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[Canadian Journal of Communication](#) Vol 38 (2013) 121-137

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Oil in the Ether: A Critical History of Spectrum Auctions in Canada

Gregory Taylor

Ryerson University

Gregory Taylor, who holds a PhD from McGill University in Communication Studies, is currently a Fonds québécois de la recherche sur la société et culture postdoctoral fellow at Ted Rogers School of Management, Ryerson University, 350 Victoria Street, Toronto, ON M5B 2K3. Email: gregory.a.k.taylor@gmail.com.

ABSTRACT This article offers a critical history of the growth of the auctioning paradigm as a method of radio spectrum assignment in Canada. It establishes the growing importance of spectrum access as a primary conduit for computer-mediated communication worldwide, and it demonstrates how the rise of auctioning fundamentally challenges the administrative model that has been used for Canadian spectrum assignment for decades. The key junctures raised in the historical development of spectrum auctions include the pioneering theoretical debates of the 1950s, the fundamental changes to telecommunications in the 1980s, and Canada's gradual acceptance of auctioning as an assignment mechanism in the 1990s. The research is based upon historical studies and scholarly publications as well as primary documents from the Department of Communications and Industry Canada.

KEYWORDS Telecommunications policy; Spectrum auctions; Wireless

RÉSUMÉ Cet essai propose une histoire critique de la croissance du paradigme de la vente aux enchères comme méthode d'assignation des fréquences radio au Canada. Il établit l'importance

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croissante de l'accès au spectre du service de radiodiffusion comme un conduit principal pour communication médiatisée par ordinateur dans le monde entier, et montre comment la montée des enchères remet fondamentalement en cause le modèle administratif qui a été utilisé pour l'attribution du spectre canadien depuis des décennies. Les moments clés soulevées dans le développement historique des enchères du spectre incluent les débats théoriques pionnières des années 1950, les changements fondamentaux dans les télécommunications 1980, et l'acceptation progressive du Canada aux enchères comme mécanisme d'assignation dans les années 1990. La recherche est basée sur des études historiques et des publications savantes, ainsi que des documents primaires du ministère de la Communication et Industrie Canada.

MOTS CLÉS Politique des telecommunications; Enchères du spectre; Sans fils

Certainly the inescapable common property nature of the radio spectrum offers an enduring legal and political basis for a struggle to achieve for the first time a democratic system for informing ourselves via TV and radio.

—Dallas Smythe (1989, p. 137)

The great Canadian political economist Dallas Smythe should not have been so certain of the radio spectrum's enduring democratic legacy. Indeed, the common-resource nature of the spectrum has provided legal underpinning for broadcasting regulation for nearly 100 years; however, the durability of this arrangement is currently being challenged worldwide. The year after Dallas Smythe published the article from which this quotation is taken, a new spectrum assignment process was launched in New Zealand that would alter the course of national spectrum distribution policies across the globe—and move the “inescapable common property” of spectrum into the realm of private ownership. Since that first spectrum auction in 1990, auctioning has become the preferred method of spectrum assignment by many governments, placing proprietary rules upon a resource the title for which, Smythe had argued, “does not rest with particular individuals or nations, but with all humanity” (Smythe, 1987, p. 264).¹ The growth of the auctioning paradigm marks a fundamental shift from the administrative approach to spectrum assignment that had been prevalent for the previous century to a market-based process based on classical economic models.

The Radiocommunication Act defines the radio spectrum as a subset of the electromagnetic waves that lie below 3000 gigahertz (GHz = billions of cycles per second). Auctions are the latest development in over 100 years of divvying up radio frequencies: a complex governance process that encompasses international agreements (the International Telecommunication Union), supranational accords (the three global regions set by the ITU,² the European Union), and national governments. The purpose of this article is to contribute to the work on the wider political economy of spectrum policy by providing a critical history of the development of spectrum auctions in Canada. I use the term “critical history” because the story of spectrum assignment is always one of power dynamics and indicative of wider social concerns. Spectrum assignment methods are a reflection of the political, technological, and economic conditions of a given period.³ This historic context seeks to augment the greater social and political significance of the 700 MHz auction, scheduled in Canada for 2013.

This article demonstrates the fundamental institutional shift brought about by the auctioning process via examining the evolution of Canadian spectrum governance in three distinct stages:

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- the pioneering theoretical debates on spectrum auction. including Dallas Smythe, Nobel Laureate economist Ronald Coase, and a highly influential law student named Leo Herzel,
- the dramatic technological and industrial changes of the 1980s, and
- the contested yet persistent rise of the spectrum auctioning process in Canada over the past two decades.

