Internet

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CHAPTER 7

Internet

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The analysis of communication rights -- or a unified right to communicate -- in the context of new information and communication technologies (ICTs) is continually confronted by two situations. First, certain aspects of new ICTs may reproduce an existing mode of communication about which potential threats and violations of norms are well-understood. For example, the applicability of privacy protections to Internet-based telephony can be seen as a natural extension of the norms around previous forms of telephony.[2] Second, a new ICT is also likely to produce potential modes of communication, interactions, or conditions that were not contemplated during its design. Such potentials are referred to as "affordances" in human-computer interaction and design research (Norman 2002). A new ICT offers affordances in the sense that it makes possible certain actions through its properties. The potentials for such actions may be readily apparent, as in the reproduction of an existing mode of communication; or, more importantly, the potentials may be latent. For example, while the applicability of privacy protections to Internet-based telephony may have been readily-apparent, technical properties unique to the new form of telephony have afforded various actors with new methods of violating privacy which may or may not have been apparent to the public or

[1]An early discussion with Bill St. Arnaud of CANARIE helped the author to further the development of an analysis of trends in Internet architectures and applications. Research support and conceptual discussions with Mary Milliken were invaluable.

[2]This does not address the issue of whether such expectations are actually held by the public. Evidence suggests they might not. For example a Zoby survey in 2007 found divergent expectations of privacy on the Internet between young and older respondents (Claburn, 2007).

regulators.

The general problem posed by the existence of technological affordances in communication rights is not new (McIver & Birdsall, 2004). Jean D'Arcy's (1969) introduction of the notion of a right to communicate can be seen as emanating from the identification of new affordances offered by satellite-based communications technologies (see Chapter 2). Fundamental properties of the Internet have enabled an environment in which affordances that challenge existing norms and human rights codes are produced more rapidly than in earlier communication technology frameworks like analog telephony or telegraphy (McIver & Birdsall, 2004). Further, these same properties have enabled the production of higher-order affordances – affordances resulting from the combination of others – which are increasing the complexity of addressing communication rights. For example, as we will discuss later in this chapter, non-neutral network policies result in higher-order impacts on various types of Internet applications.

This chapter will examine communication rights in the context of three Internet technology areas: the practice of network traffic shaping; the broad area of Semantic Web and Web 2.0 applications; and Internet telephony. These three areas are linked through the layered architecture of Internet applications. Internet applications depend fundamentally on the exchange of data through functionality provided by technologies at lower layers of the Internet. Thus, technologies that are implemented at higher layers are partially an expression of the functionality presented and constraints posed by lower layers. For example, network traffic shaping involves layers of functionality upon which

Semantic Web, Web 2.0, and Internet telephony applications depend. Each of these technology areas presents different affordances to different actors, resulting in sites of conflict around communication rights. Semantic Web, Web 2.0, and Internet telephony have enabled the expansion of social and political communication for individuals, with significant reductions in cost barriers in many cases. Network traffic shaping capabilities – a form of control over Internet data exchange -- are actionable by the state and private sector network operators and, objectively, present both barriers and benefits to citizens.

Canadian Internet Policy Objectives

The impacts of Internet technologies on communication rights in Canada must be examined in the context of the country's policy objectives. The Canadian government set out a course for data networking early in the history of what was to become the Internet. The build-out of the U.S.-funded ARPANET – the principal ancestor of the Internet -- started in 1969. The defunct Science Council of Canada (1971, p. 4) issued a proposal for the establishment of "a nationwide system of computer communication networks" only two years later.[3] This proposal articulated a policy approach meant to ensure Canadian control over its networks in the face of market forces, stating in part:

> A "laissez-faire" attitude will eventually result in the supply of most computing and information services via spur lines from U.S. computer communications networks.

[3]This was the same year that *Instant World* was published; see Chapter 1.

and called for equitable access to these networks, saying:

> The system of networks should not be allowed to practice "cream-skimming" by concentrating exclusively on the densely populated, highly profitable regions of Canada. It must link all important centres in Canada in order to bring computing and information services to the greatest number of Canadians.

Two decades later, the 1993 Canadian Telecommunications Act defined a broad and overlapping set of policy objectives in economic, social, and technical areas for telephony in Canada (See Canada 1993). Although the Internet as we know it today was still in its infancy, a number of these policy objectives relate to social communication, the complex of rights relating to communication, and – indirectly – the Internet itself. These include:

1. strengthening of the "social and economic fabric of Canada" (para. 7.a);
2. making possible "reliable and affordable telecommunications services" to Canadians in both "urban and rural areas" (para. 7.b);
3. fostering the creation of innovative ICT services in Canada through "research and development (para. 7. g);
4. responding to "the economic and social requirements of users of telecommunications services" (para. 7.h); and
5. supporting privacy protections for users of ICT (para. 7.).

The requirements of *the Telecommunications Act* coupled with the emergence of new Internet-based communications technologies continues to create new conditions under which existing rights can be challenged. The Canadian Government recognized the need to update its telecommunication policy framework given new technological and market realities and formed a Telecommunications Policy Review Panel in 2005 Though the TPRP report (see Sinclair, Intven & Tremblay 2006), was, as discussed in Chapter 6, hardly framed around communication rights, some of the recommendations from its final report are nonetheless revealing about the challenges that the diffusion of Internet technologies pose to existing Telecommunications policies in Canada

Traffic Shaping, Network Neutrality and Communication Rights

The Internet is comprised of many separately-managed networks which are interconnected, hence 'Inter' and 'net.' The networks that participate in the Internet are implemented with hardware and software from a variety of sources. The ability of diverse networks to inter-operate to form the Internet has been made by a common set of technical protocols to which vendors and network operators adhere. Transmission Control Protocol / Internet Protocol (TCP/IP) and the Domain Name System (DNS) are key examples. Thus, the operation of the Internet has depended in a large part on the cooperative implementation and equitable use of protocols among its constituent networks.

Network Traffic shaping

One dimension of the Internet's operation where cooperation and equity are most relevant is the handling of packets as they cross individual networks from sender to receiver. Network traffic shaping is the practice of controlling the flow of packets through a network based on the type of data they contain, current network conditions, and other constraints. Packets are the basic unit of transmission for any type of data sent across a network, including e-mail messages, audio and video files, and documents.

Packet flows are “shaped” in the sense that they are handled in a differential manner according to their volumes or the types of data they contain. There are several basic traffic shaping policies. Some types of packets may be given priority over others so that they will reach their destinations with shorter delays. This is a practice that is sometimes referred to as “throttling.” Limits may be placed on the volume of certain types of packets to preserve a network's channel capacity (also know as 'bandwidth') for other types of packets or certain classes of users of a network. Some types of packets may be blocked altogether by a network operator. Any type of packet that is not prioritized must be handled within whatever network capacity remains due to the other policies.

Traffic shaping is often necessary in managing a network. Each network has practical limits as to the volume and arrival frequency of packets that it can service effectively. When a network's channel capacity is approached or exceeded, the quality of service (QoS) that it supports decreases and services may eventually cease to function altogether. E-mail messages, for example, might be delayed significantly.

Traffic shaping provides an operator with the ability to maintain a certain QoS offered by its network under a heavy load. For example, a provider of real-time voice or video communication services will want to prioritize traffic generated by those services over others given that delays and interruptions in natural language are less tolerable than those that might occur with e-mail. An operator might also choose to limit the amount of data that any one user can transfer to ensure a minimal QoS to everyone on its network. Some networks shape traffic based on time of day, where more stringent policies are implemented during times when heavier loads are expected.

Finally, organizations must use traffic shaping if they wish to respond to the arrival of undesirable data on their networks from other networks. If a user engages in illegal music or video file sharing, their Internet service provider may face legal threats. Independent of their legal status, music and video files may be less desirable because they are orders of magnitude larger than typical Web page transfers or e-mail messages. Networks now commonly experience performance problems related to the transfer of video and audio files. Traffic shaping allows an operator to constrain or block undesirable data outright to prevent unwanted activities on their network. One recent example is Ohio University's (2007) effort to address both legal threats and performance problems caused by music file sharing. The university was classified in 2007 by the Recording Industry Association of America (RIAA) as one of the top institutions in which music piracy was taking place. As a result, it decided to block all P2P traffic on its network.

