Danish Energy Agency

Information Memorandum

Annex C

Draft Licence
700 MHz, 900 MHz and 2300 MHz Auction

2018

Annex C: Draft Licence

A draft licence and the associated technical information are indicated below:

- Draft licence to use frequencies in the frequency bands 703.0-733.0 MHz, 758.0-788.0 MHz and 738.0-758.0 MHz (the 700 MHz frequency band), 880.0-891.9 MHz, 896.9-915.0 MHz, 925.0-936.9 MHz and 941.9-960.0 MHz (the 900 MHz frequency band) and annexes containing technical conditions for using these frequencies, and legal conditions.

[Licensee]

Licence [No.] for using frequencies in the frequency bands 703.0-733.0 MHz, 758.0-788.0 MHz and 738.0-758.0 MHz (the 700 MHz frequency band), 880.0-891.9 MHz, 896.9-915.0 MHz, 925.0-936.9 MHz and 941.9-960.0 MHz (the 900 MHz-frequency band)

Following an auction, [name of licence holder] (hereinafter referred to as the licensee) is granted a licence to use the following radio frequencies (band limits):

[xxx-xxx MHz]	Base station transmitting frequency
[xxx-xxx MHz]	Base station receiving frequency
[xxx-xxx MHz]	Base station transmitting and receiving frequency

The licence is issued in pursuance of Section 10 of the Act on Radio Frequencies, cf. Consolidated Act No. 1100 of 10 August 2016 (Frequency Act).

Licence terms and conditions
For radio frequencies in the frequency band 700 MHz, the licence will enter into force on 4 April 2020 and expire on 3 April 2040.

For radio frequencies in the frequency band 900 MHz, the licence will enter into force on 1 April 2020 and expire on 31 December 2034.

Upon expiry, the licence shall lapse without further notice.

Pursuant to section 10 (3), sections 14 and 15 of the Frequency Act, the following terms and conditions shall apply to the licence:

1) The frequencies may be used throughout Denmark, which shall mean Danish land territory and Danish territorial waters, cf. Executive Order No. 242 of 21 April 1999 on Delimitation of Danish Territorial Waters (as subsequently amended).

2) The maximum transmission power allowed (E.I.R.P.): 64 dBm/5 MHz per antenna.

3) Base station emissions shall comply with the relevant harmonised standard in the ETSI EN 301 908 series applicable to the technology chosen.

4) Frequency usage in the bands 703-733 MHz, 738-758 MHz and 758-788 MHz shall be subject to the licensee complying with the technical requirements specified by Commission Implementing Decision (EU) 2016/687 of 28 April 2016 on the harmonisation of the 694-790 MHz frequency band, cf. Annex 7.

5) In case the base station's receiving bandwidth is larger than 10 MHz and across 713 MHz (for example a block from 703-723 MHz or a block from 708-728 MHz), the block may not be used as one contiguous frequency block, but must be implemented as two independent blocks separated at 713 MHz.

6) However, subject to agreement with holders of licences in frequency bands adjacent to this licence, the licensee may depart from the above-mentioned technical requirements which relate to unwanted emissions within the frequency band in question. This is based on the condition that technical terms in relation to other licensees and neighbouring countries are complied with, and that the agreement does not affect frequency users other than the parties to the agreement.

7) The licensee shall comply with such agreements as might be concluded any time between Denmark and other countries on the use of 694-791 MHz and 880-960 MHz, including border coordination agreements with Sweden, Germany and Russia, cf. Information Memorandum on the 700 MHz, 900 MHz and 2300 MHz Auction, annexes L, M and N. It follows from the current coordination agreements that the licensee, subject to agreement with licensees in Sweden and Germany, may depart from the terms of such coordination agreements if this does not affect other users of frequencies.

8) The licensee shall fulfil the usage requirements specified in annex 1 to this licence not later than 4 April 2022.

9) [The licensee shall fulfil the coverage obligation specified in annex 3 to this licence not later than 4 April 2022. The coverage requirements shall be fulfilled in the areas specified in annex 5 to this licence.]

10) [The licensee shall fulfil the coverage obligation specified in annex 4 to this licence not later than 4 April 2022. The coverage obligation shall be fulfilled at the addresses specified in annex 6 to this licence.]

