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**Canadian Radio-television and
Telecommunications Commission**

**Call for comments – Commercial radio policy framework review
Broadcasting Notice of Consultation CRTC 2020-374**

Xperi Holding Corporation

March 29, 2021

INTERVENER'S BRIEF

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EXECUTIVE SUMMARY

- ES-1 HD Radio™ technology is the implementation of the NRSC-5 standard for digital broadcasting.
- ES-2 Xperi Holding Corporation, a worldwide technology company headquartered in San Jose, California with over 11,000 patents and patent applications in various technologies, is committed to the commercial success of digital sound broadcasting. Through partnerships in the broadcast industry and consumer electronics industry, the Xperi team has developed the strategy and methodology for successfully launching digital broadcast solutions and building a sustainable digital broadcast ecosystem utilizing the HD Radio technology.
- ES-3 Xperi supports the Commission's efforts to review the regulatory landscape for the commercial radio sector in light of the transformational changes in listeners' demands audio services.
- ES-4 The past 5-10 years have seen significant growth in the proliferation of on-demand streaming IP audio services. Nevertheless, conventional broadcast services are still occupying the main share of listening hours. The introduction of new IP-based services, which are mainly focused within the home or for listening devices within Wi-Fi range, are not highly deployed for a mobile environment, especially in the automotive space where radio listening mainly occurs via conventional AM/FM broadcast services or satellite services such as Sirius XM.
- ES-5 Analogue radio services are inherently limited in their ability to deliver the diverse listening experience Canadians have come to expect. A scarcity of spectrum, particularly in heavily populated, urban areas, makes it impossible for conventional radio stations to serve the needs and interest of all listeners. And with limits on the number of available program streams, it is particularly challenging for Canadian broadcasters to provide opportunities to new Canadian artists and to provide a balance of English- and French-language content.
- ES-6 At the same time, implementation of digital broadcasting in Canada has stagnated due to the uncertain regulatory landscape. When the CRTC considered the implementation of a digital broadcast standard in 2014, it determined that HD Radio technology should be implemented with an experimental status due to technical concerns. While those concerns have since been successfully addressed, the uncertainty that comes with HD Radio's experimental status remains.
- ES-7 Promoting and expanding the voluntary use of HD Radio broadcast technology should be at the forefront of the Commission's efforts to update the regulatory framework to address these challenges.
- ES-8 *For Canadian listeners*, HD Radio technology can expand the diversity of available programming by creating 2-3 additional audio services for each existing analogue service in a given market. With HD Radio technology, Canadians with analogue

receivers can still listen to existing analogue stations. But for Canadians with receivers that support HD Radio decoding (including more than 36% of new cars), the adoption of HD Radio services can expand available programming streams several times over. Additional benefits of HD Radio technology for Canadian consumers include access to enhanced digital services, including visual “jpeg” files and integration with existing or new IP-streaming services.

ES-9 *For Canadian artists*, the expansion in available programming streams will create more opportunities for broadcasters to support emerging artists and new genres of music that are not available today. The Commission can adopt licensing requirements for newly introduced digital programming streams to help encourage the promotion of Canadian artists. These artists will also benefit from the enhanced artist data that HD Radio technology supports, making it easier for listeners to identify the artists they are hearing on the radio.

ES-10 *Finally, for broadcasters*, the transition to HD Radio broadcasting will provide the opportunity to compete more effectively with existing and emerging IP-services. With HD Radio technology, broadcasters can operate the FM allotted bandwidth as a multiplex, where up to 3 additional licensed programs can be multicast along with the main analogue one. The move to HD Radio broadcasting will also allow broadcasters to apply for new spectrum licenses supported by their existing studio infrastructure and personnel.

ES-11 To support the expansion of HD Radio technology and the fulfilment of the Commission’s goals in this proceeding, Xperi makes the following recommendations:

Recommendation #1: *The CRTC should adapt its commercial radio regulatory framework by recognizing the NRSC-5 standard as a Canadian digital broadcasting standard for broadcasting licences. The regulatory framework should provide for a voluntary adoption of the NRSC-5 standard by broadcasters.*

Recommendation #2: *In order to foster a diversity of voices, the CRTC must consider the multiplexed approach for new digital services (for example, HD Radio digital stations HD2 to HD4). The licensing process of new digital stations should be defined by the CRTC through a specific consultation following the adoption of the NRSC-5 digital broadcasting standard.*

Recommendation #3: *Additional digital programs (for example, on HD Radio digital stations HD2 to HD4) not directly linked to the analogue FM program should be licenced as a multiplexed operation, where the operator may or may not have any affiliation with the licensee of the analogue FM program.*

Recommendation #4: *In order to provide broadcasters a predictable regulatory environment, we recommend that the CRTC advise ISED that the integration of BC-21 within BPR-3 is necessary for the purposes of fulfilling the objectives of the Canadian Broadcasting Policy. Protection ratios for HD Radio digital signals should be as those defined in the latest CRC report on this matter.*

Recommendation #5: *The CRTC should monitor the technical regulatory developments that ISED will undertake in the future in relation to HD Radio technology use by the AM radio service.*

Section 1 Introduction

1. Following the first radio transmission (music and voice) from the Canadian-born inventor Reginal Fessenden in 1906¹, radio broadcasting evolution was mainly marked by the introduction of the FM band in 1946² before entering in the digital era from the 1990s onward.³
2. The past 5-10 years have seen a growth of on-demand streaming IP audio services. Nevertheless, conventional AM and FM services are still occupying the main share of listening hours.⁴ The introduction of new IP-based services, which are mainly focused within the home or for listening devices within Wi-Fi⁵ range are not highly deployed for mobile environment, especially in the car space where radio listening mainly occurs via conventional AM, FM or satellite services such as Sirius XM.⁶
3. The growing demands of radio listeners for niche programs and a higher diversity of services cannot be accommodated in most major markets due to the broadcast spectrum being highly congested in urban areas. Therefore, most countries facing a similar situation as Canada are adopting or have adopted a digital broadcast strategy to allow for the deployment of new broadcasting audio services and to provide more diverse choices. Such strategies must include the adoption of new technical broadcasting standards.
4. Different digital radio broadcasting standards are used around the globe. Since the Canadian market is highly integrated with that of the United States ("U.S."), an obvious choice is to implement the same technical standard utilized by all digital radio broadcasters in the U.S., namely the National Radio Systems Committee's NRSC-5 In-band/On-channel ("IBOC") Digital Radio Broadcasting Standard.⁷ This standard was originally developed more than twenty years ago by iBiquity Digita, an Xperi company, and it has

¹ See IEEE, "Radio's First Voice... Canadian!", https://www.ieee.ca/millennium/radio/radio_birth.html (consulted on March 22, 2021).

² See Hammond Museum of Radio, "Some dates from Canadian Broadcasting", <http://www.hammondmuseumofradio.org/dates.html> (consulted on March 22, 2021).

³ *Infra* Section 2.

⁴ See Call for comments – *Commercial radio policy framework review* - Broadcasting Notice of Consultation CRTC 2020-374, 12 November 2020 - Public record: 1011-NOC2020-03742020-374 ("CRTC 2020-374"), Appendix, page ii, Figure 3.

⁵ "Wi-Fi is a family of wireless network protocols, based on the IEEE 802.11 family of standards, which are commonly used for local area networking of devices and Internet access, allowing nearby digital devices to exchange data by radio waves. *Wi-Fi* is [also] a trademark of the non-profit Wi-Fi Alliance, which restricts the use of the term Wi-Fi Certified to products that successfully complete interoperability certification testing." – source Wikipedia <https://en.wikipedia.org/wiki/Wi-Fi> (consulted on March 25 2021).

⁶ See most recent licensing decision from the CRTC: *Sirius Canada and XM Canada – Licence renewal and licence amendments*, Broadcasting Decision CRTC 2019-431, 19 December 2019 ("CRTC 2019-431").

⁷ See National Radio Systems Committee NRSC-5 Revision D "*In-band/on-channel Digital Radio Broadcasting Standard*" April 2017. FCC adopted the IBOC standard in the U.S. in 2002; NRSC finalized the first version NRSC-5 in 2005; Mexico adopted HD Radio™ IBOC in 2011. See also Federal Communications Commission, FCC docket 99-325, "*Digital Audio Broadcasting*", October 1999 and Comision Federal de Telecomunicaciones (COFETEL), *Diario Oficial*, 16 de Junio de 2011, June 16, 2011.

been continuously updated and improved upon since then.⁸ We refer to our technology implementing this digital radio broadcast standard as the HD Radio broadcast technology.

