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North American Broadcasters Association (NABA)

FOR INFORMATION

A VOLUNTARY NORTH AMERICAN DIGITAL RADIO STANDARD

The North American Broadcasters Association¹, (NABA, www.nabanet.com) is an association of broadcasters within ITU-R Region 2 countries Canada, Mexico and the United States.

NABA is a Sector Member of ITU-R and a long-time participant in ITU-R Study Groups, Working Parties, Task Groups, Rapporteur Groups, etc. NABA numbers among its members Chairmen, Vice-Chairmen and members of the above groups. NABA also participates widely in the ITU work on radio, television and multimedia services.

The purpose of this document is to provide information to Study Group 6 and Working Party 6A, and visibility for NABA's advocacy for the development of a voluntary North American digital radio standard, harmonizing regulatory and technical elements in Canada, Mexico and the United States of America. This would encourage the rapid adoption of the technology and enhanced digital services, which will benefit the consumer and all industry stakeholders.

This document was developed by the NABA Radio Committee in the Digital Radio Working Group, and focuses on the In-Band, On-Channel (IBOC) HD Radio™ technology developed by DTS Inc. (formerly iBiquity Digital Corporation) in North America. The technology has been approved for use in the United States by the Federal Communications Commission (FCC) and in Mexico by the Federal Institute of Telecommunications (IFT). Experimental authority has been granted for HD Radio transmission in Canada by the Canadian Radio-television and Telecommunications Commission (CRTC). It is logical to consider the harmonization of regulation and voluntary standardization of HD Radio across all of North America to maximize the potential economic, regulatory and service quality benefits across all borders. Attached please find the document as "Appendix 1."

¹ NABA members include: Ad-ID LLC; Bell Media; CBC/Radio-Canada; CBS Broadcasting, Inc.; Corus Entertainment; Dejero Labs Inc.; DIRECTV, Inc.; Disney/ABC Television Group; Dolby Laboratories, Inc.; Emmis Communications; Eutelsat America Corp.; Fox Entertainment Group, Inc.; Globecast; Grupo Televisa S.A.; Harmonic Inc.; HERE Technologies; Imagine Communications; Inmarsat; Intelsat; National Association of Broadcasters (NAB); Nautel; NBCUniversal; NPR; Panasonic; Pearl TV; Public Broadcasting Service (PBS); SES; Sinclair Broadcast Group (SBG); TimeWarner, Inc.; Turner; TV Azteca S.A. de C.V.; Univision Communications Inc.; and Xperi (DTS Inc.)

APPENDIX 1

Position paper - A voluntary North American digital radio standard

Objective

The purpose of this document is to advocate for the development of a voluntary North American digital radio standard, harmonizing regulatory and technical elements in Canada, Mexico and the United States of America. This would encourage the rapid adoption of the technology and enhanced digital services, which will benefit the consumer and all industry stakeholders.

This document was developed by the NABA Radio Committee in the Digital Radio Working Group, and focuses on the In-Band, On-Channel (IBOC) HD Radio™ technology developed by DTS Inc. (formerly iBiquity Digital Corporation) in North America. The technology has been approved for use in the United States by the Federal Communications Commission (FCC) and in Mexico by the Federal Institute of Telecommunications (IFT). Experimental authority has been granted for HD Radio transmission in Canada by the Canadian Radio-television and Telecommunications Commission (CRTC). It is logical to consider the harmonization of regulation and voluntary standardization of HD Radio across all of North America to maximize the potential economic, regulatory and service quality benefits across all borders.

The analysis and recommendation for a voluntary HD Radio IBOC standard is based on present spectrum availability within North America. AM and FM HD Radio broadcasting allow for the voluntary migration and evolution to digital broadcasting without requiring additional spectrum. This document includes information to support discussion and co-operation between policy makers and regulatory entities across the North American continent.

Executive summary

The development of a voluntary digital radio broadcast standard in North America will greatly benefit listeners by providing for new and enhanced broadcasting services that are accessible across the entire continent. Having a continental digital radio market will assist broadcasters in planning and creating a unified set of program and data services compatible across the majority of OEM automotive receivers, arguably the most impactful and relevant platform for radio listening. The standardization of digital radio services simplifies content creation toolsets for data and program service vendors, reducing cost and complexity of development and system testing. These actions all help realize the rapid adoption of digital radio.