11) As instalments on the licence price, the licensee shall pay DKK [amount] to the Danish Energy Agency each year on [date of licence issue] during the period from [2020 to 2028 / 2022 to 2030], both years inclusive.

12) In case of failure to pay the instalment in due time, interest shall accrue from the due date until the date on which payment is effected, in accordance with the Act on Interest[1].

13) The licensee shall provide at any time a demand guarantee in relation to the Danish State, issued by a bank or insurance company which does not control, nor is controlled by, the licensee, nor is controlled by a person who controls the licensee, and which is registered in the European Economic Area and has a minimum long-term debt rating from Standard & Poors or Fitch Rating of at least A or from Moody's Investors Service Limited of at least A2. The guarantee shall at any time be for an amount equivalent to the sum of three annual instalments payable on the licence price, cf. section 68 in the Danish Energy Agency's Decision of 14 June 2018 on 700 MHz, 900 MHz and 2300 MHz auction, cf. annex 2, however in such a manner that the guarantee shall be reduced by the instalments that are paid over the last three years of the repayment period. The guarantee shall be effective from the date of issue of the licence and shall at any time be effective in the period where the following three instalments fall due for payment. Other terms appear from the guarantee payable on demand as signed by the licensee.

14) The licensee shall notify the Danish Energy Agency, or the authority responsible at the time in question, without undue delay in the event that the bank or insurance company that has provided the guarantee mentioned above no longer has the credit rating stated.

Further details

The licence shall be subject to the provisions of Acts and Executive Orders that specify rules for holders of frequency licences. At the time of issuing the licence, the provisions of the following Executive Orders are particularly relevant:

- Executive Order No. 1329 of 30 November 2017 on Licences to Use Radio Frequencies, and
- Executive Order No. 1129 of 1 December 2009 on the Transfer and Return of Certain Licences to Use Radio Frequencies.

The frequencies may only be used in radio equipment that complies with the Act on Radio Equipment and Electromagnetic Matters and rules issued in pursuance thereof, including requirements for the use of radio equipment that complies with the essential requirements and the regulated interfaces.

[1] Consolidated Act No. 459 of 13 May 2014 on Interest Accruing on Delayed Payments etc.

Under section 21 of the Frequency Act, the licence may be transferred in its entirety without prior approval. Transfer or return of part of the licence shall be subject to approval by the Danish Energy Agency, cf. section 1 of Executive Order No. 1129 of 1 December 2009 on the Transfer and Return of Certain Licences to Use Radio Frequencies.

Under section 5 of Executive Order No. 1329 of 30 November 2017 on Licences to use Radio Frequencies, the licensee shall notify the Danish Energy Agency of its plans to transfer the licence or parts thereof before such transfer takes place. Information about current plans for transfer will be published in the Frequency Register on the Danish Energy Agency's website.

The Danish Energy Agency will collect frequency charges, cf. section 50 of the Frequency Act. The charges are fixed annually in the Finance Act. An invoice for the frequency charge will be sent separately.

The Danish Energy Agency shall revoke the licence if the licensee fails to pay frequency charges due, cf. section 25 of the Frequency Act.

In certain cases the Danish Energy Agency may modify terms in the licence or revoke the licence, cf. section 23 and section 24 of the Frequency Act.

If the licensee grossly violates the Frequency Act, rules laid down in pursuance of the Act, or terms in the licence, cf. section 26 of the Frequency Act, the Danish Energy Agency may revoke the licence.

Upon return of its licence to the Danish Energy Agency, the licensee may terminate future rights and obligations not yet due by paying not later than the date of return an amount equivalent to 30 % of the licence price, or, if payment of a smaller amount of the licence price is outstanding, then such smaller amount. Thus a return of the licence shall not imply that the licence price will be repaid.

The Danish Energy Agency may impose on the licensee the sanctions that follow from the Danish Energy Agency's decision of 18 June 2018 on the 700 MHz, 900 MHz and 2300 MHz Auction, appended as annex 2 to this licence. Annex 2 thus specifies the sanction options that may be adopted in case of violation of the payment terms of this licence and for matters bearing on the auction process if the Danish Energy Agency becomes aware of such violations after issuing this licence, refer in particular to clauses 80-81 and 85-92 in annex 2.

