CEPT ECC
Electronic Communications Committee

ECC Recommendation (08)02

Cross-border coordination for Mobile/Fixed Communications Networks (MFCN) in the frequency bands 900 MHz and 1800 MHz (excluding GSM vs. GSM)

Approved 21 February 2008

latest amended 7 November 2025

INTRODUCTION

This Recommendation contains provisions for cross-border coordination between Mobile/Fixed Communications Networks (MFCN) in the frequency bands 900 MHz (880-915 MHz/925-960 MHz) and 1800 MHz (1710-1785 MHz/1805-1880 MHz) in border areas.

This Recommendation covers the following cross-border scenarios:

1) wideband systems vs. wideband systems (WB vs. WB);

2) narrowband systems vs. wideband systems (NB vs. WB);

3) narrowband systems vs. narrowband systems (NB vs. NB).

where narrowband systems include GSM and standalone NB-IoT and wideband systems include UMTS, LTE and NR for both non-AAS and AAS base stations as appropriate.

Note: LTE-M, in-band and guard-band NB-IoT are part of LTE and EC-GSM-IoT is part of GSM.

Cross-border coordination scenario of GSM vs. GSM is not part of this Recommendation as it is covered in ECC Recommendation (05)08 [1].

ECC RECOMMENDATION (08)02 ON CROSS-BORDER COORDINATION FOR MOBILE/FIXED COMMUNICATIONS NETWORKS (MFCN) IN THE FREQUENCY BANDS 900 MHZ AND 1800 MHZ EXCLUDING GSM VS. GSM, AMENDED 8 FEBRUARY 2019, AMENDED 8 OCTOBER 2021 AND AMENDED 7 NOVEMBER 2025

"The European Conference of Postal and Telecommunications Administrations,

considering

a) that the ECC Recommendation (05)08 [1] addresses frequency planning and cross-border coordination between GSM Land Mobile Systems (GSM 900, GSM 1800 and GSM-R);

b) that the ITU Radio Regulations identify the frequency bands 880-915 MHz / 925-960 MHz (RR 5.317A) and 1710-1785 MHz / 1805-1880 MHz (RR 5.384A) for terrestrial IMT;

c) that ERC Decision (94)01 [2], ERC Decision (97)02 [3] and ERC Decision (95)03 [4] designate the frequency bands 880-915 MHz / 925-960 MHz and 1710-1785 MHz / 1805-1880 MHz for GSM systems;

d) that ECC Decision (06)13 [5] designates the frequency bands 880-915 MHz / 925-960 MHz and 1710-1785 MHz / 1805-1880 MHz for MFCN Narrowband (NB) systems which are operating in 200 kHz channels (excluding GSM and EC-GSM-IoT) and MFCN Wideband (WB) systems which are operating in channels larger than 200 kHz;

e) that ECC Decision (06)13 also indicates that administrations shall take all necessary measures to ensure the protection of continued operation of GSM systems in the 900 MHz and 1800 MHz bands;

f) that frequency (GSM and UMTS/LTE/NR) and code (only for UMTS) and PCI (only for LTE/NR) planning in border areas will be based on coordination between national administrations in cooperation with their operators;

g) that Physical-layer-Cell Identity (PCI) coordination is necessary for LTE/NR systems to avoid unnecessary signalling load and handover failures;

h) that other radio parameters may need to be coordinated for LTE/NR systems on a bilateral/multilateral basis;

i) that coordination is necessary between countries operating GSM/, UMTS, LTE/NR systems in the same frequency band;

j) that where practicable and only for UMTS systems soft-handover between neighbouring networks may provide an option to facilitate coordination in border areas and to enhance efficiency of spectrum usage;

k) that administrations may diverge from the technical parameters, propagation models and procedures described in this Recommendation subject to bilateral/multilateral agreements;

l) that in the case of operator arrangements approved by national administrations it is possible to deviate from this Recommendation;

m) that a frequency coordination procedure is necessary both between countries operating GSM and UMTS/LTE/NR systems and between those countries and countries operating other systems in accordance with the ITU Radio Regulations;

n) that frequency coordination in border areas should be based on the concept of equal spectrum access probability by systems on each side of a border.

recommends

1. that frequency coordination between MFCN systems in neighbouring countries should be based on bilateral/multilateral agreements between administrations;

