

Mobile Wireless in Canada: Recognizing the Problems and Approaching Solutions



March 2014

The CMCR Project's Wireless Report: Mobile Wireless in Canada: Recognizing the Problems and Approaching Solutions

The Canadian Media Concentration Research Project is releasing the final iteration of this report on the state of mobile wireless markets in Canada. The first draft was presented at a panel on "The State of Competition in Canada's Telecommunications Sector" at the International Institute of Communications (IIC)/Canadian Wireless Telecommunications Association (CWTA) conference on November 17 and 18th at the Ottawa Conference centre. We were delighted to offer our views and to debate the issue of whether mobile wireless markets in Canada are highly competitive or badly concentrated at the conference.

We argue in favour of the latter claim. This report offers a fairly comprehensive, long-term body of data that places trends in Canada in a comparative international context. It shows that Canada shares a similar condition with many, indeed, almost all countries that we have studied: high levels of concentration in mobile wireless markets. Canada is not unusual in this regard, and indeed no matter whether we look at things from the perspective of 19 countries, the 34 OECD countries, or 57 countries that account for four-fifths of the world's population, the answer is pretty much the same in all cases: concentration levels in mobile wireless markets are "astonishingly high everywhere" (Noam, 2013).

The difference between Canada and elsewhere, however, is whether or not there is the resolve to do anything about this state of affairs. Until recently, the answer to that question has not been promising, although there are some bright spots on the horizon and it is possible that they will light the way yet.

For the time being, however, the stronger tendency amongst defenders of the status quo is to deny reality, even when incontrovertible evidence stares them in the face. This is symptomatic of a bigger problem, namely that in Canada the circles involved in discussing wireless issues are exceedingly small and they like to hear the sound of one another's voices all too much. Their members do not look kindly on those who might rock the tight oligopoly that has ruled the industry from the get-go.

When by any conventional standard of mainstream economics, mobile wireless markets are remarkably concentrated, trained economists look the other way. When new phenomenon are taking root in one country after another around the world – i.e. the spread of national wholesale wireless carriers in the British and European mobile wireless markets and many others as well -- plus the fact that countries with four or more national Cellcos are in the firm majority -- apologists for the industry either turn away or, worse, point to such entities as a dying breed.

The reality, as we show, is that, while highly concentrated, new 'maverick brands' like T-Mobile in the US, Hutchison 3G in the UK, Hot Mobile and Golan Telecom in Israel, and Iliad's Free in France are taking hold in many countries. There is some

humour in this as well, as T-Mobile’s advertisement clips on Youtube show quite brilliantly (see [here](#) and [here](#), for instance).

“Maverick Brands” share many things in common, although Canadians might be forgiven for never having heard of such a thing:

- all have faced incumbents bent on giving them a still birth;
- all play the role of status quo disruptors, pushing down prices, driving massive growth in contract free wireless plans, unlocking phones, and doing their best to dig in for the long haul.
- they have all relied on the state for a fundamental *public* resource that underpins the entire mobile wireless set-up: spectrum, an immensely valuable public resource that governments grant privileges to use in return for – at least in theory – providing public services at a fair return rather than just filling the coffers of the state treasury.
- Inevitably, governments must choose between who will get access to this resource, and who will not. This is the unavoidable norm, and the Harper Government was in such a position with respect to the recently concluded 700 MHz spectrum auction.

Incumbents themselves have fought tooth-and-nail against new upstarts (TMUS, Wind, 3, Free, Hot Mobile, Freedom Pop, etc), and used every tool in their power to stare down democratically elected governments in bids to preserve their own domination of the spectrum. In Canada, 90% of spectrum actively in use is held by three companies, as of November 14th, 2013: Rogers (41%), Telus (25%) and Bell (24%). The rest is scattered amongst Sasktel, MTS and a handful of “new entrants”: Quebecor (Videotron), Wind, Mobilicity and Public (recently acquired by Telus).

The big three, not unusually, and much in the spirit of those who stand in a similar place in other countries around the world, go to great lengths to hold back the tide and defend their privileges. Last summer’s “wireless wars” expressed this reality, as Bell, Rogers, and Telus fought on all fronts against what they perceived as a double-barreled threat from Verizon and the government’s relatively newfound resolve to:

- foster more competition in Canada’s mobile wireless market,
- drive down domestic and international roaming charges,
- and otherwise give Canadians access to world class wireless services .

This study underpins its analysis with a comprehensive, long-term and systematic body of data from the FCC, OECD, Ofcom, Wall Communications, CRTC, and many other sources as cited, all of which universally support the same conclusion: namely, that Canada’s mobile wireless market is a lackluster performer.

We show:

- wireless markets in Canada, whether measured by revenue, spectrum held, spectrum in use or subscribers, whether at level of the country as a whole, specific provinces or Canada's nine biggest cities – Toronto, Montreal, Vancouver, Ottawa-Gatineau, Calgary, Edmonton, Quebec City, Winnipeg, Hamilton -- are remarkably concentrated;
- in terms of standings in international league tables, Canada's wireless market, based on a composite score using price, penetration and speed, ranks 19th; the US ranks 10th;
- in terms of penetration, or access and use, matters are worse: Canada ranks 25, while on price it ranks 28th, yet despite all this Canadians are Number 1 when it comes to how much time they spend on the internet, how many GBs of data they upload and download, smartphone data they send and receive, use of Wikipedia, log onto Facebook, and watch television;
- Canada ranks very highly when it comes to capital investment in its wireline infrastructure, no matter how you measure it and when measured for one, five, ten or more years;
- The same cannot be said of wireless despite the fact that Canada has fared well in the most recent year for which complete data is available (2012) because Bell, Rogers and Telus flipped the switch and began rolling out in a substantial way LTE/4G networks. Stretch the time horizon, however, and that standing collapses and Canada falls toward the bottom third of the pack – 23rd out of 34 OECD countries.

Other findings emerge in the report too numerous to outline here. However, one thing that stands out is that those governments that stare reality in the face and act accordingly must stiffen their spine against the backlash that they will inevitably meet when they encounter some of the biggest, and most profitable, companies in the country. That is the lesson learned by governments and regulators everywhere, particularly as this study shows, in the UK, the US, Israel, France, with many others noted only in passing but widely recognized in the literature.

Whether or not people get the media, wireless and internet capabilities they need to live, love and thrive in the 21st century depends on the right choices being made. Those choices now stare Canadians in the face. How we act, and the government moves ahead, will set the baseline for how mobile wireless media in this country will evolve for at least the next two decades – the length of the licenses awarded in the recent 700 MHz spectrum auction – and probably for a lot longer than that!

As with the earlier drafts of this report, we would be delighted to hear constructive comments and criticism that can help us improve our understanding of the issues at hand and any future work we do on this topic. This final draft involved further cleaning up editorial matters, adding a few missing references and clarifying key concepts used, notably the idea of national wholesale carriers. The complete data sets behind the charts, figures, tables and rankings have also been posted and linked to the CMCR project website under the "Wireless Report" tab. We have also added two appendixes that describe the primary data sources used and methods employed

to arrive at our rankings across measures of penetration, speed, price and capital investment. Our best efforts have been made to ensure the accuracy of the data and the correctness of our interpretations. If, however, you find something you believe to be in error, please let us know and we will look into it, make sure that things are set aright when need be, and thank you.

The [Canadian Media Concentration Research](#) project is directed by Professor Dwayne Winseck, School of Journalism and Communication, Carleton University. It is funded by the Social Sciences and Humanities Research Council and has the mission of developing a comprehensive, systematic and long-term analysis of the media, internet and telecom industries in Canada.

Professor Winseck can be reached at either dwayne_winseck@carleton.ca or 613 520-2600 x.7525.

Contents

Introduction

The Wireless Wars and the Damnation of International Comparative Studies: or the OECD as the Canadian Cellco Industry's Jilted Lover

Wireless Concentration in Canada: The Real World

Wireless Markets are Highly Concentrated Almost Everywhere

The State of Wireless Markets in Canada

What's a Regulator to Do? Telecoms Regulatory Toolkit for the 21st Century

Tool #1, Importance of Cultivating Competitive Markets and 4 or More Cellcos

The Fourth Player as Holy Grail (or Why a Strong "Maverick Brand" is a Good Thing)

The UK: Promoting Four National Wireless Wholesale Companies

The US: The Department of Justice and the Aborted AT&T T-Mobile Merger

The 4+ Competitive National Cellcos Model Around the World: France and Israel

Need for Clear Policy and Regulators with a Spine: Expanding the Regulatory Remit from the Edges-In

So, What's the Problem Anyway?

Penetration, Prices, ARPU and Profits

Conclusion and Where to Go from Here?

Figures

Figure 1: The Increasingly Network and Mobile-Centric Media Universe, 2012

Figure 2: Household Access to Information and Communication Technologies by Income Quintile, 2012

Figure 3: Summary of Spectrum Holdings by Wireless Service Provider

Figure 4: Share of Spectrum in Active Use (Antenna) in Canada's Largest 9 Cities, 2012

Figure 5: Average Revenue Per User (per Annum): Canada vs. OECD, G7& and Select Countries, 1998-2012 (OECD Data)

Figure 6: Average Revenue Per User (per month): Canada vs. OECD, G7& and Select Countries, 2001-2012 (BAML Data)

Figure 7: Operating Profits, Rogers, BCE and Telus vs. Canadian Industry Average, 1990-2012

Figure 8: Bell, Rogers, Telus & Canada EBITDA vs OECD + G7

Maps

Map 1: Church & Wilkins 19 Country Survey of Wireless Concentration, 2012

Map 2: 34 OECD Country Survey of Wireless Concentration Levels, 2012

Map 3: 57 OECD + Bank of America/Merrill Lynch 57 Country Survey of State of wireless Concentration Levels, 2012.

Map 4: Wireless Service Area Map

Tables

Table 1: Media + Broadband Use and Rankings in Select OECD Countries, 2012

Table 2: Market Share based on Subscribers, by Province, 2012

Table 3: Composite Wireless Ranking: Penetration, Speed, Price, 2011-2012

Table 4: Composite Wireline Ranking: Penetration, Speed, Price, 2011-2012

Table 5: Composite Wireless + Wireline Ranking, for Penetration, Speed, Price (33 Countries), 2011-2012

Table 6: Composite Ranking of Capital Investment in Wireline Infrastructure, 1997-2012

Table 7: Composite Ranking of Capital Investment in Wireless Infrastructure, 1997-2012

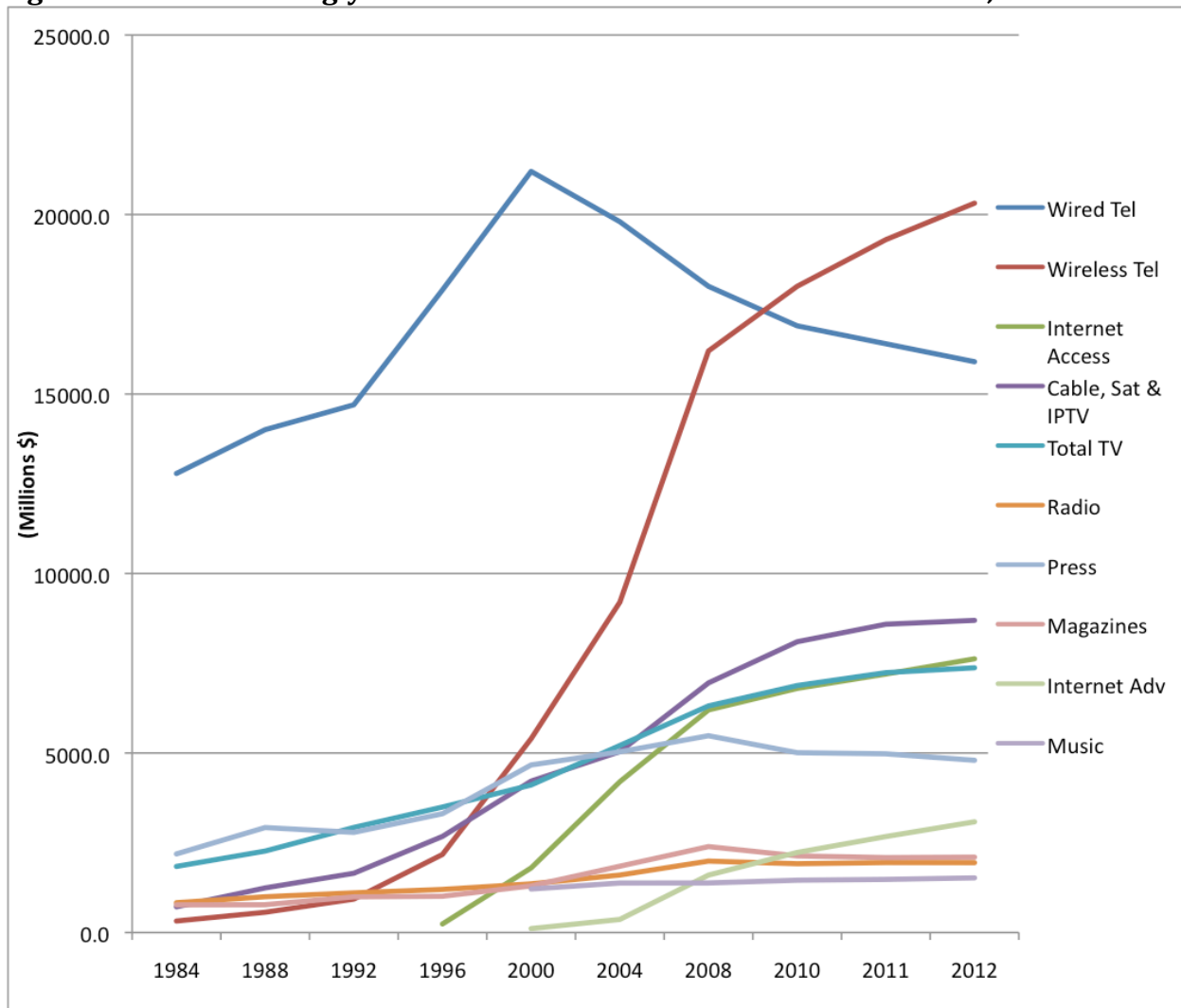
Mobile Wireless in Canada: Recognizing the Problems and Approaching Solutions¹

Introduction

Over the course of thirty years wireless services in Canada have gone through four successive generations of network technologies and personal communication devices. Hand-held devices have gone from being the size and weight of a brick to lightweight, powerful computers carried about in the palm of our hands, internet connected, deeply personal and socially powerful. Mobile wireless media are integral to contemporary life.

Mobile wireless services are also a cornerstone of the digital media ecology and the economy. With revenues of \$20.3 billion in 2012, such services account for more than a quarter of the entire \$73.4 billion network media economy in Canada (CMCR, 2013a). The rate of growth for mobile wireless relative to other media and the economy generally has also been enormous, and fast, breaking gallop only in the past few years, as the market matures and in the face of the economic uncertainty that has followed on from the global financial crisis. Revenues for mobile wireless services overtook those of wiredline services in Canada in 2009 ([CMCR, 2013a](#)); two years later the cross-over occurred at the international level (ITU, nd). In short, more and more of our lives are being immersed in a wireless-centric world, and this is only going to continue for the foreseeable future. Figure 1 below depicts the trends.

¹ I owe a great deal of thanks to many people who pulled out all the stops to help me finish this study/report in an incredibly short period of time from being invited just over a month before it was first presented at the International Institute of Communication/Canadian Wireless Telecommunications Association conference in Ottawa, November 18, 2013. Let me start with research assistants from the School of Journalism and Communication. Caitlin Turner made all of the visuals for this report and the presentation, while her partner, Connor Turner stepped away from his Amardillo Studios to apply his data visualization skills to this project in its final stages. Ben Klass from the University of Manitoba and Lianrui Jia from Carleton did some of the data collection. David Ellis, a long-time consultant specializing in media and internet issues, and instructor at York University rarefully assembled the penetration, price and speed tables. Teaching assistants Emily Hiltz and Henry Guardado helped pick up the slack. The Canadian Spectrum Policy Research group at Ryerson University, Greg Taylor, Catherine Middleton and Paul Goodrick, shared their knowledge and essential research materials with me. Paul and Louise Budde at Budde Communications and Kevin MacDonald at Loxcel prepared datasets on short notice and mindful of an academic researchers' limited budget. Others at the CRTC and Industry Canada offered help where they could, as did principle researchers at the OECD, and George Sciadas of Statistics Canada was a helpful and sage guide, as always. Professor Anders Henten, Aalborg University, Denmark, was also very helpful with respect to pointers to important European Commission sources. Thanks, too, to Hank Intven for the invitation to present, and to Jim Patrick and Donna Lachance of the IIC organizing committee for their generous help and support in terms of allowing several Carleton University students to attend. And finally, my partner, Kristina, deserves huge thanks for having the patience of a saint and a deep well of love and for standing by me every step of the way.

Figure 1: The Increasingly Network and Mobile-Centric Media Universe, 2012

Source: Canadian Media Concentration Research Project, [Media Economy Data](#).

Cisco (2013) estimates that, worldwide, mobile and mobile data traffic “will grow 13-fold from 2012 to 2017, a compound annual growth rate of 66%”. The numbers in Canada are impressive as well, albeit more modest. Mobile and mobile data traffic expanded by 85% in 2012 and is projected to grow 9-fold in the next five years, “a compound annual growth rate of 57%”. Decisions taken now will shape the wireless media environment for decades to come. The 700 MHz spectrum auction licenses recently auctioned will run for twenty years. They may even continue in perpetuity if the past three decades is any guide, and as is the case, for example, currently in the United Kingdom (Ofcom, 2012). A lot is at stake.

For some, things are unfolding as they should. Church and Wilkins (2013), for instance, note “Canadians’ love of smartphones and high rates of data usage”, while claiming that such trends are “a direct result of the rollout of high-speed networks” (p. 19). Unneeded

government intervention threatens to derail the good things already coming down the tracks, they argue -- a view that is shared by others who see the status quo as not only adequate, but cause to celebrate (Nordicity, 2011; Nordicity, 2013; McTaggart, 2013).

Independent analysis and critics, in contrast, are not so sure (Middleton, 2011; Benkler, 2010; Geist, 2013; Nowak, 2013; Seaboard Group, 2013; OpenMedia, 2013). Nor am I. It is no doubt true that for those who own smart phones find the ability to access the internet, their lovers, friends and family from anywhere, anytime, and through an ever expanding galaxy of devices useful, convenient and fun -- a lifeline. Maintaining complex, modern mobile lives demands such connections and involves a great deal of data – the bits and bytes that bind us together. The rapid uptake of mobile wireless technologies embodies such realities (Goggin, 2011; Wellman & Rainie, 2012).

Canadians have long been extensive users of all kinds of media, even if sometimes not with the best facilities at their disposal. Historically, postal facilities, for example, fared poorly in Canada relative to those in the US and Britain. Social correspondence and the development of the press were stunted as a result. In contrast, personal correspondence and the press flourished in the US and the UK by the mid-19th century on account of the universal and affordable postal services in each of those countries (Starr, 2004; John, 2010; Osborne & Pike, 1991).

Canadians were amongst the most talkative and communicative people on the planet by the turn-of-the-20th century, as witness after witness told the Government Telephone Inquiry convened by the Liberal Government of Prime Minister Wilfrid Laurier in 1905 (Canada, 1905). While telephone service was under-developed in much of the country, in the cities where service did exist, the “number of calls per subscriber was more than double that in the cities of Great Britain, Germany, Australia, and the US” (Mavor, 1917, pp. 91-94; also see Babe, 1990; Winseck, 1998, pp. 121-138). Telephone service was a social necessity rather than just a luxury, or tool of business and administration, by early in the 20th century (Pike & Mosco, 1986).

Canadians continue to communicate a lot by every-and-any media at their disposal. Indeed, when it comes to broadband and mobile media and internet use, tallying up the rankings across the measures shown in Table 1 indicates that they are number 1 relative to the thirteen countries shown.²

² Countries included on the grounds that they are OECD countries and that a full-set of data was available for them across the range of measures included in Table 1. Similar results emerge when comparing Canada to the twelve largest media economies in the world: the United States, Japan, China, Germany, the United Kingdom, France, Italy, Brazil, Canada, Australia, South Korea and Spain. Note that Canada also has a large media economy, the ninth largest in the world (see Winseck, 2014).

Table 1: Media + Broadband Use and Rankings in Select OECD Countries, 2012

Media + Broadband Use and Rankings in Select OECD Countries, 2012 (Rankings)											
OECD Country Ranks	Online Min/ User/Month (Rank)	IP Traffic/ Capita (GB) (Rank)	Smart Phone Data/Mo/User (MB) (Rank)	Tablet Data/ Mo/Device (MB) Rank	Online Video Viewing/Mo (min) (Rank)	TV Viewing Min/Day (2011) (Rank)	Facebook (% Pop) (Rank)	Wikipedia Rank	Cable & Sat Pay	Cumulative Total	Overall Rank
Canada	2	3	2	8	4	3	2	2	3	29	1
Korea	4	1	1	1	1	6	12	6	1	33	2
US	1	2	7	12	5	1	2	1	2	33	3
UK	3	4	5	2	3	4	2	4	7	34	4
Japan	8	5	6	4	1	6	13	1	4	48	5
France	5	5	3	3	8	8	7	5	5	49	6
Spain	7	10	4	5	9	5	9	5	11	65	7
Germany	6	9	12	7	6	7	11	4	5	67	8
Italy	12	12	13	6	7	2	8	2	9	71	9
Australia	11	5	9	10	12	10	5	3	10	75	10
New Zealand	12	8	8	11	13	9	6	3	7	77	11
Chile	9	11	11	9	10	13	1	1	12	77	11
Mexico	10	13	10	13	11	12	10	2	12	93	13
Media + Broadband Use and Rankings in Select OECD Countries, 2012 (Raw Scores)											
OECD Country Ranks	Online Min/ User/Month	IP Traffic/ Capita (GB)	Smart Phone Data/Mo/ User (MB)	Tablet Data/ Mo/Device (MB)	Online Video Viewing/Mo (min)	TV Viewing Min/Day (2011)	Facebook (% Pop)	Wikipedia Rank/Top Websites	Cable & Sat Pay	Overall Rank	
Canada	2478	36	316	508	1488	248	53	7	86	1	
UK	2238	26	304	991	1870	246	52	9	54	2	
Korea	1800	48	528	1544	2842	231	21	16	96	2	
US	2580	40	201	382	1308	293	53	6	87	3	
France	1674	18	315	970	1094	209	39	10	64	4	
Japan	1314	18	232	957	2842	231	14	6	66	5	
Spain	1428	12	306	724	989	243	37	10	24	6	
Germany	1476	13	72	533	1299	216	31	9	64	7	
Italy	1110	8	61	644	1208	257	38	7	33	8	
Australia	1116	18	141	469	670	193	49	8	31	9	
New Zealand	1110	16	174	464	666	205	45	8	52	10	
Chile	1176	11	78	479	765	165	54	6	14	11	
Mexico	1128	5	104	352	710	165	33	7	14	12	
Avg	1587	21	218	694	1365	223	40	8	53		

Sources: OECD (2013) [Communications Outlook](#); Cisco (2013). [Visual Networking Index -- Country Profiles](#); Comscore (2013) [US Digital Future in Focus 2013 \(end 2012\)](#); [Europe Digital Future in Focus 2013](#); [UK Digital Future in Focus 2013](#); [Canada Future in Focus 2013](#); [Spain Future in Focus 2013](#); [France Future in Focus 2013](#); [Brazil Future in Focus 2013](#). Internetworldstats (2013) [Facebook Stats for 2011-2012](#).

