Canadian Radio-television and Telecommunications Commission
Conseil de la radiodiffusion et des télécommunications canadiennes

Broadcasting Public Notice CRTC 2006-160

Ottawa, 15 December 2006

Digital radio policy

In this public notice, the Commission sets out its revised policy for digital radio broadcasting.

This public notice is one of three issued following the Commission's review of its policy for commercial radio announced in Review of the commercial radio policy, *Broadcasting Notice of Public Hearing CRTC 2006-1, 31 January 2006, and that was the subject of a public hearing in the National Capital Region that began on 15 May 2006. The other two public notices are* Commercial Radio Policy 2006, *Broadcasting Public Notice CRTC 2006-158, 15 December 2006, and* Revised policy concerning the issuance of calls for radio applications and a new process for applications to serve small markets, *Broadcasting Public Notice CRTC 2006-159, 15 December 2006*.

Background

The 1995 transitional digital radio policy

1. On 29 October 1995, the Commission issued *A Policy to Govern the Introduction of Digital Radio*, Public Notice CRTC 1995-184 (the Transitional Digital Radio Policy). This followed the establishment of the L-band allotment plan by the Department of Industry (the Department) in September 1995. Because digital radio in Canada was in the early experimental period, the Commission set out a two-stage approach for its implementation. The first stage involved establishing a licensing process for digital radio services on a transitional basis under which transitional digital radio licences would be issued for a term of three years. The second stage, to occur in the future, would involve consideration of all aspects of digital radio broadcasting (DRB) in the longer term, which would ultimately lead to the establishment of a permanent licensing regime for digital radio undertakings.

2. The Commission also stated that it considered digital radio to be a replacement technology for existing AM and FM radio services and decided that existing radio services would have priority access, but not exclusive access, to the digital band.

The need for a policy review

3. Since 1998, the Commission has licensed 76 transitional digital radio undertakings in Toronto, Windsor, Montréal, Vancouver, Victoria and Ottawa. Of these licences, 57 have been issued to existing commercial radio programming undertakings. The Commission has also approved 18 applications for transitional digital radio undertakings related to existing Canadian Broadcasting Corporation (CBC) stations. In addition, the Commission approved an application by Sur Sagar Radio Inc. for a new stand-alone

ethnic commercial transitional digital radio undertaking.[1] This station has not commenced operations. Currently, there are over 60 radio stations offering DRB service in the broadcast portion of the L-band, which in Canada extends from 1452 to 1492 MHz. All of these rebroadcast existing analog programming services.

4. After a promising start, the rollout of DRB has slowed in recent years in Canada. In fact, the adoption of the new digital radio technology by consumers and the switch-over by the radio industry to digital is now effectively stalled. Not only has the extension of services halted, but there now appear to be only token efforts underway to promote the digital radio services that have been launched. As well, there has been little investment in the building and operation of digital radio transmission facilities outside of the markets where these services were initially established. Some stations that began broadcasting in digital have ceased operations.

5. This has been due to a number of factors. The first is the limited availability and relatively high cost of the DRB receivers that have entered the market. The lack of receivers stems from several causes. In much of the rest of the world, digital radio is broadcast in Band III, a VHF band, not in the L-band. In the few countries that have launched stations in the L-band, the channel plans are slightly different from the Canadian plan. In addition, displays on the receivers to be used must accommodate both the French and English languages. While these are not difficult technical challenges, they do mean that all of the receivers sold here must be manufactured solely for, or at least adapted to, the Canadian market. The decision by the United States to adopt a different technology known as In-Band-On-Channel (IBOC)[2] for the conversion of American radio stations from analog to digital has also prevented the development of economies of scale in the manufacture of L-band digital radio receivers in the Canadian market.

