



WORLD DAB Newsletter

International News and Strategic Analysis on Digital Sound Broadcasting

'We will make DAB happen'

EACEM the consumer electronics industry body, released a statement last month that clearly shows their commitment to DAB. We print their ground-breaking statement in full

Industry position:

The consumer electronics industry, represented by EACEM, is committed to DAB and will make it happen.

By mid 1998, receivers will be available in the European Market in sufficient quantities to meet market demand. The delta cost for DAB in the radio-receivers will initially be between 400 and 1000 ECU (Editor's note: approximately £300 - £750). It is expected that this cost will drop rapidly as the market develops and as more and more radio-receivers will integrate DAB.

The initial receivers will mostly include dynamic label. A RDI (Radio Data Interface) supports the connection of devices such as PCs, therefore providing sophisticated data handling capability.

Today's pilot features will all be available in the market. These features will gradually be further developed and integrated in the standard receivers.

While the initial receivers address especially

the car-radio market, more and more receivers will be made available in the portable, home and PC market.

Second generation DAB receivers are planned by mid 1999. These receivers will include enhanced data services such as traffic information and be equipped with additional facilities to be announced later.

DAB and DVB-T:

EACEM considers both technologies as complementary. DVB was developed as a transport vehicle for moving pictures, surround sound and data. DAB is dedicated to audio and data applications designed for the mobile receiver. Therefore the receiver is simpler, uses less power and can be offered at attractive prices.

It is expected that all broadcasters will offer both DVB and DAB applications (as is presently the case in UK).

From a timing point of view DAB is ready for introduction. Mobile high quality reception is proven, reasonably priced receivers will be in the market by mid 1998, and the European frequency spectrum plan is finalised. Companies want return now on their yearlong DAB investment.

EACEM does not expect any synergy savings by attempting to merge DVB-T and DAB. Both technologies will serve their own specific purpose.

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New low-cost way to receive DAB services on a PC

UK software company RadioScape Ltd have announced details of a major technical software breakthrough which replaces most of the dedicated hardware requirements of a DAB receiver. This makes possible the volume production of low cost PC cards for digital radio on the PC platform using Eureka 147 DAB.

Radioscape's Managing Director, Peter Florence said, "So far, digital radio development has relied on a dedicated hardware solution. By developing DAB demodulation and decoding in software running on Windows 95 and Windows NT with the Intel Pentium chip, RadioScape can offer a low cost solution to the reception of DAB multiplexes and real-time decoding of audio and data services on a conventional PC platform"

News Bytes

Urgent call for receiver availability at 'Radio Day' in Brussels

WorldDAB attended the 'Radio in the Digital Era' that was hosted in Brussels by the European Commission in March. The meeting was commissioned by the European Commission to provide necessary relevant thinking on objectives and actions to put radio in a position to face the challenges of the digital era.

The Director General of Directorate X at the European Commission Spyros Pappas said "It is obvious the future is digital. The question is how will the new digital technologies affect the role played by radio in our society? How will the radio sector respond to the new needs and how will citizens react to technological change in something they have been accustomed to for many years?"

Most speakers agreed that the most important thing was to get receivers onto the market. Michael McEwen, President of the WorldDAB Forum said the rest of the world was looking to Europe for the rollout of DAB and if Europe faltered, there were many other people ready to push in with other digital systems.

Michel Tremblay from the Canadian Association of Broadcasters intervened in the debate on the question of subsidies because he believed it to be the wrong approach. "Digital radio has reached the point where it can compete, and market forces should now operate," he said.

Frans Westra, the Product Manager of VDO Car Communication and the Vice President of Eureka 147 spoke on behalf of the manufacturers. He wanted to correct the impression that there were lots of service providers but few sets. He pointed out that manufacturers had spent huge sums on developing DAB and wanted to recoup their investment. The reasons for the lack of set availability were complicated. The industry had prepared for the launch of consumer receivers at IFA97, which was primarily targeted at German consumers. "No one could guarantee that if they sold the sets there would be something to receive on them."

Optimistic Turn-out for DAB at CeBIT

CeBIT is the world's biggest computer and information technology trade fair and it attracted over 425,000 visitors this year

Report by Julie Unsworth

Thankfully, it's well sign-posted and situated mainly on one level which makes the maze of halls seem less daunting than those at Berlin's IFA.

