The future of radio broadcasting in Europe

Identified needs, opportunities and possible ways forward

Working Group RSPG10-349

(Please note that the detailed replies to the questionnaire are available in annex in document "RSPG-10 349 bis Annex to Report")

2010-10-29

Introduction

At its meeting on the 11th February 2010 the Radio Spectrum Policy Group (RSPG) decided that there was a need to study in more detail the future of radio broadcasting in Europe with a view to understand possible spectrum implications. A working group was formed to undertake the work, chaired by Sweden.

The work within the group has mainly been done by correspondence – but also by meetings amongst participating member states, with round-table discussions. Two questionnaires were sent out to both member states and industry – asking for the view on strategic challenges and opportunities of the radio broadcasting sector today.

The questionnaire sent out to member states was comprised of four parts - public policy objectives, market issues, European initiatives and usage of spectrum. 24 member states replied to the questionnaire and their respective replies can be found in the separate report *RSPG10-316 – replies to questionnaires.*[1] In the case of the industry eleven organisations replied to the request for information.[2] This questionnaire was comprised of four questions covering both market and technical aspects.

The chair would like to thank all delegates from member states in taking part in this important work – and of course also the organisations that have contributed by answering the above-mentioned questionnaire.

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It is no exaggeration to say that there is a huge need to identify ways forward regarding the development of Radio (sound) Broadcasting in Europe.[3] By undertaking the work that is presented in this report – the RSPG hopes that the results will not only stimulate further discussions, but also pin-point direct activities that should be initiated in Europe. The main question that arises is: "- Since development regarding digital radio is so disparate between countries (both regarding technical aspects and degree of deployment), is it even possible to identify common driving forces for the development of digital radio on a large scale?".

[1] The countries are Austria, Sweden, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Malta, Netherlands, Slovak Republic, Switzerland, UK, Portugal, Belgium, Latvia, Luxembourg, Spain and Norway.
[2] The organisations are AER, DRM, EBU, ETSI, SAP, EHDRA, DigitalEurope, Polish Digital Forum, Ericsson, QualComm and World DMB Forum.
[3] Some reasons: Band II is heavily congested and cannot match demand, Digital radio (DAB) has not taken off across Europe and there are multiple digital standards available.

In this report the RSPG tries to identify just that kind of possible ways forward, - that can unlock the situation regarding Radio Broadcasting in Europe today.

The report deals, in a broader sense, with technology impact on the possibilities of achieving a more efficient spectrum management/usage. The aim is to highlight the spectrum usage situation by radio broadcasting services – in order to manage a more efficient use of the bands. This is done by:

1. describing today's usage in some European countries
2. assessing the needs and the opportunities of the sector based on the findings
3. identifying strategic objectives for the VHF bands and 1.5GHz
4. identifying and proposing activities that would be beneficial for its development

The analysis also touches upon the subject of indicating a target date for analogue radio broadcasting (FM) switchover (off) and assessing the efficient use of L band frequencies.

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1 Summary

The future of Radio Broadcasting in Europe is probably digital, but there are several things that should be done to reach that future common scenario. Up until now it has been within every country to decide on how to approach the introduction of Digital Radio Broadcasting. This situation shall of course prevail – however, it is important then to show why some countries succeed in moving towards a switchover, and by that also show why in some countries progress is slow or non-existent.

Firstly, in all cases were progress is being made there has been a political interest, both in the sense that the issue has been high up on the political agenda for discussion, and that the discussion in itself has encompassed issues such as a switch-off date. Secondly, there has been a close cooperation between the regulator and broadcasters/market interests[4], and thirdly, but probably most important to make it a "success", there is the informational part, issuing adequate information to consumers. It is here important to highlight the importance of defining consumer protection in a context of a fast evolving technology and lack of EU-wide solution.

Below 27 MHz, digitalization has been introduced in different bands by using the DRM and HDRadio standards. This report examines the needs and opportunities of frequency bands allocated to radio broadcasting service in Bands I (47-68 MHz), II (87,5-108 MHz), III (174-230 MHz)[5] and in L Band (1452-1479.5 MHz) knowing that radio can be broadcasted over TV channels and other technologies. The work in Europe shall be undertaken within a broader view so that our work could be taken as reference by other countries that want to reuse our experiences and technologies developed, adopted and improved in Europe. The following review is therefore accompanied by the ITU International allocations for broadcasting service for Bands I, II, III and L (see Annex 1).

The lack of frequencies in the FM Band

Although the sound quality of FM radio is considered satisfactory, the lack of frequencies hinders further developments. In the medium to long term FM broadcasting can be replaced or supplemented by a digital technology, in order to overcome the lack of frequencies for FM radio.

[4] Only two Member States have reached an encouraging market share for digital radio: Denmark and the UK. In both cases, public policy and public broadcaster(s) were the main driving force.
[5] In addition to the frequency range 174-230 MHz a number of member states has possibilities under the Wi95CO07-agreement to use the frequency band 230-240 MHz for radio broadcasting services (T-DAB).

Possibilities for the digitalisation of Band II are explored in the *ECC Report 141*[6]. This document also contains the information about the current and possible future use of this frequency band in a number of European countries, as provided by the national administrations.

The digitalisation of radio has been, and still is, a long term process

There is no indication of any progress anywhere to cease analogue radio in the foreseeable future. The market for analogue receivers is far from declining and it is still a lucrative market while digital tries to replace it.[7] The industry of radio receivers is based on a world market which has adopted the common modulation standards that can produce attractive, low terminal cost for the benefit of European listeners.

Outside Europe and developed countries, broadcasters are still implementing analogue coverage and the penetration rate can make important progresses. These administrations are looking at a smooth evolution of technology by adding new services in the existing bands (following the model adopted for DTTV) which is the US model.

There is no budget or fiscal assistance for listeners to accelerate migration to complete digital reception, so, the complete replacement of analogue, especially FM reception, will be a long process based upon the motivation and interest of listeners. It is of key importance for the future of digital radio that a common European strategy is developed as far as possible taking into account the whole radio market (frequency bands and analogue and digital modulations used by radio).

The difficulty in switching off FM radio in Band II 87.5-108 MHz

The FM Band is used for FM radio services worldwide and in many European countries this band is exploited close to its full capacity. Today, and for the foreseeable future, FM is by far the dominant revenue source for commercial radio broadcasters and the major source of listening amongst all radio services.