2. that administrations should encourage and facilitate the establishment of arrangements between operators of different countries with the aim to enhance the efficient use of the spectrum and the coverage in the border areas;

3. that, if the levels in Annex 1 are exceeded, coordination is required and the procedure detailed in Annex 3 should be used;

4. that field strength level predictions should be made using the appropriate propagation models defined in Annex 2 for UMTS and LTE/NR systems and in ECC Recommendation (05)08 for GSM systems. If it is agreeable to administrations concerned, the same field strength level predictions may be applied for all systems;

5. that coordination in coastal areas is based on prediction of field strength levels at the coastline of the neighbouring country. Other principles for coordination in coastal areas may be agreed between the administrations concerned;

6. that bilateral/multilateral agreements should be established for cross-border coordination between WB systems based on the principles provided in section A1.1;

7. that cross-border coordination between WB systems may also use preferential frequencies based on bilateral/multilateral agreements;

8. that cross-border coordination between neighbouring UMTS systems in border areas should be based on the code groups provided in Annex 4;

9. that cross-border coordination between neighbouring LTE/NR systems in border areas should be based on the PCIs provided in Annex 5 when synchronisation signal centre frequencies are aligned;

10. that GSM systems can continue their operation based on the field strength levels defined in ECC Recommendation(05)08 or existing agreement/arrangement between administrations/operators (see section A1.2.1);

11. that bilateral/multilateral agreements may be established for cross-border coordination between NB systems and WB systems according to section A1.2.2;

12. that cross-border coordination between NB systems (GSM, EC-GSM-IoT and standalone NB-IoT) should be in accordance with section A1.3;

13. that this Recommendation should be reviewed within 5 years of its adoption in the light of practical experience of its application and of the operation of MFCN systems."

Note:

Please check the ECO Documentation Database https://docdb.cept.org for the up to date position on the implementation of this and other ECC Recommendations.

ANNEX 1: FIELD STRENGTH LEVELS FOR THE CROSS-BORDER OPERATION WITHOUT COORDINATION BETWEEN MFCN FDD SYSTEMS IN THE FREQUENCY BANDS 900 MHZ AND 1800 MHZ

In this annex, field strength levels are given for MFCN FDD systems for cross-border scenarios of WB vs. WB, NB vs. WB and NB vs. NB.

Preferential and non-preferential codes for UMTS and PCIs for LTE and NR are provided in Annex 4 and Annex 5.

In the 900 MHz frequency band, the field strength levels are applicable to non-AAS base stations. In the 1800 MHz frequency band, the field strength levels are applicable to both non-AAS and AAS base stations.

Administrations/operators may agree on other values of field strength and preferential frequency usage based on bilateral/multilateral agreements/arrangements.

Synchronisation signal means Synchronisation Signal Block (SSB) for NR and Primary/Secondary Synchronisation Signal (PSS/SSS) for LTE.

For non-AAS base stations the field strength values are given for 5 MHz frequency block size. In cases of other frequency block sizes other than 5 MHz, a factor of 10 × $\log_{10}$ (channel bandwidth[1]/(5 MHz)) should be added to the field strength values. The data and control channels are fixed and therefore the same field strength values in dB(µV/m)/5 MHz apply to both channel types. The mean value is with respect to e.g. changing traffic load and downlink transmission time. The field strength values are upper bounds of each cell produced by the base station.

For AAS base stations the upper bound field strength for each cell of a base station is given as the median for a random beamforming data channel with 5 MHz frequency block size and for a static SSB field with SCS 30 kHz. In the case of a SCS other than 30 kHz, a correction factor of 10 × $\log_{10}$ (SCS in kHz/(30 kHz)) dB, should be added to the SSB field strength value.

Field strength values for WB systems provided in this Annex refer to non-preferential frequency usage.