Relevant Acts and Executive Orders may be found on the Danish Energy Agency's website under: http://www.ens.dk.

No supplement to the licence will be issued if the rules mentioned above are changed.

In regard to matters bearing on the licence, the venue applicable to the licensee shall be in Denmark. If the venue of a licensee is not in Denmark, the agreed venue of the licensee will be the Danish Energy Agency's venue.

Danish Energy Agency, dd Mm 2019

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Annex 1: Requirements for using frequencies in the frequency bands [xx MHz and xx MHz]

Terms

Antennas and transmitting and receiving equipment capable of using the frequencies specified in the licence shall be installed by the licensee not later than 4 April 2022 at a minimum of 100 mast positions. The equipment at the relevant mast positions shall be connected to the necessary telecommunications infrastructure to enable the licensee, via the relevant mast positions, to offer at least one electronic communications service (at the licensee's own discretion) to end-users by using the frequencies specified in the licence.

Supervision

The licensee shall forward, not later than 1 July 2022, a survey to the Danish Energy Agency specifying the mast positions at which antennas and transmitting and receiving equipment have been installed so that at least one electronic communications service can be offered to end-users by using the frequencies specified in the licence. In the survey, the licensee shall indicate the geographical coordinates of the mast positions and the type of the installed transmitting and receiving equipment.

Annex 2: Decision by the Danish Energy Agency of 18 June 2018 on the 700 MHz, 900 MHz and 2300 MHz Auction

[Reference is made to annex B to the Information Memorandum.]

Annex 3: Coverage obligation for using frequencies in the frequency bands [xx MHz and xx MHz]

Terms

The licensee shall ensure provision, not later than 4 April 2022, of an outdoor mobile voice service and a mobile broadband service with a download bit rate of at least 30 Mbit/s and an upload bit rate of at least 3 Mbit/s. The coverage obligation applies in the coverage areas specified in the licence, and in each individual coverage area at least 90 % of the area shall be covered, cf. annex 5.

The coverage obligation can be fulfilled by using frequencies governed by this licence or other frequencies available to the licensee. The coverage obligation may be fulfilled via national roaming agreements.

In quite exceptional cases where a licensee cannot ensure provision of a mobile voice service or a mobile broadband service in accordance with the requirements above for reasons outside the control of the licensee, including environmental, preservation-related or quite exceptional radio planning conditions, the Danish Energy Agency, subject to application and after having received proper documentation, may relax the terms requiring coverage for specific coverage areas.

In case the Danish Energy Agency, in connection with the disposal of frequency bands other than the 700 MHz and 900 MHz bands, issues frequency licences subject to coverage obligations, the Agency may relax the terms for coverage, including cases in which the areas correspond wholly or partly with coverage areas in other frequency licences, or where other frequency licences specify higher requirements for offered broadband bit rates etc.

Supervision and documentation for fulfilling the coverage obligation

The licensee shall provide documentation that the coverage obligation is fulfilled. This implies that the licensee shall forward documentation that it is possible to provide a download bit rate of at least 30 Mbit/s and an upload bit rate of at least 3 Mbit/s when using the broadband service. In case the licensee can document fulfilment of that part of the coverage obligation which relates to a mobile broadband service of at least 30 Mbit/s download, that part of the coverage obligation which relates to a mobile voice service is also regarded as having been fulfilled, provided that the licensee can document offering a service that enables voice via a broadband connection, for example Voice over LTE (VoLTE).

Documentation of compliance with the coverage obligation shall consist of both coverage calculations/simulations and specific measurements confirming such calculations/simulations.

When preparing calculations/simulations, the licensee can use the method that it finds most suitable, taking into account the technology used and the implementation of the network. Calculations may for example be made using the same model as that used for calculating the mobile coverage, as reported for the use of Tjekditnet.dk to the Danish Energy Agency. The licensee can provide documentation for the functioning of the network with chosen technical parameters, or it can simulate the grade-of-service that it can deliver in the network with the chosen technical parameters and other operational parameters. These parameters are for example: Transmitting power, propagation model, link budget, geographical distribution of users, number of simultaneous users, usage pattern etc.

