Anhang 2

Bundesministerium
für Verkehr,
Innovation und Technologie

Innovation und Telekommunikation

TECHNICAL ARRANGEMENT

BETWEEN THE NATIONAL FREQUENCY MANAGEMENT AUTHORITIES OF

AUSTRIA, CROATIA, [THE CZECH REPUBLIC,] HUNGARY, THE SLOVAK REPUBLIC and SLOVENIA

ON BORDER COORDINATION

FOR TERRESTRIAL SYSTEMS CAPABLE OF PROVIDING ELECTRONIC COMMUNICATIONS SERVICES

IN THE FREQUENCY BAND 790 - 862 MHz

Vienna, 12th October 2011

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1 INTRODUCTION

The aim of this Technical Arrangement is to lay down the principles, the technical provisions and administrative procedure necessary to regulate the common deployment of terrestrial systems capable of providing electronic communications services that may use different technologies in the band 790 - 862 MHz in border areas. This frequency band is called as WRC-07 "Digital Dividend".

In the framework of Article 6 of ITU Radio Regulations, of bi- or multilateral agreements, arrangements or protocols dealing with frequency coordination in general (e.g. the "HCM Agreement"), the Croatian Post and Electronic Communications Agency (Croatia), [Czech Telecommunication Office (the Czech Republic),] the Federal Ministry for Transport, Innovation and Technology (Austria), the National Media and Infocommunications Authority (Hungary), the Post and Electronic Communications Agency of the Republic of Slovenia (Slovenia) and the Telecommunications Regulatory Authority of the Slovak Republic (the Slovak Republic) (hereinafter called Signatory Authorities) concluded this Technical Arrangement concerning the usage of the frequencies for terrestrial systems capable of providing electronic communications services in the band 790 - 862 MHz in border areas.

The Signatory Authorities have agreed on the following coordination procedures and rules detailed in the sections below in border areas.

2 PRINCIPLES OF FREQUENCY PLANNING AND FREQUENCY USAGE IN BORDER AREAS

2.1 Relevant regulations

From regulatory point of view, the following deliverables play an important role in the regulation of border coordination in the band 790 - 862 MHz:

- COMMISSION DECISION (2010/267/EU) of 6 May 2010 on

  harmonised technical conditions of use in the 790 – 862 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union *(notified under document number C(2010) 2923)*;

- ECC Decision (ECC/DEC/(09)03) of 30 October 2009 on

  harmonised conditions for mobile/fixed communications networks (MFCN) operating in the band 790 – 862 MHz;

- ECC RECOMMENDATION (ECC/REC/(11)04) adopted on 20 May 2011 on

  frequency planning and frequency coordination for terrestrial systems for mobile/fixed communication networks (MFCN) capable of providing electronic communications services in the frequency band 790 – 862 MHz.

- CEPT REPORT 29 of 26 June 2009 on

  technical considerations regarding harmonisation options for the digital dividend in the European Union. Guideline on cross border coordination issues between mobile services in one country and broadcasting services in another country.

2.2 Access to the frequency spectrum in general

One of the most important aims of this Technical Arrangement is to give simple procedure and rules so that networks in border areas may be deployed easily, ensuring proper access to the frequency spectrum. From this point of view, the coordination principle applied in this Technical Arrangement is that each country concerned has the same access to the frequency spectrum, i.e. they may use all the frequencies in the bands 791 – 821 and 832 - 862 MHz.

To apply the principle outlined above, the same interference field strength level is allowed for a home network and its opposite network in the neighbouring country, ensuring a more or less equitable access to the frequency spectrum for the operators in the neighbouring countries.

As a consequence of the above, traditional frequency coordination would disturb this delicate balance in the border area. Therefore, traditional frequency coordination will not be performed according to this Technical Arrangement.

Nevertheless, this kind of frequency usage in the border area is rather delicate and only viable if the field strength triggers given in this Technical Arrangement are kept and calculated using accurate radio wave propagation methods, and in addition, radio parameters of the systems are coordinated between neighbouring operators.

2.3 Radio wave propagation

Achieving equitable access to the frequency spectrum rather depends upon the radio wave propagation method applied to calculate the field strength since that method serves as a tool for enforcing the rules of this Technical Arrangement.

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2.3.1 Calculation for planning and effectuation

For the field strength calculations the method of the HCM Agreement shall be applied. Time probability for electronic communications services is 10% and for analogue/digital TV systems 1%.

