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Annex III

Technical network description

Licensee

Example AG

Table of contents

1	Description	3
2	Network type	3
3	Assigned frequencies.....	3
3.1	Assignments in general	3
3.2	Frequency range 800 MHz (791 – 821 MHz, 832 – 862 MHz)	4
3.2.1	Assignment	4
3.2.2	Availability	4
3.2.3	Conditions of use	7
3.2.4	Restrictions on use subject to TV in Italy	7
3.2.5	Conditions of use at the national borders	8
3.3	Frequency range 900 MHz (880 – 915 MHz, 925 – 960 MHz)	10
3.3.1	Assignment	10
3.3.2	Availability:	10
3.3.3	Conditions of use	10
3.3.4	Restrictions on use for the protection of GSM rail and radio navigation	12
3.3.5	Guard channels	12
3.3.6	Conditions of use at the national borders	13
3.4	Frequency range 1800 MHz (1710 – 1785 MHz, 1805 – 1880 MHz)	16
3.4.1	Assignment	16
3.4.2	Availability	16
3.4.3	Conditions of use	16
3.4.4	Recommendation of use for protection of DECT systems	18
3.4.5	Guard channels	18
3.4.6	Conditions of use at the national borders	18
3.5	Frequency range 2100 MHz (1920 – 1980 MHz, 2110 – 2170 MHz)	22
3.5.1	Assignment	22
3.5.2	Availability:	22
3.5.3	Conditions of use	22
3.5.4	Conditions of use at the national borders	23
3.6	Frequency range 2600 MHz (2500 – 2690 MHz).....	25
3.6.1	Assignment	25
3.6.2	Availability	25
3.6.3	Conditions of use	25
3.6.4	Restrictions on use	27
3.6.5	Conditions of use at the national borders	28
4	Operator agreements	30
5	Construction and operation of the radio network.....	31
5.1	Base station data to be supplied to OFCOM	31
5.2	Radio interference and special precautions.....	33
5.3	Confederation measurement stations.....	33

1 Description

Nationwide terrestrial digital cellular mobile radio network on a technologically-neutral basis using the 800, 900, 1800, 2000, 2100 and 2600 MHz frequency bands.

2 Network type

Multi-band and multi-technology radio network

3 Assigned frequencies

The assigned frequencies are frequency class A frequencies according to Art. 6 para. 1 of the Ordinance on Frequency Management and Radiocommunication Licences (OFMRL), i.e. the frequencies can be assigned to a limited number of users within a specific operational area. This applies, for example, to GSM on-board systems in aircraft or the use of mobile telephone jamming in prisons.

3.1 Assignments in general

Use of the assigned frequencies is possible for all suitable technologies in sections 1 and 2, if a contiguous frequency block permits this and recommendations regarding the prevention of interference due to out-of-band emissions are complied with.

3.2 Frequency range 800 MHz (791 – 821 MHz, 832 – 862 MHz)

3.2.1 Assignment

The following frequencies are assigned nationwide:

Frequencies	Frequencies	Bandwidth
Uplink	Downlink	
from ... to	from ... to	

3.2.2 Availability

The frequency band is available from 1.1.2013 until 31.12.2013 subject to restriction. The following partial frequency ranges cannot be used in the coverage areas of the following TV transmitter sites:

Sub-range / TV channel	TV transmitter station and TV coverage area
790 – 798 MHz K61	VS: Guttet-Feschel Wilerzaelg GR: Versam
798 – 806 MHz K62	VS: Visperterminen Gebidem GR: Celerina Laret, Davos Gotschnagrat, Trun
806 – 814 MHz K63	VS: Blatten bei Naters, Ferden Faerdaried, Graechen Steinet GR: Davos Ischalp, Arosa Weissshorn
814 – 822 MHz K64	VS: Guttet-Feschel Wilerzaelg GR: Davos Gotschnagrat, Versam
830 – 838 MHz K66	VS: Ausserberg GR: Davos Ischalp
838 – 846 MHz K67	VS: Bürchen Hochastler, Inden, Simplon Pass Gibratt, St. Niklaus Sparruzug GR: Grono Oltra,
846 – 854 MHz K68	VS: Visperterminen Gebidem GR: Celerina Laret
854 – 862 MHz K69	VS: Guttet-Feschel Wilerzaelg GR Grono Oltra

If required, the detailed coverage areas can be requested from OFCOM.

Regions with limited availability:

