The Sound of the Future

La voie du futur

A joint project of
the Canadian Association of Broadcasters,
the Canadian Broadcasting Corporation
and Communications Canada

DIGITAL RADIO

LA RADIO NUMÉRIQUE

Une collaboration de
l'Association canadienne des radiodiffuseurs,
Communications Canada
et la Société Radio-Canada

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LA RADIO NUMÉRIQUE

Digital Radio Comes to North America

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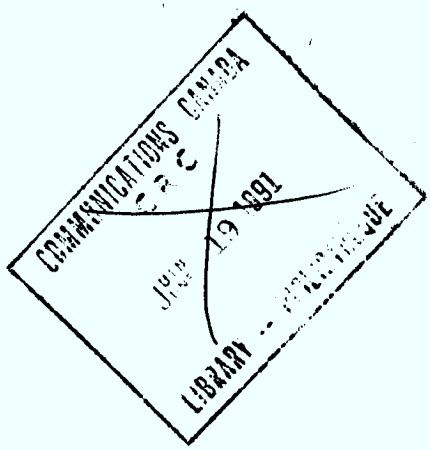
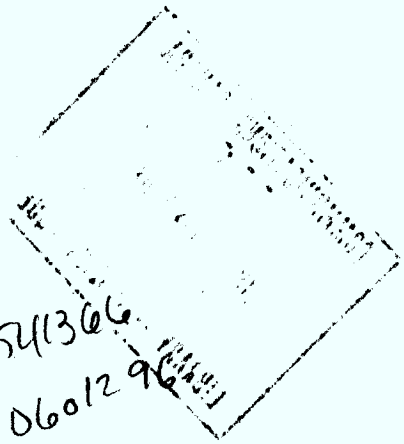
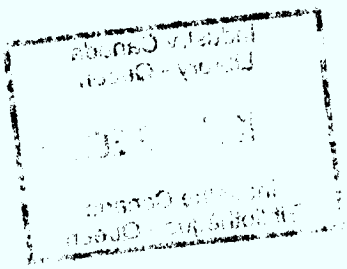


October 1990

CANADIAN ASSOCIATION OF BROADCASTERS
TAKING THE LEAD





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PREFACE

The North American launch of Digital Radio was made possible thanks to the cooperation of several companies and organizations. Special thanks must be given to our colleagues in the European EUREKA-147 project and two agencies intimately involved with it, the Centre Commun d'études de télédiffusion et télécommunications (CCETT) in France and the Institut für Rundfunktechnik (IRT) in Germany, who loaned us the prototype equipment essential to our own project. That project itself was the product of the joint efforts of the Canadian Association of Broadcasters (CAB), the Canadian Broadcasting Corporation (CBC), the federal Communications Canada (DOC) and a large number of private broadcasters. We express our appreciation also to the private companies that sponsored many different aspects of this large and complicated operation. Without them we could not have achieved the success we did.

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INTRODUCTION

THE PROJECT

Digital Radio is now a reality and will help radio broadcasters remain competitive with other services over the next decades. The Canadian Association of Broadcasters took the lead to ensure that private broadcasters would be part of the development and policy decisions related to Digital radio, rather than see it imposed on the industry. Private radio's commitment to "make radio more competitive through new technologies" is a major objective of the industry's strategic plan.

Together, the Canadian Association of Broadcasters (CAB), the Canadian Broadcasting Corporation (CBC) and Communications Canada (DOC) created **"Digital Radio The Sound of The Future"/La radio numérique: La voie du futur"** a project designed to enable broadcasters and other key publics to assess, experience, understand the issues and challenges, and develop an action plan related to this new and revolutionary technology

The first concrete step was to bring to Canada the EUREKA-147 prototype developed by the CCETT in France and the IRT in Germany in order to hold field tests and demonstrations of DR technology in the 4 largest Canadian radio broadcasting markets to convince all those concerned, broadcasters, government, regulators and consumers alike, of the benefits the technology would bring.

