Commission for
Communications Regulation

Submissions to Consultation

Digital Sound-Broadcasting Multiplex Licence Conditions 2008: Consultation Submissions

Submissions received from respondents

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An Coimisiún um Rialáil Cumarsáide
Commission for Communications Regulation
Abbey Court Irish Life Centre Lower Abbey Street Dublin 1 Ireland
Telephone +353 1 804 9600 *Fax* +353 1 804 9680 *Email* info@comreg.ie *Web* www.comreg.ie

Contents

1 Beat 102103

Replies to Consolation Questions on Licensing Digital Terrestrial Radio.

Complied by

October 2008

Q. 1. Do you consider that the proposed length of a Digital Radio Multiplex License is appropriate? If not, how long should the license period be for? Please give reasons supporting your proposal

The first phase should be for 15 years and after that there should be a 10 year license. This will give the industry and the public time to settle down with the new technology.

Q. 2. Do you consider that other factors might also need to be considered in determining the length of the license?

Penetration of receivers in the market should be taken into account when determining the length of the license. If the uptake of receivers is poor then the length of the license should be longer this will give the operators a better chance to establish the services.

Q. 3. Do you agree with the proposed license conditions relating to interference, other authorizations and responsibilities, variation of license, Non-ionizing radiation, sanctions for non-compliance and provision of information? If not, please support your position with other relevant considerations.

Yes we agree with the proposed license conditions relating to interference, other authorizations and responsibilities, variation of license, Non-ionizing radiation, sanctions for non-compliance and provision of information.

Q. 4. Do you consider that any other relevant conditions should apply? If so, please specify and give the reasons for your proposal.

No we do not consider any other conditions.

Q. 5. Do you agree with ComReg's proposal that at least 80% of a licensed Digital Sound Broadcasting Multiplex's capacity should be used to carry digital sound broadcasting services, associated technical services, or text and graphics content related to the sound broadcasting services? If not, please propose an alternative scheme and the reasons for your view.

We agree with the proposal that at least 80% of a licensed Digital Sound Broadcasting Multiplex's capacity should be used to carry digital sound broadcasting services

Q. 6. Do you agree with the level of license fee proposed for Digital Sound Broadcasting Multiplex licenses? If not, please suggest an alternative fee

regime with supporting reasons.

Yes we agree with the fee regime.

Q. 7. Do you agree with the proposed license fee review on the fifth anniversary of any Digital Sound-Broadcasting Licenses? Please elaborate with reference to technological or other relevant developments.

Yes, however this should be undertaken with a review of the market in order to see how well DAB is been adapted by the public. This review should also take in to account the content providers and the service that they provide along with the listenership figures this will help to ensure that the content is kept at a high standard and therefore attract better listenership.

Q. 8. Do you consider that broadcasters should set encoding parameters that can objectively offer an equivalent to the current FM analogue service? Please elaborate on your answer?

Yes but under guidelines set down by the BCI. It would not be good practice to have a free for all regarding audio encoding as the audio standard of stations could vary so much as to alienate the listeners. It has seen that in the UK the lack of "CD" quality has been a factor in the poor uptake of DAB and we should avoid this from happening by keeping a tight grip on the encoding standards.

Q. 9. What audio encoding parameters would you suggest? Please justify your answer?

Minimum Stereo Audio bit rate should be 160kbps and 64kbps for a Mono speech service on the DAB platform.

For stereo audio on the DAB+ platform listening tests carried out by the EBU show that at an audio bit rate of 48 kbps using AAC offers good to excellent quality and at an audio bit rate of 64 kbps it offers excellent quality.

We would like to see DAB+ as the digital technology adapted in Ireland as it is a far better system offering a higher audio quality and is more efficient from a data point of view.

Q. 10. Please provide comments on the proposed technical conditions having regard to Sections 3.1.5, 3.1.6 and ComReg's legislative requirements in Section 4.1?

It will be important to have a very clear road map for the implementation of digital audio broadcasting in Ireland. This service will have to run alongside the existing FM services and therefore will have to be of a very high standard in order to attract listeners. This in turn will increase the uptake of receivers in the market place.

DAB+ would be the best technology to use as is can be seen from the benefits in section 3.1.5. however the availability for suitable receivers and the timescale of the rollout will be important. DAB+ is new and the number of receivers is low add to this the reluctance of OFCOM to adapt it in the UK may force Ireland to use the original DAB MPEG2 format.

With regard to services available on the digital platform it should not be good enough to just re broadcast the analog content from the FM provider . Perceived improved audio quality will not be enough to increase listenership there will have to be improved and unique content also.

2 Digital Radio Ltd

Ms Sinead Devey
Commission of Communications Regulation
Irish Life Centre
Abbey Street
Dublin 1

16th October 2008

Ref: Submission - Licensing Digital Radio Consultation 08/79

Dear Ms Devey,

We would like to contribute to the Commission's consultation on Digital Terrestrial Radio with particular focus on Questions 5, 8, 9 and 10 of the consultation document.

About Us
Digital Radio Ltd was established in 2007 by well known broadcaster Dusty Rhodes. Dusty has over 25 years of experience at all levels of the Irish broadcasting market. The company is an active participant in the current DAB trial with two services; *All 80s* and *Mocha*. We are also a full member of the cross-industry *digitalradio.ie* group.

Our comments on the consultation are as follows;

Digital Radio Ltd. 7/8 Upper Mount Street. Dublin 2. +353 1 6611999
Directors: I Nolan R Nolan No.424571 VAT Reg 9647398U

Q5: Do you agree with ComReg's proposal that at least 80% of a licensed Digital Sound Broadcasting Multiplex's capacity should be used to carry digital sound broadcasting services, associated technical services, or text and graphics content related to the sound broadcasting services? If not, please propose an alternative scheme and the reasons for your view.

No. We do not agree.

Our view is that 100% capacity should be allocated to Programme Service Providers using audio and data to deliver the listener a superior digital radio experience. This is opposed to 20% of the overall multiplex capacity being allocated to non-audio services not associated with the Programme Service Providers.

We propose that within that bandwidth allocated to each Programme Service Provider they must supply an audio service and data relating to the output of that service. For example, a Programme Service Provider with 128k could provide audio at a bit-rate of 112k and "now/next", "now playing" or "EPG" data would occupy the remaining 16k.

As better encoding technologies are introduced, the portion of bandwidth required for audio would reduce to 64k or lower allowing the Programme Service Provider to deliver superior programme related data. This could be extended information on the programme being broadcast such as biographical material on a musical artist playing or a guest being interviewed on a talk programme. It could be a news, traffic, weather or other information service displayed on a receiver's screen using text and/or pictures. It could even be a form of download service allowing a listener to purchase music or free on-demand programming.

What is important is that the data displayed / available will be relevant to the audio programme being listened to. This type of additional data is one of the key benefits of digital radio for listeners and should be a requirement on all Programme Service Providers.

Q8: Do you consider that broadcasters should set encoding parameters that can objectively offer an equivalent to the current FM analogue service? Please elaborate on your answer.

We firmly believe broadcasters should set encoding parameters that can subjectively offer an equivalent to the current FM analogue service for a number of reasons;

1. Quality of audio is a subjective matter. During the 1980's and 1990's consumers in their millions invested in Compact Disc. In the past 10 years, these same consumers have invested in mp3 players, ripping those same "perfect quality" Compact Disc's to low bit-rates of 128k and often less. Consumers did this for reasons far removed from sound quality. They moved from vinyl to the more portable / easily stored compact disc and from CD to mp3 for the same reasons. Sound quality was not an issue.

   The same can be said of television. A CRT screen displays a superior picture to new LCD screens. However because LCD screens are less bulky and offer a much larger picture, consumers are switching for that benefit, not picture quality.

   It will be the same with DAB. Listeners will switch because DAB offers other benefits such as a larger choice of radio stations to listen to and informative data to go with those stations on the receivers screen.

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We agree with the Commission that there is a difference in quality between FM and DAB in Ireland. The difference is the audio heard on FM broadcasts is passed through a sound processor (ie Orban) and pre-emphasis is brought into the chain to overcome audible limitations in FM broadcasting.

We ourselves can hear the difference and feel many DAB stations would benefit from sound processing. However every single DAB listener we have encountered says the sound quality on DAB is better!

2. Radio broadcasters are in the business of offering superior sound quality to listeners. FM broadcasters work hard and invest greatly to ensure their broadcast sounds the best. They know if the quality of their audio output is sub-standard, they won't attract listeners and hence advertisers and before long they are not in business any more.

   As DAB becomes a common broadcasting platform broadcasters will move from a low-cost trial operation to investing in sound quality with correct sound processing on their audio output.

3. Broadcasters know their listeners and their product very well. They know various bit-rates are suitable for various programming types. For example mainly speech programming is well suited to a slightly lower bit-rate whereas classical music demands a high bit-rate.

4. Broadcasters also know if the quality of their output is not to a standard acceptable by the listener their broadcasting service and advertising revenues will suffer. The market will ultimately decide.

Q9: What encoding parameters would you suggest? Please justify your answer.

Our comments on this question specifically relate to which encoding technology Ireland should adopt, DAB or DAB+

The EBU has recently published the "WorldDMB Digital Radio Receiver Profiles" a set of minimum features and functions for all digital radio receivers. The minimum is "Standard Profile 1" which specifies a requirement for reception of DAB, DAB+ and DMB to be built into every radio receiver ensuring interoperability across Europe. As these EBU Profiles have the backing of Europe's major manufacturers, as well as broadcasters, we can reasonably expect receivers sold in Ireland from late 2009 to be DAB+ capable.