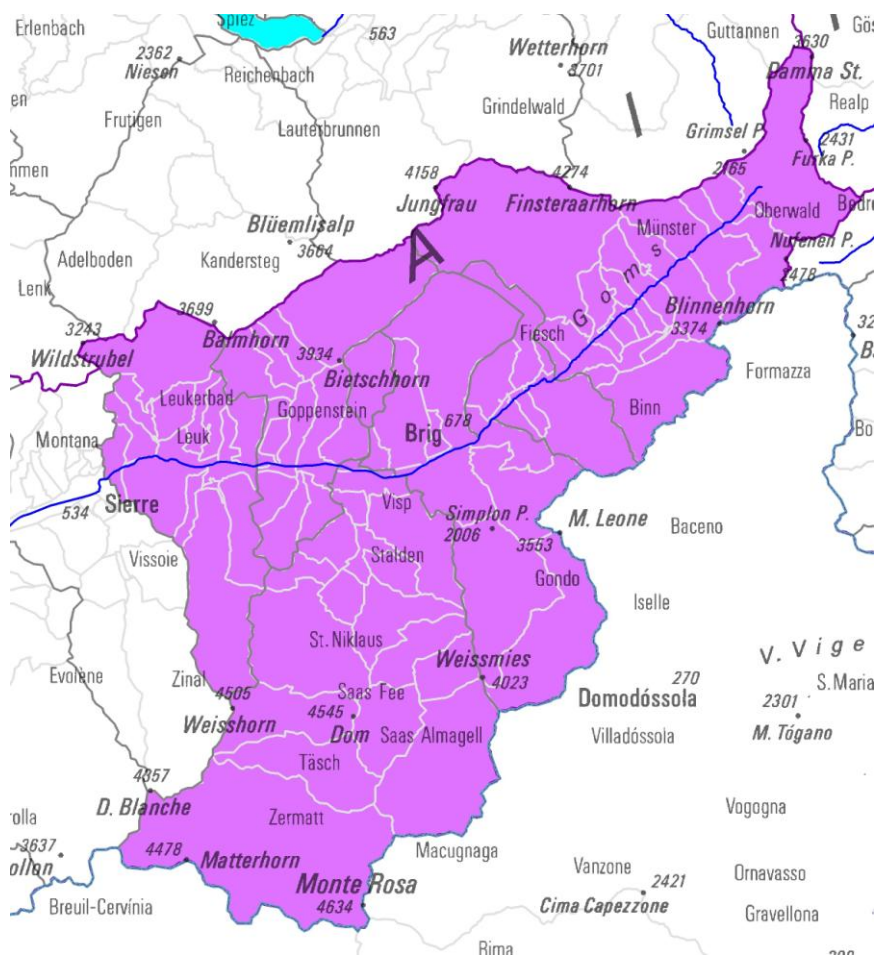


Figure 1: Overview of the entire Valais region

3.2.3 Conditions of use

In each case the latest updated versions ratified by Switzerland of the provisions of the CEPT decisions, recommendations and reports apply:

- ECC/DEC/(09)03: Harmonised conditions for MFCN operating in the band 790-862 MHz
- CEPT Report 030: The identification of common and minimal (least restrictive) technical conditions for 790-862 MHz for the digital dividend in the European Union
- CEPT Report 031: Frequency (channelling) arrangements for the 790-862 MHz band
- CEPT Report 019: Least restrictive technical conditions for WAPECS frequency bands

The block edge masks (BEM) are defined in ECC/DEC/ (09) 03 (Annex 3).

In particular, the following conditions of use are listed:

- duplex mode: FDD
- the maximum mean in-block EIRP of base stations in accordance with ECC/DEC/(09)03, Annex 3, section 1, is laid down as follows: +56dBm/5 MHz for all blocks
- maximum mean out-of-block EIRP of base stations: in accordance with ECC/DEC/(09)03, Annex 3, Table 4, Case A: ($P_{TX_EIRP} - 59$)dBm/8MHz
- in particular, the block edge masks (BEM) defined in ECC/DEC/ (09)03 (Annex 3) must be complied with.

3.2.4 Restrictions on use subject to TV in Italy

As in Switzerland, in Italy the frequency range 791-821 MHz, 832-862 MHz is reserved from 1.1.2013 for use by mobile radio. If delays in the phasing-out of broadcasting transmitters in this frequency range should occur, from this date the operation of Swiss mobile telephone networks in a zone approximately 20 km from Italy may be adversely affected or may even be impossible for an unknown period.

3.2.5 Conditions of use at the national borders

3.2.5.1 Preferential frequencies

There are no agreements with neighbouring countries for this frequency band which define specific parts of the spectrum for preferential use.

With the exception of Italy, it is possible to reach agreements with operators in neighbouring countries in accordance with Section 4.

3.2.5.2 Maximum interference field strengths in border regions

In principle and in the absence of bilateral or multilateral agreements, or if no other points are made in this Section, the conditions of use in ECC RECOMMENDATION (11) 04, Annex 1, 2 and 5¹ apply.

Border regions in relation to Germany and France

The mean field strength generated by a base station at a height of 3 m above ground and in a reference bandwidth of 5 MHz shall not exceed the following values at the border and in neighbouring countries:

If only FDD is in operation:

- 59 dB μ V/m at the border
- 41 dB μ V/m on a coordination line 6 km beyond the border in the neighbouring country

If TDD is in operation² the following applies for TDD:

- 59 dB μ V/m at the border

For LTE use, the coordination of the PCI code groups and other radio parameters is recommended in accordance with ECC RECOMMENDATION (11) 04, Annex 5.

Border regions in relation to Austria and Liechtenstein

The mean field strength generated by a base station at a height of 3 m above ground and in a reference bandwidth of 5 MHz shall not exceed the following values towards and in neighbouring countries:

If only FDD is in operation:

- 55 dB μ V/m at the border
- 29 dB μ V/m on a coordination line 9 km beyond the border in the neighbouring country

For LTE use, the coordination of the PCI code groups and other radio parameters is recommended in accordance with ECC RECOMMENDATION (11) 04, Annex 5.

¹ www.cept.org → ECC → Deliverables or <http://www.ecodocdb.dk/>

² In accordance with Section 3.2.3 this frequency band may be used in Switzerland only in FDD mode. It is possible, however, that TDD may be used in neighbouring countries. In this case, account must be taken of the indicated field strength from abroad.

3.2.5.3 Basis for calculation of interference field strength

The basis is the latest valid version of the HCM tools (Harmonised Calculation Method) of the "AGREEMENT between the administrations of (17 countries) on the co-ordination of frequencies between 29.7 MHz and 39.5 GHz for the fixed service and the land mobile radio service". (HCM Agreement) September 2011³.

The time probability for all calculations is 10%.

3.2.5.4 Operator agreements, planning agreements

See Section 4

³ http://www.hcm-agreement.info/http/deutsch/verwaltung/index_hcm_programs.htm

3.3 Frequency range 900 MHz (880 – 915 MHz, 925 – 960 MHz)

3.3.1 Assignment

The following frequencies are assigned nationwide:

ARFCN from ... to and with	Num- ber of chan- nels:	Frequencies Uplink from ... to	Frequencies Downlink from ... to	Bandwidth

3.3.2 Availability:

This frequency band is fully available from 1.1.2014. It is subject to deadlines for the transfer of frequencies which are being transferred from one operator to another.