Calculations/simulations shall be verified by concrete measurements. The measurements in question shall be made in a radio-related environment (i.e. ground conditions), over distances and with equipment matching the conditions applicable in relation to the user. Information about the calculation model, measurement results and degree of correlation between the calculation model and measurement results shall be included in the material that the licensee shall submit to the Danish Energy Agency in connection with the supervision. Thus the licensee shall make a sufficient number of measurements to be able to verify the results of the calculation model, and measurements may be made gradually as the infrastructure is rolled out.

The licensee shall forward documentation to the Danish Energy Agency for the fulfilment of the coverage obligation not later than 1 July 2022.

Annex 4: [Additional] coverage obligations for using frequencies in the frequency band [xx MHz and xx MHz]

Terms

Licensees shall ensure provision, not later than 4 April 2022, of a mobile voice service and a mobile broadband service with an outdoor download bit rate of at least 50 Mbit/s and an upload bit rate of at least 5 Mbit/s. [At selected addresses it is sufficient to ensure provision of a mobile voice service and a mobile broadband service with an outdoor download bit rate of at least 30 Mbit/s and an upload bit rate of at least 3 Mbit/s.] The coverage obligation shall apply to at least 98 % of the addresses included in the coverage obligation specified in the licence, cf. annex 6. Coverage may be provided assuming that any end-customer at the address is using fixed equipment for receiving the connection, if the licensee is generally marketing such product at a reasonable cost for the end-customer.

The coverage obligation can be fulfilled by using frequencies governed by this licence or other frequencies available to the licensee. The coverage obligation may be fulfilled via national roaming agreements or via bilateral agreements between licensees. If a licensee chooses to fulfil a coverage obligation at an address via another licensee, a concrete agreement between the licensees on coverage at the address must be available.

In quite exceptional cases where a licensee cannot ensure provision of a mobile voice service or a mobile broadband service in accordance with the requirements above for reasons outside the control of the licensee, including environmental, preservation-related or quite exceptional radio planning conditions, the Danish Energy Agency, subject to application and after having received proper documentation, may relax the terms requiring coverage for specific addresses.

In case the Danish Energy Agency, in connection with the disposal of frequency bands other than the 700 MHz, 900 MHz and 2300 MHz bands, issues frequency licences subject to coverage obligations, the Agency may relax the terms for coverage, including cases in which the areas correspond wholly or partly with coverage areas in other frequency licences, or where other frequency licences specify higher requirements for offered broadband bit rates etc.

Supervision and documentation for fulfilling the coverage obligation

The licensee shall provide documentation that the coverage obligation is fulfilled. This implies that the licensee shall forward documentation that it is possible to provide an outdoor download bit rate of at least 50 Mbit/s and an upload bit rate of at least 5 Mbit/s when using the broadband service. [At selected addresses the licensee shall forward documentation that it is possible to provide an outdoor download bit rate of at least 30 Mbit/s and an upload bit rate of at least 3 Mbit/s when using the broadband service.]

Documentation of compliance with the coverage obligation shall consist of coverage calculations/simulations supplemented with measurements confirming such calculations/simulations. When preparing calculations/simulations, the licensee can use the method that it finds most suitable, taking into account the technology used and the implementation of the network. Calculations may for example be made using the same model as that used for calculating the coverage reported for the use of Tjekditnet.dk to the Danish Energy Agency.

Either the licensee can provide documentation for the functioning of the network with chosen technical parameters, or it can simulate the grade-of-service that it can deliver in the network with the chosen technical parameters and other operational parameters. These parameters are, for example: Transmitting power, propagation model, link budget, geographical distribution of users, number of simultaneous users, usage pattern etc. Furthermore it may be assumed that a possible end-customer is using fixed receiving equipment placed at a height of 4 m above ground level and has a directional antenna placed optimally if the licensee is marketing such product, see above.

Calculations/simulations shall be verified by concrete measurements. The measurements in question shall be made in a radio-related environment (i.e. ground conditions), over distances and with equipment matching the conditions applicable in relation to the user. Information about the calculation model, measurement results and degree of correlation between the calculation model and measurement results shall be included in the material that the licensee shall submit to the Danish Energy Agency in connection with the supervision. Thus the licensee shall make a sufficient number of measurements to be able to verify the results of the calculation model, and measurements may be made gradually as the infrastructure is rolled out.

