

Agreement between the Danish Energy Agency and the Swedish Post and Telecom Authority concerning the use of the 900 MHz frequency band for wideband systems

March 2022

1. Principles and definitions

- 1.1 Wideband systems include e.g.: UMTS, LTE, LTE-MTC (LTE Machine Type Communication), LTE-eMTC (evolved MTC), LTE in-band NB-IoT (Narrow Band Internet of Things), LTE guard-band NB-IoT and NR (New Radio).
- 1.2 The 900 MHz frequency band, as referred to in this agreement, covers the frequencies from 880 MHz to 915 MHz (UL) paired with 925 MHz to 960 MHz (DL) for the FDD arrangement, as defined in ECC Decision (06)13 (amended March 2022).
- 1.3 For the narrowband systems GSM, EC-GSM-IoT (Extended Coverage-GSM-IoT) and standalone NB-IoT the existing coordination agreement from 2010 is still valid.
- 1.4 This agreement is based on the concept of electric field strength levels. When LTE or 5G NR is used, in accordance with ECC REC (08)02 (amended Oct 2021) and as defined in Annex 1, preferential Physical-layer Cell Identities (PCIs) shall be used in border areas to improve coverage and service when channel centre frequencies are aligned. In case of other technology using some type of preferential codes those should be used, e.g. for UMTS preferential Scrambling Codes (SC) as defined in Annex 2 shall be used.
- 1.5 This Agreement covers the co-ordination of base stations, including repeaters. User equipment are allowed to be used on non-interfering basis, in accordance with ITU RR 4.4.
- 1.6 For the purpose of this agreement the borderline of Denmark and Sweden respectively is defined as the coastline, excluding the islands of Flakfortet, Middelgrund, Peberholmen and Saltholmen in Denmark and excluding the island of Ven in Sweden.
- 1.7 For predictions of field strength values the latest version of 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 for a receiving antenna height of 3 m above ground.

2. Use of frequencies without coordination by administrations

- 2.1 The wideband systems may be used without coordination between Denmark and Sweden if the predicted electric field strength produced by a base station does not exceed the threshold at and beyond the reference lines (@ x km beyond the border to the neighboring country), see Table 1.

Table 1 Threshold for use without coordination.

| Threshold @ X km reference line and beyond, electric field strength, E ₀ [dBμV/m/5 MHz] | | |
|---|--------------------------------|-----------------------------------|
| Centre frequencies aligned | | Centre frequencies not aligned |
| Preferential PCIs / SCs | Non-preferential PCIs / SCs | All PCIs / SCs |
| 59 @ 0 km and 41 @ 6 km | 41 @ 0 km | 59 @ 0 km and 41 @ 6 km |

Note: These values also protect possible narrowband (GSM, EC-GSM-IoT and standalone NB-IoT) usage in the 900 MHz band in neighbouring country.

- 2.2 In cases of frequency block sizes other than 5 MHz, the predicted field strength E shall be adjusted by a factor in comparison with E₀:

$$E = E_0 + 10 \cdot \log_{10}(BW/5), \text{ where } BW \text{ is the used block size measured in MHz.}$$

3. Coordination procedure

- 3.1 Establishment of agreements between operators shall be encouraged to the extent possible. Subject to agreement between operators other technical characteristics can be used, e.g. other field strength limits or propagation models.
- 3.2 Any case of interference shall as far as possible be resolved among operators concerned. If not resolved, or in case of unequal access to the spectrum band, assistance might be sought from the administrations.

4. Revision and cancellation

- 4.1 This agreement may be cancelled with a notice of at least twelve months from any of the two parties.
- 4.2 This agreement may be cancelled or revised without notice, if mutual understanding is reached between the administrations, e.g. due to revision of ECC REC (08)02.

5. Enter into force

- 5.1 This Agreement shall enter into force from date of signing.
- 5.2 This agreement has been drawn in two identical copies, one for Denmark and one for Sweden.

Place

Date

For the Danish Energy Agency

Jeppe Tanderup Kristensen

Senior Adviser, Center for Telecoms

Place

Date

For the Swedish Post and Telecom Authority

Farshad Moradi

Head of Section for Spectrum Development

ANNEX 1 - PREFERENTIAL PHYSICAL CELL IDENTIFIER (PCI) FOR LTE and 5G NR

PCI division, according to table below, shall be used in border areas to improve coverage and service when channel centre frequencies are aligned.

The PCIs are divided between the administrations according to the following tables:

Table A1. PCI division for LTE

| | | | | | | |
|---------|------------------|--------------------|---------------------|---------------------|---------------------|---------------------|
| PCI | Set A 0 to 83 | Set B 84 to 167 | Set C 168 to 251 | Set D 252 to 335 | Set E 336 to 419 | Set F 420 to 503 |
| Country | Denmark | Denmark | Denmark | Sweden | Sweden | Sweden |

Table A2. PCI division for 5G NR

| | | | | | | |
|---------|-----------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| PCI | Set A 0 to 83 504-587 | Set B 84 to 167 588-671 | Set C 168 to 251 672-755 | Set D 252 to 335 756-839 | Set E 336 to 419 840-923 | Set F 420 to 503 924-1007 |
| Country | Denmark | Denmark | Denmark | Sweden | Sweden | Sweden |

ANNEX 2 - Assignment of preferential scrambling code groups between Denmark and Sweden for UMTS

In border areas, the codes will be divided into six "code sets" containing each one sixth of the available code groups. Each country is allocated three code sets.

Four types of countries are defined in ECC/REC/(08)02 in a way that no country will use the same code set as any one of its neighbours. The following lists describe the distribution of codes in this agreement.

Country 1: Denmark, DNK

Country 3: Sweden, S

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

| | |
|--|-----------------------|
| | Preferential code |
| | Non-preferential code |

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

Table A3: 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 |
|----------------|-------|--------|--------|--------|--------|--------|
| Denmark | 0..10 | 11..20 | 21..31 | 32..42 | 43..52 | 53..63 |
| Border DNK-S | | | | | | |

| | Set A | Set B | Set C | Set D | Set E | Set F |
|---------------|-------|--------|--------|--------|--------|--------|
| Sweden | 0..10 | 11..20 | 21..31 | 32..42 | 43..52 | 53..63 |
| Border S-DNK | | | | | | |