Funds for the realization of this project were provided by private broadcasters and technical companies, the CBC, DOC and other levels of government.

SOME BACKGROUND INFORMATION ON DIGITAL RADIO

Digital Radio (DR) technology is based on very short radio waves similar to those we are familiar with on our present FM radio dials, but capable of producing much better sound quality. In DR the radio wave carries a stream of pulses of the type that form the basis of computer signals; they in fact mark the entry of computer technology fully into the realm of radio broadcasting. Over the past few years it has been the subject of successful experiments in several European cities, including Rennes, Geneva and Munich. This summer it was Canada's turn.

The introduction of this computer-like technology means several important things to radio broadcasting. One of them is that, for the first time, the capacity would exist to provide a quality of sound that has until now been only the stuff of dreams, and this on all DR units, whether they are used in homes, vehicles or as portables.

It is a sound quality virtually identical with that of the compact disc and digital audio tape that are now taking over the music recording market in both western Europe and North America. It is a technique that will allow radio listeners to hear on their local stations the sound of music as they have never heard it before except on the finest stereo equipment in their own homes.

In addition to music, reception of all types of programming will be enormously enhanced, especially in areas where both the present AM and FM bands are subject to interference from natural and/or human sources. DR is simply not susceptible to the interference that can cause stations to fade out, to conflict with each other, and generally become difficult to capture -- particularly in large cities, in the mountains, or in other areas where there are obstructions to radio signals.

DR is, in short, the ultimate in user-friendly radio broadcasting. It will enable listeners to tune in more easily than ever before to their choice of stations that serve their community, and these could all be located on just a single new radio band. As presently conceived, DR would replace current AM and FM signals, and the bands used by these stations could then be re-assigned to other types of services such as mobile radio telephones.

It will constitute a radio revolution even more profound than that which came with the introduction of FM. Stations will be easy to locate on the dials of the new smart radio receivers, themselves utilizing a large dose of computer technology. Interference will be minimal and reception near perfect. It will be, for the consumer, a whole new era in radio broadcasting.

DR will constitute a revolution for broadcasters too. The new technology will allow up to 16 local stations to share a single transmitter broadcasting along one wide band on the radio spectrum and covering the whole market area they are licensed to serve. The sharing by so many stations of the same transmitter will substantially lower transmission costs, permitting more funds to be devoted to programming. DR is also equally suited to satellite transmission, using the same receivers as required for the reception of terrestrial transmissions.

A comprehensive DR system will allow broadcasters to pass on to listeners the quality benefits of the latest in radio studio technology -- a technology that is being used by a steadily increasing number of stations. Listeners will no longer have to rely exclusively on CDs or digital audio tape for the best in musical reproduction.

There is another advantage as well to the whole broadcasting industry. Technologically all stations will be on a level playing field. DR will assure an identical sound quality for all stations. Each can produce its own variety of programming based on the requirements of its own audience and its own role. The quality of the sound will be a given, allowing each station to have its own particular character and its own target audience based strictly on programming considerations.

If the old AM/FM distinctions no longer apply, we can expect regulatory changes to follow. Programming regulations should be less complex and more flexible.

In short, a real revolution lies ahead, one that will benefit both the industry -- owners, workers, investors and advertisers -- and the listeners. Broadcasting technology will have taken a giant step forward. It will be more reliable, of better quality, and completely consistent.

But for this to happen, there must be a radio band available upon which DR stations can broadcast. It would be preferable if this band could accommodate both terrestrial and satellite digital radio.

Of crucial importance in this regard will be the World Administrative Radio Conference (WARC), which will take place in Spain in 1992 and will deal with this issue. In preparation for this conference, Canadian broadcasters decided last year they must form a common front uniting all sectors of the industry -- the private broadcasters, the CBC -- and the DOC, to try to ensure that WARC take steps to allocate specific parts of the spectrum on the radio frequency bands for both

local and satellite digital transmission in North America as well as in Europe. They also agreed to push for international standards for DR transmitting and receiving equipment. The adoption of such standards will allow large-scale manufacturing of digital equipment, resulting in reasonable pricing for broadcasters and consumers alike. To reach these objectives, the cooperation of government and the broadcasting industry is essential. That has been the goal of the Canadian industry.

