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

Telecom Order CRTC 2018-99

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Ottawa, 22 March 2018

Public record: Bell Mobility Tariff Notices 1B, 1C, and 4; Rogers Communications Partnership Tariff Notice 42; and TELUS Communications Company Tariff Notice 501

Wholesale mobile wireless roaming service tariffs – Final rates

*The Commission **approves, with changes, on a final basis** rates for the wholesale mobile wireless roaming services provided by Bell Mobility, RCCI, and TCI.*

The Commission's determinations will further enable sustainable facilities-based competition in the Canadian mobile wireless services market. The determinations foster increased investment in high-quality networks by wireless carriers resulting in more affordable and innovative services being available to all Canadians.

Background

1. Before 2015, the provision of Global System for Mobile communications (GSM)-based wholesale mobile wireless roaming services (wholesale roaming) was exempt from the Commission requirement for the service provider to file a tariff, and these services were made available pursuant to negotiated agreements. However, holders of spectrum licences were required to abide by the conditions of licence for mandatory roaming imposed by Innovation, Science and Economic Development Canada (ISED).[1]

2. In Telecom Regulatory Policy 2015-177, the Commission determined that wholesale roaming was not subject to a level of competition sufficient to protect the interests of users. The Commission therefore determined that it was necessary to (i) mandate the provision of wholesale roaming by Bell Mobility Inc. (Bell Mobility), Rogers Communications Canada Inc. (RCCI),[2] and TELUS Communications Inc. (TCI)[3] [collectively, the national wireless carriers], to other Canadian wireless carriers, and (ii) regulate the rates, terms, and conditions for such services in accordance with the interim rates, terms, and conditions established in that decision. Consequently, the Commission directed the national wireless carriers to file proposed

[1] These conditions are set out in *Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements* (CPC-2-0-17 Issue 2, March 2013).

[2] RCCI holds all the business activities, including assets and liabilities, of the former Rogers Communications Partnership, which ceased to exist on 1 January 2016. For ease of reference, "RCCI" will be used in this order.

[3] In this proceeding, submissions were received from TELUS Communications Company (TCC). However, effective 1 October 2017, TCC's assets were legally transferred to TCI and TCC ceased to exist. For ease of reference, "TCI" is used in this order.

tariffs, for its approval, with a view to determining final rates, terms, and conditions. The Commission also determined that the rates for wholesale roaming provided by the national wireless carriers were to be based on the Phase II costing methodology.[4]

3. In Telecom Regulatory Policy 2015-177, the Commission established, on an interim basis, maximum rates that the national wireless carriers could charge, and in Telecom Order 2015-537, the Commission approved, on an interim basis, the national wireless carriers' proposed tariffs and rates. In Telecom Order 2017-433, the Commission approved, on a final basis, the terms and conditions for the wholesale roaming offered by the national wireless carriers.

Applications

4. On 23 November 2015, the national wireless carriers filed tariff applications with supporting cost studies in which they proposed cost-based rates for voice, Short Message Service (SMS), and data wholesale roaming. The proposed cost-based rates included a markup of 40%.

5. In response to a Commission staff request for information, the national wireless carriers filed revised cost studies, in which the companies made modifications and updates to their initial cost studies.

6. On 21 April 2017, Bell Mobility filed proposed changes to its wholesale roaming tariff (Tariff Notice 4), including a satellite surcharge for each of voice, SMS, and data wholesale roaming. Specifically, Bell Mobility proposed that the surcharge would apply, in addition to the standard roaming rates, when the end-user roams in an area where the company's public mobile network is served by satellite backhaul.

7. On 21 June 2017, the process for Tariff Notice 4 was combined with the broader, ongoing process to consider the national wireless carriers' final wholesale roaming rates.

8. The Commission received interventions regarding these applications from Bragg Communications Incorporated, carrying on business as Eastlink (Eastlink); Freedom Mobile Inc. (Freedom Mobile);[5] Ice Wireless Inc. (Ice Wireless); Quebecor Media Inc., on behalf of Videotron Ltd. (Videotron);[6] Vaxination Informatique (Vaxination); and Benjamin Klass.

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[4] This approach is used to calculate the incremental, forward-looking, network element costs causal to the provision of a specific service.

[5] During the course of the proceeding, WIND Mobile Corp. became Freedom Mobile Inc.

[6] In the proceeding, submissions were received from Videotron G.P. However, effective 29 December 2017, all of Videotron G.P.'s assets and operations were transferred to its affiliate, Videotron Ltd., and Videotron G.P. was subsequently dissolved. For ease of reference, "Videotron Ltd." is used in this order.

Issues

9. In reviewing the national wireless carriers' various applications and related cost studies, the Commission has identified the following issues to be addressed in this order:

    - Reasonableness of the proposed spectrum costs
    - Reasonableness of the proposed radio access network (RAN) costs
    - Reasonableness of the proposed tower costs
    - Reasonableness of the proposed service demand forecasts
    - Reasonableness of the proposed conversion factors
    - Reasonableness of the proposed capital increase factors (CIFs)
    - National wireless carrier-specific issues
    - Markup
    - Effective date of the final wholesale roaming rates

Reasonableness of the proposed spectrum costs

Background

10. Radio frequency spectrum (spectrum) is a finite public resource, available in different frequencies, each with its own technical specifications and uses. Wireless service providers require spectrum for a diverse range of uses. The Minister of Industry, supported by ISED, and acting pursuant to the *Department of Industry Act*, the *Radiocommunication Act*, and the *Radiocommunication Regulations*, is responsible for spectrum management in Canada.

11. Mobile wireless carriers require spectrum to provide mobile wireless services. Each carrier's spectrum holdings determines its wireless footprint and network capacity.

12. When spectrum is acquired, there are typically upfront acquisition costs (from auctions). Annual licence fees typically apply when a new licence is issued after the initial licence term has expired.

Reasonableness of spectrum bands included in the cost studies

Positions of parties

13. The national wireless carriers' cost studies identified their respective spectrum holdings, including the frequency band and size, as well as the acquisition costs and fair market value of each spectrum licence.

14. Interveners generally submitted that certain national wireless carriers appeared to have included costs for spectrum holdings in their cost studies that are not currently used for the provision of wholesale roaming and that these costs should have been excluded.

15. Specifically, Eastlink argued that the national wireless carriers did not purchase spectrum to provide wholesale roaming; therefore, spectrum-related costs should not be included in the cost studies, since these costs are not causal or incremental to providing wholesale roaming.

16. Eastlink submitted that the national wireless carriers included in their cost studies spectrum that is not currently used to provide mobile wireless service. Eastlink argued that costs for spectrum in the enhanced specialized mobile radio (ESMR), 2300 megahertz (MHz), and 3500 MHz bands should not be included in TCI's cost study, and that costs for any spectrum in the 2500 MHz band used to provide fixed wireless services should be removed from Bell Mobility's and RCCI's cost studies.

17. Eastlink added that Bell Mobility and TCI purchased spectrum in the 700 MHz band, some of which they cannot technically use (i.e. the upper and lower parts) to provide wholesale roaming. Eastlink argued that the national wireless carriers did not purchase 700 MHz, Advanced Wireless Services (AWS)-1, AWS-3, and 2500 MHz spectrum to provide wholesale roaming, and that it was inappropriate to include the associated costs in the wholesale roaming cost studies.

18. Vaxination argued that only costs for spectrum used by a carrier for high-speed packet access (HSPA) and long-term evolution (LTE) networks should be included in the cost studies. Unused spectrum and spectrum assigned to older technologies should be ignored until the national wireless carriers redeploy it to LTE or fifth-generation (5G) technology.

19. TCI submitted that spectrum is a prerequisite for building and operating a wireless network. The company indicated that therefore, spectrum must be included in the wholesale roaming cost studies. Spectrum is a network cost, like switches and antennas, that an operator must be able to recover.

20. TCI submitted that it requires spectrum to serve both its own subscribers and its wholesale customers; therefore, the associated costs must be recovered from all users of the company's wireless network. TCI added that its cost study assumes that spectrum bands not currently used to provide mobile wireless services will be deployed in 2018.

21. Bell Mobility submitted that its cost study assumes that spectrum in the 2300 MHz and 3500 MHz bands will be deployed in the last two years of the cost study period. Bell Mobility added that spectrum in the 2500 MHz band has been redeployed from fixed wireless services to mobile wireless services; therefore, it is appropriate to include costs for this spectrum in the company's wholesale roaming cost study.

Commission's analysis and determinations

22. The wholesale roaming cost studies submitted by the national wireless carriers are based on an all-carrier approach[7] and include all traffic on the mobile wireless network for each of voice, SMS, and data services. In addition, the studies include costs that are specific to wholesale roaming customers, such as costs related to interconnection, roaming agreement processing, billing, and third-party clearinghouses.

