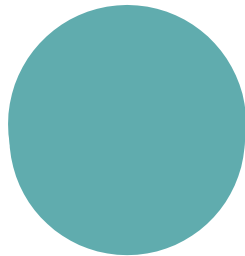


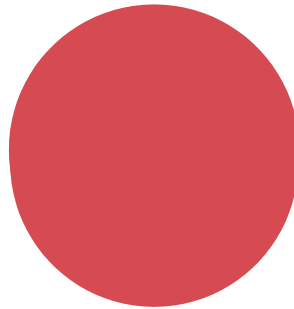


Energistyrelsen



# **Informationsmemorandum**

## **Bilag O**



**Grænsekoordineringsaftaler  
Danmark og Sverige**

**mellem**

**2021**

**Agreement between the Telecom Agency, Denmark  
and the National Post and Telecom Agency, Sweden  
concerning the use of the frequency bands 1900–1980  
MHz, 2020-2025 MHz and 2110-2170 MHz  
for terrestrial UMTS system.**

**March 2004**

## 1 Principles

- 1.1 This agreement is based on the concept of preferential scrambling code groups<sup>1</sup>.
- 1.2 The use of TDD systems in the band 1920-1980 MHz is not covered in this agreement.

## 2 Definition of border

For this agreement only, the coastline of Denmark is defined as excluding the islands of Middlegrund, Flakfortet, Saltholm and Pepparholm and the coastline of Sweden shall be defined as excluding the island of Ven.

## 3 Preferential scrambling code groups

The assignment of preferential scrambling code groups between Sweden and Denmark within frequency bands 1900-1920 MHz, 2020-2025 MHz and 2110-2170 MHz are defined in Annex 1.

## 4 Use of frequencies without co-ordination<sup>2</sup>

- 4.1 Each country may use channels within frequency bands 1900-1920 MHz and 2020-2025 MHz for TDD systems using preferential codes without co-ordination with the neighbouring country, if the field strength value of each carrier produced by the base station does not exceed 36 dB $\mu$ V/m/5 MHz at neighbouring coastline.
- 4.2 Each country may use channels within the frequency band 2110-2170 MHz for FDD systems using preferential codes or for systems not using CDMA IMT-2000 radio interface, without co-ordination with the neighbouring country, if the field strength value of each carrier produced by the base station does not exceed 45 dB $\mu$ V/m/5 MHz at neighbouring coastline.
- 4.3 Each country can use channels within frequency bands 1900-1920 MHz, 2020-2025 MHz and 2110-2170 MHz for systems using non preferential codes without co-ordination with the neighbouring country, if the field strength value of each carrier produced by the base station does not exceed 21 dB $\mu$ V/m/5 MHz at neighbouring coastline.

## 5 General

- 5.1 Establishment of agreements between operators is encouraged to the extent possible. Subject to agreement between operators other technical characteristics can be used, i.e. preferential frequencies, other field strength limits or propagation models. The Administration shall be informed of such agreements.
- 5.2 A complaint in case of harmful interference shall be based on the median values of measurements of field strength, performed at 3 meter of receiving antenna height at least on two different occasions over a range of at least 100 meter along the coastline.
- 5.3 The field strength values in this agreement are based on a receiving antenna height of 3 meter, 10 % of the time and 50 % of locations.

<sup>1</sup> Annex 4, ERC/REC(01)01

<sup>2</sup> Annex 1, ERC/REC(01)01

- 5.4 Countries shall use the ITU-R P.1546-1 "Method for point-to area predictions for terrestrial services in the frequency range 30-3000 MHz" as specified in ERC/REC.(01)01 Annex 2 for field strength calculations relating to this agreement.

## 6 Revision and cancellation

- 6.1 This agreement may be revised or cancelled as desired by one of the administrations with a notice of one year.
- 6.2 In case this agreement is cancelled and new one is not concluded the co-ordination procedure will be based on CEPT ERC Recommendation (01)01 Annex 5.
- 6.3 A review should take place 12 months from the entry into force of this agreement.