6. A second factor has been that digital radio has only been implemented in the major markets, which are some distance apart. The automobile industry expected that DRB transmitters would be constructed rapidly in the traffic corridors between Windsor and Québec, Calgary and Edmonton, and Vancouver and the Lower Mainland, making it possible for receivers in cars to receive high-quality DRB signals as they travelled between the major cities. This did not occur and, as a result, the automobile industry has switched its support to digital satellite subscription radio.

[1] *Stand-alone ethnic transitional digital radio undertaking in Toronto*, Broadcasting Decision CRTC 2003-118, 17 April 2003.
[2] The technical aspects of IBOC are described in paragraph 51 of this public notice.

7. It has also been argued that roll out of DRB has been slowed by the lack of different radio programming on the L-band. As noted above, L-band DRB has been considered as a replacement technology for analog AM and FM service and consumers have been placed in a position where they must purchase relatively expensive digital receivers to receive the same content that is broadcast by analog stations, albeit with better sound quality. Experience to date appears to call the replacement model into question and suggests that, in order to incent consumers to buy digital receivers, digital radio services will need to offer distinct programming.

8. The emergence of new digital technologies and distribution platforms has also had an impact on the development of DRB. In addition to the satellite radio services, originally obtained through the grey market but now offered by licensed Canadian operators, there are several Internet-based methods of delivering audio content, including file-sharing, podcasting, downloading and audio streaming. All of these methods offer listeners a multitude of programming choices using a variety of devices, as well as the ability to tailor such choices to their personal tastes and preferences.

9. All of these factors led the Commission to the conclusion that it should review the Transitional Digital Radio Policy in the context of its review of its *Commercial Radio Policy 1998*, Public Notice CRTC 1998-41, 30 April 1998 (1998 Commercial Radio Policy).

10. In *Review of the Commercial Radio Policy*, Broadcasting Notice of Public Hearing CRTC 2006-1, 13 January 2006 (Notice of Public Hearing 2006-1), the Commission stated that it was appropriate to seek the views of the commercial radio sector and other interested parties, such as the CBC, with respect to the necessary conditions and regulatory approach to ensure a successful transition from analog to digital radio transmission and reception.

11. In that connection, the Commission raised the following specific questions:

- How can radio best make the transition from analog to digital, and how can the Commission assist this through policy and regulatory actions? Should a distinction be made between the AM and FM bands?

- Should the Transitional Digital Radio Policy be modified so that DRB is no longer deemed to be a replacement technology? If so, what should be the status of existing replacement DRB stations which are now in operation?

- Should the Transitional Digital Radio Policy be modified to facilitate the use of DRB by new entrants? If so, how would adequate DRB spectrum be obtained in markets such as Toronto, where available frequencies are scarce?

- Should the Commission permit the use of IBOC as a digital platform for radio? If so, what regulatory measures and criteria should be adopted?

- Should the Commission consider other standards, such as Digital Radio Mondiale (DRM),[3] Digital Multimedia Broadcasting (DMB) or Digital Video Broadcasting – Handheld (DVB-H),[4] for digital broadcasting in Canada?

- In the event that no other plans are identified, what other use could be made of the DRB spectrum?

- How can digital radio policies help provide better services to Canada's diverse cultural and ethnic communities?

Positions of parties

12. The Commission received comments on matters related to DRB from a number of parties, including the Canadian Association of Broadcasters (CAB), the CBC, CHUM Limited (CHUM), Corus Entertainment Inc. (Corus), the Canadian Association of Ethnic Broadcasters (CAEB), iBiquity Digital Corporation (iBiquity), the Ontario Independent Radio Group (OIRG), and DRM. Comments from these parties are summarized below.

The CAB

13. The CAB submitted that a DRB transition policy that provides little new programming has limited appeal to consumers. Accordingly, it submitted that the concept of L-band DRB as a pure replacement technology for AM and FM broadcasting should be abandoned and policy measures put in place that will encourage broadcasters to develop innovative programming services that will be delivered to the listening public solely by digital means.