A1.1 FIELD STRENGTH LEVELS FOR WB VS. WB CASE

A1.1.1 Base stations of WB systems in the frequency bands 925-960 MHz and 1805-1880 MHz using the same technology on both sides of the borderline with synchronisation signal centre frequencies not aligned for all codes/PCIs or with synchronisation signal centre frequencies aligned and for preferential codes/PCIs

Base stations of WB systems on both sides of the borderline with synchronisation signal centre frequencies not aligned for all codes/PCIs or with synchronisation signal centre frequencies aligned and for preferential codes/PCIs may be used without coordination with a neighbouring country if the mean field strength of each cell produced by base station does not exceed the values of:

in the frequency band 925-960 MHz

59 dB(µV/m)/5 MHz at a height of 3 m above ground at the borderline between countries and 41 dB(µV/m)/5 MHz 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

65 dB(µV/m)/5 MHz at a height of 3 m above ground at the borderline between countries and 47 dB(µV/m)/5 MHz at a height of 3 m above ground at a distance of 6 km inside the neighbouring country.

[1] not occupied bandwidth

A1.1.2 Base stations of WB systems in the frequency bands 925-960 MHz and 1805-1880 MHz using the same technology on both sides of the borderline with synchronisation signal centre frequencies aligned and for non-preferential codes/PCIs

Base stations of WB systems on both sides of the borderline with synchronisation signal centre frequencies aligned and for non-preferential codes/PCIs may be used without coordination with a neighbouring country if the mean field strength of each cell produced by base station does not exceed the values of:

in the frequency band 925-960 MHz

41 dB(μV/m)/5 MHz at a height of 3 m above ground at the borderline between neighbouring countries,

in the frequency band 1805-1880 MHz

47 dB(μV/m)/5 MHz at a height of 3 m above ground at the borderline between neighbouring countries.

A1.1.3 Base stations of WB systems in the frequency bands 925-960 MHz and 1805-1880 MHz using different technologies on both sides of the borderline

If different technologies are deployed on both sides of the borderline, base stations of WB systems in the frequency bands 925-960 MHz and 1805-1880 MHz may be used without coordination in the neighbouring country following the same field strength level as mentioned in section A1.1.1 for all codes/PCIs irrespective of whether the synchronisation signal centre frequencies are aligned or not.

A1.2 FIELD STRENGTH LEVELS FOR NB VS. WB CASE

A1.2.1 Option 1

GSM systems can continue their operation based on the field strength levels defined in ECC Recommendation (05)08 [1] or existing agreement/arrangement between administrations/operators, and in that case a base stations may be used without coordination with a neighbouring country if:

in the frequency band 925-960 MHz

- **for NB systems**: the mean field strength of each carrier produced by base station does not exceed the values according to ECC Recommendation (05)08 or existing agreement/arrangement between administrations/operators;
- **for WB systems**: the mean field strength of each cell produced by base station does not exceed the values of 59 dB(μV/m)/5 MHz at a height of 3 m above ground at the borderline and 41 dB(μV/m)/5 MHz at a height of 3 m above ground at a distance of 6 km for all codes/PCIs.

in the frequency band 1805-1880 MHz

- **for NB systems**: the mean field strength of each carrier produced by base station does not exceed the values of according to ECC Recommendation (05)08 or existing agreement/arrangement between administrations/operators;
- **for WB systems**: the mean field strength of each cell produced by base station does not exceed the values of 65 dB(μV/m)/5 MHz at a height of 3 m above ground at the borderline and 47 dB(μV/m)/5 MHz at a height of 3 m above ground at a distance of 6 km for all codes/PCIs.

Mobile network operators in neighbouring countries may seek an arrangement for redistributing the preferential frequencies of GSM system to facilitate the introduction of wideband technologies if needed.

A1.2.2 Option 2

Alternatively, new bilateral or multilateral agreements could be established for cross-border coordination between GSM systems and WB systems, and in that case a base stations may be used without coordination with a neighbouring country if:

in the frequency band 925-960 MHz

- **for NB systems**: the mean field strength of each carrier produced by base station does not exceed the value of 45 dB(µV/m)/200 kHz at a height of 3 m above ground at the borderline between neighbouring countries for all frequencies;
- **for WB systems**: the mean field strength of each cell produced by base station does not exceed the values of 59 dB(µV/m)/5 MHz at a height of 3 m above ground at the borderline and 41 dB(µV/m)/5 MHz at a height of 3 m above ground at a distance of 6 km for all codes/PCIs.

in the frequency band 1805-1880 MHz

- **for NB systems**: the mean field strength of each carrier produced by base station does not exceed the value of 51 dB(µV/m)/200 kHz at a height of 3 m above ground at the borderline between neighbouring countries for all frequencies;
- **for WB systems**: the mean field strength of each cell produced by base station does not exceed the values of 65 dB(µV/m)/5 MHz at a height of 3 m above ground at the borderline and 47 dB(µV/m)/5 MHz at a height of 3 m above ground at a distance of 6 km for all codes/PCIs.

