

Public Consultation on the Digital Dividend
(taking place from 30 March to 13 May 2009)

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Executive Summary

The ability to communicate and have access to the maximum information available at any time and at any place has been one of the drivers of the development of electronic communications.

Radio spectrum is a scarce public resource and its demand has increased in modern society. It is the foundation of any type of wireless service, of mobile communications, of radio and television broadcasting, of satellite communications, and of maritime and aircraft support communications, among many others.

Concerning terrestrial television, the efficiency of digital versus analogue technology – a much greater volume of information is broadcasted on the same spectrum – will enable a much more efficient use of the spectrum; the migration from analogue to digital television, which, such as it's happening throughout Europe, will also be started in Portugal soon, will open new perspectives in terms of spectrum use that may assume an inestimable social and economic value.

The digital dividend concept emerges in this context. It is understood to be the spectrum that is currently allocated to television broadcasting in the VHF and UHF bands to be released as a result of the conversion of the existing analogue terrestrial television programmes into the digital format.

However, the transition process implies that analogue and digital television broadcastings will coexist for a given period in time. This is designated the *simulcast* period, which is expected to last about three years in Portugal, considering that digital terrestrial broadcasts are expected to start in April 2009, and that the ending of analogue television broadcasts, commonly designated *switch-off*, should take place in the entire national territory until 26 April 2012.

This fact implies that the release of the entire spectrum corresponding to the digital dividend will only be possible after that date.

Furthermore, the allocation of the digital dividend can have implications at the social, cultural and economic levels, which, together with the need to ensure this resource's efficient and effective management, justifies the launch of the current consultation. This consultation is part of a reflection process undergoing at ICP-ANACOM to evaluate alternative spectrum usage scenarios, aiming at a future decision on this matter.

The consultation summarizes some of the digital dividend's potential uses, namely mobile television, high definition television, mobile and fixed broadband services, and digital audio broadcasting, among others.

With this consultation, ICP-ANACOM aims to collect, until 13 May, contributions from the several market players (operators, manufacturers, users and other) regarding this resource's potentials. Questions raised concern the expected impact of using the digital dividend, its usage's coordination or harmonization at the European level, its sharing by the several services/applications, the possibility of adopting technological and service neutrality criteria, and the procedures to release/allocate the spectrum that becomes available and the corresponding schedules.

ICP-ANACOM will release a report with the main conclusions stemming from the public consultation now started, noting however that the digital dividend's allocation process is not confined to this consultation.

1. Introduction

The ability to communicate and have access to the maximum information available at any time and at any place has been one of the drivers of the development of electronic communications.

Radio spectrum is a scarce public resource and its demand has increased in modern society, being the foundation of any type of wireless service, of mobile communications, of radio and television broadcasting, of satellite communications, and of maritime and aircraft support communications, among many others.

The development of mobile communications during the last decades has motivated an increasing demand of spectrum in order to support networks that are able to provide that type of communications.

Concerning terrestrial television, the efficiency of digital versus analogue technology – a much greater volume of information is broadcasted on the same spectrum – will enable a much more efficient use of the spectrum.

This spectrum in the UHF band has a great value for society since it combines coverage (propagation) and capacity (bandwidth) characteristics that make it suitable for a wide range of applications and services.

The migration process from analogue to digital television, which, such as it's happening throughout Europe, will also be started in Portugal, will open new perspectives in terms of spectrum use that may assume an inestimable social and economic value. It is of the public interest that the spectrum to be released with this transition – the digital dividend – be managed effectively and used efficiently, in order to offer a balanced response to this resource's increasing demand. Establishing the services to which it could be allocated and the inevitable social and economic consequences of those options justifies involving in this matter all potential interested parties and the market.

ICP-ANACOM's Statutes¹ establish that this Authority's responsibilities include, among others, "to ensure the management of radio spectrum, involving the planning, allocation and supervision of spectrum resources (..)", "to promote the competitiveness and the development of communications markets, namely within the context of the convergence of communications, media and information technologies", "to promote processes of public consultation and expression of interest (...)", "to participate in the definition of the communications' global strategic development, namely within the context of the convergence of telecommunications, media and information technologies, conducting appropriate studies for that purpose"².

¹ Published as an annex to Decree-Law no. 309/2001 of 7 December.

² Article 6, no. 1 paragraphs c), f), m) and o) of the Statutes.

In the same sense, Law no. 5/2004 of 10 February (ECL - Electronic Communications Law) establishes that, within the scope of spectrum management³, it is ICP-ANACOM's responsibility to plan frequencies according to the following principles: a) radio spectrum availability; b) the guarantee of effective competitive conditions in the relevant markets; c) the effective and efficient use of frequencies⁴.

As an outcome of the established regime, it is ICP-ANACOM's responsibility to allocate and assign frequencies, in accordance with objective, transparent, non-discriminatory and proportional criteria⁵.

At a supranational level, it is this Authority's responsibility to ensure the technical representation of the Portuguese State at similar international organizations, unless determined otherwise⁶, being responsible for following up the activity of regulatory entities alike, of the foreign regulatory experiences and to establish relationships (...) in the technical field with Community and international organizations⁷. ICP-ANACOM should promote the harmonization of the use of frequencies in the European Union in order to guarantee its effective and efficient use within the scope of Decision no. 676/2002/EC (Radio Spectrum Decision).^{8 9}

The objectives shaping all the regulatory activity to be carried out by this Authority are "to promote competition in the offer of electronic communications networks and services, resources and associated services", "to contribute to the development of the European Union internal market", and "to protect citizens' interests", under the terms of the ECL¹⁰. In this context, it is ICP-ANACOM's particular responsibility "to foster an efficient use and ensure an effective management of frequencies (...)"¹¹.

This is the framework of the present consultation on the use of the digital dividend, aiming to consider the future use of part of the radio spectrum, which shows great usage potential.

This consultation is part of an information gathering process that will support ICP-ANACOM on a future decision on this matter, which also includes the seminar¹² on the digital dividend that ICP-ANACOM will promote during the month of April and which aims to stimulate the reflection on this matter, in order to incentive all interested parties to participate in the consultation.

Being a market hearing, this consultation is not part of and does not replace the consultation procedures foreseen in article 8 of the ECL and in the remaining legal provisions which apply within the legal framework in force.

³ Understood as the set of frequencies associated to radio waves (article 15, no. 1 of the ECL).

⁴ Article 15, no. 2 of the ECL.

⁵ Article 15, no. 3 of the ECL.

⁶ Article 6, no. 1 paragraph r) of the Statutes.

⁷ Article 6, no. 2 paragraph b) of the Statutes.

⁸ Of the European Parliament and the Council, of 7 March, regarding a regulatory framework for the radio spectrum policy in the European Union.

⁹ Article 15, no. 4 of the ECL.

¹⁰ Article 5, no. 1, paragraphs a) to c) of the ECL.

¹¹ Article 5, no. 2 paragraph d) of the ECL.

¹² <http://www.anacom.pt/render.jsp?contentId=870081>

1. What is the desired impact of using the digital dividend at the economic and social levels, among others?

2. Framework

2.1. Spectrum framework

2.1.1. Spectrum currently allocated to television broadcasting

The following frequency bands are currently allocated to the television broadcasting service:

Band I: 47-68 MHz (channels 2 to 4) – VHF

| channel 2 | channel 3 | channel 4 |
|-----------|-----------|-----------|
| 47-54 MHz | 54-61 MHz | 61-68 MHz |

Band III: 174-230 MHz (channels 5 to 12) – VHF

| channel 5 | channel 6 | channel 7 | channel 8 | channel 9 | channel 10 | channel 11 | channel 12 |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 174-181 MHz | 181-188 MHz | 188-195 MHz | 195-202 MHz | 202-209 MHz | 209-216 MHz | 216-223 MHz | 223-230 MHz |

Bands IV and V: 470-862 MHz (channels 21 to 69) – UHF

| | | | | | | |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| channel 21 | channel 22 | channel 23 | channel 24 | channel 25 | channel 26 | channel 27 |
| 470-478 MHz | 478-486 MHz | 486-494 MHz | 494-502 MHz | 502-510 MHz | 510-518 MHz | 518-526 MHz |
| channel 28 | channel 29 | channel 30 | channel 31 | channel 32 | channel 33 | channel 34 |
| 526-534 MHz | 534-542 MHz | 542-550 MHz | 550-558 MHz | 558-566 MHz | 566-574 MHz | 574-582 MHz |
| channel 35 | channel 36 | channel 37 | channel 38 | channel 39 | channel 40 | channel 41 |
| 582-590 MHz | 590-598 MHz | 598-606 MHz | 606-614 MHz | 614-622 MHz | 622-630 MHz | 630-638 MHz |
| channel 42 | channel 43 | channel 44 | channel 45 | channel 46 | channel 47 | channel 48 |
| 638-646 MHz | 646-654 MHz | 654-662 MHz | 662-670 MHz | 670-678 MHz | 678-686 MHz | 686-694 MHz |
| channel 49 | channel 50 | channel 51 | channel 52 | channel 53 | channel 54 | channel 55 |
| 694-702 MHz | 702-710 MHz | 710-718 MHz | 718-726 MHz | 726-734 MHz | 734-742 MHz | 742-750 MHz |
| channel 56 | channel 57 | channel 58 | channel 59 | channel 60 | channel 61 | channel 62 |
| 750-758 MHz | 758-766 MHz | 766-774 MHz | 774-782 MHz | 782-790 MHz | 790-798 MHz | 798-806 MHz |
| channel 63 | channel 64 | channel 65 | channel 66 | channel 67 | channel 68 | channel 69 |
| 806-814 MHz | 814-822 MHz | 822-830 MHz | 830-838 MHz | 838-846 MHz | 846-854 MHz | 854-862 MHz |

Legend:

| |
|-----------------------------|
| VHF |
| Lower part of the UHF band |
| Middle part of the UHF band |
| Upper part of the UHF band |

VHF (I and III) frequency bands are made up of 11 radio channels, with 7 MHz each, while UHF (IV and V) frequency bands are made up of 49 radio channels, with 8 MHz each; channels 21 to 36 make up its lower part, channels 37 to 53 make up its middle part, and channels 54 to 69 make up its upper part.