14. The CAB further argued that existing AM and FM broadcasters should continue to have preferred access to the L-Band spectrum that has been set aside for them, but that this privilege should be balanced against a long-term but steadily increasing commitment to provide separate programming on the facility. The CAB submitted that programming slots on L-Band allotments that are not taken up within seven years by existing AM or FM stations should be opened up to new market entrants and to existing DRB broadcasters seeking additional transmission capacity. As well, rules for the use of the ancillary multicast programming capacity for both L-Band and IBOC should be similar to those already in place for FM subsidiary communications multiplex operations (SCMO).

[3] DRM is a competing IBOC technology that uses existing analog spectrum to provide digital signals. DRM is described in paragraph 31 of this notice.
[4] DMB and DVB-H are competing broadcasting standards that can be used to provide both digital video and audio services.

15. The CAB further argued that the Commission should remain open to a wide range of experiments and field trials that would evaluate the ability of DMB and DVB-H to meet the objectives for new DRB services, but that the licensing of permanent services should await further proceedings that would identify suitable bands for such transmissions.

The CBC

16. The CBC was of the view that there should be a distinction between stations operating in the AM and FM bands in the transition to DRB, because of their particular electromagnetic properties.

17. The Corporation also indicated that it remains committed to DRB in the L-band. It submitted that new technological applications and devices now available in many markets, particularly in the mobile market, may provide the needed spark for DRB in Canada.

18. However, the CBC was of the view that the Commission should re-examine its transition model for digital radio, arguing that DRB should not be a replacement technology but a technology that will co-exist with the existing analog services.

19. As well, the CBC stated that the requirement for CD quality sound should be removed so that a market-driven approach would be used to determine the quality of audio content. For example, under such an approach, three new DRB allotments or one new digital multimedia allotment could be made available per existing DRB multiplex since, with the Eureka 147 standard[5], it is possible to increase the number of stations on a channel by sacrificing the audio quality.

20. The CBC further submitted that the Commission should also consider other standards such as DRM, DMB and possibly even DVB-H for digital broadcasting in Canada as a complement to the use of the Eureka 147 standard. It argued that DMB could create the missing synergy with the PCS cellular carrier industry by integrating digital receivers in mobile devices.

21. Before permitting the use of IBOC technology in Canada, the CBC suggested that actions and measures should be taken to ensure that IBOC will not create harmful interference to existing Canadian services.

22. The CBC noted that the AM IBOC system requires the reduction of the audio bandwidth by half (4.5 kHz) of the bandwidth of all existing AM stations, not just the ones adopting the system. This would create a serious degradation in sound quality for existing AM stations. Even with these measures, the CBC submitted that the fact that the IBOC data resides precisely on the carrier frequencies of first adjacent stations to which skywave protection is not afforded means that IBOC transmission at night is not practical.

[5] Eureka 147 is the technical standard chosen for L-Band DRB in Canada. The Department of Industry has described and applied the Eureka 147 standard in its L-Band DRB allotment plan, which can be found at http://spectrum.ic.gc.ca/infoback/dgse/english/bprs.html

23. Likewise, on the FM side, the CBC argued that implementation of the FM IBOC system would require additional first and second adjacent channel coordination. Furthermore, the insertion of the IBOC digital component within the FM band would make it difficult to coordinate the CBC's network operations.

CHUM

24. CHUM submitted that digital radio is, at this early stage, very similar to SCMO radio in that operators will need to offer distinct content to entice listeners to purchase a special receiver to access it.

25. In CHUM's view, multicast channels associated with L-band DRB should not have content requirements.

Corus

26. Corus suggested that there be no regulations for digital broadcasting, with the exception of Canadian ownership requirements, until all analog transmissions have been terminated. In its view, such an approach could provide incentives for consumers to acquire digital receivers.

The CAEB

27. The CAEB recommended that the Commission not force any transition to digital transmission technology until the choice of the technology to use becomes clearer and affordable receivers become more widely available. It further recommended that DRB be regulated in a similar manner to existing AM and FM stations.

iBiquity

28. iBiquity is the inventor and developer of the IBOC technology used for the digital radio transition in the United States.

