Decision of the President's Chamber of the Bundesnetzagentur für Elektrizität, Gas, Telekommunikation, Post und Eisenbahnen of 16 November 2020 on the order for and choice of proceedings for award, the determinations and rules in detail (award rules) and the determinations and rules for conduct of the proceedings (tendering rules) for spectrum in the 450 MHz band for mobile/fixed communications networks (MFCN)

-Reference: BK1-20/001-

The spectrum usage rights in the 450 MHz band (451.00 - 455.74 MHz / 461.00 - 465.74 MHz) expire on 31 December 2020; the spectrum will be made available primarily for critical infrastructure applications within the framework of the designation for mobile/fixed communications networks (MFCN). The needs of public safety authorities and organisations and the federal armed forces will be taken into consideration as far as is possible on the basis of the Frequency Plan.

The provision of the 450 MHz spectrum for critical infrastructures will help to pave the way for the digitisation of the energy transition. The spectrum is particularly suitable for use in building a highly available and blackout-resilient nationwide wireless network infrastructure for sectors such as electricity, gas, wastewater, water and district heating.

It should also be taken into account that no alternative broadband spectrum and no exclusive bands are currently available for critical infrastructure operators. The provision of the spectrum can therefore make a significant contribution to the energy transition.

The functioning of critical infrastructures is an essential part of society and the economy. Degradation or failure of these infrastructures together with supply shortages can bring society in Germany to a standstill, endanger public safety and order and even put lives at risk.

In particular shortages in water and energy supply represent realistic crisis scenarios that can have a significant impact on public and private life. A disruption to energy supply, for instance, can have knock-on effects on many different areas of everyday life. With the transition towards an increasingly decentralised and digitalised energy system, in particular the secure connection of millions of small, distributed generation installations is increasingly important for security of supply. Failure of the supply networks could potentially lead to traffic chaos as a result of the failure of traffic management systems (such as traffic lights). In addition to chaos on the roads, public transport, for example trains, would come to a halt en route or at stations. Furthermore, heating, air conditioning and water pump systems might stop working, production facilities might come to a standstill, and in the health sector essential operations might not be able to be carried out. An electricity power cut could result in the failure of telecommunications infrastructure, depending on how long energy is buffered for the network elements. As a result, it would no longer be possible to make emergency calls and get help or coordinate the restoration of the supply networks. There is a threat of similar crisis scenarios in the event of the failure of other infrastructure essential for meeting society's basic needs, for example water supply infrastructure. The purpose of use is not restricted to crisis communications or the connection of critical infrastructures within the narrower meaning of the BSI Critical Infrastructure Ordinance (BSI-KritisV) but, in the energy supply sector for instance, includes the whole digitisation of the energy transition. It is therefore important to be able to respond adequately to future events in the supply networks and for the telecommunications infrastructure to be "blackout-resilient" in these circumstances. This is also in line with the requirements of Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration.

The nationwide availability of adequate telecommunications infrastructure is crucial for a reliable energy supply.

In the case of supply for critical infrastructures, the technical aspects of the reliability and security of communications networks are therefore of particular importance. The exceptional resilience of critical infrastructural services thus forms a fundamental basis for the functioning of modern society.

The requirements of the federal armed forces and public safety authorities and organisations must also be kept in mind in addition to the requirements of critical infrastructures. The time and geographically limited requirements of the federal armed forces have already been taken into consideration in the President's Chamber Decision. The more complex interests with respect to the requirements of public safety authorities and organisations have already been taken into account in the provision of frequency usage rights in the 700 MHz band. In addition, account has been taken within the framework of this Decision of the requirements of the public safety authorities and organisations. Should data transmission capacity not be used primarily for critical infrastructure applications, necessary safety and security-related applications of the Federal Agency for Public Safety Digital Radio (BDBOS) with a high level of protection are to be enabled as a matter of priority in this band, provided they do not conflict with the spectrum assignment holder's own use.

In addition, further requirements will be taken into consideration in the overall strategy to be drawn up. In light of this, the Bundesnetzagentur published a "Spectrum compass" on 19 August 2020 (Official Gazette No 16/2020, Communication No 237/2020). The paper presents initial considerations on future spectrum availability.

Translation - In case of divergent interpretation, the German text shall prevail.

Decision of the President's Chamber of 16 November 2020 on the order for and choice of proceedings for award, the determinations and rules in detail (award rules) and the determinations and rules for conduct of the proceedings (tendering rules) for spectrum in the 450 MHz band for mobile/fixed communications networks (MFCN) under section 55(10), section 60(1), section 61(1), (2), (3) and (5) and section 132(1) and (3) of the German Telecommunications Act (TKG)

-Reference: BK1-20/001-

The Bundesnetzagentur für Elektrizität, Gas, Telekommunikation, Post und Eisenbahnen, through Ruling Chamber 1 (President's Chamber), hereby issues the following decisions under section 55(10), section 60(1), section 61(1), (2), (3) and (5) and section 132(1) and (3) TKG on the award of spectrum for mobile/fixed communications networks (MFCN) in the 450 MHz band in consultation with the Advisory Council:

I. Order for award proceedings

It is hereby ordered under section 55(10) TKG that the assignment of spectrum for MFCN at 451.00 MHz - 455.74 MHz (lower band) and 461.00 MHz - 465.74 MHz (upper band) is to be preceded by award proceedings as set out in section 61 TKG.

II. Choice of award proceedings

The award proceedings as provided for by section 61(1) TKG will be conducted in the form of tendering proceedings in accordance with section 61(5) TKG.

III. Determinations and rules for the award proceedings

III.1 Requirements for participation in the tendering proceedings, section 61(3) sentence 2 para 1 TKG

III.1.1 No restriction on participation

The right to take part in the tendering proceedings, given the minimum specialist and other requirements within the meaning of section 61(3) sentence 2 para 1 TKG, is not restricted.

III.1.2 Competitive independence

Undertakings may be admitted once only. This also applies in respect of consortia. Undertakings that have merged under section 37 of the German Competition Act (GWB) are deemed to be one undertaking.

III.1.3 Admission to the tendering proceedings

In their application, applicants must state how the minimum objective and subjective specialist requirements for admission to the tendering proceedings pursuant to

section 61(3) sentence 2 para 1 in conjunction with section 55(4) and (5) TKG are met (see section IV.2).

In their written application, applicants must apply for admission to the tendering proceedings.

Admission to the tendering proceedings is made in an official notice and is granted provided that the application was received by the deadline and includes information on the following points:

- applicant
- competitive independence
- reliability
- financial capacity
- specialist knowledge
- spectrum usage concept.

Applications are to be submitted in German

by 12:00 noon on 18 December 2020 in writing, in triplicate, to

Bundesnetzagentur
Referat 212
Kennwort: 450 MHz
Tulpenfeld 4
53113 Bonn

and also

electronically in Microsoft Word (or Microsoft Word-compatible) or PDF format (copying and printing must be enabled) by email to referat212@bnetza.de or on data media.

A blacked-out version in which any business and trade secrets have been blacked out, together with a list justifying the blacked-out parts, is also to be submitted.

Only applicants providing the above information in full will be admitted.

III.2 Determination of the purpose for which the spectrum to be awarded may be used in compliance with the Frequency Plan (section 61(3) sentence 2 para 2 in conjunction with section 55(5), section 60 and section 65 TKG)

III.2.1 Purpose of use of the spectrum

The spectrum to be awarded may be used for MFCN in compliance with the Frequency Plan. The spectrum is to be used primarily for critical infrastructure applications.

Should the data transmission capacity not be used primarily for critical infrastructure applications, necessary safety and security-related applications of the BDBOS with a high level of protection are to be enabled as a matter of priority in this band, provided they do not conflict with the spectrum assignment holder's own use. The arrangements for shared use are to be agreed bilaterally between the assignment holder and the BDBOS.

The assignment holder must ensure the protection of its critical infrastructure network in the case of logical or physical network connections and gateways to other networks within the framework of the legal regulations on network security.

Spectrum in the 450 MHz band is to be made available to military users as required for time and geographically limited local use.

Use of the assigned spectrum may be restricted on a temporary basis as provided for by the TKG, as amended, if the spectrum is required by the responsible authorities to perform their public safety tasks. If use of the spectrum is restricted as thus provided for, the spectrum will be used by the responsible authorities (for example the BDBOS and the federal armed forces).

III.2.2 Nationwide use

The spectrum at 451.00 - 455.74 MHz and 461.00 - 465.74 MHz will be made available for nationwide use.

III.3 Spectrum usage conditions, including the degree of coverage with the spectrum usage, section 61(3) sentence 2 para 4 TKG

1. The usage conditions in this Decision and in Annex 1 apply to the use of the spectrum in the 450 MHz band.

   The assignment holder may diverge from these conditions if mutual arrangements to this effect have been made and divergence is without detriment to the spectrum usage rights of third parties. The Bundesnetzagentur must be informed of this in writing beforehand.

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

2. The spectrum assignment will be valid until 31 December 2040.
3. The assignment holder must negotiate with critical infrastructure operators upon request about coverage with wireless applications and must submit offers for coverage to meet operators' requirements within a reasonable period (offer and negotiation requirement).
4. The assignment holder must report to the Bundesnetzagentur twice a year from the date of assignment and upon request on the progress in planning, building and rolling out the network and on compliance with all obligations entered into in connection with the tendering, in particular on the number of requests for and the progress in negotiations within the framework of the offer and negotiation requirement.

III.4 Fees and contributions

A fee of €113,760,000 will be imposed for spectrum assignment in accordance with section 142 TKG. The notice of the fee payable will be delivered together with the assignment notice.

Payment of the fee will be due in instalments on five dates in five consecutive years following issue of the fee notice, as specified in the notice. The first amount will be due within five banking days of delivery of the fee notice and will be payable to the account specified by the Bundesnetzagentur. The subsequent amounts will be due on the calendar dates specified.

An amount of at least €5,688,000 will be payable on each due date; the total amount of €113,760,000 must have been paid by the last specified due date.

In addition, spectrum usage contribution charges in accordance with section 143(1) TKG and contributions in accordance with section 31 EMVG and section 35 FUAG will be imposed.

IV. Tendering rules

Under section 61(5) sentence 1 TKG, the Chamber must determine the criteria against which applicants' eligibility will be assessed prior to the award proceedings.

IV.1 Eligibility criteria

Applications will be assessed against the criteria as prescribed by law in section 61(5) sentence 2 TKG. These are:

- reliability
- specialist knowledge
- financial capacity
- suitability of the plans to be submitted for using the spectrum for tender
- promotion of a sustainable competitive market
- degree of geographic coverage.

IV.2 Contents of applications

IV.2.1 **Applicant details**

Applicants must provide information about themselves and their authorised agents.

IV.2.2 **Applicant's financial interests**

In their application, applicants must include details and proof of the ownership structure – including indirect ownership – of their undertaking.

IV.2.3 **Reliability**

Applicants must include details and proof of their reliability. Applicants must declare their compliance with the relevant security requirements.

IV.2.4 **Specialist knowledge**

Applicants must include clear and conclusive details of their specialist knowledge. Applicants must include proof that the persons engaged in planning, building and operating the wireless network have the necessary knowledge, experience and skills.

IV.2.5 **Financial capacity and business planning**

Applicants must include details and proof of permanent and sufficient financial resources for the build and roll-out investments set out in the spectrum usage concept and for operation of the wireless network or of how financing is to be secured. In addition, applicants must submit a medium-term business plan covering a period of five years. The plan should include a market and marketing analysis, an investment and financing plan, details of the project management and an evaluation of the planning up to the forecasted roll-out in line with demand.

IV.2.6 **Spectrum usage concept.**

Applicants must present a spectrum usage concept to demonstrate the suitability of their plans for using the spectrum. This applies in particular with respect to the purpose of use of providing coverage primarily for critical infrastructure applications.

IV.2.7 **Promotion of a sustainable competitive market**

Applicants must include details and proof of how they will promote a sustainable competitive market within the meaning of section 2(2) para 2 TKG.

IV.2.8 **Degree of geographic coverage**

Applicants must include details of how they will provide coverage with wireless applications to critical infrastructure operators in order to achieve coverage in line with demand and the purpose of use.

IV.3 Binding effect of the application

The contents of the applications submitted are binding and cannot be changed up until the award is made.

IV.4 Exclusion from the proceedings

Applicants may not disclose or publish any information relating to their application.

Applicants not complying with the tendering rules can be excluded from the proceedings. If non-compliance is not found until after the tendering proceedings, the award and spectrum assignment can be revoked.

IV.5 Award decision and assignment

The award will be made to the most eligible applicant based on the criteria specified in section IV.2.

In the case of equal eligibility, the applicant guaranteeing a higher degree of geographic coverage with the relevant telecommunications services is to be selected. If two or more applicants with equal eligibility also guarantee the same degree of geographic coverage, the award will be made by drawing lots.

The award decision will be based on an assessment of each bid against the specified criteria. The Chamber's decision will take the form of an official notice. The award decision will be published.

The award decision will form the basis for assignment of the spectrum, which is made upon application.

IV.6 Application documents, application costs

Applicants that are not selected will receive an official notice that their application was not successful after the award decision has been made.

Application documents will not be returned even after the proceedings have been completed. Costs incurred by applicants in connection with preparing and submitting their applications will not be reimbursed by the Bundesnetzagentur.

Translation - In case of divergent interpretation, the German text shall prevail.

RATIONALE

1 The following considerations and grounds prompted the Chamber's decision on the order and choice of proceedings for award, the determinations and rules in detail (award rules) and the determinations and rules for conduct of the proceedings (tendering rules) for spectrum in the 450 MHz band for mobile/fixed communications networks (MFCN), in particular for critical infrastructure applications.

Circumstances and steps

2 These decisions are based on the following circumstances:

3 Three usage rights each with a channel bandwidth of 2 x 1.25 MHz (paired) are currently assigned in the 450 MHz band (451.00 - 455.74 MHz / 461.00 - 465.74 MHz). The current assignments, which expire on 31 December 2020, enable use of the spectrum for MFCN.

Spectrum demand survey

4 The Bundesnetzagentur, in light of the expiry of the usage rights on 31 December 2020, conducted a spectrum demand survey (see Official Gazette No 24/2017 of 20 December 2017, Order No 700/2017) to obtain information in particular about the specific requirements for critical infrastructure applications.

5 Approximately 50 notifications of demand and submissions were received in response to the spectrum demand survey. Responses were received primarily from energy, water and telecommunications companies, but also from associations and manufacturers.

6 The energy sector representatives called for spectrum in the 450 MHz band for a reliable energy supply. They argued that the spectrum should be used for a reliable and blackout-resilient network. They said that the spectrum's propagation characteristics made it very well suited to the security-critical applications. In this context, demand was expressed for use for critical infrastructure applications on both a regional and a nationwide basis.

7 However, the user groups comprising public safety authorities and organisations and the federal armed forces called for exclusive use of this spectrum.