These frequency bands were planned for analogue television at an International Communications Union's (ITU) Regional Conference held in 1961 in Stockholm, where the designated "*Stockholm Agreement*" (ST61) was reached.

In Portugal, channel 12 and channels 61 to 69 were not included in the television planning since they were then allocated to military defence and security uses.

The sub-band corresponding to channels 61-69 (790-862 MHz) was released for civil use at the end of the 1990s and there is thus already some use of channels 61 to 64 by low-power analogue TV relays, channels 65 to 69 having been exclusively reserved for the introduction of Digital Terrestrial Television (DTT). It can thus be stated that the current analogue terrestrial television programme services (four nationwide and two regional ones, one in each Autonomous Region) use about 70 MHz in VHF and 352 MHz in UHF, totalling 422 MHz of used radio spectrum.

2.1.2. The Regional Radiocommunication Conference (RRC-06)

At the end of the 1990s and with the development of the DVB-T¹³ (*Digital Video Broadcasting – Terrestrial*) standard by ETSI (*European Telecommunications Standards Institute*), digital television started to be introduced in Europe.

However, although ST61 made it possible to add digital stations to the Plan, this Plan had been optimized for an analogue technology and was thus not suited for the present reality. Furthermore, as it was important to ensure the maximum spectrum efficiency within a fully digital context, as well as to ensure that all countries would have equitable access to the radio spectrum, it was concluded that it was necessary to develop a new Plan.

Thus, in 2006, Geneva held ITU's Regional Conference – RRC06 (involving Europe, Africa and some Middle-Eastern countries) that reviewed the 1962 Stockholm Agreement, regarding bands III, IV and V¹⁴, not only to enable the introduction of DTT in Europe, but also to frame the use of digital audio broadcasting (T-DAB), within a broader international frequency plan and in the scope of the ITU.

In fact, the Conference planned all the frequency bands for audio and television broadcasting, that being its only mandate. There was however an understanding, formalized by a reservation presented by Europe, that European countries would reserve the right to implement other services in their countries, as long as it fulfilled the defined spectrum masks, and that these services would not need a greater protection or produce greater interference in the territories of the countries nearby.

¹³ Standard EN 300 744

¹⁴ Band I continues to be managed by ST61

A new Agreement (GE06) was thus made containing the new frequency plan of terrestrial digital broadcasting to be implemented the countries of Europe, Africa and some of the Middle East., June 2015¹⁵ been set as the date to end the protection to analogue systems.

2.1.3. The Digital Dividend

As previously mentioned, digital technology enables a much more effective use of spectrum than analogue technology.

On the other hand, the vast majority of spectrum currently allocated to television (fundamentally that of bands IV and V) is considered to be among the spectrum with most potential, since it combines coverage (propagation) and capacity (bandwidth) characteristics that make it suitable for a wide range of applications and services.

Under these circumstances and having in view the transition from analogue to digital television at the European level, expressions of interest soon started to emerge from the most varied sources in order for the spectrum to be released to be allocated to new applications or services.

The digital dividend concept emerges in this context. It is understood to be the spectrum that is currently allocated to television broadcasting in the VHF and UHF bands that will be released as a result of converting existing analogue terrestrial television programmes into the digital format.

However, it should be noted that the complete release of radio spectrum corresponding to the digital dividend will only be possible after the ending of analogue television broadcasts, a process commonly designated *switch-off*, which should occur in Portugal until April 2012, according to CMR no. 26/2009 of 17 March.

2.2. International Framework

2.2.1. EU

The Communication of the European Commission COM(2007)700, of 13 November 2007, stresses out that the digital dividend is a unique opportunity to respond to the fast increase in the demand of wireless communication services, and that action at the European Level will support the implementation of the i2010¹⁶ Initiative adopted in 2005, which includes the Lisbon Strategy for growth and employment in Europe. It is within this scope that different European institutions have stated their opinion on the digital dividend, also within the transition process from analogue to digital broadcasting, under the terms summarized ahead.

¹⁵ Although for the VHF band in some countries (Europe excluded) the date is June 2020

¹⁶ http://ec.europa.eu/information_society/europe/i2010/index_en.htm

At the European Commission level

- Communication COM(2005) 204, of 24 May 2005, designated “Accelerating the Transition from Analogue to Digital Broadcasting”, sets the Community’s policy goals for the mentioned transition and proposes 2012 to be the maximum deadline to end analogue broadcasting in all Member States.
- Communication COM(2007) 371, of 2 July 2007, on the World Radiocommunication Conference 2007 (WRC-07), established the Commission’s objectives for that conference. One of those objectives was, at the ITU level, to grant mobile services the same regulatory statute held by broadcasting services in the UHF frequency band. According to the Commission, this would make it possible to give a competitive advantage to mobile services, since they would be able to use part of the digital dividend’s spectrum.
- Communication COM(2007) 700, of 13 November 2007 [1], designated “Reaping the full benefits of the digital dividend in Europe: A common approach to the use of the spectrum released by the digital switchover”, with the purpose of proposing coordination at the European level in order to ensure an efficient use of the digital dividend resulting from the *switch-off* of analogue television expected in 2012, according to the social and economic perspectives.

On this Communication, the Commission supports that besides more and higher resolution (High Definition) television services, part of the spectrum released should be made available for new convergence and multimedia services, namely mobile TV, and also for other mobile services (e.g. mobile cellular services, emergency services, etc.), for which these frequency bands have a considerably high value. Furthermore, other types of usage are mentioned, such as the use of spectrum without the need of a licence (such as short-range and low-power devices, medical telemetry, and hearing aids), besides the analogue applications currently operating in the UHF band, such as wireless microphones.

Their added value, according to the Commission, stems namely from the propagation characteristics, which enables a considerable reduction in the amount of stations to be installed in order to provide the service in a same coverage area, which is obviously mirrored in the costs associated to infrastructure roll-out.

On this Communication, the Commission clearly points to the intention of dividing the UHF band by systems. Part of the band would thus be allocated to digital fixed television (lower sub-band), another sub-band would be allocated to mobile digital television (middle sub-band), and the remaining sub-band would be allocated to mobile systems (upper sub-band),

In connection with this issue, the Commission has also been releasing the information provided by the Member States, through the Communications Committee. The information on the implementation date of Digital Terrestrial Television and on the *switch-off* of analogue terrestrial television was published by the Commission’s services, as a working document, initially as an Annex to the Communication of 2005 “Accelerating the transition from analogue to digital broadcasting”. This information has been updated afterwards.

Within this context, mention should also be made to the speech delivered by European Commissioner Viviane Reding supporting that the 470-862 MHz band should be allocated in equal parts to the broadcasting services and to other services (196 MHz for broadcasting and 196 MHz for other services).

Finally, and still at the European Commission's level, mention should be made to the ongoing study within the scope of the Radio Spectrum Policy Group (RSPG), "Exploring the digital dividend", which will identify and evaluate the options for adopting a coordinated strategy in the European Union. The study's final report should be delivered at the beginning of August 2009, and the final recommendation and corresponding roadmap presented in early September 2009.

At the Council level

- The Conclusions of the Council of 1 December 2005 "Accelerating the Transition from Analogue to Digital Broadcasting", recognizing the importance of the analogue-digital switchover, namely inviting all Member States, as much as possible, to conclude the process until 2012.
- The Conclusions of the Council of 11 and 12 December 2005, mentioning that *"among the immediate priorities is the development of models for allocating radio spectrum frequencies that suit all the desired goals, the quick promotion of advanced mobile services and, as much as possible, a coordinated approach to the use of radio spectrum released further to the switchover to the digital system"*.
- The Conclusions of the Council of 12 June 2008 [2], on "Reaping the full benefits of the digital dividend in Europe: A common approach to the use of the spectrum released by the digital switchover", which recognize the need to adopt a coordinated approach on the digital dividend that doesn't include "mandatory" decisions from the Commission, and able to ensure a great flexibility in the adoption of national decisions.

At the European Parliament level

- The Resolution of the European Parliament of 14 February 2007, on a Community policy regarding radio spectrum.
- The Resolution of the European Parliament, of 24 September 2008 [3], Reaping the full benefits of the digital dividend in Europe: A common approach to the use of the spectrum released by the digital switchover.

In this resolution the European Parliament, even if less assertive than the Commission, still mentions that the increase of digital terrestrial television's spectrum efficiency may make it possible to allocate 100 MHz from the digital dividend to other services, including mobile broadband services.

