRST OUT” ROUTING PRINCIPLES	12
2.2 DUMB NETWORKS VS SMART NETWORKS	13
3.0 <u>THE RISE OF DISCRIMINATORY NETWORKS</u>	15
3.1 CONTENT DISCRIMINATION	15
3.1.1 Preferred Content Arrangements	15
3.1.2 Access Tiering and Transmission Tariffs	16
3.1.3 Content Blocking, Filtering and Deep Packet Inspection	16
3.1.4 Distributed Computing	17
3.2 NETWORK MANAGEMENT – PROTOCOL AND APPLICATION DISCRIMINATION	17
3.2.1 Port Blocking	18
3.2.2 Traffic Shaping / Traffic Prioritization	18
3.2.3 Quality of Service Enhancements	20
4.0 <u>DEVIATING FROM NETWORK NEUTRALITY – CASE STUDIES FROM CANADA, THE U.S., EUROPE AND ASIA</u>	21
America Online (AOL)	21
Bell Canada and Clearwire Communications	21
Cisco Systems Inc.	22
HostonFiber	23
Korea Telecom and LG Powercomm	23

	Madison River Communications	24
	MCI Canada (Verizon)	24
	Nokia	24
	Perspektiv Broadband	24
	Project Cleanfeed Canada	25
	Rogers Communications	25
	Shaw Communications	26
	Telus Communications	26
	T-Mobile UK	26
	Verio	27
	Vodafone	27
5.0	<u>THE NET NEUTRALITY DEBATE: STAKEHOLDERS AND POSITIONS</u>	28
5.1	NETWORK PROVIDERS	28
5.2	CONTENT AND APPLICATION PROVIDERS	30
5.3	NET NEUTRALITY ADVOCATES, CONSUMER AND PUBLIC INTEREST GROUPS	32
6.0	<u>ACADEMIC RESEARCH AND DEBATE ON NETWORK NEUTRALITY</u>	36
6.1	“NETWORK DIVERSITY” PROPONENTS	36
6.1.1	The internet was never neutral	36
6.1.2	“Network Diversity” is good for consumers	37
6.1.3	“Network Diversity” promotes broadband investment and innovation	38
6.2	NETWORK NEUTRALITY PROPONENTS	38
6.2.1	“The First Amendment of the Internet”	38
6.2.2	Network Neutrality is the new common carriage	39
6.2.3	Network Neutrality benefits consumers and encourages innovation, investment and competition	39
6.2.4	The broadband market is too concentrated to discipline anti-competitive conduct	40
6.2.5	Content providers already pay for network access	41
6.2.6	Incumbent infrastructure has been subsidized by the public purse ...	42
6.2.7	Deep packet inspection threatens consumer privacy	43

6.3	TOWARD A ‘THIRD WAY’ ON NETWORK NEUTRALITY?	43
6.3.1	The internet isn’t neutral now	44
6.3.2	Some forms of discrimination are necessary and beneficial	45
6.3.3	Policymakers need to distinguish between good and bad forms of discrimination	46
6.4	TOWARDS A NEUTRAL INTERNET FOR ALL	47
7.0	<u>THE POLICY LANDSCAPE: NETWORK NEUTRALITY POLICY IN CANADA AND ABROAD</u>	49
7.1	HISTORICAL CONTEXT: NETWORK NEUTRALITY – THE NEW “COMMON CARRIAGE”?	49
7.2	THE EROSION OF COMMON CARRIAGE AND THE RISE OF INFORMATION SERVICES	51
7.3	NETWORK NEUTRALITY IN CANADA: LEGISLATION, REGULATION AND POLICY DEBATE	52
7.3.1	<i>Telecommunications Act</i> (1993)	52
7.3.2	Cabinet and Ministerial Statements	53
7.3.3	Telecommunications Policy Review Panel (TPRP)	54
7.3.4	Canadian Radio-television and Telecommunications Commission (CRTC)	55
7.3.5	Competition Bureau of Canada	57
7.3.6	House of Commons Standing Committee on Industry Science and Technology	58
7.3.7	Industry Canada Task Force on SPAM	59
7.4	THE UNITED STATES	59
7.4.1	Federal Communications Commission and the AT&T/BellSouth merger	59
7.4.2	Congressional Legislation	62
7.4.3	Federal Trade Commission	64
7.5	EUROPEAN UNION	64
7.6	THE NETHERLANDS	65
7.7	UNITED KINGDOM	66
7.8	JAPAN	66

8.0	<u>NETWORK NEUTRALITY IN THE ONTARIO CONTEXT</u>	68
8.1	INDUSTRY STAKEHOLDERS	68
8.2	BROADBAND USERS IN ONTARIO	70
8.3	PROVINCIAL AUTHORITY TO INTERVENE IS LIMITED	71
9.0	<u>CONCLUSION</u>	74
	<u>REFERENCES</u>	76

INTRODUCTION

In 2006 the issue of “network neutrality” leapt to the forefront of telecommunications policy in the United States and, to a lesser extent, Canada and elsewhere. Network neutrality refers to the principle that all internet traffic be treated by network owners and service providers (ie. telecommunications and cable internet service providers) with equal priority and without discrimination. At the heart of the issue is whether and to what extent the owners and providers of broadband internet infrastructure and services should be permitted to interfere with internet content and services as they travel over the former’s networks.

Network owners argue that they need to be able to control and prioritize internet content and applications in order to recoup investments, meet customer needs, and provide innovative services in the context of exploding demand for bandwidth, as customers make growing use of applications like video streaming, internet telephony and P2P networking. Without greater control, they argue, investment, expansion and innovation in broadband infrastructure will stagnate.

On the other hand, advocates of network neutrality argue that the principle is foundational to the internet as a platform for free expression and communication in a democratic society. Deviating from network neutrality by allowing network providers increasing control over network traffic will stifle the creativity, democratic vitality and innovation that the internet has enabled thus far. As Tim Berners-Lee, inventor of the World Wide Web, has argued:

“The Internet is increasingly becoming the dominant medium binding us. The neutral communications medium is essential to our society. It is the basis of a fair competitive market economy. It is the basis of democracy, by which a community should decide what to do. It is the basis of science, by which human kind should decide what is true.”
(Berners-Lee, 2006)

On this view, the answer to growing demand for bandwidth is societal investment in broadband infrastructure, rather than granting network owners greater control over internet traffic.

Both sides agree that how the debate is resolved will have a significant impact on broadband investment and innovation going forward. The network neutrality debate raises issues of considerable technical and regulatory complexity. However, in light of its economic and social implications, as well as the rapidity with which telecommunications policy and regulation are changing in Canada and abroad, it is imperative that policy makers and members of the

public in Ontario and elsewhere understand what network neutrality is and what the potential implications of its abandonment as a principle for internet architecture and development are.

The following paper provides an overview of the issue of network neutrality. The paper begins with a discussion of the background and drivers that have pushed the issue to the forefront of telecommunications policy (Sections 1.0). Section 2.0 provides a definition of network neutrality. This is followed by a typology and discussion of the emergence of business and technological practices within the broadband network industry that deviate from network neutrality (Section 3.0), and an examination of reported cases where network providers have discriminated against internet content and applications (Section 4.0). The major stakeholders in the debate are then introduced, along with an overview of their various positions (Section 5.0). This is followed by a brief review of academic studies of the network neutrality debate and its implications for broadband development and innovation, as well as democratic communication (Section 6.0). Section 7.0 provides an overview of policy developments on the network neutrality issue in Canada, the United States and elsewhere. Finally, the paper concludes with a discussion of the implications of network neutrality/network diversity for broadband development and use in an Ontario context (Section 8.0).

1.0 BACKGROUND AND DRIVERS

While it has been lurking on the fringes of telecommunications policy for a number of years, the issue of network neutrality burst into the open in the spring of 2006. Behind the network neutrality debate are a number of economic, technical, cultural and policy drivers. The issue itself concerns whether or not the owners and providers of broadband network infrastructure and services (e.g. cable and DSL internet providers) should be permitted to interfere with internet traffic by blocking, degrading, or, alternatively, providing preferential access to, internet content and applications of various types. Increasingly, broadband access providers are exploring ways to monetize their infrastructure assets and differentiate their service offerings by, for example: providing faster and more reliable access to internet sites (e.g. Google) and applications (e.g. Vonage's internet telephony service) that pay them a fee; charging subscribers additional fees to enhance the performance of certain applications such as internet telephony (VOIP) and on-line gaming; and limiting the amount of bandwidth available on their networks for popular but bandwidth-hungry applications like peer-to-peer (P2P) file-sharing. In some cases, ISPs have deliberately blocked subscribers' access to, or degraded the performance of, particular sites and applications. While network providers argue that such discriminatory practices and fees are vital to recouping investments in internet infrastructure and enhancing user experience, opponents argue that they violate the principle of network neutrality and pose a threat to internet freedom, consumer choice, and future broadband investment and innovation.

1.1 THE U.S. SUPREME COURT *BRAND X* DECISION

The U.S. policy debate was kicked off in the autumn of 2005 with statements by leading telecommunications and cable company executives suggesting that, in future, popular internet sites and application providers would be required to pay network owners for guaranteed quality of service over the latter's broadband networks. This new approach was triggered by a decision of the U.S. Supreme Court in the *Brand X* case, in which the court argued that cable broadband providers were not obliged to open their networks to competitor services, brushing aside the regulatory principles of common carriage and non-discrimination that had been at the heart of U.S. telecommunications policy for a century (Noguchi, 2005). In order to level the regulatory and competitive playing field for broadband, the obligation to interconnect to competing

broadband service providers was dropped for telephone carriers by the Federal Communications Commission shortly thereafter as well. Sensing the potential threat posed by the Supreme Court's decision and subsequent threat of transmission tariffs, the debate was soon joined by a variety of stakeholders, including new media content providers, Congressional politicians, and public interest and freedom of expression advocates, who argued that network neutrality should be maintained in order to safeguard innovation, freedom and choice on the internet.

1.2 “THE INTERNET IS BROKEN”: CAPACITY AND SECURITY CONCERNS

Also driving the debate are concerns about the capacity and resiliency of existing broadband networks under growing pressure from new uses, applications and threats. A recent issue of MIT's *Technology Review* declared that “the Internet is broken” and that network infrastructures must become “smarter” in order to monitor and manage network resources (Talbot, 2005). Concerns have been raised, for example, about the internet's ability to sustain and support explosive growth in bandwidth intensive applications and services increasingly demanded by consumers, such as VOIP, audio and video streaming, and P2P applications (Deloitte, 2007; Glasner, 2005). A recent Deloitte report suggests that current growth trends in bandwidth usage will soon exceed the internet's overall capacity, thanks in large part to the explosion of video-based applications and services like YouTube (Deloitte, 2007: 6). In addition, many of these newer applications and services are more “latency-sensitive” – meaning their reliability and performance are more significantly affected by minor delays and disruptions in the transmission of data packets than older applications like email and web browsing – leading some to suggest that network owners and providers should be allowed, among other things, to differentiate and discriminate between different types of traffic in order to ensure the performance of latency-sensitive applications. Concerns have also been raised about the resiliency and sustainability of the internet's end-to-end architecture in the face of growing security threats like spam, spyware, worms and viruses (Talbot, 2005). According to many in industry, government and academia, the internet requires reengineering in order to place more intelligence in the network itself to eliminate or control security threats.

Dire warnings of the internet's immanent collapse under the weight of bandwidth over-consumption, growing security threats, and concerns about the viability of latency-sensitive applications have been accompanied by calls to relax regulatory restrictions on broadband

network owners and service providers limiting their ability to interfere with internet transmissions, in order to encourage renewed investment in network infrastructure, innovations in network security, and the diversification of service offerings. Failure to address these issues, it has been claimed, risks stifling investment and innovation in the broadband economy (Wu and Yoo, 2006).

1.3 NET NEUTRALITY GOES TO WASHINGTON

2006 witnessed considerable political mobilization and legislative activity on network neutrality in the United States. Grassroots campaigns in favour of network neutrality were organized by groups like *Save the Internet*, whose online petition has gathered over 1.6 million signatures. The issue garnered sufficient popular attention to be featured on TV on Jon Stewart's *The Daily Show*, and was the subject of a Bill Moyers documentary on PBS, as well as editorial coverage in major newspapers such as the *The New York Times* (The New York Times, 2006, 2007) and *The Wall Street Journal* (The Wall Street Journal, 2006). In the U.S. Congress, meanwhile, a number of network neutrality bills and legislative amendments, both pro and con, were debated and voted upon, and the issue is believed to have had an impact on the outcome of the November 2006 congressional elections, with many pro-network neutrality Democrats elected to office. With their victory in the congressional election, the issue is slated for legislative attention once again, with Democrats assuming the chairs of key congressional committees.

While the network neutrality debate in Canada has been far more muted, the issue has nonetheless been raised in a variety of important policy forums and reports, as well as in the news media. The 2005 Telecommunications Policy Review Panel (TPRP) raised serious concerns about network neutrality and made a number of specific recommendations. The federal Minister of Industry, Maxime Bernier, has acknowledged the issue and is considering the recommendations of the TPRP. Opposition members in the House of Commons have raised the issue. The CRTC, too, has ruled recently on a number of related issues.

For their part, major Canadian telecommunications and cable firms have kept a low profile, with the exception of Quebec-based Videotron, which has come out publicly in favour of so-called "transmission tariffs". Others, including Telus Communications and Rogers Communications, have quietly acknowledged that they engage in various practices that diverge from network neutrality. Tentative steps at popular mobilization around the issue have been

made as well, with advocacy organizations and web sites beginning to spring up (e.g. *neutrality.ca* and *whatisnetneutrality.ca*). In other words, the debate has been joined here in Canada as well. While the issue of network neutrality has yet to hit the political radar screens of average Canadians, it raises important public policy questions and harbours significant implications for the development of a broadband-enabled economy and society in Ontario and the rest of Canada.

2.0 WHAT IS NETWORK NEUTRALITY?

All traffic on the internet moves across the network on the basis of “packet-switching” technology, in which individual transmissions (e.g. data files, emails, audio streams, and web pages) are broken into data “packets,” each of which is addressed and labeled, that are then sent through the network via the most efficient pathways and then reassembled at their destination. Although the precise meaning of network neutrality is contested, a standard definition holds that it refers to the principle that all packets transmitted over the public internet be treated equally, regardless of source, ownership, content, or destination (Scott, Cooper and Kenney, 2006). Stanford University law professor Lawrence Lessig and communications policy expert Robert McChesney defined network neutrality in a 2006 editorial for *The Washington Post*: “Net neutrality means simply that all like Internet content must be treated alike and move at the same speed over the network. The owners of the Internet’s wires cannot discriminate” (Lessig and McChesney, 2006). Wu captures the main sentiment embodied in the principle when he writes that “a maximally useful public information network aspires to treat all content, sites, and platforms equally” (Wu, 2003).

2.1 “BEST-EFFORT” AND “FIRST IN, FIRST OUT” ROUTING PRINCIPLES

According to the principle of network neutrality, packets are routed over the public internet without preference on a “best-effort” and “first in, first out” (FIFO) basis. Best-effort service “does not provide any guarantees that data is delivered or that a user [is] given a guaranteed quality of service level or a certain priority”. Furthermore, “all users obtain best-effort service, meaning that they obtain unspecified variable bit rate and delivery time, depending on the current traffic load” (Wikipedia, 2007a). FIFO refers to the first-come, first-served principle for processing network traffic in a queue: “what comes in first is handled first, what comes in next waits until the first is finished, etc.” (Wikipedia, 2007b). The OECD describes best-effort and FIFO in the following way:

“When packets enter the router faster than they can be sent on the packets are stored in a buffer until traffic lightens. If the buffer runs out of space then packets are dropped based on the amount of time they have spent in the buffer, not on the type of data traffic they contain. All packets are treated on a first in, first out basis (FIFO). No priority is given for different packet contents.”

(Organization for Economic Cooperation and Development, 2007)

2.2 DUMB NETWORKS VS SMART NETWORKS

Neutral networks are also designed on the basis of the “end-to-end” (E2E) principle, according to which communication protocols are determined at the edges of the network by end-user devices (Saltzer, Reed and Clark, 1984). According to Isenberg, such end-to-end or “dumb” networks are designed with:

“intelligence at the end-user's device, not in the network. And the network [is] engineered simply to "Deliver the Bits, Stupid," not for fancy network routing or "smart" number translation [...] In the Stupid Network, the data [...] tell the network where it needs to go. (In contrast, in a circuit network, the network tells the data where to go.) In a Stupid Network, the data on it [is] the boss [...]" (Isenberg, 1997)

In other words, beyond its adherence to the FIFO principle, a “dumb” or neutral network is designed to have as little knowledge of and influence over the packets that traverse it as possible. The principles of network neutrality (best effort, FIFO, E2E) were designed into the architecture of the internet from the beginning, in the form of the TCP/IP communication protocols governing the traffic moving across it.

One drawback of neutral networks is that they are less suitable for low latency uses and applications, that is, those that are less tolerant of lost or delayed packets that can result from adherence to best effort/FIFO principles, particularly in circumstances of network congestion (Wu, 2003). When users run low latency applications like internet telephony (VoIP), online gaming, and audio/video streaming, packet loss or delay interfere with service quality (resulting in video “jitter” for example) and degrade the overall experience for the user. While, until recently, most internet use involved higher latency data applications such as email and web surfing (which are much more tolerant of minor packet loss and delay), the contemporary internet is increasingly being used for low latency audio and video applications. In other words, under conditions where bandwidth is a finite resource, network neutrality is anything but neutral in its impact on low latency applications and services. In order for such applications to run over the internet effectively, some argue, network providers must resort to “smarter” networking technologies that can differentiate and prioritize bits based on their sensitivity to latency.

Some have also argued that certain network management practices should be allowed under mandatory network neutrality laws, such as the ability of ISPs to filter and block spam, viruses and other malicious code (Peha, 2006). While they may violate network neutrality in its purest sense, the argument goes, such network management practices interfere with traffic for the

purposes of maintaining the efficient functioning of networks and shielding customers from destructive viruses and unwanted nuisance communications, rather than for commercial gain. For some commentators, the issue of motive is a key consideration. While ISPs should be barred from non-neutral practices that undermine competition, consumer choice and free speech (e.g. blocking customers from accessing services that compete with the ISP's own offerings, or blocking access to legal content), they argue that ISPs should be permitted to engage in non-neutral practices that serve the interests of the majority of subscribers, such as filtering spam and limiting the amount of bandwidth allotted to P2P applications such as BitTorrent. As such, a limited number of non-neutral practices ought to be accommodated under any legislative or regulatory network neutrality regime (Peha, 2006; Sandvig, 2006; Wu, 2003;). The range of practices that are necessary for ISPs to ensure the efficient operation of their networks is subject to debate, however. Left too vague, legislative and regulatory allowances can sanction such a wide range of non-neutral activities on the part of service providers as to render the principle of net neutrality meaningless.

Arriving at a consensus definition of what network neutrality means, and identifying non-neutral practices that should and should not be considered acceptable under it, will be key albeit difficult first steps for stakeholders and policymakers seeking a resolution to the debate. The following section provides a typology of current and proposed practices of network owners that deviate from strict interpretations of the principle of network neutrality. This is followed by a discussion of documented and alleged violations of network neutrality on the part of Canadian, U.S. and European network owners, service providers and equipment vendors.

3.0 THE RISE OF DISCRIMINATORY NETWORKS

While the network neutrality debate has increased in intensity and visibility in the wake of post-*Brand X* statements by telecommunications executives, discriminatory business, legal, and technological practices in broadband network provision have been in existence for a decade or more and are becoming more prevalent.¹

3.1 CONTENT DISCRIMINATION

Among the more common practices that deviate from network neutrality is the discriminatory treatment of content, which can take a variety of forms ranging from networks facilitating access to preferred or affiliated content to networks degrading or outright blocking customer access to unaffiliated and/or competitor content and applications. The following provides brief descriptions of these practices.