29. iBiquity recommended that IBOC be allowed to operate in Canada, given that the technology is compatible with the current broadcast infrastructure and therefore enables the reuse of frequency spectrum as well as some of the existing equipment. The company was also of the view that the introduction of IBOC would further the Commission's objectives of transitioning analog radio broadcasting to digital technology. In addition, iBiquity argued that IBOC provides other public benefits, such as services to specific ethnic groups through multicasting and to the deaf community through the auxiliary data channel.

The OIRG

30. The OIRG recommended that Canadian stations wishing to adopt IBOC technology should be able to do so without a prolonged regulatory process or processing delays. It also recommended that Canadian stations be permitted to multi-cast alternative category 2 formats on the additional digital channels, which is possible with IBOC technologies, without a requirement to submit an application or to obtain regulatory approval.

DRM

31. DRM is a consortium of operators and manufacturers that was established to develop a new, universal open standard for digital radio. Although the standard was initially developed for the short wave and AM bands, it is now being extended to the FM band. DRM expects the FM extension development to be ready in 2007 and market access by 2009. The Commission notes that the DRM standard reuses existing analog spectrum, as is the case with the iBiquity's standard.

32. In DRM's view, its technology is the best technical solution for converting existing analog services to digital. More importantly, it is an open standard, and, as a consequence, there are no licensing fees.

Commission's analysis and determinations

33. The Department and the Commission play complementary roles in the Canadian broadcasting system. The Department allocates frequency spectrum for broadcasting and authorizes any new technical standards for use in the frequency spectrum allocated to broadcasting services. The Commission licences, regulates and supervises the broadcasting system in a manner that further the objectives set out in the *Broadcasting Act* (the Act). Objectives relevant to the introduction of DRB include those set out in section 3(1)(d)(iv), which provides that the Canadian broadcasting system should be "readily adaptable to scientific change," and section 5(2)(f), which provides that the Canadian broadcasting system should be regulated and supervised in a flexible manner that "does not inhibit the development of information technologies and their application or the delivery of resultant services to Canadians."

34. In the following sections of this public notice, the Commission discusses its approach to digital radio flowing from its radio review. In the case of DRB offered in the L-Band, it amends the Transitional Digital Radio Policy with a view to enhancing the prospects for DRB. It recognizes, however, that these changes are no guarantee of success since many of the factors leading to the current state of L-Band DRB, such as the limited availability of receivers, remain.

35. In the case of IBOC and other technologies, a number of the issues raised by parties are discussed, many of which raise issues for the Department. The Commission will adopt a specific framework for IBOC and other technologies for digital radio if and when IBOC and other technologies related to digital radio are adopted in Canada. The policy will take into account the state of L-Band DRB and radio in Canada at that time.

L-band DRB

The new service model

36. The Commission agrees with the industry consensus that the provision of new, innovative services is needed if consumer interest in L-Band DRB is to be raised. Improved technical quality, by itself, will not be enough to drive consumer demand for digital audio services.

37. Based on the most recent evidence, it is unlikely that either the AM or the FM bands will be shut down anytime in the immediate future. The Commission notes that the FM band in particular continues to enjoy robust growth, and that the increasing demand for the limited spectrum that remains is FM radio's chief technical problem today. On the other hand, the long-term future of the AM band remains problematic as broadcasters continue to convert AM facilities to FM. Even so, the transition of today's analog technology to digital by means of IBOC or possibly DRM technologies, in spite of their known limitations, may well give the AM band an additional lease on life. It will certainly postpone any possible shut-down of the band for some years to come. As the CBC noted in its submission, DRB services will not replace the analog services; they will co-exist with them for many years.

