Canadian Radio-television and Telecommunications Commission
Conseil de la radiodiffusion et des télécommunications canadiennes

Telecom Decision CRTC 2019-119

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Northwestel Inc. – Application to review and vary Telecom Decision 2018-241

*The Commission **denies** Northwestel Inc.'s (Northwestel) request to review and vary Telecom Decision 2018-241. Northwestel has failed to (i) demonstrate that there is substantial doubt as to the correctness of the Commission's established 50 millisecond round-trip latency threshold to define high-quality fixed broadband Internet access service, and (ii) justify its claim that latency cannot be incrementally improved through infrastructure investments in Canadian communities with terrestrial connectivity where this threshold is not currently being met.*

Background

1. In Telecom Regulatory Policy 2016-496, the Commission determined that the availability of fixed broadband Internet access service offerings that meet certain levels of speed, data allowance, and quality of service (QoS) will help ensure that Canadians receive services that meet their needs and enable them to participate in the digital economy. Accordingly, the Commission established a universal service objective: Canadians, in urban areas as well as in rural and remote areas, have access to voice services and broadband Internet access services, on both fixed and mobile wireless networks. To measure the successful achievement of this objective, the Commission established several criteria, including the following:

    - Canadian residential and business fixed broadband Internet access service subscribers should be able to access speeds of at least 50 megabits per second (Mbps) download and 10 Mbps upload, and to subscribe to a service offering with an unlimited data allowance; and

    - the latest generally deployed mobile wireless technology should be available not only in Canadian homes and businesses, but on as many major transportation roads as possible in Canada.

2. To assist in achieving the universal service objective, the Commission announced its intention to establish a funding mechanism for broadband Internet access services. The Commission announced further details regarding the Broadband Fund in Telecom Regulatory Policy 2018-377, including the criteria it would use to evaluate projects.

3. In Telecom Regulatory Policy 2016-496, the Commission determined that the QoS levels for latency,[1] jitter,[2] and packet loss[3] need to be established to define high-quality fixed broadband Internet access service. Accordingly, the Commission requested that the CRTC Interconnection Steering Committee (CISC) review and make recommendations on appropriate metrics for latency, jitter, and packet loss to define high-quality fixed broadband Internet access service. The Commission was seeking to establish QoS metrics that would reflect the objective that broadband Internet access services in rural and remote areas be of similar high quality as those in urban areas.

4. Consequently, the CISC Network Working Group (NTWG) submitted non-consensus report NTRE061 (hereafter, the NTWG report) for the Commission's consideration. The NTWG was not able to reach consensus on the round-trip latency, jitter, or packet loss thresholds to define high-quality fixed broadband Internet access service.

5. In Telecom Decision 2018-241, on the basis of the NTWG report, the Commission established a round-trip latency threshold of 50 milliseconds (ms) and a packet loss threshold of 0.25%, measured during peak times (i.e. from 7 p.m. to 11 p.m. local time on weekdays). The Commission launched a separate proceeding with respect to jitter. In Telecom Regulatory Policy 2019-42, the Commission established a jitter threshold of 5 ms.

6. In the above-mentioned decisions, the Commission determined that the QoS thresholds for round-trip latency, jitter, and packet loss are based on measurement from the modem in the customer premises to a server located off-net[4] at the Internet exchange point (IXP)[5] in a Canadian Tier 1 city.[6]

Application

7. The Commission received an application from Northwestel Inc. (Northwestel), dated 23 November 2018, in which the company requested that the Commission review

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[1] Latency refers to the time it takes for data packets to travel from a source to a destination. Latency is usually measured in terms of the round trip, i.e. from a source to a destination and back to the source.

[2] Jitter refers to the variation in latency that causes data packets that were sent at regular intervals from a source to arrive at a destination at irregular intervals.

[3] Packet loss refers to the number of data packets that are sent from a source that fail to reach their intended destination.

[4] Off-net refers to a location at an Internet exchange point that marks the end of an Internet service provider's (ISP) network. Since this location is outside the ISP's network, it is referred to as being "off-net."

[5] The IXP is where multiple ISPs connect to exchange Internet traffic with other ISPs in Canada and with the global Internet.

[6] The current Tier 1 cities, based on the consensus recommendation in the NTWG report, are Calgary, Edmonton, Halifax, Moncton, Montréal, Ottawa, Saskatoon, Toronto, Vancouver, and Winnipeg.

and vary Telecom Decision 2018-241.[7] Northwestel submitted that (i) the Commission's latency threshold determination implies that any fixed broadband Internet access service with a latency higher than 50 ms is not a high-quality service, and (ii) this threshold will have negative implications for any Commission Broadband Fund allocations for the North.

