

Review and Vary Analysis

Telecom Decision CRTC 2008-108

**The Canadian Association of Internet Providers'
application regarding Bell Canada's traffic
shaping of its wholesale Gateway Access Service**

Original CRTC Reference: 8622-C51-200805153

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Links to external resources

The CAIP vs Bell CRTC traffic shaping page:

http://www.crtc.gc.ca/PartVII/eng/2008/8622/c51_200805153.htm

The CAIP vs Bell 2008-108 decision (PDF):

<http://www.crtc.gc.ca/eng/archive/2008/dt2008-108.pdf>

Access to Information Act

To understand how the CRTC Council came to this decision, an Access to Information request was made to the CRTC in December to obtain all documents presented to the Council by the analysts. These documents are now in the public domain and can be obtained from any CRTC office by providing the access to information reference number [A-2008-00050](#). They consist of Powerpoint simpletons without any in-depth analysis.

The Public Notice 2008-019

http://www.crtc.gc.ca/PartVII/eng/2008/8646/c12_200815400.htm

The CRTC documents, including the December 4th interrogatory provide background on the CRTC's thinking of this issue. The questions asked to the telcos show continued lack of understanding of the issues and lack of desire to understand the issue.

A CBC interview of Leonard Katz, the CRTC's vice-chairman

<http://www.cbc.ca/technology/story/2008/11/20/tech-crtcqna.html>

On the day the decision was made public, Mr. Katz provided the CBC with much insight on what arguments were given priority to help the CRTC justify its decision.

The Telecommunications Act

http://laws.justice.gc.ca/en/ShowFullDoc/cs/T-3.4//20090216/en?command=HOME&caller=SI&search_type=all&shorttitle=Telecommunications%20Act&day=16&month=2&year=2009&search_domain=cs&showall=L&statuteyear=all&lengthannual=50&length=50

The 98-6 Review and Vary Guidelines.

<http://www.crtc.gc.ca/eng/archive/1998/PT98-6.HTM>

The PPPoE protocol definition

<http://www.rfc-editor.org/rfc/rfc2516.txt>

The PPP protocol definition (part of PPPoE)

<http://www.rfc-editor.org/rfc/std/std51.txt>

Note: The term "Sympatico" is used in this document to refer to Bell Canada's retail ISP service. Despite branding changes, this term is still more recognised and provides clearer distinction between the retail ISP business and Bell Canada's commercial network services.

Note: Paragraphs in this document begin at 20 to prevent confusion with paragraphs in the cover letter.

Summary

20. The Commission made an extremely significant error in fact when it wrote in 2008-108 that Bell Canada's DPI equipment did not look at the packet contents.
21. The Commission made an extremely significant error in fact when it defined traffic shaping as "delaying of packets". Not only had Bell Canada not published the details on how its DPI equipment crippled certain communications to a very slow speed, but the Commission was given evidence by participants in the process that Bell Canada's DPI equipment actively destroyed a large number of packets to force retransmissions.
22. The Commission, by wrongly making the assumption that GAS is an internet service, has made many conclusions which are inapplicable to the PPPoE based GAS service, notably the acceptable network management practices.
23. The analysis of section 27.2 of the Telecommunications act was flawed. The application of equal throttling to services which are different in both commercial and technical nature is in fact discriminatory. The CRTC's argument would have been valid if and only if Sympatico purchased GAS/AHSSPI and used the same facilities.
24. The analysis of section 27.2 failed to deal with the issue that Bell Canada discriminates at the packet level, treating certain TCP packets differently based on having looked at their contents. This is discriminatory.
25. The Commission failed to look at section 27.1 of the Act. A regulated service whose rates had been approved as "just and reasonable" no longer fits this requirement when Bell Canada decides to prevent the delivery of the full capacity being paid by GAS customers 40% of the time. Bell Canada is now preventing GAS customers from getting the full value of the service they are paying for.
26. The Commission's interpretation of section 36 of the act is completely flawed. The Commission not only condones but has itself agreed in its opening of 2008-19 to assign a low priority purpose to packets assumed to belong to a certain class of applications. Neither the Commission nor the carrier can know how the end user will process the packet once it has left the carrier's network, and they must not be allowed to assign such a purpose.
27. No common carrier should be allowed to decide that a communication has a purpose that is less important than another by looking at a few undisclosed bytes to look for a data signature in the packet payload.
28. The Commission failed to tackle the issue that by throttling a specific class of packets for 40% of the time, whether there is congestion or not, Bell Canada could have ulterior motives to prevent certain content types or usage types from becoming popular. This is clearly an attempt to control the content or meaning of communications, especially since Bell Canada does not throttle similar uses, notably downloads of movies from its own Bell Video Store. A clear violation of section 36.
29. The Commission failed to address the fact that in citing section 8.3 of its own Tariffs, Bell Canada accuses one legitimate use of the network to have a negative impact on another legitimate use of the network and that such uses are promoted by Bell Canada marketing on TV/print ads. If a legitimate use of a network causes disruptions, Bell Canada must not blame users, it must blame itself for not having sufficient infrastructure to provide the advertised services.