The conditions depicted in Table 1 *are* a good news story. They suggest that long cultivated habits and Canadian's desire for, and enjoyment of, the ability to communicate has endured over time. Such trends should not be confused, however, with the notion that people are getting good value for their money – a “consumer surplus”, as some euphemistically put it (Nordicity, 2013). Prices, as we shall see, are high in Canada and penetration low relative to other OECD countries, although in some instances conditions in Canada are better than in the U.S. (Wall Communications, 2013; CRTC, 2013, p. 200).

Mobile wireless services are the cornerstones of increasingly mobile, highly individuated lives, the means through which people conduct business, to be sure, but also the vehicles through which we assert our identities and maintain social connections. They are part of the fabric of everyday life and the media environment in which we live (Goggin, 2011). As such, it is essential that mobile wireless services conform to our communicative habits and the ideals of trying to create an open media fit for an open and democratic society in which not just competitive markets and healthy economies thrive – essential as those are -- but where values of freedom of expression, autonomy and democracy flourish. Seen from this view, mobile broadband wireless connectivity should be seen as more than a luxury good, where tethered devices are locked to networks by infrastructure providers who play the role of gatekeepers over technological, pricing and service innovations, information flows and applications, as well as uses that are privileged versus those that are discouraged (i.e. think of the extensive use and low levels of data caps which distinguish Canada from almost all other OECD countries, except Iceland, Australia and New Zealand, see *OECD Broadband Portal*).

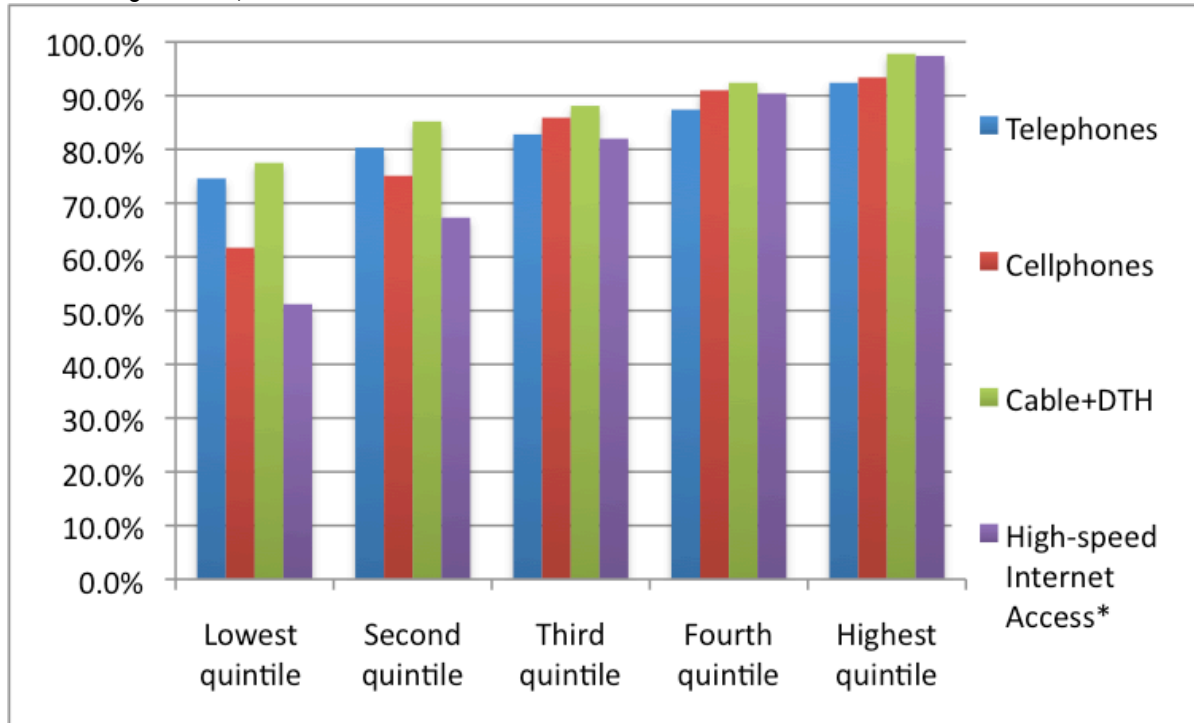
Rotary phones were unlocked from wiredline networks in 1968 in the United States, and more than a decade later in Canada. In both cases, this simple move of letting people buy and plug their own phones into standardized wall jackets met staunch opposition from the incumbent carriers. Three decades later, and now well into the 21st century, we are still waiting for our ‘wireless carterphone’,³ while the plug-and-play lego-land view of networks imagined in the 1980s and 1990s were subsequently progressively put into place around the world for wiredline networks and as the foundation of the internet in the 1990s and early-2000s (Frieden, 2008; Wu, 2010; Benkler, et. al.; 2010; Huber, 1987). On a happier note, and with respect to the first point – untethered phones -- we are getting part-way to where we want to be courtesy of the CRTC's (2013a) *National Wireless Code*, but there is a very long way to go yet.

Beyond this, and while defenders of the status quo might not like to shine a bright light on the following fact, income inequality and the digital divide are still persistent features of

³ The reference is to the need to establish a parallel in mobile wireless services to the 1968 decision by the FCC in the U.S. that gave wiredline telephone subscribers the right to purchase and attach certified telephone and other devices of their choice (modems, fax machines, answering machines, etc.) to the telephone network without having to either rent or gain permission to do so from the telephone company (Freiden, 2008).

the network-centric digital media universe. They are not narrowing, or disappearing, but mutating in light of new and emergent conditions. Figure 2 below illustrates the point.

Figure 2: Household Access to Information and Communication Technologies by Income Quintile, 2012



Source: Statistics Canada (2014). *Survey of Household Spending* in 2012.

It is not necessary to dwell on each and every aspect illustrated by Figure 2, except to say that, of most relevance to this paper, wireless connectivity remains elusive for many. 40% of households in the lowest income bracket go without, while a quarter of those on the next rung up the income ladder stand in the same position. If prices were not an issue, affordability would be high and penetration levels would be as nearly universal as plain old telephone service. High-speed internet access is worse, with under one-half of the poorest households having access, and more than a third in the second tier likewise on the 'wrong side' of the digital divide. At the opposite end of the income scale, cellphone and high-speed internet access are nearly universal, or at least well-above 90%.

In short, while there are indeed things that distinguish Canadians from their international peers, it does not follow that all is well across the land. Triumphalist discourses are the last thing needed at this juncture. Instead, we need a critical interrogation of the facts on the ground, and attention to the reality that while markets, capital investment and economic forces are absolutely crucial, they are not the beginning and end point of discussions.

We must keep this point front and centre because too often the discourse hews excessively to the values of the marketplace without looking up to realize that, while not gainsaying the importance of the market, communication is vital to contemporary life – always has been, and likely always will be (Habermas, 1985). As more of our lives are immersed within the mesh of mobile wireless broadband connections, the more the politics of wireless will heat up. Debates over concentration, capital investment, penetration, Gigabits, prices, speed and smartphones are not just about markets, technology and policy, although they must be firmly grounded in an understanding of those domains, but the development of a good communication system fit for a good society.

This is too often lost in the ‘wireless wars’, especially amongst the defenders of the status quo who take a myopic view of the wireless- and internet-centric media world, blinders on, focusing only on one thing at a time, and too often making a fetish of markets, neglecting the fact that communication is central to life and connected to everything else. Blinkered views are especially problematic because mobile wireless markets in Canada are highly consolidated and integrated across media, telecom and internet markets. As a result, something that is an issue in wireless can become a problem of TV or even journalism. Journalists who have to check their smart phones at the door and be issued new ones – or have tech support rejig their monthly plans -- before traveling abroad to cover a breaking story, as is the case at the *Huffington Post*, for instance, to avoid the sky-high international roaming charges levied by the big three (Roger, Telus and Bell) -- are being hobbled in their efforts. In other words, international roaming charges are a constraint on the free flow of news, to say nothing of an inconvenience and added expense for business people and tourists.

The Wireless Wars and the Damnation of International Comparative Studies: or the OECD as the Canadian Cellco Industry’s Jilted Lover

It has become a bit of a sport in the past few years amongst incumbent wireless companies and their defenders to dismiss international comparative studies of wireless services, especially those done by the OECD. We will have ample room to offer plenty of examples of such efforts below, but the point to be made now is that there are too many studies and reports that *consistently* rank Canada at the low ends of the 'global league tables' to be so easily dismissed: e.g OECD, Ofcom, FCC, ITU, Wall Communications, to name just the most prominent.

Complaints about these studies have a Johnny-come-lately feel to them. Back in the 1990s and the turn-of-the-21st century when the OECD was ranking Canada highly, and lauding its policy-makers for their early embrace of competitive markets, and for smartly using the policy and regulatory levers available to them to help bring about such conditions, Canada was the darling of the world. Everybody applauded, including those here at home (OECD, 1996).

The US and Canada were leaders in fostering competition and open networks. The passage of the *Telecommunications Act of 1996* in the US, and promotion of the convergence policy and local telephone competition in 1996-1997 by the Liberals in Canada, spurred rivalry between the incumbent telephone and cable companies, while using the lure of a liberal network access regime and network unbundling to attract new entrants.

Wireless competition was also pioneered in Canada from the outset, with the Liberal Communications Minister Francis Fox using a beauty contest between contenders to hand out not just one cellular license in 1983, but two: one for the incumbent telcos, the other for Rogers/Cantel.⁴ Fast-forward to 1995, and four new PCS licenses were handed out, once again not by auction but beauty contest. This time, two new entrants – Clearnet PCS and Microcell – were the ‘chosen ones’, and given three times the PCS spectrum (30MHz) as their incumbent counterparts, Roger and Bell, who each received 10 MHz each. Spectrum caps were installed in 1995 and 1999, respectively, and additional spectrum set-aside to limit the incumbents’ control of essential resources and to foster more competition when the time was right. Concentration levels plunged, the press of competitive forces increased, and the adoption of cellular services expanded fast as prices fell sharply (Industry Canada, 2010; OECD, 1996; Taylor, 2012). Cellphones went from being the near exclusive tool of businessmen as women increasingly picked up their own.

The OECD praised Canada, along with the US, UK, Australia, France, Germany and Sweden, for “taking advantage of PCS technology to go beyond duopolies” to foster new third and fourth competitive cellcos (p. 16). As its 1996 *Mobile Cellular Communications* report stated bluntly, “The available evidence is unambiguous[:] competition is driving the growth of personal communication” (p. 12). Monopolists and duopolists are “cream skimmers”, it chided (p. 12). Year-after-year, Canada ranked in the top eight versus its bottom-half of the pack standings year-after-year today because it recognized these facts and dealt with them accordingly (OECD, 1996, p. 19).

And Canadians basked in the glow; others followed: Finland, Denmark, Sweden, Norway and Japan embraced competition between incumbent telecom and cable companies *and* unbundling so that newcomers could compete without having to build their own networks -- as the U.S. and Canada had done. These measures were also extended to mobile wireless service, and competition ramped up. Policies that originated in wiredline telecoms in the US and Canada (and to a lesser degree, the UK) in the 1980s and 1990s were leveraged in one country after another through a wave of regulatory liberalization as well as the export of

⁴ After 1997, Fox went into the executive suites at Rogers until 2003, and has sat as a Liberal appointment in the Senate since 2005 (see Office of the Information Commissioner, nd). On another point, the first half of the 1990s did indeed see lean years for Rogers, with operating profits behind those at Telus and Bell by a quarter to a third, respectively, but after that, and until the present day, the gap has disappeared and all three have been enormously profitable. Operating profit for the big three between 1995 and 2012 has been double that of industry in general: 18.1 percent vs 8.9 percent (Corporate Annual Reports; Statistics Canada (nd) [Summary Table - Operating profit margin by industries](#)).

telecommunications and media regulatory regimes that took the US and Canadian “models” as their guide, with a huge boost added in 1997 when ninety countries adopted the World Trade Organization’s *Basic Telecommunications Agreement* and accompanying Regulatory Reference Paper (Melody, 1997; Cowhey & Aronson, 2009, pp. 149-206).⁵

At the same time that Canada was enjoying its place in the sun, however, something happened. While the open, competitive network model and regulated markets approach was being embraced around the world, and especially in Europe, Australia, New Zealand (European Parliament, 2002), it was falling out of favour where it had started, North America, with strong pressure exerted by the incumbents to wall off wireless services from such rules altogether, as if this emergent domain was terra nullus where the ‘old rules’ no longer applied. Rules adopted at the end of the 1990s to foster local telephone competition were sunset, incumbent cable and telephone companies fought tooth and nail against open access regimes that aimed to provide third party internet access, and dragged their feet. Competition was stunted as a result. Crucially, instead of adapting unbundling to wireless services, as the ‘the incumbents, now including a firmly entrenched Rogers in control of 40-50% of all the available spectrum and having the biggest share of the market (i.e. 36% in 2012), walled off the field from these measures just as the wireless market was coming into full-swing, as if it was they alone who should define the path of development, sans any rules. The CRTC willingly complied (see [CRTC, 2012, fn6](#) for a reprise of the Commission’s forbearance path).

In short, the early- to mid-2000s saw what we might call a “regulatory flip”. Just as the rest of the world embraced the good things Canada and the US had to offer, the two countries abandoned ship and battened down the hatches. The incumbents began fighting a rear-guard battle that continues to this day and which took on a hysterical pitch last summer when all this history disappeared in a fog of bombast, fallacious arguments, and dubious studies that purported to find the truth, but that had little sense of their objects of analysis – communication, telecommunications history and policy, or the political economy of the wireless- and internet-centric media world.

As Canada and the United States back-peddled, in no small part because regulators and policy-makers were captured by those whose power they were supposed to be curbing rather than abetting, or out of an inability to steel their spine in the face of intransigent incumbent bluster, they slid backwards in international rankings, the details of which will be relayed more fully below. The regulatory switch from regulated markets to markets *uber alles* -- which simply meant handing over control of the levers of power to industry -- also handed the reigns over to others in the global league tables.

⁵ Parenthetically, several individuals at Industry Canada, Michael Tiger and Doris Mozes, played key roles in ‘exporting’ the Canadian model, and in conceptualizing and writing the WTO telecoms agreement.

In concrete terms, Canada's position at the top of the ranks in wireless, wiredline and broadband in the late-1990s and early-2000s collapsed, while others who deepened their commitment to using regulation to build and maintain viable markets – Denmark, South Korea, Sweden, Japan, Finland, Norway, for instance – mostly stayed right where they were: at the top of the league. At the same time, newcomers filled the empty places where Canada and the US had once stood: France, Estonia, the UK, Iceland, and so on (OECD, 2013; FCC, 2012; ITU, 2012; Benkler, et. al., 2010, pp. 85-88; Oxford University & Oviedo University, 2010; Ookla, 2013). Of course, things are not entirely to one side, as we shall see. When it comes to capital investment in wiredline infrastructure, for example, Canada still fares very well by international standards, but that, again as we shall see, is a rare exception set against an overwhelmingly bleak story of mediocrity and decline.

It was only once Canada's place in the sun began to set in during the last decade that the tune amongst observers in this country went from cheers to jeers, with consultants like Nordicity (2011) and Goldberg and Associates (2009) trying to sully the methods of the OECD and others, with the incumbents and their coterie of hired guns piling on (e.g. Church & Wilkins, 2013; Bohlin, Caves & Eisenach, 2013), financial analysts leaning in (Fan; Ghose) and journalists all-too-willing to parrot the incumbents' party line (Corcoran, Ladurantaye, Trichur, Houpt, O'Brien).⁶

To be sure, OECD, FCC, ITU, Ookla, Benkler, et. al. and other international comparative studies miss certain unique characteristics of the Canadian wireless, wiredline and internet industries. But the same complaint could be made of *every* country, but there is no reason to believe that Canada, or the US for that matter, are being singled out for ill-treatment. The idea that some details are overlooked misses the point that standardized tools do this by design and, that the same methodological rules apply to everybody. Moreover, it is not that these tools are concocted by aloof Mandarins in Geneva who are unfamiliar with the realities of what lies across the Atlantic.

In fact, a leading figure behind the development and constant efforts to improve the OECD data is one of Canada's top statisticians, George Sciadas, who, among other things, designed the use and access studies for Statistics Canada's *Household Internet Use Studies* and *Connecting Canadians* series. Furthermore, this is not a one-man show and, as the FCC (2012) and Ofcom (2013), for instance, observe, they, along with their counterparts from across the EC countries, as well as from Industry Canada, are constantly working hand-in-glove with the OECD to make the best set of comprehensive data possible. Workshops to this end are a regular occurrence, and unlike the incumbents and the consultancy industry

⁶ Parenthetically, Christine Dobby at the *National Post* as well as Nick Kyonka, Simon Doyle and other writers at the *Wire Report* appear to me to have distinguished themselves with the capacity for independent thought and analysis rather than following corporate press releases and striking a faux sense of balance that typically elaborates on the press release with a few comments from industry insiders and financial analysts, followed up, perhaps, with a token nod to 'critical voices' tucked in towards the end.

that has grown fat on their contracts, there is little in it for the OECD, the FCC, Ofcom, etc. to torque the numbers one way or another.

In sum, much of the criticism in Canada is facile, self-serving and intended to muddy the waters more than generate insight in the public interest of Canadians. Perhaps the FCC (2012) put it best in its latest International Broadband Data Report, “*The best currently available* data set comparing the United States to other countries along a number of metrics . . . [is] from the OECD” (*emphasis mine*, p. 8).

Wireless Concentration in Canada: The Real World

The function of the present report, however, is not to defend the OECD, or anybody else for that matter. Instead, first and foremost it is a response to a 19-country study by Jeffrey Church and Andrew Wilkins (2013) from the School of Public Policy at the University of Calgary that concludes that “*there is no ‘competition problem’*” in Canada (*emphasis theirs*) (p. 5).⁷ We disagree.

As we show, Church and Wilkins’ own evidence demonstrates quite the opposite. We also show that extending the analysis beyond the 19 countries they select to include all thirty-four OECD countries, and all of the countries covered in the main source that underpins

⁷ While the focus in the pages ahead is on Church and Wilkins’ study, it is important to note that the CWTA has recently begun to tout a recent study by Bohlin, Cave and Eisenach (2013) as supporting much the same case that Church and Wilkins make. Many of the problems identified in the pages ahead with respect to the Church and Wilkin’s study apply to the new ‘study’, to which we might add: (1) Bohlin et. al.’s claim that Europe is lagging behind, and North America surging ahead in mobile wireless appears to be much the same; (2) no mention is made of factors that might contribute to such lags, if they do in fact exist, such as the depth of the economic crisis since 2008, the timing of spectrum auctions or the fact that LTE/4G launches are being announced weekly, meaning that whatever ‘first mover’ advantages the US and Canada may have gained with respect to speed and investment will likely be transitory, etc.. This is especially important given that Bohlin, et. al. argue that in the last five years US and Canada have surged ahead after having fallen behind during the early 2000s; (3) key data claims are introduced without clear references to sources or dates (pp. 3-4); (4) estimates of penetration and use are projected into the future and comparisons made on estimates of future states as if they are relevant today; (5) much of the phrasing and even claims are very similar, and at points exactly the same, notably with respect to the characterization of the purported role of anti-trust regulators and the Herfindahl-Hirschman Index (HHI)(p. ii); (6) US calling minutes per subscriber are doubled by counting incoming and outgoing minutes and then compared favourably with other OECD countries whereas OECD studies only count traffic in one direction (Figure 1, p. 6); and, finally, (7) the study is presented by the CWTA, incumbents and journalists as if it is independent research when it is not. The study is “supported” by Telus. This is similar to the Church and Wilkins study, which in many of its key parts is a partially updated, derivative version of a report that Church wrote under commission for Rogers as part of its submission to Industry Canada’s consultation on foreign ownership in 2010 (Rogers, 2010; Church, 2010). No mention is made of these origins in the current version of the study, nor of sources of funding, if any, for the 2013 version. The bottom line is that industry-sponsored research is the norm in Canadian policy circles; this in itself would not be a problem if not for the sore lack of reasonably-funded, independent research which questions the status quo. Indeed, independent, objective reports are few and far between; our report seeks to contribute to analytical discourse from the perspective of disinterested observation, based on readily available third-party empirical evidence.

their own study – Bank of America Merrill Lynch’s *Global Wireless Report* – for a total of 57 countries, leads to the irrefutable finding that levels of concentration in wireless markets are, with few exceptions, “astonishingly high everywhere” (Noam, 2013, pp. 13-18), including Canada.

As we show, this is true whether we look at the evidence nationally, internationally, provincially or within Canada’s largest cities. Furthermore, it is true regardless of the measure we use to calculate market share: revenues, subscribers, spectrum holdings, or spectrum actively in use. While Church and Wilkins do not think that there is any role for government to do anything about the current state of affairs, there is scope aplenty and very good reasons to do so, as well as a great need.

Church and Wilkins (2013) throw down the gauntlet on page one in reference to critics who allege that concentration is high, service expensive, penetration low, and quality poor in Canada relative to its international peers with the provocative message that “What everybody knows is wrong” (p. 1). In fact, everybody is not wrong.

Concentration levels in Canada are very high, and range from moderately-high to sky-high in every country they study, except the US (which is at the high end of the moderately concentrated scale), and in all but five of the 57 countries we survey: India, Pakistan, the US, Russia and Brazil. Their claims that countries with four or more national wireless companies are a rare and dying breed, is confounded by the evidence. There are *examples* of consolidation that have reduced the number of carriers in *some* markets, notably in the UK where the merger of Orange and T-Mobile in late 2010 reduced the number of *national wholesale wireless carriers* from five to four. However, countries with four or more national Cellcos are in the solid majority. More countries have fourth national wireless carriers than those without (see below)(BAML, 2013; OECD, 2013; GSMA, 2013).

The best available evidence shows that Canada is at best a middle-of-the-pack performer and occasionally in the bottom quartile of comparisons on some specific measures relative to OECD countries, on the basis of both OECD and FCC data (see below). The best that the incumbents and defenders of the status quo are able to show is that Canada occasionally ranks better than the United States on *some* criteria (Wall Communications, 2013; CRTC, 2013, p. 200). Even the comparison with the US is increasingly inapt, as the US puts its house more in order, particularly in wireless, and sees its international rankings climb as a result (the US ranks 10th out of 34 OECD countries versus Canada, which still languishes at 19^h, on our composite wireless ranking). Canada fairs well in terms of capital investment, but here, too, the evidence is mixed. It ranks at the top of the league tables for investment in wiredline infrastructure (3rd out of 34) but near the bottom third of the rankings when it comes to wireless infrastructure (23rd)(see below).

To develop our analysis, this study does several things. First, we use three key sources of evidence, supplemented by others as cited: (1) the OECD’s *Communications Outlook* and

associated data sets that go along with that report; (2) the Bank of America Merrill Lynch *Global Wireless Matrix* (BAML Report hereinafter); and (3) the latest edition of the FCC's *International Broadband Data Report*. We also use the CRTC's *Communication Monitoring Report* and other CRTC data sets; publications and data sets from Statistics Canada,⁸ and Ofcom's *International Communication Monitoring Report* are also used. Other sources are used on an as needed basis, and are cited throughout the pages ahead.

