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## C.D. Howe Institute Telecommunications Policy Working Group

### Communiqué #4: High Spectrum Costs in Canada Raise Questions about Fairness and Consumer Prices

- Ottawa has a policy of auctioning off radio frequency spectrum for telecommunications purposes in discrete chunks, which minimizes interference and ensures its safe use. But Canada lags peer jurisdictions in the timing and quantity of available spectrum for economically critical 5G spectrum bands. By the time of the June 2021 5G auction, 37 countries will have already assigned this 5G band. Such regulatory impediments impact the rollout of 5G and undermine Canada's technological competitiveness.
- Costs for radiocommunications spectrum in Canada have historically been elevated relative to other peer jurisdictions. Spectrum prices in Canada are almost four times higher than the international average. Elevated spectrum costs result in lower network investment and higher consumer prices. If spectrum costs were as low as those paid by European wireless carriers, Canadian wireless rates could be as much as 12 percent lower.
- The federal government's process for awarding spectrum should be designed and updated more frequently to align with international best practices. Ottawa's primary goal should be to allocate spectrum most efficiently and ensure competitive access to spectrum.

Canadian telecommunications policy is at a critical crossroads. Policy decisions about the structure and stance of regulation for telecommunications providers will in turn shape commercial decisions about investments in next-generation facilities and capabilities. Government support for build-out of telecommunications infrastructure will impact the pace at which communities are digitally connected and their ability to participate in an increasingly digital economy.

To this end, the C.D. Howe Institute has established the Telecommunications Policy Working Group to identify and distill policy directions on the strategic questions facing Canadian telecommunications – particularly concerning:



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1. Vigorous competition for competitive pricing and high-quality telecommunications services;
2. Investment in next-generation infrastructure; and
3. Inclusive access to telecommunications services and participation in the digital economy.

This fourth communiqué charts a path forward on spectrum allocation policy to enable the critically needed 5G infrastructure of the future.

Broadly, this Working Group believes a key challenge that governments must resolve is improving the framework and timeliness for allocating spectrum – particularly to address high relative costs, expedite the now slow release of new spectrum, and ensure competitive availability.

## **Economically Efficient Allocation of Radiocommunications Spectrum**

Significant questions to resolve concerning the costs and allocation of spectrum are:

- What are the policy objectives of spectrum auctions? Does the design of Canada’s spectrum auctions achieve those objectives?
- What are the consequences of Canada’s high relative costs for spectrum?
- How can Canada ensure competition and efficient allocation of spectrum?
- How can the timing of auctions be improved?
- What spectrum access will be required for innovative new applications (e.g., “Internet of Things” deployment)?

## **Implications of Spectrum Policy for Connectivity**

Spectrum auctions provide a framework for resolving inherent information asymmetries around the value to each provider of this scarce resource. Market participants may overvalue spectrum in a particular auction if timelines for release of new spectrum are protracted or the roadmap is uncertain. As well, as a scarce resource – and potential bottleneck – auction design must contend with the potential for anti-competitive bottlenecks to new entry. To address these challenges, policymakers should avoid high minimum auction prices, artificial spectrum scarcity (e.g., sluggish or unclear schedule for release of new spectrum, fragmented packaging) and rules that may allow competitors to foreclose competition and incite bidding wars (e.g., opaque auction rounds, lack of spectrum caps). High prices for Canadian wireless spectrum may result from various features of auction design and provider behaviour in past auctions. Working Group members observe that, in any auction, competition

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between bidders sets prices. However, the design of auctions may impact behaviour and auction outcomes in several ways.

First, wireless providers may drive prices higher with bids for the scarce resource, including some competitors that may acquire spectrum for speculative reasons (e.g., anticipation of future resale). Second, set-asides for new entrants and regional players, which are designed to prevent foreclosure on competition, restrict the spectrum available for national players, which compete intensely for the limited allocation. Third, spectrum may be fragmented inefficiently. Fourth, the size of the licence area to be auctioned may have an impact on the cost of the spectrum, serving as an additional barrier for some players.

Certain Working Group members contend that so-called “set-asides” (i.e., allocation of amounts or blocks of spectrum for particular providers) have artificially reduced the amount of spectrum available to national wireless carriers and consequently driven up costs for spectrum. These Working Group members observe that the national carriers have paid spectrum prices almost four times higher than regional carriers or new entrants.<sup>1</sup> They also observe that certain carriers have been comparatively slow to deploy spectrum to serve consumers – particularly for rural areas – and allege that certain spectrum acquisition has been speculative.

