Summary of 16 October New Frontiers for Broadband and Resilience in Telecommunications – Satellites and Beyond

by Erik Bohlin, Romel Mostafa, Jean Pier Poma Rios, Ivey Business School, and presenters

The workshop on the theme "New Frontiers for Broadband and Resilience in Telecommunications – Satellites and Beyond" was convened on 16 October 2024, at the Ivey Donald K. Johnson Centre in Toronto. It attracted more than 70 in-person registrations and 25 webinar participants. It was the third Ivey Workshop on Telecommunications Policy, convened by the Ivey Chair in Telecommunications Economics, Policy and Regulation, *Erik Bohlin*, and the Director of Lawrence National Centre for Policy and Management, *Romel Mostafa*, Ivey Business School at Western University.

This workshop focused on the critical role of non-terrestrial networks (NTN), including various applications of satellite and direct-to-device integration, enhancing network resilience and security, providing new business models, raising new regulatory challenges, and bridging the digital divide. The purpose of the workshop was to gather policy makers, industry representatives and researchers to address the increasing importance of satellite networks for broadband policy and resilience amid several challenges and topics, such as:

- Emerging geopolitical security and extra-territorial impacts of satellite networks
- Resilience reconsidered: GPS, cybersecurity, emergency management
- Space race, legal options and crowding-out
- New solutions for digital divide
- Regulatory asymmetries, bottlenecks, roaming and open access
- New spectrum assignment and licensing opportunities
- New business models and network substitutions
- New opportunities for public-private partnerships and government finance

This workshop is being organized at a time when Innovation, Science and Economic Development (ISED) Canada has launched a consultation on mobile coverage and satellite networks, and similar initiatives have been launched in the USA, Australia and the United Kingdom.[1] The event convened international experts from academia, government, and industry to address pressing questions and solutions.

Government officials from Canada, industry and international experts spoke during the day. Here follows a summary of each presentation, with implications toward the end. Complete presentations are available at the Ivey Business School website, together with the agenda of the day, also in the Annex of this report.[2]

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[1] See further https://ised-isde.canada.ca/site/spectrum-management-telecommunications/en/learn-more/key-documents/consultations/consultation-policy-licensing-and-technical-framework-supplemental-mobile-coverage-satellite

[2] See https://www.ivey.uwo.ca/news/events/2024/10/new-frontiers-for-broadband-and-resilience-in-telecommunications-satellites-and-beyond/

In the introduction, Professor *Erik Bohlin* emphasized that the ambitions of the Ivey Workshops on Telecommunications Policy are to invite government and industry to reflect on the pressing situation for the telecom infrastructure for Canada. There is a need for an increased dialogue between industry and government about the fundamental objectives for developing a strong, viable Canada, and the enabling role that telecom infrastructure may play in achieving that vision. Several government initiatives are on-going, with implications for how satellites can improve the state of broadband access and resilient networks in Canada. Satellites are also being integrated by industry in their various service offerings. Some are even speculating that satellites will transform our communication landscape fundamentally, with potential big industry upheavals and changes for government policy.

Professor *Romel Mostafa*, Director of Lawrence National Centre for Policy and Management, welcomed the participants, emphasizing how the Ivey Workshops on Telecommunications Policy has evolved step by step, with both consistency and new topics. Today's workshop builds further on the first workshop on broadband, likewise on the second workshop which was on resilience.[3] Moreover, the centre has published a recent policy brief on broadband and non-terrestrial networks, so the scope of today's workshop fits well with research at the centre.[4] The workshops have been a resounding success, and an engaged and returning community has been shaped, evidenced by a completely full room, with all seats taken!