THE OBJECTIVES OF THE CANADIAN DIGITAL RADIO PROJECT

The main objectives identified by the National Coordinating Committee, last spring, were the following:

1. To raise the awareness of the key publics to the prospects and implications of DR.
2. To position broadcasters, regulators and decision-makers regarding the 1992 WARC decisions on standards and spectrum allocation.
3. To position Canadian radio broadcasters as leaders in new broadcast developments.
4. To encourage the U.S. broadcasting industry to support the Canadian position on DR and to encourage them to work with Canadians in developing future standards.

Several different methods were used to get the various messages across to key publics. These include press conferences, news releases, preparation and, distribution of information kits, interviews, briefings and personal contacts.

The core of the effort was the joint CAB/CBC/DOC staging of the first North American demonstrations of DR in action, to show how it works and how it sounds, in four Canadian cities: Ottawa, Toronto, Montreal and Vancouver. Aptly entitled "Digital Radio: The Sound of the Future", the four-city operation combined fixed presentations and a mobile demonstration. It employed prototype equipment on special loan from the leading European research organizations in the DR field.

The center of attraction everywhere was a specially converted bus, complete with individual head-sets, that enabled from 12 to 14 people at a time to hear for themselves the digital difference, during short tours of each of the four cities. Switching back and forth between regular AM and FM and the digital transmissions the bus was equipped to receive, the riders were able to make instantaneous comparisons in typical urban reception conditions. Invariably they agreed that Digital radio is far superior to AM and FM.

Even before the demonstrations were completed, we received the good news in July that Canada had succeeded in having land-based DR included on the agenda of the 1992 WARC conference. This was a key objective for all Canadian participants in last summer's project. The aim is to reserve the necessary spectrum for DR so that broadcasters will be physically able to bring this

new technology to their listeners. Canadian broadcasters are pressing for a hybrid service that can be delivered primarily by local stations and, in some situations, by satellite transmission. We now have an excellent possibility of achieving that objective in 1992.

Involving the National Association of Broadcasters (NAB), which represents American broadcasters, in this endeavour was also high on the agenda. The results of a meeting and special demonstrations for their American counterparts, hosted by the CAB in Montréal, were highly successful. The NAB and the CAB have both created Digital Radio Policy Task Forces and agreed to have a representative sit on each other's Committee.

The leadership and vision of the CAB Radio Board and its Engineering and Technology Council combined with contributions from private broadcasters and the hard work of those involved in each city has allowed us to meet all of the objectives.

1. Raise Awareness Level

Large numbers of private broadcasters have been exposed to digital radio and can now participate in the discussions about its implementation in Canada in an informed way.

CRTC Commissioners and staff, DOC officials and many members of the House are now fully aware of CAB's leadership role in this area of new technologies and have also been exposed to the technology itself.

2. Position Canada for WARC-92

Our efforts paid off when the International Telecommunications Union (ITU) agreed to include spectrum allocation for terrestrial DAB at WARC 1992 and not only satellite allocation.

3. Harness DAB to Our Advantage

As a result of this project, we are now a significant and leading party in the discussions relating to the implementation of digital radio at home with regulators, in the Americas and in the world forums.

4. Raise the Awareness Level of the American Broadcasters

Our early involvement with the experimentation of DAB in Canada and the media coverage stemming from our program has raised the awareness of American broadcasters and has caused digital radio to become a priority item for the NAB. On August 8, 1990, the newly formed NAB Digital Audio Broadcasting Task Force met in Montreal for a demonstration of the technology and to meet with us.