Currently the market penetration of FM receivers is high (close to 100% of cars in many European countries and car manufactures still view FM as their de-facto standard) and most households have several receivers[8]. Many FM

[6] ECC Report 141. Future possibilities for the digitalisation of Band II (87.5 - 108 MHz) St. Petersburg, May 2010.
[7] See The Communications Market 2010: UK - Key market developments in radio and audio. http://www.ofcom.org.uk/static/cmr-10/UKCM-3.1a.html.
[8] 98% of households own at least one radio receiver, the average number receivers per household is six. Source : http://www.csa.fr/upload/dossier/radio_numerique_26_mai_09_b.pdf.

receivers can offer additional facilities like RDS (information and seamless retuning). Furthermore, they are often combined with other technology (e.g. DAB receivers, music players, mobile phones) ensuring even wider availability of FM[9].

Digitalisation and switchover plan

At this stage, there are only preconditioned switchover decisions (Hungary and United Kingdom)[10] or only long-term plans for the switchover of the radio analogue FM services in Band II (e.g. France, Netherlands). The digitalisation of sound broadcasting has been introduced in Band III using the DAB family standard (e.g. in Denmark, Germany, Malta, United Kingdom, Sweden) and experiments are running in LF (150 kHz – 285 kHz), MF (530 kHz to 1720 kHz) and HF (2.3 MHz to 27 MHz) bands with the DRM standard.

Some administrations have set up legislation about the digital broadcasting with in some cases, mandatory aspects of digitalisation of terminals and starting dates for that.

View of the industry

The questionnaire to the industry organisations was comprised of four questions covering both market and technical aspects However, not all replies covered all questions. It is hard to include all aspects of these extensive replies in this report – the full replies can be found in a separate report *RSPG10-316 – Replies to questionnaires*. There is however some things that are worth mentioning here, as regards what is believed to be important activities to stimulate the development of radio Broadcasting in Europe – and that is:

Digital Radio Mondial
One standard or a flexible combination of standards should practically offer a digitisation solution for any European country. Promoting one standard or a combination of standards should give the courage and clarity needed for the transition to digital terrestrial radio broadcasting.

Satellite Action Plan regulatory Group
SAP REG believes that the further development of Radio Broadcasting in Europe could be facilitated by the emergence of satellite-delivered services, and

[9] http://www.drm.org/uploads/files/drm_receiver_profiles.pdf and http://www.worlddab.org/public_documents/WorldDMB_Digital_Radio_Receiver_Profiles.pdf.
[10] When date of switch off is given in a Broadcasting Act it is under condition of percentage of population coverage and with a minimun of percentage of population equiped with a digital receiver.

notes that the L band has been harmonised in Europe through various regulatory instruments, such as CEPT ECC/DEC/(03)02. The long investment cycle of such projects requires certainty that the regulatory framework prevailing in this frequency band will continue.

European Telecommunications Standardisations Institute
A co-ordinated approach to transmission digitisation across Europe would assist all member states with increased certainty over the future of radio and provide the necessary volumes for consumer device manufacturers to invest appropriately for affordable and effective devices for all the diverse needs of radio listeners.

European Braodcasting Union
Promotion of European open standards (e.g. DAB/DAB+, DRM/DRM+). Creation of a thriving digital radio receiver market is a prerequisite for the transition from analogue to digital.

Association Européenne des Radios
Any shift towards digital radio broadcasting will most likely require a very long process. Decision on the adequate time-frame should be left to each national industry: as a matter of principle, transition to any improved digital broadcasting system should benefit from a long time-frame, unless there is industry agreement to move at a faster rate.

HD Radio Alliance
Regulation must be tailored to local, regional or national needs in order to allow the best possible development of radio.

Digital Europe
For the benefit of both commercial and private technology investment planning roadmaps for the analogue – digital radio broadcast migration need to be developed very soon defining key criteria (e.g. population and geographical coverage, content availability) and milestones for analogue radio broadcast switch-off.

Polish Digital Radio Forum
The government regulations - the consumers, producers and broadcasters must be sure, the new platforms are stable for certain period of time (due to economic calculations). A wide selection of receivers in the market at low cost will allow to deliver the digital services to all EU population.

Ericsson
To review all the complementary and alternative innovative digital multimedia and broadcasting technologies available, without excluding nor ignoring some of the more advanced IP based digital systems, allowing for proposals from outside of the traditional mainstream technologies of the broadcasting industry.

World DMB Forum
Coordination of transition plans to move from analogue to digital technology across Europe would bring benefits to all. Progress has already been made in several European countries using the DAB family of standards, for example, the UK, Denmark, Switzerland, etc., but greater coordination would allow risks to be mitigated and more consistent messages to consumers to be given. European standards for digital radio should be promoted within Europe.

Qualcomm
The broadcasting and mobile industries are witnessing considerable changes in users' behavior, in particular through a clear move from linear audio and video to on-demand, non-linear content consumption. The availability of supplemental mobile downlink-only spectrum would therefore be crucial to enable the appropriate support of multimedia services on the mobile broadband platform in the future. The L-band is currently the perfect candidate for supplemental 3G/4G downlink-only spectrum in Europe.

1.1 Proposals

A common EU Strategy

An EU strategy would be helpful for the introduction of Digital Terrestrial Sound Broadcasting. Timetables for the introduction phase should be coordinated among the Member States as much as possible. An annually updated overview of the process in the different countries would also be beneficial for the introduction of digital terrestrial radio.

RSPG thinks that an EU-wide strategy is needed to provide all stakeholders with the necessary market scale to launch mass Digital Radio services across the EU. This would also benefit consumers, who should be able to access Digital Radio services anywhere across Europe. RSPG recommends that, in developing its strategy, EU takes into account the studies made in different European study group, especially in CEPT FM 45. However, at the European level, transversal cooperation between car manufacturers (including the

Intelligent Car Initiative), mobile manufacturers and media service providers can be organised. RSPG believes that appropriate initiatives, such as "Unique Digital Radio" by WorldDMB, EBU and DigitalEurope, should be recognized and supported by EC.[11]

Furthermore, RSPG recommends that technical methods be defined for the implementation of narrow band systems within existing international agreements (for example DRM+ under the St61, GE84 and GE06 agreements respectively).