However, other Working Group members contend that spectrum set-asides are a necessary support for competitive entry in key markets and for national wireless carriage, which has resulted in a more competitive and dynamic wireless market. They contend that, without this preferential access to a necessary input, regional carriers and new entrants would be foreclosed by the national carriers and this would allow the national incumbents to undo the progress that the regional competitors have made in recent years. They also point out that the national carriers control over 75 percent of Canada’s allocated spectrum and received significant amounts of critical low-frequency spectrum for free at the beginning of their network deployments. The regional competitors, by contrast, have had to pay for all their spectrum.

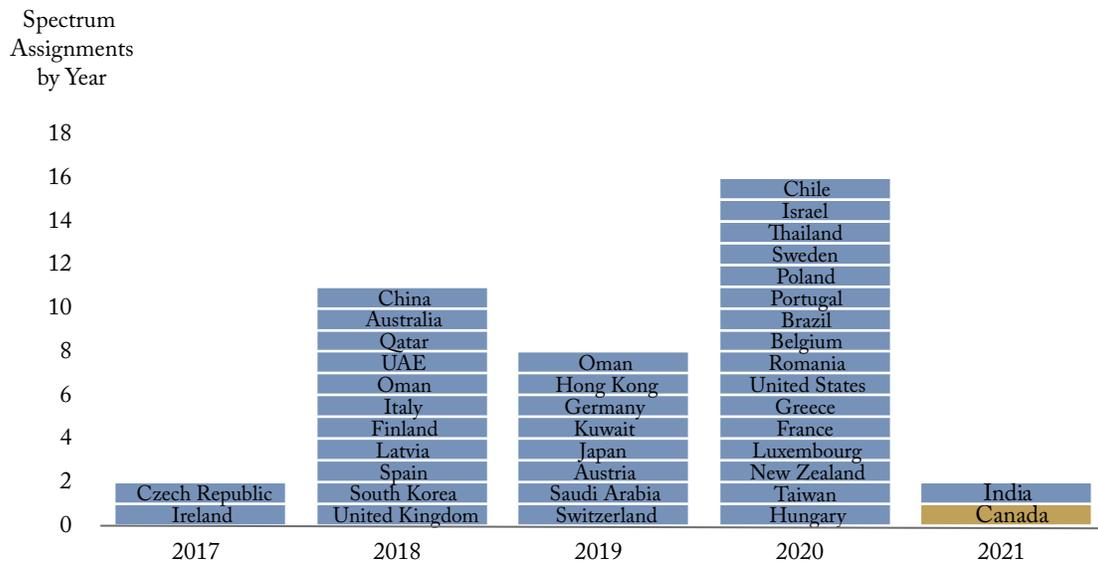
Certain Working Group members observed that much of the focus around spectrum allocation – and intense competition – concerns access to highly profitable urban markets. Rural build-out likely requires distinct approaches to spectrum allocation and build-out requirements – for example,

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1 Koutroumpis, P. 2020. “The impact of spectrum allocation on mobile communications in Canada.” Available upon request.

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Figure 1: Global Spectrum Assignments in 3500 MHz Band



Source: GSMA Intelligence (data as of Q2/2020).

deferred spectrum fees based on deployment commitments, reverse auctions for rights for particular service areas, consortium arrangements for build-out, or smaller licence areas to better target specific underserved areas. Certain Working Group members contend that, without build-out requirements, spectrum remains unused in rural areas.

Working Group members also raised concerns surrounding the timing and quantity of available spectrum. On timing, members observe that Canada lags peer jurisdictions in releasing spectrum for 5G. By Canada's target for the auction of 3500 MHz spectrum (scheduled for June 2021), 37 countries will have already assigned this 5G band spectrum (see Figure 1)<sup>2</sup> and Working Group members observe that an auction for 3800 MHz is not expected until 2023.<sup>3</sup>

2 Castells, Pau, Stefano Suardi, Dennisa Nichiforov-Chuang, and David George. 2020. *5G and economic growth: An assessment of GDP impacts in Canada*. GSMA Intelligence. Available online: <https://data.gsmaintelligence.com/api-web/v2/research-file-download?id=54165916&file=051120-5G-in-Canada.pdf>