Key elements and identification of demand in January 2020

8 In September 2019, the Advisory Council of the Bundesnetzagentur adopted the following resolution on the 450 MHz spectrum:

> *"The Advisory Council notes that the energy industry has an urgent and long-term need for a secure, blackout-resilient and nationally available communications solution in order to safeguard energy supply and successfully implement the energy transition.*
>
> *The energy transition and decentralisation are leading to considerably more complex structures in our future energy supply system. Millions of electricity producers and consumers need to be connected digitally to enable secure management. The use of a secure communications platform is a key prerequisite for a long-term secure energy supply.*
>
> *Of the communications solutions currently available and market-ready for use in critical infrastructures such as the energy sector, the use of a wireless solution on the basis of the 450 MHz spectrum shows the best results.*
>
> *However, the user groups comprising public safety authorities and organisations and the federal armed forces have also called for exclusive use of this spectrum.*

The Advisory Council considers it absolutely necessary that the field of energy supply should be recognised as an essential service of general interest and thus also as a critical infrastructure.

The Advisory Council strongly advocates that the tried and tested secure communications solution on the basis of 450 MHz wireless technology should continue to be available to the energy industry after 2020."

9 In light of the responses received and the expiry of the usage rights on 31 December 2020, the Bundesnetzagentur drew up key elements for the needs-oriented provision of the spectrum for use primarily for critical infrastructure applications and published these key elements for consultation on 30 January 2020 (Communication No 39/2020, Bundesnetzagentur Official Gazette No 3/2020 of 19 February 2020, page 204 et seq). The key elements set out the initial framework conditions for a procedure for the provision of spectrum.

10 At the same time, interested companies were invited to set out their spectrum requirements for critical infrastructure applications.

11 In the demand identification proceedings, specific nationwide demand was notified for spectrum in the 450 MHz band – primarily for critical infrastructure applications.

12 The requirements notified and specified primarily for critical infrastructure applications all cover the whole of the nationally available spectrum comprising 2 x 4.74 MHz (paired). In addition, a large number of companies declared a demand for spectrum for regional business models to implement primarily critical infrastructure applications, with some also notifying these spectrum requirements. Some of these companies with regional business models stated that nationwide models with cooperation partners were also conceivable.

13 Essentially, respondents made the following comments during the course of the consultation:

- **Re key element 1 – available spectrum**

  "At present, 2 x 4.74 MHz (451.00 - 455.74 MHz / 461.00 - 465.74 MHz) will be available for MFCN from 1 January 2021. The 450 MHz spectrum is to be provided in one paired block."

  - **[Block size]**

  The majority of the respondents were in favour of the proposed block size, adding that the requirements of critical infrastructures could only be fully met by providing all the 2 x 4.74 MHz of spectrum.

  It was also said, however, that efforts should be made to provide spectrum as a block of 2 x 5 MHz.

  - **[Timing of award decision]**

  Many respondents were in favour of objective, transparent and non-discriminatory award proceedings. In light of this, a swift decision in the course of 2020 was essential.

  By contrast, it was also said that it would be possible to extend the usage rights of current assignment holders until new assignment proceedings had been completed and thus conduct a multi-stage procedure.

  - **[Protection requirements]**

  It was said that the 460 - 470 MHz band was used by weather satellites on a secondary basis and by earth observation satellites in accordance with No 5.289 of the Radio Regulations. There were currently no plans for this service to use the 451.00 - 455.74 MHz and 461.00 - 465.74 MHz bands.

- **Re key element 2 – designation**

  "In the 450 MHz band, the frequencies 451.00 - 455.74 MHz and 461.00 - 465.75 MHz are designated in accordance with the Frequency Plan (entry nos 248029 and 248067) for use for MFCN."

  - **[Changes to the Frequency Plan]**

    The majority of the respondents were in favour of providing the spectrum as designated for MFCN, adding that the intended purpose of use could be implemented by attaching conditions to the spectrum assignment.

    Some respondents said that if the spectrum were designated for MFCN, it should also be provided for MFCN without any restrictions.

    Other respondents said that the purpose of use should be changed/supplemented in the Frequency Plan. It was said that the designation for MFCN was questionable in connection with providing the spectrum for critical infrastructures.

- **Re key element 3 – nationwide use**

  "The spectrum in the 450 MHz band is to be provided in one block on a nationwide basis."

  - **[Roll-out obligation/nationwide assignment]**

    The majority of the respondents were in favour of the key element on nationwide use, saying that this was in line with the approach of basic service provision. Local and regional requirements could be met through a nationwide roll-out obligation and currently identifiable deficits could be eliminated. Provision on a nationwide basis would enable the spectrum to be used more economically and efficiently than provision on a regional basis. In addition, having one nationwide provider would guarantee timely and appropriate use.

    By contrast, it was said that numerous critical infrastructure operators were only active locally or regionally. A critical view was therefore taken of provision on a nationwide basis in light of security concerns. In addition, regional assignments would make it possible for independent communications systems to be established efficiently, operated and used cost-effectively and made available to third parties on an application-specific basis.

- **Re key element 4 – purpose of use**

  "The spectrum in the 450 MHz band is to be provided primarily for critical infrastructure applications."

  - **[Use of the spectrum and extension of the "critical infrastructures" user group]**

    Very many respondents pointed to the fact that critical infrastructures urgently needed a secure, highly available and above all nationwide communications solution. In addition, attention was drawn to the fact that spectrum was also needed for the water, wastewater, district heating and transport sectors, including the associated metering services.

    By contrast, it was said that the spectrum should be provided for public mobile communications to ensure that sufficient spectrum was available for nationwide coverage. It was also said that provision for critical infrastructure applications should not be allowed to lead to a distortion of competition or monopoly of use.

- **[Specification of the purpose of use]**

  A large number of respondents said that the purpose of use should be specified in more detail in order to give priority to critical applications and lay down the necessary minimum requirements.

- **[Use of free capacity]**

  A number of respondents called for elaboration on the possibility to use free capacity. No applications should be excluded per se and free capacity should be made available for other use (such as for smart metering systems).

  However, it was also said that special consideration should be given to the public safety authorities and organisations and shared use should be guaranteed through a binding condition. In addition, it was said that the offer of shared use made to the BDBOS still held good.

- **[Network design]**

  Respondents commented on the proposed application-specific security requirements.

  On the one hand, it was said that the security requirements were too restrictive. On the other hand, it was pointed out that, in order to safeguard supply, an emergency power supply lasting for at least 72 hours for the components of the 450 MHz network that were required in the event of a blackout was absolutely necessary and should be made mandatory.

  Furthermore, it was pointed out that, with respect to critical infrastructure-compliant applications in the field of public mobile communications, technological approaches that supported critical infrastructures and that were also based on other bands (for example 700, 800, 900 MHz) were under development. In the absence of limiting conditions and restrictions, a guarantee was needed that the services mentioned would still be able to prove themselves in the market with fair competition between technologies and business models if changes were made to the use of the 450 MHz band.

- **[Technical characteristics of smart meter gateways]**

  It was said that all metering systems currently being rolled out served both critical and non-security critical applications. In addition, connecting smart metering systems via two communications technologies raised a new problem with respect to the smart meter gateways certified by the Federal Office for Information Security (BSI) and could not be implemented with a reasonable amount of technical and economic effort.

- **Re key element 5 – local and regional requirements**

  "The assignment holder is to provide relevant coverage or lease spectrum upon request by critical infrastructure operators."

  - **[Spectrum leasing]**

    Many respondents welcomed the Bundesnetzagentur's proposal.

    Some respondents said that the possibility of leasing spectrum could not replace a roll-out obligation. The requirements of the energy and water industries should be met as a matter of priority in any case.

    Furthermore, some network operators said that leasing spectrum was difficult with respect to using the spectrum as efficiently as possible and in light of the frequency coordination needed in the event of leasing.

- **[Roll-out obligation]**

  Many respondents said that an obligation should be imposed for a reasonable minimum nationwide roll-out, possibly within four years or in conjunction with milestones. The respondents also considered implementation by one nationwide operator to be appropriate for reasons of spectrum efficiency, economic efficiency and technical competence.

  By contrast, a small number of respondents opposed a roll-out obligation or called for further elaboration.

- **[Network access/possible monopoly position]**

  It was said that access to the wireless network should be available under non-discriminatory market conditions. Individual respondents took the view that monopoly pricing should be prevented by giving an exact definition of "market".

- **Re key element 6 – time limit**

  "The spectrum is to be awarded with an expiry date of 31 December 2040."

  The majority of the respondents considered the duration of 20 years to be expedient. Some respondents even called for a longer duration (such as 30 years).

- **Re key element 7 – costs**

  "Fees and contributions will be imposed for assignment."

  The view was put forward that the fees should be set appropriately in light of the purpose of use and the public interest and should take sufficient account of the special circumstances of the provision of general interest services.

  By contrast, it was said that it was not clear why particularly moderate fees should be charged for critical infrastructures. Discrimination against nationwide mobile operators should be avoided.

14 Respondents also commented on the following points:

- **Award proceedings:**

  Many respondents favoured the award by tendering with criteria based on the requirements of the energy industry. Tendering would enable financial resources to be better invested in a swift roll-out of the necessary infrastructure.

  Some respondents said that a tendering process should enable implementation of a commercial model.

  By contrast, some respondents criticised the fact that the Bundesnetzagentur excluded the possibility of auction proceedings in advance. If the designation for MFCN were kept, regulatory consequences needed to be considered. Some respondents also opposed awarding scarce spectrum for MFCN by tendering because of the consequent distortion of competition to the detriment of mobile operators. Furthermore, it was suggested that the key elements should be laid down first and the demand identification proceedings should not initially be conducted. There was therefore opposition to a tendering process because of concerns about a massive distortion of competition in the market for MFCN.

15 The responses to the key elements – as far as they do not contain any business or trade secrets – can be viewed on the Bundesnetzagentur website (www.bundesnetzagentur.de/450MHz).

Consultation draft

16 The responses to the key elements were drawn on and taken into account in drawing up the consultation draft. The draft was published for consultation on the Bundesnetzagentur website on 29 July 2020 (Communication No 201/2020, Bundesnetzagentur Official Gazette No 14/2020 of 5 August 2020, page 625 et seq). The responses to the draft – as far as they do not contain any business or trade secrets – can be viewed on the Bundesnetzagentur website (www.bundesnetzagentur.de/).

Detailed reasoning

Re I. Order for award proceedings

17 In accordance with section 55(10), section 61(1), section 55(4) and (5) and section 2(2) and (3) TKG, the order for award proceedings is made in such a way that the nationwide assignment of spectrum in the 450 MHz band must be preceded by award proceedings.

18 Under section 55(10) sentence 1 TKG it may be ordered, without prejudice to section 55(5) TKG, that the assignment of spectrum be preceded by award proceedings based on conditions determined by the Bundesnetzagentur in accordance with section 61 TKG. Award proceedings can be ordered where an insufficient amount of spectrum is available for assignment or where more than one application is made for particular spectrum. This order as per section 55(10) TKG is at the discretion of the Bundesnetzagentur.

Re I.1 Timing of the order

The following was said on this:

19 The majority of the respondents said that the award decision should be made and concluded as soon as possible in the interests of the energy industry. Assignment of the spectrum should be implemented swiftly in transparent, open and non-

discriminatory assignment proceedings. Respondents welcomed implementation on the basis of the current Frequency Plan, stating that this guaranteed award in good time before the current spectrum assignments expired at the end of 2020.

20 The provision of the 450 MHz spectrum was a matter of urgency in light of the transition in the energy and transport sectors and the digitisation of the energy networks. A swift and legally sound award of the 450 MHz spectrum primarily for critical infrastructure applications was important in order to continue to guarantee secure and efficient control in the future, including in particular at medium-voltage and low-voltage level, prevent the delayed roll-out of smart meters and give impetus to electromobility.

21 The 450 MHz spectrum was already being used for emergency communications, smart grid applications and connecting smart meter gateways. In light of the foreseeable expiry of the current assignments and the need by all interested parties and potential customers for decision and planning certainty, it was high time that the award decision was made.

22 Other respondents stated that the Bundesnetzagentur was obviously prepared, in view of the tight timescale, to give way to the pressure of time and defer key procedural issues. The federal government had not yet taken a decision on the future use of the spectrum. Nevertheless, the consultation draft had been published without drawing attention to the current status of interministerial discussions and the possible consequences for the proceedings. The introduction merely contained an abstract statement that the needs of other user groups were to be taken into consideration within an overall strategy for the bands below 1 GHz. This gave the impression that the higher-level decision had already been taken.

23 Furthermore, it was open to question whether issuing all the decisions in one act and carrying out only one consultation impermissibly restricted stakeholder participation as provided for by the legislature. On account of the reach of President's Chamber decisions, it was to be assumed that the legislature had consciously separated the steps in abstract regulation in order to avoid decisions in specific individual cases being subject to political (time) pressure.

24 Moreover, it was said that both the scope of the available spectrum and the usability of the spectrum were still subject to uncertainties. The question of the possibility of using an unrestricted 5 MHz carrier could mislead some market participants into speculating about acquiring such a carrier at low cost. In the interests of transparent proceedings, transparency and planning certainty with regard to the usability of an unrestricted carrier had to be created in advance. Further planning uncertainty arose from the usage restrictions to be expected because of the military users. These restrictions on use had not been specified in sufficient detail.

25 Some other user groups stated that the Bundesnetzagentur should not proceed with the planned award. At least, the final decision should include a proviso that the decision might be subject to a different decision by the federal government.

26 Some respondents called for a hybrid model or shared use by the BDBOS and critical infrastructures.

The Chamber has ruled as follows:

27 The Chamber considers it appropriate to order award proceedings for the spectrum in the 450 MHz band at the present time. The key elements published in Official Gazette No 3/2020 of 19 February 2020 (Communication No 39) and the consultation draft (loc cit) provide the basis in these proceedings.

28 The current spectrum usage rights expire on 31 December 2020 and will therefore be available from 1 January 2021 primarily for critical infrastructure applications within the framework of the designation for MFCN. The steps up to conducting award

proceedings in accordance with section 61 TKG and subsequently assigning spectrum usually take a considerable amount of time, which is why it is necessary to order award proceedings at the latest at the present time. Ordering the award proceedings at the present time is thus consistent with the regulatory aim of securing efficient spectrum use as envisaged in section 2(2) para 7 TKG.

29 Ordering proceedings at the present time also takes account of the regulatory aim set out in section 2(2) para 2 TKG. Ordering proceedings at the present time provides all interested companies with equal access to the spectrum available nationwide. The Bundesnetzagentur's aim is to give all interested companies the necessary planning and investment certainty with respect to the future use of the spectrum and to conclude the proceedings for awarding this spectrum as soon as possible. The Chamber has therefore not followed the call to issue the President's Chamber decision with the proviso that it may be subject to a different decision by the federal government.

30 The required planning framework for the provision of the 450 MHz spectrum in the Frequency Ordinance (FreqV) and the Frequency Plan is already in place. The 440 - 470 MHz band is allocated to the mobile service and is designated for MFCN in the Frequency Plan (entry nos 248029 and 248067).

31 Regarding the comments that both the scope and the usability of the spectrum were still subject to uncertainties and that this could mislead some market participants into speculating about acquiring a 5 MHz block at low cost, the Chamber would like to make it clear that this depicts a possible future expansion in usage and does not signify investment and planning uncertainty for interested companies. In fact, it is planned to designate this band for a specific and thus restricted purpose of use within the framework of MFCN. In connection with the usage restrictions because of the military users, attention is drawn to section III.2.2 (nationwide use).