30. While the Privacy Commissioner found that Bell's alleged use of DPI equipment did not break PIPEDA, the Commission failed to uphold its mandate as defined by section 7.(i) to contribute to the protection of the privacy of persons. By condoning the use of DPI equipment to look inside packets transiting through a common carrier, the Commission has set very dangerous precedents that undermine the trust Canadians have in their telecommunications industry.
31. The neutrality and transparency of telecommunications is a required pillar of a modern economy, and the precedents set by 2008-108 could be used to justify the deployment of DPI equipment on other commercial telecommunications links such as those used to carry bank transactions.
32. The decision failed to set acceptable auditing and change control standards to the configuration of the DPI equipment. The Commission was made aware of many of the dangerous capabilities of this equipment that go well beyond throttling of packets, yet it chose to specify that Bell only needs to notify anyone when it make changes that affect performance.
33. And while the Telecommunications Act predates the establishment of the ISO 7 layers concepts, the Commission must endeavour to apply modern telecommunications concepts that clearly delineate jurisdiction and network management practices. http://en.wikipedia.org/wiki/OSI_model
34. Bell Canada, with its DPI equipment, seeks to exceed its jurisdiction by looking deep inside the payload of PPPoE packets and managing those packets with techniques which are not applicable to the PPPoE protocol. To ensure the integrity of the Canadian telecommunications environment, the CRTC must strictly enforce jurisdictional boundaries. Making one exception here and there will quickly degrade into widespread abuses by carriers, especially those who have vested interest to prevent emerging technologies from jeopardising their legacy business (ex: a television signal distributor not wanting to see customers reduce the number of purchased channels because they are starting to watch TV via the internet).
35. Bell Canada breaks the OSI model in 2 major ways. As a PPPoE service, Bell Canada must not look beyond the PPPoE packet headers once the session has been established. The PPPoE packet header contains all the information necessary to carry packets from their 2 fixed end points. Secondly, Bell Canada must manage the service only with network management techniques which are acceptable/compatible with the PPPoE protocol.

Broken Core Principles

36. 2008-108 grants Bell Canada the legal permission to sell to competitors capacity it has no intention of providing. As a result of 2008-108, others (notably Rogers) plan to do the same to their wholesale customers. The message is quite clear: any common carrier can now concoct any excuse to claim network congestion and not provide the service that is being purchased by customers. This allows carriers to sell additional capacity without a matching capacity increase in their infrastructure.
37. Prior to writing 2008-108, the Commission failed to require Bell Canada to produce financial reports so that an unbiased and factual analysis can be made on whether GAS service generates sufficient funds to pay for network maintenance and upgrades. Since Bell clearly did not invest sufficiently to provide a reliable GAS service without significant congestion, it is important to know whether the lack of investment was caused by insufficient revenues, or whether Bell Canada diverted funds to upgrade sections of its infrastructure which are not used by GAS.
38. On the date of filing of this document, the Commission published a letter dated May 13 which requires Bell Canada to submit cost studies as part of the TN-7181 Tariff request process. The responses to this request should be incorporated into this 2008-108 Review and Vary process as well since the two are intertwined and this would allow the CRTC to fill a huge gap in its original analysis of the GAS throttling issue.
39. The previous paragraph is all the more important because Bell Canada has been decrying the situation to Cabinet, saying that it is subsidizing the GAS service. What if it is the other way around ?
40. **If Bell Canada sells 10gbps of capacity to a service provider , then it must be forced to provide this capacity. Bell's inability to provide this capacity must be blamed only on Bell's lack of infrastructure investment. Bell must not be allowed to sell services it cannot provide.**
41. Bell Canada has bragged about how many billions or dollars it has invested in its infrastructure. However, there has been no document detailing investments specific to the GAS service. In fact, in TN-7181, Bell Canada provides the image that it has no intentions of upgrading CO-based DSLAMS to which GAS customers are still limited. Considering that upgrading from ancient ATM to current hardware (often just by replacing a card/software) in a DSLAM van often result in operating cost savings, the Commission must ensure that it has a complete, unbiased and technically accurate picture of Bell Canada's costs, revenues and investments.

Definition of the GAS service

42. The Commission failed to achieve a proper understanding of the nature of the GAS service, perhaps influenced by Bell Canada repeating often enough to the media that the independents were just resellers of Bell's retail offering. It is therefore necessary to set the record straight before proceeding with the arguments.

Business definition

43. GAS is a commercial bulk data transmission service which is conceptually similar to a lottery corporation buying telecom capacity from Bell to link all the lottery terminals to its data centre(s). This is **not** a turnkey solution that provides an white label ISP service.
44. Service providers need to purchase 3 components from Bell to make GAS work:
- **Fixed price ADSL link**, roughly \$20 per end user, which provides a dedicated copper based connection to a DSLAM (whether a DSLAM is located in a CO, or on a remote makes no difference to the architecture of the service). This provides dedicated capacity which is limited by the negotiated ADSL speeds over the copper link. The copper loop's length and quality often prevents users from attaining the marketed speed (5mbps is the current maximum for residential GAS service). It is important to note that the dedicated nature of this segment prevents one user from disrupting other users. Bell Canada still uses this argument in its advertising (albeit now with a caveat that it applies only to the copper loop).
 - **The AHSSPI links**. These are capacity based and aggregate traffic from end users throughout the territory to a Bell wire centre nearest to the service provider's premises. Service providers need to purchase sufficient capacity to handle the load generated by its own customers. Failure to purchase sufficient capacity will see that Service Provider's customers experience slower throughput, but this will not affect customers of other service providers nor Sympatico customers.
 - **Access links**. These links are not part of the GAS tariff and are not regulated, but must also be purchased to link the Service Provider's premises to the nearest Bell wire centre. Equal capacity to that of AHSSPI must be purchased. Depending on areas, these links can be ethernet based while un-upgraded areas are still faced with ancient ATM links all the way to the service provider. (There are areas in major city cores where ISPs are still limited to ATM links to the Bell wire centre).
45. The GAS service provides no connectivity to the Internet. This is purchased and managed by the service providers independently and outside of the GAS service.
46. It is important to underline the fact that **Sympatico does not purchase GAS service**. It is therefore impossible to compare the GAS service purchased by independents with whatever undisclosed internal accommodation exists between Sympatico and Bell Canada.
47. As usage patterns change and end users start to download larger chunks of data (movies etc.), service providers need to increase their own network's capacity. This includes the purchase of additional AHSSPI capacity from Bell Canada. A normal business would not only welcome but also encourage increase business because it results in increased profits. Why is Bell Canada so eager to increase capacity and business in all of its network EXCEPT the portion which competes against Sympatico ?
48. If Sympatico were forced to purchase GAS and AHSSPI services from Bell Canada, there would no longer be a conflict of interest and Bell Canada would likely be quite happy to constantly increase capacity of its network to sell more capacity, and increase its revenues/profits.