1.1 Overview of Characteristics of HD Radio Broadcast Technology

5. HD Radio broadcast technology is a digital data transmission platform that enables a variety of services and applications to enhance broadcasting of information and entertainment in local markets. The NRSC-5 standard is the basis for the HD Radio broadcast technology. The HD Radio technology implements the IBOC standard to enable digital broadcasting of the original analogue broadcast.
6. Xperi's IBOC HD Radio system further allows broadcast stations to provide HD Multicast services, that is the ability to transmit multiple audio programs on a single pre-existing frequency bandwidth.
7. The data portion of the NRSC-5 standard, including the transmission of text, images, and other data supports many additional services. Xperi utilizes the data portion of the NRSC-5 to support its HD Radio Program Service Data^{TM9} and Artist Experience^{TM10} services to enrich the audio program with text and images.
8. Xperi's HD Radio TrafficTM services provide real-time traffic updates to GPS navigation systems to enabled receivers. Xperi's HD Radio Emergency AlertsTM can alert enabled receivers and have the ability to interrupt programming and to provide both text and images to listeners.
9. The majority of car manufacturers support HD Radio technology in their vehicles today, implementing reception of HD Radio digital radio broadcasts and further improvements such as HD Radio Traffic,¹¹ and HD Radio Emergency Alerts.¹² Currently, at least 4.5 million cars on the road in Canada include HD Radio receivers, with more than 36% of new vehicles sold (33 auto brands, 112 models) come equipped with HD Radio technology.

⁸ In 2015, DTS Inc. acquired iBiquity Digital Corporation, the original developer and licensor of HD RadioTM technology. In 2016, Xperi acquired DTS Inc., which continues to operate as a wholly-owned subsidiary of Xperi. Xperi Holding Corporation, a worldwide technology company headquartered in San Jose, California with over 11,000 patents in various technologies, is committed to the commercial success of digital radio broadcasting. Through partnerships in the broadcast industry and consumer electronics industry, the Xperi team has developed the strategy and methodology for successfully launching digital broadcast solutions and building a sustainable digital broadcast ecosystem. Xperi's major technology holdings and brands include DTS® Audio, HD RadioTM, and TiVo. The HD RadioTM digital broadcast platform was originally developed by iBiquity Digital. iBiquity's core engineering teams and technology patents joined DTS, Inc. in 2015 and merged into Xperi Corporation in 2017.

⁹ See NRSC doc. 1085s rev D "*HD RadioTM Air Interface Design Description Program Service Data*", <https://www.nrcstandards.org/standards-and-guidelines/documents/archive/nrsc-5-c/1028sd.pdf> (consulted on March 22, 2021).

¹⁰ See NSRC, "*HD RadioTM Artist Experience Basics*", <https://www.nrcstandards.org/standards-and-guidelines/documents/references/hd-radio-artist-experience-basics-hd-radio-alliance-white-paper.pdf> (consulted March on 22, 2021).

¹¹ See videos: [HD Radio in Canada](#).

¹² This is compatible with the Canadian mandated alert system. See also Annex D.

XPERI'S BRIEF

10. Xperi's HD Radio broadcast technology has gained widespread adoption¹³ and is currently providing services to more than 400 million people¹⁴ in North America and in other markets.¹⁵ Xperi's digital HD Radio technology and its related products have attained the following milestones:
- Over 2,300 digital transmitters;¹⁶
 - Over 4,400 digital audio program channels;¹⁷
 - Digital public service applications (traffic alerts, weather alerts, emergency alerts);¹⁸
 - Over 75 Million receivers sold;¹⁹
 - Over 70 Million cars equipped with HD Radio receivers;²⁰
 - Over 4,500 unique product models certified, including home and portable, and receivers, and mobile phones.²¹
11. HD Radio broadcast technology is a success story for digital radio solutions in the AM and FM broadcast bands around the world.²² The HD Radio system has successfully met key criteria for digital conversion in North America (Canada included), such as:
- No interference to existing analogue broadcasts;
 - Existing analogue receivers will continue to receive the analogue broadcast from the hybrid HD Radio transmission;
 - Provides domestic regulatory agencies with solutions to address the increasing spectrum and allocation needs in FM spectrum congested areas;
 - Provides radio station owners with new business opportunities to realize a meaningful return on investments;
 - Provides listeners with a diversity of programs with no subscription fees attached;
 - Offers an anticipated forward compatibility and will remain relevant and efficient as new technologies emerge.

¹³ HD Radio™ is currently operating in the U.S., Mexico, Canada, Panama, the Dominican Republic and the Philippines.

¹⁴ 300 million of the 400 million people are in the U.S. The other 100 million are in Mexico, Canada, Panama, the Dominican Republic and the Philippines.

¹⁵ The standard has been adopted in the U.S. and Mexico; *supra* note 7.

¹⁶ Xperi collects this data through quarterly reports filed by its business partners in the manufacturing sector. Data provided here reflects those reports as of December 31, 2020.

¹⁷ *Ibid.*

¹⁸ See Annex D.

¹⁹ *Supra* note 14.

²⁰ The numbers are broken down between 70 million car receivers and 5 million consumer products radio receivers.

²¹ *Supra* note 16.

²² HD Radio™ is operating in the U.S., Canada, Mexico, Panama, Dominican Republic, the Philippines. See: *A targeted policy review of the commercial radio sector*, Broadcasting Regulatory Policy CRTC 2014-554, 28 October 2014 ("CRTC 2014-554") and *ISED Broadcasting database* https://sms-sgs.ic.gc.ca/eic/site/sms-sgs-prod.nsf/eng/h_00015.html; Federal Communications Commission, FCC docket 99-325, "Digital Audio Broadcasting", October 1999; Comision Federal de Telecomunicaciones (COFETEL), Diario Oficial, 16 de Junio de 2011, June 16, 2011; National Telecommunications Commission, Internal Memorandum, "Guidelines for the Operation of Digital FM Radio Broadcast", 11-11-2007; Ministerio de Gobierno y Justicia, Decreto Ejectuvio No. 96, "Que Adopta los Estandares Digitales para los Servicios de Radio y Television en la Republica de Panama", May, 2009.

1.2 HD Radio Broadcasting in Canada

12. HD Radio technology is already in operation in Canada. A large proportion of cars in Canada (more than 36% of new cars) already support HD Radio decoding. Digital radio broadcasting is, however, only operational on the “fringe” as the CRTC continues labelling it as “experimental”, despite the fact that HD Radio technology is a mature technology that has been in use for more than 20 years.
13. HD Radio broadcasting now needs to increase its reach in Canada for the benefit of listeners and broadcasters.
14. We believe that the recognition of the NRSC-5 standard²³— a tried and tested robust digital radio broadcasting solution fully compatible with Canada’s existing FM and AM radio broadcasting and frequency allocation systems – is critical to solving the congested-spectrum issues in urban markets which are currently hindering the increased deployment of diverse voices and the achievements of the objectives of the Canadian Broadcasting Policy.
15. This policy review undertaken by the Commission is the ideal opportunity to formally integrate this standard in Canada, as artists and creators are looking for readily available outlets for their content, and broadcasters are in need of new sources of revenues.
16. Our brief will demonstrate how HD Radio technology, adopted as a voluntary standard by broadcasters, can address many of the CRTC’s questions regarding the future of the Canadian Commercial Radio Policy.

²³ *Infra* note 7

Section 2 –Implementing the IBOC NRSC-5 Standard in Canada

17. The last time the CRTC considered the implementation of a digital broadcasting standard in Canada was at the end of 2013 when the Commission launched a targeted review of its 2006 commercial radio regulator policy²⁴. One of the six subjects addressed by the CRTC was the possible implementation of HD Radio technology in Canada and the need for a regulatory framework if it decided to adopt the NRSC-5 standard.
18. The CRTC acknowledged the outstanding technical issues raised by parties to the proceeding, including availability of receivers and the need to establish protection and interference criteria for this new service and then concluded by allowing HD Radio technology to be implemented in Canada with an experimental status:

52. Most interveners suggested that the Commission's approach be characterized by flexibility, voluntary transition to digital broadcasting, and provision for continued experimentation.