Traffic shaping is of interest here because its use has come to be seen – under the term network neutrality – as antithetical to communication rights.

Network neutrality

The concept of network neutrality has arisen in recent years as a framework for describing the practice of traffic shaping in the context of the interconnected networks that make up the Internet. Network neutrality is a traffic shaping policy whereby all data are treated equally in terms of restrictions and costs for their transit across a network. Controversy has arisen in recent years around non-neutral network practices proposed by commercial Internet service providers.

The concepts of network neutrality and network traffic shaping are often conflated, which is improper. These two concepts must be examined as distinct, though potentially inter-related. Network traffic shaping refers mainly to the technical dimension of routing content across networks. Network neutrality refers mainly to a set rights pertaining to both Internet users and network operators: operators should not discriminate in terms of performance or access between the sources or types of data to which they provide their users or other interconnecting networks; and network operators should have limited liability for the data they permit across their networks (Mueller 2007).

Supporters of network neutrality link the characteristics of TCP/IP with network neutrality in explaining the essential strengths and the successes of the Internet. One

perspective is that network neutrality relates to the operationalization of TCP/IP suite. From the example depicted in Figure 1, the message sent from $Computer_1$ to $Computer_2$ traverses only $Network_1$ which connects the origin and destination computers. At minimum, the devices on $Network_1$ must examine the address on the message to route it to $Computer_2$. $Network_1$ may choose to do more, however. It may give preferential or prejudicial treatment to the delivery of the message based on its origin or destination addresses depending on the policies of the owners of the network. Further, $Network_1$ might choose to examine the contents of the message and give preferential or prejudicial treatment to its delivery. A network neutral approach would be to deliver the message without prejudice as to its origin, destination, or content.

A network neutral approach is key to enabling the commonly-held notion that telecommunication common carriers should provide transmission services to the public without discrimination. According to Noam (1994, para. 8), common carrier principles were developed "to guarantee that no customer seeking service upon reasonable demand, willing and able to pay the established price, however set, would be denied lawful use of the service or would otherwise be discriminated against". Noam (1994, para 20) cites U.S. legal precedent in stating that "[the] prohibition on unreasonable discrimination is the most important component of the common carrier obligation".

The development of common carriage principles began well before the regulation of telecommunications services, having origins that predate early English common law. These principles eventually supported the development of telecommunication networks

by giving carriers certain benefits, such as physical rights-of-way and monopoly protections, in exchange for the anti-discrimination restrictions placed on them. Common carriage was applied to telecommunications as early as 1848 in the context of telegraphy and was a key part of the U.S. Communications Act of 1934 (Noam 1994). It also exists within Canadian law.

The Canadian Telecommunications Act of 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" (Canada 1993, at sec. 27.2). *The Act* frames its obligation to protect consumers against discrimination, unjust and unreasonable rates, and preference or disadvantage as solely a function of Canadian carriers being subject to sufficient competition (Canada 1993, at sec. 35.1).

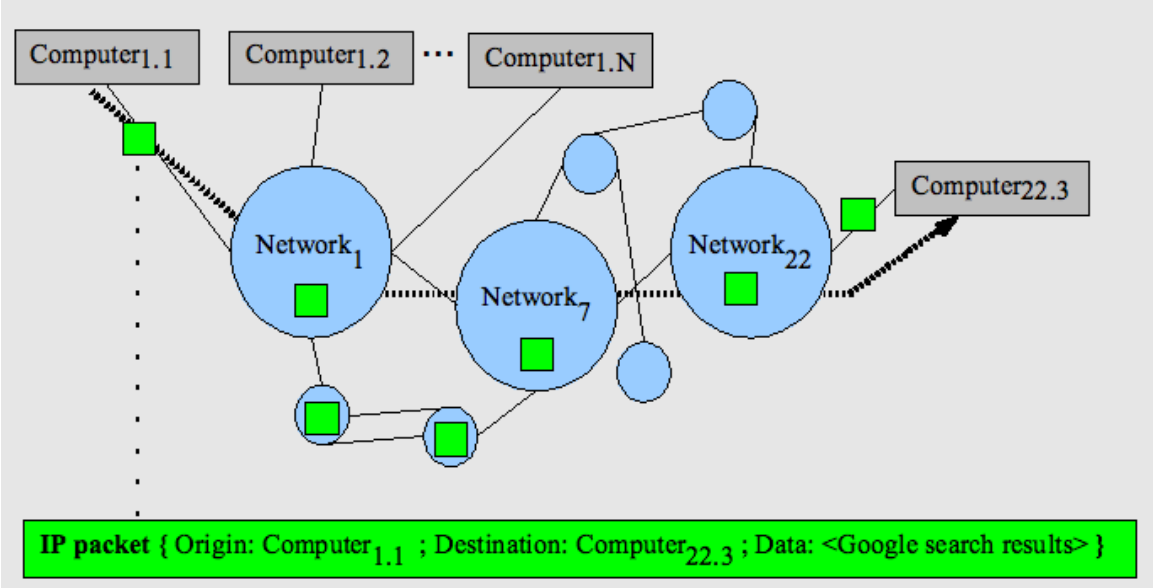

Figure 1. Sending packets over interconnected networks.

Frequently, arguments for network neutrality are given at an engineering level in terms of its importance to innovation. This has been derived mostly from the 'end-to-end' (e2e) principle in the design of the Internet (Saltzer, Reed, & Clark 1984). The e2e argument applies to communications in general, not just the Internet. It addresses the engineering dilemma of where to place data communications services, such as message ordering, filtering or error detection, when they can either be implemented in a network or be made the responsibility of the systems that use the network. The e2e principle holds that as long as sufficient basic data communications functionality exists at a lower layer, advanced functionality can and should be added later at higher layers. The implication is that the network should not discriminate between the types of applications it is serving.

One example of advanced functionality in this context would be specialized methods for handling packets containing specific data types, such as voice or video. The e2e principle holds that advanced functionality is best implemented above the basic service layer of the network inside of the specific applications that require it.

The consequences of non-discrimination from an e2e perspective must viewed not from isolated perspectives around specific technologies, but from the standpoint of its impacts on performance and innovation across the whole Internet "ecology." Saltzer Reed, & Clark (1984, 9) showed that this approach is necessary to achieve optimal modularity and economy in developing software, where complex and expensive functionality need not be designed ahead of time and then locked into the lower layers of a network. The authors described this as "a kind of 'Occam's razor' when it comes to choosing the functions to be provided in a communication subsystem". The use of the e2e principle has been cited as a major factor in enabling the rapid evolution of on-line services. An example of what has been made possible by the end-to-end principle is the relative ease with which TCP/IP has been able to support higher level protocols that are the basis for the Web, such as the Hypertext Transfer Protocol (HTTP). Google (2007, para. 2) has stated that network neutrality has "allowed many companies, including Google, to launch, grow, and innovate" because of this principle.

Fundamental aspects of the Internet's architecture are being reexamined, including the appropriateness of the e2e principle across all classes of services (Clark 2005; Clark et. al 2003). Security and mobility, for example, have been shown to be ill-served by the current Internet architecture. Proposals for addressing these short comings have included

reexamining adherence to the e2e principle for all services (Feldman 2007). While not an immediate challenge to network neutrality, the potential impacts of these efforts – known as the Clean Slate approach – should be studied by policy makers.

Non-neutral network policies

Arguments for non-neutral network policies have originated from major commercial Internet service providers (ISPs) such as telephone and cable television companies. Many of these ISPs do not simply provide their customers with access to the Internet. They offer content-based services of their own and view them as complementary to their data communications product offerings. Services include e-mail, web site hosting, news feeds, and music downloading. The business proposition is that content-based services make their core products – data communications services – more attractive. Conflicts of interest are seen by ISPs where third party content providers are concerned. Popular examples include Google.com, YouTube.com, Yahoo.com, Vonage.com, and Skype.com. When a customer of an ISP accesses a third party content provider, the resulting data are communicated over the ISP's network infrastructure. Thus, the packets from the third party 'compete' with the ISP's own content, potentially slowing down the network where data-intensive content such as video is concerned. An ISP may also view third party content providers as getting a 'free ride' since they do not invest in network construction and operation. This position is exemplified by Edward Whitacre (quoted in O'Connell 2005), CEO of SBC Telecommunications, a peer of Verizon:

> How do you think they're 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!