With that in mind we propose, for the short term, all of a Multiplex capacity is devoted to the carriage of initial services being encoded simultaneously in DAB *and* DAB+ This will ensure current DAB listeners in Ireland and in the border region can continue to enjoy DAB radio while the new standard DAB+ receivers become commonplace. Based on quotes received by our company from DAB Multiplex manufacturers a single multiplex can broadcast eight services simultaneously in both formats.

In the medium term, when DAB+ capable receivers hit a critical mass, the Multiplex will be in a position to drop the old DAB standard freeing up bandwidth for new Programme Service Providers and the development of programme related data services as outlined above. As relatively few DAB receivers have been sold in the Republic this should take no more than 18 to 24 months.

Digital Radio Ltd. 7/8 Upper Mount Street. Dublin 2. +353 1 6611999
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Q10: Please provide comments on the proposed technical conditions having regard to Sections 3.1.5, 3.1.6 and ComReg's legislative requirements in Section 4.1

In our opinion the quoted sections point very directly to the issue of future planning for DAB in Ireland and we direct our comments on a section by section basis;

Section 3.1.5

The Commission notes that DAB in the UK, though successful, has been slow to reach the same critical mass as digital terrestrial television (DTT).

The reason is that DTT is a highly publicised replacement for analogue television which will be turned off in 2012. If consumers do not switch to DTT they will have no service. Not surprisingly the take up has been high.

DAB on the other hand does not have any such mortal deadline. Its adoption by the public is purely on the strength of the benefits it gives listeners. DAB receiver sales over the past five years have grown and continue to grow at a rate of over 30% year on year.*
*(Source RAJAR Digital Listening Q3 2008 / DAB Ownership).

Despite this consumer success, the UK industry is floundering due to a lack of focus. There is no plan for the future of radio in the UK. As a result GCap (now Bauer) and Channel 4 Radio have both withdrawn temporarily from the DAB market. Both companies have cited difficult economic times and not the DAB platform as the reason for withdrawal.

The UK Secretary for Culture, Media and Sport has now established a cross-industry "Digital Radio Working Group" (DRWG) which will report its final findings by the end of 2008. Their interim recommendations published in June state:

- DAB is the most appropriate replacement for analogue
- The future radio landscape should be a mix of DAB and FM
- DAB should be the primary platform for national and regional stations
- FM capacity should be used for local and community radio

From this experience in the UK we can see the need for future planning is critical.

Section 3.1.6

Despite the absence of regulatory factors driving Irelands move to digital there is a push from the industry itself, the Broadcasting Bill 2008 clearly makes provision for digital broadcasting and our FM spectrum is almost at capacity.

The digital radio sector is beginning to emerge in Ireland. Standards are being agreed enabling mass manufacture of radios to receive FM, DAB, DAB+ and DMB broadcasts. Across Europe, the Far East and Australia plans are already underway to adopt one or other methods of DAB broadcasting.

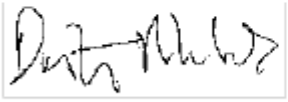
It is a key regulatory duty of the Commission to plan for efficient management of radio spectrum in Ireland, to promote competition, help develop the market and promote the interests of users within the Community.

We feel strongly that now is the time for the Commission to at least begin to formulate a plan for the future of digital radio in Ireland. Without it we are doomed to repeat the same mistakes made in the UK over the past number of years.

Digital Radio Ltd. 7/8 Upper Mount Street. Dublin 2. +353 1 6611999
Directors: I Nolan R Nolan No.424571 VAT Reg 9647398U

We very much appreciate the opportunity the Commission has allowed us to contribute to this consultation and we look forward to the publication of your findings in the near future.

Yours sincerely,



Dusty Rhodes
Managing Director
Digital Radio Ltd

3 Frontier Silicon

FRONTIER SILICON

Contents

FRONTIER SILICON

1 DOCUMENT HISTORY

Issue	Date	Changes / Comments
Draft 0.1	22nd October 2008	

2 SUBMISSION

This white paper addresses the following question posed by the Commission for Communications Regulation in the Consultation Paper entitled "Licensing Digital Terrestrial Radio":

Appendix B – Consultation Questions

"Q9. What audio encoding parameters would you suggest? Please justify your answer?"

3 INTRODUCTION

In 2006 it was made official that DAB Eureka-147 would be supplemented by an enhanced radio standard called DAB+. Based on the original DAB standard, DAB+ uses a highly efficient audio codec, AAC+. In February 2007, DAB+ finalized its European Communication Standards Institute (ETSI) standardisation process.

DAB+ allows regulators and broadcasters to implement DAB with a two to threefold increase in transmission capacity, lower per-station transmission costs and offer listeners an even greater choice of services. In countries such as Ireland where DAB broadcasts are already established, Broadcasters are able to broadcast DAB and DAB+ on the same multiplex at the same time. New multi-mode receivers, which include both types of audio codecs, work in any country with the first DAB+ enabled receivers launched in early 2008.

This white paper:

- Highlights the commercial benefits of choosing to deploy DAB+ over DAB
- Outlines the position of receiver manufacturers with regards to DAB+ receivers
- Provides a summary comparison between DAB and the enhanced DAB+
- Provides a snap shot of the current status of DAB+ roll-out around the world.

4 WHY CHOOSE DAB+ OVER DAB?

4.1 DAB+ provides increased capacity

DAB+ is very similar to DAB. The key difference is the use of the AAC+ audio codec. The AAC+ codec allows more stations to be transmitted on the same multiplex without sacrificing quality of service. In a typical scenario a DAB+ multiplex can have around 3 times more stations than a DAB multiplex (Figure 1)

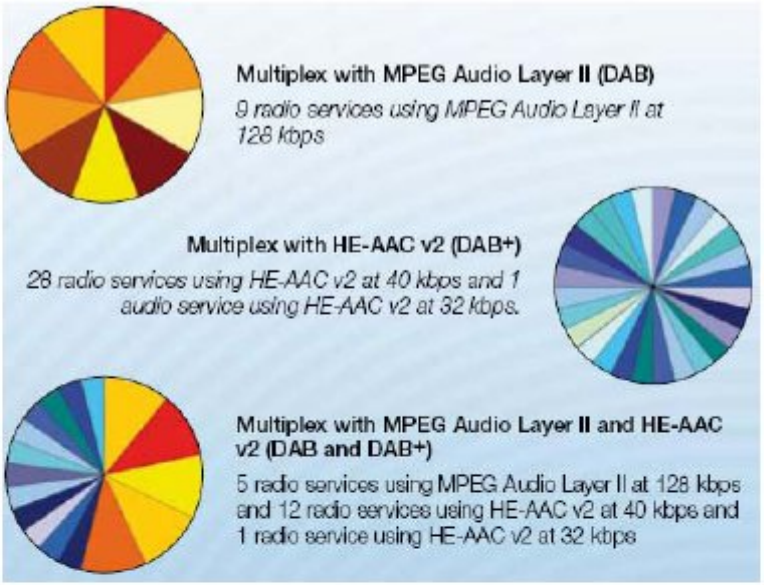


Figure 1. DAB / DAB+ ensemble bit-rate assignments.

What this means for the broadcaster is that each radio station can be broadcast for a third of the cost. Alternatively since DAB+ services take up less room on the multiplex the bandwidth freed up can be used to broadcast additional data services.

From another perspective, a multiplex operator can only transmit around 10 services on a DAB multiplex. This has been seriously limiting in countries who adopted DAB at an earlier stage. They have been forced to either lower the quality of each audio service, which has been highly unpopular with end-users or reduce the number of services. The stations have been left to deal with high transmission costs.

DAB+ multiplexes are being deployed with between 25 to 40 services and this gives broadcaster the freedom to grow, maintain service quality and the end-users a greater variety of content.

4.2 The availability of DAB+ receivers

There is an argument that proposes using DAB in Ireland because it's what the UK uses today. This would seem a sensible and pragmatic approach in that

1) Receiver manufacturers will not build and distribute products only for the Irish market as it is to small so stick with what the UK use

2) There is lots of crossed border movement of goods where consumers buy DAB radio's in the north for consumption in the south.

The above argument would make sense if receiver manufactures continued to produce DAB only radios. However this is not the case any more. Let's look at the market trend:

2007 – Majority of receivers are DAB only

2008 – DAB/DAB+ Receivers available for new DAB+ territories

(see Appendix E - DAB and DAB+ Roll Out around the world)

Generally all new receiver chipsets/modules support DAB+

2009 – Technology matures such that receivers with DAB+ do not incur additional price

2010 – All receivers support DAB/DAB+ as standard

(Frontier Silicon will only make multi-mode receivers available)

There is a clear move across Europe and Australia to standardize on DAB+ for new Digital Radio launches. Furthermore, this move is supported by the work of the EBU[1] and WorldDMB who have defined a minimum receiver profile mandating DAB/DAB+ and DMB-Audio as the mass market radio standard (see Appendix D - WorldDMB Receiver Profiles for details).

By mid 2009 there will be no difference in price for the consumer to purchase a DAB only receiver versus a DAB/DAB+ receiver. This is according to Frontier Silicon who currently power 80% of all DAB radio's with their receiver solutions. Frontier will be converting its entire customer based over to multi-mode receivers by offering a plug-in replacement module at the same price as the current DAB only module.

By 2010, Frontier is confident that receiver manufactures will have fully converted to supplying multi-mode receivers supporting DAB+. This means that by 2010, all products sold in the UK will be profile 1 complaint.

This means that by the time Ireland launches digital radio, there will be an abundance of cost effective DAB+ receivers from low to high end.

