

Dear radio spectrum users,

Nowadays, most of the inhabitants and visitors of the Czech Republic witness the use of radio spectrum, be they radio broadcasting listeners, TV broadcasting viewers, customers of mobile phone networks, car drivers with remote car locks or with navigation systems, parents of the children who play with remote control toy models, or operators or users of a series of other wireless applications that we meet anywhere. We all have now the opportunity to co-decide how to get greater benefit from radio spectrum use for further development of the society as a whole.

This opportunity is being referred to as the digital dividend and emerges in the context of the transition to digital terrestrial TV broadcasting, that needs substantially lower number of frequencies to transmit the same TV programmes than the existing analogue broadcasting.

The Czech Telecommunication Office (CTO), namely its officials dealing with the field of spectrum management and myself, in my capacity of the President of the CTO Council, consider this opportunity as of great importance, and we are convinced that, in a way similar to other countries, the discussion on its possible future use should not happen only behind closed doors of government agencies or among technicians or lawyers. There is no doubt that this discussion should involve all the existing or future users of the spectrum or of the services provided through it who have shaped their opinion on these issues and want to contribute to the decision making in a qualified manner.

Our intention is not to limit the discussion to one document only and to this public discussion, which is not happening in compliance with the provisions of the law on electronic communications, but we want, thanks to this document and the subsequent discussion, open a complex process comprising a series of phases, including, among others, workshops, conferences or further public discussions about the definition of the digital dividend objectives, public discussions related to the specific steps in radio spectrum management in keeping with the future development of transition to digital terrestrial broadcasting.

Nevertheless, we consider it important to inform you in time with sufficient notice before the adoption of important decisions in the spectrum management and open as wide as possible discussion on this issue. We suppose that this discussion shall involve mainly the respective committees and commissions of the Chamber of Deputies of the Parliament of the Czech Republic, the ministries concerned, the Council for Radio and TV Broadcasting, the Councils of the Czech Radio and of the Czech TV, as well as operators of radio and TV broadcasting, and even possible investors and operators of broadcasting networks who could benefit from the digital dividend.

We intend to sum up this initial round of a systematic public discussion in September this year at a workshop and open, on this basis, another round that would be more focussed on individual specific issues of the digital dividend in the Czech Republic and on the preparation of necessary and timely decisions.

PhDr. Pavel Dvořák, CSc.
President of the Council
CTO

DIGITAL DIVIDEND

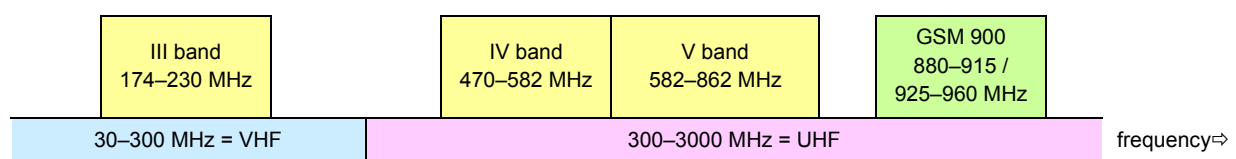
CTO information and communication document

I. Introduction

One of the important tasks of the Czech Telecommunication Office (hereinafter „CTO“ or „the Office“) is the management of radio spectrum focussed on its efficient use and on ensuring its accessibility to users so as the spectrum use may be beneficial to the life and development of the society as a whole. The CTO follows carefully and in a systematic manner the international development related to the use of the pertinent part of radio spectrum in relation to the ongoing switch to digital terrestrial TV broadcasting. The Office staff are involved in the solution of related expert issues in the respective working groups and bodies of international organisations.

The digital switchover in the case of digital terrestrial TV broadcasting means a step unseen so far in its history. It allows to achieve basic changes not only as far as the extent of the programmes offered and the quality of TV broadcasting are concerned, but also allows the onset of new electronic communication services supporting the development of the society in social and economic fields.

From the point of view of spectrum management, more efficient use of radio spectrum, namely in the frequency band from 470 to 862 MHz, is the target of the whole transition process. This band was for a long time reserved only for analogue terrestrial TV broadcasting, the initial frequency plan for the TV broadcasting in European countries having been compiled and signed in Stockholm in 1961. But, in the context of new broadcasting technologies, the properties of electromagnetic waves in this band bring promises and show possibilities for future mobile services, available „anywhere and any time“, which is shown by the universal use of the GSM mobile phones operated at the proximity of the upper band end.



How should possible use of radio spectrum, released thanks to the digital switchover of the terrestrial TV broadcasting, look like and how to reap the full benefits of the digital dividend – this has become an issue for discussion in all countries that set about the digital switchover of the terrestrial TV broadcasting.

This document submitted by the CTO opens a systematic discussion about possible directions of further development and tries to formulate the key questions related to this set of issues (Part II). The answers to these questions may lead to new opinions, to assessments of the development to date and to comments helpful in the quest for specific conclusions on the set of issues of the digital dividend in the conditions of the Czech Republic (hereinafter „the CR“). The description of factual correlations and the accompanying information are given in the Part III of this document which is a summing up of internal background documents and discussions of the CTO.