2.3.2 Calculations in the case of reported interference

As for interference field strength prediction the following three methods have been mentioned in the relevant frequency coordination Recommendation ECC/REC/(11)04:

- site general model with line calculations (hereinafter called "site general method");
- path specific model with radial calculations from base stations (hereinafter called "radial calculations");
- area calculations with a path specific model (hereinafter called "area calculations").

Using a site general method (like "HCM" Agreement") for the assessment of interference cannot ensure proper protection against harmful interference for several cases and results in less efficiency in frequency usage in border areas.

Radial calculations can only give better result than site general methods if steps along paths are small enough and the number of radial directions is high enough. Still, there may be some cases causing harmful interference.

Area calculations, especially alongside using clutter data, can eliminate the mistakes of both site general methods and radial calculations and, in addition, important geographic areas can also be protected. Therefore, area calculations are preferable in the case where it is necessary to evaluate interference in detail. Thus, operators are expected to apply area calculations based on commonly agreed wave propagation model, trigger values and method used for evaluation of interference to protect their networks or a special part of the border area and to enhance spectrum efficiency in border areas.

2.4 Coordination procedure

In general, neither coordination nor notification of stations is required except in cases of harmful interference.

Operators may diverge from the regulation given in this Technical Arrangement subject to the so-called "Operator Arrangement" (see section 7.).

3 GENERAL TECHNICAL PROVISIONS

In this section the general technical provisions are given while section 4 details the additional technical provisions for the values of interference field strength that shall be kept in border areas.

In the bands 791 – 821 and 832 - 862 MHz only FDD systems may be used according to the preferred harmonised frequency arrangement.

According to ECC Decision ECC/DEC/(09)03 the preferred harmonised frequency arrangement shall be as follows:

"a"	790 – 791 MHz	guard band between broadcasting band edge at 790 MHz and the lower edge of FDD downlink band ***"b"***
"b"	791 – 821 MHz	downlink band of the paired band ***"b"*** and ***"d"***
"c"	821 – 832 MHz	guard band between the upper edge of FDD downlink band ***"b"*** and the lower edge of FDD uplink band ***"d"***
"d"	832 – 862 MHz	uplink band of the paired band ***"b"*** and ***"d"***

The assigned blocks shall be in multiple of 5.0 MHz with the first lower block edge starting at the frequency of 791 MHz.

The bands ***"b"*** and ***"d"*** as a paired band may be used for FDD systems. The duplex spacing for FDD operation shall be 41 MHz with terminal station transmission in the uplink band and base station transmission in the downlink band.

Guard bands may not be used in the preferred harmonised frequency arrangement.

Parameters of mobile and base stations such as power shall comply with the requirements given in COMMISSION DECISION (2010/267/EU) of 6 May 2010.

In the case of IMT/LTE it is required to share the preferential physical-layer cell identities (PCI) according to ECC Recommendation ECC/REC/(11)04. The allocation of codes is given in Annex 1 to this Technical Arrangement.

In addition, it is also desirable for the operators to coordinate radio parameters of their systems to minimise the deteriorating effects of uplink interference in line with the above-mentioned Recommendation.

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4 TECHNICAL PROVISIONS RELATED TO FIELD STRENGTH TRIGGERS

4.1 Basic rules

Field strength values or triggers given in section 4.2 refer to a reference frequency block of 5 MHz. The field strength triggers shall be modified according to the value of the bandwidth and the aggregated power correction factor given below. The modified field strength triggers shall be applied to each individual base station.

a) Bandwidth correction factor

If the nominal channel spacing of a system is not equal to 5 MHz, the value of the bandwidth correction factor according to the following equation shall be added to the field strength triggers given in section 4.2:

10 * log (Cs/5 MHz) (dB)

where

"Cs" nominal channel spacing (MHz).

b) Aggregated power correction factor

If there is more than one transmission in a respective reference frequency block, the field strength triggers shall be decreased by the value of the aggregated power correction factor according to the following equation in each antenna sector.

10 * log n (dB)

where

"n" the number of the transmitters or transmissions in the respective antenna sectors

If a transmission with nominal channel spacing falls into a respective reference frequency block (even if partly), it shall be included in the value of "n".

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4.2 Frequency utilisation in the paired band "b" and "d"

4.2.1 General case

This is the case where it is not necessary to examine what technology is used in the neighbouring country.