4.3 Summary

DAB+ gives the consumer access to a larger choice of content

DAB+ offers broadcasters the potential of 3 times cost savings

DAB+ offers content providers the ability to more easily host data services

DAB+ has no impact on receiver prices

There will be an abundance of DAB+ capable receivers in the market by 2010

5 CONCLUSION

Since the availability of the enhanced DAB standard, countries around the world launching new digital radio broadcast networks are predominantly opting for DAB+. The benefits to broadcasters and consumers alike are compelling. With up to a three times increase in transmission capacity and lower per-station transmission costs, radio listeners have the opportunity for even greater choice of services.

The fact that DAB+ enables more channels compared to DAB means the major players in the radio industry are agreed that it is better to invest immediately in the latest technology rather than needing to upgrade later.

This trend is set to continue with the growing wide-scale availability of multi-mode DAB/DAB+ radios. Thanks to the definition of the Eureka-147 profiles, receiver manufactures now have the opportunity to produce single radio products which will interoperate throughout Europe. Profile

[1] European Broadcast Union

1 in particular, will ensure an abundance of low-cost digital radios from a huge array of audio brands from around the world.

In answer to the question posed at the beginning of this paper and for the reasons outlined throughout, Frontier Silicon strongly recommends DAB+ using MPEG-4 HEAAC v2 as specified in ETSI TS 102 563 "Digital Audio Broadcasting (DAB);Transport of Advanced Audio Coding (AAC) audio".

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APPENDIX A - BENEFITS OF DAB+

- Latest MPEG-4 audio codec delivers exceptional performance efficiency
- More stations can be broadcast on a multiplex
- Greater station choice for consumer
- More efficient use of radio spectrum
- Lower transmission costs for digital stations
- New receivers backwards compatible with existing DAB MPEG Audio Layer II broadcasts
- Broadcasters/regulators can select either standard MPEG Audio Layer II (DAB), or the additional audio coding (DAB+), or both, to suit their country. This means current DAB services and consumers in Northern Ireland could work in harmony with DAB+ services deployed in Ireland
- Compatible with existing scrolling text and multimedia services
- Robust audio delivery
- Optimised for live broadcast radio
- Fast re-tuning response time (low zapping delay)

DAB digital radio is broadcast using MPEG Audio Layer II coding. In the years since the DAB digital radio standard was first defined, more efficient coding schemes and algorithms have been devised. These allow audio with equivalent or better subjective quality to be broadcast at lower bit rates. Other broadcast technologies such as DVB-H (digital video broadcasting for handheld), DRM (Digital Radio Mondiale; i.e. digital long, medium and short wave) or MediaFLO use the audio coding MPEG-4 HE-AAC v2 and are able to carry multiple audio services in the digital capacity needed for a single radio service using MPEG Audio Layer II.

WorldDMB created a Task Force of its Technical Committee to develop the additional standard. After examining the options, DAB+ using MPEG-4 HEAAC v2 was adopted. DAB+ was published in February 2007 as ETSI TS 102 563 "Digital Audio Broadcasting (DAB);Transport of Advanced Audio Coding (AAC) audio".

The significantly increased efficiency, which is discussed in more detail later in this document, offers benefits for Governments and Regulators (even better spectrum efficiency), broadcasters (lower costs per station) and consumers (a bigger choice of stations). It is designed to provide the same functionality as the current MPEG Audio Layer II radio services including service following (e.g. to the same service on another DAB ensemble or its FM simulcast), traffic announcements, PAD multimedia data (e.g. dynamic labels such as title artist information or news headlines; complementary graphics and images etc.).

In some countries where DAB digital radio has already been launched, broadcasters are committed to continuing to use MPEG Audio Layer II. However, in countries planning to launch digital radio the arguments in favour of launching with DAB+ are compelling.

6 APPENDIX B - FEATURES OF DAB+

DAB+ uses MPEG-4 High Efficiency AAC v2 profile (HE-AAC v2). This audio codec is the most efficient audio compression scheme available worldwide. It combines three technologies:

- The core audio codec AAC (Advanced Audio Coding).
- A bandwidth extension tool SBR (Spectral Band Replication), which enhances efficiency by using most of the available bit rate for the lower frequencies (low band) of the audio signal. The decoder generates the higher frequencies (high band) by using the low band and side information provided by the encoder. This side information needs considerably less bit rate than would be required to encode the high band with the core audio codec.
- Parametric stereo (PS): a mono down-mix and side information is encoded as opposed to a conventional stereo signal. The decoder reconstructs the stereo signal from the mono signal using the side information.

HE-AAC v2 is a superset of the AAC core codec. This superset structure permits to use plain AAC for high bit rates, AAC and SBR (HE-AAC) for medium bit rates or AAC, SBR and PS (HE-AAC v2) for low bit rates. Therefore HE-AAC v2 provides the highest level of flexibility for the broadcaster. A detailed description of HE-AAC v2 is available on the EBU website[1]. An introduction to MPEG-4 is available on the MPEG Industry Forum website[2].

HE-AAC v2 provides the same perceived audio quality at about one third of the sub-channel bit rate needed by MPEG Audio Layer II. The same audio coding is also used in DRM and DMB.

MPEG Audio Layer II and HE-AAC v2 radio services can coexist in one ensemble. However, legacy receivers might list HE-AAC v2 radio services even though they will not be able to decode them.

The geographical coverage area of radio services using HE-AAC v2 is slightly larger than that for radio services using MPEG Audio Layer II. The multimedia information carried in PAD of an HE-AAC v2 radio service is much better protected against transmission errors than PAD data of a radio service using MPEG Audio Layer II.

An important design criterion for DAB+ was a short "zapping" delay. Both the time it takes to switch from one radio service to another station on the same DAB ensemble as well as the time it takes to tune to a radio service on another DAB ensemble was minimized.

Currently all DAB radio services are mono or stereo. However, DAB+ also provides the means to broadcast surround sound in a backwards compatible way. Using MPEG Surround it is possible to broadcast a stereo signal together with surround side information (e.g. 5 kbps side information). Standard stereo radios will ignore this side information and decode the stereo signal. MPEG Surround receivers will evaluate the side information and reproduce surround sound. So at a comparatively low additional bit rate, the broadcaster can increase the audio experience on surround sound receivers, and still provide high quality sound to all other radios.

Note: A 40 kbps subchannel with HE-AAC v2 provides a similar audio quality (even slightly better in most cases) to MPEG Audio Layer II at 128 kbps.

[1] EBU Tech review: MPEG-4 HE-AAC v2 – audio coding for today's digital media world (2006)
http://www.ebu.ch/en/technical/trev/trev_305-moser.pdf
[2] An MPEGIF White Paper: Understanding MPEG-4: Technologies, Advantages, and Markets
http://www.m4if.org/public/documents/vault/MPEG4WhitePaperV2a.zip

7 APPENDIX C - PERFORMANCE OF DAB+

During the standardisation process, field tests were conducted in the UK and Australia. They showed that the geographical coverage area of radio services using HE-AAC v2 is slightly larger than that for radio services using MPEG Audio Layer II.

Audio services using HE-AAC v2 performed about 2-3 dB better at the threshold of audibility. This means that in some areas close to the coverage area where MPEG Audio Layer II services already showed audible artefacts, HE-AAC v2 radio services showed no audible artefacts. The error behaviour of MPEG Audio Layer II is different to that of HE-AAC v2. With MPEG Audio Layer II, the weaker the DAB signal gets, the more audible artefacts can be heard.

HE-AAC v2 produces no audible artefacts, but when the signal gets too weak, an increased number of audio frames will be lost and this causes short periods of silence (fade-out and fade-in). Test listeners preferred this error behaviour.

Compared to radio services using MPEG Audio Layer II, radio services using HE-AAC v2 will fail later (they can cope with a slightly lower DAB signal quality), but the margin from error free reception to loss of reception is smaller. To determine the audio quality at low bitrates, listening tests were performed by the EBU (European Broadcasting Union) in 2003. For stereophonic audio, the listening tests show that at an audio bit rate of 48 kbps, HE-AAC offers good to excellent quality, at an audio bit rate of 64 kbps it offers excellent quality.

At the time of these tests, HE-AAC v2 was not yet available. The PS (parametric stereo) tool, which was added after the EBU tests were completed, significantly increases the perceived audio quality at lower bit rates.

It should be noted that the bit rates cited from these listening tests are pure audio bit rates and not DAB sub-channel bit rates. In order to carry audio in a DAB multiplex using the new specification a 10% overhead should be taken into account.

Audio comparison tests performed in Australia in 2005 confirmed that HE-AAC v2 provides similar perceived audio quality at about one third of the sub-channel bit rate needed by MPEG Audio Layer II.

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8 APPENDIX D - WORLDDMB RECEIVER PROFILES

On September 12th 2008, WorldDMB announced a set of Receiver Profiles defining the minimum functionality requirements for radio receiver within each profile. The Receiver Profiles are composed of mandatory features which must be implemented and recommended features which offer enhancements with wide appeal.

Manufacturers making products to receive Eureka 147 based services are encouraged to self-declare adherence of a product to one of the Receiver Profiles. Manufacturers intend to develop a logo to promote digital radio receivers offering this pan-European interoperability.

Broadcasters may use the Receiver Profiles to plan services for maximum take-up and to help listeners to make sensible purchasing decisions.

Regulators may use the Receiver Profiles to develop strategies and policies for digital radio broadcasting within national boundaries or with reference to trans-national and harmonised markets.

The Receiver Profiles describe minimum functionality; the implementation of each feature in conformance with the relevant ETSI standards is best determined by each manufacturer and is not proscribed.

8.1 Receiver Profile 1 - Standard Radio Receiver

This is an audio receiver with a basic alphanumeric display.