Developments around the practice of non-neutral network policy by the private sector have evolved considerably since Whitacre's comments in 2005. Comcast, one of the largest residential Internet service providers in the U.S., retreated from its policy of restricting data in its network resulting from the popular peer-to-peer (P2P) BitTorrent protocol, which is used most often to download large video and audio files (Comcast 2008). In Canada, Bell Canada acknowledged its practice of restricting P2P data on its Sympatico Internet Service (CbcNews 2008c). The most important policy developments in Canada have emanated from a complaint filed with the Canadian Radio-television and Telecommunication Commission (CRTC) in April 2008 against Bell Canada by the Canadian Association of Internet Providers (CAIP).

CAIP's membership includes ISPs who buy wholesale Internet services from

companies such as Bell Canada for resale as a retail service to their customers. CAIP claimed that Bell Canada's traffic shaping policies for its wholesale Asymmetric Digital Subscriber Line (ADSL) Internet service violates several parts of the Telecommunications Act in that they, among other claims, (1) are not part of the conditions established under the tarrif approved by the CRTC for the wholesale Internet service in question; (2) result in a form of unjust control and influence over content of public telecommunications and its meaning; and (3) result in a form of unjust discrimination toward certain users of their services (CRTC, 2008-108). Some parties testified that data transfer rates over Bell's ADSL service used via these ISPs were reduced significantly for P2P applications due to traffic shaping. This is seen as problematic because the files are typically very large, which can cause congestion, and many of these files are in violation of copyright laws. Complainants against Bell disputed claims by Bell that their customers were the cause of congestion or even that it existed.

Bell Canada argued that its traffic shaping policies were not in violation of the tarrif, in part, because (1) the tarrif specifies only the upper and lower bounds on communication rates guaranteed to wholesale subscribers and (2) that traffic shaping is necessary for the company to “ensure fair and proportionate use of its network as specified in its Commission-approved Terms of Service.” They claimed that their network experiences congestion due to the use of peer-to-peer (P2P) technologies by the retail customers of the ISPs who buy their wholesale service (CRTC, 2008-108, sec. I. 16).

The CRTC denied CAIP's complaint saying, in summary, that Bell had demonstrated that (1) P2P contributed disproportionate load and congestion on Bell's network, (2) traffic shaping was the only practical method of managing its network under such load conditions, and (3) they applied traffic shaping equally to their own retail customers and those of the ISPs who buy their wholesale ADSL service.

The CRTC did find that Bell's introduction of traffic shaping caused impacts of such significance on the retail customers of the ISPs who buy their wholesale ADSL service that advanced notice should have been given. Ironically, the CRTC did not find this lack of notice to be in violation of its earlier requirements to provide advanced notice of changes.

The most important outcome surrounding the CRTC's decision is that it initiated a consultation process and scheduled a hearing for July 2009 on network neutrality in recognition that these issues have not been satisfactorily resolved (CRTC, 2008-19).

Major concerns remain over large carriers' use of traffic shaping despite the CRTC 2008-108 decision. The major carriers do not apply traffic shaping in a manner that is transparent to the public, as evidenced by testimony for the CRTC 2008-108 decision. Traffic shaping prevents customers from making full use of services at advertised rates. P2P technologies are objectively legitimate and ideal, technologies for transferring large files. The presumption that P2P file transfers and other data rich technologies suggest illegal or undesirable activities is not warranted. Rich data types,

such as video and audio, are now common for legal data transfers over the Internet and, thus, traffic shaping policies have the effect of undue discrimination against communications that are constitutionally-protected. Finally, carriers who sell wholesale services to companies with which they compete for retail customers in the same class of services enjoy an unreasonable competitive advantage in establishing network policies, especially when they can do so in nontransparent ways.

Responses to this consultation have, thus far, yielded some unexpected arguments against network neutrality regulations as well as arguments in support of ISPs' rights to employ traffic shaping and content blocking policies from some ISPs and content providers who compete against the major network operators. Companies representing these points of view see such policies as providing valid and necessary tools for controlling unwanted content, including viruses, spam, child pornography,, and illegally-copied content (Anderson 2009).

Network neutrality and the process of social communication

Network neutrality, as shown above, is often framed in a market context, with a communication rights dialectic pitting the rights of individuals to enjoy completely unfettered data packet exchange against entities motivated to impose cost-based traffic shaping policies. Non-neutral network policies are often seen as cost barriers to social communication processes. Some Canadian Internet telephone companies have stated that

those who want to use their services should have to pay a premium to their Internet service providers (CRTC 2006c). Depending on how such policies are implemented, those who do not pay for premium services could experience poor voice quality or outright blocking of voice data. The CRTC has not found this to be true thus far (CRTC 2006c, 2008-108). Some early commentators pointed to rulings in the U.S. to suggest that it was possible that this practice could occur in Canada (Geist 2005, May 16).

Mueller (2007) and others argue that competition based on tiered service could yield positive impacts on Internet access for all users, even those who may not be able to afford top tier services. These potentials, according to Mueller, include overall improvement in bandwidth availability as operators upgrade their networks to compete in tiered service markets and, which is then expected to reduce bandwidth costs for everyone due to overall increases in network capacity.

A reliance on market-based solutions to ensure network access and network neutrality would be problematic, both in terms of market dynamics and existing legal frameworks. Evidence shows that both market and political forces have at times encouraged non-neutral network policies. Van Schewick (van Schewick and Farber, 2009) has documented a series of recent cases in North America where network operators have implemented traffic shaping policies to thwart competition or to block Web content for political reasons.

Slater and Wu (2008) have pointed out that growth in broadband has traditionally

been slow relative to other aspects of computing, such as processing power. The expected returns on the large investments required to grow bandwidth may not be sufficient to motivate carriers who worry about maximizing returns on investment from existing infrastructure and avoiding new competition. Providing larger bandwidth to consumers has made it possible for third parties to compete against carriers over their own networks. Skype and Vonage are examples of Internet-based telecommunications services that effectively compete against the telephony services offered by the carriers who also offer Internet services.

Competition has historically not guaranteed network access by people in rural and remote regions where infrastructure development costs are usually higher due to geography and potential profits are lower due to sparse consumer markets. Governments have historically had to subsidize such services.

Competition has also not been a reliable force for the introduction of life-critical communications services. The extention of wireline 9-1-1 emergency services to wireless telephony is a prime example, where Canada lags behind the U.S. Interventions by government, in this case the CRTC, have often been necessary to force carriers to make such infrastructure improvements.[4]

Van Schewick points out that antitrust law may be too narrowly-defined to include

[4] The CRTC has required wireless telephony companies to implement 9-1-1 on their networks by February 1, 2010.

certain types of anticompetitive behaviour involving non-neutral network policies. Under U.S. law, for example, traffic shaping policies would have to be shown to create or provide the potential for monopoly power to be found anticompetitive. In this case, some traffic shaping policies may fall short of providing ISPs with monopoly power, but are still harmful to its competitors, as some examples above showed. Indeed, a 2007 OECD study on network neutrality, discussed below, calls for a re-examination of competition laws.

Market-based networking neutrality protections are also not likely to be stable. Defenders of network neutrality change positions for business reasons. Google, an early and outspoken defender of network neutrality, has recently announced an effort to arrange preferential treatment for the transmission of its data – search results and advertisements – with selected telecommunications companies (Kumar and Rhoads 2008).[5]

Some network traffic shaping policies may transcend competitive practices, leaving consumers without recourse, as has been pointed out by van Schewick. If all network operators within a market decide to block P2P services, for example, then changing one's ISP will not be an option for obtaining those services.