Spectrum is an invisible public resource that is an increasingly essential component of the global digital media superstructure. The drive for further spectrum development in the twenty-first century has not been spearheaded by traditional broadcasters (TV and radio) but by wireless digital industries that have been leading growth in communication sectors across the globe. In an interview with Barbara Crow for the collection *The Wireless Spectrum: The Politics, Practices and Poetics of Mobile Media*, artist Julian Priests describes spectrum as “an infinitely rewritable medium, a space of endless possibility, the space of all possible information transactions” (Crow, Sawchuk, & Longford, 2010, p. 146). Radio and television broadcasters’ relatively comfortable spectrum positions that have been in place for decades are now challenged by newer industries such as cellphone and wireless broadband providers, eager to acquire an increased piece of this limited, but non-depletable public resource.

Dallas Smythe emphatically challenged the use of auction as a spectrum assignment tool since the concept first appeared as a strictly academic debate in 1952. Despite his efforts, even the most adamant Smythe supporter would have to concede that his struggle against auctioning spectrum has been effectively lost. Variations of the auctioning process exist in different jurisdictions, but governments across the globe have been attracted to the relatively transparent process and enormous revenues to be generated by allowing companies to bid on the exclusive rights to spectrum use. The international transition to digital television has not been prompted by the desire of governments to bring high-definition TV to the masses (though the sale of new digital televisions was certainly a contributing factor); the true driving force is digital transmission’s more economic use of spectrum, which has allowed for valuable broadcast-quality frequencies (the digital dividend) to be cleared and sold by governments via auction (Taylor, 2010). Of the options available to nations on how best to utilize the digital dividend—including, but by no means limited to, public safety and health system infrastructure—it is market-based auctions that have increasingly become the preferred choice for governments.

Any spectrum auction debate in the academic community hitherto has been dominated by economists at the international and Canadian level (Cave, Doyle, & Webb, 2007; Hazlett & Muñoz, 2004; Noam, 1998; for Canada, see Cave & Foster, 2010; French, 2008). Despite the spectrum’s place as an increasingly vital method of transmission for a range of digital applications, recent work from Canadian critical communication scholars has been limited (Longford, 2008). Canadian communication scholarship has benefited from excellent work in broadcasting (Peers, 1969, 1979; Raboy, 1990; Vipond, 1992) and telecommunications history (Babe, 1990; Mussio, 2001; Rideout, 2003; Winseck, 1998); however, the central presence of the radio spectrum has been by and large taken for granted. The inherently interdisciplinary nature of spectrum governance and the central normative questions surrounding the privatization of a public resource are such that critical communication scholarship is an entirely appropriate vehicle to address this significant and timely issue.

The transfer of digital data is increasingly happening between untethered portable devices. With the sale of each new smartphone and tablet (the fastest-growing sectors of the computer industry),

demand for wireless broadband access jumps. As Gordon Gow and Richard Smith (2006) observe, "the radio spectrum is a resource that supports a high stakes game of 'technology, industry, money and power.' Over the past century this has always been true, but today it is more so than ever before" (p. 5). According to a 2011 report from the ITU, global mobile-broadband subscriptions have grown 45% annually over the past four years, and today there are twice as many mobile-broadband as fixed broadband subscriptions worldwide (International Telecommunication Union, 2011. p. 2). In its 2011 review the ITU also states: "A total of 159 economies worldwide have launched 3G (third generation cellular) services commercially and the number of active mobile-broadband subscriptions has increased to almost 1.2 billion" (p. 4). Although people in developed countries usually use mobile-broadband networks in addition to a fixed broadband connection, mobile-broadband is often the only access method available to people in developing countries. Cisco predicts that global mobile data traffic will increase 26-fold between 2010 and 2015 (Cisco, 2011).

Given the enormous potential, it is little wonder there is a rush of digital prospectors hoping to stake a claim on humanity's common property. The wired world is becoming increasingly wireless. In their 2011 article "The Next Broadband Revolution," Catherine Middleton and Jock Given caution against the commonly held wisdom of continued government investment in fibre to the home broadband networks, arguing that wireless access is more useful for a range of digital applications. Their essay makes the bold assertion that "wireless broadband can not only compete with fiber networks in the short term, but that it may become the longer-term broadband solution of choice" (p. 46). This proposed paradigm shift in digital infrastructure development is contingent upon the necessary spectrum access.