Unfortunately, receiver manufacturers' stands were dotted around different halls because receiver equipment wasn't a major part of the exhibition. This meant that anyone interested in DAB had a long journey to find receiver manufacturer stands - a walk that often ended in disappointment when it emerged that certain manufacturers were not displaying DAB.

Sharp displayed their Network Audio System. This is a hi-fi offering DAB, CD, Digital Satellite Radio, DAT, MiniDisc and PCMCIA possibilities. It was the same hi-fi that was shown on the WorldDAB Stand at IFA last August but it was linked up to a PC to demonstrate its PCMCIA capabilities at CeBIT. Sharp said they would be releasing this product in June and it would cost DM 1500.



Sharp's Network Audio System

It was disappointing to see that Sony, JVC, Pioneer and Philips only displayed professional equipment, mobile telephones and video conferencing - there was no mention of DAB. Bosch's Dr Hamed Amor justified this rationale when I visited their stand. He said manufacturers were concentrating on other industry sectors because CeBIT is a professional rather than a consumer fair and most visitors were interested in PCs or mobile telephones.

The Bosch stand was a delight for DAB spotters. We saw the impressive MiniDAB, which is a personal stereo sized receiver. The MiniDAB system is very easy to use with just a few buttons on the front. It provides both L-Band and Band III use and has an LC-display consisting of 2 x 16 characters. I was able to walk around the Bosch stand listening to DAB in perfect quality - if only I could have taken one with

Panasonic showed a DAB in-car receiver but it was a first-generation test receiver with an oversized black box. Its launch price would be DM 1000 for audio only and DM 1300 for audio and data capabilities. Their hi-fi system, which will be launched under the Technics label, was nowhere to be seen. The Technics hi-fi system is predicted to cost less than DM 1000 and will have a PC connector. The in-car and hi-fi systems will be launched at the beginning of 1999.



Panasonic's first-generation DAB in-car receiver



me for train journey back to my hotel in Hamburg that lasted for nearly two hours. Bosch also displayed their DAB PCMCIA receiver and the in-car Hanover 106 DAB receiver.

The new DAB-core PCI plug in card was presented for the first time. It appears that the card will be available in small quantities in the second quarter of 1998.

Bosch's impressive miniDAB receiver

The DAB-core-PCI main features are:

- PC-plug-in card according to PCI 2.1 Std
- Contains the Bosch DAB Module in its high-end version
- Common antenna input connector (50 Ohm)
- VHF Band III and L-Band
- Analogue stereo headphone connector, volume controlled by software
- Audio record function for one audio sub-channel
- PC internal connections to soundcard and CD-drive
- Receiver data interface (RDI), optical
- Win95 GUI to tune, select sub-channels and other receiver functions
- Dynamic label information and PAD slideshow in extended windows
- Display of HTML formatted MOT2.4 data with standard browser
- Other applications as an option - defined by the OEM application software
- Dimensions 145 x 110 x 19 mm

Geneva Motor Show Report

Julie Unsworth discovers that awareness amongst car manufacturers is not as high as it should be

The 68th International Geneva Motor Show took place at Palexpo from 5th - 15th March. Network providers Swisscom, the recently privatised Telecom PTT used part of their mobile telephone stand to demonstrate DAB.

A PC with a DAB PC Card, a Bosch in-car receiver and a BMW dashboard with a Bosch DAB receiver combined with a data-decoder and an integrated VGA display from Kontron were on display. One disappointment was that 15 of the car manufacturers that I visited did not have DAB in their cars. In fact, it appeared that not only did they have no plans for DAB but many did not even know what Digital Audio Broadcasting was. They did not even recognise the DAB logo. This is a setback but not surprising. WorldDAB has already identified this major problem. Now is the time to reach out to car manufacturers if DAB is ever to appear as a standard fitting. If we do not act now, our target to introduce DAB as a mass-market product will never be achieved.

Bosch, Kenwood, Pioneer and Clarion also exhibited DAB receivers. Only one manufacturer had literature to hand out to interested visitors and just one displayed a price for the unit. The feeling from manufacturers at the Motor Show was that a system could not be properly promoted under such an uncertain climate and without broadcast services

being available at the present time. There are plans to start building up regular networks at the end of this year but so far all DAB testing has been carried out by Swisscom who have played a leading role in trying to implement DAB. Extensive market research has been carried out in the Bernese Oberland area around Bern, the Swiss capital, to get some data on the potential acceptance and use of DAB.

Swisscom provided some excellent easy-to-read literature on DAB in four languages. There was also WorldDAB literature on the stand and a useful map showing the DAB coverage in Europe.