1. THE DEMONSTRATIONS

A) Overview

A National Coordinating Committee, including engineers, communications specialists and broadcasters from CAB, CBC and DOC, was set up to organize and coordinate the demonstrations. Local committees were also formed in each of the host cities to run the demonstration program. These groups include private and public broadcasters experienced in programming, management and engineering.

Overall, 3,000 people were exposed to the Digital Technology. The unanimous verdict was that Digital radio delivers everything it is claimed to deliver: CD quality sound and no signal interference or multipath

B) Ottawa/Hull

The National Capital Region launch took place June 11 in the main auditorium of the Museum of Civilization in Hull, just across the Ottawa river from the Parliament buildings. It included a sound and video presentation that was subsequently used in the other three cities as well. More than 200 broadcasters, government officials, business people, journalists and others accepted the invitation sent out by a coordinating committee chaired by Hal Blackadar of Ottawa stations W1310 and CKBY. Broadcasting and government officials, including CAB president Michael McCabe, expressed faith in the future of DR. Sheila Finestone, communications critic for the Official Opposition and a Member of the House of Commons Communications and Culture Committee spoke on behalf of all parliamentarians. Rising later that day in the House of Commons, Mrs. Finestone praised Canadian broadcasters for showing that "Canada can remain at the forefront of global change in the communications area." Representing the DOC was Richard Stursberg, ADM, Cultural Affairs and Broadcasting, Ottawa Regional Director, Pierre Racicot represented the CBC.

Following the reception, the demonstration bus took members of the media and guests, in groups of 12 to 14, on the first few of what would be many tours of downtown Ottawa to demonstrate DR. Tours continued in the city until June 26. Key executives and staff from all local radio stations were invited to experience Digital Radio. Special demonstrations were also held for the Central Canada Broadcasters' Association, the CAB Board of Directors, the CRTC and key DOC personnel, as well as all local radio stations.

The overwhelmingly positive reactions generated by this national launch were reflected in the extensive national media coverage summarized in the following chapter.

C) Toronto

Broadcasters in the Queen City, the site of the second demonstration, had been preparing for the event since mid-May, working with local chairman, Walter Unger of the CBC and Duff Roman, Coordinating Privtate Broadcasters' involvement. The technical components were put in place in three locations -- the CN Tower, the CBC digital studio on Jarvis Street, and an exhibition area provided by the Telemedia group. About 1,500 people, including some 500 on the bus tour and 1000 in the exhibition center, were able to personally experience DR during the Toronto demonstration period, from July 5-16.

Unique to the Toronto demonstrations was the use of an all-digital radio show, provided by the CBC. As well, a dedicated FM transmitter carrying this same programming permitted continuous comparisons of FM and DR reception.

Reactions from every group were again universally positive

D) Montréal

Montréal was the site of the third demonstration between July 23 and August 4, during which time, local chair Michel Arpin of Radiomutuel reported, more than 400 guests of local radio stations and others took a bus tour with a difference. This one included a trip through the Ville Marie tunnel, with the cooperation of the provincial transport department, an on-channel rebroadcasting system had been set up as a gap filler to permit perfect reception throughout the 3 km. tunnel. The DR signal transmitted at far lower power levels than those used for FM, not only covered much of the island of Montreal, but also an area as far away as Granby, 96 km to the east.

The official public ceremony was held on July 31 in the Montreal Planetarium, with about 300 in attendance. The provincial government was represented by the minister of communications, Lisa Frulla-Hébert. Also present were several U.S. broadcasters and consultants, who were impressed by the technology, and most particularly the sound reception in the Ville-Marie tunnel.

The CAB hosted a special demonstration and meeting with executives from the National Association of Broadcasters (NAB), which resulted in a commitment from both parties to work together on the development and implementation of policy related to Digital Radio.

E) Vancouver

The local launch, including sound and video displays, was organized by Vancouver chair Tom Peacock of WX1130 aid KISS-FM radio stations, and drew hundreds of guests to the British Columbia Science Centre on Aug. 21. Guests include a cross-section of local and provincial broadcasters and engineers, as well as a considerable number of visitors from the United States. Provincial and federal government representatives and business and professional people were also among the audience.

