

Appendix 2

Broadcasting Technology: Industry Adoption and Issues

Broadcasting Public Notice CRTC 2006-72



Canadian Association of Broadcasters
L'Association canadienne des radiodiffuseurs

Executive Summary

1. While the Commission embraces, in theory, a voluntary, market-driven transition to digital/HD television broadcasting, in practice it has set out a series of detailed regulatory expectations and requirements that have a direct impact on the cost of technology adoption by broadcasters.
2. The costs of upgrading to digital/HD production and transmission are substantial for large and small market television broadcasters, and for specialty and pay services. A key issue is the extent to which these costs significantly increase capital investment and operating expenses without any ability under existing business and regulatory models to recover the incremental costs in the marketplace. This issue is particularly worrisome for small market television stations and for small and independent specialty and pay services, which face the same high costs of upgrading to HD with an even smaller revenue base to offset them.
3. Private television broadcasters are active in the mobile and broadband spaces, but to date, these revenues generated under these business models do not come close to offsetting the cost of the digital/HD transitions.
4. Private radio broadcasters are facing new forms of unregulated competition, at the same time that they are planning their digital business models. Opportunities exist for existing radio broadcasters to make use of new platforms to extend the reach of their brands and content, but so far, those opportunities do not represent revenue opportunities equal to the impact of new audio and multi-media technologies on radio's business models.
5. Content producers also face incremental costs in the digital/HD environment. As private broadcasters are already the primary investors in independently-produced Canadian content, and as they are currently faced with the large, unrecoverable costs of outfitting their operations for digital/HD broadcasting, it would not be reasonable to expect them to also absorb all of the incremental costs faced by independent producers.

Introduction

1. This report addresses the adoption of new technologies by Canada's private broadcasters. It contains the following five sections:
 - (i) The regulatory environment for the adoption of digital television and high-definition (HD) technologies, examining in particular the Commission's expectations of Canada's private broadcasters (for the purposes of this report, 'digital television' refers to digital over-the-air television, digital specialty and pay services, and analog specialty and pay services that have migrated to digital distribution).
 - (ii) The business environment for the adoption of new technologies, examining in particular private broadcasters' adoption of digital television, HD and alternative technologies for the distribution of video content.
 - (iii) The challenges facing private broadcasters as they adopt digital television, HD and alternative technologies, examining in particular the specific costs to private broadcasters associated with the adoption of digital television and HD technologies, and the fact that these costs are both large and unrecoverable.
 - (iv) The regulatory and business environment around the adoption of new technologies by Canada's private radio broadcasters, examining in particular the current state of digital radio platforms in Canada, and the opportunities and challenges associated with alternative technologies for the distribution of audio content.
 - (v) The challenges associated with digital television and HD faced by producers of Canadian content, examining in particular the costs of producing HD content.

The regulatory environment for the adoption of digital television and HD technologies

2. Understanding the regulatory framework under which Canada's private broadcasters are adopting digital, HD and other new technologies is key to understanding the opportunities and challenges these technologies represent for Canada's broadcasting system.
3. Although the Commission adheres in theory to the principle of a "voluntary, market-driven" transition from analog to digital broadcasting, the reality is that the Commission's framework for digital and HD television is a highly detailed set of regulatory expectations relating to timelines, technical standards, and content quotas. These obligations will have a significant impact on the cost of the digital and HD transitions for broadcasters.

4. The Commission foresees the transition of the analog, standard-definition (SD) broadcasting system to a fully digital, HD broadcasting system as taking place over three overlapping stages¹:
 - the distribution of both analog and digital services by cable broadcasting distribution undertakings (BDUs);
 - the absence of analog services, having been replaced by a mix of SD and HD digital services; and
 - the replacement of all SD digital services with HD digital services.
5. These three stages are further reflected in the general principles which the Commission has adopted with respect to the adoption of digital and HD technology by conventional, specialty and pay television broadcasters²:
 - in general, digital technology should be treated as a replacement for analog technology;
 - a voluntary transition, developed at a pace set by the marketplace rather than by mandated guidelines, is the appropriate approach for the Canadian broadcasting system; and,
 - the issuance of new, transitional licences is preferable to the amendment of existing licences.
6. The Commission's general expectation is, therefore, the gradual 'full replacement' of analog, SD programming services with digital, HD versions of those services. This expectation is chiefly realized in five separate policy and regulatory frameworks designed to govern the digital and HD transitions.
7. First, Public Notice CRTC 2000-6 *Licensing framework policy for new digital pay and specialty services* (January 13, 2000) sets out the rules by which new digital specialty and pay services are licensed. The main element of this framework was its creation of two licence categories:
 - Category 1 digital specialty services have high Canadian content requirements and must be carried by BDUs;
 - Category 2 digital specialty services have lower Canadian content requirements and must negotiate carriage on BDUs.
8. Second, Public Notice CRTC 2002-31 *A licensing policy to oversee the transition from analog to digital, over-the-air television broadcasting* sets out the policy framework for the transition of over-the-air television broadcasters to DTV broadcasting. The key elements of this framework are:

¹ See the *Broadcasting Policy Monitoring Report 2006*, pg. 75.

