TELUS COMMUNICATIONS INC.

Comments for

CONSULTATION on a TECHNICAL, POLICY and LICENSING FRAMEWORK for SPECTRUM in the 600 MHz BAND

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Executive Summary

1. TELUS appreciates the opportunity to provide its comments.

2. TELUS fully supports the steps initiated by the Department to make valuable 600 MHz spectrum available for the benefit of all Canadians. Combined with 3.5 GHz and mmWave bands, the allocation of this spectrum in a timely manner will be instrumental in securing Canada's position as a global leader in 5G.

3. TELUS firmly believes that 5G networks will act as a stimulus for disruption in modern digital economies. 5G networks will serve as a platform for innovation and will drive digital development in vertical industries such as health care, transportation, agriculture, manufacturing, automation, and smart cities. As such, 5G will become a central technological pillar in the realisation of the Government's Innovation Agenda: Empowering Canada's digital society, building a highly talented workforce capable of undertaking the challenges of the 21st century, and maintaining Canada's leadership in a digitally competitive world.

4. TELUS continues to advocate for the release of additional spectrum to address the insatiable demand for data and enable the emergence of disruptive applications. TELUS offered its strong support for the bold steps proposed by the Department in response to the recent *Consultation on Releasing Millimetre Wave Spectrum to Support 5G*, in which the Department demonstrated a willingness to address critical incumbent coexistence issues and challenge the status quo in order to accelerate Canada's 5G journey.

5. TELUS is also a strong proponent of a reliance on market forces to drive Canada's digital economy leadership. Both the *Spectrum Policy Framework for Canada* (SPFC)[1] and the *Framework for Spectrum Auctions in Canada* (FSAC)[2] emphasise the reliance on market forces as a guiding principle.

[1] http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08776.html
[2] http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01626.html

6. The framework proposed in this 600 MHz consultation does not challenge the status quo nor does it support the realisation of the Government's Innovation Agenda. The Department proposes to sustain its four player policy with "pro-competitive measures" that are destined to result in market distortion. TELUS disagrees with the majority of the Department's proposals and remains of the view that the Canada-specific flavour of a four player policy built on sustained privilege and subsidy is misguided.

The alleged "pro-competitive measures" will not fulfil the Department's stated objectives and are destined to hinder Canada's digital economy

7. In the view of NERA Economic Consulting expert Christian Dippon[3]:

> *Fundamentally, the evidence in this matter does not support the introduction of pro-competitive measures in the upcoming 600 MHz auction. The Canadian marketplace for wireless service is competitive. Facilities-based nationwide and regional providers compete for subscribers in a saturated market by employing the latest technology and offering ubiquitous nationwide coverage, thus yielding some of the world's highest long-term evolution (LTE) penetration rates. There is no evidence of market power, and ISED must weigh the 2014 claim by the Competition Bureau against the vast contemporaneous evidence demonstrating the opposite. Additionally, set-asides restrict spectrum supply to non-eligible providers and open these bidders up to fake bidding (instances where eligible providers drive up the spectrum costs for non-eligible bidders). Thus, set-asides are not simply superfluous but seriously harmful. On this finding alone, I recommend against the adoption of this proposed putatively pro-competitive measure.*
>
> *There is no correlation between market share and the ability or willingness to pay for spectrum. As such, the eligibility criteria are severely flawed because they benefit well-funded companies, in this case, established cable conglomerates, that simply elect not to expand their serving areas. Further, the ISED-proposed test to assess commercial intent falls far short of remedying this problem.*

8. The proposed technical, policy and licensing framework serves to stifle innovation by confining the access of more than 90% of Canadian subscribers to at most 57% of the 600

[3] C.M. Dippon, NERA Economic Consulting. *Expert Report of Christian M. Dippon, PhD Re: Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band,* October 2017 (Hereafter abbreviated Dippon 2017).

MHz band. The provided proposal may delay the benefits of 43% of the band reaching Canadians outside of the cable footprint by up to 20 years.

9. Rural Canada remains critically underserved due to the low utilisation of 700 MHz spectrum allocated to regional providers, who continue to exploit lax deployment requirements and mandated roaming. The provision of another oversized set-aside of sub-GHz spectrum to well-capitalised regional providers (at the expense of Canadian taxpayers) is unlikely to yield a different outcome and is detrimental to the development of Canada's digital economy. The Department should instead implement policies that fundamentally rely on market forces to promote Canadian investment and facilities-based competition to benefit all Canadians, particularly in rural and remote areas.

10. Finally, this is matter of fairness for TELUS. TELUS is the original new entrant that brought a sustainable third national provider to Canadians at great corporate cost, without a single spectrum subsidy from the Government along the way. TELUS emphasises the serious imbalance in sub-GHz holdings between national incumbents, due to historical reasons, which the proposed framework fails to recognise in any way. If the Department remains of the view that imposing market distorting measures is prudent, in spite of the proven ramifications of past unwise policies, the proposed set-aside constitutes the least appropriate approach. A set-aside will fail to broadly address imbalances in sub-GHz spectrum holdings, enable egregious gaming[4,5] and provide large unjustified subsidies[6] that will continue to enrich family controlled companies. While TELUS affirms its strong preference to rely on undistorted market forces, it provides the following alternatives to alleviate some of the most dire consequences of the proposed set-aside. TELUS' proposals involving caps address the matter of fairness and provide a path forward whereby the Government's objectives can be fulfilled without choosing winners and losers.

[4] C.M. Dippon, NERA Economic Consulting. *Regulatory Policy Goals and Spectrum Auction Design: Lessons from the Canadian AWS Auction*, March 2009 (Hereafter abbreviated Dippon 2009).
[5] Dippon 2017.
[6] For example, in the 2015 AWS-3 auction with a 60% set aside where the average price of unrestricted spectrum sold for 2850% more than the average price of set-aside spectrum.

Alternatives to proposed set-aside

a) Implementing a cap instead of a set-aside creates an effective set-aside which prevents the possibility of foreclosure for regional players. A 50 MHz sub-GHz broadband spectrum cap would effectively enforce a 30-40 MHz set-aside for regional providers in all major markets.

b) If a set-aside is to be implemented in spite of its profound shortcomings then to minimise the impact of picking winners and to better align with the Department's stated objectives,

   i. The set-aside must not exceed 20 MHz (29% of the band) as a larger set-aside would provide privileged access to a block of contiguous sub-GHz spectrum the size of which no national operator holds.

   ii. The eligibility criteria must be amended such that providers with less than 45 MHz of sub-GHz broadband spectrum in a region are allowed to bid on the set-aside in that region to address sub-GHz spectrum imbalances.

   iii. Set-aside measures must be combined with a cap of no more than 60 MHz on sub-GHz broadband spectrum holdings to address sub-GHz spectrum imbalances.

   iv. To prevent foreclosure, while ensuring the Canadian taxpayer is fairly compensated the activation of the set-aside must be made conditional on the largest eight markets exceeding on average a high price metric such as $1.25 per MHz-pop or higher.

   v. Simple service area subdivisions must be employed to exempt rural areas from the set-aside per Paragraph 11 below.

Ensuring the delivery of world-class connectivity to rural Canada

11. If set-aside measures are to be implemented, in support of the goals of the *Connecting Canadians* and *Connect to Innovate* programs, TELUS proposes breaking each Tier 2 licence into two sub-licences:

   i. A sub-licence comprising the set of all Tier 4 service areas with a population centre greater than 30,000 (the "urban sub-licence") and,

ii. The complementary set of Tier 4 service areas within the Tier 2 service area being geographically divided (the "rural sub-licence" – e.g., all Tier 4 service areas without a population centre greater than 30,000), regardless of geographic contiguity.

12. Rural sub-licences should be excluded from the set-aside so that national providers with a proven desire and ability to invest in rural areas can deliver world-class services for Canadians, as opposed to having set-aside spectrum sit fallow for 20 years in the hands of cable companies exploiting lax deployment requirements and mandated roaming.

Auction mechanics and efficient outcomes

13. TELUS supports in principle the employment of a combinatorial clock auction using the WARP-based activity rule (with the exception of the proposed assignment phase). However, TELUS stresses the importance of closing the loopholes inherent in the employment of inadequate set-aside rules which have plagued previous auctions and were abused for gaming purposes in the unrestricted portion of the auction by the same set of beneficiaries that the Department is proposing to make set-aside eligible. This behaviour artificially reduces prices of set-aside spectrum while dramatically increasing prices of unrestricted spectrum[7].

14. For the assignment stage, TELUS contends that the adopted mechanism must ensure the contiguity of awarded spectrum blocks while allowing bidders to express valuations for their block preferences, both intrinsic and in relation to others.

15. As proposed, opening bids reflect the expected price of set-aside spectrum in over 90% of the country, where the Department's proposal effectively picks a single regional provider as a set-aside winner. Opening bids are set too low when considering set-aside blocks since, when picking winners through flawed eligibility rules, set-aside blocks are bound to be acquired at reserve price. On the other hand, opening bids are set far too high to enable price discovery in the competitive portion of the auction. TELUS proposes the Department adjust opening bids by the measures successfully adopted by the FCC 600 MHz auction, i.e. reduce

[7] Dippon 2009.

opening bids and invoke set-aside only when block prices exceed a specified threshold such as $1.25 per MHz-pop. Additionally, TELUS emphasises prohibiting parties bidding on set-aside spectrum from distorting the price of remaining blocks.

16. Details supporting TELUS' comments and recommendations in response to the various questions raised by the Department follow in the main body of this document.

Introduction

5G: Beyond mobile broadband

17. In its recent response to the *Consultation on Releasing Millimetre Wave Spectrum to Support 5G*, TELUS noted the convergence of industry views on the 5G architecture requirements that will enable the enhanced mobile broadband (eMBB) service layer. TELUS described a heterogeneous terrestrial network based on broad 3.5 GHz coverage (in urban and suburban environments) and an ultra-dense underlay utilising mmWave spectrum and offered strong support for the bold steps proposed by the Department as a way forward for the mmWave bands to help establish Canada's early 5G leadership.

18. In the context of 5G, TELUS also points out the tremendous momentum behind 3.5 GHz as the prime 5G band below 6 GHz balancing coverage and capacity requirements. While 3GPP currently defines 30 bands[8] for the initial phase of 5G standardisation to be completed in December of this year, over 45% of the currently defined multi-band transmission combinations involve the 3.5 GHz frequency range[9]. TELUS cannot overstate the importance of the 3.5 GHz band for early 5G deployments and urges the Department to build on its bold steps by imminently consulting on the 3.5 GHz band, thereby ensuring that Canada does not fall behind other administrations (e.g., Japan, Korea, China and many E.U. member states) that are pushing forward with 3.5 GHz for 5G.

19. When considering the target peak downlink throughput targets in excess of 20 Gbps for the eMBB use case, the characteristics of 600 MHz spectrum (relatively small bandwidth and

[8] 3GPP R4-1709871, *Update of NR bands*, September 2017.
[9] 3GPP R4-1710082, *Update of DC band combination lists*, September 2017.

FDD duplexing[10]) make it far less effective in achieving 5G eMBB performance targets. Nevertheless, TELUS believes that the 600 MHz band will have an important role to play in the 5G networks of the future.

20. Spectrum below 1 GHz in frequency, sometimes referred to as *sub-GHz spectrum*, is vital for the operation of mobile networks. Mid-band spectrum (such as AWS, PCS, WCS, BRS, and 3.5 GHz) and high-band spectrum (such as mmWave) is incapable of matching the ubiquitous network coverage across all 5G use cases that sub-GHz spectrum enables with its advantageous propagation and penetration characteristics. A sub-GHz network layer will therefore be critical for providing service continuity across all environments (rural, suburban, and urban) and complementing the 3.5 GHz and mmWave bands in 5G networks.

21. Another key use case envisioned for 5G is that of ultra-reliable low-latency communications (URLLC). URLLC in 5G networks will drive joint innovation between vertical industries and mobile network operators in partnerships that develop and deploy mission-critical applications spanning industrial automation, e-health, smart cities, public safety and more. Guaranteeing service continuity will be a key requirement in achieving "five nines and beyond" reliability and, once again, sub-GHz spectrum will be critical for that purpose.

22. Sub-GHz spectrum is also anticipated to play a key role in enabling the 5G use case of Massive Machine Type Communications (mMTC). This 5G use case is the evolution of the nascent Internet of Things (IoT) and is envisioned to facilitate the connectivity of billions of devices. Mobile IoT applications requiring deep indoor coverage (such as meters and sensors in basements) and extreme range (in cases of remote sensing and object tracking) can only be addressed using sub-GHz spectrum.

[10] As paired sub-GHz FDD spectrum, the 600 MHz band will not benefit from some of the key 5G technology advances that will drive new eMBB capabilities. In TDD bands, advanced techniques such as multi-user spatial multiplexing and high resolution beamforming are made possible using near-perfect channel knowledge at the base station by exploiting the channel reciprocity characteristic of TDD (where channel estimates made from uplink pilot symbol transmissions can be transformed into equivalent estimates of the downlink channel). Additionally, with its longer wavelength, the 600 MHz band will be limited to lower-order (e.g., 2x2) multiple-input / multiple-output (MIMO), as the physical size of equipment makes the use of higher-order / massive MIMO infeasible.

Why do all operators need 600 MHz spectrum?

23. While the 850 MHz (Cellular) band is also being standardised for 5G, it has currently been deployed to deliver broad coverage in GSM, HSPA and LTE networks. This use is anticipated to be sustained to some extent for the foreseeable future to serve the needs of both domestic consumers and international visitors. A smooth transition to 5G based on the 850 MHz band as its only sub-GHz spectrum would be highly disruptive.

24. The 700 MHz bands (such as 3GPP Bands 12, 13, and 17) are not in scope for early 5G standardisation. TELUS suggests that this is due to their relatively early state of deployment (at least in national service providers' 4G LTE networks as the bands remain fallow in the hands of most regional providers in Canada); it is too early in the investment cycle to consider stranding equipment investments to repurpose the spectrum for 5G use.

25. As such, for use cases requiring sub-GHz spectrum (e.g., rural coverage and deep indoor IoT), the 600 MHz band will be the only spectrum which is both appropriate and available to support early 5G network deployments in North America. Ensuring that all operators (national and regional alike) have an opportunity to access sufficient spectrum in the 600 MHz band is critical in supporting the establishment of Canada's 5G leadership, the development of Canada's digital economy, and the benefit of Canadian consumers. Conversely, maintaining the proposed disproportionate 43% set-aside of the band for regional providers would be detrimental to Canadian 5G innovation. The set-aside would be particularly problematic for rural Canadians, who are highly dependent on sub-GHz spectrum to be part of the digital economy, since the Government proposes to grant it to parties that will have no obligation or incentive to deploy it until the end of the 20 year term of the licence.

26. It is in this context of 5G innovation that TELUS provides detailed responses to the questions raised by the Department in the remainder of its submission.

TELUS' Comments on Specific Questions Posed by ISED

Q1A—ISED is seeking comments on its proposal to implement a set-aside as a pro-competitive measure in the auction process for the 600 MHz band.
Q1B—ISED is seeking comments on its proposal to set aside 30 MHz of spectrum in the 600 MHz band for eligible entities and to have open bidding (no pro-competitive measures) on the remaining 40 MHz in the band.
Q1C—ISED is seeking comments on its proposal to limit the eligibility criteria to bid on set-aside spectrum to those registered with the CRTC as facilities-based-providers, that are not national incumbent service providers, and that are actively providing commercial telecommunication services to the general public in the licence area of interest, effective as of the date of application to participate in the 600 MHz auction.

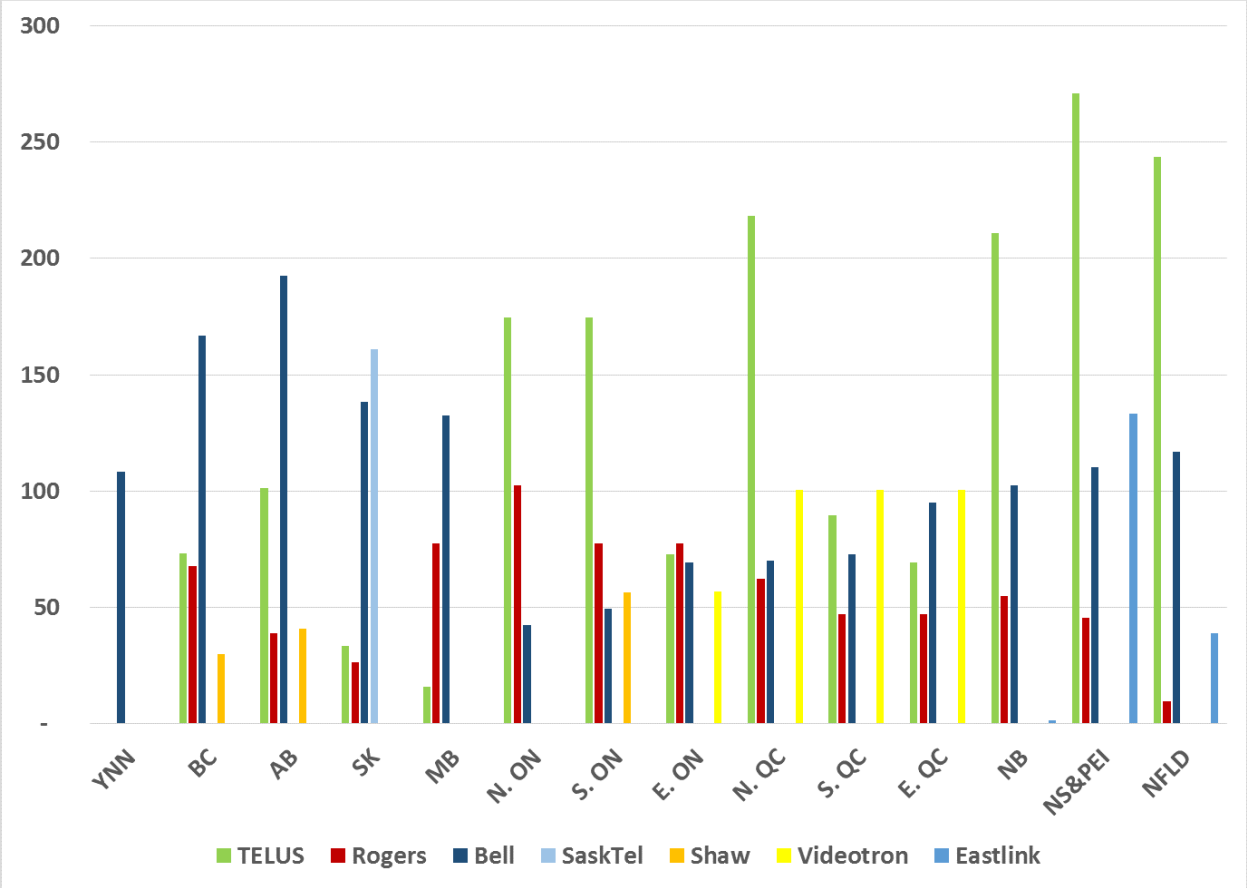
27. TELUS is shocked to see the Department proposing a set-aside of 43% (30 MHz out of 70 MHz) for regional operators in the 600 MHz band. This proposed set-aside unjustifiably maintains the trend of providing regional operators with preferred access to a disproportionate amount of spectrum, following set-asides of 44% (40 MHz out of 90 MHz) in the AWS-1 band and 60% (30 MHz out of 50 MHz) in the AWS-3 band.

28. TELUS urges the Department to give careful reconsideration to its rationale for proposing a set-aside for regional operators – particularly one of this magnitude. In 40% of the country by population (including Canada's largest market, Southern Ontario), TELUS holds only one sub-GHz broadband spectrum licence – the same single paired block of Upper 700 MHz spectrum that the set-aside eligible regional providers hold – and no more. If the intention of the proposed set-aside is to create preferential access to sub-GHz spectrum for those who need it the most and would maximise its utilisation, TELUS would certainly qualify.

29. As TELUS has consistently brought to the Department's attention, an operator's relative need for additional spectrum can be estimated based on a simple comparison of spectrum utilisation (measured in subscribers per MHz-pop). Figure 1 demonstrates this relative spectrum need using the spectrum utilisation metric when considering low-band (sub-GHz) spectrum only[11].

[11] Utilisation figures are multiplied by 10,000 for scale. Detailed subscriber counts were not available on a regional basis; the divided licence areas in Ontario and Quebec therefore assume a split of subscribers in proportion to each service area's relative population in the province.

Figure 1: Relative Spectrum Need (Subs per MHz-pop × 10,000 using Sub-GHz low-band spectrum, pre-auction)



30. Bell, SaskTel, TELUS, and Videotron are the operators in the biggest need of sub-GHz broadband spectrum, not Shaw (other than in Eastern Ontario where they do not have low band spectrum) who is proposed to have uncontested access to two thirds of the proposed set-aside. The Department must consider the needs of all Canadians, particularly in the current regime where Rogers and Shaw customers are so often now roaming on TELUS' mobile network.

31. In regions where TELUS' sub-GHz broadband spectrum holdings are identical to the proposed set-aside eligible regional operators, the Department suggests that TELUS' large subscriber base should make do with its 10 MHz of sub-GHz broadband spectrum plus any of the open 40 MHz TELUS can win at auction (most likely at a steep price), while each of the regional providers can secure an additional 30 MHz at the reserve price.

32. This is poor public policy, is contrary to international best practices and almost certain to cause more harm than good. The continued employment of such poor policies and their inevitable fallout will cripple innovation, undermine the development of Canada's digital economy and constrain the development of 5G services for Canadians.

33. In the remainder of this section, TELUS recommends and justifies modifications to the Departments proposed "pro-competitive measures" and suggests alternatives that provide a fair and equitable opportunity for all operators (both national and regional alike) to acquire spectrum in the 600 MHz band.

A set-aside is not required

34. When a set-aside was adopted in the 2008 AWS-1 auction, the Department aimed to create incentives for new competitors to enter the mobile wireless marketplace. The Department imposed mandated tower sharing and mandated roaming on the national providers as further incentive to enter the market via the AWS-1 auction. NERA produced a report[12] in 2009 outlining the gaming, outlier pricing and problems with set-asides. NERA produced a report[13] analysing the need for the proposed 600 MHz set-aside and in the view of NERA Economic Consulting expert Christian Dippon[13]:

> *Fundamentally, the evidence in this matter does not support the introduction of pro-competitive measures in the upcoming 600 MHz auction. The Canadian marketplace for wireless service is competitive. Facilities-based nationwide and regional providers compete for subscribers in a saturated market by employing the latest technology and offering ubiquitous nationwide coverage, thus yielding some of the world's highest long-term evolution (LTE) penetration rates. There is no evidence of market power, and ISED must weigh the 2014 claim by the Competition Bureau against the vast contemporaneous evidence demonstrating the opposite. Additionally, set-asides restrict spectrum supply to non-eligible providers and open these bidders up to fake bidding (instances where eligible providers drive up the spectrum costs for non-eligible bidders). Thus, set-asides are not simply superfluous but seriously harmful. On this finding alone, I recommend against the adoption of this proposed putatively pro-competitive measure.*
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> *There is no correlation between market share and the ability or willingness to pay for spectrum. As such, the eligibility criteria are severely flawed because they benefit well-*

[12] Dippon 2009.
[13] Dippon 2017.

funded companies, in this case, established cable conglomerates, that simply elect not to expand their serving areas. Further, the ISED-proposed test to assess commercial intent falls far short of remedying this problem

35. The wireless market is markedly different today than in 2008. After nearly a decade of set-asides and caps (i.e., effective set-asides) amounting to roughly $8B in taxpayer funded spectrum subsidies, the "challenger" market has consolidated down to one strong, stable and mature cable incumbent providing facilities-based mobile service in almost every region to round out a vibrant four player market. There no longer is any significant risk endangering regional operators who now have a stable mobile extension to their TV, HSIA and home phone product lines. They are now capable of and should be paying the going rate and competing without privilege.