Many people were able to take advantage of the bus tours, which went on for a week; the feedback from the tours was very positive, Mr. Peacock reported. Coverage of the station, again at low power levels, extended as far south as the U.S. border.

Local broadcasters, as well as visiting American broadcasters, experienced first hand this revolutionary sound.

F) Special Demonstration

The final demonstration involved a return of the bus to Ottawa for September 13 when delegates of the Inter-American Telecommunications Conference (CITEL), an arm of the Organization of American States (OAS), heard a presentation and took a digital bus tour in Ottawa.

Delegates were impressed with DR and especially with the absence of multipath. Spanish interpreters were present to handle questions and copies of the DR information kit were distributed to attendees.

This was the finale of the operation and was used primarily to introduce this technology to representatives of Latin America countries who will ultimately influence their countries WARC-92 positions.

2. MEDIA REACTIONS

The summer-long demonstration scored a great success, not only with broadcasters, government officials and members of the public; they were also a big hit with the information media. English and French stations across the country, as well as in the US, paid considerable attention to the event, as did newspapers, and in the most positive terms. Here are a few selected comments from news articles and specialized columns:

Globe & Mail 12.06.90. Sarah Jennings in the Arts section:

Heading: "'Digital Bus' drives into the future." re Ottawa demonstration. "Back in Hull, dignitaries and media types stumble off the bus as excited as school children. If this is the 'sound of the future', they like it."

Toronto Star 12.06.90. Radio column by Gregg Quill:

"I have heard the future of radio. And its name is digital."

Ottawa Citizen 12.06.90.

(Heading) "...the magic bus"

Le Droit (Ottawa) 12.06.90. Michel Beauparlant:

"Would you like your radio to transmit a sound equal to that of your compact disc player? If you reply in the affirmative, what you want is digital radio."*

Globe & Mail 09.07.90. Mary Gooderham, front page:

"A new kind of radio is making sound waves in the broadcasting business this summer....The sound appears to be better than even the clearest FM broadcast. Gone is the "noise floor", the hiss in the background and the 'multipath' interference distortion that occurs when the signals of other stations are reflected by large objects."

Toronto Sun 10.07.90. Gary Dunford column:

"Superior in sound to AM or FM, cheaper to operate, digital radio is just around the corner if everyone gets on the train....DR beams in so clearly that those aboard the bus think it's a compact disc system playing from under the seat. (It isn't).

New York Times 11.07.90. Andrew Pollack:

"Radio broadcasting is preparing for its biggest technological leap since FM..."

Radio World (USA) 11.07.90. James Careless:

" Canadian broadcasters have made history with what they believe is the future of radio..."

Le Devoir 01.08.90. Odile Tremblay:

"The radio is playing a tune from an opera. Headphones attached, we plunge in a minibus into the Ville Marie tunnel. Jumbled by the interference, the FM begins to sputter, to crackle, to cut off. Then the DR takes over. A miracle! A pure, luminous sound in the middle of the tunnel. We are on the airwaves of the year 2000."**

La Presse 01.08.90. Marie-France Léger:

"The advantage of DR is a double one. First it gives listeners a sound quality equivalent to that of a compact disc. Second, it allows savings in broadcast costs, using the same frequency band."***

Montreal Gazette 01.08.90. Mike Boone, TV & radio critic.

"Imagine radio that sounds as good as compact disc -- no hisses, no pops, no signal loss or interference, none of the horrors music lovers associate with radio reception. DR will eliminate them all. Listeners at home, in cars, or strolling down the street tuned in on portables, will be able to enjoy concert-hall quality sound, the distortion-free perfection that characterizes CDs."

The Vancouver Sun 29.08.90. Cameron Smith.

"Digital radio is the wave of the future."