1 The consumer benefit

As with other consumer electronics (CE) digital upgrades, the HD Radio system provides consumers substantial advantages over legacy analogue technology. CE digital transitions have historically given consumers better quality, greater choice and more services, and interactivity; benefits that are all realized by the HD Radio system.

HD Radio technology improves audio quality: consumers receive sound quality equal to or better than (depending upon bit rate) analogue FM. The potential for CD-like sound quality for over the air services is possible. HD Radio signals are much less prone to interference than existing analogue signals as well, leading to cleaner audio.

HD Radio technology increases choice: through the multicasting capability, digital FM broadcasters are able to offer multiple audio channels over a single FM frequency. The new audio channels, known as HD2, HD3, etc., offer consumers new, diverse, targeted content. Multicasting has led to an explosion of programming creativity, with formats such as dance, garage band, gospel,

bluegrass, jazz, comedy and indie rock. A greater selection of audio choices has expanded listener appetites for new music. These new audio sources are often referred to as “infinite shelf space” and radio needs these additional channels to meet a more diverse consumer taste in music.

The opportunity for additional public service programming exists, including emergency alerting and programming, minority language programming, and community services and information. The opportunity to better serve the listener is all enhanced by digital radio.

The HD Radio system provides new services and interactivity: by using Program Service Data (PSD), stations can display text information such as artist, song title, station call letters or other real-time information like stock quotes and sports scores on the radio’s screen. Market research suggests that program-associated information is an important feature for customer satisfaction. Industry-leading companies are implementing systems to deliver real-time and on-demand traffic data to consumers using HD Radio technology. Working with CE manufacturers, music tagging for HD Radio technology is supported, enabling consumers to purchase music they hear on the radio through on-line music stores. Support for displaying station logos and cover art images is available through the HD Radio feature known as “Artist Experience.” Through Artist Experience, the listener is presented with an image-rich visual enhancement to their listening experience. Commercial announcements may also be enhanced with client logos and product images.

Emergency Alerts may be enhanced by HD Radio technology’s ability to provide images and text content in addition to the traditional audio information contained in the alerts. Digital receivers, even while in a standby mode, are able to receive HD Radio Emergency Alert messages and turn on during the announcement. This feature significantly increases the effectiveness of emergency alerts.

Other advanced services in the early stages of implementation include an electronic program guide and store-and-replay functionality. For consumers, digital radio standardization would make possible a uniform product offering (that product being digital audio and data services conveyed by HD Radio transmission), enhancing the user experience with familiar graphical user interface (GUI) displays tailored to the services offered by a common digital radio platform.

Finally, since activation of HD Radio does not alter radio station dial positions (frequencies), there is little or no change in well-established consumer behavior. Consumers purchasing HD Radio receivers will simply tune to their favorite programs and stations and enjoy the digital upgrades in quality, choice and services automatically as stations transition from analogue to digital.

2 The broadcaster benefit

The HD Radio system facilitates a smooth upgrade to digital broadcasting by using existing infrastructure and minimizing implementation costs, providing a means for broadcasters to compete effectively against new digital media and thereby grow the broadcast industry. Broadcasters’ existing studios, towers and antenna equipment are maintained under the HD Radio system. Each station will require a new digital exciter to provide basic HD Radio services and a digital service multiplexer, known as the Importer, to enable multicasting and other advanced services. The overall upgrade costs for a station range from USD \$23,000 to \$195,000, depending on its existing infrastructure, with an average around USD \$100,000. Stations will be able to preserve their current consumer base and retain all brand equity associated with their dial positions, typically developed at great expense over long periods of time. HD Radio technology has the potential to provide broadcasters new revenue through multicasting, advanced data services and other new applications.

