

# **TECHNICAL ARRANGEMENT**

**BETWEEN THE NATIONAL FREQUENCY MANAGEMENT  
AUTHORITIES OF  
AUSTRIA, CROATIA, HUNGARY, ROMANIA, SERBIA,  
THE SLOVAK REPUBLIC, SLOVENIA AND UKRAINE**

## **ON BORDER COORDINATION OF IMT/UMTS SYSTEMS IN GSM BANDS**

**880 – 915/925 – 960 MHz and 1710 – 1785/1805 – 1880 MHz**

**Budapest, 28<sup>th</sup> October 2010**

## 1 Introduction

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), the Federal Ministry for Transport, Innovation and Technology (Austria), the National Communications Authority (Hungary), the National Authority for Management and Regulation in Communications (Romania), the Post and Electronic Communications Agency of the Republic of Slovenia (Slovenia), the Republic Agency for Electronic Communications of Republic of Serbia (Serbia), the Telecommunications Regulatory Authority of the Slovak Republic (Slovak Republic) and the Ukrainian State Centre of Radio Frequencies (Ukraine) (hereinafter called Signatory Authorities) **concluded this Technical Arrangement concerning the usage of the frequencies for IMT/UMTS network** in the bands 880 – 915/925 – 960 MHz (GSM 900 MHz band) and 1710 – 1785/1805 – 1880 MHz (GSM 1800 MHz band).

In the above mentioned frequency bands and in border areas – except some parts of them – the frequency usage has only been regulated for GSM technology in special bi- or multilateral agreements, arrangements or protocols. At the same time, as indicated in ECC Decision ECC/DEC/(06)13, in these bands the migration of 2G (GSM technology) to 3G (UMTS technology) makes vital the introduction of broad band technologies, too.

In line with ECC Decision ECC/DEC/(06)13, it is also important to protect and sustain GSM technologies for the future. Nevertheless, there are not any European-wide plans for refarming the GSM bands or for unified introduction of UMTS technology in the GSM bands. So, it is expected that placing UMTS channels within the GSM bands will be various, depending on, among other things, the frequency spectrum mobile operators have.

**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 the GSM and the UMTS networks in GSM 900 MHz and GSM 1800 MHz bands in border areas.

The Signatory Authorities have agreed on the following coordination procedures in border areas.

## 2 Principles of coordination

Only the IMT/UMTS usage in the border areas in the GSM 900/1800 MHz bands is regulated in this Technical Arrangement.

The protection of continuing GSM operations with UMTS operations in the same GSM bands is of prime importance.

GSM base stations that are in operation or that will later be put into operation can continue to operate according to the provisions laid down in the relevant bi- or multilateral agreements, arrangements or protocols.

UMTS systems may be operated in a way that the protection of GSM systems be ensured.

Principles of border coordination between GSM and IMT/UMTS systems and between two IMT/UMTS systems used in GSM bands are laid down in ECC/REC/(08)02.

### **3 General technical provisions for IMT/UMTS systems**

The frequency bands 880 – 915/925 – 960 MHz and 1710 – 1785/1805 – 1880 MHz may only be used for duplex operation.

Base stations shall transmit in the bands 925 – 960 MHz and 1805 – 1880 MHz (downlink bands), and mobile stations shall transmit in the bands 880 – 915 MHz and 1710 – 1785 MHz (uplink bands).

The relevant provisions of the bi- or multilateral agreements, arrangements or protocols dealing with frequency coordination in general (e.g. "HCM Agreement") shall be applied unless otherwise laid down in this Technical Arrangement.

### **4 Technical provisions for IMT/UMTS systems in border areas**

The frequency coordination situations depending upon technologies applied and negotiations between Signatory Authorities concerned are:

- uncoordinated case of GSM and UMTS usage,
- coordinated case between two UMTS systems.

If it is required by operators that the following provisions may be exceeded or changed, they may conclude an arrangement between operators (hereinafter called "Operator Arrangement") (see Section 6) that should be based on ECC/REC/(08)02.

#### **4.1 Uncoordinated case**

This is the case where it is not necessary to examine whether GSM or UMTS system is used in the neighbouring country.

Frequencies of IMT/UMTS base stations may be used if the mean field strength of each carrier produced by a base station does not exceed the following levels in the following bands:

##### **a) GSM 900 MHz band (925-960 MHz)**

33 dB $\mu$ V/m/5 MHz (trigger value) at a height of 3m above ground at the border line between two neighbouring countries.

##### **b) GSM 1800 MHz band (1805-1880 MHz)**

39 dB $\mu$ V/m/5 MHz (trigger value) at a height of 3m above ground at the border line between two neighbouring countries.