Andre Arbour, Director General at ISED Canada, started the presentation program and emphasized three main points. First, the government's connectivity strategy launched in 2019 recognizes the importance and potential role of satellites to complement other technologies, in realization of the grand goals. With the new satellite technologies available, satellite provides interesting and cost-effective solutions for broadband and access where coverage is problematic, particularly for remote areas. Second, an on-going consultation by ISED addresses conditions, opportunities and challenges for allowing satellite constellations to use frequency bands that are traditionally allocated to commercial mobile services, for the purpose of providing satellite services direct to terrestrial devices, such as smartphones . Mr. Arbour focused on several challenges: the licensing regime, including roaming conditions; emergency calling (911) and tracing through a satellite-to-device network; and concerns about viable business models. Third, Mr. Arbour commented on the recently concluded financial agreement between the government and Telesat, providing a $2.14 billion loan to support the development and manufacturing of Telesat's LEO constellation. This includes manufacturing satellites by the Canadian firm MDA Space. While some commentators have framed this initiative as solely about connectivity, the core objectives are much broader and concern national interests in terms of sovereignty and the development of the Canadian space sector.

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[3] For both workshops with presentations and summaries, see https://www.ivey.uwo.ca/news/events/2023/10/comparative-perspectives-on-broadband-regulation-and-access/, and https://www.ivey.uwo.ca/news/events/2024/05/building-resilience-in-telecommunications-in-canada-and-beyond/

[4] For the policy brief, see https://www.ivey.uwo.ca/lawrencecentre/research/2024/03/policy-brief-achieving-ubiquitous-broadband-access-through-next-generation-non-terrestrial-networks-ntns/

Martin Doczkat, Division Chief, Federal Communications Commission (FCC) of the United States, provided an engaging overview of both fundamental outlooks of the FCC and recent initiatives on satellites in terms of rulemaking and applications.[5] Starting with the overview, the vision of a Single Network Future with complete seamless flow between technologies and communication needs has recently been emphasized by FCC, and this vision includes satellites. On the recent initiatives, Mr. Doczkat elaborated on the recent Report and Order (R&O) and Further Notice of Proposed Rulemaking (Further Notice) on Supplemental Coverage from Space (SCS). This initiative allows satellite operators collaborating with terrestrial service providers to seek FCC authorization to operate space stations on certain licensed, flexible-use spectrum currently allocated to wireless services. Once authorized, a satellite operator can then serve a wireless provider's customers connectivity outside of coverage areas. In addition, the presentation elaborated upon flexible network architectures that included satellite, including the far-reaching implications for moving earth stations, such as airplanes, trains and ships. Generally, FCC sought a framework which is flexible and allows for both innovation and standardization. Finally, Mr. Doczkat described some important satellite applications in emergency situations, most notably the recent heavy hurricanes in the US.

Dr. *Bronwyn Howell*, Senior Lecturer at Victoria University at Wellington, New Zealand, emphasized the importance of satellite from several perspectives –geography, demographics, network structure, competition, emergency management and unique customer value. First of all, New Zealand is not only very far away but also quite isolated, with Australia as its closest neighbor and being 2000 km away. And the degree of urbanization is very high, so that for instance more than 50% lives in the very top half of the north island of New Zealand. The urbanized and concentrated population has enabled 87% availability of fiber to the home, with 50% uptake. On the other hand, New Zealand is world leader in satellite retail subscriptions – more than 14% of rural households, leading in the OECD. This uptake is essentially because of Starlink, with higher performance of other networks and solutions, and a high willingness to pay by consumers. (Communications expenses are almost 3% rural household income.) The satellite provides a new dimension of competition, as New Zealand has just one terrestrial network with several service competitors. The satellite promises also new capabilities for emergency management in times of hurricanes, landslides, wildfires and other disasters, quickly setting up connections when cables are broken. Satellite to mobile texting service is already available. Generally, the satellites change the whole telecom landscape quickly, with new and promising research venues!

Professor emeritus *Peter Cramton*, University of Maryland, presented a vision for open access and efficient market mechanisms that holds significant potential for a variety of applications. His model, which is designed to address different kinds of market failures in electricity, air transport, financial trading, and communications, features a flexible market design with an intermediary to enable flow trading. This model is applied to many communication scenarios, including merger remedies, a spot market for spectrum frequencies, and a trading platform for forward and spot global communications. Notably, it also serves as a framework for trading the wholesale capacity of intersatellite optical mesh networks in space. Participants in this model bid persistent piecewise-linear downward-sloping net demand curves for portfolios of products. The regulator or

[5] With the disclaimer: The views expressed in the presentation were only personal and do not necessarily represent the views of the Federal Communications Commission or its Commissioners.

market participants may designate a market operator as an independent trading platform. The designated market operator clears the market, finding unique prices and quantities that maximize as-bid social welfare. Prices, aggregate quantities, and the slope of the aggregate net demand are made public. The result is an efficient market mechanism with significant potential gains for society. Although still in its early stages, this model is gaining traction in several regulated markets, with the potential to enhance welfare across various applications.

