Bundesnetzagentur

Administrative rules

for

spectrum assignments for local spectrum usages in the 3700-3800 MHz band

(Administrative rules for local broadband applications)

Bundesnetzagentur

für Elektrizität, Gas, Telekommunikation, Post und Eisenbahnen

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Version: 15 May 2023

I. Administrative rules for local broadband applications

Scope of the administrative rules

Under the terms of section 91 TKG each spectrum usage requires prior spectrum assignment. Spectrum will be assigned in line with the Frequency Plan.

With a view to facilitating technical progress and swiftly implementing international harmonisation decisions, the Frequency Plan only sets out the framework conditions to ensure spectrum use with the maximum possible efficiency and freedom from interference. These framework conditions are supplemented by more detailed administrative rules to ensure a uniform administrative practice.

The following administrative rules apply to spectrum assignments for local spectrum usages in the 3700-3800 MHz band ("Administrative rules for local broadband"). **These administrative rules supplement the "Basic framework conditions for the future application process for the 3700-3800 MHz band for MFCN applications" (Annex 1).**

These administrative rules, including the spectrum usage conditions, can be amended at a later date, particularly if this is necessary to ensure efficient and interference-free spectrum use or as a result of international harmonisation agreements.

As the applications and business models for 5G are still under development, it is not currently possible to definitely predict the future market demand for local spectrum.

The Bundesnetzagentur reserves the right to review the framework conditions for the 3700-3800 MHz band one year after the application process has begun, with a view to ensuring efficient and interference-free spectrum use.

II. Supplements to the basic framework conditions

1. Spectrum usage conditions

Spectrum in the 3700-3800 MHz band will be assigned on a technology-neutral basis.

The spectrum usage conditions in section 3 of the basic framework conditions (see Annex 1) are supplemented by the following:

1.1 Field strength at the assignment border

Assignment holders are free in the planning of their networks within the premises. The Bundesnetzagentur will not generally define a maximum permissible field strength at the assignment area border. Assignment holders are, however, required to ensure efficient and interference-free use of their networks, for instance to design and build their networks in such a way as to minimise the interference ranges of their spectrum usages. This can be achieved for instance with low transmit powers, low antenna heights and appropriate antenna directional patterns.

Operators of geographically adjacent wireless networks are subject to a **negotiation requirement for operator agreements**. The operators have the best overview of the local conditions (such as topography and buildings) relevant to radio wave propagation. Optimal spectrum planning taking account of these conditions can be carried out and agreed among the operators on location. The Bundesnetzagentur assumes that the operators will find an appropriate solution among themselves. The relevant operator agreements (see 2.5 for further details) must be submitted to the Bundesnetzagentur.

Should the adjacent operators not reach an agreement, the Bundesnetzagentur can lay down measures to ensure efficient spectrum use with the minimum of interference for all operators concerned. The Bundesnetzagentur will define a field strength limit of 32 dBµV/m/5 MHz at a height of three metres at and beyond the border of the assignment area (based on ECC Recommendation (15)01). Costs for any necessary reconfiguration of the wireless networks must be borne by the assignment holders.

The limits for public exposure to electromagnetic fields from radio equipment must be met.

1.2 Permissible block emissions and out-of-band emissions

The relevant conditions are set out in Annex 2.

1.3 Spectrum coordination to protect radio applications within the 3700-3800 MHz band

The 3700-3800 MHz band is used by other radiocommunication services (for example FSS earth stations). Relevant details can be found in **Annex 2**.

To protect these radio applications, the Bundesnetzagentur requires details of the parameters for the local usages at the application stage in order to be able to carry out the necessary radio compatibility calculations.

2. Application documents

The following documents are required for processing applications:

- application for area assignment/definition of the site-related technical parameters for the base stations
- spectrum usage concept
- confirmation of eligibility to apply
- confirmation of specialist knowledge, financial capacity and reliability
- operator agreements (if applicable)
- extract from the commercial register (if applicable).

2.1 Assignment Application and definition of site-specific technical parameters for base stations

The application form for spectrum assignment/definition of the site-related technical parameters for the base stations is in Excel format. This file can be processed electronically by the Bundesnetzagentur's IT system.

Further information can be found in **Annex 3**.