The transfer times are described in Annex V.

3.3.3 Conditions of use

In each case the latest updated versions ratified by Switzerland of the provisions of the CEPT decisions, recommendations and reports apply:

- ECC/DEC/(06)13: Designation of GSM-900/1800 bands for terrestrial IMT-2000/UMTS
- ECC Report 082: Compatibility study for UMTS operating within the GSM 900/1800
- ECC Report 096: Compatibility between UMTS 900/1800 and systems operating in adjacent bands
- CEPT Report 040: Compatibility between LTE and WiMAX operating within the bands 880-915 MHz / 925-960 MHz and 1710-1785 MHz / 1805-1880 MHz (900/1800 MHz bands) and systems operating in adjacent bands
- CEPT Report 041: Compatibility between LTE and WiMAX operating within the bands 880-915 MHz / 925-960 MHz and 1710-1785 MHz / 1805-1880 MHz (900/1800 MHz bands) and systems operating in adjacent bands
- CEPT Report 042: Compatibility between UMTS and existing and planned aeronautical systems above 960 MHz
- ECC Report 146: Compatibility between GSM MCBTS and other services (TRR, RSBN/PRMG, HC-SDMA, GSM-R, DME, MIDS, DECT) operating in the 900 and 1800 MHz frequency bands
- ECC/DEC/(06) 07amended: GSM on board aircraft
- ECC/DEC/(08) 08: GSM on board vessels
- ECC Report 082: Compatibility study for UMTS operating within the GSM 900/1800 band

- ECC Report 096: Compatibility between UMTS 900/1800 and systems operating in adjacent bands
- CEPT Report 019: Least restrictive technical conditions for WAPECS frequency bands.

For the 900 MHz frequency band no block edge masks are defined. The transmission technologies are limited to GSM and the members of the IMT family (see the current version of ITU-R Rec. M. 1457), in particular IMT-2000/UMTS and LTE.

Conditions of use for GSM MCBTS (multi carrier base station):

- Only devices of classes 1 and 2 are allowed for GSM MCBTS
- Power Control (PC) must be used on the uplink and downlink
- The minimum separation of the carrier frequencies between GSM MCBTS and GSM-R is 0.4 MHz
- The minimum separation between a GSM MCBTS and a GSM-R BTS must be at least 50 metres
- Coordination with other operators, in particular with the operators of GSM-R networks, or the use of interference prevention techniques may be necessary⁴.

Conditions of use for UMTS/LTE/WiMAX:

- Unless agreed otherwise between network operators, the GSM channels/carriers at the block edges of the assigned blocks are to be used. The UMTS channels/carriers must be used between the GSM carriers in the allocated frequency ranges.
- The spacing between one's own UMTS carrier and the GSM carrier of another operator should be as large as possible and
 - at least 2.8 MHz in the uncoordinated case or
 - at least 2.6 MHz in the co-ordinated case.
- The spacing between one's own UMTS carrier and that of another operator is
 - at least 5 MHz in the uncoordinated case or
 - 5 MHz or less in the coordinated case.
- In the case of adjacent blocks (channel edge) of different operators with UMTS/LTE/WiMAX use on the one hand and GSM or GSM-R use on the other, a gap of at least 200 kHz must be complied with by the holder of the block with UMTS/LTE/WiMAX use.
- In the event of interference, network construction must be coordinated between the operators and/or interference prevention techniques must be applied.
- In the case of adjacent blocks (channel edge) of different operators with UMTS/LTE/WiMAX use on both sides, no minimum spacing is required (minimum spacing 0 kHz).

⁴ See Section 3.3.4

3.3.4 Restrictions on use for the protection of GSM rail and radio navigation

- For the entire 880-915 MHz / 925-960 MHz frequency range, coordination is not necessary if the median of out-of-band emissions of the base stations along the rails at a height of 4.5 m in the 921-925 MHz frequency range in the measurement bandwidth of 200 kHz (in each 100 m interval) is max. 107 dBm. The measuring antenna has a gain of 0 dBi. At higher values of out-of-band emissions, the construction of a mobile radio base station must be coordinated with the GSM-R operators.
- In principle, in the case of interference priority⁵ is given to GSM systems (including GSM-R) over systems using other transmission technologies (e.g. UMTS/LTE/WiMAX).
- If the operation of systems in the 960 MHz to 1215 MHz frequency band (e.g. DME⁶) is affected, interference prevention techniques may be necessary.

3.3.5 Guard channels

For use with GSM, guard channels are defined in the 900 and 1800 MHz frequency bands. They may not be occupied by GSM or by technologies which require a guard channel in relation to an adjacent frequency system.

The following convention applies: If no guard channel is required between two allocation blocks for a specific technology, the channel with the higher frequency within the allocation block may be used. The limits of the allocation blocks are therefore defined by upper cut-off frequencies of the guard channels. More specific recommendations for such cases must be taken into account.

⁵ Priority means that in the event of interference, until further notice the operator of a mobile radio system with a transmission standard other than GSM must take measures to prevent interference (mitigation techniques).

⁶ Air traffic control distance measuring equipment

3.3.6 Conditions of use at the national borders

3.3.6.1 Basics

In so far as the existing bilateral and multilateral agreements for the use of GSM in the 900 - 1800 MHz frequency bands at national borders apply and if only GSM is used, the current principle of use with preferential frequencies remains in force. In principle and in the absence of bilateral or multilateral agreements, or if no other points are made in relation to this frequency range, at the national borders the conditions of use defined in ECC RECOMMENDATION (08) 02 apply⁷.

3.3.6.2 Preferential frequencies and conditions of use for GSM

There are agreements with neighbouring countries for this frequency band which define specific parts of the spectrum for preferential use with GSM.