² See Public Notice CRTC 2002-31 *A licensing policy to oversee the transition from analog to digital, over-the-air television broadcasting* and Broadcasting Public Notice CRTC 2006-74 *Regulatory framework for the licensing and distribution of high definition pay and specialty services*.

Market driven transition: the transition will be market-driven, as opposed to being subject to specific transition dates and deadlines. However, the Commission encourages transitional DTV licensees to ensure that two-thirds of their schedules are available in HD format by the end of 2007.

Universal coverage: conventional broadcasters will be expected to construct digital over-the-air transmitters that replicate the coverage area of their analog transmitters.

Existing broadcasters protected: existing broadcasters will be given the first opportunity to apply for licences to broadcast digitally, but if they fail to do so in a reasonable amount of time, the Commission will consider other applicants for the relevant frequencies.

Canadian content: transitional digital licences will authorize broadcasters to offer a certain amount of programming not offered on their analog transmitters – up to 14 hours per week – on their digital transmitters, provided that at least half of it is Canadian, and all of which must be in HD.

9. This notice was a follow-up to the earlier Public Notice CRTC 2001-62 *Call for comments on a proposed policy to oversee the transition from analog to digital over-the-air television broadcasting*, in which the Commission set out further details and expectations with respect to technical standards for digital over-the-air television:

DTV is a new, over-the-air transmission system. It is designed to serve as an eventual replacement for the current analog NTSC broadcast system that has been in use now in North America for over half a century. The new system is based on the Advanced Television Systems Committee standard (A/53) that has been adopted for use in Canada as well as in the U.S. The standard defines a number of digital television formats ranging from narrow screen to wide screen and from “low definition” to “high definition” television. The DTV standard also allows broadcasters to transmit multiple programs simultaneously (as well as up to five channels of high quality sound per program) using a single television channel. The new standard will overcome many of the shortcomings of today's analog system which have become increasingly apparent as consumer TV sets have become more technologically advanced.

Many countries are moving to digital television. Some of them have adopted variants of the transmission standard (DVB-T) that was developed in Europe. A third standard has been adopted in Japan.

Unlike the conversion from black and white to colour television, the new A/53 standard is not backward compatible. That is, these digital transmissions can only be received by new digital TV sets or, with some sacrifice in quality, on analog TV sets equipped with set top boxes that can convert A/53 digital signals to analog. In order to ensure that over-the-air television viewers without new digital sets or converters are not deprived of existing off-air signals, the current analog and the new digital transmission systems will broadcast in tandem for some years. The transition to digital will likely begin in the major population centres, including Toronto, Montréal, Ottawa and Vancouver. The next phase would see DTV service introduced to perhaps the 30 largest Canadian markets where programming is currently originated. Because the new standard encompasses only

*over-the-air transmissions, cable and satellite systems will use other modulation techniques to transmit high definition pictures.*³

10. Third, Public Notice CRTC 2003-61 *The regulatory framework for the distribution of digital television signals* sets out the rules for the distribution of over-the-air digital television signals by cable BDUs. Under the terms of this framework, BDUs will be able to distribute digital services under rules similar to those that govern their distribution of analog signals:

Priority carriage: the framework gives priority to the carriage of over-the-air Canadian digital television signals.

Duplicate analog/digital carriage threshold: cable BDUs will be required to carry both the analog and digital versions of priority services until at least 85% of their subscribers are capable of receiving digital services, at which point they may apply to the Commission to stop distributing the analog signals.

11. Fourth, Broadcasting Public Notice CRTC 2006-23 *Digital migration framework* sets out the requirements of programmers and BDUs with respect to the migration of analog specialty services to digital distribution. Some of the main elements of this framework include:

Consent: a BDU must obtain prior written consent before distributing an analog service on digital, until 85% of the households that currently subscribe to the analog tier have a digital set-top-box.

Mirroring: cable BDUs must “mirror” the existing analog tiers in digital at least until January 1 2010, or after that date, until the earlier of 85% digital penetration or January 1, 2013.

Distribution and linkage: in a digital distribution environment, the current ‘dual status’ and ‘modified dual status’ rules shall cease to apply to the distribution of specialty services on September 1, 2007. These rules spell out whether analog specialty services must be carried, by default, on basic or discretionary tiers.