Applicants are responsible for the correctness of the geographic coordinates of the area and base stations applied for. The coordinates given in the application must be in WGS 84 format.

If it is planned to use more than one base station indoors, it is sufficient for the purposes of the application to give just one reference base station. This must be the base station with the highest transmit power. The application must also give the planned maximum indoor antenna height. The coordinates of the centre of the building must be given. This enables flexible use of the base stations within the building.

Further details of the planned indoor use of base stations has to be provided in the spectrum usage concept.

2.2 Spectrum usage concept

Applicants must provide a clear and plausible account of their spectrum requirements in line with section 4 of the basic framework conditions. Further guidance on drawing up a spectrum usage concept can be found in **Annex 4**.

The Bundesnetzagentur would again like to draw attention to section 102 TKG. This states that a spectrum assignment can be revoked if use of the spectrum has not begun within one year of the assignment, or if the spectrum has not been used for the purpose for which it has been assigned for more than one year (use it or lose it procedure).

The Bundesnetzagentur can request reports on the status of network roll-out and spectrum utilisation for the purposes of evaluation. The Bundesnetzagentur's radio monitoring and inspection service can also carry out relevant measurements on location.

2.3 Confirmation of eligibility to apply

Eligibility to apply can ensue from a premises ownership right or another right to use premises (such as a lease), or from relevant authorisation by the holder of such a right. For offshore projects in the German exclusive economic zone, the eligibility to apply can ensue for carriers of projects approved by the Bundesamt für Seeschifffahrt und Hydrographie (BSH), or from relevant authorisation by the holder of such a right.

Applicants must confirm (see **Annex 5**) that they qualify as a party eligible to apply. The Bundesnetzagentur will verify eligibility in individual cases only. Incorrect information can lead to the spectrum assignment being revoked.

Assignment holders are responsible vis-à-vis the Bundesnetzagentur for compliance with the spectrum assignment. This also applies if an assignment holder transfers the exercise of the spectrum assignment rights to a third party for a temporary period. The transfer of spectrum assignment rights under the terms of section 91(8) TKG requires the consent of the Bundesnetzagentur. The application for consent must be made in writing.

An applicant's eligibility must be valid for the entire duration of the spectrum assignment.

2.4 Confirmation of radio engineering knowledge, financial capacity and reliability

Applicants must demonstrate their compliance with the subjective requirements for spectrum assignment (in particular reliability, financial capacity and specialist knowledge) to the extent appropriate, necessary and reasonable with regard to efficient and interference-free spectrum use. The Bundesnetzagentur can request an applicant to provide relevant proof.

The application process requires applicants to confirm their specialist knowledge, financial capacity and reliability in line with **Annex 5**.

2.5 Operator agreements

The conclusion of operator agreements is the core element in ensuring interference-free spectrum use on location. **Annex 6** includes possible factors for consideration when making an operator agreement.

2.6 Beginning of use, spectrum assignment revocation

Section 102 TKG expressly provides for the revocation of a spectrum assignment as a discretionary provision. The Bundesnetzagentur will not generally revoke a spectrum assignment if the assignment holder can satisfactorily demonstrate that the network will be built in the foreseeable future.

III. Application process and application documents

The web portal for applications is currently not yet available.

Spectrum assignment applications can only be processed quickly if sent in electronic form by email to

226.lokalesbreitband@bnetza.de.

It is particularly important to use the Excel application form. The application documents listed in section 2 should be sent to the Bundesnetzagentur together in one email with "Antrag auf Frequenzzuteilung" in the subject line.

The relevant information and forms (in German) can be downloaded from the Bundesnetzagentur website at **www.bundesnetzagentur.de/lokalesbreitband**.

Any questions about the application process should be sent by mail to

Bundesnetzagentur für Elektrizität, Gas, Telekommunikation, Post und Eisenbahnen
Referat 226
Fehrbelliner Platz 3
10707 Berlin

or the central email address given above.