The following channels (ARFCN) have been agreed for preferential use by Switzerland in the designated border regions:

Border region	P-GSM 900 (from ... to and incl.)
F/SUI	1-10 42-93
F/D/SUI	1-10 50-59 81-86 88-102
D/SUI	1-25 88-124
D/AUT/SUI	13-37 109-124
AUT/SUI	13-49 100-124
AUT/L/SUI	13-37 109-124
I/SUI	7-26 49-54 67-96 119-124

Key: AUT: Austria; D: Germany; F: France; I: Italy L: Principality of Liechtenstein; SUI: Switzerland

Notes:

- AUT/I/SUI and F/I/SUI border coordination is not necessary due to topographical frequency decoupling and is not applicable.
- Assignment of the preferential frequencies can be adapted at any time with reasonable prior notice.

⁷ www.cept.org → ECC → Deliverables or <http://www.ecodocdb.dk/>

3.3.6.3 Maximum interference field strengths in border regions

All border regions excluding Italy

The mean field strength generated at a height of 3 m above ground and in a reference bandwidth of 200 kHz shall not exceed the following values at the border and in neighbouring countries:

With preferential frequencies:

- 19 dB μ V/m on a coordination line 15 km beyond the border in the neighbouring country

With non-preferential frequencies:

- 19 dB μ V/m at the border

Border region in relation to Italy

The mean field strength generated at a height of 3 m above ground and in a reference bandwidth of 200 kHz shall not exceed the following values at the border and in neighbouring countries:

With preferential frequencies:

- 32 dB μ V/m on a coordination line 10 km beyond the border in the neighbouring country

With non-preferential frequencies:

- 26 dB μ V/m at the border

3.3.6.4 Basis for calculation of the interference field strength

Border regions in relation to Germany and France including the three-country case

The basis is the latest valid version of the HCM tools (Harmonised Calculation Method) of the "AGREEMENT between the administrations of (17 countries) on the co-ordination of frequencies between 29.7 MHz and 39.5 GHz for the fixed service and the land mobile radio service". (HCM Agreement) September 2011⁸.

Border regions in relation to Austria and the three-country case with Germany

CEPT Recommendation T/R 20-08 E, "Frequency Planning and Frequency Coordination for the GSM System"⁹.

Border region in relation to Italy¹⁰

ITU-R Recommendation PN .370-7

For preferential frequencies:

- Propagation curves location/time 50%/50% (Rec. PN.370-7, Fig.9)

For non-preferential frequencies:

⁸ http://www.hcm-agreement.info/http/deutsch/verwaltung/index_hcm_programs.htm

⁹ www.cept.org → ECC → Deliverables or <http://www.ecodocdb.dk/>

¹⁰ Currently tolerable condition with Italy. Replacement by a method based on ECC/REC(05)08 or HCM is envisaged.

- propagation curves location/time 50%/10% (Rec. PN.370-7, Fig.10)

3.3.6.5 Conditions of use at the national border in the case of joint use of technologies other than GSM in the 880 to 960 MHz frequency range

In principle and in the absence of bilateral or multilateral agreements, or if no other points are made in this Section, the conditions of use in ECC RECOMMENDATION (08) 02, Annexes 1 to 5¹¹ apply.

Border regions with Germany and France

Deviating from ECC recommendation (08) 02, the following conditions of use apply to border regions with Germany and France:

The mean field strength generated by a base station at a height of 3 m above ground and in a reference bandwidth of 5 MHz shall not exceed the following values at the border and in neighbouring countries:

For FDD stations:

- 59 dB μ V/m at the border
- 41 dB μ V/m on a coordination line 6 km beyond the border in the neighbouring country

For LTE use, the coordination of the PCI code groups and other radio parameters is recommended in accordance with ECC RECOMMENDATION (08)02, Annex 5.

3.3.6.6 Operator agreements, planning agreements

See Section 4

¹¹ www.cept.org → ECC → Deliverables or <http://www.ecodocdb.dk/>

3.4 Frequency range 1800 MHz (1710 – 1785 MHz, 1805 – 1880 MHz)

3.4.1 Assignment

The following frequencies are assigned nationwide in two stages:

Assignment stage 1:

ARFCN from ... to and incl.	Num- ber of chan- nels:	Frequencies Uplink from ... to	Frequencies Downlink from ... to	Bandwidth

Assignment stage 2:

ARFCN From ... to and incl.	Num- ber of chan- nels:	Frequencies Uplink from ... to	Frequencies Downlink from ... to	Bandwidth

3.4.2 Availability

The XX to YY portion of ARFCN (total 2 x Z MHz) is available in a first assignment phase from the award of the licence until 31.12.2013.

In the second stage of the assignment, the entire frequency band is fully available from 1.1.2014.

This is subject to deadlines for the transfer of frequencies which are being transferred from one operator to another. The transfer deadlines are described in Annex V.

3.4.3 Conditions of use

In each case the latest updated versions ratified by Switzerland of the provisions of the CEPT decisions, recommendations and reports apply:

- ECC/DEC/(06)13: Designation of GSM-900/1800 bands for terrestrial IMT-2000/UMTS
- ECC Report 082: Compatibility study for UMTS operating within the GSM 900/1800
- ECC Report 096: Compatibility between UMTS 900/1800 and systems operating in adjacent bands
- CEPT Report 040: Compatibility between LTE and WiMAX operating within the bands 880-915 MHz / 925-960 MHz and 1710-1785 MHz / 1805-1880 MHz (900/1800 MHz bands) and systems operating in adjacent bands