Digital basic service: in addition to priority signals and section 9(1)(h) services (i.e. CPAC, APTN, TVA, Voiceprint), the Commission will entertain applications from services that believe they warrant distribution on digital basic based on ‘public interest’ considerations.

Wholesale Rates: the Commission will not regulate the wholesale rates for services on digital basic except for section 9(1)(h) services.

12. Fifth, Broadcasting Public Notice CRTC 2006-74 *Regulatory framework for the licensing and distribution of high definition pay and specialty services* sets out the rules and regulations that will

³ Public Notice CRTC 2001-62, paragraphs 4-6.

govern the HD versions of *existing* analog specialty and pay services, as well as *new* HD specialty and pay services. Some of the main elements of this framework include:

Licensing and Distribution: services that agree to carry certain levels of HD content, at certain times of the day, will be granted new ‘transitional licences’. Services that wish to offer HD content, but cannot agree to carry certain levels of HD content, will be granted amendments to their existing licences.

Required levels of HD programming: transitional HD services are required to broadcast 50% of their content in HD between 6pm and midnight, for English services, and 30% during the same time period for French-language services. Other times of the day require lower levels of HD content to be broadcast, rising year-to-year over the course of the licence term.

Genre protection: should an existing licensee fail to apply for an HD-transitional licence within a reasonable time-period, the Commission will consider an application for a new service in the same genre. If an amended HD service did not apply for a transitional licence within the 3 year lifespan of the amendment, the Commission may entertain competitive applications.

Carriage requirements: all cable BDUs (except those serving fewer than 2000 subscribers) that have not reached the 85% digital penetration benchmark will be required to distribute the transitional HD versions of existing specialty and pay services, subject to available channel capacity. Once these BDUs reach the 85% digital penetration benchmark, they must distribute all transitional HD services without regard to channel capacity.

Technical standards: HD encompasses both 720p and 1080i formats. Line-doubled or ‘stretched’ 4:3 ratio pictures will not be counted toward HD thresholds.

Distribution and linkage rules: dual status and modified dual status provisions will not apply with respect to the distribution of HD services.

13. To summarize, the Commission’s stated expectation is for a *voluntary* and *market-driven* transition to digital and HD broadcasting.
14. However, taken together, the main digital and HD policy documents comprise a highly complex framework of specific deadlines, content thresholds, and technical standards. They also lay the groundwork for the elimination of specific rules and regulations that have long enabled broadcasters to make valuable contributions to the achievement of the objectives of the *Broadcasting Act*.
15. The CAB agrees with the Commission’s long-held view that the transition to a fully digital broadcasting environment offers important opportunities for the Canadian broadcasting system. At the same time, digital technology also poses significant costs and uncertainty for individual programming services.

16. The Commission has recognized this cost, but has simply noted that, “in (its) view, the cost of the transition to HD is a cost of doing business for both distributors and programmers.”⁴
17. The following sections of this study will detail the opportunities that digital and HD technology present for Canada’s private broadcasters, as well as the very real (and largely unrecoverable) costs that are the price of the transition to digital/HD broadcasting.

The business environment for the adoption of DTV and HD technologies

The status of the digital television and HD transitions

18. According to the Commission’s *Broadcasting Policy Monitoring Report 2006*, the adoption of digital and HD technologies by Canadian broadcasters is well underway:
 - To date, transitional DTV licences have been issued to 22 originating over-the-air television stations and 4 rebroadcasters, in Montreal, Quebec, Ottawa, Toronto, Hamilton, and Vancouver.
 - Twelve of those stations are already offering digital versions of their over-the-air signals, whether by transmitter, direct-feed to BDUs, or both. A further six are expected to begin digital broadcasting before September 2007.
 - To date, the Commission has approved, by way of licence amendment, 9 analog specialty, 2 pay and 11 Category 2 digital services for distribution in HD format.
 - The total number of households subscribing to the digital service of a licensed Canadian BDU surpassed 5 million by the end of 2005. It is estimated that a further million households will subscribe to the digital service of a licensed Canadian BDU in 2006.⁵
 - There are currently over 320,000 Canadian households subscribing to discretionary HD services.
19. In addition to the adoption of digital and HD broadcasting technologies, Canada’s private broadcasters are also taking advantage of the opportunities presented by other mobile and broadband audio-visual distribution platforms.

Mobile

20. In August 2005 Bell, Rogers and Telus began offering mobile television service in Canada. These services allow subscribers to access television programming on

⁴ See Broadcasting Public Notice CRTC 2006-74, paragraph 194.