## 4.2 Coordinated case between two IMT/UMTS systems in border areas

This is the case where neighbouring operators wish to deploy UMTS networks in a common frequency band in border areas. In this case the following procedure has to be applied:

- a) The operators of neighbouring countries conclude an "Operator Arrangement" based on this Technical Arrangement.
- b) The Draft "Operator Arrangement" shall be sent to the Signatory Authorities concerned for approval.
- c) The Draft "Operator Arrangement" may only enter into force, if the Draft "Operator Arrangement" is approved by all the Signatory Authorities concerned.
- d) If there is no agreement achieved, technical provisions a) and b) of section 4.1 of this Technical Arrangement shall be applied.

The regulation in this section may only be applied if exclusively UMTS systems are used in the neighbouring countries in a certain frequency band and the carrier separation is 2.8 MHz or more between the UMTS and GSM networks used in different countries.

The technical provisions for this coordinated case are given in Annex 1 and the preferential codes in Annex 2.

## 5 Harmful interference

If harmful interference occurs, in order to check the interference, for field strength line calculations (border line), depending on radio wave propagation paths, the following models should be used:

- The free space attenuation for distances less than or equal to 2 km, and for distances larger than 2 km if there is no terrain obstacle within the 1st Fresnel zone. The calculations shall be carried out between a base station and the receiver points of the borderline in the direction of the interfered area. The reference antenna height of receiver points is 3m above ground.
- "HCM" Agreement" based on a site general method for distances larger than 2km. This model is to be employed for 10% of the time and at 50% of the locations.

As a first step it is necessary to adjust the parameters of base stations, according to the calculation method detailed above.

In the case where harmful interference is still experienced, it is necessary to examine whether the measured field strength exceeds the trigger values defined in section 4. If so, the radiation parameters of the interfering station shall be adjusted until trigger values are met or mutually accepted solutions shall be reached by all the Signatory Authorities concerned.

## **6 Administrative procedure**

Notifications of base stations are not required in general. However, in the case of harmful interference, the data necessary to evaluate and treat harmful interference shall be exchanged between Signatory Authorities concerned.

Each Signatory Authority has to inform the Signatory Authorities concerned about the date of starting the operation, center frequency of the UMTS channels and the name of the operator.

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" of different countries for GSM and UMTS usage should be based on ECC/REC/(05)08 and ECC/REC/(08)02 and agreed by the Signatory Authorities of relevant countries.

## **7 Review**

This Technical Arrangement can be revised in light of administrative, regulatory or technical developments, especially in order to comply with relevant amendments of the bi- or multilateral agreements dealing with frequency coordination in general (e.g. the "HCM Agreement") or CEPT ERC/ECC decisions, recommendations and reports at the proposal of any Signatory Authority with the agreement of all other Signatory Authorities.

In particular, this Technical Arrangement can be revised once technical provisions (modulation, channel spacing, etc) of broad band systems different from UMTS have been clarified, or other countries influencing or interested in the frequency usage laid down in this Technical Arrangement wish to join.

With regard to a new technology different from UMTS, the operators introducing the new technology are responsible for the coexistence study and/or protection values or curves between the used and the new technologies until the relevant ECC Recommendation is available.

## **8 Withdrawal**

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.

Frequency assignments made within the framework of this Technical Arrangement prior to the date of entry into force of the withdrawal shall remain valid and be protected according to their status.

## 9 Language of the Technical Arrangement

The original text of this Technical Arrangement exists in English in eight originals.

## 10 Date of entry into force of the Technical Arrangement

This Technical Arrangement will enter into force on 28<sup>th</sup> October 2010.

Done at Budapest, 28<sup>th</sup> October 2010.

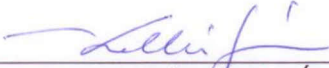
For Austria

  
(Florian CZICZATKA)

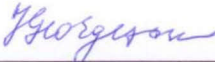
For Croatia

  
(Ivančica SAKAL)

For Hungary

  
(dr. Gábor KOLLÁTH)

For Romania

  
(Ingrid GEORGESCU)

For Serbia

  
(Slavenko RAŠAJSKI M.Sc.E.E.)

For the Slovak Republic

  
(Igor GROFIK)

For Slovenia

  
(Martin OČKO)

For Ukraine

  
(Valerii KAZACHKOV)