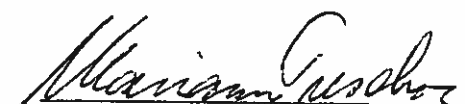
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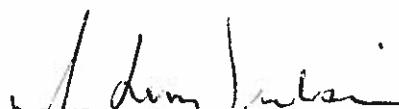
This agreement shall come into effect from date of signature.

This agreement has been drawn up in two identical copies, of which each administration has taken one each.

Stockholm 17/3 2004

Copenhagen 29/3 2004

  
Marianne Treschow

  
J. Lang Nielsen

**Annex 1****Assignment of preferential scrambling code groups between Denmark and Sweden**

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

Four types of countries are defined in Recommendation ERC(01)01 in a way such 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

	Preferential code
	non-preferential code

**FDD scrambling codes<sup>3</sup>**

<b>Denmark</b>	Set A	Set B	Set C	Set D	Set E	Set F	<b>Sweden</b>	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	Country 3	0..10	11..20	21..31	32..42	43..52	53..63
Border DNK-S							Border S-DNK						

**TDD scrambling codes<sup>4</sup>**

<b>Denmark</b>	Set A	Set B	Set C	Set D	Set E	Set F	<b>Sweden</b>	Set A	Set B	Set C	Set D	Set E	Set F
Country 1	0..4	5..10	11..15	16..20	21..26	27..31	Country 3	0..4	5..10	11..15	16..20	21..26	27..31
Border DNK-S							Border S-DNK						

<sup>3</sup> 3GPP TS 25.213 defines 64 « scrambling code groups » in §5.2.3, numbered {0..63}.

<sup>4</sup> 3GPP TS 25.223 defines 32 « scrambling code groups » in §7.3, numbered {0..31}.

# Agreement between the Danish Energy Agency and the Swedish Post and Telecom Authority concerning the use of the frequency band 2300- 2400 MHz

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February 2018

## **1. Principles and definitions**

- 1.1 The frequency band 2300-2400 MHz is harmonized for mobile/fixed communications networks (MFCN), in accordance with CEPT ECC Decision (14)02.
- 1.2 This agreement is based on the concept of field strength levels on borderlines in accordance with ECC REC (14)04.
- 1.3 This agreement covers the coordination of TDD (Time Division Duplex) and downlink only base stations. 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 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.
- 1.5 The latest version of Recommendation ITU-R P. 1546 "Method for point-to-area predictions for terrestrial services in the frequency range 30 MHz to 3000 MHz" shall be used for prediction of field strength values.

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

- 2.1 Denmark may use the frequency band 2300-2400 MHz without coordination with Sweden, if the cumulative interfering field strength produced by an individual base station does not exceed 30 dB( $\mu$ V/m)/5 MHz.
- 2.2 Sweden may use the frequency band 2300-2400 MHz without coordination with Denmark, if the cumulative interfering field strength produced by an individual base station does not exceed 30 dB( $\mu$ V/m)/5 MHz.
- 2.3 For base stations that are synchronized<sup>1</sup> between Denmark and Sweden or deployed as downlink only on both sides of the border, the following applies:
  - 2.3.1 Denmark may use the frequency band 2300-2400 MHz without coordination with Sweden, if the cumulative interfering field strength produced by an individual base station does not exceed 65 dB( $\mu$ V/m)/5 MHz within the Swedish borderline or beyond and 49 dB( $\mu$ V/m)/5 MHz at a distance of 6 km inside the Swedish borderline or beyond.

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<sup>1</sup> Synchronized TDD base stations operate aligned in time, so that there is no overlap between DL and UL transmission.

- 2.3.2 Sweden may use the frequency band 2300-2400 MHz without coordination with Denmark, if the cumulative interfering field strength produced by an individual base station does not exceed 65 dB( $\mu$ V/m)/5 MHz within the Danish borderline or beyond and 49 dB( $\mu$ V/m)/5 MHz at a distance of 6 km inside the Danish borderline or beyond.
- 2.4 Field strength values are defined within a reference block of 5 MHz. In cases of other frequency block sizes a value of  $10 \times \log_{10}$  (frequency block size [in MHz]/5 MHz) dB should be added to the field strength values.
- 2.5 The field strength values in this agreement are based on a receiving antenna height of 3 m above the ground, 10 % of the time and 50 % of location.