32 Regarding the comments that there was merely a statement that the needs of other user groups were to be taken into consideration within an overall strategy for the bands below 1 GHz and that this gave the impression that the higher-level decision had already been taken, the Chamber would like to point out the following:

33 The needs of other user groups can only be taken into consideration in the context of the award decision as far as they are in line with the spectrum allocation and designation. Other user groups cannot be taken into consideration in the present Decision on the award of the spectrum. These other requirements are to be taken into consideration within an overall strategy for the bands below 1 GHz. However, this overall strategy first requires close cooperation between all stakeholders in national coordination prior to international coordination as well as the associated allocation to the radiocommunication services and is therefore not within the scope of this Decision.

34 Thus – contrary to respondents' views – there are no open procedural issues. There has been no different decision from the federal government with respect to the provision of the spectrum primarily for critical infrastructures. It is therefore not necessary to subject the final award decision to a proviso. Moreover, such a proviso would be contrary to providing planning and investment certainty for potential assignment holders.

35 Ordering award proceedings at the present time is consistent with the regulatory approach set out in section 2(3) para 1 TKG, namely that the Bundesnetzagentur, in following the aims set out in section 2(2) para 2 TKG, applies objective, transparent, non-discriminatory and proportionate regulatory principles by promoting regulatory predictability through ensuring a consistent regulatory approach over appropriate review periods.

36 In 2017 the Bundesnetzagentur, in light of the expiry of the usage rights on 31 December 2020, conducted a spectrum demand survey (see Official Gazette No 24/2017 of 20 December 2017, Order No 700/2017) to obtain information in particular about the specific requirements for critical infrastructure applications. The results indicated a high demand for critical infrastructure applications on a regional and nationwide basis, in particular from the energy sector.

37 In September 2019, the Advisory Council of the Bundesnetzagentur adopted a resolution on the 450 MHz spectrum and strongly advocated "[…] that the tried and tested secure communications solution on the basis of 450 MHz wireless technology should continue to be available to the energy industry after 2020."

38 In the key elements and identification of demand paper of 30 January 2020 (loc cit), the Bundesnetzagentur stated that it was seeking to make the spectrum available for critical infrastructure applications and take a decision on provision of the above-mentioned expiring spectrum assignments in the 450 MHz band in the course of 2020.

39 In this respect, ordering award proceedings for the provision of the 450 MHz spectrum primarily for critical infrastructure applications is consistent with the regulatory approach adopted so far by the Bundesnetzagentur. The regulatory approach provides for the 450 MHz spectrum to be made available primarily for critical infrastructure applications in objective, transparent and non-discriminatory proceedings before the current usage rights expire. Ordering award proceedings at the present time implements the Bundesnetzagentur's regulatory approach for the 450 MHz spectrum. This promotes the above-mentioned regulatory aims and takes account of the regulatory principles within the meaning of section 2(3) TKG.

40 Regarding the comments that issuing all the decisions in one act impermissibly restricted stakeholder participation as provided for by the legislature, the Chamber would like to make the following clear:

41 The President's Chamber can itself shape the framework conditions in terms of content and time by combining several ruling chamber decisions into one or splitting them up into several general administrative orders in an appropriate manner (see Federal Administrative Court (BVerwG) ruling 6 C 4.09 of 1 September 2009, margin no 27). In light of the expiry of the current frequency usage rights on 31 December 2020, the Chamber considers it necessary, expedient and reasonable to combine the decision on the order for and choice of proceedings and the award and tendering rules into one act. The Chamber's objective in doing so is to speed up the procedure for the provision of the spectrum and give market players planning and investment certainty in good time. This does not reduce stakeholder participation as provided for in legislation or the scope of legal protection.

Re I.2 Spectrum availability

The following was said on this:

42 The majority of the respondents supported the draft and welcomed implementation on the basis of the current Frequency Plan and award as one block, stating that this was the only way to enable the necessary technology to be used and sufficient capacity to be offered to all interested parties on economically efficient terms and in line with demand. These respondents essentially agreed that the offer and negotiation requirement ensured non-discriminatory access to 450 MHz wireless services for all users irrespective of the future assignment holder.

43 Another majority of respondents supported the planned shared use of the spectrum by the federal armed forces, which would be limited in terms of area and time. Some respondents called for measures to ensure that at least parts of the spectrum would always remain usable for critical infrastructure operators' highly critical applications.

44 One respondent pointed out that the information about military applications needed to be provided early on. The future assignment holder would, however, not be informed of the geographic location of the military training areas concerned until the assignment process. This raised the question of how the spectrum usage concept to be submitted in the tendering proceedings was to include solid and assessable statements based on this information. An applicant with relevant inside information would be at a significant advantage even in the competitive tendering process. However, this would call into question the impartiality and thus the openness of the proceedings in the long term.

45 A number of respondents would welcome expanding the spectrum to 2 x 5 MHz (paired) in the medium term.

46 However, one respondent pointed out that parts of the spectrum under discussion comprising 2 x 0.26 MHz (paired) were used by paging services, which served thousands of critical infrastructure operators. The assignment holder would need to provide particular protection for these parts of the spectrum, with the associated minimum separation. Demand for this efficiently used part of the spectrum from paging services was increasing. The operators of the relevant critical infrastructures had made considerable investments in their solutions. Full use of a 2 x 5 MHz block for the assignment holder would be contrary to the assignment purpose and needed to be ruled out.

The Chamber has ruled as follows:

47 Spectrum is available when it is not encumbered by other usage rights and when the assignment criteria pursuant to section 55(5) TKG are met, that is when the spectrum is designated for the planned usage in the Frequency Plan, there is compatibility with other spectrum usages, and efficient and interference-free use of the spectrum by the applicant can be secured.

48 The spectrum at 450.00 - 455.74 MHz and 460.00 - 465.74 MHz is designated for MFCN in the Frequency Plan of October 2019 in entry nos 248029 and 248067. Entry nos 248028 and 248030 and 248066 and 248068 also enable use of the bands at 450.00 - 451.00 MHz and 460.00 - 461.00 MHz for private mobile radio (PMR).

49 The current usage rights for the spectrum at 451.00 - 455.74 MHz and 461.00 - 465.74 MHz expire on 31 December 2020. Thus 2 x 4.74 MHz (paired) of spectrum will be available on a nationwide basis from 1 January 2021.

50 As explained in the key elements of 30 January 2020 and in the consultation draft of 29 July 2020 (published at www.bundesnetzagentur.de/450mhz), it appears expedient, also in light of the usage scenarios presented in the demand identification proceedings, to combine the spectrum at 451.00 - 455.74 MHz / 461.00 - 465.74 MHz into one paired block comprising 2 x 4.74 MHz. It is not intended to retain the current division of three blocks each with a system bandwidth of 2 x 1.25 MHz (paired) – see Annex 2 (diagram of current and future spectrum provision). Because there will be no individual channel division between different users within the band, a block of contiguous spectrum will be available to deploy new broadband technologies with the highest possible data rates, which will enable the implementation of various different services.

51 With respect to fears about the emergence of a monopoly for applications in the 450 MHz band, the Chamber is convinced that this can be effectively countered by the determinations in section III.3.3. Requiring the future assignment holder to enable interested critical infrastructure operators to have the necessary applications on reasonable terms will ensure that the requirements of local and regional critical infrastructure operators will be met.

52 Regarding comments that spectrum should be provided as a block of 2 x 5 MHz (paired), attention should be drawn first and foremost to the current designations in

the Frequency Plan. In addition to the spectrum at 450.00 - 455.74 MHz (entry no 248029) and 460 - 465.74 MHz (entry no 248067) being designated for MFCN, spectrum at 450 - 451 MHz and above 455.74 MHz and at 460 - 461 MHz and above 465.74 MHz is designated for PMR applications. In order to provide spectrum as a block of 2 x 5 MHz (paired) for use solely for MFCN, the designations in the Frequency Plan for the spectrum at 455.74 - 456.00 MHz and 465.74 - 466.00 MHz would need to be changed for MFCN. At present, it is not intended to do this because of the time needed, taking special consideration of the existing assignments.

53 Attention is also drawn to the current assignment and usage situation in adjacent bands. There are currently still a large number of assignments in the adjacent bands, which rules out providing additional spectrum in the short term from 1 January 2021. It should also be noted that the applications operated in the adjacent bands may require additional measures at technical level (see Annex 1 – spectrum usage conditions).

54 The Chamber acknowledges that a paired 5 MHz block would enable the use of an unrestricted 5 MHz carrier as soon as the whole block of spectrum was available for harmonised and standardised use. The Bundesnetzagentur will therefore examine the possibility of expanding the 2 x 4.74 MHz block into a complete 2 x 5 MHz block in the medium to long term. If it is possible to expand the block by 2 x 0.26 MHz during the term of the future assignment, the possibility of assigning this additional spectrum at 455.74 - 456.00 MHz and 465.74 - 466.00 MHz to the assignment holder will be considered. The assignment holder would then be able to use a block of 2 x 5 MHz (paired) following a possible expansion of the spectrum in the medium to long term. However, this may not be able to be guaranteed, depending on the results of the examination to be made. This examination will also need to take account of the necessity to protect the radiocommunication services affected by the expansion.

55 Alongside critical infrastructure applications, spectrum in the 450 MHz band is required on a local basis to train soldiers on military training areas and on a regional basis and for strictly limited periods for large-scale military training exercises. The use of the spectrum is based on usage provision 3 of the Frequency Ordinance of 27 August 2013 (Federal Law Gazette I page 3326), as last amended by Article 1 of the Act of 27 November 2018 (Federal Law Gazette I page 2026). This usage provision allows individual frequencies in the 410 - 862 MHz band to be used for military purposes. The assignment holder will be required to make spectrum in this band available to military users as required for local use as well as time and geographically limited use.

56 The future assignment holder will be informed during the assignment process of the geographic location of the military training areas concerned in order to guarantee efficient and interference-free spectrum use to the greatest possible extent. Spectrum coordination will be based on the latest version of ECC Recommendation T/R 25-08 (Planning criteria and cross-border coordination of frequencies for land mobile systems in the range 29.7-470 MHz).

57 Regarding the comment from one respondent that the application procedure could be affected by possible inside information about the site locations and that information about the locations needed to be provided early on, the Chamber would like to point out the following. The Chamber assumes that the federal armed forces will give the assignment holder sufficient notice of the strictly limited large-scale military exercises. The Chamber expects that sufficient spectrum will be made available for military use in such a way that spectrum resources will still be available for critical infrastructures in these cases.

58 The restrictions from military use are limited in terms of area, time and frequencies and therefore do not preclude nationwide assignment.

59 The Bundesnetzagentur will provide potential applicants, upon request, with more detailed information on the military training area locations in the form of a cartographic representation of the locations and specific coordinates. At present, it is assumed that no more than 20 military training areas within the Federal Republic of Germany are concerned. All potential applicants will thus be guaranteed access to the same information and, contrary to respondents' comments, different levels of information among applicants will be prevented.

60 In the Chamber's view, a spectrum usage concept describes the basic plan for building and operating the planned network, irrespective of the specific regional characteristics. As the planned President's Chamber decision requires account to be taken of options for shared use by the federal armed forces on a regional basis, additional statements are required. It is therefore necessary to set out not only how the spectrum will be used as efficiently as possible but also how basic operation of the network for critical infrastructure will be guaranteed in any given region without the use of parts of the spectrum.

Re I.3 Scarcity

The following was said on this:

61 Providing the spectrum in award proceedings was welcomed. In light of both the limited amount of spectrum available and the demand identified in the demand identification proceedings, there was no alternative other than to award the spectrum in award proceedings. Use of the 450 MHz spectrum was an essential prerequisite for the secure integration of renewable energy sources into the energy system. The 450 MHz spectrum therefore constituted a core building block for implementing the transition in the energy and transport sectors and thus for achieving the climate targets in Germany.

62 The majority of the responses received stated that critical infrastructure operators – in particular in the energy sector, but also in the water, wastewater, district heating and transport sectors – urgently needed a secure, highly available and powerful nationwide communications solution for implementing the energy and transport transition, also given the increase in M2M communication applications. The 450 MHz band was the only spectrum suitable and available for this. Only this spectrum met the requirements for technical performance, viability and short-term feasibility. Neither conventional narrowband PMR networks, licence-exempt wireless systems, energy utilities' own optical fibre nor public mobile networks could meet these requirements. The energy industry had made preparations for the rapid construction of a nationwide 450 MHz wireless network. Energy utilities already operated regional 450 MHz wireless networks, and consortia from the energy sector had come forward as possible national operators. Moreover, the ecosystem required for a long-term, efficient and economic use of the spectrum for machine applications was already available.

63 Some individual respondents stated that it was not clear how the needs of other user groups, in particular those of the public safety authorities and organisations, would be taken into consideration.

The Chamber has ruled as follows:

64 Based on the qualified notified requirements submitted in response to the key elements and identification of demand for the future use of spectrum in the 450 MHz band (loc cit), the Chamber is convinced that the demand for spectrum in the band at 450 MHz exceeds the available spectrum and that the spectrum is therefore scarce within the meaning of section 55(10) sentence 1 first alternative TKG.

65 Under section 55(10) sentence 1 TKG it may be ordered, without prejudice to section 55(5) TKG, that the assignment of spectrum be preceded by award

proceedings based on conditions determined by the Chamber in accordance with section 61 TKG when spectrum is scarce. The scarcity posited in the two alternatives set out in section 55(10) sentence 1 TKG can result from either the established fact of a surplus of applications (section 55(10) sentence 1, second alternative) or the forecast of an insufficient amount of spectrum being available (section 55(10) sentence 1, first alternative). In consideration of the wording of the law and of the connection between the two possible alternatives, the forecast mentioned in the first alternative refers to a greater number of applications being made than spectrum is available at the time of assignment. This forecast is based on the Chamber's determination that the demand for spectrum exceeds supply.

66 Orders for awards that are based on a scarcity forecast must be underpinned by a regulatory decision to the effect that particular spectrum will be made available at a given time for a purpose of use defining the further planning framework. This decision must be based on a correct weighing of interests with plausible and exhaustive argumentation and must be taken by the President's Chamber (BVerwG ruling 6 C 3.19 of 24 June 2020 – juris.de). A regulatory decision on which spectrum is to be made available for a specified purpose at a given time is thus usually required for spectrum scarcity to be established.

67 This decision is based on section 55(5) sentence 2 TKG and therefore depends on the use being compatible with the regulatory aims set out in section 2(2) TKG. The Bundesnetzagentur – contrary to the assumption made by respondents – has scope for interpretation in its decision-making and must fill this scope by weighing up all the interests (BVerwG ruling 6 C 3.19 of 24 June 2020 – juris.de).

68 Providing the 450 MHz spectrum on a nationwide basis primarily for critical infrastructures serves the regulatory aim of securing efficient and interference-free spectrum use, section 2(2) para 7 TKG.

69 The 450 MHz spectrum has favourable propagation characteristics and is suited to providing wireless applications within a relatively large radius around a base station. Because of these propagation characteristics, providing the spectrum on a nationwide basis also serves the aim of efficient and interference-free spectrum use as it avoids the need for complex coordination and facilitates network planning.