Administrative rules for local broadband applications

Annexes

Annex 1: Excerpt from the basic framework conditions

for the future application process for the 3700-3800 MHz band for MFCN applications as published in Bundesnetzagentur Official Gazette No 6 of 27 March 2019 (Administrative Order No 43) and on the Bundesnetzagentur website at www.bundesnetzagentur.de/lokalesbreitband

Basic framework conditions for the future application process for the 3700-3800 MHz band for MFCN applications

In addition to the nationwide spectrum usage rights in the 3400-3700 MHz bands, the Bundesnetzagentur is making further spectrum in the 3700-3800 MHz band available for local assignments. The Bundesnetzagentur's objective is to ensure that applicants can be awarded local assignments on a flexible and needs-oriented basis even after the provision of a substantial part of the 3.6 GHz band for nationwide assignments and therefore that emerging business models can still be implemented at a later date. Account is also taken in particular of the fact that some business models require spectrum for separate, autonomous telecommunications networks (see President's Chamber decisions BK1-17/001 of 14 May 2018 and 26 November 2018).

In view of the different business models and associated spectrum requirements, the Bundesnetzagentur is making the 3700-3800 MHz band available for local applications. It will therefore be possible to use this spectrum in line with the notified requirements, in particular for industrial automation/industry 4.0, but also for agriculture and forestry.

Eligibility to apply can ensue from a premises ownership right or another right to use premises (such as a lease), or from relevant authorisation by the holder of such a right. The applications will therefore generally be in-house applications.

As the applications and business models for 5G are still under development, it is not currently possible to definitely predict the future market demand for local spectrum. The Bundesnetzagentur therefore reserves the right to review the framework conditions for the 3700-3800 MHz band one year after the application process has begun, with a view to ensuring efficient and interference-free spectrum use. The Bundesnetzagentur will also take into account the possibility for holders of nationwide assignments at 3400-3700 MHz to use unused spectrum above 3700 MHz as temporary additional capacity (see President's Chamber decision BK1-17/001 of 26 November 2018, margin no 86).

[....]

II. Basic framework conditions

In light of the responses to the consultation, the Bundesnetzagentur has drawn up the following basic framework conditions for the future application process for the 3700-3800 MHz band for local MFCN applications.

1. Spectrum assignment area

Applications can be made for local spectrum usages, including in particular assignments for business/commercial/industrial premises. Premises are also taken to mean a section of the surface of the Earth that forms a unit because of the nature of its economic use or its external appearance, even if it comprises more than one plot in real estate terms. This definition therefore covers, for example, industrial parks and exhibition venues as well as agricultural and forestry land.

Eligibility to apply can ensue from a premises ownership right or another right to use premises (such as a lease), or from relevant authorisation by the holder of such a right. In this context, it is also conceivable for several owners of premises, for example in an industrial park, to make a joint application for spectrum assignment for the whole area.

2. Ensuring radio compatibility between adjacent areas

Operator agreements are necessary to ensure compatible as well as efficient and interference-free spectrum use for users in adjacent geographic areas and/or of adjacent spectrum. The aim of these operator agreements is to enable unrestricted use for adjacent spectrum users and contribute to efficient spectrum use.

Spectrum must be used in such a way that the spectrum usage is feasible in the assignment area without causing significant interference to adjacent spectrum usages and is compatible with other spectrum usages.

Cologne Administrative Court specifically said the following (21 K 8149/09, 14 September 2011):

"The legal requirement imposed on the Bundesnetzagentur to ensure efficient and interference-free spectrum use (section 2(2) para 7, section 52(1), section 53(2), section 55(5) para 4, and section 60(1) and (2) TKG) presents an objective involving a conflict of interests between efficiency and freedom from interference; this conflict is to be resolved not by maximising one interest at the expense of the other but by balancing the two in line with demand. The requirement of efficient and interference-free spectrum use therefore does not oblige the Bundesnetzagentur to ensure maximum freedom from interference but to reduce radio interference to an acceptable level in terms of creating maximum possible freedom from interference together with maximum efficiency in spectrum use. Where the requirement to ensure efficient and interference-free spectrum use is also imposed on the spectrum user (section 55(5) para 4 and section 60(1) and (2) TKG), it comprises on the one hand the right and duty to use the assigned spectrum efficiently and on the other hand the duty not to cause interference to other spectrum usages. Even if it is assumed that the latter duty corresponds to a defensive claim to be asserted by the spectrum users affected by interference vis-à-vis the Bundesnetzagentur, it does not include absolute protection from interference "at any price" but merely the right to defence against unacceptable degradation as a result of the balancing of interests referred to above, irrespective of which spectrum usage was in operation first and which came into operation later. […]"

If it is not possible to ensure compatibility between spectrum usages by means of operator agreements, the Bundesnetzagentur can lay down technical conditions to mitigate interference.