38. For these reasons, the Commission has concluded that the current replacement model for L-band DRB should be replaced with a new service model. Under the new service model, new digital radio licence holders will be free, subject to the L-band DRB regulatory framework set out below, to develop whatever broadcast services they believe will be of greatest interest to the listening public. Licensees will no longer be licensed as transitional digital radio undertakings but as digital radio undertakings. Licences will normally be for a term of seven years, and the 14-hour limit on non-duplicated programming permitted under the Transitional Digital Radio Policy will be lifted.

The regulatory framework for the new service model

39. A number of suggestions were put forward for the new regulatory framework for L-band DRB. One suggestion was that the Commission set a relatively low Canadian content level, on a temporary basis, in order to drive consumer demand for L-band DRB receivers. At the same time, the business model could be assisted by lowering the operating expenses of broadcasters by, for example, reducing, or even eliminating, the expenditure requirements for Canadian talent development. Alternatively, it was suggested by some parties that the regulatory framework for the existing analog radio services could be extended to L-band DRB.

40. The Commission notes that it has just completed a review of the regulatory framework for radio. This framework is tailored to meet the objectives of the Act, while providing flexibility for small radio stations in all sizes of market with respect to commitments for Canadian content development. The Commission further considers there would be little point or purpose in undertaking another review for DRB, given that it is an emerging service whose impact will not be felt for some years to come. Such a framework could also be applied in a flexible manner to fledgling digital stations.

41. Accordingly, the Commission has concluded that the regulatory framework for the existing FM analogue services will be extended to licensees operating under the new service model in the L-band. The revised policy for FM radio stations is set out in *Commercial Radio Policy 2006,* Broadcasting Public Notice CRTC 2006-158, 15 December 2006. However, to encourage innovation in programming, the Commission will entertain applications by digital stations that propose exceptions to the provision of the commercial radio policy that requires that stations operate in specialty or non-specialty programming formats by condition of licence.

42. As for the common ownership requirements, the Commission will permit a person to own or control one digital radio undertaking for every analog radio undertaking permitted under the common ownership policy set out in the 1998 Commercial Radio Policy. Therefore, in a market where the current ownership limit is three stations, a person may own or control as many as three digital stations and three analog stations, and in a market where the limit is four stations, a person may own or control a maximum of four digital stations and four analog stations.

The licensing regime

43. The Commission will issue L-band digital licences as per its current licensing practices for the FM band. That is, applicants are free to apply for licences to operate digital radio stations using the available L-band spectrum. Each L-band service will require its own licence.

44. In addition, an expedited process will be established for licensees of transitional digital radio undertakings that apply for full-term licences under the new service model established by this policy framework.

45. The Commission notes that a number of transitional digital radio licences have been awarded but the digital radio undertakings are not operational. The Commission will follow its current practice under which, if an undertaking is not operational within the authorized timeframe, the authority will lapse.

Sharing of channel capacity

46. The Department's allotment plan assigns all radio undertakings in a geographic area to groups of not more than five stations for the purpose of sharing a 1.5 MHz digital radio channel. In the Transitional Digital Radio Policy, the Commission stipulated that, in order to ensure that all licensees have fair and equitable access to digital channel capacity, each undertaking would be restricted to the use of no more than 20% of the digital capacity of each 1.5 MHz channel.

47. The Commission considers that fair and equitable access remains a keystone of its digital radio policy. Accordingly, the 20% restriction remains in force. In the event that more efficient use can be made of the spectrum, for example, if compression technology improves to the point where 10 audio streams could be broadcast with the same technical quality as 5 audio streams can be broadcast today, the Commission would be prepared to review this matter.

Coverage areas

48. The proposed coverage area of each programming service sharing a digital radio channel will be part of the application process. Coverage may be provided by a single transmitter or it may be supplemented by coverage extenders and by fill-in transmitters (gap fillers).

Ancillary data services and ownership and control of digital facilities

49. With respect to the distribution of ancillary data services and the ownership and control of digital facilities, the Commission maintains the approach set out in the Transitional Digital Radio Policy.