Spectrum	Band 3 reception (174 to 240 MHz) is mandatory in all territories.
	L-Band reception (1452 to 1492 MHz) is mandatory for all in-car products and or receivers sold in territories with L-Band services on-air or licensed[1].
Channel decoding	Decoding of a minimum of one sub-channel is mandatory.
	Decoding of a minimum of 280 Capacity Units (e.g. 256 kbps@UEP1) is mandatory for sub-channels containing DAB audio services[2].
	Decoding of a minimum of 144 Capacity Units (e.g. 256 kbps@EEP3B, 192 kbps@EEP3A, 96kbps@EEP1A) is mandatory for sub-channels containing DAB+[3] or DMB services[4].
Audio	MPEG layer 2[5] decoding is mandatory.
	MPEG-4 HE AACv2[6] decoding is mandatory[7].
Text	Service label (station name) display is mandatory.
	Dynamic label display is mandatory on products with a 2-line display or better (except for in-car products).

[1] See www.worlddab.org for details

[2] As defined in ISO EN 62104

[3] As defined in ETSI TS 102 563

[4] As defined in ETSI TS 102 428

[5] As defined in ETSI EN 300 401

[6] As defined in ETSI TS 102 563 and ETSI TS 102 428

[7] Note that BSAC audio is used in DMB profile 1 but is not required for European receivers

EPG	EPG [1] presentation is recommended for products with a suitable display. When implemented it may be used to select services.
Analogue services	FM-RDS[2] and MW (AM) decoding is recommended for all products.
Traffic & Travel	For in-car products, TPEG [3] and TMC[4] decoding is recommended. For in car products, announcement signalling and switching is recommended.
Service Following	For in-car products which include FM-RDS decoding, service following between DAB, DAB+ and DMB services and their signalled simulcasts[5] carried on FM-RDS is mandatory. For in-car products, service following between DAB, DAB+ and DMB services and their signalled simulcasts[6] carried in adjacent DAB ensembles is recommended.

8.2 Receiver Profile 2 - Rich Media Radio Receiver

This is an audio receiver with a colour screen display of at least 320 x 240 pixels.

All Receiver Profile 1 functionality, *plus:*

Channel decoding	Simultaneous decoding of a minimum of four sub-channels is mandatory. Decoding of a minimum of 288 Capacity Units (total) is mandatory.
Text	DL+ [7] and Intellitext[8] presentation are mandatory. Journaline[9] presentation is recommended.
EPG	EPG [10] presentation is mandatory. Decoding of the advanced profile is recommended. The EPG can be used to select and record services.
SlideShow	SlideShow[11] presentation is mandatory.
BIFS	MPEG-4 BIFS[12] presentation is mandatory.
Broadcast Website	BWS[1] presentation is recommended when a suitable browser and navigation method exist.

[1] As defined in ETSI TS 102 818 and TS 102 371; decoded from X-PAD (see EN 300 401 clause 7.4 (v1.4.1 onwards)) and packet mode including FEC (see EN 300 401 clause 5.3.5 (v1.4.1 onwards))

[2] As defined in ISO EN 62105

[3] As defined in ISO TS 18234

[4] As defined in ETSI TS 102 368

[5] Signalling of alternate sources of the same programme using FIG 0/6, FIG 0/21, etc, and on FM-RDS services using RDS ODA 147 (ETSI EN 301 700)

[6] Signalling of alternate sources of the same programme using FIG 0/6, FIG 0/21, etc

[7] As defined in ETSI TS 102 980

[8] As defined in ETSI TS 102 652

[9] As defined in ETSI TS 102 979

[10] As defined in ETSI TS 102 818 and TS 102 371; decoded from X-PAD (see EN 300 401 clause 7.4 (v1.4.1 onwards)) and packet mode including FEC (see EN 300 401 clause 5.3.5 (v1.4.1 onwards))

[11] As defined in ETSI TS 101 499; decoded from X-PAD (see EN 300 401 clause 7.4 (v1.4.1 onwards)) and packet mode including FEC (see EN 300 401 clause 5.3.5 (v1.4.1 onwards))

[12] As defined in ETSI TS 102 428

EPG	EPG [1] presentation is recommended for products with a suitable display. When implemented it may be used to select services.
Analogue services	FM-RDS[2] and MW (AM) decoding is recommended for all products.
Traffic & Travel	For in-car products, TPEG [3] and TMC[4] decoding is recommended.
	For in car products, announcement signalling and switching is recommended.
Service Following	For in-car products which include FM-RDS decoding, service following between DAB, DAB+ and DMB services and their signalled simulcasts[5] carried on FM-RDS is mandatory.
	For in-car products, service following between DAB, DAB+ and DMB services and their signalled simulcasts[6] carried in adjacent DAB ensembles is recommended.

8.2 Receiver Profile 2 - Rich Media Radio Receiver

This is an audio receiver with a colour screen display of at least 320 x 240 pixels.

All Receiver Profile 1 functionality, *plus:*

Channel decoding	Simultaneous decoding of a minimum of four sub-channels is mandatory. Decoding of a minimum of 288 Capacity Units (total) is mandatory.
Text	DL+ [7] and Intellitext[8] presentation are mandatory.
	Journaline[9] presentation is recommended.
EPG	EPG [10] presentation is mandatory. Decoding of the advanced profile is recommended. The EPG can be used to select and record services.
SlideShow	SlideShow[11] presentation is mandatory.
BIFS	MPEG-4 BIFS[12] presentation is mandatory.
Broadcast Website	BWS[1] presentation is recommended when a suitable browser and navigation method exist.

[1] As defined in ETSI TS 102 818 and TS 102 371; decoded from X-PAD (see EN 300 401 clause 7.4 (v1.4.1 onwards)) and packet mode including FEC (see EN 300 401 clause 5.3.5 (v1.4.1 onwards))

[2] As defined in ISO EN 62105

[3] As defined in ISO TS 18234

[4] As defined in ETSI TS 102 368

[5] Signalling of alternate sources of the same programme using FIG 0/6, FIG 0/21, etc, and on FM-RDS services using RDS ODA 147 (ETSI EN 301 700)

[6] Signalling of alternate sources of the same programme using FIG 0/6, FIG 0/21, etc

[7] As defined in ETSI TS 102 980

[8] As defined in ETSI TS 102 652

[9] As defined in ETSI TS 102 979

[10] As defined in ETSI TS 102 818 and TS 102 371; decoded from X-PAD (see EN 300 401 clause 7.4 (v1.4.1 onwards)) and packet mode including FEC (see EN 300 401 clause 5.3.5 (v1.4.1 onwards))

[11] As defined in ETSI TS 101 499; decoded from X-PAD (see EN 300 401 clause 7.4 (v1.4.1 onwards)) and packet mode including FEC (see EN 300 401 clause 5.3.5 (v1.4.1 onwards))

[12] As defined in ETSI TS 102 428

Traffic & Travel	For in-car products, TPEG [2] and TMC [3] decoding is mandatory for products with integrated navigation systems.
Service Following	For personal products, service following between DAB, DAB+ and DMB services and their signalled simulcasts carried in adjacent DAB ensembles and on FM-RDS is recommended.

8.3 Receiver Profile 3 - Multimedia Receiver

This is a multipurpose receiver with a colour screen display capable of rendering video.

All Receiver Profile 2 functionality, *plus:*

Channel decoding	Decoding of a minimum of 432 Capacity Units (total) is mandatory.
Video	H.264[4] decoding is mandatory.

8.4 How will industry benefit from having such profiles?

The WorldDMB Profile's will facilitate the rapid growth of digital radio across Europe by providing receiver manufactures with the economies-of-scale that result from a single Europe-wide marketplace. The mass market, low cost appeal of Profile 1 radio's in particular will ensure the proliferation of multi-mode radios throughout Europe. This in turn will give broadcasters and regulators the confidence to roll-out DAB+ services given there will be a multitude of radios available for the consumer.

Receiver technology provides such as Frontier Silicon are giving receiver manufactures the option to sell low cost DAB / DAB+ capable receivers today. Receiver manufactures also have the option to sell DAB+ upgradeable receivers for retail in mature DAB markets such as the UK. Fast time-to-market is also assured with multi-mode DAB/DAB+ receiver modules being supplied into existing DAB-only radio's as a plug-in replacement[5]. This provides a fast low risk way for receiver manufactures to launch DAB/DAB+ radios.

[1] As defined in ETSI TS 102 498; decoded from X-PAD (see EN 300 401 clause 7.4 (v1.4.1 onwards)) and packet mode including FEC (see EN 300 401 clause 5.3.5 (v1.4.1 onwards))

[2] As defined in ISO TS 18234

[3] As defined in ETSI TS 102 368

[4] As defined in ETSI TS 102 428

[5] See Frontier Silicon's Venice 7 WorldDMB profile 1 receiver module for details

http://www.frontier-silicon.com/media/releases/08/1010_Venice7.htm

FRONTIER SILICON

9 APPENDIX E - DAB AND DAB+ ROLL OUT AROUND THE WORLD

Many countries around the world have acknowledged the benefits of DAB+ for their individual markets. So far, the DAB+ standard has been adopted by Singapore (launched in June 2008), Malta (launched in October 2008), Australia (launching in May 2009) , Italy (launching along with DMB in 1H 09) and Germany (launching in 2H 09). Other countries to potentially consider this enhanced radio standard include: New Zealand, India, Switzerland, Canada, The Netherlands and China.

Tests and trials are being carried out around the world (see the map below).