From the perspective of the practical social communications needs that all citizens have, non-neutral network policies are unjust barriers, with exceptions discussed below. While network neutrality is often discussed in the context of non-life-critical

[5] This move by Google is not entirely unexpected. Cringely (2005) has been pointed to Google's acquisition of dark fiber and its development of mobile data centres as a means of implementing its own Internet – the "Google Internet."

communications, such the downloading of movies and music for entertainment, the Internet is becoming the medium through which increasing amounts of life-critical communication takes place. Non-neutral services will be unacceptable in this context to the extent that they create either economic or operational barriers to communication. For example, we anticipate a time in the near future where 911 will benefit from the use of two-way video communication between citizens in need and emergency responders. Non-discriminatory treatment of such data will then be necessary if people are not to be put at risk. Some people will not be able to afford the QoS necessary to exchange life-critical information.

Non-neutral network policies are not necessarily discriminatory in an economic sense. Sometimes such policies are actually necessary to guarantee adequate QoS for critical communication needs. Rural and remote aboriginal communities in Canada present on such setting where the dominant market-based, binary framing of network traffic shaping is not appropriate. The Keewaytinook Okimakanak (KO) First Nations tribal council, which is comprised of seven First Nations in Northern Ontario, formed the Kuhkenah Network (K-Net) in the late 1990s to address major gaps in telecommunications between its communities that were arguably completely outside the norms of most communities in Canada at the time. The only telephone service that many members of these First Nations had prior to before K-Net was through their local tribal council offices. K-Net, an TCP/IP-based network implemented with a sophisticated hybrid architecture of satellite communications and landlines, brought Internet access to homes that did not even have telephones. Thus, and in contrast to non-rural and remote

parts of Canada, Internet access became the life-critical medium for most communication throughout the KO communities. Unique also to the KO communities is that the use of video and voice communications over the Internet is far more common than in most other parts of Canada, where e-mail and Web accesses are still prevalent. In this case, the affordance of telephony over the Internet was not an alternative, but the only practical communications services between KO communities and the outside world.

It is in this context that network traffic shaping is seen by K-Net administrators as as a vital tool for preserving their community members' abilities to communicate effectively (O'Donnell, Perley, Walmark et al. 2007). Since K-Net hosts many data intensive video conferencing and voice communication sessions concerning life-critical matters such as health care and governance, it is critical that network QoS be managed in a highly disciplined way. Inappropriate use of the network could conceivably present life-threatening situations to the citizens of the KO First Nations, such as preventing emergency communications from taking place.

The most ominous example of non-neutral network policies is the use by governments of packet filtering to implement censorship and surveillance (HRW 2006). Deibert Deibert, Palfrey, Rohozinski, et al. (2008) have shown how many countries use packet filtering to prevent their citizens from exchanging news with the outside world. Human rights groups are, thus, prevented from reporting on events within their own countries to people outside of their countries; and they are also prevented from accessing alternate sources of news to their state-controlled media. One affordance that packetized

communications offers in a unique form of censorship is the implementation of efficient content substitution. By examining packet contents, origins, and destinations, a network operator can decide whether to add or substitute information on its way to a recipient. Rogers Cable has reportedly experimented with content substitution whereby commercial messages are added to Google search results (Geist 2007d). Content filtering prevents people and communities from exchanging life-critical information. Content substitution results in inaccurate communications and reduces the confidence that people have in the information they request.

Impacts of network traffic shaping policy on communication rights in Canada

Non-technical arguments for network neutrality are usually given in terms of a user's rights. Google (2007, para. 2) has described network neutrality as allowing people to take "control of what content they view and what applications they use on the Internet."

Non-neutral network policies might be interpreted as infringements on the exercise of civil rights in Canadian society. One approach is to link guarantees in *the Charter of Rights and Freedoms* with the intent of Canadian telecommunication policy. Article 2 (b) of *the Charter* provides for the "freedom of the press and other media of communication." (Canada 1982). Freedom here could be interpreted broadly to include a positive right of equal access to media of communication. *The Telecommunications Act* for its part does not refer explicitly to the Charter as the basis for its objectives, but it

does make clear that the Act is rooted in supporting the "essential role" of telecommunication in "the maintenance of Canada's identity and sovereignty" (Canada 1993, para. 7). Further, the Act includes the objective of "[rendering] reliable and affordable telecommunications," as discussed above (para. 7.b). There are arguments that non-neutral network policies have the potential to prevent the attainment of this objective (see Geist, 2004).

The implications of network neutrality or non-neutrality become more complex and potentially disruptive when multiple networks are interconnected. Messages might need to traverse multiple networks to reach their destinations. A sender might know and be prepared for the consequences of their own network's policies; however, a sender would not make use of a network if it could not be certain of the network's policies regarding their data.

Revisiting the example depicted in Figure 1, suppose a packet is to be sent from computer $Computer_{1.1}$ on $Network_1$ to $Computer_{22.3}$ on $Network_{22}$ via another network that connects them, $Network_7$. This is shown in Figure 2. At minimum, $Network_1$, $Network_7$, and $Network_{22}$ must examine the address of the message to determine how to route it properly from $Computer_{1.1}$ to $Computer_{22.3}$. $Network_7$ and $Network_{22}$ would be non-neutral if they refused to assist in the delivery of the packet on the basis of the type of data it contains or the IP addresses indicating its origin or destination. It is also possible that some packets making up a single message will take different routes to the destination. Each packet could be subjected to different network neutrality policies as

they cross each of these networks.

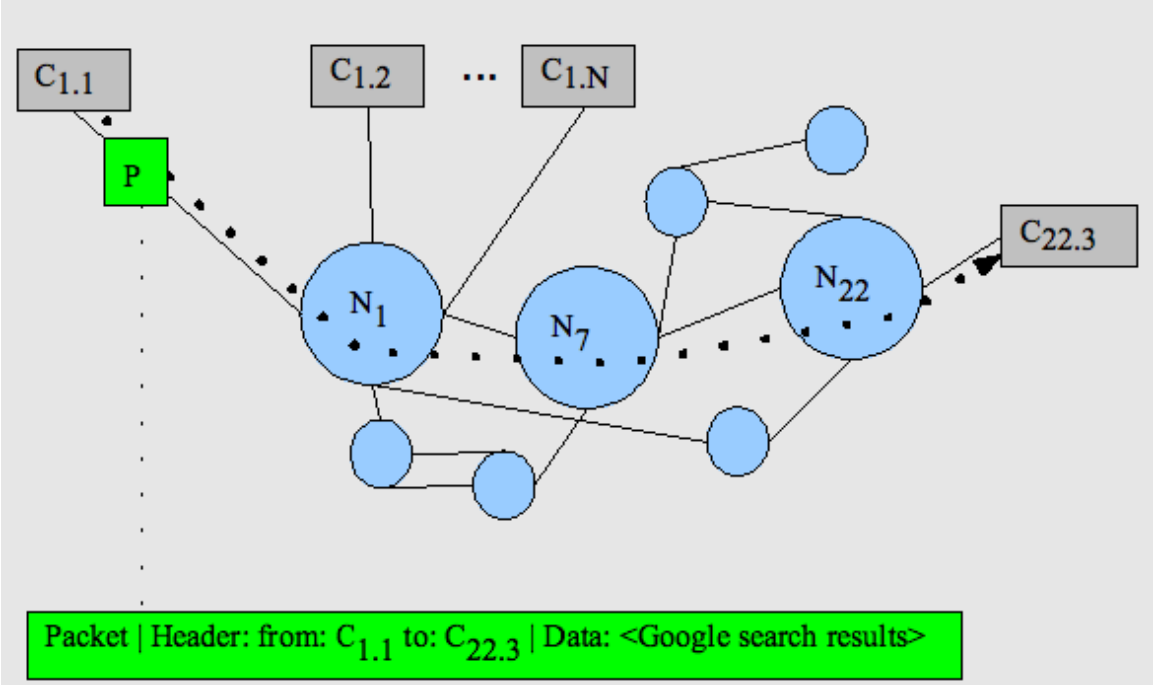

Figure 2. Potentials for non-neutral network behaviour.

