World DAB Forum

COUNTRY PROGRESS REPORTS

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DAB: a digital revolution for Europe and the World
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**Australia**
Digital Radio services are planned to start in the second half of 2001. In early 2000 a public consultation will be conducted and the necessary legislation is expected to be passed in July. Services will generally be in L-Band with VHF being considered in some regional areas. Initial services will be provided by existing radio broadcasters with a lengthy simulcasting period. There is a permanent test facility in Canberra, which is exploring SFN (single frequency network) performance and evaluating service planning tools. In June, Digital Radio 2000 was officially inaugurated and comprises of 5 networks: the ABC, Austereo, ARN, Macquarie, and 2KY Racing Radio.
In Sydney, a consortium of broadcasters is operating a two-station SFN and another pilot system is expected to be set up in Melbourne before the end of the year. As a replacement for high power AM stations with wide area coverage, Australian broadcasters are also looking into DRM (Digital Radio Mondial).

**Austria**
There is currently one Multiplex operating with three transmitters in Vienna, covering the whole city. Future plans involve setting up transmitters in Tyrol (Innsbruck), Steiermark (Graz), in the city of Salzburg and Upper Austria (Linz). The Vienna multiplex features the channels Ö1 (classical music), Radio Wien (local station), Ö3 (pop music) and Blue Danube Radio/FM4.

**Belgium**
Since 1\textsuperscript{st} January 1999, VRT, the public broadcasting company for the Flemish community in Belgium, has had 14 DAB transmitters in operation, covering about 5 million people. A further extension is planned by the end of 1999. Currently 80\% of Flanders – around 5.3 million people - has coverage and this figure is expected to reach 100\%. In 2000, VRT is broadcasting 6 existing channels and one new service on Digital Radio.
RTBF, the public broadcasting company for the French community in Belgium and its partner, the Walloon Ministry of Equipment and Transport, set up the first operational transmitter on July 1\textsuperscript{st} 1999. By the end of this year, 5 transmitters were operating. The official launch of the RTBF network is planned for January 2000.

**Canada**
The "official" launch of Digital Radio in Canada took place on 1\textsuperscript{st} November 1999 during the Canadian Association of Broadcasters Convention in Montreal. Networks in Toronto, Montreal and Vancouver have been operating since early this year. With the networks operating in Canada’s three largest cities some 10 Million potential listeners can receive DAB which amounts to about 35\% of the population. In Toronto, 15 private and 4 public CBC services are on air, in Montreal there are 5 private and 4 CBC stations (4 more commercial stations have applied for licenses) and in Vancouver 7 services are on air with another 6 which have been approved. The Canadian DAB platform organisation DRRI recently changed their name from "Digital Radio
Research Inc.” to “Digital Radio Roll-Out Inc.” to reflect the market launch of the system. DRRI plans to promote Digital Radio at various events in the Toronto area and to facilitate the successful transition from analogue to digital radio in Canada.

China
A three-station Eureka 147 network in the burgeoning Guangdong Province was opened on 15 December 1996. The three sites are Foshan, Guangzhou (formerly Canton) and Zhongshan.

Czech Republic
The national platform, the Czech Digital Media Group, was recently set up in the Czech Republic and is looking at Digital Television and Radio matters. Ceske Radiokomunikace, the main provider of radio and television transmitter networks in the Czech Republic, and Czech Radio, the public broadcaster, began experimental DAB services in Prague in March 1999. The experimental project uses a mini SFN of two transmitters (Prague-Mesto and Cukrak). Currently, four Czech Radio programmes are transmitted: Praha, Radiojournal, Vltava and Regian along with some PAD and NPAD. Urban Prague is currently covered by a DAB signal, which represents about 12% of the population of the Czech Republic.

Denmark
Tele Danmark have three transmitters in operation. There is a two-transmitter SFN in the Copenhagen Area at Hove and Margrettheholm, and a separate independent transmitter at Vestjylland in Western Jylland. Around 30% of the population have DAB coverage.

Finland
In May 1999, the first part of the national DAB network was launched by the public broadcaster YLE with 10 transmitters, covering 2 million people (approximately 40% of the Finnish population). One month later, a first regional multiplex was launched covering 1.2 million people. YLE currently simulcasts its 6 existing channels on DAB and has added 4 new services. The Finnish government has received 32 applications from commercial broadcasters and the Ministry of Transport and Communications is currently deciding on license allocations. The government also announced that it will advertise the first local multiplex for private stations in the Greater Helsinki area shortly. National, regional and local multiplexes all operate in band III in Finland.