Associate Professor *Rob McMahon*, University of Alberta, joined virtually and reported on a recent study as part of a multi-year project with Native Women's Association of the Northwestern Territories (NWT). The project examines the impacts of LEO satellite internet in Indigenous communities in the Northwest Territories, supported primarily by Indigenous Services Canada. This particular study focused on two small fly-in communities in the Northwestern Territories, Aklavik and Lutselk'e. According to Statistics Canada, Aklavik has 220 dwellings with 536 people, and Lutselk'e has 130 dwellings with 333 people. The study was designed to study the adoption and use of LEO satellites (Starlink) compared with other telecommunications services, and involved some 45 questions, conducted on site by trained local researchers. The response rate was just about a sixth of the households in the two communities. While the study has several typical limitations, it provided several interesting and stark results. First, larger households and/or those with higher numbers of devices prefer satellites, possibly related to higher data overage fees charged by the alternative broadband provider. Second, Starlink users report fewer challenges associated with quality of service, speed, reliability and cost. Instead, they reported more challenges associated with the availability and cost of devices. Third, Starlink users reported they are more likely to use online services, compared to non-Starlink users who are more likely to access services in-person and more often travel to an urban centre to access services. Fourth, Starlink users reported higher engagement in the digital economy, such as through working remotely and buying/selling goods and services online. The preliminary results are compelling on the potential benefits of LEO satellites for very remote communities.

A panel discussion ensued, moderated by *Romel Mostafa*. with industry leaders, including *Michèle Beck*, Senior Vice President at Telesat; *Imran Khan*, Chief Financial Officer at Northwestel; *Phil Moore*, Vice President of Corporate Real Estate and Emergency Response at Telus; and *Sohayla Praysner*, an independent consultant with extensive experience in telecommunications and technology. They explored the evolving role of satellite telecommunications and key industry trends. *Sohayla Praysner* highlighted how the satellite industry is evolving to work seamlessly with terrestrial networks. "Edge computing and virtualization are driving this shift," she noted, emphasizing that these innovations are making satellites more efficient and deeply integrated into the broader digital infrastructure. *Michèle Beck* highlighted the cost reduction in satellite technology, thanks to a number of innovations and to reusable rockets. She added "We're pioneering constellations with onboard processing, offering unprecedented resiliency. These advancements position satellites as a critical component of global connectivity." *Imran Khan* focused on how these advancements benefit remote and Indigenous communities. "Lower costs allow us to offer affordable broadband in areas where laying fiber isn't feasible," he said, emphasizing the role satellites play in closing the digital divide. *Phil Moore* discussed the importance of satellites in emergency response. "During the wildfires in Jasper, satellite units kept up communication when traditional infrastructure failed," he said. He highlighted the role of

satellites in ensuring network resilience, especially in rural areas. The panel agreed that satellites will play a growing role in connectivity, supporting not only remote communities but also national security and critical infrastructure. *Michèle Beck* noted that public-private collaboration is crucial to unlocking the full potential of satellite technologies, ensuring they work in harmony with terrestrial networks.

Professor Emeritus Rob Frieden, Pennsylvania State University, joined virtually and engaged the audience with both stark images and a pressing message of the potential for a Tragedy of the Commons in outer space, from the potential proliferation of space junk. This threat contrasts with the great potential of accessing outer space by both satellites and space travel. Without significant amendment to space and spectrum resource management treaties, the United Nations and International Telecommunication Union will continue to lack authority to require mitigation of space debris and to resolve emerging conflicts triggered by space commercialization. While the five Space Treaties, circa 1960s-70s, committed nations to peaceful uses for the benefit of all, private ventures were not anticipated. Spacefaring nations and private ventures need financial incentives to mitigate space debris and foreclose a domino effect that would render space too risky for investment and insurance underwriting. Serious challenges are involved in creating a viable insurance system, and grimly exacerbated by the threat of space weaponization. In view of these challenges, Prof. Frieden offered some recommendations. The five Space Treaties need substantial amendment to create enforceable rights and responsibilities for national governments and private ventures. Moreover, the UN and ITU need to improve coordination of individual and joint responsibilities and more proactively anticipate emerging conflicts. Their registration functions cannot remain passive and perfunctory.