## Annex 1

### PRINCIPLES AND COORDINATION FIELD STRENGTH LEVELS FOR THE BORDER COORDINATION BETWEEN:

IMT/UMTS (FDD) SYSTEMS IN THE FREQUENCY BANDS  
880-915 MHz /925-960 MHz and 1710-1785 MHz /1805-1880 MHz

#### Code coordination:

1. Frequencies in the bands 925-960 MHz and 1805-1880 MHz for systems **using preferential codes**, or where **centre frequencies are not aligned** may be used without coordination with a neighbouring country if the mean field strength of each carrier produced by the base station does not exceed a value of:
  - **IMT/UMTS900 (FDD) => 59 dB $\mu$ V/m/5MHz** at a height of 3 m above ground at the borderline between two countries **and** a value of **31 dB $\mu$ V/m/5MHz** at a height of 3 m above ground at a distance of 6 km inside the neighbouring country, in the frequency band 925-960 MHz.
  - **IMT/UMTS1800 (FDD) => 65 dB $\mu$ V/m/5MHz** at a height of 3 m above ground at the borderline between two countries **and** a value of **37 dB $\mu$ V/m/5MHz** at a height of 3 m above ground at a distance of 6 km inside the neighbouring country, in the frequency band 1805-1880 MHz.
2. Frequencies in the bands of 925-960 MHz and 1805-1880 MHz for systems using **non preferential codes** and **with centre frequencies aligned** may be used without coordination with a neighbouring country if the mean field strength of each carrier produced by the base station does not exceed a value of:
  - **IMT/UMTS900 (FDD) => 31 dB $\mu$ V/m/5MHz** at a height of 3 m above ground at the border line between two countries in the frequency band 925-960 MHz.
  - **IMT/UMTS1800 (FDD) => 37 dB $\mu$ V/m/5MHz** at a height of 3 m above ground at the border line between two countries in the frequency band 1805-1880 MHz.

	Preferential Code <sup>1</sup>	Alignment of centre frequency <sup>2</sup>	dB $\mu$ V/m at km 900 MHz	dB $\mu$ V/m at km 1800 MHz
	Y	Y/N	59 at 0 & 31 at 6	65 at 0 & 37 at 6
	Y/N	N	59 at 0 & 31 at 6	65 at 0 & 37 at 6
	N	Y	31 at 0	37 at 0

**Table A1.1: Summary of field strength levels for the coordination between IMT/UMTS systems at 900 MHz and 1800 MHz**

Administrations may agree in bi or multilateral agreements on preferential frequency blocks of 5 MHz. In this case, the trigger values for the coordination between IMT/UMTS systems at 900 MHz and 1800 MHz are increased by 10 dB for administrations which are using the preferential frequency blocks. IMT/UMTS systems operating on non-preferential frequencies in the border area must accept interference from services in the neighbouring country using preferential frequencies.

Note for IMT/UMTS 900/1800 systems: Administrations have the flexibility to use different values e.g. when re-using existing GSM sites.

<sup>1</sup> For Preferential Codes: Y – “preferential”, N – “non-preferential”

<sup>2</sup> For Alignment of centre frequencies: Y – “aligned”, N – “not aligned”

## Annex 2

### PREFERENTIAL CODES FOR IMT/UMTS (UTRA FDD)

The code groups defined for the FDD modes have no particular correlation properties and no particular organisation of the repartition is required.

Administrations should agree on a repartition of these code groups on an equitable basis.

In any case, apart from in the border areas, each country could use all code groups.

In border areas, the codes will be divided into 6 "code sets" containing each one sixth of the available code groups. Each country is allocated three code sets (half of the codes) in a bilateral case, and two code sets (one third of the codes) 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 codes with its neighbouring countries, with the following conventions of writing:

	Preferential code
	non-preferential code

For the FDD mode; 3GPP TS 25.213 defines 64 « scrambling code groups » in §5.2.3, numbered {0...63}, hereafter called « code groups ».

	Set A	Set B	Set C	Set D	Set E	Set F
<b>Country 1</b>	0..10	11..20	21..31	32..42	43..52	53..63
Border 1-2						
Zone 1-2-3						
Border 1-3						
Zone 1-2-4						
Border 1-4						
Zone 1-3-4						

	Set A	Set B	Set C	Set D	Set E	Set F
<b>Country 2</b>	0..10	11..20	21..31	32..42	43..52	53..63
Border 2-1						
Zone 2-3-1						
Border 2-3						
Zone 2-1-4						
Border 2-4						
Zone 2-3-4						





	Set A	Set B	Set C	Set D	Set E	Set F
<b>Country 3</b>	0..10	11..20	21..31	32..42	43..52	53..63
Border 3-2						
Zone 3-1-2						
Border 3-1						
Zone 3-1-4						
Border 3-4						
Zone 3-2-4						

	Set A	Set B	Set C	Set D	Set E	Set F
<b>Country 4</b>	0..10	11..20	21..31	32..42	43..52	53..63
Border 4-1						
Zone 4-1-2						
Border 4-2						
Zone 4-2-3						
Border 4-3						
Zone 4-3-1						



Notes

1. All codes are available in areas away from the border where the field strengths into the neighbouring country are below the relevant trigger levels.
2. For the other IMT CDMA radio interfaces (IMT-MC, or cdma2000), preferential code allocation schemes are still to be developed.
3. A two countries code sharing should be applied or used by base stations that exceed the relevant trigger level (Annex 1) of only one neighbouring country. A three countries code sharing should be applied or used by base stations that exceed the relevant trigger level (Annex 1) of two neighbouring countries.
4. 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