⁵ Estimate drawn from Decima Research’s *Digital Domain*, May 24, 2006.

compatible wireless handsets. Some programs are streamed, live, to the handset, while others consist of pre-recorded content, downloaded to the handset from a host server. The mobile television services of all three wireless carriers are powered by MobiTV, a software platform consisting of a java application that must be launched on the handset.

- (i) As of August 2006, programming from 11 licensed Canadian broadcasters is available on the mobile television services of all three mobile phone carriers: Newsworld, RDI, Weather Network, MétéoMedia, Star, MuchMusic, Much More Retro, Much Vibe, G4TechTV, YTV and Treehouse.⁶ CanWest is further offering live streamed content to Blackberry users, including clips of *Global National*.

Online

- 21. Many private Canadian broadcasters have also undertaken initiatives to make their video content available on online channels, and to complement that content with new and original web-based content and services. For example:
 - (i) CTV has launched the CTV Broadband Network, with a premium broadband player offering access to full length CTV programs on four different channels. The company also is offering made-for-mobile CTV and RobTV news channels;
 - (ii) CHUM and Yahoo Canada partnered in the establishment of the official website for *Canada's Next Top Model*. CHUM has also launched a new online music community website, MUCHAXS. MuchMusic partnered with Universal Music and mobile channel enabler m-Qube to promote new CDs through speedier access to product-based ring tones;
 - (iii) Corus has launched a web store-front to sell Treehouse and Nelvana content. YTV plans to do a multiplatform launch for the Nelvana series *Pandalian*;
 - (iv) Québecor, including Groupe TVA, launched Canoe Live with integrated broadcast, print and broadband content;
 - (v) S-Vox has introduced religious podcasts with the service called MyGodPod.
 - (vi) Alliance Atlantis has begun offering broadband video content, from full episodes on demand (Season III Finale of *Naked Josh*) to unique webisodes (*Rescue Me*).
- 22. The adoption of digital, HD, mobile and broadband technologies will allow Canada's private broadcasters to reach Canadian audiences using a variety of cross-platform business models. However, some of these technologies comes at a steep cost to broadcasters, particularly production, editing, and transmission costs associated with HD broadcasting. As noted elsewhere in this report, these costs are largely unrecoverable under current regulatory and business models, and it is not at all clear that new mobile or online revenue streams will offset incremental operational HD costs.

⁶ MobiTV website: www.mobitv.com

Costs related to the adoption of digital and HD television technologies

23. Regardless of the nature or language of a broadcaster's operation, the main costs associated with the digital and HD transitions relate to the cost of upgrading the production and master control facilities.
24. The major production costs facing conventional and/or specialty and pay broadcasters as they make the switch from analog/SD broadcasting to digital/HD broadcasting generally fall into three categories: studio production, mobile production and master control. The increased cost of acquiring HD programming must also be considered. However, as HD programming costs vary widely from genre to genre, they do not fall neatly into a general description of costs.⁷
25. Conventional broadcasters also face additional transmission costs, usually associated with the upgrading or replacement of transmitters, studio-to-transmitter links, antennae and perhaps even towers.
26. Specialty and pay broadcasters face additional transmission costs in the form of greatly increased satellite uplink fees because of the higher transmission capacity requirements associated with HD.
27. These cost are compounded by other challenges to broadcasters' traditional cost and revenue centers, such as the increasing competition for programming rights and an increasingly fragmented advertising market.
28. For the purposes of this study, however, it is important to bear in mind that the traditional value chains by which broadcasters assemble and monetize programming are coming under increased pressure as a result of new technologies. These pressures are occurring at the same time as the digital and HD transitions, and accordingly, are having a compounding effect on the cost of technology adoption for broadcasters.
29. Deriving an accurate Canada-wide estimate of the total cost of the digital and HD transitions is a difficult proposition.
30. For example, the rate at which *production* equipment is adopted has a direct impact on the absolute cost to the broadcaster in question. Some stations and operators have already made significant investments in digital and HD conversion. Others have yet to begin upgrading their facilities. The rate at which facilities are upgraded has a direct impact on the rate at which the costs of the equipment are absorbed and amortized by each station, impacting, in turn, the 'real cost' of upgrading the entire broadcasting system.

⁷ It is not clear, under the Commission's current HD policy, how some services will be able to meet the expectations of the regulatory framework. For example, despite the fact that the Commission expects HD to fully replace SD, the mandatory technical standards that define what the Commission considers 'true HD' exclude most up-converted SD programming. Accordingly, it is difficult to understand how services that rely solely on rebroadcasts of older programs will ever meet the Commission's expectations and requirements.