70 At the same time, the suitability of the spectrum for broadband MFCN applications (with high data rates) is only very limited because of the small channel bandwidth of less than 5 MHz. In fact, the spectrum is – as also stated by respondents – particularly suitable for relatively narrowband critical infrastructure applications. The propagation characteristics also make the spectrum to be awarded very suitable for indoor coverage and thus also potentially for controlling smart metering systems. These systems are often installed in basements and so connecting the systems using higher frequencies could involve a substantial amount of additional work in network planning and a considerable increase in the number of base stations.

71 An adequate and nationwide wireless network infrastructure is crucial for a reliable energy supply and the digitisation of the energy transition, as was confirmed in the majority of the responses received. The fluctuations in renewable electricity generation represent one of the biggest challenges of the energy transition. Fluctuating generation and demand need to be integrated intelligently into the electricity networks. This requires a highly available and blackout-resilient nationwide wireless network infrastructure in order to maintain the provision of general interest services in the event of a crisis. This concerns in particular the electricity, gas, wastewater, water and district heating sectors. A reinforced wireless network is required in particular in the event of a crisis in order to guarantee the functionality and/or restoration of critical infrastructure networks. In principle, any network infrastructure can be made blackout-resilient.

72 In particular, the fact should be taken into account that no alternative broadband spectrum and no exclusive bands are currently available for critical infrastructure operators. The 450 MHz spectrum meets the particular requirements for technical performance, viability and short-term feasibility that cannot be met with either narrowband PMR networks, generally assigned spectrum, optical fibre or public mobile networks. This was confirmed by the majority of the respondents. The provision of the spectrum can therefore make a significant contribution to the energy transition. The expert opinion on the digitisation of the energy transition commissioned by the Federal Ministry for Economic Affairs and Energy also reaches this conclusion. According to the expert opinion, a dedicated mobile network for critical infrastructures in the 450 MHz band can meet the specific requirements comprehensively and at the lowest cost (for details see "Digitalisierung der Energiewende", https://www.bmwi.de/Redaktion/DE/Publikationen/Studien/digitalisierung-der-energiewende-thema-3.pdf?__blob=publicationFile&v=10, as at 2 July 2020).

73 The Advisory Council of the Bundesnetzagentur noted the following in its resolution on the 450 MHz spectrum of 23 September 2019:

> *"[...] the energy industry has an urgent and long-term need for a secure, blackout-resilient and nationally available communications solution in order to safeguard energy supply and successfully implement the energy transition. The energy transition and decentralisation are leading to considerably more complex structures in our future energy supply system. Millions of electricity producers and consumers need to be connected digitally to enable secure management. The use of a secure communications platform is a key prerequisite for a long-term secure energy supply. Of the communications solutions currently available and market-ready for use in critical infrastructures such as the energy sector, the use of a wireless solution on the basis of the 450 MHz spectrum shows the best results.*
>
> *[…]*
>
> *The Advisory Council considers it absolutely necessary that the field of energy supply should be recognised as an essential service of general interest and thus also as a critical infrastructure. The Advisory Council strongly advocates that the tried and tested secure communications solution on the basis of 450 MHz wireless technology should continue to be available to the energy industry after 2020."*

74 The Chamber was guided by these deliberations in specifying the purpose of use within the limits of its scope for establishing spectrum scarcity. On this basis, the Chamber examined whether an insufficient amount of spectrum was available for such spectrum assignments (section 55(5) in conjunction with section 60 TKG), section 55(10) TKG. Excess demand or a surplus of demand for spectrum can be established on the basis of various findings, including demand surveys, demand notifications and the authority's own demand estimates (see BVerwG ruling 6 C 6.10 of 23 March 2011, margin no 22).

75 The Bundesnetzagentur held that it is appropriate and efficient to initiate demand identification proceedings to determine spectrum requirements in the 450 MHz band in order to ensure that spectrum is assigned in open, objective, transparent and non-discriminatory proceedings (for details see key elements and identification of demand paper of 30 January 2020, loc cit). Demand identification proceedings are a tried and tested, informative, multi-stage procedure. With the demand identification proceedings the Chamber makes a public call for requirements for particular spectrum to be notified within a reasonable period, paving the way for its decision on issuing an order for award proceedings. The possibility of providing the spectrum on a nationwide basis and primarily for critical infrastructure applications within the

framework of the designation in the Frequency Plan for MFCN was considered in connection with the key elements and identification of demand (section 55(5) TKG in conjunction with section 60 TKG). Demand is identified in accordance with section 55 TKG in non-discriminatory, transparent and objective proceedings. It is essential that the Chamber can act on the basis of spectrum requirements that are rooted in objective fact and reflect the actual requirements of the interested companies. The information from the companies expressing their interest in specific use of the spectrum in spectrum demand surveys or requirement notifications is of crucial importance (see Cologne Administrative Court (VG Köln) ruling 21 K 4413/11 of 3 September 2014, margin no 82 et seq).

76 The starting point for identifying demand is always the demand notified by the market participants themselves, which primarily depends on the companies' individual positions and options in the competitive market, for instance the design of their networks and other technical equipment, their plans for products and services in terms of quality and quantity, their own forecasts of market developments and traffic and their strategic and competitive objectives (see BVerwG ruling 6 B 43.13 of 21 January 2014, margin no 13).

77 In the demand identification proceedings, at least six companies or consortia notified specific nationwide demand for spectrum in the 450 MHz band – primarily for critical infrastructure applications.

78 The requirements notified and specified primarily for critical infrastructure applications all cover the whole of the nationally available spectrum comprising 2 x 4.74 MHz (paired). These notified requirements alone result in a surplus of demand for spectrum in the 450 MHz band. In addition, a large number of companies declared a demand for spectrum for regional business models to implement primarily critical infrastructure applications, with some also notifying these spectrum requirements. Some of these companies with regional business models stated that nationwide models with cooperation partners were also conceivable.

79 Following thorough verification of the facts of the case, the Chamber has based its forecast decision in accordance with section 55(10) sentence 1, first alternative TKG on all the circumstances that are relevant for clarifying the availability of sufficient spectrum at the time of award.

80 On the basis of the notified requirements for the spectrum comprising 2 x 4.74 MHz (paired) in the 450 MHz band, the Chamber assumes that an insufficient amount of suitable spectrum will be available for assignment. The Chamber considers the qualified notified requirements to be sufficiently informative for the purpose of forecasting that there will not be sufficient spectrum available for the requested assignments (see section 55(10) sentence 1, first alternative TKG). The Chamber's forecast decision has taken the qualified notified requirements for nationwide use of this spectrum and the resulting excess demand as a sound factual basis.

81 In assessing the demand for spectrum, the Chamber took those requirements into special account where the interested companies had demonstrated that their demand for spectrum for critical infrastructure applications was plausible and serious in accordance with qualified demand identification proceedings. The Chamber would like to make it clear in this context that – contrary to the call made by individual respondents – other requirements that are not in line with the allocation, designation and thus specified purpose of use did not need to be taken into account in the forecast decision.

82 The Chamber laid down stringent criteria for the notification of requirements in the demand identification proceedings in order to ensure that the notifications were serious. The requirements to be met by notifications in the demand identification proceedings were essentially based on the requirements for assignment pursuant to section 55(4) and (5) TKG without the need, however, to present relevant

documentary evidence. The following was stated in the key elements (see key elements, loc cit, page 10):

> *"Particularly convincing, in line with the purpose of identifying demand, are notified requirements that also cover the objective and subjective criteria for future spectrum assignment (section 55 subsections (3), (4) and (5) TKG) in setting out interest in a particular use, in particular for critical infrastructure applications. Preconditions for assigning spectrum are that "efficient and interference-free use by the applicant [is] secured" and "compatibility with other frequency usages [is given]" (section 55(5) sentence 1 paras 3 and 4 TKG). Interested companies are thus called upon to set out clearly and conclusively that efficient and interference-free use by them will be secured at the time of assignment. This clear and conclusive account must cover both the subjective requirements of reliability, financial capability and specialist knowledge and presentation of a convincing concept for the intended use of the spectrum for assignment (...)."*

83 Therefore the Chamber's determination regarding the potential scarcity of spectrum was only based on notifications for which the interested companies clearly and conclusively demonstrated that they can secure efficient and interference-free use of the spectrum within the meaning of section 55(5) sentence 1 para 4 TKG. This clear and conclusive account must cover both the subjective requirements of reliability, financial capacity and specialist knowledge and the presentation of a convincing concept for the intended use of the spectrum for assignment. Mere declarations of interest or the announcement of requirements are not sufficient for inclusion when demand is identified.

84 The Chamber notes, however, that the notified requirements have not been subject to a definitive technical and efficiency assessment at the stage of establishing a surplus of demand in accordance with section 55(10) TKG. In particular, the notified requirements as a basis for establishing spectrum scarcity have not been subject to an assessment as required for the assignment of spectrum pursuant to section 55(5) TKG. The forecast to be made according to section 55(10) sentence 1 first alternative TKG relates (only) to whether there will be insufficient spectrum available for the requested assignments at the time of assignment, but not also to whether the assignment requests can be readily granted (see BVerwG ruling 6 C 3.10 of 22 June 2011, margin no 25; VG Köln ruling 21 K 4413/11 of 3 September 2014, margin no 88).

85 Consequently, companies notifying requirements were not required to provide evidence (such as financing commitments) in addition to plausible spectrum requirements. This would have placed an unreasonable burden on the companies at that stage of the proceedings – not least because of the associated costs – and would therefore not have been proportionate.

86 Having examined the notified requirements for nationwide business models that would use the spectrum primarily for critical infrastructures, the Chamber has reached the conclusion that the total requirements exceed the spectrum available in the 450 MHz band. The interested companies have, as required in the demand identification proceedings (see key elements paper of 30 January 2020, loc cit), shown that they meet the requirements for assignment and presented clear and conclusive concepts for the use of the spectrum primarily for critical infrastructure applications.

87 The specific notified requirements received therefore exceed the amount of nationally available spectrum in the 450 MHz band comprising 2 x 4.74 MHz (paired). The notified requirements were also reaffirmed in the course of the consultation on the draft decision. In particular, respondents stated that the energy industry was preparing for the rapid construction of a nationwide 450 MHz wireless network.

Energy utilities already operated regional 450 MHz wireless networks, and consortia from the energy sector had come forward as possible national operators.

Re I.4 Order for award proceedings

The following was said on this:

88 The majority of the responses commenting on this welcomed the order for the award proceedings for MFCN. Respondents drew attention in particular to the importance of conducting objective, transparent and non-discriminatory spectrum assignment proceedings for the 450 MHz band. The roll-out of the 450 MHz network was a matter of urgency in light of the transition in the energy and transport sectors and the digitisation of the energy networks.

The chamber has ruled as follows:

89 In accordance with section 55(10), section 61, section 2(2) and (3), section 55(4) and (5) TKG, the order for award proceedings is made in such a way that the assignment of spectrum in the 450 MHz band must be preceded by award proceedings.

90 Section 55(10) TKG states that the Bundesnetzagentur may order, without prejudice to section 55(5) TKG, that spectrum assignment be preceded by award proceedings according to section 61 TKG. The law makes provision for award proceedings to be ordered in the event of a scarcity of spectrum.

There will not be sufficient spectrum available in the 450 MHz band for the requested assignments. On account of the spectrum scarcity identified in this band, the legislation makes provision in section 55(10) TKG for award proceedings to be ordered. Only by way of exception may an order for award proceedings not be issued despite spectrum scarcity, taking into consideration the regulatory aims.

91 Award proceedings are suited to ensuring fulfilment of the Bundesnetzagentur's statutory task. Extending the spectrum usage rights would not be equally suited to securing the regulatory aims as set out in section 2(2) TKG. In any case, the President's Chamber does not consider there to be any reasons of sufficient nature or weight to justify not conducting award proceedings for the spectrum in the 450 MHz band.

92 Conducting award proceedings takes account of the regulatory aims concerning user and consumer interests as set out in section 2(2) para 1 TKG. Award proceedings make it possible to determine who can use the spectrum most efficiently. The propagation characteristics of the nationally available spectrum at 450 MHz make the spectrum particularly suitable for providing applications primarily for critical infrastructures such as electricity, gas, water and district heating with a nationwide wireless network. This enables the provision of general interest services to be maintained in the event of a crisis. Inefficient use of the spectrum could at worst lead to failure of the supply networks and would therefore have a considerable impact on consumers. Award proceedings make it possible to determine who is best placed to establish such a wireless network efficiently and therefore also taking account of the criteria of coverage area, quality and price. These criteria have decisive effects on users and consumers. This enables maximum account to be taken of consumer interests. Extending the spectrum usage rights would not be equally suited to taking account of user and consumer interests because it would not involve comparing several potential assignment holders.

93 Ordering award proceedings serves the regulatory aim of securing fair competition and promoting sustainable competitive markets for telecommunications services and networks and for associated facilities and services, in rural areas as well, as set out in section 2(2) para 2 TKG. Award proceedings are objective, open, transparent and non-discriminatory proceedings that will provide both the current assignment holders

and other interested companies with equal access to spectrum resources. This view was supported by respondents. Open, objective, transparent and non-discriminatory award proceedings provide an impetus that can stimulate competition and thus also network roll-out. Unlike the option of extending spectrum usage rights, award proceedings will also enable existing assignment holders to review their spectrum packages with respect to the changing regulatory and competitive conditions and adapt their business models.

94 Award proceedings are also suited to securing efficient spectrum use as envisaged in section 2(2) para 7 TKG. Award proceedings can serve to determine which of the parties seeking assignment are best placed to make efficient use of the spectrum to be assigned. How the suitability of these parties can be determined depends on the type of proceedings and the award rules in each individual case.

Re II. Choice of award proceedings as provided for by section 61(1) and (2) TKG

Essentially, the following was said on this:

95 Many respondents were in agreement with the choice of tendering proceedings. It was said to be necessary, in particular because in the field of critical infrastructure the implementation concept presented for the requirements determined was essential. Only tendering proceedings were suitable to adequately assess the content and quality of the operators' plans and thus ensure that they were implemented as well as possible.

96 Auction proceedings, by contrast, would not go into the necessary detail to decide on the objective and subjective suitability of the assignment holder and its spectrum usage concept. Auction proceedings would therefore not be suitable to ensure that the best usage concept in terms of content and quality was selected.

97 Regarding the reasoning, the regulatory aim of safeguarding the interests of public safety, as set out in section 2(2) para 9 TKG was also mentioned. It was pointed out that a reliable energy and water supply was essential for the functioning of the federal, state and local authorities and their security organisations and thus for the maintaining of public safety and order. Safeguarding the interests of public safety should not necessarily be regarded in the narrow sense of the provisions on telecoms surveillance in Part 7 of the TKG or as used by the police, particularly with regard to the IT Security Act and sections 109 and 109a TKG.

98 It was argued that the narrow bandwidth (max 2 x 5 MHz) and the particular frequency of the 450 MHz band made it technically unsuitable for the broadband network and it was unsupported by leading smartphone manufacturers. There was therefore no risk of significant competition with public mobile services. Moreover, any fringe competition in the field of digitalisation/M2M communications would promote innovation and growth and was therefore valuable in the economic context.