A1.3 FIELD STRENGTH LEVELS FOR NB VS. NB CASE

A1.3.1 Option 1

GSM systems can continue their operation based on the field strength levels defined in ECC Recommendation (05)08 [1] or existing agreement/arrangement between administrations/operators and the other NB systems may operate following the same principles.

A1.3.2 Option 2

Base stations may be deployed without coordination with a neighbouring country if the mean field strength of each carrier produced by the base station does not exceed the values of:

in the frequency band 925-960 MHz

45 dB(µV/m)/200 kHz at a height of 3 m above ground at the borderline between neighbouring countries for preferential frequencies and 19 dB(µV/m)/200 kHz at a height of 3 m above ground at the borderline between neighbouring countries for non-preferential frequencies;

in the frequency band 1805-1880 MHz

51 dB(µV/m)/200 kHz at a height of 3 m above ground at the borderline between neighbouring countries for preferential frequencies and 25 dB(µV/m)/200 kHz at a height of 3 m above ground at the borderline between neighbouring countries for non-preferential frequencies.

A1.4 OVERVIEW OF FIELD STRENGTH LEVELS

A1.4.1 WB vs. WB

Table 1: Field strength levels at a height of 3 m above ground between wideband systems

	Wideband system vs. Wideband system		
	Synchronisation signal centre frequencies aligned		Synchronisation signal centre frequencies not aligned
	Preferential codes/PCIs	Non-preferential codes/PCIs	All codes/PCIs
900 MHz			
Between same technologies	59 dB(µV/m)/5 MHz @ 0 km and 41 dB(µV/m)/5 MHz @ 6 km (section A1.1.1)	41 dB(µV/m)/5 MHz @ 0 km (section A1.1.2)	59 dB(µV/m)/5 MHz @ 0 km and 41 dB(µV/m)/5 MHz @ 6 km (section A1.1.1)
Between different technologies	59 dB(µV/m)/5 MHz @ 0 km and 41 dB(µV/m)/5 MHz @ 6 km (section A1.1.3)		
1800 MHz			
Between same technologies	65 dB(µV/m)/5 MHz @ 0 km and 47 dB(µV/m)/5 MHz @ 6 km (section A1.1.1)	47 dB(µV/m)/5 MHz @ 0 km (section A1.1.2)	65 dB(µV/m)/5 MHz @ 0 km and 47 dB(µV/m)/5 MHz @ 6 km (section A1.1.1)
Between different technologies	65 dB(µV/m)/5 MHz @ 0 km and 47 dB(µV/m)/5 MHz @ 6 km (section A1.1.3)		

Note:
@ stands for “at a distance inside the neighbouring country”
For NR base station the values (mean using non-AAS and median using AAS) in this table correspond to the following SSB values:
65 dB(µV/m)/5 MHz corresponds to 43 dB(µV/m)/30 kHz
59 dB(µV/m)/5 MHz corresponds to 37 dB(µV/m)/30 kHz
47 dB(µV/m)/5 MHz corresponds to 25 dB(µV/m)/30 kHz
41 dB(µV/m)/5 MHz corresponds to 19 dB(µV/m)/30 kHz

A1.4.2 NB vs. WB

Table 2: Field strength levels at a height of 3 m above ground between narrowband and wideband systems