Commission's analysis and decisions

53. The Commission is of the view that it is too early to develop a policy for HD Radio technology given that it is still in its initial stages in Canada. The Commission will allow continued experimentation, voluntary participation in or transition to HD Radio technology, and will monitor developments and review its approach accordingly.

54. Licensees must inform the Commission in writing of any experimentation with HD Radio, or other digital radio technologies, that they undertake, including the type of service they provide.²⁵

[emphasis from the original text]

19. We can attest today that the concerns identified by the CRTC in 2014 have since been successfully addressed. Moreover, the IBOC technology optimizes the spectrum usage in the FM band.
20. Indeed, it appears that the work in which Industry Canada (now the Department of Innovation, Science and Economic Development) set out to do twelve years ago by issuing Broadcast Circular 21 for the "*Experimental Operation of In-Band On-Channel (IBOC) Digital Radio in the FM Broadcasting Band*"²⁶ is reaping its benefits.

²⁴ CRTC 2014-554.

²⁵ CRTC 2014-554, para. 52-54.

²⁶ See ISED, BC-21 – *Experimental Operation of In-Band On-Channel (IBOC) Digital Radio in the FM Broadcasting Band*, <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf09856.html> - Issue 2 - 2018 - Spectrum Management and Telecommunications Broadcasting Circular Experimental Operation of In -Band On-Channel (IBOC) Digital Radio in the FM Broadcasting Band – ISED BC-21 – 2018, (consulted on March 12th, 2021) ("BC-21").

XPERI'S BRIEF

21. Field studies were undertaken by Nautel, a Canadian equipment manufacturer.²⁷ In 2015, Nautel issued 2 reports: one was a study exploring new ways to increase the capacity of all digital HD Radio transmissions²⁸, the other was to assess the spectrum efficiency of IBOC in the FM broadcasting band.²⁹ In 2018, Nautel also reported on its field trials with U.S. radio station KKLZ (FM), Las Vegas, Nevada.³⁰
22. ISED has updated its Broadcasting Circular 21 (“BC-21”) in August 2018, following a request from the Radio Advisory Board of Canada’s (“RABC”) Broadcast Subcommittee for the issuance of formal distinctions and definitions between the different modes of operation available.
23. Shortly thereafter, the RABC requested that the Canadian Research Center (“CRC”)³¹ analyze the impact of the usage of IBOC signals on the quality of reception of analogue FM radio signals as well as the impact of IBOC signal transmission on IBOC signal reception quality.³²
24. The CRC’s 2019 report is the most important milestone to establish coordination criteria for the Canadian broadcasting system.³³
25. It demonstrates that most FM receivers (including receivers not meant to receive HD Radio) are performing well in the presence of HD Radio digital signals. The degradation of FM analogue reception is less than the maximum recommended by ISED’s Broadcast Procedures and Rules for FM Broadcasting, Part 3.³⁴ In other words, the presence HD Radio digital signals in the FM band will not degrade the reception of analogue signals on

²⁷ “Established in 1969, Nautel has over 50 years experience in creating highly innovative products, and has earned a reputation as a world leader in the design, manufacture, sales and support of high power, solid state RF products for radio broadcast, navigation, sonar, and industrial applications. More than 16,000 customers in 177 countries rely on Nautel’s RF solutions — systems that meet stringent quality standards at our ISO 9001 registered manufacturing facilities in Canada and U.S.A., and perform in harsh climates ranging from arctic, to desert, to jungle.” Extract from <https://www.nautel.com/about/company/> (consulted on March 28, 2021).

²⁸Nautel, *Interleaving IBOC Signals for a Digital HD Radio™ Multiplex*, https://www.nautel.com/content/user_files/2016/04/Interleaving-IBOC-signals-for-digital-hd-radio-multiplex-philipp-schmid-2015.pdf , (consulted on March 22, 2021).

²⁹ Nautel, *HD Multiplex – All Digital IBOC Today*, http://support.nautel.com/content/user_files/sites/2/2018/07/HD-Multiplex-NUG-2015-1.pdf , (consulted on March 22 2021).

³⁰Nautel, *All Digital HD Multiplex Field Trial at KKLZ, Las Vegas. Description: Testing of HD Radio™*, http://support.nautel.com/content/user_files/sites/2/2018/07/All-Digital-HD-Multiplex-Field-Trial-KKLZ-NUG2018.pdf , (consulted on March 22, 2021).

³¹ The CRC is “the federal government’s primary laboratory for research and development in wireless technologies. It is a client-driven, applied research centre providing technical advice and support to Innovation, Science and Economic Development Canada’s Spectrum and Telecommunications Sector, the Department of National Defence, Public Safety Canada and other government organizations. When these clients address key national priorities, they use CRC’s independent and impartial research to support their policy, regulatory and technical decisions. Along with supporting government, CRC collaborates with industry, universities, and other research institutes on common goals.” Extract from <https://www.ic.gc.ca/eic/site/069.nsf/eng/home>, (consulted on March 15, 2021).

³² Proposed test procedures where issued on Nov 23, 2017. See <https://www.rabc-cccr.ca/hd-radio/>.

³³ Communication Research Centre, *Compatibility Study – Analogue and HD Radio™ Broadcasting Systems in the 88 – 108 MHz Band*, - Sébastien Lafleche, Martin Quenneville, Adrian Florea, CRC ISED; Document # CRC Technical Report 031017-TR-01, February 2019, <https://www.rabc-cccr.ca/download/40/open-consultations/7552/compatibility-study-analog-and-hd-radio-broadcasting-systems-in-the-88-108-mhz-band-redacted-version.pdf>, (consulted on March 9, 2021), (“CRC Report – 2019”).

³⁴ See CRC Report – 2019, section 3.3, p.14. Degradation is measured in terms of audible demodulated signal to noise (S/N) ratio in relation to a specific RF desired signal to undesired signal (D/U) ratio.

- existing FM radio receivers and as such, the use of HD Radio transmission is fully compatible with existing spectrum regulations in Canada.³⁵
26. Since performance and potential interference are non-issues, it is our opinion that the single most important factor slowing down the deployment of HD Radio transmitters in Canada, along with its increased spectrum capacity, is the uncertainty of the status of the standard as it is still considered “experimental” by the Commission.³⁶
 27. For such operations, the CRTC provides a one-year temporary licence. ISED issues one-year broadcasting certifications. Both authorizations are obtained through administrative requests only.³⁷ So far these have been renewed almost automatically. But this does not qualify as regulatory certainty, a criterion that financial institutions often request of small corporations. While it has the capacity of providing enhanced choices of programs, it also represents an additional investment for broadcasters when compared to “just analogue” transmission.
 28. Independent commercial broadcasters³⁸, as well as community and campus radio stations³⁹ have often explained to us that this regulatory uncertainty is a major obstacle for them as they try to secure and justify the investment with only a 1-year experimental licence, which can ultimately be revoked unilaterally by the CRTC.
 29. And yet, some have nonetheless already started to take it on, hence demonstrating just how beneficial they assess HD Radio to be. For example:
 - First commercial (ethnic) HD Radio transmitter for CJSA-FM in Toronto started its operation in 2013.
 - First CBC HD Radio transmitter for CBF-FM in Montreal started its operation in 2017.
 - First community radio station CHAA-FM in Longueuil (QC) started its operation with HD Radio technology in June 2019.
 - First AM Hybrid HD Radio transmitter experimental use approval issued for CHLO AM in Brampton (ON), in 2020.
 - More than 8 HD Radio stations (not counting the additional digital services) operate in the Greater Toronto Area.
 30. As of today, no additional engineering tests are required to assess the impact of HD Radio on the existing FM broadcasting system. The transmission characteristics of IBOC are well known and well documented in Canada.
 31. The last time that the CRTC considered this possibility of accepting IBOC in Canada was in 2014⁴⁰. Seven years later, the technical reservations of the time have been addressed so much so that over 35 radio stations in Canada have approval from ISED to operate HD

³⁵ See CRC Report – 2019, Executive Summary

³⁶ See CRTC 2014-554, summary and para. 37-55; see also BC-21.

³⁷ See CRTC 2014-554, para. 53-54 and BC-21, section 2 – Purpose.