Using these sources we assess Canada's standing relative to its international peers in terms of:

- market concentration on the basis of revenue and, for Canada, its provinces, and nine biggest cities, overall spectrum holdings and amount of spectrum actively in use by each of the operating wireless companies;
- capital investment (on a per capita and per communication path basis for wiredline and as a proportion of revenue for both wireless and wiredline);
- penetration levels;
- price;
- speed

Multiple indicators are used for each of these measures, and a composite score tallied for each country and each measure and used as a basis for ranking countries relative to one another. Standardized time frames are also used, versus what appears to us to be a strong tendency to choose time frames that best comport with researchers' desired conclusions. In contrast, we use standardized comparisons based on the most recent year, while examining trends over five, ten and as many years as the available data permits. This is typically from 1997 onwards when using the OECD data sets, but 2000 or 2006 for the BAML *Global Wireless Matrix*, depending on the country. After establishing composite scores and country-by-country rankings and showing trends across time, we scaffold upwards to give a view of Canada's wireless market as a whole and its place within the broader network media ecology. The picture does indeed have some bright spots but overall it is not pretty.

We go well beyond the 19 countries that Church and Wilkins select to analyze conditions in the thirty-four countries that make up the OECD. We then add all of the fifty-plus countries covered by the BAML *Global Wireless Matrix* that underpins Church and Wilkin's study, yielding a total sample of 57 countries, and which cover roughly four-fifth's of the world's population. The 19 countries that Church and Wilkins account for, in contrast, cover just ten percent of the world population, and about sixty percent of the OECD population.

⁸ Quarterly telecommunications statistics [56-002-XIB](#); Telecommunications in Canada [56-203-XIE](#); [The Canadian Cellular Service Industry: Historical Statistics](#) Communications: service bulletin [56-001-XIB](#). How each of these sources is used, and in which tables, is explained further below in the text and in two appendices at the end of the report.

Wireless Markets are Highly Concentrated Almost Everywhere

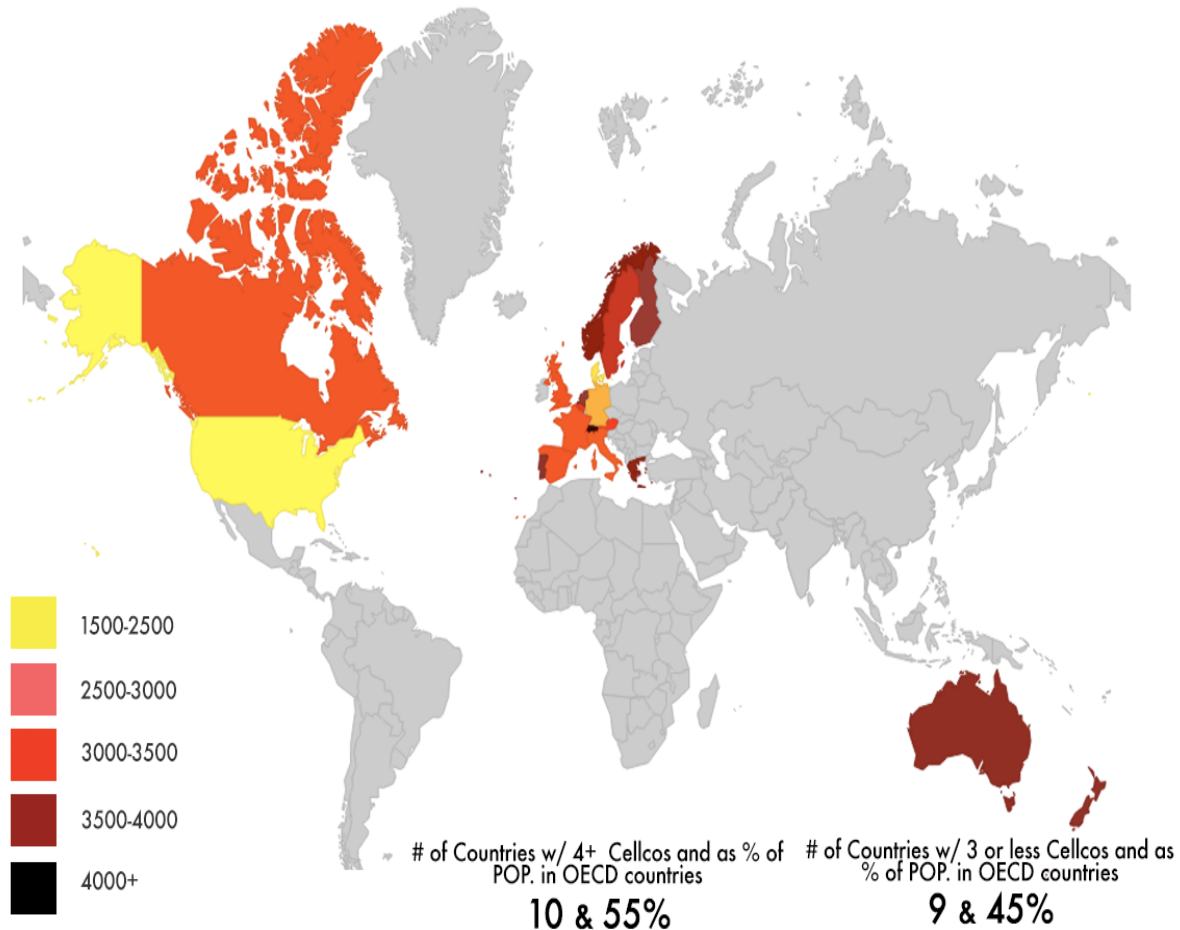
Church and Wilkins present their comparative analysis of 19 countries as a good news story for Canada. They argue that mobile wireless services in Canada are less concentrated than most of their international peers, with Canada tied for 6th place out of 19 along with Spain, just behind France but ahead of the UK. In other words, Canada ends up on the 'good' end of the scale relative to those at the opposite end of the spectrum. They also claim that while the Canadian Government is engaged in a quixotic pursuit to cultivate conditions that might allow a fourth national wireless competitor to emerge, "4th Carriers", or "Challenger Brands" as the industry and marketers call them, are a rare and dying breed.⁹ They also state that there appears to be "natural limits on the extent of competition" and, if there is a 'magic number', it does not appear to be four or more (Church & Wilkins, 2013, pp. 28-34, see Table 5, especially and surrounding discussion). We agree that there may be 'natural limits on the extent of competition', but draw radically different implications from it.

Despite Church and Wilkins claim that there is no wireless competition problem in Canada, their own evidence contradicts their headline claims. Of the 19 countries they survey, every single one of them, except one, falls into the highly concentrated category by the standards of the HHI used by the United States Department of Justice, Federal Trade Commission and the FCC. Instead of supporting their claim that there is no wireless competition problem in Canada, their evidence shows that concentration in wireless markets is "astonishingly high everywhere", as Eli Noam (2013, p. 13) puts it, including Canada. The US is the only country that does *not* fit such a designation. It slips just below the bar with an HHI score of 2425 (BAML, 2013).

Map 1 below depicts this state of affairs based on the 19 countries included in the Church and Wilkins studies using data from the same source they use: the Bank of America/Merrill Lynch (BAML) *Global Wireless Matrix*.

⁹ Our reference to "4th national wireless player" refers to facilities-based providers who have their own core networks, tower sites, a national footprint, have adequate spectrum on the basis of their own licenses, sharing arrangements or on a wholesale basis from others, and typically offer their own services at the wholesale and retail levels. The U.K. regulator, Ofcom, refers to the national footprint as being one where 90% of more of the population is reachable. Ofcom also establishes the goal of maintaining four national wholesale wireless carriers as a fundamental priority goal. Functional characteristics also include the following considerations: (1) available capacity and average data rates, (2) ability to deliver good quality coverage, (3) ability to deliver highest peak data rates and (4) ability to deliver LTE services (Ofcom, 2011, pp. 2-3; Ofcom, 2012c, pp. 67-68; also, see below).

Church & Wilkins 19 Country Survey of Wireless Concentration, 2012



Source: BAML (2013). *Global Wireless Matrix*. (Link to underlying data set for Map 1 [here](#))

In addition to concentration levels in wireless markets being “astonishingly high” in all but one of the 19 countries they survey, a review of the evidence from the BAML report, the Canadian Media Concentration Research (CMCR) project, and CRTC shows that wireless markets have been highly concentrated for a long time. This is an important point because, as Church and Wilkins (2013) observe, competition “does not mean perfectly competitive, but rather that there is not a . . . durable exercise of market power” (p. 3, fn 19 and p. 22). If that is one of the criteria, and it is, then there is a problem: concentration levels have been high for mobile wireless services in Canada since their inception thirty years ago. Much the same applies elsewhere, with some modest oscillation between the upper bands of moderate concentration and high concentration in the past decade. The “natural limits to the extent of competition” that Church and Wilkins (2013) highlight certainly is not

tantamount to the restoration of the natural monopoly regime of days past, but are we in the presence of natural oligopoly? If so, we need to act accordingly.

There are clear policy levers and regulatory measures that can and are being used to deal with this reality, in Canada and around the world, as we will see below, in contrast to what Church and Wilkins' caricature as quixotic, ad hoc intrusions by the government, which they hyperbolically characterize as being tantamount to the expropriation of capital, as if the Harper Government has torn a page from Karl Marx's *Capital*. In fact, the Government's policy is dealing with real world realities but which Church and Wilkins try to explain away in favour of a 'do nothing' approach. Far from a quixotic misadventure, however, dealing with the reality of highly concentrated wireless markets is common (OECD, 2013, p. 21).

Church and Wilkins (2013) evidence also contradicts their headline claims when it comes to the issue of "4th Carriers", or "Challenger Brands". While they claim that these entities are a rare-and-dying breed (pp. 28-34), their evidence indicates otherwise. Indeed, 10 out of the 19 countries they canvass have four or more national cellcos. That slim majority is actually a bigger majority when the populations that live in the 19 countries they survey are taken into account: 55% of the population that lives in these ten countries have four-or more nationally competitive cellcos; 45% do not.

Looking further afield to the thirty-four countries that make up the OECD instead of just the 19 countries the Church and Wilkins' study zeroes in on, what do we find?

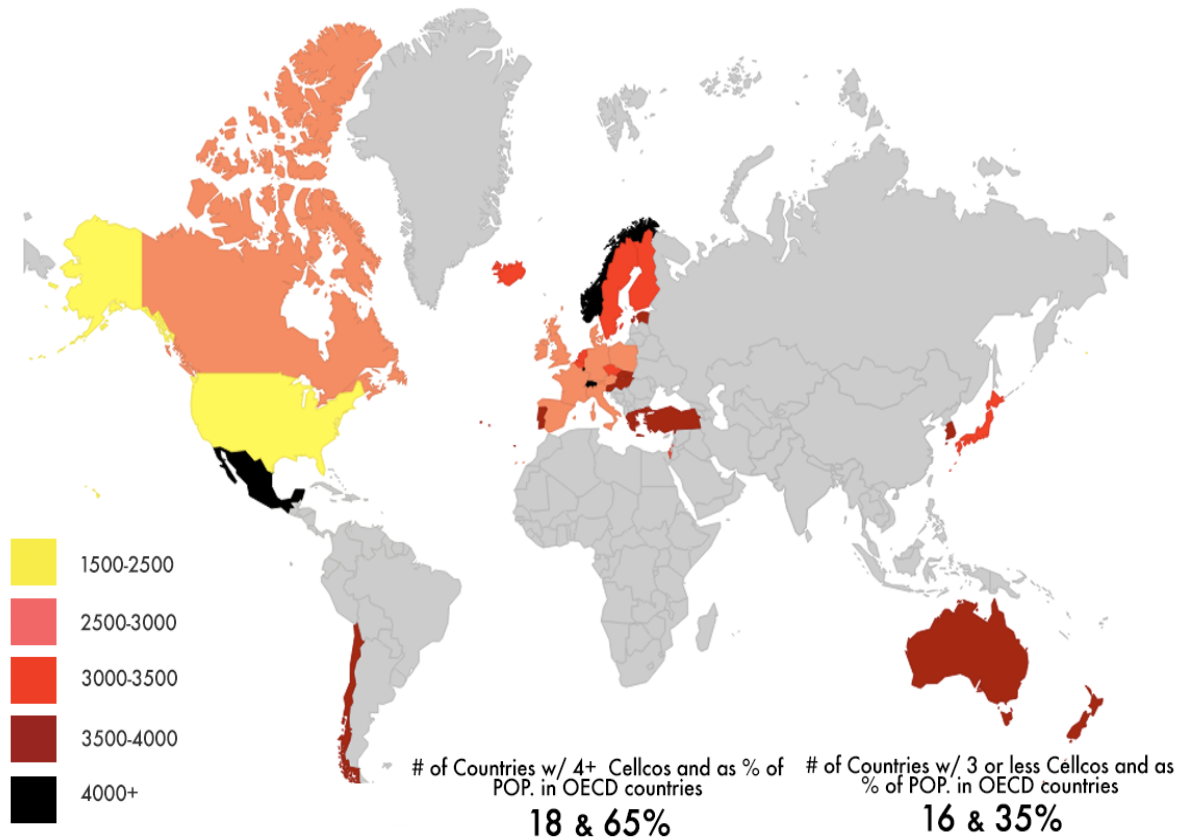
The evidence provides strong support that wireless markets are highly concentrated in all 34 OECD countries, except the United States. Eighteen of these countries, comprising two-thirds of the OECD population, however, have four or more national cellcos. Sixteen have three or fewer. Thus, whether we look at Church and Wilkins' 19 countries or the 34 OECD countries, concentration is high everywhere, while four-plus national wireless companies are the norm. This is true in either absolute terms or on the basis of population. In sum, the vast majority of people who live in OECD countries have four or more national cellcos at their service.

Map 2 below illustrates the points with respect to the 34 OECD countries using the BAML data for 2012, filling in the OECD countries not covered by that report with 2011 OECD data.¹⁰ The Canadian evidence is from the Canadian Media Concentration Research project data sets which, parenthetically, line up consistently with the results of the BAML report, even though the latter report unexplainedly under-states the size of the wireless market in Canada as well as the revenues of Rogers, Telus and Bell specifically. The report states revenues for the Canadian wireless market of \$18.7 billion for 2012 versus \$20.3 billion reported by the CRTC. It also cites revenues for Rogers, Telus and Bell of \$6,719 million,

¹⁰ Data for Iceland is from a custom-prepared report for the author by Budde Communication (2013), while the UK data is based on the sources outlined below.

\$5,3367 million and \$5,197.4 million, respectively, for 2012 when these companies' annual reports cite figures of \$7,280 million, 5,845 million and \$5,573 million – roughly a half-billion dollar difference in each case. Church and Wilkins either did not notice this discrepancy, or chose to ignore it. This discrepancy is not an exceptional case – as we will see further below – and we use the BAML report with caution for just such reasons.

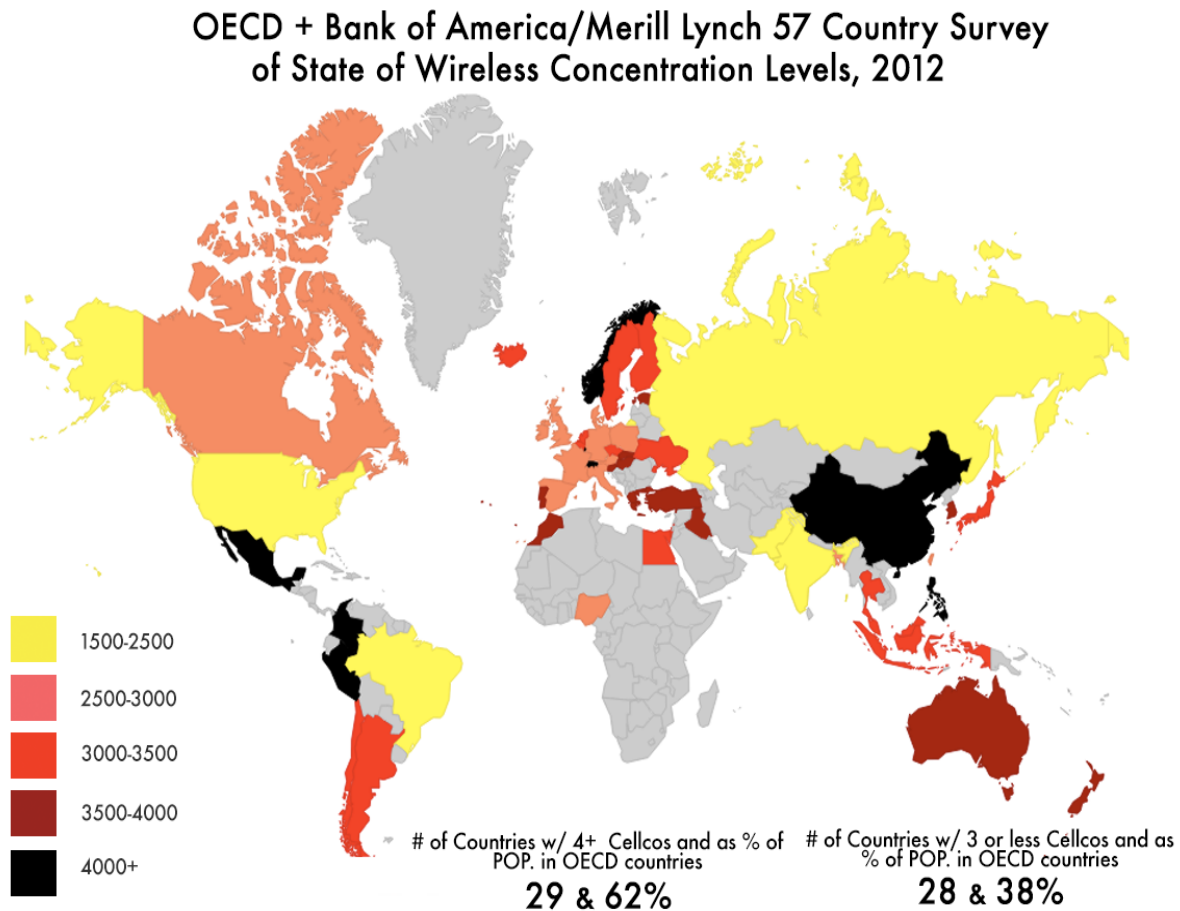
34 OECD Country Survey of Wireless Concentration Levels, 2012



Source: BAML (2013) *Global Wireless Matrix*; OECD (2013). *Communications Outlook*, Table 2.3. (Link to underlying data set for Map 2 [here](#))

Lastly, zooming out to compare concentration levels across all 57 countries included in this study makes the finding that wireless markets are almost always highly concentrated even more emphatically: there are only five countries where wireless markets are not heavily concentrated. Yet, even all of these countries, except one (India), fall just beneath the high-end of the scale by the US Department of Justice and Federal Trade Commission's (2010) HHI thresholds whereby an HHI of more than 2500 constitutes a highly concentrated market. Those five exceptions, in rank order, are: India, Pakistan, US, Russia and Brazil.

Map 3 below depicts the results, with the colour red designating countries with highly concentrated markets. The more intense the red, the higher the concentration. Yellow coding depicts those with moderately high levels of concentration, and black is for those where concentration is sky-high, i.e. above 4,000.



Source: BAML (2013) *Global Wireless Matrix*; OECD (2013). *Communications Outlook*, Table 2.3. (Link to underlying data set for Map 3 [here](#))

According to the BAML *Global Wireless Matrix*, India has the most competitive telecoms landscape in the world, with six national players, and an HHI score of 1750. Pakistan is next with five cellcos and an HHI of 2239. The United States is third, with four large national players – Verizon (37% market share), AT&T (33%), Sprint (15%), T-Mobile (11%). Leap and MetroPCS are smaller regional players with a combined market share of 5%. Russia and Brazil are next in line, respectively. Twenty-nine of the 57 countries we cover, which account for 62% of the total population of these countries, have four or more cellcos; 38

percent of the population live in countries that have only three.¹¹ In sum, most people in the world live in countries with four or more cellcos.

We should also bear in mind that, in the UK, the Competition Commission, Office of Fair Trading and Ofcom set the HHI bar lower than in the US and work with an even more sensitive dial regarding the magnitude of change needed to raise alarms. In the UK (and Europe), the standard for a “highly concentrated” market is 2000 or more (versus 2,500 in the US). In the US, a merger has to move the dial more than 200 points before anti-trust regulators kick in, while in the UK they get twitchy when the dial swings upward 150 points or more (Ofcom, 2012a, p. 13, fn 27). If we looked at the world through British lenses, then, there are *no* competitive wireless markets -- except India.

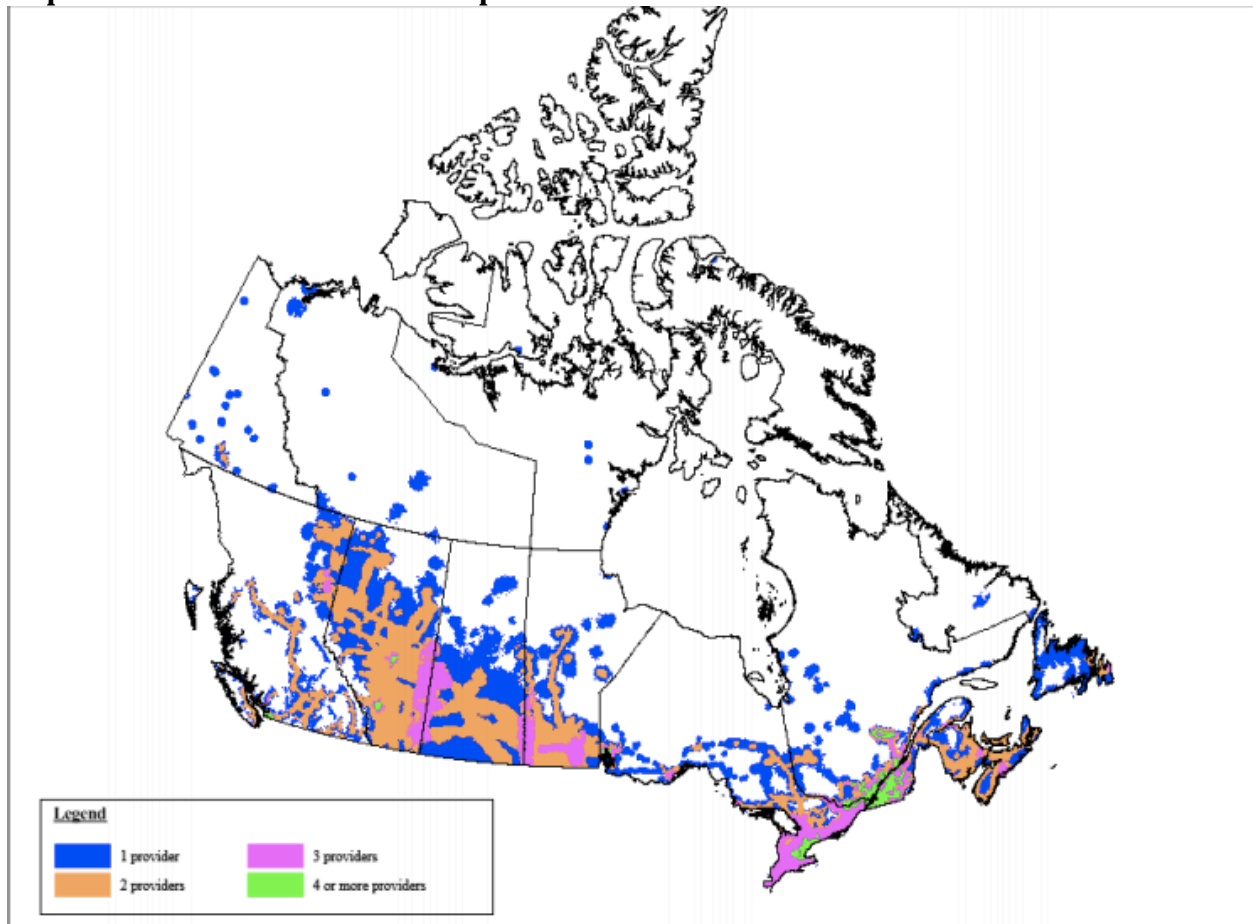
That, however, seems hard to square with the rabble-scrabble mode of mobile wireless development in the Global South, where, according to the GSMA¹², for instance, Vietnam, Tanzania, Kyrgyzstan, Brazil, Indonesia, Cambodia and Nigeria have seven-to-nine cellcos each; there are thirteen in Russia, while India had fifteen – twice the number reported in BAML’s *Global Wireless Matrix*. War-torn Afghanistan has six (GSMA, 2013).