	Narrowband system	Wideband system
	Option 1 (section A1.2.1)	
900 MHz	according to ECC Recommendation (05)08 or existing agreement/arrangement between administrations/operators	59 dB(µV/m)/5 MHz @ 0 km and 41 dB(µV/m)/5 MHz @ 6 km for all codes/PCIs
1800 MHz	according to ECC Recommendation (05)08 or existing agreement/arrangement between administrations/operators	65 dB(µV/m)/5 MHz @ 0 km and 47 dB(µV/m)/5 MHz @ 6 km for all codes/PCIs
	Option 2 (section A1.2.2)	
900 MHz	45 dB(µV/m)/200 kHz @ 0 km	59 dB(µV/m)/5 MHz @ 0 km and 41 dB(µV/m)/5 MHz @ 6 km for all codes/PCIs
1800 MHz	51 dB(µV/m)/200 kHz @ 0 km	65 dB(µV/m)/5 MHz @ 0 km and 47 dB(µV/m)/5 MHz @ 6 km for all codes/PCIs
Note: @ stands for "at a distance inside the neighbouring country" For NR base station the values (mean using non-AAS and median using AAS) in this table correspond to the following SSB values: 65 dB(µV/m)/5 MHz corresponds to 43 dB(µV/m)/30 kHz 59 dB(µV/m)/5 MHz corresponds to 37 dB(µV/m)/30 kHz 47 dB(µV/m)/5 MHz corresponds to 25 dB(µV/m)/30 kHz 41 dB(µV/m)/5 MHz corresponds to 19 dB(µV/m)/30 kHz		

A1.4.3 NB vs. NB

Table 3: Field strength levels at a height of 3 m above ground between narrowband systems

	Narrowband system vs. Narrowband system	
	Preferential frequency	**Non-preferential frequency**
	Option 1 (section A1.3.1)	
900 MHz	according to ECC Recommendation (05)08 or existing agreement/arrangement between administrations/operators	
1800 MHz	according to ECC Recommendation (05)08 or existing agreement/arrangement between administrations/operators	
	Option 2 (section A1.3.2)	
900 MHz	45 dB(µV/m)/200 kHz @ 0 km	19 dB(µV/m)/200 kHz @ 0 km
1800 MHz	51 dB(µV/m)/200 kHz @ 0 km	25 dB(µV/m)/200 kHz @ 0 km
@ stands for "at a distance inside the neighbouring country"		

ANNEX 2: PROPAGATION MODEL

The following methods are proposed for assessment of anticipated interference inside neighbouring country based on established the field strength levels. Due to complexity of radio wave propagation nature different methods are proposed to be considered by administrations and are included here for guidance purposes only.

It should be noted that following methods provide theoretical predictions based on available terrain knowledge. It is practically impossible to recreate these methods with measurement procedures in the field. Therefore only some approximation of measurements could be used to check compliance with those methods based on practical measurement procedures. The details of such approximation are not included in this recommendation and should be negotiated between countries based on their radio monitoring practices.

A2.1 PATH SPECIFIC MODEL

Where appropriate detailed terrain data is available, the propagation model for interference field strength prediction is the latest version of Recommendation ITU-R P.452 [6]. For the relevant transmitting terminal, predictions of path loss would be made at x km steps along radials of y km at z degree intervals. The values for those receiver locations within the neighbouring country would be used to construct a histogram of path loss – and if 10% of predicted values exceed the threshold the station shall be required to be coordinated.

Values for x, y and z to be agreed between the administrations concerned.

A2.2 SITE GENERAL MODEL

If it is not desirable to utilise detailed terrain height data for the propagation modelling in the border area, the basic model to be used to trigger coordination between administrations and to decide, if coordination is necessary, is Recommendation ITU-R P.1546 [7]. This model is to be employed for 50% locations, 10% time and using a receiver height of 3 m.

For specific reception areas where terrain roughness adjustments for improved accuracy of field strength prediction are needed, administrations may use correction factors according to terrain irregularity and/or an averaged value of the TCA parameter in order to describe the roughness of the area on and around the coordination line.

Administrations and/or operators concerned may agree to deviate from the aforementioned model by mutual consent[2].

A2.3 AREA CALCULATIONS

In the case where greater accuracy is required, administrations and operators may use the area calculation below.

For calculations, all the pixels of a given geographical area to be agreed between the Administrations concerned in a neighbouring country are taken into consideration.

For the relevant base station, predictions of path loss should be made for all the pixels of a given geographical area from a base station and at a receiver antenna height of 3 m above ground.

[2]e.g. as used by members of the HCM-Agreement [8]

For evaluation:

- only 10 percent of the number of geographical area between the borderline (including also the borderline) and the 6 km line itself inside the neighbouring country may be interfered by higher field strength than the values given for the borderline in Annex 1 at a height of 3 m above ground;

- only 10 percent of the number of geographical area between the 6 km (including also 6 km line) and 12 km line inside the neighbouring country may be interfered by higher field strength than the values given for the 6 km line in Annex 1 at a height of 3 m above ground.