23. Furthermore, on the basis that there is no difference in the cost to deliver a mobile wireless unit of demand (e.g. a megabyte [MB] of data, a minute of voice, or an SMS) for a national wireless carrier's retail end-user or for a wholesale roaming customer's end-user, the Commission considers it appropriate for costs for all wireless network elements (i.e. the radio access network [RAN],[8] the backhaul network,[9] and the core network[10]), including spectrum, to be included in the wholesale roaming cost studies.

24. In terms of the appropriate bands to include in the wholesale roaming cost studies, each of the national wireless carriers provided a list of the spectrum bands they are currently using, or plan on using, over the 2016 to 2020 study period, to provide wholesale roaming. They did not include spectrum bands used to provide other services or mobile wireless services using older technologies.

25. In addition, the cost studies submitted by the national wireless carriers that are planning to deploy the 2300 and 3500 MHz spectrum bands reflect the fact that the deployment and the associated costs will occur in the years of deployment.

26. In light of the above, the Commission determines that the appropriate spectrum bands have been included in the wholesale roaming cost studies to establish the rates for wholesale roaming.

Additional spectrum acquisitions over the study period

Positions of parties

27. Bell Mobility proposed to include in its wholesale roaming cost study costs for additional spectrum to be acquired over the study period to meet increasing demand. Bell Mobility argued that spectrum is a resource with limited capacity; therefore, it will need additional spectrum in the future.

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[7] Under this approach, the demand-driven cost of providing one unit of wireless service demand is the weighted average of the demand-driven cost of providing the service to the wholesale roaming customer and to the national wireless carrier, weighted by the respective in-service demand and future demand growth.

[8] The RAN includes radio equipment, antennas, and towers.

[9] The backhaul network connects the RAN to the core network.

[10] The core network includes equipment such as switches and routers.

28. RCCI's revised cost study included costs for additional spectrum that it acquired after the start of the study period.

29. TCI noted that there are no spectrum auctions scheduled; therefore, the company was not guaranteed any new spectrum during the study period. Accordingly, TCI assumed that it would not acquire any new spectrum during the study period.

30. Freedom Mobile submitted that Bell Mobility had far more spectrum per subscriber than most carriers in the world at the start of the study period, making it unlikely that Bell Mobility would need to acquire additional spectrum over the study period.

31. Freedom Mobile and Videotron argued that spectral efficiency[11] is continuously increasing and is expected to continue to increase over the study period. Therefore, spectral efficiency must be accounted for in the national wireless carriers' wholesale roaming cost studies.

Commission's analysis and determinations

32. The Commission considers that Bell Mobility has not applied the appropriate capacity costing approach,[12] as set out in Bell Canada's Regulatory Economic Studies Manual (the Manual),[13] to estimate the costs associated with spectrum.

33. In the development of its capacity cost, Bell Mobility used actual demand instead of the maximum capacity of its network. The Commission considers that Bell Mobility has not justified a deviation from the approach set out in the Manual.

34. In response to a Commission staff request for information, Bell Mobility estimated the maximum capacity of its wireless network. In its estimate, Bell Mobility assumed a spectral efficiency factor for LTE that was significantly lower than those of RCCI and TCI. Although Bell Mobility's theoretical spectral efficiency factor associated with LTE was consistent with industry standards, the company applied a number of reduction factors (also referred to as network constraints), which resulted in an 89% reduction, amounting to what Bell Mobility called a "practical" spectral efficiency factor.[14] Bell Mobility did not provide sufficient rationale for applying these network constraints.

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[11] Spectral efficiency refers to the rate of information that can be transmitted over a given bandwidth in a specific communication system, and is measured in terms of how much data can be transmitted in a given amount of spectrum. The higher the spectral efficiency factor, the more capacity over the wireless network.

[12] Costs of shared facilities are estimated using the capacity costing approach. Under this approach, the capacity unit cost is derived by dividing the cost of the shared facility by its capacity, and adjusting that result to take into account the non-service-producing, or spare, capacity.

[13] The Manual generally sets out the Phase II costing methodology.

[14] Bell Mobility submitted that its "practical" spectral efficiency factor was based on "internal company simulations."

35. The Commission considers that spectral efficiency is a key element to consider when assessing wireless network capacity and whether additional network facilities are required. An understated spectral efficiency would result in an understated wireless network capacity, and would lead to the erroneous conclusion that additional facilities, in this case, additional spectrum, are required. The result of this is overestimated costs.

36. Further, given the description of the Bell Mobility and TCI wireless network-sharing agreement submitted by each of the companies, the Commission considers that their practical spectral efficiencies should be comparable. Accordingly, the Commission considers that Bell Mobility's assumed practical spectral efficiency and the resulting maximum capacity of its wireless network are not appropriate.

37. The Commission also considers it reasonable to use TCI's spectral efficiency to assess Bell Mobility's potential requirement for additional spectrum. After revising Bell Mobility's spectral efficiency to bring it in line with TCI's, the Commission concludes that the available capacity of Bell Mobility's existing wireless network is sufficient to meet the company's demand forecast over the study period without the additional spectrum that the company proposed.

38. RCCI initially proposed that it would be able to meet its forecasted demand with the spectrum it held at the time it initially filed its cost study. In its revised cost study, RCCI proposed to include additional spectrum that the company had since acquired, though it did not propose to alter its demand forecast. The Commission therefore considers that the newly acquired spectrum is not required to meet the company's demand forecast, and that such costs should not be included in the company's wholesale roaming cost study.

39. In light of the above, the Commission does not accept the inclusion of costs for additional spectrum over the study period in the wholesale roaming cost studies for Bell Mobility and RCCI.

Reasonableness of the proposed spectrum valuations

Positions of parties

40. The national wireless carriers proposed to value their existing spectrum holdings using fair market value.

41. TCI submitted that its spectrum portfolio should be valued using the replacement cost new approach, based on fair market value, since the resulting cost represents what an efficient new entrant would incur if it were to replicate TCI's mobile wireless network.

42. RCCI submitted several reasons why including spectrum in the wholesale roaming cost study at fair market value is appropriate under Phase II costing rules, including the opportunity cost of the consumption of spectrum, the scarcity of spectrum, and the uncertainty of spectrum acquisition.

43. Bell Mobility submitted that the use of existing spectrum to provide wholesale roaming means that spectrum is not available to provide retail services. Thus, the opportunity cost of spectrum for wholesale roaming reflects the need to purchase, or advance the purchase of, additional spectrum. The company argued that opportunity cost is best estimated using fair market value, which represents what a national wireless carrier would pay at a future spectrum auction.

44. Interveners generally argued that the use of fair market value for spectrum valuation (under either the replacement cost new approach or the opportunity cost approach), as proposed by the national wireless carriers, is not appropriate or consistent with Phase II costing principles.

45. Ice Wireless argued that using recent spectrum auctions as proxies to value the spectrum assets of the national wireless carriers results in inappropriately inflated spectrum costs.

46. Videotron submitted that spectrum is not a typical asset, since it does not depreciate and does not have a limited life like standard capital assets do. Videotron further submitted that using past spectrum auction results as proxies for fair market value is not appropriate because each auction has its own historical and policy context, and auction results are influenced by various bidding circumstances, strategies, and ISED restrictions, such as set-asides.[15] Further, there is no functional marketplace where transactions could take place for the national wireless carriers' spectrum holdings at the prices observed in past auctions for similar bands.

47. Videotron argued that the concept of the national wireless carriers having to replace today their entire spectrum holdings, acquired over the past three decades, is purely fictional. Videotron indicated that any allocation or auction processes are much different today than they were in the past. As well, the market is different, and companies may not have the same bidding incentives as in previous auctions.

48. To demonstrate the inflated costs that result from using past spectrum auctions as proxies, interveners provided the following examples:

    - Some spectrum, such as the 850 and 1900 MHz bands, were obtained by the national wireless carriers for no upfront cost.

    - TCI acquired 2500 MHz spectrum for $480 million at a 2015 auction. For this auction, ISED imposed an in-band spectrum cap to ensure broad, multi-operator access to that frequency. In its 2016 wholesale roaming cost study, TCI claimed a replacement cost of $4.23 billion for this spectrum. This is nearly 10 times the amount paid at an auction just seven months before TCI submitted its cost study.

[15] A spectrum set-aside prohibits certain entities from bidding on specific blocks of spectrum.