Definition of the GAS service

Technical definition

49. The Commission refused to acknowledge that the GAS service transports packets using the PPPoE protocol, despite it being clearly written in the Bell Canada tariff 5410.
50. Allowing a service using protocol X to be managed as if it were protocol Y breaks basic telecommunications principles. It also breaks section 36 by assigning a protocol Y purpose to a X packet. Just because the assignment is generally correct (because Bell looks at the contents of the X packet) does not make this exercise acceptable from a jurisdiction point of view, especially since the guessing done by the DPI equipment is not 100% accurate.

51. The PPPoE standard states:

1. *Introduction* *The Point-to-Point Protocol is designed for simple links which transport packets between two peers. These links provide full-duplex simultaneous bi-directional operation, and are assumed to deliver packets in order.*

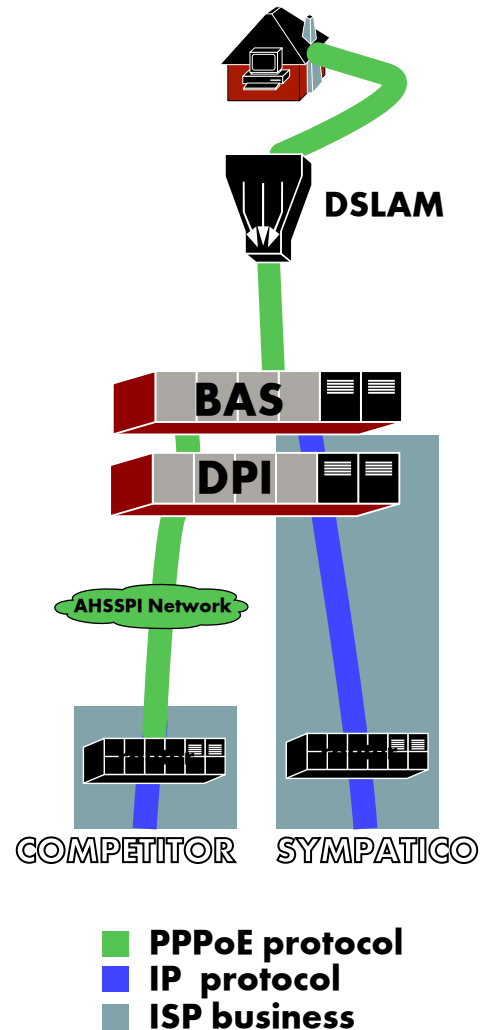
The last item is very significant because it dictates very different network management paradigm compared to protocols such as TCP which are designed to handle packets arriving out of sequence or not arriving at all. **Different protocols require different management techniques.**

52. Point-to-point protocols such as PPP, PPPoE, DDCMP, SLIP and others were developed to build tunnels between two points to allow carriage of network packets over links not designed for their carriage. During transit in such tunnels, the original network packets are considered the payload/contents of the PPPoE packet.
53. PPP was the preferred solution to transport IP packets over dial-up telephone lines. Once the connection was established (both phone call and PPP session levels), it was assumed that the tunnel would provide the full speed that the modems had negotiated. Bell Canada could not systematically intervene in the voice calls to "throttle" the noises emitted by modems to reduce their actual throughput.
54. Bell Canada is able to provide the illusion that each phone call had dedicated capacity because it properly provisioned enough capacity in its network to prevent fast talking teenage girls from having negative impact on slow talking grand mothers. And when/if usage patterns changed, Bell Canada is generally quick in adding additional capacity to trunk lines to make the telephone system work as if every phone call has its dedicated line despite calls sharing capacity between central offices. The same should be done with the GAS service especially since the GAS tariff is usage sensitive, forcing independent providers to purchase additional capacity when the usage from their customers increases. Bell Canada must give customers a service which provides a transparent point to point connection. This is what they pay for. And this is what the PPPoE protocol was built to operate over.
55. By refusing to consider HOW Bell Canada's DPI equipment reduced throughput of some traffic, the **Commission conveniently avoided discussion on whether Bell's DPI solution was acceptable to the law and applicable to a PPPoE service.** This discussion MUST be held now because it is a critical issue.

Definition of the GAS service

Technical definition

56. There is a significant difference between Sympatico and GAS customers with regards to the protocols in use as they pass through the DPI equipment. For most Sympatico customers, the PPPoE session is terminated at the BAS, beyond which the packets travel on the Sympatico portion of the internet and are managed as such.
57. However, for GAS customers the packets go through the DPI equipment as PPPoE packets and remain as PPPoE packets all the way to the competitor's premises.
58. The DPI equipment processes internet (IP) packets for Sympatico while it processes PPPoE packets destined for the GAS service. Therefore one cannot manage one the same way as the other.
59. When Bell's throttle discards a PPPoE packet, the PPPoE protocol cannot recover. However, because the payload of the PPPoE packet was a TCP/IP packet, the TCP stacks at both end peers will notice the loss and retransmit lost packets. This does not apply to all of the IP protocols.
60. While this kludge works for PPPoE payloads that contain a TCP packet, the CRTC must not start setting precedents that make it acceptable to look into a packet's payload to decide if the peers will recover from the loss of the data. The CRTC must insist that common carriers manage their networks strictly according to the protocol of the service.
61. The GAS service is a commercial data communications service. It links end users with service providers using a point to point protocol that is meant to provide a transparent link. It provides no connectivity to the Internet, and the defined transport protocol is PPPoE, it is not IP nor TCP.