II. Issues to be discussed

We consider the following as the key questions that have to be raised and to which at least a working answer has to be given before entering into more detailed discussions about individual partial steps in radio spectrum management and its alternatives. Since the following list is obviously not an exhaustive one raising all possible questions, the CTO will also welcome the formulation of other serious and specific questions. The CTO supposes that the discussion about the digital dividend in the CR will be, in this round that is to open extensive expert and factual discussion, led by the effort to answer mainly these questions:

1. Do you think that the TV band III should be used also for digital TV broadcasting (DVB-T) or exclusively for multimedia applications with the planning parameters derived from the T-DAB, i.e. mainly for digital radio broadcasting?
2. Do you agree with the CTO that the auxiliary applications described in the part III (points 3.1.1 and 3.4.7), that already use the bands III and IV/V, should not have their access limited, because of the spectral digital dividend creation, more than the currently applicable conditions? In case of disagreement, are you able to define the extent of possible access limitation?
3. Do you prefer the use of the spectral digital dividend in the IV/V band for further broadcasting network/s of digital terrestrial TV while one such network will be assigned for mobile multimedia reception?
4. Do you support the creation of a network with specific technology for mobile multimedia reception or are you convinced that the possibility of DVB-T reception in mobile terminals is sufficient?
 - 4a. Do you support the approach to the procedure which will limit the use of such networks only for the DVB-H standard? What are the risks or advantages linked to the specific determination of technology?
 - 4b. What reasons are, in your opinion, decisive for the earliest (or, on the contrary, for the latest) creation of the network for mobile multimedia services, namely for mobile TV broadcasting?
5. Do you prefer the determination of a country-wide continuous assigned sub-band in the VI/V band for mobile networks? (Please mention the preferred application, e.g. from those quoted in the Part III point 3.4.)?
 - 5a. Do you believe that the CR should set a new concept of broadband communications including into it also the EU unified assignment of a part of the spectral digital dividend for mobile networks?
 - 5b. Do you believe that this sub-band should be assigned country-wide for mobile broadband access on the whole territory?

- 5c. If so, how big should be the sub-band of the spectrum made available, including its reservation for FDD, TDD or for both?
6. What use do you prefer in the case of locally usable free spectrum in between the radio channels used for digital terrestrial TV broadcasting in the IV/V band?
- 6a. To what extent do you consider realistic that this spectrum should be used for adaptive communication systems and to which extent for coordinated local applications – local/municipal TV broadcasting, local access networks, local non-public radio networks or possibly for other local applications?
- 6b. In your opinion, how should be set the conditions for the parallel operation of auxiliary applications for programme creation (see the question 2) and of newly considered applications?
7. Do you prefer to solve first the transition from analogue TV broadcasting to digital broadcasting leaving the released frequencies for possible transitional broadcasting within this process, i.e. to ensure the robustness and stability of the process? And to determine the use of the digital dividend only afterwards within a longer time frame once the digital switch has been completed?
- 7a. To set the use of the digital dividend only after a broad public discussion, according to the European harmonization, on the basis of the national strategy of the digital dividend use and on the basis of the information available in 2011-2012?
- 7b. Which of these factors (in the question 7a) do you consider as the most important and which as the least significant ? Which other factors should be taken into consideration?
- 7c. Do you agree with the draft unified procedure for the use the band IV/V worked out by the European Commission (see Part III, point 1.8)?
8. In your opinion, is it appropriate to allow, during the preparations of key decisions about the digital dividend, longer term experiments and pilot projects with the aim of both technical and business verification and assessment of new technologies (now the legal framework limits substantially the experiments to a very short time period)? Is it not so that long term performance of the so-called experiments might be rather contra-productive for the real implementation of the possibilities offered by the digital dividend?
9. Do you agree with the opinion that, for a correct definition of the digital dividend, it is necessary, in the first place, to adopt a „national digital dividend plan“ at the political level or should the process be quick in the framework of the possibilities of the existent legal framework and feasible alternatives are to be selected on the basis of the results of systematic assessment of the development of the markets concerned and of a public discussion?

About the form of the discussion and its deadlines

Dear participants in the discussion, if you have decided to contribute your opinion, could you, please, do so in a factual way and, if possible, with clear specific formulation of the text accompanied by good reasoning.

You may send them electronically marked as „DIGITÁLNÍ DIVIDENDA“ /digital dividend/ by 19 September 2008 to the address podatelna@ctu.cz or in paper copy to the address of the Office before the same deadline. This consultation is not conducted in compliance with the article 130 of the law on electronic communications [6], but its purpose is mainly to poll the opinion. The Office does not intend to publish the contributions or to make them available to third persons without the authors' knowledge. The information stemming from the consultation will serve as a basis for the assessment and setting of further rounds of factual and specific discussion, for future communication with the contributors, which is supposed to take, among others, the form of working seminars. For these reasons we would like to ask you to give your name and your electronic mail contact address. For the same reasons, please, refrain from forwarding any information you consider as business secrecy.

The whole process will result in the working out of specific proposals for procedures and alternatives in the digital dividend use which will be subsequently submitted to the relevant government bodies as a background for future work, or will be used as a background for the next discussion round. It is sure that the first **summing up of this discussion will be submitted at the CTO workshop on 25 and 26 September 2008.**

The acquired information will also be used by the Office for the preparation of the documents it is in charge of – e.g. new texts of the respective parts of the plan of the radio spectrum use or of the general authorizations – which will be discussed within the framework of the respective provisions of the law on electronic communications.

We would like to thank in advance to all those who will make a contribution to factual discussion.