The State of Wireless Markets in Canada

Climb down from international comparisons to more closely examine conditions in Canada, not just on the basis of revenues, but spectrum holdings and actively deployed spectrum as well as subscribers, and the portrait takes on an even more definite shape. Concentration levels are high across the country on the basis of these measures, at the national level and within provinces and cities, and have been this way for a long time. The following wireless service area map depicts where service is available and how many competitors exist within each area of the country.

¹¹ These 57 countries account for four-fifths of world population, i.e. 5.5 billion people out of 7 billion (World Bank, 2013). Of course we realize that these countries vary widely in terms of development, market size, geography and general political economy, but our main point is that fourth national wireless cellcos seem to have taken root in many countries despite these large variations, suggesting that the decisive factor is policy and political will versus technological and economics, as Church and Wilkins (2013) claim (also see Bohlins, Cave and Eisenach, 2013 re. technological and economic determinist claims similar to Church and Wilkins).

¹² The association for the mobile industry worldwide.

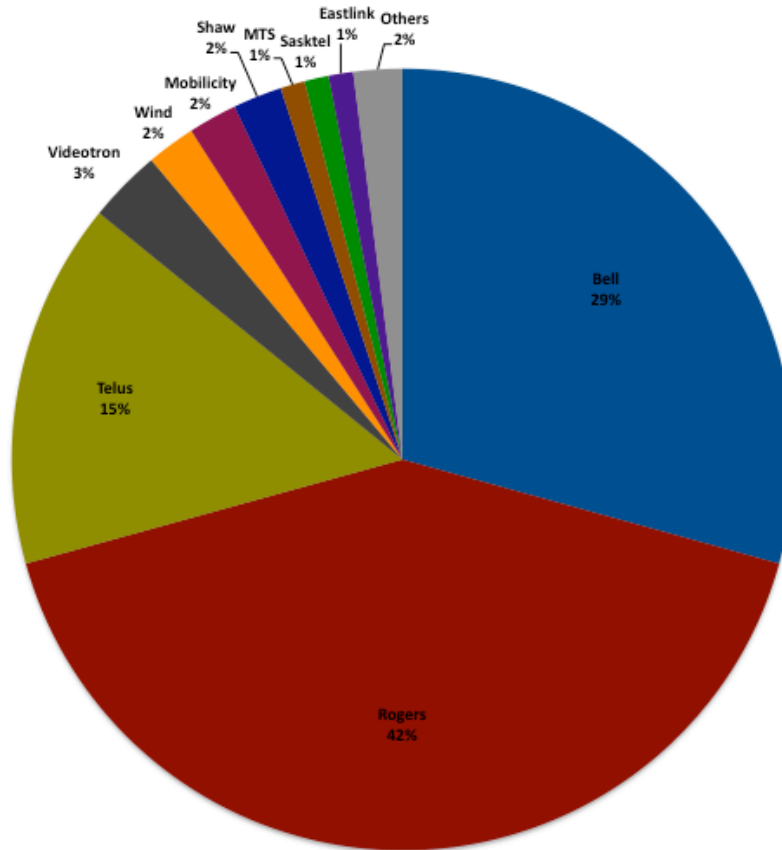
Map 4: Wireless Service Area Map

Source: CRTC (2013). *Communications Monitoring Report*, p. 168.

The map shows that much of Canada is not covered at all. It also shows that only a very narrow band of the country has more than three players.

Additional evidence further girds the case. In terms of total spectrum holdings, the big three control the lion's share by far: 86%. Rogers single-handedly has 42% of the available PCS, AWS and GBRs spectrum, while Bell has 29% and Telus 10%. Several small companies trail far behind with 1 – 3% of the available spectrum (Loxcel, 2013; Canadian Spectrum Policy Research, 2013). Tighten the focus further on spectrum in use (i.e. active antenna), and the big three control 93% of the channels/antenna in active use. In either case, concentration levels with respect to *the* essential resource underpinning wireless markets – spectrum, which cannot be stressed enough, is a public good held in trust on behalf of citizens -- *are* high by either the CR4 or the HHI. The HHI scores on both measures – spectrum holdings and spectrum actively in use -- is well into the highly concentrated range at 2,775 and 2,890, respectively. The two diagrams in Figure 3 below illustrate the points.

Figure 3: Summary of Spectrum Holdings by Wireless Service Provider



Sources: Canadian Spectrum Policy Research, 2013; Loxcel, 2013.

The same is true if we look at the provincial level on the basis of subscriber share, as Table 2 illustrates. While the national HHI score in 2012 based on revenues was 2,873, this was surpassed in every single province, except Quebec. In short, whether we look at things from the vantage point of the country as a whole, or individual provinces, the answer remains the same: wireless markets in all areas of Canada are highly concentrated. Table 2 depicts the point.

Table 2: Market Share based on Subscribers, by Province, 2012

Province	Bell	Telus	Rogers	New Entrants	Other	CR2	CR3	HHI
BC	18	40	39	3	0	79	97	3454
AB	23	50	24	3	0	74	97	3614
SK	10	10	9	0	71	81	91	5322
MB	5	9	33	0	53	86	95	4004
ON	28	20	44	6	1	72	92	3157
QC	33	28	29	10	0	62	90	2814
NB	58	23	19	0	0	81	100	4254
NS	54	29	16	0	0	83	99	4013
PEI	58	27	15	0	0	85	100	4318
NL	73	25	2	0	0	98	100	5958
TER	90	0	0	0	10	100	100	8200
Average	36	26.1	23	22	62	80.1	96.1	4090.8

Source: CRTC (2013). *Communications Monitoring Report*, p. 167. (Link to underlying data set for Table 2 [here](#))

As Table 2 shows, Quebec is at the lower end of the market consolidation scale. While there has been a downward drift in concentration since 2008 nationally, the pace of change has been greater in Quebec. Unlike in many other areas of the country where two of the big three stand out in front of the pack, in Quebec, Bell (33% market share), Rogers (29%) and Telus (28%) all have large market shares, but Quebecor/Videotron has also become a quite significant rival since entering the market after acquiring spectrum under the ‘new entrant’ provisions of the AWS spectrum auctions in 2008. Its share of the market grew to 5.3% in the four years since.¹³ Wind and Mobilicity have also picked up about 4.7% market share between themselves, as well. As a result, three dominant players plus Quebecor and two smaller players have created a more competitive market structure, even if the HHI is still at the high end of the scale (2742). If there is any vindication of the viability of the “4th mobile wireless carrier” strategy in Canada, Quebec is it.

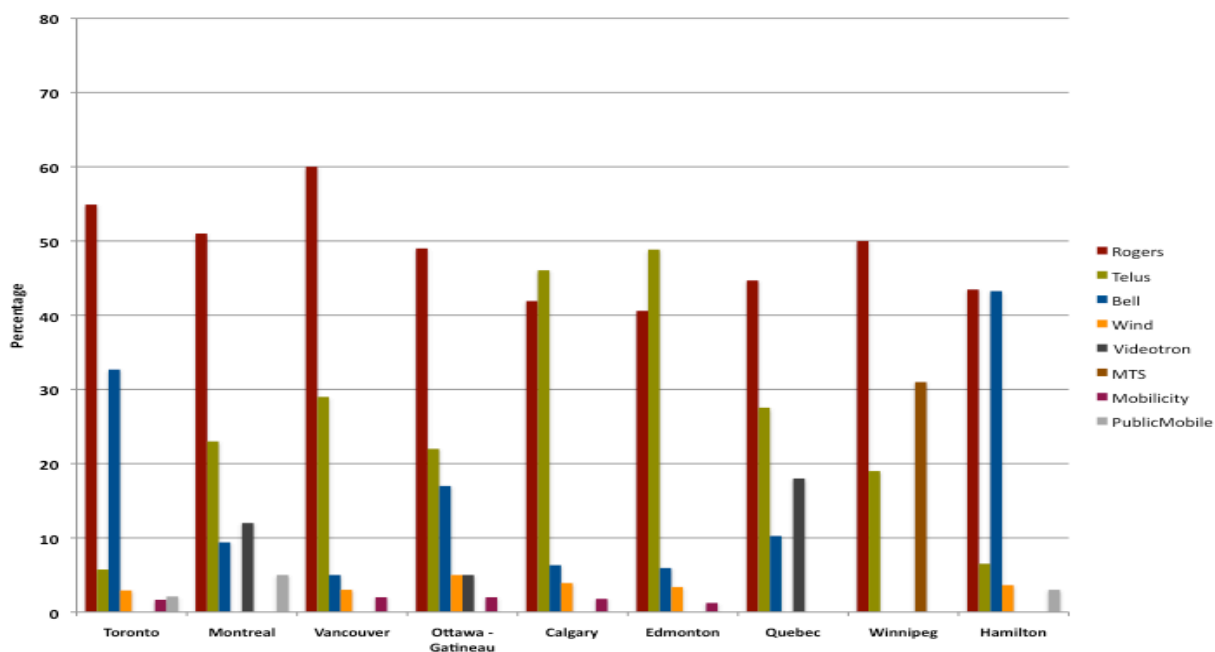
Outside of Quebec, however, this kind of market structure is unusual. It is not possible to break out the data in terms of revenues or subscribers by wireless company and city, but we can use antenna counts as a proxy to arrive at a rough approximation of conditions in the nine biggest cities across the country. Indeed, if we zoom in on these cities – Toronto, Montreal, Vancouver, Ottawa/Gatineau, Calgary, Edmonton, Quebec City and Winnipeg,

¹³ Based on the number of channels in service, Quebecor/Videotron appears to hold a greater share of used spectrum in Montreal and Quebec City, with 11.5% and 17.5% of the active channels, respectively, compared to 9.4 and 10.3%, respectively, for Bell.

Hamilton¹⁴ -- we find that the city with the closest market structure to conditions in Quebec is Ottawa/Gatineau. There are six wireless companies actively deploying spectrum (based on active antennas) in the city: Rogers (49% of channel capacity), followed by Telus (22%), Bell (17%), Videotron (5%), Wind (5%) and Mobilicity (2%). The HHI in Ottawa/Gatineau is still substantially higher than the Quebec average at 3247, but it is relatively low compared to the other big cities in the mainly English-language parts of the country.

Concentration levels in these cities sits at the very high end of the range, with HHI scores outside of Ottawa ranging from a low of 3,600-3,700 in Hamilton and Winnipeg, 3,900 in Toronto, 4,100 – 4300 in Calgary and Edmonton and with Vancouver at the top of the scale at 4,369. This is likely due to the fact that there is a strong tendency for some combination of two of the big three cellcos to dominate in Canada's major cities, with Bell and Telus sharing facilities in a rough division of the country into Canada East (Bell) and Canada West (Telus), although both possess their own scaled down facilities in certain cities. This is the case, for instance, with respect to Bell in Vancouver and Telus in Toronto (Loxcel, 2013). Figure 4, below, illustrates the point.

Figure 4: Share of Spectrum in Active Use (Antenna) in Canada's Largest 9 Cities, 2012



Source: Loxcel, 2013 (based on data current as of November 14, 2013).

¹⁴ These cities were chosen because this is the number of cities that it takes to reach half of the Canadian population. Canada has a bimodal population split, with half heavily concentrated and easy to reach; the other half is more challenging, but much of the land is uncovered. According to the OECD, Canada's population density is not thin and scattered but rather tightly knit, with half the population settled on 16% of the land versus the OECD average of half the population occupying just under 20% of the land in most countries.

One additional point to be made with respect to the above figure is the presence, for instance, of some entities that hold spectrum, such as Shaw, but which have forsaken any intention to actively deploy such services on their own. Indeed, Shaw has tried to swap its spectrum with Rogers, a move that has been stymied by the government's refusal to give its blessing.¹⁵ While Church and Wilkins (2013) single this out as another capricious act by the government, the government's actions are nothing of the sort. Instead, its actions reflect the reality that spectrum holdings in Canada are very highly concentrated and the belief that, if competition has a hope of succeeding, it is essential that new entrants secure access to this key resource. In other words, the government's stance is rational, despite the attempts by Church and Wilkins, the big three and their other defenders to paint it otherwise (see, for example, Bohlins, Cave & Eisenach, 2013; Fan, 2013; Ghose, 2013).

Moreover, recalling that one of the conditions for determining market power is whether large market shares are transitory or long-lived, the fact that Rogers has held between 40 and 50% of the available spectrum since receiving its first set of licenses back in 1983 is another indication that market power in the Canadian wireless market is not only real, but entrenched (Industry Canada, 2010; Canadian Spectrum Policy Research, 2013).

What's a Regulator to Do? Telecoms Regulatory Toolkit for the 21st Century: Tool #1, Importance of Cultivating Competitive Markets and 4 or More Cellcos

The above realities leaves us with a choice: do nothing, as Church and Wilkins and other defenders of the status quo would have us do, or deal with reality as it is, as the FCC, DOJ, UK Ofcom, NZ, Australia, EC currently do, and as Industry Canada, the CRTC, and the current government have once again begun to do with greater conviction relative to the early years of the 21st century, and as independent analysts and critics such as Michael Geist, Open Media, Peter Nowak, the Public Interest Advocacy Centre, the Seaboard Group, the Canadian Spectrum Policy Research group (Ryerson University) and as many others who know this area well advocate (Shade, Shephard, Crow, Sawchuk, etc.). Indeed, there are numerous policy levers and regulatory measures that can and are being used in many countries around the world to deal with the reality that wireless markets tend to be highly concentrated. Far from being ad-hoc intrusions tantamount to the expropriation of capital, they should be used.

The Fourth Player as Holy Grail (or Why a Strong "Maverick Brand" is a Good Thing)

¹⁵ Parenthetically, while Church and Wilkins (2013), and others (e.g. Fan, 2013; Ghose, 2013), suggest that Shaw's desire to sell its spectrum holdings is further proof more competition is not viable, the better explanation is probably this: with operating profits of 26% and EBITDA of 41% in 2012, respectively, why would Shaw want to stray from such rich fields when, as Church and Wilkins' own data for Rogers shows, taking incumbents means much leaner profits for years, even if healthy by average industrial profits?

By now, two things should stand out in sharp contrast to the main lines of thought in Church and Wilkins' paper, and those who dislike the Government's wireless policy. First, fourth competitive national cellcos are not a rare and dying breed, but actively striving to make a go of it in a tough slog against dominant players, with strong governments at their back in many cases. Indeed, far from being an alien invention of the Harper Government, the goal of four or more carriers, and explicit policies that do everything possible to ensure their survival, is a tried and tested policy *norm* -- albeit not one without flaws.

Capital intensity and scale are undoubtedly important for world-class mobile wireless networks, as Church and Wilkins (2013) stress, but such things must not be overplayed. As we have seen, countries with four or more cellcos are more plentiful than those without. The reality is that capital intensity is not so high as to preclude more than four national wireless providers in most countries. Moreover, it is exactly the historical tendency to over-exaggerate the capital requirements that girded the natural monopoly regime for wiredline telecommunications in Canada, the United States and most countries worldwide well past their due date in the 20th century -- if they were ever the inevitable feature they were often made out to be to begin with (Babe, 1990; Melody, 1997; John, 2010). We should be careful that such claims are not used to similar ends with respect to mobile wireless services.

Canadians strung together 1000s of telephone companies in the 1910s; and these indy telcos were important to extending the social reach and business utility of the telephone. At the heights of the early competitive telephony era (circa 1911 and 1916), their numbers tripled from 600 to 1,700, and they served one-half of all subscribers. Bell managed to hang on to the other (better) half. The percentage of Canadians with home phone service nearly doubled in just five years at the height of the competitive telephony era (Board of Railway Commissioners, 1918, pp. 10-11; Bell, 1916; Babe, 1990, pp 121-126; Winseck, 1998, p. 132). Backwoods treckers with antennas strapped to their backs and mesh networks are their counterparts today.

The UK: Promoting Four National Wireless Wholesale Companies

Claims about the need for scale and the high capital intensity of the wireless sector have recently been dealt with explicitly in several cases. Instances in which such claims have been exaggerated, and specifically when they have come wrapped in nationalistic flags, have been rejected (AT&T + T-Mobile in the US), while others that have promised more competition through greater consolidation but have been given the green light (Orange + T-Mobile in the UK).

The latter is of particular importance because while consolidation of the number three and four players in the UK did raise concentration levels, the deal was made contingent upon the new entity, Everything Everywhere (EE), handing over *a quarter* of its prized LTE/4G spectrum to the new fourth ranked player: Hutchison 3G. The move met with a hew and cry from Vodafone (the #1 player) and O2 (Telefónica) (the #2 player), which disagreed with

the merger of Orange and T-Mobile to begin with. They raised their voices again when it was clear that Oftel had earmarked EE's divested spectrum for Hutchison 3G. Vodafone and O2 needed the 'beachfront spectrum' themselves, they argued, to roll-out broadband 4G wireless services across the nation -- pleadings that, while not falling completely on deaf ears, were sternly rejected by Ofcom. European competition authorities chimed in with similar views (US, Department of Justice, 2011; Ofcom, 2012a).

Ofcom's (2012c) response to Vodafone and O2's pleadings are instructive: "Our policy aim is to promote competition in mobile markets primarily through national wholesale competition" (p. 2), it declared. And further,

. . . we have concluded that the *highest source* of risk relates to the failure of a fourth national wholesaler to win the spectrum it would need . . . to be . . . a credible national wholesaler We recognise that there *is some risk* that this concern could arise through the failure of one of Everything Everywhere, Vodafone or Telefónica to have sufficient spectrum to be credible after the Auction but we consider that this risk is much lower. This is for a combination of reasons: first, since it is less clear that additional spectrum is needed for them to be credible, and second, even if it is, it is less clear that these national wholesalers would be unable to acquire sufficient spectrum [to meet] . . . future mobile competition and award of 800 MHz and 2.6 GHz to mitigate the risk. The balance between these two factors differs for these national wholesalers but we consider the overall effect is similar (*emphasis added*, [Ofcom, 2012c, pp. 67-68](#)).

Continuing, Ofcom (2012c) observed that: "The *main concern* is that there will be fewer than four credible national wholesalers; and a *lesser concern* is that even if there were at least four credible national wholesalers, one or more will be at a disadvantage" because unable to acquire the advanced spectrum they need to "compet[e] across a wide range of services and customers" (p. 2).

Church and Wilkins (2013), and the big three Canadian incumbents want to turn this order of things upside down so that Ofcom's lesser concern becomes Canada's dominant one. That special pleading should be treated for what it is, and rejected. Just like current conditions in Canada, Ofcom had a very clear choice between cultivating Hutchison 3G as a viable fourth player by giving it access to the valuable public resource and linchpin of the entire mobile wireless market – spectrum – or giving it to Vodafone, O2 or EE – each of which promised to build world-class broadband mobile wireless networks in return if they were the 'chosen one'. Ofcom, instead, resolutely chose to do the former, standing firm in the face of strong pressure to do the opposite. The Government of Canada now stands in the exact same spot that Ofcom did two years ago, and all indications are that it intends to stand pat – which is an entirely defensible position.

Ofcom had to choose between another opposing set of interests as well. For years, it has fostered conditions conducive to MVNOs as well as smaller regional and local interests, but it took the opportunity of its consultation on spectrum policy to make it explicit that this support did *not* include using spectrum policy to ensure their survival. In other words, MVNOs were great, but the first priority was to do everything in its power to ensure the viability of four national *wholesale* wireless carriers, and in this case that fourth cellco was Hutchison 3G. Using all of the powers at its disposal to ensure that there were four strong national *wholesale* wireless companies, Ofcom argued, would serve the needs of MVNOs well, even if only indirectly. As Ofcom stated bluntly, “Our policy is to promote competition in mobile markets primarily through national *wholesale* competition” (*emphasis added*, [Ofcom, 2012a, p. 3](#)).

Canadians might be forgiven for not knowing that such policy priorities and that something called a ‘national wireless wholesale regime’ even exists in the UK, given the incumbent’s rhetoric, much journalistic coverage that slavishly follows that rhetoric, and studies such as Church and Wilkins (2013) that give no hint that such possibilities even exist. Furthermore, the UK is not alone.

National wholesale wireless regimes are being used as one tool in the regulatory tool-kit to offset the ‘natural limits to competition’, as Church and Wilkins put it, in many countries. In fact, “mandated wholesale access is the rule and a key driver for competition . . . across the European Union area” (OECD, 2013, pp. 41-42). That Church and Wilkins do not even broach the notion that the *national wireless wholesale regime* is standard policy across *all* of Europe is either misleading or a sign that they are not as familiar with the terrain as they ought to be.

Before moving on to similar recent events in the United States, it is useful to sum up some of the qualities of the regulated wireless markets approach adopted in the UK, six of which stand out:

1. the UK regulators’ lower HHI thresholds are stricter than those in the US, and miles apart from the idiosyncratic approach to such things adopted by the Competition Bureau and CRTC here in Canada;
2. Incumbents will fight tooth-and-nail against efforts to cultivate as many strong players as possible, but in the UK, Ofcom felt that consolidation could, simultaneously, allow EE to become a strong competitive disciplining force against the much larger Vodafone and Orange, while giving Hutchinson’s 3 access to highly sought after LTE spectrum that would allow it to roll out a nationwide fourth wholesale wireless network and to become a strong competitor in its own right.
3. The composition of the UK wireless market in terms of the nationality of capital within it is unique: Vodafone (British), O2 (Spanish, Telefónica), EE (France Telecom/Orange + Deutsche Telecom); Hutchison’s 3 (Hong Kong).

4. The external pressure applied by a continental trade and communications policy framework, i.e. the harmonization that takes place between UK and EU regulators.
5. The need for all political institutions and actors – governments, ministers, telecom and media policy-makers and regulatory chiefs, etc. – to steel their spines in the face of dominant players who will do everything within their powers to preserve their dominant market positions. This is what Ofcom did in the face of much bluster and pressure from Vodafone and O2, and even EE.
6. MVNOs are actively encouraged because they help to extend the market to those not served well by the dominant players' focus on higher ARPUs.

In summary, the UK has the advantage it would seem of the multinational character of the capital that stands behind the wireless industry in the country. The British state welcomes capital investment, but sets substantial targets for service roll-outs, regulates conditions of wholesale access and fills in the dark spaces where no coverage exists with considerable investments of its own. Where all else fails, the UK government's Mobile Internet Project (MIP) has a budget of \$177 million to build out mobile broadband wireless networks to reach areas of the country where 'the market' will not (Ofcom, 2012a).