Much to our delight and surprise, Swisscom were able to secure coverage of the Geneva region with a DAB signal from the Saleve transmitter. Six audio services were broadcast with PAD (Radio Lac, WRG, La Première, Couleur 3, DRS1 and One FM)

Service	Coding	Data rate [kbit/s]	Protection Level
La Première	Joint-Stereo	160	3
Couleur 3	Joint-Stereo	160	3
DRS1	Joint-Stereo	160	3
World Radio Geneva	Joint-Stereo	160	3
Radio Lac	Joint-Stereo	160	3
One FM	Joint-Stereo	160	3
NPAD	Joint-Stereo	160	3

Each Audio-Channel contained:

- Automatic data service (8kbit/s): A slide show of JPEG-pictures which changed every 30 seconds.
- Dynamic Label (1kbit/s) : Some text informed the listener of the name of the radio station they were listening to in French and German every ten seconds.
- Interactive data service (5kbit/s) : an HTML-page with the radio station's name

Additionally the following NPAD- services were transmitted.

Data Services	Kind of service	Language (d/f/e)	Directory car receivers	Directory PC Card	Bitrate
News channel (Swiss, international economy, Sports, Weather)*	Interactive	d	x		20kbit/s
DAB activities in Switzerland	Interactive	d/f	x		20kbit/s
Meteo (SFDRS/SMA)*	Interactive	d/f	x		30kbit/s
L'essenteil (short News from Blue Window, the Swisscom Internet Provider)*	Interactive	f	x		20kbit/s
Palexpo (Information from the Internet)	Interactive	e		x	10kbit/s
Demo PC-Card	Interactive	d		x	50kbit/s

**New Press Officer for
WorldDAB**

WorldDAB's new Press Officer is Ronke Jolaoso. Her objectives are to make sure that members of the press are kept up to date with WorldDAB activities and developments within digital audio broadcasting. Her responsibilities also include editing the Newsletter and maintaining the WorldDAB website.

She will be based at the Project Office in London and will be working closely with the President and the Project Manager. She is based at the London Project Office with Julie Unsworth.

Before coming to WorldDAB, she was a journalist on the London-based publication called *What Mobile* for two years.

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**International DAB
Symposium details announced**

The Fourth International DAB Symposium will be held in Singapore from 13th - 15th January 1999. The title is DAB - Digital Radio Now: Seizing opportunities in the multi-media world.

It is being organised by the WorldDAB Forum in conjunction with the Singapore Broadcasting Authority. The aim of the symposium is to promote the Eureka 147 DAB system as the future radio (and ancillary services) system in the Asia-Pacific region.

It will have a broader appeal than previous symposiums and the focus will be on DAB services and applications.

The event is also supported by the European Broadcasting Union, the Asia Pacific Broadcasting Union and Eureka 147.

*right: DAB-core-PCI plugin card,
Bosch 4/98*

News Bytes

Bosch's DAB-core-PCI plugin card enlarges area of DAB applications

By Markus Weins

Bosch proudly announced and demonstrated the first compact DAB PCI-core-plugin card at CeBIT'98 in Hanover. Once again, it has been proved that there is a lot of interest in constantly expanding PC application concerning wireless IT solutions. The plugin card is in response to PC owners who want DAB applications on their stationary home and office PCs.

Another advantage - beside all other known DAB-preferences - which of course gives an additional value to the product is the possibility to record audio channels directly on hard disk (MPEG format) for further use or modifications.

An analogue stereo headphone output with a 3.5 mm jack allows the user to amplify the audio signals at its home stereo set, so it is not necessary to have a soundcard although this isn't possible with recorded files. The card also offers two on-board connections to the soundcard and the CD-ROM. The graphical user interface (GUI) is set up under Windows95 and is easy to use. The GUI can indicate the Ensemble Label, program list, PAD, frequency, signal quality, data channel selected, volume level and dynamic label simultaneously if desired (see picture B). Programme Associated Data (PAD) can be viewed with the Internet browser Microsoft Internet Explorer. The Non-PAD can be viewed with an HTML-Browser that supports



Screencopy of a typical DAB-application under Windows95

- top left :* main control window for receivable programmes
- top right :* PAD (CD-cover) broadcast by program "RockAntenne"
- bottom left :* NPAD departure times from Hanover railway station
- bottom right :* NPAD map of Hanover City

frames, like Netscape or MS Internet Explorer. The PC platform's large monitor and high colour resolution provides the basis for a wide spectrum of possible applications.