-Other stories appeared in Le Journal de Montréal, Le Soleil (Canadian Press) Maclean's Magazine, R&R (Washington, D.C), the Washington Post, Broadcaster, Broadcast Technology, Playback, Broadcasting and others too numerous to list.

Coverage by the electronic press in every province and some US states was enormous. From news to talk shows, public affairs and cultural shows, broadcasters' interest in telling their listeners and viewers about this sound revolution was reflected in the unusual amount of airtime dedicated to this subject.

3. THE NEXT STEPS

Now that the CAB has achieved all of its objectives through the digital radio demonstration program, we must continue to press on to keep our leadership position.

The position that the CAB took right from the beginning was to ensure that existing radio broadcasters should remain technologically competitive in the next decades to continue to serve the demands of their listeners. We see digital radio gradually replacing current AM and FM broadcasting technology. Existing radio stations would be given a frequency on the new spectrum assigned to digital radio at the World Administrative Radio Conference in 1992 (WARC-92). The rationale simply being that an additional layer of radio services on top of the AM and FM bands does not make economic sense, and could lead to endangering the viability of existing radio stations. Our position also recognizes that while digital radio will be primarily used for terrestrial broadcasting, some satellite application could prove viable for CBC and educational broadcasters .

It is anticipated that if spectrum is allocated for digital radio at WARC-92, technical standards could then be set for transmitting and receiving equipment at more or less the same time and we could expect to see the first digital radio broadcast between 1995 and 2000. According to our phase-in model, it could take up to 15 years, after the first digital broadcast, to replace AM and FM stations. The rate of penetration of compatible receivers and consumer acceptance will ultimately determine the timing.

The challenges we face are numerous. We must:

(i) Obtain adequate spectrum allocation;

(ii) Press for the establishment of technical standards;

(iii) Resolve the operational, regulatory and economic implications associated with the introduction of digital radio;

(iv) Assess consumer demand and readiness to move toward CD-quality radio; and

(v) Involve receiving equipment manufacturers.

The CAB has been active in many ways in tackling these challenges and ensuring they are resolved in the interest of the local radio broadcasters.

Members of the CAB Engineering and Technology Council have been involved right from the start with the Canadian Preparatory Committee (CPC), struck by the Department of Communications, to develop the Canadian position for WARC-92. They have been ensuring that the Canadian position is put forward, and is consistent with our views.

Ongoing high-level discussions have been taking place with representatives of the National Association of Broadcasters (NAB) to harmonize our positions, and they are now being pursued more formally.

Representatives from most of the South and North American countries have been exposed to digital radio technology during their recent meeting of the Inter-America Telecommunications Conference (CITEL) in Canada. Due to the collective leadership we have demonstrated, Canada was given the mandate to coordinate the DAB position for CITEL at WARC-92.

At its September 1990 meeting, the CAB Radio Board struck a **Digital Radio Policy Task Force** to continue to spearhead our activities, to address the challenges of policy development and implementation in Canada, and to coordinate and present our position in national and international forums.

The eleven members of the Task Force include top radio executives from across the country who have been closely associated with the developmental work in which CAB has been involved.

To ensure maximum cooperation and coordination, the CAB and NAB have agreed to allow a representative from each others' organization to sit on their respective Task Forces that deal with digital radio.

The CAB believes that we have to take every possible step to ensure that private radio broadcasters remain competitive with the new technology over the next decades. Undoubtedly, we are facing numerous challenges including the need for a major system overhaul. But, we have little choice. We must lead or be the unwilling victims of technological change. We chose to take the lead and to position private radio broadcasters for a better tomorrow.

APPENDIX 1

QUESTIONS AND ANSWERS ON DIGITAL RADIO

Q. What is digital radio?

A. It is recently developed European technology based on the broadcasting of computer-like pulses to convey music and voice signals. This enormously enhances the quality of radio broadcasting both as it comes out of the transmitter and is received by the listener. The sound quality is almost identical with that provided by the latest CD systems.