If the coverage obligation is fulfilled via a bilateral agreement, the licensee shall in addition to the abovementioned documentation also forward the bilateral agreement. The agreement shall consequently be enclosed as part of the material, which the licensee forwards to the Danish Energy Agency in connection with documenting fulfilment of the coverage obligation.

The licensee shall forward a list of those addresses not to be covered. For each address the licensee shall substantiate the reason for not covering the addresses in question. The list including the substantiation will be published at the Danish Energy Agency’s website.

The licensee shall provide documentation for the fulfilment of the coverage obligation not later than 1 July 2022.

Annex 5: Areas subject to coverage obligations in the licence

[Reference is made to annex I to the Information Memorandum for coverage obligations associated with the 700 MHz and 900 MHz frequency bands.]

Annex 6: Addresses subject to coverage obligations in the licence

[Reference is made to annex K to the Information Memorandum for additional coverage obligations.]

Annex 7: Technical conditions for base stations for terrestrial systems capable of providing electronic communications services within the frequency band 738-788 MHz

The technical parameters for base stations called "Block Edge Mask" (in the following referred to as "BEM") are used in order to ensure coexistence between neighbouring networks and protection of other services and applications in adjacent frequency bands.

The BEM is an emission mask that is defined as a function of frequency in relation to a ‘block edge’ - a frequency boundary of a spectrum block for which rights of use are assigned to the licensee. The BEM consists of several elements which are defined for certain measurement bandwidths. A ‘band edge’ denotes the frequency boundary of a spectrum range designated for a certain use.

BEMs for base stations given below have been developed for equipment used in mobile networks. The same base station BEM applies both for FDD downlink use within the 758-788 MHz frequency band and the 738-758 MHz frequency band. The BEMs serve to protect other spectrum blocks used for electronic communications services (including downlink-only use) as well as other services and applications in adjacent bands.

The base station BEM consists of in-block and out-of-block power limits. The in-block power limit is applied to a block assigned to a licensee. The out-of-block power limits are applied to spectrum within or outside the 700 MHz frequency band, which is outside the block assigned. Table 1 contains the different spectrum elements of the base station BEM, whereby all BEM elements except ‘in-block’ are mapped to out-of-block power limits. In-block power limits are given in Table 2. Out-of-block power limits for different BEM elements are given in Tables 3-8.

Table 1

Definition of BEM elements for blocks pursuant to Sections A.1 and A.2

BEM element	Definitions
In-block	Refers to a block for which the BEM is derived.
Baseline	Spectrum used within the frequency bands 703-733 MHz (i.e. FDD uplink) and 758-788 MHz (i.e. FDD downlink) as well as within the 738-758 MHz frequency band for downlink-only (if applicable), for digital terrestrial television broadcasting below the 694 MHz band edge, for terrestrial systems capable of providing electronic communications services above 790 MHz (both uplink and downlink), for PPDR radio communications in the 700 MHz frequency band (both uplink and downlink), and for M2M radio communications in the 700 MHz frequency band (both uplink and downlink).
Transitional region	Spectrum from 0 to 10 MHz below and from 0 to 10 MHz above the block assigned to an operator; in a frequency range where transitional regions and spectrum used for FDD uplink, PPDR uplink or M2M uplink overlap, transitional power limits do not apply.
Guard bands	a) Spectrum between the lower edge of the 700 MHz frequency band and the

	lower edge of the FDD uplink (i.e. 694-703 MHz). b) Spectrum between the upper edge of FDD downlink (i.e. 788 MHz) and the lower edge of the FDD downlink according to Decision 2010/267/EU (i.e. 791 MHz). In case of overlap between a transitional region and a guard band, transitional power limits are used. When spectrum is used for PPDR or M2M radio communications, baseline or transitional power limits are used.
Duplex gap	Spectrum in the 733-758 MHz frequency band. In case of overlap between a transitional region and the part of the duplex gap not used for downlink-only or PPDR radio communications or M2M radio communications, transitional power limits are used

In-block requirements

Table 2

Base station in-block power limit

Frequency range	Maximum mean e.i.r.p.[2]	Measurement bandwidth
Block assigned to the operator	64 dBm/5 MHz per antenna.	5 MHz