It is recommended that during area calculations not only detailed terrain data but also clutter data be taken into account. Use of correction factors for clutter is crucial in particular where the border area is ‘open’ or ‘quasi-open’ from the point of view of clutter or where the interfering base station is just a few kilometres from a borderline.

If the distance between a base station and a terrain point of a borderline is closer than or equal to 1 km, free space propagation model needs to be applied. Furthermore, if there is no terrain obstacle within the 1st Fresnel zone, also the free space propagation model should be applied.

If clutter data is not available, it is proposed to extend the usage of free space propagation model to a few kilometres, depending on the clutter situation in border areas.

For area type interference calculations, propagation models with path specific terrain correction factors are recommended (e.g. Recommendation ITU-R P.1546 with the terrain clearance angle correction factor TCA, HCM method with the terrain clearance angle correction factor or Recommendation ITU-R P.1812 [9]).

As to correction factors for clutters ‘open area’ and ‘quasi-open area’, 20 dB and 15 dB should be used respectively. Recommendation ITU-R P.1406 [10] should be used if a finer selection of clutter is required. It must be noted that terrain irregularity factor Δh is not recommended to be used in area calculations. Administrations and/or operators concerned may agree to deviate from the aforementioned models by mutual consent.

ANNEX 3: COORDINATION PROCEDURE

When requesting coordination the relevant characteristics of the base station, the code group number and the PCI numbers should be forwarded to the Administration affected. All of the following characteristics should be included:

a) channel centre frequency (MHz)

b) synchronisation signal centre frequency (MHz), if differs from channel centre frequency;

c) channel bandwidth (MHz)

d) subcarrier spacing (kHz) (only for NR)

e) name of transmitter station

f) country of location of transmitter station

g) geographical coordinates (W/E, N; WGS84)

h) effective antenna height (m)

i) antenna polarisation

j) antenna azimuth (deg)

k) directivity in antenna systems or antenna gain (dBi)

l) effective radiated power (dBW)

m) expected coverage zone or cell range (km)

n) date of entry into service (month, year).

o) PCI numbers used (only for LTE/NR)

p) antenna tilt (electrical and mechanical) (deg)

q) antenna pattern or envelop.

The Administration affected shall evaluate the request for coordination and shall within 30 days notify the result of the evaluation to the Administration requesting coordination.

If in the course of the coordination procedure an Administration may request additional information.

If no reply is received by the Administration requesting coordination within 30 days it may send a reminder to the Administration affected. An Administration not having responded within 30 days following communication of the reminder shall be deemed to have given its consent and the station may be put into use with the characteristics given in the request for coordination.

The periods mentioned above may be extended by common consent.

ANNEX 4: CODES FOR UMTS (UTRA FDD)

For the FDD mode; ETSI TS 125.213 [11] defines 64 «scrambling code groups» in section 5.2.3, numbered {0…63}, hereafter called «code groups».

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 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.

The preferential code of a two country code sharing should be applied for a base station if the level of field strength relating to non-preferential codes could be exceeded at the borderline of only one neighbouring country. The preferential codes of a three country code sharing should be applied for a base station if the level of field strength related to non-preferential codes could be exceeded at the borderline of only two neighbouring countries.

Four types of countries are defined in such a way 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, SRB, SUI, SVN UKR;

Type country 2: AND, BIH, BUL, D, EST, G, GEO, HNG, I and MDA;

Type country 3: ALB, AUT, F, HOL, HRV, MLT, POL, POR, ROU and S;

Type country 4: LIE, LUX, LVA, MKD, MNE, NOR, SVK and TUR.

For each type of country, the Table 4 and Figure 1 describe the sharing of the codes with its neighbouring countries, with the following conventions of writing:

■	Preferential code
	Non-preferential code

Table 4: Code group sub-sets for use in border areas when the carrier frequencies are aligned

	Set A	Set B	Set C	Set D	Set E	Set F
Country 1	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
Country 2	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
Country 3	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
Country 4	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		■		■		

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.