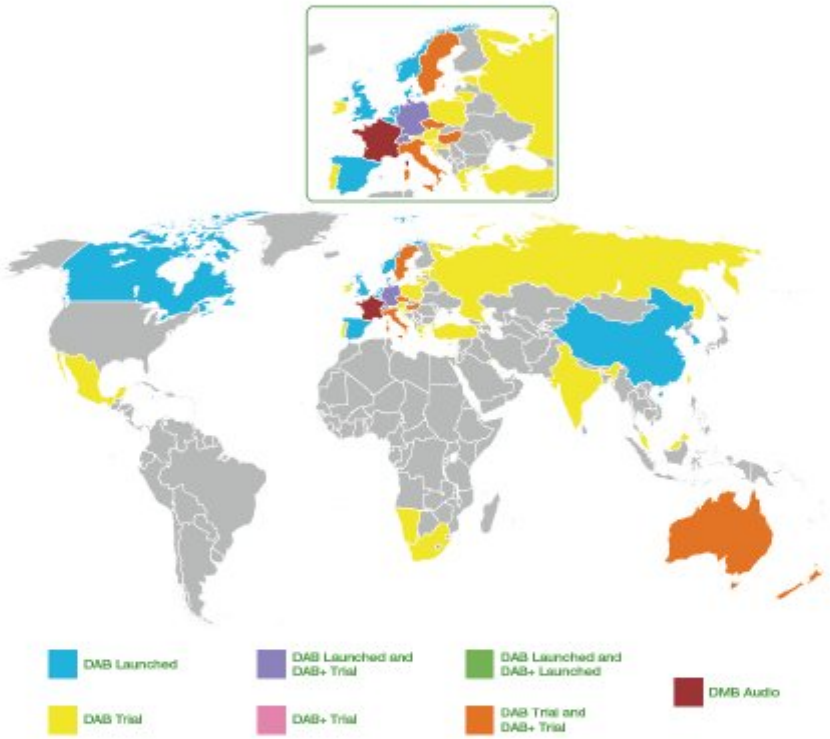

Figure 2. Country-wide snapshot of DAB and DAB+ trials and commercial launches

4 Independent Broadcasters of Ireland

Response to

Commission for Communication Regulation

Consultation Document

on

Licensing Digital Terrestrial Radio

21st October 2008

Who we are

IBI represents national, regional and local commercial radio and television stations throughout Ireland. Independent broadcasting in Ireland has never been as strong as it is today. Over 63% of the population or 2.208 million people tune into independent radio on a daily basis, which gives an indication of the amount of people that independent broadcasters connect with on a daily basis. Given these figures no-one can disagree that independent radio is providing a vital and invaluable service to the Irish people.

The Independent radio sector is growing. Currently there are 2 national radio stations, 3 regional radio stations and 27 local stations. Added to these figures is a regional radio station preparing for its initial broadcasting date, a multi-city license and an easy listening service and this is all before we begin to focus on digital radio.

The IBI is focused on the future and we keep an eye on developments which will determine the future of broadcasting. IBI will ensure that independent broadcasters are involved in shaping the future of broadcasting in Ireland.

The consultation document launched by the Commission for Communications Regulation on Licensing Digital Terrestrial Radio is welcomed by the IBI.

1. License Duration

Regarding the proposed length of a Digital Radio Multiplex license, the 10 year license duration proposed by ComReg is supported by the IBI. Such a term

corresponds with current commercial radio licenses and would also provide a realistic opportunity to achieve a return on investment. We would, however, urge ComReg to explore the fast-track application process as outlined for commercial radio licenses in the Broadcasting Bill 2008, where in the absence of competition, the incumbent is automatically awarded the license. This would serve to reduce the licensee's cost in applying for a license, it would reduce the regulators costs in awarding the license and it would also provide a greater degree of stability for the radio stations that are carried on the multiplex.

2. Proposed License Conditions

The IBI is supportive of the proposed license conditions relating to interference, other authorisations and responsibilities, variation of license, non-ionising and radiation. Regarding sanctions for non-compliance and provision of information, we find the suggested sanctions slightly draconian. Such sanctions would impact negatively on the radio stations carried on the multiplex in question rather than solely on the multiplex licensee. Financial sanctions should be examined as an alternative sanction, which would serve to punish the licensee but would not impact on the radio stations carried.

3. Use of Digital Sound Broadcasting Capacity

The IBI agrees with the 80/20 divide as proposed. The inclusion of additional digital services such as motor traffic, graphics, advertising and music download information is welcomed, however, further information would be required to establish whether there are financial and/or contractual considerations surrounding the use of this capacity.

4. License Fee

The proposed license fee is welcomed as it is modest enough so as not to dissuade smaller groups from applying due to financial constraints.

5. Proposed License Fee Review

Reviewing the license fee on the fifth anniversary is reasonable. Consideration, however, should be given to the inclusion of a technological review at this stage

in order to ensure that the licensee is providing the best possible carriage to the stations it is carrying.

6. Proposed Technical Conditions

In order for digital radio broadcasting to be successful in Ireland it is vital that all radio broadcasters buy into the format, both independent and public service radio broadcasters. Every encouragement needs to be given to broadcasters to encourage their participation in digital from the early stages. There is a high degree of uncertainty surrounding digital radio within the independent commercial sector. This is largely based on the shortage of concrete information available on issues such as the technology that will be used, what radio stations will get carriage on the digital platform, the amount of investment required and indeed the benefits that digital broadcasting will afford radio broadcasters.

Prior to a decision on the technology to be used, due attention should be given to the consumer and the broadcaster. To date both groups have invested financially in digital radio, through purchasing digital radio receivers, participating in the digital radio trial and marketing the service to the public. This activity has been based on the use of DAB and any movement from DAB technology as a result of this consultation will have to consider the effect on both the consumer and the radio broadcasters.

Regarding carriage for independent commercial radio stations on the digital radio platform, there is a great deal of confusion among the members of the IBI. It is our understanding that there is enough spectrum available for all local, regional and national independent stations on the multiplexes that will be allocated for the independent sector. We have also been given cause to believe that this does not mean that all stations will be allocated spectrum or will be given the opportunity to broadcast digitally. Such information does not fill the independent radio sector with confidence in digital broadcasting. On the contrary it has resulted in some independent radio stations expressing a distinct lack of interest in digital radio compounded by the fact that analogue radio will still be available for broadcasting and receiving radio for the foreseeable future.

The progression of digital radio in the UK provides an interesting case study and comparison for the Irish broadcasting industry. Following an automatic license roll-over for all commercial radio stations who invested in the development of,

and began broadcasting in digital many radio stations and groups in the UK have expressed an high level of dissatisfaction in the system and have stated the lack of return on investment as a major source of disappointment. This cannot be replicated in Ireland and we should learn from the mistakes of the UK radio sector.

While it is important to choose technology that best suits the Irish radio industry, it is also important to ensure that the technology chosen now is the best available. It is not feasible for the broadcasters or the consumer to expect either group to invest in a recommended technology only to find out that they have to adapt to another different technology within a few short years. The technology chosen should be in line with that being used throughout Europe.

5 RTÉ

Licensing Digital Terrestrial Radio

RTÉ Response to

ComReg Consultation Document 08/79
21st October 2008

Introduction

RTÉ welcomes the opportunity to respond to ComReg's *Consultation Document* on Licensing Digital Terrestrial Radio. RTÉ has been in discussion with both the DCENR and ComReg regarding the provision of digital terrestrial radio services in Ireland over the last number of years, and RTÉ is currently operating a trial Digital Audio Broadcasting (DAB) service which can be received by circa 44% of the population.

This DAB Trial offers a range of new digital services from RTÉ and commercial broadcasters, and clearly indicates the benefits of digital over analogue radio, with DAB receivers widely available in the trial areas. For the future RTÉ is hoping that there will be greater engagement from the commercial radio sector so that DAB services can increase in Ireland. But RTÉ is on record as having stated that it would not be prepared to go beyond the present coverage until a commercial national multiplex (mux) is also licensed.

In August 2004 RTÉ responded to the (then) DCMNR consultation on Frequency Spectrum Policy for VHF, Band III, saying that RTÉ "would envisage Band III being allocated for sound and probably new data and media broadcasting applications, as this would be the most flexible and forward looking approach to take in developing the Irish broadcasting environment." At that time, RTÉ also proposed that DAB be prioritised in VHF Band III and that no changes be made to existing analogue Television services until such time as their digital provision would be secure, whether on VHF Band III or elsewhere.[1]

RTÉ is currently advocating DAB as distinct from DAB+ for the medium term, as DAB receivers are now widely available, and cross-border services would be enabled for the foreseeable future. But RTÉ is fully aware of the advantages that DAB+ would offer citizen consumers in Ireland, and will be keeping abreast of developments in this regard in other territories, especially in the UK. RTÉ recognises that DAB is only one of the potential digital radio standards that could be adopted in Ireland, and RTÉ is at the forefront of developing other new platforms from trials of DRM to the provision of online content. RTÉ is also very engaged with developments underway in Internet radio/audio services. However, RTÉ proposes in this *Response Document* that VHF Band III be reserved for the Eureka 147 family of standards.

For the future, in the event that commercial broadcasters are successful in acquiring a DAB multiplexing licence together with RTÉ, then RTÉ advocates that ComReg, together with the DCENR and the BCI, would consider the establishment of a national framework for the implementation of digital terrestrial radio services in Ireland. Similar to Digital Terrestrial Television (DTT), there would be a need for a co-ordinated and collaborative approach to the establishment of these services so that the Irish public could best benefit from them and could be fully informed about the range of choice and quality that would become available as a result. In addition, RTÉ wishes to underline the potential advantages of an all-island approach to digital radio services, and given the successful engagement to date with the UK in spectrum

[1] RTÉ notes that ComReg in its *Response Document 04/93* to the DCMNR Consultation advocated the possible advantages of "leap-frogging the Eureka 147 DAB system" (page 3).

frequency planning bi-lateral meetings arising from RRC '06 conference, RTÉ asks if this possibility could be placed on the agenda for such meetings and discussions.