99 However, it was also argued that the choice of tendering proceedings could lead to distortion of competition.

100 A 450 MHz assignment holder could compete with the public mobile communications networks but receive the spectrum for a lower price per megahertz. There was a risk that the capacity of the 450 MHz band, which was so important for critical infrastructure, could be used for applications also offered by the commercial mobile market, distorting competition, because of the lack of determination of the purpose of use. If the term "critical infrastructure" were to be interpreted broadly, the market potential in the industrial and services sector of the future 450 MHz assignment holder and of the mobile network operators was likely to be nearly identical. If it were interpreted more narrowly, however, there would be more capacity "left over" that could be used for other MFCN applications with an effect on competition. Making

available the corresponding spectrum would in effect carve out the critical infrastructure applications from the 5G market potential and lower the possibility of refinancing 5G networks.

101 The provision of 450 MHz spectrum was relevant to competition regardless of the specific purpose of use and the small amount of spectrum involved, particularly (and also with respect to business customers) if a national mobile network operator were to win the tender. It should be noted that the narrowband applications (eg via NB-IoT) were also an important business area for mobile network operators, in particular in the industrial and services sector. The amount of spectrum, nearly 2 x 5 MHz, was likely to be more than sufficient for these narrowband applications for the time being. In addition, it could not be ruled out that the 450 MHz assignment holder could have access to additional spectrum during the term of the assignment.

102 It was also pointed out that, depending on the amount of remaining capacity, there could be cross-subsidisation of other MFCN applications of the 450 MHz assignment holder from the proceeds of the applications for the operators of critical infrastructure.

103 Some respondents were therefore not fully supportive of the choice of tendering proceedings. They wanted the purpose of use of the spectrum to be amended either for MFCN or for security-critical applications. In any case, the purpose of use was too imprecise given the choice of award proceedings as tendering proceedings.

104 In this context, it was also stated that while the tendering proceedings were appropriate with a view to the amount of spectrum currently available, if in the medium term there was a restructuring of the surrounding bands (430 – 470 MHz) and an expansion of the requirements for spectrum for critical infrastructure, an auction for the award of competing usage rights would be preferable.

105 One respondent was generally in agreement with the tender but pointed to possible distortion of competition for narrowband usages for paging services, which also provided control solutions in the field of energy. In this case, about 40 times the amount of spectrum resources were to be awarded as for paging services. The competition-based argument did not go far enough with regard to "public mobile communications networks"; no more than 5% of the capacity should be made available for "other applications".

106 In contrast, another respondent argued in favour of an auction if the spectrum was not to be allocated to the public safety authorities and organisations.

107 One respondent noted that the standard set out in law was if auction proceedings were unsuitable to meet the regulatory aims, but the Bundesnetzagentur had written that the auction proceedings were "not equally suitable".

The Chamber has ruled as follows:

108 The Chamber hereby orders that assignment of the spectrum in the 450 MHz band be preceded by tendering proceedings, section 61(1) and (2) TKG.

109 Under section 61(1) sentence 1 TKG, award proceedings may take the form of auction or tendering proceedings. According to section 61(2) sentence 1 TKG, as a general rule auction proceedings as laid down in section 61(4) TKG are to be conducted except where an auction is not suitable to secure the regulatory aims as set out in section 2(2) TKG. Apart from an auction, it is also possible to order the award by tendering.

110 Under the regime framed by the statutory regulations, section 61(2) sentence 1 TKG establishes auction proceedings as the rule to which exceptions may be made. The wording of the law expressly states that "as a general rule" auction proceedings are to be conducted, except where such proceedings are not suitable to secure the regulatory aims according to section 2(2) TKG.

111 According to section 61(2) sentence 2 TKG, auction proceedings may not be suited to securing the regulatory aims where spectrum has already been assigned without auction proceedings for the usage designated in the Frequency Plan or where an applicant can demonstrate a preference on the basis of statutory provisions for the spectrum to be assigned. While the two cases given as examples are not exhaustive ("in particular"), they are also not obligatory ("may").

112 On the decision that has to be taken, the Federal Administrative Court (BVerwG) has stated the following (see BVerwG ruling 6 C 13/11 of 10 October 2012, margin no 33):

> *"The Bundesnetzagentur does not have any discretionary powers in determining the proceedings given that, under section 61(2) sentence 1 TKG, auction proceedings are to be conducted as a general rule except where such proceedings are not suitable to secure the regulatory aims. In this respect, however, the Bundesnetzagentur does have certain scope for interpretation as far as the factual elements of the provision are concerned. This is justified by the need for a complex process of weighing up the regulatory aims and balancing conflicting public and private interests to determine the suitability or lack of suitability of auction proceedings."*

113 Only those interests relating to the question of suitability of auction proceedings are to be taken into account in this process.

114 In an abstract sense, both types of proceedings, tendering and auction, enable objective, open, transparent and non-discriminatory proceedings for the reallocation of spectrum under competitive conditions.

115 In this specific case, however, auction proceedings are not suited to securing the regulatory aims as set out in section 2(2) TKG, whereas tendering proceedings are particularly suited to securing the regulatory aims.

Specifically:

116 No preference as to the choice of proceedings arises from the specific – non-exhaustive – examples given in section 61(2) sentence 2 TKG.

117 With regard to the designation of the 450 MHz spectrum, there is no reason why auction proceedings must be ordered. This is the case even in view of the fact that, according to the Frequency Plan, the spectrum in the 450 MHz band has been designated for MFCN and all spectrum designated for this purpose up to now has been awarded in auction proceedings.

118 Section 61(2) sentence 2 TKG explicitly mentions the case when "spectrum has already been assigned without auction proceedings" but an auction comes into consideration. In the present case, however, all spectrum for MFCN has been awarded via auction proceedings, yet for the award of the 450 MHz spectrum tendering comes into consideration. The connection to previous award proceedings of spectrum with the same designation in accordance with section 61(2) sentence 2 TKG is due to the intention of avoiding differing market entry conditions (see VG Köln, 21 K 7172/09, margin no. 70). However, in the specific case of the provision of 450 MHz spectrum, there is no concern about distortion of competition from differing market entry conditions because this spectrum, in contrast to the other spectrum of MFCN, is to serve a more specific purpose of use (see section III.2.1). Even though the spectrum is also designated for MFCN and assigned on a technology-neutral basis, it cannot be deployed to a competitively significant extent as it is only a small amount of spectrum and its purpose of use is more specific.

119 Unlike the conditions in previous auction proceedings, the purpose of use does not directly address the roll-out of the networks to the benefit of consumers, because creating blackout-resistant infrastructure does not generally directly affect people's

ability to access networks and services themselves. Rather, consumers will generally benefit indirectly from the spectrum usage because it will maintain the provision of vital services such as water and electricity supply as part of a crisis management process.

120 There is therefore no need to be concerned about market asymmetries caused by heterogeneous market entry conditions. Apart from the particular purpose of spectrum use in the 450 MHz band, it should also be noted that participation in the award proceedings is not restricted (see section III.1.1). With regard to the concerns expressed about differing access to spectrum resources caused by the proceedings leading to distortion of competition, it should be noted that a successful participant in the tender for 450 MHz spectrum can only enter into competition with the established network operators to a limited extent, if at all.

121 Although the spectrum that is the subject of these proceedings has physical propagation conditions that are favourable for an economical network roll-out, the amount of spectrum is very small, particularly in comparison to the spectrum portfolio of the mobile network operators. The spectrum being awarded is less than 2 x 5 MHz.

122 Regarding the comments that the choice of tendering proceedings would create heterogeneous market entry conditions and thus distortion of competition, because the amount of spectrum, nearly 2 x 5 MHz, is more than sufficient for narrowband applications for the time being, the following should be noted:

123 With a view to the purpose of use, the Chamber judges the possible service offering based on this assignment to be limited. An established mobile network operator, in particular, could offer a far greater range of services due to its spectrum portfolio and the existing national network roll-out, even if the NB-IoT band overlaps with the usage at 450 MHz. In particular, the operator could complement narrowband services with powerful broadband services that cannot be provided by means of 2 x 4.74 MHz. What is more, the respondent acknowledges that the amount of spectrum at 450 MHz is more than sufficient "for the time being". Even if the data volume of the IoT sector develops much more slowly than the mobile broadband sector, as the assignment is for 20 years it should be taken into account that the further development of technology and innovative services could place higher demands on the IoT sector as well in future.

124 Moreover, the purpose of use of the spectrum is limited primarily to critical infrastructure applications, so it may not be used freely for MFCN applications. There is still no risk of distortion of competition if the spectrum is acquired by an established, national mobile network operator, because this spectrum is subject to the restricted purpose of use.

125 With regard to comments that the purpose of use of the spectrum is not precise enough, which could give rise to distortion of competition, please see the Chamber's explanations in section III.2.1 (purpose of use). As far as avoiding heterogeneous market entry conditions is concerned, a distinction must be made between spectrum resources that are to be awarded under largely the same usage conditions as spectrum that was auctioned previously and spectrum resources that have a restricted purpose of use justifying a different award method, which is the case here. Even though the 450 MHz spectrum is designated for MFCN, its purpose of use is more restricted than that of the spectrum that was auctioned previously (see section III.2.1).

126 With regard to the suitability of the spectrum use in the 450 MHz band for Machine-to-Machine applications (M2M) or the nationwide introduction of smart metering systems, the following should be noted: this kind of use can be implemented in principle using either the public mobile communications networks or a dedicated 450 MHz wireless network. The designation for MFCN is flexible, so a

variety of applications is basically possible, but the offer of a 450 MHz user is only likely to enter into competition with the offers of public networks partially, if at all.

127 In response to the comments that this is a particularly important business area that would in effect be carved out from the 5G market potential, the Chamber acknowledges that the 450 MHz spectrum could in principle be suited to implementing certain 5G applications such as massive machine type communications (mMTC). However, it should also be noted that many characteristics are ascribed to 5G, in particular, which are supposed to meet the varying needs of users, depending on the specific application. But the 450 MHz band has a much lower level of availability as regards equipment technology than the other MFCN spectrum, so assignment holders that can access spectrum resources from different bands flexibly with a good "ecosystem" of terminal equipment have an advantage over the very restricted uses at 450 MHz. The Chamber does not expect a mass market for terminal equipment in the 450 MHz band to develop in the foreseeable future that is comparable to the mass market for MFCN applications in other bands.

128 The award of 450 MHz spectrum is therefore not comparable with the proceedings for the other MFCN spectrum with regards to the purpose of use, as the latter were awarded without a primary purpose of use. Apart from the physical limitations of the achievable data rates, the 450 MHz spectrum is to be prioritised for critical infrastructure applications at all times, so only any capacity left over could be available for other MFCN uses. This remaining capacity could only make up a part of the 450 MHz capacity, of which there is already only a small amount. The Chamber does not therefore expect such use to occur to a competitively significant extent.

129 This applies even if one of the established, national mobile network operators were to be successful in the tender and combine the 450 MHz spectrum with its existing spectrum portfolio. It would still be required to use the 450 MHz spectrum primarily for the above-mentioned purposes. Regarding the fact that it could gain advantages from combining its existing spectrum portfolio with the 450 MHz spectrum, it should be recalled that all established mobile network operators are equally free to apply for the 450 MHz spectrum. The market for mobile services is not static and is characterised by spectrum being made available at intervals. It is inherent to the acquisition of spectrum usage rights for periods of 15 or 20 years that the market situation can change during that time. It is up to each network operator to decide whether to participate in proceedings on the basis of its business model and the specific award conditions. The constitutional occupational freedom of the affected parties is therefore that competition is protected, not that they are protected from competition.

130 No distortion of competition needs to be feared with regard to other mobile applications either. Section 61(2) sentence 2 TKG envisages the specific case that spectrum has already been awarded for the same purpose of use without auction proceedings. If existing usage rights have a purpose of use other than MFCN, they are not covered by section 61(2) sentence 2 TKG. But even regardless of this, there is no relevant distortion of competition, because the aspects relevant to the decision on the choice of proceedings must arise from the choice of proceedings and not simply from the provision of spectrum. The fact that spectrum is provided with which competing services can be offered is not an argument against the choice of proceedings. For other spectrum users as for mobile network operators, the market is not static but is characterised by spectrum being made available at intervals. Other users have the choice to compete for the 450 MHz spectrum in these proceedings.

131 The potential distortion of competition mentioned by respondents to the effect that other spectrum usage rights for wireless access were acquired in an auction but the 450 MHz spectrum will be provided in tendering proceedings is not a concern with a view to the costs of spectrum acquisition either. Regarding the fact that access to spectrum resources will require less financial outlay from a fee for the assignment of spectrum than in an auction, the following should be noted: the costs for network use

are largely incurred from acquiring the spectrum, rolling out the network and operating the network. From an economic point of view, these costs must be weighed against the potential profit from spectrum use. Even if it were assumed that an auction would lead to higher acquisition costs – something that is by no means certain – the costs of network roll-out and operation are likely to be comparatively high due to the high demands placed on security-critical networks, even given the smaller number of necessary base stations.

132 Therefore, contrary to the responses received, there is no relevant risk of distortion of competition by cross-subsidisation from the proceeds of the applications for the operators of critical infrastructure either. The security-critical applications are likely to mean particularly high network investments, which will reduce the profits to be expected from such services. Regarding comments that the assignment holder could pass on the network investments to customers from the energy industry and therefore not have to factor in network costs, it seems unlikely that this would happen on a large scale. Particularly if the assignment holder were to use significant amounts of remaining capacity of MFCN – as respondents fear – it may be practically ruled out that all the network costs could be passed on to energy sector customers, including in view of the offer and negotiation requirement. Moreover, this remaining capacity can only make up a part of the 2 x 4.74 MHz of capacity, which is already a small amount, so the scope of any potential cross-subsidisation of accessible services is significantly reduced.

133 As far as the heterogeneous market entry is concerned, it should also be noted that in other proceedings for MFCN spectrum, the amount of spectrum on offer was much larger and mostly came from multiple spectrum bands, too. Those proceedings served to provide spectrum for different business models in competition. By contrast, these proceedings are subject to a specific purpose of use, even though the spectrum is also designated for MFCN.

134 The origin of the law gives no other assessment of the auction proceedings taking priority. The explanatory notes to section 61(4) TKG (section 59(5) TKG of the government draft of 2004, Bundesrat printed paper 755/03, page 109) state the following in this context:

> *"The successful bid typically demonstrates the willingness and ability to make optimal use of the spectrum to be assigned in providing services in a competitive environment and to strive for efficient and economical use of the spectrum."*

135 This explanation applies in particular to the use of spectrum for supplying broadband to the population in a competitive environment. In that case, the spectrum is one of the resources enabling broadband services to be offered directly in a mass market and thus to generate revenue. It is in the commercial interests of an auction participant to recover its investment in the spectrum via its use.

136 By contrast, the purpose of use in the 450 MHz band is restricted and primarily focuses on the implementation of critical infrastructure applications and their availability in the event of a crisis. In the award of the 450 MHz spectrum, it is therefore necessary to choose the type of proceedings suitable to identify the user that will use the spectrum as efficiently as possible in this particular usage scenario in order to secure the regulatory aims of section 2(2) TKG.