3.1.1 Preferred Content Arrangements

Sponsored content arrangements between networks and content providers make certain content available to subscribers on an *exclusive* basis, such that internet users can only access the content if they subscribe to the services of an ISP that has entered into a commercial arrangement with the provider. Examples include ESPN360, a sports video highlight service that is available to a limited number of ISPs in the U.S. (McTaggart, 2006), and Sega Dreamcast online game service, which received preferred treatment by AT&T@Home's cable modem service in the late 1990s, at the expense of other online gaming services (Sandvig, 2006). In the U.S., Comcast offers subscribers access to prime content, including sports highlight videos, Disney content, and music. ISPs also offer preferred content to subscribers by partnering with content providers to create internet *portal sites* like Rogers Yahoo! and Sympatico MSN, where subscribers receive enhanced access to exclusive content.

¹ Useful sources for more detailed and technical descriptions include McTaggart (2006), Organization for Economic Cooperation and Development (2007), Peha (2006) and Sandvig (2006). The following descriptions rely heavily on these sources.

3.1.2 Access Tiering and Transmission Tariffs

A new business model for the internet is beginning to emerge that is called “access tiering”. Access tiering refers to the introduction of additional fees charged either to consumers or web site owners for preferred treatment of data packets to ensure fast download speeds and quality of service (QOS). Internet access tiering introduces fast lanes and slow lanes, with the speed of access to web sites and the quality of services like internet telephony and online gaming determined by ability to pay. For example, while they have yet to be widely implemented, major telecommunications firms in the U.S. and Canada have called for the introduction of so-called “transmission tariffs,” that is, additional fees that ISPs would charge to internet content providers like Google, eBay and Yahoo! in exchange for preferred treatment on their networks (Business Week, 2005; Panetta, 2006). Web content from providers that pay the transmission tariff will load faster and perform better compared to content from those that choose not to.

3.1.3 Content Blocking, Filtering and Deep Packet Inspection

Network owners and ISPs have the technological means to filter and block internet traffic based on the addressing information contained in the packet headers (e.g. transmission origin and destination) and the actual content of the transmission itself. These can be achieved by technologies such as *address blocking* and *content filtering*. Address blocking involves the blacklisting and blocking of specific IP addresses and URLs and is commonly used to block offensive and/or illegal content such as child pornography. Content filtering technology reconstructs and examines the actual content of packets to determine if they should be blocked or filtered, for whatever reason. Content filtering relies on *deep packet inspection* tools produced by firms like Cisco, Allot Communications, P-Cube and Packeteer that can scrutinize the content of emails, web pages, and downloaded files. Content blocking and filtering have been used by ISPs at the request of law enforcement officials and other parties to monitor, filter, and block internet sites containing hate messages and child pornography. However, the same technology can and has been used by ISPs to block sites carrying legal content. In 2005, for example, Telus Communications Inc. blocked subscribers’ access to a Telus employee union’s web site during a labour dispute (Open Net Initiative, 2005).

3.1.4 Distributed Computing

Geography still matters in the networked world and the closer one's servers are located to major internet access points (e.g. ISP facilities) and site users the faster one's site will load and perform. In order to deliver fast and more reliable access to internet content to their subscribers, ISPs take advantage of various techniques of distributed computing, such as *content caching*, in which they copy the contents of web pages, typically those most frequently requested by their subscribers, and cache the content on a geographically distributed network of servers (McTaggart, 2006). When a subscriber requests a certain web site, the page content will be served from a cache on the ISP server that is closest and not necessarily from the originating server of the content producer. Access to content from more popular sites is accelerated in this manner, while content from sites that the ISP chooses not to cache may be delivered more slowly, resulting in slower page loading.

Content providers themselves can influence and manipulate user access to and the performance of web sites by taking advantage of distributed server networks of their own. Deep-pocketed web sites like Google, for example, can store their content on a network of distributed local servers so that users don't experience delays associated with content having to traverse long distances over the network. Firms without such distributed server networks of their own can contract the services of firms like Akamai that operate so-called "server farms" offering local content hosting and caching (*Akamai.com*). Site owners without the means to create or pay for access to such networks will find that their content is delivered to users more slowly as a result.

3.2 NETWORK MANAGEMENT – PROTOCOL AND APPLICATION DISCRIMINATION

Network providers have any array of techniques for discriminating against network protocols associated with particular applications (e.g. email, P2P networking, VOIP) that they regard as either a nuisance or potentially harmful to the network and its users. This is particularly the case with spam and bandwidth-intensive applications such as BitTorrent. Protocol and application discrimination makes use of network configuration tools and traffic analysis and management software to identify and then block, degrade, or limit available bandwidth for traffic associated with a given application, which can be identified by the protocol and/or other identifying information contained in the headers or tags associated with individual packets moving across the internet.

3.2.1 Port Blocking

Port blocking involves denying users access to certain applications by blocking the ports to which they are typically assigned in being delivered to or originating from a user's computer (e.g. Port 25 for sending email, Port 80 for HTTP web pages, Port 110 for incoming POP email). Ports, of which there are thousands, are like dedicated channels for certain kinds of communication or packet transmission over the internet. Port blocking is commonly used by ISPs to thwart spam and 'illegal' file-sharing activities. For example, many ISPs, institutional networks, and publicly access wireless networks (such as free or paid wi-fi hotspots) block Port 25, which is the port assigned to the Simple Mail Transfer Protocol (SMTP) associated with sending email between an email client and an email server or between email servers. Port 25 blocking prevents an ISP's residential customers from sending email from their own independently operated servers and, instead, forces them to route all out-going email through the ISP's servers, where it is typically inspected for viruses and signs that the user is generating spam or other malicious code. While Port 25 blocking has helped to reduce spam, however, it tends to limit legitimate uses that can be made of mail servers by non-profits and sole proprietors. In response, operators of spam and file-sharing networks have developed more sophisticated techniques for circumventing measures like port blocking, such as encrypting or disguising transmissions or reassigning them to non-standard ports.

3.2.2 Traffic Shaping / Traffic Prioritization

"Traffic shaping" or "traffic prioritization" refers to technologies that enable network operators to distinguish between and segregate different kinds of traffic for differential treatment (e.g. data vs. VoIP), usually to speed up latency sensitive applications like VOIP or slow down popular but bandwidth intensive applications such as BitTorrent. Traffic shaping can take a number of forms. "*Bandwidth throttling*" is a term applied to the practice of limiting the overall amount of bandwidth made available to specific applications, such as peer-to-peer file-sharing or streaming audio and video, over a specified time period. Bandwidth throttling is typically implemented by network administrators in order to limit the amount of P2P traffic on a server in order to avoid congestion and preserve the performance of other applications and services, such as web browsing. However, bandwidth throttling techniques can also be implemented by end-users to ensure that they do not exceed monthly bandwidth caps.

Traffic prioritization involves the use of sophisticated network management software to identify, distinguish, and prioritize transmissions based on their origin, ownership, content, application type and destination (OECD, 2007). Once the nature of a packet has been identified, traffic prioritization software assigns a priority to it and then places it in a queue for forwarding. Sophisticated algorithms are used to determine the order in which packets are forwarded, delayed or, in some cases, dropped altogether. Traffic prioritization can operate at various levels, from identifying, distinguishing and prioritizing traffic based on broad domains and application types, to conducting very fine-grained filtering and prioritization of particular web sites and of applications and services provided by specific firms. Traffic prioritization software can, for example, be used to de-prioritize packets associated with free VOIP services like Skype, which causes the service to degrade. Alternatively, it can be used by a network provider to lend preferential treatment to whole classes of traffic (e.g. streaming video) or to particular applications and services, including its own affiliated web content and services. Table 1 lists a sample of applications that can currently be monitored, controlled and prioritized/deprioritized using current traffic shaping technologies.

Table 1 – Sample of applications that can be monitored, controlled and prioritized

Peer-to-Peer	Voice over IP	Multimedia	Gaming	Messaging
Aimster	CiscoCTI	Abacast	Asheron's Call	AOL (IM, Talk, Image, File, ISP)
Apple-iTunes	Clarent	Motion Video using	Battle.net	iChat
AudioGalaxy	CUSeeMe	DIGStream	Diablo II	ICQ
Bit Torrent	Dialpad	MPEG (Audio, Video)	Doom	IRC
Blubster	H.323	Multi-cast NetShow	EverQuest	Lotus IM
DirectConnect	I-Phone	NetMeeting	Half-Life	MSN Messenger
Earth Station V	iChat	Ogg over HTTP	Kali	Windows-POPUP
EDonkey	MCK Commun.	QuickTime	LucasArts (Jedi)	Yahoo! Messenger
Emule	Megaco	RadioNetscape	MSN Zone	
Gnutella	Micom VIP	Real (Audio, Video)	Mythic	
Grokster	MGCP	RTP	Quake I, II, & III	
Groove	Net2Phone	RTSP	SonyOnline	
Hopster	RTP	SHOUTcast	Tribes I, II	
Hotline	RTCP	Streamworks	Unreal	
iMesh	SIP	VideoFrame	Warcraft III	
Limewire	Skinny (SCCP)	WebEx	WorldofWarcraft	
KaZaa	Skype	WinampStream	WboxLive	
KaZaa Lite	T.120	WinMedia	Yahoo! Games	
Morpeus	VDO Phone			
Napster	Vonage			
Napigator				
+ 50 others				

Source: OECD, 2007

While traffic shaping has been deemed necessary by some in order to ensure optimal performance of latency-sensitive applications, others are critical of the relative lack of transparency associated with traffic shaping techniques. ISPs have been reluctant to acknowledge their use let alone provide explicit detail about which sites and applications are affected and how (Geist, 2007a). Furthermore, traffic shaping is problematic because the average user has no way of knowing if and when their network provider is employing such techniques and how their experience as a user is affected (Sandvig, 2006: 7-10) .

3.2.3 Quality of Service Enhancements

Closely related to traffic shaping is the introduction of Quality of Service (QoS) enhancements by many ISPs. QoS enhancements typically take the form of services whereby, in exchange for an additional fee, a subscriber receives enhanced network service for certain applications (e.g. VOIP, online gaming) or specific services in order to optimize their performance. One example of such a QoS enhancement is the additional fee being charged by ISPs to users of Vonage's VOIP service. Again, QoS may be particularly appealing to users of low-latency applications in order to enhance the online experience. On the other hand, as some have pointed out, the introduction of paid QoS enhancements creates an incentive for ISPs to degrade network service to regular subscribers in order to "up-sell" them to the enhanced service, and to deliberately degrade competitor services that traverse their networks in order to encourage subscribers to switch.

4.0 DEVIATING FROM NETWORK NEUTRALITY - CASE STUDIES FROM CANADA, THE U.S., EUROPE AND ASIA

The following section documents recent cases in which telecommunications service providers in Canada, the U.S. and Europe have deviated from network neutrality by engaging in practices such as content blocking, bandwidth throttling, traffic shaping, and offering quality of service enhancements. Network neutrality has been called “a solution in search of a problem,” suggesting that there is little evidence that network providers are interfering with consumer access to the content and services of their choice or that existing practices are harming consumer interests. On the other hand, net neutrality advocates cite such high profile cases as Telus’s blocking of a pro-union web site as evidence of the risks entailed in granting providers more control over content and services. The following examples of interference are drawn from a range of public documents, including company web sites and media reports. It should also be acknowledged that what is reported as a violation depends in part on how one defines network neutrality. Non-neutral practices are defined somewhat broadly here in order to capture the full range of practices potentially at issue in the debate. The following cases are listed by company name.

America Online (AOL)

In March 2006 AOL is alleged to have blocked its subscribers’ access to all emails containing references to a web site called *DearAOL.com*, the founders of which were protesting a company proposal to allow messages to bypass the company’s junk mail filters in exchange for a fee (Dyson, 2006; Karr, 2006). *DearAOL.com* was supported by over 600 organizations and had gathered over 350,000 signatures calling on the company to refrain from imposing such an “email tax”. Over 300 reports of problems sending email containing the *DearAOL.com* address were made. The problem disappeared shortly after being reported by *DearAOL.com* and its supporters. AOL subsequently claimed that the problem was due to a “software glitch” (Karr 2006; Olsen, 2006).

Bell Canada & Clearwire Corporation

Little is known about the non-neutral practices adopted by Bell Canada. Nonetheless, the company has been actively involved in initiatives and investments in companies using

technologies that deviate from network neutrality. For example, in March 2005 Bell Canada Enterprises (BCE) partnered with Clearwire Corporation, a private US-based wireless broadband provider, to become Clearwire's preferred VOIP provider (Bell Canada Enterprises, 2005). Clearwire has since been accused by rival VOIP providers like Vonage of blocking competitor services on its network (CBC News, 2006). Clearwire's Terms of Service agreement also lists a variety of bandwidth intensive services which it reserves the right to restrict or block, including VOIP, audio/video downloading and uploading, and web hosting. In addition to being Clearwire's partner for VoIP, Bell Canada invested \$100 million (US) in Clearwire and Michael Sabia, Bell Canada's CEO, was given a seat on Clearwire's board of directors (Bell Canada Enterprises, 2005).

In addition to its investment in Clearwire, BCE has also invested in U.S.-based Ellacoya, a network control equipment provider. Ellacoya documents state that the explosion of broadband penetration and high bandwidth applications,

“presents an opportunity for service providers to enhance revenue by offering these applications as premium services with preferred data transport. To accomplish this, the service provider needs to add intelligence to its network infrastructure coupled with the ability to prioritize applications that deliver the greatest value and create the best online experience for their subscribers.”

According to Ellacoya its network control product “identifies subscribers and applications, reports granular usage detail, and classifies and controls applications on a per-subscriber basis” (Ellacoya, 2007).

Bell Canada is also listed as a client of the Waterloo, Ontario-based network equipment maker, Sandvine, which specializes in network surveillance and traffic prioritization and control technologies. According to the firm's web site:

“Sandvine's award-winning solutions identify the types and behaviours of traffic on networks enabling service providers to improve customer satisfaction, reduce operational costs and increase profitability. Service providers can better understand subscriber behavior, recognize and address network threats like worms and spam Trojans, classify applications running on your network (for example, voice over IP, gaming, video streams), guarantee service levels and create profitable tiers for multiple broadband services.” (Sandvine, 2007)

Cisco Systems Inc.

Cisco Systems Inc. is one of the world's largest providers of IP networking hardware, software and services. Among the many products and services the company offers is a network

surveillance and traffic prioritization and control technology called Cisco Systems Service Control (CSSC), which it markets to network providers. According to Cisco, CSSC helps “service providers manage and control bandwidth-hungry applications and address the challenges posed by aggressive P2P applications” (Cisco, 2007). Cisco’s product is marketed as a “smart” solution that provides a granular view of network users and uses and the ability to impose a variety of restrictive traffic filtering and prioritization policies to limit the bandwidth resources consumed by P2P applications. Examples of CSSC’s capabilities include:

- Deprioritizing P2P during congestion periods;
- Throttling upstream traffic (file upload) while not limiting downstream traffic (file downloads);
- Limiting P2P access during certain periods of the day or week;
- Providing unrestricted subscription plans for an additional charge;
- Enforcing a P2P quota, which when depleted throttles back P2P traffic but does not affect other application traffic; and,
- Providing optional P2P “bandwidth on demand” for an additional charge.

Cisco markets and sells this and many other networking management solutions to major Canadian broadband providers, including Bell Canada, Videotron, MTSAllstream and SaskTel.

HostonFiber

HostonFiber, a small Edmonton-based ISP offering web hosting services, has admitted to interfering with internet content. In September 2006, HostonFiber evicted a client’s web site featuring an online Goth/Vampire subculture magazine called *Some Lives Are Different (SLAD)*. HostonFiber’s owner explained that the removal of the site from its servers was in response to a shooting spree at Dawson College in Montreal that was allegedly inspired by Goth/Vampire subculture and related web sites. HostonFiber removed the SLAD site from its servers despite the fact that it carried appropriate warnings and contained legal content (Montgomery, 2006).

Korea Telecom and LG Powercomm

In the fall of 2006, South Korea’s two largest cable ISPs, Korea Telecom and LG Powercomm, began to block subscriber access to an internet television service, HanaTV, originating from rival ISP Hanaro Telecom (Burns, 2006). Korea Telecom and LG Powercomm have over 3 million combined subscribers.

Madison River Communications

In 2005, a rural North Carolina telephone company, Madison River Communications, agreed to pay a \$15,000 fine to the Federal Communications Commission after Vonage complained to the FCC that it was being blocked from offering its service to the telephone company's internet customers. Under the terms of its settlement with the FCC, Madison River agreed not to block VOIP traffic for 30 months. Critics have pointed out that the agreement does not prevent the company from blocking other content and services and is of limited duration (Bradner, 2005).

MCI Canada (Verizon)

MCI Canada is an ISP owned by the large American ISP Verizon. MCI Canada has threatened to cut off a Canadian web-hosting service called *Epifora.com*, which hosts a number of sites it calls "self help message boards for minor-attracted adults". MCI Canada maintains that the sites are in breach of Verizon's Acceptable Use Policy. For its part, Epifora has not been charged with any criminal offence and its content has been found in compliance with Canadian law (Canadian Internet Policy and Public Interest Clinic, 2006).

Nokia

Finland's Nokia is a world leader in wireless handsets and mobile telephony service. In November 2006, Nokia launched a product designed to enable network operators to block user access to specific types of data services, namely P2P file sharing and VoIP calls. "With the explosion of affordable high-speed mobile data access, operators are now being challenged to make the best possible use of their networks, especially when peer-to-peer applications increase their traffic load and compete with their own services," says Nokia Vice President, Roberto Loiola. "The Nokia Peer-to-peer Traffic Control solution now gives operators the means to analyse and manage such traffic. It allows them to apply their business models by prioritizing the traffic of preferred services and partners, maximize their return on network investment, and avoid becoming only bit pipes for other content providers" (Nokia, 2006).

Perspektiv Broadband

Perspektiv Broadband is a Swedish ISP. In 2006, Perspektiv blocked subscriber access to the Russian website *allofmp3.com*, a popular web site for music downloaders that offers discount

downloads of high quality music files in multiple file formats (Gilbertson, 2006). Perspektiv's decision came on the heels of a court order issued in Denmark that required the Danish ISP, Tele2, to block subscriber access to the allofmp3.com site, in response to complaints of copyright infringement by the International Federation of the Phonographic Industry (IFPI). Perspektiv's action appears motivated by a desire to preempt similar legal action in Sweden. It is worth noting that allofmp3.com is a legal web site in both Sweden and Denmark. Perspektiv rescinded its decision after consumer complaints.

Project Cleanfeed Canada

Project Cleanfeed is a joint initiative between Canadian ISPs and Cybertip.ca, a child exploitation tip-line aimed at blocking subscriber access to child pornography and exploitation web sites hosted outside of Canada (CNW Group, 2006; Cybertip, 2007). Participating ISPs include Bell Aliant, Bell Canada, MTS Allstream, Rogers, SaskTel, Shaw Communications Inc., TELUS, and Videotron, who have installed filtering software to block subscriber access to URLs from a blocking list based on public complaints and information from law enforcement agencies.