Georg Serentschy, Managing Partner at Serentschy Advisory Services GmbH, put satellites in the context of resilience and geopolitical concerns. While satellite is not the silver bullet for all resilience concerns, satellite is a powerful and valuable means for emergency applications when terrestrial infrastructure fails, but not a magic cure against all resilience issues. For satellites to support resilience, trust is fundamental. The current market for LEO constellations is a quasi-monopoly of Starlink and not only is such strong market dominance a problem, but the main protagonist repeatedly attracts attention with bizarre comments and is able to exert economic power that is more powerful than that of some nation states. This does not exactly build trust when it comes to operating critical infrastructure. Digital infrastructures, in particular those labelled as “critical infrastructures” represent the backbone of our society. It is very costly to improve the resilience and security of digital systems, and this requires a new form of public-private partnership between governments and the private sector. Governments cannot tackle these challenges alone, nor can industry. New ways of collaborating between industry and government should be pursued. Details of the split of responsibilities between government and industry in this partnership remain to be worked out, with each partner taking responsibility in their core area.

Adam Scott, the Vice Chairperson of Telecommunications at the Canadian Radio-television and Telecommunications Commission (CRTC), concluded the workshop with a reflection on the rapidly evolving role of satellite technology and some take-aways for Canada. In his words, “what was once farfetched, has become the near future, or maybe even the present.”

The capabilities of satellite networks have improved tremendously over the last few years, and competition among satellite providers is only increasing. Satellite is not a niche solution, or a

technology that just fills in hard-to-reach parts of the country. Satellite cuts across the entire Canadian telecommunications agenda: from increasing access to high-speed telecommunications services in rural, remote, and Indigenous communities; to expanding cellular coverage along major transportation roads; to improving network reliability and resiliency; to increasing competition and affordability. And satellite networks are a complementary force to terrestrial-based networks, helping further close the digital divide. According to Vice Chairperson Scott, it's not simply a question of satellite vs. terrestrial – it's a matter of finding the best mix of technologies to meet Canadians' needs and deliver the most value.

Two of the CRTC's recent decisions reflect this complementarity. First, to help improve Internet access in Nunavut, late last year, the CRTC committed more than $26 million through its Broadband Fund to a project that proposed to use LEO satellites to bring 50/10 service to all 25 communities in the territory for the very first time. And second, recognizing the continued importance of building fibre infrastructure in the territory, the CRTC recently announced its largest funding commitment to date for a project seeking to build a 1,300-kilometre fibre link to connect four of those 25 communities, including one official language minority community. This is the first time these four communities in Nunavut will have access to fibre Internet, or any service provided by way of a terrestrial-based network.

In making the decision to commit funding to a second project in Nunavut, the CRTC noted that the projects would collectively enhance the reliability, quality, and choice of Internet service for residents, and serve as a foundation to connect all of Nunavut. According to Vice Chairperson Scott, this is the perfect example of how satellite and terrestrial-based networks can complement each other to further the telecommunications agenda, and in that same vein, he encouraged all of us to continue working collaboratively to do the same.

The workshop was adjourned shortly after 5PM.

Annex Agenda of the Day – 16 October

Wednesday, October 16, 2024
12 – 6 p.m.
Donald K. Johnson Centre, First Canadian Place / Exchange Tower
130 King Street, Toronto, Ontario

Host
Ivey Business School, Western University, Ontario

Organizer
Erik Bohlin, Ivey Chair in Telecommunication Economics, Regulation and Policy – with support from Lawrence National Centre for Policy and Management, Ivey Business School

Moderator
Romel Mostafa, Director, Lawrence National Centre for Policy and Management, Ivey Business School