III Summing up of the digital dividend issues

1. Current situation

- 1.1. **The transition from analogue terrestrial to digital terrestrial TV broadcasting concerns the frequency bands 174–230 MHz (so-called band III) and 470–862 MHz (so-called band IV/V)**, while the key interest is focussed namely on the band IV/V because of its width and its propagation properties. The transition to digital terrestrial TV broadcasting will happen not only in Europe but, due to globalization, practically across the world.
- 1.2. However, this does not mean that the conditions are the same everywhere and, what is more, the frequency range concerned by the transition is not identical either. Recently the allocation of the released frequencies started in the US and this is frequently quoted as a successful model to be followed. But, compared to Europe, the released frequency range in the US is more extensive, since there is no issue of different languages in use, individual localities are at sufficient distance apart and residential terrestrial broadcasting plays less important role than in some European countries. In the US they already have identified the issues which the released radio spectrum is supposed to help solve. One of these specific issues is the fact that more than 30% of the people living in the vast American rural regions have no access to the internet broadband connection.
- 1.3. In some European countries the conditions are similar, e.g. the Nordic countries have just minimum requirements for terrestrial TV broadcasting and its digitalization has been or soon will be completed. But these countries see the growth of the demand for the radio spectrum allowing, at lower cost, to provide broadband connection even in sparsely populated regions. In other countries the decisive role in TV broadcasting reception is played by cable TV, satellite reception, or they have the landscape profile that allows for the coverage of the whole territory by a small number of transmitters. In these countries the need for radio spectrum for terrestrial TV broadcasting is limited while the trend of the growing demand for broadband applications is there because users have the possibility to get connected anywhere, i.e. the mobility of such service.
- 1.4. **In the CR and in the majority of neighbouring countries TV broadcasting was based on the network of high capacity transceivers and gap-filling stations.** The CR is a small country and thus none of the important high power transmitters can be operated without successful international coordination with adjacent countries. Due to the technical properties of analogue broadcasting all available frequencies, resulting from the international plan or coordinated with the surrounding countries, are now being used for terrestrial TV broadcasting. But the frequency sources allowed for the operation of three broadcasters' national networks only. The possibility to use the frequencies in one country depends at all times on the needs of their use in the neighbouring countries. This situation was confirmed at the RRC-04/06 international conference preparing the new frequency plan for digital broadcasting which, in numerous cases, led to the situation which might be referred to as „domino effect“. The requirement of a country,

maybe not even a neighbouring country of the CR, generated a chain reaction leading to subsequent changes in the planned allocations of many other countries as well.

- 1.5. **The harmonization document, containing the plan of digital terrestrial TV and radio broadcasting in Europe, Africa and a part of Asia, is the 2006 Geneva Agreement** [21], adopted at the above mentioned conference. But this document contains only basic allotments for the high power transmitters and its implementation in practice depends on other related coordination talks with neighbouring countries. To give a better picture we might say that the Geneva Agreement solved only about 10% of transmitters needed for digital broadcasting. The real number of transmitters will be specified by concrete projects and by the implementation of the networks needed for the required coverage range in the Agreement on planned territorially specified sets of assignments. The Agreement also specifies the closing date for the protection of current analogue broadcasting (2015) together with the conditions for the use of the planned allotments by other applications than TV broadcasting.
- 1.6. **The attempts to harmonize the frequencies that will ceased to be used for this broadcasting after the transition to digital terrestrial TV broadcasting represent an important element in the considerations about the digital dividend use at the European level.** The efforts to achieve the most efficient use of radio spectrum are focussed on removing the obstacles preventing, on these frequencies, the application of the technological neutrality principle and the neutrality of the services provided. The ideal situation is when the electronic communications network operator himself selects the appropriate technology while he freely adapts the structure and the extend of the service provided to users demand. [9].
- 1.7. But the implementation of the above mentioned principles is hampered by physical proprieties of radio spectrum and they cannot be completely solved by current technical means. This is true mainly for harmful interference, in other words for mutual incompatibility of individual radio technologies or systems which do not allow for the absolute liberation of limitative conditions. Technical studies CEPT [12 to 16] were carried on these issues. Also for the cases of new use of the released spectrum, not only for TV broadcasting, the above-mentioned „domino effect“ is valid, causing the subsequent influencing of the possibilities of free use of broadcasting spectrum in other countries. This is why it is not possible to neglect the issue of frequency coordination and of cooperation with other countries.
- 1.8. **Within the European Community, the European Commission suggests a unified approach to the use of the IV/V band** [7]. The Commission suggests to split the band into three sub-bands:
 - The sub-band starting at 470 MHz would be assigned for unidirectional networks for digital terrestrial TV broadcasting from high power transmitters.
 - The sub-band near the upper band limit of 862 MHz would be assigned for the use by bi-directional low power networks providing e.g. high speed mobile data transmission or broadband access.

- As these two sub-bands cannot be close to each other due to the risk of mutual interference, they would be separated by a sub-band for unidirectional networks of low to medium power, e.g. for narrow-band mobile TV.
- These sub-bands would have, according to the suggestion in all member states, the same width, and the exclusive national management would continue only for the spectrum reserved for TV broadcasting.

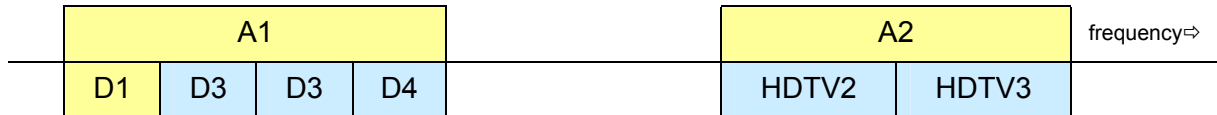
Digital TV including the digital dividend use for TV	Unidirectional networks (Mobile TV)	Mobile networks including terminals' transmission	frequency ⇒
470 MHz	790 MHz	862 MHz	

- 1.9. **The transition process to digital broadcasting in the Czech Republic got a substantial impulse this year – the adoption of the technical plan of the transition** (government regulation No 161/2008 Coll.) [1]. The document defines primary requirements of the state on the extend of digital terrestrial TV broadcasting. **It defines the transition of the existing analogue networks to three digital networks and also takes the decision about a part of the generated digital dividend – a new broadcasting network No 4.**

However, the Technical Plan of the Transition (hereinafter the „TPT“) does not define the use of the whole spectrum range that will be made available by digitalization (of the whole digital dividend), as it will not be known before the termination of the transition from the existing analogue broadcasting to digital broadcasting. At present the total need for further frequencies for secondary parts of digital TV broadcasting networks – the transceivers and the gap fillers is not yet obvious. Just to give a better picture – at the beginning of digital broadcasting planning the idea was that only single-frequency networks will be used (SFN). Technical problems with the synchronization of such networks led to the diversion in their implementation at larger territories and, for the coverage of some difficult localities independent radio channels using different radio frequencies will be necessary. During the transition to digital broadcasting the operators of current analogue local or regional TV stations and the operator of the public service broadcasting, who also calls for regional subdivision, submit requirements for new radio channels. Although the real extent of the digital dividend will be known only in the years 2011 – 2012, it is necessary to start solving now the issues of radio spectrum on which the government has not yet taken a decision, and to look for its future optimal use for the society.