Rogers Communications

Rogers is one of the few Canadian network providers to admit deploying traffic shaping technology, although the company has offered few details regarding what kind of traffic receives discriminatory or preferential treatment (Kapica, 2005). Allegations have been made that Rogers' traffic shaping practices degrade the performance of popular files-sharing applications like BitTorrent, and that the company systematically degrades traffic that uses encryption, despite the fact that both BitTorrent and encryption have many legitimate uses (Geist, 2007b). While Rogers has denied allegations that it is purposely degrades encrypted traffic, the firm concedes that its equipment "ensures network capacity is reserved for such services as email and Web surfing," and that "peer-to-peer traffic does not overwhelm the system" (Engelhart, 2007). Rogers is also on record as exploring new kinds of billing systems, including 'metering' systems which charge customers for downloading video and using other bandwidth-intensive applications (McLean, 2006).

Shaw Communications

Shaw offers high speed cable internet customers a “Quality of Service Enhancement” feature for users of third-party internet telephone services (VOIP) such as those offered by Vonage. The QoS feature costs subscribers an additional \$10 per month to ensure that their third party service works properly (Shaw Communications, 2006). This kind of service enhancement has been described as a “VOIP tax” (Geist, 2006). Shaw and Vonage are involved in litigation over this issue (CBC, 2006). Shaw’s own Digital Phone Service uses managed networks with built-in QoS that are connected directly to the telephone network. Should Shaw decide to offer a VOIP service of its own at a later date, it can waive the QoS fees to make its service cheaper than third party alternatives. In addition, Shaw does not offer its Quality of Service Enhancement feature to resellers of its high speed internet service, such as Cybersurf, thus placing resellers at a competitive disadvantage. The CRTC recently ruled that Shaw’s refusal to offer the QoS service to resellers does not, however, constitute ‘unjust discrimination’ under the *Telecommunications Act*.

Telus Communications

In July 2005, Telus, one of Canada’s largest ISPs with over 1 million subscribers, blocked subscribers’ access to a web site called “Voices for Change” which was being operated by its unionized employees and with whom it was in the midst of a labour dispute. Telus maintains that the site endangered its employees because it carried pictures of managers and employees crossing picket lines. Independent testing by university-based researchers revealed that Telus’ blocking activities affected not only the Voices for Change site but 766 other unrelated sites (Open Net Initiative, 2005). The Telus case has since become one of the most widely-cited cases of content blocking by an ISP in North America.

T-Mobile UK

T-Mobile’s UK wireless telephony service plans block users from using VOIP and text messaging services on their internet-enabled handsets. As part of T-Mobile’s Fair Use Policy, the company does not permit “use of this service to provide modem access for a computer or for peer to peer file sharing, internet phone calls or instant messaging” (T-Mobile, 2007). Furthermore, according to the policy, “If use of either or both of these services is detected, T-

Mobile may terminate all contracts with the customer and disconnect any SIM cards and/or Web 'n' Walk cards from the T-Mobile network" (Smith, 2007).

Verio

Verio is a Japanese-owned ISP that operates in over two dozen major U.S. markets. Verio has recently evicted a site called *Cryptome.org* which it has hosted for several years. *Cryptome.org* is a web site that posts documents related to U.S. intelligence policy. According to Verio, *Cryptome.org*'s content violated the firm's acceptable use policy, although the firm made no effort to prove that content on the site was unlawful (Gohring, 2007).

Vodaphone

UK-based mobile phone company Vodaphone has 191 million subscribers in 26 markets worldwide. Vodaphone has been accused of blocking its customers from accessing certain web sites and applications such as VOIP via its web-enabled handsets (Judge, 2007). VOIP service provider, Truphone, has launched a lawsuit against Vodaphone, alleging that the latter is refusing to interconnect with its service and disabling VOIP capability on customer handsets, affecting other providers such as Skype as well. Vodaphone has acknowledged disabling VOIP, on grounds that it is protecting consumers. A Vodaphone statement claims that "VOIP-over-mobile is not yet a mature service proposition as it does not have guaranteed quality of service, and would fall short of the customer experience demanded of any service we launch" (Judge, 2007).

5.0 THE NET NEUTRALITY DEBATE: STAKEHOLDERS AND POSITIONS

5.1 NETWORK PROVIDERS

On the heels of the U.S. Supreme Court's 2005 *BrandX* decision, major telecommunications and cable companies in the U.S. announced plans to impose tariff charges for preferred treatment of internet traffic. Popular internet sites and new media properties such as Google, e-Bay and iTunes have been singled out by network providers as building their business models and accessing their lucrative customer base on the backs of the cable and telecom firms that build and invest in network infrastructure. Network neutrality, the latter firms contend, has offered internet site owners a "free ride". In future, they suggest, popular web sites and applications such as Google, e-Bay, MSN and Vonage will be compelled to pay network service providers a packet preference fee to ensure that their sites load quickly and that applications like internet phone service and online games run smoothly. Ed Whitacre, former CEO of U.S. telco giant, SBC Telecommunications, launched the current network neutrality debate with the following statement to *Business Week* magazine:

"How do you think they're [Google, e-Bay, Vonage etc.] going to get to customers? Through a broadband pipe. Cable companies have them. We have them. Now what they would like to do is use my pipes free, but I ain't going to let them do that because we have spent this capital and we have to have a return on it. So there's going to have to be some mechanism for these people who use these pipes to pay for the portion they're using. Why should they be allowed to use my pipes? The Internet can't be free in that sense, because we and the cable companies have made an investment and for a Google or Yahoo! or Vonage or anybody to expect to use these pipes [for] free is nuts!" (Business Week, 2005)

Meanwhile, William L. Smith, chief technology officer for Atlanta-based BellSouth Corp., told *The Washington Post* that internet service providers should be allowed to make deals giving certain Web sites or services priority in reaching computer users (Krim, 2005). For example, Smith said, an ISP should be able to charge Yahoo Inc. for the opportunity to have its search site load faster than Google's, or to charge a rival internet telephone firm so that its service can operate with the same quality over BellSouth's network as the latter's own internet phone service.

In addition, network providers argue that broadband subscribers are making increasing use of high bandwidth, low latency applications, and that the performance of such applications will be jeopardized if network providers are barred from intervening to prioritize low latency applications over other internet traffic when networks become congested (Hunter, 2007). Failure to create the conditions for optimal performance of such applications will undermine consumer confidence in them and discourage innovation in new internet-related products and services as a result.

Network providers also argue that the viability of their networks faces increasing pressure from malicious code (viruses, worms) and bandwidth-greedy applications such as P2P file-sharing (Hunter, 2007). In order to manage such threats and ensure continuity and quality of service to their customers, they argue, providers need to take advantage of the latest tools of network management, e.g. blocking, filtering and deep packet inspection.

Network providers have also criticized a variety of proposals for legislated network neutrality that have surfaced in the wake of statements by industry executives such as Whitacre and Smith. *Hands-Off-the-Internet* (HOTI), a network industry lobby group, argues that “the Net’s phenomenal growth over the past decade stems from the ability of entrepreneurs to expand consumer choices and opportunities without worrying about government regulation” (Hands-Off-the-Internet, 2007). HOTI claims that mandatory network neutrality would be “the start of a never-ending flood of legislation and regulation” that would limit consumer choice and stifle innovation, investment, and internet freedom. HOTI goes on to claim that the internet “could never have developed with the freedom and the speed we see today if the federal government had taken a heavy-handed regulatory approach”.

Canadian telecommunications and cable companies have been relatively quiet about their views and intentions with regard to network neutrality, although several have acknowledged deviating from it in practice (McTaggart, 2006). In the autumn of 2006, however, Robert Depatie, head of Quebec-based cable internet service provider Videotron, called publicly for the federal government to impose a “transmission tariff” on internet content and service providers like iTunes and Amazon, in order to cover the costs of the network bandwidth and infrastructure used by their customers. Echoing Whitacre, Depatie said: “If the movie studio were to mail a DVD...they would expect to pay postage or courier fees. Why should they not expect a

transmission tariff?”. Major content and application service providers should not expect what he called “a free ride” on Videotron’s network.

“We build the network, renovate the network, spend the money on marketing to get customers, we invoice and service those customers. We pay a great deal of money...”
[For producers] it's just a free ride — ‘Let's provide movie downloads. It's the telcos that will pay for it.’ (Panetta, 2006)

Depatie’s proposal called for the government to share the proceeds of such a fee among network owners, just as it imposes copyright levies on blank media such as CDs, who would reinvest them in infrastructure upgrades (Panetta, 2006).

Other major network providers have made only limited public statements about the issue of network neutrality. A Bell Canada spokesperson, for example, has said that “Our position on network diversity/neutrality is that it should be determined by market forces, not regulation” (Goodman, 2006). Other Bell Canada officials have been somewhat more vocal in their dismissal of concerns about network neutrality, arguing that it is largely a solution in search of a problem (Hunter, 2007). For its part, Rogers Communications acknowledges that its technology “ensures network capacity is reserved for such services as email and Web surfing,” and that “peer-to-peer traffic does not overwhelm the system” (Engelhart, 2007). Meanwhile, Craig McTaggart, a legal scholar and regulatory counsel for Telus Communications, has argued that non-neutral practices have been deployed by network providers for many years, that such practices are necessary to sustain network services and produce adequate return on investment, and that the adoption of such practices benefits consumers as well as network providers (McTaggart, 2006).

5.2 CONTENT AND APPLICATION PROVIDERS

Internet and other new media content suppliers and application providers in the U.S. have responded to network owners’ threats of internet tiering with statements and campaigns in favour of network neutrality. Google, for example, argues that network neutrality “has allowed many companies, including Google, to launch, grow, and innovate”. Google goes on to argue that:

“broadband carriers should not be permitted to use their market power to discriminate against competing applications or content. Just as telephone companies are not permitted to tell consumers who they can call or what they can say, broadband carriers should not be allowed to use their market power to control activity online ... Put simply, this would fundamentally alter the openness of the Internet.” (Google, 2007)

Similarly, in recent testimony to Congress, Google Vice President, Vint Cerf, (one of the architects of the original internet protocols), stated that:

“The Internet has become an immense catalyst for economic growth and prosperity, in this country and around the world. [...] Allowing the interests of network owners to shackle the Internet could severely undercut our nation’s ability to compete effectively in the global market. We must do all we can to preserve the fundamental enabling principles of the Internet: user choice, innovation, and global competitiveness.” (Cerf, 2006).

Google is also involved with the net neutrality lobby group, the *Open Internet Coalition*, the membership of which consists of many top-drawer web companies, including Amazon, eBay, PayPal, Earthlink, Skype and YouTube (Open Internet Coalition, 2007).

Another internet company whose business would be negatively impacted by non-neutral practices is Vonage, a U.S.-based provider of VOIP telephone service with 2.5 million subscribers. Vonage’s business model relies heavily on gaining unimpeded access to its subscribers’ broadband service. According to the company’s most recent annual report,

“The success of our business relies on customers’ continued and unimpeded access to broadband service. Providers of broadband services may be able to block our services or charge their customers more for also using our services, which could adversely affect our revenue and growth. [...] Some providers of broadband access may take measures that affect their customers’ ability to use our service, such as degrading the quality of the data packets we transmit over their lines, giving those packets low priority, giving other packets higher priority than ours, blocking our packets entirely or attempting to charge their customers more for also using our services. [...] *Interference with our service or higher charges for also using our service could cause us to lose existing customers, impair our ability to attract new customers and harm our revenue and growth.* These problems could also arise in international markets. *For example, in 2006 a Canadian cable provider began offering an optional Cdn\$10 per month “quality of service premium” to customers who use third-party VoIP services over its facilities. However, customers who purchase VoIP services directly from this cable provider are not required to pay this additional fee.*” (Vonage, 2007 - emphasis added)

In recent years, Vonage has been involved in a number of legal and regulatory disputes involving broadband providers, including an important network neutrality complaint before Canada’s CRTC. In March 2006 Vonage filed a complaint with the CRTC regarding Shaw Communication’s \$10 quality of service for VOIP users. According to Vonage’s complaint:

"Because Vonage competes directly with the telephone services of the network operators that also provide the high-speed Internet access, the incentives to discriminate against us are clear. This will result in less innovation, less choice and higher prices for Canadian consumers in the long run. [...] there is good reason to believe (Shaw's) service offering is not an enhancement to Shaw's high-speed Internet service but rather is an anti-competitive measure aimed at either increasing the perceived cost, or damaging the perceived reliability, of the services of independent

Internet telephone service providers when compared to Shaw's higher-priced phone service." (CNW Group, 2006)

5.3 NETWORK NEUTRALITY ADVOCATES, CONSUMER & PUBLIC INTEREST GROUPS

As mentioned above, the network neutrality debate involves more than a dispute between rival industry titans. At stake, according to “net neutrality” advocates, broadband users, and consumer and public interest groups are a range of public interest issues and the communication and democratic rights of citizens. Net neutrality and other consumer and public interest groups argue that network neutrality is indeed at risk and that there is growing evidence of abuse and discrimination that harms the interests of consumers.

April 2006 saw the launch of the *Save the Internet* (STI) coalition, a grassroots organization spearheaded by media reform activists, consumer and public interest groups, community media organizations, non-profits, bloggers, and academics, among others, to raise public awareness, mobilize supporters and lobby Congress for legislation to mandate protection for network neutrality (Save the Internet, 2007). Among the Charter members of the coalition are the American Library Association, the American Civil Liberties Union, MoveOn.org, and the Consumers Federation of America. STI uses both web-based as well as more traditional means of communication, networking, and lobbying in Washington, D.C.. STI is comprised of over 700 member organizations and has succeeded in gathering over 1.6 million signatures for a petition to the U.S. Congress to protect network neutrality.

STI warns that violations of network neutrality threaten to limit internet users’ freedom to choose, limit the democratic potential of the internet, and to stifle future technical innovation. “Without Net Neutrality,” STI argues, “the Internet will look more like cable TV,” in which “decisions now made collectively by millions of users will be made in corporate boardrooms.” “Network owners,” STI continues, “will decide which channels, content and applications are available; consumers will have to choose from their menu” (Save-the-Internet, 2007).

The introduction of so-called “internet tiering” is a major shift in the network providers’ business model, which has traditionally relied on funding network infrastructure by charging access fees to subscribers. Consumers groups like STI argue that internet tiering means network providers can make money at both ends by charging content providers as well as individual subscribers (who will bear the cost of both in the long run). They also contend that a tiered internet will be biased toward commercial sites and applications with deep pockets and that can

afford to pay tariff charges for access to the “fast lane”, while sites and applications offered by non-profits and individuals will be relegated to the “slow lane,” where service will suffer (Scott *et al*, 2006). Moreover, thanks to increasing cross-ownership between telecom carriers and content providers, many network service providers may be tempted to slap tariffs on content and services offered by competitor networks, effectively locking their customers into accessing content and services provided by the ISP. Internet tiering, STI points out, is qualitatively different from existing industry practices like offering different subscription packages with various bandwidth levels. The latter practice simply charges subscribers an additional fee to use extra bandwidth, without showing preference or prejudice toward the content or applications they chose to access and use.

Net neutrality advocates have identified a variety of broadband user groups that could potentially be harmed by a departure from the principle. STI, for examples, offers the following list:

- **Google users**—Another search engine could pay dominant Internet providers like AT&T to guarantee the competing search engine opens faster than Google on users’ computers.
- **iPod listeners**—A company like Comcast could slow access to iTunes, steering users to a higher-priced music service that it owned.
- **Political groups**—Political organizing could be slowed by a handful of dominant Internet providers who ask advocacy groups to pay "protection money" for their websites and online features to work correctly.
- **Nonprofits**—A charity's website could open at snail-speed, and online contributions could grind to a halt, if nonprofits can't pay dominant Internet providers for access to "the fast lane" of Internet service.
- **E-Commerce consumers**—Companies could pay Internet providers to guarantee their online sales process faster than competitors with lower prices—distorting consumer choice.
- **Small businesses and tele-commuters**—When Internet companies like AT&T favor their own services, consumers won't be able to choose more affordable providers for online video, teleconferencing, Internet phone calls, and software that connects their home computer to the office.
- **Bloggers**—Costs will skyrocket to post and share video and audio clips—silencing citizen journalists and putting more power in the hands of a few corporate-owned media outlets.²

² Adapted from *SavetheInternet.com*

In addition, STI and its members have played an important role in lobbying key Congressional figures from both political parties, and have helped either defeat or promote a number of pieces of legislation containing language relevant to network neutrality. STI and its member organizations successfully lobbied the FCC, for example, to impose network neutrality obligations on AT&T as a condition of approval for the latter's \$85 billion merger with BellSouth. STI was also instrumental in helping to steward network neutrality legislation through the U.S. Congress, including the recently introduced Dorgan/Snowe *Internet Freedom Preservation Act of 2007*, and to defeat anti-neutrality bills such the Stevens bill to amend the *Telecommunications Act*.

Coordinated grassroots mobilization by public interest and consumer groups around the issue of net neutrality has yet to occur in Canada. Having said that, a number of individual and ad hoc group initiatives have recently been launched, most designed to raise the issue's profile and educate Canadians about its public interest dimensions. University of Ottawa law professor, Michael Geist, for example, has discussed the issue on numerous occasions in a regular *Toronto Star* column, as well as his own blog, voicing concerns about the impact of discriminatory networks on innovation and consumer choice (Geist, 2007a; Geist, 2005). In addition, Geist recently appeared before the parliamentary Standing Committee on Industry, Science and Technology. In his comments before the committee, Geist warned of the impact of internet tiering, content blocking and service degradation on the future of internet innovation:

“While consumers already pay different prices for different speeds, imagine a world in which Chapters cannot compete in the online book space because its content is on the slow lane while Amazon is on the fast lane. Consider an Internet where U.S. television shows and movie productions zip quickly to consumers' computers because U.S. studios have paid for the fast lane, while Canadian and user generated content creeps along in the slow lane.” (Geist, 2007c)

Geist has called for net neutrality legislation “so that the opportunities afforded to today's Internet success stories such as Google, Amazon, and eBay will be granted to the next generation of Internet companies along with the millions who contribute content online.” In the absence of such legislation, he argues, the next generation of such content providers and start-ups, including increasingly popular user-generated content sites like YouTube, MySpace and Facebook, may not be able to afford the online exposure that they need to become sustainable.

“The worst-case scenario is that the Googles and the Amazons and the eBays pay and leave everybody else unable to pay, because the fees are simply too high [...] With user-generated

content, many smaller players have the ability to use the network to suddenly find audiences where previously they were unable to do so. But I fear that they may lose some of those audiences, or at least lose the ability to reach those audiences, if they are consigned to a slow track while those who are in a position to pay--broadcasting companies and others--ensure that their content reaches the end-user in as fast a manner as possible.” (Geist, 2007c)

A second argument points out that there is limited competition in the Canadian broadband access market, meaning that subscribers have little meaningful opportunity to change service providers if they are affected by or unhappy with their ISP’s practices. Net neutrality opponents often argue that market forces are sufficient to discipline providers and prevent abusive practices, in so far as consumers always have the option to switch providers. However, as Geist and other commentators have pointed out, consolidation in the Canadian broadband service market over the last few years is reducing consumers’ room for maneuver and weakening their ability to discipline providers by switching. In addition, there is so little transparency and disclosure with respect to such practices on the part of ISPs that subscribers have no way of knowing if and how their service is being affected by them (Geist, 2007c).