- The fair market value for spectrum claimed by the national wireless carriers is much higher than the value claimed in their publicly available financial reports. For example, RCCI claimed a fair market value for its spectrum holdings of $20 billion in its wholesale roaming cost study, compared to $6.4 billion in its publicly available financial reports.

49. Some interveners submitted that it is not appropriate for the national wireless carriers to attribute replacement costs to spectrum that will never be necessary or possible to replace, given that these carriers control the spectrum licences indefinitely. While spectrum licences may carry an initial term, this term does not reflect the economic life of the asset due to the high expectation of issuance of a new licence.

50. Some interveners argued that the only spectrum costs that should be included in the wholesale roaming cost studies are the auction costs paid by the national wireless carriers and the annual spectrum licence fees.

51. Eastlink submitted that if the Commission finds that spectrum costs should be included, the annual spectrum licence fees paid by the national wireless carriers should be included in the wholesale roaming cost studies as an expenditure. For spectrum bands whose initial licence term has not expired, an annual amount equivalent to the initial costs divided by the number of years of the licence term should be included in the cost studies.

52. Freedom Mobile noted Bell Mobility's submission that spectrum tends to be purchased not when it is immediately needed but when it is available. Freedom Mobile indicated that other than a possible 600 MHz spectrum auction to be conducted in a few years, there is likely little spectrum available for auction in the mid-term. The national wireless carriers have therefore bought much more spectrum than they currently need.

53. In reply, the national wireless carriers submitted that spectrum should be considered a fungible asset,[16] since its use is shared for various wireless services, either between retail and wholesale services, or between data, voice, and SMS services. They argued that according to the Manual, fungible assets are to be included in a cost study at replacement cost new, and that the proper method to estimate replacement cost new is using fair market value.

54. Bell Mobility submitted that using historical costs or annual licence fees, as argued by interveners, is inappropriate since spectrum is a resource with limited capacity that will be consumed quickly with growing demand and that will need to be increased in the future.

55. RCCI submitted that its spectrum valuation not only represents fair market value, it also strictly follows Phase II costing methodology. RCCI indicated that using any

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[16] The Manual states that a discrete asset is fungible if it is used by growth demand outside the service under the proposed course of action.

other proxy for valuing spectrum would (i) be a departure from the opportunity cost of consuming a scarce resource, (ii) result in a direct subsidy from spectrum holders to non-spectrum-holders, and (iii) not provide the proper incentives to facilities-based providers, which would be detrimental to facilities-based competition.

56. The national wireless carriers submitted that according to Phase II costing methodology, all costs are to be determined on a forward-looking basis, and based on the price to replicate the network and not the costs that have been paid.

Commission's analysis and determinations

57. To estimate the costs of their respective spectrum holdings, the national wireless carriers assumed spectrum to be a capital asset and used various approaches to value this asset based on fair market value reflecting current market conditions. For the reasons that follow, the Commission does not consider that these approaches represent appropriate methods by which to value spectrum.

58. The Commission considers that the use of fair market value based on recent auction prices as proxies to estimate the proposed spectrum valuation results in inflated spectrum valuation.

59. TCI, for instance, used the replacement cost new approach. In general, this approach represents the company-specific cost that is incurred by a service provider to purchase a typical capital asset. A typical capital asset (e.g. a router or switching equipment) is purchased by service providers to provide services and, at the end of its useful life, the asset is generally replaced with a new capital asset. The replacement cost new approach is also used to estimate the company-specific costs associated with the use of an existing typical capital asset for other services the company provides.

60. While the Commission does not take issue generally with the national wireless carriers characterizing spectrum as a capital asset, the record of this proceeding reveals a number of important ways in which spectrum differs from a typical capital asset. For instance, spectrum cannot be purchased in the same manner as a typical capital asset, and a spectrum licence represents the right to use a specific frequency band over a licence period, subject to an upfront payment or annual payments (i.e. annual licence fees).

61. In addition, unlike a typical capital asset, spectrum has an indefinite life. It therefore cannot be retired and replaced. According to the ISED framework for spectrum auctions,[17] as a condition of licence, licensees have a high expectation of renewal unless (i) a breach has occurred, (ii) a fundamental reallocation of spectrum to a new service is required, or (iii) an overriding policy need arises. Indeed, the national wireless carriers themselves have publicly recognized (in their respective annual

[17] *Framework for Spectrum Auctions in Canada*, Spectrum Management and Telecommunications, Issue 3, March 2011.

financial reports) that there are currently no legal, regulatory, competitive, or other factors that limit the useful life of spectrum.

62. The Commission also considers that spectrum is not a typical capital asset on the basis that the value of a spectrum licence can appreciate over time, due to spectrum's scarcity and demand, whereas the value of a typical capital asset generally depreciates over the asset's life.

63. Further, TCI submitted that its replacement cost new approach reflects the costs that a new entrant would incur if it were to replicate TCI's mobile wireless network. As such, the Commission considers that such costs do not represent the company-specific costs that TCI would actually incur to provide mobile wireless services. In addition, the Commission considers that only the company-specific costs that are expected to be incurred over the study period should be included in the wholesale roaming cost studies, consistent with the Phase II costing methodology. In any event, TCI has not demonstrated that a deviation from the Phase II costing methodology is appropriate in the circumstances. Accordingly, the Commission considers that TCI's replacement cost new approach is not appropriate for its wholesale roaming cost study.

64. Bell Mobility and RCCI used an approach similar to TCI's to estimate the costs of their respective spectrum holdings, but chose to characterize their proposed costs as opportunity costs. The Commission considers that the spectrum costs proposed by Bell Mobility and RCCI, similar to TCI's, reflect the costs that a new entrant would incur to replicate their respective mobile wireless networks. As such, these costs are not appropriate for inclusion in the companies' wholesale roaming cost studies.

65. Even if the proposed spectrum costs are considered as opportunity costs, the opportunity cost approach proposed by Bell Mobility and RCCI is not appropriate for the reasons outlined below.

66. On one hand, these companies proposed to include opportunity costs that have increased significantly since the spectrum was acquired, due to, for instance, the scarcity of and high demand for spectrum. On the other hand, these companies did not account for an increase in spectrum value during the study period, resulting in a significant overestimation of costs. Had they accounted for the benefits of such an increase, this would have offset some of these carriers' proposed spectrum costs and ultimately led to lower wholesale roaming rates. Furthermore, as explained in paragraph 64 above, the proposed opportunity costs have been significantly overestimated and, accordingly, are not reasonable for inclusion in the cost study.

67. The Commission considers that the appropriate spectrum costs to be included in the national wireless carriers' wholesale roaming cost studies are the related company-specific costs incurred over the study period. The Commission considers that these costs are represented by the costs associated with existing licences and any licences that are expected to expire and be reissued during the study period.

68. Therefore, the Commission determines that the appropriate spectrum costs to be included in the national wireless carriers' wholesale roaming cost studies are as follows:

    - For existing spectrum licences that are not expected to expire during the study period, include the upfront spectrum acquisition capital cost or annual licence fee, as applicable, associated with each spectrum licence; and

    - For existing spectrum licences that are expected to expire during the study period, include the annuity of the upfront spectrum acquisition capital cost incurred by the national wireless carrier in each year until the spectrum licence expires, and in each subsequent year, include the annual licence fee expected to be incurred upon extension of the licence period.

Reasonableness of the proposed radio access network (RAN) costs

Background

69. The RAN provides the connection between a wireless device and other parts of a wireless network through radio connections. The main components of the RAN are antennas, towers, and base stations. The costs associated with towers are addressed as a separate issue.

Positions of parties

70. Bell Mobility derived its RAN unit cost based on actual demand. Bell Mobility submitted that its approach has the advantage of not requiring the maximum capacity of the company's RAN to be calculated, since maximum capacity is ill-defined and hard to measure for wireless networks.

71. RCCI and TCI estimated their respective RAN costs by replicating the existing coverage of their networks. RCCI and TCI estimated their respective capital costs of RAN components using the maximum capacity of the equipment adjusted by a working fill factor.

72. Freedom Mobile submitted that Bell Mobility did not use the accepted methodology of using maximum capacity and working fill to estimate its RAN costs.
    Freedom Mobile further submitted that using actual demand instead of the maximum capacity produces an incorrect result, since it understates the network capacity. The maximum capacity is the full engineering capacity, and the working fill is the ratio of service-producing capacity to the installed capacity. The product of the two is not equal to actual demand.

73. Ice Wireless submitted that the Commission should ensure that TCI's RAN costs do not include costs associated with any part of Bell Mobility's network to which TCI may have access as a result of their network-sharing agreement.

74. In response to a Commission staff request for information, each of the national wireless carriers submitted that its wholesale roaming cost study captured the RAN costs only from RAN sites that it owns solely.