New business models enabled by HD Radio technology include expanding current offerings, such as additional programming streams through multicasting, as well as the addition of news services, wireless data, and other advanced digital applications, which are becoming widespread in North

America. A radio station's revenue potential is increased by allowing broadcasters to better target listening audiences and offer niche services. And, the HD Radio system provides radio broadcasters with the most economical means of transmitting wireless data services to mobile platforms such as GPS and portable entertainment devices and smart phones. Hundreds of millions of units of these products are sold each year. Having access to mobile platforms is key to growing the broadcasting industry marketplace. Using the HD Radio system, radio broadcasters have the potential to compete in this market with sufficient bandwidth and a low cost, high quality digital data pipe.

Widespread inclusion of analogue FM receivers as an application feature on mobile phones and digital media players is paving the way for future adoption of HD Radio technology on these devices. Several media players have already incorporated analogue FM tuners, and a significant percentage of smart phones sold into the US, Mexico and European markets include analogue FM tuners (and inclusion of HD Radio capabilities would involve only a minor upgrade to the existing analogue receivers).

3 The benefit to manufacturers and retailers

Manufacturers and retailers have a strong interest in upgrading radio technology from analogue to digital. A uniform digital radio standard across North America would incentivize manufacturers that have benefited tremendously from previous digital product upgrades, and the broad base of manufacturers building various HD Radio products will capture that same opportunity in radio's digital transition.

The basic existing analogue radio technology, which has been stable for many years, offers limited opportunity to add new features, and thus limits growth of device sales. The HD Radio system provides manufacturers with an opportunity to upgrade a very large product category. The large installed base of analogue radio equipment is being replaced over time, and new audio products, even whole new product categories, are being developed with increased functionality and potentially higher profit margins. For high growth wireless devices like mobile phones, media players, personal navigation systems, telematics systems and converged versions of these consumer electronics products, HD Radio technology offers the potential to increase device functionality by adding digital radio to these devices with the potential benefit of delivering wireless data and audio services. For automotive OEM and Tier 1 suppliers (any supplier of automotive components to an auto brand), a uniform North American product offering means reduced receiver head unit model inventory, and the ability to conduct more thorough testing of a reduced subset of receivers, resulting in better performance and lower costs.

4 Benefit to regulatory agencies

Allocation of new spectrum for digital radio is not required as the HD Radio IBOC signal is carried within the same frequencies that broadcasters currently utilize. As a result of these and other factors, in a first Report and Order in October 2002, the FCC selected the HD Radio IBOC system as the sole technology AM and FM radio broadcasters will use to upgrade to digital in the United States. In March 2007, in a Second Report and Order, the FCC adopted service rules and other requirements for terrestrial digital radio. Subsequent regulatory actions by the FCC since then have implemented incremental improvements and modifications to operational parameters such as allowing increased transmit power in the digital sidebands of HD Radio signals.

In Mexico, HD Radio technology was adopted officially by the CoFeTel (now IFT) on June 16, 2011. Since the formal adoption, more than 70 radio stations have upgraded to HD Radio technology and offer over 115 Digital Programs. HD Radio technology has a presence in 4 of the top 10 Mexican markets with 33% national population coverage. The technology may be found in 15 OEM automotive brands in Mexico across 50 models.

In Canada, the CRTC released a targeted policy review of the commercial radio sector (Broadcasting Regulatory Policy CRTC 2014-554) on October 28th, 2014. Included in this review was a flexible approach for introducing HD Radio technology in Canada, designed to allow for innovation and experimentation. Licencees are required to apply to Innovation, Science and Economic Development Canada (ISED) for experimental authorization and inform the CRTC in writing of any experimentation with HD Radio (or other digital radio technologies) that they undertake, including the type of service they intend to provide.

Presently, twelve radio stations are on-air with HD Radio in Canada across seven markets: Toronto, Hamilton, Vancouver, Markham, Montreal, Ottawa and Calgary. While limited, this represents a significant increase within a twelve month period.

Adoption of HD Radio in Canada has a number of issues that need to be addressed during this experimental period. ISED deals with spectrum and technical issues in Canada, and has yet to provide broadcasters with a consistent technical framework or provisional technical rules to allow widespread deployment. Operating parameters are authorized on a case by case basis and only the stations directly involved have knowledge of those parameters. A database is currently not available to permit stations to gain knowledge from prior experience.