Participants in an Alternative Telecommunications Policy Forum, held in Ottawa in the autumn of 2006, identified net neutrality as a key concern. In a subsequent letter to Industry Minister Bernier, Forum organizers called on the government to strengthen net neutrality protection in Canada (CRACIN, 2007). A number of web sites have been established by individuals and ad hoc groups in order to raise awareness of the issue, including *neutrality.ca* and *whatisnetneutrality.ca*. The *neutrality.ca* site featured an online petition to parliament that garnered roughly 2000 signatures, calling on legislators to adopt strong protection for net neutrality in Canada. The *neutrality.ca* web site was briefly taken down by its owner in April 2007 after alleged threats of legal action (MacArthur, 2007). The site has been re-launched under new ownership. *Whatisnetneutrality.ca* offers a non-partisan overview of the debate, in an effort to educate Canadians about the issue. Activities such as these have achieved some modest successes, raising the issue’s profile among Members of Parliament, for example, a number of whom have since pressed Industry Minister Bernier on the issue.

6.0 ACADEMIC RESEARCH AND DEBATE ON NETWORK NEUTRALITY

A number of academics and other experts in telecommunications law and policy have recently waded into the network neutrality debate. Academic analyses of the issue tend to be divided between proponents of so-called “network diversity” and network neutrality purists, although a growing number have also begun to articulate something of a compromise position that acknowledges the necessity of some degree of differentiation between types of traffic, as well as controls on spam and the like, while precluding blatantly discriminatory and anti-competitive conduct by network owners.

6.1 “NETWORK DIVERSITY” PROPONENTS

Noteworthy academic proponents of “network diversity” include Christopher Yoo, Thomas Hazlett, and Craig McTaggart. These and other academics advance a number of arguments in defense of industry practices that diverge from the principle of network neutrality, and offer a number of criticisms of network neutrality in practice. Among the claims they advance are the following: the internet was never neutral, ie. differential treatment of internet traffic is a longstanding norm; “network diversity” is good for consumers and promotes investment and innovation in broadband deployment and service; and mandatory net neutrality legislation will stifle investment and innovation in broadband.

6.1.1 *The internet was never neutral*

Defenders of “network diversity” argue that if the internet ever was neutral, it is not now and has not been for some time. Responding to consumer demand for high quality services, premium content, and applications that are increasingly latency sensitive (e.g. VoIP), network owners and network service, application and content providers have developed technological, legal and business practices that deviate from the principles of network neutrality. Such practices take place at a variety of levels, from the treatment of content in the ‘last mile’ to the management and routing of packets at the deepest layers of the internet (McTaggart, 2006; Sandvig, 2006)

Based on the prevalence of existing industry practices that deviate from network neutrality, industry apologists argue that net neutrality rules “cannot be justified as simply a codification of ‘the way the internet has always been’,” since the internet has not measured up to

the demands of net neutrality advocates for many years (2006: 1). “If the internet was ever predominantly ‘neutral’,” McTaggart claims, “it was at a time when the public was not allowed to use it,” harkening back to its early days as a US Defense Department and academic computing project (2006: 1). Thus, the vision of the internet that is proffered by net neutrality enthusiasts is an anachronistic one that is neither representative of the internet as it operates today nor of what its users increasingly expect and demand. Today’s internet is a predominantly commercial one where ‘non-neutrality’ is the norm rather than the exception; “To require ISPs to treat all packets equally would be to attempt to impose a completely new rule that would fundamentally alter the way the internet works,” McTaggart claims, in a way that would conflict with consumer demand and interests (2006: 2).

6.1.2 *Network diversity is good for consumers*

A number of academic commentators argue that non-neutrality represents a response to increasing consumer demand for services such as spam-blocking, faster page loading, exclusive content, and quality of service guarantees for low-latency applications such as VoIP (McTaggart, 2006; Yoo & Wu, 2006). According to Yoo, for example, deviations from network neutrality “represent nothing more than network owners’ attempts to satisfy the increasingly intense and heterogeneous demands imposed by end users” (Yoo & Wu, 2006: 1). Under circumstances of scarce bandwidth, differentiated consumer needs (email vs. VoIP applications), an explosion in the use of resource-intensive applications (e.g. streaming video), and the increasing availability of technological tools for the differential treatment of internet traffic, it is only natural that network owners and operators have turned to non-neutral practices in order to meet consumer expectations while managing their network resources. Adherence to long-since-abandoned network neutrality principles such as best efforts, FIFO etc. would hand-cuff network owners’ ability to meet their customers’ demands and expectations. “Best-efforts,” according to McTaggart, “has become a bug, rather than a feature” of the internet (McTaggart, 2006: 15). Furthermore, in the absence of any evidence that consumers resent or are being harmed by non-neutrality, governments have no cause to step in and prohibit it (McTaggart, 2006: 5).

Network diversity proponents acknowledge some risk of anti-competitive behaviour on the part of vertically integrated network owners that have financial interests in content and applications services as well. However, in addition to having a stronger incentive to maximize

the utility of their networks for users by facilitating rather than restricting consumers' access to the content and applications of their choice, such firms can be held in check by anti-trust and competition laws. There is no compelling need for additional net neutrality legislation to control such anti-competitive behaviour (Yoo & Wu, 2006: 3).

6.1.3 *Network diversity promotes broadband investment and innovation*

Network diversity advocates also argue that the potential to reap additional profit from the creation of multiple tiers of broadband service provides industry with the incentive to innovate in the area of new services and applications, thus enabling network owners to offer increased choice to consumers. By opening up new revenue streams through product and service diversification (e.g. access tiering and QoS enhancements), network owners will be encouraged to extend and reinvest in broadband networks, helping to drive penetration and increase network speeds. Blanket regulatory and legislative prohibitions against non-neutral practices and arrangements in the name of an anachronistic vision of net neutrality would remove the network owners' incentive to innovate in product and service lines and to reinvest in their infrastructure (McTaggart, 2006, Yoo & Wu, 2006: 3).

6.2 NETWORK NEUTRALITY PROPONENTS

6.2.1 *"The First Amendment of the internet"*

Proponents of network neutrality offer a number of main arguments to defend it in practice, policy and law. Firstly, proponents argue that network neutrality is continuous with customary traffic routing practices that have been in place for decades and date back to the origins of the internet and its foundational TCP/IP protocols. As such, net neutrality has acquired the status of "the First Amendment of the internet". The *Brand X* decision and subsequent fallout in the form of relaxed protection for net neutrality and the development of network business models based on discrimination constitute threats to the very foundations of the internet as it has developed over decades (Scott et al, 2006:7-8). As such, deviations from the norms, practices and laws of non-discrimination should be openly debated and resisted.

Allusions to the First Amendment right of free speech are not accidental. Network neutrality proponents link preserving this principle with the preservation of freedom of speech in cyberspace. Net neutrality protects freedom of expression and speech on the internet by ensuring that network operators don't willfully engage in blocking or degrading access to lawful content and applications. The fact that network owners like Telus Communications Inc., MCI Canada, Clearwire, Shaw Communications, and Madison River Communication and others have already demonstrated a willingness to engage in such practices underscores the need to codify network neutrality and non-discrimination guarantees in law.

6.2.2 *Network neutrality is the new common carriage*

Network neutrality is continuous with regulatory concepts and obligations in telecommunications law and policy, such as common carriage and open access, that date back to the early 20th century (Meinrath & Pickard, 2006; Scott, Cooper and Kenney, 2006). Throughout the history of telecommunications regulation, and in spite of recent waves of deregulation in the sector, the principles of non-discriminatory interconnection and access (net neutrality) have been preserved. Laws prohibiting discrimination by carriers have been entrenched in U.S telecom policy and regulation for a century, and have been adapted and updated with the introduction of new technologies (Meinrath & Pickard, 2006: 5). Net neutrality advocates defend principles for which ample historical precedent exists, and seek merely to return to the *status quo* that existed prior to the Supreme Court's 2005 *Brand X* decision.

6.2.3 *Net Neutrality benefits consumers and encourages innovation, investment and competition*

Consumers benefit from net neutrality rules because the latter place them in control of the content and applications they want to access without unwarranted interference from network operators. Network neutrality ensures the end-to-end nature of the internet as a "dumb" network, where intelligence is located in end-user devices controlled by consumers at the edges of the network. All consumers have equal access to the content and applications of their choice at a given level of bandwidth without being subject to network operators selectively speeding up or slowing down content and applications based on exclusive deals with providers. "This genius of the network," Scott *et al* write, "has proven to be a wonderland for entrepreneurs."

“It is critical to remember that the internet’s brand names of today were just ‘good ideas in garages’ a decade ago. College kids created Google. A hobbyist conceived the idea for eBay [...] Some of the most popular sites on the internet right now – MySpace, Facebook, and YouTube – didn’t exist three years ago. This technological revolution keeps turning because the internet is an unrestricted marketplace of ideas where innovators rise and fall on their merits.” (Scott *et al*, 2006: 10)

In other words, when content and application developers and providers are free to innovate and offer new products and services without having to pay ‘transmission tariffs’ or fear that their services will be degraded by network owners if they don’t, consumers benefit from the increased choice that results.

In addition to fostering consumer choice and innovation, there is evidence that network neutrality rules would promote rather than stifle investment in broadband infrastructure and increased capacity. A recent study by University of Florida economists found that broadband service providers would have much more incentive to expand their infrastructure and capacity under a network neutrality regime than under a non-neutral regime (Cheng, Bandyopadhyay and Guo, 2007: 30). The authors also point out that in the Japanese broadband market, where discrimination is prohibited and competition among providers is vigorous, consumers enjoy bandwidth speeds in excess of 100Mps at lower prices than those paid by US consumers (Cheng *et al*, 2007: 30)

6.2.4 *The broadband market is too concentrated to discipline anti-competitive conduct*

Broadband providers argue that market forces and competition – the fact that consumers can switch providers if they don’t like their existing providers’ practices – are sufficient to discipline the latter and prevent them from engaging in anti-competitive or discriminatory conduct that harms consumers (McTaggart, 2006). As a number of other commentators have pointed out, however, broadband markets in the U.S. and Canada tend to be quite concentrated, with incumbents enjoying significant market power in most major markets. In the U.S., for example, 98 per cent of broadband consumers find themselves facing local duopolies consisting of an incumbent DSL service and a cable modem service, while the market share of competitors using alternative access technologies (satellite, fixed and mobile wireless, and broadband over power lines) has actually decreased. Even more troubling, according to Scott *et al*, is that a significant number of communities are served by only one broadband provider (Scott *et al*, 2006).

The situation in Canada is similar, if not worse. According to Clement, “the telecom and cable industry here is more highly concentrated and more vertically integrated than it is in the United States and that poses the threat of the exploitation of the control over the networks to favour or block content or services” (Clement, 2007). Recent CRTC statistics on competition in Canadian telecommunications markets bear Clement out. The combined revenue market shares of incumbent telcos and cablecos was 85% in 2005, up from 82% in 2004. Revenue market share for competitor firms went down, meanwhile, from 15% to 12% in the same period. The four largest ISPs along (Bell, Telus, Rogers, and Shaw) have steadily increased their share of revenue from the retail Internet access market, from 44% in 2001 to 63% in 2005. Market share for all other providers has declined from 52% to 37% in the same period. The same four companies have also increased their share of residential internet access subscriptions. Between them, incumbents and cablecos have cornered almost 96% of all high speed subscriptions (CRTC, 2006a). The regionalized nature of Canada’s residential broadband access market suggests that in most parts of the country the problem is even more pronounced. Most consumers face a DSL/Cable duopoly, with one incumbent telco and one cable internet service provider. For example, while Canada has 3 major cable providers (Shaw, Rogers, Videotron) these are regionally concentrated, with Shaw operating largely west of the Ontario/Manitoba border, Rogers operating primarily in Ontario, and Videotron in Quebec. Among incumbent telcos, Telus serves western Canada, while Bell Canada serves broadband internet subscribers predominantly in Ontario and Quebec.

Given the highly concentrated nature of U.S. and Canadian broadband markets, consumers lack the necessary choice and option to switch between providers to impose the kind of discipline on incumbent telcos and cablecos necessary to prevent them from engaging in anti-competitive and discriminatory practices (Clement, 2007).

6.2.5 *Content providers already pay for network access*

Telecommunications and cable broadband executives have often claimed that internet content providers ride over the formers’ network infrastructure for free. However, as has been pointed out, all internet content, e-commerce and application providers pay for access to the internet in order to reach their customers. In fact, the “enterprise” sector of the internet services market is worth billions of dollars in revenue for the incumbent telco and cable firms. The internet access

market in the U.S., for example, was worth \$28.3 billion in 2005 (Telecommunications Industry Association, 2006). According to a recent estimate by the American Electronics Association, the U.S.'s 7.3 million enterprise internet access customers spend \$13.1 billion in order to access and make their products and services available via the internet (American Electronics Association, 2006). Internet service provision is a \$4.5 billion market in Canada and is currently one of the fastest growing segments in the telecommunications sector overall. Canadian businesses paid \$860 million dollars to telecommunications firms for enterprise internet access services in 2006 (CRTC, 2006a).

6.2.6 *Incumbent infrastructure has been subsidized by the public purse*

Incumbents in Canada and the U.S. frequently claim that content and application providers ride free over wireline infrastructure that is owned by the former. Some commentators have pointed out, however, that a significant portion of the cost of this infrastructure has been subsidized by the public purse in the form of access to rights-of-way, government support for extending broadband infrastructure to rural and remote communities, and generous tax breaks (Meinrath and Pickard, 2006; Scott et al, 2006). In the U.S. for example, 98 per cent of wireline infrastructure is strung along public rights-of-way without compensation. Municipalities and their residents bear a portion of the cost and inconvenience as telcos lay new fibre-optic cable under major traffic thoroughfares. Until governments began to auction off valuable radio spectrum in the last few years, wireless carriers were given access to public airwaves practically free of charge. The value of U.S. government subsidies to incumbent telcos to extend and maintain telephone service in rural areas has exceeded \$5 billion over the last five years (Scott *et al*, 2006). In Canada, meanwhile, the federal government has invested more than \$600 million over the last decade to improve access to the internet and deepen broadband penetration across the country, investments that broadband incumbents have profited from both directly and indirectly. Generous tax treatment of telecommunications firms, in the form of write-offs for depreciation etc., constitutes another important way in which their infrastructure builds are publicly subsidized.

6.2.7 *Deep packet inspection threatens consumer privacy*

A number of commentators have also drawn attention to the privacy implications of allowing network owners to use deep packet inspection technologies that enable them to monitor network traffic, including potentially monitoring, analyzing and filtering the content of subscribers' internet transmissions (Chester, 2006). Indeed, such concerns have been acknowledged and validated in a recent report on traffic prioritization by the OECD. According to the report,

“policy makers should be aware that the wide-spread adoption of packet shaping technologies at least gives operators the ability to flag packets based on the payload (contents) of the packet and the IP address of the user. This could, in turn, raise fears that data could easily be processed for purposes unrelated to traffic routing. The privacy issues may be complex under a multi-tiered internet structure and could warrant particular attention by privacy specialists.”

(Organization for Economic Cooperation and Development, 2007)

One potential outcome of the increasing adoption of deep packet inspection technologies to filter and meter access to the internet is a technological arms-race of sorts between, on the one hand, network users seeking to disguise the nature of their transmissions via encryption (in order to avoid costs, circumvent filters, speed up access etc.) and, on the other, network owners seeking to decrypt, identify and maximize profit from all such network transmissions (Meinrath and Pickard, 2006).

6.3 TOWARD A “THIRD WAY” ON NET NEUTRALITY?

A number of scholars approach the net neutrality issue from a more moderate perspective and have been working on articulating a compromise position or a “third way” (Atkinson and Weiser, 2006). Tim Wu, Christian Sandvig, Jon Peha, Robert Atkinson and Philip Weiser, among others, acknowledge that a variety of non-neutral practices have become common-place in the operation of the contemporary internet and concede that not all forms of non-neutrality or discrimination are necessarily bad. While these authors reject an absolute ban on differential or discriminatory treatment of packets, they nonetheless recognize the need for legislative and regulatory controls to ensure that consumers are protected against ISPs abusing their power. For “third way” proponents, the question is not one of neutrality versus non-neutrality but, rather, of how to distinguish between benign and more malignant forms of packet differentiation and discrimination. Wu writes, “what I think is going on in the network neutrality debate – the useful

part of it – is getting a better grip on what amounts to good and bad forms of discrimination on information networks” (Yoo & Wu, 2006: 2).

6.3.1 *The internet isn't neutral now*

Third way proponents acknowledge the diversity or non-neutrality of the contemporary internet, as well as the possibility that some forms of discrimination are necessary and beneficial, such as measures to control spam and congestion. Echoing McTaggart, for example, Sandvig writes: “While a recent policy debate calls for nondiscrimination rules to protect a neutral Internet, the Internet isn't neutral now.” “Many kinds of discrimination are at work—often secretly—and it is not at all clear that all of these are a bad idea” (Sandvig, 2006). The pro-network neutrality position is conceptually flawed, Sandvig argues, because it rests upon and defends an ideal of neutrality that is purely notional. The internet has not functioned neutrally for a long time, if it ever really did. According to Sandvig, exclusive and secretive deals between network owners and content and applications providers date back to the 1990s. Sandvig stresses the prevalence of technological tools that network owners use today that deviate from network neutrality.

“Technological manipulation of traffic—as opposed to legal—is not in the future and is not speculative. A wide variety of software packages and tools now exist to assist Internet providers in inspecting the content of Internet traffic and controlling it, including Packeteer, L7-filter, Packet Details Markup Language (PDML), netscreen-IDP, and NetScout. These are not prospective or experimental—many of them appear to be robust software packages that are in wide use” (Sandvig, 2006: 7).

Tim Wu, another “third way” net neutrality scholar, argues that insofar as the original TCP/IP protocols and best-efforts customs of the early internet treated all packets the same, regardless of latency-sensitivity, one could argue that in fact the architecture of the early internet too lacked neutrality, in so far as it contained a bias toward latency-insensitive applications like email and web browsing:

“As the universe of applications has grown, the original conception of IP neutrality has dated: for IP was only neutral among *data* applications. Internet networks tend to favour, as a class, applications insensitive to latency (delay) or jitter (signal distortion). Consider that it doesn't matter whether an email arrives now or a few milliseconds later. But it certainly matters for applications that want to carry voice or video. In a universe of applications, that includes latency-sensitive and insensitive applications, it is difficult to regard the IP suite as truly neutral as among all applications.”(Wu, 2005: 149)

6.3.2 *Some forms of discrimination are necessary and beneficial*

A number of scholars have called for a more balanced debate, one that recognizes that some forms of discrimination benefit consumers and operators alike (Peha, 2006; Sandvig, 2006; Wu, 2003). By framing the debate in terms of “inherent evils of discrimination, violations of revered Internet traditions, the basic freedoms of consumers and divine rights of carriers,” Peha argues, net neutrality purists obscure this common sense perspective.

Potentially beneficial forms of discrimination, according to Peha, include the use of deep packet inspection to detect and block malicious and nuisance packets associated with viruses, spyware, denial of service attacks, and spam (Peha, 2006: 7). In the hands of network operators, use of such tools is consistent with consumer interests and demands. Indeed, consumers themselves make routine use of various tools to detect and block malicious packets. Another application of discriminatory network management that benefits users is the use of packet scheduling and dropping software that reduces the priority of packets associated with bandwidth-greedy applications such as BitTorrent, particularly during times of high network congestion, in order to ensure sufficient bandwidth is available for all users (Peha, 2006: 7). Prioritizing latency-sensitive applications (quality of service – QoS) such as VOIP is also beneficial, since such applications can become useless without it, while users of latency-insensitive applications that are assigned a lower priority, such as web browsing and email, experience minimal inconvenience to meet the QoS needs of others (Peha, 2006: 8).