This will attract new service providers to offer other information via DAB including:

- newspapers and other publications
- financial data such as stock quotes and interest rates
- advertising
- Internet pages

Bosch's ongoing efforts in product development will target portable Notebooks and personal digital assistants with DAB-PCMCIA-cards - known as PC-Card - capable of fulfilling the same functionality and performance as the DAB-PCI-card.

Robert-Bosch Multimedia-Systeme GmbH & Co KG already delivers DAB-core-PCI plugin cards.

For further information email:
ml_mu_sales@fr.bosch.de

DAB activity in Britain gathers speed

In the last issue of the newsletter we reported on the increasing activity in the UK. The past month has been no exception. In the same week four important announcements were made which marked an important stage in the development of digital radio

The BBC confirmed that transmitter coverage of its Digital Radio services can now reach 60% of the UK population (over 30 million people), with 27 transmitters in operation, as planned. Glyn Jones, Managing Editor, BBC Digital Radio said "Alongside the Radio Authority's advertisement for a national commercial licence, it further improves the conditions for manufacturers launching radios."

On March 24, the Radio Authority began the formal process of licensing commercial digital radio, by advertising the licence for the national commercial multiplex. The multiplex, on which the three existing INR services (Classic FM, Virgin Radio and Talk Radio) will be simulcast, will also be able to accommodate up to five new digital stations nationwide.

On the same day, GWR Group plc and Ginger Media Group announced the formation of a new radio consortium to bid for the UK national commercial licence. The consortium, known as Digital One, is led by GWR, owners of Classic FM, and Ginger Media, owners of Virgin Radio. GWR Group Chief Executive becomes Digital One's Chairman and David Campbell, Ginger Media Group Chief Executive becomes Vice Chairman. It is expected that Richard Branson and Chris Evans, both strong supporters of digital radio will play a significant role in Digital One's bid to run the multiplex.

Since then it has been announced that Talk Radio will be joining the consortium, bringing all the UK's national commercial stations under one umbrella for the bid.

Finally, the BBC's Director of Radio, Matthew Bannister outlined initial options for new BBC digital radio services at a meeting in London. Services will include a popular music archive service drawing on the BBC's unique collection of performance, interviews and documentaries. Any new services are subject to the approval of the BBC's Board of Governors, the Secretary of State for Culture, Media and Sport and widespread public consultation.

All four services, Mr Bannister remarked, would be distinctive from any likely commercial radio offering, and increasing the choice of public service radio for listeners would contribute to the success of digital radio by driving the initial uptake of sets.

By Samantha Dawe



The German-based DAB Plattform e.V Board has approved the free use of the digital radio logo during its most recent meeting. Any interested parties can use the logo and special type for the promotion of DAB/Eureka 147 without requiring special permission.

Digital versions of the logo and typeface are available from the DAB-Plattform Web site at <http://www.dab.plattform.de/english/logo.htm> or can be requested on CD-ROM from the DAB-Plattform Project Office (DAB-Plattform @t-online.se.).

The postal address is:
AM Moosfeld 31
D-81829
Munich, Germany

Australia signs up for DAB

The Australian Department of Communications and the Arts has announced plans to introduce digital radio and television services in 2001. The plans allocate frequencies to commercial, community and national broadcasters and give guidelines for the launch of services. The plans also outline a set of measures aimed at upholding the quality of programmes and guaranteeing simulcast of analogue and digital signals for a number of years to ensure that listeners are not disadvantaged.

There will also be opportunities for new digital commercial radio services,

with the number and timing of new entrants to be determined as part of the planning process.

Planning will proceed on the basis that the Eureka 147 system will be used to provide digital services, operating generally in L-band spectrum [1452-1492 MHz] but with consideration of VHF spectrum in regional areas. Existing broadcasters will share a multiplex facility which can provide five CD quality radio services.

The government is committed to ensuring the best possible outcomes and to ensuring that digital radio meets the needs of urban, rural and remote communities. Other planning options and transmission standards will therefore not be discounted in the planning process.

What now for DAB regulations and frequencies?

Former Module 2 Chairman Mark Thomas summarises the outcomes to two questionnaires that addressed the legal frameworks and associated principles that might apply to digital radio and frequency availability

Module 2 provide guidance to members of the WorldDAB Forum on regulatory issues surrounding the implementation of DAB in different countries. Their recent work has underlined the importance of the legal framework and frequency matters to the development of digital radio. Module 2 completed its first phase of work at the end of 1997. The work largely preceded WorldDAB's transition from EuroDAB in January 1997 so the balance of responses and relevance of conclusions does tend to reflect this.