The US: The Department of Justice and the Aborted AT&T T-Mobile Merger

The UK Government and Ofcom allowed the merger of Orange (France Telecom) and T-Mobile (Deutsche Telecom) on highly conditional grounds—i.e. the divestiture of one-fourth of the new entity, EE's, LTE/4G spectrum holdings to Hutchison 3G. In the United States, policy-makers and regulators pursued the same objective but through different means. In contrast to the course of events in the UK, the Department of Justice, with seven US states (California, Illinois, Massachusetts, NY, Ohio, Pennsylvania and Washington), rejected the proposed amalgamation between AT&T and T-Mobile (TMUS) -- the second biggest and fourth biggest wireless players in the US, respectively -- outright. Why?

The DOJ examined the nationwide competitive impact of the proposed transaction. It also looked closely at each of the firms involved, notably TMUS, and their specific roles within nationwide and local markets. Lastly, it zeroed in on 97 cities in which AT&T and TMUS competed head-to-head.

According to the DOJ, assessing the nationwide competitive effects of the AT&T and T-Mobile deal was essential. This is because the big four US cellcos' compete on technology, prices, service plans and device offerings in cities across the nation. Network technology and standards are national in scope as well. A national reach also means simplified pricing and service plans for customers, while large business and government clients typically seek "a mobile wireless provider with a nationwide network" (pp. 10-12). Smaller regional players are great, the DOJ intimated, but their limited subscriber reach and market share, and lack of spectrum and quick access to devices, neuters their effect ([US, DOJ, 2011, p. 3](#)).

The DOJ also cast TMUS as an important innovator, having chalked up a number of “firsts” in the national market: “the first company to roll out and market a nationwide network based on advanced HSPA+ technology” and to offer “Android handsets, Blackberry wireless e-mail, the Sidekick (a consumer “all-in-one” messaging device), national WiFi ‘hotspot’ access, and a variety of unlimited service plans, among other firsts” (US, 2011, p. 14). TMUS self-styled ‘challenger brand’ strategy also meant that it offers “disruptive’ pricing’ plans” that Verizon and AT&T have no desire to match (US, 2011, p. 14). Furthermore, and of particular importance, TMUS has set a goal for itself to “make smart phones affordable for the average US consumer” and to set prices for mobile broadband data plans that ‘the big guys won’t match’ (US, 2011, p. 15). In other words, TMUS was plying the ‘lower end’ of the market and bringing new customers in, or offering more to those under-served by AT&T and Verizon, for example, in their relentless pursuit of high-end users and, thus, higher ARPUs.

AS TMUS put it in its own internal documents

... as a challenger brand ... we will attack incumbents and find innovative ways to overcome scale disadvantages. TMUS will be faster, more agile, and scrappy, with diligence on decisions and costs both big and small. Our approach to market will not be conventional, and we will push to the boundaries. ... TMUS will champion the customer and break down industry barriers with innovations ...” (quoted in US, DOJ, 2011, p. 14).

Turning to individual cities, the DOJ cast a wary eye on the fact that competition in the 97 cities across the US in which AT&T and TMUS compete head-to-head would be lost if the two combined. The cities represent half the US population. The AT&T-TMUS merger would have raised already high HHI scores to above 3000 in all but two of the 97 cities examined, as well: Seattle, Washington and El Paso, Texas. Similarly, HHI scores would have risen between 200 and 1,400 points in all of the 97 cities selected for close examination except Toledo, Ohio and Grand Rapids, Michigan.¹⁶ Citizens of LA, would have been especially hard hit by the demise of TMUS, with their local HHI (2380) rising sharply from the moderately concentrated zone firmly into the highly concentrated one with a post-merger HHI of 3174 (US, DOJ, 2011, Appendix B). The elimination of TMUS as a real rival to not just AT&T, but Verizon and Sprint in one city after another across the country was too much for anti-trust regulators.

Finally, the DOJ cast a wary eye on claims that the combined entity was necessary to achieve the scale and spectrum required to build ‘world class wireless networks’ for the benefit of all Americans. The DOJ did not reject such claims entirely but, like Ofcom, it saw such concerns as a lower priority than keeping T-Mobile alive as a strong independent

¹⁶ That the merger would have raised HHI scores by more than 200 points was important because changes of this magnitude in already highly concentrated markets are seen as particularly worrisome.

fourth, nationwide competitor. On this matter, the DOJ and Ofcom were joined at the hip. The DOJ also made short shrift of the nationalist pleadings made by AT&T to the effect that what is good for AT&T – the ability to amass the spectrum and scale needed to build ‘world class networks’ -- is good for America (United States, Department of Justice, 2011, p. 91; Sturke & Grunes, 2012, p. 205). On that ground, if anybody was expanding the reach of the market and meeting the needs of Americans, it was TMUS, for reasons set out above. Seeing the writing on the wall, AT&T and TMUS folded, and went back to competing against one another.

The effects of stopping the AT&T – TMUS merger dead in its track have been important. For one, playing to its ‘challenger brand’ identity, TMUS has taken the lead on opening up to MVNOs which has, in turn, driven Verizon, AT&T and Sprint to do the same. Cheaper prices and the emergence of a more robust approach to marketing prepaid plans is another result, where before, as in Canada, the standard line has been that consumers did not want them (OECD, 2013, p. 24). Indeed, as *Forbe’s* puts it, denied a merger with AT&T, TMUS cranked up innovation instead. At the front of such initiatives are a raft of smartphone data plans that are nowhere to be found in Canada (Louis, 2013). This is a crucial point as VoIP and instant message style “apps” are increasingly substituted for wireless service providers’ legacy-proprietary services. Moreover, like MTS and Wind in Canada, but not the incumbents, TMUS does not charge data overages, but throttles its users after reaching specified limits. As a result, advertised prices are likely to be closer to the real prices that subscribers pay at the end of the month.¹⁷

T-Mobile’s recent television advertisements doubles-down on the point, while infusing their “maverick brand” message with much humour, as clips on YouTube show (see [here](#) and [here](#)). In the second link, T-Mobile’s touts its new standard rate plans that come with unlimited international data roaming to 100 countries. While such things are obviously good news for consumers, the accumulated results are starting to have an effect on the United States’ standing in the international league tables, as well, where it ranked 17th in 2012 in terms of pricing and 11th overall. In contrast, Canada ranked 27th for pricing and 18th overall, based on our composite examination of OECD and FCC data for penetration, pricing and speed for wireless services (OECD, 2013, *Broadband Portal*; FCC, 2012).

Also crucial, especially from the Canadian view, the rapid growth of MVNOs and prepaid subscriptions in the United States is moving that country closer to the best in the world, while leaving Canada further on its own and laying bare the dubious assertion – which serves as a centerpiece in Church and Wilkin’s (2013) as well as two recent Nordicity (2011; 2013) studies – that prepaid plans are somehow foreign to the North American wireless mentality. What the US results suggest, however, is that the lack of prepaid plans (and MVNOs) is a barometer of weak market forces, rather than some ill-explained cultural

¹⁷ I am especially grateful to Ben Klass for his guidance and research assistance on this point.

predisposition against pre-paid wireless plans. The OECD (2013) is emphatic that this is exactly the point (pp. 21-22).

Ultimately, the transactions on both sides of the Atlantic – the merger between Orange and T-Mobile that formed EE in the UK, and the failed merger between AT&T and T-Mobile in the US -- displayed a unity of purpose despite their opposite results: every rational tool of the state and regulators would be used to foster conditions that would either keep a strong competitor alive (TMUS in the US) or give a new fourth player a hand up the ladder. In the UK, this also involved playing midwife to the birth of a third large player closer in size and scale to the top 2 (Vodafone and O2), while trying to ensure that MVNOs could flourish as well on the back of the national wholesale wireless regime. The end game was similar in both countries: better *national* wireless markets, greater technological, pricing and service innovation, broadening the market, extending high-speed networks across the country and maintaining a viable national fourth player.

The 4+ Competitive National Cellcos Model Around the World: France and Israel

As we have seen, countries with four or more national cellcos are the norm, not the exception. There are many other examples to choose from to illustrate why this model is being pursued. It is neither possible nor necessary to canvass them all, but a brief review of Iliad/Free in France as well as Hot Mobile and Golan Telecom in Israel help to illustrate the achievements of the model, as well as the continued obstacles and pitfalls that remain in their path.

Following in the footsteps of Canada and the US, France adopted network unbundling in 2001, but a weak regulator and an intransigent France Telecom blunted the desired effect. That is, until the European Union intervened in 2003 to force a change in events. These actions were ultimately extended to all regulators across Europe, requiring companies with *significant market power* to offer open network access based on regulated prices, technical standards and other conditions (European Parliament, 2011, pp. 54-61).¹⁸

Once these changes took hold, competition increased greatly. By 2008, France Telecoms' share of the broadband market had fallen to 47%. Iliad (Free) and SFR/Neuf Telecom had 24 and 22 percent market share, respectively, while Numericable-Comptel held 5.5% of the market. Free began building its network in 2000, but efforts accelerated after 2003 as the new regulatory climate took effect. Crucially, France Telecom responded by ramping up investment and lowering prices. Free also offers a bundled quad play of services, including "100Mbps service to the home, digital TV with HD and the ability to create your own private television channel for others to watch, unlimited voice telephony throughout

¹⁸ This and the following paragraph pull directly from Winseck (2012). New Zealand's Ultrafast Broadband Plan: Digital Public Works Project for a Network Free Press in the 21st Century or Playfield of Incumbent Interests?

France and to 70 other countries, . . . and secure nomadic WiFi access wherever one's laptop or WiFi-enabled phone is within range of the Freebox of any other Free subscriber in the country, for USD32.59 PPP a month" (Benkler, et. al., 2010, p. 86, 153; OECD, 2011b, p. 54). Iliad/Free's effect on the wireless market in France is lauded by all, except Canadian observers bent on maintaining the status quo, and offering few if any glimpses over the horizon to see what others are doing that could be beneficially adopted in Canada.

After meeting staunch resistance during its initial five years, Free now seems to have carved out a place for itself within the existing industry, with considerable encouragement from Arcep, the French regulator, which "is encouraging operators to invest in their own infrastructure but also to share costs and investment between one another" (Infrastructure sharing is France's FTTH route, 2011). A key part of cementing its position within France's telecoms market has been Iliad's ability to leverage its wiredline networks and customer base to introduce mobile wireless services using a mix of WiFi and cellular to create a more or less seamless blanket network that partially distributes capital costs among customers. In addition, a strong commitment to infrastructure sharing by the industry, backstopped by Arcep, has ensured that tower sharing and roaming agreements between Iliad/Free and Orange/SFR have been more forthcoming than in Canada. As a result, Free gained an 8% market share of mobile wireless subscribers in its first year, 2012 (Iliad, 2013). That number had grown to 11% by late 2013 (Trichur, 2013).

Four other points stand out about the French experience in the past decade, and especially in the last five years. First, and similar to the US and UK where strong fourth players have sought to extend the market 'downscale', so to speak, prepaid, no-commitment plans are becoming standard. As with Canada, such things were virtually unknown before the arrival of Free Mobile, but in 2012 there were nearly 35 million SIM-only subscribers. Handsets are no longer tethered to specific providers or contracts, while sales of untethered devices rose from 3 to 15 percent in 2012 (Iliad, 2013). Thus, while Church and Wilkins (2013) suggest that there is a "relative lack of interest in pay-as-you-go" in Canada (p. 16), the more likely reason is that such offerings are not a central part of what is on offer (also see Nordicity, 2013; Nordicity 2011).

Second, Iliad/Free is not only disrupting conventional wireless markets with more affordable offerings, untied phones and no contracts, but also driving investment in 4G networks. It has surpassed its required coverage targets and also adding momentum for other players to do the same (Iliad, 2013), countering claims by Telus, Rogers and Bell that new players will have a deleterious effect on rural citizens by forcing the incumbents to retrench in their core service areas to meet the 'unfair' advantage handed to new entrants by the state (McTaggart, 2013).

Third, new entrants are innovating, with the aid of wise spectrum policies, in other ways too. Thus, for example, the OECD (2013) points to the emergence of another mobile wireless operator in France that uses unused broadcast spectrum ("white spaces") and

innovative user authentication techniques to allow subscribers to connect freely via WiFi and fixed networks to the mobile wireless services of their choice. As a result, “overnight, the mobile customers of the new provider could access more than four million hotspots without needing to log on to those networks or enter passwords”, states the OECD (p. 23).

Fourth, new entrants in France such as Free have not only increased the country’s rankings in the international league tables overall, even if it still lags in wireless, and made “markets significantly more competitive and encouraged new innovation” (OECD, 2013, p. 23), they have served as examples for others to emulate. This is notably so in Israel, where Golan Telecom became the *fifth* mobile wireless operator after entering the market in 2012, along with another new entrant, Hot Mobile, an existing cable company that uses a combination of equipment from a previous operator and leased equipment. Both Golan Telecom and Hot Mobile present themselves as ‘challenger brands’, with substantially more affordable prices than existing players (Cellcom, Pelfone, Partner (Orange)). GT especially has shaken up the market, with two things critical to its disruptive impact: *effective regulation*, especially of mobile termination rates, and reasonable access to shared broadband fibre facilities and, second, the fact that its pricing strategy follows the Free model closely, with unlimited service for \$25 (USD) a month (OECD, 2013, pp. 43, 205).

Need for Clear Policy and Regulators with a Spine: Expanding the Regulatory Remit from the Edges-In

In sum, it is clear that while concentration levels in mobile wireless markets are very high almost everywhere, there is no shortage of countries with four or more cellcos. Indeed, it would seem that if Israel, along with so many others are able to sustain that many players, then the decisive factor is probably not the size of the market so much as the determination of policy makers and regulators to make it happen. That is the clear lesson from each of the examples discussed above: the UK, US, France and Israel. The OECD (2013) stresses exactly this point: “Policy makers and regulators have a vital role to play in ensuring sufficient competition” (p. 16), it states matter of factly.

The absolutely critical factors in whether or not regulators and policy-makers will rise to the task, however, is if they have the skills to do so, and the fortitude to stand down well-entrenched interests who will fight their efforts every step of the way. And at the heart of that issue is whether or not they will face the fundamental realities of the political economy of communication, namely that there *will be* a struggle over the distribution of critical and scarce resources, and in this respect two resources stand out: spectrum and essential facilities.

Bringing this back for the remainder of this study primarily to issues directly focused on Canada, two questions emerge: Do the CRTC, Industry Canada and the government-of-the-day have the independence of mind, and the ability to steel their spine, to do what it takes in the face of incumbents – Rogers, Bell and Telus – who will resist challenges to the status

quo with all their might, as the lessons of last summer so amply demonstrate? And second, is there really a need to do so, and if so, and doubling back to the first question, what needs to be done?

With respect to the first question, the ‘regulatory flip’ spoken of early in which the CRTC beat a hasty retreat from the innovative network unbundling regime it put into place in the 1990s until, roughly, 2002, when open access and unbundling rules were effectively gutted and competition between incumbent telecom and cable companies made the norm (Benkler, et. al. 2010. pp. 136-7). So, too, do the long line of decisions from 1994 through to the present day that have turned mobile wireless services into a regulatory no-man’s land stand as a striking portrait of a lack of resolve to meet reality head-on (see, for instance, fn 6 in [CRTC, 2012](#) reprising this history).

As Yochai Benkler (2010) and colleagues at the Berkman Centre put it gently a few years ago, the Canadian regulator has not so much abstained from taking up the baton, but rather withdrawn early after initially taking promising steps while, simultaneously, implementing regulated wholesale rates for wiredline facilities that are amongst the highest in the OECD. Furthermore, as they put it, Canada looks like a case “where the concern for incumbent investment incentives” keep it from implementing the types of measures that have been so effectively used, for example, in the UK, France, Sweden and, more recently, New Zealand and Australia, with strikingly positive effects (p. 162). All of which leads the authors to characterize the CRTC as “hesitant” (p. 162).

The record of half measures continues. Thus, for example, at the same time that the CRTC decided to open consultations on a mandatory wireless code, which it ultimately did adopt, and which is set to take effect next month, it found that wireless markets were sufficiently competitive that rate regulation was not required – although that decision was made by interim acting chair Len Katz as incoming chair J.P. Blais assumed the mantle ([CRTC, 2012](#)). A sense of hesitancy and old ways still hang about the Commission, however, as well in relation to its upcoming essential services consultation that is focused solely on wholesale access for wiredline services, but which explicitly eschews raising questions about a wireless wholesale regime ([CRTC, 2013c](#)).

Of course, it may be that the CRTC is holding its fire as it lines up a separate inquiry into essential facilities and a national wireless wholesale regime to be held when the time is ripe. Whether it does or does not do so will determine where it stands in relation to the UK and Europe where, as we have seen, promoting national wholesale wireless operators are *de rigueur*, and has been for nearly a decade. Perhaps the idea of a national wireless wholesale regime marks the outer limits of the possible in Canada?

On the other hand, there is an apparent appetite emerging within the CRTC, Industry Canada and the government to expand the realm of the possible. Indeed, while one might think that the wireless industry might celebrate the fact that the CRTC and government

have forsaken the national wireless wholesale regulatory regime, they are, in fact, up in arms about a list of active items on the agenda they claim represent a stunning expansion of intrusive measures, although they are nothing of the sort, notably:

- the National Wireless Code that is set to kick into effect December 2, 2013 ([CRTC, 2013b](#));
- the fact that domestic roaming charges are on the regulatory agenda and the CRTC's recently opening of an examination of international roaming charges ([CRTC, 2013a](#); CRTC, 2013b);
- [last year's decision](#) by the Government to relax foreign ownership rules "for companies that have less than a 10 percent share of the telecommunications market" (Canada, 2012), even though such rules continue to be far more restrictive in Canada than nearly every other OECD country, except Israel, Korea and Mexico (OECD, 2013, p. 46);
- the government's rejection of Telus' bid to acquire Mobilicity in June 2013 ([Canada, 2013](#));
- and the [spectrum set aside rules](#) for new entrants in the 700 MHz spectrum auction (Industry Canada, 2013).

So, What's the Problem Anyway?

Despite the evidence of high concentration, not just in Canada, but everywhere, yet with many other countries seemingly taking steps to improve the situation, one might still ask, what is the problem anyway. Is it that prices are too high, not enough people with access, or something else? In other words, is there really a problem that needs solving?

The answer is yes. Moreover, there is not one problem but a cluster of substantial issues that seriously impede what Canadians like to do: communicate. Indeed, as shown at the very outset of this paper, Canadians are a yakky and communicative nation, although the divides between people on the basis of income and how this shapes the communicative opportunities available to them are great. There is also ample evidence to show that conditions in Canada are out of line with those in many other countries in terms of three basic measures that are commonly used to assess these kinds of questions: penetration (usage levels per capita, or household, typically), pricing and indicators of the quality of services available such as speed (OECD, 2013; FCC, 2012; Benkler, et. al., 2010; Ofcom, 2013; CRTC, 2013).

The fact that Canadians like to talk and communicate a lot suggests that we use as many means of communication at our disposal as possible, as Figure 1 at the outset of this paper showed. Indeed, when it comes to broadband and mobile media and internet use, it bears repeating, Canadians are number 1.

Penetration, Prices, ARPU and Profits

The following tables and analyses are based primarily on two main sources: the OECD's data on wireless and wiredline broadband, use, access and prices from the tables compiled in its 2013 *Communications Outlook* and the FCC's (2012) *International Broadband Data Report*, with some additional data drawn from Ookla's (2012) speedtest (see Appendix 1 for additional discussion of sources, data and methodology).

The evidence shows that there are serious problems in Canada. Wall Communications Report prepared for the CRTC is a good source of evidence in its own right, but it is limited by the fact that the analysis is restricted to just six. The main headlines from that report are this: on the thirteen measures for which a full set of data for all six of countries examined, Canada ranks in the middle (i.e. third or fourth out of six) in eight cases and at the bottom of the pack on the rest of the measures. For the highest-end quad play packages of wireless, wiredline, broadband internet and digital television, it is tied in the middle with Australia and Japan, but far behind the UK and France, whose services are \$35 to \$75 cheaper per month. However, this still leaves Canada far ahead of the even more expensive suite of media, telecom and internet services in the United States (\$224 versus \$177 in Canada) (Wall Report, 2013; CRTC, 2013, p. 200). Confined by its restriction to just six countries, the best that Bell, Rogers and Telus can claim on the basis of the Wall Report is that the situation in Canada is better than in the United States, and that wireless rates have fallen since 2008.

Both statements are true, but the price comparison to the United State is hardly edifying given the US's middle-of-the-pack ranking of 17th place based on a composite set of FCC pricing data across a number of different 'service baskets'. Canada ranks 28th. Table 3 below shows the broader results for both countries relative to the other OECD countries based on a composite set of penetration, pricing and speed data from the OECD and FCC.

Table 3: Composite Wireless Ranking: Penetration, Speed, Price, 2011-2012

Country	Subscriber Rank	Speed Rank	Price Rank	Total	Composite Rank
Denmark	5	1	5	11	1
Finland	1	7	13	21	2
Sweden	2	8	11	21	2
Poland	15	3	12	30	4
Norway	8	5	18	31	5
Australia	3	23	6	32	6
Korea	4	4	24	32	6
Austria	18	9	8	35	8
Japan	7	15	15	37	9
United States	6	15	17	38	10
Luxembourg	9	29	3	41	11
Slovenia	30	11	2	43	12
Iceland	12	31	1	44	13
Italy	21	13	20	44	13
Slovakia	28	14	3	45	15
Czech Republic	20	17	9	46	16
Germany	27	11	9	47	17
Estonia	11	26	15	52	18
Canada	25	2	28	55	19
Turkey	32	21	6	59	20
Ireland	14	21	25	60	21
France	23	17	20	60	21
New Zealand	10	24	27	61	23
Spain	19	19	23	61	23
Greece	24	6	32	62	25
Switzerland	17	26	20	63	26
Portugal	26	10	29	65	27
United Kingdom	13	31	26	70	28
Netherlands	15	25	31	71	29
Hungary	33	19	19	71	29
Chile	31	29	13	73	31
Belgium**	29	26	27	82	32
Israel	22	33	30	85	33
Mexico	34	33	32	99	34

Sources: OECD [Broadband Portal](#), spreadsheet 1d (subscribers per 100) and spreadsheet 5e (speed) and FCC, [Third International Broadband Data Report](#). See underlying Tables [8](#), [9](#), [10](#) and [11](#) under Wireless Industry Project page on the CMC project website and explanatory notes associated with those tables and Appendix 1 for further information on methodology.

Based on this broader set of measures, Table 3 shows that Canada sits in the bottom half of the thirty-four OECD countries surveyed. It also shows that the US has improved relative to its standing in past years, making the comparison along just the dimension of price rather

selective. Improving conditions in the US in the past few years suggests that comparisons between Canada and it are now becoming less apt.

With respect to price comparisons, defenders of the wireless status quo argue that these are flawed because they mix different types of usage patterns, i.e. post paid subscriber plans where consumers have long term contracts and pay a monthly bill versus prepaid pay-as-you-go plans which, until recently, have been far more popular in Europe than they have been in Canada or the United States. Given that there are so few prepaid subscriptions in Canada relative to the rest of the world means that international comparisons are not very useful, they say (Church & Wilkins, 2013; Nordicity, 2011). This is fundamentally wrong.