36. NERA Economic Consulting expert Jeffrey Eisenach notes[14]:

i. North American markets continue to outperform those in the EU, especially in terms of availability and uptake of advanced LTE networks and associated increase in usage of data-intensive services.

ii. The strong relative performance of the Canadian mobile wireless market is even more impressive when viewed in the context of cost-factors which place Canada at a distinct disadvantage. These factors include Canada's extremely low population density, the relatively small size of Canadian mobile operators (and resulting lack of economies of scale), and high government-imposed costs. In particular, Canadian operators pay among some of the highest prices in the world for both spectrum licenses and spectrum fees.

iii. The Canadian market is among the least concentrated in the world, as measured by the Herfindahl-Hirschman Index (HHI), and that concentration is declining.

[14] Eisenach, J.A., *Expert Report of Jeffrey A. Eisenach, Ph.D. in Reconsideration of Telecom Decision 2017-56 Regarding Final Terms and Conditions for Wholesale Mobile Wireless Roaming Service* (CRTC 2017-259). September 8, 2017.

iv. Growing output, declining prices, rapid innovation and extensive product differentiation and consumer choice in the Canadian mobile wireless market are inconsistent with the existence of monopoly power and instead indicate the presence of robust competition that forces operators to improve their offerings while cutting costs and lowering prices.

v. The Nordicity Report commissioned by the government in 2016, which purports to compare Canadian mobile wireless prices to those in other countries, suffers from fundamental methodological flaws and is systematically biased.

vi. The available evidence fails to support, and in general contradicts, concerns about adoption and affordability. The evidence demonstrates that, even ignoring improvements in network speed and availability, prices for the services purchased by most consumers are falling rapidly.

vii. International evidence on the rate of smartphone adoption by those with low incomes as compared with the more affluent shows that Canada is a leader, not a laggard in making high quality mobile broadband connections available to low income citizens.

37. All of Canada's mobile operators (both national and regional) are well capitalised, deliver quad plays in their incumbent territory, have similar net debt to EBITDA ratios (i.e., have similarly levered balance sheets) and drive roughly the same normalised operating cashflow (EBITDA per pop in their operating territory) – see Table 1 below. As such all of Canada's operators are equally matched and capable to compete in an open auction.

Table 1: Operating cashflow, leverage and unit cost at auction

	EBITDA (TTM 2nd Qtr 2017)	EBITDA %	Net Debt / EBITDA	Pops (M)	Average Auction Cost 2008-2015 ($ / MHz-pop)
TELUS	4,098	31.6%	3.2x	33.5	1.32
Bell	8,318	37.5%	2.7x	33.5	1.27
Rogers	5,144	36.9%	3.3x	33.5	2.59
Quebecor	1,447	35.5%	3.0x[15]	9.1	0.82
Shaw	2,095	40.0%	2.6x	21.3	0.61
Eastlink	N/A	N/A	N/A	3.1	0.21

38. TELUS has asked NERA Economic Consulting to provide an arm's length review[16] of the consultation and comment on questions 1A, 1B, 1C and 1D and this paper has been filed with TELUS' submission. NERA provides a thorough analysis and concludes that there is no evidence of market power. Their conclusions build on their work filed as part the CRTC proceeding 2017-259. NERA has concluded that a set-aside or cap is unwarranted and that at best ISED should be offering any entity viewed as a necessary beneficiary of pro-competitive measures (e.g., small companies) bidder credits instead. NERA does not suggest these bidder credits for Canada's cable conglomerates. TELUS shares NERA's view on this latter point, based on the evidence provided above in Paragraph 34 and in Table 1. However, while TELUS is opposed to providing preferential measures to the well-capitalised cable conglomerates, TELUS accepts that a direct subsidy (via bidder credits) would be far less damaging than a set-aside.

[15] Excludes debt raised to buy back shares from CDP Capital in 2012 and 2015. Inclusive of that debt, Quebecor's Net Debt / EBITDA ratio is 4.0x.
[16] Dippon 2017.

A set-aside is not advisable

39. When the Department first implemented a set-aside as a "pro-competitive" measure in the 2008 AWS-1 auction, it presumably did not envision the unintended consequences: gaming bids from set-aside eligible bidders[17]; the indirect cost to consumers of higher spectrum prices; spectrum going unused or underutilised for many years; and spectrum flipping that directly profited the shareholders of family controlled companies. These were all paid for by society at large.

40. In their current form, the Department's proposals provide low risk gaming opportunities for set-aside eligible bidders that will cause material harm. For this reason, set-aside eligible bidders must not be able to bid outside of a set-aside. Set-asides have repeatedly proven to distort post-market outcomes[18] and result in the inefficient utilisation of spectrum. Public historical bidding data provides strong evidence of malicious bidding behaviour in the 2008 AWS-1 auction. The auction of unrestricted AWS-1 spectrum effectively ended in round 23 and for an astounding 308 additional rounds, the set-aside eligible bidders including the proposed 600 MHz set-aside eligible bidders Eastlink, Videotron and Shaw displayed some of the most blatant examples of gaming behaviour on the global spectrum auction record by deliberately and systematically pushing[19] open spectrum prices up in each of the service areas in Canada.

41. Table 2 highlights the extent of the gaming activity in the AWS-1 auction as demonstrated by the intended beneficiaries of the proposed set-aside in the 600 MHz auction. Column (a) highlights the ratio of peak bid (the most money they put on the line in any round) to actual end purchase on spectrum. No bidder came close to being as brazen as Bragg (Eastlink) who placed bids 10 times higher than its final spend. Column (b) shows the percentage premium entrants were willing to bid on open spectrum blocks versus the going price for the equivalent set-aside blocks. All of the intended beneficiaries of the proposed 600 MHz set-aside were active in this regard and it shows how far entrants were willing to go to game the auction. Column (c) shows the spectrum flipping profits realised by large cable

[17] Dippon 2009.
[18] *Ibid.*
[19] As per AWS-1 bid data.

companies that the Department intends to be the beneficiaries of the proposed 600 MHz set-aside. Column (d) shows how two likely beneficiaries of the proposed 600 MHz set-aside have not yet actually put to use the low band spectrum they already acquired via privileged access in 2014.

Table 2: Bidding behaviour, spectrum flipping and sub-GHz deployment of proposed set-aside eligible bidders

Bidder	(a) AWS-1 peak bid to ending spend	(b) AWS-1 most uneconomic bid	(c) AWS-1, MBS, BRS flipping profits	(d) 700 MHz sites deployed[20]
Eastlink	10x	805%[21]	n/a	308
Shaw	2.5x	162%[22]	$162M	0
Wind	1.75x	1,060%[23]	$45M	
Videotron	1.25x	1,110%[24]	$261M	0
National providers	1x	n/a	Rogers but not TELUS allowed to acquire half the AWS-1 set-aside in BC, AB and S. ON	11,741

42. In the 2008 AWS-1 auction, Videotron foreclosed the entire three block 40 MHz set-aside in every service area in Quebec. Videotron also outbid Bell for unrestricted spectrum (i.e., three national providers and three open blocks but only TELUS and Rogers won a block) in part of Quebec. In this area, Videotron acquired more AWS-1 spectrum than all three national incumbents combined (50 MHz vs 40 MHz total for Rogers and TELUS). Clearly, Videotron did not need a set aside back in 2008. Since 2008, Quebecor's stock price has appreciated by 164%, more than three times the average stock appreciation rate of its

[20] Based on data from the Department's Spectrum Management System as of October 2, 2017
[21] Round 177
[22] Round 138
[23] Round 125
[24] Round 126

competitors. Today, like TELUS, Videotron has negotiated subordination rights to address its current sub-GHz deficiencies[25]. There is no policy rationale to have Videotron bidding with special privileges and subsidy. And if there is, why wouldn't these benefits be applied to TELUS where it is deficient in sub-GHz broadband spectrum?

43. The public record shows that Shaw has vacillated for more than two decades on its mobile strategy, investing and exiting twice[26] before buying Wind in 2016. That was not the result of any regulatory impediment – it was the result of choices Shaw made. TELUS and Shaw have the same sub-GHz broadband spectrum in Canada's largest market, Southern Ontario. There is no policy rationale to have Shaw bidding with special privileges and subsidy in Southern Ontario. And if there is, why wouldn't these benefits be applied to TELUS?

44. Underlying the market with four strong companies providing mobile service in every major market are two large wireline HSIA providers in each region - one telco copper/fibre provider and one coax/fibre provider. TELUS notes that Rogers was approved to acquire half of the AWS-1 set-aside spectrum in two thirds of the country in 2015 and 2017 via deals with cable based regional wireless providers. The public record also shows subordination agreements in place between Rogers and Videotron with respect to AWS-1 and 700 MHz spectrum. Historical factors and new 5G technology and market forces may drive Rogers to eventually partner with all or most of the regional cableco mobile providers[27] versus relying on wireless backhaul, mandated fibre access and/or extensive out-of-cable-footprint fibre investment to deliver 5G services. TELUS contends that the alleged "pro-competitive" measures proposed by the Department therefore are likely to benefit Rogers in addition to the regional providers in spite of Rogers already having been

[25] *Subordinate Licences for Spectrum Licences Held by Rogers Communications Partnership to Vidéotron G.P.* , http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11135.html

[26] Per the public record and Rogers' Reply Comments on the BRS Consultation on Policy and Technical Framework, Quebecor Media (Quebecor) and Shaw each partly owned Microcell in its early days. In July 1995, both companies were reported to have increased their respective ownership stakes in Microcell to 10% with an option to increase their stakes to 15%. However, in March 1998, Shaw decided to sell its 10% stake for a profit of $11.6 million, saying that the sale would allow Shaw to focus on its core operations. Quebecor attempted to sell its stake in Microcell but they were unsuccessful and eventually wrote-down their investment in 2002. Shaw spent $190M in the 2008 AWS-1 auction but agreed in 2013 to sell this spectrum to Rogers, which it did in 2015.

[27] The regional providers all hold underutilised spectrum and have fibre assets in their territories which are outside Rogers' hybrid fibre/coax network footprint.

given privileged access to the largest amounts of spectrum in almost every mainstream band in Canada including sub-GHz spectrum.

45. The following table shows privileged and subsidised access to spectrum by band by operator. Within each band it shows the quantity of national MHz (for comparability) that each major mobile provider has had privileged and/or subsidised access to. The table highlights how TELUS' heritage as the original new entrant and the only still standing company to ever create new competition in the history of the Canadian mobile industry, without being provided lucrative incentives and subsidies to do so, has yet to receive balancing treatment from the Department.

46. Line (1) in the table shows the size of the original 850 grants in terms of national MHz. Line (2) similarly shows the 1995 PCS grants. The beneficiaries of these grants have paid $3.5B in spectrum fees over the lifespan of these licences (over $8.5B in terms of 2017 dollars)[28]. The table clearly illustrates the scale of the benefit Rogers received in comparison to other providers.

47. Note that Rogers and TELUS bought PCS spectrum previously granted in 1995 from Microcell and Clearnet but paid for this spectrum in open secondary market transactions and as such, this PCS spectrum is not included in the table just as none of the recent secondary market transactions are included.

48. Line (3) shows the effect of the only clawback of mobile spectrum[29] in Canadian history related to the 20 MHz of PCS that was clawed back from TELUS when TELUS acquired Clearnet in 2000. In January 2001, the Department turned around and auctioned this spectrum creating 60 MHz of supply in regions where TELUS had been stripped of 20 MHz in BC, Alberta and Eastern Quebec. TELUS could not bid to buy it back due to the cap in place. Bell and Rogers could only buy part of it (due to the cap) but were able to acquire it

[28] Mark Goldberg, *Two Sides of Every Coin*, http://mhgoldberg.com/blog/?p=1157

[29] Note: There was a clawback of fixed 2500 MHz band spectrum but this was related to a mobile conversion windfall which saw billions of dollars in value transferred from the Canadian taxpayer to Rogers and Bell. There will be another clawback of fixed 3500 MHz band spectrum in the future, but again this relates to a mobile conversion windfall which will see billions of dollars in value transferred from the Canadian taxpayer to Rogers, Bell and to a much lesser extent Xplornet.

at 16 cents per MHz-pop (just over the reserve price) while TELUS, Rogers and Bell spent close to $4 per MHz-pop fighting over four blocks in Southern Ontario. Speculator W2N Inc. was also able to acquire the remaining spectrum clawed back from TELUS in BC and Alberta at 16 cents per MHz-pop (just over the reserve price). Line (4) shows the quantity of national MHz that the AWS-1 entrants were able to acquire with privileged access and a taxpayer subsidy.

49. Line (5) shows the quantity of national MHz of mobile 2500 MHz spectrum that Bell and Rogers received as part of a windfall associated with the fundamental reallocation of fixed service MCS and MDS licences to mobile service.

50. Line (7) shows the quantity of national MHz of AWS-3 spectrum that the operating entrants were able to acquire with privileged access and a taxpayer subsidy. This "auction" (which was for all intents and purposes was a grant, since the rules ensured that there was no competitive bidding for the set-aside except in one service area), saw the operating entrants pay on average 11 cents per MHz-pop while national providers paid $3 per MHz-pop (almost 30x more.) It is worth noting that the price the operating entrants got away with is essentially equivalent to 70% off a free grant of spectrum. A cost-free grant of spectrum attracting standard annual mobile spectrum licence fees would have cost the operating entrants over time, almost three times what they paid at auction. Once again taxpayers were forced to give up the general revenues while the benefits accrued to family owned businesses.

Table 3: Privileged and subsidised access to spectrum in Canada (National MHz attributed using 2016 population)

		Year	Band	Rogers	Bell	TELUS	Shaw/Wind[30]	Videotron	Eastlink	SaskTel
1	Grant	1985	850	25	16	6.4				0.8
2	Grant	1995	PCS	10[31]	7	2.5[32]				0.3
3	Clawback	2001	PCS	5	6	-5				
4	Set-aside	2008	AWS-1	0[33]			17	7	3	
5	Windfall	2011	BRS	49	49					2.0
6	Cap	2014	700							
7	Set aside	2015	AWS-3				16	9	3	
8	Cap	2015	BRS							
9	[Set-aside]	TBA	600				[18]	[9]	[1]	[1]
10	Windfall	TBA	3500	TBA	TBA					
11	**Total**	**National MHz**		**89**	**78**	**4**	**51**	**25**	**7**	**4**
12		**In-territory MHz**		**89**	**78**	**4**	**83**	**85**	**90**	**130**

If implementing allegedly "pro-competitive" measures, use a cap instead of a set-aside

51. If the Department proceeds with imposing allegedly "pro-competitive" measures in spite of the compelling arguments to the contrary, implementing an operator neutral band cap or sub-GHz broadband spectrum cap, rather than a set-aside, would circumvent many of the shortcomings of the proposed set-aside (e.g., low band structural advantage, unjustified subsidy and gaming opportunities, as described above) while still providing an effective set-aside.

A band cap creates an effective set-aside

52. A two block band cap would guarantee four winners and create an effective set-aside of 10 MHz. This would mirror the competitive measures the Department implemented in the 2015 auction of BRS spectrum where there were, like the 600 MHz band, seven paired blocks and no operator able to acquire more than two paired blocks. A two block cap ensures that

[30] Although Shaw's acquisition of Wind was a secondary-market transaction, it was a privileged transaction

[31] Rogers acquired Microcell in 2004, including 30 MHz of granted PCS spectrum

[32] TELUS acquired Clearnet in 2000, including 30 MHz of granted PCS spectrum of which 20 MHz was clawed back in TELUS' ILEC territories.

[33] Rogers acquired 20 MHz of AWS-1 set aside spectrum in most of Canada's top markets from Mobilicity, Wind and Shaw via a series of orchestrated transactions as well as from Videotron.

at a minimum, a regional provider would win a single block at the reserve price except in a few service areas where two regional providers might bid against each other. Regional providers, all well capitalised cable conglomerates or government telcos, would be free to bid to win a second block. Such an approach would address foreclosure concerns in an equitable way.

A sub-GHz broadband spectrum cap recognises the low band deficiencies of all operators

53. The proposed set-aside seeks to address an imbalance in sub-GHz broadband spectrum holdings between the national providers and regional providers, but it fails to address the imbalance in sub-GHz broadband spectrum holdings among the national providers and the ongoing foreclosure risk faced by TELUS, the original new entrant and the national provider with the lowest ex-ante sub-GHz broadband spectrum holdings.

54. A 50 MHz sub-GHz broadband spectrum cap would resolve this legacy imbalance while effectively enforcing a 30-40 MHz set-aside for regional providers in all major markets. It would however, keep Rogers out of most of the auction and render them dependent, for 600 MHz spectrum, on future subordination or secondary market spectrum acquisition after five years.

55. Table 4 illustrates the ex-ante sub-GHz broadband[34] spectrum holdings of the national and regional providers. TELUS' sub-GHz broadband spectrum holdings in six of the fourteen Tier 2 service areas are identical to that of the regional operator – a single 10 MHz paired block of Upper 700 MHz spectrum. One of these regions (Southern Ontario) is the largest Tier 2 service area by population, and is an area where TELUS is competing aggressively for market share. Even in areas where TELUS bid to acquire more than a single block in the 700 MHz auction (e.g., much of Quebec and Eastern Ontario), TELUS' sub-GHz broadband spectrum holdings are still far lower than those of Rogers (with a national 25 MHz 850A block) and Bell (with the 25 MHz 850B block in those ILEC regions).

[34] These figures (i) include gross holdings (i.e., all guard bands), (ii) include unpaired 700 with currently only a CA profile with mid band spectrum and hence effectively mid band spectrum, (iii) exclude narrowband ESMR spectrum licences

56. It is also worth noting that on top of Rogers' significant lead in low band quantity, Rogers also has a significant lead in low band contiguity / quality. During the 700 MHz auction in 2014, Rogers outspent the next highest bidder (TELUS) by a factor of nearly three, spending $3.3B to outbid TELUS in acquiring two contiguous paired blocks of spectrum in all of the top six markets. The proposed 600 MHz auction rules give Rogers the ability to continue to outbid TELUS to maintain Rogers' sub-GHz advantage of twice as much as TELUS, while providing an immediate avenue to negotiate subordinated access to the proposed 30 MHz set-aside nationally. Thus, the merit in a 50 MHz sub-GHz broadband spectrum cap is both apparent and justified.

Table 4: Ex-ante sub-GHz broadband spectrum holdings

Tier 2 Service Area	Service Area Name	TELUS	Rogers	Bell	SaskTel	Shaw	Videotron	Eastlink
2-001	Newfoundland and Labrador	**10.0**	**49.0**	**49.0**	-	-	-	**10.0**
2-002	Nova Scotia and Prince Edward Island	**10.0**	**49.0**	**49.0**	-	-	-	**10.0**
2-003	New Brunswick	**10.0**	**49.0**	**49.0**	-	-	-	**10.0**
2-004	Eastern Quebec	**31.5**	**49.0**	**26.6**	-	-	**10.0**	-
2-005	Southern Quebec	**24.3**	**49.0**	**34.7**	-	-	**10.0**	-
2-006	Eastern Ontario and Outaouais	**24.0**	**49.0**	**35.0**	-	-	**10.0**	-
2-007	Northern Quebec	**10.0**	**37.0**	**36.0**	-	-	**10.0**	-
2-008	Southern Ontario	**10.0**	**49.0**	**49.0**	-	**10.0**	-	-
2-009	Northern Ontario	**10.0**	**37.0**	**57.1**	-	-	-	**10.0**
2-010	Manitoba	**36.0**	**37.0**	**35.0**	-	-	-	-
2-011	Saskatchewan	**36.0**	**37.0**	**10.0**	**35.0**	-	-	-
2-012	Alberta	**48.7**	**49.0**	**10.0**	**0.3**	**10.0**	-	-
2-013	British Columbia	**49.0**	**49.0**	**10.0**	-	**10.0**	-	-
2-014	Yukon, Nunavut, NWT	**12.0**	**25.0**	**61.0**	-	-	-	-

Table 5: Number of blocks each bidder could bid on under 50 MHz sub-GHz spectrum cap

Tier 2 Service Area	Service Area Name	TELUS	Rogers	Bell	Max Blocks to National Providers	Effective Set-Aside Blocks
2-001	Newfoundland and Labrador	**4**	**0**	**0**	**4**	**3**
2-002	Nova Scotia and Prince Edward Island	**4**	**0**	**0**	**4**	**3**
2-003	New Brunswick	**4**	**0**	**0**	**4**	**3**
2-004	Eastern Quebec	**1**	**0**	**2**	**3**	**4**
2-005	Southern Quebec	**2**	**0**	**1**	**3**	**4**
2-006	Eastern Ontario and Outaouais	**2**	**0**	**1**	**3**	**4**
2-007	Northern Quebec	**4**	**1**	**1**	**6**	**1**
2-008	Southern Ontario	**4**	**0**	**0**	**4**	**3**
2-009	Northern Ontario	**4**	**1**	**0**	**5**	**2**
2-010	Manitoba	**1**	**1**	**1**	**3**	**4**
2-011	Saskatchewan	**1**	**1**	**4**	**6**	**1**
2-012	Alberta	**0**	**0**	**4**	**4**	**3**
2-013	British Columbia	**0**	**0**	**4**	**4**	**3**
2-014	Yukon, Nunavut, NWT	**3**	**2**	**0**	**5**	**2**

57. Table 5 illustrates the number of 5+5 MHz paired FDD blocks that each bidder could potentially access in an auction with a 50 MHz sub-GHz spectrum cap. Note that in all major markets, the three national operators (TELUS, Bell, and Rogers) are only able to cumulatively bid on at most four blocks (Northern Quebec, Northern Ontario, Saskatchewan and Northern Canada are the only exceptions). This proposal illustrates that in adopting a 50 MHz sub-GHz broadband spectrum cap, the Department would be enforcing an effective set-aside of 30 MHz in most major markets and a 40 MHz effective set-aside in Manitoba, Eastern Ontario, and the highly populated regions of Quebec.