France
In January 1997, TDF (Télédifusion de France) established the first DAB transmitters in Paris. Meanwhile, TDF is broadcasting 13 DAB programmes on two multiplexes in the French capital, a third multiplex with 5 programmes is operated by SOGETEC. These transmitters alone cover some 10 million people in the Greater Paris area, about 17% of the French population.

Meanwhile, DAB networks have also been launched in the cities of Lyon, Marseille, Nantes and Toulouse. There are three multiplexes on air in each of the cities, carrying between 4 and 7 services each. In Lyon a new player called ”La Voix du Lyon” recently joined TDF and SOGETEC and operates the cities third multiplex.
In October, TDF also established a network along the motorway between Tours and Poitiers that will be extended over the next few months. Today, some 15 million people, or 25% of the population are covered by regular DAB transmissions. TDF intend to cover 25 million people by the end of 1999.

The French government published a White Paper on the digitisation of radio and television which will prepare a new legislation regulating Digital Radio. It will be drafted during the course of the year 2000. Meanwhile, the provisional ”loi Fillon”, a law dealing with digital test transmissions was extended until next year. Hence the French regulatory body CSA can continue to grant provisional licenses, allowing further extensions of the DAB networks in France.

**Germany**

In Germany, the Federal States are launching DAB at different paces as they all have their own individual broadcasting legislation. On 1st April 1999, the eastern German state of Saxony Anhalt was the first to launch Digital Radio services. More than 95% of the State, and virtually all of the 2.7 million inhabitants are covered.

In May, Bavaria became the second Federal State in Germany to switch from pilot to regular services, with an initial coverage of over 40% of area and population. The networks will be extended to almost 90% coverage in 2005.

Meanwhile, all 16 States have expressed their commitment to DAB. In Baden Wurttemberg, 15 commercial broadcasters were granted licenses in April and a joint venture company comprising the public broadcaster SWR, transmission provider Deutsche Telekom and some private radio stations was set up to operate the networks. The new company called Digital Radio Südwest (DRS), being the sole applicant for a transmission license, is still waiting for the final authorisation by the federal Regulatory Authorities and expects to officially launch services in December. In January, Saxony and Thuringia plan to go on air, soon to be followed by Rhineland Palatinate, Saarland and North-Rhine Westphalia.

The five North German States recently signed an agreement on a joint Digital Radio roll-out in their territory, starting on the occasion of next year’s Expo fair in Hannover.

Today, some 30% of the population or 25-30 million people are already covered by DAB transmissions – pilot and regular - with more than 100 programmes on the air.

Germany is a key country for the success of DAB because of the size of its potential market of more than 80 million people, 38 million households and 42 million cars.

**Hong Kong**

Radio Television Hong Kong (RTHK) is going to launch a DAB trial in August 1998. The results will serve as a basis for further development of terrestrial DAB services across Hong Kong. RTHK launched a tender for the supply of L-Band DAB equipment in mid-January 1998.

**Hungary**
The public Hungarian broadcaster, Magyar Radio, started experimental DAB transmissions in Budapest using a 250W transmitter. Services began on 1 December 1995 and coincided with Magyar Radio’s 70th birthday. The multiplex contains 3 main domestic programmes and one special high-quality programme reaching three million people. Some data services will be included in the near future and a second transmitter has also been installed covering 20% of the population. Both transmitters are delivering DAB coverage to approximately 60% of the Hungarian population.

India
Another vast nation looking to the Eureka 147 system as the future of radio. The public broadcaster, All India Radio, started preliminary studies and experiments some time ago and set up a test transmission system in Delhi. Over the past two years or so, work has been oriented towards DAB service planning, satellite distribution of a DAB ensemble and its relay in major cities.

Ireland
RTE launched a 5-channel DAB pilot system in Dublin on 15th November 1999. RTE installed a 500 Watt DAB transmitter in the Three Rock site above Dublin city operating on channel 12c, in the VHF band. The Republic of Ireland has a population of around 3.6 million and about one million of these live in Dublin. The pilot transmitter carries RTE’s four FM services, the national commercial channel Today fm and international broadcaster WRN.

RTE are going to investigate multi-media applications and would like to link the system to their extensive radio Web Site. The pilot will assess also potential interference to cable TV services. RTE intends to develop a national DAB system in the near future based on the experiences of other forum members and the results of the pilot system.

