TECHNICAL ARRANGEMENT

BETWEEN THE NATIONAL FREQUENCY MANAGEMENT AUTHORITIES OF

AUSTRIA, CROATIA, HUNGARY, ROMANIA, SERBIA THE SLOVAK REPUBLIC and SLOVENIA

ON BORDER COORDINATION

FOR TERRESTRIAL SYSTEMS CAPABLE OF PROVIDING ELECTRONIC COMMUNICATIONS SERVICES AND NATIONAL OPTIONS

IN THE 700 MHz FREQUENCY BAND

agreed by correspondence in 2025

1 INTRODUCTION

The aim of this Technical Arrangement is to lay down the principles, the technical provisions and administrative procedure necessary to regulate the deployment of terrestrial systems capable of providing electronic communications services **in** the band 694 - 790 MHz in border areas**.**

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 Federal Ministry of Finance (Austria), the Croatian Regulatory Authority for Network Industries (Croatia), the National Media and Infocommunications Authority (Hungary), the National Authority for Management and Regulation in Communications of Romania (Romania), Regulatory Authority for Electronic Communications and Postal Services (Republic of Serbia), the Regulatory Authority for Electronic Communications and Postal Services (the Slovak Republic) and Agency for Communication Networks and Services of the Republic of Slovenia (Slovenia) (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 694-790 MHz in border areas.

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

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 cross border coordination in the band 694 - 790 MHz:

- COMMISSION IMPLEMENTING DECISION (2016/687/EU) of 28 April 2016

  on the harmonisation of the 694-790 MHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services and for flexible national use in the Union;

- ECC DECISION (ECC/DEC/(15)01) approved 06 March 2015

  Harmonised technical conditions for mobile/fixed communications networks (MFCN) in the band 694-790 MHz including a paired frequency arrangement (Frequency Division Duplex 2x30 MHz) and an optional unpaired frequency arrangement (Supplemental Downlink) (*Approved 06 March 2015*);

- ECC RECOMMENDATION (ECC/REC/(15)01) approved 13 February 2015 latest amended on 10 June 2022;

  Cross-border coordination for mobile / fixed communications networks (MFCN) in the frequency bands: 694-790 MHz, 1452-1492 MHz, 3400-3600 MHz and 3600-3800 MHz

- ECC RECOMMENDATION (ECC/REC/(16)03) approved 17 October 2016

  Cross-border coordination for Broadband Public Protection and Disaster Relief (BB-PPDR) systems in the frequency band 698 to 791 MHz;

- CEPT REPORT 53 of 28 November 2014

  REPORT A from CEPT to the European Commission in response to the Mandate "to develop harmonised technical conditions for the 694-790 MHz ('700 MHz') frequency band in the EU for the provision of wireless broadband and other uses in support of EU spectrum policy objectives" *(Report approved on 28 November 2014 by the ECC);*

- CEPT REPORT 60 of 01 March 2016

  REPORT B from CEPT to the European Commission in response to the Mandate "to develop harmonised technical conditions for the 694-790 MHz ('700 MHz') frequency band in the EU for the provision of wireless broadband and other uses in support of EU spectrum policy objectives" *(Report approved on 01 March 2016 by the ECC);*

- CEPT REPORT 29 of 26 June 2009

  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;

- ECC REPORT 239 Approved 30 September 2015

  Compatibility and sharing studies for BB PPDR systems operating in the 700 MHz range;

- ECC REPORT 242 Approved 04 March 2016

  Compatibility and sharing studies for M2M applications in the 733-736 MHz / 788-791 MHz band.

The versions of the above mentioned deliverables available at the time of signing this technical arrangement are attached for reference in Annex 3.