Base stations of FDD systems may be operated in the paired band **"b"** and **"d"** if the produced mean field strength at a height of 3 m above ground does not exceed the value of 55 dBµV/m/5MHz at the borderline, and does not exceed the value of 29 dBµV/m/5MHz at a line of 9 km beyond the border at a height of 3 m above ground.

4.2.2 LTE deployment

In the case where the technology LTE is deployed on both sides of the borderline, the field strength level may be increased to 59 dBµV/m/5MHz at the borderline and 41 dBµV/m/5MHz at the 6 km line according to Annex 1 to ECC/REC/(11)04. These field strength triggers may only be applied, if a Simplified Operator Arrangement has been concluded for this regulation by the operators concerned (see section 7.2).

5 PROTECTION OF DIGITAL AND ANALOGUE TV SYSTEMS

In the frequency bands 791 –862 MHz, analogue and digital television transmitters are still operated in some countries. Border sections and field strength thresholds required to protect the reception of these TV signals are given in Annex 2. These field strength limits are to be kept in the respective border sections in addition to the values specified in section 4.2. The field strength threshold values are taken from the CEPT Report 29 and correspond to the following table:

Coordination trigger field strength for the protection of the Broadcasting Service at 10m	
Protection of the analogue TV	22 dBµV/m/8 MHz at the border
Protection of the digital TV	25 dBµV/m/8 MHz at the border

For the field strength calculations the method of the HCM Agreement shall be applied. Time probability in all calculations is 1 %.

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6 HARMFUL INTERFERENCE

This section deals with harmful interference between terrestrial systems capable of providing electronic communications services and does not deal with interference in connection with services under section 5.

Concerning interference calculations a two-step procedure is described below and based upon interference calculations operators shall adjust the characteristics of base stations.

As the first step, in the case of harmful interference, the characteristics of base stations shall be adjusted based upon interference calculations laid down in section 6.1. If the first step does not result in interference-free operation, the second step shall be taken.

As the second step, in the case of harmful interference, the characteristics of base stations shall be adjusted based upon interference calculations laid down in section 6.2. If the second step does not result in interference-free operation, the measurements based on the method of area calculation shall be carried out.

6.1 Step 1: Line calculations

If harmful interference occurs, field strength line calculations shall be carried out between the base stations and the points of the borderline/6 km line/9 km line regarding trigger values in section 4.2, and depending on radio wave propagation paths the HCM model shall be used. Time probability in all calculations is 10 %.

6.2 Step 2: Area calculations

Operators are required to apply area calculations based on commonly agreed wave propagation models, commonly agreed trigger values and commonly agreed method used for evaluation of interference when interference is still experienced after step 1, according to section "Area calculations" of Annex 3 to ECC Recommendation ECC/REC/(11)04 before measuring the interference field strength.

Area calculations including its elements detailed in the previous paragraph shall at this time be agreed by the Operators concerned.

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7 OPERATOR ARRANGEMENTS

7.1 Operator Arrangements in general

To further improve the compatibility of terrestrial systems capable of providing electronic communications services, and to enhance the efficient use of frequency spectrum and coverage in border areas, operators may conclude so-called additional "Operator Arrangements", using e.g.:

- preferential code division arrangements (e.g. according to ERC/REC(01)01);
- frequency carrier definitions (e.g. with LTE);

Such Operator Arrangements are subject to prior consent of the Signatory Authorities concerned.

7.2 Simplified Operator Arrangements

In the case detailed below, operators may conclude special Operator Arrangements called "Simplified Operator Arrangements" to enhance the efficient use of the frequency spectrum and the coverage, and also to speed up the coordination procedure. This means that certain deviations from this Technical Arrangement are permitted with subsequent notification and consent of the Signatory Authorities concerned.

In general, Simplified Operator Arrangements may only be concluded for

a) a common frequency band or sub-band that has been allocated to all the operators concerned.

b) certain border areas determined by the operators concerned.

It is required to get the consent of all the operators concerned in the given border areas.

The issue for which Simplified Operator Arrangements may only be concluded is the following:

- Increased field strength level at the borderline for FDD LTE systems according to section 4.2.2.

The Simplified Operator Arrangement shall contain the common frequency bands and the border areas affected where the higher trigger values will be applied, and shall be forwarded to the administrations concerned within one month.

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8 ADMINISTRATIVE PROCEDURE

Neither coordination nor notification of stations is required, in general. However, in the case of harmful interference, the data necessary to evaluate and treat the harmful interference shall be exchanged between Signatory Authorities concerned.