Schedule

Time	Location
12:00 – 1:00 p.m.	**Welcome Buffet Lunch**
1:00 – 1:10 p.m.	**Welcome and Introduction** Erik Bohlin, Professor, Ivey Business School and Romel Mostafa, Director, Lawrence National Centre for Policy and Management, Ivey Business School
1:10 – 1:30 p.m.	**Opening Keynote: Satellites Contributing to Canadian Broadband Policy and Resilience** Andre Arbour, Director General, Innovation, Science and Economic Development Canada (ISED)
1:30 – 1:50 p.m.	**Recent Initiatives by FCC on Satellite Access** Martin Doczkat, Office of Engineering and Technology, Federal Communications Commission, USA (to be confirmed)
1:50 – 2:10 p.m.	**Satellites and Digital Divide in New Zealand** Bronwyn Howell, Professor, Victoria Business School, New Zealand
2:10 – 2:30 p.m.	**An Open Access Model for Inter Satellite Wholesale Communication** Peter Cramton, Emeritus Professor, University of Maryland, USA and International Research Fellow, Planck Institute, Germany
2:30 – 3:00 p.m.	**Coffee Break**
3:00 – 3:15 p.m.	**Impact of LEO in Remote Indigenous Communities: Canada's Northwest Territories** Rob McMahon, Professor, University of Alberta (virtual presentation)

3:15 – 4:15 p.m.	**Panel Discussion** Moderated by Romel Mostafa, Director, Lawrence National Centre for Policy and Management, Ivey Business School Michèle Beck, Senior Vice President, Telesat Imran Khan, Chief Financial Officer, Northwestel Phil Moore, Vice President, Corporate Real Estate and Emergency Response, Telus Sohayla Praysner, Independent Advisor
4:15 – 4:30 p.m.	**Dangers of Regulatory Vacuums in Space** Rob Frieden, Emeritus Professor of Telecommunications Law, Penn State University
4:30 – 4:45 p.m.	**What are Some Takeaways for Canada?** Georg Serentschy, Managing Partner, Serentschy Advisory Services, Austria
4:45 – 5:00 p.m.	**What are Some Takeaways for Canada?** Adam Scott, Vice Chair, Canadian Radio-Television and Telecommunications Commission (CRTC)
5:00 – 6:00 p.m.	**Networking Reception with Cocktails and Hors d'oeuvres**

Speakers

Andre Arbour is the Director General of Telecommunications and Internet Policy at Innovation, Science and Economic Development Canada. He is responsible for leading policy development on various telecommunications matters including Internet and mobile wireless competition, rural and remote access, international Internet governance and in relation to the Telecommunications Act. Prior to his current role he occupied a series positions working in telecommunications and public policy. Past initiatives including leading development of Canada's first national Connectivity Strategy, leading policy for $4 billion in connectivity program funding, and policy development on various issues related to net neutrality and consumer protection.

Michèle Beck is Telesat's Senior Vice President, Canadian Sales responsible for both Enterprise, Government and Broadcast sales in Canada. Ms. Beck joined Telesat in 1987 where she began her career in engineering, developing new products in digital video compression, HDTV and direct-to-home satellite services. She was then hired by the Canadian Cable Telecommunications Association serving as their Vice President Technology. In 2006, Ms. Beck returned to Telesat as Director, Engineering responsible for all satellite service offerings including R&D, enterprise, broadband and broadcast. She soon was appointed Director, North American Enterprise and Government Sales where she built an impressive record enabling Telesat customers to achieve operational efficiencies and meet other business goals by applying her expertise in technical, commercial and regulatory matters. Promoted to her current position in 2013, Ms. Beck holds a BA Sc., Electrical Engineering from the University of Ottawa.

Erik Bohlin is Professor and Chair in Telecommunication Economics, Policy and Regulation at the Ivey Business School. He is an expert in telecommunications policy, an inter-disciplinary topic concerned with the impact of digitalization in the economy and society. He is Editor-in-Chief of *Telecommunications Policy*, a premier journal in the field. He is on leave as Professor at Chalmers University of Technology, Sweden. His graduate degree is in Business Administration and Economics at the Stockholm School of Economics (1987) and his Ph.D. is from Chalmers University of Technology (1995). He is a Member of the Swedish Royal Academy of Engineering, and Past Chair of the International Telecommunications Society, an inter-disciplinary professional society convening conferences on the evolving digital society and policy needs.