Out-of-block requirements

Table 3

Base station baseline power limit

Frequency range	Bandwidth of protected block	Maximum mean e.i.r.p. [3]	Measurement bandwidth
Uplink frequencies in the range 698-736 MHz	≥ 5 MHz	– 50 dBm per cell	5 MHz
	3 MHz	– 52 dBm per cell	3 MHz
	≤ 3 MHz	– 64 dBm per cell	200 kHz
FDD uplink frequencies as defined in Decision 2010/267/EU (i.e. 832-862 MHz)	≥ 5 MHz	– 49 dBm per cell	5 MHz
Downlink frequencies in the range 738-791 MHz	≥ 5 MHz	16 dBm per antenna	5 MHz
	3 MHz	14 dBm per antenna	3 MHz

[2] E.i.r.p. (Equivalent Isotropically Radiated Power) is the total power radiated in any direction at a single location, independent of any base station configuration.
[3] In a multi-sector site, the value per 'cell' corresponds to the value for one of the sectors.

	< 3 MHz	2 dBm per antenna	200 kHz
FDD downlink frequencies as defined in Decision 2010/267/EU (i.e. 791-821 MHz)	≥ 5 MHz	16 dBm per antenna	5 MHz

Table 4

Base station transitional power limits in the range 733-788 MHz

Frequency range	Maximum mean e.i.r.p.	Measurement bandwidth
– 10 to – 5 MHz from lower block edge	18 dBm per antenna	5 MHz
– 5 to 0 MHz from lower block edge	22 dBm per antenna	5 MHz
0 to + 5 MHz from upper block edge	22 dBm per antenna	5 MHz
+ 5 to + 10 MHz from upper block edge	18 dBm per antenna	5 MHz

Table 5

Base station transitional power limits above 788 MHz

Frequency range	Maximum mean e.i.r.p.	Measurement bandwidth
788-791 MHz for a block with upper edge at 788 MHz	21 dBm per antenna	3 MHz
788-791 MHz for a block with upper edge at 783 MHz	16 dBm per antenna	3 MHz
788-791 MHz for a block with upper edge at 788 MHz for protection of systems with bandwidth < 3 MHz	11 dBm per antenna	200 kHz
788-791 MHz for a block with upper edge at 783 MHz for protection of systems with bandwidth < 3 MHz	4 dBm per antenna	200 kHz
791-796 MHz for a block with upper edge at 788 MHz	19 dBm per antenna	5 MHz
791-796 MHz for a block with upper edge at 783 MHz	17 dBm per antenna	5 MHz
796-801 MHz for a block with upper edge at 788 MHz	17 dBm per antenna	5 MHz

Table 6

Base station power limits for the part of the duplex gap not used for downlink-only or PPDR radio communications or M2M radio communications

Frequency range	Maximum mean e.i.r.p.	Measurement bandwidth
– 10 to 0 MHz offset from FDD downlink lower band edge or lower edge of the lowest downlink-only block, but above FDD uplink upper band edge	16 dBm per antenna	5 MHz
More than 10 MHz offset from FDD downlink lower band edge or lower edge of the lowest downlink-only block, but above FDD uplink upper band edge	– 4 dBm per antenna	5 MHz

Table 7

Base station power limits for the part of the guard bands not used for PPDR radio communications or M2M radio communications

Frequency range	Maximum mean e.i.r.p.	Measurement bandwidth
Spectrum between the lower band edge of the 700 MHz frequency band and FDD uplink lower band edge (i.e. 694-703 MHz)	– 32 dBm per cell[4]	1 MHz
Spectrum between FDD downlink upper band edge and the FDD downlink lower band edge as defined in Decision 2010/267/EU (i.e. 788-791 MHz)	14 dBm per antenna	3 MHz

Table 8

Base station baseline power limits for spectrum below 694 MHz

Frequency range	Maximum mean e.i.r.p.	Measurement bandwidth
Frequencies below 694 MHz where digital terrestrial television broadcasting is protected	– 23 dBm per cell[5]	8 MHz

[4] In a multi-sector site, the value per 'cell' corresponds to the value for one of the sectors.
[5] In a multi-sector site, the value per 'cell' corresponds to the value for one of the sectors.