The Bundesnetzagentur will base these technical conditions on applicable international harmonisation decisions (see, for example, CEPT Report 67, ECC Report 296).

3. Spectrum usage conditions

The usage conditions serve to ensure coexistence between different applications in the 3700-3800 MHz band and the adjacent bands. Compliance with the spectrum/block edge masks defined in the reports and decisions referred to below is generally necessary to ensure coexistence.

The 3700-3800 MHz band is part of the European harmonised band 3400-3800 MHz. This band is essentially subject to the spectrum usage conditions laid down in the Commission Decision of 21 May 2008 on the harmonisation of the 3400-3800 MHz frequency band for

terrestrial systems capable of providing electronic communications services in the Community (2008/411/EC), as last amended by Commission Implementing Decision (EU) 2019/235 of 24 January 2019 on amending Decision 2008/411/EC as regards an update of relevant technical conditions applicable to the 3400-3800 MHz frequency band.

In 2016, the European Commission issued a mandate to CEPT to review the technical parameters and their suitability for 5G technology. CEPT issued CEPT Report 67 as its response to the mandate in July 2018. CEPT Report 67 contains the necessary amendments to the above-mentioned European harmonisation measures. The revised ECC Decision (11)06 was adopted in October 2018. This provides a firm decision-making basis with regard to the spectrum usage conditions, and the Bundesnetzagentur will apply the modified spectrum usage conditions set out in the Commission Implementing Decision of 24 January 2019.

The national spectrum usage conditions will be based on the following framework conditions:

The spectrum will be assigned in multiples of 10 MHz. No guard bands will be defined. Only TDD usages will be possible.

Any guard bands between local assignments and adjacent nationwide assignments below 3700 MHz must be implemented by the local assignment holders above 3700 MHz. Nationwide assignment holders are not required to implement a guard band between their usages and adjacent usages above 3700 MHz (see President's Chamber decision of 26 November 2018 (Annex 3, section 3), Administrative Order No 152/2018, Bundesnetzagentur Official Gazette No 23/2018 of 5 December 2018, page 2551 et seq).

Synchronised network operation between adjacent assignment holders can make sense for reasons of spectrum efficiency. On account of the complexity of the various applications, however, the Bundesnetzagentur does not consider it possible to make a general stipulation.

In the case of synchronised networks, no guard band is generally needed between the frequency block of one network operator using TDD and the frequency block of an adjacent network operator. In the case of unsynchronised and semi-synchronised networks, the international studies on synchronisation in the 3.6 GHz band can be taken into account (ECC Report 296). Any necessary guard bands must be implemented using spectrum from both adjacent operators of local networks. Any deviations require bilateral or multilateral agreements between the network operators concerned. Such agreements must be notified to the Bundesnetzagentur before operation.

The spectrum usage conditions can be amended at a later date, particularly if this is necessary to secure efficient and interference-free spectrum use or as a result of international harmonisation agreements.

4. Spectrum packages and spectrum usage concept

The spectrum blocks assigned will be in multiples of 10 MHz. Applicants must set out their spectrum requirements in a spectrum usage concept. A plausible account of the spectrum requirements must be provided based on the planned spectrum usage and underlying business model. In particular, applicants must show how they will ensure efficient spectrum use.

5. Beginning of use, spectrum assignment revocation

The Bundesnetzagentur must be notified of the beginning and end of use. The same applies to plans for transferring or leasing spectrum. The Bundesnetzagentur would specifically like to draw attention to section 102 TKG. This states that a spectrum assignment can be

revoked if use of the spectrum has not begun within one year of the assignment, or if the spectrum has not been used for the purpose for which it has been assigned for more than one year (use it or lose it procedure).

6. Spectrum usages requiring protection

No interference may be caused to existing, coordinated FSS receivers in the 3700-3800 MHz sub-band. Protection must also be provided for the Bundesnetzagentur's monitoring earth station in Leeheim, the radio monitoring stations of the Bundesnetzagentur's radio monitoring and inspection service, and the Geodetic Observatory Wettzell.