If set-aside persists then TELUS strongly recommends changes

58. While TELUS strongly believes that caps are much less distortionary and damaging than set-asides, TELUS proposes that if the Department insists on implementing a set-aside and accepts the consequences (e.g., a potential repeat of the distorted pricing arising from set-aside bidders' blatant gaming behaviour in the 2008 AWS-1 auction), the Department needs to correct the eligibility rules. Failing this, the Department needs to reduce the quantity of

spectrum set-aside in each service area and layer on a sub-GHz broadband spectrum cap during the auction to reduce the imbalance in sub-GHz broadband spectrum holdings. Additionally, the geography of the set-aside must be restricted to urban service areas only as detailed in Paragraph 70 and our response to Question 2.

If implementing a set-aside then correct the eligibility rules

59. The Department refers in Paragraph 23 of the Consultation to the FCC's recent use of a set-aside in the 600 MHz incentive auction. However, the Department's proposed set-aside is markedly different than the FCC's (which implemented a conditional set-aside with capped access). The Department's proposal removes all of the checks and balances built into the U.S. set-aside.

60. Firstly, the FCC spectrum reserve was conditional. It was only triggered when forward incentive auction average pricing in the top 40 U.S. markets (partial economic areas [PEAs] in this case) reached an average price of $1.25 per MHz-pop. In other words, the FCC recognised that bidders did not need protection from foreclosure except potentially at higher price levels. This is certainly applicable to Canada where all the expected set-aside eligible bidders are well capitalised, mature and stable wireline incumbents. In the FCC incentive auction, open and set-aside blocks were one generic product until the set-aside was triggered and only then did they go onto separate clock prices. Up until this point, all bidders could express their full demand across all available product. The FCC designed it this way to ensure that set-aside spectrum did not sell for too low a price. In other words, the set-aside winners paid some proxy for market value. TELUS provides specific recommendations for a similar set-aside trigger mechanism in its response to Question 7 on the methodology for price increments.

61. Secondly, the FCC rules only excluded bidders that held more than 45 MHz (i.e., approximately one third) of the sub-GHz broadband spectrum from bidding on reserve spectrum in any given service area. The FCC recognised that all operators should be able to bid on all spectrum where they did not already hold a significant amount of sub-GHz broadband spectrum. With Verizon surpassing this threshold in 82% of the country and AT&T surpassing this threshold in 75% of the country (no other operators' sub-GHz

spectrum holdings beyond the threshold anywhere in the country), the U.S. 600 MHz auction involved multiple set-aside eligible bidders in every service area.

62. Therefore, the Department should allow all providers in Canada with less than 45 MHz of sub-GHz broadband spectrum in any region to bid on the set-aside in that region. Additionally, the set-aside should be invoked only when the auction exceeds some high price metric such as $1.25 per MHz-pop.

If implementing a set-aside, anything more than 20 MHz unjustified

63. No operator in Canada has access to a contiguous 30 MHz (15+15 MHz paired FDD) sub-GHz channel. 850 MHz (Cellular) band enables up to 22 MHz of contiguous spectrum per operator (11+11 MHz in block A, used as 10+10 MHz paired FDD), but will be deployable for 5G only once it is completely refarmed. Maintaining GSM/HSPA networks to support Canadian consumers with older handsets, and to enable inbound roaming among other reasons, precludes refarming in the foreseeable future as specified in TELUS' introductory response to this Question. In the 700 MHz auction, Rogers foreclosed access in most major markets to the contiguous paired 700A/B blocks (24 MHz, but used as 10+10 MHz paired FDD in LTE). Regional providers SaskTel and Eastlink have begun to deploy their 700 MHz spectrum from the 2014 auction, but the extent of their deployment is orders of magnitude below that of the national providers. Shaw and Videotron appear to have not deployed the spectrum whatsoever.

64. The 600 MHz band is the first sub-GHz band to potentially enable operators to acquire contiguous channel bandwidths in excess of 10+10 MHz. The proposed set-aside virtually guarantees that one of these operators is a set-aside eligible regional operator, and that a second contiguous 15+15 MHz or greater channel is only available through exceptional means whereby a national provider wins 3 of 4 unrestricted blocks and at least one national provider is foreclosed. TELUS views the proposed set-aside as going far beyond presenting an "opportunity to support the competitiveness of the newer service providers [who are strong regional cable incumbents] by ensuring that they will have an opportunity to acquire additional low-band spectrum to effectively compete with the services offered by the more established wireless service providers"; it creates privileged access to a block of contiguous

sub-GHz spectrum the size of which no national operator holds. Any set-aside must thus not exceed 20 MHz, so as to not pick winners by assigning a predetermined contiguity advantage by regulatory fiat.

If implementing a set-aside, it must be complemented by a cap on sub-GHz holdings to address low-band spectrum concentration concerns not resolved by proposed set-aside

65. If the Department deems a set-aside as necessary, and maintains their eligibility rules (which exclude national providers where they hold less than 45 MHz of spectrum) despite the strong arguments against a set-aside and the proposed eligibility rules, then having a low-band cap in place on top of the set-aside would address the industry problem of low-band spectrum concentration arising from Rogers' historical national holdings of 850 MHz spectrum (as compared to the regional holdings of 850 MHz spectrum within the ILEC territories for telcos).

66. As illustrated in Table 5 above, a 50 MHz cap on sub-GHz broadband spectrum holdings would serve to drive the industry to the highest level of sub-GHz parity, and would create an effective 30-40 MHz set-aside for regional providers.

67. TELUS acknowledges that a 50 MHz sub-GHz broadband cap, despite providing a fair opportunity for bidders to correct the current sub-GHz spectrum imbalance, would preclude Rogers from meaningful access to 600 MHz in the near term.

68. Table 6 illustrates the scenario where a 60 MHz sub-GHz broadband spectrum cap is applied. It lists the number of 5+5 MHz paired FDD blocks that each bidder could bid on in an auction with a 60 MHz sub-GHz broadband spectrum cap while assuming that a two block (20 MHz) set-aside[35] is implemented. This scenario illustrates a potential for competitive bidding on open blocks in each region (as the maximum aggregate demand across the three national bidders exceeds five – the number of open blocks). By imposing a 60 MHz cap on sub-GHz broadband holdings, a measure of fairness is introduced in

[35] Although TELUS emphasises its strong opposition to a set-aside, a 10 or 20 MHz set-aside could be coupled with a 60 MHz sub-GHz broadband spectrum cap to prevent regional providers from being foreclosed from accessing the band in most regions. We note, however, that this type of foreclosure appears highly unlikely, given that it would require massive bids (to try to buy 5+ blocks) on the part of various national providers.

creating an opportunity for all bidders (both national and regional providers) to balance the current disparity in sub-GHz broadband spectrum holdings. Unlike the 50 MHz cap scenario shown above, it does not preclude Rogers from bidding in any region during the auction.

Table 6: Number of blocks each bidder could bid on under 60 MHz cap

Tier 2 Service Area	Service Area Name	TELUS	Rogers	Bell	Set-Aside Blocks
2-001	Newfoundland and Labrador	**5**	**1**	**1**	**2**
2-002	Nova Scotia and Prince Edward Island	**5**	**1**	**1**	**2**
2-003	New Brunswick	**5**	**1**	**1**	**2**
2-004	Eastern Quebec	**2**	**1**	**3**	**2**
2-005	Southern Quebec	**3**	**1**	**2**	**2**
2-006	Eastern Ontario and Outaouais	**3**	**1**	**2**	**2**
2-007	Northern Quebec	**5**	**2**	**2**	**2**
2-008	Southern Ontario	**5**	**1**	**1**	**2**
2-009	Northern Ontario	**5**	**2**	**0**	**2**
2-010	Manitoba	**2**	**2**	**2**	**2**
2-011	Saskatchewan	**2**	**2**	**5**	**2**
2-012	Alberta	**1**	**1**	**5**	**2**
2-013	British Columbia	**1**	**1**	**5**	**2**
2-014	Yukon, Nunavut, NWT	**4**	**3**	**0**	**2**

If implementing a set-aside, must remove the set-aside in rural service areas

69. The proposed set-aside eligibility rules, by virtue of the use of Tier 2 licences, confer upon the regional providers (other than SaskTel) eligibility to bid on spectrum province wide despite not having cable plant or mobile network assets beyond urban and suburban markets. Unlike telcos with a historical obligation to serve, cable footprints typically focus on higher density urban areas and as such do not reach nearly as many rural and remote Canadians as wireline telecom networks. Similarly, TELUS covers over 99% of Canadians with mobile service and over 97% with LTE. Regional providers do not come close to achieving these metrics. Moreover, they have been provided disincentives from engaging

in facilities-based investment to stretch their coverage through the provision of a generous mandated roaming framework from the Department and the CRTC. The proposed deployment requirements in the Consultation are also quite lax in providing 20 years to enforce build out to Tier 4 towns[36]. TELUS further details its concerns with the mandatory roaming framework and the opportunities for network arbitrage that it provides in its response to Question 13.

70. As such TELUS recommends that the Department:

i. Enforce the deployment requirements for 600 MHz spectrum as TELUS details in its response to Question 12.

ii. Remove set-aside measures for the 111 of 172 Tier 4 service areas without a population centre greater than 30,000. This recommendation effectively subdivides each Tier 2 service area into two sub-licence areas – a collection of all Tier 4 service areas within the service area containing a population centre greater than 30,000 ("urban sub-licences") and a collection of the complementary Tier 4 service areas ("rural sub-licences"), regardless of the geographic contiguity of these two sets. Removing the set-aside from rural sub-licences would ensure that providers that possess a demonstrated desire and proven ability to invest in rural areas can deliver world class connectivity to rural Canadians, as opposed to having set-aside spectrum sit fallow in the hands of regional providers with no business incentive nor requirement to deploy it for 20 years.

Q1D—ISED is seeking comments on its proposal to limit the transferability of the set-aside spectrum for the first five years of the licence term.

71. If the Department insists on implementing a set-aside in spite of its shortcomings, TELUS supports the proposal to limit the transferability of set-aside spectrum for the first five years of the licence term. TELUS recommends the proposed five-year deployment requirements

[36] Dippon 2017.

be assessed before the expiry of the prohibition on licence transfer to set-aside ineligible entities. By forcing deployment requirements to be met prior to transfer, the Department will help discourage speculation. TELUS is strongly opposed to permitting the transfer of any set-aside spectrum that has not been deployed. Licences failing to meet the deployment requirements should be revoked in part or in whole by the Department as detailed in TELUS' response to Question 12.

Q1E—ISED is seeking comments on its proposal to auction the set-aside spectrum as three separate paired blocks of 5+5 MHz.

72. TELUS reiterates its opposition to set-aside measures for the reasons detailed in its response to Questions 1A / 1B / 1C. If the Department carries through with a set-aside, TELUS supports the proposal to partition the set-aside spectrum into separate paired blocks of 5+5 MHz. (This recommendation also holds true for the 20 MHz maximum set-aside proposed by TELUS.) The set-aside should not necessarily be acquired by a single bidder. A single block per region would result in an all or nothing proposition and would make it hard for smaller providers such as Xplornet, CanWISP members and the like from sharing in the winnings should they be motivated to bid for set-aside spectrum as set-aside eligible entities within their regions of operation. Partitioning the set-aside into multiple paired blocks of 5+5 MHz also provides the opportunity for market forces to permit multiple winners in service areas like Eastern Ontario where Shaw and Videotron both have mobile networks.

Q2—ISED is seeking comments on its proposal to use Tier 2 service areas across the country, except in the three Territories (Yukon, Northwest Territories and Nunavut) where Tier 4 service areas would apply.

73. TELUS has always advocated for the large Tier 2 service areas for competitive licensing of mobile services and supports Tier 2 service licences for the 600 MHz spectrum band. TELUS agrees with the points made by the Department in Paragraphs 35-37 of the Consultation – that due to the propagation characteristics of 600 MHz (as a low frequency band), it is best matched to larger (e.g., Tier 2) service areas that minimise coordination requirements between operators.

74. However, TELUS has several concerns with supporting the use of Tier 2 service areas in the context of the proposed 600 MHz licensing framework.

75. The Department's proposed criterion for assessing set-aside eligibility is on the basis of geography of facilities. This assessment criterion has the effect of providing eligibility to bid on the set-aside spectrum in regions where a bidder has no facilities (e.g., smaller markets within a Tier 2 service area). Thus, regional mobile operators who have only deployed in urban and suburban markets and have no incentive to build out any further given the generous mandatory roaming framework and proposed 10/20 year deployment requirements for geographies at Tier-3 / Tier-4 levels, respectively, will win and sit on precious rural spectrum.

76. TELUS recommends that the 600 MHz spectrum be licensed in Tier 2 service areas but that each of the Tier 2 licences be broken into two sub-licences such that the 111 of 172 Tier 4 service areas without a population centre greater than 30,000 pops are grouped in a sub-licences by Tier 2 region. In other words, each Tier 2 licence is broken into two sub licences:

    i. An "urban" sub-licence – the set of all urban/suburban Tier 4s within a Tier 2 service area with a population centre greater than 30,000; and

    ii. A "rural" sub-licence – a set of all rural and remote Tier 4s within a Tier 2 service area without a population centre of 30,000 regardless of geographic contiguity.

77. TELUS proposes removing the rural sub-licences from the set-aside so that providers with a proven desire and ability to invest in rural areas can deliver world class service for Canadians, as opposed to having 43% of the band which is so precious to rural connectivity sit fallow in the hands of cable companies with no business incentive or requirement to deploy it for 20 years.

Q3—ISED is seeking comments on:
a) the proposal to use generic licences; and
b) the proposal to categorize all blocks won by set-aside-eligible bidders as set-aside blocks.

Generic Licences

78. TELUS supports the proposal to use generic licences for the clock rounds of the auction. TELUS concurs with the Department's assessment that the use of generic licences simplifies the bidding process and suggests that preferences for specific blocks in a given service area or set of service areas can be addressed with the adoption of an appropriate assignment mechanism as detailed in its response to Question 6.

Categorisation of blocks won by set-aside-eligible bidders

79. While TELUS opposes both the use of set-asides and the magnitude of the proposed set-aside, TELUS supports the proposal for all blocks won by set-aside-eligible bidders to be categorised as set-aside blocks (should a set-aside be implemented). TELUS believes that if a set-aside eligible bidder is going to bid for open spectrum blocks, they must be prepared to deploy the spectrum. TELUS supports this proposal as one significant measure of deterring set-aside-eligible bidders from gaming bidding behaviour, as they would be forced to deploy (rather than resell) any open block spectrum won before the expiration of the proposed moratorium on transfer.

Q4—ISED is seeking comments on:
a) the use [of] anonymous bidding during the auction; and
b) the information that will be disclosed to bidders during the clock rounds, as described in annex A (which would also apply to the CCA with a modified activity rule set out in annex B) and annex C.

Anonymous Bidding

80. TELUS supports the proposal to use anonymous bidding in the clock rounds of the auction. TELUS concurs with the Department's rationale for proposing anonymous bidding as described in Paragraph 56 of the Consultation; in particular, that anonymous bidding would promote value-based bidding and reduce the potential for anti-competitive (gaming) behaviour in multi-round auction formats.

81. TELUS supports the use of anonymous bidding in assignment stage as well. The disclosure of specific bids following assignment rounds (whether in the Department's proposed auction design or in TELUS' preferred alternatives) could potentially lead to anti-competitive behaviour due to the sequential nature of assignment round bidding.

Clock Round Information Disclosure

82. TELUS supports the proposals for information disclosure during the clock rounds as described in Annex A of the consultation, in alignment with its support for the CCA format using the WARP-based activity rule.

83. TELUS notes that the same information is proposed for disclosure during the clock rounds for the CCA format using the GARP-based activity rule; while TELUS does not support the CCA format using the GARP-based activity rule, TELUS accepts that the proposed information disclosure is appropriate for the use of that format.

84. TELUS notes the additional information disclosure proposed for the ECCA format; specifically, the provision of estimates for a bidder's base price during the clock rounds and the aggregate demand in each service area after the final clock round. While TELUS does not support the ECCA format, TELUS understands the rationale for the proposed information disclosure in defining that format.

Q5—ISED is seeking comments on:
a) The advantages and disadvantages of the three auction formats being considered for the 600 MHz auction:
i. Combinatorial clock auction, using the WARP-based activity rule (annex A);
ii. Combinatorial clock auction, using the GARP-based activity rule (annex B);
iii. Enhanced combinatorial clock auction (annex C).
b) Where there is a preference for one of the options, respondents are asked to provide a rationale and explanation.

CCA using WARP-based activity rule

85. TELUS supports the use of the CCA format using the WARP-based activity rule (with exceptions for implementation of the assignment stage, as described in response to Question 6).

86. One advantage of applying the CCA format using the WARP-based activity rule is that this format has been tested and proven in the two previous Canadian CCA-format auctions for 700 MHz and 2500 MHz spectrum, with most potential bidders having some degree of familiarity with the format (given their participation in one or both of those auctions) or have means to access auction consultants who are experienced with the CCA format using the WARP-based activity rule.

87. TELUS notes that the WARP-based activity rule seems to be more forgiving of potential deviations of bidding from a strict valuation model. TELUS suggests that constraints on allowable bids should be based only upon actual explicit expressions of revealed preference (as under the WARP-based activity rule), rather than through being determined implicitly by inference based on a larger set of bids.

CCA using GARP-based activity rule

88. TELUS does not support the use of the CCA format using the GARP-based activity rule.

89. TELUS' rationale for rejecting the GARP-based activity rule is clearest when contrasted to its support for use of the WARP-based activity rule. None of the potential bidders in the 600 MHz auction has familiarity with the GARP-based activity rule; preparing for an auction with this change would seem to require reconsideration of the methodology applied

for bid construction and decision making. Tools available for bidders from their experience with previous auctions would need to be heavily modified or rebuilt to support the GARP-based activity rule.

90. Developing tools under the GARP-based activity rule seems quite challenging. In contrast to the WARP-based activity rule (which is already complex, but only requires the calculation of a minimum from a set of linear equations), TELUS understands that checking whether particular clock round packages or specific bid amount on supplementary round packages are permitted would require solving the feasibility of an increasingly large set of linear inequalities as the auction progresses in higher clock rounds. TELUS does not believe that these checks can be performed as closed-form solutions; rather, each check under the GARP-based activity rule would require the solution of a linear program. As such, TELUS believes that the implementation of bidding tools would be far more complex under the GARP-based activity rule, and could entail a reliance on the availability of the Department's auction system and tools.

ECCA

91. TELUS strongly opposes the use of the proposed ECCA format.

92. TELUS' rejection of the ECCA format is partially due to its preference for the WARP-based activity rule over the GARP-based activity rule (which the ECCA would adopt), as described above.

93. TELUS appreciates the attempt being made by the Department in proposing the ECCA format to reduce bidder pricing uncertainty through the provision of estimated discount at the end of each clock round. However, even with consideration of the benefits to price certainty that would come with discount estimates, TELUS would still strongly object to the use of the ECCA format due to its distortion of the Vickrey pricing mechanism.

94. TELUS supports the adoption of Vickrey (second price) mechanisms as the basis of price determination, as the opportunity cost of the spectrum being allocated serves as an appropriate balance between ensuring that Canadian taxpayers are compensated for a scarce public resource while not causing undue and excessive costs to providers who could

otherwise deploy capital for the delivery of innovative services to Canadian consumers. In order to appropriately reflect this opportunity cost, the Vickrey price calculations must be based on actual bids from competing bidders.

95. Under the ECCA format, the price determination mechanism does not determine a bidder's price based on what other bidders have actually bid; rather, the ECCA assumes a set of implied maximum valuations based on the historical clock round package bid patterns of other bidders. As such, the proposed ECCA format more closely resembles a first-price auction than a second-price auction as described in the Consultation. This pricing mechanism would seem to prioritise the generation of auction revenues over pricing based on market value (i.e., the opportunity cost of the spectrum). On this basis as well, TELUS' opposes the use of the ECCA format.

Q6—ISED is seeking comments on:
a) The proposal that winners of more than one block in a single service area be assigned contiguous blocks; and
b) The proposed structure of the assignment stage, including the order of the assignment rounds and the combination of service areas into a single assignment round.

Guarantee of Contiguity

96. TELUS supports the proposal that winners of more than one block in a single service area be assigned contiguous blocks.

97. Winners of multiple spectrum blocks will want to avoid intermodulation distortion, an adverse effect which occurs when multiple transmissions from a radio combine in such a way that creates self-interference[37]. The phenomenon can also be observed when combining blocks from different frequency bands through carrier aggregation, a transmission technique commonly employed to improve the utilisation of spectrum assets. Providing wireless services using blocks subject to intermodulation distortion entails the deployment of

[37] The conditions which lead to intermodulation distortion are different for each band, and depend on both the transmission bandwidths and the duplex gap for the band. In the 600 MHz band, intermodulation distortion occurs in many different scenarios when non-contiguous blocks are combined across the band.

multiple radios (i.e. physically separating the transmission of blocks subject to intermodulation distortion). When compared to higher frequency bands, 600 MHz antennas and integrated antenna-radio products are much larger[38] in size with consequential impact to the feasibility of deployment in the presence of intermodulation distortion.

98. TELUS strongly supports the efficient use of spectrum as a key driver of both economic and societal benefits in alignment with the policy objective of the *Spectrum Policy Framework for Canada* (SPFC) "to maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum resource". Maximising the contiguity of assignments and minimising or eliminating fragmentation represents efficient use of a scarce public resource and enables cost effective network deployments, especially in rural and remote areas where infrastructure investment is costly, which in turn ensures the timely delivery of innovative services to Canadian consumers.

Assignment Stage

99. TELUS does not support the proposed structure of the assignment stage. As proposed, the assignment stage guarantees the contiguity of a bidder's own spectrum winnings and allows a bidder to express preferences for the position of those contiguous winnings within the band. However, the proposal does not provide any consideration for the position of a winner's blocks relative to the blocks of other winners. There are a number of economic reasons for a provider to seek adjacency with others, as demonstrated by the recent patterns of holdings resulting from previous auctions and secondary market transactions in bands such as AWS-1 and BRS. For example, in its attempt to secure adjacency to Rogers in the BRS auction assignment stage, Videotron bid approximately six times more than the base price of its winning package.

100. In order to allow bidders to express valuations for their block preferences, both intrinsic and in relation to others, TELUS proposes two alternative mechanisms for the assignment stage of the auction.

[38] Ideal antenna size is determined by transmission wavelength, which is inversely proportional to carrier frequency. The lower the frequency, the larger the antenna size.

Option 1: Winner-Submitted Concrete Block Scenarios and Assignment Round Bidding

i. Rather than having each winner bid blindly on the position of its contiguous winnings, all winning bidders within a given service area grouping (as described below) would bid on a collection of scenarios that takes into account all possible outcomes proposed by the set of winning bidders.

ii. Before each assignment round corresponding to a given service area grouping, the names and number of generic licences for all winning bidders would be provided. Each interested assignment bidder would construct a set of concrete block scenarios (e.g., specific blocks for each winning bidder) on which it wishes to bid and would submit the set of scenarios to the Department. Scenarios which do not ensure the contiguity of any winner's blocks within the service area grouping would be prohibited. Ideally, this set of proposal-driven scenarios would be a smaller subset than the potentially exhaustive list of all permutations over all sets of winners.

iii. The Department would collate the list of unique proposed concrete block scenarios and publish the full list for assignment round bidding in a time-bound single bid set format. Non-interested winning bidders could opt out of participating (effectively bidding zero on all scenarios) and would be notified of their specific blocks as specified in the winning scenario resulting from the assignment round.