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

In the case when LTE systems or 5G NR are used, preferential PCIs as defined in Annex 1 to this agreement shall be used.

### **4. Coordination procedure**

- 4.1 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.
- 4.2 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.

### **5. Revision and cancellation**

- 5.1 This agreement may be cancelled with a notice of at least twelve months from any of the two parties.
- 5.2 This agreement may be cancelled without notice or revised, if mutual understanding is reached between the administrations.

### **6. Enter into force**

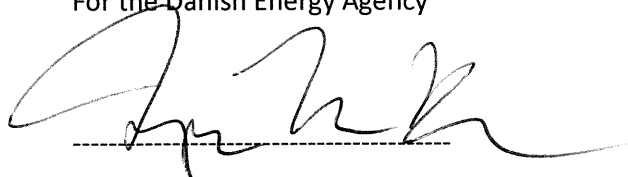
- 6.1 This Agreement shall enter into force from April 1, 2019.

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

Place København

Date 12 March 2019

For the Danish Energy Agency

A handwritten signature in black ink, appearing to read 'Jeppe Tanderup Kristensen', written over a horizontal dashed line.

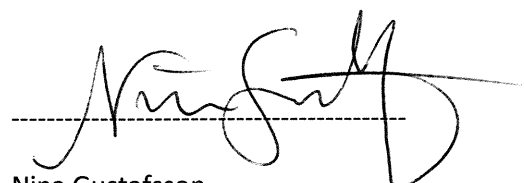
Jeppe Tanderup Kristensen

Senior Adviser, Center for Telecoms

Place Stockholm

Date 6 March, 2019

For the Swedish Post and Telecom Authority

A handwritten signature in black ink, appearing to read 'Nina Gustafsson', written over a horizontal dashed line.

Nina Gustafsson

Head of Section for Spectrum Development,  
Spectrum Department



## ANNEX 1 - PREFERENTIAL PHYSICAL-LAYER CELL IDENTITIES (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<sup>2</sup>

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

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<sup>2</sup> According to working document for revision of ECC REC (14)04

## Aftale om 3400-3800 MHz med Sverige

- Aftalen af juni 2020 er den aktuelt gældende
- Aftalen af november 2020 træder i kraft og erstatter aftalen af juni 2020 ved de svenske myndigheders (PTS) underskrift, som forventes inden auktionens gennemførelse.

# Agreement between the Danish Energy Agency and the Swedish Post and Telecom Authority concerning the use of the 3.6 GHz (3400-3800 MHz) frequency band

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June 2020

## 1. Principles and definitions

- 1.1 The 3.6 GHz band, as referred to in this agreement, corresponds to the frequency band 3400 -3800 MHz, with the TDD arrangement in accordance with ECC Decision (11)06.
- 1.2 This agreement is based on the concept of field strength levels on borderlines in accordance with ECC REC (15)01.
- 1.3 This agreement covers the coordination of TDD (Time Division Duplex) and downlink only base stations. User equipment, or terminals, are allowed to be used on non-interference basis, in accordance with ITU RR 4.4.
- 1.4 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.
- 1.5 The latest version of ITU-R P.1546 "Method for point-to-area predictions for terrestrial services in the frequency range 30-4000 MHz" shall be used for predictions of field strength values.

## 2. Use of frequencies without coordination by administrations

- 2.1 Denmark may use the 3.6 GHz band without coordination with Sweden, if the predicted field strength  $E_0$  produced by a base station does not exceed  $0 \text{ dB}(\mu\text{V}/\text{m})/5 \text{ MHz}$  at the Swedish borderline and beyond.
- 2.2 Sweden may use the 3.6 GHz band without coordination with Denmark, if the predicted field strength  $E_0$  produced by a base station does not exceed  $0 \text{ dB}(\mu\text{V}/\text{m})/5 \text{ MHz}$ , at the Danish borderline and beyond.
- 2.3 For base stations that are synchronized<sup>1</sup> between Denmark and Sweden or deployed as downlink only on both sides of the border, the following applies:
  - 2.3.1 Denmark may use the 3.6 GHz band without coordination with Sweden, if the predicted field strength  $E_0$  produced by a base station does not exceed  $67 \text{ dB}(\mu\text{V}/\text{m})/5 \text{ MHz}$  at the Swedish borderline and beyond and  $49 \text{ dB}(\mu\text{V}/\text{m})/5 \text{ MHz}$  at a distance of 6 km from the Swedish borderline and beyond, excluding Onsala peninsula, see 2.3.2.