Finally RTÉ would request that ComReg give some consideration to the criteria that it may wish to use in defining the conditions under which an eventual switch off of the FM radio services would be undertaken.

RTÉ Response to Consultation Questions

List of Questions

Q. 1. Do you consider that the proposed length of a Digital Radio Multiplex licence is appropriate? If not, how long should the licence period be for?
Please give reasons supporting your proposal.....

RTÉ believes that 10 years is a reasonable balance between the need for return on investment and the capacity to facilitate innovation, particularly as the Eureka 147 family of standards (DAB/DAB+/T-DMB/DAP-IP) has engendered a strong microclimate of innovation in both Europe and Asia.

Q. 2. Do you consider that other factors might also need to be considered in determining the length of the licence?.....

Experience elsewhere shows that while regional multiplexes and local multiplexes in large urban areas can be cost effective relative to audience, it is more costly and difficult to roll out national networks.

While national coverage must be the aim of national licences, it would be unwise to insist on full networks in the early years of a national multiplex licence and conditions for national licences may have to allow longer periods to account for this fact.

As an aside, while the immediate issue for consideration is national multiplex licences, RTÉ notes ComReg's statement in section 4.3 of the consultation that "This paper consults on proposed Digital Sound Broadcasting Multiplex licence conditions which would apply to RTÉ and to *any* (our italics) subsequent Digital Sound Broadcasting licences issued by ComReg …etc".

RTÉ is therefore of the view that ComReg and the BCI should prioritise the roll out of spectral allocations to national and regional levels and that, with the exception of large urban areas, the market argument for allocation of spectrum to local multiplex operation is weak.

This argument is particularly relevant to local commercial and community stations as the provision and cost of local multiplex networks covering small areas would be onerous for those broadcasters and would run counter to the best principles of spectral efficiency in planning Eureka 147 networks.

Q. 3. Do you agree with the proposed licence conditions relating to interference, other authorisations and responsibilities, variation of licence, non-ionising radiation,

sanctions for non-compliance and provision of information? If not, please support your position with other relevant considerations.

RTÉ agrees with these conditions.

Q. 4. Do you consider that any other relevant conditions should apply? If so, please specify and give the reasons for your proposal.

In general, experience of other countries shows that co-operation between regulators, broadcasters and manufacturers/retailers is key to the adoption of digital radio.

Particularly important here is co-operation between broadcasters. In Australia this has led to broadcasters sharing the ownership of multiplexes. This facilitates a commonality of interest between those whose business is the provision of content to audiences.

An alternative approach is to require or strongly recommend that broadcasters should, as much as possible, co-operate in the roll out and promotion of DAB digital radio.

In that respect, RTÉ recommends that ComReg would form a Joint Framework that would set out the steps to full coverage at national, regional and local urban levels and that conditional to the granting of a licence should be evidence that candidates will co-operate with the Joint Framework. In addition, evidence of proposed partnerships by these applicants with other sectors and/or plans for new services that will bolster the adoption of DAB digital radio should be considered in this context.

While detailed consideration of these conditions may be more appropriate for the BCI, RTÉ proposes the Joint Framework in the context of: the overarching nature of this consultation; the stated national role and objectives of ComReg; and the terms of the Broadcasting Bill 2008 which proposes a single regulator, the BAI, for both public and commercial broadcasters.

On the question of FM switch off, RTÉ agrees that it is not desirable that a timeframe should be proposed at this point but would recommend that the conditions for such a switch off should be explored in the Joint Framework.

Q. 5. Do you agree with ComReg's proposal that at least 80% of a licensed Digital Sound Broadcasting Multiplex's capacity should be used to carry digital sound broadcasting services, associated technical services, or text and graphics content related to the sound broadcasting services? If not, please propose an alternative scheme and the reasons for your view.

RTÉ considers the definition set out in the Broadcasting (Amendment) Act 2007 that; *"sound broadcasting multiplex" means a multiplex in which the programme material is predominantly sound* to be an adequate definition in this respect.

The proposal to limit capacity for services other than related to sound broadcast to 80% may be overly prescriptive. What is important is to ensure that flexibility is maintained to allow for future, as yet unknown, developments.

As above, there is a great deal of innovation around the Eureka 147 family of standards in Europe and Asia in the fields of sound broadcast, associated services and mobile video. While the carriage of sound broadcast (radio) services must be protected, this is achieved in the Broadcasting (Amendment) Act 2007 without limiting the cross-media potential of the technological standard.

In section 6.3 of the consultation, ComReg notes "*with interest*" the developments at ETSI concerning DRM+ but states that the "*use of DRM in the HF frequency is also not considered further in this consultation*" ComReg further notes that "*if a DRM transmission is to be operated in the HF frequency band....this multiplex licensing regime discussed in this paper would not be appropriate*"

In the interests of a clear policy, RTÉ recommends that the VHF Band III spectrum that is the subject of this consultation be reserved for the Eureka 147 family of standards. This will aid efficient spectral planning and network deployment, will provide assurances to broadcasters, network operators and receiver manufacturers in their planning, will allow for a strong degree of innovation and will help to protect the free to air, universal nature of radio and associated services.

Q. 6. Do you agree with the level of licence fee proposed for Digital Sound Broadcasting Multiplex licences? If not, please suggest an alternative fee regime with supporting reasons.....

RTÉ believes that the charge proposed is excessive given the market conditions and roll-out costs operators and broadcasters are likely to encounter. RTÉ advocates a much reduced administrative charge. This could be the subject of review on renewal.

Comparisons with domestic DTT and UK DAB multiplex costs are inappropriate given the existing free to air nature of radio and the much smaller scale of the market in the Republic of Ireland.

With regard to costs, an aspect of the challenge of digital roll out for broadcasters is the interim cost of transmission on both FM and DAB. While the costs of transmission are likely to fall considerably in the event of a DAB/DAB+ only environment, RTÉ suggests that, during transition, the lesser cost of dual transmission could possibly be the subject of a gross relief against liability for Corporation Tax and that ComReg might explore this concept.

Q. 7. Do you agree with the proposed licence fee review on the fifth anniversary of any Digital Sound-Broadcasting Licences? Please elaborate with reference to technological or other relevant developments.

RTÉ agrees with this timing but would refer to the Joint Framework advocated in Q4 above as the context for the review.

Q. 8. Do you consider that broadcasters should set encoding parameters that can objectively offer an equivalent to the current FM analogue service? Please elaborate on your answer?

RTÉ believes that such a requirement is subjective, difficult to enforce and counter to the statement in the consultation that *"audio quality is however a function of content and ComReg intends to leave the specification of the audio encoding parameters to its licensees, RTÉ and the BCI"*.

The consultation states in section 3.1.5 when describing the number of services per mux in other jurisdictions that *"it would appear that one of the key consumer advantages of digital radio, being near compact disc ("CD") quality broadcasts, was not maintained"*.

RTÉ dispute that audio quality of the sort described is valued by audiences *above* new services. It is often a misguided assumption and characterised many of the first European DAB roll-outs, and in the end, was key to their failure. Broadcasters assumed that simulcasts at higher quality would be sufficient to drive the migration to digital radio: but they were not.

What became clear was that FM has reached and arguably slightly exceeds the quality required for the vast majority of the listening public under normal conditions. For this reason audiences did not find further enhancements to audio quality to be of value.

RTÉ believes that there are three key drivers to the take up of DAB digital radio:

- A wide range of receivers at all cost levels,
- A strong regulatory/financial catalyst and
- The involvement of existing and new broadcasters.

In the provision of services, broadcasters must be free to set audio bit rates that they and the audience will find adequate. For example, one of RTÉ's trial services was a looped news headline service at 64kbps mono which was an appropriate rate for that content. In addition, smaller broadcasters such as community stations may find it to their advantage to avail of the lower cost that lower bit rates are likely to bring. Conversely RTÉ maintains its classical music and arts service, RTÉ lyric fm at a bit rate of 160kbps on the basis that its listeners require and value a more immersive experience, and are more likely to listen under "hi fi" conditions.

Broadcasters are justifiably concerned that their output and its audio quality are as high as possible. However, in studies undertaken in both Ireland and the UK, listeners consistently rate the sound quality of DAB as "as good as or better than FM". RTÉ believes that the hiss-free reception of DAB is a strong advantage in audibility versus FM in most ordinary listening environments.

RTÉ also notes the capacity for DAB+ to provide higher quality at lower bit rates using a different codec. RTÉ also acknowledges the part that DAB+ may play in the future of digital radio. However, RTÉ is strongly of the view that the medium term future for digital radio should be based on DAB due our close proximity and shared

borders with the U.K. especially Northern Ireland, and the consequent advantages in mobility, innovation and range of receiver models offered to the listener.

In the next year, RTÉ believes that broadcasters and manufacturers should work together to remove the issue of the transition as a consumer concern.

Q. 9. What audio encoding parameters would you suggest? Please justify your answer? .....

No comments.

Q. 10. Please provide comments on the proposed technical conditions having regard to Sections 3.1.5, 3.1.6 and ComReg's legislative requirements in Section 4.1? .....

No comments.

- - - -

RTÉ, 21st October 2008.

6 WLRfm

Replies to Consolation Questions on Licensing Digital Terrestrial Radio.

Complied by

October 2008

Q. 1. Do you consider that the proposed length of a Digital Radio Multiplex License is appropriate? If not, how long should the license period be for? Please give reasons supporting your proposal

The first phase should be for 15 years and after that there should be a 10 year license. This will give the industry and the public time to settle down with the new technology.