³⁸ The CRTC recognizes the five dominant radio broadcasters as: BCE, Rogers, Corus, Cogeco and Stingray. These five dominant players accounted for 63% of all radio broadcasting revenues in 2019: See CRTC, *Communications Monitoring Report*, 2020, p.79, <https://crtc.gc.ca/pubs/cm2020-en.pdf>, (consulted on March 25, 2020) . In this brief, “independent broadcasters” refers to any broadcasters other than on of this select group of five.

³⁹ Community and Campus broadcasters as defined by the CRTC in *Campus and Community Radio Policy*, Broadcasting Regulatory Policy CRTC 2010-499, 22 July 2010.

⁴⁰ See CRTC 2014-554, para. 34-54.

XPERI'S BRIEF

- Radio⁴¹. Now is the time for the CRTC to capitalize on the results of the work of the last fifteen years for the benefit of the Canadian broadcasting system.
32. Though the CRTC does not make the technical broadcasting rules for operating HD Radio, it can signal to ISED that it is ready to issue regular broadcasting licences for HD Radio, so that ISED may adopt formal broadcast procedures and rules for this purpose.
33. Should the CRTC decide to let the NRSC-5 standard be a choice for Canadian broadcasters, ISED already has all the information needed to issue a revised Broadcast Procedures and Rules Part 3 to incorporate the standard within its existing rules using the existing BC-21 Broadcast Circular.
34. Hence, Xperi recommends that:

Recommendation #1: *The CRTC should adapt its commercial radio regulatory framework by recognizing the NRSC-5 standard as a Canadian digital broadcasting standard for broadcasting licences. The regulatory framework should provide for a voluntary adoption of the NRSC-5 standard by broadcasters.*

⁴¹ Extracts from ISED broadcasting database show that 37 FM stations have received authorization to operate HD Radio™ in Canada and one AM stations is waiting for such authorization; https://sms-sgs.ic.gc.ca/eic/site/sms-sgs-prod.nsf/eng/h_00015.html (consulted on March 22 2021).

Section 3 –HD Radio technology: a way to meet the CRTC Policy’s revision’s goals

35. In the introduction of Broadcasting Notice of Consultation CRTC 2020-374, the Commission listed 3 main objectives of its policy review:
- *For Canadian listeners: Provide diverse, relevant and quality programming that serves their needs and interests;*
 - *For Canadian artists: Ensure that artists (music and spoken word) are best supported by broadcasters in a balanced manner for the creation, presentation and discoverability of Canadian content;*
 - *For broadcasters: Establish a flexible regulatory framework that enables both English- and French-language radio to remain competitive in the digital environment.*
36. In this section, Xperi will address each of the above topics and highlight how HD Radio can be of use for the Canadian broadcasting system to meet such objectives.

3.1 For Canadian Listeners

37. Some important findings from the report *Attitudes and opinions towards commercial radio in Canada* are summarized below:⁴²
- Commercial radio is still considered the most important broadcast platform to have access to music and local news content;⁴³
 - What Canadians appreciate the most of radio is that it is free of charge;⁴⁴
 - Francophones believe that commercial radio is too focused on popular music;⁴⁵
 - Canadians would like to hear less commercial ads on radio;⁴⁶
 - Diverse musical content, more local content and more timely news coverage are also mentioned as wanted improvement of radio programming;⁴⁷
 - Most Canadians feel it is important that the broadcasting industry continues to promote Canadian artists;⁴⁸
 - Most Canadians agree that streaming music services should be required to support the Canadian broadcasting system.⁴⁹
38. We conclude from the above that most Canadian listeners, including those from Generation Z,⁵⁰ support over-the-air radio broadcasting but at the same time fault it with a limited diversity of content (either more music genres, news or local content).

⁴² *Attitudes and opinions towards commercial radio in Canada* [Attitude Report].

⁴³ See Attitude Report, Figure 1, p. 13.

⁴⁴ See Attitude Report, Figure 6, p. 18.

⁴⁵ See Attitude Report, p. 33.

⁴⁶ See Attitude Report, Figure 7, p.19.

⁴⁷ See Attitude Report, Figure 7, p. 19

⁴⁸ See Attitude Report, p. 20.

⁴⁹ See Attitude Report, Figure 11, p. 23.

⁵⁰ Following its 2011 census, Stat Canada identified Generation Z as “people born since 1993”. See https://www12.statcan.gc.ca/census-recensement/2011/as-sa/98-311-x/98-311-x2011003_2-eng.cfm, (consulted 22 March 2021).

39. The current difficulty facing the demands of listeners is that the FM spectrum is highly congested in most markets in Canada. In these congested markets, any new FM radio station can then only be implemented at the cost of many technical compromises, resulting in a very limited potential coverage area. In turn, this limited coverage area cannot transform into sufficient revenues for a broadcaster. Hence, the current over-the-air broadcasting system in Canada cannot grow anymore in its analogue-only form.
40. Although some existing digital technologies can solve some of the issues, the usage of those streaming services always comes with a price over and above the one for the receiving/decoding apparatus: a monthly subscription to a streaming service, coupled with either a home Internet subscription or a more expensive wireless subscription are also necessary.
41. HD Radio technology can eliminate most of the above impediments and fill the demands of Canadian listeners as it:
- Leverages the existing analogue radio stations in digital HD Radio technology, by creating 2-3 additional audio services for each existing analogue service in any given market;
 - Converts analogue transmitters to digital HD Radio system at a much cheaper cost than creating brand new analogue radio stations. Many existing analogue stations using relatively new transmitters (less than ten (10) years of age) are usually ready-made to operate in HD Radio technology;
 - Offers a relatively low-cost transition, allowing for the insertion of new audio streams where up to 4 audio programs can share the operating and investment costs of a single transmitter;
 - Provides enhanced digital services, including commercial ads that can also be sent to the receivers as a visual "jpeg" file. This allows for fewer interruptions in the radio programs, while still creating a new source of revenues;
 - The new HD Radio streams can be tied in with existing or new IP-streaming services so that users can listen to them at home via IP streaming and be able to continue to receive them in the mobile environment of their cars.
42. In our opinion, HD Radio technology is currently the only foreseeable path available in Canada to address the issues that its broadcasting system is facing.

3.2 For Canadian Artists

43. The Attitudes Report indicates that 60% of Canadians support the content requirements for Canadian popular music and French-language vocal music.⁵¹ New HD Radio services can be licenced with requirements which support the development of Canadian artists, similar to current standard conditions of licence for analogue FM radio services.⁵²
44. In fact, it is possible to transform an existing FM station into an HD Radio multicast service application, where each newly created digital program, can be licenced to a broadcaster other than the operator of the main original analogue FM station. Each licensee, operating under conditions set by the Commission, would then increase the overall support to Canadian artists from the broadcasting system.
45. In our opinion, the creation of such new digital radio programs will benefit specific demographics and currently under-represented groups, including Indigenous and ethnic communities, as well as increase the coverage footprint and availability of community and campus broadcasters.
46. Due to spectrum scarcity, independently owned radio groups⁵³ are less present in major urban markets or are broadcasting from stations using lower power (such as classes A or B FM stations) which can limit their audience reach. And yet, some of those broadcasters often carry a high share of emerging artists and new genres of music. Additional spectrum capacity on FM class C multiplexes in urban areas would allow the CRTC to rebalance the dial with more diversity and thus provide more available airtime for artists representing different music genres and various ethnic communities.
47. Lastly, the digital capability of HD Radio technology permits the broadcasting of enriched and enhanced artist visibility, since an album cover and other information relating to the music or the artist can be displayed on the receiver, greatly increasing the artist's discoverability. Included below is an example of such upgraded display:

⁵¹ See Attitudes Report, Figure 10, p.23. More specifically, the report states: "Support is highest for Canadian content requirements for popular music (60% strongly/ somewhat support) and French-language music requirements among Francophones (60%), while closer to half of Canadians support special interest music rules (53%). Around one third (36%) of Francophones feel the percentage of French-language vocal music should increase, while a similar proportion of Canadians feel the percentage of special interest music (34%) or popular music (31%) should increase."

⁵² See Radio Regulations, 1986, SOR/86-982, s. 2.2.

⁵³ Refer to definition of independent broadcasters in note 40 above.