Myths on P2P use of bandwidth

Footnote3 ...P2P applications allow end-users to download a single file from multiple end-users simultaneously, thus creating the potential for faster download speeds

and

30 The Commission notes Bell Canada's submission that P2P file-sharing applications are designed to make the maximum use of downstream and upstream bandwidth and to use up additional capacity in the network as it becomes available. The Commission considers that intensive use of such applications could, during periods of high Internet traffic, result in network congestion and degrade the performance of Internet services for other end-users.

62. The Commission failed to note that **all** TCP/IP applications are designed to make the maximum use of downstream bandwidth. While it is true that many P2P applications (but not necessarily all) will use otherwise idle upstream to contribute to the P2P network, there is no congestion problem noted for the upstream because the ADSL profiles limit upstream to a slow speed (generally 800kbps or 100KBs).
63. The Commission failed to note that whether one downloads a movie from iTunes, BitTorrent, Bell Video Store or any other service, one will take the same download bandwidth. Evidence was filed to this effect, but ignored by the Commission.
64. All TCP based applications, whether a web browser, a P2P application, email etc. use the same throughput (flow control) management techniques which are managed by the low level networking software of a host, not by the application generating/receiving the data. These are well documented in the protocol standards. **All applications that use TCP connections behave the same way.**
65. BitTorrent class applications often have additional controls to limit throughput to **below** the available bandwidth and one can argue that they are better behaved and cause less congestion than other protocols which always use all available bandwidth. On the internet itself, P2P applications tend to generate less congestion because the load is distributed more evenly to/from multiple destinations.
66. The Commission failed to note that the real issue is not the use of a certain class of applications, but rather the increasing demand to transfer large chunks of data. Such transfers will use up available bandwidth for a relatively long period until the transfer is complete as opposed to the sporadic nature of HTTP transactions where a user will transfer one small page and then spend much time reading it (during which the link is idle).
67. It needs to be noted that not all P2P transfers are for large files, and not all P2P transfers are able to use the full available bandwidth. There are many transfers where there are few seeders and the rate of reception of data is small. The throttling of such links makes such file transfers extremely long. While Bell Canada is correct when it states that it does not outright block such transfers, it does make them useless because they take so long to complete.
68. Targeting a single subset of applications is not only discriminatory, but does not solve congestion problem since other applications take up as much bandwidth and usage will switch to other applications. Why is one class of applications punished and another not punished when they both use the same flow control technique and download the same amount of data ?
69. The Commission failed to note that applications such as YouTube already consume more bandwidth than all P2P applications put together.

70. The Commission failed to note that it is the size of the pipe which determines how fast data can flow through it, not the application. Whether a node has 100 TCP connections or just one makes no difference to the amount of data that can flow through the pipe at any point in time. Both operate on the same speed limit (namely the ADSL speed on the copper link) and will send the same number of IP packets.
71. The Commission failed to note that as a provider of PPPoE packet transport, awareness of the TCP context between nodes on the internet should not be possible/permitted. The TCP context is something which is private between two communicating nodes on the internet. On the Internet, transit providers are only concerned with the source and destination addresses in the IP header. They are unaware of the TCP context, as they just route individual packets to destination.
72. If a GAS end user is receiving a 5mbps stream from somewhere on the internet, he is getting roughly 625 KB/s. With packets containing 1500 bytes, this means roughly 416 packets per second. (this does not take into account packet overhead, actual numbers will be lower).
73. Bell Canada sees 416 PPPoE packets flowing from 1 service provider to that user. It doesn't care/ know if all 416 PPPoE packets contain IP packets that all come from one large server on the internet, or half of the packets come from one server and the other half from another, or if the user has 416 TCP connections each sending 1 packet per second. Bell still sees 416 PPPoE packets per second that come from 1 source (the service provider) going to 1 destination (the end user).

Why 30KB/s ?

9 *Some parties stated that Bell slowed traffic down to 30KB/s.*

74. The fact that the CRTC's interrogatory to Bell did not follow up on this question shows how shallow the Commission's analysis was. Bell Canada's arbitrary decision to set a throttled speed which is 20 times slower than the current definition of "broadband" (5mbps) should have been highly scrutinised by the Commission. No explanation was given on why/how Bell came to decide on that speed.
75. The CRTC also did not question Bell Canada's decision to throttle such traffic for 40% of the time, whether there is congestion or not.
76. The decision set a permanent permission for Bell Canada to throttle. The Commission did not request a schedule for Bell to complete upgrades of its ancient infrastructure to provide sufficient additional capacity to eliminate the need for throttling or raise this 30KB/s speed to a broadband level and/or reduce the time period where use of the GAS network is limited.
77. On the internet, when a transit provider has chronic performance problems, customers will switch to another transit provider or negotiate lower prices. The competitive environment forces transit providers to provide the capacity purchased by its customers and reduce to a minimum the periods where the portions of their networks experience problems and/or congestion.
78. The 2008-108 decision grants Bell Canada (and sets a precedent for others) to keep capacity problems unfixed on a permanent basis. This would not happen in a competitive environment. The Commission failed in upholding the goals set by section 7(c) of the Act. Bell's actions also prevent independent providers from providing differentiated services by preventing them from purchasing sufficient capacity to provide competitive service to their customers.
79. The permission to throttle contravenes the spirit of almost all paragraphs in section 7 of the Telecommunications Act because it removes any incentive for common carriers to fix capacity problems and upgrade/improve older portions of their networks. It legitimises permanent under investment in capacity by hiding capacity problems under the throttling carpet.
80. The permission to throttle contravenes section 27.1 of the Act since it condones the non delivery of purchased capacity, which breaks the "fair and reasonable" rate structure that had been accepted when the CRTC agreed that GAS service needed to be regulated.
81. It must be noted that the condoned use of throttling has allowed Bell Canada to start advertising even higher speeds for its Sympatico product, further exacerbating the significant gap between advertised speeds and sustainable speeds.
82. Since Bell Canada has an effective monopoly for ADSL access in Québec and Ontario, the Commission has a duty to ensure that Bell provides acceptable service levels and deliver the capacity that is being purchased. GAS customers have no viable alternatives to provide services to a wide area in Québec and Ontario.