Peter Cramton is an Emeritus Professor of Economics at the University of Maryland and an International Research Fellow at the Max Planck Institute for Research on Collective Goods. Since 1983, he has researched auctions and market design, designing complex markets to achieve goals. Applications include electricity, financial, and communications markets. He has introduced innovative market designs in many industries. He has advised many governments on market design and dozens of bidders in major auctions. Cramton is a co-inventor of spectrum auction designs used in North America, Europe, and Asia-Pacific. He is an advisor and chief economist to companies implementing markets. From 2015-2021, Cramton was an independent director of the Electric Reliability Council of Texas (ERCOT) board. He received his BS in Engineering from Cornell University and his PhD in Business from Stanford University.

Robert Frieden holds the Pioneers Chair in Telecommunications and Law at Penn State University. He is a leading analyst in the field of telecommunications and Internet infrastructure and has authored many comprehensive works on international telecommunications, Internet law and policy, cable television, and communications law. Professor Frieden has published over 100 journal articles and four books on various telecommunications topics. Prior to joining Penn State, Professor Frieden served as Deputy Director, International Relations, Motorola Satellite Communications, Inc., where he managed the regulatory and international liaison efforts for Motorola's IRIDIUM low earth orbiting satellite project. He has held senior level policy making positions in government and worked in the private sector as an attorney. Professor Frieden received a B.A. in Telecommunications from the University of Pennsylvania and a J.D. from the University of Virginia.

Bronwyn Howell is the undergraduate programme director for the BCom Management major, and teach decision-making and operations management in the School of Management, Victoria University of Wellington. Bronwyn has a multidisciplinary academic background in Operations Research, Economics, Management and Public Policy, and practitioner experience in the information technology and health sectors. Her current research focuses on the governance, policy and management of new technology projects, particularly mobile telecommunications and distributed ledger (blockchain) applications. This draws on her work in decision-making under uncertainty, risk and risk management and the intersection with government funding, policy decisions and regulatory interventions. The latter includes her work on public-private partnerships in both the telecommunications and health sectors. Bronwyn has a particular interest in comparing the effects of new technology projects in small, remote and developing countries, with to those in large, centralised economies, focusing on the effects of scale and distance on outcomes. Her research is multidisciplinary, and predicated upon a systems view of interactions within projects, firms, industries and economies.

Imran Khan is Chief Financial Officer and VP of Corporate Services at Northwestel. In this role, Imran oversees Northwestel's Finance and Accounting, Capital Program, Carrier services, Legal services, Facilities and fleet Management, Procurement and Supply Chain functions, and Corporate security. Over the past 18 years, Imran has held several leadership roles, encompassing operations, finance, engineering, and, most recently, the MacValley Fibre Link Project. He has varied experience in financial management, business leadership, and corporate strategy. Based in Yellowknife, Imran is also a dedicated community member. His active involvement in the Stanton Territorial Hospital Foundation and the Yellowknife Chamber of Commerce Board of Directors showcases his commitment to Yellowknife.

Rob McMahon is an Associate Professor in the Media & Technology Studies Unit and the Department of Political Science at the University of Alberta. Prior to joining the University of Alberta in 2015, he worked as a postdoctoral researcher with the First Nations Innovation Project at the University of New Brunswick and co-founded the First Mile Connectivity Consortium, a national nonprofit association of Indigenous technology organizations. In 2020, Dr. McMahon received the Killam Accelerator research award from the University of Alberta. From 2018-2022 he was the co-director of the DigitalNWT project, which employs a co-creational approach to strengthen the foundation of community-based digital literacy in the Northwest Territories (NWT). Today he is part of a multi-year project investigating the impacts of LEO satellite access in rural/remote communities in the NWT.