More certainty about digital radio technologies is needed

A larger market for digital radio receivers (including in-car receivers) could be beneficial. RSPG believe that Europe-wide recommendations concerning Digital Radio technologies would help defining pan-European receivers by setting some common rules, and by this give future proofing/stability in the process.

Delivery of local Digital Radio content/services

In order to satisfy the complete set of demands (local, regional and nationwide coverage) a more flexible option than the T-DAB family is needed for single program services. One option that could be studied is the use of narrow band systems (for example DRM+) in bands I, II and III. Such an option should be clarified in order to define pan-European receiver profiles.

Additional European studies would be useful to address the technical challenges with regards to the delivery of local Digital Radio content/services.

Furthermore, the RSPG

- recommends that a specific study on the future of L-band should be conducted by relevant European Organisation responsible for Spectrum issues.

- recommends that EC should indicate that the Band III (174 - 230 MHz) is envisaged to be used also for the introduction of digital radio broadcasting on the basis of the Geneva06 agreement and that in some member states parts of the band 230-240 MHz may also be used in addition to the band 174-230 MHz on the basis of the Wi95CO7 agreement.

[11] http://www.ebu.ch/en/technical/trev/trev_2008-Q3.pdf

- encourages European administrations to take advantage of receiver profiles adopted by industry, in order to develop strategies and policies for digital radio broadcasting within national and international boundaries to harmonise markets.

- recommends that EC should monitor and report on the progress of the deployment of Digital radio broadcasting networks in the European countries.

- should invite studies into the use of narrow band standards (for example DRM+) taking into account opportunities to explore and to experiment with broadcasting applications in Band I, II and III (including the experiment of digital receiver profiles).

2 What is the situation in different European countries today?

It is no easy task to define the situation regarding Radio Broadcasting in Europe today. On one hand there is the shift of technology and economic aspects that lies therein, and on the other hand you have different views on what should be the guiding principles for the sectors development: regulation or market forces. The shift in technology – analogue to digital – is what everybody concerned have been discussing, and has done so for quite some time. This has led to great differences between the European countries regarding the deployment of digital radio – several different technical platforms are in use and there are as many different strategies for this as there are countries. Not to mention if and why (are there significant benfits?) the shift to digital is the way to go for Radio Broadcasting.

In many ways the situation – i.e. the challenges being faced today – regarding radio broadcasting looks like it was for TV broadcasting in 2003/2004. RSPG stated then in its opinion on *Spectrum Implications of Switchover to Digital Broadcasting* (RSPG04-55) that:

The main obstacles to a rapid switchover lie in the political and economic arenas rather than in purely technical issues, even though the technical obstacles in some regions should not be neglected.

Examples mentioned were political obstacles such as absence of decisions regarding national switch-off or political decisions not to set up switch-off dates and a lack of European approach and policy. Apart from this some other examples were given that are very similar to the challenges that have been identified in the context of radio broadcasting – especially within economic/market issues:

"...a large installed base of analogue receivers, poor consumer demand based on lack of incentives to switch (lack of perceived added value, cost of digital receivers, etc.), a reluctance, based on financial risks, from operators to invest, and the costs and the sometimes questionable benefits…".

It is interesting to see how well the perceived challenges in both cases coincide – and how different they have been met and discussed during the years, especially the lack of a common European approach in the case of Radio Broadcasting. It is however important not to make harsh assumptions regarding how to meet the challenges at hand, on the grounds of these similarities. One must keep in mind that the two cases differ in one major

aspect – and that is the issue of spectrum efficiency. There will of course be a "spectrum gain" in moving towards digital broadcasting – as in the TV switchover – however, this gain does not have the same economic driving force behind it. It is thus hard to really advocate for the switchover – again: what are the benefits?

There are however things being done in Europe. In Britain – the leading country in the deployment of digital radio – support is still strong, even though there have been major setbacks such as a licence being given back to the regulator in the beginning of 2009. Apart from UK – support has also been proved in France and Germany, as for example laws have been passed pointing out one of the major driving forces in this regard: the car industry (France). In Germany a decision was taken regarding rollout of a nationwide DAB+ system. Several reports also show that the consumer demand of digital radio receivers is growing in some countries.

In Denmark there has been a continuing strong interest in digital radio, both regarding consumers buying receivers and political parties putting it on the agenda – and thus the Danish government has taken a decision to further the development of national DAB systems and develop a national long-term strategy for the country which will encompass a plan for the transition from DAB to DAB+.

So signs of political will can be found in some countries – and the consumer demand is at least not "withering away" in the cases were progress has been made (as for example Denmark). This leads to the conclusion that what must be met first hand in the countries were progress is slow (or non existent), is to raise political awareness about the benefits, and identify what the first steps should be to be able to move towards a switchover in the Radio Broadcasting sector.

The following table presents a summarized overview of the situation in Europe today regarding existing usage of bands – along with comments per band.

Table 1. Existing use

Band	Licensed services	Non-licensed services	Possible future use	Comments
Band I	Analogue television, land mobile, wind profiling radar, military services	Amateur radio	Analogue broadcasting, DRM+, military services, Auction for alternative technologies	Band I is presently very poorly used over much of the study area partially because of its highly variable propagation characteristics
Band II	FM broadcast services	Short range devices, short range communications	Analogue broadcasting, DRM+, HDRadio	Band II is highly congested by FM broadcasting services
Band III	Analogue television, T-DAB, land mobile,	Radio Microphones, PMSE, telemetry,	Broadcasting: DVB-T, Eureka 147 services[1], DRM+, Radio microphones, land mobile	Band III is already used for T-DAB and analogue television services are leaving the band in accordance with the ITU GE06 Plan to allow widespread implementation of Eu147 and DVB-T services
L-Band	T-DAB, auctioned for commercial uses	PMSE	Eureka 147 services, wireless microphones, Alternative technologies	Already planned for T-DAB services under the Maastricht agreement.

3 What are the needs and opportunities for the future of Radio Broadcasting?

Taking into account what has been stated in the previous chapter – that the future of the Radio Broadcasting sector in Europe is dependent on solutions being brought forward to solve technical, economical and political obstacles. It is then important to sort out what the needs and opportunities are in some more detail. What kind of action points that different member states deem important to meet up to these conceived needs and opportunities (or challenges) is being discussed in the end of this chapter.