7. Spectrum coordination for radio stations in border areas

The amount of spectrum available for use in the border areas of the Federal Republic of Germany is limited because of the need for coordination with neighbouring countries. Restrictions with respect to spectrum and scope will vary from area to area, depending on whether one, two, three or possibly four countries need to be included in the coordination process. Restrictions will also depend on the transmission methods in use either side of the borders. The necessary coordination is carried out on the basis of contracts and agreements concluded by the Federal Republic of Germany with its neighbouring countries.

8. Time limit

The Bundesnetzagentur will assign spectrum upon application for a period of up to ten years, but not beyond 31 December 2040. Attention is drawn to the possibility of extending an assignment under the terms of section 92(2) TKG. Limiting assignments to not beyond 31 December 2040 is a regulatory means of ensuring that a joint decision can be made on the use of the 3400-3800 MHz band from 2041 onwards.

9. Information about assignments

Details of the assignment areas together with details of the assigned spectrum and the names of the assignment holders will be provided to third parties with a justified interest (for example geographically neighbouring usages). This enables efficient and interference-free spectrum use for adjacent applications to be optimised by means of operator agreements.

10. Fees and contributions

A fee as set out in the BNetzA BGebV-FreqZut will be imposed for spectrum assignment on the basis of section 223(1) TKG (see Annex 7 for details). In addition, spectrum usage contribution charges in accordance with section 224(1) TKG and contributions in accordance with section 31 EMVG and section 35 FuAG will be imposed. The spectrum usage contribution charges and the EMVG and FuAG contributions will be recalculated annually. The contributions will be calculated in accordance with the FSBeitrV, as amended.

Annex 2: Spectrum usage conditions for the 3700 3800 MHz band

The usage conditions serve to ensure interference-free coexistence between different applications in the bands specified below and adjacent bands. Compliance with the BEMs in this annex is a necessary condition to ensure interference-free coexistence.

1. Permissible block emissions (in-block and out-of-block)

1.1 General parameters

1. The assigned block sizes are in multiples of 10 MHz.
2. The duplex mode of operation is TDD.
3. The following BEMs for semi-synchronised and unsynchronised networks assume a guard band between blocks of one TDD network and blocks of another TDD network. This guard band must be implemented by the assignment holders in their own spectrum.
4. Operation can take place using both non-AAS and AAS.
5. The following technical parameters for base stations, also referred to as BEMs, are essential components of conditions necessary to ensure the simultaneous operation of adjacent networks in the absence of bilateral or multilateral agreements between the operators. Any deviations require bilateral or multilateral agreements between the spectrum users concerned. Such agreements must be notified to the Bundesnetzagentur before operation.

1.2 Technical conditions for TDD base stations

1.2.1 Requirements for in-block emissions for non-AAS and AAS

No in-block EIRP limits have been defined for base stations. In the case of femto base stations, the power should be selected to minimise interference to adjacent channels.

1.2.2 Requirements for out-of-block emissions for non-AAS and AAS in synchronised networks in the 3700-3800 MHz band

A) Baseline requirements – BEM for out-of-block EIRP/TRP limits for base stations per antenna/cell

Band	Non-AAS maximum permissible EIRP	AAS maximum permissible TRP
Above 10 MHz offset from the block edge	Min(P_{Max}-43, 13) dBm/ (5 MHz) per antenna	Min($P_{Max'}$-43, 1) dBm/ (5 MHz) per cell (*)
(*) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.		

B) Transitional requirements – BEM for out-of-block EIRP/TRP limits for base stations per antenna/cell

Band	**Non-AAS maximum permissible EIRP**	**AAS maximum permissible TRP**
-5 to 0 MHz offset from lower block edge or 0 to 5 MHz offset from upper block edge	Min(P_{Max}-40, 21) dBm/ (5 MHz) per antenna	Min($P_{Max'}$-40, 16) dBm/ (5 MHz) per cell (*)
-10 to -5 MHz offset from lower block edge or 5 to 10 MHz offset from upper block edge	Min(P_{Max}-43, 15) dBm/ (5 MHz) per antenna	Min($P_{Max'}$-43, 12) dBm/ (5 MHz) per cell (*)
(*) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.		