For Canada, the 700 MHz spectrum auction looms large as a key juncture in constructing Canada's digital infrastructure for the twenty-first century. The 700 MHz area of the radio spectrum is commonly referred to as "beachfront property" for its ability to traverse large distances with less power and penetrate through barriers such as buildings. The Canadian government has completed much of the preliminary work for this auction. In March 2011, Industry Canada completed a *Consultation on a Policy and Technical Framework for the 700 MHz Band and Aspects Related to Commercial Mobile Spectrum* that preceded revisions to the Framework for Spectrum Auctions in Canada (Industry Canada, 2010c; 2011). In March 2012, Industry Canada released the *Policy and Technical Framework: Mobile Broadband Services (MBS)—700 MHz Band, Broadband Radio Service (BRS)—2500 MHz Band*, which outlined Industry Canada's policy decisions for the 700 MHz band and a plan to hold the auction sometime in the first half of 2013. As of December 2012, there was still no firm date from Industry Canada for the auction and no details on the spectrum licence conditions.

There are powerful lobbying efforts at work in Ottawa. Canadian telecom corporations have been amassing great capital reserves and recruiting former politicians to their board of directors in preparation for the 700 MHz auction. In the summer of 2011 former Treasury Board president Stockwell Day was named to the Telus board of directors and former Tory Industry and Environment minister Jim Prentice joined BCE (Burgess, 2011). The economic stakes are extremely high. The lesser-valued Advanced Wireless Services (AWS) spectrum auction held in Canada in 2008 raised \$4.8 billion for the Canadian treasury. The 2008 spectrum auction of 700 MHz frequencies in the United States generated more than \$19 billion for the U.S. federal government. Columbia University scholar Eli Noam believes these vast revenues cloud government perspective on this key resource: "Conceived in the original sin of budget politics rather than communications policy, spectrum auctions are doomed to serve as collection tools first and allocation mechanism second"

(Noam, 1998, p. 773).

In announcing the 700 MHz auction in December of 2010, then Industry minister Tony Clement referred to spectrum as “the oil of the 21st Century” (Industry Canada, 2010b). In the same speech, Clement announced that the licence terms for the spectrum auction would be doubled from the previous 10-year limits to 20 years. Thus, the radio spectrum and its methods of assignment are fundamental to how Canadians will transmit and receive knowledge in the twenty-first century. The auction of these 84 MHz of prime radio frequencies will prove pivotal for Canadian communication for decades to come.

The 700 MHz spectrum auction is a product of almost 100 years of communication policy development. In the inaugural issue of the *Global Media Journal—Canadian Edition*, Vincent Mosco notes that “current political economy research demonstrates that media systems in place today are the result of a deeply contested history” (Mosco, 2008, p. 49). This aptly describes the dynamic surrounding Canadian spectrum: a contested resource, where the battles for control often occur at the institutional level, away from wider critical analysis. The most recent *Framework for Spectrum Auctions in Canada* was entirely a dialogue between Industry Canada and interested business groups—there was no non-industrial involvement for determining the future assignment of this valuable and limited public resource (Industry Canada, 2011). The 700 MHz spectrum auction is a seminal communications event with profound implications for traditional industrial and public interest goals in Canadian telecommunications.

Spectrum auctions: Early theoretical debates

In the beginning, there was a brief idyllic stage of spectrum allocation
Entry to the virginal ether was free ...

—Eli Noam (1998, p. 766)

“Free” may be one way of looking at the early growth of wireless communication; “confused” and “chaotic” may be a more apt description. Early North American spectrum management demonstrates Canada’s independent management style, though in a decidedly secondary position to the United States. The first two decades of wireless communications were characterized by rampant signal interference and poor coordination between Canadian and American governments. The 1912 Radio Act in the United States gave the Department of Commerce no authority to restrict the number of radio licences or to deny one to a qualified applicant—certainly “idyllic” for a post-war explosion of commercial radio growth. Though there were meetings between Canada and the U.S. officials over frequency administration, there were no formal rules, and signal interference between the countries was commonplace. The U.S. government’s legal authority over spectrum in this period was tentative, so no official deals could be struck. There was only a gentleman’s agreement governing the U.S. and Canadian airwaves between 1924 and 1932, an agreement that granted Canada six exclusive spectrum channels and the sharing of six others (Starr, 2004). The Canadian Radio Branch (under the Auspices of the Department of Marine and Fisheries) took its concerns to the international level and formally submitted its frequencies request for the official list at the International Telegraph Bureau. In 1932, Canada and the U.S. reached agreement that Canada would have nine clear channels (exclusive and suitable for high-power transmissions necessary for creating a national broadcaster) and 27 shared (apt for short and medium-power broadcasts)—a minor improvement over the previous allotment but short of the 11 clear channels Canada had initially requested (Vipond, 1992).

The first U.S. Radio Act viewed radio as an unlimited resource, and radio communication was a right, not a privilege (Starr, 2004). Early Canadian wireless development was more structured than its American counterpart, with radio licences seen as “a privilege accorded only to a few” (Vipond, 1992, p. 152). The ad hoc nature of the early years of spectrum management served to legitimize the place of government oversight of this resource for the next several decades.