Phil Moore is Vice President, Corporate Real Estate and Emergency Response at TELUS. He has been with TELUS for over 25 years and has held a variety of senior positions. Since 2018 he has been the Chair of TELUS Emergency Management Operating Committee. He has led the organization through preparation and response for impacts from floods, wildfires, atmospheric rivers, Derechos and the COVID-19 pandemic. His team takes each response as an opportunity to learn and direct further investment into climate risk mitigation and response. TELUS response goes beyond infrastructure protection, service continuity and safety and has evolved into a more impactful humanitarian response both domestically and internationally. Phil has a Master of Business Administration from the University of Calgary, a post-diploma from the British Columbia Institute of Technology and a Bachelor of Arts from the University of Western Ontario.

Romel Mostafa is an Assistant Professor of Business, Economics and Public Policy at the Ivey Business School. Romel's areas of research and expertise include strategy & capability development in new firms, innovation & competitive dynamics, industrial evolution & policy, as well as behavioural decision-making. He has published in a number of leading academic journals, including Academy of Management Journal, Journal of Behavioral Decision Making, Journal of Risk & Uncertainty, Organization Science and Management Science. His research and commentaries have been featured in global media outlets such as CNN, NPR and the New York Times. Romel has taught both at graduate and undergraduate levels, and received several teaching awards. He obtained his PhD and MSc from Carnegie Mellon University, and BA from Lawrence University. As the Director of Ivey's Lawrence National Centre for Policy and Management, Romel spearheads the Centre's research, outreach and teaching initiatives. The

Centre advocates for sound policy and corporate action towards unlocking national competitive advantage, by focusing on critical challenges and opportunities around digital, trade and social infrastructural pillars.

Sohayla Praysner is a customer-focused industry leader who has built partnerships with Canadian Service Providers throughout her career. Most recently, Sohayla was Country Manager, Canada at Intelsat, who operates the world's largest integrated satellite-terrestrial network. Prior to that, Sohayla held several leadership roles at Cisco Canada, Alcatel-Lucent and Nortel Networks. Her telecom career began at Bell Canada as a Network Engineer, and she has since led significant initiatives enabling large scale deployments of transformational technologies across Canada. Sohayla is a Professional Engineer and a graduate of the University of Toronto's Electrical Engineering program. She enjoys being involved with leading edge communication technologies that allow people to live, work and interact seamlessly across multiple, integrated terrestrial and non-terrestrial networks. Sohayla remains engaged with Engineering and Business programs and students at Canadian universities, as a coach and mentor to the next generation of professionals who will shape the future of the country.

Adam Scott is currently the Vice-Chair of Telecommunications at the Canadian Radio-television and Telecommunications Commission. With over 20 years of telecommunications policy and regulatory experience, Adam has managed complex files with technological, economic, social and legal dimensions, including Canada's 5G spectrum auctions. He has 12 years of experience at the executive level and brings a wealth of legislative, policy, regulatory, and program expertise to the telecommunications space. During his time at Innovation, Science and Economic Development Canada, he was responsible for developing strategies on how to optimize social and economic benefits of wireless spectrum in Canada. For many years, he developed government programs to improve broadband access in rural and remote parts of Canada, and developed a vision and strategy for improving Canada's communications infrastructure, addressing rural gaps, affordability issues, competition, innovation and investment. Adam brings significant experience to the table in consulting and cooperating with industry, civil society, other levels of government, departments and agencies.

Georg Serentschy advises C-level and top experts in the digital sector (platforms, telecommunications, media, and technology) on strategy, regulation & competition, spectrum policies, cybersecurity policies and innovation. A prime focus of his advisory work is the strategic positioning of companies in a specific regulatory environment. Experience shows that regulation is the most critical lever for driving commercial performance, investment and innovation in the digital sector. Georg's professional career spans more than 40 years. It began in nuclear physics, after which he turned to industrial research and development in various high-tech industrial areas such as software development, solar energy, aerospace, and telecommunications. After his career in industry, he joined Arthur D. Little, a strategy consulting firm. Then, for over a decade, he headed up the Regulatory Authority for Telecommunications in Austria (RTR-GmbH). The highlight of Georg's regulatory career was chairing and vice-chairing BEREC (Body of European Regulators for Electronic Communications). In 2014, he founded his consulting boutique, focused on advising C-suite and top digital sector experts on strategy, artificial intelligence, regulation & competition, spectrum policy, cybersecurity policy and innovation. In parallel, he continues to work with leading consultancies on a project basis.