31. Also, the specific *HD programming* requirements of various broadcasters can differ widely, depending on the nature of the service in question. For example:
- The number of hours of HD network programming that can simply be received and passed through by an affiliated station may differ from company to company, and within each company, from station to station.
 - The number of hours of local or regional programming produced in HD will differ from licensee to licensee, depending on licence requirements and market demand.
 - Similarly, the number of hours of live HD news or sports programming will differ from broadcaster to broadcaster, as will related remote HD broadcast and electronic news gathering (ENG) requirements.
 - Some broadcasters do live studio ‘hits’, while others do not.
32. All of these factors will have a direct impact on the cost of HD programming for any given conventional or specialty broadcaster. Hence the difficulty in establishing an overall “HD programming cost” for the entire broadcasting system.
33. Similarly, over-the-air digital/HD *transmission* upgrades are occurring under a number of distinct scenarios, all having different attached costs. In some cases, the existing analog transmitter will be augmented by a digital/HD transmitter using the US transitional model, whereby a station operates parallel digital/analog transmitters for a period of time, then just a digital/HD transmitter. In other cases, transmitters will be replaced using a ‘flash-cut’ model, whereby the analog transmitter is directly replaced by a digital/HD transmitter, likely operating on the same channel. Some conventional broadcasters will build new digital/HD over-the-air transmitters, while some conventional (and all specialty and pay) broadcasters may deliver their digital/HD signals in the future only through BDUs.
34. It is also likely that a mixture of the above production, programming and transmission models will occur in various markets, at various times. This makes it extremely difficult to capture the precise cost of converting the Canadian broadcasting system from analog/SD to digital/HD.
35. That said, when it comes to outfitting an analog/SD broadcaster for digital/HD operations, there are a number of incremental capital and operating costs that will be fairly common, whether the operation in question is conventional or specialty, large or small.
36. The following tables provide a general picture of typical costs to outfit an analog/SD broadcaster for digital/HD operations. These estimates assume that the digital/HD technology will completely replace analog/HD technology in a short timeframe, as per the Commission’s expectations. Costs that are specific to conventional, specialty, and French-language broadcasters are described separately.

Typical HD upgrade costs – conventional TV

Item	Large market	Small market
1. Studio upgrade costs – local production other than news <ul style="list-style-type: none"> Includes cameras, monitors, switchers, routers, lighting and sets 	\$1.5 million per studio	N/A
2. News/information programming <ul style="list-style-type: none"> Studio upgrade and ENG cameras/editing system Note mobile HD cameras for sports broadcasting can run up to \$250,000 each 	\$1.5 million	\$0.5 million
3. Satellite truck upgrades (remote HD broadcasts) <ul style="list-style-type: none"> Upgrade of the uplink encoder. Downlink decoder at master control would also have to be upgraded 	\$0.1 million	N/A
4. Master control	\$2 million	\$0.5 million
5. HD transmitter/antenna <ul style="list-style-type: none"> Requires interim UHF HD transmitter/antenna during period of simultaneous analog/digital broadcasts, plus a replacement VHF/UHF HD transmitter (or upgrade) when analog transmissions end and station reverts to original frequency 	\$1.2 million	\$1.2 million
6. Convert studio-transmitter link for HD	\$0.3 million	\$0.3 million
7. Tower upgrade/replacement (if required to accommodate transitional digital antenna)	0 to \$2 million	0 to \$2 million

Typical HD upgrade costs – specialty and pay services

Item	Cost
1. Contracted HD satellite uplink <ul style="list-style-type: none"> Cost varies based on the applicable digital compression system (and thus the amount of satellite bandwidth required to transmit the HD signal) 	\$0.5 to \$1 million annually
2. Master control	\$2 million
3. Studio/set upgrades <ul style="list-style-type: none"> For those services that originate programming – e.g. news, sports, weather 	\$1.5 million