The lack of take-up of prepaid plans in Canada is primarily a problem of supply not demand (OECD, 2013, pp. 21-22). As we saw above, prepaid, no-commitment plans are becoming standard in many countries, notably the UK, France, Israel and, most significant in light of cultural, market and geographical proximity, the US, especially since TMUS doubled down on its 'challenger brand' image after the DOJ foiled its bid to merge with AT&T. The rapid growth of MVNOs and prepaid subscriptions in the United States is moving that country closer to the rest of the world, while leaving Canada further on its own and laying bare the dubious assertion – which serves as a centerpiece in Church and Wilkin's (2013) study as well as recent Nordicity (2011; 2013) studies – that prepaid plans are somehow foreign to the North American mentality. Indeed, on the measures of penetration and the FCC's range of price measures, the U.S. now ranks in the top ten and well-ahead of Canada.

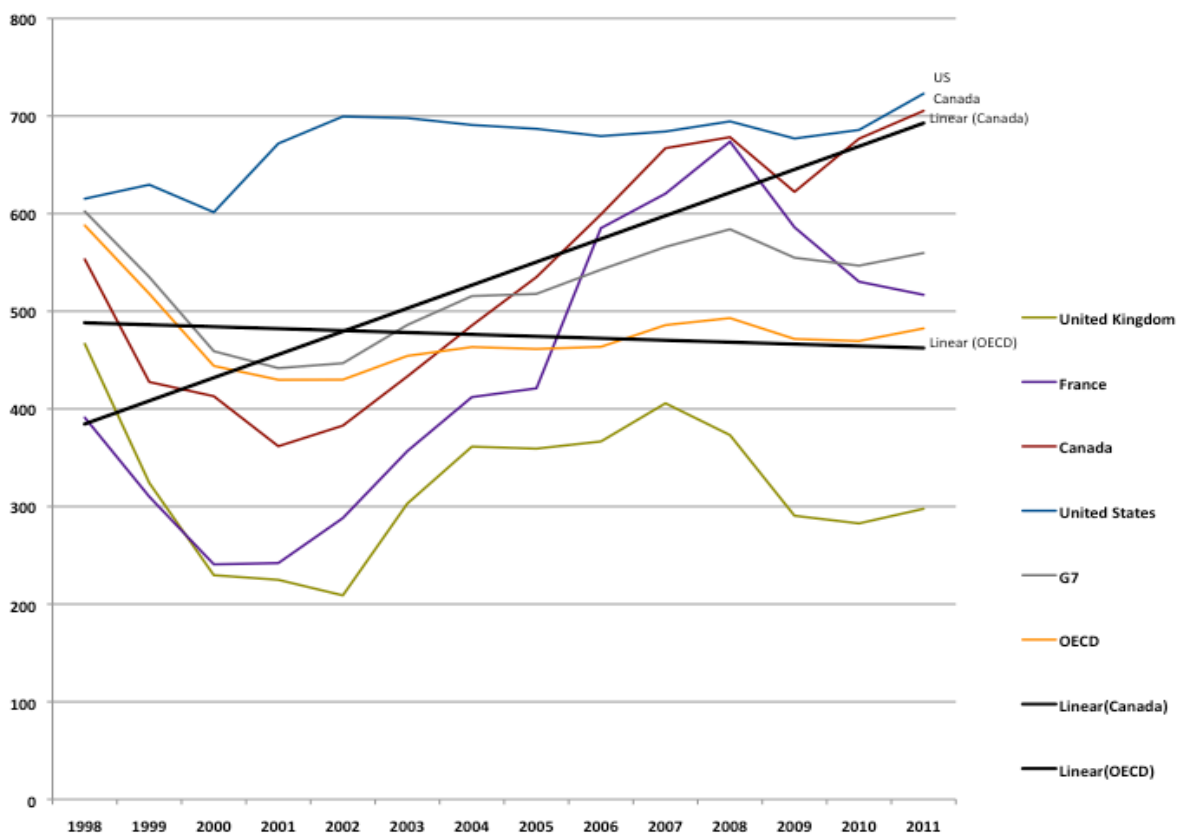
The same is true of France, where, similar to how things now stand in Canada, contract free wireless plans were virtually unknown before Free Mobile arrived; by 2012 nearly there were 35 million SIM-only subscribers and Free had cornered 8 percent of the market in its first year as a mobile wireless operator (2012) – compared to the total 5-6% acquired by all of the new entrants in Canada combined – Wind, Quebecor, Publicity, Mobilicity -- after half-a-decade of tepid policy measures and intransigent incumbents bent on keeping the wireless market their own tightly-knit domain. What these results suggest, especially in the US, is that the lack of prepaid plans (and MVNOs) in Canada is a barometer of weak market forces, rather than ill-explained cultural predispositions against pre-paid wireless plans.

In short, the relative lack of prepaid plans in Canada is not a reason to squelch attempts to compare Canada with the rest of the world, but a sign that discount wireless services and the low-end of the market are being neglected as Rogers, Telus and Bell keep their eyes fixed on a bigger prize: higher ARPUs, an acronym that stands for "average revenue per user". In Church and Wilkins' world, and by extension the incumbent interests they have chosen to defend, the poor don't matter, while in the OECD and FCC's data, and our vision of the world, they do.

That Canada is out of line with global trends is not only shown by its mediocre standing in the Wall Report and its even less edifying rank in the combined FCC dataset that we have compiled (i.e. 28th place, as shown in Table 3 above), but also in terms of ARPU, the holy grail of big three – Rogers, Bell and Telus, and an industry standard around the world, albeit one that is pursued more single-mindedly by some (dominant players) than others (challenger brands).

Church and Wilkins are right that ARPU is not a perfect proxy for price, but it is indicative of prices and, moreover, what consumers pay at the end of the month. When we take this as our measure, Canadian’s cellphone bills are rising faster, much faster, year-after-year, than the OECD or G7 countries, or most other comparable countries, such as France and the UK but not in the US – a point that is consistent with CRTC (2013) findings and the Wall Report (2013). In fact, while ARPU is rising sharply in Canada it is gradually *declining* across the OECD, as Figure 5 shows for the period from 1998 to 2012.

Figure 5: Average Revenue Per User (per Annum): Canada vs OECD, G7& and Select Countries, 1998-2012 (OECD Data)

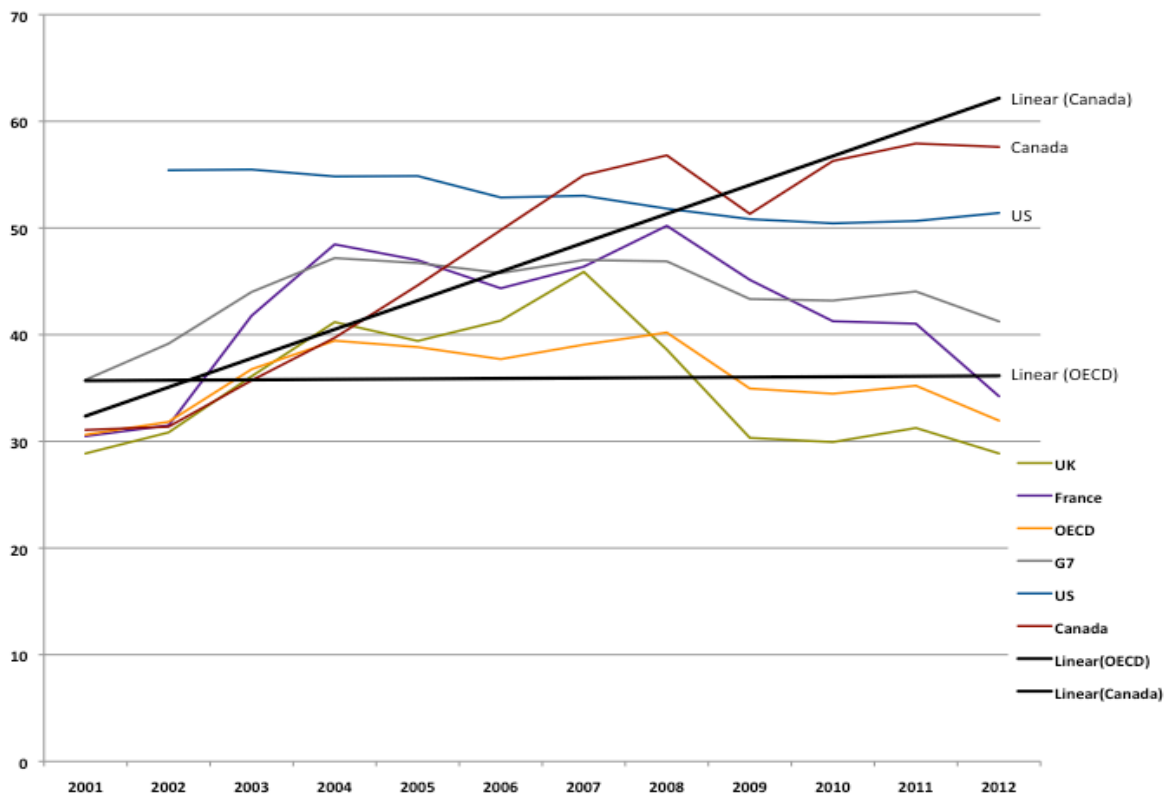


Source: OECD (2013). *Communications Outlook*. Table 3.5 (Link to underlying data set for Figure 5 [here](#)).

Figure 5 is worth pausing to examine further for a moment. Several things stand out, in addition to the obvious opposing trends between rising ARPUs in Canada and steadily declining ones on average across the OECD. Note, for example, the UK, where consumers pay about forty percent of what Canadians pay. Note too the sharp drops in pricing in the UK and France as competition ramped up, and new fourth players cemented their place in the market. Note, too, that there’s a slight hiccup between 2007 and 2009, when Canadian cellcos girded for the arrival of new entrants, then once again let their prices – or ARPU, to be technical – soar once it became evident that Wind, Publicity and Mobile would be mere gnats on the backside of elephants, and easily foiled through a thousand and one ways to inflict damage on new comers where capital intensity is high and control over essential facilities dear.

Switching the source to the BAML *Global Wireless Matrix* does not change this story at all. It is worthwhile showing to illustrate the point.

Figure 6: Average Revenue Per User (per month): Canada vs OECD, G7& and Select Countries, 2001-2012 (BAML Data)



Source: BAML (2013). *Global Wireless Matrix*. (Link to underlying data set for Figure 6 [here](#)).

The same is true whenever we use the BAML report on each of the measures studied (penetration, speed, price), but we have chosen not to for reasons outlined earlier and because it only extends back to 2001, under the best of circumstances, and often times just to 2006. The OECD datasets typically go back to the mid- to late-1990s.

As we showed at the outset of this study, the idea that we need to take account of use is absolutely correct, but the high levels of use in Canada are not an explanation of high ARPU, as Church and Wilkins (2013), as well as Bohlin, et. al. (2013) assert, but rather (1) a historical fact of Canadian life and (2) consistent across wireless, internet and almost all media. Talking of 'consumer surplus', as Nordicity's (2013) study for the Canadian Wireless Telecommunications Association (CWTA) – the industry association representing the big 3 – does is a smokescreen for what economists call price inelasticity, i.e. a willingness to pay dear for things close to one's heart, or that are considered basic necessities of life (Pike & Mosco, 1986).

Communication is one of those basic things of human life. Also recall, based on tallying up our use of different media – by GBs uploaded and downloaded, time spent watching the telly or on the internet, watching videos online, using smartphones, tablets, and so forth -- Canadians are Number 1. Smartphone adoption as a percentage of users may be high in Canada, as Church and Wilkins claim, but taking the *extremely* low base of users in Canada as the denominator and concluding that because so many existing users are taking up smartphones the big three are doing a wonderful job is misleading, for two reasons.

First, the take-up of smartphones *everywhere* is taking place fast, and so even if the data means what Church and Wilkins (2013) assert it does, it is misleading because the gap is very likely to be fleeting. Second, and more importantly, the real evidence of the current state of affairs is indicated in Table 3 above: Canada ranks 25th out of 34 countries on the measure of penetration.

Second, as we illustrated earlier, there is little reason to be sanguine given the gaping divides between the upper and lower ends of the income scale when it comes to who does and does not have a smartphone, i.e. 40% of those in the lowest income quintile go without any wireless service at all, while a quarter of the next rung up are in the same position, compared to a penetration rate of 92% for those in the upper income bracket (see Figure 2 above).

However, the issues are not just of inequality but also real commercial pressures. For example, there is intense pressure being placed on wireless carriers around the world to lower their roaming charges, especially from Chinese and Indian cellcos. These pressures are becoming more acute as Canadian companies compete and work with Chinese and Indian businesses that pay international roaming charges that are often 1/10th those, and *less*, than in Canada, the US and other OECD countries. The growing pressure to harmonize roaming rates downwards, steeply, is great, and serious consideration is now being given

to making it a front-burner international trade issue within the WTO in ways that expand upon existing agreements covering telecoms, media, internet and ecommerce. As the OECD (2013) observes, “a growing number of industry leaders recognise that high prices for international mobile roaming as detrimental to their relationship with their customers, and a significant barrier to trade and travel in OECD economies” (p. 21). Thus, far from the politics of wireless being driven by populist politics, as critics assert, the realpolitik of global business is bearing down on Canada’s cellcos with full force.

Yet, as if to demonstrate how tone deaf the big three cellcos are to all this, Mirko Bibic, BCE’s Executive Vice President and Chief Legal & Regulatory Officer, responded to the CRTC’s examination of international roaming charges and request for information as follows: “While the Companies are providing the requested information, we believe the Information Requests themselves and any related process the Commission may be considering are without legal foundation. . .” (Bibic, 2013, p. 2).

Bibic may be right, legally speaking, but on all of the other grounds in play, that is doubtful. Yet, perhaps he sees the writing on the wall? The CRTC does seem to have girded its resolve with J. P. Blais at the helm, and the stirrings across the government outlined above may be causing a bit of nervousness in the industry. The European Commission (2013a; 2013b) is moving to abolish roaming charges altogether. Perhaps Bibic’s fear is that Canada might be next in line?

The ‘pricing problem’ in Canada is not limited to just mobile wireless services, or domestic and international roaming charges, but reaches across the board. Poor conditions in terms of wireless are aggravated by the fact that Canada ranks just as poorly on wiredline services as well as an overall composite view that brings both mobile wireless and wiredline services together to give us a picture of the whole. Tables 4 and 5 show the results.

Table 4. Final Composite Wireline Rank: Penetration, Speed, Price, 2011-2012 (OECD+FCC)

Country	Subscribers per 100 populations (OECD)	Rank by composite download speed	Rank by mean cost of monthly plans (FCC)	Rank by composite of 6 price baskets	Cumulative Totals	Final wireline rank*
Korea	4	2	2	1	9	1
Denmark	3	6	10	6	25	2
Japan	17	2	9	5	33	3
Estonia	22	6	3	4	35	4
Sweden	12	1	4	21	38	5
Germany	9	21	1	8	39	6
France	5	9	5	20	39	6
Netherlands	2	4	16	18	40	8
Finland	14	13	7	13	47	9
United Kingdom	8	21	14	8	51	10
Belgium	10	12	18	18	58	11
Switzerland	1	11	34	14	60	12
Iceland	7	23	8	24	62	13
Slovakia	31	15	15	2	63	14
Norway	6	8	23	31	68	15
Austria	19	28	13	10	70	16
Portugal	26	5	24	17	72	17
Canada	11	10	26	25	72	17
Czech Republic	29	18	11	16	74	19
Israel	20	31	12	12	75	20
Hungary	28	24	20	3	75	20
Slovenia	23	14	31	7	75	20
Luxembourg	13	17	22	26	78	23
Italy	27	27	6	23	83	24
Poland	30	24	21	11	86	25
Australia	18	18	28	22	86	25
United States	15	15	30	27	87	27
Greece	24	32	19	15	90	28
Spain	21	20	27	33	101	29
New Zealand	16	30	29	27	102	30
Turkey	34	26	17	29	106	31
Ireland	25	29	25	30	109	32
Chile	32	32	32	32	128	33
Mexico	33	34	33	34	134	34

Sources: OECD Broadband Portal, spreadsheets 1d (subscribers), 4d-4m inclusive (price). The data used here reflect the survey closing date of September 2012. The ranks shown above reflect the combined rankings from the OECD data for its "high" and "low" baskets. The FCC price data shown here taken from the FCC's *Third International Broadband Data Report*, Appendix Table 1b. The FCC data in the table reflect average monthly prices for broadband service converted to USD, then adjusted using the PPP formula (valid for 2011). See underlying Tables [1](#), [2](#), [3](#), [4](#), [5](#), [6](#) & [7](#) under Wireless Industry Project page on the CMCR project website and explanatory notes associated with those tables and Appendix 1 for further information on methodology.

Table 5: Composite Wireless + Wireline Ranking: Penetration, Speed, Price, 2011-2012

Country	Final wireless rank	Final wireline rank	Cumulative rank	Final rank
Denmark	1	2	3	1
Korea	6	1	7	2
Sweden	2	5	7	2
Finland	2	9	11	4
Japan	9	3	12	5
Norway	5	15	20	6
Estonia	18	4	22	7
Germany	17	6	23	8
Austria	8	16	24	9
Iceland	13	13	26	10
France	21	6	27	11
Poland	4	25	29	12
Slovakia	15	14	29	12
Australia	6	25	31	14
Slovenia	12	20	32	15
Luxembourg	11	23	34	16
Czech Republic	16	19	35	17
Canada	19	17	36	18
Netherlands	29	8	37	19
United States	10	27	37	19
Italy	13	24	37	19
Switzerland	26	12	38	22
United Kingdom	28	10	38	22
Belgium	32	11	43	24
Portugal	27	17	44	25
Hungary	29	20	49	26
Turkey	20	31	51	27
Spain	23	29	52	28
Greece	25	28	53	29
Israel	33	20	53	29
New Zealand	23	30	53	29
Ireland	21	32	53	29
Chile	31	33	64	33
Mexico	34	34	68	34

Sources: see Tables 3 and 4 above and underlying Tables 1-11 under [Wireless Industry Project](#) page, International Comparative Performance Indicators, on the CMCR project website and explanatory notes associated with those tables and Appendix 1 for further information on methodology.

Canada's telecom ecology is flagging, badly, on measures of penetration, speed and price, but some point to recent high levels of investment in wireless infrastructure, as the big three have begun to roll-out 4G/LTE networks, to counter to such a bleak assessment. This is correct if we take just the latest year for which data is available (2012). Take a longer

view, however, and what emerges is flat spending against rising revenues. Looking at trends over the last five and ten years, and going back to 1997 on the basis of OECD data, reveals a mixed picture. The idea of using fixed time frames is important because of the tendency in the literature of analysts to cherry-pick years to suit the outcomes desired.

On capital investment in wiredline infrastructure, however, Canada does remarkably well. Indeed, it ranks third out of thirty-four OECD countries. Table 6 shows the results based on three measures of wiredline network investment and across a time frame that encompasses one, five and ten year views as well as one that goes back as far as 1997 when the available data set from the OECD begins.

Table 6: Composite Ranking of Capital Investment in Wiredline Infrastructure, 1997-2012

Country	Composite Rank Capex/Revenue	Composite Rank Capex/Per Capita	Composite Rank Capex/Comm Access	Cumulative Totals	Composite Rank Investment
Australia	11	2	1	14	1
Netherlands	3	5	6	14	1
Canada	5	6	4	15	3
Denmark	8	4	5	17	4
New Zealand	4	10	7	21	5
Switzerland	21	1	2	24	6
US	20	3	3	26	7
Luxembourg	15	6	9	30	8
UK	12	9	11	32	9
Slovenia	9	13	14	36	10
Sweden	7	12	19	38	11
Iceland	23	8	8	39	12
Chile	1	26	15	42	13
Japan	24	11	9	44	14
Belgium	19	14	16	49	15
Slovak Republic	2	29	22	53	16
Italy	17	15	21	53	16
France	25	17	12	54	18
Greece	14	20	24	58	19
Korea	18	21	20	59	20
Ireland	31	15	13	59	20
Spain	28	17	17	62	22
Norway	29	19	18	66	23
Poland	5	32	29	66	23
Israel	30	22	23	75	25
Portugal	25	25	25	75	25
Czech Republic	22	24	30	76	27
Hungary	15	31	31	77	28
Turkey	9	34	34	77	28
Mexico	13	33	33	79	30
Austria	27	26	28	81	31
Finland	33	23	26	82	32
Germany	34	28	27	89	33
Estonia	32	30	31	93	34

Sources: OECD (2013). *Communication Outlook 2013*. Geneva: OECD. Table 3.8. Public telecommunication investment as a percentage of telecommunication revenue; Table 3.10. Public telecommunication investment per total communication access path, USD and Table 3.11. Public telecommunication investment per capita, USD. See Appendix 2 for additional notes. (Link to underlying data sets for Table 6 [here](#), [here](#) and [here](#), respectively)

There is no gainsaying the data and the resulting top of the rankings achievement is *the* bright spot in all of the data we have gathered with respect to concentration, investment, penetration, price and speed. However, that result is an outlier. That this is so is apparent as soon as we examine investment in wireless, but with the addition of the BAML *Global Wireless Matrix* report given that Church and Wilkins (2013) see it as something of a gold standard with respect to the data they use when painting their portrait of Canada's supposedly stellar performance when it comes to the capital intensive business of investing in wireless infrastructure. The problem with that interpretation, however, is that it is limited to one source – the BAML report – and to one year. We combine that report with OECD data and, as per our usual method, take snapshots across time and tally them up to show the results. Those results, as Table 7 shows, are less than edifying. Canada, rather than being at the top of the heap, languishes in the bottom third: 23rd out of 34 countries and well below the OECD average.

Table 7: Composite Ranking of Capital Investment in Wireless Infrastructure, 1997-2012

Country	Composite Rank Capex (OECD)	Composite Rank (BAML) Capex	Cumulative Totals	Composite Rank
Japan	1	3	4	1
Slovak Republic	3	4	7	2
Mexico	7	5	12	3
Turkey	4	9	13	4
Czech Republic	6	7	13	4
Austria	2	17	19	6
Italy	9	10	19	6
Belgium	11	12	23	8
Korea	22	2	24	9
Finland	16	11	27	10
Luxembourg	15	14	29	11
Israel	8	22	30	12
Hungary	12	18	30	12
Germany	29	1	30	12
Greece	10	21	31	15
Estonia	13	19	32	16
New Zealand	25	8	33	17
Chile	4	30	34	18
Portugal	32	5	37	19
Norway	13	25	38	20
Denmark	26	13	39	21
France	18	22	40	22
Australia	17	24	41	23
Canada	27	14	41	23
US	29	16	45	25
Ireland	19	28	47	26
Poland	20	28	48	27
Netherlands	24	24	48	27
Sweden	20	30	50	29
UK	33	19	52	30
Slovenia	23	32	55	31
Spain	31	29	60	32
Switzerland	34	26	60	32
Iceland	28	33	61	34

Sources: OECD (2013). *Communication Outlook 2013*. Table 3.9 and Bank of America/Merrill Lynch (2013). *Global Wireless Matrix*. Some OECD countries are not covered in the BAML report: the Slovak Republic, Poland, Slovenia, Mexico, Hungary, Czech Republic, Ireland, Luxembourg, Iceland and Estonia. Their OECD rank is used as a proxy for the missing data. See Appendix 2 for additional notes. Links to underlying OECD and BAML data [here](#) and [here](#), respectively)

In Canada, Canada is a poor performer on almost all measures, and regardless how far out we stand back to gain a proper gauge of things, except with respect to capital investment in wiredline infrastructure. There is, however, one other thing upon which Rogers, Telus and Bell do excel: profits.