137 For the spectrum that is the subject of these proceedings, it is not possible to demonstrate a preference on the basis of statutory provisions within the meaning of section 61(2) sentence 2 TKG for tendering proceedings. The provision of the spectrum at 450 MHz that is the subject of these proceedings does not affect the interests of broadcasting within the meaning of section 61(2) sentence 3 TKG nor can the Chamber identify any other relevant criteria that would justify a statutory preference for the spectrum being assigned.

138 However, the lack of a preference on the basis of statutory provisions does not prevent tendering proceedings from being chosen. In fact, according to the wording of the law, such a preference "may" support "in particular" the choice of such proceedings. The wording of the law therefore does not show that the lack of a preference affects the choice of proceedings. Even if there is no preference on the basis of statutory provisions, the Bundesnetzagentur is still free to choose tendering proceedings if an auction is not suitable to secure the regulatory aims in accordance with section 2 TKG.

139 With this in mind, the Chamber stands by its view that auction proceedings are not suitable in this case to secure the regulatory aims.

140 The Chamber takes the view that in this case, it is best possible to secure the regulatory aims in accordance with section 61(2) sentence 1 TKG and section 2(2) TKG with tendering proceedings. Auction proceedings, on the other hand, would not be suitable.

141 Auction proceedings are not suitable to securing efficient and interference-free use of the spectrum pursuant to section (2) para 7 TKG in this case, because in an auction no selection can be made on the basis of an assessment of the usage concepts or additional offers.

142 The previous proceedings for the provision of the 450 MHz spectrum showed that a network for critical infrastructure can in principle be set up by different operators. The various interested parties obviously base their plans on different concepts, which may vary significantly, unlike those for the previous provision of spectrum for mobile broadband.

143 Insofar as spectrum usage concepts are presented in the course of auction proceedings, they are only used to ensure that the requirements for assignment are fulfilled as the minimum requirements for the admission process. They are thus used to decide on admission to participate in the auction but are not the subject of a further, specific assessment that can be used to weigh up different factors in the course of a selection procedure. Rather, the pricing mechanism of the auction serves to select the efficient user.

144 By contrast, tendering allows the different concepts to be assessed so that the concept that best fulfils – or even exceeds – the specified criteria can be chosen. Under section 61(5) TKG, in the event of tendering proceedings the Bundesnetzagentur determines the criteria against which applicants' eligibility will be assessed prior to the award proceedings. One of the criteria is the suitability of the plans to be submitted for using the tendered spectrum. Tendering proceedings thus allow for competition as to which of the different concepts presented ensures the efficient use of spectrum to the greatest extent. This includes the fact that participants in tendering proceedings can often offer conditions that go beyond the (minimum) conditions specified in the award decision. If the application is successful, these conditions become part of the assignment (section 61(6) TKG) and are thus binding. They can serve to further promote the efficient use of spectrum.

145 As shown above, the provision of the 450 MHz spectrum is based on the special purpose of use of setting up network infrastructure for critical infrastructure applications. The use of spectrum should therefore be regarded as particularly efficient if this purpose is fulfilled. For the efficient use of spectrum, the selection procedure thus needs to identify which concept is most suitable for this purpose. It is conducive to the securing of the regulatory aims and, in particular, the efficient use of spectrum if the specific implementation of the purpose of use can be subject to assessment. In tendering proceedings, it can, while in an auction it cannot.

146 In this context, security concerns take particular priority. The primary purpose of the spectrum provision is to set up network infrastructure for critical infrastructure

applications and enable general interest services to be maintained in the event of a crisis. For this reason, the physical and software-related security and resilience of the network are subject to higher standards. As shown above, tendering is particularly suitable for assessing the respective concepts of the potential assignment holders on the basis of specified criteria. This relates especially to the aspects of security and blackout resilience, which were not necessary to the same extent in previous proceedings for the provision of spectrum.

147 In this regard, tendering proceedings are particularly suited to ensuring efficient, interference-free spectrum use as envisaged in section 2(2) para 7 TKG.

148 With regard to the regulatory aim of section 2(2) para 2 TKG, auction proceedings are not the appropriate award proceedings in this case in terms of securing fair competition and promoting sustainable competitive markets for telecommunications services and networks and for associated facilities and services, including in rural areas.

149 In particular, auction proceedings are not suitable for securing fair competition in this case. This form of award proceedings would not sufficiently ensure that all interested parties had a non-discriminatory chance of access to the scarce resource of spectrum, regardless of any differences in the focus of their expertise in the specific usage conditions to be assessed by means of the legal criteria.

150 In auction proceedings, there would be no comparison of the different areas of focus of the applicants' expertise using the legal criteria as regards the specific usage conditions, eg of the concepts for the proposed purpose of use for critical infrastructure, beyond the decision to admit applicants to the auction. Interested parties that might have great expertise in the field of critical infrastructure would not have the opportunity to display this strength in such a selection procedure. As well as the effects on the efficient use of spectrum discussed above, in this case this could also distort the competition to identify the user that was most efficient in terms of the specific usage conditions.

151 Tendering proceedings, on the other hand, are suitable for securing the regulatory aim of section 2(2) para 2 TKG. Tendering proceedings enable non-discriminatory access to scarce spectrum by giving all interested participants equal opportunity to compete with their implementation concepts for the scarce resource.

152 The concern about heterogeneous market entry conditions caused by the choice of tendering proceedings was dealt with in detail at the beginning of this section. Moreover, all interested undertakings are free to take part in tendering proceedings for the 450 MHz spectrum.

153 Auction proceedings are not suitable for securing the regulatory aim set out in section 2(2) para 1 TKG of safeguarding the interests of users, particularly those of consumers. User interests are primarily affected here. Users may be undertakings or bodies that benefit from the infrastructure to be set up without being consumers. There is great interest in security-related, resilient infrastructure. With this in mind, the proceedings must ensure that the recipient of the spectrum is the one that presents the best usage concept for these applications as regards the demand indicated. The previous proceedings indicated great interest from local/regional operators of critical infrastructure that need access to such infrastructure to provide general interest services at a local level. The fact that the amount of spectrum is limited and its provision on a nationwide basis make it particularly necessary to examine the usage concepts closely and assess them.

154 Tendering proceedings are thus suitable for securing the regulatory aim of safeguarding the interests of users, particularly those of consumers, under section 2(2) para 1 TKG. The coverage for local and regional interested parties can be better assessed in the course of the award decision using the specified criteria.

Moreover, additional commitments made by applicants with their bids can be taken into account.

155 As far as safeguarding the interests of users is concerned, an auction also does not seem suitable for securing the regulatory aim of promoting telecommunications services in public institutions in accordance with section 2(2) para 6 TKG. Tendering proceedings, meanwhile, do secure this regulatory aim. "Public institutions" is a term with a broad meaning taking in community services such as swimming pools, community halls, squares and streets as well as commercial enterprises of the municipality. Within this broad term, public institutions may include general interest services, which would benefit from crisis-resilient infrastructure based on 450 MHz. As already explained with reference to the safeguarding of user interests, tendering proceedings are suitable for promoting the provision of wireless services for local and regional users by taking into account usage concepts in the selection procedure, in contrast to an auction.

156 Regarding comments drawing attention to the regulatory aim of safeguarding the interests of public safety, as set out in section 2(2) para 9 TKG, the Chamber does not deny that security concerns carry particular weight, as explained in connection with the efficient use of spectrum. To the extent that the regulatory aim of section 2(2) para 9 TKG is not limited to Part 7 of the TKG and sections 57 and 65 TKG in its specific meaning, the interests of public safety are also addressed by the particular conditions of these proceedings. The tendering proceedings are intended to find the spectrum user that offers the greatest possible efficiency as regards the award conditions and thus also ensures the blackout resilience of critical infrastructure, among other things. This also supports the functioning of the State and its institutions in the event of a crisis.

157 When the regulatory aims and the interests affected in the specific proceedings are weighed up, therefore, auction proceedings are not suitable for securing the regulatory aims. By contrast, tendering proceedings offer the greatest possible suitability and this method is therefore ordered to be carried out.

Re III. Determinations and rules of the award proceedings

Re III.1 Requirements for admission to the tendering proceedings, section 61(3) sentence 2 para 1 TKG

Re III.1.1 No restriction on participation

158 The right to take part in the tendering proceedings within the meaning of section 61(3) sentence 2 para 1 TKG is not restricted. The Chamber does not consider it necessary to place any restrictions on participation provided the undertakings meet the minimum specialist and other requirements and present a coherent spectrum usage concept.

Re III.1.2 Competitive independence

159 If insufficient spectrum is available to cover all assignment demands, current standard regulatory practice is to assign spectrum to undertakings that are independent from a competition standpoint. The regulatory aim of safeguarding fair, fully functioning competition (section 2(2) para 2 TKG) requires the assignment holders/network operators to be competitively independent from one another. This rules out the possibility of multiple applications being filed. As such, applicants must confirm in their application that there are no grounds for concern under the German Competition Act (GWB). In the event of anti-competitive conduct, however, the applicant in question may be excluded from the proceedings, including retroactively.

160 The exclusion of multiple applications also applies to the case of an interested undertaking also applying as part of a cooperation with another undertaking.

Otherwise, it would be possible to apply for the spectrum assignment with multiple alternative applications. However, the proceedings should afford all applicants an equal chance of access with a view to the regulatory aims, in particular the aspect of competition as set out in section 2(2) para 2 TKG.

Re III.1.3 Admission to the tendering proceedings

161 In their written application, applicants must apply for admission to the tendering proceedings. The admission process is part of the application.

162 In their application, applicants must state how the minimum subjective specialist and other requirements for admission to the tendering proceedings pursuant to section 61(3) sentence 2 para 1 in conjunction with section 55(4) and (5) TKG are met.

163 In order to meet the minimum specialist and other requirements for admission to the tendering proceedings within the meaning of section 61(3) sentence 2 para 1 TKG, the applicant must show

- that it meets the legal conditions for assignment within the meaning of section 55(4) and (5) TKG;
- that it can safeguard the efficient and interference-free use of spectrum as per section 55(5) sentence 1 para 4 TKG;
- that it has access to the financial resources necessary to pay for building and rolling out the network;
- details of the investment and ownership structures at its undertaking and where relevant its parent undertaking and, if applicable, with which undertaking a cooperation is planned to roll out the network.

164 Applicants have a duty to demonstrate more than the personal characteristics of reliability, financial capacity and specialist knowledge within the meaning of section 61(3) sentence 2 para 1 TKG. In accordance with section 55(5) sentence 1 para 4 TKG, the applicant must ensure the efficient and interference-free use of spectrum in line with the conditions of assignment. This must be shown in the application for admission to the tendering proceedings. To this end, every applicant must submit a spectrum usage concept detailing how it plans to safeguard the efficient use of spectrum (for the requirements of a spectrum usage concept, see IV.2.6).

165 Admission to the tendering proceedings is made in an official notice and is granted provided that the application was received by the deadline and includes information on the following points:

- applicant
- competitive independence
- reliability
- financial capacity
- specialist knowledge
- spectrum usage concept.

166 Only applicants providing the above information in full will be admitted.

Re III.2 Determination of the purpose for which the spectrum to be awarded may be used in compliance with the Frequency Plan (section 61(3) sentence 2 para 2 TKG)

Re III.2.1 Purpose of use of the spectrum

167 The majority of respondents were in favour of the proposed purpose of use and were in agreement that the spectrum should continue to be designated for MFCN.

168 They said that the proposed purpose of use would meet the urgent needs of critical infrastructure operators. Existing spectrum usage in the 450 MHz band by critical infrastructure companies would mean that use could continue in an efficient manner and longer transitional phases with idle spectrum could be avoided. Planning and preparation for a rapid construction and start of operation of a nationwide LTE450 wireless network were already at an advanced stage.

169 The transition in the energy and transport sectors and the growth in electromobility were leading to much higher demands (including legal demands) on networks. There was a much greater need for communications infrastructure that was particularly secure and highly available, especially in the event of a blackout. The spectrum was therefore also important for achieving climate targets and implementing the EU Electricity Directive.

170 The proposed purpose of use was the best way to put the regulatory aims into practice. The 450 MHz spectrum was particularly suitable for the energy industry and other critical infrastructure. The propagation characteristics made it possible to plan a nationwide wireless network with relatively few antennas. The good building penetration would allow basements to be accessed well, while the low number of sites would ensure blackout resilience with a highly reliable emergency power supply. There was no alternative spectrum band fully meeting the needs of the energy sector and critical infrastructure available in the medium term.

171 The 450 MHz spectrum could therefore be used to set up a highly available mobile network that met requirements and was particularly efficient and economical. Given the sharp increase in M2M communications applications, powerful, highly available and particularly secure communications solutions were needed that were also economically feasible. Neither narrowband PMR networks, licence-exempt radio systems, energy utilities' own optical fibre nor public mobile networks would be able to meet these requirements.

172 It was stated that the flexible purpose of use with priority for certain applications was the right, and indeed the absolutely necessary, approach. It was not expedient to impose a restriction to particular services given the ongoing digital transformation and dynamic developments in criticality across sectors and applications. It was hardly possible to separate critical from less critical applications. More and more M2M applications were being used that were increasingly able to perform critical functions. Other countries such as Denmark, the Netherlands, Austria and Poland used 450 – 470 MHz for critical infrastructure as well.

173 The fact that the connection of smart meter services with smart metering systems was explicitly stated as a purpose of use was welcomed. Smart meter gateways could be used to connect modern metering equipment for readings and to provide services to the benefit of the grid. Moreover, it would not be reasonable for operators of critical infrastructure to have to select two different types of technology and wireless networks or even two separate smart meter gateways for the same, related applications.

174 Smart grids could also lead to a significant drop in energy consumption and carbon dioxide emissions by employing new technology and making renewable energy

programs more accessible. The ITU had outlined how smart grids could help to halt climate change.

175 There were some comments that metering equipment was not part of critical infrastructure. General terms like "digitalisation" should not be included in the criteria parameters. This term, for example, was too vague and could be interpreted in an arbitrary manner.

176 There were also comments that there should be clarification about which critical infrastructure was covered by the priority use. It was suggested that critical infrastructure should be limited to mean spectrum usage in the fields of energy, water, wastewater, district heating and transport. There were also some calls for commercial use of the spectrum to be allowed only if there was no impact on the primary objective. Certain applications for the electricity grid, as a critical infrastructure, must have priority at all times. There should be a mechanism to ensure that no priority use of the spectrum occurs for non-critical processes. Such use could take place on existing commercial networks.

177 With regard to the implications for competition, it was argued that in the view of the limited amount of spectrum and the restricted usage right, there would be no significant competition with public mobile communications. Possible fringe competition was sensible from an economic point of view. It was also argued that fears of a monopoly could be allayed with the determinations made under section III.3.3 and the offer and negotiation requirement.

178 There were isolated calls for the spectrum to be used by the public safety authorities and organisations and by critical infrastructure equally, which was possible and already happening in the 700 MHz band. The decision to make the spectrum available for critical infrastructure only must be called into question in the interests of national security, given the intention to assign it until 2040. Moreover, there was for the time being no comparable spectrum available. It was true that capacity might run short, but this could be avoided by excluding commercial use. Resilience would be a further reason for shared use. The energy sector supplied innovative practical applications, while the public safety authorities and organisations protected the life and health of the community if a blackout or disaster should occur. In this context, there was an emphasis on synergies arising from the shared use by the armed forces, energy sector and public safety organisations. In Switzerland, there had been cooperation between disaster prevention, critical infrastructure and public safety authorities and organisations for years. Critical infrastructure operators needed access to the networks of public safety organisations in the event of a disaster.