Israel
Bezeq, the Israeli Telecommunications Corporation, has been piloting DAB transmissions since 1996, using Band III. There are currently two transmitters covering about 70% of the Israel population and a third is planned. Bezeq sponsored an international conference in Tel Aviv in May 1997 to communicate the benefits of DAB to governmental and business organisations.

Italy
In 1995, RAI, the Italian public broadcaster, introduced the first DAB service on channel 12/VHF in the Aosta Valley in an SFN configuration. In 1998, the Italian Parliament approved a new Telecommunications / Broadcasting law which provides the basic regulatory framework for the introduction of DAB. Only existing FM broadcasters can receive a digital radio license. These licenses will be free of charge until 2007. Currently, another broadcasting law is under consideration which will regulate the transition from anaalogue to digital broadcasting for radio and television.

RAI now has five DAB transmitters in operation providing full coverage along the A5 motorway and the Gran S. Bernardo highway. An ensemble with all the RAI programmes and one data channel is currently broadcast in Milano, Torino, Andrate,
Japan
After reviewing alternative Digital Radio systems including Eureka 147, Japan has decided to use a national solution called ISDB-T (Terrestrial Integrated Services Digital Broadcasting). ISDB-T is a technology for broadcasting both digital radio and television with the ability to broadcast at both narrow and wide bandwidths. It utilises COFDM signal coding technology, the same system that was developed for DAB. ISDB-T services are expected to be available in Japan 2005-2007. So far, no other country has opted for the ISDB technology. Most recently, Singapore chose Eureka 147 over ISDB-T after an intensive evaluation of the existing digital broadcasting standards.

Malaysia
A draft National DAB Spectrum plan for Malaysia was presented to the spectrum regulators from Malaysia, Singapore and Brunei. Frequency block allocations should now be allocated (one block as an SFN Band III throughout Malaysia and another block as a Regional Network in Band III). Two blocks have also been requested in L-Band (one SFN and one Regional Network). A Pilot Project was started in 1998. It was scheduled to be allocated, in Kuala Lumpur in Band III.

It is hoped that a trial will also take place in Johore Bahru (a border city with Singapore) with at least two transmitters operating in Band III. The government recently gave a Tax Free Operational Status to radio stations for 10 years for Digital Broadcasting and Multi-Media applications. With this status, AMP Radio Networks hope to build a Development Department of innovative software engineers to assist in developing the software applications particularly for Malaysia. These applications will be tailored to allow automated data handling from AMP Radio Networks broadcast transmission centre.

Mexico
Some terrestrial and satellite experiments are currently taking place in L-Band.
The Netherlands
The Dutch DAB pilot project entered a new phase in July 1998, when the first DAB receivers started selling on the consumer market. The licensing of DAB frequencies by the Dutch Government is expected to take place at the end of 1999.

Currently, the pilot multiplex operated by the Dutch DAB Foundation reaches 45% of the population via three transmitters. Commercial broadcasters Sky Radio, Veronica, Classic Arrow Rock and Radio 10 Gold share the multiplex, together with public broadcaster NOS Radio 2 and 3.

In early 1999, new broadcasting facilities provider db Europe went on air in four Dutch cities in L-Band: Amsterdam, Breda, Hellmond and Eindhoven are covered in L-Band. The Broadcasters on-air are Salto Anderstalig, Salto Informatief, Radio Amsterdam, Amstel Radio, New Dance Radio, City FM and World Radio Network.

Norway
The national network went into regular service on 1st February 1999 with public and commercial services. Public broadcaster NRK has been assigned 4/6 of the capacity, 1/6 each went to commercial FM station P4 Radio Hele Norge and to a new station called Radio 2 Digital who received their license in August. Network operator Norkring is currently expanding the transmitter network and expects to cover about 50% of the population by the end of 1999 with 30 DAB transmitters. Within a few years, Norkring plans to extend the coverage to 95%. The coverage is being planned with careful attention to continuous coverage on important main roads in the area. The existing network, will be providing DAB coverage to approximately 35% of the population.

Currently, NRK P2, P3, and P4 Radio simulcast their existing analogue services on digital radio. Additionally, there are four new service: NRK Alltid Nyheter (24 hour news), NRK Alltid Klassisk (24 hours classical music), NRK Metro (urban adult) and NRK Stortingskanalen (parliamentary network). Radio 2 Digital is expected to go on air in April 2000.

Poland
Polskie Radio, the Polish public broadcaster, is currently broadcasting 4 audio services in Band II with 8% of the population receiving the signal in central Poland. Recently a trial began along the European Route E22 in the Southern part of Poland in Band III that reaches about 6 million people. The Polish Radio Authority is currently seeking ways of broadcasting in the Northern part of the country.