In fact, the European Parliament recognizes each Member State's right to determine the use of its dividend, considering that the division of the UHF band should be based on a "*bottom-up*" strategy, taking into account national markets' specificities.

Therefore, the European Parliament urgently requests the Commission to carry out, in cooperation with Member States, technical, socio-economic and cost/benefit studies that establish the size and characteristics of the sub-bands that may be coordinated or harmonized at the Community level, stressing out that a coordinated strategy at the Community level will considerably increase the dividend's value.

2. What role do you consider the EU should have in the coordination of the ways to use the digital dividend? Which possible harmonization level, in which frequencies and for which type of service do you consider would be desirable by the E.U.?

2.2.2. CEPT

Further to a first mandate [4] of EC's Spectrum Committee to study the technical constraints faced by the digital dividend having in view the adoption of a harmonized policy in the European Union, at the end of 2006 the European Conference of Postal and Telecommunications Administrations (CEPT) created the ECC TG4 group.

Fulfilling the mandate it was given, TG4 was basically assigned to produce three reports.

– **CEPT Report 21** [5]

This report deals with compatibility issues between DVB-T networks for fixed reception and DVB-H (*Digital Video Broadcasting – Handheld*) networks for mobile reception, and the possibility of harmonizing a sub-band in frequency bands IV and V for operating DVB-H networks, concluding that both types of network are basically compatible, with the identification of several mitigation techniques to solve possible interferences. Regarding the possibility of harmonizing a sub-band for the DVB-H networks, the report is not conclusive, showing the advantages and disadvantages of harmonizing or not harmonizing a sub-band. It also mentions that, should a harmonization take place, it should not be binding, its adoption being left to each country's consideration.

– **CEPT Report 22** [6]

The second report, which basically approaches the technical feasibility of harmonizing a sub-band in UHF bands IV and V for fixed/mobile applications including uplinks, concludes it is feasible to carry out including at least channels 62 to 69, as long as the harmonization is not mandatory. This report also concludes that it will be virtually impossible for a country to start using this sub-band for mobile applications without the previous consent of its neighbouring countries, taking into account the level of interference produced by GE06's digital entries.

It should be mentioned that Portugal, such as other countries, presented a reserve to this report's conclusions since the band identified in the report is precisely the band where DTT is being introduced in Portugal, following its national uses and the international agreements signed. In fact, the implementation of DTT in this sub-band was a strategy adopted by several European countries, due to its wider availability, further to its release from military defence and security uses, thus making it possible to implement DTT without changing the radio channels used by analogue TV.

– **CEPT Report 24** [7]

The last report evaluates the possibility of taking part of the spectrum that is not used by DVB-T transmitters and consignments on a given area/region (designated “white spaces”¹⁷) for new/future applications or services.

Basically, the report concludes that the technology associated to *cognitive radios* is still at an initial stage, and therefore it would be premature to define the requirements that will enable its use, which will always be based on non-interference and non-protection. It also concludes that “white spaces”, by a large scale, will continue to be used by transmitter microphones for the production of special programmes and events (PMSE - *Programme-making and Special Events*), and should thus maintain some usage leadership.

Taking into account these reports’ conclusions, EC’s Spectrum Committee issued in the middle of 2008 a second mandate [8] to CEPT on the digital dividend. Given the extended scope of the studies it implied, these studies were divided by three CEPT groups - TG4, SE42 and PT1

Currently, TG4 is developing (i) guidelines for border coordination of mobile services in a country, and broadcasting service in the neighbouring country; (ii) a Recommendation on the best way to ensure the maintenance of PMSE equipment operating in the 470-862 MHz band, including the assessment of the advantages of a strategy at the European level; (iii) a Recommendation on the possible re-planning of the broadcasting service, in order to release sub-band 790-862 MHz; (iv) the definition of protection relations, to protect the mobile service’s broadcasting service, to help establishing compatibility situations.

On the other hand, SE42 is defining the optimized technical conditions to implement fixed and mobile electronic communications services in sub-band 790-862 MHz, taking into account the coexistence with current services, namely the broadcasting service. SE42 is considering using the BEM (*Block Edge Mask*) concept to define the technical conditions in the sub-band.

Lastly, PT1 is developing channellings of sub-band 790-862 MHz for IMT (*International Mobile Communications*), which on one hand make it possible to implement IMT systems in the European Union on a large scale, and on the other hand, make it possible for countries to adapt the proposed channelling to their national realities and market needs. IMT channellings developed by the groups should comply with the GE06 agreement.

2.2.3. ITU

The International Telecommunication Union (ITU) is the United Nations’ specialized organization for information and communication technologies. It includes three sectors: radiocommunication (ITU-R), telecommunication standardization (ITU-T) and telecommunication development (ITU-D).

¹⁷ *White spaces* correspond to the radio channels that can not be used by DVB-T in a given area, since they will be used for that purpose on a close or adjacent area

The Radio Regulation (RR) published by ITU-R is a tool resulting from agreements signed between Member States within the scope of (world and regional) international conferences. The “Frequency Allocation Table” stems from this international law tool, namely from its article 5, which classifies the spectrum allocated to the range of radiocommunication services for each of the three administrative regions into which ITU divides the globe.

WRC-07 considered the allocation of spectrum for new wireless services, namely for IMT (*International Mobile Telecommunications*). From this World Conference came a primary allocation in the RR for the mobile service in frequency sub-band 790-862 MHz, according to the constraints mentioned further on. It should be noted that this same spectrum was already allocated in the RR to the broadcasting service (also with a primary statute).

The identification by WRC-07 of spectrum for IMT was made by a change to footnote 5.317A¹⁸ of Article 5 of the RR, although it was delayed in time (it enters into force on 17 June 2015), as specified in footnote 5.316B¹⁹, agreed upon during this Conference.

During WRC-07 discussions there was a relevant debate around footnote 5.316²⁰ of Article 5 of the RR, a note that already existed and made an additional allocation to the mobile service in sub-band 790-862 MHz. We remind that that footnote identified a group of countries, Portugal included, and that it aimed the operation/protection of other type of mobile services (namely defence services’ systems). In conclusion, some countries integrated that footnote, for it may allow, if desired, the introduction of mobile systems, such as IMT for example.

In short, establishing sub-band 790-862 MHz for IMT in Region 1 provides flexibility in terms of the implementation of other radiocommunication services.

¹⁸ 5.317A *Those parts of the band 698-960 MHz in Region 2 and the band 790-960 MHz in Regions 1 and 3 which are allocated to the mobile service on a primary basis are identified for use by administrations wishing to implement International Mobile Telecommunications (IMT). See Resolution 224 (Rev.WRC 07) and Resolution 749 (WRC-07). This identification does not preclude the use of these bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. (WRC 07).*

¹⁹ 5.316B *In Region 1, the allocation to the mobile, except aeronautical mobile, service on a primary basis in the frequency band 790-862 MHz shall come into effect from 17 June 2015 and shall be subject to agreement obtained under No. 9.21 with respect to the aeronautical radio navigation service in countries mentioned in No. 5.312. For countries party to the GE06 Agreement, the use of stations of the mobile service is also subject to the successful application of the procedures of that Agreement. Resolutions 224 (Rev.WRC-07) and 749 (WRC-07) shall apply. (WRC-07)*

²⁰ 5.316 *Additional allocation: in Germany, Saudi Arabia, Bosnia and Herzegovina, Burkina Faso, Cameroon, Côte d'Ivoire, Croatia, Denmark, Egypt, Finland, Greece, Israel, the Libyan Arab Jamahiriya, Jordan, Kenya, The Former Yugoslav Republic of Macedonia, Liechtenstein, Mali, Monaco, Montenegro, Norway, the Netherlands, Portugal, the United Kingdom, the Syrian Arab Republic, Serbia, Sweden and Switzerland, the band 790-830 MHz, and in these same countries and in Spain, France, Gabon and Malta, the band 830-862 MHz, are also allocated to the mobile, except aeronautical mobile, service on a primary basis. However, stations of the 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, stations of services operating in accordance with the Table in countries other than those mentioned in connection with the band. This allocation is effective until 16 June 2015. (WRC-07)*

The creation of group JTG 5-6 within the scope of ITU should also be mentioned. This combined group was made up by study groups SG5 (Terrestrial Service) and SG6 (Broadcasting Service) in order to deal with item 1.17 of the next world conference (WRC-11) agenda. This item requests that studies be carried out on the sharing between the mobile service and other services for which band 790-862 MHz is allocated (broadcasting, fixed, mobile and aeronautical navigation services) in Regions 1 and 3, according to Resolution 749 (WRC-07 versions). These studies must be concluded until mid-2010.

3. Situation in Europe

Each country's situation regarding the digital dividend depends on their specific situation regarding the switchover from the analogue terrestrial television system to the digital system, since the release of spectrum is determined by its conclusion.

Digital terrestrial television broadcasts already started in 21 Member States. In Portugal they will start in the beginning of 2009, while four Member States have announced that the offer of digital services will start, at the most, in 2010. Romania still hasn't identified its plans.

On the other hand, analogue terrestrial television broadcasts have already been switched off in Germany, Belgium (Flanders), Finland, Netherlands, Luxembourg and Sweden, as well as in the main regions of Austria. At the end of 2010 or even before, they will end in Austria's remaining territory, in Denmark, Slovenia, Spain, Estonia and in Malta. In the remaining Member States, analogue terrestrial television should be switched off between the end of 2010 and the end of 2020, except for Poland, where the switch-off is scheduled for 2015.