Legal/Regulatory Issues

We received about 40 responses. These were balanced between different countries and categories of respondent: regulators, DAB associations, potential programme providers, potential transmission or multiplex operators, and data service providers.

When the questionnaire was returned in early 1997, respondents expected enabling legislation to be in place as early as 1998 - this has been shown to be optimistic. The Group believes that the limited extent of regulatory frame-works has slowed down the introduction of digital radio although many countries are now urgently addressing this.

A short report of the main conclusions will be posted on the WorldDAB Website but some of the main points were:

- Digital Radio Multiplexes are expected to include the reservation of capacity for virtually all existing analogue public service broadcasters and at least some commercial broadcasters. 50% of respondents expected new competition to be allowed during any introductory phase.
- There was an even split in expectation that the principal licensees in digital radio would be at the multiplex level or at the level of the individual programme service providers. Others expected a mixed approach.
- There is a widespread view that the market will be the dominant mechanism for the introduction of digital radio, with little external direct influence other than the regulatory environment itself.
- Bit-rate allocation to individual services within a multiplex should be flexible between lower limits (to preserve audio quality) and an upper limit (to facilitate audio programme diversity).

- Respondents tend to advocate significant freedom for the use of programme associated data facilities but not at the expense of audio quality.
- It is important to unite the regulation of telecommunications and sound broadcasting elements within a multiplex. The ongoing study of convergence issues is likely within Module 2.
- Many respondents favour a clear limit on the use of multiplex capacity for non-broadcast-related data services - 10% of capacity was a typical figure.
- The questionnaire responses suggest a strong preference for liberal philosophies to apply towards DAB regulation.

Frequency Issues

The Frequencies questionnaire attempted to ask simple questions, again based on the expectation and perception of respondents who were similar in number and balance to the legal matters questionnaire. A full evaluation of frequency demand would have needed to be a much larger and rather hypothetical exercise, requiring detailed but largely speculative plans to be drawn up of geographical areas and transmitter networks. The main conclusions of this questionnaire will be posted on the WorldDAB Website but the following principal trends emerged.

- Analogue services appear to be at saturation point in most countries. The questionnaire did not probe the reasons, although shortage of frequencies is a probable factor, as well as finite financial resources. As expected, the number of services in large cities appears to be significantly greater than in less populated areas.



- Frequency constraints do present a major challenge for digital radio in the short term. Although there are now more analogue services available than existing agreed T-DAB allocations could support, the disparity between actual demand and supply is not so unbalanced, particularly given that the CEPT agreements at Wiesbaden and Bonn (1995 and 1996) provide for the further development of services within the existing allocations for T-DAB.

Respondents estimate that by about 2004, the number of services available on digital radio would be about 20% higher in capital cities and rural areas if there were no frequency constraint. The disparity would be greater in more 'intermediate' locations (e.g. medium density areas centred on large towns). This appears to indicate that frequency limitation may constrain DAB's growth in the first five or so years, but not so as to undermine the establishment of the technology in the market. The fact that receiver introduction is delayed in comparison with expectations at the time of the questionnaire may also alleviate this discrepancy.

- Looking beyond 2004, a more strategic difficulty becomes apparent as the ability of the market to support and have more digital services would increase demand for frequencies. Responses suggest that by about 2010, the typical demand of the market would be for at least three multiplexes to be available to a listener at a given point of reception. More than four would be a typical number in large regional centres and capital cities. This compares with the existing allocations apparent ability to support at least two multiplexes, rising to about four in most areas of peak demand.

- Respondents favour extension of frequency allocations in the VHF range to address this need, although some further expansion of T-DAB allocations in L-Band would be an effective response to some of it, particularly in areas where coverage requirements are small, and the total number of multiplexes exceeds, say, four.

Spectrum is always in demand from competing aspirants and incumbent users, so expanding the T-DAB allocations is not an easy matter, although increasing attention is now being paid to it. The CEPT has established a Project Team within its Frequency Management Structure to review the repartition of the 1452-1492 MHz L-Band range between T-DAB and S-DAB.