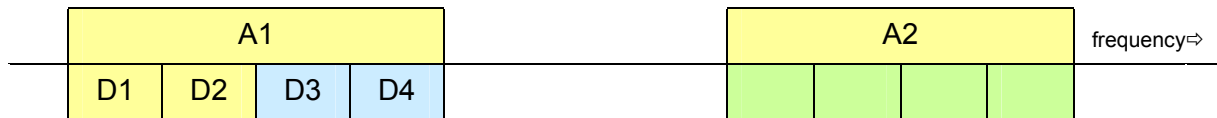
- 1.10. The possibilities and opportunities for new radio applications and services mentioned in relation to the transition to digital terrestrial TV broadcasting are referred to as the digital dividend use. In this context it has to be made clear what the digital dividend notion means. The most complex concept is when the whole effect of the new way of using radio spectrum, i.e. including the subsequent impacts in social and economic field, e.g. in the growth of employment rate and of the GNP, are considered to be the digital dividend. **The digital dividend in more narrow sense means the content and the spectrum dividend.**

- The content dividend expresses the quantitative growth of the disseminated content (e.g. the number of programmes) and/or its qualitative growth (e.g. the transition to high definition broadcasting - HDTV), allowed by the transition to digital broadcasting itself, i.e. without extending the range of the radio spectrum used.



Legend: AX – analogue programme, DX – digital programme, HDTV – high definition digital programme, in blue: content dividend

- The spectrum dividend is created by these parts of radio spectrum (frequencies), that are not used in digital broadcasting for broadcasting of the programmes that were originally transmitted by analogue broadcasting. The determination of the spectrum dividend cannot be separated from a specific place and specific time.



Legend: AX – analogue programme, DX – digital programme, in blue: content dividend, in green spectrum dividend

This document is primarily dealing with the digital dividend in the sense of the spectrum digital dividend while the stress is to be laid on:

- From the time point of view the digital dividend will be fully identifiable and available only when analogue broadcasting will have been terminated and the transition to final digital networks will have been completed.
- From the territorial point of view there might be significant differences in the digital dividend as in some localities there will be the need to accompany primary transmitters with secondary gap fillers and that will reduce the digital dividend. The full extend of the digital dividend cannot therefore be defined for the whole national territory as a flat value.

1.11. On the basis of what has been mentioned above and of the definitions given in the European documents – namely of the RSPG [11,] the digital dividend in the CR may be defined as follows:

The spectrum digital dividend is the range of radio spectrum in the frequency bands 174–230 MHz and 470–862 MHz, which, on a part of the territory, is not used, after the completion of the transition to digital terrestrial TV broadcasting for digital terrestrial broadcasting of TV programmes for which analogue broadcasting was used on 15 May 2008.

1.12. The digital dividend includes:

- the frequencies originally used for analogue broadcasting which are not used for this broadcasting in digital form, therefore it also includes the frequencies formerly reserved for digital terrestrial radio broadcasting,
- the frequencies which could not be used in the past for technical reasons, e.g. because of their interference with analogue broadcasting or whose range was insufficient for the use,
- the frequencies released from other use that may be implemented for new use in relation to the transition to digital broadcasting.

1.13. The digital dividend may be split into two parts:

- a) continuous assigned country-wide sub-bands of radio spectrum,
- b) individual radio channels which are not used for TV broadcasting at a certain territory and there is no interference from its part either (sometimes referred to as white spots, (white places, interleaved spectrum)).

	Radio channels										
Region1		DTV				DTV			DTV		
Region2	DTV				DTV	DTV					
Region3	DTV		DTV	DTV			DTV	DTV			
Region4		DTV			DTV				DTV		
Region5	DTV		DTV	DTV		DTV					

Legend: DTV – digital TV broadcasting, in blue: – „white spots“, in green: – country-wide assigned sub-band, in white – sub-bands interfered by the TV broadcasting from neighbouring regions

Ad a)

The creation of a continuous frequency space to operate country-wide networks is very complicated and depends on the coordination with neighbouring countries. It might be supposed that pan-European harmonization will give the basic impulse for the creation of such space. In this case the fact that all neighbouring countries of the CR are EU members might show as an advantage. Nevertheless, during the transition period from analogue to digital broadcasting, when both analogue and digital broadcasting are operated, the creation of such free space is not realistic. It is practically impossible and, due to the need for a certain level of flexibility to solve urgent problems of the digital switchover, even not desirable, to set beforehand the frequencies for which there would be the guarantee that they will be released at a precise moment in time and say that it will be possible to build any new networks on them, and possibly accept related undertakings. This is made even stronger due to the similar situation prevailing in some neighbouring countries.

Ad b)

These free channels may be used to cover regional or local needs both for TV broadcasting (individual transmitters) or for other applications with limited territorial scope, depending on technical parameters of radio frequencies, which may be used in this manner. But it should not be supposed that the use of more „white spots“ will allow for the creation of a space for any applications with a larger territorial range. The limiting factor for the existence of “white spots” is the interference from the use of neighbouring channels or from adjacent or identical channels used in other regions or possibly in other countries.

Note: Although future expectations foresee also the possibility of using adaptable intelligent systems that would identify the free spectrum range and adapt their own operation to it, these equipments have not yet achieved satisfactory results even at research stage.