Option 2: Concrete Block Scenario Permutations and Assignment Round Bidding

i. In the event that the Department or other bidders expresses a strong exception to TELUS' proposed Option 1, TELUS suggests that an alternative mechanism to winner-submitted concrete block scenarios could be implemented wherein the Department would allow bidders to bid on a set of scenarios for each service area grouping listing all licensees' concrete block positions under all possible permutations. As in Option 1, this proposed assignment mechanism would require the disclosure of winners and the number of generic licences they have won within the service area grouping.

ii. The Department would publish the entire set of possible permutations for any given collection of winners (and their associated number of generic blocks) in an assignment round, so as to provide an unbiased set of options available to bidders for the expression of their relative valuations. For example, assuming five winners across the seven paired blocks, the highest number of permutations would come from an outcome where two of the bidders each win two generic blocks (20 MHz), and the remaining three each win a single 10 MHz block. In such a scenario, there are 120 possible winner permutations which is a manageable number of bids. Similarly, having four winners yields 24 permutations to bid on (and so on).

101. Under either of TELUS' two proposed mechanisms for assignment, TELUS supports the Department's proposal for order of the assignment rounds, service area group by service area group, in descending order of population. TELUS supports the grouping of service areas into a single assignment round when the winners and number of licences they have won are the same in the service areas being considered

102. TELUS support the use of a "nearest Vickrey" mechanism for price determination, which would calculate and reflect implied opportunity cost of all participant bids. Each bidder's price would be revealed to the round bidders following the close of that particular round.

103. If the Department is not willing to implement any of TELUS' proposals above to improve the assignment phase, then TELUS strongly recommends that the Department pre-assign the location of set-aside blocks at either at the top or the bottom of the band.

Q7—ISED is seeking comments on the proposed methodology for incrementing prices during the clock rounds, as described in annex A.

104. The proposed methodology for incrementing prices during the clock rounds fails to address the fundamental shortcoming of previous auctions with set asides, as gaming behaviour as seen in the AWS-1 auction remain fully available (see TELUS' detailed response to Question 1 and the supporting NERA analysis[16,18]). The new addition provided by the

proposed rules is ensuring that the set-aside is never more expensive than open spectrum in a given service area.

105. The proposed clock round pricing rules are incapable of mitigating gaming concerns. The proposed methodology for incrementing prices on set-aside blocks would have open spectrum prices tracking set-aside prices when a set-aside eligible bidder drives the set-aside product into excess demand. TELUS asserts that for the majority of service areas (over 90% of Canada), this price equalisation would be in appearance only. With few exceptions (e.g., Eastern Ontario and Northern Ontario), the likely set-aside-eligible bidders are regional providers with almost exclusively complementary mobile coverage footprints. When only one set-aside-eligible bidder is able to bid on the set-aside product in a given service area, the published clock round prices will not be a true reflection of the cost of spectrum (as the Vickrey price will be determined by the reserve bidder).

106. Such an issue would not be present in an open auction or under a 60 MHz sub-GHz broadband spectrum cap (with bidding on a single open product per service area). Nevertheless, TELUS proposes that if a set-aside is implemented, the invocation of the set-aside should only take place at a high price level (such as when the average price across the top eight service areas reaches $1.25 per MHz-pop), an approach implemented by the FCC which recognised that bidders did not need protection from foreclosure except at high price levels. If a set-aside is retained, this is a simple change to implement and it is entirely consistent with the rationale for a set-aside. In either case (sub-GHz spectrum cap instead of set-aside or price-triggered set-aside), ISED can reduce the opening bid levels to provide the price discovery phase missing from the auction (due to an attempt to ensure a modest price from regional providers for uncontested set-aside blocks).

107. If the Department addresses the concerns described above regarding gaming and price disparities through these proposals, then TELUS would support the Department's use of bid increments as proposed, in the range of 1% to 20% and in proportion to the aggregate demand of the product whose price is being incremented.

Q8—ISED is seeking comments on the proposed Affiliated and Associated Entities rules that would apply to bidders in the 600 MHz auction

108. TELUS supports the proposed Affiliated and Associated Entities rules that would apply to bidders in the 600 MHz auction.

109. TELUS notes that the wording and framework is unchanged from other recent auctions.

Q9—ISED is seeking comments on the proposed rules prohibiting collusion and other communication rules, which would apply to bidders in the upcoming 600 MHz auction.

110. TELUS supports the proposed rules prohibiting collusion and other communication rules, which would apply to bidders in the 600 MHz auction.

111. TELUS notes that the wording and framework is unchanged from other recent auctions.

Q10— ISED is seeking comments on its proposal to issue spectrum licences in the 600 MHz band with a 20-year licence term and the proposed wording of the condition of licence above.

112. TELUS supports the issuance of spectrum licences in the 600 MHz band with a 20-year licence term and supports the wording of the condition of licence as related to licence term.

113. Longer licence terms promote facilities-based competition and will provide licensees pursuing 5G network deployments with investment certainty, but must be coupled with aggressive build requirements to deter spectrum warehousing and speculation.

Q11— ISED is seeking comments on the proposals on the condition of licence related to transferability and divisibility, and the proposed wording above.

114. TELUS supports the proposed condition of licence related to transferability and divisibility.

115. As noted above in TELUS' response to Question 1D: If the Department insists on implementing a set-aside in spite of its shortcomings, TELUS supports the proposal to limit the transferability of set-aside spectrum for the first five years of the licence term. TELUS recommends the proposed five-year deployment requirements be assessed before the expiry of the prohibition on licence transfer to set-aside ineligible entities. By forcing deployment requirements to be met prior to transfer, the Department will help discourage speculation. TELUS is strongly opposed to permitting the transfer of any set-aside spectrum that has not been deployed. Licences failing to meet the deployment requirements should be revoked in part or in whole by the Department as detailed in TELUS' response to Question 12.

Q12— ISED is seeking comments on the proposed deployment condition of licence as stated above.

116. TELUS supports the proposed deployment condition of licence in its approach to applying increasingly stringent deployment requirements throughout the licence term.

117. TELUS does not believe that the proposed five-year Tier 2 requirements are sufficient. TELUS suggests that the Tier 2 requirements should at least match the Tier 2 requirements outlined in the AWS-1 Framework[39], as the 600 MHz band with its advantageous propagation characteristics should easily be able to achieve a similar footprint with fewer sites when compared to AWS-1.

118. Breaches of conditions of licence can be addressed by the Department through the Administrative Monetary Penalties (AMP) framework. TELUS suggests two additional

[39] *Policy Framework for the Auction for Spectrum Licences for Advanced Wireless Services and other Spectrum in the 2 GHz Range,* Canada Gazette DGTP-002-07, November 2007.

measures that would better encourage spectrum be put to good use by creating stronger incentives for infrastructure investment.

119. **Option 1 – Strict "use it or lose it":** A licensee failing to meet mid-term deployment requirements (Tier 2 at 5 years, Tier 3 at 10 years, Tier 4 at 20 years) would have all undeployed or underdeployed spectrum licences revoked.

120. **Option 2 – Tiered "use it or lose it":** A less strict approach could be applied upon the assessment of each mid-term deployment requirement:

i. If Tier 2 deployment requirements are not met at the 5-year mark, all spectrum corresponding to undeployed Tier 3 service areas would be revoked.

ii. If Tier 3 deployment requirements are not met at the 10-year mark, all spectrum corresponding to undeployed Tier 4 service areas would be revoked.

iii. If Tier 4 deployment requirements are not met at the 20-year mark, all undeployed spectrum in the Tier 4 service areas would be revoked. TELUS notes that the full assessment of deployment requirements will be addressed as part of the renewal consultation.

Q13— ISED is seeking comments on proposed conditions of licence outlined in annex G that would apply to licences issued through the proposed auction process for spectrum in the 600 MHz band.

121. TELUS supports the majority of the proposed conditions of licence outlined in Annex G of the Consultation, with the following exceptions consistent with TELUS' recent submissions to SLPB-002-17 and SLPB-003-17. TELUS strongly advocates that the Department eliminate the R&D COL. With respect to the mandatory roaming COL, TELUS proposes that the entire mandatory roaming framework requires reconsideration in totality. TELUS advocates for change to reduce the administrative burden of annual reporting.

Research and Development Condition of Licence

122. The research and development (R&D) condition of licence, included[40] in all or most mobile spectrum licences since 1991, has run its course and Bell, CWTA, Eastlink, Rogers, Québecor, SaskTel and Shaw have all recently called for its removal entirely along with TELUS.

123. TELUS calls upon the Department to remove the R&D COL altogether for all licensees. Such removal would enhance competitiveness as all licensees would be treated equally. TELUS also reiterates that removal of the R&D COL would not cause any negative effects in terms of licensee investment in wireless technology. Canada is a world leader in deployment of advanced wireless networks and capital intensity. Smartphone penetration is extremely strong and customers in Canada consume a massive amount of wireless data. Therefore, all licensees already have the competitive impetus to invest in new technology, network deployment and infrastructure upgrades.

124. TELUS highlights Bell's recent comments on this issue. Bell has noted a number of frailties with the R&D COL, including that it serves as a constraint on the operating flexibility of wireless licensees with limited, if any, evidence that it benefits Canadians, it treats licensees asymmetrically in that some licensees are not subject to the requirement and that spending that satisfies the R&D requirement might be better and more productively expended on other operating activities. As such, Bell called the R&D COL "both unnecessary and out-of-step with today's modern wireless industry."

125. In short, the widespread support for removal of this COL is based on ensuring a framework that places maximum reliance on market forces, consistent with the Department's spectrum policy. Rather than compliance with an artificial R&D spending requirement, licensees would make their investments based on the best means to serve customers in the competitive

[40] *Decisions on Conditions of Licence Regarding Research and Development and Learning Plans, (Canada Gazette SLPB-002-14),* February 2014. "In 1983, Cantel (now Rogers) made a commitment in its cellular licence application to purchase handsets from Canadian manufacturers only. This commitment was later modified to a requirement that 2% of the company's adjusted gross revenues be allocated to R&D with respect to mobile cellular technology and services. In 1991, a similar R&D condition of licence was applied to the regional telephone companies' five-year cellular special authorizations. This R&D condition of licence is currently incorporated in most long-term spectrum licences."

marketplace across the country, rather than forcing a portion of their capital investment to fall within the strict parameters of the R&D COL.

126. Finally, if the R&D COL was rescinded as TELUS recommends, the annual reporting COL would need to be amended to remove the necessity to report on R&D activities.

Mandatory Roaming for 5G Technologies Should Be for Out-of-Territory Regions Only

127. The current mandatory roaming COL is set out in CPC-2-0-17, and allows any licensee to have a right of roaming on any other licensee's network. The expansion of mandatory roaming in 2013 gave licensees roaming access rights both "in-territory" and "out-of-territory." The inclusion of in-territory roaming rights means that a licensee can obtain roaming in geographic areas where the licensee holds a licence.

128. The ostensible reason for allowing in-territory roaming rights is to afford a licensee network coverage as it deploys its own network. As such, in-territory roaming, especially in urban areas, should be viewed as a temporary measure. With the underlying policy of facilities-based competition, all licensees should build their networks throughout their licence areas, thereby ensuring optimal deployment of spectrum with customers being able to choose from different wireless network providers.

129. However, allowing licensees to obtain roaming for an unlimited period of time in-territory has resulted in some licensees choosing to rely on roaming rather than deploying their licenced spectrum, particularly in areas requiring heavy investments to match the coverage and performance of competing networks. This is a major issue when it comes to 5G technology in that this is a brand new wireless technology that must be built from scratch. No carrier, national or regional, holds an advantage in building out this technology. All carriers must build 5G networks in order to enable this technology.

130. In this light, there is simply no basis for allowing in-territory 5G roaming. To do so would allow some carriers to make decisions whereby they delay deployment or limit deployment to only certain areas in their geographic licence region. This leads to depressed or delayed construction of 5G facilities, low spectrum utilisation and denial of the benefits of new 5G networks and facilities-based competition for Canadians.

131. As a result, TELUS proposes that any 5G mandatory roaming for the 600 MHz band be only available for out-of-territory geographic areas. Doing so forces parties that participate in the auction to bid on licences where they will put the licences into use in a timely fashion, and enforces discipline on 600 MHz licensees in that they would be required to build out their 5G networks in their geographic areas as quickly as feasible, spurring network coverage across Canada. Licensees would still have the benefit of roaming on other 5G networks outside of their licence areas.

132. TELUS' proposal benefits network construction, motivates efficient and timely use of spectrum and benefits Canadians. Moreover, TELUS' proposal is consistent with the current mandatory roaming rule that limits roaming access only to the service available in the home network. Finally, by limiting mandatory roaming to out-of-territory roaming only, it ensures that roaming will only be used on an incidental basis – namely when a licensee's customer is outside of the licensee's network coverage area.

Mandatory In-Territory Roaming for Existing Technologies Should Only Be for Out-of-Footprint Areas

133. TELUS proposal above applies for 600 MHz licences that are used for 5G technology – it would not restrict existing mandatory roaming rights on 3G/4G networks. A licensee that uses 600 MHz for non-5G technologies, such as LTE, would obtain general mandatory roaming rights. However, as noted in TELUS' submission[41] in SLPB-003-17, TELUS has proposed a change to mandatory roaming for areas in-territory to avoid the potential of network arbitrage. Network arbitrage occurs when a carrier finds preferable economics in having their customers roam on another carrier's network rather than building out an expansion of their own network.

134. The application of stringent deployment requirements helps mitigate, though not eliminate, the risk of network arbitrage. As a means to mitigate this adverse outcome, TELUS proposes further rules for in-territory roaming that should apply for roaming on existing technologies. In particular, TELUS elaborates by differentiating the relationship between deployment requirements and mandatory roaming for both *out-of-footprint* (i.e., beyond a mobile

[41] *Consultation on a Licensing Framework for Residual Spectrum Licences in the 700 MHz, 2500 MHz, 2300 MHz, PCS and 1670 – 1675 MHz Bands*, Canada Gazette SLPB-003-17, July 2017.

network operator's claimed network coverage) and *in-footprint* (within their network coverage) scenarios.

135. In the out-of-footprint scenario, the presence of strict deployment requirements helps in mitigating opportunities for network arbitrage. Specifically, when deployment requirements are imposed, a spectrum licensee must provide some form of economic contribution towards facilities-based competition, either through direct investment in infrastructure that provides network facilities for expansion into previously unserved markets, or through the indirect support (via spectrum subordination) to a provider making the infrastructure investment in a surrogate role. While imposing deployment requirements does not completely eliminate arbitrage and pricing risks, in TELUS' view, the economic incentive to either build or subordinate helps in balancing an otherwise asymmetric position arising from the combination of mandatory out-of-footprint roaming and commercially negotiated rates subject to a mandatory dispute resolution mechanism.

136. On the other hand, in the in-footprint scenario, the introduction of strict deployment requirements is insufficient in addressing TELUS' concerns with mandatory roaming – an outcome which TELUS observes is taking place with alarmingly increasing frequency in urban and suburban settings. Here, network arbitrage is the result of a decision to "under-deploy" (i.e., fail to continue infilling the network and deploying indoor and small cell coverage) within an operator's network footprint, while choosing to rely on artificially depressed rates, which arise, as the near-certain outcome of commercial negotiation turning to arbitration.

137. In TELUS' view, the only way to close this loophole is to eliminate the requirement for providing in-footprint roaming. Elimination of such a requirement is primarily justified by the demise of circumstances that drove its adoption. While mandatory roaming was originally conceived as a facilitator for new entrants nine years ago, all new entrants are now well-established regional players and have the ability to obtain roaming by way of CRTC tariff, meaning that the Department's rules with respect to mandatory roaming are unnecessary for them. In addition, these rules were never intended for incumbents to exploit; TELUS does not believe that the consequent reduction in facilities-based competition was an intended outcome of the Department's original and modified rules.

General Reconsideration of Mandatory Roaming

138. Finally, and in any event, TELUS has asked for a general review and reconsideration of the mandatory roaming COL in totality. With the anticipated roll-out of new 5G technologies, the financial capability of well-capitalised regional providers and the existence of a CRTC mandatory roaming tariff, the need for the Department to impose a mandatory roaming COL should be put to in-depth review.

139. The wireless marketplace has changed dramatically since the introduction of the mandatory roaming COL, and all licensees should be subject to competitive market forces to determine how and to what extent they wish to build their network coverage. The mandatory roaming COL dramatically alters the competitive dynamic and could have the effect of delaying network construction by some licensees. As such, TELUS calls upon the Department to conduct a consultation to review CPC-2-0-17 to confirm to what extent it needs to be maintained in light of the current Canadian marketplace.

Annual Reporting Condition of Licence

140. With respect to the annual reporting COL, TELUS suggests that it be renamed the "Periodic Reporting" COL so as to give the Department the flexibility to both move to an ad hoc, as requested basis for periodic reporting and as deemed appropriate, reduce the level of reporting required at certain points in time versus others in a periodic reporting cycle.

Q14— ISED is seeking comments on the proposed opening bids as presented in table 1.

141. TELUS does not support the proposed opening bids as presented in Table 1 of the Consultation.

142. TELUS suggests that in general, highly competitive open auctions without set-asides do not require opening bids at high prices. Opening bids should be low enough so as to permit price discovery across a full range of potential bidder valuations. The competitive nature of

an open auction will in return ensure that market value is paid for all spectrum, thus guaranteeing an appropriate compensation to Canadian taxpayers.

143. The Department seems to recognise that this is not the case for set-aside spectrum. By selecting opening bids that reflect the outcome of the 700 MHz auction, the Department seems to be trying to set opening bids high enough such that the proposed 30 MHz of set-aside spectrum (that will almost certainly sell at or near the opening bid price) is not seen as being given away while shortchanging Canadian taxpayers.

144. The Department needs to decouple these objectives by either:

i. Abandoning the set-aside and holding either an open auction or an auction with band cap or an aggregate sub-GHz spectrum cap, or

ii. Making the set-aside conditional on clock round prices exceeding a certain threshold, as discussed in TELUS' response to Question 7.

145. Once the set-aside is abandoned or made conditional, the Department can focus on facilitating price discovery. In TELUS' view, these opening bid prices are too high for that purpose. The Department's proposed methodology for determining opening bid prices is based on the attribution of 700 MHz auction payments to service areas in proportion to the relative final clock prices. The proposed methodology and resulting prices do not account for the differences between the 600 MHz band today and the 700 MHz band at the time of the 2014 auction. The 600 MHz band provides more available spectrum for bidders and a single unified ecosystem (as compared to the bifurcation of the Upper and Lower 700 MHz band). Both of these factors could contribute to reducing bid contention on the open blocks, making it important to start price discovery from a lower opening bid.

146. Furthermore, with the U.S. 600 MHz auction only recently completed and a 39+ month television transition process just beginning, using the final prices from the 700 MHz auction as the basis for 600 MHz opening bids is inappropriate. In TELUS' view, the opening bid prices in this auction (once the set-aside is removed or made conditional) must be decreased in order to provide bidders with price discovery.

Q15— ISED is seeking comments on the proposed eligibility points for spectrum licences in the 600 MHz as outlined in table 2, and pre-auction deposits as outlined above.

147. In TELUS' response to Question 14, it suggests modifications to the opening bids (increasing them if the set-aside is retained and not made conditional, or lowering them if the set-aside is removed or made conditional). TELUS supports the methodology proposed for determining the eligibility points associated with each licence, but notes that the values may need to change if the relative prices of the opening bids are modified. Assigning a single eligibility point to the opening bid price associated with the lowest population service area is appropriate (i.e., 4-170 Yukon, sets the correspondence of $48,000 per eligibility point under the proposed opening bids), as is scaling the eligibility points according to each licence's opening bid value and rounding eligibility to the nearest ten points in all service areas with the exception of the North.

148. TELUS supports the deposit process proposed in the Consultation, with deposits proportional to the number of eligibility points on which each applicant wishes to be eligible to bid. The financial deposit should be scaled to the base price for a single eligibility point (the opening bid for the 4-170 Yukon licence) as described in the previous paragraph, so that the financial deposit for a given number of eligibility points closely approximates the opening bid for that level of eligibility.

Q16— ISED is seeking comments on the proposed renewal process for spectrum licences in the 600 MHz band.

149. TELUS supports the proposed renewal process for spectrum licences in the 600 MHz band.

End of document

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Spectrum Management and Telecommunications

EXPERT REPORT OF CHRISTIAN M. DIPPON, PhD
On Behalf of TELUS Communications Inc.

Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band

October 2, 2017

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Expert Report of Christian M. Dippon, PhD

I. QUALIFICATIONS

1. My name is Christian M. Dippon. I am an economist and Managing Director at NERA Economic Consulting (NERA) where I chair NERA's Global Energy, Environment, Communications, and Infrastructure (EECI) Practice. NERA provides expert economic and financial analysis for firms and government bodies on a wide variety of issues. Founded in 1961, NERA serves clients from more than 25 offices across North America, Europe, and Asia. My business address is 1255 23rd Street NW, Suite 600, Washington, DC 20037.

2. I hold a PhD in Economics from Curtin University (Perth, Australia), an MA in Economics from the University of California, and a BA with honors in Business Administration from California State University. I have specialized in telecommunications economics for over 21 years, especially in wireline, wireless, cable, and emerging technologies. I serve on the Board of Directors of the International Telecommunications Society (ITS), and I am a member of the Federal Communications Bar Association (FCBA), the American Bar Association (ABA), and the American Economics Association (AEA). I have authored and edited several books as well as book chapters in anthologies and have written numerous articles on telecommunications competition and strategies. I also frequently lecture in these areas at industry conferences, continuing education programs for lawyers, and universities. National and international newspapers and magazines, including the *Financial Times*, *Business Week*, *Forbes*, the *Chicago Tribune*, and the *Sydney Morning Herald*, have cited my work.

3. My experience in telecommunications and media includes assessing the competitive impact of mergers and acquisitions, the need (or lack thereof) for state and federal regulatory intervention and reform, the industry impact of competition policy, reviews of alleged anticompetitive conduct, the analysis of economic damages in complex business disputes, and the allocation of radio spectrum. I also have assessed the level of competition in the telecommunications sector of several countries and consulted on cases involving industry standards.

4. I have testified on telecommunication matters before the US Federal Communications Commission (FCC), the International Trade Commission (ITC), US federal and state courts, arbitration panels, international competition and regulatory authorities, and numerous US state regulatory commissions. In Canada, I have testified before the Ontario Superior Court of Justice; the Superior Court, Province of Quebec, District of Montreal; the Supreme Court of British Columbia, Vancouver Registry; and the Canadian Radio-television and Telecommunications Commission (CRTC).

5. Relevant to this consultation, I have published, lectured, and consulted on spectrum allocation methods, spectrum valuations, and non-facilities-based entry and its effects on competition. In particular, I have analyzed the impact of the set-aside licenses on bidding strategies and winning bid prices in the 2008 AWS auction.[1] I have also extensively studied and testified on the competitive forces in the Canadian wireless market. Appendix A of this report contains my curriculum vitae.