Is DPI the only feasible option ?

33. *The Commission notes Bell Canada's submission that the traffic-shaping approach it has implemented is the only practical option that is technologically and economically suitable, at this time, for addressing congestion in its ADSL network.*

83. The Commission failed to note that the primary, most practical and most economically suitable option to manage this type of network is intelligent matching of ADSL modem speeds to aggregation network capacity. This is a capability which Bell Canada has had from day one and does not require installation of expensive or controversial DPI equipment.
84. The Commission failed to note that Bell Canada raised ADSL speeds over 600% since 2003 but that aggregation capacity rose by only 50% between 2003 and 2007. (extrapolated from figure 16, page 42 in Bell Canada's July 11th 2008 86 page filing). Since 2008-108 was rendered, Sympatico speeds were raised to even higher levels, although GAS speeds have not changed. Why is Bell Canada continuing to increase ADSL speeds when its network is so under provisioned that DPI equipment is used to control congestion 40% of every day ?
85. As part of 2008-19, other carriers, namely Telus, have stated that they can manage their network without DPI by properly provisioning capacity to match demand. The CRTC clearly failed to question Bell Canada's statement that a DPI solution was the only feasible one.
86. Documents obtained through the Access to Information Act show that the Commission was given information about how the FCC viewed Comcast's practices: (see appendix 1).
- Comcast's practices do not constitute reasonable network management, have contravened industry standards and impede the user's ability to use applications and access content of their choice.*
87. It is hard to reconcile the fact that the CRTC was aware that throttling is considered unacceptable by its peer in the U.S.A. , while stating that in Canada, it is not only acceptable, but also the only practical option. The CRTC also contradicted itself when telling the media that it did not condone throttling while writing a legal decision which not only condones throttling but states it is the only practical option.
88. The Commission failed to note that Bell Canada's supposed congestion problems are caused by it raising ADSL speeds without matching capacity increases. DPI equipment is not used to solve network congestion, it is used to hide reckless network management practices dictated by marketing pressures to increase advertised speeds.

Article 8.3 of Bell's tariffs

34. *In light of the above, the Commission considers that, based on the record of this proceeding, Bell Canada's application of its traffic-shaping measures to GAS is permitted under article 8.3 of its Terms of Service*

89. Paragraph 8.3 of the Bell General Tariffs states:

8.3 Customers are prohibited from using Bell Canada's services or permitting them to be used so as to prevent a fair and proportionate use by others. ...

90. Until branding changes late in 2008, Bell Canada was still running TV advertisements with its beavers shouting that you could download all the videos and music you wanted without fear of negatively impacting your neighbours (and/or vice versa).

91. How can the CRTC condone Bell using 8.3 to label certain types of use as disruptive while another is fair and proportionate when both have the same congestion impact and Bell Canada's Sympatico advertising promoted this type of use, claiming it would not disrupt others in the neighbourhood ?

<http://www.youtube.com/watch?v=ArpmbnxlQIQ&feature=Playlist&p=865887949D5E5C6E&index=4>

92. Why is the CRTC accepting the claim that a user downloading a movie with a BitTorrent application will negatively impact others while another user downloading the same movie at the same speed from the Bell Video Store will not have negative impact ? The CRTC needs to be reminded again that no application, P2P or otherwise, can exceed the ADSL modem speed limits set by Bell .

93. Bell is accusing a certain group of negatively impacting another group when both groups use the same amount of network download bandwidth and are using the internet in a way which is promoted by Bell's own advertising. If Bell Canada's advertising promotes certain types of uses, how are end users supposed to know that this type of use is hurting other users and contravenes article 8.3 ?

94. The Commission has condoned Bell blaming an innocent group of customers doing what Bell's own advertisements loudly proclaimed could not harm other users. It has supported that Bell hide behind its 8.3 rule, blaming congestion problems on users when the real problem is Bell Canada increasing ADSL speeds to unsustainable levels where fair and acceptable usage patterns cause congestion problems because Bell did not invest sufficiently in its GAS infrastructure to support the increase in ADSL speeds.

95. It is important to note that Bell Canada throttles all P2P usage, even customers transferring small files or live audio/video streams that use this technology. (the decision to throttle a flow is made within the first few packets and thus without any knowledge of how much data will be exchanged afterwards).

96. Bell is using 8.3 to justify disruption of a certain type of use in order to ensure another type of use has unfettered access through the under provisioned infrastructure. How can the CRTC not conclude that Bell Canada is trying to control the content ?

97. With this decision, the CRTC allows any carrier to sell and advertise capacity it cannot deliver and blame congestion problems on early adopters who begin to use the internet in the very way their advertisements promote.

Subsection 27(2) of the Act



27 (2) 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.