The list shown below is comprised of selected, separate statements from member states – and does not represent the view of all respondents (and does not cover all aspects). However – the working group agreed that they all have their own validity, in accordance to the current situation for the responding member state.

- The question of standards and the availability of cheap and/or attractive receivers supporting the digital and analogue standards in the different frequency Bands is essential for a move forward.

- Commitments on standards to be used and profiles for the receiver functionalities would allow reaching economies of scale in a single market.

- A common agreed EU strategy would be very helpful. An EU-wide coordination would also benefit to consumers, who should be able to access Digital Radio services anywhere across Europe.

- A transparent and updated overview of the process in the different countries would also be beneficial for the introduction of digital terrestrial radio. The progress in digital broadcasting in countries like Germany, Italy, France, United Kingdom has a great influence to stimulate the process of digitalization in others countries.

- Every member state should have the flexibility to use different digital terrestrial systems for specific radio needs (e.g. local or nation wide coverage).

- Success of digital radio can not be expected without added value of digital radio e.g. content - greater variety of BC programs, better sound

quality in specific conditions; new services (additional information, multimedia).

- The migration from analogue to digital radio requires receivers for cars, homes, mobile phones etc. with reasonable prices. Thus common decisions in Europe would be needed to create larger markets in the manufacturer point of view, lowering the cost for and improving receiver availability.

- The obstacles can be related to reluctance of service providers to change/update transmitter systems and with inability of population to change the receiver equipment.

- The question will arise if analogue radio continues to be available parallel to digital radio or a complete transition from analogue to digital radio will take place (switch-off scenario).

- The success of digital radio depends on the coverage of the territory and the quality of receivers. The suitability of the implementation of various standards differs from the frequency bands.

- Consumers expect the seamless availability of their favourite radio programs. They should not have to care in detail about the distribution path of these programmes.

- A 'killer' application has not yet been identified. A large base of existing analogue receivers that continue to operate.

- Value added service: it should be suitable for inclusion in other electronic devices, e.g. mobile phones, etc. A low price comparable with FM radio and resulting from mass-production is also important.

In table 2 below it is shown how the different countries see the future usage of the bands, what is planned and not planned for. The table provides an overview of the needs and possible opportunities in each country – especially when considering the cases where there are no immediate plans.

	Band I : 47-68 MHz	**Band II : 87,5-108 MHz**	**Band III : 174-230 MHz**	**Band L : 1452-1479,5 MHz**
Austria	Probably no usage for Broadcasting; not yet decided	Probably Sound Broadcasting Digital; not yet decided	Digital Broadcasting; Division of Band between Radio and TV not yet decided	Probably no usage for Broadcasting; not yet decided
Sweden	No plans.	No plans.	T-DAB and DVB-T2	Under consideration.
Cyprus	(No indication)	(No indication)	T-DAB Wiesbaden 1995 Special Arrangement, as revised in Constanta, 2007 GE06 Plan	T-DAB Maastricht 2002 Special Arrangement as revised in Constanta 2007
Denmark	No plans.	No new plans	with 230-235 MHz GE06 VHF-MUX is to be used for radio or TV DAB allocations will be used for DAB as described above	A political decision is made to allocate the L-band for mobile TV or similar purposes, however no specific plans yet
Czech Republic	Analogue broadcasting switch-off (S-O) is planned no later than 2012. After S O, implementation of mobile service operation expected.	For the time being, there are No plans on analogue FM broadcasting S O.	Analogue S-O until 2012. Multimedia applications (conformity either with DVB T or with T-DAB channel mask).	Tender for allocation of spectrum rights is under way.
Estonia	Analogue television broadcasting transmission will be finished by 1st of July 2010 at the latest.	No specific future plan.	Analogue television broadcasting transmission will be finished by 1st of July 2010 at the latest.	No specific future plan.
Finland	Band is under review	FM radio at least for the next 7 years, plans after that open	HDTV / possibilities for DAB (under review)	Under consideration

France	Some studies are on going concerning the use of DRM+ (some trials have been made in 2009)	Several new FM calls for tender will be launched in 2011 for more than 600 frequencies (licences are granted for 5 years and can be renewed twice).	Digital radio services (T-DMB and/or T-DAB+). A first T-DMB call for tender has been launched in 2008 for the cities of Paris, Marseille and Nice-Cannes. 136 radio services have been selected.	Digital radio services (T-DAB, T-DMB, ESDR and/or DVB-SH). Digital radio microphones
Germany	No change is foreseen in the near future.	No change is foreseen in the near future.	No change is foreseen in the near future.	digital broadcasting to be terminated PMSE (secondary service)
Hungary	(No indications)	(No indications)	BROADCASTING (Digital radio)	(No indications)
Ireland	There are no specific plans for the future use of this band within Ireland at this time.	Ireland is keeping an open mind at present regarding any future digitisation of Band II, in light of the ever increasing development of radio services in this band.	Future uses will be considered in line with Ireland's allocation under the Geneva 2006 Agreement.	Future uses will be considered in line with Ireland's allocations under the relevant agreements e.g. The Maastricht 2002 Special arrangement as revised in Constanta 2007 (MA02revCO07)
Italy	In Italy the frequency band 47-52.5 Mhz is allocated to Land Mobile service. The band 47-52.5 Mhz is allocated to Land Mobile and Broadcasting services. No specific plan for the future use of this band, nevertheless, following the switch-off of Analogue TV (GE06), this band should be used for Land Mobile Service, even in accordance with ECA Table.	The frequency band 87,5-108 MHz is used for FM sound broadcasting. No change is foreseen in the near future	The frequency band 174-223 is used for digital broadcasting. The frequency band 223-230 MHz (ch. 12) is designated for terrestrial digital sound broadcasting.	The frequency band 1452-1479,5 MHz within the broadcasting service is designated for the introduction of terrestrial mobile multimedia services according to Maastricht 2002 Special arrangement as revised in Constanta 2007 (MA02revCO07)