Q. What will it mean to Canadian radio listeners?

A. It will mean CD-quality, interference-free reception of all radio stations in your community, whether in the home or in the automobile. It will mean easy tuning to all the radio stations serving your area.

Q. Will it involve the purchase of a new radio receiver?

A. Yes, although the present AM and FM services will continue to be available for many years after the commencement of digital broadcasting which can only occur post 1994-1995.

Q. Will the new receivers be very expensive?

A. Digital receivers are complex devices containing many expensive computer "chips". But within a very short time, as mass production sets in, they will become much cheaper. Within a few years at most, the new sets will be sold in the same price range as are ordinary radios today.

Q. How long can we expect today's analog AM and FM programming and DR to coexist?

A. Probably for a decade or two. During that period, AM and FM programming will gradually be phased out, to be replaced by DR. And stations will continue to broadcast in both modes. Eventually, DR will take over completely.

Q. What will DR mean for private broadcasters?

A. It will mean the opportunity to participate in the latest technology, and in turn provide for their local listeners the highest quality sound possible. In so doing, it will help them maintain their market share and perhaps increase it.

Q. How expensive will the transition to DR be for members of the broadcasting industry?

A. The key is that new digital studio hardware can be phased in as the equipment industry can supply it and as the broadcaster can afford it. Equipment will be replaced in the normal depreciation/replacement cycle. No current hardware will be instantly obsolete. For those broadcasters who have already been phasing DR into their studio operations, the costs will be minimal. For broadcasters in general, there will, of course, be substantial costs for the new equipment. In the long run, these will be more than matched by even greater savings resulting from the sharing by several broadcasters of the transmission facilities. Operating costs will be even lower owing to the fact that DR technology needs considerably less powerful transmitters than does the present AM/FM program transmission.

Q. What difference will it make if we just ignore DR?

A. In general, it will mean that the Canadian industry will fall far behind technologically compared to other countries. Radio listeners will be deprived of the high quality sound transmission that is now possible. In addition, they will certainly lose many listeners to digital radio services delivered by satellites and cable. Many listeners may turn off their radios, preferring the CDs that are readily available to them.

Q. Will DR have an effect on radio advertisers?

A. Essentially, the benefits to advertisers will be the same as to the broadcasters themselves. They will be assured that their messages are getting through with the maximum quality of sound and a minimum of interference. Also they will know that the radio stations concerned will not be unnecessarily losing music listeners because of a disparity of sound quality between the stations and other technologies available to the listener.

Q. When will Canadians get a chance to hear DR in operation?

A. Limited demonstrations of DR have taken place in Ottawa, Toronto, Montreal and Vancouver from June - August 1990, sponsored by Canadian public and private broadcasters and by the Federal Department of Communications.

Q. Will DR technology affect both public and private broadcasting in Canada?

A. Yes. Both the CBC and the private industry are involved in its introduction. The major difference, once it comes on stream, is that the private stations, which are mostly strictly local, will tend to use land-based transmission systems, while the CBC may prefer to use satellite transmission for its national and regional operations. Room on the spectrum must be provided for both.

Q. Is there any urgency for the Canadian government and industry to move forward in preparations for the introduction of DR technology?

A. Yes. There is an international radio-communications conference scheduled for 1992, at which time there will be an opportunity for all those interested to press for the allocation of a specific radio band for the use of DR broadcasting. If we miss this opportunity, we may have to wait a decade or more to obtain the means to bring the improved services to the public. If we wait that long, all available spectrum may even be allocated and Canadians may be prevented from ever receiving Digital Radio.