8. Northwestel submitted that there is substantial doubt as to the correctness of Telecom Decision 2018-241 due to an error in fact, since the Commission misinterpreted the evidence it considered in making its determination and failed to consider as a basic principle that latency cannot be improved to reach the established threshold through future investments.

9. The Commission received interventions regarding Northwestel's application from the Canadian Network Operators Consortium Inc. (CNOC), Rogers Communications Canada Inc. (RCCI), TELUS Communications Inc. (TCI), and Xplornet Communications Inc. (Xplornet), as well as from the Government of Northwest Territories, the Government of Yukon, and Hyman Glustein and Dr. Fenwick McKelvey (Glustein/McKelvey).

Review and vary criteria

10. In Telecom Information Bulletin 2011-214, the Commission outlined the criteria it would use to assess review and vary applications filed pursuant to section 62 of the *Telecommunications Act*. Specifically, the Commission stated that applicants must demonstrate that there is substantial doubt as to the correctness of the original decision, for example due to (i) an error in law or in fact, (ii) a fundamental change in circumstances or facts since the decision, (iii) a failure to consider a basic principle which had been raised in the original proceeding, or (iv) a new principle which has arisen as a result of the decision.

Issues

11. The Commission has identified the following issues to be addressed in this decision:

    - Did the Commission err in fact by establishing a round-trip latency threshold of 50 ms to define high-quality fixed broadband Internet access service?

    - Did the Commission fail to consider Northwestel's argument that as a basic principle, latency cannot be improved through investments in communities where the established threshold is not being met?

[7] Northwestel originally filed its application on 13 August 2018. The Commission suspended further process pending the release of Telecom Regulatory Policy 2018-377. Following this release, Northwestel filed its amended application on 23 November 2018.

Did the Commission err in fact by establishing a round-trip latency threshold of 50 ms to define high-quality fixed broadband Internet access service?

Positions of parties

12. Northwestel submitted that the Commission erred by determining that a 50 ms latency threshold is achievable in all regions of Canada. Northwestel argued that the Commission incorrectly cited the Canadian Internet Registration Authority and certain other parties (hereafter, CIRA et al.)[8] as recommending a 50 ms latency threshold. Northwestel argued that CIRA et al.'s Internet Performance Test actually found that Canada had an average round-trip latency of 104.72 ms, and that no party recommended or submitted evidence in favour of a round-trip latency threshold of less than 100 ms. According to Northwestel, the Commission's determination may have been driven in part by a desire to set a prospective latency threshold rather than base the threshold on what is attainable.

13. As new evidence, Northwestel submitted that it had conducted round-trip latency testing from customer premises in Whitehorse to Tier 1 IXPs in Calgary, Edmonton, and Vancouver. The round-trip latency results either exceeded or were close to the 50 ms threshold. Northwestel noted that latency data for Whitehorse, one of the southernmost cities in its operating territory, demonstrate that traffic from other communities further north that transits through Whitehorse to reach a Canadian Tier 1 IXP would not meet the latency threshold established by the Commission.

14. TCI submitted that only a subset of customers, particularly those using online action game or web-based applications, demand exceptionally low latency, while most applications and customers are well served with a round-trip latency of 150 ms. TCI noted that round-trip latency is not as important as other aspects of Internet access; therefore, a low latency threshold would divert resources away from more important initiatives to improve Internet access speeds, reach, and reliability. TCI indicated that a latency threshold that is lower than what most customers demand would result in all customers paying for the higher costs associated with providing lower latency, whether they require it or not.

15. RCCI was also in favour of a round-trip latency threshold of 150 ms, noting that fast-action multi-player interactive games are a driver for a lower latency threshold. RCCI argued that no other applications require a round-trip latency of less than 100 ms.

16. Northwestel, RCCI, and TCI, as well as the governments of Northwest Territories and Yukon, expressed concern that the Commission's latency threshold could disadvantage communities in the North with respect to the award of funding from the

[8] CIRA et al. comprise CIRA, Dr. Fenwick McKelvey, the Cree Nation / Eeyou Communications Network, and Herb Charles (independent consultant).

Broadband Fund. Northwestel and Xplornet noted that services that do not meet the latency threshold could be cast in a negative light.