While sanguine about the potential benefits of discrimination for consumers, Peha remains mindful of the circumstances in which discrimination can be detrimental to them, particularly in situations where competition is limited or non-existent. Harmful forms of discrimination include: cable and telephone network operators blocking, degrading or overcharging for IP-based video and voice applications that compete with their own legacy services; monetization of congestion by intentionally degrading service for certain applications in order to induce users to subscribe to QoS enhancements; extraction of oligopolistic rents from upstream markets by charging additional fees to any product or service provider (e.g. Apple iTunes, Amazon books) whose business depends on gaining access to the network and its subscribers; and the blocking, degrading or redirecting of traffic associated with products and services that refuse to pay such access fees (Peha, 2006: 11). In addition, network operators may be tempted to block or degrade certain forms of traffic that benefit users while reducing the profit of certain businesses. For

example, in exchange for a fee paid by adware firms, networks can block anti-spyware software run by users. Similarly, copyright owners can pay network operators to block users' access to copyrighted content, whether legal or otherwise (Peha, 2006: 13).

6.3.3 *Policymakers need to distinguish between good and bad forms of discrimination*

Given the prevalence, entrenched position and, in some cases, benefits of such non-neutral technologies and practices in managing network resources, Sandvig argues that the more fruitful and necessary debate to be had should be about what forms of discrimination are acceptable and beneficial versus those that are not, and about how to ensure that practices of discrimination are made transparent to users.

“On the inevitably discriminatory, biased, tollbooth-ridden Internet that already exists in 2006, the issue is not neutrality. Instead, it is who discriminates for what purpose, and whether this discrimination is hidden or visible. To reason meaningfully about the present and future of the Internet, we need not neutrality, but a normative vision of what public duties the Internet is meant to serve.” (Sandvig, 2006: 1)

In other words, the forms of discrimination that we take to be “good” and “bad” will depend in large measure on what we think the network is for and what it ought to do. It is this broader debate that needs to take place, rather than the current, highly polarized one between defenders of a nonexistent neutral internet and champions of a proprietary, commercial internet that few, other than the incumbents, want.

Peha opposes an across-the-board ban on non-neutral/discriminatory forms of network management: “imposing a broadly-defined network neutrality policy could prohibit carriers from adopting [...] valuable practices” (Peha, 2006: 2). The challenge of achieving a balanced policy lies in limiting network operators' use of discrimination to exploit market power and harm consumers while leaving room for discrimination that the latter would benefit from. The trick is in regulating in a fashion that limits the potential for abuse without imposing burdens that are worse than the potential harm of the discrimination one is trying to prevent.

Wu proposes a set of criteria for distinguishing between permissible and prohibited forms and grounds of discrimination. Wu makes a distinction between “capacity-based” and “content-based” discrimination. “Capacity-based” discrimination involves placing limits on the amount of traffic users can generate at a given time, without regard to the content of said traffic, while “content-based” discrimination involves blocking, degrading or, alternatively, enhancing, users'

access to certain content for commercial reasons. Whereas the former would be allowed under Wu's scheme for the purposes of network management, the latter would be prohibited. Thus, traffic discrimination or bandwidth caps to "prevent broadband users from interfering with other broadband or Internet users' use of their Internet connections," - by, for example, running bandwidth greedy applications like BitTorrent - would be permissible (Wu, 2003: 170).

6.4 Towards a Neutral Internet for All?

What might a realistic framework for a neutral internet look like, one that meets the network management needs of broadband providers and users while respecting the principles of non-interference and non-discrimination that have served the internet and its users so well thus far? Clement and Longford have recently proposed a framework for the operation of a neutral internet, one that re-conceives neutrality in more pragmatic terms and tries to avoid the extremes of net neutrality puritanism on the one hand and unfettered network provider control on the other (Clement and Longford, 2007).

Clement and Longford propose six principles for a neutral internet which, if implemented and respected, would ensure that the internet continues to develop as a platform for economic growth, innovation, and democratic communication (See Figure 2).

Figure 2: Towards a Neutral Internet for All: Six Principles

1. Basic broadband service

Broadband network operators should provide "Basic Access Broadband," a meaningful, neutral Internet connectivity service, [capable of handling all major application classes]. Beyond providing this level of service, operators would be free to determine all service parameters.

2. Common carriage

Broadband network operators should maintain a strict separation between network carriage infrastructures and the content and services offered over them. They must ensure nondiscriminatory access and interconnection to competitors, including municipalities and public utilities, as well as data and content service providers.

3. Open

Network infrastructures at all layers should be based on open architectures, standards and protocols, especially for interconnection and interoperability with other networks and devices.

4. Transparent

Network operators should make available to customers, citizens and oversight bodies in clear and understandable terms their service offerings, prices, terms of inter-connection and peering agreements, as well as other aspects of their operation of vital public interest. Where operator actions may impair service, they need to provide clear notice and justifications.

5. Privacy protective

In keeping with legislative requirements and common carrier principles, network operators should keep personal information secure and under customer control. No 'back-doors' and deep packet inspection. Surveillance activities should be strictly limited in scope and demonstrably lawful.

Source: Clement and Longford, 2007

7.0 THE POLICY LANDSCAPE: NETWORK NEUTRALITY POLICY IN CANADA AND ABROAD

7.1 HISTORICAL CONTEXT: NETWORK NEUTRALITY – THE NEW COMMON CARRIAGE?

Network neutrality of a sort has been a cornerstone of telecommunications policy in Canada and the U.S. for over a century, and has roots in early telegraph and railway legislation. In the United States, for example, legislation in the nineteenth century prohibited telegraph companies from interfering with and discriminating against transmissions originating from or destined for competitor networks. The principle of “common carriage” – often cited as a historical predecessor to network neutrality – became the centerpiece of telecommunications regulation in the nineteenth century in response to the potential for discriminatory marketplace abuses and anti-competitive behaviour on the part of dominant telecommunications service providers such as Western Union, AT&T and Bell Canada. Common carrier obligations include the obligation to open and interconnect a firm’s network to those of its competitors, and to refrain from interfering with content originating from or destined for rival networks (Noam, 1994). Winseck explains that the purpose of common carrier obligations “is to sever mediated communication from the potentially distorting influence of ownership and control” (Winseck, 1998).

Prior to the birth of the internet, policymakers, regulators and courts maintained a strict separation between network infrastructures and the content and services offered over them, imposing strict obligations on network operators to ensure nondiscriminatory access and interconnection to competitors and data and content service providers. In addition, network providers were prohibited from interfering with customers’ lawful use of telecommunications services in any way. In addition, limits were placed on the ability of telecommunications common carriers to own assets in the content industries, for fear that a convergence of carriage and content would tempt carriers to favour and privilege access to their own content properties at the expense of those owned by competitor firms. In exchange for the burden of such public service obligations and limits, carriers were granted a number of privileges, including limited liability with respect to the content and services carried over their networks, and access to rights-of-way to deploy network infrastructure.

Major telecommunications legislation and regulatory decisions from the nineteenth and early twentieth centuries are replete with references to common carriage and non-discrimination. Foreshadowing the FIFO/end-to-end discourse of contemporary network neutrality advocates,

for example, Section 3 of the *Pacific Telegraph Act of 1860* clearly states that “messages received from any individual, company, or corporation, or from any telegraph lines connecting with this line at either of its termini, shall be impartially transmitted in the order of their reception”. Title II of the U.S. *Communications Act* (1934) established telecommunications firms as common carriers, thus imposed a duty of non-discrimination on all telecommunications providers (Noam, 1994). Section 201 of the Act states with respect to services and charges that:

(a) It shall be the duty of every common carrier engaged in interstate or foreign communication by wire or radio to furnish such communication service upon reasonable request therefor; and, in accordance with the orders of the Commission, [...]to establish physical connections with other carriers, to establish through routes and charges applicable thereto and the divisions of such charges, and to establish and provide facilities and regulations for operating such through routes.

(b) All charges, practices, classifications, and regulations for and in connection with such communication service, shall be just and reasonable, and any such charge, practice, classification, or regulation that is unjust or unreasonable is declared to be unlawful:...”

Canadian telecommunications policy and regulation have a similar early history of enforcing the principles of common carriage (Winseck, 1998). The *Railway Act* of 1906 brought the Bell Telephone Company of Canada under the jurisdiction of the Board of Railway Commissioners, which was empowered to regulate telephone tolls to ensure these were just, reasonable and neither preferential nor discriminatory in their impact, and to order and authorize the terms and conditions of interconnection between Bell and other telephone companies. Section 5 of the *Bell Canada Act* of 1967 states that the company “shall neither control the contents nor influence the meaning or purpose of the message emitted, transmitted or received” nor “be the holder of a broadcast license.” Sec. 27(2) of Canada’s *Telecommunications Act* (1993), states that “no Canadian carrier shall, in relation to the provision of a telecommunications service or the charging of a rate for it, unjustly discriminate or give an undue or unreasonable preference toward any person, including itself, or subject any person to an undue or unreasonable disadvantage.”

The applicability of the conceptual framework of common carriage obligations to network neutrality is disputed however. U.S. net neutrality advocates argue that mandatory network neutrality laws would impose no new obligations on telecommunications carriers but, rather, would simply reinforce historic non-discrimination obligations established in the 1934 *Telecommunications Act* and reinforced in subsequent decisions and regulations. On this view,

net neutrality legislation is continuous with and would merely restore historic non-discrimination obligations to the *status quo* prior to the *Brand X* decision (Meinrath & Pickard, 2006: 4-7; Scott, Cooper and Kenney, 2006: 7). Others see less affinity between common carriage and network neutrality as the latter has been articulated in recent debates. Sandvig, for example, argues that common carriage regulation in the U.S. was far more flexible and contingent in practice than the absolute prohibition on discrimination called for in contemporary visions of net neutrality. Winseck notes that the rigour with which the Government of Canada applied and enforced the principles of common carriage has varied as well, and that a significant relaxation of common carrier rules has been underway in recent decades (Winseck, 1998).

7.2 THE EROSION OF COMMON CARRIAGE AND THE RISE OF INFORMATION SERVICES

In spite of the public advantages of common carriage, the principle of common carriage has gradually been eroded in telecommunications regulation both in Canada and the U.S.. In the U.S. for example, the FCC has distinguished between “basic” and “advanced” telecommunications services since 1980, subjecting only the former to common carriage rules. More recently, in 2002 the FCC struck a blow to the principle of non-discrimination in advanced telecommunications by redefining cable broadband internet provision as an “information service” rather than a “telecommunications service” in order to make an end run around common carrier obligations, giving birth to the *Brand X* case in the process. The effect of the decision was to deny access to the cable companies’ networks to competing broadband service providers, a violation of the interconnection and open access obligations established under common carriage. The FCC decision was later overturned in court. After several years of litigation, however, in 2005 the U.S. Supreme Court handed down a decision in the *Brand X* case, in which it upheld the FCC’s redefinition of cable broadband as an ‘information’ rather than telecommunication service, thus exempting cable broadband network operators from common carrier obligations. The FCC quickly extended this exemption to telephone companies providing broadband DSL service. The current and on-going debate on network neutrality in the U.S. originates out of the *BrandX* decision and the ensuing announcements by newly deregulated incumbents that they planned to change the way the internet worked as a result.

Here in Canada, the 1999 CRTC exemption order on regulating the internet and new media has had a somewhat similar effect on the enforcement of common carriage rules, since it

has left the internet and the ISP service industry unencumbered by legislation and regulation pertaining specifically to them (CRTC, 1999).

7.3 NETWORK NEUTRALITY IN CANADA: LEGISLATION, REGULATION AND POLICY DEBATE

Few elected politicians in Canada have made public statements about network neutrality as of yet, and there are no bills currently being considered that address it specifically. Having said that, existing legislation and regulation offer some purchase for the principle of network neutrality, and a number of key policy and regulatory bodies have issued positions and decisions touching directly and indirectly on the issue, including the 2006 final report of the Telecommunications Policy Review Panel and a number of recent decisions of the CRTC. Questions have also been raised in Parliament about the government's position on network neutrality by the Opposition-controlled Standing Committee on Industry, Science and Technology. The current minority Conservative government professes to be studying the issue. However, since coming to power both the federal Cabinet and the Industry Minister have moved aggressively to deregulate the telecommunications sector and to maximize the influence of market forces over its development, suggesting that the likelihood of the federal government adopting new legislative or regulatory measures to protect network neutrality is low. The following section provides an overview of the key policy and regulatory reports, decisions, announcements and positions recently issued by major players in the federal telecommunications policy scene in Canada.

7.3.1 *Telecommunications Act (1993)*

In addition to Canada's long-standing legislative and regulatory commitment to the principles of common carriage, the existing *Telecommunications Act* contains some language that could give purchase to network neutrality arguments. Section 27(b), for example, provides a guarantee of non-discrimination in relation to the provision of and rate-setting for a telecommunications service, and empowers the CRTC to investigate and rectify claims of discrimination. The Act states that:

“No Canadian carrier shall, in relation to the provision of a telecommunications service or the charging of a rate for it, unjustly discriminate or give an undue or unreasonable preference toward any person, including itself, or subject any person to an undue or unreasonable disadvantage.” (Canada, 1993)

Furthermore, Section 36 prohibits carriers from interfering with the content of messages delivered over their networks. According to the Act “a Canadian carrier shall not control the content or influence the meaning or purpose of telecommunications carried by it for the public.” The applicability of these sections to the network neutrality debate has only just begun to be tested, however. It is also worth noting that in its 2006 report the TPRP recommended the elimination of Sec. 27(b) from the Act.

7.3.2 Cabinet and Ministerial Statements

Ultimate responsibility for legislating and regulating the network neutrality issue falls primarily to the federal Cabinet, the Minister of Industry, and the Canadian Radio-television and Telecommunications Commission (CRTC), who are empowered by the *Telecommunications Act* of 1993. Neither the current Minister of Industry (the Hon Maxime Bernier), the federal Cabinet, nor the CRTC have made explicit policy or regulatory announcements or decisions about the network neutrality issue. However, a number of related policy announcements, initiatives and internal documents suggest that the current government will refrain from any legislative or regulatory measures mandating network neutrality. Indeed, since forming the current government, the federal Conservatives have moved swiftly to deregulate the telecommunications sector by all non-legislative means available, and the Minister of Industry has championed the cause of maximizing the influence of free market forces in the industry at the expense of regulatory intervention (Ditchburn, 2006). In December of 2006, for example, the federal cabinet issued a policy directive to the CRTC (an almost unprecedented move) to henceforth rely on market forces “to the maximum extent feasible”. In addition, since coming into power the federal Cabinet has overturned an unprecedented number of CRTC decisions in favour of deregulation, including major CRTC decisions on VOIP and local telephone regulation.

While the current federal government has not taken an official policy stance on network neutrality, a series of internal documents prepared for the Minister of Industry, and recently made public as a result of an Access to Information request, suggest a clear preference for deregulation and avoidance of the kind of mandatory network neutrality legislation proposed in other jurisdictions such as the United States. For example, ministerial briefing notes on Videotron CEO Robert Depatie’s proposed “transmission tariff” included the following:

“Currently, there is a wide range of contractual arrangements between ISPs and on-line service providers and a range of technical measures have been put in place by ISPs which affect traffic patterns on the Internet [...] In many respects, these measures respond to marketplace demand.” (Industry Canada, 2006c)

As another document makes clear, the Minister is hesitant to adopt network neutrality legislation:

“Market forces have served Canadians well when it comes to the Internet. Public policy must consider a number of aspects of this broad issue, including: consumer protection and choice; enabling market forces to continue to shape the evolution of the Internet infrastructure, investment and innovation to the greatest extent feasible. At this point it is premature to adopt a position on net neutrality. The Internet is moving so fast that caution is warranted before interfering with market forces.” (Industry Canada, 2006c).

7.3.3 Telecommunications Policy Review Panel (TPRP)

A major review of telecommunications policy and regulation conducted in 2005 drew attention to network neutrality as an issue and offered a number of recommendations. In its final report the Telecommunications Policy Review Panel expressed concern with respect to carriers intentionally blocking and/or degrading particular internet content and applications. Among the Panel’s recommendations was a strong regulatory mandate for the CRTC to review complaints and establish rules with respect to content blocking and service degradation. “Customers of [telecommunications] services,” the Panel wrote:

“usually expect to be able to access legally permitted applications and content of their choice. Recently, however, concerns have arisen that this may not always be the case, as a result of the technical capability of network operators and providers of retail Internet services to block or degrade access to certain types of applications or content.” (Industry Canada, 2006a).

The Panel condemned the blocking of legal content by ISPs, citing the example of Telus as an unacceptable and arbitrary intrusion on consumer access. In cases where the reasons for blocking content or degrading applications are commercial and competitive, however, the TPRP was more ambivalent, citing instances in which such practices *would* (e.g. to block illegal sharing of copyrighted material, or degrade file-sharing applications to ensure adequate bandwidth for all subscribers) and *would not* be reasonable (e.g. giving preferential access by commercial agreement to a provider of services such as VOIP or instant messaging while degrading the quality of competitor services in order to encourage subscribers to switch). In any case, the Panel

expressed confidence that providers would have little incentive to abuse their power, that market forces and consumer choice would in most cases be sufficient to discipline them when they did, and that the CRTC should be empowered to regulate when they were not.

The TPRP did recommended specific legislative action to protect network neutrality, as it understood it, saying that:

"The Telecommunications Act should be amended to confirm the right of Canadian consumers to access publicly available Internet applications and content of their choice by means of all public telecommunications networks providing access to the Internet. This amendment should:

- (a) authorize the CRTC to administer and enforce these consumer access rights;
- (b) take into account any reasonable technical constraints and efficiency considerations related to providing such access, and;
- (c) be subject to legal constraints on such access, such as those established in criminal, copyright and broadcasting laws." (Industry Canada, 2006a)

7.3.4 Canadian Radio-television and Telecommunications Commission (CRTC)

The CRTC has made a number of recent rulings with implications for the network neutrality debate in Canada. In its May 2005 decision, *Regulatory Framework for Voice Communication Services Using Internet Protocol* (Telecom Decision CRTC 2005-28) – now known as the Commission’s ‘VOIP decision’ – the CRTC considered and ruled on a number of relevant proposals (CRTC, 2005). While the CRTC VOIP decision was primarily about whether to regulate the pricing of VOIP telephony as a telecommunications service or define it as an internet (and therefore unregulated) service, it also considered a number of net neutrality issues.

A key proposal considered was the imposition of access conditions to ensure that dominant telecommunications and cable firms refrain from anti-competitive practices such as intentionally degrading the VOIP services of competitor firms (e.g. Vonage) delivered over the former’s networks, or charging additional fees to ensure equivalent quality of service for them. Such practices are designed to discourage broadband service subscribers from using any VOIP service other than that offered by their existing ISP. In its decision, however, the CRTC found insufficient evidence of market abuses, such as intentional service degradation, to warrant

explicit prohibitions against them. It went on to suggest that the Sec.27(2) non-discrimination clause gave the Commission jurisdiction to intervene in competitive disputes on such matters on a case-by-case basis.

In May 2006 the federal Cabinet took the unusual step of referring the VOIP decision back to the CRTC for reconsideration in light of increasing demand for VOIP services and the recommendations of the Telecommunications Policy Review Panel (TPRP). The CRTC confirmed its original decision in September 2006. In response, the federal Cabinet took the unusual step of ‘varying’ with the CRTC VOIP decision, thereby requiring the CRTC to refrain from regulating VOIP telephony services with respect to pricing. While the CRTC VOIP decision contained few if any net neutrality guarantees in the first place, the Cabinet variance strengthens the position of incumbents *vis.* new entrants in the VOIP market and offers little protection to consumers.