Further implementation of digitalization and future use of the spectrum released from analogue broadcasting will mainly depend on the real development of terrestrial TV broadcasting market and on the demand for other electronic communication services.

1.14. Even now the spectrum is also used by other applications than TV broadcasting. The conditions of the use of the III and VI/V bands are regulated in the CR by the frequency bands allocation plan [2] and by PV-P/10 a PV-P/21 parts of the radio spectrum use plan [3], [4]. These national documents implement the Geneva 2006 international agreement and the plan.

Both bands III and IV/V are, apart from terrestrial TV broadcasting, used by accessory services, e.g. by wireless microphones. These applications are operated both on the basis of individual authorizations and, with performance limitation, on the basis of the general authorization VO-R/10 [5] and this on the locally free frequency sub-bands between radio channels used for TV broadcasting. They may not interfere with TV broadcasting and reception and they have no right to the protection from TV broadcasting interference.

At present, the CTO does not foresee to terminate this manner of bands use.

2. Timeframe of the events

Which events and deadlines will be important for future development of the digital dividend use:

- **15 August 2008** – the date by which the commercial TV stations operators may adhere to the Technical Plan of the Transition [1]
- **September 2008** – European Parliament report on the European Commission communication on the digital dividend [7]
- **March 2009** – working out of the technical solution drafts for the use of the upper part of the IV/V band for mobile applications in CEPT

- **June 2009** – examination of the CEPT Report with the technical solution in the RSC Committee
- **continuously until 11 November 2011** – the implementation of the transition to digital broadcasting in the CR – the digital switchover termination with the exception of the territorial regions of Jeseník and Zlín
- **year 2012** – the foreseen termination of the transition in the EU member states including the Czech Republic (Jeseník and Zlín by 30/6 2012)
- **17 June 2015** – the termination of the transition period according to the Geneva 2006 Agreement [21], then, it is supposed that in international relations only digital technologies will be used (termination of the analogue broadcasting protection).

3. Alternatives of possible development

The list of events, facts and technical conditions given in the previous chapter is a paradoxical proof that it is a topical matter to formulate current needs, foreseen development and to deduce necessary specific steps to be taken. However, it will be necessary to verify the real development and possibly make corrections when it comes to further action.

Facts and suppositions of possible development:

A) 174-230 MHz – band III

- 3.1. In the case of the band III the situation is relatively simple, as the band, due to its properties and demand it generates is **predetermined for digital applications of multimedia nature, namely for digital radio broadcasting including possible auxiliary services**. The band was partly replanned for this way of using in the framework of the RRC-04/06 international conference. Due to considerable frequency distance from the current bands of mobile service, this band is not in the focus of interest of the operators of future broadband mobile services.
 - 3.1.1. It is not foreseen now to operate in this band any digital terrestrial TV broadcasting replacing current analogue broadcasting. **Thus the whole band will create the digital dividend**, but when thinking about its use we have to take into consideration the needs for its parallel use by auxiliary applications used for the creation of TV programmes, for radio, social events, life reporting, etc. like wireless microphones, wireless pick ups, temporary connections, etc. The CTO has no future plans to substantially change the conditions for this use as compared to actual conditions.
 - 3.1.2. When thinking of the use of the digital dividend in this band, the CTO pays heed to its current use. The frequencies of this band are now used to operate one of the broadcasting network of analogue TV broadcasting. Thus the possibility of spectrum use till the end of the digital switchover is to a great extent limited.
 - 3.1.3. In the plan annexed to the Geneva Agreement 2006, the III band is allocated in the CR for three networks of digital terrestrial broadcasting in the T-DAB standard and for one network in the DVB-T standard.
 - 3.1.4. The allocation may be used for any multimedia applications that comply with the T-DAB spectrum mask, e.g. those using the technologies based on T-DAB standard – such as T-DMB for mobile multimedia. The planned DVB-T allocations may be, on the basis of successful international coordination, converged to T-DAB allocations.
- 3.2. Since new bands have been allocated for digital radio broadcasting, there are no equivalent international measures for radio broadcasting as they were taken for TV broadcasting, where the conversion of broadcasting is happening in current bands, so far taken by analogue broadcasting (the plans adopted by the ITU Regional

Radiocommunication Conference, Geneva, 2006; the CEPT harmonization measure or the European Commission). **Therefore no deadlines have been set so far for the analogue radio broadcasting termination and it is not even necessary to set them in the foreseeable future.** As mentioned above, it is true that digital terrestrial radio broadcasting is supposed to be operated on the frequency bands which are different from those on which analogue terrestrial radio broadcasting is operated now. **So there is no such condition as to terminate or limit in any way current terrestrial analogue radio broadcasting in the VHF FM band in order to introduce digital terrestrial radio broadcasting.**

- 3.2.1. In this direction **it is therefore not necessary to draw up any transition plan** which should solve such situation of terrestrial radio broadcasting. Here, it is not about the transition but only about the introduction of digital radio broadcasting. Both platforms of radio broadcasting will certainly co-exist in parallel for quite a long and so far indefinite time.
- 3.2.2. The CTO in principle refuses the use of the notion of the Technical Plan of the Transition from analogue terrestrial radio broadcasting to digital terrestrial radio broadcasting or of any similar document, or the arguments based on the analogy with the transition from analogue terrestrial TV broadcasting to digital terrestrial TV broadcasting, and considers the use of this analogy with TV broadcasting, due to completely different conditions of the digital switchover in radio as against TV broadcasting, as utterly misleading, confusing and therefore unacceptable.
- 3.2.3. Despite of this standpoint, the CTO does not exclude a political decision about the support to be shown for the development of digital radio broadcasting e.g. in the form of some advantages for those current radio broadcasting operators who will broadcast in parallel on both platforms, analogue and digital. There are good reasons to believe that **even after the introduction of digital radio broadcasting, the public service radio should, due to its mission, remain a natural leading entity, bringing in, together with new technologies, higher quality and extension of services for broad classes of citizens.** Serious considerations are to be given as well to define if some form of support should be given to experiments and pilot projects in this field, or to those commercial operators of radio broadcasting who will invest their know-how, means and name into the introduction of digital radio broadcasting. But the decision on how and with what means the operator wants to broadcast radio programmes is just a managerial decision of the given entrepreneur with the licence, unless these issues are regulated in the operational licence for broadcasting or by law. These documents also stipulate if analogue or digital broadcasting or both will be operated, if one or more distribution channels will be used.
- 3.3. **The CTO is now getting ready for the steps allowing to start proceeding in compliance with the law on electronic communications (hereinafter the LRC) to grant the right for the use of radio frequencies necessary to ensure the T-DAB networks.** Now public consultation is going on within the framework of the necessary modifications of the Plan of Radio Spectrum Use, together with the progress assessment of the process of frequencies releasing in the III band on the