Lithuania	Radio broadcasting	The term of licences of up to 10 years is currently in practice.	1. There are planned allotments of national coverage of 3 T-DAB frequency blocks and some regional coverage of 4 blocks under the Regional Agreement Geneva 2006 and associated planes. 2. 174–216 MHz radio frequency band for professional radio microphones, and for auxiliary program preparation and broadcasting systems.	There are planned allotments of national coverage of 2 T-DAB frequency blocks under the Special Arrangement Constanta 2007
Malta	(No indications)	(No indications)	Frequency allocated for Digital TV	(No indications)
Netherlands	Plans to allocate to Defense landmobile systems, taking into account that for future usage this band also can be allocated to programme making and special event (PMSE) services.	FM radio broadcasting services	Digital broadcasting services and digital radio broadcasting services.	Digital broadcasting services and digital radio broadcasting services.
Slovak Republic	48,5-66 MHz: BROADCASTING (digital terrestrial) – under consideration; Other bands: no change	BROADCASTING (FM sound analogue + sound digital); Wireless audio-applications (secondary service)	BROADCASTING (DVB T + T DAB) 174-223 MHz: Radio microphones (secondary service)	BROADCASTING (T DAB)
Luxembourg	No plans.	Yes, for digital transmission	Yes, only if there will be a request	No plans.

Switzerland	Defence	Broadcast services (no specific changes planned)	Broadcast services	Non broadcasting (Wireless Microphones under evaluation)
Portugal	(No indication)	Some more local stations in rural areas	2 national networks, 12 regional networks	14 Regional networks, 60 local networks
Belgium	(No indication)	To be studied	To be studied	To be studied
Latvia	Under consideration. Probably MS and future digital broadcasting systems	No change. In visible future will be used for FM broadcasting	Digital TV (55%) Digital sound (45%)	Future multimedia systems
Norway	Not yet decided	Not yet decided	Digital radio broadcasting. Possible other services not yet decided.	Not yet decided
Spain	Same use	Same use	Same use	Same use
United Kingdom	The band 55-68 MHz has been identified for possible future award by Ofcom.	Continued use for FM Radio services. It is planned that national and large scale services will migrate to DAB at some point in the future. This will leave Band II available for smaller scale local commercial and community radio services.	PMR services will release their spectrum above 193 MHz at the end of 2012.	This spectrum has been auctioned to Qualcomm and is a tradable licence that could be sold.

3.1 Suggested activities by Member States

In the questionnaire sent out it was asked if the respondents could foresee any particular specific European initiatives/activities that would benefit terrestrial digital radio. The description below is a summarasation of what was put forward regarding this. It is important to note that these are separate statements from member states – and does not represent the view of all respondents. It gives however an insight in the different reasonings that was issued – and how contractidory they also could be.

- It is of key importance for the future of digital radio that a common European strategy is developed as far as possible. There is no business case visible which could drive the digitisation process. The initiative "Unique Digital Radio" is very welcome. If possible that initiative should be widen, by including other digital terrestrial radio techniques. The DVB-T implementation could be used as example to this process. This would provide a large market that would lead to economies of scale and cost reduction, and also avoid uncertainties which prevent assert the benefits of the migration to digital technology. This strategy should consider a plan migration to digital-only, considering the real needs of spectrum, by setting a date for analogue switch-off.

- An initiative to highlight the advantages of digital radio.

- Bands below 80 MHz: Since analogue VHF TV in band I ceased operation in 2009, this band is not currently used. We do not have specific plans for the use of the band, but it offers a possibility to test different digital tv and radio systems.

- 87.5-108 MHz: A CEPT report 141 on "Future possibilities for the digitalisation of band II), has just been agreed to be published. The report describes different digital technologies to replace FM broadcasting.

- A wider market base would increase the availability of receivers/equipment with lower cost.

- Any initiative that brings an opportunity to develop an economy of scale for infrastructure builders, program editors and for listeners or users would help developing digital radio. France has decided to launch digital radio services on its overall territory in order to stimulate this economy. A European initiative is welcome.

- An EU-wide coordinated approach with regards to the transition period may be desirable. The actual reasons of the difficulties raised by the migration of the radio medium from analogue to digital are numerous but it is still difficult to clearly point the key factors of success and failure based on the specific configuration of each European country. A European initiative to study this work item would be very useful to put an end to some hesitations. In particular, such investigations could address the possible ways to define a Europe-wide target date for analogue switch-off that would speed-up the take-off of digital radio.

- Additional European studies would be useful to address the technical challenges with regards to the delivery of local Digital Radio content / services (for example, DRM+, using narrow channels in Band III).

- There is no urgent requirement to progress the deployment of digital radio. There is no equivalent of a "digital dividend" in relation to spectrum used by analogue radio. The spectrum in question is not as attractive to other users. The costs associated with deployment of new sound broadcasting technologies outweigh any benefit in such deployment.

- Some countries expressed the view that no analogue switch off date should be set.

- It seems important to have radiosets that can cope with different digital technologies.

- Promotion of a one or a very limited number of systems seems to be an important factor for success.

4 Conclusion

In many ways the overall activities that can be proposed on a European level – are similar to the ones that were suggested in 2004 regarding switchover to Digital Television Broadcasting.

In 2004 emphasis was put on the cooperation between member states – with clearer coordination on spectrum management (CEPT and EU-level), and information sharing with regular reports on national plans and strategies being decided. This is much the case also today – facilitation and encouragement of this should be made through the help of RSPG. Regarding information sharing it should also be useful to arrange public work shops/forums that are not only national – but invite participants from other countries in order to provide guidance on best practices covering technical, economical and political aspects. It is clearly shown in the responses from the member states that there are things being done (for instance Austria) – but the information regarding their analysis, recommendations and decisions is not spread for the benefit of all member states.

Promotion of benefits

There are two major interested parties in this context: governments/agencies and industry. In trying to achieve the same goal, they most certainly will end up with different views on how this should be done, and most importantly why, and for whom? Both will say that it is for the end user, the consumers benefit, but then this will not be achieved if the right regulatory framework is not in place, and that the business case is sound. So it is not just the benefits of the consumer that can drive things in the right direction, it is also the benefits for society as a whole and especially the benefits of the ones that shall provide the content.

As regards the benefits for the society as a whole it has already been stated that there is not the same economic imperative in this case as with Digital Television Broadcasting (Digital Dividend), but then one should look for other kinds of benefits, such as diversity. If there is not sufficient interest right now for nationwide programs – a benefit would arise from the diversity of stimulating small local programmes (as in the case of UK).