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<sup>1</sup> Synchronized TDD base stations operate aligned in time, so that there is no overlap between DL and UL transmission.

- 2.3.2 Denmark may use the 3.6 GHz band without coordination with Sweden, if the predicted field strength  $E_0$  produced by a base station does not exceed 40 dB( $\mu$ V/m)/5 MHz at the Swedish borderline of Onsala peninsula.
- 2.3.3 Sweden may use the 3.6 GHz band without coordination with Denmark, if the predicted field strength  $E_0$  produced by a base station does not exceed 67 dB( $\mu$ V/m)/5 MHz at the Danish borderline or beyond and 49 dB( $\mu$ V/m)/5 MHz at a distance of 6 km from the Danish borderline and beyond.
- 2.4 In cases of frequency block sizes other 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 to 2.3:  
 $E = E_0 + 10 \cdot \log_{10}(BW/5)$ , where  $BW$  is measured in MHz.
- 2.5 In unsynchronized case where preferential frequency blocks are used in combination with preferential PCI the trigger value in 2.1 & 2.2 is replaced by 45 dB( $\mu$ V/m)/5 MHz at the border and 27 dB( $\mu$ V/m)/5 MHz at 6 km beyond the border.
- 2.6 The field strength values in this agreement are based on a receiving antenna height of 3 m above the ground, 10% of the time and 50% of location.

### **3. Use of Physical Cell Identifier (PCI)**

- 3.1 In the case when LTE or 5G NR systems are used, preferential PCIs as defined in Annex 1 shall be used.

### **4. Coordination procedure**

- 4.1 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.
- 4.2 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.

### **5. Revision and cancellation**

- 5.1 This agreement may be cancelled with a notice of at least twelve months from any of the two parties.
- 5.2 This agreement may be cancelled without notice or revised, if mutual understanding is reached between the administrations, for example due to revision of ECC REC (15)01.
- 5.3 If needed the point 2.3.2 is to be reconsidered in 2027.

### **6. Enter into force**

- 6.1 This Agreement shall enter into force from 1 January 2021.

### **7. Abrogation of previous agreement**

- 7.1 The "Agreement between the National Post and Telecom Agency, Sweden and National Telecom Agency, Denmark Concerning the use of the frequency band 3410-3600 MHz" is abrogated from the date of signature.

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

Place København

Date 26/6 2020

For the Danish Energy Agency



Jeppe Tanderup Kristensen

Senior Adviser, Center for Telecoms

Place Stockholm

Date 11 sept. 2020

For the Swedish Post and Telecom Authority



Nina Gustafsson

Head of Section for Spectrum Development,

Spectrum Department

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

Table A2. PCI division for 5G NR<sup>2</sup>

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

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<sup>2</sup> According to working document for revision of ECC REC (15)01

# Agreement between the Danish Energy Agency and the Swedish Post and Telecom Authority concerning the use of the 3.6 GHz (3400-3800 MHz) frequency band

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November 2020

## 1. Principles and definitions

- 1.1 The 3.6 GHz band, as referred to in this agreement, corresponds to the frequency band 3400 -3800 MHz, with the TDD arrangement in accordance with ECC Decision (11)06.
- 1.2 This agreement is based on the concept of field strength levels on borderlines in accordance with ECC REC (15)01.
- 1.3 This agreement covers the coordination of TDD (Time Division Duplex) and downlink only base stations. User equipment, or terminals, are allowed to be used on non-interference basis, in accordance with ITU RR 4.4.
- 1.4 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.
- 1.5 The latest version of ITU-R P.1546 "Method for point-to-area predictions for terrestrial services in the frequency range 30-4000 MHz" shall be used for predictions of field strength values.