2.2 Regulated bands

The 700 MHz band, as referred to in this Technical Arrangement, covers the preferred harmonised frequency arrangement in the band 694-790 MHz according to COMMISSION IMPLEMENTING DECISION (2016/687/EU) / ECC Decision ECC/DEC/(15)01 (see Figure below) including

- a 2x30 MHz FDD frequency arrangement in the 703-733 MHz / 758 – 788 MHz band used for MFCN;
- "zero or up to four block(s) of 5 MHz based on national demands" used for Supplemental Downlink (SDL) in the 738-758 MHz band;
- a 2x5 MHz and/or a 2x3 MHz FDD frequency arrangement in the 698-703 MHz / 753-758 MHz and 733-736 MHz / 788-791 MHz bands as a national option for public protection and disaster relief (PPDR) radio communications;
- a 2x3 MHz FDD frequency arrangement in the 733-736 MHz / 788-791 MHz bands as a national option for licensed machine to machine (M2M) radio communications.

2.3 Access to the 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 in a fast and effective way ensuring proper access to the frequency spectrum.

In order to assure equitable access to the spectrum for the operators in neighbouring countries, the coordination principle applied in this Technical Arrangement is based on the concept of trigger field strength values applicable for all concerned operators in the border areas and the concept of preferential physical-layer cell-identity (PCI) codes.

As a consequence, according to this Technical Arrangement, neither coordination nor notification of stations is required. Nevertheless, this kind of frequency usage in the border areas is only viable if the trigger field strength values given in this Technical Arrangement are fulfilled and the field strength values are calculated using accurate radio wave propagation methods. It is also beneficial if radio parameters of the systems are coordinated between neighbouring operators.

It is also important that the information about bringing the frequency bands into use by the operators is available for the interested Administrations and this information can be seen in EFIS (https://efis.cept.org/).

2.4 Radio wave propagation methods

Achieving equitable access to the 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.

2.4.1 Calculation of field strength for planning and effectuation

For the calculation of the field strength values to assess compliance with the triggers given in section 4.2 the method of the HCM Agreement shall be applied. Time probability for the calculation of field strength values for electronic communications services is 10%.

2.4.2 Calculations in case of reported interference

As for interference field strength prediction, the following three methods are proposed to be considered by administrations in the relevant frequency coordination Recommendation ECC/REC/(15)01:

- 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 case where it is necessary to evaluate interference in detail. Thus, operators are expected to apply area calculations based on a 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.

3 GENERAL TECHNICAL PROVISIONS

In this section the general technical provisions are given while section 4 details the additional technical provisions for the trigger field strengths values in border areas.

This Technical Arrangement applies only for the band usage by MFCN systems complying with the frequency arrangement in section 3.1 and radio parameters specified in section 3.2.

This Agreement covers Wideband (WB) vs. Wideband systems cross-border coordination scenarios and does not address cross-border coordination of MFCN vs. other systems in these bands. Wideband systems include LTE and New Radio (NR).

In case of any other technology or radio service the Signatory Authorities concerned shall reach an agreement for properly modifying this Technical Arrangement before putting any station into operation.

3.1 Frequency arrangement

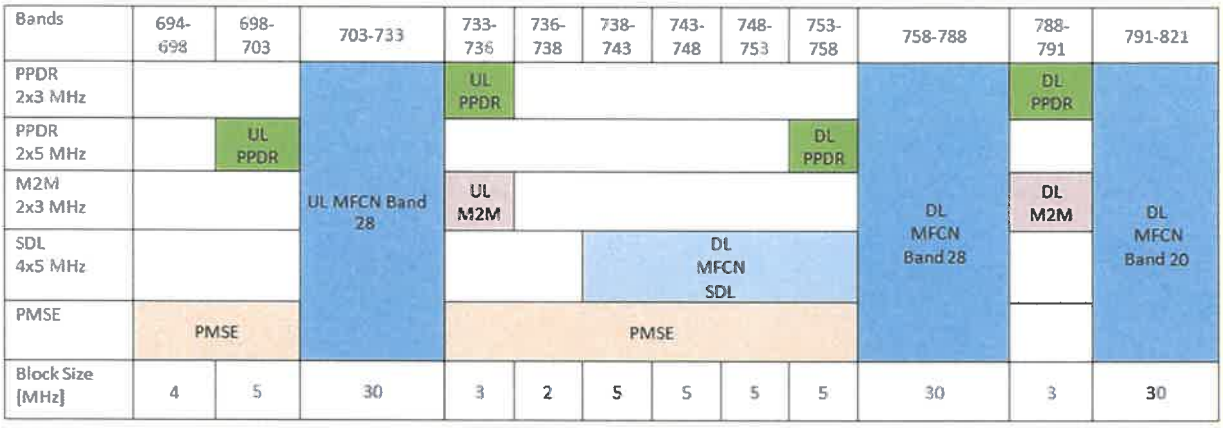
In accordance with the COMMISSION IMPLEMENTING DECISION (2016/687/EU) of 28 April 2016 / ECC DECISION (ECC/DEC/(15)01) approved 06 March 2015 the preferred harmonised frequency arrangement shall be as follows:

- within the paired 703-733 MHz and 758-788 MHz frequency bands
    - the mode of operation shall be Frequency Division Duplex (FDD); the duplex spacing shall be 55 MHz with
        - terminal station transmission located in the lower frequency band 703-733 MHz (FDD uplink);
        - base station transmission (FDD downlink) located in the upper frequency band 758-788 MHz;
    - the block sizes shall be in multiples of 5 MHz;
    - the lower frequency limit of an assigned block shall be aligned with or spaced at multiples of 5 MHz from the band edge of 703 MHz;
- within the 738-758 MHz frequency band an unpaired frequency arrangement (supplemental downlink, SDL) on optional basis:
    - the use of this band shall be limited to base station ("downlink-only") transmission;
    - the lower band edge of the designated spectrum range shall start at one of the following: 738 MHz, 743 MHz, 748 MHz or 753 MHz;

- the assigned block sizes within the designated spectrum range shall be in multiples of 5 MHz (SDL using "zero or up to four" of the following frequency blocks: 738 – 743 MHz, 743 – 748 MHz, 748 – 753 MHz and 753 – 758 MHz, however this does not preclude smaller channel bandwidths within a block);
- the upper frequency limit of an assigned block shall be aligned with or spaced at multiples of 5 MHz from the upper band edge;

- within the 698-703 MHz/753-758 MHz and 733-736 MHz/788-791 MHz bands
  - the mode of operation shall be Frequency Division Duplex (FDD); the duplex spacing shall be 55 MHz with
    - terminal station transmission (PPDR uplink) located in the lower frequency band 698-703 MHz and/or 733-736 MHz;
    - base station transmission (PPDR downlink) located in the upper frequency band 753-758 MHz and/or 788-791 MHz;

- within the 733-736 MHz/788-791 MHz bands
  - the mode of operation shall be Frequency Division Duplex (FDD); the duplex spacing shall be 55 MHz with
    - terminal station transmission (M2M uplink) located in the lower frequency band 733-736 MHz;
    - base station transmission (M2M downlink) located in the upper frequency band 788-791 MHz.



Source: ECC Report 242

3.2 Radio parameters

Radio parameters of mobile and base stations such as power limits shall comply with the requirements given in COMMISSION IMPLEMENTING DECISION (2016/687/EU) of 28 April 2016 / ECC DECISION (ECC/DEC/(15)01)/ approved 06 March 2015.

When one country uses 733-736 MHz for UL, another country is using adjacent spectrum with only 2 MHz guard band for SDL in 738–743 MHz, coexistence parameters and mitigation techniques proposed in ECC Report 242 and/or ECC report 239 should be taken into account to prevent possible interference issues at the borderline between neighbouring countries.

Operators are required to share the preferential physical-layer cell identities (PCI) according to 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 related Recommendation.