179 By contrast, there were comments that the 450 MHz spectrum was ideal for overcoming the challenges facing critical infrastructure but not so much for broadband data services as required by the public safety authorities and organisations. Shared use of this spectrum was unconstitutional under Article 87f of the Basic Law (Grundgesetz, GG).

180 It was also argued that the radiocommunication services needed by critical infrastructure operators could only be provided technically by employing LTE and LTE-M in parallel. It would be necessary to keep operating the existing regional CDMA 450 wireless networks for a transitional period. Splitting up the spectrum of just 2 x 4.74 MHz would greatly restrict the technical usage possibilities, making efficient use with offers and services to meet demand impossible. Guard bands would make a considerable part of the spectrum unusable, so there would be even less capacity available for users.

181 Some respondents called for spectrum not to be made available primarily for use for critical infrastructure but rather for MFCN on a nationwide basis.

182 The term "critical infrastructure" had not been defined. Only examples of sectors had been given. It was not clear whether their needs could be met by one assignment holder.

183 The assignment holder would have a lot of leeway to use the spectrum and capacity for other, non-critical applications. It was therefore not possible to comprehend the statement that the specification of use primarily for coverage for critical infrastructure, along with the relatively small amount of spectrum, was appropriate to avoid potential distortion of competition. The amount of spectrum would be more than sufficient for the narrowband applications relevant in this case. The mobile network operators did not have significantly more spectrum in the comparable bands of 700 MHz and 800 MHz, with 2 x 10 MHz each, but they had had to acquire it at auction with high bids and far-reaching coverage obligations. To avoid the risk of unfair competition, the purpose of use must be restricted to crisis communications and smart meter applications must be excluded. What is more, the spectrum at 450 MHz was not permanently limited to 2 x 5 MHz.

184 Reserving nationally available spectrum for a particular scope of application would run the risk of causing a regulation-induced scarcity of spectrum. As there was apparently a desire for a market with four mobile network operators, sufficient spectrum – in particular nationwide spectrum – should be provided.

185 It must be avoided that offers were made using the possibly cheaper 450 MHz usage rights in competition with the usage rights in the 2 GHz and 3.6 GHz bands acquired at auction. The winner of the tender would also have a competitive advantage over the holders of national spectrum assignments owing to the far lower spectrum costs (per MHz). Making available the dedicated spectrum would in effect carve out the critical infrastructure applications from the 5G market potential and lower the possibility of refinancing 5G networks.

186 It was also generally relevant to competition who was the assignment holder of the 450 MHz spectrum. This holder would have clear competitive advantages, in particular from the ability of one mobile network operator to offer critical infrastructure applications. Moreover, the winner would explicitly have access to the remaining capacity for other MFCN uses. The market potential in the industrial and services sector of the future 450 MHz assignment holder and of the mobile network operators was likely to be nearly identical. If the term critical infrastructure were to be interpreted more narrowly, there would be more capacity "left over" that could be used competitively for other MFCN applications. Applications like smart meters were a commercial part of the business model of energy, gas and water network operators and were already offered with various technical solutions by the national mobile network operators.

187 The issue of potential cross-subsidisation was also raised. It was to be expected that the energy utilities would settle their expenses for telecommunications services for the secure operation of the electricity networks via the regulated network charges and would thus pass them on to consumers in the electricity market. This would allow the 450 MHz assignment holder to calculate its offers for the other MFCN applications without taking network costs into consideration. Since the holder would not have to take account of any spectrum fees worth mentioning either, it would have a clear competitive advantage caused by regulation. Although the Bundesnetzagentur was correct to state that the relevance of this advantage would largely depend on how much capacity was left over for other MFCN applications, this could not be estimated without a definition of the term "critical infrastructure" and therefore also "remaining capacity". The purpose of use should therefore be amended so that the spectrum was not primarily provided for critical infrastructure applications.

188 The type of services and amount of capacity should be checked on an on-going basis. Metering and control mechanisms should be developed for this purpose. If

other uses made up more than 50% of the total capacity in the long term, it would not be possible to speak of priority use for critical infrastructure. This would amount to a misuse of the usage rights acquired by tender under special conditions and these rights should therefore be taken back, as they would jeopardise the existing competition of narrowband mobile services.

189 Another respondent, who primarily argued in favour of the provision of spectrum for MFCN, called for the spectrum to be allocated alternatively to the authorities and organisations concerned with public safety. This would be an effective way to rule out distortion of competition in the MFCN market. If the spectrum were to be assigned to these authorities, they should be free to offer critical infrastructure applications in addition. The authorities' interest in secure and permanently available communications would ensure that the spectrum was only used for applications that were really critical.

190 A further respondent pointed to the possibility of a hybrid model. The spectrum was sufficient both for the needs of critical infrastructure and for the authorities and organisations concerned with public safety. This would enable the network to be better utilised and both user groups to recoup their investments and it would lower costs. Moreover, it would be a better way to ensure competitive use of the 450 MHz spectrum. The Bundesnetzagentur had not taken sufficient account of the needs of the authorities and organisations concerned with public safety.

The Chamber has ruled as follows:

191 The spectrum to be awarded may be used for MFCN in compliance with the Frequency Plan. The spectrum is to be used primarily for critical infrastructure applications.

192 The operative part has been amended to include the following:

193 Should the data transmission capacity not be used primarily for critical infrastructure applications, necessary safety and security-related applications of the BDBOS with a high level of protection are to be enabled as a matter of priority in this band, provided they do not conflict with the spectrum assignment holder's own use. The arrangements for shared use are to be agreed bilaterally between the assignment holder and the BDBOS.

194 The assignment holder must ensure the protection of its critical infrastructure network in the case of logical or physical network connections and gateways to other networks within the framework of the legal regulations on network security.

195 Spectrum in the 450 MHz band is to be made available to military users as required for time and geographically limited local use (see the considerations of the Chamber in section III.2.2).

196 Use of the assigned spectrum may be restricted on a temporary basis as provided for by the TKG, as amended, if the spectrum is required by the responsible authorities to perform their public safety tasks. If use of the spectrum is restricted as thus provided for, the spectrum will be used by the responsible authorities (for example the BDBOS and the federal armed forces).

197 The determination of the purpose of use is based on the following considerations.

198 The general section of the Frequency Plan describes MFCN as follows:

> *"This spectrum usage serves to connect terminal equipment to wireless networks via fixed base stations. This is usually for the purpose of providing telecommunications services."*

199 The current Frequency Plan (page 4) contains the following more detailed information:

> *"An example is the use of spectrum for MFCN. The technology-neutral designation will enable the deployment of different technologies and systems without restriction to particular standards. Further, spectrum usage is structured so broadly that, within the scope of the allocations in the Frequency Ordinance (FreqV), it covers all services consisting in, or having as their principal feature, the conveyance of signals by means of telecommunications networks. The allocation for mobile services can be used for mobile, nomadic or fixed applications provided the stipulated mobile service parameters are complied with. The spectrum usage designated for MFCN connects terminal equipment to wireless networks via fixed base stations. This is usually for the purpose of providing telecommunications services. Other applications outside of telecommunications services are also possible, such as in-house applications or infrastructure applications."*

200 According to the Frequency Plan, the broad designation for MFCN enables mobile, nomadic and fixed applications to be realised in compliance with the spectrum usage conditions. Infrastructure applications are specifically mentioned as part of the designation. The Chamber is therefore convinced that there is no need to alter the designation in the Frequency Plan to enable critical infrastructure applications. The purpose of use of the spectrum is further specified to the effect that the spectrum is to be used primarily for critical infrastructure applications. The legal basis of this specification is section 61(3) sentence 2 para 2 TKG in conjunction with section 60(1) sentence 1, section 55(5) and (10) TKG. The Bundesnetzagentur specifies the type and extent of the spectrum usage, insofar as is necessary to secure efficient and interference-free use of spectrum (section 60(1) sentence 1 TKG). In accordance with section 55(5) sentence 2 TKG, specification of the permissible usage can mean ensuring the future use is compatible with the regulatory aims set out in section 2 TKG (see BVerwG 6 C 3.19 – ruling of 24 June 2020).

201 The spectrum provided is thus to be used primarily for critical infrastructure applications, in particular in the sectors of energy, water, wastewater, district heating and transport. For energy, for example, all applications that the applicable legal and regulatory framework requires or enables can be provided via the spectrum.

202 This includes applications coming under the Metering Act (MsbG). While some respondents argued that applications under the MsbG do not belong to critical infrastructure, the Chamber views it as expedient to include these applications in the purpose of use. They are an important element of smart grids, which form part of the basis for the implementation of the energy transition. The fluctuating generation of electricity from renewable sources means that energy networks, generation and consumption must be monitored in detail and linked together efficiently and intelligently, something in which smart grids play an important role. The smart grid ensures communication between energy generators and consumers. Unlike in conventional energy networks, it is not merely necessary to communicate data in two directions with a few systemically relevant network users. Rather, it is necessary to communicate with many decentralised network users to ensure system security.

203 Smart meters form an important part of a smart energy system. They set up a secure connection between consumers and network operators and energy generators. Smart meters measure electricity consumption and pass this information on to energy utilities. These data, along with the grid status data provided by the smart meters (current, voltage and phase angle) enable network operators to manage the grid according to requirements/consumption. The explanatory note on the Energy Transition Digitisation Act (printed paper 543/15 page 124/125) gives equal weight to "measuring general electricity consumption", "ensuring installations can be controlled remotely" and "collecting and transmitting grid status data".

> *"Of equal priority is the additional requirement related to the collection and transmission of grid status data [...]. This refers to smart metering systems being designed in a way that benefits the grid in order to fully exploit the potential of modern metering systems for the purposes of network operation as well. Network operators should be able to access smart metering systems for grid status data instead of having to install their own, separate equipment; this will make network operation more efficient and derive greater benefit from smart metering systems."*

204 On this, the Federal Ministry for Economic Affairs and Energy (BMWi) has stated the following:

> *"Smart metering systems are the backbone of a smart grid. They form digital infrastructure designed to drive forward the energy transition. The energy transition is not only about green electricity, it is also about switching to renewable heat and a more sustainable transport system. Smart metering technology can also be used to transmit data related to the charging of electric vehicles or to the smart control units of heating systems in buildings*." (https://www.bmwi.de/Redaktion/DE/Artikel/Energie/intelligente-netze.html, as at 15 October 2020).

205 On this basis, the Chamber does not consider it appropriate to exclude such applications from the purpose of use, since there is a close factual connection between the critical applications in the more narrow sense and the applications in the broader sense (eg smart meters).

206 The Chamber therefore agrees with the comments that it would not be reasonable for an assignment holder to have to select multiple different types of technology and wireless networks for the same, related applications.

207 Correspondingly, the Chamber has not followed the suggestions to restrict the purpose of use to crisis communications in the more narrow sense and to exclude smart meter applications in order to avoid distortion of competition. The Chamber sees the risk of distortion of competition as low, given the fact that only 2 x 4.74 MHz (paired) of spectrum is being made available and the purpose of use is limited. Free data transmission capacity can also be used for other MFCN applications in addition to critical infrastructure applications, as respondents had requested. As requested, the Chamber would like to make clear here that the spectrum is to be used primarily for applications in the field of critical infrastructure – energy, water, wastewater, district heating and transport. Beyond this, remaining, free data transmission capacity is to be used as a priority to meet the needs of the authorities and organisations concerned with public safety, in particular. The Chamber will take account of the priority use of the spectrum in the areas of critical infrastructure mentioned above as required by the specific purpose of use in its assessment of the applications received. In this context, the Chamber would also like to highlight the offer and negotiation requirement and the reporting requirement.

208 Regarding calls for commercial use of the spectrum to be allowed only if there is no impact on the primary objective and that there should be a mechanism to ensure that no priority use of the spectrum occurs for non-critical processes, the Chamber takes the view that this is not necessary.

209 Rather, the Chamber considers it necessary and also sufficient to specify an offer and negotiation requirement (see section III.3.3) alongside the primary use for critical infrastructure. A reporting requirement will also be imposed on the assignment holder (see section III.3.4). This will allow the Bundesnetzagentur to assess whether the assignment holder is using the spectrum in accordance with the primary purpose of use. In addition, the Bundesnetzagentur also has the legal means of monitoring frequency regulation set out in the TKG at its disposal – section 126 and, as a last

resort, section 63. There is no need for any further control mechanism, as some respondents had wanted.

210 Regarding the calls for the spectrum to be made available for MFCN and that this would provide sufficient spectrum for nationwide coverage, the Chamber points out that only 2 x 4.74 MHz of spectrum is available, which owing to its propagation characteristics is particularly suitable for critical infrastructure applications.

211 Other spectrum bands, such as 700 MHz, 800 MHz and 900 MHz, are available to supply consumers with mobile broadband. A larger amount of spectrum than the 2 x 4.74 MHz (paired) relevant here can be used there. The Chamber therefore disagrees with the argument from respondents that there is a risk of regulation-induced spectrum shortage with a view to MFCN. The provision of further spectrum for MFCN with a focus on mobile broadband is already being discussed at an international level (WRC 2023). In light of this, the Bundesnetzagentur published a "Spectrum compass" on 19 August 2020 (Communication No 237/2020, Official Gazette No 16/2020 of 2 September 2020, page 848 et seq). It presents initial considerations on the future availability of spectrum for MFCN in light of the fact that spectrum usage rights in the frequency bands relevant to mobile broadband at 800 MHz, 1,800 MHz and 2.6 GHz will be expiring on 31 December 2025. The spectrum must therefore be re-provided at an early stage. Decisions need to be taken as to which spectrum should be included in award proceedings. However, these questions are not the subject of the current proceedings on the provision of the 450 MHz spectrum. The Chamber therefore cannot comprehend or follow the comments that making this spectrum available primarily for critical infrastructure applications will lead to a risk of regulation-induced scarcity with a view to MFCN.

212 For critical infrastructure, unlike for assignment holders in the field of mobile communications, there is no other suitable, dedicated spectrum available.

213 Regarding the isolated calls from respondents to use the spectrum for authorities and organisations concerned with public safety and for critical infrastructure applications equally, the Chamber has based its decision on the following considerations:

214 Frequency regulation provisions assume that spectrum is designated for the respective spectrum usage. The 450 MHz spectrum is designated for MFCN and not for authorities and organisations concerned with public safety. Parts of the 700 MHz spectrum (2 x 8 MHz) and other spectrum have already been specifically envisaged for these authorities. They do not offer telecommunications services but only use applications internally. The Chamber is also in agreement with the comments that if the spectrum were to be used equally by the authorities and organisations concerned with public safety and by critical infrastructure applications, Article 87f(2) sentence 1 GG would have to be observed.

215 It is also not expedient for critical infrastructure applications and authorities and organisations concerned with public safety to share use of the 450 MHz spectrum equally. If critical infrastructure and public safety authorities and organisations were to share use equally, the Chamber finds it likely that exceptional situations in the field of critical infrastructure would coincide with exceptional situations for authorities and organisations concerned with public safety. Neither side would have sufficient planning and investment certainty in the event of a crisis and the urgently needed network stability would be doubtful.