Use of Band I

Band I (47-68 MHz) is planned as a broadcasting band and is still used for analogue TV broadcasting in some European countries. In Europe, in some

countries this band is also assigned to military service, shared with mobile services and radio amateur services.

The answers indicate that there is no strong interest in use of Band I expressed by administrations although broadcasters and the Digital Radio Mondiale Consortium foresee an interest for an initial launch of the DRM+ standard[12]. This frequency band could be particularly attractive for local and regional coverage of rural areas, small and community radio stations and specific data transmissions.

RSPG could investigate the opportunity of the European DRM+ standard in Band I, e.g. for digital narrow band broadcasting applications in anticipation of a development in the band 87.5-108 MHz, thus possibly helping to validate the digital receiver profiles[13].

Use of Band II

Band II is the core band for analogue FM sound broadcasting in Europe. This band is considered completely occupied in all European countries and there are a lack of frequencies to satisfy the demand, especially in densely populated regions. However, in less populated area, some space in this band exists and could offer opportunity to start the introduction of digital narrow band systems (for example DRM+). The CEPT FM 45 Group has produced a report about the future possibilities for the digitalisation of Band II (*ECC Report 141[14]*). Knowing that Band II is also allocated for broadcasting services in the radio Regulations for the 3 ITU Regions[15], digitalisation of this band is likely to be introduced progressively where there are opportunities.

The use of Band III

Band III (174 - 230 MHz)[16] is the primary spectrum range for the introduction of digital radio broadcasting, currently on the basis of the DAB-family. This is an open European standard adopted by ETSI and covers T-DAB, T-DAB+ and T-DMB[17] .

However, some countries support the idea of studying the use of a narrow band standard in band III e.g. (DRM+). There is also a suggestion of using a

[12] ETSI ES 201 980.
[13] http://www.drm.org/uploads/files/drm_receiver_profiles.pdf.
[14] ECC Report 141 – Future possibilities for the digitalisation of Band II (87.5 - 108 MHz) St. Petersburg, May 2010.
[15] 87.5-108 MHz in R1, 76-108 MHz in R2 and 87-108 MHz in R3.
[16] In addition to the frequency range 174-230 MHz a number of member states has possibilities under the Wi95CO07-agreement to use the frequency band 230-240 MHz for radio broadcasting services (T-DAB).
[17] ETSI EN 300 401, TS 102 563, TS 102 427, TS 102 428.

single broadcasting standard (i.e. DVB-T2) for the transmission of both terrestrial audio and television as a medium-term possibility.

In this frequency band, digital radio is generally supported by broadcasters and industry. Some administrations are studying the introduction of Digital TV. Furthermore regulatory framework is provided by the GE06 Agreement, where a number of countries have DVB-T & T-DAB entries in the Plan facilitating coordination by European countries with other signatories of the GE06 Agreement.

The use of Band L

Regarding Band L, CEPT administrations agreed on the Maastricht 2002 Special Arrangement as revised in Constanta 2007, which includes options for using of multimedia systems. There are no clear or strong views from administrations about a future of T-DAB in this band, but there are initiatives from industry to use this spectrum for mobile multimedia services and/or for the deployment of subscription-based radio services (e.g. on the basis of ETSI's ESDR standard[18]). Enhanced digital radio services are well suited to be part of the multimedia service offering. Any action taken with respect to this has to be based on collaboration in the whole range of CEPT. Furthermore, some aspects of the proposed mobile multimedia services may cause the necessity of amendments of national Regulations or frequency allocations in some European countries.

This band has been considered as an appropriate candidate band for radio microphones in CEPT Report 32[19] and ECC Report 121[20]. Some Member States plan to use this band for radio microphones as a consequence of the use of the frequency band 790 – 862 MHz for the mobile/fixed communications networks (MFCN) in order to compensate for the loss of spectrum for radio microphones. However, at this stage, this subject is still under discussion at the CEPT level.

[18] ETSI TR 102 525 V1.1.1 Satellite Earth Stations and Systems (SES); Satellite Digital Radio (SDR) service; Functionalities, architecture and technologies ETSI EN 302 550-1-1 Satellite Earth Stations and Systems (SES); Satellite Digital Radio (SDR) Systems; Part 1: Physical Layer of the Radio Interface; Sub-part 1: Outer Physical Layer ETSI EN 302 550-1-2 Satellite Earth Stations and Systems (SES); Satellite Digital Radio (SDR) Systems; Part 1: Physical Layer of the Radio Interface; Sub-part 2: Inner Physical Layer Single Carrier Modulation
ETSI EN 302 550-1-3 Satellite Earth Stations and Systems (SES); Satellite Digital Radio (SDR) Systems; Part 1: Physical Layer of the Radio Interface; Sub-part 3: Inner Physical Layer Multi Carrier Modulation.

[19] CEPT Report 32 - Report from CEPT to the European Commission in response to the Mandate on "Technical considerations regarding harmonisation options for the digital dividend in the European Union" "Recommendation on the best approach to ensure the continuation of existing Program Making and Special Events (PMSE) services operating in the UHF (470-862 MHz), including the assessment of the advantage of an EU-level approach"

[20] ECC Report 121- Compatibility studies between professional wireless microphones systems (PWMS) and other services/systems in the bands 1452-1492 MHz, 1492-1530 MHz, 1533-1559 MHz also considering the services/systems in the adjacent bands (below 1452 MHz and above 1559 MHz) -Vilnius, September 2008.

With respect to the band 1479.5-1492 MHz, ECC/DEC/(03)02 decision designates its use for satellite digital audio broadcasting systems. It has been implemented by 11 EU Member States and another three EU Member States have committed to implement it. Several pan-European satellite filings are registered in ITU to provide multimedia services to automotive, portable or handheld terminals in this band. SAP REG recommends to maintain the current regulatory certainty that prevails in the L band, whether in the 1452-1479.5 MHz portion, covered by the MA02_revCO07 plan, or the upper 1479.5-1492 MHz sub band, as harmonised for satellite use through ECC/DEC(02)03.

Studies have been made in many European groups and should be used by EU in order to find ways to promote digital radio

The definition of European labels guarantying multi-standard capabilities, multi-band reception and also some level of richness for associated data, as initiated by the WorldDMB Forum, would help speeding up the launch of Digital Radio in all Europe. The initiative "Unique Digital Radio" by WorldDMB, EBU and DigitalEurope is helpful in the development of digital radio.