4 TECHNICAL PROVISIONS RELATED TO TRIGGER FIELD STRENGTH VALUES

4.1 Basic rules

Trigger field strength values given in section 4.2 refer to a reference frequency block of 5 MHz. The trigger field strength values shall be modified taking into consideration 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 bandwidth of a system is not equal to 5 MHz, the value of the bandwidth correction factor (BCF) according to the following formula shall be added to the field strength triggers given in section 4.2:

$$BCF = 10 * \log (CB/5\ MHz) \quad (dB)$$

where

"CB" nominal channel bandwidth (MHz).

b) Aggregated power correction factor

If there is more than one transmitter within the sector operating in a respective reference frequency block, in case of single entry interference calculation the trigger field strength values given in section 4.2 shall be decreased by the value of the aggregated power correction factor according to the following formula in each antenna sector:

$$10 * \log n \quad (dB)$$

where

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

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".

If there is more than one transmitter within the sector operating in a respective reference frequency block and the aggregated power of all transmitters is considered, this correction factor is not required.

4.2 Trigger field strength values for the cross-border operation of FDD and SDL systems in the 700 MHz band

The following trigger field strength values shall be applied for Non-AAS base stations of FDD systems operating in the downlink bands of the paired 703-733 MHz/758-788 MHz, 698-703 MHz/753-758 MHz, 733-736 MHz/788-791 MHz bands and SDL systems in the 738-758 MHz band:

- **Non-AAS base stations with centre frequencies not aligned for all PCIs on both sides of the borderline or with centre frequencies aligned using preferential PCI codes** given in Annex 1 may be operated if the mean field strength of each cell produced by base station does not exceed the value of
  - 59 dBµV/m/5 MHz at a height of 3 m above ground at the borderline between countries and
  - 41 dBµV/m/5 MHz at a height of 3 m above ground at a distance of 6 km inside the neighbouring country;
- **Non-AAS base stations with centre frequencies aligned on both sides of the borderline using non-preferential PCI codes** given in Annex 1 may be operated if the mean field strength does not exceed the value of
  - 41 dBµV/m/5 MHz at a height of 3 m above ground at the borderline between countries.

The 738-758 MHz band may be used for MFCN SDL systems, as a national option, and in case of MFCN SDL vs. MFCN SDL scenario the same field strength levels should be used as for FDD case.

5 PROCEDURE IN CASE OF HARMFUL INTERFERENCE

In case of harmful interference all data necessary to evaluate and treat the harmful interference shall be exchanged between Signatory Authorities concerned. Administrations concerned shall endeavour to achieve a mutually satisfactory solution as soon as possible.

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 case of harmful interference, field strength line calculations shall be carried out between the base stations causing harmful interference and the points of the borderline / 6 km line with regard to trigger values in section 4.2 and the characteristics of the base station shall be adjusted in such a way that the trigger values in section 4.2 are kept. For line calculations, taking into account the different type of radio wave propagation paths, the HCM model shall be used. Time probability in all calculations is 10 %. Operators may also apply more accurate area calculations according to Annex 2 to ECC Recommendation ECC/REC/(15)01 for evaluation of interference based on commonly agreed methods in the "Operator Arrangements".

As the second step, if harmful interference is still experienced despite the above adjustment, measurements shall be carried out according to international/mutually agreed procedures.

6 OPERATOR ARRANGEMENTS

To further improve the coexistence of terrestrial systems capable of providing electronic communications services, and to enhance the efficient use of radio spectrum and coverage in border areas, operators may diverge from the regulation given in this Technical Arrangement, except the cases given in section 3.1 (band arrangement) and in section 3.2 (radio parameters), based on an arrangement concluded between operators, so-called additional "Operator Arrangements".

Operators may negotiate arrangements which concern only the common part of those frequency bands in respect of which they have been granted licences, without affecting the rights of non-involved third parties, and are subject to prior approval of their respective administration.

The "Operator Arrangements" shall be in line with the *"Agreements between administrations concerning the approval of arrangements between operators"* for the administrations that have signed such agreement.

The "Operator Arrangements" should be based on the relevant deliverables listed in section 2.1 and their subsequently revised versions.