The CEPT's review of VHF frequencies lasted several years. It is titled the Detailed Spectrum Investigation and concluded last December. There had been a proposition to effectively allocate the 230-240 MHz range exclusively to digital radio. It is currently mainly used by military applications and this possibility was echoed by our questionnaire responses.

The CEPT did not resolve to implement this at this stage. This is an unsurprising decision, especially given that public penetration of DAB is only about to start now. However, it did agree to review the position at a later date when the position of DAB in the marketplace is better known.

The prospects appear encouraging, but the question of frequency allocations and their expansion is crucially important to digital radio's future. WorldDAB and others will need to keep this matter firmly on their agendas.

Mark Thomas is the Head of Engineering at The Radio Authority.

BBC research shows Digital Radio's potential

The BBC Digital Radio unit set about establishing some hard facts about digital radio and commissioned six pieces of market research during 1997. Research ranged from telephone interviews with early adopters and the general public, to in-depth focus groups with people who had been listening to digital radios for up to a month. A full report will be available in the next issue.

WorldDAB Forum Members

National DAB Groupings

Belgian DAB Platform	Belgium
Club DAB France	France
Club DAB Italia	Italy
DAB Plattform e.V.	Germany
DRRI	Canada
Dutch DAB Association	Netherlands
Polish Platform	Poland
SADABA	South Africa
UK DAB Forum	United Kingdom

Manufacturers

Alcatel	France
Alpine Electronics	United Kingdom
Bang and Olufsen	Denmark
Beckerautoradiowerk	Germany
Bosch	Germany
Clarion Europa	Germany
Delco Electronics	Germany
Edixia	France
Factum Elektronik AB	Sweden
Ford Motor Company	USA
Fujitsu Ten Europe GmbH	Germany
Grundig Car Audio	Germany
Hirschmann	Austria
Hitachi Europe GB	Germany
ITIS	France
JVC Technology	Germany
Kenwood Electronics	Netherlands
Lucent Technologies	United Kingdom
Mitsubishi Electric	United Kingdom
Motorola Inc. Wilmington	Switzerland
Orban Inc.	USA
Panasonic Europe	Germany
Philips	Netherlands
Pioneer Electronics	Belgium
RadioScape	United Kingdom
Rohde & Schwarz	Germany
Sharp Corporation	Japan
Sony Deutschland International	Germany
The Technology Partnership	United Kingdom
Thomson CSF	France
Thomson Multimedia	France
Volvo Car Corporation	Sweden

Research Agencies

CCETT	France
Daimler-Benz Aerospace	Germany
Fraunhofer Gesellschaft	Germany
IRT	Germany
Roke Manor Research	United Kingdom

Broadcasters/Service Providers

Bayerischer Rundfunk	Germany
BBC Radio	United Kingdom
BBC World Service	United Kingdom
CLT UFA	Luxembourg
Danmarks Radio	Denmark
Deutsche Welle	Germany
GWR - Classic FM	United Kingdom
Magyar Radio	Hungary
NRK	Norway
P4 Radio	Norway
Polskie Radio	Poland
Radio France	France
Radio France Internationale (RFI)	France
Radio Romania	Romania
RAI	Italy
SRG	Switzerland
Suddeutsche Rundfunk	Germany
Sveriges Radio	Sweden
Turkish Radio	Turkey
VRT	Belgium
Yleisradio	Finland

Network Providers

Deutsche Telekom	Germany
Merlin Communications	United Kingdom
National Transcommunication (NTL)	United Kingdom
Nederlandse Omroep (Nozema)	Netherlands
SBS Corporation	Australia
Sentech	South Africa
Swisscom	Switzerland
TDF	France
Tele Danmark A/S	Denmark
Telecom (Norkring)	Norway
Teracom	Sweden
World Radio Network Ltd	United Kingdom
WorldSpace	USA

Regulatory Bodies

General Inspectorate of Communication	Hungary
Liikenneministerio (Ministry of Comms)	Finland
Ministry of Telecommunications and Post	Netherlands
National Telecom Agency (Telestyrelsen)	Denmark
National Transmission Agency	Australia
OFCOM/BACOM	Switzerland
Radio Authority	United Kingdom
Telecommunications Admin. Centre	Finland

International Organisations

ABU	Malasia
AER	Belgium
CRCA	United Kingdom
EACEM	Belgium
EBU	Switzerland
ETSI	France
Eureka 147	Germany
European Commission DG X and DG XIII	Belgium
Federation of ARB	Australia
ITU	Switzerland
Radio E	Belgium
RDS Forum	Switzerland

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