Less stringent technical parameters can be agreed between the different spectrum users concerned.

1.2.3 Restricted baseline requirement for out-of-block emissions for non-AAS and AAS for base stations in <u>unsynchronised and semi-synchronised</u> networks in the 3700-3800 MHz band

Band	**Non-AAS maximum permissible EIRP**	**AAS maximum permissible TRP**
Unsynchronised and semi-synchronised blocks below the lower block edge and above the upper block edge	-34 dBm/(5 MHz) per cell (*)	-43 dBm/(5 MHz) per cell (*)
(*) In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.		

The strict limits for unsynchronised/semi-synchronised use between the networks are generally applicable. The limits for synchronised use between networks can be used for applications with sufficient decoupling between the networks (for example geographic separation or indoor operation). Less stringent technical parameters can also be agreed between the different spectrum users concerned.

1.3. Technical conditions for TDD terminal stations

The in-block emission limit for mobile TDD terminal stations should not exceed 28 dBm TRP.

2. Out-of-band emissions

2.1 Additional baseline requirement for out-of-band emissions for non-AAS and AAS for base stations for coexistence with FSS/FS above 3800 MHz

Band	Non-AAS maximum permissible EIRP	AAS maximum permissible TRP
3800-3805 MHz	Min(P_{Max}-40, 21) dBm/ (5 MHz) per antenna (*)	Min($P_{Max'}$-40, 16) dBm/ (5 MHz) per cell (**) (***)
3805-3810 MHz	Min(P_{Max}-43, 15) dBm/ (5 MHz) per antenna (*)	Min($P_{Max'}$-43, 12) dBm/ (5 MHz) per cell (**) (***)
3810-3840 MHz	Min(P_{Max}-43, 13) dBm/ (5 MHz) per antenna (*)	Min($P_{Max'}$-43, 1) dBm/ (5 MHz) per cell (**) (***)
Above 3840 MHz	-2 dBm/(5 MHz) per antenna (*)	-14 dBm/(5 MHz) per cell (***)

* Measured as EIRP per carrier, interpreted as per antenna

** In a multi-sector base station, the radiated power limit applies to each one of the individual sectors.

*** Measured as TRP per carrier per cell

3. Spectrum coordination for the protection of radio applications within the 3700-3800 MHz band

The Bundesnetzagentur carries out spectrum coordination for the protection of the following applications in the 3700-3800 MHz band:

- Geodetic Observatory Wettzell
- Leeheim monitoring earth station
- existing, coordinated FSS receivers
- radio monitoring stations of the Bundesnetzagentur's radio monitoring and inspection service
- radio stations in border areas.

Annex 3: Application form and guidance notes

The latest version of the Excel application form and the accompanying guidance notes (in German) can be downloaded from the Bundesnetzagentur website at www.bundesnetzagentur.de/lokalesbreitband.

The latest version of the application form has to be used to ensure that the data can be imported automatically.

Annex 4: Guidance on drawing up a spectrum usage concept

Applicants must explain the planned usage in a spectrum usage concept. Applicants must in particular provide a plausible account of their spectrum requirements based on the planned spectrum usage. Applicants must also show how they will ensure efficient spectrum use.

The Bundesnetzagentur would like to draw specific attention to section 63 TKG. This states that a spectrum assignment can be revoked if use of the spectrum has not begun within one year of the assignment, or if the spectrum has not been used for the purpose for which the assignment has been granted for more than one year (use it or lose it procedure). Here, account is taken in particular of the use of the full bandwidth applied for.

The spectrum usage concept must include the following in particular:

Details of the planned coverage area and a geographical map.

Which type of application is planned?
(For example agricultural/forestry, industrial)

What is the planned purpose of use?
(For example machine control, in-house communication)

What is the bandwidth required for the planned purpose of use?
(Please provide a detailed explanation of the bandwidth requirements applied for)

What is the signal level and protection required for the purpose of use?
(Details of the technology used and network build, number and technical characteristics of base stations, etc.)

Which measures will be taken to ensure efficient spectrum use with regard to compliance with the interference ranges?
(Description of interference mitigation techniques, for example details of the antennas to be used (type, location, height, directional pattern), shielding measures, indoor/outdoor applications)

What is the timescale for the network build and network roll-out?