7 STATUS OF EXISTING ARRANGEMENTS

This Technical Arrangement replaces the existing Agreements between the national frequency management authorities of Austria, Croatia, Hungary, Romania, Slovak Republic and Slovenia on border coordination for terrestrial systems capable of providing electronic communications services and national options in the 700 MHz frequency band (Budapest 14. February 2018)

8 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 requires it. Such revision requests shall be answered within 30 days of receipt of the modification request information.

9 WITHDRAWAL FROM THE TECHNICAL 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.

10 LANGUAGE OF THE TECHNICAL ARRANGEMENT

This Technical Arrangement has been concluded in English.

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

11 DATE OF ENTRY INTO FORCE

This Technical Arrangement will enter into force upon the signature of the paper version of this Arrangement by all Parties.

For Austria
on 4./3./2025

(Franz ZIEGELWANGER)

For Croatia
on 05./03./2025

For Hungary
on 26./02./2025

For Romania
on 22./09./2025

For Serbia
on 4./3./2025

For the Slovak Republic
on 6./5./2025

For Slovenia
on 5./3./2025

ANNEX 1

PREFERENTIAL PHYSICAL-LAYER CELL IDENTITIES (PCI) FOR LTE and NR

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

ETSI TS 136 211 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.

ETSI TS 138 211 defines NR Physical channels and modulation, in NR 2-step identification using PSS/SSS detection of the Physical Cell ID (same as LTE), the number of different cell IDs has been increased from 504 in LTE to 1008 for NR.

Repartition of these PCIs should be made 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 PCIs is equivalent.

As shown in the table below, the PCIs should be divided into 6 sub-sets containing each one sixth of the available PCIs. Each country is allocated three sets (half of the PCIs) in a bilateral case, and two sets (one third of the PCIs) 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: AZE, BEL, CVA, CYP, CZE, DNK, E, FIN, GRC, IRL, ISL, LTU, MCO, SMR, SUI, SVN, UKR, and SRB.

Type country 2: AND, BIH, BUL, D, EST, G, HNG, I, MDA, and GEO.
Type country 3: ALB, AUT, F, HOL, HRV, POL, POR, ROU, S and 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 PCIs 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, 504..587	84..167, 588..671	168..251, 672..755	252..335, 756..839	336..419, 840..923	420..503, 924..1007
Border 1-2	■	■				■
Zone 1-2-3	■	■				
Border 1-3	■	■	■			
Zone 1-2-4	■					■
Border 1-4	■		■			■
Zone 1-3-4	■		■			