FIGURE 1



FIGURE 2

3.3 For Canadian Broadcasters

48. In its notice of consultation, the Commission states that it wants Canadian broadcasting, “to remain competitive in the digital environment”.⁵⁴ Xperi strongly believes that in order to remain competitive, the existing commercial analogue broadcasting system must migrate and that the best cost/benefit option for Canadian broadcasters is HD Radio technology. The move to HD Radio broadcasting will provide following improvement to their operations:

- Capacity to operate the FM allotted bandwidth as a multiplex, where up to 3 other licensed programs can be multicast along with the main analogue one. This will reduce operating costs per licensed program.
- Capacity to apply for new spectrum licences, supported by existing studio infrastructure and personnel helping to generate new revenues with limited additional investment.
- Capacity to integrate with ease program streams within other digital platforms, such as cars connected radio, as well as link programs with other digital platforms (iHeartMedia,inc.; Stingray, etc.). This multi-platform scenario protects existing revenues and enables additional ones from the digital platforms.

49. Here below is an example of additional digital advertisement:



FIGURE 3

50. For more details, we have provided answers to some specific questions from the Commission in section 6 which address how HD Radio broadcasting can fulfill the CRTC's Commercial radio objectives.

⁵⁴ See CRTC 2020-374, Summary.

Section 4 – Deployment of HD Radio Broadcast Technology in Canada

51. In the previous sections, Xperi demonstrated the benefit of operating HD Radio technology in Canada and how it can best address some of the Commission's key objectives in this proceeding. In this section, we will explore the foreseeable milestones to ensure a successful integration into the existing broadcasting system.
52. Xperi's first recommendation is that the Canadian regulatory bodies recognize the digital broadcasting NRSC-5 standard. HD Radio technology will then be available for all North American broadcasters. The adoption of the standard and technology should be on a voluntary basis.
53. The Commission would also need to develop a regulatory framework to extracts all the benefits it can get from the adoption of the digital broadcasting standard. In its 2014 decision, the CRTC had briefly considered the issue without make any decision since it stopped short from recognizing any digital broadcasting standard.
54. As such, the following is a summary of the parties' positions at the time:

Regulatory approach⁵⁵

49. Parties were divided about the need to develop a licensing framework for HD Radio technology. Those opposed to licensing requirements included iBiquity, ARRF, Bell Media, and the CAB. They considered that such a framework could stifle experimentation and hinder further deployment of HD Radio technology in Canada.
 50. However, cultural organizations, such as the Association québécoise de l'industrie du disque, du spectacle et de la vidéo (ADISQ), the Société professionnelle des auteurs et compositeurs du Québec (SPACQ), the Canadian Council of Music Industry Associations, and the Canadian Independent Music Association (CIMA) considered that a licensing framework should be put in place to ensure that additional programming provided by HD Radio technology includes local programming, French-language programming, and Canadian content, and makes provision for contributions to Canadian content development (CCD).
 51. Most opposed an approach to HD Radio technology similar to that which applies to Subsidiary Communication Multiplex Operation (SCMO) services.
-
55. While HD1 shall remain at the disposal of the licensee of the existing analogue FM station, the CRTC would then have the option to licence HD2, HD3 and HD4 to other broadcasters who would best achieve the objectives of the Broadcasting Act.⁵⁶ With such a scenario, the existing licensees could be offered the licence of their HD2 capacity if the proposed

⁵⁵ CRTC 2014-554.

⁵⁶ See Broadcasting Act, S.C. 1991, ch. 11, s. 3.

- usage meets the CRTC's policy objectives, in order to allow them to host additional licensees (HD3 and possibly HD4).
56. Multiplexed radio operations already exist and are regulated in Canada within the FM broadcasting band, through the Subsidiary Communications Multiplex Operation (SCMO).⁵⁷ To ensure consistency in the HD Radio multiplexed channel applications, the CRTC should define a standard frame agreement to address the relationships to come between the main FM analogue licensee and the new digital licensees.
 57. In insight, the existing regulatory model from the SCMO rules⁵⁸ appears to be the best suited almost readily available tool to put HD Radio technology at the service of the diversity of voices in spectrum congested markets. A similar regulatory framework for digital broadcasting with HD Radio technology would offer the flexibility that is so important to all broadcasters, without disrupting the existing digital broadcasting operating with the "experimental" status.
 58. All existing HD Radio technology test programs which are linked to a main analogue FM frequency of a single transmitter (through the same licensee operation) could be automatically permitted to continue this operation. Renewal of their HD1 program can then unsevered from the FM analogue main licence of the broadcaster.
 59. After coordination with ISED to update the technical standards under their jurisdiction, the CRTC would then be in the best position to call for applications in urban market to expand the offering of programs from underrepresented groups. This would then be possible with the newly optimized FM spectrum band and would, ahead of any legislative reform, fulfill one of the Broadcasting and Telecommunications Legislative Review report's recommendation:⁵⁹ [emphasis added]

Recommendation 53

We recommend that the policy objectives currently contained in section 3 of the Broadcasting Act be modernized to reflect the changing environment and be replaced by the following:

- Canadians should have access to trusted, accurate, and reliable sources of news reflecting national, regional, and local perspectives from diverse sources and across all platforms.
- Canadians should be able to find and access a wide range of media content choices, including Canadian choices, that are affordable and reflect a diversity of voices.
- Canadians should be able to access and consume media content safely and securely and be assured that their data and privacy are respected and protected.

⁵⁷ See *Services using the vertical blanking interval (television) or subsidiary communications multiplex operation (FM)*, Public Notice CRTC 1989-23, 23 March 1989 ("CRTC – SCMO")

⁵⁸ See CRTC - SCMO

⁵⁹ ISED, *Canada's Communications Future: Time to Act*, February 2020, [https://www.ic.gc.ca/eic/site/110.nsf/vwapi/btlr_eng-v3.pdf/\\$file/btlr_eng-v3.pdf](https://www.ic.gc.ca/eic/site/110.nsf/vwapi/btlr_eng-v3.pdf/$file/btlr_eng-v3.pdf), (consulted on March 12th 2021), "BTLR Report"), recommendation 53.

- Media content undertakings should have a responsibility for the media content they provide.
- The media communications sector should:
 - invest in the development, creation, and distribution of high-quality Canadian content that competes at home and abroad and reflects Canadian diversity, with each undertaking making maximum use of Canadian creative and other resources in the creation and presentation of media content, taking into account its circumstances;
 - ensure the creation of and access to content by and for Indigenous Peoples, including Indigenous languages content;
 - ensure the creation of and access to content by and for official language minority communities;
 - meet the needs of Canadians with disabilities and ensure creation of and access to content by and for Canadians with disabilities;
 - consist of Canadian-owned and -controlled companies alongside foreign companies; and
 - promote the development of a strong Canadian production sector, including a robust independent production community.

60. Therefore, in light of the foregoing, Xperi recommends that:

Recommendation #2: *In order to foster a diversity of voices, the CRTC must consider the multiplexed approach for new digital services (for example, HD Radio digital stations HD2 to HD4). The licensing process of new digital stations should be defined by the CRTC through a specific consultation following the adoption of the NRSC-5 digital broadcasting standard.*

Section 5 – Basics of HD Radio Technology

61. The following outlines the basic technical and performance characteristics of the HD Radio broadcasting systems designed as per Xperi's specifications and in line with NRSC-5 standard currently in effect.
62. The HD Radio system is designed to support digital radio broadcasting in the AM and FM broadcast bands while simultaneously maintaining a simulcast of existing analogue transmissions in a manner consistent with existing signal coordination rules of ISED's BPR-3.
63. The technology is referred to as In-Band, On-Channel (or IBOC), meaning that the digital carriers are inserted directly within the existing FM band on each side of the FM analogue carrier making it compatible with the existing FM analogue coordination rules. Such hybrid transmission (analogue and digital on the same channel) allows consumers to experience digital broadcasting within familiar, currently existing AM and FM channel assignments.