## 2. Use of frequencies without coordination by administrations

- 2.1 Denmark may use the 3.6 GHz band without coordination with Sweden, if the predicted field strength  $E_0$  produced by a base station does not exceed 32 dB( $\mu$ V/m)/5 MHz at the Swedish borderline and beyond.
- 2.2 Sweden may use the 3.6 GHz band without coordination with Denmark, if the predicted field strength  $E_0$  produced by a base station does not exceed 32 dB( $\mu$ V/m)/5 MHz, at the Danish borderline and beyond.
- 2.3 For base stations that are synchronized<sup>1</sup> between Denmark and Sweden or deployed as downlink only on both sides of the border, the following applies:
  - 2.3.1 Denmark may use the 3.6 GHz band without coordination with Sweden, if the predicted field strength  $E_0$  produced by a base station does not exceed 67 dB( $\mu$ V/m)/5 MHz at the Swedish borderline and beyond and 49 dB( $\mu$ V/m)/5 MHz at a distance of 6 km from the Swedish borderline and beyond, excluding Onsala peninsula, see 2.3.2.

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<sup>1</sup> Synchronized TDD base stations operate aligned in time, so that there is no overlap between DL and UL transmission.

- 2.3.2 Denmark may use the 3.6 GHz band without coordination with Sweden, if the predicted field strength  $E_0$  produced by a base station does not exceed 40 dB( $\mu$ V/m)/5 MHz at the Swedish borderline of Onsala peninsula.
- 2.3.3 Sweden may use the 3.6 GHz band without coordination with Denmark, if the predicted field strength  $E_0$  produced by a base station does not exceed 67 dB( $\mu$ V/m)/5 MHz at the Danish borderline or beyond and 49 dB( $\mu$ V/m)/5 MHz at a distance of 6 km from the Danish borderline and beyond.
- 2.4 In cases of frequency block sizes other 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 to 2.3:  
 $E = E_0 + 10 \cdot \log_{10}(BW/5)$ , where  $BW$  is measured in MHz.
- 2.5 The field strength values in this agreement are based on a receiving antenna height of 3 m above the ground, 10% of the time and 50% of location.

### **3. Use of Physical Cell Identifier (PCI)**

- 3.1 In the case when LTE or 5G NR systems are used, preferential PCIs as defined in Annex 1 shall be used.

### **4. Coordination procedure**

- 4.1 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.
- 4.2 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.



**5. Revision and cancellation**

- 5.1 This agreement may be cancelled with a notice of at least twelve months from any of the two parties.
- 5.2 This agreement may be cancelled without notice or revised, if mutual understanding is reached between the administrations, for example due to revision of ECC REC (15)01.
- 5.3 If needed the point 2.3.2 is to be reconsidered in 2027.

**6. Enter into force**

- 6.1 This Agreement shall enter into force from 1 January 2021.

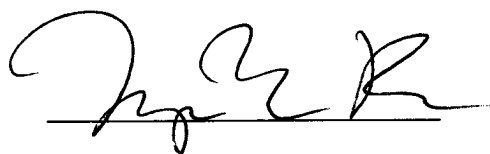
**7. Abrogation of previous agreement**

The previous "Agreement between the Danish Energy Agency and the Swedish Post and Telecom Authority concerning the use of the 3.6 GHz (3400-3800 MHz) frequency band" of June 2020 is abrogated from the date when both parties have signed. This agreement has been drawn in two identical copies, one for Denmark and one for Sweden.

Place København

Date 4/11 2020

For the Danish Energy Agency



Jeppe Tanderup Kristensen

Senior Adviser, Center for Telecoms

Place

Date

For the Swedish Post and Telecom Authority



Nina Gustafsson

Head of Section for Spectrum Development,  
Spectrum Department

## 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:

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Country	Denmark	Denmark	Denmark	Sweden	Sweden	Sweden

Table A2. PCI division for 5G NR<sup>2</sup>

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
	504-587	588-671	672-755	756-839	840-923	924-1007
Country	Denmark	Denmark	Denmark	Sweden	Sweden	Sweden

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<sup>2</sup> According to ECC REC (15)01