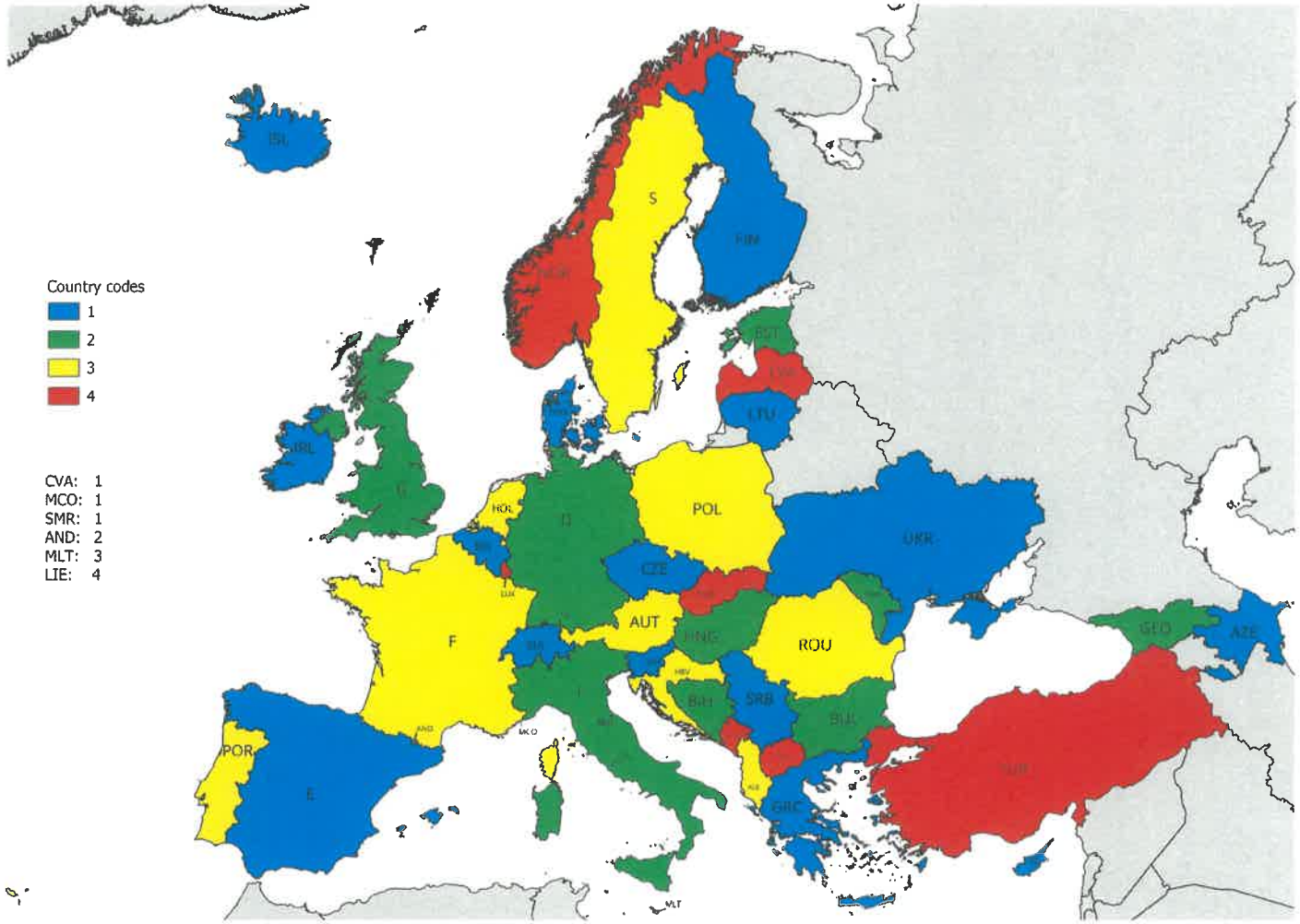
PCI	Set A	Set B	Set C	Set D	Set E	Set F
Country 2	0..83, 504..587	84..167, 588..671	168..251, 672..755	252..335, 756..839	336..419, 840..923	420..503, 924..1007
Border 2-1			■	■	■	
Zone 2-3-1			■	■		
Border 2-3		■	■	■		
Zone 2-1-4			■	■		
Border 2-4			■	■		■
Zone 2-3-4			■	■		

PCI	Set A	Set B	Set C	Set D	Set E	Set F
Country 3	0..83, 504..587	84..167, 588..671	168..251, 672..755	252..335, 756..839	336..419, 840..923	420..503, 924..1007
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, 504..587	84..167, 588..671	168..251, 672..755	252..335, 756..839	336..419, 840..923	420..503, 924..1007
Border 4-1		■		■	■	
Zone 4-1-2		■			■	
Border 4-2	■	■			■	
Zone 4-2-3	■	■				
Border 4-3	■	■		■		
Zone 4-3-1		■		■		

Note:

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 bilateral /multilateral coordination agreements as necessary, and may include further subdivision of the allocated codes in certain areas.


Country codes
1
2
3
4
CVA: 1
MCO: 1
SMR: 1
AND: 2
MLT: 3
LIE: 4
ISL
S
FIN
EST
LTU
IRL
G
HOL
D
POL
UKR
CZE
AUT
HNG
ROU
F
GEO
AZE
BIH
SRB
BUL
POR
E
GRC
MLT

ANNEX 3

REFERENCES

The deliverables mentioned in the Agreement being in force at the time of signing this technical arrangement are attached for reference in pdf format in the electronic version.