Portugal
RDP is the national network provider for DAB in Portugal and the programme provider for half of the DAB multiplex. In June 1998 RDP won the licence for the commercial use of the national multiplex (12B). A national network of some 44 transmitters will cover the whole country carrying 6 programmes – three of them from RDP (Antena 1, Antena 2 and Antena 3).

By the end of 1999 they will have 15 transmitters in use, 13 in the mainland, one in Azores and one in the Madeira Atlantic islands so covering about 70% of the
population and about one third of the country’s area. This equipment will serve Portugal's 750 km coastline. Full coverage will be reached by the end of 2004 in the mainland and Madeira, and by 2006 in the Azores.

The government is preparing a new tender for the regional blocks in Band III and is evaluating the introduction of the L Band for small local radios.

**Singapore**

Regular digital radio services in Singapore were launched on 19\textsuperscript{th} November 1999. Radio Corporation of Singapore (RCS) who received their license in January 1999 dubbed their service SmartRadio. The DAB ensemble in Singapore carries 6 audio services, Symphony FM92.4, Class 95FM, News Radio FM93.8, Y.E.S. FM93.3, Bloomberg Radio and a preview channel. Additionally, some 10 multimedia services are part of the multiplex, including traffic information, weather news with live photos and financial reports.

First pilot transmissions of RCS and SAFRA Radio began in 1997. The Singapore Broadcasting Authority, the national regulator who has been promoting digital radio, has also spearheaded a "Multimedia Radio Forum" to bring DAB to a higher plane and to create more synergy among industry players. It currently has about 100 members.

In October, Singapore became the first country where cars can be ordered equipped with a DAB radio. Korean car manufacturer Hyundai are delivering all Grandeur XG cars in Singapore equipped with the Pioneer GEX P900 DAB02 tuner. A young Singapore-based company, Plexus Multimedia, has developed the prototype of a hand-held digital radio that includes an MP3 player/recorder that was presented for the first time at the launch of SmartRadio on 19\textsuperscript{th} November 1999. Production is expected to begin in April 2000.

**Slovenia**

The public broadcaster, RTV Slovenia has been carrying out experimental transmissions since October 1997 to cover the central part of Slovenia including the capital city of Ljubljana. About half a million people are potentially able to receive DAB transmissions.

**South Korea**

Tests and evaluations of the Eureka 147 system have been carried out. The Ministry of Information and Culture has announced that the system will be adopted in South Korea over the next five years.

**South Africa**

By late 1997, test transmissions started in both Band III and the L-Band covering Johannesburg with a DAB signal. This established the first pilot trials in Africa. Approximately 10\% of the population has DAB coverage. Demonstration of audio and PAD services are being broadcast. The regulatory framework for digital radio in South Africa has yet to be established. In 1999, a new Broadcasting Act was created that deliberately excluded digital broadcasting in expectation of a separate legislation. Currently there are two authorities involved in regulating DAB. The South African Telecommunications Regulatory Authority (SATRA) is dealing with spectrum issues.
for telecommunications services and the Independent Broadcasting Authority (IAB) is responsible for licensing services and planning the broadcast frequency spectrum.

Spain
In July 1999, a law was passed creating the framework for the launch of DAB services in Spain. The decree provides spectrum for 3 national and 2 regional coverages in band III from 1st of January 2000 and additional L-band spectrum for local services from 2003. All analogue TV stations using channels 7-12 have to relocate their transmitters to UHF frequencies by the end of 1999. The first national coverage has to cover 20% of the population by the end of 1999 and 50% by June 2001, there are similar requirement for the other national and regional networks.

A call for tender for the national and regional multiplexes was closed at the end of October. The licenses are expected to be awarded before the end of the year.

On the first national network, four channels are reserved for the public broadcaster RTVE, as well as two channels on the second national network which can be disconnected for regional windows at certain times. In the regional networks, public broadcasters can claim up to three channels for their services.

Spain’s first DAB pilot broadcasts began in April 1998 in Madrid, Barcelona and Valencia. Trial services in the Catalonia region cover some 80% of the region with a DAB signal. It is hoped that by November 1999 the coverage will be extended to 95% of the population of the region (or 5.8 million people)

Radio Nacional Español (RNE) are broadcasting services alongside some commercial broadcasters.