3 Innovation, Science and Economic Development Canada. 2020. *Consultation on the Technical and Policy Framework for the 3650–4200 MHz Band and Changes to the Frequency Allocation of the 3500–3650 MHz Band*. Gazette Notice No. SLPB-002-20. August 2020. Available at: <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11627.html#s11> <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11627.html#s11>

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Working Group members suggest the federal government could improve the predictability of spectrum release by increasing the frequency for the refresh of its schedule for spectrum release and allocation. For example, Innovation, Science and Economic Development Canada's most recent spectrum outlook was published in June 2018, covering the 2018 to 2022 interval.<sup>4</sup> More frequent updates would assist facilities operators and equipment manufacturers with business planning and anticipation of Canadian mobile network requirements.

To provide additional spectrum for 5G use, the government has commendably proposed to repurpose 250 MHz in the 3800 MHz band (C-band spectrum), and commenced a consultation in August 2020.<sup>5</sup> However, separation of the 3500 MHz and 3800 MHz allocations would result in a fragmentation of telecommunications providers' spectrum holdings. Certain Working Group members are concerned that the lack of contiguous spectrum could hinder network expansion and network quality improvements, particularly in rural areas. These members suggest that a simple reassignment after the 3800 MHz spectrum allocation would ensure all carriers have contiguous holdings across these 5G spectrum bands.

Other members note that contiguity of spectrum is not critical for the deployment of 5G in Canada, noting that both standards and equipment have been developed that will ensure that service providers can operate equipment and provide services using both the 3500 and 3800 MHz spectrum bands concurrently.

## Consequences of High Spectrum Costs

Working Group members observe that costs for radiocommunications spectrum in Canada have historically been elevated relative to other peer jurisdictions. Using a dataset provided by the GSMA (a worldwide association of mobile network operators) covering 27 countries for the period 2010 to 2020 and including all major spectrum auctions for frequency bands ranging from 700 MHz to 3800 MHz, a study by Koutroumpis (2020) finds that spectrum prices in Canada are almost four times higher than the international average.<sup>6</sup>

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4 Innovation, Science and Economic Development Canada. 2018. "Spectrum Outlook 2018 to 2022." 6 June. Available online: <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11403.html>

5 Innovation, Science and Economic Development Canada. 2020. *News Release: Launch of consultation on repurposing the 3800 MHz spectrum band*. August 27. Available online: <https://www.canada.ca/en/innovation-science-economic-development/news/2020/08/government-of-canada-ensures-that-canadians-continue-to-have-access-to-the-highest-quality-wireless-services.html>

6 Koutroumpis, Pantelis. 2020. Op. Cit.

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**Table 1: Overall Cost Difference Between Canada and Benchmark Countries**

Production Factor	Assumed Cost Share	Difference of Factor Cost in Canada vs. Benchmark Countries <sup>*</sup>	Impact on Relative Costs in Canada vs. Benchmark Countries <sup>*</sup>
		<i>Percent</i>	
Capital	63	48	30.2
Labour	5	12	0.5
Materials**	12	0	0.0
Spectrum	20	261	52.3
<b>Overall Difference</b>			<b>83.0</b>

Notes:

\* Benchmark Countries are Japan, Germany, France, UK, Italy, and Australia.

\*\* Materials costs assumed as equivalent between Canada and the Benchmark Countries.

Source: Christensen Associates (2020).

Expert evidence indicates that the cost of spectrum is the central factor in the higher relative costs faced by Canadian telecommunications providers relative to foreign counterparts. In a contracted consulting report, Christensen Associates calculates that average costs for capital, labour, materials, and spectrum are 83 percent higher in Canada compared to a set of benchmark countries and that elevated spectrum costs account for more than 50 percentage points of the higher costs in Canada (Table 1).<sup>7</sup>

The required return on capital for investments in spectrum acquisition may explain a significant share of the divergence of Canadian retail prices from international benchmarks. For example, Crandall (2020) computes that Canada's major telecommunications providers spent \$21.7 billion on investment in spectrum and, based on an assumed 20 percent pre-tax cost of capital, estimates that the required

<sup>7</sup> Meitzen, Mark, and Nick Crowley. 2020. *Key Cost Drivers of Mobile Wireless Services in Canada: Implications for Pricing*. Christensen Associates. January 9. Available online: <https://www.lrca.com/wp-content/uploads/2020/10/Key-Cost-Drivers-of-Mobile-Wireless-Services-in-Canada-Implications-for-Pricing-US-Included.pdf>

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return on this investment in spectrum accounts for 16 percent of wireless revenues.<sup>8</sup> On this basis, he further computes that, if spectrum costs were as low as those paid by European wireless carriers (i.e., approximately 75 percent below Canada’s average spectrum costs), Canadian wireless rates could be as much as 12 percent lower.