The information about bringing the frequency bands into use by the operators can be seen in EFIS (www.efis.dk, according to ECC/DEC/(01)03).

Operators concerned may agree to deviate from the principles, the technical provisions and administrative procedure etc. given in this Technical Arrangement by mutual consent in an "Operator Arrangement".

The "Operator Arrangement" should be based on the relevant deliverables and shall be agreed by the Signatory Authorities of relevant countries.

9 REVISION OF THE TECHNICAL ARRANGEMENT

With the consent of the other Signatory Authorities, this Technical Arrangement may be reviewed or modified at the request of one or more Signatory Authorities where such modifications become necessary in the light of administrative, regulatory or technical developments, or if practical experience or the operation of terrestrial systems capable of providing electronic communications services require.

10 WITHDRAWAL FROM THE ARRANGEMENT

Any Authority may withdraw from this Technical Arrangement by the end of a calendar month by giving notice of its intention at least six months in advance. A declaration to that effect shall be addressed to all other Signatory Authorities.

11 LANGUAGE OF THE ARRANGEMENT

This Technical Arrangement has been concluded in English.

One original version of this Technical Arrangement is handed over to each Signatory Authorities and a copy is submitted to the Managing Administration of the HCM Agreement.

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12 DATE OF ENTRY INTO FORCE

This Technical Arrangement will enter into force on 12th October 2011.

Done at Vienna, 12th October 2011.

For Austria
(Franz Ziegelwanger)

For Croatia
(Ivančica Sakal)

[For the Czech Republic]
( )

For Hungary
(Dr. Gábor Kolláth)

For the Slovak Republic
(Milan Mizera)

For Slovenia
(Martin Očko)

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Annex 1

PREFERENTIAL PHYSICAL-LAYER CELL IDENTITIES (PCI) FOR IMT-2000/LTE

PCI co-ordination is only needed when channel centre frequencies are aligned independent of the channel bandwidth.

3GPP TS 36.211 defines 168 "unique physical-layer cell-identity groups" in §6.11, numbered 0...167, hereafter called "PCI groups". Within each PCI group there are three separate PCIs giving 504 PCIs in total.

Administrations should agree on a repartition of these 504 PCI on an equitable basis when channel centre frequencies are aligned as shown in the Table below. It has to be noted that dividing the PCI groups or PCI's is equivalent. Each country can use all PCI groups away from the border areas.

As shown in the table below, the PCI's should be divided into 6 sub-sets containing each one sixth of the available PCI's. Each country is allocated three sets (half of the PCI's) in a bilateral case, and two sets (one third of the PCI's) in a trilateral case.

Four types of countries are defined in a way such that no country will use the same code set as any one of its neighbours. The following lists describe the distribution of European countries:

Type country 1: BEL, CVA, CYP, CZE, DNK, E, FIN, GRC, IRL, ISL, LTU, MCO, SMR, SUI, SVN, UKR, AZE, SRB.

Type country 2: AND, BIH, BLR, BUL, D, EST, G, HNG, I, MDA, RUS (Exclave), GEO
Type country 3: ALB, AUT, F, HOL, HRV, POL, POR, ROU, RUS, S, MLT
Type country 4:LIE, LUX, LVA, MKD, MNE, NOR, SVK, TUR.

For each type of country, the following tables and figure describe the sharing of the PCI's with its neighbouring countries, with the following conventions of writing:

	Preferential PCI
	non-preferential PCI

The 504 physical-layer cell-identities should be divided into the following 6 sub-sets when the carrier frequencies are aligned in border areas:

PCI	Set A	Set B	Set C	Set D	Set E	Set F
Country 1	0..83	84..167	168..251	252..335	336..419	420..503
Border 1-2						
Zone 1-2-3						
Border 1-3						
Zone 1-2-4						
Border 1-4						
Zone 1-3-4						

PCI	Set A	Set B	Set C	Set D	Set E	Set F
Country 2	0..83	84..167	168..251	252..335	336..419	420..503
Border 2-1						
Zone 2-3-1						
Border 2-3						
Zone 2-1-4						
Border 2-4						
Zone 2-3-4						