Katz: *It was mainly based on whether discrimination was going on and one of the pieces of evidence that was filed was that Bell had done this back in October 2007 to their own retail customers. That weighed quite heavily into the fact that there was no discrimination here and that they weren't trying to do something anti-competitive.*

Discrimination at the commercial level

98. The CRTC was tasked to evaluate the throttling practice for a regulated GAS service with published prices. Sympatico does NOT purchase GAS service. The relationship between Sympatico and Bell is private, unregulated and financial exchanges between Sympatico and Bell are not disclosed. To state that equal throttling was not discriminatory would require one to ensure that Sympatico paid the same amounts as GAS customers.
99. Bell Sympatico advertises complete internet access [packages starting at \\$14.95](#), which is well below the GAS price for the copper loop only.
100. As a general practice, tariffs are approved with both Bell and the CRTC satisfied that the price for the service would cover capital and operating costs and generate a reasonable profit. The arrangement between Sympatico and Bell is unknown.
101. **The application of equal throttling is therefore discriminatory against GAS customers because the financial arrangements are different.**
102. The current 5410 tariff structure ensures that service providers get only the capacity they purchase. Insufficient purchase of AHSSPI capacity results in congestion happening within the service provider's premises without any negative impacts on other GAS customers or Sympatico. If GAS revenues are sufficient to sustain the level of capacity being purchased, then GAS customers should not be held responsible for any congestion which happens as a result of Bell Canada under investing in capacity upgrades.
103. **The application of equal throttling is therefore discriminatory against GAS customers if their relative contribution towards capacity upgrades is higher than for Sympatico.**

may change with 2008-117

104. Since the summer of 2007, a gap was created when Sympatico customers got their speeds raised to 7mbps while GAS remained at 5mbps. This gap was recently widened with Sympatico offering 16mbps packages, over 3 times as fast as 5mbps.
105. With GAS customers limited to DSLAMS in Central Offices, a greater percentage are unable to achieve advertised speed of 5mbps due to longer copper loops of inferior quality compared to Sympatico customers who have exclusive access to neighbourhood/remote DSLAMS. This creates and even bigger average speed gap between GAS and Sympatico.
106. With significantly higher speeds, Sympatico customers required significantly more capacity and are up to 3 times more likely to cause congestion problems.
107. **The application of equal throttling is therefore discriminatory against GAS customers who do not generate equal amounts of congestion due to significantly lower speeds.**

- 27 (2)  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.

Discrimination at the packet level

108. While the Commission put a large emphasis on the Bell Canada supplied argument that it throttled Sympatico and GAS equally, it failed to look at the real issue raised by third parties:
109. **Discrimination of service based on contents of packets being transmitted.**
110. By looking at packet contents, Bell Canada's DPI equipment guesses what application is generating packets. A person using a particular application to exchange information will be subjected to an unreasonable disadvantage (throttling) while a person using another application (such as Bell's Video Store) will not be subjected to this disadvantage, despite both using the same network protocols and the same amount of bandwidth to download the content. It is important to repeat that at the PPPoE level, there is no concept of application. There is merely the concept of a PPPoE header that allows Bell to deliver PPPoE packet to the other end point in a point to point link, and a content agnostic packet payload that must remain opaque to the common carrier who has no business peeking inside it.
111. There are fundamental aspects of telecommunications which any regulator must uphold. A carrier's job is to deliver packets to their destinations. Packets with identical network features should all be treated equally. When a carrier treats packets differently despite them having identical network level features, it is, by definition, discrimination.
112. The issue is even worse at the GAS service level because all Bell Canada should only see PPPoE packets flowing on a point to point link between an end user and his service provider. The fact that some PPPoE packets in that session would be targeted for throttling while others would not is extremely discriminatory because all PPPoE packets in that session have identical features, namely the session ID which defines the end points in this point to point link. The Commission has no choice but to admit that Bell Canada, in selecting certain PPPoE packets for throttling, discriminates based on its inspection of packet contents.
113. What a user does with a packet once it has been delivered is none of the carrier's business and the carrier cannot be allowed to discriminate between packets based on what the carrier guesses the packets will be used for once they have left its infrastructure.

114. At the internet level, whether packets are generated by a P2P application or an email application, makes no difference. They are IP packets.
115. At the TCP level, whether packets are generated by a P2P application or an email application makes no difference, they are both TCP packets with identical throughput/flow control logic which is managed by the network stack in the node, not by the application. They will both behave the same way in terms of managing congestion, or use of available bandwidth.
116. Because the TCP layer is managed by a node's network stack and not an application, the throttling of packets generated by one TCP application and not another is extremely discriminatory because both behave the exact same way at the network level because both are handled by the same computer code in the network stack for the node.
117. If sending a 5 megabyte file via email (SMTP), web (HTTP) or P2P (Bittorrent) results in all communications using the same TCP protocol with the same TCP network utilisation/flow control features and thus having the exact same behaviour/impact on the network, why would a network wish to throttle only the P2P traffic ?
118. In the GAS/PPPoE context, if each of the above 3 scenarios results in the downloading of the same number of PPPoE packet at the same speed/rate, why would Bell Canada decide to target only one for throttling ?
119. Even in the case of an ISP (which carries IP packets), except for applications that use well known/ reserved ports, the packets headers yield no clue on the type of application which generated the packet and the type of application which will receive the packet.
120. For Bell Canada to guess what application generated a packet, it MUST look inside not only the PPPoE payload, but within it, look at the IP payload, and within it, look at the TCP payload at which point, it gets the raw data being transmitted between 2 computers. There is no such thing as an application header after the TCP header, this was a pure invention by desperate Bell Canada lawyers who wanted to find any way they could to avoid admitting that their DPI equipment looks at packet contents.
- 121. In allowing Bell to treat packets differently based on information acquired beyond the network layers defined by the GAS tariffs, the CRTC has failed to uphold section 27-2 since it legalises discrimination of packets based on characteristics of their payloads and based on assumptions on how packets will be used once beyond Bell Canada's infrastructure.**
122. It should be noted that Access to Information documents show that the Commission was made fully aware of the FCC opinion that Comcast's throttling practices were discriminatory. The following is text which the Commission was shown by its analysts (obtained via Access to Information) is part of the FCC decision: (see appendix 1 for copy of the powerpoint slide)
- Submit a compliance plan that describes how it intends to transition from discriminatory to non-discriminatory network management practices by the end of the year.*
- 123. Having been given evidence that the FCC considered such practices to be discriminatory, the CRTC still decided to argue that Bell's actions were not discriminatory, and claim publicly that this was a major factor in its decision.**