Commission's analysis and determinations

75. RCCI's and TCI's approach to estimate their RAN costs at the start of the study period was based on each company's existing RAN facilities. RCCI and TCI proposed to estimate their RAN costs over the study period based on the demand forecast and network capacity. The Commission considers that this approach takes into consideration the incremental costs associated with cell sites, is consistent with Phase II costing methodology, and is therefore reasonable.

76. Bell Mobility's approach, which was to calculate a unit cost based on actual demand, is not consistent with the methodology set out in the Manual and results in an overestimation of costs. As per the Manual, the unit cost should be based on the maximum capacity of the equipment and not actual demand.

77. With respect to Bell Mobility's RAN equipment costs at the start of the study period, it is reasonable to allow costs based on the existing amount of RAN equipment. This approach is also consistent with RCCI's and TCI's approach of estimating RAN costs at the start of the study period. Accordingly, the Commission determines that the RAN equipment costs at the start of the study period should be based on the existing amount of RAN equipment.

78. In response to a Commission staff request for information, Bell Mobility provided a very low estimate of the maximum capacity of its network because the company assumed a very low spectral efficiency (see paragraph 34 above). Use of Bell Mobility's proposed maximum capacity would result in higher unit costs, which would lead to a substantial increase in RAN equipment over the study period, and ultimately, to much higher costs. Such an increase is disproportionate to the costs provided by the other national wireless carriers, and the Commission does not consider that Bell Mobility justified its increase.

79. As discussed in paragraph 37 above, given, among other things, the fact that Bell Mobility and TCI have a network-sharing agreement, it is reasonable to use TCI's spectral efficiency to assess Bell Mobility's maximum capacity. After revising Bell Mobility's spectral efficiency to be in line with TCI's, the Commission concludes that the available capacity of Bell Mobility's RAN is sufficient to meet the company's demand forecast over the study period. Accordingly, the Commission does not accept Bell Mobility's proposed additional RAN costs over the study period.

80. While the Commission considers that Bell Mobility's capacity is sufficient to meet its demand forecast, Bell Mobility requires additional RAN equipment over the study period to account for increased coverage, similar to what RCCI and TCI proposed. However, Bell Mobility did not propose a reliable method of estimating the associated costs. Therefore, for the same reasons that make TCI's spectral efficiency

an appropriate proxy for Bell Mobility, the Commission determines that it is reasonable to use TCI's RAN equipment cost trend as a proxy to determine additional RAN costs for Bell Mobility over the study period.

Reasonableness of the proposed tower costs

Background

81. A cell tower or cell site is a location where antennas and electronic communications equipment are placed – typically on a radio mast, tower, or other raised structure – to create a cell in a cellular network.

Positions of parties

82. The national wireless carriers included tower costs as replacement cost new for the cell sites that would be required to replicate the existing coverage of their respective mobile wireless networks.

83. In response to a Commission staff request for information, the national wireless carriers addressed the appropriateness of using a structure cost factor (SCF),[18] rather than replacement cost new, to estimate tower costs.

84. Bell Mobility submitted that tower costs do not meet the conditions set out in the Manual for using an SCF: (i) the effort required to estimate the explicit costs is not commensurate with the materiality of the costs – in this case, Bell Mobility estimated approximately three months of a dedicated resource's time, and (ii) certain shared facilities have unlimited capacity; consequently, capacity costing is not an appropriate method for estimating tower costs.

85. TCI submitted that SCFs are used when explicit cost estimates for the structure are not readily available, which is not the case here, and argued that a finer distinction between costs causal to the cost study and those generated using SCFs would not significantly impact the results in this case. TCI added that re-estimation would be burdensome, contrary to its Manual, and produce less accurate results.

86. RCCI submitted that use of an SCF does not apply to it, since it does not have a company-specific Manual.

Commission's analysis and determinations

87. The Manual sets out the types of facilities for which costs are estimated using SCFs, including poles, conduits, and fibre. While Bell Mobility argued that tower costs do not meet certain conditions set out in the Manual for using an SCF, the Commission notes that towers are support structures, similar to poles and conduits. In addition, until 2012, Bell Canada listed towers as support structures in the Manual and estimated an associated SCF.

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[18] SCFs are calculated by determining the ratio of the total capital expenditures for a particular structure or technology to the total capital expenditures for equipment making use of that structure or technology.

88. In light of the above, the Commission considers it reasonable for Bell Mobility to estimate its tower costs using an SCF. Since Bell Mobility did not provide an updated SCF in response to Commission staff's request for information, the Commission considers that the SCF of 0.4374, which was last published in the 2012 Appendix V to the Manual, is appropriate.

89. RCCI and TCI both used replacement cost new to derive their respective tower costs. The Commission considers that this approach is not appropriate because it assumes that all existing towers would be rebuilt at the start of the study period, which is not the case. Accordingly, the Commission does not agree with the use of this approach to estimate tower costs.

90. The Commission considers it reasonable for RCCI and TCI to estimate their respective tower costs using the SCF approach. RCCI and TCI do not have company-specific SCFs, and they did not provide such a factor when given the opportunity to do so in response to Commission staff's request for information. Consequently, the Commission considers that since the national wireless carriers are using similar technology to deploy mobile wireless networks on a national basis, the ratio of tower costs to RAN equipment costs should be similar for each company. As such, the Commission considers it appropriate to use Bell Canada's SCF value as a proxy for the purpose of determining RCCI's and TCI's tower costs.

Reasonableness of the proposed service demand forecasts

Positions of parties

91. The national wireless carriers provided service demand forecasts for voice, SMS, and data services.

92. In response to a Commission staff request for information, the national wireless carriers opposed using a common growth rate for data services in the last three years of the study period, namely the 42% compound annual growth rate (CAGR) for data growth in Canada found in the Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2015-2020 (the Cisco VNI).

93. The national wireless carriers generally submitted that the Cisco VNI does not reflect company-specific growth rates for data services. They generally argued that their service demand forecasts reflect historical demand on their respective networks, which demonstrates that while data usage continues to grow, it is doing so at a slower rate than the rate forecasted in the Cisco VNI as the wireless service market reaches saturation.

94. RCCI submitted that the Cisco VNI should be used only to check reasonableness, since it is based on numerous layers of assumptions that may differ significantly from the actual results experienced by network operators.

95. TCI argued that the Cisco VNI likely overstates actual data growth, and that it should therefore not be used in the national wireless carriers' wholesale roaming cost studies.

96. Freedom Mobile and Ice Wireless supported using the Cisco VNI, arguing that it is a reasonable forecast for industry-wide mobile wireless data demand. Specifically, Freedom Mobile submitted that the Cisco VNI is the best available and most thoroughly researched summary of current industry trends relating to data growth in the wireless service sector. Ice Wireless argued that, contrary to the assertions of the national wireless carriers, it is unlikely that the Cisco VNI would not account for company-specific data.

Commission's analysis and determinations

97. The Commission has reviewed the national wireless carriers' demand forecasts for voice and SMS services and considers that they are reasonable.

98. With respect to data services, the Commission has reviewed historical data usage provided in confidence by the national wireless carriers. According to the Manual, historical information may be used in forecasting demand. Based on the historical information provided by the national wireless carriers, the Commission considers that the Cisco VNI does not reflect their historical trends; therefore, it would not be reasonable to use the Cisco VNI to estimate the national wireless carriers' data growth rates in the circumstances. Accordingly, the Commission considers that the company-specific data usage forecasts provided by the national wireless carriers should be used, with the exception set out below.

99. In TCI's cost study, the data growth rate in later years is significantly different from the growth rates provided on the record by the other national wireless carriers. TCI has provided no compelling evidence on the record of this proceeding to explain or justify this difference. The Commission considers it reasonable to assume that the national wireless carriers' data growth rates are similar. Given that TCI has a network-sharing agreement with Bell Mobility, the Commission considers that Bell Mobility represents the most reasonable proxy in the circumstances. Accordingly, the Commission determines that TCI's data growth rate in later years should be modified to reflect that of Bell Mobility.

Reasonableness of the proposed conversion factors

Background

100. Voice, SMS, and data services are each measured differently with respect to how demand for these services is forecasted and how the rates are charged to wholesale customers (i.e. voice is in minutes, SMS is in number of messages, and data is in MB of usage). Conversion factors are used to convert voice minutes and SMS messages into a common unit of demand (MB), over which total costs can be apportioned. Conversely, conversion factors are also used to convert wholesale roaming rates per MB into rates for voice per minute and for SMS per message.

Positions of parties

101. Each of the national wireless carriers proposed company-specific conversion factors, whereas some interveners proposed a common set of factors to be used by all the national wireless carriers.