Impacts of non-neutral network policies extend to international contexts. A number of popular services running on top of the Internet protocol suite -- and as such susceptible to non-neutral policies -- are often used for communication across Canadian borders. For example, Voice over Internet Protocol services, such as Skype, have become attractive substitutes for traditional international long distance calling for many people because of their low costs.

International Internet data traffic traverses multiple jurisdictions, each with its own network neutrality policies (if any). Thus, a policy framework for Canada would not be sufficient for addressing impacts felt within its borders. Mueller sees network

neutrality as a “global principle for Internet governance” (2007, p.1). Activity on network neutrality has taken place at the international level within the Organisation for Economic Co-operation and Development (OECD). The OECD's Working Party on Communication Infrastructures and Services Policy of the Committee for Information, Computer and Communications Policy (CISP) issued a report on “Internet Traffic Prioritization” (OECD 2007). The Government of Canada is represented on the CISP as a member state of OECD. Among the CISP's key findings in this study were that (1) network service providers should operate in a manner that is transparent to customers with respect to network traffic shaping policies and their expected impacts; (2) antitrust laws must be re-examined in the context of traffic shaping concepts and realities; and (3) entry into the broadband market should be made easier to encourage competition. The OECD report does not, however, deal with cross border issues of network neutrality.

Non-neutral network policies might be interpreted in the international dimension of communication rights as a corollary to domestic human rights interpretations. In this context, such policies might be seen as infringements on Articles 19 and 27 of the UDHR.

The CRTC has supported public consultation processes on issues relating to network neutrality. Comments were sought, in particular, for its proceeding on VoIP services. Canadian incumbent telecommunications providers and VoIP providers gave input on various topics including network neutrality (CRTC 2004b; 2004c; 2004d).

However, by using these submissions as a basis for accentuating the principle of technology neutrality, the CRTC largely steered clear of adopting a position on the issues related to network traffic shaping until the its 2008-108 decision and the consultation and hearing process it announced in CRTC 2008-19, which is scheduled to conclude in July 2009.

Semantic Web and Web 2.0 Technologies

The semantic Web and Web 2.0 are related and competing research and development movements attempting to improve the usefulness of the World Wide Web. The semantic Web aims to change the way information is represented on the Web to enable computers in ways that are more useful to humans (Berners-Lee, Hendler, Lassila, 2001). The initial approach to sharing information on the Web has been human-oriented in that Web documents have been defined largely in terms of their structure and visual presentation and less so with respect to the meaning of their content. Information represented in this way is difficult for machines to process and, thus, limits the ways in which it can be searched, interpreted, and used. For example, search engines cannot reliably search for Web pages by their authors' names because that information is often not explicitly represented. A software agent cannot reliably interpret the contents of travelers' Web pages for their opinions on hotels without being told how to locate it within a page and how it should be evaluated. How is a machine to understand the differences or similarities between “the hotel was decent” and “I found it to be clean but overpriced” and generate a recommendation?

Web 2.0 generally refers to human-oriented techniques for improving the usability of Web content and an evolving set of business models that depend on these techniques. Web 2.0 shares some of the technologies for representing content developed for the semantic Web, but it depends largely on interaction of humans to process information in ways that make it more useful to whole communities. O'Reilly (2005, section 2 at para. 24) has characterized Web 2.0 as a "harnessing [of] collective intelligence." If a software agent cannot be made to locate and process information intelligently, software can make it easier for larger numbers of humans to collaborate in carrying out such tasks. This is known as "collaborative filtering."

Web 2.0 encompasses blog systems, social networking services, "mash-ups," and rich Internet applications (RIAs). The essential contribution of Web 2.0 technologies to blog systems is the concept of tagging, which allows human authors and readers to categorize entries so as to make searching more effective. Web services help people establish social networks on the Internet, including facilities for finding people with common interests, managing contact lists, and analyzing one's own network. Tagging and social networking should be seen as new forms of communication subject to protection.

A mash-up is a process of combining two or more existing Web services to form a new service to solve a specific problem. A well-known example is the combination of Google's traditional search service with its mapping service to allow users to either locate information geographically or to locate geographic information associated with other

forms of information. For example, one can ask to see certain kinds of businesses near a certain address along with opinions about them. This is an example of a service that is dependent on the cooperation of multiple users, in this case to contribute opinions and rankings.

RIAs are provided by web services running in users' web browsers, but they provide interactivity and functionality that are similar to traditional applications resident on personal computers. RIAs do not just mimic traditional applications. The Web dimension of RIAs allows real-time collaboration and remote storage of documents. A well-known example of an RIA is Google Docs, a web-based service that allows people to edit documents and spreadsheets.

Semantic Web, Web 2.0 and the process of social communication

Traditional knowledge creation is being supported and extended by semantic Web and Web 2.0 technologies. Researchers, writers, composers and artists can collaborate with others over the Internet in more sophisticated ways using these technologies. RIAs exist that support real-time collaborative text editing. Photographers are using blogging systems to display their work and to allow people to search their portfolios. Web 2.0 technologies are offering new affordances in the area of knowledge creation. The tagging facilities in blogging systems have made it possible for communities of scholars to semi-automatically generate taxonomies of any knowledge space. These have been termed 'folksonomies.'

Distribution of knowledge using Web 2.0 technologies is being accomplished on multiple levels. Interpersonal and group communication occurs using blogs, chat and e-mail RAIs. Gatekeeping is achieved using access controls and editorial functions on shared knowledge spaces such as blogs. Filtering takes place through collaboration, as discussed above. Gatekeeping and filtering are, thus, barriers to communication; they deny or remove access to knowledge. In contrast, many Web 2.0 technologies support dissemination and distribution processes whereby knowledge is promoted and recommended to people on the basis of voting or sophisticated processing of their pre-defined preferences.

Practical access to knowledge using Web 2.0 technologies generally requires only a personal computer with a Web browser and Internet service; however the necessary characteristics of Internet service are changing. Documents containing only text and images were once the dominant form of Web content, but video and audio are now prevalent. This type of content can be orders of magnitude larger than text documents. Thus, to have effective access to knowledge using Web 2.0 technologies people are being required to obtain Internet services that permit higher data transmission rates. Some Web 2.0 services may require the installation of software in addition to the Web browser. In contrast to communication costs, software costs are often not a barrier in Web 2.0. The dominant Web 2.0 business model provides software and access to data for free with the objective of generating revenue from the viewing of Web content through advertising and by stimulating sales of products and services through that content.

The capacity to use knowledge accessed via Web 2.0 technologies is limited largely to their ease of use and, in some cases, to the ability to install the necessary software . The usability of Web 2.0 technologies, including Web browsers and RIAs, is generally no worse than traditional PC applications.

Use and interaction of knowledge via Web 2.0 technologies takes place in the context of the public sphere, business activities, identity formation, and cultural activities. In the public sphere, Web 2.0 technologies are supporting democratic processes and social organization. The functionality provided in social networking and blogging systems have been combined to support political campaigns and other forms of activism.

In terms of business activities, Web 2.0 as a movement has fostered an inversion of the dominant business relationship between software and data. Profit in Web 2.0 enterprises is now generated from data and not the software used to process them. For example, people submit music recordings and opinions on music to the Canadian inDiscover.net[6] Web service for free. The service then offers collaborative filtering services for free using those recordings and opinions to help people buy music they will like.

Identity and cultural formation are also facilitated by social networking services. One example is Cyber Yugoslavia, a Web site which serves as a virtual nation for former

[6] inDiscover.net can be viewed at http://indiscover.net (last accessed May 30, 2008).

citizens of Yugoslavia[7].