French-language broadcasters

37. There are some specific incremental costs associated with the adoption of digital and HD technologies by *French-language* broadcasters. These incremental costs are mainly related to the need to upgrade studios used for local production other than news. These costs are overall more significant for French-language broadcasters than for English-language broadcasters simply because they have to maintain a greater number of production studios to meet their programming needs than what is required in the English market. They also produce a wider variety of programs in house from game shows to “Téléromans” and sitcoms which requires greater studio capacity than their English counterpart. Since it is estimated that the cost to convert a studio from analog\SD technology to digital\HD technology could represent up to \$1.5 million, it is anticipated that upgrading all the studio capacity will represent a substantial incremental cost for the French-language broadcasters that can’t be alleviated by additional sources of revenues derived from the conversion to HD technology.
38. To summarize, private broadcasters’ adoption of digital and HD technologies is occurring under a variety of scenarios, depending on a number of regulatory and business considerations. The one constant, however is that the costs associated with the HD transition are largely unrecoverable in the current regulatory and business environment.
39. The Commission’s digital and HD regulatory frameworks put a priority on migrating broadcasters and audiences to new technologies. However, for the most part, advertisers have not yet followed. Moreover, the much-hyped ‘interactive television’ revolution has yet to materialize, at least to the extent that it would represent new revenue streams to offset the new onerous cost centers detailed above. Nor are broadcasters’ current mobile and broadband initiatives delivering nearly the return on investment necessary to counterbalance new digital/HD production and transmission costs.
40. When it comes to the adoption of digital and HD technologies, the dilemma facing most broadcasters is this: the Commission expects or requires broadcasters to make certain investments in new technologies at certain times. And despite the large capital costs, and increased operating expenses, associated with digital and HD technologies, the current regulatory framework and business models simply don’t provide for the increased revenues necessary to compensate for the impact of these expected investments. This dilemma is particularly acute for smaller conventional and specialty broadcasters, who have an even smaller revenue base across which to amortize these onerous upgrade expenses.

The regulatory and business environment pertaining to the adoption of new technologies by Canada's private radio broadcasters

Regulatory Environment

41. In 1995 the Commission issued PN 1995-184 *A policy to govern the introduction of digital radio*.
42. The initial regulatory assumptions about digital radio were similar in many respects to the regulatory assumptions about digital television: that digital radio broadcasting (DRB) would consist largely of migrating existing audiences and advertisers to a new digital delivery platform, that some new services and advertising features would be possible in the digital age, and that radio's digital transition would be a complete replacement for the analog AM/FM system.
43. However, like television, it is now clear that the actual experience of radio broadcasters with respect to the adoption of digital technologies has not met original regulatory expectations. This is largely due to the arrival of new, competing consumer electronics for the delivery of audio programming.
44. Various new audio technologies present multiple options for developing the current radio business models. Like television, evaluating these radio options requires estimates of cost, capital and operating requirements, receiver subsidies and costs of promotion.
45. For private radio broadcasters to have the necessary flexibility to adopt new technologies and to adapt to new digital business models, the regulatory framework for radio in the digital age must accommodate the continuing evolution of the current, successful business model based on advertising revenues, with additional revenue streams enabled by new technologies.⁸
46. The extent to which Canada's private radio broadcasters have necessary flexibility in the digital age depends largely on the outcome of the Commission's 2006 Commercial Radio Policy Review. The Commission is expected to announce the new regulatory framework for commercial AM and FM radio before the end of the 2006.

Technical standards and associated adoption issues

47. DRB distribution systems use local, terrestrial-based transmitters that operate in radio spectrum allocated to broadcasting, and are therefore capable of providing service to larger populations. These may be powerful single transmitters, or multiple lower-power transmitters, all operating on the same assigned frequency.
48. The most practical technical models to consider for this type of operation are:

⁸ For a comprehensive picture of the CAB's position on where the Commission should guide the commercial radio industry, see 'Then and Now...Private Radio's Changing Realities:' <http://www.cab-acr.ca/english/radio/rreview/default.shtm>

- Eureka/147, operating in the 1452-1492 MHz Band;
 - iBiquity Digital Corporation’s In-Band On-Channel (IBOC, aka HD Radio™), operating in either a hybrid analog/digital mode or in full-digital mode, in the 525-1705 kHz (AM) band and the 88-108 MHz (FM) band; and
 - the Digital Radio Mondiale (DRM) full digital system, operating in the 525-1705 kHz band.
49. At present, the single technical standard for conventional terrestrial DRB transmission in Canada is the Eureka/147 system which, due to its wide bandwidth requirements, can only be implemented in new radio broadcasting spectrum.⁹ Other standards would pose particular challenges in the Canadian context.
50. Industry Canada has provided 40 MHz of spectrum for Eureka/147 service at 1452-1492 MHz (L-Band), and has set up city-by-city frequency allotments for this purpose. The capacity currently exists in this band to provide DRB transmission capability for every existing analog AM and FM station in Canada, with some spare capacity for future growth in all but the most congested radio markets.
51. In order for HD Radio™ or DRM to be implemented on a permanent basis in Canada, regulatory action would need to be taken. Industry Canada would have to establish domestic technical standards for IBOC transmissions in both the FM and AM bands.¹⁰
52. Industry Canada may not be in a position to authorize permanent AM IBOC transmissions using any type of digital emissions unless and until the ITU Region 2 AM Agreement is amended. The wording of the current agreement, as well as the bilateral Canada/U.S. agreement respecting the AM band, appears to prohibit digital transmissions at present. Canada has already agreed to work with other Region 2 countries to amend the Agreement to allow for digital transmissions in this band. However, this may take several years to finalize.
53. As for FM IBOC in the U.S., one of its key advantages is that the technology allows the 96 kbits/sec digital multiplex to be split into two or more parts. This would enable a station to carry a simulcast of its main FM program on one part of the multiplex and originate one or two additional separate audio programs using the remainder. This multicasting option does not exist for AM IBOC, which has a much lower data capacity and can only be used for simulcasting the main analog audio programming.
54. But there are two key challenges with this multicasting concept. First, the digital IBOC signal is more fragile than the main analog FM service. When the digital signal fails,