Q. 2. Do you consider that other factors might also need to be considered in determining the length of the license?

Penetration of receivers in the market should be taken into account when determining the length of the license. If the uptake of receivers is poor then the length of the license should be longer this will give the operators a better chance to establish the services.

Q. 3. Do you agree with the proposed license conditions relating to interference, other authorizations and responsibilities, variation of license, Non-ionizing radiation, sanctions for non-compliance and provision of information? If not, please support your position with other relevant considerations.

Yes we agree with the proposed license conditions relating to interference, other authorizations and responsibilities, variation of license, Non-ionizing radiation, sanctions for non-compliance and provision of information.

Q. 4. Do you consider that any other relevant conditions should apply? If so, please specify and give the reasons for your proposal.

No we do not consider any other conditions.

Q. 5. Do you agree with ComReg's proposal that at least 80% of a licensed Digital Sound Broadcasting Multiplex's capacity should be used to carry digital sound broadcasting services, associated technical services, or text and graphics content related to the sound broadcasting services? If not, please propose an alternative scheme and the reasons for your view.

We agree with the proposal that at least 80% of a licensed Digital Sound Broadcasting Multiplex's capacity should be used to carry digital sound broadcasting services

Q. 6. Do you agree with the level of license fee proposed for Digital Sound Broadcasting Multiplex licenses? If not, please suggest an alternative fee regime with supporting reasons.

Yes we agree with the fee regime.

Q. 7. Do you agree with the proposed license fee review on the fifth anniversary of any Digital Sound-Broadcasting Licenses? Please elaborate with reference to technological or other relevant developments.

Yes, however this should be undertaken with a review of the market in order to see how well DAB is been adapted by the public. This review should also take in to account the content providers and the service that they provide along with the listenership figures this will help to ensure that the content is kept at a high standard and therefore attract better listenership.

Q. 8. Do you consider that broadcasters should set encoding parameters that can objectively offer an equivalent to the current FM analogue service? Please elaborate on your answer?

Yes but under guidelines set down by the BCI. It would not be good practice to have a free for all regarding audio encoding as the audio standard of stations could vary so much as to alienate the listeners. It has seen that in the UK the lack of "CD" quality has been a factor in the poor uptake of DAB and we should avoid this from happening by keeping a tight grip on the encoding standards.

Q. 9. What audio encoding parameters would you suggest? Please justify your answer?

Minimum Stereo Audio bit rate should be 160kbps and 64kbps for a Mono speech service on the DAB platform.

For stereo audio on the DAB+ platform listening tests carried out by the EBU show that at an audio bit rate of 48 kbps using AAC offers good to excellent quality and at an audio bit rate of 64 kbps it offers excellent quality.

We would like to see DAB+ as the digital technology adapted in Ireland as it is a far better system offering a higher audio quality and is more efficient from a data point of view.

Q. 10. Please provide comments on the proposed technical conditions having regard to Sections 3.1.5, 3.1.6 and ComReg's legislative requirements in Section 4.1?

It will be important to have a very clear road map for the implementation of digital audio broadcasting in Ireland. This service will have to run alongside the existing FM services and therefore will have to be of a very high standard in order to attract listeners. This in turn will increase the uptake of receivers in the market place.

DAB+ would be the best technology to use as is can be seen from the benefits in section 3.1.5. however the availability for suitable receivers and the timescale of the rollout will be important. DAB+ is new and the number of receivers is low add to this the reluctance of OFCOM to adapt it in the UK may force Ireland to use the original DAB MPEG2 format.

With regard to services available on the digital platform it should not be good enough to just re broadcast the analog content from the FM provider . Perceived improved audio quality will not be enough to increase listenership there will have to be improved and unique content also.

7 World DMB Project Office

WORLD DMB
Digital Multimedia Broadcasting
Radio • Mobile TV • Multimedia • Traffic Data

21st October 2008

Ms. Sinead Devey
Commission for Communications Regulation
Irish Life Centre
Abbey Street
Dublin 1
Ireland

By email only

Dear Ms Devey,

WorldDMB response to Digital Terrestrial Radio Consultation.
Document No. 08/79

WorldDMB is an international, non-governmental organisation whose role is to promote the awareness, adoption and implementation of DAB/DAB+/DMB technologies worldwide. Its members include public and private broadcasters, transmission suppliers, network operators, manufacturers of applications, software, silicon and consumer radio receivers, together with companies and organisations involved in, and committed to, the promotion of services and equipment based on the Eureka 147 family of standards.

WorldDMB represents some 130 organisations drawn from every facet of digital broadcasting. Through its membership it is able to draw on the widest range of expertise and practical experience gained in planning, launching and running businesses and infrastructures required for digital radio broadcasting.

WorldDMB welcomes the Commission for Communications Regulation ("ComReg") proposals to introduce licensed digital radio services in Ireland and is pleased to have this opportunity to respond to the consultation. The comments and opinions contained in this response have been prepared by the WorldDMB Project Office and are believed to represent a consensus view in the main, however we appreciate that each member of WorldDMB is free to offer alternative and further comment directly to ComReg.

For ease of reference, this response will follow the numbered questions in the consultation. WorldDMB is willing to provide any further information that may be requested, drawing upon its members' considerable experience in all aspects of digital radio.

WorldDMB Project Office: 5th Floor, The RadioCentre, 77 Shaftesbury Avenue, London, W1D 5DU, United Kingdom
Tel: +44 207 306 2530 • Fax: +44 207 306 2539 • e-mail: rosemary.smith@worlddab.org

Registered office: c/o EBU CH-1218 Grand-Saconnex GE Switzerland
Tel: + 41 22 717 27 36 • Fax: + 41 22 74 74 736 • e-mail: lina.vanberghem@ebu.ch

Q. 1. Do you consider that the proposed length of a Digital Radio Multiplex licence is appropriate? If not, how long should the licence period be for? Please give reasons supporting your proposal.

We agree that licence durations need to be of sufficient length to allow investments to be recouped and 10 years is probably a minimum period. Many administrations offer 12 year licences or longer (sometimes through automatic renewal mechanisms). Consideration should be given to longer periods designed to encourage more significant investment in infrastructure, for example, to improve geographic and/or service quality offering to consumers from the outset. Longer licence periods tend to require measures to encourage continued innovation and spectrum efficiency, and we would recommend that the roll-over/renewal mechanisms plus any incentives are indicated in the original license or agreed during its term as early as possible. This can avoid the risk of stagnation towards the end of a licence period where, for obvious reasons, parties tend not to invest or develop the business due to the risks associated with renewal outcome.

Q. 2. Do you consider that other factors might also need to be considered in determining the length of the licence?

Mechanisms that encourage continued development of the system throughout the licence term can benefit the general aims, and ensure that citizens enjoy the best possible experience of digital radio. We believe opportunities to extend licences automatically upon achievement of specified aims (such as coverage, marketing activity, diversity of content choice, etc.) are effective ways to encourage the multiplex licensee to invest both short- and long-term in the system.

Q. 3. Do you agree with the proposed licence conditions relating to interference, other authorisations and responsibilities, variation of licence, non-ionising radiation, sanctions for non-compliance and provision of information? If not, please support your position with other relevant considerations.

WorldDMB offers no opinion here.

Q. 4. Do you consider that any other relevant conditions should apply? If so, please specify and give the reasons for your proposal.

WorldDMB members have experience of a number of different terrestrial digital radio licensing regimes. These vary from a "free market multiplex licensing model" (i.e. the multiplex licensee selects content providers and builds the network) through to schemes which mimic FM licensing (i.e. per service, per channel, defined content licences, perhaps where the multiplex itself is treated as a fixed transmission system). Whilst it is difficult to generalise, the more rigid the licensing scheme the less likely the digital broadcasting system proves to be successful.

Members of WorldDMB who favour the multiplex model tend to recommend that the role of the multiplex licensee should include incentives and obligations relating to industry-wide marketing and promotion activities, as well as protections for any content providers requiring access to the multiplex from time to time.

WorldDMB Project Office: 5th Floor, The RadioCentre, 77 Shaftesbury Avenue, London, W1D 5DU, United Kingdom
Tel: +44 207 306 2530 • Fax: +44 207 306 2539 • e-mail: rosemary.smith@worlddab.org

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The multiplex operator is in a unique position to co-ordinate and undertake certain trade and consumer marketing activities to ensure the best possible outcome for digital broadcasting. Licence conditions relating to these responsibilities can benefit the consumer and content providers alike. Similarly they can create the conditions necessary to ensure content providers participate actively in the success of the system as a whole rather than focusing purely on their own channel(s) or brand(s), which can lead to a plethora of differing consumer messages and confusion.

In some cases, the industry tends to create a joint marketing body (e.g. IMDB in Germany, DRDB in the UK), however its effectiveness can be limited by the voluntary nature of participation. A multiplex licence which includes certain obligations and incentives is more likely to ensure these objectives are met by providing an overarching responsibility, yet does not preclude the formation of a joint marketing body. Responsibility for the success of the platform as a whole should be shared between public and private broadcasters.

Content providers may be concerned that if a multiplex licensee has interests in, or connections to, a competitor broadcaster, they themselves are not disadvantaged or denied access to the multiplex. This can be addressed in licence conditions which require non-discriminatory practices, fair and effective terms and conditions, and in some cases, a method of appeal to the regulator.