Equal throttling, unequal responsibilities

124. Furthermore, the CRTC failed to note the significant difference between the GAS-Bell and Sympatico-Bell relationship in terms of custodial responsibilities.
125. Bell Canada offers a CRTC regulated, tariff defined service to wholesalers. The scope of network management is defined by the PPPoE protocol, and Bell, acting as a neutral carrier, is expected to deliver the purchased bandwidth and transport PPPoE packets, irrespective of their content, from point to point.
126. Acting as a single entity, Bell and Sympatico act as an internet service provider and policies desired by Sympatico can be implemented by Bell or vice versa. They are not regulated and the entity can freely define the service, features and management policies and how the network is managed internally.
127. Sympatico is put in a privileged situation where it has effective control over the DPI equipment with no jurisdiction from the CRTC or need to report changes to anyone.
128. GAS service providers are slaves to Bell Canada's wishes with extremely limited protection from the CRTC which asked Bell to only notify the CRTC/GAS customers if there are changes to DPI equipment which affect performance.
129. Sympatico, through its direct control of the DPI equipment is given undue preference, while GAS customers, forced to submit to Bell's wishes are submitted to an undue disadvantage. This breaks section 27(2) of the Act despite the throttling being equal.

Section 36 of the Act



36. *Except where the Commission approves otherwise, a Canadian carrier shall not control the content or influence the meaning or purpose of telecommunications carried by it for the public.*

54. *The Commission notes CAIP's submission that traffic shaping can result in data transfer rates being significantly reduced. The evidence before the Commission is to the effect that the telecommunications that are subject to traffic shaping in the circumstances of this case reach their intended recipients with their contents unchanged, although more slowly than if traffic shaping had not been applied.*

130. The CRTC's interrogatory of Bell Canada did not cover HOW the throttling was applied. Bell Canada did not reveal how it implemented the throttling. How can the CRTC claim that it has evidence that the contents are unchanged, especially considering that the CRTC was given evidence in 3rd party submissions to the contrary ?

131. This is about section 36 of the **Telecommunications Act**, not the Applications Act. It is what happens to the data as it transits through Bell's infrastructure that is in question, not whether applications at each end can recover from harm inflicted to packets during transit.

55. *The Commission notes that, based on the record of this proceeding, the traffic shaping carried out by Bell Canada does not involve any editorial control over the content of the telecommunications and does not involve blocking any telecommunications.*

132. The CRTC ignored evidence presented to it that Bell Canada actively blocked over 20% of packets when a connection is throttled. Bell Canada did not challenge this claim.

133. Bell Canada decides, based on contents of initial packet(s) of a flow whether the remainder will see a large portion of packets blocked. This CRTC ruling sets a precedent that would allow Bell Canada to blank out periods of telephone conversations for customers it doesn't like, arguing that because humans are able to request a sentence be repeated, that the message would eventually be transmitted.

134. The CRTC totally evaded discussions over the definition of content. The tariffs define GAS as a PPPoE service. The contents should therefore be defined as the payload of PPPoE packets.

135. By choosing which flows are to be throttled based on the contents of the packets, Bell Canada effects editorial control.

136. By willingly dropping over 20% of packets within its infrastructure, Bell Canada forces a large number of retransmissions to occur which means that customers on metered services will end up paying a substantial penalty for all the retransmitted packets as well as suffering extremely slow transfers.

137. Bell Canada exerts control over the content by deciding to drop 20% of packets based on what it has seen when inspecting the contents of previous packets. And by forcing a large number of retransmissions, Bell Canada changes the content since the data transferred will be different with many packets duplicated.



36. *Except where the Commission approves otherwise, a Canadian carrier shall not control the content or influence the meaning or purpose of telecommunications carried by it for the public.*

56. *Finally, the Commission notes that Bell Canada is only applying traffic shaping to file-sharing applications, which, even without traffic shaping, require time for the complete file to be transmitted before an end-user can access it.*

138. The CRTC has decided that P2P communications are file sharing applications. The CRTC has imposed a meaning and purpose to a flow of packets identified by a few bytes in the contents of the first packet in that flow.

139. Neither the CRTC nor the carriers can possibly know what the user intends to do with packets once they are delivered, and cannot assume any packet priority unless one is specifically incorporated in packet headers by the sender of the packet. The carrier assumes a certain application and type of use (prohibited by section 36), when no such information is specified in the packet header or content.

140. There are HTTP transactions which are highly interactive, and some which are not time sensitive (google's robots that scour the net for instance). At the network level, there is ABSOLUTELY NO DIFFERENCE between the two and it would be extremely wrong to allow a carrier to program its DPI equipment to make assumptions on the purpose of a communication based on what it thinks the recipient might do with packets.

141. The CRTC has ignored the fact that not all P2P applications are "file sharing". Some actually stream data live using a distributed feed to allow widespread distribution. The BBC's iPlayer is an example of P2P technology used for live content. What about any new upcoming P2P applications ? How can the CRTC assume a meaning/purpose of new applications that do not yet exist ?

142. The BitTorrent application protocol defines how data is to be formatted inside the packet so that it can be transmitted over a TCP-IP network in such a way that the recipient can reconstitute the original stream of bytes. It does not define how that data is to be used. It does not define what type of data can be transmitted. It could be used to distribute live video feeds, or transmit large datasets from researchers who are sharing data collected from multiple telescopes around the world or anything else. One cannot define a purpose to such a protocol because there is no purpose to be defined other than the efficient transmission of data.