⁹ Industry Canada has also authorized the use of non-compatible, proprietary technical transmission systems for the satellite and terrestrial components of the DARS digital radio services provided in Canada by Sirius and XM Radio; however, it would not be correct to call these “standards” as only a single licensee uses each one.

¹⁰ Lab and field testing of FM HD Radio™ is now underway, to better understand both the interference and service potentials of this technology. Testing of HD Radio™ and DRM full-digital system in the AM band may also be undertaken later this year.

listeners will find that their receivers automatically fold back to the main analog program. There is no such protection for any secondary programs carried on the digital multiplex. When the digital signal fails, the secondary service disappears completely. Moreover, the extensive processing that occurs in FM IBOC receivers means that 5 to 8 seconds is required to 'lockup' these subsidiary audio signals whenever the listener changes stations.

55. Second, receiver manufacturers are having difficulty managing the issue of how to design receivers that allow listeners to easily find and display any secondary audio services that are being transmitted.

Business Environment

56. The current business environment for commercial radio in Canada is characterized by increasing levels of unregulated competition from new media that deliver audio to Canadians on recently developed platforms such as the Internet, cell phones and satellite/subscription services and portable audio devices. To compensate for the resulting market fragmentation, many private radio broadcasters are looking to new digital radio options.
57. As of May 1 2006, the Commission has granted 76 licences for transitional digital radio services. Of these, 57 have been issued to existing commercial radio programming undertakings (in Montreal, Ottawa, Toronto, Vancouver, Victoria, and Windsor), one to a stand-alone ethnic radio service, and 18 to existing public radio broadcasters. That few of these services have launched is an indication that the business environment has not been suited to the full adoption of digital radio broadcasting by Canada's radio broadcasters.
58. The future of digital radio broadcasting in Canada depends on two main factors: *receiver availability* and *listener take-up*. While radio stations may try to create public demand by originating digital services (such as DRB-only programming) the effectiveness of this will be limited unless (i) manufacturers and retailers are prepared to make available a considerable quantity of DRB-capable receivers, (ii) consumers find programming and other features attractive, and (iii) acceptable/attractive price points are achieved.
59. While the broadcasting industry is accustomed to thinking that its digital radio options are limited to technologies that can be controlled by radio station operators, the considerable difficulties attendant on launching a radio-specific platform compel analysis of a larger field of technologies.
60. That is, industry players need to evaluate new, unregulated audio distribution services to determine whether they may provide digital transmission opportunities as well as competitive threats. Most of these platforms are intended for subscriber supported services and are therefore not true 'DRB' services.
61. Digital Multimedia Broadcasting (DMB) is an offshoot of the only standard currently approved for Canada, Eureka/147. It can be transmitted within the L-Band channels already allotted for use in Canada's radio markets. Its more efficient coding enables the

radio channel to be used for the delivery of multimedia – pictures and some video, along with high-quality audio services – to mobile receiving devices. Such services would not be backward compatible with current Eureka/147 transmissions, so specific L-Band channels would have to be set aside for any DMB services that might be authorized.