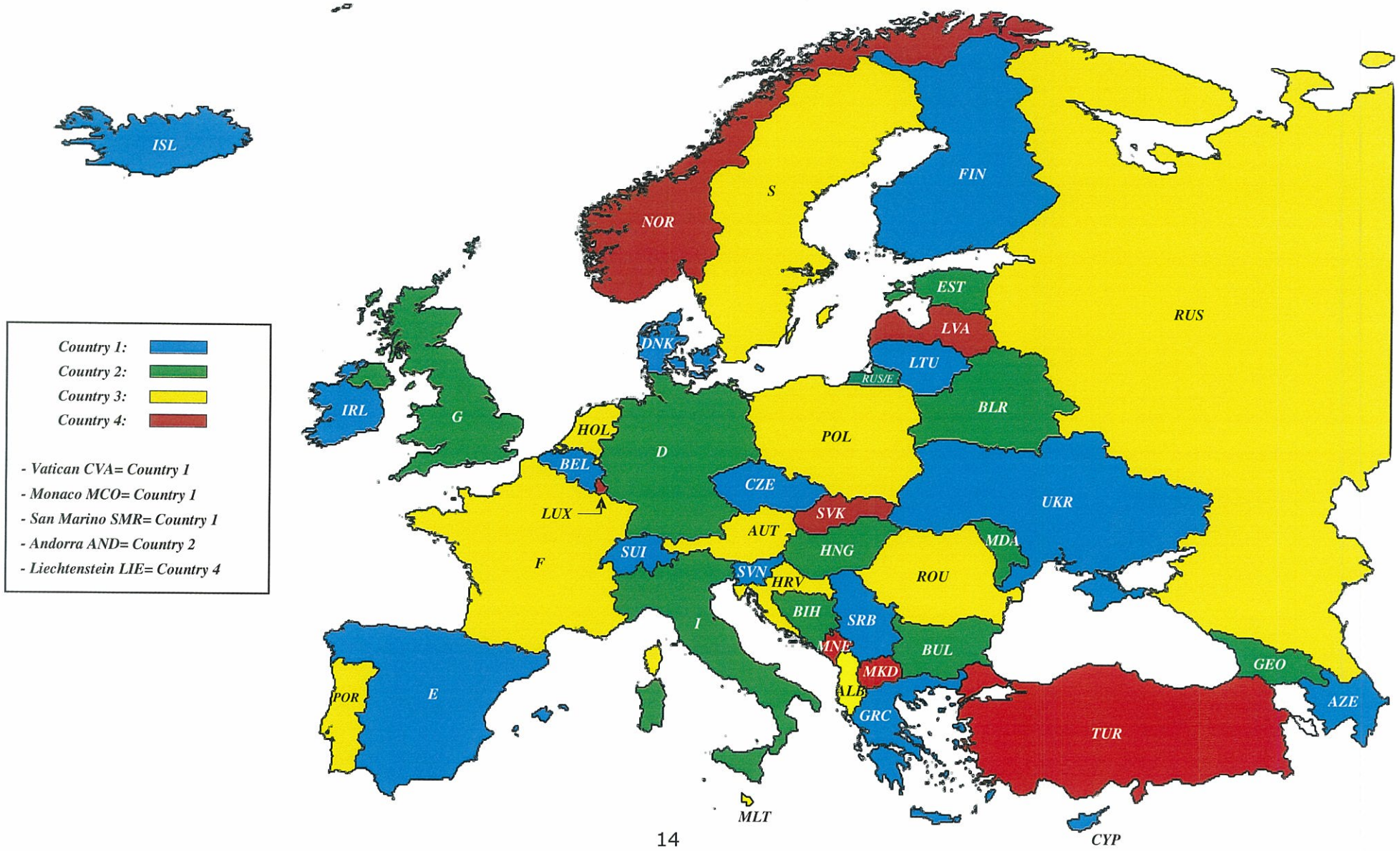
PCI	Set A	Set B	Set C	Set D	Set E	Set F
Country 3	0..83	84..167	168..251	252..335	336..419	420..503
Border 3-2						
Zone 3-1-2						
Border 3-1						
Zone 3-1-4						
Border 3-4						
Zone 3-2-4						

PCI	Set A	Set B	Set C	Set D	Set E	Set F
Country 4	0..83	84..167	168..251	252..335	336..419	420..503
Border 4-1						
Zone 4-1-2						
Border 4-2						
Zone 4-2-3						
Border 4-3						
Zone 4-3-1						

Notes

1) All PCI's are available in areas away from the border.