APPENDIX 2

THE SPONSORS

A) National

Digital Radio: The Sound of the Future was made possible thanks to the generous contribution of:

Canadian Association of Broadcasters/l'Association canadienne des radiodiffuseurs
Canadian Broadcasting Corporation/Société Radio-Canada
CHEZ-FM Inc.
CHUM Ltd.
Communications Canada/Communications Research Centre
Communications Canada/Centre de recherches sur les communications
LeBlanc and Royle Telecom Inc.
Lindsay Specialty Products Ltd.
Maclean Hunter Broadcasting
Moffat Communications Ltd.
NewCap Broadcasting Ltd.
Radiomutuel Inc.
Radio Station CJVB
Rawlco Communications Ltd.
Rogers Broadcasting Ltd.
Rohde & Schwarz Canada Inc.
Skeena Broadcasters
Sony of Canada Ltd.
Technology Inflow Program TIP (External Affairs)
Programme d'apport technologiques DAT (Affaires extérieures et Commerce extérieur Canada)
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Institut für Rundfunktechnik (IRT) Federal Republic of Germany
Eureka 147 .
European Broadcasting Union

B) Local

Ottawa

CBC
CFGO
CFRA/CFMO-FM
CHEZ-FM
CIMF-FM/CKCH
CJRC/CKTF-FM
CJSB
CKBY-FM
Ottawa Board of Education

Toronto

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Cantel Inc.
CHUM
CHUM-FM
CFTR
CHFI-FM
CKEY
CFNY-FM
CJCL
CHOG
Q107-FM
CJRT-FM
CN Tower
Contact Distribution
Leitch Video International
Maruno Electronics Ltd.
Neil Muncy Associates
Panasonic - Matsushita Electric of Canada Ltd.
Paradigm Electronics
Pilchner Associates
Pitney Bowes
Rogers Network Services
Telemedia Communications Ontario Inc.
The Great Metropolitan Sound Company
Westbury Sound
Westcom

Montreal

ACRTF
Bell Canada
CFMB Ltée
Cogéco Inc.
Diffusion Power Inc.
Marketing Marc Vallée
Ministère des Communications du Québec
Ministère des Transports du Québec
Planétarium Dow de Montréal
Radio CHVD Inc.
Radio Roberval Inc.
Sonotechnique

Vancouver

B.C. Association of Broadcasters
B.C. Telephone Company
Cantel
Communications Canada (CAP)
CBC
CFMI-FM
CHQM-FM
CJJR-FM
CJVB
CKKS-FM
CKLG/CFOX-FM
Commercial Electronics Ltd.
Kallberg Studios
NEXUS Engineering Corp.
Okanagan Skeena Group
PJS Communications
Province of British Columbia, Ministry of Regional and Economic Development
Rogers Broadcasting Ltd., Mount Seymour Facility
Science World
University of British Columbia

APPENDIX 3

THE PEOPLE

A) National Coordinating Committee

François Conway, Chair/President	Canadian Broadcasting Corporation Société Radio-Canada
Michel Arpin,	Radiomutuel Inc.
Hal Blackadar,	Maclean Hunter Broadcasting
Lynn Buffone,	Canadian Association of Broadcasters l'Association canadienne des radiodiffuseurs
Liette Champagne,	Communications Télémédia Inc.
Steve Edwards,	Rogers Broadcasting Ltd.
Emmanuelle Gattuso,	Canadian Association of Broadcasters l'Association canadienne des radiodiffuseurs
Tom Peacock,	Rogers Broadcasting Ltd
Wayne Stacey,	Canadian Association of Broadcasters l'Association canadienne des radiodiffuseurs
Michel Tremblay,	Canadian Association of Broadcasters l'Association canadienne des radiodiffuseurs
Royce Trenholm,	Communications Canada
Don Tyrie,	Communications Canada
Walter Unger,	Canadian Broadcasting Corporation, Société Radio-Canada
René Voyer,	Communications Canada/Communications Research Centre Communications Canada/Centre de recherches sur les communications
Tom Young,	CHEZ-FM

B) Local Committees

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Doug Eide	CHEZ-FM
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Montreal

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Liette Champagne	Télémédia
Normand Charbonneau	Société Radio-Canada
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Patsy Worrall	PJS Communcations

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