The CRTC rendered a related VOIP decision in September 2006, involving claims of discrimination made by Cybersurf Corp, (a high speed internet access reseller), against Shaw, RCI and Videotron (CRTC, 2006b). Cybersurf claimed that it was being unjustly discriminated against by Shaw, as Shaw refused to make its \$10 VOIP Quality of Service Enhancement (see above) available to resellers like Cybersurf, thereby placing the latter at a competitive disadvantage. In its claim against RCI and Videotron, Cybersurf insisted that as a third party purchaser of internet access from the former companies, it was being denied access to the functionality of PacketCable software that RCI and Videotron used to offer QoS to their own retail subscribers, thereby preventing Cybersurf from offering a similar range and quality of service. The CRTC rejected Cybersurf’s claim of discrimination.

What is noteworthy about the Cybersurf proceeding is the frankness with which the use of traffic shaping technologies are discussed and Cybersurf’s insistence on its own need to access and deploy such technologies in order to remain competitive. The CRTC was more cautious in its discussion and analysis of the case, however, going out of its way to point out that Cybersurf offered little evidence that such technologies were actually in use by the cable companies in the ways it alleged. The cable companies themselves acknowledged using such technologies on their managed, private networks, but not on their public internet access and services network.

7.3.5 Competition Bureau of Canada

As telecommunications moves from being a regulated to an unregulated industry, disputes between incumbents and competitors, in particular, will migrate from under the bailiwick of the CRTC to that of the *Competition Act* and the federal Competition Bureau of Canada. In particular, the Competition Bureau will take on an increasing role in intervening in and resolving complaints of abuse of dominant market position by the incumbents. There is a strong likelihood, as indicated by a number of recent complaints before the CRTC (e.g. VOIP decision) and as acknowledged by the TPRP, that certain discriminatory and non-neutral practices will become the subject of complaints before the Competition Bureau, thus moving the debate about network neutrality into the area of competition law (Competition Bureau of Canada, 2007).

Anticipating an increasing load of telecommunications cases, the Bureau has taken steps to ensure that it has both the resources and the legal/technical wherewithal to handle it. The Bureau has recently secured additional budgetary resources to handle the anticipated caseload, and has been consulting with both the CRTC and industry stakeholders to establish legal principles for responding to complaints of anti-competitive behaviour in the telecommunications industry (Competition Bureau of Canada, 2007; Scott, 2007a). In its *Draft Information Bulletin on Abuse of Dominance in the Telecommunications Industry*, the Bureau has enumerated a list of practices that could potentially result in enforcement action, including several that are relevant to network neutrality: raising rivals' costs; market foreclosure; margin squeezing; denial of access to a facility; predatory pricing; targeted pricing; and bundling (Competition Bureau of Canada, 2006). According to Commissioner of Competition, Sheridan Scott, "the Competition Bureau has telecommunications as one of its top priorities [...] We will take action in a timely and effective manner if there is evidence of abuse of a dominant position" (Competition Bureau of Canada, 2007).

Having said that, the Bureau has made it clear that it has no intention (or mandate) to impose or enforce network neutrality regulations on an ongoing basis. Consistent with its approach to competition in other sectors (e.g. airlines), the Bureau will respond only to specific complaints brought before it and will act only when it finds that practices adopted by a dominant firm threaten to impair the performance of market forces. Where market dominance or the

impairment of markets are not found, the Bureau will refrain from taking action (Scott, 2007a, 2007b). Furthermore, analysts and critics of the Bureau's track record on investigating complaints of anti-competitive behaviour in other highly consolidated industries, such as airlines, have expressed skepticism about its resolve and ability to discipline major telecom firms and protect the interest of new entrants and consumers (Yakabuski, 2006). Lack of resolve to confront powerful market participants or of the resources needed to investigate and pursue complaints of anti-competitive conduct will diminish the likelihood that the Bureau will play an active role in policing net neutrality in Canada.

7.3.6 House of Commons Standing Committee on Industry, Science and Technology

In the fall of 2006 the Opposition-dominated House of Commons Standing Committee on Industry, Science and Technology (INDU) began to hold a series of meetings and hearings to explore the implications of the Cabinet's then-proposed CRTC Policy Directive. Opposition members of the committee, as well as many witnesses, expressed concern regarding the unprecedented nature and potential impact of the policy directive. In October of 2006 the INDU committee issued a report in which it called upon the Minister of Industry to defer implementing the policy directive until after more public consultations had been held. In the wake of the federal cabinet's variance with the CRTC's VOIP and local telephone exchange decisions, the INDU committee broadened its investigation to examine the issue of telecommunications deregulation more generally. A number of witnesses were heard by the committee, including University of Ottawa law professor and internet policy expert, Michael Geist, whose testimony is cited above. Minister Bernier also testified before the committee, where he was asked about his position on network neutrality. The Minister offered the following response:

“A free market has served the Internet well, which is not regulated, as you know. Through the free play of market forces, innovation has allowed Canadians to take advantage of the Internet. At the present time, we want to ensure that consumers have access to the Internet and the market is competitive. We are currently reviewing possible regulation of the Internet infrastructure. What will the government's position be on network neutrality? It would be premature to tell you what recommendation I will be making on that. The Internet is evolving very rapidly. There is a need to be cautious before introducing regulations. As is the case for other aspects of the Internet, I do not want to adversely affect innovation but would like to continue to look closely at this and, if there is a need, take action at the appropriate time.” (Parliament of Canada, 2007)

7.3.7 Industry Canada Task Force on Spam

Industry Canada established a Task Force on Spam in 2004 to create and oversee the implementation of a national action plan to combat the commercial generation of unsolicited email (Industry Canada, 2005). While seldom regarded as a key policy initiative in network neutrality discussions, the Task Force considered a number of regulatory and technical issues of relevance to the debate. A number of the Task Force's recommendations included endorsements of ISP port and content blocking, measures that deviate from network neutrality strictly speaking. For example, the Task Force recommended a series of best practices for ISPs that included blocking Port 25 in order to control the flow of Spam through their networks.

According to the Task Force's Working Group on Network and Technology Management, ISPs who employ port blocking experience declines of over 95% and 98%, respectively, in the rate of virus emissions and abuse reports, while only a small minority of subscribers are adversely affected by, or even notice, the practice. The Task Force also recommended that ISPs routinely block or examine the contents of email attachments using file extensions known to be popular with virus writers (Industry Canada, 2005). Since Canadian ISPs began implementing routine Port 25 blocking, Canada has dropped steadily down the rankings of the world's most prolific spam-producing countries (Sophos, 2004; 2007). However, such routine Port 25 blocking by ISPs has been challenged in a complaint to the federal Privacy Commissioner of Canada, on the grounds that it violates the latter's rights to privacy under the *Personal Information Privacy and Electronic Documents Act* (PIPEDA), since the practice requires the ISP to scrutinize subscribers' outgoing email. The Commissioner dismissed the complaint as not well-founded, however, and ruled that Port 25 blocking did not violate the terms of PIPEDA (Office of the Privacy Commissioner of Canada, 2005).

7.4 THE UNITED STATES

7.4.1 Federal Communications Commission and the AT&T/BellSouth Merger

The Federal Communications Commission (FCC), which is the chief federal regulator of interstate and international communications in the United States, has been fairly active on the network neutrality issue since 2005, although the Commission's approach has been ambivalent.

On the one hand, the FCC has actively sought to erode the influence of common carrier and non-discrimination rules in the regulation of broadband, while on the other hand it has espoused a general commitment to ensuring that the internet is operated in a neutral fashion.

In the wake of the *Brand X* decision exempting cable broadband providers from common carriage obligations, the FCC implemented a similar exemption for telecommunications firms delivering broadband service. While the Supreme Court and FCC decisions have meant that broadband providers are no longer obligated to open or share their networks with competitors, the Commission asserted its jurisdiction to ensure that broadband networks are operated in a neutral fashion by issuing a Policy Statement on network neutrality in August of 2005. “[T]o ensure that broadband networks are widely deployed, open, affordable, and accessible to all consumers,” the Commission declared its adherence to the following principles:

- **consumers are entitled to access the lawful Internet content of their choice;**
- **consumers are entitled to run applications and use services of their choice, subject to the needs of law enforcement;**
- **consumers are entitled to connect their choice of legal devices that do not harm the network; and,**
- **consumers are entitled to competition among network providers, application and service providers, and content providers.**

(FCC, 2005)

Critics have pointed out, however, that as policy instruments, such statements have little effect. Commission Chair, Kevin Martin, himself conceded that the statement established no new FCC rules and is not enforceable (Mark, 2005).

The FCC’s resolve to protect network neutrality was tested in the spring of 2006 with the announcement of AT&T’s planned merger with BellSouth, a deal worth an estimated \$85 billion. In order to secure FCC approval of the deal, AT&T was compelled to guarantee that it would operate the new combined network in a neutral fashion. The terms of AT&T’s commitment on network neutrality read as follows:

1. Effective on the Merger Closing Date, and continuing for 30 months thereafter, AT&T/BellSouth will conduct business in a manner that comports with the principles set forth in the Commission’s Policy Statement, issued September 23, 2005 (FCC 05-151).

2. AT&T/BellSouth also commits that it will maintain a neutral network and neutral routing in its wireline broadband Internet access service. This commitment shall be satisfied by AT&T/BellSouth's agreement not to provide or to sell to Internet content, application, or service providers, including those affiliated with AT&T/BellSouth, any service that privileges, degrades or prioritizes any packet transmitted over AT&T/BellSouth's wireline broadband Internet access service based on its source, ownership or destination.

This commitment shall apply to AT&T/BellSouth's wireline broadband Internet access service from the network side of the customer premise equipment up to and including the Internet Exchange Point closest to the customer's premise, defined as the point of interconnection that is logically, temporally or physically closest to the customer's premise where public or private Internet backbone networks freely exchange Internet packets [...]

This commitment shall sunset on the earlier of (1) two years from the Merger Closing Date, or (2) the effective date of any legislation enacted by Congress subsequent to the Merger Closing Date that substantially addresses "network neutrality" obligations of broadband Internet access providers, including, but not limited to, any legislation that substantially addresses the privileging, degradation, or prioritization of broadband Internet access traffic.

(AT&T, 2006)

While greeted as a victory for network neutrality in some circles, other net neutrality proponents have expressed dismay with a number of the agreements' loopholes, including the exclusion of AT&T's "enterprise services" customers from network neutrality protection and the agreements' time-limited nature, in which AT&T commits to observing network neutrality rules for no more than two years.

In March of 2007 the FCC also launched an inquiry into the non-neutral practices of broadband service providers in order "to better understand the behavior of participants in the market for broadband services" (Federal Communications Commission, 2007). The Inquiry proposes a fact-finding investigation into the behaviour of broadband market participants, including:

- **How broadband providers are managing Internet traffic on their networks today;**
- **Whether providers charge different prices for different speeds or capacities of service;**
- **Whether our policies should distinguish between content providers that charge end users for access to content and those that do not ; and,**
- **How consumers are affected by these practices**

In addition, the Commission is seeking comment on whether or not a new “principle of nondiscrimination” should be incorporated into the 2005 Policy Statement and how such discrimination should be defined (Federal Communications Commission, 2007). It is worth noting that the Commission itself is divided on how to approach the issue. Two of the five commissioners issued statements lamenting the Commission’s approach and urging that it move quickly from fact-finding to rule-making to preempt providers from normalizing discriminatory practices. Commissioner Copps, for example, wrote that industry and the FCC should commit “unequivocally to a specific principle of enforceable non-discrimination, one that allows for reasonable network management but makes clear that broadband network providers will not be allowed to shackle the promise of the Internet in its adolescence” (Copps, 2007). Whether the Commission’s notice represents an acknowledgement that these practices pose serious problems to be dealt with, or, as critics suggest, a signal to industry that the Commission does not take the issue seriously, remains to be seen.

7.4.2 Congressional Legislation

There was considerable legislative activity on network neutrality in the U.S. Congress in 2006. For example, the Congress considered a major overhaul of the *Telecommunications Act*, along with a number of lesser bills concerning rural broadband and network neutrality. The main telecommunications reform bill was Sen. Ted Stevens' (R-Alaska) *Communications Opportunity, Promotion and Enhancement Act* (S.2686), or the COPE Act, which was supported by the telephone and cable companies. The original COPE Act lacked any substantive reference to network neutrality. A bipartisan initiative on the part of Sens. Olympia Snowe (R-Maine) and Byron Dorgan (D-N.D.), the *Internet Freedom Preservation Act* (S. 2917), was introduced into the Senate in June of 2006. Both bills died in Congress with the Republican defeat in the November 2006 congressional election. The 2006 election has reshaped the US House of Representatives and the Senate, however, putting vocal net neutrality supporters in key positions of power.

In January of 2007, the Snowe-Dorgan *Internet Freedom Preservation Act* was re-introduced into the U.S. Senate. The bill contains a series of amendments to the *Communications Act* (1934). Most notably, the bill calls for a section on network neutrality and broadband service

provision to be inserted into the existing Act. The Act would be amended to state that it is a duty of broadband service providers to do the following:

- not block, interfere with, discriminate against, impair, or degrade the ability of any person to use a broadband service to access, use, send, post, receive, or offer any lawful content, application, service made available via the Internet;
- not prevent or obstruct a user from attaching or using any device to the network of such broadband service provider, only if such device does not physically damage or substantially degrade the use of such network by other subscribers;
- provide and make available to each user information about such user's access to the Internet, and the speed, nature, and limitations of such user's broadband service;
- enable any content, application, or service made available via the Internet to be offered, provided, or posted on a basis that:
 - is reasonable and nondiscriminatory, including with respect to quality of service, access, speed, and bandwidth;
 - is at least equivalent to the access, speed, quality of service, and bandwidth that such broadband service provider offers to affiliated content, applications, or services made available via the public Internet into the network of such broadband service provider; and
 - does not impose a charge on the basis of the type of content, applications, or services made available via the Internet into the network of such broadband service provider;
- only prioritize content, applications, or services accessed by a user that is made available via the Internet within the network of such broadband service provider based on the type of content, applications, or services and the level of service purchased by the user, without charge for such prioritization; and,
- not install or utilize network features, functions, or capabilities that impede or hinder compliance with this section.

The bill states very explicitly, however, that providers are free to engage in "certain management and business-related practices," including:

- protecting the security of a user's computer on the network of such broadband service provider, or managing such network in a manner that does not distinguish based on the source or ownership of content, application, or service;
- offering directly to each user broadband service that does not distinguish based on the source or ownership of content, application, or service, at different prices based on defined levels of bandwidth or the actual quantity of data flow over a user's connection;
- offering consumer protection services (including parental controls for indecency or unwanted content, software for the prevention of unsolicited commercial electronic messages, or other similar capabilities), if each user is provided clear and accurate advance notice of the ability of such user to refuse or disable individually provided consumer protection capabilities.

While still opposed by incumbent telco and cable firms, the Snowe-Dorgan bill contains many of the elements of a compromise position on network neutrality. While the bill calls for the imposition of a number of non-discrimination obligations, it leaves the door open to practices such as traffic prioritization, provided that prioritization is based on class of packets rather than their source, ownership or destination. This means that providers can prioritize VOIP, but must prioritize *all* VOIP services to the same degree and not just affiliated services or those that pay for enhanced priority. In addition, the bill leaves room for providers to take technical measures to protect their networks and users from spam and various forms of malicious code. For network neutrality advocates, the Snowe-Dorgan bill contains significant advantages over the AT&T merger commitments, including the closure of the “enterprise customer” loophole and the absence of an expiry date for network neutrality obligations (Feld, 2007).

7.4.3 Federal Trade Commission (FTC)

Given deregulatory trends in telecommunications there is a strongly likelihood that issues of network neutrality and discrimination in the United States will come under the purview of general competition law. In that event, the Federal Trade Commission (FTC) may become more involved. The FTC is responsible for policing anti-competitive behaviour and consumer protection in the U.S. marketplace. The FTC has charged its Internet Access Task Force with studying the issue of network neutrality. Current FTC Chair, Deborah Platt Majoras, however, has expressed skepticism about the need for network neutrality legislation. “I urge caution in proceeding on the issue. I [. . .] question the starting assumption that government regulation, rather than the market itself under existing laws, will provide the best solution to a problem” (Platt Majoras, 2006)

7.5 EUROPEAN UNION

The European Commission is currently undertaking a major regulatory review of the telecommunications sector. While network neutrality has received some attention, concern about the issue is overshadowed by other priorities, including spectrum management, deregulation, and consolidation of markets and regulations across the E.U. (European Commission, 2007).

Generally speaking, net neutrality concerns have been more muted in the E.U. compared to the U.S. as a result of the E.U.'s relatively stronger protection for access and interconnection rights and the more competitive environment in the 'last mile' broadband market, thanks largely to the adoption of 'local loop unbundling' by many member states. It is generally believed that existing regulations and current market conditions will preclude service providers from engaging in discriminatory and abusive practices, and that there is no need for mandatory network neutrality legislation (European Commission, 2006).

Having said that, the E.U. is nonetheless considering a number of regulatory provisions to reinforce the neutral operation of the internet. Recognizing that under certain conditions "there is a risk that [...] the quality of service could degrade to unacceptably low levels" for some customers, the E.U. is considering adopting *minimum quality of service requirements*. Accordingly, the European Commission is proposing to "give NRAs [national regulatory agencies] the power to set minimum quality levels for network transmission services in an NGN environment based on technical standards identified at EU level" (European Commission, 2006).

Unlike North America, where incumbents are uniformly in favour of network diversity and opposed to network neutrality legislation, incumbent telecommunications firms in Europe are divided on the issue. For example, Deutsche Telecom and Telecom Italia are proposing massive investments in ultra high speed fibre infrastructure, on condition that they be permitted to deny competitors access to their networks. British Telecom and France Telecom, meanwhile, have expressed their contentment with the current regulatory system (Shannon, 2006).

7.6 THE NETHERLANDS

The Dutch parliament has become possibly the first legislature in the world to call for rigid adherence to net neutrality principles by endorsing a strict separation between network ownership and content carriage, in a country with 90% cable penetration and a highly concentrated industry. On October 24, 2006, the parliament approved two resolutions that would force cable operators to open their networks to competitors' content and services (Reuters, 2006). A bi-partisan motion by Christian-Democrat and Labour MPs called on the Economy Ministry to draw up legislation within a year that included "mandatory, open, non-discriminatory

access" to the networks of cable operators. The resolution effectively calls upon all cable companies to legally split their broadcasting arms from their network arms, and allow other broadcasters to use their networks on equal terms.

7.7 UNITED KINGDOM

Telecommunications regulators in the UK currently maintain that there is no need for specific legislation or regulation to protect network neutrality. Officials from both the Office of Communications (Ofcom) and the Department of Industry and Trade maintain that "the European regulatory framework allows us to deal with any issues that may arise" including abuses of market power, and that competitive broadband service markets will discipline providers to treat consumers fairly (Meyers, 2007). Furthermore, Ofcom officials maintain that there are "real advantages to consumers in treating certain types of applications differently to others" (Meyers, 2007). Having said that, Ofcom acknowledges the potential for abuse of market power, as well as a need for broadband service providers to be more transparent and accountable to consumers with respect to practices like traffic shaping.