The situation in Europe concerning the digital dividend is however very diverse, with some countries where decisions have already been made, and other countries where the situation is still being analyzed.

Below is a description of the situation regarding the digital dividend in some countries.

- Germany

In Germany the *switch-off* was concluded in 2008.

According to the German constitution, television is under the responsibility of Federal States, which Authorities may request radio spectrum for that purpose to its managing entity, BnetzA. In this context and notwithstanding that harmonizing the use of the digital dividend for other types of service requires the agreement between media authorities, these authorities already established in 2006 a set of principles concerning their spectrum needs. They are based on the priority of television regarding *on-demand* services, on a balanced sharing between public and private operators, on safeguarding the efficient use of spectrum, and on using band III (VHF) for television services using DAB/DMB and bands IV/V for television services using DVB-T/DVB-H.

In June 2008 these media authorities created a group to evaluate the possibility of using the spectrum (namely band 790-862 MHz) for television and wireless broadband services in rural areas.

- **Denmark**

In Denmark the switchover from the analogue system to the digital system should take place by the end of October 2009. It was decided that from a total of 8 planned coverages (multiplexers), the radio channels associated to two of those coverages will be allocated as a “reserve for innovation”. This spectrum may be used for occasional experiences, which may include electronic communications services, with a final decision on its use being expected in 2009 or 2010.

- **Spain**

In Spain, not much spectrum is expected to be released with the phased *switch-off* of analogue terrestrial television, to be concluded until 3 April 2010. The national technical plan for DTT foresees the use of the digital dividend for television, including mobile television (with no specified standard), high definition television, and new interactive services.

- **Finland**

The switchover to the digital system will take place in Finland on 31 August 2009, sub-band 790-862 MHz being allocated to mobile broadband networks.

It should be mentioned that two national HDTV *multiplexers* will be included in the VHF band (174-230 MHz).

- **France**

In France, the law of 4 March 2007 established that most of the spectrum associated to the digital dividend would be for the television service.

In France, the digital dividend is spread by 230 MHz, 180 MHz of it in UHF and 49 MHz in VHF.

In this context, the “*France Numérique 2012*” plan was approved on 20 October 2008, which sets the *switch-off* of analogue terrestrial television for 30 November 2011 and confirms that, until 2012, eleven *multiplexers* will be allocated to DVB-T (for standard and high definition services) and two *multiplexers* will be allocated to mobile television in band 470-790 MHz, leaving the VHF (174-230 MHz) band reserved for digital radio.

The plan foresees the use of sub-band 790-862 MHz for the development of Internet access services, high-speed fixed services and mobile services. Their allocation procedure is expected to start already in 2009.

- **United Kingdom**

The United Kingdom launched a first and broad public consultation on the digital dividend at the end of 2006.

With the conclusion of the *switch-off* in 2012, the United Kingdom expects to have 368 MHz, of which however only 256 MHz will be used for DTT, according to a Government's decision. 112 MHz will thus be left completely available and 16 MHz *interleaved*, which, together with 8 MHz from the radiolocation service (channel 36) and 8 MHz used for radio astronomy (channel 38), both possibly available in a short term, make up the United Kingdom's entire digital dividend. The VHF band will only be used for T-DAB and channel 69 will continue to be used by transmitter microphones.

At the end of 2007, following the mentioned consultation, the British Regulator (Ofcom) published a document specifying its initial strategy for the digital dividend, based on a "*market-driven*" approach, supported on the principles of technological and service neutrality, leaving to the market to decide the most appropriate use to be given to the spectrum.

In the meantime, Ofcom already launched two new consultations (June and July 2008) within this scope, namely on the procedures for spectrum allocation, having stated from the start that it favours the use of tenders.

It should also be mentioned that on 2 February 2008, Ofcom launched a new public consultation aiming to release the entire 790-862 MHz sub-band, in order to "align" the upper part of its digital dividend with the digital dividend already defined in some European countries.

- Sweden

In Sweden the VHF band will be used by T-DAB and by DVB-T (a nationwide coverage). Band 470-790 MHz will be used by DVB-T (six nationwide coverages), while the 790-862 MHz sub-band will be released and used by other services besides broadcasting. The allocation process will be based on technological neutrality, its use being proposed by interested parties, and subject to secondary commerce. No specific date has still been established for the allocation of the band, but it is expected to occur during 2009-2010. The *switch-off* in Sweden took place on 15 October 2007.

In short, this is the situation of the analysed countries:

| | DTT start | <i>Switch-off</i> | Dividend Decision |
|----------------|-----------|-------------------|--------------------|
| Germany | 2003 | 2008 | No |
| Denmark | 2006 | 2009 | Yes |
| Spain | 2000 | 2010 | No |
| Finland | 2002 | 2007 | Yes |
| France | 2005 | 2011 | Yes |
| United Kingdom | 1998 | 2012 | Yes (under review) |
| Sweden | 1999 | 2007 | Yes |

4. Current situation in Portugal

Current uses

There are currently in Portugal four nationwide programming services (RTP1, RTP2, SIC and TVI) and two regional services, one in each Autonomous Regions (RTP Açores and RTP Madeira), all broadcasted using analogue technology. As previously mentioned, CRM no. 26/2009 of 17 March establishes that the ending of terrestrial analogue broadcasts in the entire national territory will occur until 26 April 2012.

Besides analogue television, there is still a nationwide T-DAB single frequency network under operation, in bloc 12B (224.880 – 226.416 MHz), operated by RDP²¹.

On 25 February 2008, with the publication of Regulation no. 95-A/2008, a public tender was launched for the allocation of a nationwide right of frequency use for the digital terrestrial television broadcasting service (Multiplexer A). For now, considering the main objective of the transition from analogue to digital broadcasting in compliance with the Television Law regime (Law no. 27/2007 of 30 July), the tender's regulation set apart the capacity reserve for the transmission of television programmes broadcasted in the analogue mode by terrestrial radio waves held by the licensed and/or concessioners.

On the same date, through the publication of Administrative Rule no. 207-A/2008, the Government launched a tender for the allocation of five rights of frequency use for the terrestrial television broadcasting service (Multiplexer B to F) and for the licensing of the distribution operators.

On 9 December 2008, ICP-ANACOM decided to issue PT Comunicações, S.A. a licence allocating the right of frequency use for the provision of the Digital Terrestrial Television service, to which Multiplexer A is associated.

The fulfilment of the obligations taken on under the terms of the tender will enable digital broadcasting of the current four nationwide (RTP 1, RTP 2, SIC and TVI) and regional (RTP Açores and RTP Madeira) open access television programmes, as well as of the fifth television programme service that was expected to be licensed, within the scope of a public tender launched by the Government, during 2009²². It will also enable high definition broadcasts of these services, non-simultaneous, as foreseen by the Council of Ministers Resolution no. 12/2008 of 22 January, which established the way to use the remaining capacity of Multiplexer A.

To accomplish the coverage associated to Multiplexer A, channel 67 (838-846 MHz) will be used in the mainland territory and in the Autonomous Region of Madeira, while channels 47, 56, 61, 64 and 67 will be used in the Autonomous Region of the Azores.

According to the mentioned licence, service provision should begin until 31 August 2009, and network implementation should be concluded until the end of the 4th quarter of 2010.

²¹ Rádio e Televisão de Portugal S.A.

²² Determination 2/LIC-TV/2009 of ERC's Regulator Council
(<http://www.erc.pt/index.php?op=downloads&enviar=enviar&lang=pt&id=865>)

The conclusion of the public tender regarding Multiplexers B to F is pending from an ongoing a judicial process, further to a lawsuit by one of the applicants, with its following impact on the frequency bands that were subject to the tender.

To accomplish the coverage associated to these Multiplexers, nationwide channels 60 and 69 and partial channels 65, 66 and 68 will be used in the mainland territory; channels 63 and 69 will be used in the Autonomous Region of Madeira, while channels 48, 49, 57, 58, 62, 63, 65, 66, 68 and 69 will be used in the Autonomous Region of the Azores.

It thus results that analogue and digital broadcasts will co-exist during a given period of time (*simulcast* period) which will last about three years, assuming the beginning of digital broadcast to take place in April 2009 and the *switch-off* of analogue broadcasts to occur on the entire national territory until 26 April 2012.

During the simulcast period, spectrum will be intensively used and therefore any release of spectrum in these bands during this period will be subject to great constraints.

Planned spectrum

For the Regional Radiocommunication Conference (RRC-06), Portugal established the requirements to be presented (type and number of coverages), not only for the needs of the analogue TV now implemented in the entire country, but essentially regarding what is expected for these frequency bands in the future, i.e., after the *switch-off*.

Considering this fact, Portugal adopted a position aiming to maximize the number of coverages obtained, together with the greatest possible flexibility, in order to be able to host several scenarios and to adapt the provisions of Plan GE06 to what will effectively be decided. It was thus essential for the radio coverages obtained to give the framework for the short/medium/long term aspirations that Portugal had for television in its whole an in its several components, in view of its natural evolution, namely high definition and mobile television, also considering the possibility of being able to add other services.

The established frequency plan was developed over two frequency bands, 174 – 230 MHz and 470 – 862 MHz.