The initial signs of a fissure in this tried-and-tested administrative paradigm arose in the academic community. Spectrum auctions have a recognized moment of conception. Debate concerning auction as a method of spectrum assignment can trace its roots to a 1950s journal article by a second-year University of Chicago Law School student. The clash of ideas that followed included a strong retort from a prominent Canadian communication scholar and, in 1959, support for the student’s position from a future Nobel Prize winner in economics. The results of this theoretical debate would take more than 30 years to be reflected in actual government policy, but the echo of this exchange currently forms the basis for much of the current global approach to spectrum governance.

The article that proved the catalyst for this movement was written by a then-unidentified student editor of the *University of Chicago Law Review*. In “‘Public Interest’ and the Market in Color Television Regulation,” the author’s thesis regarding U.S. spectrum assignment was simple and controversial: “to abandon regulation by government fiat altogether and to substitute the market, bringing the market within the standard of ‘public interest, convenience or necessity’” (Herzel, 1951, p. 811). The author, Leo Herzel, later described by Eli Noam (1998) as “a law student with little to lose” (p. 768), advocated not just for a market-based approach to spectrum assignments but to allow consumers to choose the technical standard for the emerging colour television sector:

The FCC could lease channels for a stated period to the highest bidder without making any other judgement of the economic or engineering adequacy of the standards to be used by the applicant. ... The market solution would follow the logic of the price mechanism in an economy based on free consumer choice. (Herzel, 1951, p. 811)

The idea of shopping for technical standards never gained much traction, but the proposal that “[t]he FCC could lease channels for a stated period to the highest bidder” (Herzel, 1951, p. 811) launched a crucial policy debate.

The student article might have been lost to dusty bookshelves and (later) databases; however, Dallas Smythe (1952), then a professor at the University of Illinois, chose to publicly challenge the position of the author. In a rebuttal to Herzel’s article in the same journal the following year, Smythe was scathing in his critique that the anonymous author “offers a graphic illustration of the hazards of applying in sweeping fashion a general body of economic theory to an industry whose facts do not conform to the premises of the theory” (p. 97). The need for sustained government regulation of spectrum is described as an

engineering fact of life, learned the hard way in the chaotic period of market control of AM broadcasting, July, 1926 to February, 1927, which led to the conscious national decision to abandon the market controls and to substitute statutory and administrative controls as the basis of our radio policy. (p. 101).

As Smythe notes in his challenge to Herzel, the potential for disorder in ungoverned spectrum was not just a theory; there was clear historical precedent.

The student editor (still unidentified at this point) did not waver from his commentary and wrote a brief rejoinder to Smythe's article in which he reasserted his controversial position in the face of Smythe's critique. In a 1998 speech commemorating this key policy exchange, the then-public Leo Herzel also claimed that shortly after Smythe's article was published he went to the University of Illinois and debated Smythe on this issue (Herzel, 1998).

While the initial theoretical duel between the law student and Dallas Smythe is central to the initial development of this approach, it was when University of Chicago economist Ronald Coase (1959) entered the fray some eight years later that the argument in favour of auctioning gained greater academic currency.³ In his 1959 essay "The Federal Communication Commission," Coase notes that Herzel's article is the first he had found advocating bidding for frequencies, and Coase himself reaches the same conclusion: "There is no reason why users of radio frequencies should not be in the same position as other businessmen. ... The simplest way [of establishing frequency rights] would undoubtedly be to dispose of the use of a frequency to the highest bidder" (p. 30). In his seminal 1960 article "The Problem of Social Cost," Coase continues this trajectory by arguing that resource allotment is best served by market forces. Though this article does not explicitly address spectrum issues, Coase begins the paper with a footnote that explains, "The argument of the present article was implicit in a previous article dealing with the problem of allocating radio and television frequencies" (Coase, 1960, p. 1).

Despite Coase's significant academic clout, his position was still seen as too radical by those with access to power. As he explained in a 1998 speech:

In 1959, before my article was published, the FCC decided to hold hearings on the future of broadcasting and I was asked to testify. You can imagine what I proposed. When I concluded, the questioning was opened by Commissioner Philip S. Cross. His first question was: "Are you spoofing us? Is this all a big joke?" I was completely taken aback but I managed to reply: "Is it a joke to believe in the American economic system?" (p. 579)

The disbelief expressed by Commissioner Cross was founded upon decades of consistent government oversight of this limited resource, a process that had created and protected a powerful American broadcasting and telecommunications industry. The positions of Herzel and Coase clearly challenged the conventional wisdom that government vigilance was necessary to maintain order in the airwaves.