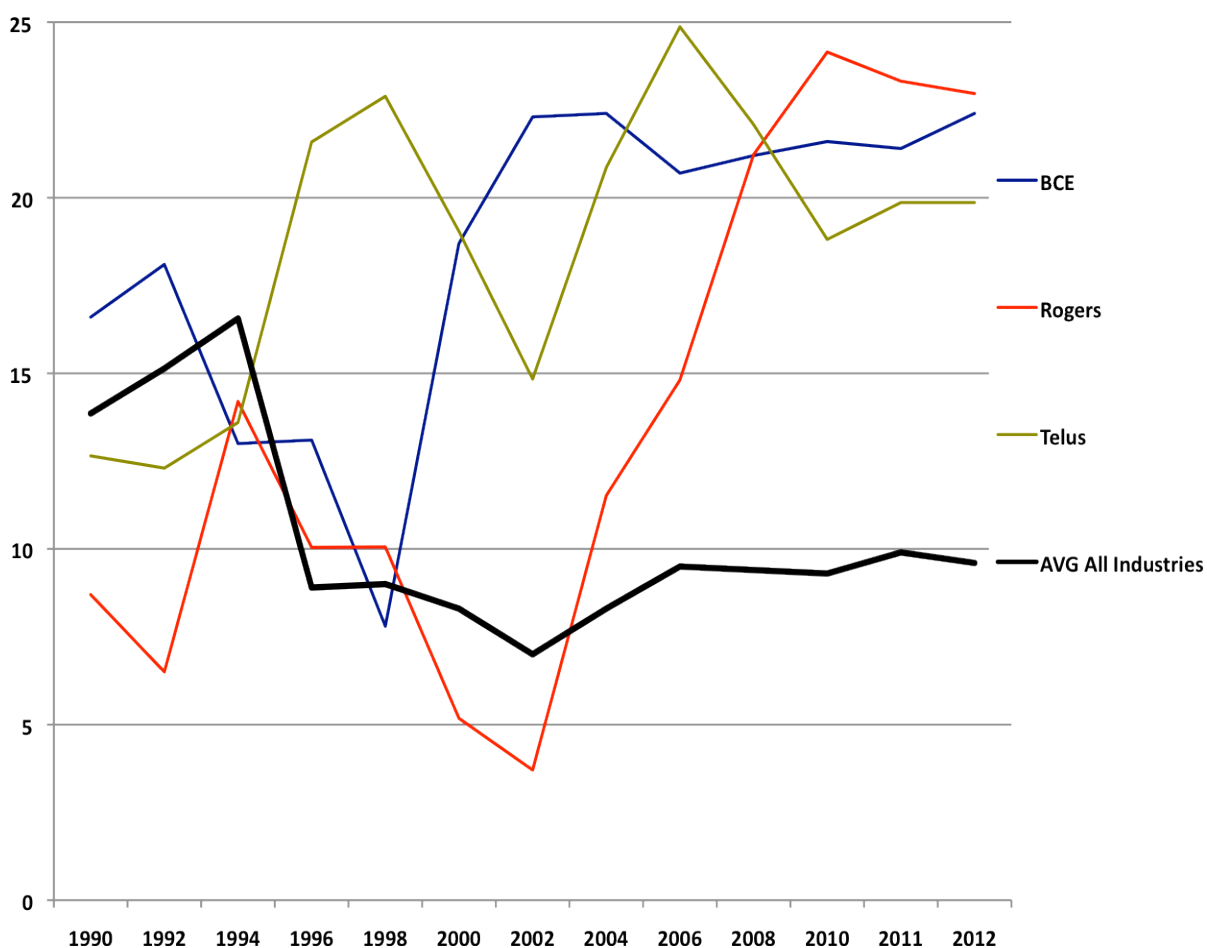
Church and Wilkins hone in on the free cash flow of Rogers wireless services since the mid-1980s to tell a story of a long period of low profits, and sometimes even profitless years, followed by some recent years in the sun, and generalize on that basis to imply a story of low profits for the industry as a whole. That story, however, is tendentious. Rogers is not typical of the big three but rather the one that had to lay out the deepest investments when it was the outsider rather than the insider it has since become in order to breakdown the entrenched position that Canada's telephone companies had built up over a century. Thus, over a successive series of technological innovations – i.e. four generations of wireless network technology and accompanying devices – not one three-decade long single 'product life cycle', as Church and Wilkins misleadingly suggest -- Rogers made very substantial investments to breakdown the calcified telco monopolies across the land. It succeeded, even though profits were slim before the turn-of-the-21st century, not just by industry standards but by the average of *all* industries in Canada. In Church and Wilkins telling, that Rogers has raked in 'supranormal' profits in recent years is not a sign of dominant market power and cause for concern, but rather the company's just reward for its years in the risky wilderness.

The problems with this account are too many to recount here but a few indications will help to set the tone. First, the data they rely upon is unavailable to anyone other than themselves, or at least not to independent scholars and the public generally so that we can inspect the numbers to see what they discover. It's a closed data set. But that's just a technical issue, albeit a hugely important one and one that mars the analytical landscape from one media issue to the next, with Industry Canada and CRTC workers often eager to help but fearful of betraying confidential requirements when it comes to 'commercially sensitive' data. The extent to which workers at both organizations consulted during the course of research for this project appeared to want to be helpful but ultimately too timid to disclose the data needed to conduct a proper analysis is striking. This problem is only compounded by the fact that Government's cutbacks to Industry Canada are cutting deep and disabling critical skills and insights when we need them most.

Back to the case at hand regarding the profits in the wireless industry, and at Rogers, Telus and Bell specifically, it is a mistake to generalize from Rogers to a tale about Telus and Bell and the wireless industry as a whole. While Rogers may have indeed had a very hard go of things in the early years, this was not the case for Telus or Bell, whose operating profits have been well above Rogers and the average for *all* Canadian industries since the first mobile wireless spectrum licenses rolled off the government printing presses in 1983. That might be a bit of an exaggeration, since the data at my disposal only runs to 1990. Ever since that time, however, operating profits for Bell and Telus have been at or well-above

those across all industries in Canada, year-after-year, except for Telus in 1990, 1991 and 1994, when they fell slightly short. Ever since that time, however, they have consistently been two- to two-and-a-half times average industrial profits, with Rogers finally joining the fold as of 2006, albeit already having enjoyed many years of healthy profits in the interim, i.e. between 1990 and 2005, when Rogers' average operating profits were 9.1%, just under the average for all industries of 10%. Since 2005, Rogers, Bell and Telus's have averaged operating profits of 20.1%, more than twice the 9.3% enjoyed by the rest of the country's industries. Figure 7 below illustrates the point.

Figure 7: Operating Profits, Rogers, BCE and Telus vs Canadian Industry Average, 1990-2012

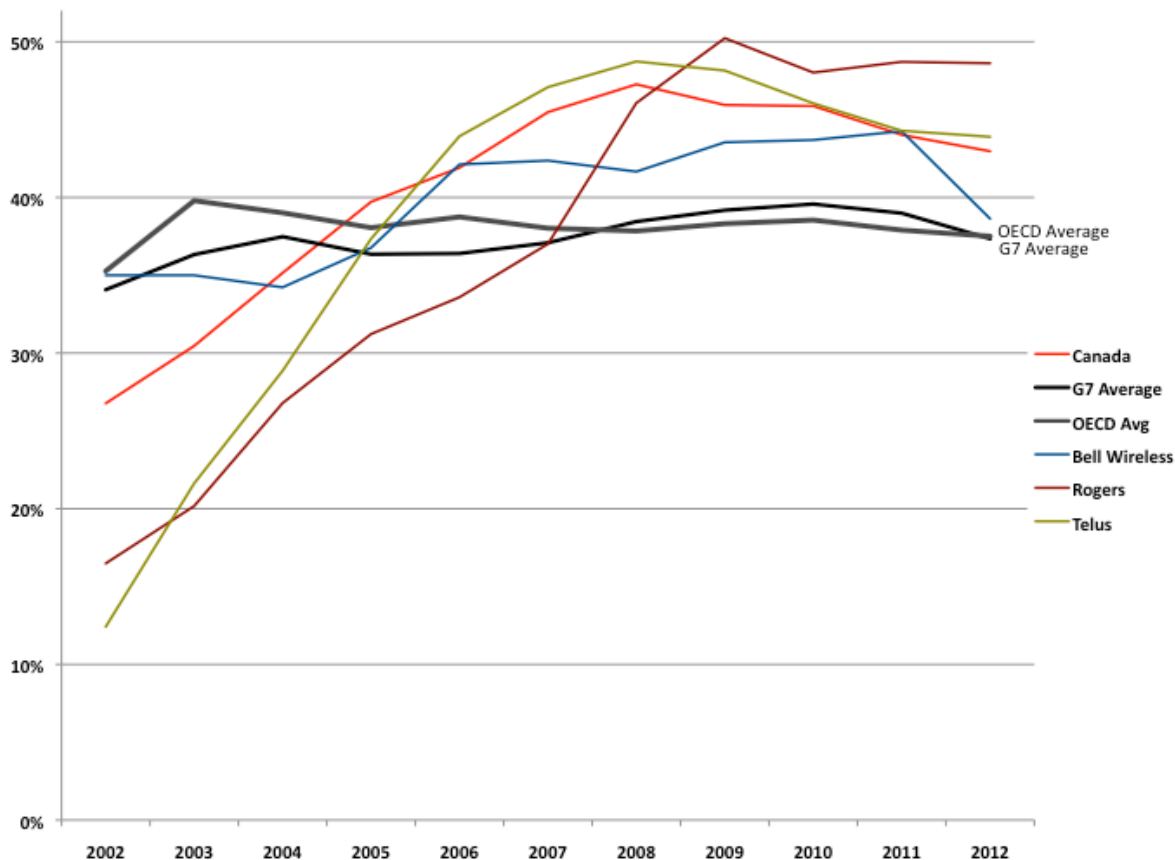


Sources: Corporate Annual Reports; Statistics Canada, [no date\(a\)](#); Statistics Canada, [no date\(b\)](#). (Link to underlying data set for Figure 7 [here](#))

Church and Wilkins pick one measure of profit – free cash flow – for one company – Rogers -- and generalize to the industry as a whole. This is wrong. Figure 6 above clearly shows the weakness of such claims when considered on their own merit and especially when seen up against the standards for prevailing operating profits across all industries as a whole.

The story stays pretty much the same regardless of whether we look at things from operating profits, return on equity and, the incumbent's favourite, EBITDA. Moreover, it is not simply the case that Telus, Bell and, to a slightly lesser extent, Rogers have accumulated high levels of profits for a very long time, and relative to the average of all other industries in Canada, but by international comparative standards too. Figure 7 illustrates the point.

Figure 8: Bell, Rogers, Telus & Canada EBITDA vs OECD + G7



Sources: Corporate Annual Reports; Statistics Canada, [no date\(a\)](#); Statistics Canada, [no date\(b\)](#). (Link to underlying data set for Figure 8 [here](#))

Conclusion and Where to Go from Here?

This study has shown that Canada shares a similar condition with many, indeed, almost all countries: high levels of concentration in mobile wireless markets. Canada is not unusual in this regard, and indeed no matter whether we look at things from the perspective of 19 countries, thirty-four or fifty-seven the answer in pretty much all cases is the same: concentration levels in mobile wireless markets are 'astonishingly high everywhere'.

The difference between Canada and elsewhere, however, is whether or not there is the resolve to do anything about this state of affairs. So far, the answer to that question is not all that promising, although there are a few bright spots on the horizon and it is possible that they will light the way yet.

For the time being, however, the tendency is to deny reality, even when incontrovertible evidence stares observers in the face. This, however, is symptomatic of a bigger problem, namely that in Canada the circles involved are exceedingly small and they like to hear the sound of one another's voices all too much and do not look kindly on those who might rock the tight oligopoly that has ruled the industry from the get-go. When by any conventional standard of mainstream economics, mobile wireless markets are remarkably concentrated, trained economists look the other way. When fundamentally new phenomena are taking root in one country after another around the world, they point to dying breed. The reality, however, as we have shown, is that, while markets are highly concentrated, there are new 'maverick brands' like T-Mobile in the US, Hutchison 3G in the UK, Hot Mobile and Golan Telecom in Israel and most famously of all, Iliad and Free in France. More countries than not have 4th national wireless carriers.

These companies share many things in common: All have faced incumbents bent on giving them a still birth; they have all played the role status quo disruptors, pushing down prices, driving massive growth in contract free wireless plans, unlocking phones, and doing their best to dig in for the long haul. They have also all relied on the state for the indispensable **public** resource that underpins the entire mobile wireless set-up: spectrum, an immensely valuable public resource that governments grant privileges to use in return – at least in theory – to do things that serve the public rather than just fill the coffers of the state treasury. Governments have had to choose, inevitably, between who will get access to this resource and, crucially, who will not. This is not an exceptional state-of-affairs; it is the unavoidable norm, although one could be forgiven for not having a clue about any of this when seen from Canada for several reasons.

One, the incumbents themselves have fought tooth-and-nail against not just new upstarts (TMUS, Wind, 3, Free, Hot Mobile, Freedom Pop, etc), but gone as far as they conceivably can in trying to stare down democratically elected governments in the name of trying to preserve their own domination of the spectrum. In Canada, before the 2014 700 Mhz spectrum auction, 90% of spectrum actively in use is held by just three companies as of November 14th, 2013: Rogers (41%), Telus (25%) and Bell (24%). The rest is scattered amongst Sasktel, MTS and a handful of "new entrants": Quebecor (Videotron), Wind, Mobilicity and Public (recently acquired by Telus). The results of the 700 Mhz auction further ramified this state of affairs.

The big three, not unusually, and much in the spirit of those who stand in a similar place in other countries throughout the OECD and around the world are doing everything they can

to hold back the tide and to defend their privileges. Last summer's "wireless wars" were simply the expression of that reality, as Bell, Rogers, and Telus fought on all fronts to fend off what they perceived as the double-barreled threat of Verizon's potential entry into the Canadian mobile wireless market and the government's relatively newfound resolve to foster more competition, to drive down domestic and international roaming charges, and to otherwise give Canadians access to world class wireless services at affordable rates and using the devices of their choice whereas now, as this study shows using comprehensive, long term and systematic data from the FCC, OECD, Ofcom, Wall Communications, CRTC, and many other sources as cited, Canada's mobile wireless market continues to be a poor performer.

To recap, this study shows:

- wireless markets in Canada, whether measured by revenue, spectrum held, spectrum in use or subscribers, whether at level of the country as a whole, specific provinces or Canada's nine biggest cities – Toronto, Montreal, Vancouver, Ottawa-Gatineau, Calgary, Edmonton, Quebec City, Winnipeg, Hamilton -- are remarkably concentrated;
- in terms of standings in international league tables, Canada's wireless market, based on a composite score using price, penetration and speed, ranks 18th; the US ranks 9th;
- in terms of penetration, or access and use, matters are worse: Canada ranks 25, while on price it ranks 28th, yet despite all this Canadians are Number 1 when it comes to how much time they spend on the internet, how many GBs of data they upload and download, smartphone data they send and receive, use of Wikipedia, log onto Facebook, and watch the telly;
- Canada also ranks very highly when it comes to capital investment in its wiredline infrastructure, no matter how you measure it and when measured for one, five, ten or more years;
- The same cannot be said of wireless despite the fact that Canada fared very well last year because Bell, Rogers and Telus flipped the switch and began rolling out in a substantial way LTE/4G networks. Stretch the time horizon, however, and that standing collapses and Canada falls toward the bottom third of the pack – 23rd out of 34 places.

Another key lesson is that it is only those governments that stare reality in the face and stiffen their spine against the backlash that they will inevitably meet when they encounter some of the biggest, and most profitable, companies in the country, that will achieve the policy changes that are needed and outcomes desired. This lessons has been learned by governments and regulators everywhere and whether or not countries with democratic governments get the media, wireless and internet capabilities they need to live, love and thrive in the 21st century depends on nothing less than the right choices being made in the short- and medium-term that lies ahead. Those choices now stare Canadians in the face.

How we act, and our government moves ahead, will set the baseline for how the mobile wireless media in this country will evolve for at least the next two decades – the length of the licenses awarded in the just concluded 700 MHz spectrum auction – and probably for a lot longer than that!

Methodology Appendices for Tables

Appendix 1. Notes on Research Methodology for the Penetration, Speed and Price Rankings Compiled in the Report

Two sources of data were used to arrive at the rankings for penetration, speed and price in the wiredline and wireless sectors in this report: the OECD's online broadband portal and the FCC's *Third International Broadband Data Report*.

The figures used for penetration are based on the OECD data from its survey closing date of September 2012, not the more recent data posted in June 2013, because the latter datasets are incomplete across the criteria relevant to this report. Regardless, the differences between the 2012 and 2013 datasets for penetration are minor. All of the OECD's broadband data are provided here in the form of Excel spreadsheets.

The data from the FCC's *Third International Broadband Data Report* was published in August 2012, and therefore uses data from 2011. The FCC itself uses data from Ookla's online Net Index as the source for some of the speed and pricing information presented in the FCC publication. <<http://www.netindex.com/download/allcountries/>>

We derived rankings on the three major variables (penetration, speed, price) for each of the wiredline and wireless sectors respectively, then combined the two composite rankings to arrive at a final, overall ranking for the 34 OECD member countries. Using the "scaffolding" method to build rankings cumulatively, we have wherever possible combined the OECD's data for each variable with data provided by the FCC. The reader should note that this cumulative approach was not used for either the wiredline or wireless penetration figures (expressed as subscribers per 100 inhabitants), since the FCC's source for these two datasets is the OECD. On the other hand, the final rankings for speed and price were arrived at by adding together the separate OECD and FCC rankings, which are based on different measures, as explained below. Note that it is the *rankings* that are added together, not the data findings in the underlying metrics, such as Mb/sec or USD.

It is also worth making a few more observations on the OECD's price-basket methodology for wiredline prices. In this report, we derived wiredline prices from the OECD data by selecting a subset of the five "high" wiredline baskets and five "low" wiredline baskets, respectively, as shown in the original OECD spreadsheets (4d to 4m inclusive). To reduce complexity while ensuring representative results, we chose the 1st, 3rd and 5th from each of the high and low baskets, i.e. three of the original five (eliminating 2 and 4).

The OECD defines its price baskets by reference to the advertised download speed and size of the data caps associated with each service measured. Each of the five low categories matches one of the five high categories by advertised download speed (bandwidth), expressed as the minimum or threshold bandwidth. So for example, "Fixed Broadband

Basket Low 1” corresponds to “Fixed Broadband Basket High 1” as both are assigned a bandwidth threshold of 0.25 Mbit/s. “Fixed Broadband Basket Low 3” corresponds to “Fixed Broadband Basket High 3” as both are assigned a bandwidth threshold of 15 Mbit/s. And “Fixed Broadband Basket Low 5” corresponds to “Fixed Broadband Basket High 5” as both are assigned a bandwidth threshold of 45 Mbit/s.

Once matched on bandwidth, these high-low pairs are compared on size of data cap in order to derive the corresponding price data (in USD/PPP). Under the OECD method, the data cap associated with each high category is set at three times the size of the matching low category. Thus, the data cap for Low 1 is 2 GB, while that for High 1 is 6 GB; for Low 3, the cap is 11 GB, while for High 3, the cap is 33 GB; and for Low 5, the cap is 18 GB, while for High 5, the cap is 54 GB.

In the body of the report, the results of our analysis are shown in Tables 3-5. Underlying these tables, however, is a dozen tables that compile the data for each of the dimensions just discussed. These underlying data sets for these tables are organized as follows: the wiredline data are presented Tables 1-7, covering penetration, speed and price; the wireless data are shown in Tables 8-11, again covering penetration, speed and price; and the final results for each of these two datasets are combined in Table 12.

Table 1. Wiredline Penetration: Subscribers per 100 Inhabitants (OECD)

This table presents the wiredline broadband penetration data compiled by the OECD from its 2012 survey. The ranks here are carried forward to Table 7 where they are combined with the speed and price findings.

Table 2. Wiredline Speed Rank: Mean Download Speeds and Composite Rank (FCC + OECD)

The wiredline speed ranks in Table 2 are derived by adding the FCC ranks (based on mean *actual* download speeds as measured by Ookla, in Mb/sec); and the OECD ranks (based on mean *advertised* download speeds, in Mb/sec). The composite ranks are then carried forward to Table 7, as with the other two main variables (penetration and price).

Table 3. Wiredline Prices: 3 “Low” Baskets and Composite Rank (by data cap and speed categories: OECD)

The data reflect the OECD survey closing date of September 2012. Three “low” wiredline baskets were chosen from among the five published by the OECD (the 1st, 3rd and 5th). These baskets are defined by reference to the size of data caps and nominal download speed associated with each service measured. The “low” and “high” baskets use the same capacity measures but are distinguished on the basis of

the size of the data caps. The composite ranks are then carried forward to Table 7, as with the other two main variables (penetration and speed).

Table 4. Wiredline Prices: 3 “High” Baskets and Composite Rank (by data cap and speed categories: OECD)

The data used here reflect the OECD survey closing date of September 2012. For this report, three “high” wiredline baskets were chosen from among the five published by the OECD (the 1st, 3rd and 5th). As explained in the notes to Table 3, these baskets are defined by the nominal download speed associated with each service measured and by reference to the size of data caps. Under the OECD method, the 5 “low” and “high” categories, respectively, have matching speeds but are distinguished from one another on the basis of the size of their data caps, with the “low” baskets having lower data caps than the “high” baskets. See Appendix 1 for further details. The composite ranks are then carried forward to Table 7, as with the other two main variables (penetration and speed).

Table 5. Composite Wiredline Price Rank (OECD): 3 High + 3 Low Baskets

The price calculations for wiredline have some extra steps, as they incorporate the “price basket” method employed by the OECD. In Table 3, we combine three of the OECD’s “low” baskets (of the original five in the original OECD spreadsheet). Table 4 shows the equivalent data for three of the OECD’s “high” baskets (of the original five in the original OECD spreadsheet). These two composite rankings are then combined in Table 5.

Table 6. Wiredline Price Rank (FCC)

In Table 6, we present the wiredline pricing sourced from the FCC report, calculated on the basis of the mean monthly cost, in each country surveyed, of monthly broadband plans. The OECD price ranks for wiredline are combined with the FCC price ranks for wiredline in Table 7. Note that all price figures have been calculated in US dollars (USD) using the purchasing power parity formula (PPP).

Table 7. Final Composite Wiredline Rank: Penetration, Speed, Price (OECD + FCC)

Table 7 provides the rollup of all the wiredline results: the OECD penetration ranks; the composite ranks for speed from both the OECD and FCC data; and the price data from both the OECD and FCC sources. This combination produces the composite ranks for wiredline, which are carried forward to Table 12 for the final tally.

The next four tables - 8, 9, 10 and 11 - provide the breakouts for the wireless sector corresponding to those provided above for wiredline.

Table 8. Wireless Penetration: Subscribers per 100 Inhabitants (OECD)

Table 8 presents the wireless broadband penetration data compiled by the OECD from its 2012 survey. The ranks here are carried forward to Table 11 where they are combined with the speed and price findings.

Table 9. Wireless Speed Rank: Mean Advertised Speed (OECD)

The wiredline speed ranks in Table 9 are based on the associated OECD data only, expressed as mean *advertised* speed in Mb/sec; the FCC's findings on wireless speeds are not aggregated in a form suitable for use in this report. The speed ranks are carried forward to Table 11 to produce the composite wireless ranks.