Band 174-230 MHz

For band 174-230 MHz, where it was possible to plan television and audio broadcasting services, it was decided to allocate in Plan GE06 three nationwide coverages on SFN²³ networks, and three regional coverages on multi-frequency networks (MFN) for T-DAB, following the previously carried-out planning, both at the level of CEPT and with the Spanish administration.

A nationwide DVB-T SFN network was also planned, in channel 5 (174-181 MHz), for mobile reception on vehicles, in spite of the larger size of the reception antennas. This

²³ One of them is currently operated by RDP in bloc 12B

band can be appropriated for this kind of reception, particularly due to the lesser influence of the *Doppler* effect and to the lesser field intensity needed.

The coverages planned in the national territory in the VHF band are shown on Annex 1, which also shows the allocated frequency blocs and radio channels.

Band 470-862 MHz

The following coverages were planned for band 470-862 MHz, where it was only possible to plan television broadcasting services, besides the 3 national coverages on single frequency networks in channels 60, 67 and 69 that had already been coordinated with the Spanish Administration, and which were the basis of both tenders launched in 2000 and in 2008 for the implementation of DTT in Portugal:

- 3 national MFN coverages;
- 1 district MFN coverages;
- 3 national MFN coverages, for reception by mobile terminals of the GSM/UMTS (DVB-H) type.

The option for MFN networks was justified by the fact that these networks are not so demanding in technical terms as compared with single frequency networks, with consequences at the economic level. Since these networks could only be implemented after the *switch-off*, they would not face then the spectrum constraints that imposed the use of SFN networks during the start of DTT.

The district coverage was planned to make the future operation of terrestrial television possible by programming services of a regional/district nature, while DVB-H coverages were planned due to the interest in that technology, already stated by several market agents, and because, in spite of using more spectrum, this type of networks confer a greater flexibility to the use of the corresponding radio channels.

It should be mentioned that the 3 SFN networks of the mainland's territory coastline area, foreseen for the introduction of DTT in Portugal, in channels 65, 66 and 68, were not coordinated at the international level since they had no coordination requirements regarding third parties.

The coverages planned in the national territory in the UHF band are shown on Annex 2, which also shows the allocated frequency blocs and radio channels.

In principle, the release of spectrum resulting from the digital dividend in Portugal will have to conform to the spectrum planned and represented on Annexes 1 and 2. It should be noted that there is no direct relation between the amount of coverages foreseen in the scope of GE06 (made up of allocations/consignments) and the number of coverages where it is possible to use nationwide frequencies, i.e., in the entire national territory. In fact, except for the use of channels 5, 60, 67 and 69, all the remaining channels cannot be used on a national basis (i.e. they are limited to certain geographical areas).

It should also be noted, as mentioned before, that the European countries reserved the right to implement other services in the Plan's "entries", i.e., in the coverages planned for each country, as long as it fulfils the defined spectrum masks, and that these services

do not need a greater protection and do not produce greater interference in the adjacent countries' territories. However, the feasibility of that implementation can be considerably influenced by the constraints resulting from the distribution of frequencies associated to each coverage foreseen for Portugal.

5. Potential uses

As mentioned, the digital dividend may have implications at the social, cultural and economic level. As a scarce resource, its management must be as efficient and effective as possible.

In this context, it is already possible to preview a wide set of services and applications that could benefit from the use of this spectrum.

3. Do you consider that the use of the digital dividend overall should favour (i) strengthening the television service in diversity and quality (such as more television services and programmes, HDTV, regional and local television, etc.), (ii) new convergent services and multimedia (for example, mobile cellular services, emergency services etc.) (iv) other services?

4. How do you evaluate and quantify (with as much detail as possible) the socio-economic impact of the different ways of allocating the digital dividend, particularly the one you support in the response to the previous question?

5. In your opinion is the digital dividend suitable for a homogenous use all over the national territory or should a more varied use be considered depending on the area of the country?

6. What do you consider to be the appropriate spectrum distribution for the several types of use? Or do you consider it is more appropriate to adopt a technological and/or service neutrality criteria and that the market should decide on its potential uses?

7. Should technological and/or service neutrality criteria be adopted, how can it be implemented in terms of the regulation of spectrum use and of equipments? Please justify. And which selection procedure do you consider the most appropriate – tender, auction, other? Please justify.

The purpose of this Chapter 5 however is to identify, at the present moment, in a summarized and non-exhaustive way, some of the digital dividend's potential uses, within an industry framework under constant evolution, both in terms of applications and services, and in terms of consumers' interests and needs.

In this context, the following services and applications are firstly identified:

- High Definition Television (HDTV)
- Mobile Television
- Regional Television
- Digital Audio Broadcasting (T-DAB, T-DMB, DAB-IP)

- Mobile/Fixed Broadband Services
- Public Protection and Disaster Relief Systems (PPDR)
- Programme-making and Special Events (PMSE)
- Low Power Equipment
- Cognitive Radio Systems

5.1. High Definition Television (HDTV)

The success of HDTV depends, besides the demand for the services it will distribute, on the availability of receiving equipment, of content production and of proper signal transmission. The first two factors tend to become generalized, given the decreasing costs of receivers and of High Definition (HD) production equipment, stemming from its increasing general adoption. Signal broadcasting in the HD format has also been gaining its space within paid television offers, namely on cable, satellite and IPTV platforms.

With the introduction of DTT in Portugal, conditions for digital broadcasting were created in the terrestrial platform, for now essentially in the standard format but not excluding non-simultaneous broadcasts until the switch-off of analogue television broadcasting, or of high definition broadcasts of programming services distributed on *Multiplexer A*, whenever technical conditions make it possible, in accordance with the previously mentioned Council of Ministers Resolution no. 12/2008.

The terrestrial radio platform will thus have space for some HDTV broadcasts. However, the possibility of extending it to all television programme services should be considered.

In the preamble to CMR no. 12/2008 of 22 January, concerning the occupation of the remaining capacity of DTT platform's Multiplexer A, the Government underlines that *«[the] high definition broadcast (HDTV) can become another differentiation factor for DTT, due to the increased quality of sound and image regarding the current analogue system, creating a new television reception experience, prepared to foster the mentioned migration, while simultaneously mirroring the aspirations conveyed by the licensed television operators during the public hearing period».*

The same preamble also refers that *«[the] spectrum constraints will continue until the switch-off of analogue radio television broadcasting. After that, it will be possible to broadcast the programming services of the licensed and concessioners continuously in high definition.»*

Finally, it adds that *«[the] adoption of high definition on a free access platform will make it possible to prevent discrimination in the access to those broadcasts of citizens that, due to social-economic constraints, have no access to other television distribution networks».*

8. In this context, what conditions do you think should be ensured for high definition television broadcasting, based in the use of the designated digital dividend spectrum, namely what overall bandwidth could/should be reserved for that purpose?

9. What schedule and what mode for the release/allocation of the corresponding spectrum.

10. What other television programme services, as well as uses, such as higher high definition (e.g. Ultra HDTV) or three-dimensional television, do you suppose could require, in the long run, the use of the spectrum now under analysis?

5.2. Mobile Television

Mobile television is a new service platform for the distribution of audio-visual contents and related interactive services, for portable/mobile (mobile phones) terminal equipment.

There are two kinds of mobile television distribution.

The designated “*unicast*” or addressed mode, where the services are sent upon customer request and only to that customer, and the “*broadcast*” mode, where services are broadcasted to all customers but only received by those who subscribed to the service.

The possibility of users being able to access television programme services in mobility seems a natural extension of the traditional access at fixed location, although it not only provides access to the same services in a broader way over space and time, but also under other formats and usage profiles.

In this context, mobile television seems to be, both for operators and content producers, a means to diversify their business.

In Europe, a large amount of mobile operators currently provide access to television services through their UMTS networks, although with some limitations in terms of quality, coverage and network capacity for more intensive uses.

In Portugal, the mobile television service was introduced by the UMTS networks in 2006, and there are currently several tariff offers in the market from the three mobile network operators. In spite of a still small consumer base, in 2007 there was an 86 per cent increase in users, totalling about 190 thousand²⁴ users by the end of the year.

The European Commission considers mobile television to be a promising new convergence platform, with the potential to lead an important role, since it combines the worlds of telecommunications and audio-visuals. It stresses out that convergence, a central element of the i2010 initiative, offers Europe new business alternatives, new

²⁴ Source ANACOM: State of Communications 2007

(http://www.anacom.pt/streaming/state_comunic2007.pdf?contentId=789239&field=ATTACHED_FILE)

jobs and services for consumers, thus contributing to competition and to the welfare of Europeans.

The Commission has therefore taken several steps in order to promote mobile television (in the “*broadcast*” mode) within the EU, the following ones standing out:

- The Communication from the Commission COM(2007)409, of 18 July 2007, on “*Strengthening the internal market for mobile television*”;
- The Commission Decision, of 17 March 2008, to add the DVB-H standard to the list of European Union standards, which is the base to foster the harmonized offer of telecommunications throughout the EU;
- The Communication from the Commission COM(2008)845, of 10 December 2008, concerning the “*Legal Framework for Mobile TV Networks and Services: Best Practice for Authorisation - The EU Model.*”

Mobile television offers in the “*broadcast*” mode, based on DVB-H technology, are currently available in Austria, Finland, the Netherlands, and Italy.

11. Given this framework and based on the coverage use planned in the scope of GE06, what conditions do you consider should be created for mobile television services in the “*broadcast*” mode? What is the number of coverages needed for that purpose?