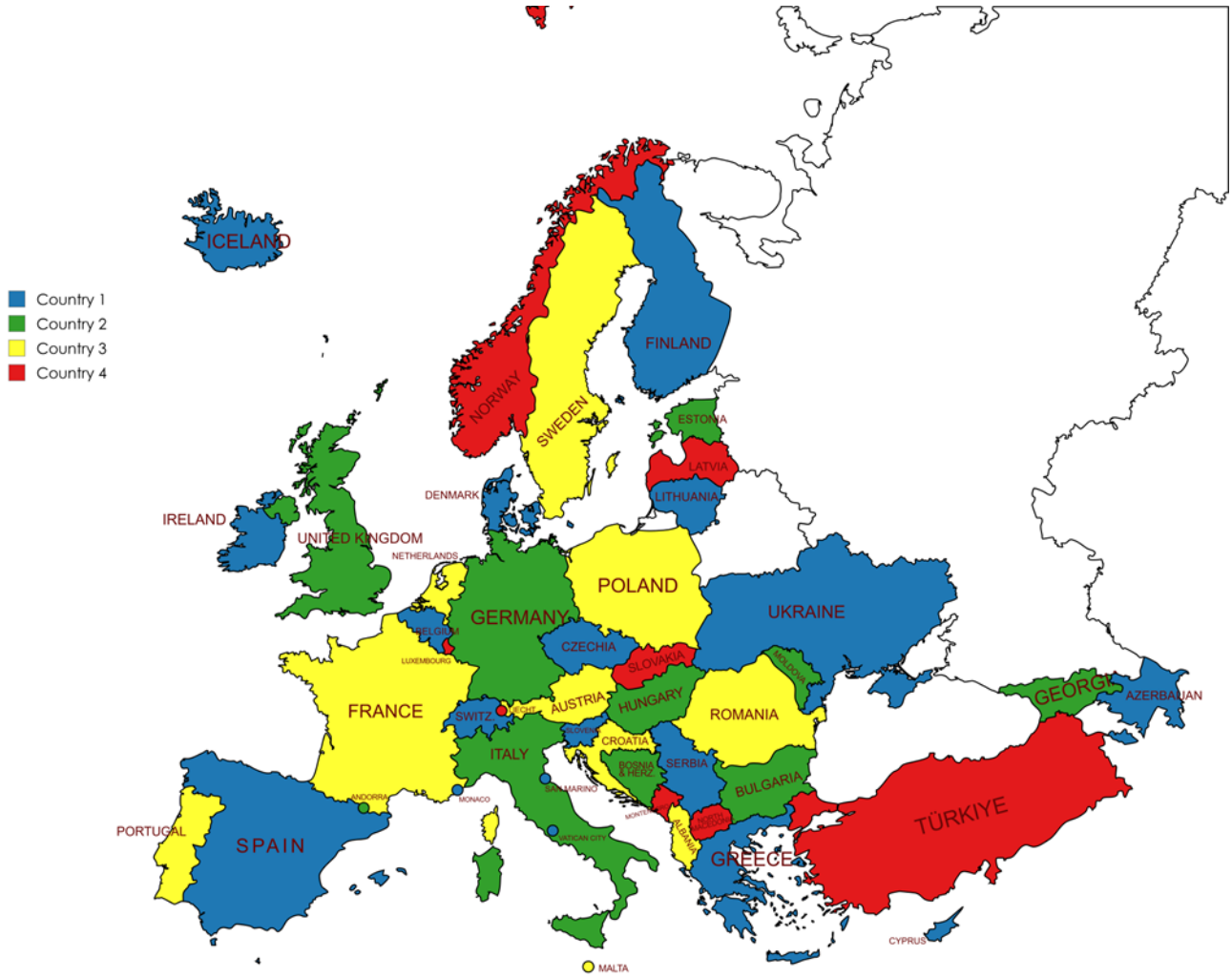


Figure 1: Country type map

ANNEX 5: PHYSICAL-LAYER CELL IDENTITIES (PCI) FOR LTE AND NR

ETSI TS 136.211 [12] defines 168 “unique physical-layer cell-identity groups” in section 6.11, numbered 0…167, hereafter called “PCI groups” for LTE. Within each PCI group there are three separate PCIs giving 504 PCIs in total.

For NR in ETSI TS 138.211, section 7.4.2 [13] the number of physical-layer cell-identity groups (different cell IDs) have been increased to 336, numbered 0..335.