basis of the transition plan implementation. It will be only in the subsequent period that the respective tendering procedures for the granting of rights might be prepared. The CTO works on the harmonization of individual steps.

B) 470-862 MHz – IV/V band

3.4. **The main field of the digital dividend use is in the IV/V band.** It is important to realise that there is no possibility to implement any and every use, rather the contrary is true, almost any selection may use up the all released frequencies. The possibilities mentioned further concern the use of this part of the spectrum digital dividend, for which the decision was not taken in the Technical Plan of Transition [1].

3.4.1. The use of this band for radio radiocommunication service comprises namely new broadcasting networks for digital terrestrial TV broadcasting, **that is to say the broadcasting networks 5, 6 and 7.** These networks may be country-wide networks or they may allow regional programmes broadcasting. They are based on the allocations stipulated in the 2006 Geneva Agreement [21] **and there cannot be any realistic assumption that other complete (country-wide) broadcasting networks would be coordinated over and above those mentioned in the Agreement.** As an alternative, the frequencies might be used to the detriment of other networks to strengthen the coverage quality of the broadcasting networks 1 to 4, e.g. in order to provide higher reception category (indoor portable). The use of the digital dividend for further TV broadcasting might, to a limited extent, start even during the transition process to digital broadcasting but only once the frequencies needed for the temporary placement of digital broadcasting are released. Radio frequencies might be used even one by one to broadcast further local programmes.

3.4.2. **The nearest realistic alternative using the allocation for one TV broadcasting network from the 2006 Geneva Agreement is the unidirectional network allowing mobile multimedia broadcasting [10]. This network is defined in one part of the radio spectrum plan of use [3].** The technology DVB-H [8] is the specific technology for this use of the spectrum digital dividend mentioned in the harmonized list of EU standards. The frequencies in the IV/V band are not considered for the reverse channel. **The use of this alternative might start even during the transition process to digital broadcasting, but the availability of final frequencies determined in the plan of use will be limited for some time.** To carry out this step, which is de facto probably the earliest step in the digital dividend use, the Office worked out several interlinked studies – with the result, i.a. of respective frequencies selection, given in the pertinent annex to the plan of radio spectrum use. Most frequency allocations in the DVB-T might be used by DVB-H, but in cases when the DVB-H is supposed to cooperate with the GSM900 network in one terminal device, it is necessary to use the for the DVB-H the frequencies under 700 MHz (under the radio channel 50) and this is also how the country-wide network in the respective part of radio spectrum is determined. The Office now assesses possible risks involved in the subsequent logical step – the announcement of the respective tendering procedure in compliance with the law on electronic communications – in the conditions where the acquired experience with the introduction of DVB-H within EU are contradictory, the terminal devices for mobile TV pursue at least 2 directions (DVB-T and DVB-H), business models

are not clearly stated, etc. Therefore, the Office faces the task to set, in this turbulent environment, rational and sufficiently flexible conditions for this allotment holder selection in such a way that it would not cause the loss of the digital dividend use for the mobile TV network.

3.4.3. One of the key strategic issues of the digital dividend is whether, in the case of re-assessing the requirements for digital terrestrial TV broadcasting, one part of the digital dividend might be used, instead of for TV broadcasting for the applications of mobile radiocommunication service. This possibility has been included into the ITU Radio Regulations [19] by the last World Radiocommunication Conference WRC-07 [20] and the band 790–862 MHz was, together with the existing assignment for radio radiocommunication service, also assigned for mobile services supposing that they will use IMT technologies. Preference is given to this use before the assignment of a sub-band of the V band, optimally country-wide. Because of mutual interference it will not be possible, in the period after the digital switchover is completed, to use the digital dividend frequencies for the applications in mobile radiocommunication service, especially not for the transmission from terminal devices (uplink). The following alternatives might be considered (Note: the dimensions of the necessary protective or middle sub-bands are subjects of the CEPT studies in the making):

3.4.3.1. bi-directional mobile networks,

DTV	Protective sub-band	Base stations transmissions	Middle sub-band	Mobile terminals transmission	frequency ⇨
790 MHz					862 MHz

3.4.3.2. the strengthening of mobile networks in the 900 MHz band for the transmission towards terminals (downlink), to cover the requirements for downloading from the Internet

DTV	Protective sub-band	Base stations transmissions		frequency ⇨
790 MHz				862 MHz

3.4.3.3. mobile broadband access.