5.1 Multiplexed Operation for Multicast Programming

64. The additional digital transmission allows for augmented channel capacity, providing generally up to 4 multiplexed audio streams. The digital simulcast of the existing analogue broadcast becomes the HD1 channel. This HD1 digital stream is much more immune to multipath and other analogue system interferences than the analogue carrier, thus increasing its audible quality. HD2, HD3 and HD4 channels are new program channels available on the same frequency to those with HD Radio receivers. All HD Radio receivers may receive all analogue stations within their ranges, as well as all the digital streams associated with them.
65. The system also supports future all-digital transmission. It enables additional new FM digital only "multicast" sub-channels to be available to anyone with a digital receiver.
66. HD Radio technology can operate in different hybrid modes (analogue and digital transmission), the most common ones being:
 - MP1: allowing for 96 kbps of digital data (primary spectrum)
 - MP3: allowing for 124 kbps of digital data (extended spectrum)
 - MP11: allowing for 148 kbps of digital data (extended spectrum)
67. For MP1 operations, the digital carriers will be located at ± 129 kHz to 198 kHz from the central carrier, while the MP3 and MP11 can be located at ± 122 kHz, ± 115 kHz or ± 101 kHz from the central carrier, depending on the maximum bit rate required. The choice to be made is the result of a trade-off: locating the digital carrier closer to the main carrier may cause some older FM receivers to perceive and output some high-frequency noise, but it allows for the transmission of a higher bit rate.

68. The following shows the spectrum characteristics required, as it relates to the operating mode:⁶⁰

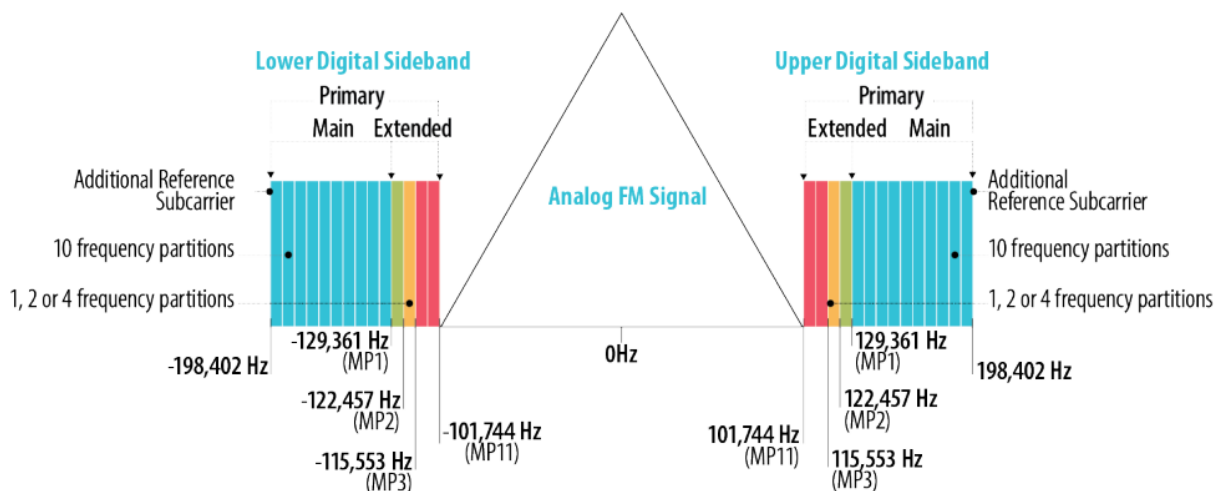


FIGURE 4

69. Looking to the future where the FM band may become “all-digital”, HD Radio broadcasting will be capable of operating in such a mode, as the total usable payload will become approximately 300 kbps. Although the full digital operation is the normal next step for HD Radio technology, Xperi considers that its operation should be revisited at a later stage. One important fact is that all receivers currently deployed are already compatible with the all-digital mode.
70. During perceptual tests conducted by the National Public Radio,⁶¹ it has been assessed that the audio quality of different musical styles required specific bit rates, depending on the program’s genre, to be considered as an imperceptibly degraded when compared with a non-digally compressed source. They are:
- Classical: 36 kbps
 - Jazz: 36 kbps
 - Rock: 48 kbps
 - Speech: 48 kbps

⁶⁰See BC-21, Figure A1.

⁶¹Tests conducted in the U.S. See NPR Laboratory, “Perceptual Tests of iBiquity’s HD Coder at Multiple Bit Rates”, Elynn G. Sheffield, PhD National Public Radio, 14 October 2004, <https://www.nrsstandards.org/committees/dr/ archive/non-nrsc-reports/nprmultiple-bit-rate-report.pdf>, (consulted on March 9th, 2021), (“NPR-Sheffield Report – 2004”), section 5.2.

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71. Based on the experience of commercial stations operating in the U.S. (typical is MP3 mode at 124 kbps) typical models of operation of HD Radio multiplex are as follows:
- Main channel HD1 at 48 kbps, HD2 at 48 kbps and HD3 at 24 kbps
 - Main channel HD1 at 32 kbps, HD2 at 32 kbps and HD3 at 32 kbps and HD4 at 24 kbps
72. Although most listeners can subjectively perceive the effects of the audio bandwidth limitation for a 24 kbps channel, the overall quality is always rated as much better than a typical AM radio service. Therefore, in such a scheme, the HD3 and HD4 channels are normally dedicated to programs broadcasting mainly news, sports, oldies, or any other type of mostly vocal content, rather than musical genres.
73. Considering that HD Radio services are a multiplexed system, and based on the field experience around the world, Xperi recommends that for the Canadian broadcasting system:

Recommendation #3: *Additional digital programs (for example, on HD Radio digital stations HD2 to HD4) not directly linked to the analogue FM program should be licenced as a multiplexed operation, where the operator may or may not have any affiliation with the licensee of the analogue FM program.*

5.2 Coverage Areas of HD Radio Technology

74. It is difficult to compare directly analogue FM to HD Radio technology because the analogue broadcast will still be perceived, although greatly degraded, much beyond its typical 0.5 mV/m protected contour, while the HD Radio service disappears once the receiver fails to decode it. But field tests have usually demonstrated that HD Radio digital carriers injected at -14 dBc will generally match the 0,5 mv/m protected contours of the analogue FM broadcast.
75. Xperi commissioned a study⁶² to estimate how many stations may operate in the FM band in Canada, with an injection level between -14 dBc and -10 dBc. The results are shown in Figure 5.⁶³

⁶² LS telcom, *Canadian HD-FM Study*, 24 April 2017, <https://www.rabc-cccr.ca/download/162/hd-radio/5359/canadian-fm-radio-study-for-dts-ls-telcom-170425.pdf>, ("LS telcom Report") (consulted on March 9th 2021).

⁶³ This is a visual presentation of the tabulated results from the LS telcom Report in its Appendix A.

