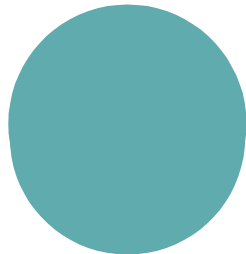


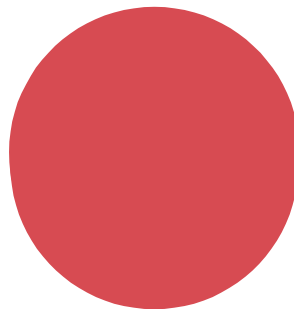


Energistyrelsen



# **Informationsmemorandum**

## **Bilag M**



**Grænsekoordineringsaftaler mellem Danmark og  
Tyskland (700 MHz- og 900 MHz-frekvensbåndene)  
700 MHz-, 900 MHz- og 2300 MHz-auktionen**

**2018**

# Agreement between the Danish Energy Agency, and the Federal Network Agency concerning the use of the 700 MHz band (694-790 MHz) for MFCN service

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[February 2018]

## Coordination agreement between MFCN and MFCN

This agreement is valid from the date of a potential Danish change of service to MFCN in the 700 MHz band. Denmark will inform Germany as soon as a final date of the change of service is set.

### 1. Principles and definitions

- 1.1. The 700 MHz band, as referred to in this agreement, covers the frequencies from 694 MHz to 790 MHz, with the FDD arrangement, including optional SDL (Supplemental Downlink, up to 4x5 MHz in the duplex gap) in accordance with ECC Decision (15)01. The use of other arrangements such as TDD is not covered in this agreement.
- 1.2. This agreement is based on the concept of field strength levels and in the case when LTE systems are used preferential PCIs as defined in Annex 1.
- 1.3. This agreement covers the coordination of the base stations. The user equipment, or terminals, are allowed to be used on non-interfering basis, in accordance with ITU RR 4.4.
- 1.4. For the purpose of this agreement the border of Denmark and Germany is the coastline, where the border is not on land.
- 1.5. The latest version of ITU-R P.1546 "Method for point-to-area predictions for terrestrial services in the frequency range 30-3000 MHz" shall be used for predictions of field strength values.

### 2. Use of frequencies without coordination by administrations

- 2.1. Denmark may use the 700 MHz band without coordination with Germany, if the predicted field strength  $E_0$  produced by a base station does not exceed 54 dB( $\mu$ V/m)/5 MHz at a height of 1.5 m above the ground at the German border, and does not exceed 36 dB( $\mu$ V/m)/5 MHz at a distance of 6 km beyond the German borderline.
- 2.2. Germany may use the 700 MHz band without coordination with Denmark, if the predicted field strength  $E_0$  produced by a base station does not exceed 54 dB( $\mu$ V/m)/5 MHz at a height of 1.5 m above the ground at the Danish border, and does not exceed 36 dB( $\mu$ V/m)/5 MHz at a distance of 6 km beyond the Danish borderline.
- 2.3. In case of using technologies with other channel bandwidths (BW) than 5 MHz, the predicted field strength  $E$  shall be adjusted by a factor in comparison with  $E_0$  as defined in paragraphs 2.1 and 2.2:

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

2.4. The field strength values (see 2.1 and 2.2) in this agreement are based on a receiving antenna height of 1.5 m, 10% of the time and 50% of the locations.

### 3. Use of Physical-Layer Cell Identities (PCI) for LTE

3.1. In the case when LTE systems are used, PCI division, according to the table in Annex 1, may 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 table.

### 4. Coordination procedure

- 4.1. Establishment of arrangements 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. Such arrangements are subject to consent of the administrations concerned. In particular, before giving consent to such arrangements, the administrations concerned should take care that all network operators concerned are parties in such an arrangement.
- 4.2. Any case of interference shall as far as possible be resolved among the operators concerned. If not resolved, or in case of unequal access to the spectrum band, assistance might be sought from the administrations.

### 5. Revision and cancellation

- 5.1. This agreement may be revised upon mutual agreement of the two administrations.
- 5.2. This agreement may be cancelled with a notice of at least twelve months from any of the two parties.

### 6. Enter into force

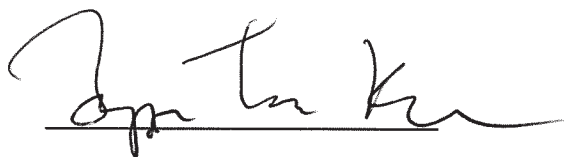
- 6.1. This agreement is valid from the date of a potential Danish change of service to MFCN in the 700 MHz band.

This agreement has been drawn in two identical copies, one for Denmark and one for Germany.

Place *Copenhagen*

Date *16.02.2018*

For the Danish Energy Agency



Jeppe Tanderup Kristensen

Place *Münch*

Date *05.02.2018*

For the Federal Network Agency



Tobias Schnetzer

## ANNEX 1

### PREFERENTIAL PHYSICAL-LAYER CELL IDENTITIES (PCI) FOR LTE

PCI division, according to the table below, may 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 table:

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	Germany	Germany	Germany	Denmark

Table: Division of Preferential Physical-Layer Cell Identities (PCI) for LTE

# **AGREEMENT**

**between the National IT- and Telecom Agency,  
Denmark and the Bundesnetzagentur, Germany**

**concerning the opening for IMT services in the  
bands,  
880-915 MHz and 925-960 MHz  
in border areas**

**April 2011**

## 1. INTRODUCTION

The frequency bands 880-915 MHz and 925-960 MHz are designated for terrestrial systems capable of providing electronic communications services according to

COMMISSION DECISION (2009/766/EC) of 16 October 2009 on the harmonisation of the 900 MHz and 1 800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community.