Further to this series of academic articles in the 1950s, no government action was taken in response to the calls for spectrum auctioning. Later studies were written in favour of this more market-based approach (de Vany, Eckert, Meyers, O'Hara, & Scott, 1969; Levin, 1971), and a strong endorsement for Smythe's opposition to the Herzel-Coase theory came from fellow Canadian William Melody (1980); however, at a policy level the debate concerning auctioning spectrum lay essentially dormant until the 1980s. When the debate was revived, it quickly gained momentum, assisted by the growth of Reaganomics, leaps in technology, and changes to the industry that left regulators scrambling to catch up. The administrative model had been the norm for governments in all nations for most of the twentieth century; however, the major technological, political, and economic changes of the 1980s and 1990s would place enormous pressures upon the traditional spectrum commons (see Hardin, below).

The 1980s: The launch of cellular phones and the end of an empire

The 1980s were a revolutionary period for the telecommunications industry: industrial empires fell, and emerging powers scrambled for position in the new and competitive marketplace. The science of telephony made an evolutionary leap in the mobility of the device itself and in the supporting cellular infrastructure. Hand-held telephones became less expensive and the introduction of a cellular grid pattern for networks allowed for true mobility, which in turn led to greater demands on the spectrum. In 1982, the FCC moved to encourage growth in the nascent cellular industry—perhaps too quickly. Concerned that the comparative process would take too long, lotteries were held for the assignment of new cellular licences. Under the proposed rules anyone could be considered for the auction, resulting in an administrative flood of 400,000 applications (McAfee, McMillan, & Wilkie, 2010). According to spectrum auction theory pioneer Paul Milgrom (2004),

Lottery winners were free to resell their licenses, encouraging thousands of new applicants to apply for licenses and randomly rewarding many with prizes worth many millions of dollars. Lottery winners were often simple speculators. ... Economic resources were wasted on a grand scale, both in processing hundreds of thousands of applications and in the consequent need for real wireless operators to negotiate and buy licenses from these speculators. The lotteries of small licenses contributed to the geographic fragmentation of the cellular industry, delaying the introduction of nationwide mobile telephone services in the United States. (p. 3)

Though many of those applications were fraudulent and the process was an administrative disaster, it was also clear from this process that there were many legitimate providers for this new service. The city of Chicago received North America's first cellular service in 1983 (Gow & Smith, 2006).

In October 1982, the Canadian Department of Communications issued its Cellular Mobile Radio Policy and Call for Licence Applications, which outlined its assignment plan for the cellular spectrum. The assignment process was not an auction or a lottery but determined solely via the discretion of the Department of Communications. This process required departmental staff to evaluate written submissions based on the proposed business plan, technology, services, and social and economic benefits provided to Canadians. It was, in current parlance, a beauty contest. The change in the science of telephony did not bring about sudden change in the institutional oversight of the Canadian spectrum.

The technological upheaval introduced by cellular phone service was accompanied by an economic policy shift that would prove no less important. In a landmark 1982 decision, AT&T was ordered by a U.S. court to split itself into six regional operations (so-called Baby Bells). Canada quickly followed suit. In 1984-85 the CRTC introduced competition in hitherto monopolized Canadian telecom markets, and previous "natural monopolies" (Babe, 1990, pp. 239-240) in telephone terminals and long-distance transmissions were also ended. In the 1980s, the telecommunications market in Canada abruptly and irrevocably changed.

In 1985, Rogers Cantel Inc. (now Rogers) and Canada's local telephone companies were licensed by the Department of Communications to provide 800 MHz cellular telephony services in Canada. Each received 25 MHz of spectrum via the established comparative licensing process. Despite the rapid growth in spectrum demand, Canada held fast to its traditional place of a strong government regulatory presence in frequency assignments.

Indeed, the Canadian government advertised this position of authority to the world. In 1986, the

Department of Communications published a brochure designed to promote Canadian expertise in spectrum management to foreign countries seeking to construct their own systems. The brochure proudly stated, “Canada’s communication system is one of the finest in the world, providing high-quality, inexpensive and reliable services for the entire population”—a fact largely attributed to Canadians being “world leaders in managing and monitoring the radio frequency spectrum” (Department of Communications, 1986, pp. 9–10).

In 1990, the Department of Communications undertook a reassessment of spectrum policy in order to respond to the changes taking place. *A Spectrum Policy Framework for Canada*, tabled in September 1992, observed that “[w]ith the rapid evolution and application of new radio technologies, the spectrum is becoming an increasingly congested and limited resource, particularly in light of increasing and competing demands for new services” (Department of Communications, 1992, p. 2).