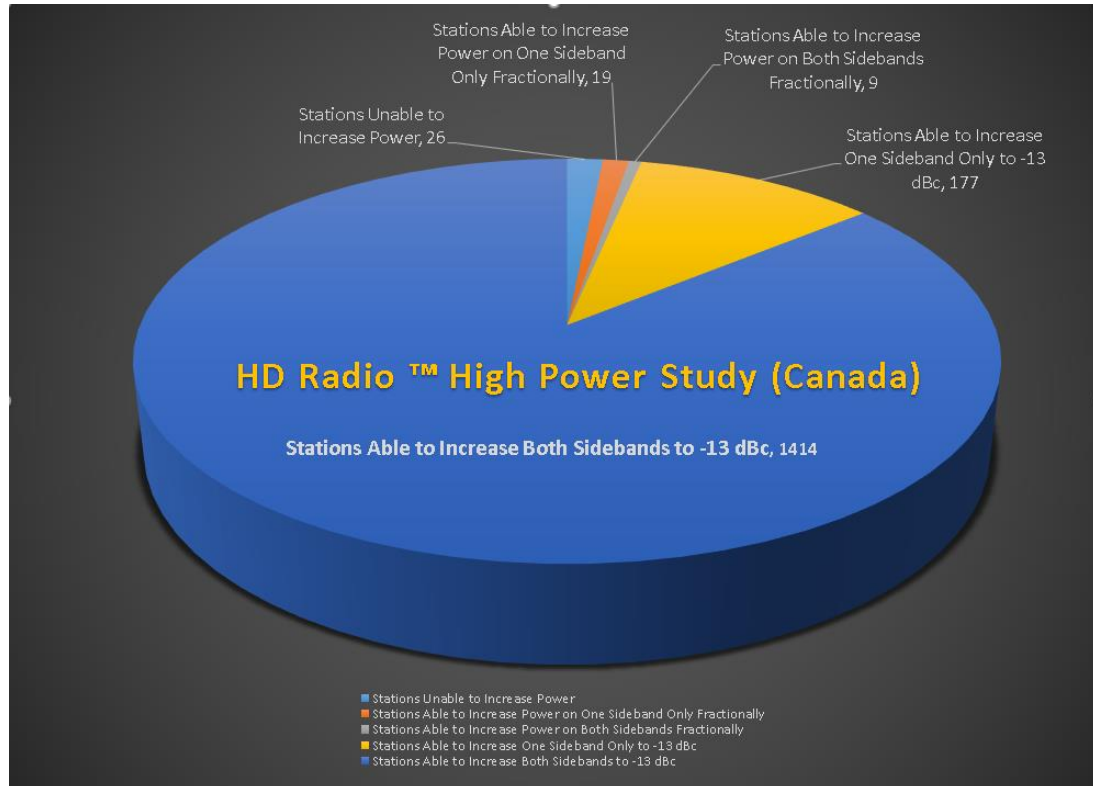


FIGURE 5

76. In Figure 5, we see that most stations existing Canadian stations (blue area) would be able to transmit IBOC signals on each sideband at -13 dBc, for a total of -10 dBc of insertion power. Out of 1645 existing stations⁶⁴ studied in 2017, only 26 would have been unable to increase the power of their HD Radio digital signals above -20 dBc (cyan zone in Figure 5).
77. In 2018, the Communications Research Centre (CRC) undertook an extensive study at the request of the RABC and the Canadian government (ISED) and reported on its results in February 2019. In its report “Compatibility Study – Analogue and HD Radio Broadcasting Systems in the 88 – 108 MHz Band”, it presented its important conclusions:⁶⁵
1. *The performance of modern analog FM equipment, both transmitters and receivers, consistently exceeds the minimum performance requirements as specified in BPR-3 and BETS-6. Please note that the current technical rules for analogue FM broadcasting are based on representative equipment performance from decades ago.*

⁶⁴ See LS telcom Report, Appendix A.

⁶⁵ See CRC Report – 2019, section 7.2, p. 43.

2. *As a result, the effective areas where the public can currently receive impairment-free FM broadcasting programming extend well beyond the stations protected contours as defined by BPR-3, with the exception of areas where these contours are determined by co-channel interference. Compared to the current protection ratios:*
 - a. *Robustness to co-channel interference has no additional margin;*
 - b. *Robustness to first adjacent interference has over 13 dB additional margin (average: 21 dB margin);*
 - c. *Robustness to second adjacent interference has more than 11 dB additional margin;*
3. *In addition, the improved equipment performance (in terms of better out-of-band emissions from transmitters, and better selectivity from receivers) has permitted operational FM broadcasting assignments on adjacent channels at distances closer than as recommended by BPR-3 (short-spaced assignments) without creating degradation in service.*
4. *Comparing the system performance when the interferer is an analogue FM only versus HD Radio, the only interference scenario that resulted in a difference in performance is first adjacent channel.*
 - a. *Enabling HD Radio transmissions at analogue FM stations will not create reception impairments within the protected contours for analogue FM stations operating on first adjacent channels, as long as the distance separation between these stations is as required by BPR-3 minimum separation distance.*
 - i. *Test results show a D/U 1 to 2 dB above the current protection ratio when the interferer is a hybrid FM in service mode MP3 at an injection level of -10 dBc. That difference is negligible and would not be perceptible in real life environment.*
 - b. *Even if the minimum separation distance is respected, a degradation in service could be noticeable by the listening public, mainly impacting areas outside the protected contours where currently good quality FM analogue reception is available. This impact could be difficult to estimate as analogue FM receivers are switching to monaural reception in areas with weak desired signal. The monaural reception of FM broadcasting is much less susceptible to interference compared with stereophonic reception.*
 - c. *Enabling HD Radio transmissions at analogue FM stations will create reception impairments, possibly significant, within the protected contours for analogue FM stations operating on first adjacent channels, if the distance separation between these stations is shorter than required by BPR-3 (short-spaced assignments).*
5. *Based on the HD Radio reception performance evaluation, it can be concluded that the HD Radio system, compared to the analogue carrier demodulation capability, has a smaller service coverage for the considered injection levels of -10 to -20 dBc*

but has no issue in the presence of strong interference. There is no need to adopt new or additional protection ratios to allow the introduction of hybrid FM transmissions. The protection ratios may have to be modified (likely relaxed) only when all FM stations have been converted to all digital mode.

78. The CRC has also recommended that a more relaxed protection ratio could be considered for the existing analogue 1st and 2nd adjacent co-existence, as well as for different HD Radio digital carrier injection level, as per the following table:⁶⁶

Protection ratios (dB) recommendations

Channel Relationship	Current Protection Ratio (dB)	Proposed Protection Ratio (dB)			
		Interferer is Analog FM	Interferer is Hybrid FM at different injection level		
			-10 dBc	-14 dBc	-20 dBc
Co-channel	20	20	20	20	20
First adjacent	6	-10	8	4	-1
Second adjacent	-26	-30	-30	-30	-30

79. In short, the CRC has already laid out the road map for the operation of HD Radio technology in the FM band in Canada.
80. In light of the study completed by the CRC, Xperi recommends that:

Recommendation #4: *In order to provide broadcasters a predictable regulatory environment, we recommend that the CRTC advises ISED that the integration of BC-21 within BPR-3 is necessary for the purposes of fulfilling the objectives of the Canadian Broadcasting Policy. Protection ratios for HD Radio digital signals should be as those defined in the latest CRC report⁶⁷ on this matter.*

5.3 AM HD Radio Broadcasting

81. So far, we have focused on the FM Broadcasting band only, but IBOC may also be operated within the AM band. It is currently the case in the U.S.
82. The AM hybrid operations can cause additional sky wave interference to 1st adjacent stations at nighttime, thus preventing its operation at higher injection levels without an additional degradation of the reception quality of the remaining AM analogue stations' signals.
83. In 2019, WWFD, an AM radio station operating in the Baltimore/Washington, DC area, made a successful transition to all digital mode, greatly increasing the audio quality of its broadcast and allowing it to compete directly with the existing FM stations in its area. Most

⁶⁶ CRC Report -- 2019, p.44.

⁶⁷ CRC Report -- 2019, p.44.

recently, WMGG (Tampa Bay, FL) has successfully transitioned to the all digital mode of operations.

84. We also note that the Canadian station CHLO AM in Brampton (ON) which is licenced to Dufferin Communications has recently requested to start experimental operations in AM HD Radio hybrid mode.⁶⁸
85. Regarding the AM band, Xperi recommends that:

Recommendation #5: *The CRTC should monitor the technical regulatory developments that ISED will undertake in the future in relation to HD Radio technology use by the AM radio service.*

⁶⁸ Information extracted from ISED's Broadcasting Database https://sms-sgs.ic.gc.ca/eic/site/sms-sgs-prod.nsf/eng/h_00015.html (consulted on March 22 2021).

Section 6 – Specific Responses to some of the Notice of Consultation Questions

86. Q1 In light of the new trends in music production:

- Is the current definition of a Canadian music selection adequate in the digital era? If not, how would you amend it or what would you replace it with?
- Do the four conditions of the MAPL system remain appropriate to contribute to the discoverability and promotion of performers, lyricists and composers by Canadian audiences? If not, how should they be modified?

R1: Broadcast technologies like Xperi's HD Radio system and DTS AutoStage™ Platform, enhance the discoverability of Canadian artists by including artist images along with the title and performer names. Metadata fields, including performers, lyricists, composers as well as lyrics may be displayed to enhance notoriety and aide promotion.

87. Q2 Does the broadcasting and music industry allow for an effective traceability of Canadian performers, lyricists and composers? Explain how the industry allows for (or does not allow for) effective traceability and how traceability could be enhanced, if applicable.

R2: Digital radio and hybrid radio technologies have sufficient metadata to enable automated airplay monitoring by market, much in the same way commercial content affidavits are generated by independent entities like Media Monitors.

88. Q3 Does the broadcasting and music industry promote the discoverability of performers, lyricists and composers by Canadian audiences? Explain how the system promotes (or does not promote) discoverability and how discoverability could be enhanced, if applicable.