More certainty about digital radio technologies is needed

The lack of a mass market for digital radio receivers (including in-car receivers) and the limited integration of the digital radio function in multifunction receivers remain one of essential obstacles when assessing the current status of Digital Radio services in Europe. RSPG believe that Europe-wide recommendations concerning Digital Radio services technologies would help defining pan-European receivers by setting some common rules.

An EU-wide coordinated approach with regards to the transition period may be desirable

So far migration to digital radio has tended to progress slowly. This may be due to the need to simulcast services on both analogue and digital platforms for an indefinite period, radio stations being reluctant or unable to bear the cost of two transmission networks. Furthermore there is limited vision regarding the the future penetration of digital radio receivers.

5 Annex 1. International allocations for Broadcasting service for Bands I, II, III and L

The following tables are extracted from the Radio Regulations for the frequency bands I (47-68 MHz), II (107.5-108 MHz), III (174-230 MHz) and L (1452-1492 MHz). They show the possibilities of international development and limitations in different countries, especially the limits of bands are not exactly the same in the 3 Regions. The potential development over the world should be taking into account when studying development of policies in Europe.

Band I

Region 1	Region 2	Region 3
47-68	**54-68**	**47-50**
BROADCASTING	BROADCASTING	FIXED
	Fixed	MOBILE
5.162A 5.163 5.164 5.165	Mobile	BROADCASTING
5.169 5.171	5.172	5.162A
	68-72	
	BROADCASTING	
	Fixed	
	Mobile	
	5.173	

5.162 *Additional allocation:* in Australia and New Zealand, the band 44-47 MHz is also allocated to the broadcasting service on a primary basis.

5.162A *Additional allocation:* in Germany, Austria, Belgium, Bosnia and Herzegovina, China, Vatican, Denmark, Spain, Estonia, the Russian Federation, Finland, France, Ireland, Iceland, Italy, Latvia, The Former Yugoslav Republic of Macedonia, Liechtenstein, Lithuania, Luxembourg, Monaco, Montenegro, Norway, the Netherlands, Poland, Portugal, Slovakia, the Czech Rep., the United Kingdom, Serbia, Slovenia, Sweden and Switzerland the band 46-68 MHz is also allocated to the radiolocation service on a secondary basis. This use is limited to the operation of wind profiler radars in accordance with Resolution 217 (WRC-97). (WRC-07)

5.163 *Additional allocation:* in Armenia, Belarus, the Russian Federation, Georgia, Hungary, Kazakhstan, Latvia, Lithuania, Moldova, Uzbekistan, Kyrgyzstan, Slovakia, the Czech Rep., Tajikistan, Turkmenistan and Ukraine, the bands 47-48.5 MHz and 56.5-58 MHz are also allocated to the fixed and land mobile services on a secondary basis. (WRC-07)

5.164 *Additional allocation:* in Albania, Germany, Austria, Belgium, Bosnia and Herzegovina, Botswana, Bulgaria, Côte d'Ivoire, Denmark, Spain, Estonia, Finland, France, Gabon, Greece, Ireland, Israel, Italy, the Libyan Arab Jamahiriya, Jordan, Lebanon, Liechtenstein, Luxembourg, Madagascar, Mali, Malta, Morocco, Mauritania, Monaco, Montenegro, Nigeria, Norway, the Netherlands, Poland, Syrian Arab Republic, Romania, the United Kingdom, Serbia, Slovenia, Sweden, Switzerland, Swaziland, Chad, Togo, Tunisia and Turkey, the band 47-68 MHz, in South Africa the band 47-50 MHz, in the Czech Rep. the band 66-68 MHz, and in Latvia and Lithuania the band 48.5-56.5 MHz, are also allocated to the land mobile service on a primary basis. However, stations of the land mobile service in the countries mentioned in connection with each band referred to in this footnote shall not cause harmful interference to, or claim protection from, existing or planned broadcasting stations of countries other than those mentioned in connection with the band. (WRC-07)

5.165 *Additional allocation:* in Angola, Cameroon, Congo (Rep. of the), Madagascar, Mozambique,Somalia, Sudan, Tanzania and Chad, the band 47-68 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

5.169 *Alternative allocation:* in Botswana, Burundi, Lesotho, Malawi, Namibia, the Dem. Rep. of the Congo, Rwanda, South Africa, Swaziland, Zambia and Zimbabwe, the band 50-54 MHz is allocated to the amateur service on a primary basis

5.171 *Additional allocation:* in Botswana, Burundi, Lesotho, Malawi, Mali, Namibia, Dem. Rep. of the Congo, Rwanda, South Africa, Swaziland and Zimbabwe, the band 54-68 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

5.172 *Different category of service:* in the French overseas departments and communities in Region 2, Guyana, Jamaica and Mexico, the allocation of the band 54-68 MHz to the fixed and mobile services is on a primary basis (see No. **5.33**).

5.173 *Different category of service:* in the French overseas departments and communities in Region 2, Guyana, Jamaica and Mexico, the allocation of the band 68-72 MHz to the fixed and mobile services is on a primary basis (see No. **5.33**).

Band II

Region 1	Region 2	Region 3
87.5-100	**76-88**	**87-100**
BROADCASTING	BROADCASTING	FIXED
5.190	Fixed	MOBILE
	Mobile	BROADCASTING
	5.185	
	88-100	
	BROADCASTING	
100-108		
BROADCASTING		
5.192 5.194		

5.185 *Different category of service:* in the United States, the French overseas departments and communities in Region 2, Guyana, Jamaica, Mexico and Paraguay, the allocation of the band 76-88 MHz to the fixed and mobile services is on a primary basis (see No. **5.33**).