The process of social learning within social communication is not automatically supported by Web 2.0 technologies; this depends on their application. Communities are using the functionality discussed above, such as social networking and collaborative filtering tools for problem solving. Some notable examples of Web 2.0 being used in Canadian communities include the following:

1. *Pep Talk Community Health Resource Mapping Tool*: The University of Toronto Medical School has created a Google Maps mash-up that helps people locate health care facilities by type, medical condition, and postal code (2007). (see http://icarus.med.utoronto.ca/mapping/ver0.6/default.asp)

2. *Toronto Public Library Finder*: This mash-up site by Greg Smith (2006) shows the geographic locations of libraries as a set of icons on a Google map and provides the street address when the user clicks on an icon. Alternatively, a user may select a library by name, in which case its geographic location and street address are shown. (see http://www.tplfinder.com/)

3. *Psychiatric Survivors of Ottawa – Blog*: This Web log sponsored by the Psychiatric Survivors of Ottawa (2007) allows people involved in the mental health system to share knowledge and opinions concerning their health and care that they are receiving. One can search for blog entries based on key words or the

[7] Cyber Yugoslavia can be viewed at: http://www.juga.com (Last accessed May 30, 2008).

name of a blogger. (see http://www.psychiatricsurvivors.org/weblog/index.php)

Impacts of Semantic Web and Web 2.0 technologies on communication rights in Canada

Semantic Web and other Web 2.0 technologies offer technical potentials for reducing communication barriers and invigorating the public sphere. RIAs and Web 2.0 are now discussed in terms of "cloud computing" whereby applications are made freely available to users not on their own computers, but in the "cloud" that is the Internet (Baker 2007). This trend could potentially reduce some communications costs for users, since it will reduce the need to invest in certain types of software necessary for communication via the Web.

Significant efforts have been made to apply Web 2.0 technologies to increase the exercise of democratic and consensual participation in society. They provide new modes of communication and interaction for community activism, elected officials, and the electorate. The Crossing Boundaries National Council (CBNC) has sponsored projects in the use of ICT to enhance democratic participation as part of a broader mandate (cf. http://www.crossingboundaries.ca). New Brunswick MLA the Hon. Jody Carr and Saskatchewan MLA the Hon. Doreen Hamilton piloted CBNC's "Wired Elected Official" system (CBNC 2007). This suite of advanced Web tools includes: managing constituents' files, performing on-line consultations with citizens, and publishing content. The Crossing Boundaries National Council's (2007, 6) own evaluation of the project claims

that the system “improved effectiveness and efficiency” of elected officials and their constituency office staff and that “citizens value the additional communication channels and the improved responsiveness.”

Web 2.0 technologies have provided new modes for communicating knowledge, many of which allowed citizens to side step traditional media such as news organizations. Older media have often operated as gatekeepers and filters. Objectively, gatekeeping and filtering functions are necessary for some media such as enforcing a discipline in the reporting of news, even if they are not always performed in an ideal manner. Some argue that many such gatekeepers have often prevented or failed to enable the communication of useful knowledge. Market forces are identified as a major factor. In many cases, market forces have led to uncompetitive environments resulting in a lack of diversity of content. Market forces have also led to a reduction in original content formation, such as in-house reporting and the reporting of local news. This has resulted in a lack of diversity of content.

The key affordance offered by Web 2.0 mechanisms such as blogging, content management, and video upload systems is that they allow people with Internet access to communicate with a wide range of people in forms that were once the sole province of traditional media. The Canadian member web sites of the global Independent Media Center (IMC) are examples (cf. http://canada.indymedia.org). Indymedia has provided a mechanism for people to publish news content which may otherwise not be published by mainstream media organizations.

Semantic Web and Web 2.0 technologies have offered only technical potentials for improving access to mass media by communities and individuals, and for invigorating democratic processes in society. These technologies have in reality not helped people fully achieve their transformative potentials. They have arguably weakened quality journalism and replaced it with a flood of amateur commentary and junk information in the form of blogs, web sites, text message broadcasts, videos, junk e-mail, and other new media. While these technologies have made significant impacts on certain types of political engagement, most prominently fundraising, the evidence that they have made significant, positive, transformative impacts on political participation is still unclear (Muhlberger 2009).

One civil rights issue involving Web 2.0 services is the question of data ownership. The blogosphere and other segments of the Web 2.0 sector, such as web-based e-mail services, Internet chat facilities, and free web content hosting services, all have a critical dependence on the externalization of personal or community knowledge. That is, they exist only through individuals or groups of people contributing and managing personal data via their web services. O'Reilly (2005, section 1 at para. 21) cites this as a central tenet of Web 2.0: “the service automatically gets better the more people use it.” Massive numbers of users now regularly externalize detailed personal knowledge by 'posting' text, pictures, video, and audio on web services owned and controlled by someone else. Technorati.com, a highly recognized monitor of the blogosphere, stated as of May 26, 2006 that they were monitoring 41.2 million blogging sites having 2.4 billion links (cf. http://www.technorati.com/about). O'Reilly (2005, section 3 at para. 2)

eventually asks: “Who owns the data?” This was also the subject of a high-level discussion at the 2006 W3C Technical Plenary and WG Week, the main forum for working groups and interest groups within the World-Wide Web Consortium (W3C, 2006).

The initial assumption in popular Web 2.0 services, such as Blogger.com, MySpace.com, and Facebook.com, was that users would retain ownership and copyright of data that they input. Blogger.com, a popular blog hosting site owned by Google, declares that it “claims no ownership or control over any content submitted, posted or displayed by you ...” (n.d., Article 6). MySpace.com also affirms in its terms of service that the users “continue to retain all ownership rights” of content they post on the site (2006, Article 6.1). The original terms of service (TOS) for Facebook.com imply that users own their own data: “All content on the Web site ... are the proprietary property of the Company, its Users or its licensors with all rights reserved” (2008, para. 5).[8] More recently, however, Facebook tried to quietly change its data ownership policies to require that users agree to license ownership of the data they create in perpetuity to the company (EPIC 2009). This was seen as an attempt to derive even more commercial value out of users' data. Public pressure and an impending complaint to the U.S. Federal Trade Commission forced Facebook to restore its original TOS.

[8] Although, questions have been raised about how Facebook operates in the grey areas of such statements. A complaint was filed with the Office of the Privacy Commissioner of Canada in 2008 by The Canadian Internet Policy and Public Interest Clinic (CIPPIC) against Facebook that alleges that Facebook does not adequately inform members about how their personal information is shared with third parties. A finding on the CIPPIC complaint had not been made as of March 2009. The question of data ownership though separate, is a related issue and the CIPPIC compliant should raise questions about Facebook’s performance in this area (see CIPPIC 2008).

Work-related blogging is now a common activity. The copyright and contents of employee blogs that are managed by an organization's systems may be owned by that organization. Hewlett-Packard, for example, owns the copyrights and data for blogs created by its employees using its corporate facilities (Foley 2005). Employees are equally capable of using a third party blogging service outside of the control of their employer. In these cases, it is becoming common for employers to issue guidelines concerning their employees' responsibilities when discussing corporate matters in their blogs. Examples among prominent corporations that practice these policies include: Yahoo! (2005), Sun Microsystems (n.d.), and Microsoft (Weil, 2005).

Another communication rights question that has arisen is whether the Web 2.0-enabled endeavors such as blogging can be classified as journalistic activities with the civil rights protections it is afforded in Canada and other countries. One case is that of Charles LeBlanc, a self-professed blogger who has been a frequent observer of the New Brunswick legislature. He was arrested and charged with obstruction in June of 2006 while taking pictures at a business conference in Saint John, New Brunswick (CBC News 2006). Police erased his photographs. He was apparently viewed by police as a protester. LeBlanc claims to have told them that he was a "blogger," implying that he should be afforded the same status as traditional, credentialed journalists at the event. LeBlanc challenged this in provincial court. The court's decision in November 2007 was that LeBlanc should be recognized as a journalist and dismissed the charges against him (Austen 2006).

Independent of data ownership and civil rights issues, users are likely to have limited control over the data they create and manage using commercial Web 2.0 services. Many common software applications store data in file formats that can be transported easily between computers and that can often be used by different applications. For example, the applications Microsoft Word, OpenOffice, NeoOffice, and TextEdit are all capable of sharing documents in several common formats; and those documents can be transferred between computers with ease. This is often not the case with the data that users enter into their blogs and other types of Web 2.0 services. While much of the underlying technologies used to implement blogging systems are non-proprietary – Extensible Markup Language (XML) and HyperText Transfer Protocol (HTTP), for example – there is not yet agreement on higher level formats for storing blog information. There is also no agreement on communication protocols for transferring blog data between different systems. Blogger.com, one of the most popular blogging sites in the world, states (n.d.):

> Blogger does not have an export or download function. However, you can use the following instructions to create a single file with all your posts which you may publish and then copy to your own computer for use as desired.