Moreover, cross-country empirical evidence strongly supports the conclusion that such elevated spectrum costs result in lower network investment and higher consumer prices. Specifically, a study published by the economic consultancy NERA using cross-country data for 2016 in high-income economies found a strongly positive relationship between wireless pricing and the per capita cost of wireless spectrum (see Figure 2).<sup>9</sup> The study also finds a negative relationship between spectrum costs and network quality, with higher spectrum costs correlating with a lower investment in 4G network capability.<sup>10</sup>

One view of spectrum costs is that such licence fees are sunk costs and should not impact subsequent investment and consumer pricing decisions. However, the NERA study provides evidence that contradicts this view. Instead, the authors suggest the “sunk cost” view ignores dynamic effects from spectrum costs over the long term, internal financing constraints and behavioural impacts on competitive intensity from elevated upfront fees.

To elaborate, investments in mobile infrastructure are not one-off but rather require repeated re-investment to sustain and enhance network quality. High costs for spectrum acquisition reduce expected return on future investments, resulting in a “hold up problem” that reduces new investment relative to a scenario with low spectrum costs. As well, high spectrum fees extract internal funds that would otherwise be available for investment and companies may face constraints and a higher risk premium for accessing external funds.

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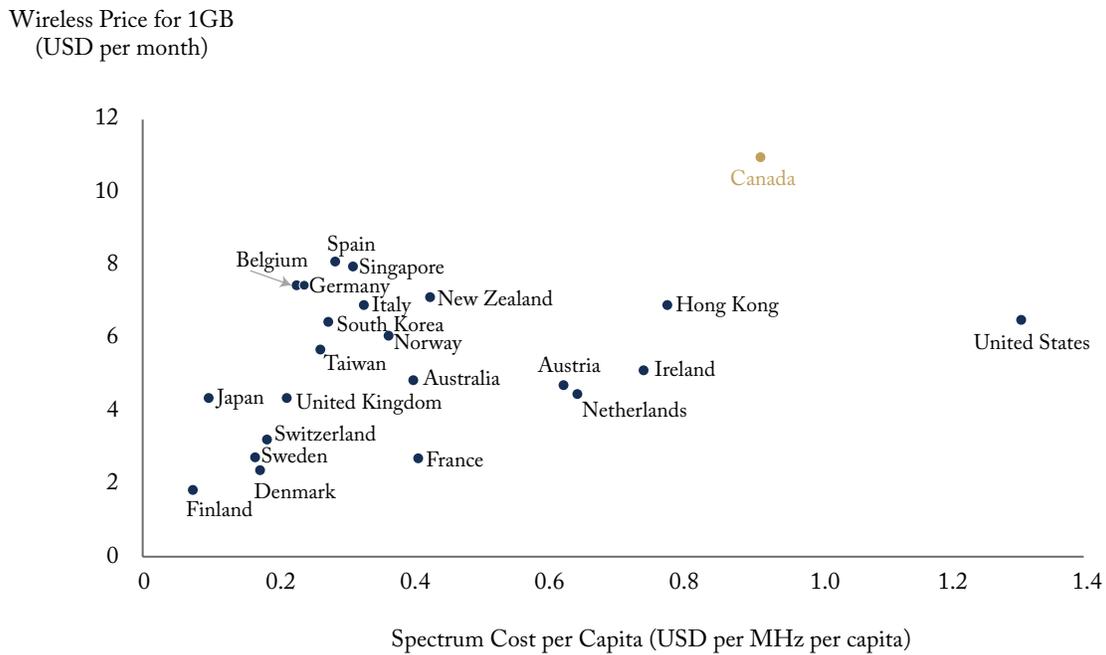
8 Crandall, Robert. 2020. “How the Canadian government’s own policy inflates mobile wireless rates,” Financial Post. January 17. Available online: <https://financialpost.com/opinion/how-the-canadian-governments-own-policy-inflates-mobile-wireless-rates>

Crandall cites Bell, Rogers, and TELUS having spent \$18.9 billion on spectrum while three of the larger regional carriers, Shaw, SaskTel, and Videotron, reported spectrum investment of an additional \$2.8 billion. The \$21.7 exceeds totals for spectrum reported in the CRTC Telecommunications Monitoring Report but this report did not include spectrum costs prior to 2014.