How long is the planned usage period?

Annex 5: Declaration of radio engineering knowledge, financial capacity and reliability

a) Declaration of radio engineering knowledge, financial capacity and reliability as required by section 91(4) sentence 3 TKG: Proof of eligibility to apply

The latest version of the form (in German) can be downloaded from the Bundesnetzagentur website at www.bundesnetzagentur.de/lokalesbreitband.

b) Declaration of radio engineering knowledge, financial capacity and reliability as required by section 91(4) sentence 3 TKG: Details of authorised person/company

The latest version of the form (in German) can be downloaded from the Bundesnetzagentur website at www.bundesnetzagentur.de/lokalesbreitband.

Annex 6: Guidance on drawing up operator agreements

To ensure radio compatibility, applicants of adjacent premises are advised to hold talks among themselves to agree on coordinating measures with the aim of mutually avoiding interference with applications in the vicinity of their planned operation. This contributes to improving both spectrum use efficiency and signal coverage in the planned area of operation.

The operation of the wireless application may affect more than one other operator, depending on the planned location of operation. The operator agreements must specify the exact names of the areas concerned. The same names as given in the spectrum assignment applications must be used. The terms of the operator agreements must be specific, detailed and transparent.

In accordance with section 9 of the basic framework conditions, the Bundesnetzagentur will provide details of assignment areas together with details of the assigned spectrum and the names of the assignment holders to third parties with a justified interest (for example geographically neighbouring usages). This enables efficient and interference-free spectrum use for adjacent applications to be optimised by means of operator agreements.

Sufficient decoupling enabling the operation of adjacent wireless applications as planned can be achieved for example with the following measures:

1	Frequency synchronisation (f)	Coordination of spectrum blocks actually used
2	Frequency and phase synchronisation (f, φ)	As 1, and additionally common carrier frequency generation
3	Frequency, phase and time synchronisation (f, φ, t)	As 2, and additionally common phase clock reference
4	Transmit power reduction	Joint planning
5	Beamforming antennas	Joint planning
6	Transmitting antenna tilting	Joint planning
7	Signal strength in coverage area	Joint planning
8	Terrain obstruction	Joint planning
9	Morphological obstruction	Joint planning
10	Indoor operation	Joint planning, shielding measurements

f – frequency

φ – phase

t – time

For reasons of efficient spectrum use, the Bundesnetzagentur recommends that assignment holders coordinate with the adjacent usages with respect to the network codes and subscriber identities used, taking account of the existing legal provisions.

Annex 7: Explanatory notes on the calculation of the fees

The Bundesnetzagentur set the fee for spectrum in the 3.7-3.8 GHz band for local applications with the BNetzA BGebV-FreqZut of 01 October 2021 (Federal Law Gazette I page 4515).

Each fee will be calculated using the following formula:

$Fee\ (€) = 1000 + B \cdot t \cdot 5 \cdot (6 \cdot a_1 + a_2)$	
1000:	1000 is the base amount in euros (€)
B:	bandwidth in MHz (from 10 MHz to 100 MHz)
t:	the assignment period in years (for example ten years)
a:	the surface area in square kilometres (km^2)
a_1:	settlement and transport land
a_2:	other types of land

Details of the elements of the fee for the 3.7-3.8 GHz band

The formula for the assignment fee is designed to ensure optimum and efficient use of the spectrum. The larger the bandwidth applied for, the higher the fee.

The base amount of €1,000 has been chosen so as not to create an obstacle for business models such as those of start-ups, SMEs or agricultural enterprises. The base amount for each assignment is designed to create incentives for professional spectrum planning and use. For instance, the base amount means that very small assignment areas with a potentially unfavourable trade-off between radio coverage and interference with adjacent usages are relatively more expensive. In addition, interest in cooperation with adjacent usages can be increased.

The fee also takes into account the assignment period. The fee increases in proportion to the assignment period, as long as the other factors remain the same. This creates an incentive for applicants to apply for assignments only for the period in which they actually envisage using the spectrum. This discourages applicants from hoarding spectrum because, apart from the risk of an assignment being revoked if spectrum is not used, assignment holders would be paying a fee or part of a fee for a spectrum assignment that they were not actually using.