[1] See Christian Michael Dippon, "Regulatory Policy Goals and Spectrum Auction Design: Lessons from the Canadian AWS Auction," NERA Economic Consulting, March 20, 2009 (hereafter Dippon 2008 AWS Auction Report).

II. PURPOSE OF THE REPORT

6. This report was prepared at the request of TELUS Communications Co. (TELUS) in response to Innovation, Science and Economic Development (ISED) Canada's *Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band* (the Consultation).[2] TELUS has requested that I analyze the "pro-competitive measures" proposed by ISED.[3] Specifically, TELUS asked me to examine whether the current market structure necessitates such measures and whether the proposed measures stand to benefit Canadian consumers. TELUS also requested that I respond to ISED's questions Q1A–Q1D as it pertains to my area of expertise.

7. The structure of this report is as follows. Section III provides a summary of findings highlighting that the pro-competitive measures proposed by ISED are unjustified, economically unsound, and stand to harm not benefit Canadian consumers. Section IV provides a brief introduction and discusses the challenges of pro-competitive measures as part of an auction design. In Section V, I summarize and evaluate the outcome of other pro-competitive measures, explain that the Canadian market is competitive and thus disciplined by market forces, and address the market power claim that reportedly motivated the introduction of set-asides in the 600 MHz auction. Section VI describes the shortfalls in the eligibility criteria proposed by ISED. Section VII details the impact of set-asides on retail prices and quality of service. Section VIII examines whether the measures could solve the alleged market power problem. Section IX conducts a cost-benefit analysis. In Section X, I explain why bidder credits are a better tool to incentive

[2] Innovation, Science and Economic Development Canada, "Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band," SLPB-005-17, August 2017 (hereafter Consultation).
[3] Ibid., ¶¶ 16–32.

regional providers to invest. Section XI addresses the topics raised in Q1A–Q1D of ISED's Consultation. My conclusions and policy recommendations are in Section XII.

III. SUMMARY OF FINDINGS

8. Fundamentally, the evidence in this matter does not support the introduction of pro-competitive measures in the upcoming 600 MHz auction. The Canadian marketplace for wireless service is competitive. Facilities-based nationwide and regional providers compete for subscribers in a saturated market by employing the latest technology and offering ubiquitous nationwide coverage, thus yielding some of the world's highest long-term evolution (LTE) penetration rates. There is no evidence of market power, and ISED must weigh the 2014 claim by the Competition Bureau against the vast contemporaneous evidence demonstrating the opposite. Additionally, set-asides restrict spectrum supply to non-eligible providers and open these bidders up to fake bidding (instances where eligible providers drive up the spectrum costs for non-eligible bidders). Thus, set-asides are not simply superfluous but seriously harmful. On this finding alone, I recommend against the adoption of this proposed putatively pro-competitive measure.

9. At a minimum, the presence of actual harm from the proposed measures requires a careful cost-benefit analysis. On the cost side, non-eligible carriers face higher spectrum prices due to the restricted supply and the potential for fake bidding. Empirical evidence demonstrates that higher spectrum costs result in higher retail prices and lower service quality. Thus, set-asides are not cost-free. On the benefit side, the proposed measures will result in few, if any, consumer upsides. First, there is no evidence that lower spectrum prices to eligible carriers actually yield lower retail prices or a higher quality of service.

Second, and related, the proposed measures must be evaluated within the larger policy framework where ISED and the CRTC offered similar pro-competitive measures to the very same firms. ISED and the CRTC have introduced a myriad of similar measures, ranging from set-asides in previous auctions to mandatory cost-based roaming access. Given ISED's belief that additional pro-competitive measures are still needed implies that these previous measures, including set-asides, did not work. There is no reason to believe that repeating set-asides in the upcoming 600 MHz auction would make them any more effective.

10. Thus, weighing the real and verifiable costs of set-asides against the potential benefits clearly demonstrates that the proposal is not in the public interest and must therefore be rejected. ISED must examine (a) whether pro-competitive measures are required in light of the competitive marketplace, (b) why previous set-asides and other alleged pro-competitive measures remain ineffective, and (c) whether there are other measures that have more potential of benefiting Canadian consumers. In particular, I recommend that ISED consider bidder credits. Although they are capable of achieving the same objective as set-asides, bidder credits are direct, explicit, and transparent government subsidies and they do not have the disadvantages of set-asides in that they do not raise retail prices or decrease the quality of service.

11. My specific findings are as follows:

- There is strong contemporaneous evidence that the mobile wireless market in Canada is competitive.
- The entrants (or regional providers as newly defined by ISED) pursue geographic, niche market strategies and have no imminent interest in deploying their networks nationwide.

- Regional and other niche providers have been repeatedly incentivized to deploy national networks, and they have chosen not to do so. This is not the result of market failure but of strategic choices made by these providers. Regulators should not force a desired market outcome by picking winners.
- Set-asides or any pro-competitive measures must not jeopardize allocating the scarce spectrum to the party that values it most.
- The sole reason for ISED's proposal of pro-competitive measures is a 2014 fact-finding exercise that resulted in a belief (not a finding) that nationwide providers have market power. This belief is not supported by any analysis. Moreover, it is outdated and does not even closely follow international best practices in assessing market power.
- The eligibility requirements will benefit inefficient providers because there is no correlation between the ability to purchase spectrum and an operator's national market share. A more meaningful measure to qualify for preferential treatment is financial strength or lack thereof.
- The set-aside proposal will increase the nationwide providers' spectrum costs due to the artificial restriction of supply and the fake bidding because eligible bidders will bid on the open spectrum simply to drive up its cost for non-eligible bidders.
- Higher spectrum costs exert an upward pressure on retail prices. Although empirical evidence shows that retail prices in Canada are low relative to most of its peer countries, these prices could be even lower if Canadian providers faced lower spectrum prices.
- The set-aside proposal provides no measurable benefits to Canadian consumers as it simply equips eligible bidders with 600 MHz spectrum but does not seek to understand how the possession of 600 MHz spectrum licenses would resolve the alleged market power problem. There are many reasons why the set-aside proposal does not address the problem that ISED is attempting to resolve.

- With no measurable benefits but significant costs, the set-aside proposal is against the public interest.
- Although not needed, bidder credit programs are far superior to set-asides because they (a) provide the beneficiary with a competitive advantage, (b) minimize the costs imposed on Canadian consumers, and (c) are direct and explicit government subsidies.

12. With respect to Q1A–Q1D, I conclude the following.

- Q1A (which seeks general comments about ISED's set-aside proposal): Pro-competitive measures are not needed as the Canadian market is already competitive, and Canadian consumers directly benefit from providers vying for their business. Furthermore and notwithstanding, the specific set-aside proposal will hurt, not benefit, Canadian consumers as it will increase retail prices and decrease the quality of service while not promising them any more retail choices than they currently have. In short, the proposal is not necessary as it harms the very parties, Canadian consumers, which ISED attempts to protect.
- Q1B (which seeks comments about the specific set-aside proposal): Setting aside 30 MHz of spectrum (or any amount for that matter) for eligible bidders and allowing open bidding on the residual has known and serious drawbacks. There is clear evidence that this mechanism leads to wide abuses as eligible bidders increase spectrum costs for non-eligible bidders. ISED applied set-asides in the 2008 AWS auction and the 2015 AWS-3 sealed-bid auction and must be fully familiar with the drawbacks of this mechanism. If ISED seeks to minimize the harm done by the proposal, it must limit the set-aside amount to the smallest practical unit, which I understand is one block of 2x5 MHz spectrum.
- Q1C (which seeks comments on the proposed eligibility criteria): Although ISED is correct in focusing on facilities-based providers that are actively deploying services to Canadian consumers, the question omits the 10-percent market share criteria that ISED has put in place. There is no correlation between market share and the ability or willingness to pay for spectrum. As such, the eligibility criteria are severely flawed

because they benefit well-funded companies, in this case, established cable conglomerates and incumbent fixed line operators that simply *elect* not to expand their serving areas. Further, the ISED-proposed test to assess commercial intent falls far short of remedying this problem. I recommend that ISED consider applying bidder credits instead as these would remove the potential harmful effects of the set-aside proposal while giving financially weaker participants the opportunity to actively and successfully participate in the upcoming 600 MHz auction. Eligibility for these bidder credits, however, must be need-based and not tied to national market share or any other non-financial metric.

- Q1D (which seeks comments on the five-year prohibition of resale of set-aside spectrum): Although the proposed prohibition decreases (but does not eliminate) the incentive for eligible carriers to resell the spectrum at a profit, the blackout period does little to alleviate the harm to Canadian consumers. In fact, if the spectrum is not deployed in a timely and efficient manner to provide wireless services, then Canadian consumers are better off if the spectrum is resold promptly to a party that is willing to deploy it in this fashion. Given the enormous value of the 600 MHz spectrum to Canadian consumers, I recommend a shorter resale prohibition period rather than a longer period.

13. Therefore, I recommend that ISED refrain from implementing its set-aside proposal. If the Department deems it necessary to assist certain bidders in the auction, it should opt for direct government subsidies in the form of bidder credits. Although still not necessary and likely not beneficial to Canadian consumers, this mechanism eliminates the costs of ISED's present proposal as it leaves the nationwide providers largely unharmed.

IV. INTRODUCTION

A. Many Providers Serve Canada's Mobile Wireless Consumers

14. Both national and niche providers serve Canada's demand for mobile wireless services. The Canadian market consists of three national facilities-based mobile wireless providers, namely Bell Canada (through its mobile arm Bell Mobility), TELUS (through TELUS Mobility), and Rogers Communications. In addition, there are a number of established facilities-based regional mobile wireless providers, including SaskTel, Tbaytel, and Sogetel. The more recent regional mobile wireless providers include Freedom Mobile (formerly WIND Mobile, now owned by cable operator Shaw and referred herein as Shaw/Freedom), Bragg (Eastlink), and Quebecor (Quebecor/Videotron). All of these regional providers are affiliates of the cable incumbent in their respective serving territories.

15. With a nationwide subscriber market share of 33.8 percent, Rogers is the largest mobile wireless operator in Canada, followed by Bell with 28.9 percent and TELUS at 28.3 percent. Shaw/Freedom and Quebecor/Videotron serve 3.6 percent and 3.1 percent of the nationwide market, respectively.[4] It is important to note, however, that calculating nationwide market shares for regional providers is misleading. Many regional providers have a considerable presence in their home territories and do not intend to invest in facilities beyond these areas. Rather, they tailor their business cases to serving local communities and to segments of those local markets.

[4] TeleGeography, Canada, p. 52.

16. For instance, Sasktel is an incumbent telephone provider that has been serving Saskatchewan for close to 110 years. In 1989, the company added mobile wireless service to its serving area and currently covers some 99 percent of the province. It is clear that Sasktel does not intend to expand nationally or regionally. It plans to continue to serve the communities that it has been serving for the last century. With 615,900 mobile subscribers as of June 2017, Sasktel's regional subscriber market share is approximately 53 percent.[5]

17. Similarly, Quebecor/Videotron offers services in Quebec and Ottawa, covering some 90 percent of the province and the City of Ottawa. This provider offers prepaid and postpaid services, reporting 953,000 subscribers. With approximately 9.3 million people living in Quebecor/Videotron's serving area, this means that Quebecor/Videotron serves 10 percent of its target market segment.[6]

18. Shaw/Freedom, the largest of the regional providers, is active in British Columbia, Alberta, and Southern Ontario. The company seems to be following a high-density rollout plan, whereas new technologies are primarily deployed in urban areas. The company just recently completed a partial network upgrade, launching 4G LTE service in Toronto and Vancouver.[7] Analysts believe that the late and limited rollout will have a limited impact on competition.[8] Thus, Shaw/Freedom's limited nationwide market share is not the result of competition but the result of its deployment strategy. The company's network only

[5] Ibid., p. 54, 76. Population by province sourced from Statistics Canada.
[6] Ibid., p. 54. Population by province sourced from Statistics Canada.
[7] Ibid., pp. 72-74. "Meanwhile, 4G LTE infrastructure was deployed, resulting in the simultaneous commercial launch of LTE and LTE-Advanced (LTE-A) services in Toronto and Vancouver on 27 November 2016, based on AWS-3 band spectrum won in 2015."
[8] See Aleksandra Sagan, "Freedom Mobile faces uphill battle to compete with Big 3, industry experts say," *The Canadian Press*, Last Updated Nov. 27, 2016, http://www.cbc.ca/news/business/freedom-mobile-big-3-competition-1.3870110.

covers about 45 percent of the nation,[9] and it lags in upgrading its network to the most recent technology. Shaw/Freedom made this strategic choice because it was targeting the niche containing entry-level subscribers. Although there is nothing wrong with such a strategy, it is not the result of *competition* but of *choice*. It is also not a requirement to provide the latest technology as entry-level mobile wireless consumers are often content with basic service options.

19. More important, the company does not view the current competitive landscape as an impediment to build out its network, noting "Shaw is well positioned to become a fourth major player in the markets it services as it's bound to attract individual customers, as well as small and mid-size business looking for less expensive, high-speed plans…."[10] Shaw/Freedom also states that it plans to acquire additional spectrum in the upcoming auction with no mention that financial backing would be an impediment.[11]

20. Shaw repeatedly assures its investors that its deployment plans are not hindered by the lack of spectrum. For instance, in a June 2016 investor call, Shaw states that it has a "decent advanced spectrum position."[12] With respect to 700 MHz, Shaw assesses it holdings as being in "good shape"[13] and adds that given its strong holdings in 700 MHz, "the 600 megahertz addition to that is a relatively small addition."[14] The company does

[9] Telegeography, Canada, p. 42.
[10] Aleksandra Sagan, "Freedom Mobile faces uphill battle to compete with Big 3, industry experts say," *The Canadian Press*, Last Updated Nov. 27, 2016, http://www.cbc.ca/news/business/freedom-mobile-big-3-competition-1.3870110.
[11] Ibid.
[12] TD Securities Telecom & Media Forum, Shaw Communications, Management Discussion Section, June 14, 2017, p. 2.
[13] Ibid, p. 3.
[14] Ibid.

not seem to have to rely on set-asides as it is "prepared to pay a fair price whatever the fair price is…."[15]

21. Thus, Canadian consumers have a wide choice of mobile wireless providers, ranging from ones that offer nationwide ubiquitous networks with the latest technology to small regional but powerful vertically integrated carriers and cable providers that focus on offering low-cost service options. Putting them all in one bucket and incorrectly calculating market shares assumes that they all have the same strategy.

B. Auction Designs Must Balance Allocation and Competition Objectives

22. Mobile wireless communication requires spectrum. However, the amount of spectrum available for mobile wireless networks is limited. Adding to this the increasing demand for network capacity and the exclusive-use requirement of spectrum (that is, a particular spectrum license can only be allocated to one network) creates a significant shortage situation. To remedy the resulting scarcity problem, governments typically resort to an auction mechanism in allocating spectrum licenses. It is commonly accepted that market forces in a properly designed spectrum auction result in the most efficient use of the spectrum, thereby maximizing consumer benefits.

23. Canada has been using spectrum auctions for a long time to allocate spectrum to those that value it most highly. In 1999, it auctioned spectrum licenses for broadband wireless access (BWA), which was followed in 2001 by the PCS – 2 GHz auction.[16] The principle that one should allocate something to the entity that values it the most (irrespective of

[15] Ibid.

[16] Government of Canada, Spectrum Auctions, accessed September 28, 2017, http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf01714.html.

what they might have to pay for it) is an important aspect of economic efficiency. If Entity A is willing to pay more for something than Entity B, then Entity A is more likely to put it to its most efficient use.

24. The agency in charge of allocating the scarce spectrum, ISED in Canada, must carefully design the auctions to ensure that the winners are those that value the spectrum the most. Although the highest bidder usually values the spectrum the most, regulators are cognizant that this might not necessarily be beneficial for competition. Consider, for instance, a market with a single mobile wireless provider. It is usually the case that the single provider will value the spectrum more than any other party will. This, however, does not mean that the regulator will allocate the spectrum to that particular provider as it also considers the retail ramifications of a monopoly market.

25. To balance the objectives of the most efficient allocation and the maintenance of a competitive market, the regulator must consider whether pro-competitive measures are necessary. Any chosen measures, however, must solve a particular problem in the market (e.g., the inability to enter the market), ensure that they apply to the right set of bidders, and ultimately benefit consumers by generating more benefits than potential harms.

26. As part of its 600 MHz auction design, ISED proposes the use of pro-competitive measures, set-asides in particular. The Department justifies its proposal based on a 2014 study prepared for the Competition Bureau that found the presence of market power in the Canadian mobile wireless market.[17] Market power is the ability to raise prices above competitive levels. Allegedly, the nationwide providers (Rogers, Bell, and TELUS) each

[17] The Brattle Group, "Canadian Wireless Market Performance and the Potential Effect of an Additional Nationwide Carrier," prepared for Competition Bureau Government of Canada, (May 12, 2014).

possess market power. Although I address this mistaken claim below, under this theory, the nationwide providers find spectrum more valuable than other parties do because it provides them with continued market power, ergo the ability to charge supracompetitive prices. This, in turn, would prevent entrants from expanding their networks due to a lack of spectrum.

27. To thwart such an outcome, ISED has proposed to incorporate set-aside spectrum. The theory of set-asides is to reserve a portion of the spectrum being auctioned for those that do not possess market power. Specifically, ISED proposes to reserve 30 MHz of the 70 MHz in the 600 MHz band to so-called eligible providers. All eligible bidders are free to bid on 70 MHz of the spectrum being auctioned. Non-eligible bidders are only allowed to bid on the non-reserved 40 MHz.

28. ISED's set-aside proposal is not new. A version of set-asides was previously used in Canada for the 2008 AWS auction and the 2015 AWS-3 sealed-bid auction. ISED has also employed different purported pro-competitive measures in other auctions. Specifically, the Department used spectrum caps (which limit the total amount of spectrum that a bidder can possess in a particular band) in the 2014 700 MHz and 2500 MHz auctions.

29. Before evaluating the specific ISED proposal for this auction, it is important that one first consider the need, or lack thereof, of pro-competitive measures. Because any such measures will necessarily distort the outcome of the auction, the Department must ensure that (a) such measures are necessary, (b) the market is not competitive, and (c) the measures are in the public interest by generating more consumer benefits than harms. I discuss each of these topics in the next section.

V. PRO-COMPETITIVE MEASURES ARE NOT NECESSARY

A. Niche Providers Ignored Previous Incentives to Expand Their Networks

30. Rogers and Bell launched their mobile wireless services in 1985, shortly after the commercialization of wireless handsets. Sasktel followed in 1989 after the company (which has been serving Saskatchewan since 1908 as the incumbent fixed-line provider) introduced mobile wireless service in Sasktel's serving area. TELUS was established in 1990 through the privatization efforts of a Crown Corporation, a state-owned enterprise, and the merger of the resulting holding company and BCTel in 1999.[18]

31. In an attempt to entice further competitive entry, ISED introduced set-asides in its 2008 AWS auction where the Department reserved 40 MHz out of 105 MHz for potential new entrants. The then Minister of Industry, the Honorable Jim Prentice, described Canada's first use of set-asides:

> "We are looking for greater competition in the market and further innovation in the industry. At the end of the day, our goals are lower prices, better service and more choice for consumers and business," said Minister Prentice. "That is why we are setting aside a portion of radio spectrum exclusively for new entrants into the wireless market."[19]

32. The Minister's stated objective was presumably met as following the auction Shaw/Freedom (formerly WIND), Quebecor/Videotron, Public Mobile, Eastlink, and Mobilicity entered the market as new facilities-based mobile wireless providers. Labeled as "entrants," each of them pursued a different market strategy, focusing on different

[18] TELUS, About TELUS – Company history, available at https://about.telus.com/community/english/news_centre/company_overview/company_history (accessed September 28, 2017).

[19] Government of Canada, "Government Opts for More Competition in the Wireless Sector," *News Release*, November 28, 2007, https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10021.html.

geographic areas and usually on specific segments within their respective areas. This is a natural outcome and is reflective of an already competitive marketplace in which entrants seek out specific niches around which they build their respective business cases.

33. A regulator's task is to ensure the proper working of market forces. With the entry of these new companies, the regulator's job was arguably done. Regulators are not supposed to pick winners and losers. Nevertheless, ISED and the CRTC provided entrants with a myriad of additional financial incentives to expand their networks nationally and even regionally, some of which are listed below.

- As part of acquiring a 2008 AWS license, ISED (formerly Industry Canada) required all nationwide mobile wireless providers to make roaming available inside the entrants' respective license areas "at commercial rates for a period of 5 years while the licensee builds out its network" and for at least 10 years outside the entrants' license areas.[20] This measure allowed entrants to delay significant capital expenditures by giving them access to the nationwide providers' networks.
- In 2013, Industry Canada amended the mandatory roaming condition and extended it to cover the entire duration of the license.[21] This measure allowed entrants to postpone their facilities-based rollout indefinitely.
- In the 2014 700 MHz auction, ISED capped the amount of spectrum that any particular party could hold in an effort to further encourage competitive entry and the expansion of regional providers.[22]

[20] Industry Canada, "Policy Framework for the Auction for Spectrum Licences for Advanced Wireless Services and other Spectrum in the 2 GHz Range," November 2007, p. 8, https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/awspolicy-e.pdf/$FILE/awspolicy-e.pdf.

[21] For example, unlike Industry Canada's "Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements," CPC-2-0-17, Issue 1, November 2008, its "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, contained no time limitations.

[22] See Industry Canada, Licensing Framework for Mobile Broadband Services (MBS) – 700 MHz Band, DGSA-001-13, March 2013, ¶ 8.

- In 2014, the Canadian Parliament amended the *Telecommunications Act of 1993* to temporarily cap wholesale domestic roaming rates at average retail prices. The cap substantially decreased domestic wholesale roaming rates for entrants providing further cost savings.[23]
- In the 2015 2500 MHz auction, ISED capped the amount of spectrum that any particular party could hold, thereby reducing the demand for said spectrum, which created an effective set-aside for regional providers.[24]
- In 2015, the CRTC required that wholesale domestic roaming rates between nationwide providers and entrants (now referred to as regional providers) be set based on cost-based tariffs rather than commercial negotiations.[25] This significant regulatory intervention entitles entrants to access the nationwide providers' networks at cost for the duration of their spectrum licenses.
- In 2015, the CRTC decided that entrants could resell regulated roaming rates to mobile virtual network operators (MVNOs) that are enabled on the entrants' networks. This allowed entrants to resell a nationwide provider's roaming services to third parties, giving them additional revenue sources.[26]
- In June 2017, ISED issued a Notice of Consultation proposing that mandatory roaming over the life of the license would be continued in future license terms.[27] If adopted, this measure would significantly lower the entrants' capital investment requirements.
- In August 2017, the Governor in Council requested that the CRTC reconsider its definition of a home network to include Wi-Fi as an alternative means of

[23] CRTC, Commission Letter Re: Wholesale Domestic Wireless Roaming caps implementation (July 28, 2014).