Despite the increased demand for spectrum, from the report’s conclusion, it was clear that the Department of Communications intended to continue Canadian spectrum assignment using a mix of first-come, first-served and comparative processes for public mobile licences. The support for auctions at the Department of Communications in 1992 was decidedly lukewarm:

Policy Guideline 11—Market-Based Approaches

For competitive licensing, where the available spectrum is inadequate to satisfy all demands or where it is necessary to limit the number of new entrants, the Department will continue to refine its current approach—the administrative comparative process, which is used to select licensees from a number of qualified applicants. If other market-based approaches are deemed to be in the public interest and applicable to specific services or frequency bands, they will be implemented only after a full public consultation. (Department of Communications, 1992, p. 18)

In 1993, the Department of Communications was eliminated and the responsibility for spectrum management was transferred to the Department of Industry. This switch coincided with a clear change in the attitude toward the applicability of auctions in the Canadian context.

The age of auctions

Concerns over spectrum scarcity led governments to look more seriously into other methods of spectrum assignment. Spectrum was increasingly coveted, and there was concern this would lead to what Garrett Hardin coined in 1968 “The Tragedy of the Commons”:

Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. Such an arrangement may work reasonably satisfactorily for centuries because tribal wars, poaching, and disease keep the numbers of both man and beast well below the carrying capacity of the land. Finally, however, comes the day of reckoning, that is, the day when the long-desired goal of social stability becomes a reality. At this point, the inherent logic of the commons remorselessly generates tragedy.

Each man is locked into a system that compels him to increase his herd without limit—in a world that is limited. (p. 1244)

Indeed, by the 1990s the digital herd was fast increasing.

In 1993, President Bill Clinton signed the Omnibus Reconciliation Act of 1993, giving the FCC the right to sell spectrum (McAfee et al., 2010). This was cheered by a range of advocates who looked upon these auctions as a painless cure for government fiscal imbalances. William Safire wrote an essay about spectrum auctions for the *New York Times* entitled "The Greatest Auction Ever," in which he predicted a potential long-term windfall of hundreds of billions of dollars and asked: "Where should the spectrum-sale money go? Toward reduction of the crushing national debt. By recognizing our hidden asset of the spectrum, Americans can ride the wave of the future" (Safire, 1995).

It all seemed so easy. In 1994, the U.S. held its first auction and the government collected \$617 million for 10 licenses for spectrum allocated for Personal Communication Service (PCS), technology that at the time was largely restricted to pagers (Cramton, 1995).

Canada moved more cautiously into the auction ring, and the comparative process for assignments continued well into the 1990s. In 1995, Industry Canada conducted a comparative review licensing process (beauty contest) of the PCS frequencies. A spectrum cap of 40 MHz was implemented to encourage further competition in the telecom industry.⁴ Four spectrum licences were awarded in the 2 GHz band: two new entrants, Clearnet PCS Inc. and Microcell Networks Inc., were each granted 30 MHz of spectrum, while Rogers Cantel Inc. and the major local telephone cellular operators were each granted 10 MHz. The increased competition was short-lived, for Clearnet was purchased by Telus in 1999 and Microcell was purchased by Rogers in 2004.

The comparative review process had served Canada for decades, but the success of the U.S. PCS auction proved difficult to resist. The newly formed government department Industry Canada undertook a public review of the administrative comparative process in 1994. According to Mike Connolly, Industry Canada's director of spectrum management operations, the review was an attempt to discern to what extent the comparative process could be enhanced to account for the full range of social, cultural, and economic considerations associated with the award of highly valued radio spectrum (Connolly, 1997). However, despite the broad range of topics, it was auctions that proved to be the most divisive issue of the review.

The prevalent political view of the time, manifested in the Liberal government cost-cutting budgets of 1995 to 1997, was that government deficits had grown to dangerous levels and all new sources of revenue and cost-savings had to be explored. In February 1996, Industry Canada released its *Review of the Comparative Selection and Radio Licensing Process: Findings*, and spectrum assignment in Canada underwent a fundamental shift. Industry Canada concluded that it would be in the public interest to establish a new alternative to the traditional comparative selection process that would feature competitive bidding where reliance on market forces was appropriate. The auction method was determined to be a more open and efficient spectrum assignment method (Industry Canada, 1996). This was clearly not supported by the Canadian telecom industry. In the consultation with Industry Canada, 95% of industry submissions strongly endorsed the continued use of a comparative selection process (Glass & Rhodes, 1999).

The federal government announced in its 1996 Budget Plan its intention to take steps "to permit auctioning of the radio spectrum, where appropriate, in the future" (Industry Canada, 1997). Subsequently, the Government's budget legislation amended the *Radiocommunication Act* to give the minister of Industry explicit authority to use a system of competitive bidding to select the

persons to whom radio authorizations would be issued. In a few short years, spectrum auctions had become a prominent tool in Canadian spectrum management.