The basic factor of €5 was set taking account of an expert valuation of the economic value of spectrum. The valuation assumed that settlement and transport land in the Federal Republic of Germany is particularly suitable for 5G applications. On this basis, a basic factor of €5 was set, taking into account the technical innovations of 5G applications in practice.

To encourage efficient spectrum use, the assignment fee is higher the larger the size of the area in which the spectrum is to be used. The settlement density is also a decisive factor in compatibility: the density of buildings in rural areas tends to be lower. By contrast, plots used in developed areas are closer together and the density of buildings is also usually higher. The probability of adjacent local usages that need to be coordinated and may lead to restrictions for both usages is therefore higher in developed areas. The formula takes account of these differences by making a distinction between settlement and transport land and other types of land. Spectrum assignments for areas classed as settlement and transport land are therefore six times as expensive as for other areas. The fact is also taken into

account that rural areas also have land classed as settlement and transport land, for example industrial estates. Efficient spectrum use is encouraged if fees for assignments in rural or undeveloped areas are lower. The definitions for categorising land are based on those used by the Umweltbundesamt[1)]. For offshore projects as well as underground areas (e.g. mines, subways), the fee calculation is based on the allocation to other types of land (a_2).

Fee calculation examples:

Example application:	**Band-width (MHz)**	**Period (years)**	**Area (km^2)**		**Fee**
			a_1	**a_2**	
Industry 4.0, small area, short period Assignment: 1 December 2019	70	1	0.5		$1000 + 70 \cdot 1 \cdot 5 \cdot 6 \cdot 0.5 = 2050.-€$
Industry 4.0, small area AND other type of land, short period Assignment: 1 December 2019	50	2	0.5	2	$1000 + 50 \cdot 2 \cdot 5 \cdot (6 \cdot 0.5 + 2) = 3500,-€$
Industry 4.0, larger area/bandwidth Assignment: 1 December 2019 - 30 November 2029	80	10	2		$1000 + 80 \cdot 10 \cdot 5 \cdot (6 \cdot 2) = 49000,-€$
Industry 4.0, larger area/bandwidth Assignment: 8 December 2019[2)] - 7 December 2029	80	10	2		$1000 + 80 \cdot 10.8\bar{3} \cdot 5 \cdot (6 \cdot 2) = 49400,-€$
Agriculture, small area Assignment: 1 December 2019	50	10		1.5	$1000 + 50 \cdot 10 \cdot 5 \cdot 1{,}5 = 4.750,-€$
Agriculture, larger area/bandwidth Assignment: 1 December 2019	80	10		5	$1000 + 80 \cdot 10 \cdot 5 \cdot 1 \cdot 5 = 21000.-€$
Agriculture, small area, short period Assignment: 1 December 2019	80	1		1.5	$1000 + 80 \cdot 1 \cdot 5 \cdot 1 \cdot 1.5 = 1600.-€$

[1)] See statistics on land use published by the Umweltbundesamt at www.umweltbundesamt.de → "CORINE Land Cover - CLC".

[2)] A fee (and a contribution) is payable for each month or part of month; years are rounded to eight decimal places.

Annex 8: List of abbreviations

5G	fifth generation of mobile communications
AAS	active antenna system
BNetzA BGebV-Zut	Special Fee Ordinance Bundesnetzagentur - Frequency Assignments
BEM	block edge mask
CEPT	European Conference of Postal and Telecommunications Administrations
dBµV/m	decibel relative to one microvolt per metre
dBm	decibel relative to one milliwatt
ECC	Electronic Communications Committee
EIRP	equivalent isotropically radiated power
EMVG	Electromagnetic Compatibility of Equipment Act
EU	European Union
FSBeitrV	Frequency Protection Contributions Ordinance
FSS	fixed satellite service
FuAG	Radio Equipment Act
GHz	gigahertz
IT	information technology
MFCN	mobile/fixed communications networks
MHz	megahertz
non-AAS	non-active antenna system
P	power
SME	small and medium-sized enterprises
TDD	time division duplex
TKG	Telecommunications Act
TRP	total radiated power
WGS 84	World Geodetic System 1984