102. The national wireless carriers submitted that their proposed conversion factors are based on company-specific information reflecting their actual network architecture. The national wireless carriers further submitted that since each of their networks is different, each of their conversion factors would also likely be different.

103. Eastlink submitted that Bell Mobility's and TCI's conversion factors should be similar, if not identical, given these companies' network-sharing agreement. Eastlink indicated that the technologies used in fourth-generation (4G) wireless networks are similar enough that any conversion factors used by the national wireless carriers should fall within a reasonable range, as opposed to the very different factors proposed by the national wireless carriers in this case.

104. Freedom Mobile submitted that given the similarities in wireless service technologies, common conversion factors for each of voice and SMS should be applied consistently across the national wireless carriers.

105. Ice Wireless submitted that if the Commission determines that the values of the national wireless carriers' conversion factors do not impact their total costs but only their allocation of costs to voice, SMS, and data units, then the company would not object to the national wireless carriers' use of company-specific conversion factors.

106. Videotron submitted that while conversion factors vary due to different service provisioning techniques and equipment types, the national wireless carriers should not be permitted to adopt radically different approaches for deriving their conversion factors. Videotron added that the conversion factors should be based on straightforward and objective calculations, and proposed a common set of conversion factors that could be applied to all the national wireless carriers.

Commission's analysis and determinations

107. The national wireless carriers' proposed company-specific conversion factors vary, even though the national wireless carriers generally use the same wireless technology.

108. Videotron's proposed common conversion factors have several benefits, including simplicity of the required calculations, as well as transparency, since the majority of the national wireless carriers' calculations were filed in confidence. However, the Commission considers that, where possible, company-specific conversion factors should be used to develop company-specific cost-based rates. Further, since a wireless network is designed based on an individual operator's requirements related to coverage, capacity, and quality of service, it is reasonable to assume that the carrier-specific conversion factors could vary.

109. The Commission has assessed the methodologies and calculations that the national wireless carriers used to derive their company-specific conversion factors. The Commission considers that the technologies and configurations used are similar enough that any company-derived conversion factor should be within a reasonable range of that of the other national wireless carriers. In addition to assessing these factors in light of each other, the Commission considers that the common conversion factors proposed by Videotron can also function as an objective method of assessing the reasonableness of the proposed company-specific factors. RCCI's and TCI's proposed conversion factors are within a reasonable range of each other and of the common conversion factors proposed by Videotron. Accordingly, the Commission considers that the conversion factors proposed by RCCI and TCI are appropriate.

110. Bell Mobility stated that it uses HSPA technology only for delivering voice calls and that its voice conversion factor was based on the required radio resources of an equivalent amount of data in MB. The Commission considers that Bell Mobility's voice conversion factor is within a reasonable range of the proposed conversion factors of RCCI, TCI, and Videotron, and is therefore reasonable.

111. However, Bell Mobility's proposed conversion factors for SMS, which are the highest among the national wireless carriers, are not within a reasonable range of the proposed conversion factors of RCCI, TCI, and Videotron. Bell Mobility calculated its SMS conversion factors based on the amount of radio resources denied to its voice service when sending an SMS message, rather than the size of the actual SMS message being sent.

112. The Commission considers that since Bell Mobility and TCI have, among other things, a network-sharing agreement, it is reasonable to assume that Bell Mobility's SMS conversion factors should be similar to that of TCI. Accordingly, TCI's conversion factor represents the most reasonable proxy available in the circumstances.

113. In light of the above, the Commission considers that Bell Mobility's proposed methodology and resulting conversion factors for SMS are not appropriate, and determines that Bell Mobility's conversion factors for SMS are to be adjusted to reflect that of TCI.

Reasonableness of the proposed capital increase factors (CIFs)

Background

114. The causal cost cash flows included in a cost study are estimated in terms of current-year dollar values and must reflect expected price changes. This is accomplished by multiplying the cost cash flow estimate, expressed in dollars, by the appropriate cost increase factor. For capital cash flows, CIFs are typically developed by asset class and applied to the relevant capital cash flows.

115. The annual capital unit cost change reflects technological advancements, whereby suppliers are able to meet rising demand by increasing equipment capacity at a lower capital cost per unit going forward.

CIFs applied to RAN electronics and spectrum

Positions of parties

116. TCI applied a 5% CIF to all capital expenditures, except towers and spectrum. TCI submitted that the CIF in its Manual does not reflect mobile wireless service equipment asset classes. As such, TCI determined the 5% CIF based on its procurement experience for typical radio equipment over the last five years. TCI submitted that the 5% CIF applies because radio equipment is the most significant asset class in its cost study in terms of dollar value and quantity. TCI submitted, in confidence, for each of the five radio equipment categories, the year-over-year price changes and associated CAGR.

117. TCI also assumed a CIF of 6.34% for spectrum costs, which it calculated based on a comparison of auction prices for AWS-1 and AWS-3 spectrum, as well as acquisition prices in secondary markets.

118. Bell Mobility assumed different CIFs depending on the asset category and consistent with Appendix V of its Manual. Bell Mobility assumed minus 9% for RAN electronics based on an existing asset class in its Manual (i.e. the equipment required to establish and maintain communications).

119. Bell Mobility assumed a 7.8% CIF for spectrum costs, which it calculated using auctions for AWS-1 spectrum purchased in 2008 and AWS-3 spectrum purchased in 2015. The 7.8% CIF was used to bring the auction valuations into 2015 dollars and to account for additional spectrum over the study period.

120. RCCI assumed no CIF in its initial cost study, and replied that any CIF applied should be based on similarly relevant equipment.

121. Ice Wireless submitted that TCI's proposed 5% CIF is inconsistent with the approved CIF in TCI's Manual.

Commission's analysis and determinations

122. The Commission has reviewed the information provided by TCI to support its proposed 5% CIF and annual productivity factor for spectrum for 4G services. While the historical price trend associated with the five radio equipment categories submitted by TCI may be correct, the Commission considers that the supporting rationale is not compelling since it is based only on a small and limited sample of radio equipment; therefore, it cannot be assumed to apply consistently to all capital expenditures within the company's wireless network. The Commission therefore does not accept TCI's proposed 5% CIF.

123. With respect to the annual productivity of spectrum, the Commission considers that the impact of TCI's assumed annual productivity is similar to Bell Mobility's proposed minus 9% CIF for RAN electronics, which is consistent with the CIF for radio equipment set out in Bell Canada's Manual. Accordingly, the Commission determines that TCI's annual productivity and Bell Mobility's CIF are reasonable.

124. With respect to the CIFs for spectrum assumed by Bell Mobility and TCI, the Commission notes that, as determined in paragraph 39 above, no additional spectrum is being acquired during the study period; therefore, CIFs are not applicable. Accordingly, the Commission does not accept the application of CIFs to spectrum costs for Bell Mobility and TCI.

125. With respect to RCCI, the company has not applied a CIF or productivity factor to RAN electronics similar to Bell Mobility and TCI. The Commission considers it appropriate for RCCI to assume that the expected reduction in costs for RAN electronics is similar to that of Bell Mobility and TCI, given that the national wireless carriers use similar technology and should expect, at a minimum, a similar level of efficiency. Accordingly, the Commission determines that a minus 9% CIF is to be applied to RAN electronics in RCCI's cost study.

Minus 26.4% as annual capital unit cost change applied to traffic-driven switching and transmission equipment in the backhaul and core networks

Background

126. In Telecom Decision 2016-117, the Commission approved an annual capital unit cost change of minus 26.4% for traffic-driven equipment.

Positions of parties

127. Ice Wireless requested that the Commission direct RCCI and TCI to modify their cost study assumptions such that the annual capital unit cost change for traffic-driven switching and transmission equipment included in their wholesale roaming cost studies (for both voice and data) is set at minus 26.4%, the value that was approved in Telecom Decision 2016-117 based on a detailed evidentiary record.

128. The national wireless carriers opposed using the minus 26.4% annual capital unit cost change.

129. Bell Mobility argued that use of the minus 26.4% annual capital unit cost change is inappropriate for a number of reasons. The minus 26.4% represents the average annual decline in the price per megabit per second (Mbps) for high-end routers as set out in the 2011 Dell'Oro Report[19] over the period from 2006 to 2013. The 2011 Dell'Oro Report was updated in July 2016, and shows that the annual average decline in high-end router prices had become 17.4%, based on United States prices.

[19] The *Routers Report: Five-Year Forecast: 2011-2015* by the Dell'Oro Group is based on observed data from 2006 to 2010 and forecast data from 2011 to 2013.