- CEPT Report 041: Compatibility between LTE and WiMAX operating within the bands 880-915 MHz / 925-960 MHz and 1710-1785 MHz / 1805-1880 MHz (900/1800 MHz bands) and systems operating in adjacent bands
- ECC Report 146: Compatibility between GSM MCBTS and other services (TRR, RSNB/PRMG, HC-SDMA, GSM-R, DME, MIDS, DECT) operating in the 900 and 1800 MHz frequency bands
- ECC/DEC/(06)07amended: GSM on board aircraft
- ECC/DEC/(08)08: GSM on board vessels
- ECC Report 082: Compatibility study for UMTS operating within the GSM 900/1800
- ECC Report 096: Compatibility between UMTS 900/1800 and systems operating in adjacent bands
- CEPT Report 019: Least restrictive technical conditions for WAPECS frequency bands
- ERC Report 100: Compatibility between certain radiocommunications systems operating in adjacent bands. Evaluation of DECT/GSM 1800 compatibility

For the 1800 MHz frequency band no block edge masks are defined. The transmission technologies are limited to GSM and the members of the IMT family (see the current version of ITU-R Rec. M. 1457), in particular IMT-2000/UMTS and LTE.

Conditions of use for GSM MCBTS (multi carrier base station):

- Only devices of classes 1 and 2 are allowed for GSM MCBTS
- Power Control (PC) must be used on the uplink and downlink
- Coordination with other operators or the use of interference prevention techniques may be necessary.

Conditions of use for UMTS/LTE/WiMAX:

- Unless agreed otherwise between network operators, the GSM channels/carriers at the block edges of the assigned blocks are to be used. The UMTS channels/carriers must be used between the GSM carriers in the allocated frequency ranges.
- The spacing between one's own UMTS carrier and the GSM carrier of another operator should be as large as possible and
 - at least 2.8 MHz in the uncoordinated case or
 - at least 2.6 MHz in the co-ordinated case.
- The spacing between one's own UMTS carrier and that of another operator is
 - at least 5 MHz in the uncoordinated case or
 - 5 MHz or less in the coordinated case.

- In the case of adjacent blocks (channel edge) of different operators with UMTS/LTE/WiMAX use on the one hand and GSM use on the other, a gap of at least 200 kHz must be complied with by the holder of the block with UMTS/LTE/WiMAX use.
- In the event of interference, network construction must be coordinated between the operators and/or interference prevention techniques must be applied.
- In the case of adjacent blocks (channel edge) of different operators with UMTS/LTE/WiMAX use on both sides, no minimum spacing is required (minimum spacing 0 kHz).

3.4.4 Recommendation of use for protection of DECT systems

In the 1878-1880 MHz range reciprocal interference with nearby DECT systems may occur¹². It is recommended that the upper 2 MHz (1878-1880 MHz) should not be used for pilot channels emission (BCCH) or that other appropriate measures be taken¹².

3.4.5 Guard channels

For use with GSM, guard channels are defined in the 900 and 1800 MHz frequency bands. These may not be occupied by GSM or by technologies which require a guard channel in respect of a system on an adjacent frequency.

The following convention applies: if no guard channel is necessary between two assignment blocks for a specific technology, the one with the higher frequency within the assignment block may be used. The limits of the assignment blocks are therefore defined by the upper limit frequencies of the guard channels. Other special recommendations for such cases must be taken into account.

3.4.6 Conditions of use at the national borders

3.4.6.1 Basics

In so far as the existing bilateral and multilateral agreements for the use of GSM in the 900 and 1800 MHz frequency bands at national borders are valid and if only GSM is used there, the current principle of use with preferential frequencies remains in force. In principle and in the absence of bilateral or multilateral agreements, or if no other points are made in relation to this frequency range, at the national borders the conditions of use defined in ECC RECOMMENDATION (08) 02 apply.¹³

3.4.6.2 Preferential frequencies and conditions of use for GSM

There are agreements with neighbouring countries for this frequency band which define specific parts of the spectrum for preferential use with GSM.

The following channels (ARFCN) are agreed in the designated border regions for preferential use by Switzerland:

¹² See ERC report 100 at www.cept.org → ECC deliverables or <http://www.ecodocdb.dk/> →

¹³ www.cept.org → ECC → Deliverables or <http://www.ecodocdb.dk/>

Border region	GSM 1800 Block 1 - 3 (from ... to and incl.)
F/SUI	550-600 625-661 700-736 781-812 856-885
F/D/SUI	557-593 631-661 712-728 787-804 862-885
D/SUI	512-524 557-600 631-668 712-741 787-824 862-885
D/AUT/SUI	557-593 631-661 712-728 787-804 862-885
AUT/SUI	550-593 618-661 700-736 781-812 856-885
AUT/L/SUI	557-593 631-661 712-728 787-804 862-885
I/SUI	512-524 ⁾ 557-600 ⁾ 631-635 ⁾ 663-700 ⁾ 738-760 ⁾ 787-824 ⁾ 862-885 ⁾

Key: AUT: Austria; D: Germany; F: France; I: Italy L: Principality of Liechtenstein; SUI: Switzerland

Note:

- AUT/I/SUI and F/I/SUI border coordination is not necessary due to topographical frequency decoupling and is not applicable.
- Assignment of the preferential frequencies can be adapted at any time with reasonable prior notice.

⁾ Reservation:

- The definitive assignment of the preferential frequencies for the GSM1800 band in the I/SUI two-country case is currently in progress and is reserved.

3.4.6.3 Maximum interference field strength in border regions

All border regions

The mean field strength generated at a height of 3 m above ground and in a reference bandwidth of 200 kHz shall not exceed the following values at the border and in neighbouring countries:

With preferential frequencies:

- 25 dB μ V/m on a coordination line 15 km beyond the border in the neighbouring country

With non-preferential frequencies:

- 25 dB μ V/m at the border

Reservation:

The definitive provisions for the interference field strength in the GSM1800 band in the two-country case with Italy are currently in progress and are reserved.