This is followed by a process that average users would probably find to be complex. Arguably such knowledge management arrangements are not yet engineered with the communication and data rights of users in mind.

Internet Telephony

The Internet has enabled the creation of a new type of telephony known as Voice over Internet Protocol (VoIP). Instead of delivering voice in analog as is still done in large parts of the public switched telephone network (PSTN), VoIP converts voice to packets and sends them via the Internet -- and sometimes over the PSTN -- to their destination.

VoIP services are attractive because they offer inexpensive long distance calls and because a subscriber's telephone number or user identifier is not tied to a specific location. VoIP allows telephone services to be delivered wherever there is Internet access. In comparison to mobile telephony, VoIP services are not tied to a specific device and there is no home calling area where roaming charges are concerned. One's telephone number need not be dependent on a physical location or a home area in the context of mobile telephony. The location-independent nature of VoIP has enabled competition in traditional local and long distance telephone markets, where barriers to competition have been based largely around physical access to facilities. In the case of rural and remote communities like the First Nations within KO, VoIP is a life-critical service.

VoIP comes in several forms depicted in Figure 2. The CRTC (2005b, para. 29) defines Category 1 VoIP services as allowing users to communicate between PCs over an Internet connection. Category 2 VoIP services allow users to communicate in either direction between PCs over an Internet connection and telephones on a public switched

telephone network. Category 3 VoIP services allow users to communicate between telephones, and other devices, on a public switched telephone network.[9] These categories represent affordances emanating out of the layered architecture of the Internet, which has provided a nexus for the integration of different forms communication, in this case, the bridging of new and older forms of telephony.

An example of a Category 1 service is Skype-to-Skype calls where all voice data are transmitted through the Internet. An example of a Category 2 service is SkypeOut where voice data are exchanged between a device on the Internet and a device, such as a telephone or FAX machine, on the traditional public switched telephone network (cf. http://skype.com). Examples of Category 3 services are traditional telephone services offered by Vonage and Primus (cf. http://vonage.ca and http://primus.ca) which are implemented by using traditional public switched telephone networks managed by incumbent carriers, such as Bell or Aliant. Incumbents such as Telus offer Category 3 services. Some services like Skype and Vonage offer integrated services that fit in both Category 1 and 2.

[9]The CRTC defines a Category 4 which is not seen as highly relevant to this chapter. It involves business services provided using Internet Protocol suite-based technologies that operate within private domains such as a corporate switch board, or PBX, system.

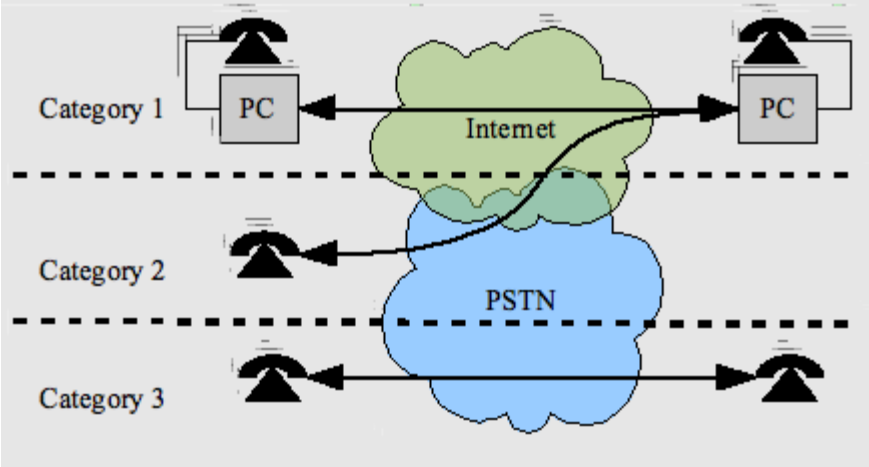

Figure 3. Categories of VoIP service.

Canada was early among nations to develop a regulatory framework for VoIP (Lemay-Yates Associates, Inc., 2005). The distinctions between categories of VoIP were central to the creation of a regulatory framework. If VoIP is equivalent to 'plain old telephone service' or 'POTS', the logic goes, it should be regulated in the same way.

The CRTC (2005b, para. 113) determined that VoIP Categories 2 and 3 are equivalent to POTS since they provide "two-way, real-time voice communications to and/or from anyone on the PSTN." This is an example of technology-neutral regulation. Category 1 services were viewed as Internet services under the framework, which are exempt from regulation under this framework. The (2005b) decision included the following regulations (paras. 213, 214, 225, 242, 326):

- Local number portability obligations for incumbents extends to VoIP service providers;

- Equal ability for VoIP providers to assign telephone numbers as incumbents;
- Equal requirements for accessing incumbent facilities and providing access to others for network interconnection purposes;
- VoIP providers must file tariffs like incumbents.

VoIP services under Categories 2 and 3 were also found to be eligible to make contributions to the CRTC's national fund, which is intended to subsidize the high cost rural and remote service (CRTC, para. 14). Any company with annual revenues over $10 million must pay a percentage of that income into the fund. This helps to support Canada's telecommunication policy objectives, as discussed in Section 2.3. Also, given that Category 2 and 3 services are viewed as equivalent to POTS, they must also abide by the 911 emergency requirements under CRTC's earlier Telecom Decision 2005-21.

Internet telephony and the process of social communication

VoIP subscriber services offer yet another medium of interpersonal communication through which knowledge can be delivered. It is important in this respect because of the advantages it provides over land-line and mobile telephony. These include: location independence, land-line independence, elimination of mobile telephony roaming charges, and advanced calling services. Since VoIP services are implemented using the Internet, services can be provided in a largely location-independent manner, unlike land-line telephony, which depends on a fixed PSTN infrastructure. A subscriber only needs to have access to an Internet service to place and receive VoIP calls. The subscriber's VoIP

service provider can map the traditional telephone number they were assigned to the specific Internet address being used at the moment. Thus, for example, if a VoIP subscriber connects to their service from an airport lounge in Bangkok, anyone calling their VoIP-enabled phone number in the New Brunswick area code can be routed transparently and at no additional cost for many VoIP services to that computer in Thailand. This can be done because the VoIP software that subscribers use notifies the service of its location. Some VoIP services, such as Skype, allow calls between computers at no cost.

The other advantages of VoIP are related to location independence. Since VoIP requires only Internet access, subscribers can potentially avoid paying for traditional land-line telephony services altogether. Though it is often the case, that VoIP subscribers must obtain Internet services from local telephone companies. Thus, telephony costs must sometimes be factored into the overall cost of VoIP services. The advantage of VoIP over mobile telephony is that the costs of roaming are potentially greatly reduced. A subscriber needs only to negotiate the cost of Internet access when they are away from their local calling area to initiate and receive VoIP calls. Thus, per call mobile telephone roaming charges can be replaced by a short term Internet access fee (e.g. in an airport lounge). Thus, the cost of that fee amortized over each VoIP call becomes the effective roaming charge with corresponding economies of scale. The combination of routing and parallelism capabilities offered by the Internet has allowed VoIP services to offer average subscribers a wide array of advanced calling services at a relatively low cost. These include the ability to ring multiple numbers in parallel or to automatically dial a list of

telephone numbers in sequence (e.g. a priority list) until the call is answered. Many of these services were previously affordable only to large organizations, some were not practical prior to VoIP.

The requirements for accessing and using VoIP services are modest for those already using computers and the Internet. Access to VoIP requires a subscription with a service provider and an Internet service with a channel capacity of greater than 2 megabits per second – typical high-speed or broadband. High-speed service is required for a reasonable quality of service. VoIP services are relatively easy to use for those familiar with computer applications. In most cases direct use of software is not necessary since traditional telephone handsets and dial keypads are used for basic calling.