12. What is the schedule and the model suited for the allocation of rights of frequency use for mobile television services?

13. Do you consider that the use of frequencies for mobile television should be limited to the DVB-H technology? What advantages/disadvantages do you associate to that option?

Besides mobile television to be received on portable/mobile terminals, there is also another type of mobile reception, to be captured on receivers installed on vehicles (buses, trains, etc.). In this case there are no limitations concerning the receiver’s power, or the sizes of the reception antenna or of the corresponding screens.

14. Do you consider that the market will be interested in the release of coverage planned for this type of reception in the scope of GE06? If so, in which terms?

5.3. Regional Television

Law no. 27/2007 of 30 July, foresees in no. 1 of its article 7, the existence of television programme services with a (i) regional and (ii) local coverage, whether they intend to cover, respectively, (i) a group of districts in the mainland or a group of islands in the Autonomous Regions, or (ii) a municipality or group of adjacent municipalities.

No. 6 of article 25 of Law no. 27/2007 of 30 July, also establishes that «*[the] operators of electronic communications networks dealing with television programme services and distribution operators must provide network and distribution capacity to regional and local television programme services, as well as to the broadcast of educational or cultural activities, given the characteristics of the composition of the offer and technical and market conditions assessed at a given time by the Regulatory Entity for the Media in the scope of authorization procedures, having heard, where it so deems necessary, the Competition Authority or the national communications regulatory authority* ».

Most television programme services currently included in the available offers of the main television platforms, namely cable, IPTV, terrestrial and satellite, have a national coverage, except RTP Açores and RTP Madeira.

Recently, all over the country, several *Web TV* initiatives, projects and operations with a strong regional or local character have emerged. Even though the investment needed for this purpose is considerably different from the amounts required to provide a television programming service based on one of the previously mentioned television platforms, the access mode also being different, it is worthwhile to carry out some reflection on this trend, which apparently reveals a growing dynamics in the context of regional and local television.

15. What spectrum do you consider admissible to reserve, in what way and with what geographical distribution, for the provision of television services under a more limited coverage, such a regional or local coverage?

16. What is the best way to have access to the possibility to use the mentioned spectrum (tender, auction, other) and what release schedule?

5.4. Digital Audio Broadcasting (T-DAB, T-DMB and DAB-IP)

As mentioned before, there is currently in Portugal a single T-DAB network installed, which coverage in the mainland territory and in the autonomous regions reaches about 75% of the population. Only a few hundred listeners are estimated, according to the data provided by the operator, most of them of the Antena 2 programme.

Also in Europe there has been no major development of T-DAB, except in the United Kingdom, where public entities decided to considerably support its development through the involvement of the public operator. In some countries, such as Denmark and Switzerland, there has been some development, although not as relevant.

With the progress of multimedia systems, DAB platform's implementation scope had to be broadened in order to also contemplate video requirements, since initially it was mainly suited for mobile audio reception.

This resulted in the emergence of DMB (*Digital Multimedia Broadcasting*) and of DAB-IP (*DAB over Internet Protocol*), with the addition of a video codifier to the current T-DAB system. This way, DMB and DAB-IP devices are able to receive multimedia services, as well as DAB audio services.

These are narrow band systems since they are all based on DAB, the channel's bandwidth being 1.712 MHz (including guard bands). Consequently, the corresponding bit rate cannot be too high, achieving real values close to 1.06 Mbit/s.

In terms of market opportunity, DMB and DAB-IP are the motive of some interest in the industry, since besides a wide range of new innovative services connected to DAB, such as information on safety and traffic data, interactivity and other applications, they make it possible to broadcast mobile television. Mobile television services have already been launched in the United Kingdom and Germany, based on DAB-IP and DMB, respectively, which were discontinued in the meantime.

17. What spectrum do you consider admissible to reserve, in what way and with what geographical distribution, for the provision of digital audio broadcasting services?

18. Do you consider that the possible allocation of some of the available networks to Media Groups would make T-DAB's development viable, since the several radios held by these Groups have analogue technology that could be hosted in the same *multiplexer*?

19. Traditionally, the audio broadcasting service has been free for subscribers. With the possibilities offered by digital technologies will there be room for paid services? What kind?

20. DMB and DAB-IP technologies enable video broadcasting. Do you consider that some of the planned networks should be released for this technology? How many? In what context?

21. What is the best way to have access to the possibility to use the mentioned spectrum (tender, auction, other) and what release schedule?

5.5. Mobile/Fixed Broadband Services

Given the propagation characteristics of band 470-862 MHz, it can be used to provide bidirectional electronic communications with broadband access (fixed, mobile and nomadic) on rural and/or info-excluded areas, with advantages to the network's implementation, not only economic but also of a social and cultural nature, since it becomes a factor that attenuates the differences between urban and rural areas.

The broadband Internet access market in Portugal has clearly increased during the latest years. Estimates indicate that at the end of the third quarter of 2008 there were already over 2.6 million accesses²⁵, distributed between fixed accesses (through the copper

²⁵ Source: STATISTICAL INFORMATION ON THE INTERNET ACESSE SERVICES 3RD QUARTER 2008

(http://www.anacom.pt/streaming/internet_3quarter2008.pdf?contentId=742284&field=ATTACHED_FILE)

telephone network using ADSL technology, or through cable distribution networks, using cable modems) and mobile accesses,

During the more recent years there was a generalized proliferation of broadband offers with great benefits for end users, which saw the offers' maximum downlink bit rates increase considerably, while the offers' prices kept unchanged or even dropped.

In terms of coverage, the 1,853 areas of PTC's public telephone network are equipped with DSLAM, which corresponds to the entire coverages of the areas where it is possible to provide ADSL. Furthermore, in several central areas there is more than one reception point with DSLAM, in order to reduce the length of the local loop and to make it possible to provide broadband services with higher bit rates.

However, exceptional cases may occur, namely in rural areas, where the provision of the broadband access service through ADSL is conditioned, since this technology strongly depends on the conditions of the transmission means (copper wire pairs) in the access component (namely its length, section and conservation state). In these cases the offer's quality may be affected with a reduction of the maximum speed (downlink and/or uplink), or even preventing the provision of the ADSL service.

Regarding the cable distribution networks, its geographical coverage is estimated to reach 69% of households, with a greater concentration in densely populated areas.

In terms of broadband coverage in rural areas, Portugal compares favourably with the remaining European countries – in 2007 it had an 86% figure while the average of the European countries was 70% (EU27 + Norway + Iceland) or 80% (EU25 + Norway + Iceland)²⁶

Concerning mobile broadband accesses, according to the last report on the assessment of the quality of voice (GSM), video-telephony (UMTS) and network coverage (GSM and WCDMA) services provided by mobile telephone service operators in Mainland Portugal's main urban agglomerations and major roads, GSM mobile communications systems present good radio coverage. On UMTS systems, in spite of a lower performance than GSM systems, there is a considerably positive evolution since the end of 2006 (when ANACOM included these systems in its analysis).

With the improvements that have occurred, namely HSPA (*High Speed Packet Access*) on the UMTS network, GSM and UMTS systems should continue being used during several years. It should be noted that, with the considerable increase in the volume of data traffic currently expected for the next years, it will most probably be the next generation of mobile systems, LTE (*Long Term Evolution*), which specifications are approved and will be included in the next version of relevant 3GPP standards, to be able to respond to the needs of the mobile market. LTE was designed to be implemented with a bandwidth up to 20 MHz, being able to reach bit rates up to 75 Mbit/s in *uplink* and up to 300 Mbit/s in *downlink*. It may be developed on several frequency bands such as on 2.5 GHz, on 3.4 GHz, or on the UHF bands resulting from the digital dividend.

²⁶ Source: IDATE study "*Broadband Coverage in Europe 2008*".

The provision of services using optical fibre may also have relevant developments in the scope of the evolution to new access networks. This is an area that already raised some expectation, where investments and prospect investments have already been announced. Since these are large investments involving economies of scale, it is expected that they focus, on an initial stage, on the area comprising the large urban centres and the coastline, with a large population and economic activity density, which can lead to the increase of regional differences regarding access to broadband services.

On the other hand, new access networks, due to the available bandwidth, may have influence on the way of providing the television service.

22. What is the digital dividend's contribution for the development of Next Generation Networks, and what will be their impact on its use?

23. In the medium and long run, will the digital dividend spectrum be more suited for supporting the provision of electronic communications services (i) mainly under mobility, (ii) also contemplating the use at a fixed location or (iii) regardless, for any type of use?

24. In your opinion, how will mobile services evolve and what are your forecasts for mobile broadband consumption? Please justify.

25. In your opinion, what will be the impact of mobile Internet access on the growing ubiquity of broadband Internet access, on the economic, social and cultural scenes?

26. What bandwidth do you consider necessary for this type of applications in the short, medium and long run? Please justify.

Following the discussion on sub-band 790-862 MHz held at WRC-07 and CEPT's Mandate [8] on the digital dividend, there has been a great interest on the harmonized release of this sub-band at the European level for mobile applications. That fact however faces an additional difficulty in Portugal, since part of that spectrum, namely channels 65 to 69 (822 – 862 MHz), will be used for the introduction of digital terrestrial television, including channel 67 (838-846 MHz), which right of frequency use has already been granted until 9 December 2023.