7.8 JAPAN

While Japan does not have specific network neutrality legislation, its national policy does mandate network sharing by telecommunications firms like NTT East and NTT West, including in the last mile, so that competitors do not have to build rival network infrastructures in order to reach customers (Gross, 2007). As Bleha describes, open access and interconnection rules were key ingredients enabling Japan to leapfrog ahead of the U.S. in broadband deployment and penetration in recent years. The Japanese government "compelled regional telephone companies to grant outside competitors access to all their residential telephone lines in exchange for a modest fee (about \$2 per line a month). The antitrust authorities also ensured that these companies did not create obstacles for their competitors, helping provide a level playing field" (Bleha, 2005). The Japanese case is worth noting, as it stands in contrast to the U.S. example, where the FCC has eliminated network sharing obligations over the last few years. It is also worth noting that such network sharing obligations have had little if any negative impact on broadband deployment and investment in Japan. While opponents of network neutrality in the U.S. and Canada allege that such requirements dampen investments in broadband infrastructure,

the Japanese example appears to counter such claims. Major Japanese incumbents have proceeded with major new network deployments and upgrades despite obligations to share their networks. Consumers appear to have been well-served in the process. Japan's predominantly DSL broadband market is far more competitive than in the U.S., and consumers enjoy 50 Mbps service for roughly \$30 (US) per month, whereas an equivalent amount buys 3 Mbps service from AT&T in the U.S..

8.0 NETWORK NEUTRALITY IN THE ONTARIO CONTEXT

The debate over network neutrality vs. network diversity has potentially significant implications for broadband investment, innovation, and usage in Ontario. Both sides of the debate maintain that the future development of the internet is at stake. Incumbent network providers argue that blanket prohibition of discriminatory practices will constrain the growth and profitability of the industry and dampen future investment in broadband infrastructure and network capacity, preventing providers from meeting consumer demand for reliable high speed service and putting the competitiveness and productivity of the broader economy at risk. If broadband network providers must continue to invest in capacity in order to meet customer expectations while being hindered from diversifying and maximizing revenues by mandatory network neutrality rules, they will have no choice but to pass on the costs of that investment to consumers, who will end up paying more for broadband service. New media content and application service providers, on the other hand, argue that they already pay network providers handsomely for internet access, and that technological and economic innovation will be stifled if network providers are allowed to engage in discriminatory practices such as imposing fees for preferential treatment, since the majority of start-up firms would be unable to afford to pay the fees they would need to pay to reach a critical mass of potential customers. Thus, the growth and vitality of the new media industry would be jeopardized.

While the network neutrality debate has often been framed in terms of a titanic struggle between network versus content providers, it is important to remember that broadband consumers and users are also significant stakeholders in its outcome. How the network neutrality debate is resolved will affect Ontarians not only as broadband consumers but as *citizens* who conduct increasingly important social, economic, cultural and political activities online. How will access to increasingly vital and popular online content and services be affected by the abandonment of network neutrality?

8.1 INDUSTRY STAKEHOLDERS

Here in Ontario, the network neutrality debate has the potential to pit the economic interests of important industrial sectors against one another. Generally speaking, the broader ICT industry is of increasing importance to economic growth and employment in the province. There are over

5,000 firms with combined annual sales of \$40 billion employing over 230,000 workers in the province; with representation in most major sectors, including telecommunications equipment and service, software development and services, cable service, digital media, microelectronics, as well as new technologies like VoIP and wireless broadband (Ontario, 2005).

The province's ICT industries are clustered in three main centres: the greater Toronto area (GTA), Ottawa, and the Kitchener/Waterloo/Cambridge region. The GTA is home to 3,300 ICT firms generating \$25 billion in revenue and employing 148,000 workers. An additional 91,000 workers are employed in information and cultural industries (ICT Toronto, 2006). Together these sectors make up one of the largest employers in the GTA and are a significant source of tax revenue. The GTA's ICT cluster has strengths in manufacturing, software development and ICT services (Ontario, 2005). Major employers include, Allstream, ATI Technologies, Bell Canada, Call-Net Enterprises, EDS Canada, IBM Canada, IMAX, Microsoft Canada, Nortel Networks, Rogers Communications and Telus.

The GTA is also a major hub for the nation's broadcast and digital/interactive media content sectors. The city is home to the third largest film and television industry cluster in North America, and is the centre of Canada's small but rapidly growing digital/interactive media and internet industry. There are over 800 new media firms clustered in the GTA employing 18,000 workers and generating \$2 billion in revenue. Most of these firms are SMEs employing fewer than 10 workers. While the GTA's new media sub-sector represents a relatively small portion of the ICT sector overall, it is one of the fastest growing (City of Toronto, 2007). Better known GTA-based new media firms include Alias, Nelvana, Decode Entertainment and Snap Media.

The City of Ottawa, along with the adjacent communities of Kanata and Napean, are home to 1,600 high tech firms with particular strengths in telecommunications networking equipment, software and photonics. Ottawa's ICT sector generates over \$10 billion in revenue and employs nearly 70,000 workers. Major employers include Adobe, Alcatel Canada, CGI Group, Cisco, Cognos Inc., Corel, JDS Uniphase, Mitel Networks, Mosaid, and Nortel Networks.

The Kitchener/Waterloo/Cambridge "Technology Triangle" in southwestern Ontario is home to 400 ICT firms employing 15,000 workers. Particular strengths of the region include microelectronics, software and telecommunications. Well known firms include COM DEV International, Open Text, Research in Motion (RIM), and Sandvine.

What impact the network neutrality issue will have on Ontario's broadband industries remains to be seen, however, and will certainly depend on how it is resolved by policymakers and regulators. It is also important to point out that, with few exceptions, much of the discussion of the economic impacts of network neutrality vs. network diversity is purely speculative. Few providers have implemented discriminatory charges for delivering content and applications, making it difficult to measure their impact on content providers. In the absence of mandatory network neutrality laws, meanwhile, it remains difficult to estimate how much investment in network deployment and upgrades would be deferred or foregone by network providers, and to quantify the potential impact of such investment decisions on the productivity and competitiveness of the Ontario economy. Of the few available studies thus far, Cheng *et al*'s suggests that while a non-neutral regime would clearly benefit network owners it would also unambiguously impose costs on content providers (Cheng *et al*, 2006). The projected impact on consumers in terms of the price of accessing services and content was less clear. Their study also found that the incentives for network providers to invest in deploying and upgrading network infrastructures were much higher under a network neutrality than a non-neutral regime of regulation. As far as the economic impact in Ontario is concerned, however, there is a significant knowledge gap that needs to be filled before this can be predicted with any certainty.

8.2 BROADBAND USERS IN ONTARIO

While the network neutrality debate is often framed in terms of a titanic struggle between network versus content providers, it is vital to remember that broadband consumers and users are also significant stakeholders in its outcome. Today, some 72 per cent of Ontario's 4 million+ households have internet access (Statistics Canada, 2006), with 54 per cent accessing the internet via broadband (Middleton, 2006). Like most Canadians, citizens of Ontario commonly use the internet for engaging in a variety of activities, including communicating with family and friends, accessing news and government information, pursuing education and training, online commerce and banking, and obtaining health information. Thus, the network neutrality issue has the potential to affect Ontarians not only as broadband consumers but as *citizens* who conduct increasingly important social, economic, cultural and political activities online. For example, network owners now have the means to block or degrade access to certain sites on both political and commercial grounds. Operators might choose, as in the case of Telus, to block sites bearing

political and ideological messages they oppose, or they might be tempted to block or degrade access to political sites if offered the right price by opponents, or to charge such sites for guaranteeing a certain level of access. In any event, the potential for network operators to use their control over networks for political influence and manipulation is greatly enhanced by the new technologies of discrimination (Peha, 2006: 13). As broadband takes on the characteristics of an essential service - like hydro, water, education and health care – the more important citizens’ unencumbered access to it becomes. As former U.S. Vice-President, Al Gore, has recently argued

“Freedom of communication is an essential prerequisite for the restoration of the health of our democracy. ... It is particularly important that the freedom of the Internet be protected against either the encroachment of government or the efforts at control by large media conglomerates. The future of our democracy depends on it.” (Jan 16, 2006)

How will the outcome of the debate affect consumers in terms of the quality and cost of broadband service and content in the future? For example, will a neutral network be able to support the expansion of high bandwidth and low latency services and applications like VOIP that consumers demand? Will network providers be compelled to increase the costs of internet access subscriptions if they are prohibited from experimenting with non-neutral practices and pricing schemes, in order to cover the cost of deploying and upgrading infrastructure? And if so, what impact will this have on the digital divide in the province? On the other hand, what are the implications for the democratic communication rights of Ontario’s citizens (e.g. free speech, privacy) if network providers engage in discriminatory practices with respect to internet content and make increasing use of technologies such as deep packet inspection to support them? Will non-neutrality inhibit access to or drive up the cost of essential content and services, such as government information and services, online learning, and telehealth services? These are difficult questions to answer at this stage in the debate.

8.3 PROVINCIAL AUTHORITY TO INTERVENE IS LIMITED

In spite of the importance of the issues at stake for broadband industries and users in Ontario, the provincial government’s authority and capacity to intervene in the network neutrality debate is relatively limited. Telecommunications policy and regulation fall under federal jurisdiction, with authority for policymaking residing in the federal Cabinet and Minister of Industry and authority for regulating telecommunications carriers resting with the Canadian Radio-television and

Telecommunications Commission (CRTC). Having said that, provincial governments retain some leverage in relation to telecommunications policy and regulation, as well as in relation to telecommunications firms, although it remains to be seen what, if any, influence the provinces are afforded by such points of leverage. Section 13 of the *Telecommunications Act* (1993) recognizes that the federal government has a duty to consult provincial governments when reviewing CRTC decisions or issuing policy directives to the latter. In addition, Section 43 grants telecommunications firms the right to construct and install telecommunications infrastructure along public rights-of-way such as provincially-owned highways and city streets, provided consent is given by affected municipalities or other public authorities, and that such construction does not “unduly interfere with the public use and enjoyment of the highway or other public place”. It is conceivable that provincial or municipal consent could be withheld unless network providers commit to observing network neutrality, although the legality and constitutionality of withholding consent on the basis of such a condition is unclear.

Provincial governments also enjoy the authority to make policy and to regulate in the area of consumer protection. A surge in consumer complaints about traffic shaping and/or restrictive Terms of Use in broadband service delivery might give the provincial government an opportunity to intervene, as it has done in relation to the cell phone industry, which was among the top ten industries in terms of consumer complaints in 2005 (Ministry of Government Services, 2007). The 2002 Ontario *Consumer Protection Act* may have implications for the terms and conditions of contracts and acceptable use agreements between broadband providers and consumers, including how much information network providers should divulge to customers about network management practices such as bandwidth-throttling and the blocking of applications and content. As a complaints-based process, however, government action would only come about as a result of consumer complaints, and would typically take the form of “name and shame” exercises, such as the province’s annual report on consumer complaints (Ministry of Government Services, 2007).

Provincial governments may also influence telecommunications policy, as well as firm behaviour, through their ability to invest in telecommunications infrastructure in general and broadband infrastructure in particular. Some provinces in Canada, such as Alberta and New Brunswick, have made massive investments in the development of provincial broadband infrastructure through partnerships with industry and local communities. Such investments have

enabled these governments to influence the broadband deployment and investment decisions of network providers. Indeed, it has been observed that the most common characteristic of leading broadband nations around the globe is the role of government in investing in network infrastructure and developing comprehensive policy frameworks for broadband deployment (Bleha, 2005). It is instructive to note, as well, that leading broadband nations such as Denmark, South Korea, Canada, and Japan have achieved their status as broadband leaders while maintaining common carriage rules. Nations such as the U.S., meanwhile, that have relied more heavily on market forces have fallen in OECD broadband rankings over the last few years. It is also worth noting that the U.S. has been falling in the OECD broadband rankings while at the same time relaxing rules around common carriage.

Finally, provincial governments have a limited opportunity to influence the outcome of the debate over network neutrality through the control they exercise over municipalities and utilities, which are subject to provincial jurisdiction. A number of municipalities and utilities in Canada and Ontario are exploring options for the development of low-cost regional and/or municipal broadband and, in some cases, wireless networks (e.g. Greater Ottawa, Toronto Hydro Telecom). Such initiatives have the potential to serve as competitor networks to the incumbents, placing pressure on the latter to keep prices competitive and refrain from overt traffic discrimination. As the OECD's traffic prioritization study suggests:

“municipal networks could play a key role in the debate over prioritisation because they provide a platform for service-level competition that could significantly reduce any anti-competitive effects of a multi-tiered Internet structure. An open-access policy allows a variety of providers to offer video, voice and data services in the same market and over the same physical infrastructure. This increased competition reduces the ability of any one provider to block services or demand excessive fees for prioritised data traffic while still providing the benefits of QoS offered by a multi-tiered system.”

(Organization for Economic Cooperation and Development, 2007:24)

9.0 CONCLUSION

The issue of network neutrality burst onto the North American telecommunications policy scene a little over one year ago. While sparked by recent threats from incumbent telecommunications firms and cable companies to charge quality of service fees to content and application providers, the debate reflects deeper issues and concerns about the development of the internet in the context of exploding bandwidth use and the rising popularity of latency sensitive applications. Concerns about the sustainability of the internet under pressure from bandwidth usage trends and security threats have also led some commentators to suggest that network providers need to exercise greater control over the traffic that traverses their networks. As we have seen above, the owners and operators of broadband network infrastructure and services argue that the introduction of network diversity is necessary for them to recoup investments in network expansion and upgrades, meet customer demand, and enhance user experience in a broadband world. Mandatory network neutrality legislation and/or regulation, they argue, will introduce unnecessary regulatory burdens and remove the incentive for providers to invest in network capacity.

On the other hand, opponents of network diversity argue that the introduction of a multi-tiered and discriminatory internet would violate the fundamental operating principle of the internet (network neutrality), threaten consumer access and choice, and suppress service innovation and investment in network capacity (since the network diversity model encourages providers to monetize and exploit congestion points rather than increase capacity). Network neutrality advocates also argue that the issue transcends the conflicting business interests of large corporations in the network service and content industries and has serious implications for the democratic communication rights of citizens in a broadband-enabled society.

While the issues raised in the network neutrality debate are complex, the conflict can be summarized as one between a highly proprietary and commercial vision of a two-tier internet accessed by users and content/application providers based on ability-to-pay (network diversity) and a non-discriminatory, neutral internet through which users and consumers have unfettered access to the content, applications and services of their choice (subject to reasonable limits required for network management) without commercially motivated interference by network owners and service providers (network neutrality). All sides of the debate agree that how the

issue is resolved will have important implications for broadband deployment, consumers, usage, investment, and innovation going forward.

Governments in Canada, the U.S. and Europe are studying the issue carefully, with the U.S., in particular, seemingly poised to enact mandatory network neutrality legislation. The current federal government in Canada, however, has articulated a strong preference for deregulating the telecommunications sector and allowing market forces to determine the future development of the internet. It appears likely that the preferred approach in Canada will be to rely on market forces to discipline network providers that abuse their control over network traffic, and to rely on competition law to resolve complaints of anti-competitive conduct when such forces fail to do so. Concerns have been raised, however, about whether the Canadian broadband market is sufficiently competitive to protect competitor services, content and application providers, and broadband consumers from such abuse, as well as about the resolve and capacity of the Competition Bureau of Canada to confront such cases forcefully. Should public interest and consumer groups succeed in stimulating and mobilizing broader public concern about the issue, as recently witnessed in the U.S., the federal government may be compelled to reconsider its current stance.

REFERENCES

- American Electronics Association (2006) "The Case for Preserving Network Neutrality: Keep Innovation and Competition on the Internet," *The Competitiveness Series*, Volume 11, September 2006, http://www.aeanet.org/publications/AeA_CS_Net_Neutrality.asp
- Associated Press, "Dutch parliament orders cable companies to open networks to competition," *International Herald Tribune*, October, 24, 2006, http://www.iht.com/articles/ap/2006/10/24/business/EU_FIN_Netherlands_Cable_Television.php
- AT&T (2006) Letter, Re: Notice of Ex Parte Communication - In the Matter of Review of AT&T Inc. and BellSouth Corp Application For Consent to Transfer of Control, WC Docket No. 06-74, December 28, http://www.fcc.gov/ATT_FINALMergerCommitments12-28.pdf
- Atkinson, Robert, and Philip J. Weiser, "A Third Way on Network Neutrality," *The New Atlantis*, Number 13, Summer 2006, pp. 47-60, <http://www.thenewatlantis.com/archive/13/atkinsonweiser.htm>
- Bell Canada Enterprises (2005) "Bell Canada and Clearwire Corporation Form Alliance: Bell Canada to be Exclusive VoIP Partner for Clearwire's US Wireless Broadband Network," March 8, 2005, <http://www.bce.ca/en/news/releases/bc/2005/03/08/72179.html>
- Berners-Lee, Tim (2006) "Neutrality of the Net", Decentralized Information Group, May 2.
- Bleha, Thomas (2005) "Down to the Wire," *Foreign Affairs*, May/June 2005, <http://www.foreignaffairs.org/20050501faessay84311/thomas-bleha/down-to-the-wire.html>
- Bradner, Scott (2005) "The Internet: Unblocking pipes," *Network World*, March 14, <http://www.networkworld.com/columnists/2005/031405bradner.html>
- Burns, Simon (2006) "Korean Internet TV battle turns ugly," November 9, *ITnews.com.au*, <http://www.itnews.com.au/newsstory.aspx?CIaNID=41950&CIaAID=8>
- Business Week (2005) "At SBC, It's All About 'Scale and Scope'," *BusinessWeek Online*, November 7, http://www.businessweek.com/@@n34h*IUQu7KtOwgA/magazine/content/05_45/b3958092.htm
- Canada (1993) *Telecommunications Act* (1993, c. 38), <http://laws.justice.gc.ca/en/T-3.4/index.html>
- Canadian Internet Policy and Public Interest Clinic (2006) "ISP threatens to unplug web hoster for offensive content," *cippic.ca*, October 25, 2006, <http://www.cippic.ca/>

CBC News (2006) “Shaw, Vonage engage in war of words over internet phone service,” *cbc.ca*, March 8, <http://www.cbc.ca/money/story/2006/03/08/shaw-060308.html>

Cerf, Vint (2006) “Prepared Statement of Vinton G. Cerf, Vice President and Chief Internet Evangelist Google Inc.,” U.S. Senate Committee on Commerce, Science, and Transportation Hearing on “Network Neutrality,” February 7, 2006, <http://commerce.senate.gov/pdf/cerf-020706.pdf>

Chester, Jeff (2006) “The End of the Internet?,” *The Nation*, February 1, <http://www.thenation.com/doc/20060213/chester>

Cisco Systems Inc (2007) Managing Peer-to-Peer Traffic With Cisco Service Control Technology, White Paper, <http://www.democraticmedia.org/PDFs/CiscoP2P.pdf>

City of Toronto (2007) *Toronto's Key Industry Clusters: Information and Communication Technology (ICT)*, <http://www.toronto.ca/invest-in-toronto/informationtech.htm>

Clement, Andrew (2007) “The Net Neutrality Debate in Canada: Time to wake up!,” Transcript of remarks for *Net Neutrality: A Public discussion on the Future of the Internet in Canada*, Ottawa Public Library, February 6, http://www.cippic.ca/en/events/net_neutrality_transcript.pdf

Clement, Andrew and Graham Longford (2007) “The Case for Net Neutrality in Canada: Towards a Non-discriminatory Internet for All,” Presentation to the Masters of Engineering in Telecommunications (MET) Executive Development Program, University of Toronto, May 14, 2007.