Sweden
Swedish Radio and Teracom began DAB services in September 1995. Teracom networks now cover 85 per cent of the population (approximately 6 million people).
Swedish Radio simulcasts 3 national networks as well as a 24 hour classical music channel, a Finnish language channel and the multilingual SR International service.
Swedish Radio is planning to launch another DAB-only channel. In January 2000, Swedish Radio launches a data service called SR Plus with 64 kbit/s.

The regional ensembles will carry both public and private services. The regulatory framework for commercial broadcasters is still under construction but first commercial trials are running in the regional ensembles in Gothenburg and Malmö.

Switzerland
Regular digital radio broadcasts in Switzerland began on 15th October 1999 in the Berne/Biel/Interlaken/Solothurn area. In November, a second network was launched in the Zurich region. Additional networks will be switched on in Basle and Geneva early next year.

Public broadcaster SRG-SSR received the first Swiss digital radio license in February 1999 from the Federal regulator BAKOM/OFCOM. The SRG license includes operation of a both DAB multiplex and transmission network in VHF as well as the right to launch a new youth service.
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The first multiplex includes the cultural service DRS 2 which has a very poor FM coverage, the new youth channel Virus, and the services Musigwälle, SwissJazz and SwissPop which currently can only be received via cable or satellite.

SRG plans to expand the networks in all four Swiss language regions by 2002 and after a review of the receiver roll-out it will target full area-coverage for 2006.

BAKOM/OFCOM has announced that in 2003 commercial broadcasters might be licensed. SRG plans to relocate television services in channels 10-11 to free additional spectrum for own and commercial DAB multiplexes.

Turkey

TRT launched a test network in Ankara in mid 1999 in Band III. Two transmitters cover the city and reach 90% of the Ankara region (3.5 million people). A CD comprised of pre-recorded services will be used as the signal source. TRT Radio will be simulcast on DAB and FM. A new technology group has been set up and other key players such as manufacturers, commercial broadcasters, government bodies and network providers will also be invited to join.

United Kingdom

On 15th November, the national commercial digital radio operator Digital One launched its network with five services. Digital One plans to broadcast a total of 10 services from early 2000 onwards with the additional services being launched at a rate of one a month. The BBC has been broadcasting on DAB since September 1995. Both national transmitter networks cover more than 60% of the UK population (over 30 million people).

The BBC simulcasts its five national networks plus extra live sports coverage and live coverage from the House of Commons. Additional channels are expected to be launched next year. Digital One carries the three national existing commercial stations Virgin, Classic FM and Talk Radio. In November, the first two digital-only channels Core and Planet Rock were launched. The services to go on air in the next months include a rolling-news service, a sports channel and a “plays, books and comedy” channel.

Digital One is owned by the UK’s biggest commercial radio group GWR and network operator NTL.

The BBC and Digital One have teamed up to jointly market and promote digital radio in the next years. The first major joint appearance of the two national broadcasters was at the London Motor Show in October 1999. Future activities will include joint presentations at conferences and exhibitions, digital radio literature, listener research and retailer training.

Meanwhile, the Radio Authority, the regulatory body for commercial broadcasters in the UK, has awarded the first 7 of a total of 26 local licenses. The first local multiplexes in London, Birmingham, Glasgow and Manchester will go on air in May 2000. The local multiplexes must also carry the BBC’s local services.
In London, there are also two multiplexes are on air for test and demonstration purposes. One is operated by NTL and CE Digital, the other by Castle Transmission and World Radio Network.

**USA**
While the Eureka 147 system has emerged as clearly superior in laboratory and field tests carried out by CEMA (Consumer and Electronics Manufacturers Association), the National Association of Broadcasters opposes the adoption of Eureka 147 in the USA. This opposition is based on lack of new spectrum; dislike of sharing transmitters in the multiplex; and concerns that DAB would introduce new competition. Efforts are being made to develop a more limited in-band solution (IBOC, In-band on-channel), utilising existing FM transmitters. In practice, the IBOC trials carried out so far have shown various problems. The digital signal is not robust against multipath problems and might interfere both with the FM-carrier and adjacent channels. Currently three companies work individually on proprietary IBOC solutions.

CEMA has recently proposed a new system for mobile multimedia systems called MMBS (Multimedia Broadcasting System). MMBS shows various similarities to Eureka 147 and would operate in UHF. CEMA is lobbying for frequencies that might become available through the digitisation of television. The FCC has also approved two licenses for satellite delivered Digital Radio in the S-Band, although this will inevitably have limited penetration in cities and especially in cars.