Administrations should apply sharing of PCIs in border areas, an equitable distribution of these PCIs when synchronisation signal centre frequencies are aligned as provided in Table 5.

Sharing of PCIs between operators of neighbouring countries should only be applied where synchronisation signal centre frequencies used in the neighbouring countries are aligned independent of the channel bandwidth or where it is not known whether or not the synchronisation signal centre frequencies used in the neighbouring countries are aligned, or where there is no network in operation in the neighbouring country unless otherwise stated in Annex 1 or administration/operator agreements/arrangements.

As shown in Table 5, the PCIs for LTE and NR are 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, therefore dividing the PCI groups or PCIs is equivalent.

The preferential PCIs of a two country PCI sharing should be applied for a base station if the level of field strength relating to non-preferential PCIs could be exceeded at the borderline of only one neighbouring country. The preferential PCIs of a three country PCI sharing should be applied for a base station if the level of field strength related to non-preferential PCIs could be exceeded at the borderline of only two neighbouring countries.

Four types of countries are defined in such a way 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, SRB, SUI, SVN UKR;

Type country 2: AND, BIH, BUL, D, EST, G, GEO, HNG, I and MDA;

Type country 3: ALB, AUT, F, HOL, HRV, MLT, POL, POR, ROU and S;

Type country 4: LIE, LUX, LVA, MKD, MNE, NOR, SVK and TUR.

For each type of country, the Table 5 and Figure 2 describe the sharing of the PCIs with its neighbouring countries, with the following conventions of writing:

	Preferential PCI
	Non-preferential PCI

Table 5: PCI sub-sets for LTE and NR for use in border areas when synchronisation signal centre frequencies are aligned

PCI	Set A	Set B	Set C	Set D	Set E	Set F
Country 1 LTE	0..83	84..167	168..251	252..335	336..419	420..503
Country 1 NR	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 LTE	0..83	84..167	168..251	252..335	336..419	420..503
Country 2 NR	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 LTE	0..83	84..167	168..251	252..335	336..419	420..503
Country 3 NR	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 LTE	0..83	84..167	168..251	252..335	336..419	420..503
Country 4 NR	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 identifiers in certain areas.



Figure 2: Country type map

ANNEX 6: LIST OF REFERENCES

[1] ECC Recommendation (05)08: “Frequency planning and cross-border coordination between GSM Land Mobile Systems (GSM 900, GSM 1800, and GSM-R)”, approved 2005 and latest amended October 2021

[2] ERC Decision (94)01: “The frequency bands to be designated for the coordinated introduction of the GSM digital pan-European communications system”, approved October 1994

[3] ERC Decision (97)02: “The extended frequency bands to be used for the GSM Digital Pan-European Communications System”, approved by March 1997

[4] ERC Decision (95)03: “The frequency bands to be designated for the introduction of DCS 1800”, approved December 1995

[5] ECC Decision (06)13: “Harmonised technical conditions for mobile/fixed communications networks (MFCN) including terrestrial IMT systems, other than GSM and EC-GSM IoT, in the bands 880-915/925-960 MHz and 1710-1785/1805-1880 MHz, approved 2006 and latest amended March 2022

[6] Recommendation ITU-R P.452: “Prediction procedure for the evaluation of interference between stations on the surface of the Earth at frequencies above about 100 MHz”

[7] Recommendation ITU-R P.1546: “Method for point-to-area predictions for terrestrial services in the frequency range 30 MHz to 4 000 MHz”

[8] HCM Agreement: https://hcm.bundesnetzagentur.de/

[9] Recommendation ITU-R P.1812: “A path-specific propagation prediction method for point-to-area terrestrial services in the frequency range 30 MHz to 6 GHz”

[10] Recommendation ITU-R P.1406: “Propagation effects relating to terrestrial land mobile and broadcasting services in the VHF and UHF bands”

[11] ETSI TS 125 213 V12.0.0 (2014-09): “Universal Mobile Telecommunications System (UMTS); Spreading and modulation (FDD)”

[12] ETSI TS 136 211 V16.6.0 (2021-08): “LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation”

[13] ETSI TS 138 211 V16.2.0 (2020-07): “5G; NR; Physical channels and modulation”