3.4.6.4 Basis for calculation of interference field strength

All border regions excluding Italy

The basis is the latest valid version of the HCM tools (Harmonised Calculation Method) of the "AGREEMENT between the administrations of (17 countries) on the co-ordination of frequencies between 29.7 MHz and 39.5 GHz for the fixed service and the land mobile radio service". (HCM Agreement) September 2011¹⁴.

Border region with Italy

Recommendation T/R 22-07 E, "Frequency Planning and Frequency Coordination for the GSM System" of the CEPT^{15 16}.

¹⁴ http://www.hcm-agreement.info/http/deutsch/verwaltung/index_hcm_programs.htm

¹⁵ <http://www.ero.dk/> → Deliverables → Recommendations (<http://www.ecodocdb.dk/>)

¹⁶ Currently tolerable condition with Italy. Replacement by a method based on ECC/REC(05)08 or HCM is envisaged.

3.4.6.5 Conditions of use at the national border in the case of joint use of technologies other than GSM in the 1710 to 1880 MHz frequency range

In principle and in the absence of bilateral or multilateral agreements, or if no other points are made in this Section, the conditions of use in ECC RECOMMENDATION (08) 02, Annexes 1 to 5¹⁷ apply.

Border regions with Germany and France

Deviating from ECC recommendation (08) 02, the following conditions of use apply to border regions with Germany and France:

The mean field strength generated by a base station at a height of 3 m above ground and in a reference bandwidth of 5 MHz shall not exceed the following values at the border and in neighbouring countries:

If only FDD is in operation:

- 65 dB μ V/m at the border
- 47 dB μ V/m on a coordination line 6 km beyond the border in the neighbouring country

For LTE use, the coordination of the PCI code groups and other radio parameters is recommended in accordance with ECC RECOMMENDATION (08) 02, Annex 5.

3.4.6.6 Operator agreements, planning agreements

See Section 4

¹⁷ www.cept.org → ECC → Deliverables or <http://www.ecodocdb.dk/>

3.5 Frequency range 2100 MHz (1920 – 1980 MHz, 2110 – 2170 MHz)

3.5.1 Assignment

The following frequencies are assigned nationwide in two stages:

Assignment stage 1:

UARFCN from ... to and incl.	Frequencies Uplink from ... to	Frequencies Downlink from ... to	Bandwidth

Assignment stage 2:

UARFCN from ... to and incl.	Frequencies Uplink from ... to	Frequencies Downlink from ... to	Bandwidth

3.5.2 Availability:

The XX to YY portion of ARFCN is available in a first assignment phase from the award of the licence until 31.12.2016.

In the second stage of the assignment, the definitively assigned frequency band is fully available from 1.1.2017. The frequencies allocated in the first stage must be released at this time.

3.5.3 Conditions of use

In each case the latest updated versions ratified by Switzerland of the provisions of the CEPT decisions, recommendations and reports apply:

- ECC/DEC/(06)01: IMT-2000/UMTS 1900-1980, 2010-2025 and 2110-2170 MHz
- ERC Report 065: Adjacent band compatibility between UMTS and other 2 GHz services
- ECC Report 039: Report from CEPT to the European Commission in response to the mandate to develop least restrictive technical conditions for 2 GHz bands
- CEPT Report 019: Least restrictive technical conditions for WAPECS frequency bands

The block edge masks are defined in CEPT Report 039.

For the use of the 1920-1980 MHz FDD band paired with 2110-2170 MHz interference prevention techniques may be necessary as a result of services in the 1980-2010 MHz / 2170-2200 MHz MSS bands in the frequency block directly below (1974.7 - 1979.7 MHz / 2164.7 - 2169.7 MHz).

3.5.4 Conditions of use at the national borders

3.5.4.1 Preferential frequencies

There are no agreements with neighbouring countries for this frequency band which define specific parts of the spectrum for preferential use.

With the exception of Italy, it is possible to reach agreements with operators in neighbouring countries in accordance with Section 4.

3.5.4.2 Maximum interference field strength in border regions

The following conditions and recommendations concerning "Cross Border Co-ordination" in particular are a subject of discussions in ECC working group PT1. The right to make short-term adjustments regarding the following information is reserved.

In principle and in the absence of bilateral or multilateral agreements, or if no other points are made in this Section, the conditions of use in ECC RECOMMENDATION 01-01, Annexes 1, 3 and 4¹⁸ apply.

Border regions with Germany and France

The mean field strength generated by a base station at a height of 3 m above ground and in a reference bandwidth of 5 MHz shall not exceed the following values at the border and in neighbouring countries:

In the event that the frequencies in the FDD mode are used with UMTS Preferential Codes and with coordinated centre frequencies, or in the event that the centre frequencies are not harmonised or no IMT-2000/UMTS is used, the following applies to the 2110-2170 MHz band:

- For France: 45 dB μ V/m at the border
- For Germany: 37 dBV/m on a coordination line 6 km beyond the border in the neighbouring country

In the event that the frequencies in the FDD mode are used without UMTS Preferential Codes or if the centre frequencies are harmonised and IMT-2000/UMTS is used, the following applies to the 2110-2170 MHz frequency band:

- For France: 21 dB μ V/m at the border and beyond
- For Germany: 37 dB μ V/m at the border and beyond

For UMTS use, coordination of the UMTS Preferential Codes (Preferential Codes for UTRA) and of other radio parameters according to ECC RECOMMENDATION 01-01, Annex 4¹⁹ is recommended.

Border regions with Liechtenstein and Austria

The mean field strength generated by a base station at a height of 3 m above ground and in a reference bandwidth of 5 MHz shall not exceed the following values towards and in neighbouring countries:

If UMTS preferential codes are used or if no IMT-2000/UMTS is used, the following applies to the 2110-2170MHz frequency band:

¹⁸ www.cept.org → ECC → Deliverables or <http://www.ecodocdb.dk/>

¹⁹ www.cept.org → ECC → Deliverables or <http://www.ecodocdb.dk/>

Reference: Licence no.