5.190 *Additional allocation:* in Monaco, the band 87.5-88 MHz is also allocated to the land mobile service on a primary basis, subject to agreement obtained under No. **9.21**. (WRC-97)

5.192 *Additional allocation:* in China and Korea (Rep. of), the band 100-108 MHz is also allocated to the fixed and mobile services on a primary basis. (WRC-97)

5.194 *Additional allocation:* in Azerbaijan, Kyrgyzstan, Somalia and Turkmenistan, the band 104-108 MHz is also allocated to the mobile, except aeronautical mobile (R), service on a secondary basis. (WRC-07)

Band III

Region 1	Region 2	Region 3
174-223	**174-216**	**174-223**
BROADCASTING	BROADCASTING	FIXED
5.235 5.237 5.243	Fixed	MOBILE
	Mobile	BROADCASTING
	5.234	5.233 5.238 5.240 5.245
223-230	**220-225**	**223-230**
BROADCASTING	AMATEUR	FIXED
Fixed	FIXED	MOBILE
Mobile	MOBILE	BROADCASTING
	Radiolocation	AERONAUTICAL
5.243 5.246 5.247	5.241	RADIONAVIGATION
		Radiolocation
		5.250
		230-240
		FIXED
		MOBILE

5.233 *Additional allocation:* in China, the band 174-184 MHz is also allocated to the space research (spaceto- Earth) and the space operation (space-to-Earth) services on a primary basis, subject to agreement obtained under No. **9.21**. These services shall not cause harmful interference to, or claim protection from, existing or planned broadcasting stations.

5.234 *Different category of service:* in Mexico, the allocation of the band 174-216 MHz to the fixed and mobile services is on a primary basis (see No. **5.33**).

5.235 *Additional allocation:* in Germany, Austria, Belgium, Denmark, Spain, Finland, France, Israel, Italy, Liechtenstein, Malta, Monaco, Norway, the Netherlands, the United Kingdom, Sweden and Switzerland, the band 174-223 MHz is also allocated to the land mobile service on a primary basis. However, the stations of the land mobile service shall not cause harmful interference to, or claim protection from, broadcasting stations, existing or planned, in countries other than those listed in this footnote.

5.237 *Additional allocation:* in Congo (Rep. of the), Eritrea, Ethiopia, Gambia, Guinea, the Libyan Arab Jamahiriya, Malawi, Mali, Sierra Leone, Somalia and Chad, the band 174-223 MHz is also allocated to the fixed and mobile services on a secondary basis. (WRC-07)

5.238 *Additional allocation:* in Bangladesh, India, Pakistan and the Philippines, the band 200-216 MHz is also allocated to the aeronautical radionavigation service on a primary basis.

5.240 *Additional allocation:* in China and India, the band 216-223 MHz is also allocated to the aeronautical radionavigation service on a primary basis and to the radiolocation service on a secondary basis.

5.241 In Region 2, no new stations in the radiolocation service may be authorized in the band 216-225 MHz. Stations authorized prior to 1 January 1990 may continue to operate on a secondary basis.

5.243 *Additional allocation:* in Somalia, the band 216-225 MHz is also allocated to the aeronautical radionavigation service on a primary basis, subject to not causing harmful interference to existing or planned broadcasting services in other countries.

5.246 *Alternative allocation:* in Spain, France, Israel and Monaco, the band 223-230 MHz is allocated to the broadcasting and land mobile services on a primary basis (see No. **5.33**) on the basis that, in the preparation of frequency plans, the broadcasting service shall have prior choice of frequencies; and allocated to the fixed and mobile, except land mobile, services on a secondary basis. However, the stations of the land mobile service shall not cause harmful interference to, or claim protection from, existing or planned broadcasting stations in Morocco and Algeria.

5.247 *Additional allocation:* in Saudi Arabia, Bahrain, the United Arab Emirates, Jordan, Oman, Qatar and Syrian Arab Republic, the band 223-235 MHz is also allocated to the aeronautical radionavigation service on a primary basis.

5.250 *Additional allocation*: in China, the band 225-235 MHz is also allocated to the radio astronomy service on a secondary basis.

5.251 *Additional allocation:* in Nigeria, the band 230-235 MHz is also allocated to the aeronautical radionavigation service on a primary basis, subject to agreement obtained under No. **9.21**.

5.252 *Alternative allocation:* in Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe, the bands 230-238 MHz and 246-254 MHz are allocated to the broadcasting service on a primary basis, subject to agreement obtained under No. **9.21**.

5.254 The bands 235-322 MHz and 335.4-399.9 MHz may be used by the mobile-satellite service, subject to agreement obtained under No. **9.21**, on condition that stations in this service do not cause harmful interference to those of other services operating or planned to be operated in accordance with the Table of Frequency Allocations except for the additional allocation made in footnote No. **5.256A**. (WRC-03)

5.256 The frequency 243 MHz is the frequency in this band for use by survival craft stations and equipment used for survival purposes. (WRC-07)

5.256A *Additional allocation:* in China, the Russian Federation, Kazakhstan and Ukraine, the band 258-261 MHz is also allocated to the space research service (Earth-to-space) and space operation service (Earth-to-space) on a primary basis. Stations in the space research service (Earth-to-space) and space operation service (Earth-to-space) shall not cause harmful interference to, nor claim protection from, nor constrain the use and development of the mobile service systems and mobile-satellite service systems operating in the band. Stations in space research service (Earth-to-space) and space operation service (Earth-to-space) shall not constrain the future development of fixed service systems of other countries. (WRC-03)

Band L

Region 1	Region 2	Region 3
1 452-1 492	**1 452-1 492**	
FIXED	FIXED	
MOBILE except aeronautical	MOBILE 5.343	
mobile	BROADCASTING 5.345	
BROADCASTING 5.345	BROADCASTING-SATELLITE 5.208B 5.345	
BROADCASTING-SATELLITE	5.341 5.344	
5.208B 5.345		
5.341 5.342		

5.341 In the bands 1 400-1 727 MHz, 101-120 GHz and 197-220 GHz, passive research is being conducted by some countries in a programme for the search for intentional emissions of extraterrestrial origin.

5.342 *Additional allocation:* in Armenia, Azerbaijan, Belarus, Bulgaria, the Russian Federation, Uzbekistan, Kyrgystan and Ukraine, the band 1 429-1 535 MHz is also allocated to the aeronautical mobile service on a primary basis exclusively for the purposes of aeronautical telemetry within the national territory. As of 1 April 2007, the use of the band 1 452-1 492 MHz is subject to agreement between the administrations concerned. (WRC-2000)

5.344 *Alternative allocation:* in the United States, the band 1 452-1 525 MHz is allocated to the fixed and mobile services on a primary basis (see also No. **5.343**).