Agreement between the Communications Authorities of:

Finland,

Norway

and

Sweden

concerning the land use of the following frequency bands:

700 MHz

800 MHz

900 MHz

1500 MHz

1800 MHz

2100 MHz

2300 MHz

2600 MHz

3600 MHz

for wideband systems capable of providing terrestrial electronic communications services in the border areas of the respective countries

March 2021

1. Introduction

1.1. The agreement describes the procedures of co-ordination of civil mobile wideband communication networks operating in the border areas of Finland, Norway and Sweden vis-à-vis any service or application in the above mentioned countries. The agreement does not concern use of GSM technology and preferential GSM-frequency assignments, these can continue to be operated according to existing agreements.

1.2. The Communication Authority of Finland is Finnish Transport and Communications Agency (Traficom).

1.3. The Communication Authority of Norway is Norwegian Communications Authority (Nkom).

1.4. The Communication Authority of Sweden is Swedish Post and Telecom Authority (PTS).

2. Principles and definitions

2.1. Wideband systems include e.g.: UMTS, LTE, LTE-MTC (LTE Machine Type Communication), LTE-eMTC (evolved MTC), LTE in-band NB-IoT, LTE guard-band NB-IoT and NR (New Radio)

2.2. The 700 MHz frequency band, as referred to in this agreement, covers the frequencies from 703 MHz to 733 MHz paired with 758 MHz to 788 MHz for the Frequency Division Duplex (FDD) arrangement and from 738 MHz to 758 MHz for Supplemental Downlink (SDL), as defined in ECC Decision(15)01.

2.3. The 800 MHz frequency band, as referred to in this agreement, covers the frequencies from 791 MHz to 821 MHz paired with 832 MHz to 862 MHz for the FDD arrangement, as defined in ECC Decision (09)03.

2.4. The 900 MHz frequency band, as referred to in this agreement, covers the frequencies from 880 MHz to 915 MHz paired with 925 MHz to 960 MHz for the FDD arrangement, as defined in ECC Decision (06)13 amended March 2019.

2.5. The 1500 MHz frequency band, as referred to in this agreement, covers the frequencies from 1427 MHz to 1518 MHz, for SDL, as defined in ECC Decision (13)03 amended March 2018 and ECC Decision (17)06 corrected March 2018.

2.6. The 1800 MHz frequency band, as referred to in this agreement, covers the frequencies from 1710 MHz to 1785 MHz paired with 1805 MHz to 1880 MHz for the FDD arrangement, as defined in ECC Decision (06)13 amended March 2019.

2.7. The 2100 MHz frequency band, as referred to in this agreement, covers the frequencies from 1920 MHz to 1980 MHz paired with 2110 MHz to 2170 MHz for the FDD arrangement, as defined in ECC Decision (06)01 amended March 2019.

2.8. The 2300 MHz frequency band, as referred to in this agreement, covers the frequencies from 2300 MHz to 2400 MHz, with the TDD arrangement, as defined in ECC Decision (14)02.

2.9. The 2600 MHz frequency band, as referred to in this agreement, covers the frequencies from 2500 MHz to 2570 MHz paired with 2620 MHz to 2690 MHz for the FDD arrangement and 2570 MHz to 2620 MHz for SDL or TDD, as defined in ECC Decision (05)05 amended July 2019

2.10. The 3600 MHz band, as referred to in this agreement, covers the frequencies from 3400 MHz to 3800 MHz, with the TDD arrangement, as defined in ECC Decision (11)06 amended October 2018.

2.11. This agreement is based on the concept of electric field strength levels and preferential Physical-layer Cell Identities (PCIs, when LTE or 5G NR is used) and preferential Scrambling Codes (SCs, when UMTS is used) as defined in Annex 1. Preferential PCI/SC shall be used in border areas to improve coverage and service when channel centre frequencies are aligned.

2.12. This agreement is based on the following country types for the use of preferential PCI/SCs as defined in Annex 1:
Finland – country type 1,
Norway – country type 4,
Sweden – country type 3

2.13. As far as possible the latest version of any relevant decision and recommendation shall be used to assist co-ordination.

2.14. This Agreement covers the co-ordination of base stations, including repeaters. User equipment, or terminals, are allowed to be used on non-interfering basis, in accordance with ITU RR 4.4.

3. Use of frequencies in the border areas

3.1. The co-ordination threshold in this agreement is based on the concept of electric field strength level of 5 MHz block assignment.