DTV	Protective sub-band	E.g. systems with time-split duplex operation	frequency ⇨
790 MHz			862 MHz

Legend: DTV – digital TV broadcasting

Due to the number of mobile phone users (130 SIM cards/100 inhabitants) and to the fact that to date not all the frequencies in the GSM 1800 MHz a UMTS 2 GHz bands are in use, the CTO supposes there will be no further demand for the services of „classical“ mobile networks, **but identifies the need for increased availability of mobile broadband access.**

3.4.4. **Fixed broadband access is an alternative that does not require to assign a country-wide independent sub-band and may be better coordinated with TV broadcasting** . That is why it would not be necessary to carry out important limitation of TV broadcasting in the band, or, in other words, both uses could be adapted to national and/or local needs. For this alternative, it is possible to make use of the assignment from the 2006 Geneva Agreement [21] that sets the conditions for the assignment use in a common plan with other applications than the digital TV or radio broadcasting . Also the locally available free radio channels may be used but with limited outputs – the nature of this application would get close to the popular access networks at WiFi basis. In the case of local access networks operation on the basis of individual measures following the previous consultation, it might be supposed that there will arise the possibility of setting less limitative conditions than for the operation on the basis of the generally valid general authorization. There will be significant differences as to the local available spectrum range.

	Radio channels								
Region1		DTV			DTV		DTV		FWA
Region2	DTV		FWA		DTV			DTV	
Region3	DTV		DTV			DTV		FWA	FWA
Region4		DTV		FWA	FWA		DTV		DTV
Region5	DTV		DTV		DTV		FWA	FWA	

Legend: DTV – digital TV broadcasting , FWA – fixed wireless access

3.4.5. Fixed broadband access may be better implemented than mobile access, but it has already at the disposal other assigned bands of 3,5 GHz, 26 GHz, 28 GHz and it also uses the 2,4 GHz and 5 GHz bands. Other bands, namely the 2,6 GHz band, are also assigned for mobile broadband access.

3.4.6. Another possible alternative mentioned in international negotiations is the use of the released spectrum for the needs of government bodies, crisis communication or non-public networks PMR (networks to be used within a company or organization). Due to the possibilities of these communications in other bands and to the limited benefit of the digital dividend use compared to other possibilities, the CTO does not suppose to use these alternatives in the CR.

3.4.7. When considering the band use on the basis of the general authorisation, we cannot forget to mention current use on the basis of the general authorisation VO-R/10 [5] (see also 3.1.1). We may foresee future extension of this use depending on devices' availability, but the CTO, when granting authorizations, will respect existing users on the basis of the general authorization, and mainly

the primary use (i.e. TV broadcasting protection including its reception and other primary services).

3.5. One of the possibilities of national strategy of the digital dividend is, among others, to leave the decision about the range and use of the released part of radio spectrum open for quite a long time, and wait until the real digital dividend release happens and then decide on its use only in the years 2011 - 2012 according to the available spectrum range at that time, to corresponding technologies topical at that time in the future, and the needed/demanded services.

3.5.1. This approach would bring the advantage of using not only the experiences and knowledge from the digital dividend application in other countries and the latest technologies, but also of maximum flexibility of transition from analogue to digital TV broadcasting.

3.5.2. On the other hand, this might bring the drawback of difficulties in the protection of the non-used frequencies during the international coordination process, i.e. the degradation of the available spectrum might happen or, due to the implementation measures adopted in the neighbouring states, the future spectrum use in the CR might be limited.

Annex: Information sources

Ministry of Interior of the CR – Collection of laws: www.mvcr.cz

- [1] CR Government Regulation No 161/2008 Coll., Technical Plan of Transition
[HTTP://APLIKACE.MVCR.CZ/ARCHIV2008/SBIRKA/2008/SB051-08.PDF](http://aplikace.mvcr.cz/archiv2008/sbirka/2008/sb051-08.pdf)

Czech Telecommunications Office: www.ctu.cz

- [2] Plan of frequency bands allocation, CTO, Prague, 2004
[HTTP://WWW.CTU.CZ/1/DOWNLOAD/PLAN-PRIDELENI-KMITOCTOVYCH-PASEM_1114099610.PDF](http://www.ctu.cz/1/download/plan-pridelezeni-kmitocitovych-pasem_1114099610.pdf)
- [3] Plan of radio spectrum use, part PV-P/10/05.2008-5 for the frequency band 470-960 MHz
[HTTP://WWW.CTU.CZ/1/DOWNLOAD/PLAN%20VYUZITI%20RADIOVEHO%20SPEKTRA/PV-P-10-05.2008-5.PDF](http://www.ctu.cz/1/download/plan-vyuziti-radioveho-spektra/pv-p-10-05.2008-5.pdf)
- [4] Plan of radio spectrum use, part PV-P/21/12.2006-36 for the frequency band 174–380 MHz
[HTTP://WWW.CTU.CZ/1/DOWNLOAD/PLAN%20VYUZITI%20RADIOVEHO%20SPEKTRA/PV-P-21-12.2006-36.PDF](http://www.ctu.cz/1/download/plan-vyuziti-radioveho-spektra/pv-p-21-12.2006-36.pdf)
- [5] General authorization No VO-R/10/03.2007–4 for the use of radio frequencies and for the operation of short-range devices.
[HTTP://WWW.CTU.CZ/1/DOWNLOAD/OOP/ROK_2007/VO_R_10_03_2007_4.PDF](http://www.ctu.cz/1/download/oop/rok_2007/vo_r_10_03_2007_4.pdf)

Ministry of Industry and Trade of the CR: www.mpo.cz

- [6] Law No 127/2005 Coll., on electronic communications and on the modification of the related laws (law on electronic communications)
[HTTP://WWW.MPO.CZ/DOKUMENT37746.HTML](http://www.mpo.cz/dokument37746.html)
- [6bis] Concept of digital broadcasting development, Ministry of Informatics
[HTTP://WWW.MPO.CZ/DOKUMENT37351.HTML](http://www.mpo.cz/dokument37351.html)

European Commission, DG INFSO:

[EC.EUROPA.EU/INFORMATION_SOCIE07TY/POLICY/RADIO_SPECTRUM](http://ec.europa.eu/information_society/policy/radio_spectrum)