Copps, Michael (2007) *Statement of Commissioner Michael J. Copps, Concurring, Re: Broadband Industry Practices, Notice of Inquiry*, http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-271687A3.pdf

Competition Bureau of Canada (2007) “Commissioner of Competition Comments on Government's Decision to Deregulate Local Telecommunications Sector,” News Release, April 4, 2007, <http://www.competitionbureau.gc.ca/internet/index.cfm?itemID=2296&lg=e>

Competition Bureau of Canada (2006) *Draft Information Bulletin on the Abuse of Dominance Provisions as applied to the Telecommunications Industry*, September 26, <http://www.competitionbureau.gc.ca/internet/index.cfm?itemID=2187&lg=e>

CRACIN (2007) “Alternative Telecommunications Policy Forum organizers receive response from federal Industry Minister Maxime Bernier,” March 20, <http://www3.fis.utoronto.ca/research/iprp/cracin/>

CRTC (2006a) *Telecommunications Monitoring Report 2006: Status of Competition in Canadian Telecommunications Markets*, <http://www.crtc.gc.ca/eng/publications/reports/PolicyMonitoring/2006/tmr2006.pdf>

CRTC (2006b) *Access to the Quality of Service Enhancement Service of Shaw Cablesystems G.P. (Shaw) and PacketCable functionality of Rogers Communications Inc., Shaw, and Vidéotron ltée*, Telecom Decision CRTC 2006-61, Ottawa, 21 September 2006, <http://www.crtc.gc.ca/archive/ENG/Decisions/2006/dt2006-61.htm>

CRTC (2005) *Regulatory Framework for Voice Communication Services Using Internet Protocol*, Telecom Decision CRTC 2005-28, Ottawa, May 12, 2005, <http://www.crtc.gc.ca/archive/ENG/Decisions/2005/dt2005-28.htm>

CRTC (1999) *New Media: Broadcasting Public Notice CRTC 1999-84; Telecom Public Notice CRTC 99-14*, Ottawa, 17 May, <http://www.crtc.gc.ca/archive/ENG/Notices/1999/PB99-84.HTM>

Deloitte (2007) *Telecommunications Predictions: TMT Trends 2007*, http://www.deloitte.com/dtt/cda/doc/content/dtt_TelecomPredictions011107.pdf

Ditchburn, Jennifer (2006) “Arms-length telecom regulator in an arm-wrestle with Conservatives,” *cbc.ca*, December, 26, <http://www.cbc.ca/cp/media/061226/X122606AU.html>

Dyson, Esther (2006) “You've Got Goodmail,” *The New York Times*, March 17, <http://www.nytimes.com/2006/03/17/opinion/17dyson.html?ex=1300251600&en=04138dcf8237c907&ei=5090&partner=rssuserland&emc=rss>

Ellacoya (2007) “About us,” <http://www.ellacoya.com/about/>

Engelhart, Ken (2007) “Cyber traffic moving smoothly,” Letter to the editor, *thestar.com*, April 20, <http://www.thestar.com/article/205204>

European Commission (2007) “Tomorrow’s Framework,” http://ec.europa.eu/information_society/policy/ecomm/tomorrow/index_en.htm

European Commission (2006) *Communication for the Commission to the Council, The European Parliament, the European Economic Council and Social Committee and the Committee of the Regions on the Review of the EU Regulatory Framework for electronic communications networks and services {COM(2006) 334 final} Proposed Changes*, Commission Staff Working Document, SEC (2006) 816, Brussels, June 28, 2006 http://ec.europa.eu/information_society/policy/ecomm/doc/info_centre/public_consult/review/staffworkingdocument_final.pdf

Federal Communications Commission (2007) “FCC Launches Inquiry into Broadband Market Practices,” New Release, March 22, http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-271687A1.pdf

Federal Communications Commission (2005) *Policy Statement – FCC 05-151*, August 5, 2005, <http://www.publicknowledge.org/pdf/FCC-05-151A1.pdf>

Feld, Harold (2007) “Snowe & Dorgan ReIntroduce Net Neutrality Bill — and A Chance for Some Presidential Politics,” *Wetmachine.com*, January 9, <http://www.wetmachine.com/item/697>

Geist, Michael (2007a) “ISP must come clean on ‘traffic shaping’,” *The Toronto Star*, April 16, <http://www.thestar.com/sciencetech/article/203408>

Geist, Michael (2007b) “The Unintended Consequences of Rogers' Packet Shaping,” <http://www.michaelgeist.ca/content/view/1859/125/>

Geist, Michael (2007c) *Evidence*, Standing Committee on Industry, Science and Technology, 39th Parliament, 1st Session, Monday, February 26, <http://cmte.parl.gc.ca/cmte/CommitteePublication.aspx?SourceId=196404>

Geist, Michael (2006) “Vonage Requests CRTC Investigation Into Shaw VoIP Charges,” *michaelgeist.ca*, March 7, 2006, <http://www.michaelgeist.ca/content/view/1147/125/>

Geist, Michael (2005) “Dangers in ISPs' bid for new tolls,” *The Toronto Star*, Dec. 19, 2005, http://www.thestar.com/NASApp/cs/ContentServer?pagename=thestar/Layout/Article_Type1&=Article&cid=1134946211708&call_pageid=968350072197&col=96904886381

Gilbertson, Scott (2006) “The Pirate Bay Bans ISP In Protest Move,” *Wired Blog Network*, December 12, http://blog.wired.com/monkeybites/2006/12/the_pirate_bay_.html

Glasner, Joanna (2005) “P2P Fuels Global Bandwidth Binge,” *Wired*, April 14, 2005, <http://www.wired.com/techbiz/media/news/2005/04/67202>

Gohring, Nancy (2007) “Verio Shuts Off Controversial Web Site, Verio responds to privacy advocates' concerns that the move points to growing control of the Web by big business and governments,” *PCWorld*, May 1, <http://www.pcworld.com/article/id,131396-page,1/article.html>

Goodman, Lee-Anne (2006) “Battle for 'Net neutrality' arrives in Canada and could forever alter Internet,” *Canadian Press*, *Canada.com*, November 03, 2006, <http://www.canada.com/topics/technology/news/gizmos/story.html?id=8221057a-024a-4d94-9e10-c242072a709e&k=38490>

Google (2007) “A Guide to Net Neutrality for Google Users,” <http://www.google.com/help/netneutrality.html>

Gross, Grant (2007) “Government policies add to Japan's broadband success,” *intergovworld.com*, April 10, <http://www.intergovworld.com/article/dbbe09b50a01040800470a37fcbba593/pg1.htm>
<http://www.intergovworld.com/article/dbbe09b50a01040800470a37fcbba593/pg1.htm>

Hands-Off-the-Internet (2007) “About Us,” http://handsoff.org/hoti_docs/aboutus/

Industry Canada (2006a) Final Report 2006, Telecommunications Policy Review Panel, March 2006, Ottawa: Minister of Industry, http://telecomreview.ca/epic/site/tprp-gecrt.nsf/en/h_rx00054e.html

Hunter, Lawson (2007) “Network Neutrality – A Questionable Solution in Search of a Problem,” Presentation to the Masters of Engineering in Telecommunications (MET) Executive Development Program, University of Toronto, May 14, 2007.

ICT Toronto (2006) *ICT Toronto - An Information and Communication Technology (ICT) Cluster Development Strategy for the Toronto Region – 2006*, http://www.toronto.ca/business/pdf/ict_toronto_final_report.pdf

Industry Canada (2006a) *Final Report 2006*, Telecommunications Policy Review Panel, March 2006, Ottawa: Minister of Industry, http://telecomreview.ca/epic/site/tprp-gecrt.nsf/en/h_rx00054e.html

Industry Canada (2006b) “Does the Minister intend to allow telecommunications companies to determine the content that its customers can and cannot access by imposing special rates, undermining net neutrality?” *Question Period Card*, November 1, 2006.

Industry Canada (2006c) “Network Neutrality – Questions and Answers,” November 16, 2006, Telecommunications Policy Branch.

Industry Canada (2005) *Recommended Best Practices for Internet Service Providers and Other Network Operators*, Task Force on Spam, Working Group on Network and Technology Management, May 2005, <http://www.e-com.ic.gc.ca/epic/site/ecic-ceac.nsf/en/gv00347e.html>

Isenberg, David (1997) “The Rise of the Stupid Network,” *Computer Telephony*, August 1997, pg 16-26.

It’s Our Net (2007) “The Coalition,” http://www.itsournet.org/About_Us.php

Judge, Peter (2007) “Vodafone to be Sued for VoIP Blocking? Mobile operator Vodafone faces legal action over its efforts to cripple VoIP on mobile phones,” *PCWorld*, May 1, <http://www.pcworld.com/article/id,131425-c,webtelephonyconferencing/article.html>

Kapica, Jack (2005) “The new shape of broadband,” *Globe and Mail*, December 8, <http://www.theglobeandmail.com/servlet/story/RTGAM.20051208.gtjkcolumnndec8/BNStory/einsider,Technology/home>

Krim, Jonathan (2005) “Executive Wants to Charge for Web Speed,” *The Washington Post*, Thursday, December 1, 2005, http://www.washingtonpost.com/wp-dyn/content/article/2005/11/30/AR2005113002109_pf.html

Lessig, Lawrence and Robert McChesney (2006) “No Tolls on the Internet,” *washingtonpost.com*, June 8, 2006.

MacArthur, Amber (2007) "Telcos Force Canadian Net Neutrality Site to Shut Down," *FreePress.com*, April 26, 2007, <http://www.freepress.net/news/22701>

Mandel, Charles, "Coming soon: pay-as-you-play - Net Service providers ponder charges for phone calls, music and games," *The Gazette*, CanWest News Service, Monday, January 30, 2006, <http://www.canada.com/montrealgazette/story.html?id=e4b771fe-fec7-417a-bb4c-d1edcb988a0d&k=44164>

Mark, Roy (2005) "FCC: 'Net Neutrality' For All," *internetnews.com*, August 9, 2005, <http://www.internetnews.com/infra/article.php/3526361>

McLean, Catherine (2006) "Rogers CFO predicts 'metered' on-line billing," *globeandmail.com*, May 25, 2006.

McTaggart, Craig (2006) "Was the Internet Ever Neutral?," paper presented to the *34th Research Conference on Communication, Information and Internet Policy*, George Mason University School of Law, Arlington, Virginia, September 29 – October 1, 2006.

Meinrath, Sascha D., and Victor W. Pickard (2006) "The New Network Neutrality: Criteria for Internet Freedom," paper presented to the *34th Research Conference on Communication, Information and Internet Policy*, George Mason University School of Law, Arlington, Virginia, September 29 – October 1, 2006.

Meyers, David, (2007) "UK regulators 'relaxed' on net neutral," *ZDNetUK.co.uk*, March 20, <http://news.zdnet.co.uk/communications/0,1000000085,39286400,00.htm>

Middleton, Catherine (2006) "Broadband: The Current Context," Presentation to *Towards a Broadband Research Agenda for Ontario*, University of Toronto, December 8, 2006, http://kmdi.utoronto.ca/broadband/events/Files/MIDDLETONont_bband.ppt.

Ministry of Government Services (2007) "Top Ten Consumer Complaints and Inquiries in 2005," Consumer Protection Legislation, http://www.gov.on.ca/MGS/en/ConsProt/STEL01_039136.html

Montgomery, Shannon (2006) "Edmonton web host asks vampire website to leave in wake of Montreal shooting," *Canada.com*, September 21, 2006, <http://www.canada.com/topics/news/national/story.html?id=74379d19-555c-42d6-8be5-83ba89804248>

Noam, Eli (1994) "Beyond Liberalization II: The Impending Doom of Common Carriage," *Telecommunications Policy*, 18, No. 6 (August), 435-52.

Noguchi, Yuki (2005) "Cable Firms Don't Have to Share Networks, Court Rules," *Washington Post*, June 28, 2005, <http://www.washingtonpost.com/wp-dyn/content/article/2005/06/27/AR2005062700415.html>

Nokia (2006) "Nokia launches a solution to fight the "bit pipe" challenge," Press Release, November 23, 2006, <http://www.nokia.com/A4136001?newsid=1089768>

Organisation for Economic Co-operation and Development (2007) *Internet Traffic Prioritization*, Working Party on Telecommunication and Information Services Policies, Directorate for Science, Technology and Industry, Committee for Information, Computer and Communications Policy, DSTI/ICCP/TISP(2006)4/final, April 6, <http://www.oecd.org/dataoecd/43/63/38405781.pdf>

Office of the Privacy Commissioner of Canada (2005) PIPEDA Case Summary #319 - ISP's anti-spam measures questioned, http://www.privcom.gc.ca/cf-dc/2005/319_20051103_e.asp

Olsen, Stefanie (2006) "AOL charged with blocking opponents' e-mail: Company accused of bouncing messages opposed to its adoption of a program requiring marketers to pay," *CNETNews.com*, April 13, http://news.com.com/AOL+charged+with+blocking+opponents+e-mail/2100-1030_3-6061089.html

Ontario (2005) *Ontario's ICT Industry: Programmed for Success*, <http://www.2ontario.com/software/brochures/infotech.pdf>

Open Internet Coalition (2007) "Who We Are," <http://www.openinternetcoalition.org>

Open Net Initiative (2005) "Telus Blocks Consumer Access to Labour Union Web Site and Filters an Additional 766 Unrelated Sites," OpenNet Initiative Bulletin 010, August 2, 2005, <http://www.opennetinitiative.net/bulletins/010/>

Panetta, Alexandra (2006) "Videotron lobbying for Internet 'transmission tariff'," *globeandmail.com*, November 1, 2006, <http://www.theglobeandmail.com/servlet/story/RTGAM.20061101.gtvideotron01/BNStory/Techology>

Parliament of Canada (2007) *Evidence - 1610*, Meeting 45, Standing Committee on Industry, Science and Technology, February 19, 2007, <http://cmte.parl.gc.ca/Content/HOC/committee/391/indu/evidence/ev2715537/induev45-e.htm#Int-1914333>

Peha, Jon (2006) "The Benefits and Risks of Mandating Network Neutrality, and the Quest for a Balanced Policy,"

Platt Majoras, Deborah (2006) "FTC Chairman addresses issue of 'net neutrality'," *Federal Trade Commission*, News Release, August 21, <http://www.ftc.gov/opa/2006/08/neutrality.shtm>

Reuters (2006) "Dutch parliament calls for cable TV shakeup," *Reuters.com*, Oct 24, 2006.

Saltzer, Jerome H., David P. Reed, and David D. Clark (1984) End-to-end arguments in system design. *ACM Transactions on Computer Systems* 2, 4 (November 1984) pages 277-288.

Sandvig Christian (2006) "Network Neutrality is the New Common Carriage," paper presented to the *34th Research Conference on Communication, Information and Internet Policy*, George Mason University School of Law, Arlington, Virginia, September 29 – October 1, 2006.

Save the Internet (2007) "FAQs," <http://www.savetheinternet.com/=faq>

Scott, Ben, Mark Cooper and Jeannine Kenney (2006) *Why Consumers Demand Internet Freedom Network Neutrality: Fact vs. Fiction*, Free Press, Consumer Federation of America, and Consumers Union, May 2006, http://www.freepress.net/docs/nn_fact_v_fiction_final.pdf

Scott, Sheridan (2007a) "Speaking Notes For Sheridan Scott, Commissioner of Competition, Competition Bureau of Canada," Standing Committee on Industry, Science and Technology, Ottawa, Ontario, February 5, 2007, <http://www.competitionbureau.gc.ca/internet/index.cfm?itemID=2275&lg=e>

Shannon, Victoria (2006) "The End User: Neutrality? Yes and no," *International Herald Tribune*, June 21, <http://www.ihf.com/articles/2006/06/21/business/ptend22.php>

Sheridan Scott (2007b) "Looking forward: The Bureau Priorities for 2007-2008," Speech to the CBA/IBA Spring Conference Toronto, Ontario May 3-4, 2007, <http://www.competitionbureau.gc.ca/internet/index.cfm?itemID=2324&lg=e>

Shaw Communications (2006) "Quality of Service Enhancement," Products and Services, Internet, <http://www.shaw.ca/en-ca/ProductsServices/Internet/ServiceEnhancement.htm>

Smith, Tony (2006) "T-Mobile UK says 'no' to VOIP," *The Register*, May 9, http://www.reghardware.co.uk/2006/05/09/t-mobile_bans_voip/

Sophos (2004) "Sophos outs 'dirty dozen' spam producing countries," www.sophos.com, 26 February 2004, http://www.sophos.com/pressoffice/news/articles/2004/02/sa_dirtydozen.html

Sophos (2007) "Sophos research reveals dirty dozen spam-relaying nations," www.sophos.com, 11 April 2007, <http://www.sophos.com/pressoffice/news/articles/2007/04/dirtydozapr07.html>

Statistics Canada (2006) "Internet use by individuals, by location of access, by province," <http://www40.statcan.ca/101/cst01/comm14b.htm>

Talbot, David (2005) "The Internet is Broken," *Technology Review*, December/January, <http://www.technologyreview.com/Infotech/16051/>

Telecommunications Industry Association (2006) "U.S. Broadband Market Reaches 41.3 Million Subscribers in 2005; Expected to Grow to 69.2 Million Subscribers by 2009," *Pulse Online*, vol. 7, Issue 6, April 2006, <http://pulse.tiaonline.org/article.cfm?id=2312>

The New York Times (2006) "Tollbooths on the Internet Highway," *The New York Times*, Editorial, February 20.

The New York Times (2007) "Protecting Internet Democracy," *The New York Times*, Editorial, January 3.

The Wall Street Journal (2006) "Stuck in Neutral," *The Wall Street Journal*, Editorial, March 8.

T-Mobile (2007) Web 'n' Talk – Fair Use Policy, http://www.t-mobile.co.uk/personal/pages.do/orphans/fairuse?WT.mc_id=fairuse&deeplink=fairuse

van der Woude, Dirk (2006) <http://www.interesting-people.org/archives/interesting-people/200610/msg00134.html>

Vonage (2007) *Annual Report* – Securities Exchange Commission Form 10K, <http://ir.vonage.com/secfiling.cfm?filingID=1193125-07-82917>

Vonage (2006) "Who controls how you use your Internet access? Vonage Canada challenges Shaw "VoIP tax," News Release, May 10, <http://www.newswire.ca/en/releases/archive/March2006/07/c4352.html>

Yakabuski, Konrad (2006) "Watchdog lacks telco bite," *Globe and Mail*, December 14, 2006

Yoo, Christopher and Tim Wu (2006) "Keeping the Internet Neutral?: Christopher S. Yoo and Timothy Wu Debate," Center for Law and Economic Studies Research Paper Series, Columbia University Law School, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=953989

Wikipedia (2007a) "Best effort delivery," http://en.wikipedia.org/wiki/Best_effort_delivery

Wikipedia (2007b) "FIFO," <http://en.wikipedia.org/wiki/FIFO>

Winseck, Dwayne (1997) "Canadian Telecommunications: A History and Political Economy of Media Reconvergence," *Canadian Journal of Communication*, Vol. 2, No. 2, <http://www.cjc-online.ca/viewarticle.php?id=418&layout=html>

Winseck, Dwayne (1998) *Reconvergence: A Political Economy of Telecommunications in Canada*. New Jersey: Hampton Press.

Wu, Tim (2003) "Network Neutrality, Broadband Discrimination," *Journal of Telecommunications and High Technology Law*, 2: 141-179.

Wu, Tim and Yoo, Christopher S. (2006) "Keeping the Internet Neutral?: Tim Wu and Christopher Yoo Debate," *Vanderbilt Public Law Research Paper No. 06-27*, (December 28, 2006), <http://ssrn.com/abstract=953989>

Zandberg, Bryan (2007) “Canada Sleeps Through War to 'Save the Internet' Pitched battle in U.S. over 'net neutrality': Digital democracy at risk if telecoms get their way say opponents,” January 17, 2007, <http://thetyee.ca/Mediacheck/2007/01/17/NetNeutrality/>

Zittrain, Jonathan (2006) “The Generative Internet,” *Harvard Law Review*, Vol. 119, 1974-2040.



This work is licensed under a [Creative Commons Attribution-NonCommercial-Share Alike 3.0 License](https://creativecommons.org/licenses/by-nc-sa/3.0/).