[24] See Industry Canada, "Licensing Framework for Broadband Radio Service (BRS) — 2500 MHz Band," January 2014, ¶248.

[25] See Canadian Radio-television and Telecommunications Commission, Telecom Regulatory Policy CRTC 2015-177, Regulatory framework for wholesale mobile wireless services, May 5, 2015, ¶ 139.

[26] Ibid., ¶ 167.

[27] See ISED, "Consultation on a Licence Renewal Process for Advanced Wireless Services and other Spectrum," SLPB-002-17, June 2017, Annex A ¶ 23.

connectivity.[28] The CRTC subsequently issued a Notice of Consultation. If adopted, this would mean that providers with no mobile wireless network would be entitled to mandatory cost-based roaming access.

34. I note that these incentives are in direct conflict with each other as some purportedly encourage facilities-based entry while others open wholesale markets with cost-based pricing, thereby offering network capacity at costs far below the cost of self-provisioning. For instance, set-asides supposedly are to encourage facilities-based entry. However, the CRTC's measure to provide mandatory cost-based roaming access throughout the duration of a spectrum license directly undermines this objective. It provides mobile wireless providers with a strong incentive to "rent" as "buying" (e.g., facilities-based expansion) becomes far more expensive.

35. In light of these numerous and significant pro-competitive measures, set-asides in the 600 MHz auction are not needed. The regional providers have been afforded numerous incentives to expand their networks regionally or nationally, more so than in any other country. Adding yet another measure to the list will not "encourage investment and improve services provided by …newer…carriers."[29] It has become increasingly clear that the entrants do not want to expand their facilities beyond their current footprints. Rather, they seek ways to expand nationally and regionally based on inexpensive access to the network of the national facilities-based providers that have invested billions in the Canadian economy. As long as the rent-buy signal is distorted (wherein renting is much cheaper than buying), the desired facilities-based network expansion will not materialize.

[28] See Before the Canadian Radio-television and Telecommunications Commission, Reconsideration of Telecom Decision 2017-56 regarding final terms and conditions for wholesale mobile wireless roaming service Telecom Notice of Consultation CRTC 2017-259 (July 20, 2017).

[29] Consultation, ¶ 7.

36. ISED's justification of pro-competitive measures is a single statement by the Competition Bureau about the presence of market power. As I discuss below, the vintage of this statement (from 2014), the simplicity of the Bureau's analysis, and the vast evidence showing a competitive retail market refute this alleged competition problem. The lack of facilities-based investment by regional providers is not the result of the alleged market failure or any anticompetitive conduct by the nationwide providers. Rather, it is the result of the competitive market, wherein entrants *elect* a strategy that maximizes their return. At present, these strategies do not include expanding into rural communities within the providers' regions or investing in facilities to build a ubiquitous nationwide network. There is nothing inherently wrong with such strategy. The market is working properly and the operators elect their strategies accordingly. It would be incorrect and even harmful if the Department attempted to alter this competitive outcome. As found by Sidak and Spulber, the regulatory objective must be one of impartiality:

> Regulatory commissions cannot "pick winners" in terms of technology, products and services, individual companies, or market institutions. Regulators can achieve the benefits of competition only by refraining from market interventions that favor particular competitors, by avoiding attempts to manage competitive outcomes, and by dismantling regulation if demonstrably competitive alternatives exist.[30]

37. This statement is valuable for the present consultation as the Canadian mobile wireless market is competitive and it appears that ISED is seeking "to manage competitive outcomes" by insisting on facilities-based expansion in all regions despite having given the entrants more than sufficient incentive to expand their infrastructures.

[30] J. Gregory Sidak and Daniel E. Spulber, "Deregulation and Managed Competition in Network Industries," *Yale Journal on Regulation* 15, Issue 1, 1998, p. 119, http://digitalcommons.law.yale.edu/cgi/viewcontent.cgi?article=1457&context=yjreg.

B. Contemporaneous Market Evidence Shows No Market Power

38. There is strong evidence that the mobile wireless market in Canada is competitive. The most compelling evidence comes from the work by my colleague, Dr. Jeffrey Eisenach, who closely analyzed competition in the market and found, among others things the following results.

> – Canadian deployment of 4G LTE networks occurred at a much faster pace than in the EU and remains higher today: 97 percent of the Canadian population has access to 4G LTE networks, compared with 93 percent in the EU;
>
> – In part as a result of this superior coverage, Canadians are nearly twice as likely as Europeans (62 percent vs. 34 percent) to connect to mobile wireless networks over LTE networks;
>
> – Canadian LTE networks deliver some of the fastest average connection speeds in the world – smartphone connection speeds average over 24 Mbps, compared with 20 Mbps in France, 18 Mbps in the UK and 17 Mbps in the US;
>
> – Canadians are much more likely tha[n] Europeans to own smartphones (75 percent to 63 percent);
>
> – Canadians average 2.2 GB/month in data usage compared with 1.3 GB/month in the EU.[31]

39. Dr. Eisenach also finds:

> The strong relative performance of the Canadian mobile wireless market is even more impressive when viewed in the context of cost-factors which place Canada at a distinct disadvantage. These factors include Canada's extremely low population density, the relatively small size of Canadian mobile operators (and resulting lack of economies of scale), and high

[31] Before the Canadian Radio-television and Telecommunications Commission, CRTC 2017-259, Reconsideration of Telecom Decision 2017-56 Regarding Final Terms and Conditions for Wholesale Mobile Wireless Roaming Service, "Expert Report of Jeffrey A. Eisenach, Ph.D. On Behalf of TELUS Communications Company," September 8, 2017, ¶ 8 (hereafter Eisenach Report).

> government-imposed costs. In particular, Canadian operators pay among some of the highest prices in the world for spectrum licenses.[32]

40. Critically, we cannot infer the existence of market power from high consumer prices alone. As Dr. Eisenach points out, inferences drawn from Canada's higher prices for service might fail to take into account the high costs of covering Canada's population (particularly the diseconomy of scale that Canada's relatively sparse population causes) and the quality of service provided.[33]

41. High spectrum prices further contribute to high network deployment costs. My analysis of the 2008 AWS auction revealed, "the overall auction revenue exceeded the average predicted value by an average of 138 percent with unrestricted and restricted licenses commanding an average premium of 174 and 94 percent, respectively, over comparable licenses."[34] As the 2008 AWS auction design was materially identical to other spectrum auctions with the exception of the set-asides, I concluded, "the valuation premium observed in Canada is at least partially, if not fully, the result of the specific design used for the Canadian AWS auction."[35] Thus, set-asides are partially to blame for the high costs of deploying a network in Canada. In fact, I warned, "if the Canadian AWS auction design was responsible for the extremely high prices of the spectrum licenses, it could harm the very policy objectives that Industry Canada strives to achieve if the same auction design were to be used for future Canadian spectrum auctions."[36] Ironically, an

[32] Ibid.
[33] Ibid., ¶ 9.
[34] Dippon 2008 AWS Auction Report, p. 2.
[35] Ibid, 3.
[36] Ibid.

inference of market power is being partly derived from a measure intended to reduce market power.

42. Dr. Eisenach's results were confirmed by Wall Communications that examined affordability in the Canadian mobile wireless market and concluded, "mobile wireless services are available to Canadians, and to low income Canadians in particular, at affordable prices."[37]

C. The Competition Bureau's Claim of Market Power Is Outdated

43. The purported rationale for ISED's proposed pro-competitive measures is a finding by the Competition Bureau that "incumbent service providers have market power in the provision of retail mobile wireless services."[38] A closer look at the Competition Bureau's findings reveals that the determination was based on a CRTC 2014 "fact finding exercise" on "concerns with respect to the rates, terms, and conditions associated with wireless roaming."[39] This exercise focused exclusively on domestic roaming, that is, whether nationwide providers could exercise market power when providing mandatory access to roaming. The Competition Bureau views that, "incumbent service providers have retail market power, and therefore have an incentive to enact strategies to protect their market power by ensuring that entrants are not, and do not become, fully effective

[37] Before the Canadian Radio-television and Telecommunications Commission, CRTC 2017-259, Reconsideration of Telecom Decision 2017-56 Regarding Final Terms and Conditions for Wholesale Mobile Wireless Roaming Service, Appendix 1, "Wall Communications. On Behalf of Bell Canada: A Research Report Examining Affordability in the Canadian Mobile Wireless Market" September 5, 2017, p. 1.

[38] Consultation, ¶ 22.

[39] Canada Competition Bureau, "Submission by the Commissioner of Competition before the Canadian Radio-television and Telecommunications Commission—Telecom Notice of Consultation CRTC 2013-685—Wholesale mobile wireless roaming in Canada—Unjust discrimination/undue preference," January 29, 2014, ¶ 1, http://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/03648.html.

competitors."[40] There are several problems with the Competition Bureau's view, particularly in light of its critical importance in the present proceeding.

44. First, there apparently is no study underlying the Competition Bureau's conclusion of market power. Rather, the Competition Bureau's belief is based on two simple observations: (a) "high concentration," and (b) "very high barriers to entry and expansion."[41] The Competition Bureau's "view," which is based on information from 2013, does not qualify as a relevant study.[42] ISED should not make a decision to introduce pro-competitive measures based on an outdated "view."

45. A conclusion of market power requires a thorough analysis. For instance, the European Commission (EC) has published specific "guidelines on market analysis and the assessment of significant market power … for electronic communications networks and services."[43] Specifically, in determining whether market power exists, the EC directs the national regulatory agencies (NRA) to define the relevant economic market, which the EC deems "of fundamental importance since effective competition can only be assessed by reference to the market thus defined."[44] Once the market is defined, the EC directs NRAs to assess market power within the defined market. The EC stresses, "the existence of a dominant position cannot be established on the sole basis of large market shares."[45] The EC directs NRAs to "undertake a thorough and overall analysis of the economic

[40] Ibid., ¶ 6.
[41] Ibid., ¶ 9.
[42] Ibid.
[43] "Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services" (2002/C 165/03), *Official Journal of the European Communities*, 11.7.2002, C165/6, http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52002XC0711(02)&from=EN.
[44] Ibid., ¶ 34.
[45] Ibid., ¶ 78.

characteristics of the relevant market before coming to a conclusion as to the existence of significant market power."[46] Factors that NRAs are to consider include:

- product/service diversification (e.g. bundled products or services),
- economies of scale,
- economies of scope,
- vertical integration,
- a highly developed distribution and sales network,
- absence of potential competition,
- barriers to expansion.[47]

The Competition Bureau used only two of the requisite criteria for its determination of market power.

46. Additionally, Dr. Eisenach found, "the Canadian market is among the least concentrated in the world, as measured by the Herfindahl-Hirschman Index (HHI), and that concentration is declining."[48]

47. Second, the Competition Bureau's belief, which is based on a 2013 query by the CRTC, does not encompass all of the numerous pro-competitive measures listed above. More important, it was made before the CRTC introduced cost-based domestic wholesale roaming rates. The Competition Bureau's concern was with domestic wholesale roaming rates—it believed that the nationwide providers' retail market power would allow them to charge excessive roaming rates to entrants that, in turn, would not be able to compete with national plans. This concern, even assuming it was justified, no longer applies as the

[46] Ibid.
[47] Ibid.
[48] Eisenach Report, ¶ 8.

CRTC has opted to regulate the rates in question. As stated previously, the claim also ignores the many other pro-competitive measures implemented by ISED, the CRTC, and the Canadian government.

48. Third, the fact that a more recent study or even statement does not seem to exist strongly suggests that the statement is no longer applicable (if it ever was). The lack of a proper study or any study at all, the outdated vintage of the statement, and the fact there is no recent evidence that corroborates the Competition Bureau's belief can only lead to one conclusion: the statement must be ignored. At a minimum, it cannot be used as the single source to assess the need, or lack thereof, of pro-competitive measures in the upcoming 600 MHz auction. In lieu, ISED should consider the evidence by Dr. Eisenach and Wall Communications that shows market forces are working properly in Canada's mobile wireless market.

VI. THE ELIGIBILITY CRITERIA WOULD BENEFIT THE WRONG PROVIDERS

49. Ignoring my belief that pro-competitive measures, particularly set-asides, are not needed because of the many other pro-competitive measures already in place and the fact that the market is competitive, I examined ISED's specific proposal. I commenced with the proposed eligibility criteria by which ISED proposes to determine which bidders can bid on the set-aside spectrum.

50. ISED's proposal contains a first screen whereas "national incumbent service providers" would not be entitled to bid on the set-aside spectrum. ISED proposes to define such

providers as "companies with 10% or more national wireless subscriber market share."[49] ISED labels the remaining providers as "regional service providers" and proposes to classify a sub-set of these providers as "eligible bidders" if they are registered as facilities-based providers and can demonstrate that they "are actively providing commercial telecommunication services to the general public in the licence area of interest…."[50]

A. Market Share Is Not Correlated with the Ability to Pay

51. The first screen eliminates all nationwide providers from bidding on set-aside spectrum as they all exceed the 10-percent national market-share threshold. This leaves only non-nationwide providers as potential bidders *irrespective of whether they have aspirations of deploying a nationwide network.* For instance, Sasktel, a provider that has been in the mobile business almost as long as Rogers, Bell, and TELUS, would pass this first screen. Similarly, Quebecor/Videotron that focuses exclusively on Quebec and the city of Ottawa would also pass. This is counterintuitive as these and other providers do not plan to invest in a nationwide network or expand significantly beyond their current footprints. By enticing them with discounted spectrum, ISED is not addressing a market power problem but is picking winners and losers.

52. It is encouraging to see that ISED proposes a second screen that addresses at least some of these problems. However, the criteria to assess "the active provision of commercial telecommunications services" are far too vague and easy to pass.[51] Practically, this

[49] Consultation, ¶ 28.
[50] Ibid., ¶¶ 28–29.
[51] Ibid., ¶ 31.

additional test will not screen out any further bidders. This, in turn, implies that eligibility will focus only on the flawed 10-percent nationwide market share threshold, which will eliminate Rogers, Bell, and TELUS but not eliminate other equally, if not more, regionally powerful cable companies and regional mobile wireless providers – many of which have markets shares in their regions above 10 percent and as high as 53 percent (Sasktel).

53. More important, the ability to pay, however, is unrelated to nationwide market share because market share is (a) not indicative of financial strength and (b) misleading as it ignores strategic focus and vertical integration. For instance, because Quebecor/Videotron focuses solely on a regional market, market share does not provide any information about its ability to participate in the auction. Similarly, Shaw/Freedom is a large vertically integrated company (i.e., a large telecommunications providers offering several types of communication services), and just because it has not yet rolled out mobile wireless services to all of its cable subscribers does not mean that it needs financial help to do so.

B. Niche Providers Are Not Financially Disadvantaged

54. By reserving a significant portion of the 600 MHz for eligible bidders, ISED ensures that these bidders receive the same spectrum at a lower price. As I found in my analysis of the 2008 AWS spectrum auction, the winning bid for set-aside spectrum was significantly lower than the winning bid for the equivalent non-set-aside spectrum. Thus, in essence, a set-aside is a form of discount that supposedly captures the premium that the national service providers are willing to pay in order to maintain their alleged retail market power.

This presumes that the national providers earn a higher profit per subscriber than the regional providers do and therefore have the ability to outbid the allegedly weaker regional providers. The correctness of this assumption can be tested empirically.

55. In Table 1, I compare the profit levels per subscriber for the potential bidders. Specifically, I divide the most recent data on net income, plus taxes, depreciation, and amortization by the number of subscribers.

Table 1. EBITDA per Subscriber by Company in 1Q17

Company	Type	Population in Territory (Millions)	1Q17 LTM EBITDA ($ Million)	Financial Strength Index
(1)	(2)	(3)	(4)	(5) (4) / (3)
Quebecor	Regional	9.1	$ 1,431	$ 157
Eastlink	Regional	3.1	Private	N/A
Shaw	National	20.0	$ 2,102	$ 105
Rogers	National	33.5	$ 5,157	$ 154
Bell	National	33.5	$ 8,839	$ 264
TELUS	National	33.5	$ 4,785	$ 143

Source: Company 2017 financial reports. Excludes restricting and other costs.

56. The results of this calculation reveal that the 10-percent nationwide market-share threshold is a poor metric to determine eligibility as the financial index does not indicate that regional providers are financially disadvantaged. For instance, the financial strength index for Quebecor/Videotron is at $157, which is higher than Rogers and TELUS. Nevertheless, under the proposal, Quebecor/Videotron would qualify as an eligible bidder. Examining the profits for the three nationwide providers also does not indicate the presence of a market power problem, particularly in light of Dr. Eisenach's work.[52]

[52] See Eisenach Report.

57. Thus, if implemented, the set-asides could benefit financially stronger companies than some that the rules will not permit to bid on the reserve spectrum. It would also benefit those that have no plans to expand their networks nationally or even regionally. The eligibility criteria are overly vague to the point that they are meaningless. I thus recommend against their adoption.

58. In lieu of ISED's proposal with respect to eligibility, I recommend that ISED consider a needs-based funding mechanism wherein startup companies, which might not be able to secure the proper loans, be provided with a bidder credit. A bidder credit is a direct subsidy that entitles the eligible bidder to pay only a fraction of the winning bid.

59. More important, a bidder credit benefits only those providers that have a demonstrable need for the subsidy and thereby excludes vertically integrated competitors that might have a small market share in the mobile wireless market segment but are significant players in neighboring markets and the Internet ecosystem in general. For instance, Shaw/Freedom and Quebecor/Videotron are affiliates of incumbent cable conglomerates that do not require preferential treatment at the expense of the Canadian consumer. Bragg is also vertically integrated in the markets it serves. Similarly, Sasktel is also not a start-up in need of preferential treatment as it is the incumbent fixed-line provider in Saskatchewan and has been for over 100 years.

VII. THE PROPOSED MEASURES WILL INCREASE RETAIL PRICES AND DECREASE QUALITY OF SERVICE

60. In this section, I examine the economic ramifications of implementing ISED's proposal. At best, the measures are superfluous. However, as this section demonstrates, the

proposed measures could inflict serious harm on the Canadian mobile wireless market, Canadian consumers in particular.

61. I commence my analysis by examining the impact of set-asides on the spectrum costs paid by non-eligible bidders, that is, the nationwide providers. In the next section, I examine the potential pass-through of increased spectrum costs to Canadian consumers in the form of higher retail prices and lower quality of service.

A. Set-asides Raise the Nationwide Providers' Spectrum Costs

62. Although the set-aside proposal is meant to benefit eligible bidders, it also impacts non-eligible bidders. First, by reserving over 40 percent of the 600 MHz auction spectrum for eligible bidders, non-eligible bidders compete for even less spectrum. This reduction in spectrum for open licenses yields higher spectrum prices in that auction. Thus, although the proposal promises lower spectrum prices for eligible bidders, it raises spectrum costs for non-eligible bidders.

63. Second, the presence of set-asides opens non-eligible bidders up to fake bidding. This occurs when eligible bidders bid on an open licenses (i.e., those available to all bidders) either to keep set-aside prices low or to increase non-set-aside prices. This side effect of set-asides is not new. As I described in my report analyzing the outcome of the 2008 AWS report:

> From a theoretical perspective, the set-aside provision in the Canadian AWS auction resulted in a double tax for the incumbents. First, set-asides decrease the supply of spectrum available to incumbents, other things being equal. Second, as implemented in Canada, the set-aside provision artificially raised the demand for spectrum because the entrants were allowed to place bids on unrestricted spectrum with no intention of

> buying, but with the objective of increasing the prices the incumbents would have to pay. We refer to such behavior as 'fake bidding.'[53]

64. Practically, fake bidding was repeatedly encountered in the 2008 AWS auction:

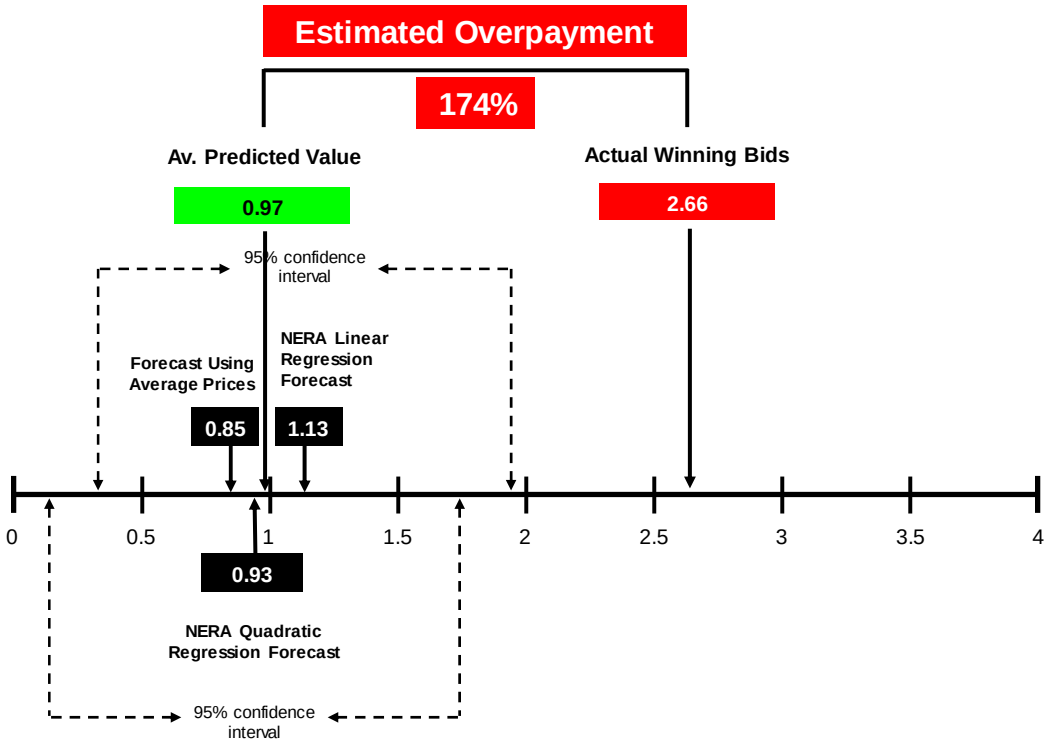
> Consider, for example, the bidding history of service area 304 (Cape Breton). License 304d is a 10 MHz set-aside license. License 304e is a 10 MHz unrestricted license. As shown in Appendix D, between rounds 31 and 117, entrant Bragg continually bid up the price of the unrestricted 10 MHz block, despite the fact that the identical set-aside block was available for as little as one-seventh the price of the unrestricted block. In round 122, Bragg then bid on the restricted spectrum and was outbid by another entrant, Globalive, in round 127. At that point, the restricted spectrum license traded at CAD 200,000, while the unrestricted license was at CAD 1,290,000 – 6.5 times higher than the identical restricted license.[54]

65. My report included an entire appendix (Appendix D) in which "we provide several more examples where entrants, particularly Globalive and Bragg, bid up the prices for unrestricted spectrum when they did not intend to purchase the license, but they simply wanted to increase the incumbents' licensing costs."[55]

66. Cumulatively, the presence of set-asides and fake bidding in particular forced nationwide providers to pay spectrum prices that were 174 percent higher than what the market price would have been absent set-asides. As Figure 1 summarizes, I estimated the overpayment on the open spectrum licenses by forecasting Canadian spectrum prices absent set-asides (using three different methods) and compared this value to the sum of the actual winning bids. In terms of capital expenditures, set-asides cost nationwide providers close to CAD1.7 billion.