The administrations of the Denmark and Germany have agreed on the following frequency planning and frequency using procedures.

This agreement covers the co-ordination of base stations. The user equipment, or terminals, is allowed to be used on a non interference basis, in accordance with ITU RR 4.4

The field strength values in this agreement are based on a receiving antenna height of 3 meters, **10%** of the time and 50% of the locations.

The latest version of ITU-R REC P.1546 shall be used.

The use of TDD is not covered by this Agreement.

This Agreement will replace the GSM900 Agreement of 2010 and the E-GSM900 Agreement of 2001, by **31. March 2014**. In case of GSM on both sides are in use by that date the existing GSM900 Agreement will remain in force.

## 2. PRINCIPLES OF FREQUENCY PLANNING AND FREQUENCY USAGE AT BORDER AREAS

The concept of equal access probability is a new frequency planning principle enabling equitable coverage for two or more networks using the same frequency band with the same or different digital technologies in geographically adjacent areas without coordination. Operation of stations in the respective border area exceeding the specified field strength values after performing traditional frequency coordination would disturb the balance in the respective area and is therefore not desirable.

The following principles apply to frequency utilisation by terrestrial systems capable of providing electronic communications services in geographically adjacent areas:

- Field strength values are defined inside a reference frequency block of 5 MHz.
- The field strength calculations shall take into account the sum of all signals radiated from the respective antenna sector within the reference frequency block. The respective field strength values for each signal should be applied by each antenna sector and can be deduced by reducing the limit proportionally to the frequency block portions falling into the reference bandwidth (reduction factor =  $10 \times \log(\text{frequency block portion} / 5 \text{ MHz})$ ).

In order to assure equitable coverage and equal access probability to the spectrum in border areas even with different transmission technologies, and to enhance the efficiency of spectrum usage, the principles and field strength limits as given in chapter 4. of this agreement shall be respected by all networks concerned.

### 3. OPERATOR ARRANGEMENTS

To further improve the compatibility of terrestrial systems capable of providing electronic communications services in border areas, operator arrangements may be concluded concerning other frequency coordination methods such as:

- preferential frequency distribution arrangements,
- (if concerned neighbouring systems in all affected countries are using code division multiple access technologies such as IMT-2000/UMTS) preferential code division arrangements (e.g. according to ERC/REC(01)01),
- frequency carrier definitions (e.g. with LTE),
- Synchronisation of concerned networks.
- use of other propagation models.

Such arrangements are subject to consent of the administrations concerned. In particular, before giving consent to such arrangements, the administrations concerned should take care that all network operators concerned are parties in such an arrangement.

In case an operator changes from GSM to IMT the affected operator in the other country shall be informed.

### 4. TECHNICAL CHARACTERISTICS

#### IMT in both countries and IMT in one country and GSM continue in the other country in common spectrum

For the protection of both IMT and GSM systems, frequencies in the bands 890-915 MHz and 935-960 MHz may be used by both IMT (FDD) systems and GSM systems without coordination with the neighbouring country, if the mean field strength of each carrier produced by the base station does not exceed **55 dB $\mu$ V/m/5MHz** at a height of 3 m above ground at the borderline in the frequency band 935-960 MHz.

IMT base stations and GSM base stations may be operated if the produced field strength does not exceed the value of **29 dB $\mu$ V/m/5MHz** at a height of 3 meters above ground at a line of **9 km** beyond the border.

#### GSM continues in common spectrum in both countries

If an operator in one country continues to use GSM and the affected operator in the other country also continues to use GSM after 31. March 2014, the GSM base stations using preferential channels in common spectrum may be operated if the produced field strength does not exceed the value of **22 dB $\mu$ V/m/200kHz** at a height of 3 meters above ground at a line of **15 km** beyond the border.

Non-preferential channels in common spectrum may be operated if the produced field strength does not exceed the value of **22 dB $\mu$ V/m/200kHz** at a height of 3 meters above ground at the border.

The division into preferential and non-preferential channels is contained in annex 1 to this Agreement.

The timing of the changover from GSM to IMT to be mutually agreed between affected operators.

## 5. DEFINITION OF BORDER

The borderline is the coastline, where the border is not on land.

## 6. REVISION OF THE AGREEMENT

This agreement may be modified at the request of one of the signatory administrations where such a modification becomes necessary in the light of administrative, regulatory or technical development.

The technical characteristics may be reviewed in the light of practical experience of its application and of the operation of terrestrial systems capable of providing electronic communications services in general.

## 7. WITHDRAWAL FROM THE AGREEMENT

Any administration may withdraw from this agreement subject to six months notice.

## 8. LANGUAGE OF THE AGREEMENT

This agreement has been concluded in English.

## 9. DATE OF ENTRY INTO FORCE

The date of entry into force is the date of the signatures.

## 10. SIGNATURE OF THE AGREEMENT

Done *11* . April 2011

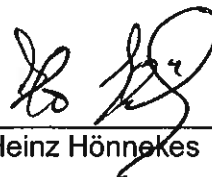
For the National Telecom Agency,  
Denmark



Per V. Christensen

Done *21* . April 2011

For the Bundesnetzagentur,  
Germany



Heinz Hönnekes