3.2. In case of other frequency block sizes, a value of

$$A = 10 * \log_{10}\left(\frac{frequency\ block\ size\ [MHz]}{5\ MHz}\right)\ [dB]$$

should be added to the electric field strength threshold values.

3.3. For electric field strength calculations the latest version of Recommendation ITU-R P.1546 "Method for point-to-area predictions for terrestrial services in the frequency range 30-4000 MHz" with 10% of the time and 50% of the locations shall be used.

3.4. The electric field strength values in this agreement are based on a receiving antenna height of 3 m above ground (mean sea level where applicable).

3.5. The wideband systems may be used without coordination between the countries being party to this agreement if the predicted electric field strength produced by a base station[1] does not exceed the threshold at and beyond the reference lines specified in Annex 2 for the respective band given in the table below[2]:

Frequency band [MHz]	Threshold @ X km reference line and beyond, electric field strength [dBµV/m/5 MHz]		
	Centre frequencies aligned		Centre frequencies not aligned
	Preferential PCIs / SCs	Non-preferential PCIs / SCs	All PCIs / SCs
700 FDD	59 @ 0 km and 41 @ 6 km	41 @ 0 km	59 @ 0 km and 41 @ 6 km
700 SDL	59 @ 0 km and 41 @ 6 km	41 @ 0 km	59 @ 0 km and 41 @ 6 km
800 FDD	59 @ 0 km and 41 @ 6 km	41 @ 0 km	59 @ 0 km And 41 @ 6 km
900 FDD	59 @ 0 km and 41 @ 6 km	41[3] @ 0 km	59 @ 0 km and 41 @ 6 km
1500 SDL	65 @ 0 km and 47 @ 6 km	47 @ 0 km	65 @ 0 km and 47 @ 6 km
1800 FDD	65 @ 0 km and 47 @ 6 km	47[3] @ 0 km	65 @ 0 km and 47 @ 6 km
2100 FDD	65 @ 0 km and 37 @ 6 km	37 @ 0 km	65 @ 0 km and 37 @ 6 km
2300 TDD synchronised	65 @ 0 km and 49 @ 6 km	30 @ 0 km	65 @ 0 km and 49 @ 6 km

[1] The values in the table are only valid if the centre frequencies of the stations of the MFCN systems are not aligned on both sides of the borderline or with centre frequencies aligned using preferential PCI codes for LTE and 5G NR systems or SC's for UMTS systems as given in Annex 1

[2] Based on: ECC Recommendation (15)01 amended Feb 2020 (700 MHz, 1.5 GHz, 3.6 GHz), ECC Recommendation (08)02 amended Feb 2019 (900 MHz and 1800 MHz), ECC Recommendation (11)04 amended Feb 2017 (800 MHz), ERC Recommendation (01)01 revised 2016 (2100 MHz), ECC Recommendation (14)04 (2300 MHz), ECC Recommendation (11)05 amended Feb 2017 (2600 MHz)

[3] Also valid to protect GSM in neighbouring country

Frequency band [MHz]	Threshold @ X km reference line and beyond, electric field strength [dBµV/m/5 MHz]		
	Centre frequencies aligned		Centre frequencies not aligned
	Preferential PCIs / SCs	Non-preferential PCIs / SCs	All PCIs / SCs
2300 TDD non synchronised	30 @ 0 km	30 @ 0 km	30 @ 0 km
2600 FDD	65 @ 0 km and 49 @ 6 km	49 @ 0 km	65 @ 0 km and 49 @ 6 km
2600 TDD synchronised	65 @ 0 km and 49 @ 6 km	49 @ 0 km	65 @ 0 km and 49 @ 6 km
2600 TDD non synchronised	30 @ 0 km	30 @ 0 km	30 @ 0 km
3600 TDD synchronised	67 @ 0 km and 49 @ 6 km	49 @ 0 km	67 @ 0 km and 49 @ 6 km
3600 TDD non synchronised	Preferential frequencies		Non-preferential frequencies
	Preferential PCIs / SCs	Non-preferential PCIs / SCs	All PCIs / SCs
	45 @ 0 km and 27 @ 6 km	27 @ 0 km	0 @ 0 km

3.6. Establishment of arrangements between operators shall be encouraged to the extent possible. Subject to agreement between operators other technical characteristics than those listed in section 3.5 can be used, e.g. other threshold values or propagation models. Agreements between operators to deviate from threshold values listed in section 3.5 shall be brought to the attention of the concerned authority.