143. The CRTC has ignored the fact that some content distributors use a small number of large servers and P2P technology to rapidly distribute their content. This means that Bell Canada would assign a low priority purpose to a service distributing a large file using P2P from some large servers, while granting unfettered transport to the same file being distributed via HTTP from Bell's Video Store (which also uses large servers). The CRTC needs to be reminded that on the Internet, there is no way to differentiate between an IP address belonging to a "server" and one belonging to a "peer" since all hosts are peers on the Internet.

144. How can the CRTC assume that the user can wait hours instead of minutes (for small files) or days instead of hours for larger files ? How can the CRTC know that the user is not working under a tight deadline and needs a file very fast ?

145. The Telecommunications Act, through Section 36 is very clear in preventing carriers from guessing what the data will be used for once it has been delivered. A carrier is handed a packet and its role is to deliver it to destination as fast as possible. When all packets have the same protocol delivery options, the carriers must not discriminate between them and assume that some have a purpose that the carrier doesn't feel is important.
146. How can the CRTC know that a feed for content is always available ? What about a feed which is only available during peak hours (when other users are on-line to serve it) and a file content too large to be downloaded at only 30KB/s during a period when it is available ?
147. Only the end users can define the purpose of their telecommunications. Neither Bell, nor the CRTC have the right to define/influence/limit the purpose communications.
- 148. By accepting and incorporating Bell's definitions in its decision, the CRTC breaks the Telecom Act, section 36 by imposing/defining the meaning and purpose of packets. Considering that CRTC decisions remain in the public record for a very long time, this means that the CRTC agrees to define that applications that have not yet been written will have a low priority and be throttled because they will use certain packet formats to transmit data.**

66 ...The Commission notes that the DPI technology used by Bell Canada examines the header information of packets, which includes source and destination IP address information, in order to carry out traffic shaping. ...

149. This is a critical issue which the CRTC got **completely** wrong.
150. The CRTC was given evidence which included the packet formats of the various protocol layers involved in this service. Bell Canada admitted in its July 11th filing it was looking beyond the IP and TCP headers into an imaginary "application header" without providing any reference to standards or header formats.
- 151. The CRTC ignored the fact that by definition, DPI equipment looks into packet payloads.**
- 152. This factual error alone is important enough to warrant the 2008-108 decision be rescinded immediately.**
153. The CRTC failed to recognise that GAS is a PPPoE service and as such, Bell Canada should be limited to handling the PPPoE headers and that anything beyond the PPPoE header is to be considered payload .
154. The failure to state that DPI equipment looks at packet contents not only shows total lack of technical expertise at the Commission, but also sets extremely dangerous precedents that can be used by carriers years from now to pretend their use of DPI equipment would be benign.
155. While the privacy commissioner may have judged that the alleged current use may not violate the privacy act, it was fully aware that the DPI equipment required inspection of the packet contents, and was fully aware of the capabilities of the equipment which, if enabled, would definitely break the privacy act.
156. In reviewing the 2008-108 decision, the CRTC MUST clearly state that DPI equipment has capabilities which are potentially extremely damaging to privacy.



Section 7 of the Telecommunications Act:

Objectives: (i) to contribute to the protection of the privacy of persons.

157. In failing to recognise the true nature of DPI equipment and the potential for invasion of privacy, the Commission has failed to include in its decision safeguards and auditing procedures to protect Canadians from Bell Canada enabling DPI features that jeopardise the privacy of persons. The Commission failed to uphold 7(i) of the Act.
158. In failing to understand the nature of the service, packet formats and purpose of fields (which had been provided during the process), by failing to uphold OSI 7 layer definitions, the Commission has sent a message to the world that Canada's telecommunications industry is regulated by a body which does not understand modern telecommunications, and which will allow carriers to ignore industry standards, manage networks in any which way they want, look into packet contents, drop packets which the carrier does not like, without having to provide a proper justification.
159. In failing to protect Canadians from the potential privacy breaking capabilities of DPI equipment, the Commission has sent a message to the world that the telecommunications industry in Canada offers no privacy protection, can look at packet contents without a legal warrant, and that all communications in Canada should be encrypted to protect ourselves from our telecommunications carriers because the CRTC has not done its job.
160. The CRTC must quickly correct the mistake that 2008-108 is, and show Canadians and the world that it can learn and rule on modern telecommunications issues, not just 1940s telephone technology.
161. The CRTC must also quickly correct the situation which allows Bell Canada to sell capacity it has no intention to provide, and ensure that GAS customers do not subsidize Sympatico's higher speeds while GAS customer are left on un-upgraded ancient technology.



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CAIP Part VII Application

Throttling of P2P File-sharing applications on Bell Canada's Gateway Access Service

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Briefing Package
DOCS #958437

 Conseil de la radiodiffusion et des télécommunications canadiennes

Canadian Radio-television and Telecommunications Commission

FCC Decision

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- The FCC re-state their on-going authority
 - ▶ "We will continue to oversee the practices of broadband Internet access service providers, and we stand prepared to take any action necessary to ensure the continued presence of an open and accessible Internet"
 - Comcast's practices do *not* constitute reasonable network management, have contravened industry standards and impede the users' ability to use applications and access content of their choice.
 - Within 30 days Comcast is ordered to:
 - ▶ Disclose precise contours of current network management practices
 - ▶ Submit a compliance plan that describes how it intends to transition from discriminatory to non-discriminatory network management practices *by the end of the year*
 - ▶ Disclose to the commission and the public the details of network management it intends to deploy following termination of current practices.

Current practices must end by year-end. No monetary fines imposed.