17. Xplornet submitted that the Commission appears to have misinterpreted CIRA et al.'s position on latency in the proceeding that led to Telecom Decision 2018-241. Xplornet argued that the Commission supported the latency threshold it adopted by citing urban-centric evidence, which fails to account for the realities of rural and remote areas.

18. Glustein/McKelvey submitted that the Commission should reject Northwestel's application. They noted that in the proceeding that led to Telecom Decision 2018-241, CIRA et al. proposed a round-trip latency of between 50 ms and 100 ms; therefore, the Commission's selection of the lower boundary of this recommendation is not a misinterpretation.

Commission's analysis and determinations

19. In Telecom Regulatory Policy 2018-377, the Commission set out (i) eligibility criteria for projects to be considered for funding, (ii) assessment criteria to be used to determine which projects will be considered of high quality, and (iii) selection considerations to be applied to determine which high-quality projects will be funded.

20. Specifically, the Commission determined that to be eligible for funding, applicants must propose fixed broadband Internet access service projects that either are capable of providing speeds of 50 Mbps download and 10 Mbps upload upon implementation or are scalable to provide those speeds prospectively. The Commission did not include latency as a project eligibility criterion; therefore, fixed broadband Internet access service projects in the North that would not meet the round-trip latency threshold will be eligible to be considered for funding.

21. The following assessment criteria for fixed broadband Internet access service projects include latency: (i) the current gap with respect to the availability of universal service objective-level services (i.e. how far the broadband services that are currently offered in the eligible geographic area(s) are from the speed, capacity, and QoS levels set out in the universal service objective); and (ii) the proposed level of service (i.e. how close the speed, capacity, and quality of the proposed broadband Internet access service in the eligible geographic area(s) would be to meeting or exceeding the levels set out in the universal service objective).

22. With respect to the Commission's selection considerations for fixed broadband Internet access service projects, the Commission noted that it would select projects in multiple regions of Canada to ensure that specific regions, such as the North, are not disadvantaged.

23. Accordingly, there is no evidence to suggest that the round-trip latency threshold of 50 ms will disadvantage the North with respect to the Broadband Fund.

24. Regarding Northwestel and Xplornet's concern that the 50 ms latency threshold could cast services that do not meet that threshold in a negative light, the Commission notes that how services are viewed in a specific region is informed by what is currently feasible and the competitive options available to customers in that region, and not by a national threshold. The Commission set a national round-trip latency threshold to define high-quality fixed broadband Internet access service on the basis of the quality of experience that Canadians in general expect to receive when using QoS-critical applications.[9]

25. In the proceeding that led to Telecom Decision 2018-241, the Commission was guided by its objective that broadband Internet access services in rural and remote areas be of similar high quality as those in urban areas. The Commission was seeking to, where feasible, move fixed broadband Internet access service in all regions of Canada prospectively towards the national threshold. In that decision, the Commission noted that if the QoS metrics to define high-quality fixed broadband Internet access service were based on the present attainability of those metrics in all or most parts of Canada, the result would be that the lowest QoS attainable would define high-quality service.

26. The Commission also considered national round-trip latency data that were available to it from the Broadband Measurement Project. The resulting reports indicate that the highest average peak period latency measured from subscribers of major Internet service providers (ISPs) in Canada was below 22 ms for digital subscriber line (DSL), cable, and fibre-to-the-home (FTTH) technologies.

27. With regard to Northwestel's argument that the Commission misinterpreted CIRA et al.'s recommended latency range of 50 ms to 100 ms, the Commission notes that Glustein/McKelvey disagreed with that statement. CIRA et al.'s recommended latency range included QoS-critical and QoS-sensitive applications.[10] However, the Commission's objective was to establish a round-trip latency threshold that would provide subscribers with a smooth experience when using real-time QoS-critical applications. Accordingly, the Commission selected the lower value of the proposed range (i.e. 50 ms).

28. Accordingly, the Commission determines that it did not err in fact by establishing a round-trip latency threshold of 50 ms to define high-quality fixed broadband Internet access service, and that Northwestel has failed to demonstrate that there is substantial doubt as to the correctness of the Commission's determination.

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[9] QoS-critical applications are those that experience a rapid degradation of service and become unusable when the QoS metrics cross certain thresholds. Examples of QoS-critical applications are multi-player interactive games; cloud-based and real-time applications such as e-health, remote surgery, and online education; and teleconferencing and teleworking through virtual private network access.