R:3 Broadcast has always had a symbiotic relationship with the music industry. Promotion and airplay are the means by which radio has remained dominant for music discovery and engagement. By increasing the number of audio services available in the existing broadcasting spectrum, the HD Radio technology can greatly help for the promotion of emerging Canadian artists by allowing the creation of digital specialty channels.

89. Q9 Given the challenges of categorizing musical selections and the strong competition that specialty music stations face, the Commission is questioning the need to maintain music categories and is wondering what the impact of eliminating musical genres would be on musical diversity in the market. Since music categories apply to all broadcasters (campus and community stations, Indigenous stations, ethnic stations, specialized radio stations (Christian music), and CBC/SRC public radio stations), the Commission is asking broadcasters for input on this particular issue.

1. If music genres (content categories 2 and 3) were eliminated, what would be the impact on musical diversity and the regulatory burden of commercial radio stations?
2. Should certain musical genres be protected to ensure that particular content types remain available for defined markets and audiences (e.g., classical music or sport)? If so, specify the types of content, the markets and the reasons that would justify this protection.

3. If the Commission were to eliminate music genres and impose a single Canadian content and FVM quota on commercial radio stations, what would be the appropriate thresholds for the broadcast week and peak listening hours?
4. Music categories and subcategories are also used by non-commercial stations, namely campus and community, Indigenous, ethnic, and CBC/SRC public radio stations, notably to calculate Canadian content. What would be the impact of eliminating music genres on these stations?

R:9 Xperi's Tivo™ Metadata can aid predictive analytics for music discovery and recommendations.

90. Q12 What other measures, regulatory or non-regulatory, might the Commission consider to encourage the discovery and broadcast of new music formats?

R:12 HD Radio multicasting (supplemental program HD2, HD3 and HD4) increases the diversity of musical genres available to the consumer as well as the diversity of voices.

91. Q15 In your opinion, how can commercial radio contribute more or differently to the support and discovery of emerging Canadian artists?

R:15 Commercial radio can employ the advances of digital radio to support retention and recall when visuals are paired with audio. Artist images on the receiver aid performer recognition. Other features such as Xperi's Connected Radio brand DTS AutoStage Platform also allows for a cross platform exchanges of metadata to allow an easy finding on their web site a music purchase sites of artists that are being aired on the HD Radio service.

92. Q19 What mechanisms should be put in place to ensure that broadcasters do more to promote emerging artists and foster musical diversity? On which platform(s) should these mechanisms be implemented (e.g., over-the-air broadcasts, the station's website or social media)? How could these mechanisms be measured by the Commission for monitoring purposes?

R: 19 Artist images, lyrics, performers, and performance venue can be added to over-the-air HD Radio services today. DTS AutoStage Platform will enable enhancements to this content by hyperlinking to local events and concert opportunities.

93. Q24 What other innovative measures within the Commission's jurisdiction should be considered to help the commercial radio sector better support Canadian English- and French-language artists, to better meet the needs and interests of their listeners and reflect their culture, particularly with respect to linguistic duality?

R:24 HD Radio multicast channels would enable both new English and French-language content without requiring additional analogue FM station allocations.

94. Q32 Is the spoken word content on commercial radio stations, particularly news bulletins, relevant and of high quality? Does it properly address the communities served? Does it adequately reflect local culture? If not, what measures could the Commission implement to ensure that spoken word content fully meets the needs and interests of the communities served?

R:32 HD Radio multicast channels would enable every broadcaster to have the ability to offer a diversity of voices on their assigned frequency. Voice or news channels usually require less capacity (bit rate) than music channels, which allows the system to include a higher number of them within the HD Radio multiplex.

95. Q48 Should specific new measures (such as exemptions and consolidation criteria) be implemented to facilitate the strategic deployment and financial health of independent undertakings given the fierce competition from large vertically integrated or national players and online audio services? If so, which ones?

R:48 Hybrid Radio would enable every broadcaster to compete in on-line music services linked to their over-the-air broadcast via DTS AutoStage Platform, Connected Car or other technologies.

As per our Recommendation #3: *Additional digital programs (for example, on HD Radio digital stations HD2 to HD4) not directly linked to the analogue FM program should be licenced as a multiplexed operation, where the operator may or may not have any affiliation with the licensee of the analogue FM program.*

This strategy allows independent broadcasters to have access to improved station coverage than typically available in the major market.

96. Q49 Are the guidelines regarding contour overlapping, which are used to determine the number of stations that can be operated by an entity in a particular language and on a particular frequency band, still appropriate and relevant?

R:49 Technology can level the playing field. Each digital broadcast could offer a diversity of voices in each market. Additionally, the usage of Single Frequency Network (SFN) repeaters in HD Radio technology will allow for an extension of the primary coverage area for digital stations (regardless of the power level of the analogue carrier frequency). Hence, the different coverage contours will not be limited to a single transmitter station anymore, but rather be similar to a regional market.

97. Q50 Should the Commission go beyond the definition of market stipulated in the Regulations as well as contour overlapping in determining the maximum number of stations a single entity is permitted to operate in a given market? If so, what other criteria should be considered?

R:50 Provided that HD Radio technology has the capability of quadrupling the number of available stations in a given market, we suggest that the Commission reassesses the market definition to permit an increased number of digital stations for existing broadcasters, as well as to maintain enough capacity in the digital multiplexes to increase the share of newcomers or currently underrepresented groups such as: Indigenous People, official language minority communities, ethnic groups and community and campus broadcasters. This will translate in the offering of a higher diversity of voices.

98. Q51 Given that there are fewer AM listeners and the number of stations on this band is declining, is it still relevant to limit the number of stations in a particular language that a single entity can hold on the AM band in a market?

R:51 Although AM transmitter operations will remain generally more expensive than FM operations considering an equivalent coverage area, Digital AM may stem the erosion of AM listenership by providing a quality similar to actual FM. The large coverage of AM airwaves could be of benefit for news, traffic or other talk services for large areas.

99. Q52 Would you be concerned if the Common Ownership Policy allowed licensees to convert their AM stations to the FM band when they have maximized the number of FM stations in a particular language allowed in a market where they also operate AM stations in that language? If so, what would your concerns be?

R:52 A concern would be the continued erosion of AM listenership. This would create additional hardships for AM owners as some auto brands are looking into excluding the AM band from their product line.

100. Q54 Diversity of programming and editorial voices are essential components of the Canadian communications industry. Notably, they disseminate Canadian culture and support Canadians' participation in democracy. In light of the above, what would be the advantages for the financial health of Canada's commercial radio industry if a single entity was allowed to operate more than two FM stations in a particular language in a given market? Would this invariably undermine the diversity of programming and editorial voices? If a diversity of voices occurs only in the presence of an independent or local player, how can their presence in markets be ensured?

R:54 Provided that HD Radio technology has the capability of quadrupling the number of available broadcast programs in a given market, we believe that digital multicast channels will increase the diversity of programming and editorial voices within each market.

The Commission should reassess the market definition to allow an increased number of digital stations for existing broadcasters, as well as to maintain enough capacity in the digital multiplexes in order to improve the share of the airwaves occupied by newcomers or currently underrepresented groups such as: Indigenous People, official language minority communities, ethnic groups and community and campus broadcasters. This will increase the offering of a diversity of voices.

Regarding market advertisement capacity, broadcasters are already facing an erosion of their revenues in favour of specialty music streaming sites. By creating their own new speciality streams with the HD Radio digital over-the-air programs, we believe broadcasters will recover part of those revenues and will see advertisers increase their expenditures with over-the-air broadcasters to achieve a broader reach of their ads.

ACRONYMS

Acronym	Full description
BC	Broadcast Circular
BPR	Broadcast Procedures and Rules
CAB	Canadian Association of Broadcasters
CBC	Canadian Broadcasting Corporation
CRC	Communication Research Center Canada
CRTC	Canadian Radio-television and Telecommunications Commission
D/U	Desired to Undesired signal ratio
dB	decibel
dBc	decibel relative to the carrier
hz	hertz
IBOC	In-Band On-Channel
ISED	Innovation, Science and Economic Development Canada
kbps	Kilo bits per second
NRSC	National Radio Standard Committee
RABC	Radio Advisory Board of Canada
S/N	Signal to Noise ratio

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ANNEX D

HD Radio™ System Functionalities