- 37 dBV/m on a coordination line 6 km beyond the border in the neighbouring country

If no UMTS preferential codes are used, the following applies to the above frequency range:

- 37 dB μ V/m at the border

3.5.4.3 Basis for calculation of frequency coordination

All border regions

The latest valid version of the HCM tools (Harmonised Calculation Method) of the "AGREEMENT between the administrations of (17 countries) on the co-ordination of frequencies between 29.7 MHz and 39.5 GHz for the fixed service and the land mobile radio service" applies. (HCM Agreement) September 2011²⁰.

3.5.4.4 Operator agreements, planning agreements

See Section 4

²⁰ http://www.hcm-agreement.info/http/deutsch/verwaltung/index_hcm_programs.htm

3.6 Frequency range 2600 MHz (2500 – 2690 MHz)

3.6.1 Assignment

The following frequencies are assigned nationwide:

Frequencies	Frequencies	Bandwidth
Uplink from ... to	Downlink from ... to	

3.6.2 Availability

This frequency band is fully available from the award of the licence.

3.6.3 Conditions of use

In each case the latest updated versions ratified by Switzerland of the provisions of the CEPT decisions, recommendations and reports apply:

- ECC/DEC/(05)05: ECC Decision on harmonised utilisation of spectrum for IMT-2000/UMTS systems operating within the band 2500-2690 MHz
- ECC/DEC/(02)06: ECC Decision of 15 November 2002 on the designation of frequency band 2500-2690 MHz for UMTS/IMT-2000
- ECC Report 045: Sharing and adjacent band compatibility between UMTS/IMT-2000 in the band 2500-2690 MHz and other services
- ECC Report 119: Coexistence between mobile systems in the 2.6 GHz frequency band at the FDD/TDD boundary
- CEPT Report 019: Least restrictive technical conditions for WAPECS frequency bands

For use of the 2500-2690 MHz band, the block edge masks are defined in CEPT Report 019, Annex IV. A distinction is made between two types of conditions of use:

- unlimited blocks: maximum EIRP = 61 dBm / 5 MHz²¹
- limited blocks: maximum EIRP = 25 dBm / 5 MHz²²

For use of the 2620-2690 MHz FDD downlink band, the following applies:

- The conditions for unlimited blocks apply to all blocks of frequencies

For use of the 2570-2615 MHz TDD band, the following applies:

²¹ CEPT Report 19, Annex IV, Table A 4.2

²² CEPT Report 19, Annex IV, Table A 4.4

Reference: Licence no.

- For the lowest 5 MHz, the conditions for unlimited blocks apply.
- The 2615-2620 MHz range is a guardband.
- For the remaining ranges of the 2570-2615 MHz frequency block, the conditions for unlimited blocks apply.

3.6.4 Restrictions on use

In Switzerland, radar installations are in operation which use frequencies above the downlink frequency band (above 2690 MHz).

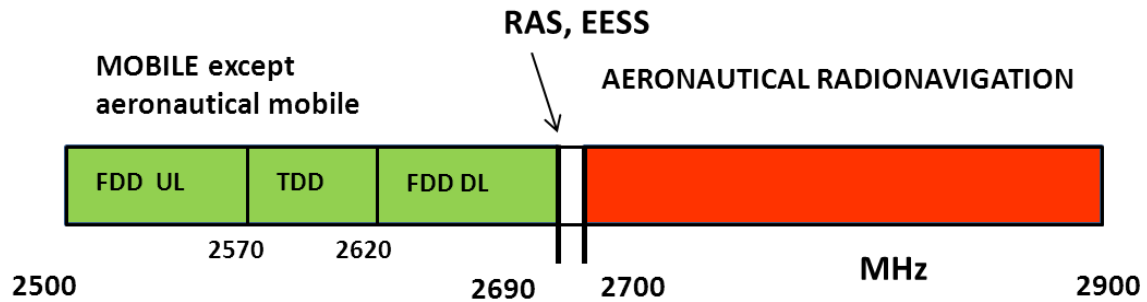


Figure: Excerpt from ECC Report 174²³

These radar installations use pulsed signals and generate field strengths which may locally interfere more or less with mobile radio depending on the assigned partial frequency range.

Because of the low frequency spacing, IMT terminals within a radius of a few kilometres of radar equipment may suffer interference (be blocked) by carrier frequencies below 2730 MHz depending on the transmission power of the radar and the properties of the environment between the radar antenna and the terminal device. The reason for this is the reception filter in the duplexer of the IMT terminal, which does not yet result in any significant attenuation for these radar signals. IMT base stations may also suffer interference due to radar systems.

In the reverse case the situation appears the same: Radar equipment may suffer interference due to nearby base stations. The following restrictions are therefore imposed on IMT base stations:

- The maximum power aggregated by IMT base stations of secondary emissions in the frequency range 2700-2900 MHz, measured at the radar antenna, must not exceed $-150 \text{ dBW/m}^2 / \text{MHz}^{24}$.
- If an IMT base station is located closer than 2 km to a radar station, this must be coordinated. The licensee shall report affected base stations to OFCOM, which carries out a coordination and may impose restrictions or adjustments to the transmission parameters of LTE transmitters. OFCOM provides the licensee with a list of the locations of the affected radar installations.

Note:

The above reciprocal interference may occur even if all the systems involved meet the minimum technical requirements²⁵.

²³ www.cept.org → ECC → Deliverables or <http://www.ecodocdb.dk/>

²⁴ This corresponds to -4 dBuV/m/MHz

²⁵ The minimum requirements for radar equipment are defined, among other things, in the latest versions of the following recommendations: RECOMMENDATION ITU-R M.1464-1; RECOMMENDATION ITU-R SM.1541-4; RECOMMENDATION ITU-R SM.329-11.