62. Television Mobile (DVB-H) is an open-standard variation of DVB – the European digital television standard – which can be received by mobile devices, especially hand-helds. This technology provides an exceedingly robust and reliable digital delivery platform as do other technologies such as the proprietary MediaFlo system. Mobile TV technologies can also carry high-quality audio services. The relatively low-bandwidth requirements of audio suggest that these platforms could carry large numbers of radio services – both subscriber-based and free. However, there is no spectrum currently allocated for this service in Canada.
63. WiFi and WiMax services, including Inukshuk, are rapidly rolling out across North America. The recent announcement that Philadelphia intends to blanket its residents with wireless Internet coverage, as well as Toronto Hydro Telecom’s announcement of similar plans for downtown Toronto, indicate an emerging market for multifunction mobile Internet access. Such services would use devices that would have music downloading and streaming as part of their functionality. It is at this point where broadband radio would become a substitution threat for broadcast radio.
64. Entry to this marketplace would, in theory be as open as the Internet, proposing unprecedented audience fragmentation and a threat to all radio business models including subscription radio satellite services. One unresolved technical challenge is the viability of these services in fast-moving vehicles. While fixed, fixed-portable, and slow-moving reception might prove possible throughout entire cities, it is not certain that complicated reception problems, such as multipath and Doppler interference, would be easily resolvable.
65. Another option for Canadian radio broadcasters who wish to take advantage of new technological opportunities is the combining of existing technologies with new devices. This is common practice, but has tended to occur when the technology is already standard and its chips are inexpensive, e.g. FM radios built into clocks, CD players, MP3 players, and other devices. More recent examples include the integration of pay audio on the television set-top box, which removed the need for a dedicated receiver – and removed a huge cost factor from the Canadian business model. To assess a similar model for digital radio, mobile devices – phones, DVB-H receivers, WiFi or WiMax equipped devices, iPods and MP3 players – would have to be evaluated to determine the viability of ‘building in’ a digital radio receiver.
66. To summarize, there are a number of potential digital radio options available to Canada’s private radio broadcasters. To date, only one technical standard for digital, over-the-air radio broadcasting has been approved by Industry Canada. As new media options divert radio’s traditional audience/revenue base, radio operators are experimenting with various new business models to extend the reach of their current brands and content.

Adoption of new technologies by the content producers

67. One of the Commission's stated objectives for the transition of Canada's broadcasting system to digital and HD is to encourage the production, broadcast and distribution of high quality Canadian programs across the country.
68. According to an April 2006 study of the *Status of Digital Production in Canada*,¹¹ approximately 50% of Canadian television production is captured in SD digital, which the report describes as the preferred choice for lower budget productions. The report estimates that in 2004/2005, over 800 hours of Canadian television content were shot in HD, while over 4000 hours were shot in SD. Of the over 2200 hours of Canadian programming supported by the Canadian Television Fund in 2004/2005, 178 hours were shot in HD, and 2100 in SD.¹²
69. The Status of Digital Production in Canada assessed the cost implications of producing television programming in HD rather than analog and determined that there are a number of relevant factors, some of which result in increased costs for HD production, others of which may result in lower HD production costs.
70. Factors that tend to result in higher costs for HD programming are the following:
- Equipment rental: rental companies charge a premium for HD equipment, resulting in an incremental cost differential of approximately 3% to an overall HD budget as compared to SD.
 - Post production: tape stock for HD is as much as five times more expensive than SD tape stock, and processing HD can take longer, leading to post-production costs up to double those for SD.
 - Increased 'on screen' costs: higher fidelity pictures necessitate new sets and more money spent on costumes, make-up, hair styling and other creative elements.
71. On the other hand, the report notes that there can be certain efficiencies and cost-savings for content producers associated with HD production. For example, shooting in HD can save time on the set, and HD capture eliminates the need to convert film stock to digital for post-production.
72. Taking all this into account, the authors of the report conclude that the cost of producing HD television is typically 10% to 15% more than the cost of producing television in SD.

¹¹ The report also provides a comprehensive primer on specific digital production technologies, their manufacturers, as well as their perceived advantages and drawbacks. Prepared by Kelly Sears Consulting Group, for the Department of Canadian Heritage: http://www.pch.gc.ca/pc-ch/sujets-subjects/arts-culture/film-video/pubs/2006-04/index_e.cfm

¹² Source: CTF

73. While the precise implications of these incremental costs on the business models of independent producers is a subject that falls outside of the CAB's mandate, two general conclusions can be drawn.
74. First, any incremental HD costs faced by independent producers apply equally to broadcaster in-house productions as well. These are in addition to the costs outlined earlier with respect to the upgrading of broadcasters' physical plants to accommodate digital/HD operations.
75. Second, as broadcasters are the primary investors in independently-produced Canadian television productions,¹³ it stands to reason that independent producers will look to recover some of their incremental HD production costs in the form of higher licence fees from Canadian broadcasters.
76. The CAB submits that licence fees are properly a matter for commercial negotiation, rather than a matter of public policy. However, it is nevertheless crucial that Government of Canada not establish high expectations with respect to the ability of Canada's private broadcasters to simply absorb all of these higher production costs.
77. In light of private broadcasters' own digital/HD related incremental costs, it would not be reasonable to expect them to also absorb all of the incremental costs faced by independent producers. If the increased costs of digital/HD production are, in the Commission's words, "the cost of doing business" for broadcasters, they must also be the cost of doing business for independent producers.

¹³ According to the CFTPA Profile 2006, independent producers have, over the last several years, increased their reliance on financing from Canadian broadcasters, as financing from foreign sources has diminished. Financing from Canadian broadcasters rose from 18% in 1999/00 to 32% in 2004/05; while foreign financing dropped from 28% to 13% during this same period.