Access to multiplex capacity can also be dealt with through "must carry" obligations and other incentives for existing analogue licensees. Typically these might include the automatic right for an analogue broadcaster to take up a simulcast channel on a multiplex (sometimes with rights to provide a proportion of differentiated content on that channel). The automatic right for an analogue broadcaster to acquire further content channels on the multiplex is a proven mechanism acting as an incentive to make digital radio attractive to consumers whilst enhancing the broadcaster's business opportunity. Care may need to be taken to ensure the multiplex is not closed to new content providers whose offerings may enhance the take up of digital radio, however existing broadcasters may argue in favour of some market protection to recognise the investment they have already made in analogue services.

WorldDMB's experience is that private commercial broadcasters find it harder to justify investment in digital radio than public service broadcasters, particularly in the early years. It follows that some incentives may be necessary to ensure equal private radio participation. Examples include automatic analogue licence extensions in return for digital participation (as in the UK), the right to a specified amount of capacity on the multiplex for each analogue licensee to use as they please (e.g. sufficient to launch several additional services, as in Australia), or other treasury/revenue incentives (such as tax relief on digital radio costs).

A further issue of concern to some WorldDMB members is the potential cost of transmission services, and it may be appropriate to include licence conditions which offer some protection. Whilst WorldDMB will always recognise the right of a transmission infrastructure operator to deliver profit from their capital investments and operations, content providers will generally expect capacity costs to reflect the proportionate cost of provision. Experience in some markets has led to a view that high transmission costs limit the investment in new content and diminishes the appeal of digital radio for the consumer.

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Q. 5. Do you agree with ComReg's proposal that at least 80% of a licensed Digital Sound Broadcasting Multiplex's capacity should be used to carry digital sound broadcasting services, associated technical services, or text and graphics content related to the sound broadcasting services? If not, please propose an alternative scheme and the reasons for your view.

The principle of ensuring a proportion of the multiplex is reserved for sound broadcasting services has many benefits. Similarly, encouraging the development of new types of "non-radio" service on the multiplex is likely to be important and may provide premium income which could lessen the cost to radio broadcasters.

WorldDMB recognises the difficulty in defining content elements relevant to, or associated with, radio broadcasting. In many cases, content may be regarded as relevant to the radio broadcasts as a whole but not necessarily associated directly with any one service or at any one time. Examples of this might be a weather graphics channel, travel and traffic information or filecasting (i.e. podcasting via the multiplex). Broadcasters in some countries are already experimenting with music videos broadcast as a separate service on the multiplex but simultaneously with the radio station's normal music output on DAB+ in order to target different devices (mobile phones, PMPs) and attract new audiences to "radio".

The benefit of any limitation is not to diminish the primary purpose of the multiplex (i.e. delivering radio broadcasting content) but equally the flexibility of the Eureka 147 systems enables broadcasters to do almost anything that may be relevant to radio broadcasting in the future, particularly as "multimedia broadcasting" evolves.

Where other countries have provided specified minima for radio content, the percentage is more often in the region of 67% to 70%, and as little as 50% in some cases. This recognises, for example, that a DMB video service requires at least 20-25% of a multiplex (192kbit/s to 288kbit/s) to deliver a satisfactory picture quality.

A further consideration is that of aggregating, or trading, percentage limits across all multiplexes. This might be relevant in the case where several video services are to be broadcast, aimed at hand held devices where networks tend to require higher field strengths. Aggregating all video content onto one multiplex can lessen the cost of the other "radio" networks whose coverage requirements may not be so exacting.

In spectrum terms, a DAB/DMB multiplex (1.7MHz) may be considered as a sub division of a TV channel (e.g. ¼ of a 7MHz DTV channel), as is reflected in the GE06 Band 3 planning. It follows that aggregating individual DAB/DMB multiplex percentages of non-radio broadcasting over to, say, one DAB/DMB multiplex is not dissimilar had the same amount of spectrum been used for a contiguous multiplex (such as DVB), but with greater efficiency and flexibility.

Q. 6. Do you agree with the level of licence fee proposed for Digital Sound Broadcasting Multiplex licences? If not, please suggest an alternative fee regime with supporting reasons.

WorldDMB agrees with the principle of lessening the cost burden of multiplex licence fees, particularly in the early years of the platform's development, so as not to diminish the economic incentive for broadcasters to adopt the new platform.

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Q. 7. Do you agree with the proposed licence fee review on the fifth anniversary of any Digital Sound-Broadcasting Licences? Please elaborate with reference to technological or other relevant developments.

See relevant comments in response to Q1, Q2, Q4, and Q5, above.

Q. 8. Do you consider that broadcasters should set encoding parameters that can objectively offer an equivalent to the current FM analogue service? Please elaborate on your answer?

WorldDMB notes that digital audio quality is subjective. Furthermore, the make of each encoder, the implementations of the MPEG algorithm, and the source material can each have an effect on the perceived audio quality. Thus, for example, a DAB ("MPEG2") service at 160kbit/s could sound inferior to another service using a different encoder operating at 128kbit/s.

Therefore, the number of services a multiplex can support is not an exact science. Typically, however, it has been found that 7-12 audio services (a mix of mono and stereo services) are typical for DAB multiplexes. Despite some journalistic criticism of DAB audio quality, research by Ofcom, the DRDB (and others) consistently demonstrates that DAB audio quality is not an issue for the vast majority of listeners. As many other digital broadcasters (using DAB or other systems) around the world have found, increased audio quality is not a primary driver for consumers to buy digital radios. It is therefore generally considered that provided the digital audio quality is comparable with typical FM reception under similar listening conditions, there is little or no commercial benefit to be gained by offering substantially higher quality for its own sake, particularly where alternative (if not so convenient) methods of listening at higher bitrates are available (such as DTH satellite).

Q. 9. What audio encoding parameters would you suggest? Please justify your answer?

DAB+ was developed by WorldDMB to deliver a number of benefits. These included the opportunity for higher audio quality than DAB (MPEG2) for a given bitrate, more services per multiplex (addressing spectrum efficiency and the consumer benefit), and as a consequence, proportionately lower transmission costs per channel/broadcaster (enabling digital radio to be viable for a wider range of broadcasters).

In September 2008, WorldDMB, together with the EBU, published a set of "**Digital Radio Receiver Profiles**"[1]. This was the culmination of work requested by government agencies and broadcasters in Germany, France and the UK to create a protocol under which manufacturers of digital radios would agree to make all future radios compatible with any of the Eureka147 standards across Europe. The work was undertaken in collaboration with EICTA, the European consumer electronics manufacturers' forum, with leading manufacturers of silicon and representatives from other product manufacturing countries (such as Korea).

The Digital Radio Receiver Profiles require that all digital radios for sale in Europe (and ultimately worldwide) should conform to a minimum set of features and functions. Amongst these is a requirement for all radios to decode DAB, DAB+ and DMB audio content such that any compliant digital radio can be used successfully in any country in Europe regardless of

[1] http://www.worlddab.org/public_documents/WorldDMB_Digital_Radio_Receiver_Profiles.pdf

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whether that country is broadcasting in DAB, DAB+ or DMB. The benefit to broadcasters and regulators is that it is no longer necessary to commit to one audio variant of the Eureka 147 family prior to the launch of digital radio.

A number of established DAB digital radio manufacturers, including market leading brands and major suppliers of silicon to manufacturers, have already announced their intention to comply with the Digital Radio Receiver Profiles. Products which comply are expected to become 'standard' during the next 12 months in the retail chain.

WorldDMB strongly recommends that Ireland adopts DAB+ as the standard for its digital radio platform.

We recognise there may be a few DAB-only receivers available for use in Ireland already, and that some listeners may wish to use existing DAB radios bought in adjacent countries. However, in the timescales contemplated for licensing and consumer launch of permanent digital radio services in Ireland, it is likely that all new digital radios available for sale by Irish retailers (and in adjacent countries) will be compliant with the Digital Radio Receiver Profiles. In our view, the benefits of selecting DAB+ in terms of spectrum, choice of services available, and broadcaster costs far outweighs the issue of existing DAB receivers.

Q. 10. Please provide comments on the proposed technical conditions having regard to Sections 3.1.5, 3.1.6 and ComReg's legislative requirements in Section 4.1?

WorldDMB supports the use of Band III as the primary spectrum choice for local, regional and national DAB/DAB+ networks.

WorldDMB supports ComReg's proposal to enable L-Band multiplexes if required.

WorldDMB would like ComReg to note that its DAB+ standard was designed to have a high degree of compatibility with DRM. In future, should DRM receivers become widely available (e.g. if a number of countries licence domestic DRM services), it is likely that they would be built to receive both DAB/DAB+ and DRM broadcasts as a multi-standard receiver. Therefore WorldDMB does not oppose the future licensing of DRM in LF or MF spectrum in Ireland. However, we would draw on our own experience of launches of digital radio systems and the need for a clear and unequivocal lead by the regulators as to the preferred system and the need to minimise risk for those broadcasters investing in the content and networks. Crucially, consumers must have available a wide range of receivers in all form factors and at all price points and with the minimum of confusion caused by multiple platform choices.

Conclusion

WorldDMB welcomes the advent of digital radio in Ireland and the preference by ComReg for the Eureka 147 family.

We believe that DAB+ is a better choice for Ireland and that concerns about DAB+ receiver availability in the timescales proposed are unfounded.

We recommend that licences for digital radio be designed to encourage the widest range of involvement by existing broadcasters, provide necessary incentives to ensure a vibrant and successful market, and encourage new content and services from existing and new players.

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WorldDMB is happy to offer further assistance to ComReg, RTE and independent broadcasters in Ireland to ensure the successful launch of digital radio. Similarly, we are happy to expand on any of the issues raised in this consultation and the answers provided.

Yours sincerely

Quentin Howard

President, WorldDMB Forum

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