3.6.5 Conditions of use at the national borders

3.6.5.1 Preferential frequencies

There are no agreements with neighbouring countries for this frequency band which define specific parts of the spectrum for preferential use.

With the exception of Italy, it is possible to reach agreements with operators in neighbouring countries in accordance with Section 4.

3.6.5.2 Maximum interference field strength in border regions

In principle and in the absence of bilateral or multilateral agreements, or if no other points are made in this Section, the conditions of use in ECC RECOMMENDATION (11) 05, Annex 1, 2 and 5²⁶ apply.

Border regions with Germany and France

The mean field strength generated by a base station at a height of 3 m above ground and in a reference bandwidth of 5 MHz shall not exceed the following values towards and in neighbouring countries:

If only FDD is in operation or if only synchronized TDD is in operation or if TDD is in operation only in the 2620-2690 MHz range:

- 65 dB μ V/m at the border
- 49 dB μ V/m on a coordination line 6 km beyond the border in the neighbouring country

In all other cases where FDD and TDD are operated jointly, the following applies to TDD:

- 21 dB μ V/m at the border

For LTE use, coordination of the PCI code groups and other radio parameters is recommended in accordance with ECC RECOMMENDATION (11) 05, Annex 5.

Border regions with Austria and Liechtenstein

The mean field strength generated by a base station at a height of 3 m above ground and in a reference bandwidth of 5 MHz shall not exceed the following values at the border and in neighbouring countries:

If only FDD is in operation or if only synchronized TDD is in operation in the 2570-2620 MHz or if TDD is in operation only in the 2620-2690 MHz range:

- 65 dB μ V/m at the border
- 39 dB μ V/m on a coordination line 5 km beyond the border in the neighbouring country

If TDD is in operation in the 2500-2570 MHz range:

- 39 dB μ V/m at the border **but at a height of 10m above ground**

For LTE use, coordination of the PCI code groups and other radio parameters is recommended in accordance with ECC RECOMMENDATION (11) 05, Annex 5.

²⁶ www.cept.org → ECC → Deliverables or <http://www.ecodocdb.dk/>

3.6.5.3 Basis for calculation of interference field strength

The latest valid version of the HCM tools (Harmonised Calculation Method) of the "AGREEMENT between the administrations of (17 countries) on the co-ordination of frequencies between 29.7 MHz and 39.5 GHz for the fixed service and the land mobile radio service" applies. (HCM Agreement) September 2011²⁷.

The time probability for all calculations is 10%.

3.6.5.4 Operator agreements, planning agreements

See Section 4

²⁷ http://www.hcm-agreement.info/http/deutsch/verwaltung/index_hcm_programs.htm

4 Operator agreements

In the border regions, agreements with foreign operators may be made in the common frequency sections or (U) ARFCN for more efficient use of the frequency spectrum and reduction of administrative work. These may include, for example:

- Apportionment of preferential frequencies
- Apportionment of preferential codes
- Definition and specification of harmonised centre frequencies or carrier frequencies (e.g. for LTE or UMTS)
- Synchronization of networks

The operator agreements

- may not be concluded at the expense of third parties and
- require the prior consent of all affected administrations.

Procedure for operator agreements

- With the request for approval, each operator concerned sends the outcome of the agreement in the form of a draft contract to their own spectrum management authority.
- Each spectrum management authority checks the submitted draft contract and sends its comments or consent in writing to the other affected foreign spectrum management authorities.
- The spectrum administrations approached in turn respond to the comments or consents received.
- The spectrum management authorities inform their operators about the decision (consent, modification, rejection) on the basis of the comments of the spectrum management authorities. The administrations concerned are notified with a copy.

None of the cited regulations and procedures regarding operator agreements are applicable to Italy.

5 Construction and operation of the radio network

5.1 Base station data to be supplied to OFCOM

Every 14 days the operational data of all base stations must be submitted to OFCOM. Licensees shall submit their base station data in the form of regular uploads to the database. The format of the data to be uploaded and the detailed procedure to be followed are to be clarified with OFCOM in advance. The operating data consists of the following parameters:

- Operator code
- Station code
- [cell type (macro, micro, pico, femto)]²⁸
- Cell name
- CH coordinates East
- CH coordinates North
- Elevation of location above sea level
- Main beam direction of the antenna (azimuth)
- Inclination of the antenna (elevation, tilt)
- Polarization of radiation
- [Antenna type]
- Antenna diagram H Vienna code
- Antenna diagram V Vienna code
- Antenna height above ground
- Site address
- Postal code
- Town or city
- [Additional comment on the site]
- Canton of the site
- Number of the equipment (TRX)
- Date of commissioning
- Maximum radiated transmission power

²⁸ Provision of the parameters in [square brackets] is optional

Reference: Licence no.

- Scrambling code (for UMTS systems only)
- Attenuation of the CPICH (for UMTS systems only)
- PCI (for LTE equipment only)
- Identification of the BCCH (for GSM systems only)
- Frequency(ies) (channel designation according to ARFCN or UARFCN)

5.2 Radio interference and special precautions

If individual base stations operated within the framework of this licence cause radio interference, the licensee is obliged to modify the parameters of the corresponding base station at OFCOM's request or to cease its operation.

5.3 Confederation measurement stations

As part of the technical monitoring of the frequency spectrum according to Art. 26 para 1 TCA, OFCOM and the Confederation operate many radio monitoring sites and reception stations. To prevent interference affecting these, base stations which are to be constructed closer than 1 km to such a measurement or reception station must be notified to OFCOM with all technical radio parameters, for coordination purposes. If it turns out that a planned base station could interfere with a measurement or reception station, it cannot be put into operation. OFCOM provides the licensee with a list of the locations of the individual measurement and reception stations.