3.7. If the field strength of an intended base station exceeds the values specified in section 3.5 without an agreement referred to in section 3.6, then agreement needs to be sought from the affected Authority before the base station can be brought into operation. The affected Authority shall give its reply within 45 days from the date of the receipt of a written request and 20 days after a reminder. A request shall be sent by e-mail to the official e-mail address of the affected Authority. If no reply is received after 65 days after the initial request, the affected Authority is considered to have given its agreement to the operation of the base station.

3.8. Any case of interference shall as far as possible be resolved among the operators concerned. If not resolved, assistance can be sought from the

Authorities. Authorities shall take all possible steps in order to eliminate the interference.

4. Status of existing co-ordination agreements

4.1. From the date of entering into the force this Agreement replaces all existing coordination Agreements, or parts of Agreements, for wideband systems capable of providing terrestrial electronic communications services in the border areas of the respective countries in the included frequency bands. Existing coordination Agreements for GSM technology or those parts of existing coordination Agreements dealing with GSM technology stay in force.

5. Revision and cancellation

5.1. This Agreement may be revised or cancelled without notice, if understanding is reached between the Authorities.

5.2. Any Authority listed in this document is entitled to withdraw from this Agreement with a notice of at least six months.

6. Entry into force

6.1. This Agreement shall enter into force from the dd. mmm 2021

6.2. This Agreement has been drawn up in 3 (three) identical copies, one for each Authority.

For the Communication Authority of Finland

Place Date

Jenni Eskola
Deputy Director-General

For the Communication Authority of Norway

Place Date

John-Eivind Velure
Director of the Spectrum Department

For the Communication Authority of Sweden

Place Date

Anders Palmberg
Acting Head of section Spectrum development

ANNEX 1 – Preferential PCIs (for LTE and NR) and SCs (for UMTS)

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

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

	Preferential PCI
	Preferential PCI, relevant for this agreement
	non-preferential PCI

The 504 (LTE) /1007 (NR) 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 Finland	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 Sweden	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 Norway	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						

2. PREFERENTIAL SCRAMBLING CODES FOR UMTS (UTRA FDD)

For each type of country, the following tables and figure describe the sharing of the scrambling codes (SC) with its neighbouring countries, with the following conventions of writing:

	Preferential SC
	Preferential SC, relevant for this agreement
	non-preferential SC

For the FDD mode; 3GPP TS 25.213 defines 64 « scrambling code groups » in §5.2.3, numbered {0…63}, which are organised into six sets A-F.

	Set A	Set B	Set C	Set D	Set E	Set F
Country 1 Finland	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 Sweden	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 Norway	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						

ANNEX 2 – Reference lines

1. *In Finland*

The land border between Sweden and Finland as well as the land border between Norway and Finland.
The coastline of Finland.
At Ahvenanmaa/Åland:
- A line between Norrskär (60º 32' 24'' N, 20º 12' 30'' E), Ådskär (60º 21' 03'' N, 19º 31' 17'' E), Västerön (60º 14' 17'' N, 19º 28' 30'' E), Askö (59º 59' 20'' N, 19º 59' 19'' E) and Kalskär (59º 47' 51'' N, 20º 57' 50'' E)

At Vaasa/Vasa:
- A line between Mickelsöarna (63º 28' 30'' N, 21º 44' 40'' E), Lappöarna (63º 22' 03'' N, 21º 11' 00'' E) and Bergö (62º 58' 41'' N, 21º 06' 59'' E)

At Oulu/Uleåborg:
- Hailuoto (65º 02' 23'' N, 24º 33' 04'' E)

2. *In Sweden*

The land border between Finland and Sweden as well as the land border between Norway and Sweden.
The coastline of Sweden.
At the coast of Uppland and Stockholm archipelago:
- A line between Argos grund (60º 37' 42'' N, 18º 21' 47'' E), Simpnäsklubb (59º 53' 34'' N, 19º 04' 46'' E), Söderarm (59º 45' 10'' N, 19º 24' 21'' E), Svenska högarna (59º 26' 38'' N, 19º 30' 06'' E) and Huvudskär (58º 47' 46'' N, 18º 34' 13'' E)

Note: Geographical coordinates in WGS 84.

Illustration of Zone S and Zone F

3. *In Norway*

The land border between Finland and Norway as well as the land border between Sweden and Norway, or a line midway between the Norwegian coastline and the Swedish coastline, due to ratified border agreement between Norway and Sweden.