The first Canadian spectrum auction was announced in 1999, for 40 MHz of the PCS frequencies that had been held in reserve since 1995 (Industry Canada, 1999). As a consequence of the acquisition of Clearnet in 2000, Telus had to return 20 MHz of spectrum in three areas of the country to come into compliance with the 1995 spectrum cap. In January 2001, an auction was held to assign the 40 MHz as well as the 20 MHz returned from the Telus merger. Even after 2001, some frequencies in more remote areas where demand did not exceed supply were assigned on a first-come, first-served basis.

In 2002, Industry Canada felt it necessary to revise the 1992 *Spectrum Policy Framework for Canada*. The fundamental difference between the two documents is the change of attitude concerning spectrum auctions. The Department of Communications may have wished to proceed with a comparative licensing process in 1992, but it was now clear that the government and Industry Canada had other plans:

[T]he Department has adopted a number of changes in spectrum policy and management. One specific example is the Department's adoption of the option of using auctions as a means of determining who should be selected among multiple competing applicants for radio licences where there is not sufficient spectrum to meet projected demand. (Industry Canada, 2002, p. 2)

The change from a Liberal to Conservative government in 2006 increased the momentum for spectrum auctions. The highly influential 2006 *Telecommunications Policy Review* included the recommendation to establish "market-based exclusive spectrum rights (i.e., ability to buy, sell and lease spectrum holdings) and elimination of barriers to the development of secondary markets in spectrum" (Canada, Telecommunications Policy Review Panel, 2006, Recommendation 5–9). This was echoed in the yet-again revised 2007 *Spectrum Policy Framework for Canada*, which trimmed the seven policy objectives of the 1992 and 2002 versions down to one straightforward and streamlined overriding guiding principle: "To maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum resource" (Industry Canada, 2007).

The 15 years between 1992 and 2007 brought about a fundamental repositioning of the Canadian government's place in oversight of the airwaves. Despite this change in direction, Canada is still moving too gingerly into auctioning for some critics. Martin Cave and Adrian Foster (2010) write, "[A]uctions that competitively assign spectrum are commonplace around the world, but are nascent in Canada" (p. 2). In their 2010 study prepared for the C.D. Howe Institute the authors note: "The United States leads in auctions with over 70 followed by Australia with 35, New Zealand with 10. Meanwhile Canada had conducted seven spectrum auctions by 2009" (p. 3). A breakdown of all spectrum auctions held in Canada is provided in Appendix 1.

Conclusion

In *Telecommunications in Canada*, Robert Babe (1990) describes political economy as "policy issues in the context of historical development" (p. 239). The political economy of this article involves the seemingly procedural, yet truly value-laden policy surrounding the assignment of Canadian radio frequencies. Spectrum auctions have been a much more gradual progression than the current rush to the bidding process would have one believe. The decision to auction radio spectrum is not a

white flag waved by governments helpless in the face of the proliferation of wireless technology; it is based upon an economic theory, the real-world applications of which are relatively young. The administrative paradigm served Canada for several decades, yet governments currently face great pressure to “strip away all aspects of the administrative regime that are not related to interference management in a market-allocation framework” (Cave & Foster, 2010; see also McLean Foster & Co, Cave, Jones, & Lehr, 2007). The original theoretical outline of spectrum auctions lay dormant for decades until it became politically palatable when the technology of cellular telephony was accompanied by the neoliberal principles of the Reagan-Thatcher era. Auctions are an assignment method that is clearly in step with the liberalization of markets worldwide.

This technical assignment process is of enormous consequence for Canadians. First and foremost, Canadians need to be assured they are receiving maximum benefit and value for the use of publicly owned radio waves. The expansion of the licence terms from 10 to 20 years in 2010 has consequently doubled the stakes for the 700 MHz spectrum auction. Given this 20-year time frame, spectrum assignment decisions made now will be of great consequence as wireless technologies evolve and new applications develop. The structure of this auction and the conditions of licences will be the *de facto* spectrum policy for the next two decades. Despite the enormous industrial pressures for a prompt auction, the Canadian government is wise to take a more studied approach.

There are legitimate questions regarding the necessity to sell the spectrum immediately. The claims of Canadian spectrum congestion are suspect. Bell, Rogers, and Telus—the largest wireless service providers in Canada—hold a combined total of 55% of the Advanced Wireless Spectrum auctioned in 2008; however, according to Industry Canada’s 2010 *Radio Spectrum Inventory*, as of 2010 they had yet to launch any services on that spectrum (Industry Canada, 2010a). Wireless traffic will certainly increase in the near future, but the major providers have substantial reserves.