27. According to the CEPT 22 report, it will be virtually impossible, considering the level of interferences produced by GE06's digital entries, for a country to start using this sub-band without the previous agreement of the adjacent countries. Under these circumstances, do you consider that sub-band 790-862 MHz should be released in Portugal for mobile broadband applications, regardless of its release in the adjacent countries?

28. Should this release occur before 9 December 2023, it will require DTT networks operating in this sub-band to change the corresponding radio channels. What do you think will be the impact of that transition and in what way can it be minimized?

5.6. Low-Power Equipment

The digital dividend may be suitable for the use of certain low-power equipments, which use a small bandwidth and do not require a spectrum use licence. This includes the radio transmitters that establish one-way or two-way communications, and which have little chance of causing interferences to other radio equipments.

One of this spectrum's potential uses is the application designated RFID (*Radio Frequency Identification*). These are automatic identification systems for articles, locating goods or anti-theft systems, through radio signals, which are used for example in stores or warehouses for tracing products. The growth and emergence of new applications for these systems may, according to the Commission²⁷, become quite limited, with the current spectrum allocation in the UHF frequencies.

Wireless systems, namely loudspeakers, headphones and wireless sound columns, are another example. There is an increasing amount of people using these systems, which make it possible to access an also increasing amount of applications inside their own homes.

29. In this context, do you consider that spectrum should be allocated for the exclusive use of this type of applications? What are the reasons? In what band? What bandwidth do you consider necessary? Please justify.

5.7. Public Protection and Disaster Relief Systems - PPDR

In some European countries there have been manifestations of interest in order to have part of the UHF spectrum used for this type of applications. These are applications for emergency services, namely to be used by public safety forces, such the public protection and disaster relief services, which need to communicate efficiently by radio, in order to ensure, for example, the transmission of voice, data, telemetry, video and medical records. It should be noted that the industry (namely through ETSI) has shown interest on this type of applications (cf. ETSI TR 102 628), requesting the identification of 2x16 MHz in band 470-862 MHz

30. In this context, do you consider that spectrum should be allocated for the exclusive use of this type of applications? What are the reasons? In what band? What bandwidth do you consider necessary? Please justify.

5.8. Programme-making and Special Events (PMSE)

Special events, television or radio programme-making and theatre companies, among others, need to use wireless equipment to transmit voice, data, audio and/or image. Several equipments fall into this category, such as the wireless microphones

²⁷ Commission Communication "Reaping the full benefits of the digital dividend in Europe: A common approach to the use of the spectrum released by the digital switchover"

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0700:FIN:PT:PDF>

transmitting voice and music, the auricular monitoring equipments mainly used by sound technicians at the studios or on the stage (of a concert, for example) to monitor the audio quality, and the “talkback” devices used to instantly communicate instructions from the director to the artists, including presenters, interviewers, camera operators, sound and light operators.

The use of this type of equipments usually requires low power, but those who use them always want a good quality of service minimizing interference risk as much as possible.

Up to now, this type of equipment has been mainly used in bands 174-216 MHz and 470-862 MHz on a non-protection and non-interference basis regarding the existing services, namely analogue television.

However, this type of equipment has been registering an increasing usage, also associated to a power increase.

31. What is the evolution you foresee for the use of these equipments in Portugal? Do you consider that it is advantageous to allocate spectrum exclusively for the use of this type of applications? In what band? What bandwidth do you consider necessary? Please justify.

5.9. Cognitive Radio Systems

The CEPT 24 concluded in early 2008 that the technology associated to cognitive radios was still on an initial stage, being a little early to define the requirements that will enable its use, which however will always take place on a non-protection and non-interference basis. These radiocommunication systems are based on technologies that use different mechanisms to detect if a band or radio channel is being used by any service, having the possibility of changing the equipment’s radio parameters according to the radio scenario detected (e.g. interference, protection of service on adjacent channel, etc.). These systems may foster the use of the “*white-spaces*” in the UHF band.

32. What do you consider to be the current development state of these technologies? What conditions do you consider should be fulfilled in order to make its use possible? Please justify.

5.10. Other issues

33. What other applications, services and technologies do you consider that could now or in the future be specifically supported on the digital dividend’s frequency bands?

34. Do you consider that it is desirable to allow long-run pilot-tests of technologies and services using the digital dividend’s spectrum? In any domain, specifically?

6. Consultation Procedures

With this consultation, ICP-ANACOM intends to collect the different opinions of all market agents on the subject of the digital dividend.

In this context, under the provisions of article 6 no.1 paragraphs c), m) and o) of its Statutes, ICP-ANACOM calls all interested parties to participate in the current consultation process, taking place during 30 working days. Sending of replies can be made until 13 May.

All interested parties are asked to send their contributions, in Portuguese or English, in Word text processor format whenever possible, through e-mail, to the address consulta.dividendo@anacom.pt, not excluding the possibility of sending them through the traditional means, to ICP-ANACOM's head office at Avenida José Malhoa, no. 12, 1099-017 Lisboa.

Upon the closure of this consultation, ICP-ANACOM will produce a final report with the summary of the received comments.

The publishing of the results will ensure the confidentiality of the comments properly identified by the respondents as confidential. On this matter, all interested parties are requested to clearly identify and justify the elements considered confidential, and to send a non-confidential version of the corresponding answers, to be released on this Authority's website once the consultation process is concluded.

The results of this consultation do not bind ICP-ANACOM's future decisions on the approached issues.

7. References

- [1] Communications COM(2007) 700, of 13 November 2007
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0700:FIN:PT:PDF>
- [2] Conclusions of the Council of 12 June 2008
http://www.eu2008.si/en/News_and_Documents/Council_Conclusions/June/0612_TTE-digital.pdf
- [3] Resolution of the European Parliament, of 24 September 2008
<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2008-0451+0+DOC+XML+V0//PT>
- [4] 1st EC Digital Dividend Mandate
http://ec.europa.eu/information_society/policy/radio_spectrum/docs/ref_docs/mandate_dig_div.pdf
- [5] CEPT Report 21
<http://www.eroocdb.dk/Docs/doc98/official/pdf/CEPTREP021.PDF>
- [6] CEPT Report 22
<http://www.eroocdb.dk/Docs/doc98/official/pdf/CEPTREP022.PDF>
- [7] CEPT Report 24
<http://www.eroocdb.dk/Docs/doc98/official/pdf/CEPTREP024.PDF>
- [8] 2nd EC Digital Dividend Mandate
http://ec.europa.eu/information_society/policy/radio_spectrum/docs/ref_docs/rsc23_public_docs/rscom08-06.pdf

ANNEXES

Annex 1

Coverages planned on band 174-230 MHz

1 National DVB-T coverage (SFN)



2 Regional T-DAB coverages



1 Regional T-DAB coverage



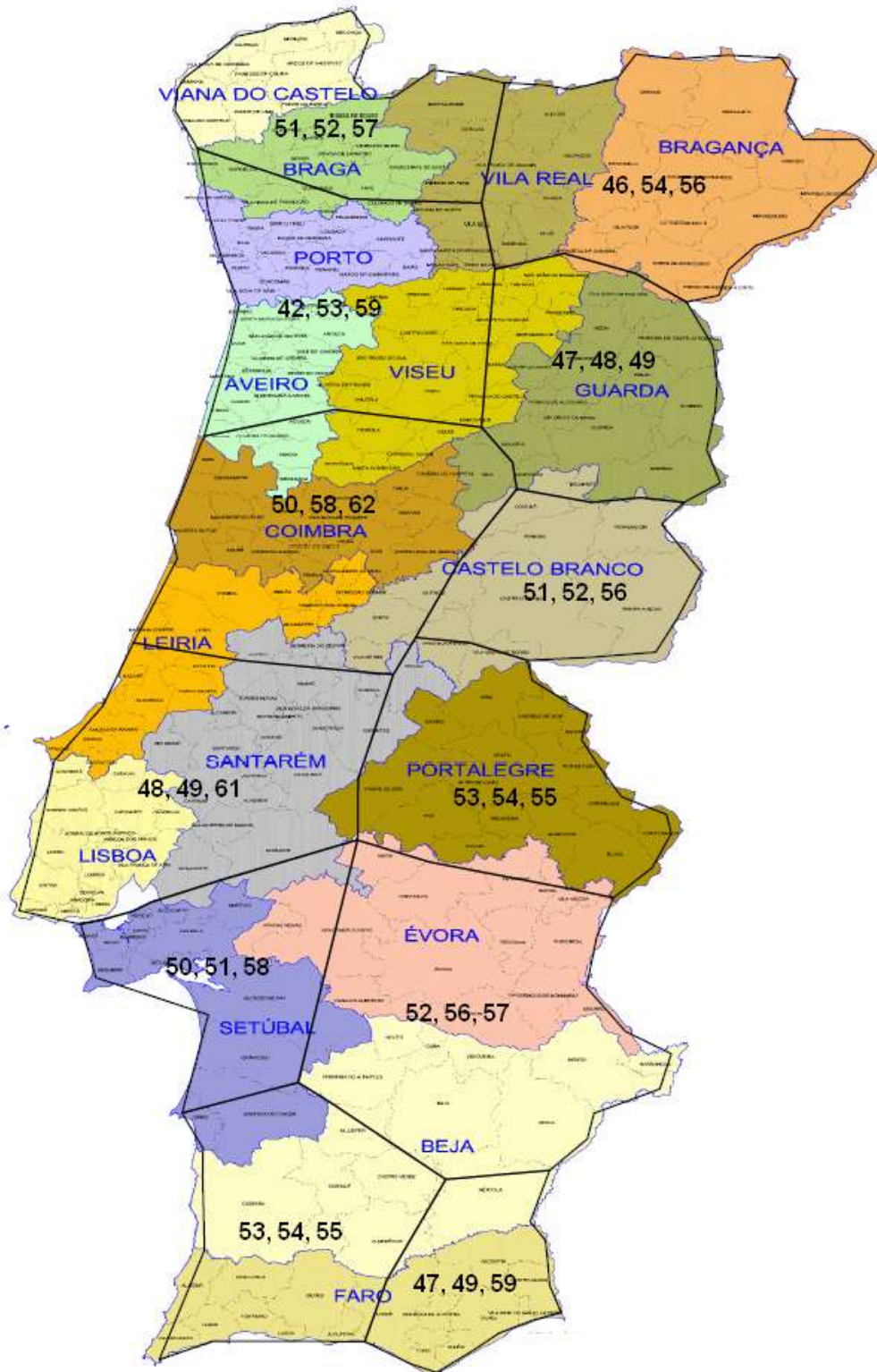
3 National T-DAB coverages (SFN)