- [7] Communication from the commission (2007)700 – 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:EN:PDF>
- [8] 2008/286/EC: Commission decision of 17 March 2008 amending Decision 2007/176/EC as regards the List of standards and/or specifications for electronic communications networks, services and associated facilities and services
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:093:0024:0024:EN:PDF>

European Commission, RADIO SPECTRUM POLICY GROUP RSPG: RSPG.EC.EUROPA.EU

- [9] RSPG opinion on WAPECS, RSPG05 102
[HTTP://RSPG.EC.EUROPA.EU/DOC/DOCUMENTS/OPINIONS/RSPG05_102_OP_WAPECS.PDF](http://RSPG.EC.EUROPA.EU/DOC/DOCUMENTS/OPINIONS/RSPG05_102_OP_WAPECS.PDF)
- [10] RSPG opinion on mobile multimedia services, RSPG06 143
[HTTP://RSPG.EC.EUROPA.EU/DOC/DOCUMENTS/OPINIONS/RSPG06_143_FINAL_RSPG_OPINION_MULTIMEDIA_SERVICES.PDF](http://RSPG.EC.EUROPA.EU/DOC/DOCUMENTS/OPINIONS/RSPG06_143_FINAL_RSPG_OPINION_MULTIMEDIA_SERVICES.PDF)
- [11] RSPG Opinion on the Digital Dividend, RSPG07 161
[HTTP://RSPG.EC.EUROPA.EU/DOC/DOCUMENTS/OPINIONS/RSPG07_161_FINAL_OP_DIGDIV.PDF](http://RSPG.EC.EUROPA.EU/DOC/DOCUMENTS/OPINIONS/RSPG07_161_FINAL_OP_DIGDIV.PDF)

CEPT / ECC; European Radiocommunications Office: [HTTP://WWW.ERO.DK](http://WWW.ERO.DK)

- [12] CEPT Report 21– Compatibility issues between cellular/low power transmitter networks and larger coverage /high power/tower type of networks”
[HTTP://WWW.ERODOCDB.DK/DOCS/DOC98/OFFICIAL/PDF/CEPTREP021.PDF](http://WWW.ERODOCDB.DK/DOCS/DOC98/OFFICIAL/PDF/CEPTREP021.PDF)
- [13] CEPT Report 22– Technical Feasibility of Harmonising a Sub-band of Bands IV and V for Fixed/Mobile Applications (including uplinks)
[HTTP://WWW.ERODOCDB.DK/DOCS/DOC98/OFFICIAL/PDF/CEPTREP022.PDF](http://WWW.ERODOCDB.DK/DOCS/DOC98/OFFICIAL/PDF/CEPTREP022.PDF)
- [14] CEPT Report 23 – Technical Options for the Use of a Harmonised Sub-Band in the Band 470 - 862 MHz for Fixed/Mobile Application (including Uplinks)
[HTTP://WWW.ERODOCDB.DK/DOCS/DOC98/OFFICIAL/PDF/CEPTREP023.PDF](http://WWW.ERODOCDB.DK/DOCS/DOC98/OFFICIAL/PDF/CEPTREP023.PDF)
- [15] CEPT Report 24 – The feasibility of fitting new applications/services in "white spaces" of the digital dividend
[HTTP://WWW.ERODOCDB.DK/DOCS/DOC98/OFFICIAL/PDF/CEPTREP024.PDF](http://WWW.ERODOCDB.DK/DOCS/DOC98/OFFICIAL/PDF/CEPTREP024.PDF)
- [16] CEPT Report 25 – Technical Roadmap proposing relevant technical options and scenarios to optimise the Digital Dividend,
[HTTP://WWW.ERODOCDB.DK/DOCS/DOC98/OFFICIAL/PDF/CEPTREP025.PDF](http://WWW.ERODOCDB.DK/DOCS/DOC98/OFFICIAL/PDF/CEPTREP025.PDF)
- [17] RECOMMENDATION CEPT/ERC/REC 70-03 – RELATING TO THE USE OF SHORT RANGE DEVICES (SRD)
[HTTP://WWW.ERO.DK/DOCUMENTATION/DOCS/DOC98/OFFICIAL/PDF/REC7003E.PDF](http://WWW.ERO.DK/DOCUMENTATION/DOCS/DOC98/OFFICIAL/PDF/REC7003E.PDF)
- [18] ERC Report 25 - (European Common Allocation Table] - The European Table of Frequency Allocations And Utilisations In The Frequency Range 9 kHz to 1000 GHz, Lisboa 02- Dublin 03- Kusadasi 04- Copenhagen 06- Nice 07
[HTTP://WWW.ERODOCDB.DK/DOKS/FILEDOWNLOAD.ASPX?FILEID=1776&FILEURL=HTTP://WWW.ERODOCDB.DK/DOCS/DOC98/OFFICIAL/PDF/ERCREP025.PDF](http://WWW.ERODOCDB.DK/DOKS/FILEDOWNLOAD.ASPX?FILEID=1776&FILEURL=HTTP://WWW.ERODOCDB.DK/DOCS/DOC98/OFFICIAL/PDF/ERCREP025.PDF)

International Telecommunication Union ITU: WWW.ITU.INT

- [19] ITU Radio Regulations, Geneva, 2004
[HTTP://WWW.ITU.INT/PUBL/R-REG-RR/EN](http://WWW.ITU.INT/PUBL/R-REG-RR/EN)
- [20] Final act WRC-07, Geneva, 2007
[HTTP://WWW.ITU.INT/PUBL/R-ACT-WRC.8-2007/EN](http://WWW.ITU.INT/PUBL/R-ACT-WRC.8-2007/EN)
- [21] Final act RRC-06, Geneva, 2006
[HTTP://WWW.ITU.INT/PUBL/R-ACT-RRC.14-2006/EN](http://WWW.ITU.INT/PUBL/R-ACT-RRC.14-2006/EN)