Bell Mobility argued that this demonstrates that the minus 26.4% figure is no longer an accurate projection based on more recent data; therefore, this value should not be used in any cost model. Bell Mobility submitted that if Dell'Oro Report values are to be used, they should be the updated values.

130. RCCI argued that the minus 26.4% figure relied on (i) data that was published in July 2011; (ii) data specific to high-capacity routers; and (iii) the assumption that the equipment was used in fixed backhaul networks, not mobile wireless networks.

131. TCI submitted that the minus 26.4% figure is based on outdated information, is not representative of cost changes for the relevant study period, and is not representative of the range of traffic-dependent costs.

Commission's analysis and determinations

132. The national wireless carriers assumed different annual capital unit cost changes applied to wireless facilities in their respective wholesale roaming cost studies.

133. Applying a uniform CIF to all wireless equipment categories at the RAN level, at the backhaul level, and at the core network level would not be appropriate given the different categories of equipment used in wireless networks and that any annual capital unit cost change assumption should be pertinent to the equipment to which it is applied.

134. While different technologies are used to provide wireless and wireline services, several types of equipment remain similar in the backhaul and core portions of the network, in particular for data aggregation, switching, and transmission, which primarily involve switches and routers. Since these types of equipment are growing in capacity and functionality, the Commission considers that their unit cost will continue to decline.

135. In the absence of sufficient evidence supporting the proposed company-specific CIFs for the national wireless carriers' traffic-driven switching and transmission equipment in the backhaul and core networks, the Commission determines that a uniform annual capital unit cost change should be applied. While the national wireless carriers argued that it would be appropriate to use the 2016 Dell'Oro Report estimate of minus 17.4% rather than the estimate of minus 26.4%, the Commission notes that in the circumstances, such a change would have a negligible impact on the final rates, and considers that use of the minus 26.4% estimate would be consistent with recent Commission decisions, including Telecom Decision 2017-287.[20]

[20] The Commission notes that its determination in this context does not prejudice the issue of the appropriate annual capital unit cost change that may apply in any separate, ongoing Commission proceeding. Any such issue will be determined based on the record of the proceeding in question.

National wireless carrier-specific issues

Core network costs for Bell Mobility

Positions of parties

136. Bell Mobility estimated the unit cost for its core network by dividing the total replacement cost new by actual demand for 2015. The total core network costs were calculated by multiplying the unit cost by the base demand and incremental demand over the study period.

137. In response to a Commission staff request for information, Bell Mobility proposed a maximum capacity for its core network that was based in part on its proposed spectral efficiency.

Commission's analysis and determinations

138. As discussed earlier, Bell Mobility's approach of calculating unit costs based on actual demand is not consistent with the methodology set out in the Manual for calculating unit costs and results in the overestimation of costs. The Commission therefore considers that the use of this approach to estimate core network costs is not appropriate. Rather, the maximum capacity approach should be used.

139. With respect to Bell Mobility's core equipment costs at the start of the study period, the Commission considers it reasonable to allow costs based on the existing amount of core equipment. This approach was also used by RCCI and TCI.

140. However, while Bell Mobility indicated that additional core network capacity would be necessary over the course of the study period, the Commission considers that no such additional capacity or associated additional costs are warranted in the circumstances. Bell Mobility's proposed maximum capacity was calculated using the spectral efficiency value that the Commission has already determined is inappropriately low, as discussed in the spectrum and RAN cost sections above.

141. Consistent with the Commission's determinations in those sections, it is appropriate to apply TCI's spectral efficiency value in this context as well to assess Bell Mobility's core network maximum capacity. This results in a level sufficient to meet Bell Mobility's demand forecast over the study period. Accordingly, the Commission does not accept Bell Mobility's proposed core network costs, and determines that the core network costs at the start of the study period are to be based on the existing amount of core equipment, with no additional core capacity or associated additional costs over the study period.

Maintenance and “other” expenses for Bell Mobility

Positions of parties

142. Bell Mobility included maintenance and “other” expenses in its wholesale roaming cost study based on unit costs that were calculated by dividing actual expenses from January to June 2015 by actual demand from January to June 2015. The company then applied the unit costs to the demand over the study period.

Commission’s analysis and determinations

143. As discussed earlier, Bell Mobility’s approach of calculating unit costs based on actual demand is not consistent with the methodology set out in the Manual for calculating unit costs and results in the overestimation of costs. According to the Manual, a unit cost used to estimate expenses should be based on and applied to an appropriate cost driver, which reflects either the natural or practical driver that closely approximates the underlying causal relationship.

144. In previous wholesale service cost studies filed with the Commission, Bell Canada identified the appropriate cost driver for maintenance expenses as the associated capital equipment (capital expenditures). The Commission considers that this approach is consistent with the Manual and should also be used to estimate the maintenance expenses for wholesale roaming.

145. In light of the above, the Commission determines that the unit cost should be calculated using actual maintenance expenses and total capital expenditures and applied to the total cumulative capital expenditures to estimate the annual maintenance expenses.

146. With respect to “other” expenses, such as property leasing fees and property taxes, Bell Mobility estimated a unit cost driven by demand. The Commission considers that since explicit expenses are available, and that there are no natural drivers for these types of expenses, they should not be unitized. Accordingly, the Commission determines that explicit “other” expenses should be included in the wholesale roaming cost studies, along with the appropriate expense increase factors.

Satellite surcharge

Positions of parties

147. Bell Mobility proposed, in Tariff Notice 4, a satellite surcharge that would apply to each of the company’s voice, SMS, and data wholesale roaming in areas served by satellite backhaul. The company based its proposed surcharge on its costs plus a 40% markup.

148. Freedom Mobile and Videotron did not object to the proposed satellite surcharge.

Commission's analysis and determinations

149. Bell Mobility's proposed costs associated with satellite backhaul mainly reflect fees paid to a satellite service provider; as such, the Commission finds them to be reasonable.

150. However, in Telecom Regulatory Policy 2015-177, the Commission determined that uniform rates for each type of wholesale roaming (i.e. voice, SMS, and data) provided by the national wireless carriers should be established based on the Phase II costing methodology. The Commission also considered that a wholesale roaming rate structure that distinguishes between urban and rural roaming or between in-territory and out-of-territory roaming would likely add complexity both to the costing exercise and to billing. Accordingly, the Commission determined that one rate per type of wholesale roaming should apply nationally.

151. Accordingly, the Commission determines that a separate tariff is not appropriate and that the costs for satellite backhaul should be included with all the other wireless service costs to have only one rate for each type of wholesale roaming nationally.

152. In light of the above, the Commission **denies** Bell Mobility's Tariff Notice 4 and determines that the costs originally included in the proposed tariffed rate will be incorporated into the costs for the overall roaming tariff.

After-tax weighted-average cost of capital for TCI

Positions of parties

153. In its wholesale roaming cost study, TCI submitted new financial parameters, including different cost of equity and debt ratio values from those currently in the company's Manual, to update the values. TCI submitted that those financial parameters are based on a projection of its cost of capital. As a result, the after-tax weighted-average cost of capital (AT-WACC) rate that TCI derived differed from the rate in the company's Manual. TCI submitted that this was a required update.

154. TCI argued that its existing parameters were developed in an era dominated by legacy wireline services and in which the level of competition was limited. TCI submitted that since wholesale roaming is provisioned almost entirely over the company's wireless facilities, the AT-WACC rate used in the company's wholesale roaming cost study should not be a historic rate that was specific to its wireline business.

155. TCI argued that given the significant expansion of regulation into key competitive services, the AT-WACC rate should be based on company-specific factors. In particular, use of a theoretical equity ratio of 55% would have significant negative implications for other components of the AT-WACC rate. TCI argued that its equity ratio is in fact close to 70%.

Commission's analysis and determinations

156. TCI's proposed AT-WACC rate is not consistent with the rate set out in the company's Manual. The Commission has previously identified certain wholesale rate-setting elements, including financial parameters such as the AT-WACC rate, that it plans to review in a separate process. The Commission considers that that review constitutes the appropriate forum to consider any changes to approved financial parameters to be used in cost studies going forward.

157. In light of the above, the Commission determines that TCI's existing AT-WACC rate set out in its Manual should be used in its wholesale roaming cost study.

Material increase factor for TCI

Positions of parties

158. In TCI's wholesale roaming cost study, the company assumed a material increase factor of 40.2%, which it applied to 2015 material capital costs to establish 1 January 2016 dollar values. The 40.2% was derived from the sum of the foreign exchange adjustment (24.0%), the material markup (10.8%), the warehouse and distribution markup (2.4%), and the provincial sales tax (3.0%). TCI submitted that this factor was needed to reflect actual costs at the beginning of the study period.