[53] Dippon 2008 AWS Auction Report, p. 4.
[54] Ibid., p. 29.
[55] Ibid.

Figure 1. Canadian AWS Spectrum Valuation and Overpayment (CAD Billion)



Source: Dippon 2008 AWS Auction Report, Figure 2.

67. Thus, as the 2008 AWS auction has shown, there are undeniable and quantifiable costs from introducing spectrum set-asides. In evaluating ISED's proposal of once again using set-asides, we must (a) study the impact the overpayments caused by set-asides have on Canadian consumers and (b) weigh any such costs against potential benefits in order to ascertain whether the overall proposal is in the public interest.

B. Analysts Typically Do Not Consider the US 600 MHz Auction a Success

68. The Department lists the US 600 MHz incentive auction as an example in which a regulator applied set-asides. While correct at a general level, this comparison ignores the facts that eligibility to bid on set-asides was subject to existing spectrum holdings

(spectrum caps) and that the FCC has previously used other forms of preferential treatment or none at all. Just because the FCC used set-asides in its incentive auction does not establish best practice.

69. It also ignores the strong opposition from bidders who warned the FCC of the negative repercussions of a set-aside design. For instance, Verizon warned the FCC: "Recent developments demonstrate, if anything, the set-aside to benefit certain favored competitors should be eliminated, not increased."[56] Although there are a number of differences between the US 600 MHz spectrum auction and the Canadian 600 MHz auction (most notably, the US auction was a two-sided incentive auction), Verizon's general findings with respect to set-asides coincides with my findings. Specifically, Verizon finds:

> … all the chatter from those who want further government handouts is a distraction from the intended purposes of the incentive auction: to encourage broadcasters to bring much-needed spectrum to market, to put that spectrum in the hands of companies that will use it to meet consumers' growing mobile broadband demands, and to generate the most revenue possible for U.S. taxpayers. An auction that creates set-asides fails to meet these fundamental goals. It limits open competition, discourages broadcasters, and slashes revenues for taxpayers.[57]

70. Finally, the US 600 MHz auction is generally not considered a success as it produced low bidder participation and consequently low spectrum prices. Verizon ultimately did not participate in the auction and AT&T acquired only small amounts of spectrum. While it

[56] Letter from Kathleen Grillo, Senior Vice President, Federal Regulatory and Legal Affairs to the Honorable Tom Wheeler, Chairman, Federal Communications Commission, Ex Parte, June 17, 2015, p. 1

[57] Ibid., p. 3.

remains unclear how much set-asides have contributed to this result, I caution the Department to rely on an auction that analysts generally consider disappointing.[58]

C. There is Consensus that Set-Asides Cause Consumer Harm

71. Nationwide providers, or any provider for that matter, cannot pay close to double the market price for spectrum and expect no changes in its retail pricing or network investment plans. In Canada's competitive market, it is unrealistic to assume that retail customers will not notice the overpayment. As I forewarned:

> As evidenced in the UK 3G (third generation) auction and other 3G auctions in the early 2000s, excessively high spectrum prices can negatively affect competition, as investors tend to sell their holdings when earnings decrease and/or debt ratings drop. In severe cases, it can lead to market exit (as evidenced by the fallout of the UK 3G auction) or market consolidation because weaker market participants go bankrupt or are acquired by a more solvent company, all of which has a direct effect on competition…. [As such, i]f the Canadian AWS auction design was responsible for the extremely high prices of the spectrum licenses, it could harm the very policy objectives that Industry Canada strives to achieve if the same auction design were to be used for future Canadian spectrum auctions.[59]

72. Similarly, as Crandall and Ingraham found when studying the 2008 AWS auction design, "a set-aside for AWS spectrum in Canada will result in … uneconomic entry … and … there are far more constructive ways than set-aside auctions to promote viable entry into the Canadian wireless industry."[60]

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[58] See, e.g., Zacks Equity Research, "FCC's 600 MHz Spectrum auction Witness Surprise Winners, https://www.msn.com/en-us/money/topstocks/fccs-600-mhz-spectrum-auction-witness-surprise-winners/ar-BBzX55o

[59] Ibid., p. 3.

[60] Robert W. Crandall and Allen T. Ingraham, "The Adverse Economic Effects of Spectrum Set-Asides," *Canadian Journal of Law & Technology* 6, November 2007, 131–132, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=992865.

73. Hazlett and Boliek confirm this point, concluding, "in some instances, the very structure of the preference programs has encouraged entry of comparatively inefficient telecommunications providers," which resulted in a "delay in the provision of telecommunications services to consumers."[61]

74. Finally, as I discuss below, a recent GSMA study conducted by my colleagues Richard Marsden, Dr. Bruno Soria, and Hans-Martin Ihle provides clear evidence of the positive correlation of spectrum costs and retail prices and the negative correlation of spectrum costs and quality of service.[62] Marsden et al. found clear empirical evidence that higher spectrum costs yields on average higher retail prices and lower quality of service. Specifically, Marsden et al. conclude:

> The report presents new empirical evidence, consistent with related academic literature, that links high spectrum spend with
>
> 1. Lower quality networks and reduced take-up of mobile data services owing to reduced incentives for investment;
>
> 2. Higher consumer prices for mobile broadband data; and
>
> 3. Lost consumer welfare with a purchasing power of US$250bn across a group of countries where spectrum was priced above the global median.[63]

[61] Thomas W. Hazlett and Babette E. L. Boliek, "Use of Designated Entity Preferences in Assigning Wireless Licenses," *Federal Communications Law Journal* 51, Issue 3, 640, http://www.repository.law.indiana.edu/fclj/vol51/iss3/7/.

[62] See Richard Marsden, Dr. Bruno Soria, and Hans-Martin Ihle, "Effective Spectrum Pricing: Supporting better quality and more affordable mobile service," *GSMA*, Full Report February 2017, https://www.gsma.com/spectrum/wp-content/uploads/2017/02/Effective-Spectrum-Pricing-Full-Web.pdf. Proper reference: I note that, owing to reasons of confidentiality, I have not consulted with my colleagues on these results and am basing this section only on their published paper. That said, I have used the charts in their paper to reproduce the data and analysis they perform.

[63] Marsden et al., p. 3.

75. Thus, there is consensus that there are negative consequences to set-asides that will be visible in the retail market and not miraculously vanish. As an evident observation, I note that WIND, Mobilicity, and Public Mobile were acquired following the AWS auction.

D. Spectrum Costs Must Be Passed Through to Retail Subscribers

76. Spectrum costs represent a significant portion of a mobile wireless provider's total capital expenditures. For a provider to remain viable, total service revenues must exceed total costs (which includes spectrum costs). It follows, at least theoretically, that higher spectrum costs translate into higher retail prices and/or lower quality of service as some investments are not executed in order to manage costs.

77. Although this effect is clearly understood by most observers, it is actually the most controversial to economists because spectrum costs are classic *sunk costs*, and the argument is that sunk costs should not affect prices. In fact, there are good reasons to expect at least some pass-through of spectrum costs to consumer prices. The main reason is that spectrum is not a once-and-for-all phenomenon but a dynamic one in which there are successive auctions, and each is informed by previous auctions and current demand levels. Bidders typically determine their maximum willingness to pay for spectrum through a business case where the incremental capital expenditure—including spectrum—is evaluated against demand, service quality, and alternative means to meet current demand levels (i.e., cell splitting). The business case is particularly sensitive for the 600 MHz auction because providers will use the spectrum, along with other bands not yet released for auction, to deploy 5G services. Unsuccessful bidders either must refrain

from offering the innovative services or engage in deploying small cell technology on an unprecedented scale.

78. Furthermore, high prices for spectrum may lead firms to become cash constrained. This forces a firm to charge higher prices as the only means to raise sufficient cash to make new investments because a lower price would not be sufficient to internally finance investments although a lower price would yield a steadier revenue stream.

79. There are also valid reasons to expect that higher spectrum prices will yield lower quality of services. Customers are willing to pay only so much for wireless service at any particular level of quality. Wireless companies would like to invest in quality until the marginal willingness to pay for service equates to the marginal investment made in quality. However, they must do so with another constraint: the requirement that they not lose money overall. High spectrum prices reduce the headroom that wireless carriers have to make investments. Thus constrained, their investments are less than they would otherwise be, and the resultant quality is lower than it would otherwise be.

80. The high prices required to fund internal investments augment this effect. High prices restrict the population able to afford the highest quality of service, which in turn lowers the equilibrium quality offered. If spectrum is expensive enough, merely covering the cost of spectrum with the barest-bone level of service is what will be provided: incremental investments to *improve* service will not be worthwhile because the added quality will be unaffordable.

E. Empirical Evidence Proves that Spectrum Costs Are Passed Through to Retail Subscribers

81. Although there is a solid theoretical basis to assume that increased spectrum prices yield higher retail prices and lower quality of service (despite the sunk cost argument), until recently there was little empirical evidence of this effect. As noted previously, Marsden et al. provide clear evidence of the positive correlation of spectrum costs and retail prices and the negative correlation of spectrum costs and quality of service. Specifically, Marsden et al. conducted a cross-country comparison of spectrum costs, wireless prices, and wireless quality. The authors found exactly what is predicted above: countries with higher spectrum costs have lower observed quality and higher wireless prices.

82. Relevant to Canada and the Consultation in particular, Marsden et al. created the following two statistical models of the relationship between quality and spectrum costs and retail price and spectrum costs. Marsden et al. fit data from 21 higher income countries to the model:[64]

$$\log Quality = \alpha + \beta \log \frac{Spectrum\ Costs}{population}$$

and

$$Retail\ Price = \alpha + \beta \log \frac{Spectrum\ Costs}{MWxPopulation}.$$

83. Marsden et al. did not intend to fully explain either retail price or quality of service variations across the 21 higher income countries. Rather, the authors sought to examine whether spectrum costs are a statistically significant contributor to these variations. As such, the model is perfectly adequate and does not require further expansion. As

[64] Canada, United States, UK, Germany, France, Sweden, Denmark, Austria, Australia, New Zealand, Japan, South Korea, Spain, Taiwan, Switzerland, Belgium, Italy, Ireland, Norway, Finland, and the Netherlands.

suspected, the data confirmed that higher spectrum costs are statistically associated with both lower quality and higher prices.[65] In the following, I consider each of these equations and their application to Canada.

1. Lower Spectrum Costs Translate into Higher Quality of Service for Canadian Consumers

84. Marsden et al. measured quality as the percentage 3G/4G coverage in the country times the percentage of subscribers who take 4G service times the reported average speed in Mbps. Thus, higher quality services cover wider areas of the given country and have higher speeds and more customers who actually avail themselves of these speeds, thus implying higher levels of required investment.

85. The result of the Marsden et al. study indicates that a 10 percent increase in spectrum costs leads to a 4.4 percent decrease in quality on average. Canada had the highest spectrum costs of any country in this sample of 21 countries: US$337/pop as opposed to a cross-country average of only US$123/pop. This, alone, is worthwhile noticing as it confirms that the preferential treatment in Canadian auctions, be this through set-asides or spectrum caps, caused Canadian spectrum prices to skyrocket relative to other similarly positioned countries.

86. To illustrate the effect that Canada's high spectrum prices have on the quality of service metric as defined by Marsden et al., if Canada's spectrum price was the same as the average of the 21 benchmark countries, this would imply an increase in the Marsden et al.

[65] Although high spectrum costs are associated with higher prices and lower quality, these analyses do not prove that this relationship is causal. Instead, these analyses should be looked at as confirmatory evidence that the theoretical predictions of higher spectrum costs appear to be borne out in observed data and the effects appear to be substantial.

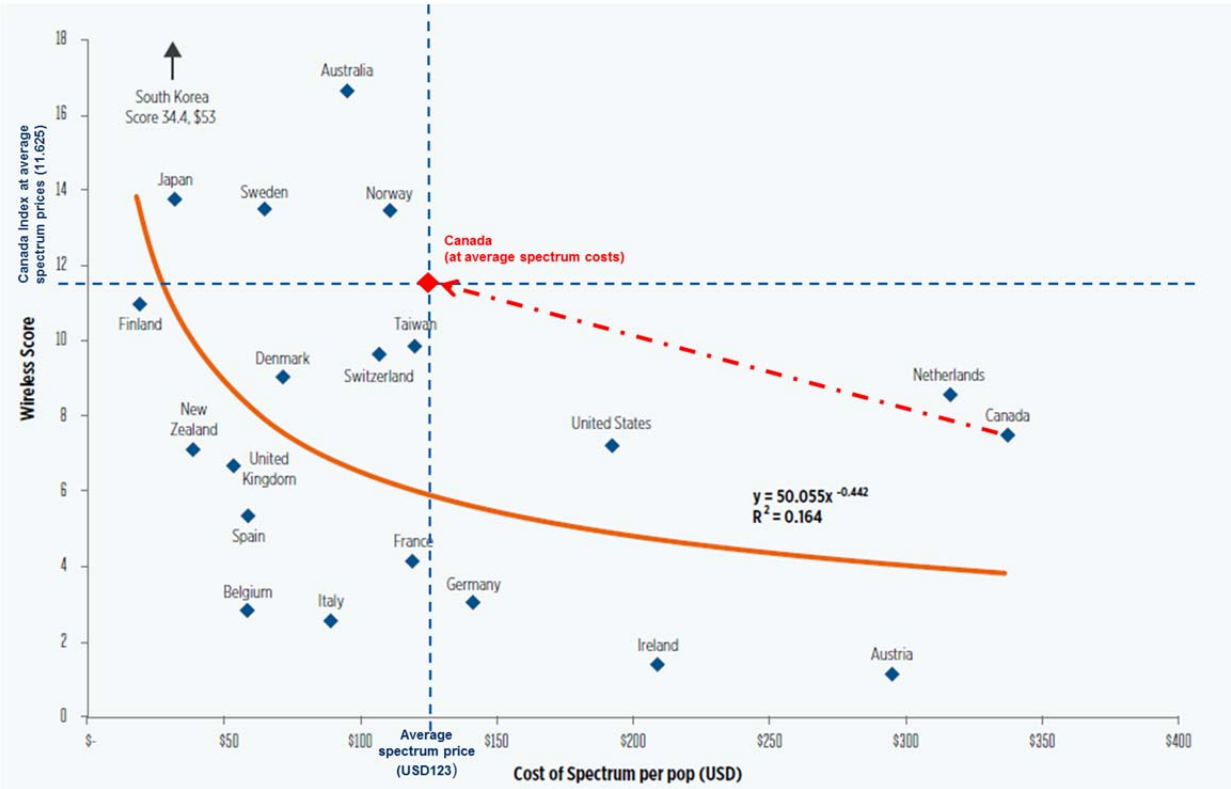
quality metric of 55 percent $\left(\frac{123}{337}^{-0.44} - 1\right)$. Thus, the combination of 3G and 4G coverage, take-up, and speed would increase significantly if Canadian spectrum prices were to align with the international average. Although a precise forecast of Canada's quality index but-for its high spectrum prices is likely far more complex, this equation shows that spectrum cost reductions can have meaningful increases in service quality.[66] This increase is in addition to the already high service quality enjoyed by Canadian consumers.[67]

87. As shown in Figure 2 (by the blue marker), Canada's wireless score is 7.5. This is significantly above the quality score expected at the given spectrum price (indicated by the orange trend line in the figure). It is also higher than the United States, the United Kingdom, and many other countries. Hence, consistent with Dr. Eisenach's findings, Canadian consumers enjoy high quality mobile wireless services. Given the negative correlation between the cost of spectrum and the wireless score as defined by Marsden et al., Canada would enjoy an even higher quality of service if spectrum prices were lower. For instance, if spectrum prices in Canada were at the average of the 21 benchmark countries (e.g., $123), Canada's wireless score would increase from 7.5 to 11.626 (indicated by the red marker). This would place Canada ahead of Finland, Taiwan, and Switzerland and in sixth position relative to the 21 benchmark countries.

[66] Many problems might raise the price of spectrum. As mentioned above, setting an inadequate quantity of spectrum for sale will also raise spectrum costs and, by the same logic, lead to higher prices and lower quality than an optimal auction would. Poorly designed auction rules might also increase observed costs without concomitant benefits.

[67] See Eisenach Report, ¶¶ 75–76.

Figure 2. Canada's Wireless Score at Average Spectrum Prices



2. Lower Spectrum Costs Translate into Lower Retail Prices for Canadian Consumers

88. Marsden et al. measures wireless prices for a representative market-basket high-quality service, expressed on a per-GB of data basis. The authors find that a 10 percent increase in spectrum costs (this time expressed on a per MHz pop basis) yields an increase in consumer prices of around US$1.57/month.[68]

89. Canada had the second highest spectrum cost (after the United States) in the Marsden et al. sample when expressed on a per MHz-pop basis: approximately US$0.92/MHz-pop. If this could be reduced to the high-income country average of US$0.40, then the price of a

[68] A 10 percent increase yields an increase of US$0.157/GB, which then translates to $1.57 per month for a representative 10 GB per month service.

Canadian 10 GB service would fall, all things equal, by $13.16/month (15.8 x ln(0.92/0.40)).

90. Again, the magnitude of the change is somewhat less important as the Marsden et al. retail price model is not intended to forecast retail prices (such exercise would be far more complex) but to examine whether spectrum prices influence retail prices at a statistically significant level. This, however, does not undermine the importance of this finding as it demonstrates that Canadian retail prices are highly sensitive to spectrum prices.

F. The ISED Set-Aside Proposal Stands to Increase Retail Prices and Suppress Quality of Service

91. There is clear evidence from the 2008 AWS auction that set-asides increase spectrum costs for nationwide providers. There is also clear evidence from the empirical work done by Marsden et al. that higher spectrum costs yield higher retail prices and lower quality of service. Thus, it follows that the set-aside proposal by ISED stands to increase retail prices and suppress quality of service. Although an exact magnitude of this impact is beyond the scope of this study, the above sensitivity analyses demonstrate that Canadian retail prices and quality of service are sensitive to high spectrum costs. The analyses also show that spectrum prices in Canada are the highest or second highest (depending on how the price is calculated) among 21 similarly situated countries across the globe.

92. In light of this finding, a set-aside proposal is only in the public interest if its benefits were to outweigh these consumer costs. As I explained above, the competitive market conditions in Canada imply that there will be no benefits from the proposed set-asides or any other pro-competitive measure. Consequently, we can infer with much confidence

that the proposed set-asides are not in the best interest of the Canadian consumer. Notwithstanding, in the following, I examine whether set-asides stand to benefit consumers, even if only marginally so.

VIII. SET-ASIDES PROVIDE NO MEASURABLE BENEFITS TO CANADIAN CONSUMERS

93. ISED has not elaborated on the theoretical rationale as to why set-asides would resolve the alleged market power problem. It seems that the Department expects that guaranteeing some 40 percent of the 600 MHz spectrum coupled with the proposed eligibility requirement will ensure that regional providers will expand their respective networks. This, in turn, will enable them to compete against nationwide providers and eventually erode their alleged market power. Even assuming there is market power (which there is not); the realization of the desired outcome is far from certain.

94. First, the theory presumes that regional providers cannot acquire the required spectrum unless it is offered in the form of set-asides. As shown in Table 1, the financial evidence does not support such an assumption. Using net income per subscriber as a proxy for financial strength indicates that financial strength varies across providers with no clear indication that eligible bidders are financially weaker and therefore in need of preferential treatment through set-asides.

95. Second, the theory presumes that regional providers would deploy the spectrum most efficiently to the benefit of the Canadian consumers. Again, there is no reason to believe that this would occur as regional facilities-based providers have repeatedly been offered preferential treatment in auctions as well as in the creation of regulated wholesale markets for domestic roaming. None of this has led to the desired nationwide expansion.

Rather, on several occasions the beneficiaries of the preferential treatment have opted to capitalize on their cost advantage by selling their spectrum on the secondary market. It is unclear why repeating the spectrum licensing framework would bring about a different the outcome.

96. As explained, the regional providers have specific strategies, focusing on geographic markets and specific segments within these markets. I recognize that the eligibility requirement demands that eligible bidders be active in offering services. However, as written, there is no guarantee that the spectrum would be deployed efficiently, if at all. Of course, the alleged market power problem cannot be resolved if the eligible carriers are not utilizing the set-aside spectrum to compete directly with the national providers.

97. Third, the theory presumes that set-aside spectrum would trade below the price of the open spectrum. Although there is a high probability that this might occur (due to the restricted supply of spectrum for non-eligible bidders and the fake bidding observed in the 2008 AWS auction), the theory actually *requires* these negative effects. Conversely, if there were no fake bidding and if the supply of non-eligible bidders was not materially restricted, both open and reserved spectrum licenses should trade at similar levels for the equivalent block size—particularly given the fact that all bidders are in similar financial positions. If there were no cost advantage, then the eligible bidders would not have a particular competitive advantage and would therefore be unable to erode the alleged market power. I note that eligible bidders could gain a competitive advantage through innovation. However, set-asides will not impact their ability to innovate—entrants are able to innovate today.

98. Fourth, and related, even if there were a cost advantage, it would presume that this cost advantage is sufficient and would be passed through to Canadian consumers. Again, this is unclear. In terms of sufficiency, there is no evidence that the cost advantage would be sufficient to address the alleged market power problem. There is also no evidence that the cost advantage would be passed on to subscribers rather than applied to the eligible carriers' profit levels.

99. Finally, the theory presumes that the set-asides are required in addition to all the other pro-competitive measures already in place. There is no evidence of such. It is known, however, that entrants have been afforded much preferential treatment, including risk-free cost-based access to their competitors' networks. It is also a fact that none of the beneficiary companies has expanded significantly with its own facilities since set-aside spectrum was first offered over nine years ago.

100. As the above demonstrates, ISED's proposal suffers from a missing critical link. Although the proposal does ensure that eligible bidders will win 40 percent of the available spectrum (assuming all licenses sell), it does not address how possessing 600 MHz spectrum licenses will erode the alleged market power. Just giving an operator spectrum does not cure anything. In fact, it can make matters worse. Spectrum is scarce and in high demand. Thus, ISED must ensure that it is used most efficiently.

101. Of course, one might argue that giving 600 MHz spectrum to eligible providers will increase the probability that such providers can compete with national providers, albeit not guaranteeing it. That is certainly true, but this probability seems rather low. More important, Canadian consumers will pay a high price to provide the eligible bidders with this opportunity.

IX. THE COSTS OF THE PROPOSED MEASURES FAR OUTWEIGH ANY BENEFITS

102. In evaluating the costs and benefits of the ISED proposal, it is helpful to summarize the findings in this respect.

- The set-aside proposal will yield higher retail prices as TELUS must compensate for the higher spectrum prices.
- The set-aside proposal will yield lower quality of service as TELUS must forgo investments, particularly in rural areas at the fringes of its existing network.
- The set-aside proposal offers a low probability of remedying the alleged market power problem as giving spectrum to some parties does not create a perfect market.