An opportunity to develop consistent technical rules and share the experience gained may encourage innovation and experimentation on a broader scale.

ISED has acknowledged the need for an engineering study, which could then be shared with the CRTC and the Radio Advisory Board of Canada (RABC), to gain an understanding of the adjacent channel impacts of HD Radio technology on existing radio stations. Understanding the impact of HD Radio technology on the existing broadcast infrastructure in Canada and a simple and supportive licensing regime would give Canadian broadcasters the confidence that a transition is both possible and desirable.

Implementation of HD Radio requires radio stations to pay licensing fees to the patent holder to use the technology. While main station (HD1) licence fees have been waived during experimentation for broadcasters who implement the technology ahead of formal adoption, a uniform licensing policy is expected following formal adoption. The certainty and stability of future licence fees are a factor in employing the technology. The affordability and flexibility of fees will contribute to further deployment.

Market information

Broadcast radio continues to play a critical role in everyday life throughout North America. Radio's role is so pervasive that it is often taken for granted. Radio remains a primary source of information and entertainment for the majority of the residents of North America, providing music, news, weather, traffic and information. Consumers are able to receive these program services virtually everywhere free of charge. Radio is ubiquitous. Audiences wake up and go to sleep listening to radio. People listen to radio in the home, while driving, at work, exercising, while walking down the street, on the beach, in the park, and while shopping.

The radio receiver remains one of the most ubiquitous devices in our lives. It is estimated that there are over 575 million radio receivers in use today in the United States. Over 92% of all people over the age of 12 listen to the radio each week. As of June 2016, there were more than 15,330 licensed radio stations in the United States. The average U.S. consumer listens to AM or FM radio more than 22 hours per week².

² <http://www.nielsen.com/content/dam/corporate/us/en/reports-downloads/2017-reports/q4-2016-comparable-metrics-report.pdf>

Canada has more than 1,250 radio stations. In 2016, Numeris reports that nearly 90% of Canadian consumers, 12 years or older, tune in weekly spending almost 18 hours of their media time with radio³.

In Mexico there are more than 1,300 radio stations. PwC Mexico reports that more than 7 out of 10 Mexican consumers listen to radio and on average spend 18% of their day doing so⁴.

There are fundamental aspects of radio broadcasting that define the service. Radio broadcasts are traditionally free; the consumer does not need a subscription and is not charged a fee. As a result, radio's penetration is unrivalled by other services. Radio is inherently local because of the nature of radio coverage. In turn, radio provides one of the best sources of local information and, to a large extent, reflects the tastes, values and interests of the local community each station serves. Although individual radio broadcasts are inherently local, radio broadcast availability is nearly universal. Anyone driving from coast to coast expects to be able to receive radio broadcasts, using the same receiver, throughout the country and indeed throughout North America.

Another important aspect of radio is the relatively low cost of receivers. Although audiophiles can spend considerable sums on a high-end receiver, radio can also serve the listener with a basic portable receiver or clock radio. In addition, radio's role in society goes beyond entertainment. HD Radio receivers available today are capable of functioning in an all-digital mode, an advanced service mode (not currently authorized) in which the analogue carrier is eliminated, allowing for higher-power digital signals that can provide even greater coverage. As such these receivers are already "seeding" the future for radio, ensuring its place in the digital world.

Radio provides a critical public service as a central part of the Emergency Alert System (EAS) in the U.S. and with similar alerting systems in Canada and Mexico. Radio is a primary means of dissemination of news and information, and as a source for public service announcements. In other words, radio informs, enlightens and entertains - all key elements for a civil society.

The basic motivations for transitioning from analogue to digital technology are enhanced performance, added capabilities, reliability, flexibility and cost efficient manufacturing. Despite the obvious benefits of digital radio, terrestrial radio has remained one of the last bastions of analogue service, due in part to the large installed base of analogue receivers as well as the low cost of including analogue radio in other products (for example, the inclusion of analogue FM radio in smart phones). While recent broadcast standards activities indicate increasing interest in the digitalization of VHF band II (87.5 to 108 MHz), many countries lack the additional spectrum required to accommodate a parallel transition (simulcast) of radio from analogue to digital service on a new frequency assignment. This is certainly the case in North America.