159. Ice Wireless submitted that the material increase factor is inappropriate and is not consistent with TCI's Manual.

Commission's analysis and determinations

160. In response to a Commission staff request for information, TCI confirmed that the capital expenditures it included in its wholesale roaming cost study are expressed in Canadian dollars. Accordingly, it is inappropriate for TCI to apply a foreign exchange adjustment of 24.0% to all material equipment.

161. TCI applied a markup of 10.8% to account for minor material without providing sufficient evidence. Costs for minor material are typically treated in cost studies as an operational expense and are included in the estimate of annual expenses. The Commission considers that TCI's inclusion of costs for an additional material markup results in an overestimation of costs and is not appropriate.

162. The Commission considers that TCI's inclusion of the warehouse and distribution markup of 2.4%, as well as the provincial sales tax of 3.0%, is appropriate and should be included in the company's wholesale roaming cost study.

163. In light of the above, the Commission determines that a material increase factor of 5.4% should be used in TCI's wholesale roaming cost study.

Annual expense estimates over the study period for TCI

Positions of parties

164. TCI assumed various factors applied to its capital expenses to derive its operational expenses over the study period. These factors ranged from 2% to 20%, depending on the capital asset category.

Commission's analysis and determinations

165. TCI proposed ratios of operational expenses to capital expenses to estimate annual expenses without providing sufficient supporting evidence on how it developed these ratios. TCI's proposed ratios are significantly higher than the ratios provided in Appendix V of the company's Manual. The Commission considers that, given the insufficient justification for proposed ratios, their use would result in an overestimation of TCI's annual expenses.

166. In light of the above, the Commission does not accept TCI's proposed ratios, and determines that TCI's operational expenses should be estimated using the ratios, by asset class, provided in Appendix V of the company's Manual.

Tariffed wholesale roaming traffic forecast for TCI

Positions of parties

167. In its wholesale roaming cost study, TCI included its forecast for tariffed wholesale roaming traffic in 2016. In response to a Commission staff request for information, TCI submitted its actual 2015 traffic for each of the three types of wholesale roaming.

Commission's analysis and determinations

168. TCI's tariffed wholesale roaming traffic forecast for 2016 is lower than its actual 2015 traffic. The Commission considers that the reduction is inconsistent with TCI's total traffic forecast and with forecasts for tariffed wholesale roaming traffic provided by Bell Mobility and RCCI.

169. The Commission considers that, in the absence of specific or compelling evidence, TCI's tariffed wholesale roaming traffic forecast should be adjusted for the study period by using the actual 2015 traffic and applying TCI's proposed wholesale roaming traffic growth rates for voice and SMS, and the data growth rate that the Commission has considered to be appropriate for TCI, as described in paragraph 99 above.

170. In light of the above, the Commission determines that TCI's forecast for tariffed wholesale roaming traffic should be adjusted, in the first year of the study period, to align with its actual 2015 traffic and that TCI should apply the appropriate annual growth rates, as described above, to estimate its tariffed wholesale roaming traffic over the remaining years of the study period.

Life estimate for RCCI's towers

Positions of parties

171. In their initial cost studies, the national wireless carriers provided life estimates for their respective towers. Bell Mobility's life estimate was 12 years, RCCI's was 15 years, and TCI's was 28 years.

172. In response to a Commission staff request for information on the wide variations between the national wireless carriers' life estimates for towers, Bell Mobility revised its life estimate to 25 years. RCCI indicated that it could not comment on the validity or rationale of the life estimates submitted by the other national wireless carriers, but that the life estimates it used are those it uses in reporting its financial results. RCCI added that its estimates generally reflect industry- and company-specific trends that may impact the expected useful life of property, plant, and equipment.

173. Eastlink submitted that the discrepancies between the life estimates for the national wireless carriers' towers indicate that these estimates were arbitrary.

Commission's analysis and determinations

174. RCCI's life estimate for towers is significantly lower than the life estimates submitted by Bell Mobility and TCI. RCCI argued that its life estimate is consistent with what it uses in its financial reports, but it did not provide any specific or compelling evidence to support the estimate.

175. Since wireless carriers construct their networks in similar ways and using similar equipment and structures, the Commission does not consider it reasonable for RCCI to use a life estimate for towers that is significantly lower than those of Bell Mobility and TCI without sufficient supporting evidence. Accordingly, the Commission considers that the use of a proxy for RCCI would be appropriate.

176. Bell Mobility and TCI submitted very similar life estimates, and the Commission considers that the effect of selecting one over the other would be minimal. In the circumstances, the Commission considers that Bell Mobility's revised life estimate for towers of 25 years is the most reasonable available proxy to apply to RCCI. Accordingly, the Commission determines that RCCI is to use a life estimate of 25 years for towers in its wholesale roaming cost study.

Markup

Positions of parties

177. The national wireless carriers each proposed a markup of 40% for wholesale roaming. They argued that this markup is required to ensure that there is an incentive for them to continue to invest in their mobile wireless networks, particularly in rural areas. They added that their proposed markup is consistent with certain Commission decisions, including Telecom Regulatory Policies 2011-703 and 2013-711.

178. Bell Mobility submitted that in decisions in which the Commission approved 40% markups for wholesale services, the Commission acknowledged the risk borne by the affected carriers due to significant upfront capital investments, and permitted a markup of 10% in addition to the generally applicable 30% markup. Bell Mobility added that the markup for wholesale roaming must take into consideration an incentive for the national wireless carriers to keep investing in and deploying mobile wireless networks, and for new entrants and smaller wireless carriers to invest in areas where they have spectrum.

179. TCI submitted that a premium in the markup for wholesale roaming is necessary, since there are competing networks that can offer retail and wholesale services, thus making investments in wireless network facilities inherently risky.

180. Freedom Mobile, Ice Wireless, and Vaxination opposed the national wireless carriers' proposed 40% markup. Freedom Mobile and Ice Wireless submitted that wholesale roaming services are not comparable to the wholesale services for which the Commission has permitted 40% markups.

181. Freedom Mobile argued that the Commission has previously determined that a markup of 10% to 15% should apply to a service that has the characteristics of an essential service. Freedom Mobile submitted that the national wireless carriers' suggested markup does not recognize the essential nature of wholesale roaming.

182. Ice Wireless argued that no significant upfront investments are needed to provide wholesale roaming, since (i) the costs associated with the acquisition of radio spectrum are sunk costs; (ii) all of the national wireless carriers have developed their wholesale roaming costs based on all-carrier demand with little, if any, capital costs causal to wholesale roaming; and (iii) any capital costs causal to wholesale roaming are simply increments of ongoing capital investments associated with the provision of all other services on the wireless network.

183. Vaxination submitted that there is nothing specific to wholesale roaming that warrants a 40% markup, since the national wireless carriers are following technological evolution, have control over the market, and are able to increase prices as they wish.

184. In reply, RCCI argued that, contrary to Ice Wireless's claim that there are no significant upfront investments to provide wholesale roaming, the national wireless carriers have invested many billions of dollars over the years in nurturing and developing the wireless services industry in Canada.

185. TCI argued that the provision of wholesale roaming has specific risks that should be accounted for in the markup, including limited barriers to new entrants switching wholesale roaming providers.

Commission's analysis and determinations

186. In Telecom Regulatory Policy 2015-177, the Commission determined that access to the national wireless carriers' wholesale roaming is essential to providing broad or national network coverage so that smaller wireless carriers may compete sustainably in the retail market. The Commission also considered that the establishment of cost-based wholesale roaming rates for the national wireless carriers must take into consideration both an incentive for these carriers to keep investing in and deploying wireless networks, and for new entrants and smaller wireless carriers to invest in areas where they have spectrum.

187. With respect to Freedom Mobile's proposed 10% to 15% markup, in Telecom Regulatory Policy 2015-326, the Commission determined that, going forward, markups for wholesale services would be determined on a case-by-case basis. The Commission is concerned that a markup of 15% would incent smaller wireless carriers to rely on wholesale roaming in some areas (e.g. rural areas) where the smaller wireless carriers hold spectrum but have not yet deployed a network. However, the Commission considers that the markup for wholesale roaming should incent smaller wireless carriers to continue to deploy network facilities in areas where they have spectrum.

188. Canadian wireless carriers have made, and continue to make, significant investments in their networks. The Commission considers that the national wireless carriers will generally continue to invest in their mobile wireless networks to compete in the market and meet the needs of their customers. However, the Commission is concerned that a markup such as that proposed by some interveners could reduce the national wireless carriers' incentive to invest in rural areas.