103. Additionally, the market is highly competitive, there is no credible evidence of market power and exercise of market power, and entrant mobile wireless providers have been benefitting from a long list of preferential treatment over the last nine years, yet they have failed to invest significantly to expand in their regions, let alone nationwide.

104. With no measurable benefits and possibly no benefits at all but real and confirmed costs to Canadian consumers, a cost-benefit analysis is straightforward: Costs far outweigh benefits. The proposal will harm Canadian consumers far more than it will benefit them, thus it is against the Canadian public interest.

X. BIDDER CREDITS OFFER A BETTER SOLUTION

105. Notwithstanding the fact that there is no need for pro-competitive measures, there are less costly options to ensure that eligible bidders obtain their fair share of the 600 MHz spectrum. Specifically, bidder credits are far superior to set-asides. As I recommended in 2008:

> Industry Canada must strive to minimize the side effects of any regulatory intervention. As evidenced in the economic literature, international best practices, and from actual auction experiences, including Canada's, set-aside provisions are inefficient and can harm competition. Therefore, we recommend that Industry Canada refrain from using set-aside provisions in future auctions. Instead, where justified by market circumstances, alternative measures should be considered, such as bidder credits like those used by the FCC in its recent spectrum auctions.[69]

106. For instance, in the 600 MHz "Incentive Auction" in the United States, the Federal Communications Commission (FCC) opted to use bidder credits whereas:

> Businesses that qualify for Designated Entity (DE) status are eligible for bidder credits. Small businesses (annual gross revenues for the preceding three years below $40 million) will receive a 15% credit; and very small businesses (turnover below $15 million) will receive a 25% credit.[70]

107. The advantages of bidder credits over set-asides are multifold. First, it actually guarantees eligible bidders a cost advantage that could be used as a competitive advantage. This is particularly important in Canada because ISED (incorrectly) believes that there is an issue of market power. Second, it minimizes the costs to Canadian consumers as national providers are not faced with significantly inflated spectrum prices from fake bidding or restricted spectrum supply (although this is a function of how much bidder credit is provided). Third, it is a direct and transparent government subsidy, rather than a wealth transfer from the national carriers to eligible bidders.

XI. CONSIDERING ISED'S INQUIRIES

108. In this section, I apply the findings of the above analysis to the questions raised by ISED.

[69] Dippon 2008 AWS Auction Report, p. 43.
[70] Richard Marsden and Jonathan Pike, "US 600MHz Incentive Auction Forward Auction Rules," *NERA Economic Consulting*, July 15, 2014, p. 2, http://www.nera.com/content/dam/nera/publications/archive2/PUB_600MHz_Forward_Auction_0714.pdf.

A. Response to Question 1A

109. In this question, ISED seeks general comments to its set-aside proposal. As I have detailed herein, pro-competitive measures are not required for at least three reasons. First, there is compelling evidence, particularly from Dr. Eisenach, that the Canadian mobile wireless market is already competitive. Second, the statement by the Competition Bureau that caused ISED to explore and propose pro-competitive measures is so outdated that it is meaningless. Third, the providers that would likely qualify for the set-aside spectrum have been benefiting from a long list of preferential treatments since at least 2008. These providers have still not expanded nationally, and there is no reason to believe that offering them yet another advantage would alter their market strategies. In addition to not being needed, the set-asides stand to be highly costly to Canadian consumers who will be subject to higher retail prices and lower quality of service if set-asides are implemented. The proposed set-aside measure also misses its target in that it is a long shot at best to resolving the alleged market power problem. On balance, it is obvious that the proposed set-asides will harm Canadian consumers far more than they will ever benefit from them. Hence, I strongly recommend against the adoption of the pro-competitive measures, particularly the set-aside proposal.

B. Response to Question 1B

110. In this question, ISED seeks comments on the size of the set-aside licenses, proposing that 30 MHz of the 70 MHz should be reserved for eligible bidders. Obviously, this question assumes that ISED will implement its set-aside proposal. I reiterate my recommendation against such a proposal as it has serious drawbacks—drawbacks that

should be known to ISED. If ISED seeks to minimize the harm done by the proposal, it must limit the set-aside amount to the smallest practical unit, which I understand is one block of 2x5 MHz spectrum.

C. Response to Question 1C

111. In this question, ISED seeks comments on its eligibility proposal. ISED is correct to limit eligibility to facilities-based providers that are actively deploying service to Canadian consumers. However, the proposal is deeply flawed in its application of market share as a filter to determine eligibility. Eligibility should be based on financial need, like any other subsidy program. There is no correlation between market share and financial strength, and implementing the proposal nevertheless would provide benefits to well-funded companies that elect not to expand their serving areas. I recommend that ISED consider applying bidder credits instead as these would enable financially weaker providers to actively and to successfully participate in the upcoming 600 MHz auction. These credits, however, should only apply to financially weak providers. Market share or some other metric unrelated to financial strength should not be indicative of eligibility.

D. Response to Question 1D

112. In this question, ISED seeks comments on its proposal to prohibit resale for the first five years of the licensing term. There are two sides to the proper resale prohibition period. The longer the period, the less likely it is that eligible providers would acquire the licenses for speculative reasons only. However, it must also be recognized that spectrum is a highly scarce resource that must be used most efficiently to serve Canadian consumers. If the spectrum is not used in the best interest of the public, then Canadian

consumers are better off if the spectrum were sold to a party that deploys it appropriately. Given the enormous value of the 600 MHz spectrum to Canadian consumers, I recommend a shorter prohibition over a longer period.

XII. CONCLUSION AND POLICY RECOMMENDATION

113. Pro-competitive measures are not needed in the upcoming 600 MHz auction or in any other upcoming spectrum auction. The market is already competitive and newer providers have enjoyed a myriad of preferential treatments for over nine years. The fact that none of them has invested in serving all Canadian consumers living in their regions and none of them have invested in expanding nationwide is not the result of market failure. There is no evidence that the entrants tried and were not able to expand due to missing market forces or anticompetitive behavior. The only logical and verifiable explanation is that regional providers did not intend to expand their serving areas, at least not with their own facilities. Rather, they focus on specific geographic markets and niches within those markets. There is nothing wrong with these market strategies, and ISED should be content with this outcome. It would be a mistake if ISED or any other regulatory body intervened and attempted to engineer an outcome where regional providers invested more intensively in their networks and service quality. While such intervention will most likely fail, it will inflict serious harm to Canadian consumers. As such, the set-aside proposal or any other so-called pro-competitive measures should be rejected.

114. Implementing the set-aside proposal nevertheless would increase spectrum costs for national providers, the very providers that offer the highly desired nationwide networks. The spectrum cost increases would come from less spectrum supply and the rampant fake

bidding that was observed in the 2008 AWS auction. Empirical evidence demonstrates that high spectrum costs are passed on (at least in part) to the retail market in the form of higher prices and lower quality of service—they do not vanish. Practically, this means that if set-asides are implemented, Canadian consumers will face higher retail prices and/or lower quality of service.

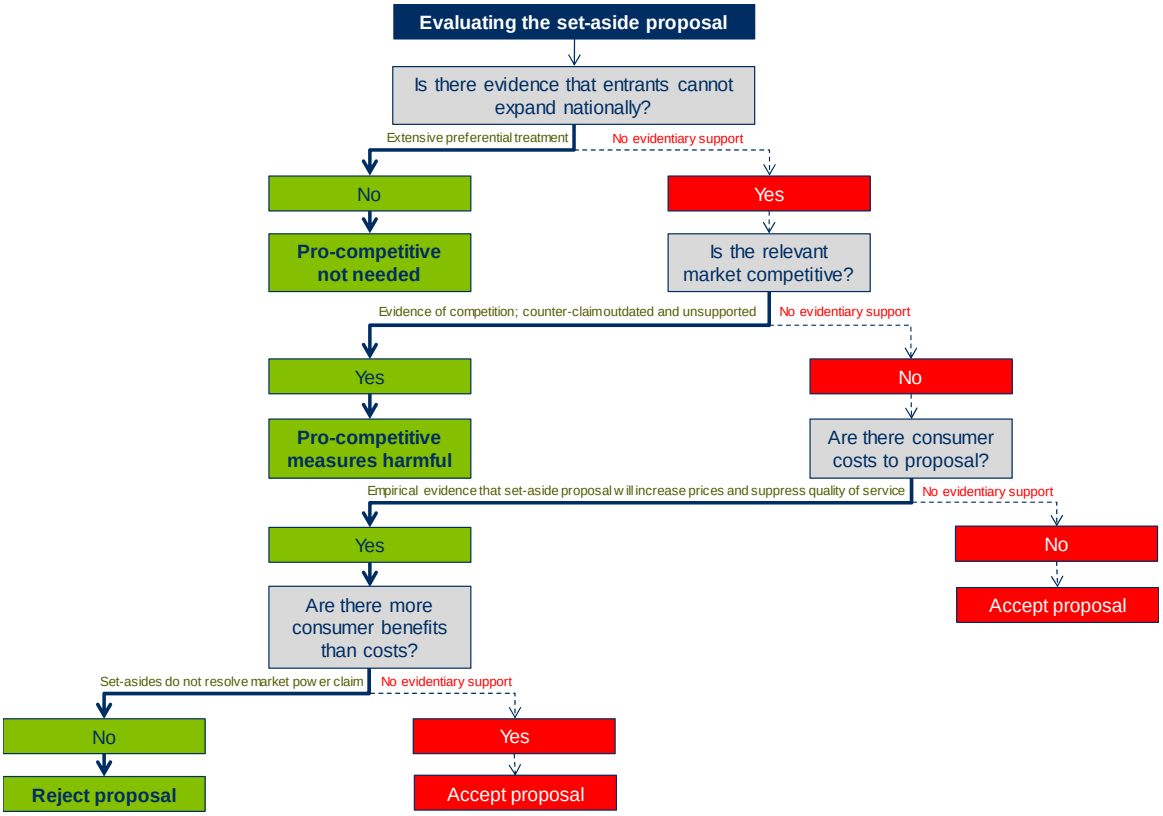
115. Accepting the costs of the set-aside proposal would only be rational if the benefits from providing eligible bidders with 40 percent of the 600 MHz spectrum were to bear consumer benefits that would surpass these costs. However, the set-aside proposal simply equips eligible providers with spectrum. It does not inform as to how the simple possession of 600 MHz licenses would actually resolve the market power problem that motivates these measures. A closer look at the proposal reveals that there is no guarantee that consumers would see any benefits from set-asides. Thus, with little to no benefits to consumers but actual and verifiable costs, the set-aside proposal should be rejected.

116. Notwithstanding, the eligibility requirement for set-asides is also flawed. Although it is correct to focus on facilities-based providers that are actively participating in the provision of mobile wireless service, basing eligibility on the national market shares of regional providers makes little sense. Further, there is no correlation between market share and the ability and willingness to purchase spectrum.

117. Although I strongly recommend against set-asides or any other pro-competitive measure, a far superior auction tool is bidder credits. Not only do bidder credits ensure that eligible bidders have a cost advantage and therefore a competitive advantage, but bidder credits also minimize the costs to Canadian consumers, are transparent and explicit, and are aligned with international best practices.

118. Figure 3 summarizes my evaluation of the ISED set-aside proposal. As the figure illustrates, there is no support for the proposal as (a) there is no need for pro-competitive measures, (b) pro-competitive measures are harmful in light of the competitive market, and (c) the specific proposal is harmful to Canadian consumers. I recommend the Department evaluate alternative proposals against this evaluation framework.

Figure 3. Evaluation of the ISED Set-Aside Proposal



APPENDIX A: CURRICULUM VITAE OF CHRISTIAN M. DIPPON, PHD

Christian M. Dippon, PhD

CHAIR, NERA'S GLOBAL ENERGY, ENVIRONMENT, COMMUNICATIONS & INFRASTRUCTURE PRACTICE

Dr. Dippon is a Managing Director at NERA and a leading authority in complex litigation disputes and regulatory matters in the communications, Internet, and high-tech sectors. He is also the Chair of NERA's Global Energy, Environment, Communications & Infrastructure (EECI) Practice where he leads over 100 experts in the areas of energy, communications, media, Internet, environment, auctions, transport, and water.

Dr. Dippon advises his clients in economic damages assessments, class certifications and damages, false advertising, antitrust matters, and regulatory and competition issues. He has extensive testimonial and litigation experience, including depositions, jury and bench trials in state and federal courts, domestic and international arbitrations, and submissions before international courts. Dr. Dippon also routinely testifies before regulatory authorities, including the Federal Communications Commission, the International Trade Commission, numerous state commissions, and international agencies.

With over 21 years of experience, Dr. Dippon's expertise spans the globe, having consulted with clients in over two dozen countries. He assists clients with a broad range of litigation disputes related to wireline, wireless, cable, media, Internet, and the high-tech sectors.

Dr. Dippon has authored and edited several books as well as book chapters in anthologies and has written numerous articles on telecommunications competition and strategies. He also frequently lectures in these areas at industry conferences, continuing education programs for lawyers, and at universities. National and international newspapers and magazines, including the *Financial Times*, *Business Week*, *Forbes*, the *Chicago Tribune*, and the *Sydney Morning Herald* have cited his work.

Dr. Dippon serves on NERA's Board of Directors, the Board of Directors of the International Telecommunications Society (ITS), and on the Editorial Board of *Telecommunications Policy*. He is a member of the Economic Club of Washington, DC, the American Economic Association (AEA), the American Bar Association (ABA), and the Federal Communications Bar Association (FCBA).

Dr. Dippon is bilingual in English and German and proficient in French and Thai. Prior to joining NERA, Dr. Dippon was an analyst at BMW in Bangkok, Thailand.

Education

Curtin University, Perth, Australia
PhD in Economics, 2011

University of California, Santa Barbara, CA, USA
MA in Economics, 1995

California State University, Hayward, CA, USA
BS *cum laude* in Business Administration, 1993

Thesis

"Consumer Preferences for Mobile Phone Service in the U.S.: An Application of Efficient Design on Conjoint Analysis," Curtin University, 2011.

PROFESSIONAL EXPERIENCE

NERA Economic Consulting

2017–present	Chair, NERA's Global Energy, Environment, Communications & Infrastructure (EECI) Practice
2017–present	Member, Board of Directors, NERA Economic Consulting
2014–present	Senior Vice President / Managing Director
2014–2017	Co-Chair, Communications, Media & Internet Practice
2015–2017	Head, NERA Washington, DC
2014–2015	Co-Head, NERA Washington, DC
2012–2014	Chair, Communications, Media & Internet Practice
2004–2014	Vice President
2000–2004	Senior Consultant
1998–2000	Consultant
1997–1998	Senior Analyst
1996–1997	Analyst

BMW Thailand

1993–1994	Business Analyst

HONORS AND PROFESSIONAL ACTIVITIES

Member, The Economic Club, Washington, DC

Editorial Board, *Telecommunications Policy*

Board of Directors, International Telecommunications Society (ITS)

Assistant Treasurer, International Telecommunications Society (ITS)

Member, American Economic Association (AEA)

Member, Federal Communications Bar Association (FCBA)

Associate, American Bar Association (ABA)

TESTIMONY IN REGULATORY AND JUDICIAL PROCEEDINGS (2010–PRESENT)

ON BEHALF OF ALCATEL-LUCENT USA INC.

In the Superior Court of California, County of Santa Clara, *In re: Alcatel-Lucent USA Inc. v. Brilliant Telecommunications, Inc., Juniper Networks, Inc., et al.*, December 7, 2012, December 13, 2012, February 21 and 25, 2013. (Economic damages)

ON BEHALF OF BELL MOBILITY

Before the Superior Court, Province of Quebec, District of Montreal, In the Matter of *Gagnon vs. Bell Mobility*, No: 500-06-000496-105, October 25, 2013, March 14, 2014 (updated version from October 25, 2013, and April 2–3, 2014. (Economic damages)

ON BEHALF OF CALINNOVATES

Before the Federal Communications Commission, Washington, DC, In the Matter of Expanding Consumers' Video Navigation Choices, MB Docket No. 16-42, Commercial Availability of Navigation Devices, CS Docket No. 97-80, April 22, 2016 (Public policy), October 11, 2016. (Economic damages)

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ON BEHALF OF CELLCOM ISRAEL, LTD.

Before the Israel Ministry of Communications, Expert Report of NERA Economic Consulting, "Reply to Frontier's Responses, Estimating the Cost of Wholesale Access Service on Bezeq's Network," Christian Dippon with Marta Petrucci, Leen Dickx, and Howard Cobb (Finite State Systems), September 29, 2014. (Regulatory policy and cost modeling)

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ON BEHALF OF COMCAST CORPORATION

Before the Federal Communications Commission, Washington, DC, In the Matter of Restoring Internet Freedom, WC Docket No. 17-108, Notice of Proposed Rulemaking, White Paper, "Public Interest Benefits of Repealing Utility-Style Title II Regulation and Reapplying Light-Touch Regulation to Broadband Internet Services, July 17 and August 28, 2017. (Competition analysis)

ON BEHALF OF THE COMMERCE COMMISSION NEW ZEALAND

"Review of Covec's 'Economic Analysis of 700MHz Allocation,'" Christian Dippon with James Mellsop, Richard Marsden, and Kevin Counsell, February 14, 2014. (Regulatory policy and competition analysis)

ON BEHALF OF THE COMMISSIONER OF COMPETITION

The Commissioner of Competition, Applicant and Chatr Wireless Inc, and Rogers Communications Inc., Respondents, Ontario Superior Court of Justice, June 13, 2012, July 25, 2012, August 15–16, 2012. (Economic damages)

ON BEHALF OF FPL GROUP INC.

In reference to *Adelphia Communications Corp., et al., Adelphia Recovery Trust, v. FPL Group Inc.*, United States Bankruptcy Court Southern District of New York, July 8, 2011, July 26, 2011, April 17, 2012, and May 2–3, 2012. (Competition analysis)

ON BEHALF OF MICROSOFT MOBILE OY AND NOKIA INC.

Before the United States International Trade Commission, In the Matter of Certain 3G Mobile Handsets and Components, Investigation No. 337-TA-613, September 12, 2014, October 3, 2014, October 15, 2014, November 21, 2014, December 12, 2014, and January 28, 2015. (Competition analysis)

Before the United States International Trade Commission, In the Matter of Certain Wireless Devices including Mobile Phones and Tablets II, Investigation No. 337-TA-905, June 26, 2014. (Competition analysis)

ON BEHALF OF MONSTER, INC.

Circuit Court of Cook County, Illinois County Department, Chancery Division, *Amy Joseph, individually and on behalf of all others similarly situated, Plaintiff, Benjamin Perez, individually and on behalf of all others similarly situated, Intervening Plaintiff vs. Monster, Inc., a Delaware Corporation and Best Buy Co, Inc., a Minnesota Corporation, Defendants,* Case No. 2015 CH 13991, September 9, 2016. (Economic damages)

ON BEHALF OF NETLINK TRUST

Before the Info-communications Development Authority of Singapore (IDA), "The Appropriate Cost Methodology for Price Regulation of Interconnection Wholesale Fiber Services," Christian Dippon with Dr. Bruno Soria, December 15, 2015. (Regulatory policy)

ON BEHALF OF NOKIA CORPORATION AND NOKIA INC.

Before the United States International Trade Commission, In the Matter of Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof, Investigation No. 337-TA-868, August 23, 2013, September 5, 2013, September 20, 2013, October 8, 2013, November 19, 2013, December 6, 2013, January 6, 2014, and February 18, 2014. (Competition analysis)

Before the United States International Trade Commission, In the Matter of Certain Integrated Circuit Devices and Products Containing the Same, Investigation No. 337-TA-873, August 30, 2013, September 16, 2013, and March 6, 2014. (Competition analysis)

ON BEHALF OF NOKIA SOLUTIONS AND NETWORKS US LLC

In the Matter of the Arbitration between *MTPCS, LLC d/b/a Cellular One vs. Nokia Solutions and Networks US LLC d/b/a Nokia Networks*, Before the American Arbitration Association, RE: 01-15-0003-5349, December 5–6, 2016 (Economic damages and competition analysis) and May 4, 2016. (Economic damages)

Before the American Arbitration Association, *Nokia Siemens Networks US LLC n/k/a Nokia Solutions Networks US, Plaintiff vs. Viaero Wireless a/k/a NE Colorado Cellular, Inc., Defendant*, Case No. 50 494 T 00510 13, May 27, 2014 and June 2, 2014. (Economic damages)

ON BEHALF OF QATAR TELECOM (QTEL)

In Connection with *Vodafone Qatar Q.S.C v. Qatar Telecom (Qtel) Q.S.C*, Pursuant to Dispute Resolution Agreement Dated 11 November 2010, January 20, 2011 and February 21, 2011. (Economic damages)

ON BEHALF OF SINGAPORE TELECOMMUNICATIONS LIMITED AND SINGAPORE TELECOM MOBILE PTE. LTD.

Before the District Court of Tangerang, "Economic Assessment and Examination of Alleged Anticompetitive Behavior in the Indonesian Mobile Market," Expert Report by Christian Dippon, Nigel Attenborough, and William Taylor, April 21, 2010. (Economic damages)

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ON BEHALF OF SONY COMPUTER ENTERTAINMENT AMERICA LLC

Before the United States District Court Northern District of California San Francisco Division, In Re Sony PS3 "Other OS" Litigation, Case No. CV-10-1811 SC, April 4, 2017 and June 7, 2017. (Economic damages)

ON BEHALF OF SPRINT COMMUNICATION COMPANY L.P., SPRINT SPECTRUM L.P., AND NEXTEL OPERATIONS, INC.

Before the United States District Court for the Eastern District of Pennsylvania, *Comcast Cable Communications, LLC; TVWorks, LLC, and Comcast Mo Group Inc. v. of Sprint Communication Company L.P., Sprint Spectrum L.P., and Nextel Operations, Inc.*, Civil Action No. 2:12-cv-00859-JD, July 15, 2015. (Economic damages), March 18, 2016 (Economic damages), February 14, 2017 (Economic damages and incremental cost modeling)

ON BEHALF OF SPRINT SPECTRUM LP AND WIRELESS CO. LP, NEXTEL COMMUNICATIONS INC., AND NEXTEL CALIFORNIA INC.

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ON BEHALF OF TELUS COMMUNICATIONS COMPANY

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"The Implications of Convergence in Telecommunications," by Christian Dippon and Timothy Tardiff, published in *The Preston Gates Guide to Telecommunications in Asia*, 2006 Edition, Asia Law & Practice, 2006, ISBN 962-936-155-8, pages 31–40.

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"Modern Approaches to Spectrum Valuation," Presented at the International Telecommunications Society 6th Africa-Asia-Australasia Regional Conference, Curtin Business School, Curtin University, Bentley, Western Australia, August 5, 2013.

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"The Link Between Spectrum Availability and Mobile Market Consolidation," Session Chair, Second Annual Spectrum Management Conference, Washington DC, October 23, 2012.

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