9 Marsden, Richard, Hans-Martin Ihle, and Peter Traber. 2017. *The Impact of High Spectrum Costs on Mobile Network Investment and Consumer Prices*. NERA Economic Consulting. May 1. Available online: <https://www.nera.com/publications/archive/2017/the-impact-of-high-spectrum-costs-on-mobile-network-investment-a.html>

10 The spectrum costs are based on NERA’s database for upfront and annual fees for awards of mobile spectrum in auctions, while comparative consumer prices are based on a representative 1 GB data plan in each country.

Figure 2: Price and Spectrum Cost Relationship in High-Income Countries



Source: Marsden, Ihle & Traber (NERA, 2017), using comprehensive spectrum award dataset across countries for 2008–2016 and survey of representative 1GB data plan for each country in 2016.

## Conclusion

The four communiqués from the C.D. Howe Institute’s Telecommunications Policy Working Group point to a series of recommendations. At the current cross-roads for Canada’s telecommunications sector, the economic imperative for expedient deployment of next generation digital infrastructure requires decisive government action to resolve pressing policy challenges. In particular, the federal government must provide facilities-based providers with a clear and predictable regulatory framework that coherently balances vigorous price competition with incentives for ongoing investment to improve network and service quality. In making decisions about the direction of policy, governments should rely on methodologically robust analysis and data, such as Statistics Canada’s consumer price

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index. To resolve holdups for infrastructure deployment, the federal government should intervene to assert its jurisdiction for telecommunications where municipalities or provincially regulated utilities unconstitutionally act to inhibit or impose conditions on passive infrastructure access. To accelerate rural and remote connectivity, federal and provincial governments should streamline and coordinate their policy aims and financial incentives.

## **Working Group Mandate:**

The C.D. Howe Institute has established the Telecommunications Policy Working Group to identify and distill policy directions on the strategic questions facing Canadian telecommunications – particularly concerning:

- Promotion of vigorous competition for pricing and quality for telecommunications services;
- Investment in next generation infrastructure; and
- Inclusive access to telecommunications services and participation in the digital economy.

## **Objectives and Format:**

This Working Group will:

- Meet monthly to distill perspective for government and identify priority policy challenges;
- Issue communiqués synthesizing discussions, identifying policy options and differing perspectives (to be drafted in coordination with co-chairs and published after feedback from members);
- Identify pressing policy questions for research by Institute;
- Contribute to Institute initiatives on issues identified by the group (e.g., podcasts, webinars).

## **Members:**

- **Lee Bragg**, Executive Vice Chair, Eastlink.
- **Lucy Casacia**, Vice-President Smart Solutions, WSP.
- **Robert Ghiz**, President & CEO, Canadian Wireless Telecommunications Association.
- **Lawson Hunter**, Senior Counsel, Stikeman Elliott LLP.
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- **Marie-Helene Labrie**, Senior Vice-President, Public Affairs, Cogeco.
- **Daniel Levitan**, Vice President of Stakeholder Relations, Hydro One.
- **Robert Malcolmson**, Chief Regulatory Officer, BCE – Bell.
- **Viet Nguyen**, Director , Head of Government & Industry Relations, Ericsson.
- **Chima Nkemdirim**, Vice-President, Government Relations, Shaw Communications.
- **Steve Orsini**, Co-chair and Adjunct Professor, Public Policy & Administration, Carleton University and former Ontario Secretary of Cabinet.
- **Wayne Purboo**, Senior Vice-President, New Relic, Inc.
- **Stephen Schmidt**, Vice-President, Telecom Policy & Chief Regulatory Legal Counsel, Telus.
- **Terence Smith**, Partner, Boston Consulting Group.
- **Susan Stanford**, Assistant Deputy Minister, Connectivity and Distributed Growth, Government of British Columbia.
- **Konrad von Finckenstein**, Senior Fellow at the C.D. Howe Institute.
- **Scott Wallsten**, President, Technology Policy Institute.
- **Len Waverman**, Co-chair and Dean of DeGroot School of Business at McMaster University.
- **Ted Woodhead**, Senior Vice-President, Regulatory Affairs, Rogers Communications.