Table 10. Composite Wireless Price Rank: Price per GB of Data + Average Price for a Monthly Plan (33 countries: FCC)

Table 10 presents the OECD results for wireless prices, based on the cost to subscribers to transfer one gigabyte of data, converted to USD/PPP. These ranks are then added to the corresponding ranks from the FCC results, measured in terms of the mean price for a monthly plan, expressed in USD/PPP. As noted earlier in this report, Belgium is excluded from this set of findings because Belgium had no limited, i.e. capped, plans for wireless at the time the FCC was collecting its data. Belgium is, however, reintroduced in Table 11 by means of a dummy variable for its wireless speed rank (calculated by averaging the Belgium scores for penetration and speed.).

Table 11. Composite Wireless Rank: Penetration, Speed, Price (OECD + FCC)

Table 11 provides the final rollup of all the wireless results: the OECD penetration ranks; the ranks for speed from the OECD and FCC data; and the price data from both the OECD and FCC sources. This combination produces the composite ranks for wireless, which are carried forward to Table 12 for the final tally.

Table 12. Final Composite Industry Ranking for Wireless + Wiredline: Penetration, Speed, Price (OECD + FCC)

Table 12 presents the final rollup for the three main variables as they relate to the wiredline and wireless sectors. The composite wiredline ranks are added to the composite wireless ranks to produce the overall ranking for the 34 OECD member countries.

Appendix 2. Notes on Research Methodology for Capital Investment in Wiredline and Wireless Infrastructure (Tables 6 and 7 in the text of the Report).

The data underpinning the depiction of wiredline and wireless network investment in Tables 6 and 7 rests upon two sources: (1) OECD (2013). *Communication Outlook 2013*. Geneva: OECD and (2) Bank of America/Merrill Lynch (2013). *Global Wireless Matrix*. New York: Author. The OECD data is drawn from: Table 3.8. Public telecommunication investment as a percentage of telecommunication revenue); Table 3.9. Investment in cellular mobile infrastructure in the OECD area (excluding spectrum fees); Table 3.10. Public telecommunication investment per total communication access path, USD and Table 3.11. Public telecommunication investment per capita, USD.

We use these sources to analyze and rank each of the 34 OECD country's performance on each of the measures just described. To give a view of trends and rankings over time, the data is assembled and examined using one, five and ten year timeframes as well as another that stretches from 1997 until 2011), i.e. from when the OECD data set begins and ends, for each of the measures used. The goal is to use standard time frames to avoid the tendency in the literature among authors to cherry-pick years to suit the outcomes sought. The BAML *Global Wireless Matrix* report is more limited in time and coverage. The time period for it, for example, stretches from 2001 until early 2013. We use only annual data and have stopped at year-end 2012, the last year for which a full annual set of data was available. Several OECD countries are not covered by the *Global Wireless Matrix* report: the Slovak Republic, Poland, Slovenia, Mexico, Hungary, Czech Republic, Ireland, Luxembourg, Iceland and Estonia. To account for this, we use these countries' OECD rank as a proxy for the missing data.

References

Babe, R. E. (1990). *Telecommunications in Canada*. Toronto: University of Toronto.

Bank of America/Merrill Lynch (2013). *Global Wireless Matrix*. New York: Author.

Benkler, Yochai, Faris, Rob, Gasser, Urs, Miyakawa, Laura, & Schultze, Stephen. (2010). *Next generation connectivity: A review of broadband Internet transitions and policy from around the world*. Cambridge, MA: Berkman Center for Internet & Society.

Available at:

<http://cyber.law.harvard.edu/publications/2010/NextGenerationConnectivity> [Last visited November 2013].

Bell (1916). *Annual Report*. Montreal: Author.

Bibic, M. (September 27, 2013). Request for Information – Wireless Roaming – Responses. <http://www.crtc.gc.ca/public/otf/2013/8620/c12-201312082/1981456.PDF>

Board of Railway Commissioners (1918). Telephone Statistics. *Sessional Papers of the Parliament of Canada*. Ottawa: J. De Labroquerie Tache, Printers to the King's Most Excellent Majesty.

Bohlin, E. Caves, K. W. & Eisenach, J. A. (2013). *Mobile Wireless Market Performance in Canada: Lessons from the EU and the US*. Report prepared for Telus.

<http://www.navigant.com/~media/WWW/Site/Insights/Economics/Navigant-Mobile-Wireless-Canada-FINAL.ashx> [last visited December 2013].

BuddeComm (2013). *Mobile Market Revenue Select countries and operators within the OECD: Report compiled for Author*. Bucketty, NSW, Australia: BuddeComm (available upon request and setting of mutually acceptable terms).

Canada (June 4, 2013). Harper Government Protecting Consumers and Increasing Competition in Canadian Wireless Sector. Ottawa: Author. Available at:

<http://news.gc.ca/web/article-eng.do?nid=746949>

Canada (March 14, 2012). Harper Government Takes Action to Support Canadian Families. Ottawa: Author. Available at:

<http://www.ic.gc.ca/eic/site/064.nsf/eng/07089.html>

Canada (1905). Proceedings of the Select Committee on Telephones. *Journal of the House of Commons* (Mulock Committee), 40. Ottawa: Printer to the King's Most Excellent Majesty.

Canadian Media Concentration Research Project (CMCR) (2013a). *Growth of the Network Media Economy in Canada, 1984-2013*. Ottawa: Canada

<http://www.cmcrp.org/2013/10/15/the-growth-of-the-network-media-economy-in-canada-1984-2012/>

Canadian Spectrum Policy Research (2013). Total Canadian Spectrum Holdings. Toronto: Ryerson University (Copy on file with author). See CSPR generally at:

<http://canadianspectrumpolicyresearch.org/>

Canadian Media Concentration Research Project (CMCR) (2013b). *Media and Internet Concentration in Canada, 1984-2013*. Ottawa: Canada.

<http://www.cmcrp.org/2013/10/22/media-and-internet-concentration-1984-2012/>

Canadian Radio-television and Telecommunications Commission (CRTC) (2013). *Communications Monitoring Report*. Ottawa: Author.

<http://www.crtc.gc.ca/eng/publications/reports/policyMonitoring/2013/cmr2013.pdf>

CRTC (2013a). *International Roaming. List of Submissions*. Ottawa: Author.

<http://www.crtc.gc.ca/otf/eng/2013/8620/c12-201312082.htm>

CRTC (2013b). *National Wireless Code*. Ottawa: Author.

<http://www.crtc.gc.ca/eng/archive/2013/2013-271.htm>

CRTC (2013c). *Consultation on mandated essential (wholesale) services*. Ottawa: Author.

<http://www.crtc.gc.ca/eng/archive/2013/2013-551.htm>

Canadian Radio-television and Telecommunications Commission (CRTC) (2012). *Telecom Decision 2012-556: Decision on whether the conditions in the mobile wireless market have changed sufficiently to warrant Commission intervention with respect to mobile wireless services*. Ottawa: Author. <http://www.crtc.gc.ca/eng/archive/2012/2012-556.pdf>

Church, J. & Wilkins, A. (2013). *Wireless Competition in Canada: An Assessment*. School of Public Policy, University of Calgary, 6(27). Calgary: University of Calgary.

<http://www.policyschool.ucalgary.ca/?q=content/wireless-competition-canada-assessment>

Church, J. (2010). *Foreign Ownership Restrictions of Canadian Telecoms: An Analysis of Industry Canada's Proposals*. Prepared for Rogers Communications submission and comments on Industry Canada's Telecommunications Foreign Ownership Consultation Paper. [http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/Rogers.pdf/\\$file/Rogers.pdf](http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/Rogers.pdf/$file/Rogers.pdf)

Cisco (May 2013). Cisco Visual Networking Index: Forecast and Methodology, 2012–2017 http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360.pdf [Last accessed November, 2013]

Comscore (2013) Brazil Future in Focus, http://www.comscore.com/Insights/Blog/2013_Digital_Future_in_Focus_Series.

Comscore (2013) Canada Future in Focus; 2013 Spain Future in Focus; 2013 France Future in Focus. <http://theexchangenetwork.ca/upload/docs/Canada's%20Digital%20Future%20in%20Focus%202013.pdf>

Comscore (2013) Europe Digital Future in Focus 2013. http://www.comscore.com/Insights/Blog/2013_Digital_Future_in_Focus_Series

Comscore (2013) UK Digital Future in Focus. http://www.comscore.com/Insights/Blog/2013_Digital_Future_in_Focus_Series

Comscore (2013) US Digital Future in Focus 2013 (end 2012). http://www.comscore.com/Insights/Presentations_and_Whitepapers/2013/2013_US_Digital_Future_in_Focus

Cowhey, P. & Aronson, J. (2009). *Transforming Global Information and Communication Markets*. Cambridge, MA: MIT.

European Commission (2013a). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Telecommunications Single Market*. Available at: <http://ec.europa.eu/digital-agenda/en/news/communication-commission-european-parliament-council-european-economic-and-social-committee-a-0>

European Commission (2013b). EU plans to end mobile phone roaming charges. http://ec.europa.eu/news/science/130916_en.htm

Fan, J. (Nov. 18, 2013).). [Facts vs Myths in Canada's Telecom Sector](#). PPT Slides for Presentation to Panel on Facts vs Myths in Canada's Telecom Sector at the [International Institute of Communication Annual Conference](#), November 18, 2013, Ottawa Congress Centre, Ottawa, Canada.

Federal Communications Commission (2012). *International Broadband Data Report*, 3rd Rpt. Washington, D.C.: FCC. http://transition.fcc.gov/Daily_Releases/Daily_Business/2012/db0821/DA-12-1334A1.pdf

Freiden, R. (2008). *Wireless Carterfone: A Long Overdue Policy Promoting Consumer Choice and Competition*. New America Foundation, Wireless Future Program, Working Paper #20. http://www.newamerica.net/files/Wireless_Carterfone_Frieden.pdf

Geist, M. (March 10, 2013). *Canadian Wireless Reality Check: Why Our Wireless Market is Still Woefully Uncompetitive*. <http://www.michaelgeist.ca/content/view/6803/125/>

Ghose, D. (Nov. 18, 2013). [Facts vs Myths in Canada's Telecom Sector](#). PPT Slides for Presentation to Panel on Facts vs Myths in Canada's Telecom Sector at the [International Institute of Communication Annual Conference](#), November 18, 2013, Ottawa Congress Centre, Ottawa, Canada.

Goggin, G. (2011). *Global Mobile Media*. New York: Routledge.

Goldberg, M. (2009). *Lagging or Leading: The State of Canada's Broadband Infrastructure*. Report Commissioned by Bell Canada, Bell Aliant, Cogeco, Rogers, SaskTel, Shaw, TELUS. Markham, ON: Goldberg & Associates. <http://www.mhgoldberg.com/> [dead link as of December 2013]. <http://www.gstconferences.com/public/project/LagOrLead.pdf>

GSMA Mobile for Development Intelligence. (2013). *Number of Mobile Network Operators operating in a country (excludes Mobile Virtual Network Operators)*. <https://mobiledevelopmentintelligence.com/statistics/73-number-of-mobile-operators>

GSMAIntelligence (Aug. 30, 2012). *UK fires 4G starting gun* <https://gsmaintelligence.com/analysis/2012/08/uk-fires-4g-starting-gun/348/>

Habermas, J. (1985). *Theory of Communicative Action (vol. 2)*. New York: Beacon Press.

Huber, P. (1987). *The Geodesic Network: Report on Competition in the Telephone Industry*. Washington, DC: Department of Justice.

Industry Canada (June 2013). *Framework Relating to Transfers, Divisions and Subordinate Licensing of Spectrum Licences for Commercial Mobile Spectrum*. Ottawa: Canada. Ottawa: Author. Available at: [http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/dgso-003-13-transfer.pdf/\\$file/dgso-003-13-transfer.pdf](http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/dgso-003-13-transfer.pdf/$file/dgso-003-13-transfer.pdf)

Industry Canada (2010). *A Brief History of Cellular and PCS Licensing*. Ottawa: Author. <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08408.html>

Infrastructure sharing is France's FTTH route, says regulator Philippe Distler. *Global Telecoms Business*, December 29, 2011. Available at: <http://www.globaltelecomsbusiness.com/Article/2949686/Regions/25187/Infrastructure-sharing-is-Frances-FTTH-route-says-regulator-Philippe-Distler.html>

Iliad (Feb. 28, 2013). Press Release: Free revolutionises mobile telephony Group posts record growth. http://www.iliad.fr/en/finances/2013/CP_280213_Eng.pdf

Internetworldstats (2013) *Facebook Stats for 2011-2012*.
<http://www.internetworldstats.com/facebook.htm>

International Telecommunications Union (n.d.). *World telecommunications indicators database* (electronic resources). Geneva, Switzerland: ITU (Available through MacOdrum Library, Carleton University).

ITU/UNESCO (2012). *The State of Broadband 2012: Inclusion for All*. Geneva, Switzerland: Authors. <http://www.ericsson.com/res/docs/2012/the-state-of-broadband-2012.pdf>

John, R. (2010). *Network Nation: Inventing American Telecommunications*. Cambridge, MA: Harvard University Press. *Business History*, 53.

Louis, T. (Sept. 22, 2013). The Real Price of Wireless Data. *Forbes*.
<http://www.forbes.com/sites/tristanlouis/2013/09/22/the-real-price-of-wireless-data/>

Loxcel (2013). Custom data set created for author re. Share of Spectrum in Active Use (antenna) (as of November 14, 2013) by country, region and city. Markham, ON: Author. Available at: <http://www.loxcel.com/>

Mavor, J. (1917). *Government Telephones*. Toronto: Maclean Publishing.

McTaggart, C. (2013). Why do Canada's Wireless Critics Want to Turn Back Time.
<http://blog.telus.com/wp-content/uploads/2013/03/Turn-back-time.pdf>

Melody, W. (1997/2001). *Telecoms Reform: Principles, Policies and Regulatory Practices*. Lyngby, Denmark: Den Private Ingeniørfond, Technical University of Denmark.
<http://lirne.net/resources/tr/telecomreform.pdf>

Middleton, C. (2011). Structural and Functional Separation in Broadband Networks: An Insufficient Remedy to Competitive Woes in the Canadian Broadband Market. In Moll, Marita and Shade, Leslie Regan. *The Internet Tree*. pp. 61-72. The Canadian Centre for Policy Alternatives. [[preprint](#)]

Noam, E. M. (2013). Who Owns the World's Media? (2013). Columbia Business School Research Paper No. 13-22. Paper presented to the 41st Research Conference on Communication, Information and Internet Policy of the Telecommunications Policy Research Conference, George Mason University School of Law, Arlington, Virginia.
<http://dx.doi.org/10.2139/ssrn.2242670>

Nordicity (2013). *The Benefit of the Wireless Telecommunications Industry to the Canadian Economy, 2012/13*. Report prepared for Canadian Wireless Telecommunications Association (CWTA). Ottawa: Author. <http://cwta.ca/wordpress/wp-content/uploads/2011/08/20130603-Nordicity-Economic-Impact-EN.pdf>

Nordicity (2011). *International Wireless Market Comparison*. Report prepared for Telus. Ottawa: Canada. <http://blog.telus.com/wp-content/uploads/2013/03/Nordicity-Report.pdf>

Nowak, P. (March 18, 2013). *Debunking the wireless myth busters, redux*. *Words By Nowak Blog*. <http://wordsbynowak.com/2013/03/18/wireless-myths/>

OECD (2013). *Communications Outlook*. Geneva: OECD. http://www.swisscom.ch/content/dam/swisscom/de/ghq/media/documents/OECE_Communications_Outlook_2013.pdf.dl.res/OECE_Communications_Outlook_2013.pdf.

OECD (2011a). *Broadband Portal*. www.oecd.org/.../0,3746,en_2649_34225_38690102_1_1_1_1,00.html.

OECD (1996). *Mobile Cellular Communications: Pricing Strategies and Competition*. Geneva: OECD. <http://www.oecd.org/sti/ieconomy/1909817.pdf>

Ofcom (UK) (2012). *International Communications Monitoring Report*. London: UK. <http://stakeholders.ofcom.org.uk/binaries/research/cmr/cmr12/icmr/ICMR-2012.pdf>

Ofcom (2012a). *Second consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues Annex 6: Revised Competition Assessment*. Available at: http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/annexes/2nd_Condoc_Annex_6.pdf

Ofcom (2012b). *Decision to vary Everything Everywhere's 1800 MHz spectrum licences to allow use of LTE and WiMax technologies*. Available at: <http://stakeholders.ofcom.org.uk/binaries/consultations/variation-900-1800mhz-lte-wimax/statement/statement.pdf>

Ofcom (2012c). *Assessment of future mobile competition and award of 800 MHz and 2.6 GHz: Statement*. Available at: <http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/statement/statement.pdf>

Ofcom (2011). *Consultation on assessment of future mobile competition and proposals for the award of 800MHz and 2.6GHz spectrum and related issues. Annex 6: Competition Assessment*.

<http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/annexes/2nd Condoc Annex 6.pdf>

Office of the Information Commissioner (nd). *Right to Know: Francis Fox*. Ottawa: Government of Canada. <http://www.oic-ci.gc.ca/rtk-dai-eng/francis-fox.aspx>

Ookla (December 5, 2013). Household Download Index. <http://www.netindex.com/>

OpenMedia (2013). *Time for an Upgrade: Demanding Choice in Canada's Cellphone Market*. [https://openmedia.ca/sites/openmedia.ca/files/TimeForAnUpgrade OpenMedia 130419.pdf](https://openmedia.ca/sites/openmedia.ca/files/TimeForAnUpgrade%20OpenMedia%20130419.pdf)

Oxford University Said Business School & University of Oviedo's Department of Applied Economics (2010). *Broadband Quality Study*. Supported by Cisco. http://newsroom.cisco.com/dlls/2010/prod_101710.html

Osborne, B. S. & Pike, R. M. (1991). Mass Mass Postal Service after 150 years: A Review Essay. *Canadian Journal of Communication*, 16(1). Available at: <http://www.cjc-online.ca/index.php/journal/article/view/585/491>. Date accessed: 06 Dec. 2013.

Pike, R. & Mosco, V. (1986). Canadian Consumers and Telephone Pricing: From Luxury to Necessity and Back Again?" *Telecommunications Policy*, 10(1), 17-32.

Rogers Communications (2010). *Comments on Industry Canada's Telecommunications Foreign Ownership Consultation Paper*. [http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/Rogers.pdf/\\$file/Rogers.pdf](http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/Rogers.pdf/$file/Rogers.pdf)

Seaboard Group (Feb. 2013). *Mad as Hell! The CRTC Steps in to Discipline Canada's Wireless Marketplace*. Toronto: Canada.

Starr, P. (2004). *The Creation of the Media*. New York: Basic Books.

Statistics Canada (nd). *Summary Table - Operating profit margin by industries* <http://www.statcan.gc.ca/pub/61-219-x/2011000/t004-eng.htm>

Statistics Canada (nd). *Financial and taxation Statistics for Enterprises, by NAICS*. <http://publications.gc.ca/collections/Collection-R/Statcan/56-001-XIB/0040356-001-XIE.pdf>

Statistics Canada (nd). Quarterly telecommunications statistics [56-002-XIB](http://publications.gc.ca/Collection-R/Statcan/56-002-XIB/56-002-XIB-e.html). Ottawa: Canada. <http://publications.gc.ca/Collection-R/Statcan/56-002-XIB/56-002-XIB-e.html>

Statistics Canada (nd). Telecommunications in Canada [56-203-XIE](http://publications.gc.ca/Collection-R/Statcan/56-203-XIE/56-203-XIE.html). Ottawa: Canada. <http://publications.gc.ca/Collection-R/Statcan/56-203-XIE/56-203-XIE.html>

Statistics Canada (nd). [The Canadian Cellular Service Industry: Historical Statistics](http://publications.gc.ca/collections/Collection-R/Statcan/56-001-XIB/0019856-001-XIB.pdf) Communications: service bulletin [56-001-XIB](http://publications.gc.ca/collections/Collection-R/Statcan/56-001-XIB/0019856-001-XIB.pdf). Ottawa: Canada. <http://publications.gc.ca/collections/Collection-R/Statcan/56-001-XIB/0019856-001-XIB.pdf>

Statistics Canada (2014). *Survey of Household Spending* in 2012. Ottawa: Author.

Sturke & Grunes, (2013). The AT&T/T-Mobile Merger: What Might Have Been? *Journal of European Competition Law & Practice*, 3(2) <http://jeclap.oxfordjournals.org/content/3/2/196.full.pdf?keytype=ref&ijkey=xQTu254rjEa8vMX>

Taylor, G. (2013). Oil in the Ether: A Critical History of Spectrum Auctions in Canada. *Canadian Journal of Communication*. 38(1), 121-137.

Trichur, R. (Nov. 26). French telecom giant eyes entry into Canadian market. *Globe and Mail*. <http://www.theglobeandmail.com/report-on-business/french-telecom-giant-eyes-entry-into-canadian-market/article15618154/#dashboard/follows/>

United States, Department of Justice (2011). *United States and Plaintiff States v. AT&T Inc., T-Mobile USA, Inc. and Deutsche Telekom AG (Amended Complaint, Sept. 16)*. Washington, DC: Author. <http://www.justice.gov/atr/cases/f275100/275128.pdf>

United States Department of Justice and Federal Trade Commission (2010). *Horizontal Merger Guidelines*. Washington, DC: Authors. <http://www.justice.gov/atr/public/guidelines/hmg-2010.pdf>

Wall Communications (2013). Price Comparisons of Wiredline, Wireless and Internet Services in Canada and with Foreign Jurisdictions (Prepared for CRTC). Ottawa: Author. http://www.wallcom.ca/pdfs/price-comp-report_2013update.pdf

Winseck, D. (forthcoming/2014). The Network Media Economy: Triumph of the Media Infrastructure Industries, or Crisis of Media? In Hong, J. H. (eds.). *New Approaches to Media and Communication Studies*. Beijing: Xinhua University (forthcoming, in Chinese).

Winseck (2012). New Zealand's Ultrafast Broadband Plan: Digital Public Works Project for a Network Free Press in the 21st Century or Playfield of Incumbent Interests? Keynote Speaker at the New Zealand Commerce Commission's *The Future with High-Speed Broadband* Conference, Auckland, New Zealand, February 20-21, 2012. Available at:

<https://www.dropbox.com/s/703faln6m93ssad/NZ%E2%80%99s%20UFB-%20Digital%20Public%20Works%20%28Jrnl%20Version%29.doc>

Winseck, D. (1998). *Reconvergence: Toward a Political Economy of Telecommunications in Canada*. Cresskill, NJ: Hampton.

Wu, T. (2010). *Master Switch*. New York: Knopf.

World Bank (2013). *World Development Indicators: Population dynamics*. New York: Author. <http://wdi.worldbank.org/table/2.1>

YouTube (Oct. 17, 2013). TV Spot: T-Mobile, Day 10: Jeremy, Eggs Are Eggs. What's Next the Milk & Butter. Un-Leash. <https://www.youtube.com/watch?v=F3JG4EvLl8k>

YouTube (April 8, 2013). T-Mobile Cowboy Commercial: No Contract Cell Phone Plan Commercial 2013 – YouTube. Available at: <https://www.youtube.com/watch?v=wmoZDgT32XM>