Conclusion

50. As noted earlier, the changes set out above are no guarantee of success since many of the factors leading to the current state of L-Band DRB, such as the limited availability of receivers, remain. The Commission has, however, attempted to be responsive to the concerns raised by broadcasters. It is confident that the Department will continue to review any spectrum-related issues that would contribute to the effective use of the L-Band.

In-Band-On-Channel (IBOC) technologies

Technical overview

51. As noted earlier, IBOC has been adopted in the United States as a technology to convert AM and FM stations from analog to digital within their existing spectrum allocations. There are two major standards being considered – the first from DRM and the second from iBiquity. iBiquity calls its technology HD Radio and it is currently being rolled out in the United States. For this reason, as well as its advanced state of deployment compared to its competitor DRM, this technology is being considered for deployment by broadcasters in Canada.

52. iBiquity's system is a hybrid system whereby the digital signal is placed "on the shoulders" of the AM or FM station's existing analog signal and both signals are transmitted together. During this dual operation, conventional radio receivers continue to pick up the analog signals while the new digital receivers incorporate both modes of reception. If the digital signal cannot be decoded or is lost, there are provisions to switch the receivers automatically back to the analog signal, if it is still available. When a sufficient base of new receivers is established, the analog signals will be discontinued. However, as discussed in the CBC's submission, the technology, particularly AM IBOC, suffers from a number of limitations arising from the need for simultaneous analog and digital operation within a relatively narrow bandwidth in an environment where frequency use is congested.

53. Because of these technical limitations, there are three key service elements to consider if a station implements IBOC in a particular market. First, digital IBOC signals will add a certain amount of noise to a station's analog signal, marginally reducing its effective service area. Second, the service area of both the main digital signal and whatever multicast signals are broadcast will be somewhat less than the service area of the corresponding analog signal. Third, IBOC signals can degrade the service areas of technically related stations located in the same or adjacent markets. The amount of the degradation will depend on a number of factors, including the frequency relationships, the relative location of the service areas and whether or not the second station has also adopted IBOC.

54. The first two limitations pertain to a station's own service. As such, it is the station's responsibility to evaluate them and to decide whether or not to proceed with the adoption of the IBOC technology. However, the third element pertains to the impact on the service areas of other stations in the same or adjacent markets.

Adopting IBOC technology in Canada

55. In light of the evidence presented in the course of this public proceeding, the Commission has concluded that, if the aforementioned issues can be addressed, particularly any potential interference to other stations, the use of IBOC technology, which enables the transition to digital without consuming additional spectrum and allows for the provision of supplementary program information and multicast services, could be considered for licensing.

56. Accordingly, if the Department authorizes IBOC technology for the AM and/or FM bands under the *Radiocommunication Act*, the Commission would be prepared to authorize services using this technology under the Act. An expedited process would be adoped for stations that propose to transmit a digital simulcast of their analog service.

57. The Commission will adopt a similar approach should the Department decide to instead adopt another technology, such as DRM, for in-band digital radio broadcasting.

DMB, DVB-H and other multimedia technologies

58. There was a general consensus that the Commission's new policy framework should encourage technical innovation. More specifically, parties suggested that the Commission consider permitting experiments and field trials using DVB-H or DMB technologies to deliver a mix of audio, video and related data services in the L-band.

59. However, concerns were expressed regarding the availability of sufficient spectrum resources. In this regard, the CAB suggested that the licensing of permanent services should await further proceedings that would identify suitable bands for such transmissions.

60. The Commission acknowledges the important role that broadcasters play in the development of new technologies and agrees that such technologies could deliver innovative programming in a variety of technical formats that could attract early adopters, provided that the spectrum capacity issues can be satisfactorily addressed and technical authorization is obtained from the Department.

Consultations

61. The Commission will convene a round table with Chief Executive Officers of the major radio groups in six months time to discuss the industry's proposed plan and implementation schedules for DRB and related issues.

Secretary General