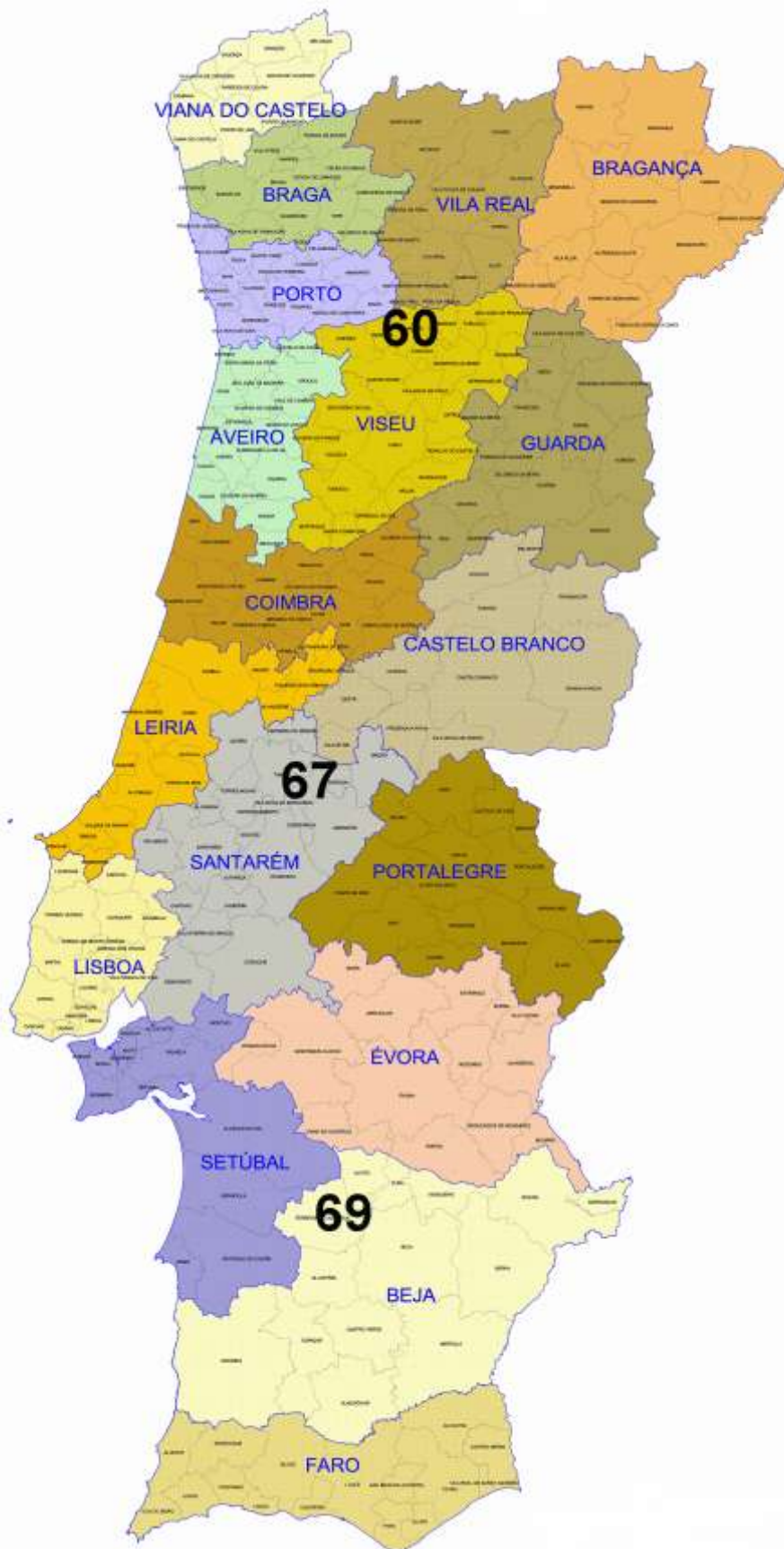
Annex 2

Coverages planned on band 470-862 MHz

3 National DVB-T coverages (MFN)



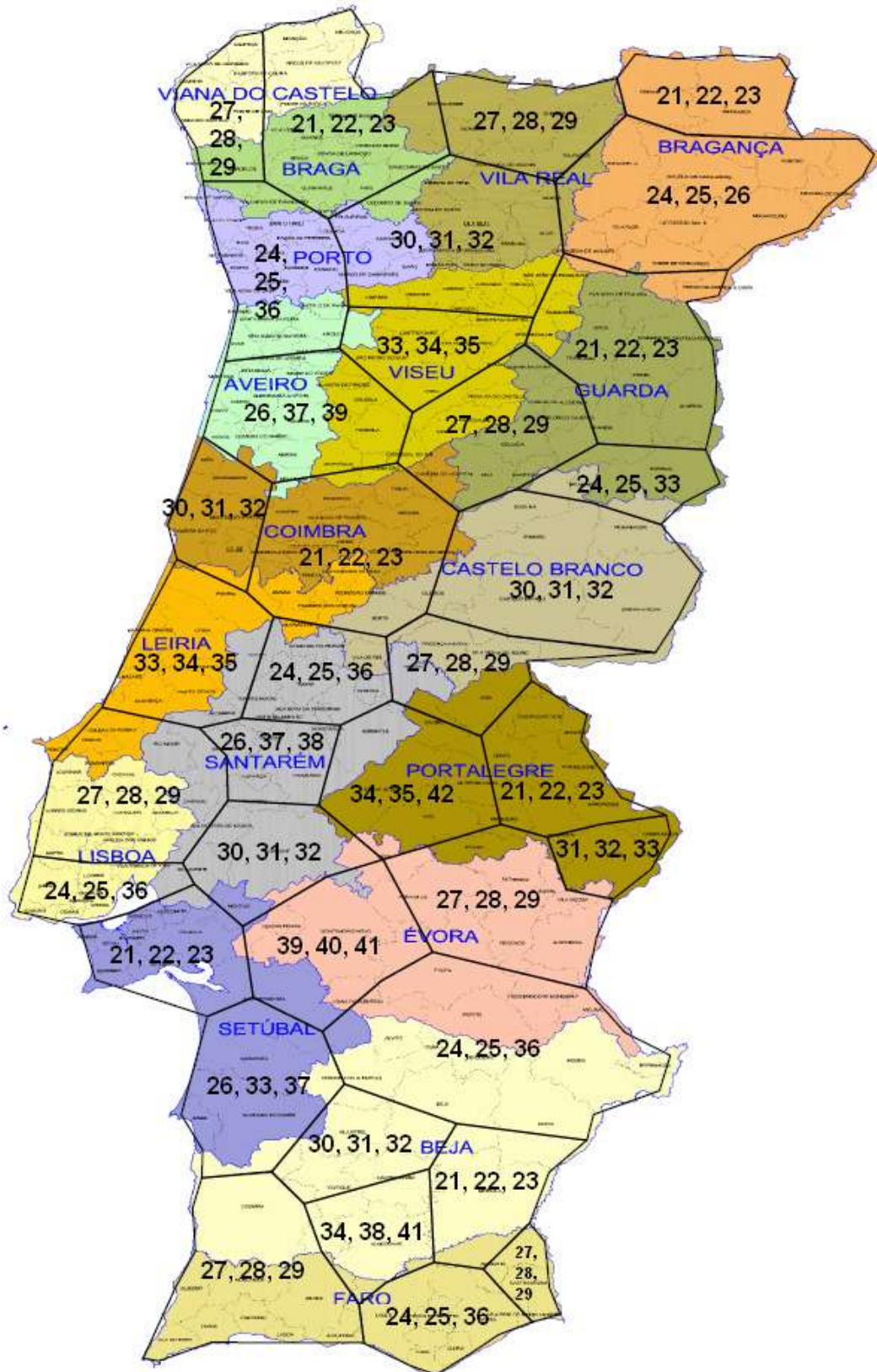
3 National DVB-T coverages (SFN)



1 District DVB-T coverage



3 National DVB-H coverages (MFN)



3 partial DVB-T coverages (SFN)