2) In certain specific cases (e.g. AUT/HRV) where the distance between two countries of the same type number is very small (< few 10s km), it may be necessary to address the situation in bi/multilateral coordination agreements as necessary, and may include further subdivision of the allocated codes in certain areas.


Country 1:
Country 2:
Country 3:
Country 4:
- Vatican CVA= Country 1
- Monaco MCO= Country 1
- San Marino SMR= Country 1
- Andorra AND= Country 2
- Liechtenstein LIE= Country 4
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Annex 2

For the Protection of the Reception of TV Transmitters according to section 5

Name of TV-Station or Name of Allotment	Frequency Area		Border Area to be Protected		Digital/Analogue	Trigger Field Strength at the Border in dBµV/m at h=10 m	To Protect until Date (max. until 17.6.2015)
	from MHz	up to MHz	from Longitude Latitude	up to Longitude Latitude			
HNG - Allotment VESGYO	790	798	016E31 10 47N0019	017E54 41. 47N44 56	Digital	25	31.12.2014
HNG – Allotment PESNOG	798	806	018E50 06 47N50 15	019E50 12 48N09 44	Digital	25	31.12.2014
HNG – Allotment KOMFEJ	806	814	017E55 29 47N44 57	018E50 29 47N50 31	Digital	25	31.12.2014
HNG – Allotment TOKAGG	806	814	020E20 22 48N17 16	022E08 31 48N24 36	Digital	25	31.12.2014
HNG - Allotment VESKOM	814	822	017E55 04 47N45 12	018E50 29 47N50 48	Digital	25	31.12.2014
HNG – Allotment ZALSOM	822	830	016E23 41 46N37 53	017E33 44 45N56 04	Digital	25	31.12.2014
HNG – Allotment BARTOL	838	846	017E33 00 45N56 24	018 51 00 45N54 36	Digital	25	31.12.2014
HNG – Allotment TOKAGG	846	854	020E20 22 48N17 16	022E08 31 48N24 36	Digital	25	31.12.2014
HNG – Allotment SOPVAS	846	854	016E23 30 46N38 11	017E04 06 47N44 22	Digital	25	31.12.2014
HNG – Allotment KISCSA	846	854	018E51 00 45N54 36	019E43 07 46N10 38	Digital	25	31.12.2014

HNG – Allotment HEV	854	862	020E20 24 48N17 24	019E49 48 48N09 36	Digital	25	31.12.2014
HNG – Allotment KISCSA	846	854	018E 51 00 45N54 36	018E 51 00 45N54 36	Digital	25	31.12.2014
AUT – Assignment WIEN 1	822	830	015E41 38 48N51 28	016E40 47 47N33 31	Digital	25	31.10.2013
SVN – Allotment VZHOD	838	846	016E06 38 46N52 10	014E36 11 46N26 25	Digital	25	17.6.2015
SVN – Allotment CENTER	814	822	014E36 17 46N26 17	013E43 04 46N31 29	Digital	25	17.6.2015
SVK – Allotment BL-07	830	838	017E 23 36 48N 48 51	017E 46 20 47N 45 11	Digital	25	31.12.2013
SVK – Allotment KE-07	814	822	020E 48 42 48N 34 36	021E 27 21 48N 34 12	Digital	25	31.12.2013
SVK – Allotment MI-07	814	822	021E 27 21 48N 34 12	018E 51 03 49N 31 03	Digital	25	31.12.2013
SVK – Allotment RS-07	790	798	019E 49 32 48N 09 48	020E 48 42 48N 34 36	Digital	25	31.12.2013
SVK – Allotment TN-02	854	862	018E 06 49 49N 05 22	017E 23 36 48N 48 51	Digital	25	31.12.2013
SVK – Allotment VK-01	782	790	018E 53 40 48N 03 21	019E 49 32 48N 09 48	Digital	25	31.12.2013
SVK – Allotment VK-06	838	846	018E 53 40 48N 03 21	019E 49 32 48N 09 48	Digital	25	31.12.2013
SVK – Allotment VK-07	822	830	018E 53 40 48N 03 21	019E 49 32 48N 09 48	Digital	25	31.12.2013
SVK – Allotment ZA-04	790	798	018E 51 03 49N 31 03	018E 06 49 49N 05 22	Digital	25	31.12.2013
SVK – Allotment ZA-07	846	854	018E 51 03 49N 31 03	018E 06 49 49N 05 22	Digital	25	31.12.2013