Impacts of Internet telephony on communication rights in Canada

The advantages of VoIP over previous forms of telephony are making possible the dissemination and distribution of knowledge for subscribers at lower costs and in more sophisticated ways than allowed by land-line and mobile telephony. This has allowed individuals and organizations alike to reduce the cost of communicating knowledge. In many cases, VoIP can bridge communications between other forms of telephony and computers, thus extending the abilities of older communication technologies in disseminating and distributing knowledge.

Current usage rates show that VoIP is an attractive mode of communication in

Canadian households. Statistics Canada (2007) reported in a December 2006 survey that 10.6% of Canadian households had VoIP or cable telephone service. The proportion of Quebec and Alberta households was over 13%. These penetration rates are remarkable because residential VoIP services have been available for less than five years in Canada. By comparison, the same survey reported that land-line and mobile telephone services were used by 90.5 % and 66.8% of Canadian households, respectively.

There has been concern over the potential for incumbents to use their networks and customer accounts in ways that would prejudice competitive VoIP providers (Geist 2004). Claims of network non-neutrality regarding VoIP have been reported following the creation of this framework (Geist 2005b). Shaw Cable, Rogers, and Videotron -- all cable companies as well as incumbent Canadian ISPs -- have been accused or found to 'shape' Internet traffic over their networks where VoIP is concerned. Shaw proposed a $10 fee to guarantee quality of service (QoS) for its customers who use VoIP.

The potential infringements on civil rights presented by network traffic shaping are directly related to VoIP services. VoIP services that are not provided by incumbent telephone carriers have been threatened with non-neutral network policies from incumbents. These carriers would discriminate against third party VoIP data crossing their networks. Some incumbents have demanded that premiums be paid by subscribers who wish to use third party VoIP services. Such actions could constitute barriers to “reliable and affordable” communication as guaranteed by *the Telecommunication Act* (see Canada 1993).

As discussed in the context of network traffic shaping, there have been public consultations related to VoIP. This resulted in a technologically neutral view of VoIP relative to traditional telephony in the CRTC's (2005b) VoIP decision. The decision did not deal with the potential impacts of non-neutral network policies on VoIP.

Another risk with new types telephony such as VoIP, and mobile telephony before it, is that they have introduced gaps in access to emergency services. In particular, 911 services were not accessible in earlier offerings. The CRTC addressed this in a decision requiring VoIP service providers to fulfill the same emergency service obligations that other carriers have (CRTCc)[10].

Communication Rights and Regulatory Challenges in Canada

The affordances offered by Internet-based ICT have, to some extent, reproduced existing modes of social communication, such as basic telephony and postal communications. Internet-based ICT have also made possible extraordinarily novel and powerful modes of communication. Web 2.0, social networking, and variations on

[10] Just how precarious but crucial the links between VoIP and emergency services can be was tragically illustrated to Canadians in the spring of 2008. The Luck family called 9-1-1 from their home in Calgary after 18 month old Elijah started having trouble breathing. As subscribers to a category 2 VoIP service, the Lucks were connected not to 9-1-1 emergency services directly, but to their VoIP company's contracted call centre in Ontario whose job it is to relay the message via landline phone to local emergency services. When the Luck's were disconnected in the middle of this call, the call centre staff quickly moved to call 9-1-1 and, having not yet confirmed the details of the emergency with the Luck's, gave emergency services a billing address in Mississauga Ontario that had not been recently updated despite the fact that it had not been the Luck's address, nor the residence at which they received telephone service, for more than 2 years. Precious minutes were lost while Mississauga paramedics searched the wrong part of the country in vain. The Luck's eventually gave up waiting and placed a 2nd call to Calgary 9-1-1 from a neighbor's landline but Elijah Luck died at some point during the 30 excruciating minutes that passed between the initial call and Elijah's arrival at the hospital (see Richards 2008).

Internet telephony now enable more far-reaching and sophisticated communication, knowledge sharing, and collaboration than at any time in history. Individuals and communities can now use Internet technologies to communicate in text, audio, or video with millions of other similarly-equipped people around the world at relatively low cost. The average users or their communities can now also publish or produce their own news, research, literature, movies, or music and distribute them to millions of others at relatively low cost; whereas before, corporate media served as gatekeepers for these types of communications, preventing most of these same people from communicating in these ways.

The new affordances created by Internet-based ICT have created conditions that require societies to reexamine both communication rights and telecommunications policy. These novel communication technologies do not give rise to the need for fundamental rights beyond those already recognized under the umbrella of communication rights so much as they create new conditions under which existing rights can be challenged. Any new technology-specific affordance that can be exploited to violate communication rights, can mapped onto a communication rights framework in a technology-independent way. For example, as we saw above, VoIP affords network operators new means to impede telephone communication through traffic shaping, but these potentials can still be articulated in a technology-neutral manner in terms of existing human rights, such as Article 19 of the UDHR. Thus, one of the critical functions that a communication rights framework must implement with regard to Internet policy is ongoing monitoring for new conditions that infringe upon communication rights. The variety of attitudes of ISPs toward network neutrality and consumer rights, as seen in the comments submitted to the

CRTC's consultation on network neutrality, combined with the potential impacts of Internet-based ICT on social communication reinforces the need for a set of inalienable communication rights.

Canadian telecommunications policy, on the other hand, is not congruent with our communication rights framework. This chapter surveyed a variety of new conditions created by Internet-based ICT that have challenged existing telecommunications policies [11]. What was also seen in this chapter is that Canada cannot depend on competition alone to achieve and preserve the social aspects of its telecommunications policy objectives, and, thereby, guarantee adequate communication rights. Governments and the policies they make must balance markets with mechanisms that require telecommunications companies to operate in a transparent manner so that people know what types of services they are entitled to receive and what types of services are being denied or restricted. This is the norm today in general commerce and many people do not otherwise have the technical expertise nor the resources to determine these facts by themselves.

Ch.7: Policy Recommendations for Communication Rights and the Internet in Canada
• The general principle of non-discrimination as understood from common carriage

[11] Some of these are articulated in the Telecommunication Policy Review Panel's final report (See Sinclair, Intven & Tremblay 2006) .

principles should be articulated in a way that is affirmative, technologically neutral and independent of competition. As discussed above, the Telecommunication Act of 1993 frames its obligations to protect consumers from discrimination solely in terms of insuring adequate competition between telecommunication common carriers. This has left a regulatory void in which carriers can – and have -- implemented discriminatory practices until such time as there is a regulatory response – usually due to public pressure. This has been seen most clearly in the context of discriminatory network traffic shaping.

- questions have been raised about the ownership and control of data that people contribute Web 2.0 and social networking services. Telecommunication policy must be expanded to address these questions. Web 2.0 and social networking services are arguably common carriers; they provide regular service to customers who are not readily predictable and are changeable, and they solicit business from the general public. These service should, therefore, be obligated to define clear policies in terms of the ownership and portability of their data. The latter is conceptually no different from mobile telephone number portability rights enacted in the U.S. and Canada in recent years. policy and programs must provide a continued investment in and support for ICT programs across the country;

- A balance between collective human rights -- which is relatively new – and individual human rights must be found in articulating communication rights protections. The case of network traffic shaping in the KO First Nations' K-Net is one example where individualistic perspectives on network neutrality are insufficient. The latter do not take into account the technological realities and needs of communities as a whole. K-Net is an example of a technological reality where individual actions can have significant negative impacts on the whole community;

- Social and policy objectives must be expanded to address: the needs of the disabled, the privacy and security concerns of ICT users, community needs for emergency information services, and continuing gaps in telecommunications services to rural and remote communities. Social communication cannot be fully realized until all members of a community who wish to communicate have the ability to do so. Advanced ICT present affordances which can address the needs of the disabled as never before. Emergency information services must be an integral part of a communication rights framework since new ICT often introduce gaps in emergency services. Attention has already been given to a related set of issues in the Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations, which is framed specifically around advanced ICT (ICET 1998) but more specific policy development is needed in this area in Canada.