The history of spectrum assignment in Canada demonstrates that Canadian airwaves are subject to international pressures, in particular from the United States; however, Canada has by and large set its own schedule and policy structure. The radio frequencies have been a primary transfer system for shared knowledge among Canadians for nearly 100 years. In a world that is increasingly demanding more from its wireless infrastructure, it is important to assess Canada’s communications needs beyond a one-time injection of funds for the federal treasury.

Acknowledgments

This research was supported by the Fonds québécois de la recherche sur la société et la culture, the GRAND Network of Centres of Excellence: Digital Infrastructures Project, and an Insight Grant from the Social Sciences and Humanities Research Council of Canada.

Notes

1. There is some debate concerning the accuracy of “proprietary rules” and spectrum auctions. Economist and former CRTC commissioner Richard French (2008) argues, “Governments do not, then, sell property rights in spectrum (the uses are determined by the ITU). They assign licences to firms or public institutions which convey to the latter rights to use the spectrum for specified purposes under specified terms and conditions, including geographical delimitations” (French, 2008). However, in an article in the *Atlantic Institute for Market Studies*, Ian Munro supports an auctioning system designed “to give licences strong property-right characteristics” (Munro, 2009, p. 16)—a point he reiterated at an Industry Canada roundtable in 2010 (see also Johannes Bauer in Mansell,

2002).

2. Region 1 (Africa and Europe), Region 2 (Americas), and Region 3 (Asia and Australasia).

3. Though the words "allocation," "allotment," and "assignment" often appear as interchangeable in the literature, the ITU *Radio Regulations* differentiate between

- *allocation* (of a frequency band): Entry in the Table of Frequency Allocations of a given frequency band for the purpose of its use by one or more terrestrial or space *radiocommunication services* or the *radio astronomy service* under specified conditions. This term shall also be applied to the frequency band concerned.
- *allotment* (of a radio frequency or radio frequency channel): Entry of a designated frequency channel in an agreed plan, adopted by a competent conference, for use by one or more administrations for a terrestrial or space *radiocommunication service* in one or more identified countries or geographical areas and under specified conditions.
- *assignment* (of a radio frequency or radio frequency channel): Authorization given by an administration for a radio *station* to use a radio frequency or radio frequency channel under specified conditions. (International Telecommunication Union, 2004) This article defers to Industry Canada's Framework for Spectrum Auction in Canada and uses "assignment" for spectrum auctions.

4. Some authors attribute the origin of the spectrum auction concept to Benkler (2002). (See also Gow, & Smith (2006).

5. In 1999, the spectrum cap was increased to 55 MHz prior to the auction of the remaining 40 MHz of PCS spectrum.

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Appendix 1

Spectrum Auctions in Canada

Spectrum	Application	Results	Price
Auction of the 24 and 38 GHz Frequency Bands (1999)	Accommodate the increased demand for high-capacity local access infrastructure required for high-speed Internet and electronic commerce applications	WNI (later Mobilexchange Spectrum) paid \$74 million for 6 licences; Videotron paid \$22.4 million for 92 licences.	\$171,838,520 Not all spectrum was sold.
Auction of Additional PCS Spectrum in the 2 GHz Frequency Range (2001)	40 MHz of PCS spectrum (four blocks of 10 MHz of spectrum)	Rogers won 23 licences; Bell, 20; and Telus, 5.	\$1,481,920,000
Auction of the 2300 MHz and 3500 MHz Frequency Bands (2004)	Wireless Communication Services (WCS) in the 2300 MHz band and Fixed Wireless Access (FWA) in 3500 MHz	Of 842 winning bids, Bell won 234.	\$11,240,615
Residual Licence Auction in the 2300 MHz and 3500 MHz Frequency Bands (Residual 2004-2005)	Local network distribution facilities for the delivery of a range of telecommunication services	Following Phase 1, Bell Canada exceeded the spectrum aggregation limit (cap) and withdrew on three licences.	\$68,700,000 (combined 2004-05)
Auction of Spectrum Licences for Advanced Wireless Services (AWS) and Other Spectrum in the 2 GHz Range (2008)	AWS suitable for high-speed video and Internet, with faster access for cellphones, Smartphones, and other hand-held devices	40 MHz set aside exclusively for new entrants. The other 65 MHz available to all bidders.	\$4,254,710,327
Auction for Spectrum Licences in the Bands 849-51 MHz and 894-96 MHz for Air-Ground Services (May 2009)	Two national spectrum licences to facilitate the provision of new ground-air services such as broadband internet access	Won by SkySurf Canada Communications Inc.	\$2,100,007
Auction of Residual Spectrum Licences in the 2300 MHz and 3500 MHz Bands (2009)	Auctioning the 10 licences that did not receive bids in 2005, largely rural and northern markets	Broadpoint Telecom Inc. won six of 10 licences.	\$415,776

Source: All Canadian spectrum auction data from Industry Canada (2012b).

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