189. In light of the above, the Commission considers that the national wireless carriers' proposed markup of 40% responds to the Commission's concerns expressed in Telecom Regulatory Policy 2015-177 regarding the incentive for investment. Further, in light of all of the already discussed adjustments to the national wireless carriers' wholesale roaming rates, the Commission considers that this markup would not represent a barrier to sustainable retail competition. Accordingly, the Commission determines that a markup of 40% is to be applied to the national wireless carriers' wholesale roaming rates.

Effective date of the final wholesale roaming rates

Positions of parties

190. RCCI submitted that its wholesale roaming rates would apply retroactively from 5 May 2015, the date of Telecom Regulatory Policy 2015-177. Bell Mobility submitted that its rates should be implemented in accordance with the Commission's determinations in this proceeding. TCI submitted that it had no objection to applying the final rates retroactive to 5 May 2015.

191. Freedom Mobile and Videotron supported the implementation of the national wireless carriers' wholesale roaming rates retroactively from 5 May 2015. Freedom Mobile submitted that this would be consistent with previous Commission decisions.

192. In reply, RCCI modified its position on the issue and argued that any retroactive application of the wholesale roaming rates should not extend past 1 January 2016, since this date was used as the start of the study period in the national wireless carriers' wholesale roaming cost studies. RCCI argued that making the rates retroactive beyond this date would require it to update its cost study with demand assumptions and costs specific to the beginning of the retroactive period.

Commission's analysis and determinations

193. The Commission first established maximum interim wholesale roaming rates for the national wireless carriers in Telecom Regulatory Policy 2015-177. Moreover, in Telecom Order 2015-537, when the Commission approved as interim the rates proposed in their tariff applications, the Commission specifically stated that it would determine whether to make final rates retroactive to 5 May 2015 when it approves final rates. Since the Commission set the rates interim as of 5 May 2015, it is open to the Commission to apply final rates retroactively to that date.

194. With respect to RCCI's submission that the final wholesale roaming rates should not be made retroactive to a date extending past 1 January 2016, the Commission considers that since RCCI proposed, in its initial tariff filing, an effective date of 5 May 2015, the company was aware, from the date of that filing, that the study period did not begin seven months after the date on which the wholesale roaming rates were made interim. Further, RCCI's modified position was only presented in the final phase of the proceeding, without significant elaboration or justification, at which point no other party could comment on it.

195. The Commission has a duty to ensure that the rates paid for regulated telecommunications services are just and reasonable at all times. The Commission considers that the final rates for the national wireless carriers' wholesale roaming set out in this order are just and reasonable, for the reasons set out in this order. The Commission therefore determines that the national wireless carriers' final wholesale roaming rates should be implemented retroactively from 5 May 2015.

Conclusion

196. In light of all the above, the Commission **approves, with changes**, **on a final basis** the national wireless carriers' respective wholesale roaming rates, as set out below, effective 5 May 2015.

National wireless carrier	Voice wholesale roaming rate per minute	SMS wholesale roaming rate per message	Data wholesale roaming rate per MB
Bell Mobility	$0.013668	$0.000593	$0.013281
RCCI	$0.007062	$0.000007	$0.013978
TCI	$0.015735	$0.001796	$0.014071

197. The Commission has included in the appendices to this order a summary of adjustments for each of the national wireless carriers (the adjustments for Bell Mobility are set out in Appendix 1, the adjustments for RCCI are set out in Appendix 2, and the adjustments for TCI are set out in Appendix 3).

198. The Commission **directs** Bell Mobility, RCCI, and TCI to issue, within **30 days** of the date of this order, revised tariffed pages for the provision of their respective wholesale roaming that reflect the determinations set out in this order.[21]

Secretary General

Related documents

- *Follow-up to Telecom Decision 2017-56: Wholesale mobile wireless roaming service tariffs – Final terms and conditions*, Telecom Order CRTC 2017-433, 6 December 2017
- *Northwestel Inc. – Application to review and vary certain determinations in Telecom Decision 2016-443 regarding Wholesale Connect service*, Telecom Decision CRTC 2017-287, 17 August 2017
- *Review of costing inputs and the application process for wholesale high-speed access services*, Telecom Decision CRTC 2016-117, 31 March 2016
- *Various companies – Interim approval of tariff applications*, Telecom Order CRTC 2015-537, 3 December 2015
- *Review of wholesale wireline services and associated policies*, Telecom Regulatory Policy CRTC 2015-326, 22 July 2015; as amended by Telecom Regulatory Policy CRTC 2015-326-1, 9 October 2015
- *Regulatory framework for wholesale mobile wireless services*, Telecom Regulatory Policy CRTC 2015-177, 5 May 2015

[21] Revised tariff pages can be submitted to the Commission without a description page or a request for approval; a tariff application is not required.

- *Northwestel Inc. – Regulatory Framework, Modernization Plan, and related matters*, Telecom Regulatory Policy CRTC 2013-711, 18 December 2013

- *Billing practices for wholesale residential high-speed access services*, Telecom Regulatory Policy CRTC 2011-703, 15 November 2011; as amended by Telecom Regulatory Policy CRTC 2011-703-1, 11 December 2011

Appendix 1 to Telecom Order CRTC 2018-99

Bell Mobility – Adjustments

Cost component	Commission adjustment
Costs for additional spectrum acquired during the study period	Revised to exclude costs associated with additional spectrum acquired during the study period.
Spectrum costs	Revised to include the upfront spectrum acquisition capital cost or annual licence fees for spectrum licences that are not expected to expire during the study period. an annuity of the upfront spectrum acquisition capital cost incurred by the company in each year of the cost study until the spectrum licence expires and, in each subsequent year, the annual licence fees expected to be incurred upon extension of the licence.
RAN equipment costs	Revised to include at the start of the study period, RAN equipment costs based on the existing amount of RAN equipment to reflect existing coverage. additional RAN equipment costs consistent with TCI's cost trend for subsequent years.
Tower costs	Revised to use Bell Canada's SCF of 0.4374.
Conversion factors	Revised conversion factors for SMS to reflect that of TCI.
CIFs applied to switching and transmission facilities in the backhaul and core networks	Revised to include an annual capital unit cost change of minus 26.4%.
Core network costs	Revised to include at the start of the study period, core network costs reflecting the existing core network. no additional core network costs for subsequent years.
Maintenance and "other" expenses	Revised to calculate the unit cost for maintenance expenses as a percentage of capital expenditures and to include other expenses as annual expenses (not unitized) over the study period.

Satellite surcharge	Included in the wholesale roaming cost study the cost of satellite backhaul used for the provision of wireless services in areas where terrestrial backhaul is not available.

Appendix 2 to Telecom Order CRTC 2018-99

RCCI – Adjustments

Cost component	Commission adjustment
Costs for additional spectrum acquired during the study period	Revised to exclude costs associated with additional spectrum acquired during the study period.
Spectrum costs	Revised to include the upfront capital acquisition cost or annual licence fees for spectrum licences that are not expected to expire during the study period. an annuity of the upfront spectrum acquisition capital cost incurred by the company in each year of the cost study until the spectrum licence expires and, in each subsequent year, the annual licence fees expected to be incurred upon extension of the licence.
Tower costs	Revised to use Bell Canada's SCF of 0.4374.
CIFs applied to costs for RAN electronics	Revised to include a minus 9% CIF.
CIFs applied to switching and transmission facilities in the backhaul and core networks	Revised to include an annual capital unit cost change of minus 26.4%.
Tower life estimate	Revised to include a life estimate of 25 years for towers.

Appendix 3 to Telecom Order CRTC 2018-99

TCI – Adjustments

Cost component	Commission adjustment
Spectrum costs	Revised to include the upfront spectrum acquisition capital cost or annual licence fees for spectrum licences that are not expected to expire during the study period. an annuity of the upfront spectrum acquisition capital cost incurred by the company in each year of the cost study until the spectrum licence expires and, in each subsequent year, the annual licence fees expected to be incurred upon extension of the licence.
Tower costs	Revised to use Bell Canada's SCF of 0.4374.
All-carrier data demand forecast	Revised to use Bell Mobility's data growth rate.
CIFs applied to costs for RAN electronics	Revised to remove the 5% CIF applied to capital expenditures.
CIFs applied to switching and transmission facilities in the backhaul and core networks	Revised to include an annual capital unit cost change of minus 26.4%.
AT-WACC rate	Revised to apply TCI's existing approved financial parameters.
Material increase factor	Revised to exclude the foreign exchange adjustment factor and the material markup.
Annual operational expenses	Revised to use TCI's existing capital ratios by asset class.
Tariffed wholesale roaming traffic forecast	Revised to reflect actual 2015 traffic and to apply the modified all-carrier annual growth rates to estimate traffic over the remaining years of the study period.