[10] QoS-sensitive applications are those that experience degradation of service when the QoS metrics cross certain thresholds. The NTWG report identified conversational voice and video applications, such as Skype, as QoS-sensitive applications.

Did the Commission fail to consider Northwestel's argument that as a basic principle, latency cannot be improved through investments in communities where the established threshold is not being met?

Positions of parties

29. Northwestel submitted that the Commission failed to consider the basic principle that, for the most part (i.e. excluding satellite-dependent communities),[11] in Canadian communities where the round-trip latency threshold is not currently being met, latency cannot be incrementally improved to meet the threshold through infrastructure investments. Northwestel submitted that satellite-served communities can benefit from investments in terrestrial networks; however, if a community already has fibre transport to the nearest Canadian Tier 1 city, it is virtually impossible to reduce round-trip latency. Further, Northwestel provided evidence that Whitehorse experienced latency of around 50 ms, submitting that for communities further north, it would not be able to meet the Commission's latency threshold.

30. RCCI argued that regardless of the amount of investment, a 50 ms round-trip latency threshold is not attainable in certain rural and remote areas in Canada.

Commission's analysis and determinations

31. The NTWG report identified two parameters that affect latency: (i) the distance that traffic must travel from the customer premises to a Tier 1 IXP, and (ii) the medium through which the traffic travels.

32. Regarding the distance that the traffic must travel, the Commission considers that this distance could be reduced through (i) investments, for example, in increased capacity and changes to the transport path;[12] and (ii) the establishment of Tier 1 IXPs in the North. Regarding the medium through which the traffic travels, as identified in the NTWG report, technological advancements and prospective investments in new technologies and equipment could also improve QoS.[13]

33. In the NTWG report, CIRA et al. noted that the biggest contributor to latency challenges in the North is a lack of Tier 1 IXPs. The establishment of Whitehorse, for example, as a Canadian Tier 1 city would reduce round-trip latency in all communities in Yukon from which traffic currently transits through Whitehorse to reach a Tier 1 IXP in the south. Similarly, the establishment of Yellowknife, for

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[11] A satellite-dependent community is a community that has no connection to terrestrially based transport facilities for connection to the Internet and that relies on satellite transport facilities to connect to the Internet. The satellite transport technology currently used to connect these communities to the Internet introduces an inherent latency, making it unsuitable for providing high-quality broadband Internet access services that meet the universal service objective.

[12] In the case of fibre, it may be possible to reduce the length of fibre that has been provisioned for that path, which could be greater than the distance between the community and the nearest Tier 1 IXP.

[13] For example, technologies such as low-Earth orbit satellites could reduce round-trip latency for certain remote communities.

example, as a Canadian Tier 1 city would reduce round-trip latency in communities in the Northwest Territories.

34. Large ISPs typically own the transit networks that deliver traffic from customer premises to a Tier 1 IXP, whereas small ISPs may use a transit service to enable their customers' traffic to reach a Tier 1 IXP. The establishment of a Tier 1 IXP closer to communities in the North would benefit all ISPs in the North and would result in greater competitive choice for consumers seeking high-quality broadband Internet access services. However, it is incumbent upon the industry to establish new Canadian Tier 1 IXPs and then approach the Commission with a proposal to add to the Canadian Tier 1 cities listed in Telecom Decision 2018-241.

35. Accordingly, the Commission determines that it is not a basic principle that latency cannot be improved through investments in communities where the established threshold is not being met, and that Northwestel has failed to demonstrate that there is substantial doubt as to the correctness of the Commission's determination.

Conclusion

36. In light of all the above, the Commission **denies** Northwestel's request to review and vary Telecom Decision 2018-241.

Secretary General

Related documents

- *Establishment of an appropriate quality of service metric for jitter to define high-quality fixed broadband Internet access service*, Telecom Regulatory Policy CRTC 2019-42, 12 February 2019

- *Development of the Commission's Broadband Fund*, Telecom Regulatory Policy CRTC 2018-377, 27 September 2018

- *CISC Network Working Group – Non-consensus report on quality of service metrics to define high-quality fixed broadband Internet access service*, Telecom Decision CRTC 2018-241, 13 July 2018; as amended by Telecom Decision CRTC 2018-241-1, 3 August 2018

- *Modern telecommunications services – A path forward for Canada's digital economy*, Telecom Regulatory Policy CRTC 2016-496, 21 December 2016

- *Revised guidelines for review and vary applications*, Telecom Information Bulletin CRTC 2011-214, 25 March 2011