IBOC technology allows broadcasters to add digital signals to their existing analogue broadcasts without new spectrum ("hybrid" broadcasts), while providing the capability for an eventual move to all-digital transmission. In short, the technology acts as a bridge from analogue to digital services.

To be clear, the hybrid mode includes both the existing analogue and the new digital services. Broadcasters are using this mode during rollout of the technology to permit the continued operation of analogue-only radios while new HD Radio receivers deliver the new enhanced services. In the future, when the market penetration of HD radio receivers is sufficiently high, broadcasters may switch to the all-digital mode resulting in additional benefits including greater digital coverage (than available in hybrid mode) and the potential for greater throughput.

³ <http://assets.numeris.ca/DNAInsights/How%20Canada%20Listens%20DNA.pdf>

⁴ <https://www.pwc.com/mx/es/knowledge-center/archivo/2015-03-kc-radio-industry-in-mexico.pdf>

HD Radio technology supports low-cost receivers; a significant factor for digital audio broadcasting deployment and acceptance. The IBOC transmission methodology utilizes adjacent digital signals that permit existing tuner components and antenna circuitry commonly used in analogue signal receivers to be employed for the reception of digital radio services.

Digital radio technology in North America

While numerous digital radio systems have been deployed worldwide, few have realized the level of commercial acceptance as the IBOC HD Radio Technology in North America. Both the United States and Mexico have selected the IBOC approach as it does not compel the broadcaster to forfeit an existing listener base to develop a new audience for the digital service. IBOC preserves the analogue broadcast located on the main frequency assignment by adding a low-level digital signal immediately adjacent to the analogue signal and within the existing frequency allocation. This combined analogue and digital signal is known as a hybrid IBOC signal.

IBOC, as implemented by the HD Radio system, retains the full power of the analogue signal, while adding digital carriers within the assigned bandwidth and at lower power levels than the analogue "host." This design allows for adjustment of the occupied bandwidth and power of the digital signal, making possible controllable tradeoffs between coverage of the digital signal and adjacent channel availability. The FM hybrid IBOC digital signal is capable of delivering up to four digital audio programs (one replicating the analogue service) along with the analogue transmission. The geographic service area of the analogue broadcast would be duplicated and, at a minimum, services/programming would be duplicated. The AM hybrid HD Radio digital signal is limited to delivering a single digital audio program replicating the analogue service. Eventually, as the transition matures, analogue radio would be shut down in favour of all-digital services.

The HD Radio brand of IBOC technology is successfully being used to deliver enhanced road traffic conditions and data services to OEM and aftermarket automotive receivers. These traffic services are presently in operation in the United States and Mexico as commercial services and experimentally in Canada. A voluntary North American digital radio standard would reinforce the economic benefits of a common broadcast infrastructure as well as streamlining product inventory requirements for Tier 1 and OEM suppliers to the automotive industry delivering these services.

Technical considerations

HD Radio Technology is described in Recommendations: ITU-R BS.1114 "Systems for terrestrial digital sound broadcasting to vehicular, portable and fixed receivers in the frequency range 30-3 000 MHz" under the heading of "System C," and ITU-R BS.1514 "System for digital sound broadcasting in the broadcasting bands below 30 MHz," under the heading of "Annex 2." These documents present an overview of the design, technical parameters and spectral considerations for implementation of the technology.

Conclusion

In this brief information document, NABA has provided information on the HD Radio IBOC digital radio technology that has been adopted for use in the U.S. and Mexico, and is currently authorized for experimental use in Canada.

NABA is supportive of and encourages broadcasters and regulators to work together to advance the rollout of HD Radio digital radio services globally, and to harmonize the use and regulation of digital radio in the AM and FM broadcast bands, and to consider the use of the *de facto* voluntary North American digital radio standard.

NABA is a resource and an advocate for IBOC digital radio and the NABA Radio Committee exists to further the interests of terrestrial radio broadcasting across the continent.