216 The Chamber has also taken into account the fact that there is only 2 x 4.74 MHz of spectrum available. The Chamber takes the view that it is not feasible for critical infrastructure and authorities and organisations concerned with public safety to share the spectrum for the intended purposes. The Chamber can understand those comments that argued that the radiocommunication services needed by critical infrastructure operators could only be provided technically by employing LTE and LTE-M in parallel. It would be necessary to keep operating the existing regional

CDMA 450 wireless networks for a transitional period. Splitting up the spectrum of just 2 x 4.74 MHz would greatly restrict the technical usage possibilities, making efficient use with offers and services to meet demand impossible. Guard bands would make a considerable part of the spectrum unusable, so there would be even less capacity available for users. The Chamber has therefore not acceded to the request for equal usage by authorities and organisations concerned with public safety and critical infrastructure applications. These considerations also come out against a hybrid model designed to meet the needs of critical infrastructure and public safety authorities in parallel.

217 At the same time, the Chamber considers that the security-related needs of the authorities and organisations concerned with public safety should be taken into account as far as possible in the use of data transmission capacity. For that reason, free data transmission capacity not being used primarily for critical infrastructure applications is to be made available as a priority for the necessary safety and security-related applications of the BDBOS with a high level of protection in this band, provided it does not conflict with the spectrum assignment holder's own use. In this context, it will have to be considered whether the needs of the BDBOS can also be met in future in another way. The Chamber expects the arrangements for shared use to be agreed under fair and appropriate conditions bilaterally between the assignment holder and the BDBOS as soon as possible after the assignment. The BDBOS is to bear the costs arising from shared use, with the fact being taken into account that shared use claims might also prevent the capacity from being used in another way (including with respect to the timescale).

218 The provision of free data transmission capacity for the BDBOS serves the aims and principles of regulation set out in section 2(2) and (3) TKG, in particular section 2(2) para 7 TKG and section 2(2) para 9 TKG.

219 This addition to the operative part promotes the efficient use of spectrum as unused data transmission capacity will be put to efficient use.

220 At the same time, the addition to the operative part also takes account of the regulatory aim of securing public order.

221 The necessary safety and security-related uses of the BDBOS with a high level of protection can therefore be achieved, provided they do not conflict with the spectrum assignment holder's own use. The BDBOS thus gains the possibility of being able to share use of free data transmission capacity if necessary, which can contribute to safeguarding the interests of public safety.

222 The same applies for the addition to the operative part regarding the needs of military users for time and geographically limited local use (see the considerations of the Chamber in section III.2.2).

223 Use of the assigned spectrum may be restricted on a temporary basis as provided for by the TKG, as amended, if the spectrum is required by the responsible authorities to perform their public safety tasks (on the current legal situation, see section 65 TKG, restrictions on spectrum usage). If use of the spectrum is restricted, the spectrum will be used by the responsible authorities (for example the BDBOS and the federal armed forces). It should be noted here that the current revision of the TKG may also affect section 65.

224 In determining the permissible uses, the Chamber was guided in particular by the following considerations:

225 An efficient and highly reliable provision of essential infrastructure services for the population in Germany is a general interest service that is a fundamental prerequisite for a functioning society. The demands placed on the efficiency and flexibility of the underlying infrastructure systems are continually increasing. Meanwhile, new scenarios that show the growing vulnerability of basic community institutions from a

rising number of threats place great demands on protection from disruption to or the failure of critical infrastructure. In the case of coverage for critical infrastructure, the technical aspects of the reliability and security of communications networks are of particular importance. The exceptional resilience of critical infrastructural services thus forms a fundamental basis for the functioning of modern society.

226 In a time of rapid digital transformation and comprehensive networking, critical infrastructure is more dependent than ever on powerful background applications controlling and overcoming crises within systems. In this framework, wireless applications play a decisive role as they are particularly flexible to implement and can be adjusted quickly as needed.

227 Even away from crisis scenarios, rapid developments are placing increasing demands on the provision of adequate spectrum resources for critical infrastructure as the basis for wireless applications. A functioning energy supply forms the basis for more and more areas of community life as digital change progresses. For example, the energy transition is leading to increasing reliance on distributed, renewable energy sources that are often weather-dependent, causing greater variability in electricity generation, which supply infrastructure must be able to deal with in a flexible and smart way. There is a similar situation with the growing trend of e-mobility in the field of transport. The infrastructure needs to be able to respond and be controlled flexibly to expected peaks in demand, such as when many electric vehicles are being charged at the same time across the country.

228 The Bundesnetzagentur's role is to manage these aspects at the level of spectrum regulation. The Chamber's aim is to provide the market with the scarce resource of spectrum as the basis for such wireless applications in open, transparent, objective and non-discriminatory proceedings. The Chamber thus believes that in these proceedings it is particularly important to appropriately take account of the common interest in reliable infrastructure coverage, which cannot merely be reduced to economic interest.

229 The Chamber is therefore working on the assumption that wireless network infrastructure needs to fulfil the following requirements in particular:

1. Communications are to be maintained in the event of a failure of a data line. This could be achieved using redundant data connections for all major network infrastructure elements via two separate lines/transmission media.
2. It is to be possible to maintain coverage for a certain period of time even if the primary external power supply fails. This is to ensure that in exceptional situations a basic level of communication (for example voice calls and control of network elements) is still possible in order to prevent greater damage and restore networks and supply so that normal operations can resume.
3. There is to be a high level of network stability and availability. This is to ensure that virtually uninterrupted communication and data transmission is possible as required even in the event of critical operation. Disruptions to network operation are to be promptly remedied so as to promptly restore the high level of network stability and availability.
4. To protect the 450 MHz network against threats, it is necessary to apply the latest security requirements for telecommunications networks and services. Constructing networks for applications in the field of (security) critical infrastructure is of crucial importance. In this context, the Bundesnetzagentur believes that industry-related and security-related issues are equally significant. With a view to security and the latest technology for telecommunications networks and services, the Bundesnetzagentur revised its catalogue of security requirements, in cooperation with the Federal Office for Information Security (BSI) and the Federal Commissioner for Data Protection

and Freedom of Information (BfDI). The draft security requirements catalogue is currently undergoing a European notification procedure as set out in Directive (EU) 2015/1535.

230 The Chamber wishes to highlight here that the assignment holder must ensure the protection of its critical infrastructure network in the case of logical or physical network connections and gateways to other networks within the framework of the legal regulations on network security.

231 The Chamber does not consider it appropriate to further limit the purpose of use or define it exhaustively, despite the wishes of some respondents. This applies in particular in light of the ongoing process of digital change and the dynamic developments in the field of critical infrastructure. In fact, the Chamber considers that restricting the usage right by making the primary purpose for critical infrastructure and at the same time allowing other uses with a view to the regulatory aims of section 2(2) para 1, para 2 and para 7 TKG to be a balanced solution.

232 This specification of use will in particular achieve the regulatory aims of ensuring efficient and interference-free use of spectrum (section 52 in conjunction with section 2(2) para 7 TKG), safeguarding the interests of telecommunications users, particularly those of consumers (section 2(2) para 1 TKG) and securing fair competition (section 2(2) para 2 TKG).

233 The restriction of the permissible purpose of use by the President's Chamber of the Bundesnetzagentur is a sovereign act and thus subject to the principles of the rule of law and, in particular, the principle of proportionality. The specification of the purpose of use must serve to achieve the regulatory aims and be suitable, necessary and reasonable for this purpose.

234 Specifying the permissible use of spectrum for providing coverage primarily for critical infrastructure wireless applications on the basis of the spectrum that is the subject of these proceedings is a suitable means of ensuring efficient and interference-free use of spectrum within the meaning of section 2(2) para 7 TKG.

235 Providing this spectrum for coverage for critical infrastructure will lead to the most efficient use of it. The Chamber sees an urgent need for critical infrastructure applications and therefore strong demand for suitable wireless solutions. The 450 MHz band represents the best possible solution for this and leads to the optimum allocation of resources.

236 An efficient and reliable communications infrastructure is necessary to meet the requirements of the reliability of critical infrastructure described above, which will increase further in the future. In view of these developments, the Chamber considers the provision of spectrum resources to the operators of critical infrastructure as the basis for corresponding wireless applications to be urgently needed.

237 Of the spectrum that will become available in a suitable time frame, the Chamber is convinced that the 450 MHz band that is the subject of these proceedings is the best to meet the requirements for coverage for critical infrastructure wireless applications and represents the optimum allocation of spectrum as regards the efficient and interference-free use of spectrum.

238 Assignment holders are already providing coverage for wireless applications for critical infrastructure on the basis of the existing spectrum usage rights in the 450 MHz band. This was pointed out in the responses on the key elements, the identification of demand and the draft document for consultation.

239 The Chamber considers that this spectrum is well suited as a basis for critical infrastructure applications. Moreover, experience with existing uses enables use to continue in a comparatively efficient manner in which loss of experience is minimised and longer transitional phases with idle spectrum can be avoided as far as possible.

The physical propagation characteristics of this spectrum are also particularly suitable for coverage for critical infrastructure and thus for the efficient allocation of spectrum.

240 The 450 MHz band has very good propagation conditions. It is able to provide better area coverage than higher spectrum bands as well as the necessary building penetration. In view of the increasingly decentralised nature of systemically relevant installations whose communication interfaces are located indoors, and the necessity for communication to take place in the event of a blackout, it is essential to ensure good coverage inside buildings and in basements. Longer radio waves are subject to weaker attenuation characteristics. If this kind of coverage were to be achieved in higher bands of spectrum, many times the number of sites would be needed to reach the same level of coverage (area and building) due to the physical propagation characteristics. The planned coverage primarily for critical infrastructure can be achieved in a cost-effective manner in the 450 MHz band thanks to its propagation characteristics. This view was shared by the majority of responses received. Most of them pointed out that the propagation characteristics made it possible to plan a nationwide wireless network with relatively few antennas. The good building penetration would allow basements to be accessed well, while the low number of sites would ensure blackout resilience with a highly reliable emergency power supply.

241 The 450 MHz spectrum thus meets the particular requirements for technical performance, viability and short-term feasibility that cannot be met either with narrowband PMR networks or with generally assigned spectrum, optical fibre or public mobile spectrum. The Chamber is therefore unconvinced by the argument that the majority of devices are firmly installed and users from the field of critical infrastructure are not reliant on wireless solutions. Specifying the use of the 450 MHz spectrum primarily for coverage for critical infrastructure is necessary and appropriate to promote the efficient and interference-free use of spectrum.

242 The Chamber is convinced that without this specification, it could not be ensured that the use of spectrum would be efficient and interference-free, in particular with regard to the needs of critical infrastructure operators.

243 As the Chamber has shown, there are no equally appropriate alternatives to the 450 MHz band to meet these needs in a suitable time frame.

244 The primary purpose of use of coverage for critical infrastructure with wireless applications on the basis of the 450 MHz spectrum is further suited to safeguarding user interests in telecommunications within the meaning of section 2(2) para 1 TKG.

245 The term "user" within the meaning of section 2(2) para 1 TKG has a broad meaning that is not restricted to the group of end-users. The interests of undertakings and bodies also fall under the protection of section 2(2) para 1 TKG. The regulatory aim thus also includes the operators of critical infrastructure.

246 As already stated, the Chamber is convinced that there is an urgent need for wireless applications among operators of critical infrastructure. To reflect this need, the future assignment holder will be required to enable primarily critical infrastructure applications with the 450 MHz spectrum. The specification of permissible use thus also serves to safeguard user interests in telecommunications.

247 The Chamber is convinced that the specification of the purpose of use for providing coverage primarily for critical infrastructure applications on the basis of the spectrum at 450 MHz is further suited to securing fair competition for telecommunications services and networks and for associated facilities and services in accordance with section 2(2) para 2 sentence 1 TKG. In particular, it will ensure the avoidance of distortion of competition within the meaning of section 2(2) para 2 sentence 3 TKG.

248 As previously stated, the Chamber is convinced that the provision of the spectrum at 450 MHz that is the subject of these proceedings for critical infrastructure

applications by way of tendering proceedings is urgently needed with a view to the efficient use of spectrum and user interests.

249 However, the Chamber is also aware that the 450 MHz spectrum consists of valuable nationwide spectrum with favourable propagation characteristics that could in principle develop competitive relevance, especially in relation to the established mobile network operators. Without measures to secure competition, the spectrum at 450 MHz could start to compete in particular with spectrum auctioned off in previous award proceedings for MFCN. In comparison to this auctioned spectrum, a future assignment holder could receive comparatively cheap access to valuable nationwide spectrum with the 450 MHz spectrum and use it for competing applications.

250 The Chamber takes the view that the specification of use primarily for coverage for critical infrastructure, along with the relatively small amount of spectrum, is appropriate to avoid this potential distortion of competition. The fact that the spectrum has to be made available primarily for critical infrastructure applications nationwide ensures that the future assignment holder will not enter into a competitive relationship with existing assignment holders of MFCN (with a focus on unlimited mobile broadband). The assignment holder will only be able to use any capacity that may be left over for other MFCN applications. Given the requirements forecast for critical infrastructure, the Chamber does not expect these applications to be on such a scale that will be relevant to competition, as already shown.

251 The specification of the purpose of use primarily for coverage for critical infrastructure is necessary and appropriate with a view to avoiding negative effects on competition.

252 The specification of the purpose of use does not exceed what is appropriate. The obligation only takes effect to the extent absolutely necessary to secure sufficient coverage for critical infrastructure. The Chamber is aware that any capacity left over when critical infrastructure has been covered will in practice only be a small amount. Nevertheless, the future assignment holder will be free to use this remaining capacity within the framework of the designation without stronger legal restrictions than are appropriate to secure the regulatory aims. Simply determining that critical infrastructure applications should take priority over other permissible applications is the least intrusive measure for this purpose, in the view of the Chamber.

253 Even though the purpose of use has been specified as primarily for coverage for critical infrastructure, MFCN applications are still possible. Beyond ensuring coverage for critical infrastructure as a priority, the assignment holder remains free to choose other uses within the framework of the planned designation. According to the Frequency Plan, any usage that connects terminal equipment to wireless networks via fixed base stations is conceivable. The spectrum can be used on a technology and service-neutral basis and there are no restrictions on the technologies that may be used. The Chamber has therefore taken account of the calls by some respondents not to further restrict the use of any remaining capacity.

254 On the basis of the identified demand, the Chamber assumes that other applications will be able to be covered as well as the priority coverage for critical infrastructure applications (specified by the applicable legal and regulatory framework). For example, in accordance with the applicable legal framework (sections 21, 25, 51 and 64 MsbG), smart meters must primarily be available for applications necessary for the energy sector and the grid and may further be used for value-added services.

255 Regarding comments that the 450 MHz rules must not have a negative impact on business models in the field of public mobile communications, the Chamber would like to point out that in this spectrum band, too, the technology-neutral and service-neutral use and the further development of the available technological approaches to support critical infrastructure will not be affected and thus there is no need for concern about a negative impact on fair competition. The Chamber does not share

the view that because other MFCN assignment holders had had to acquire comparable spectrum at auction with high bids and far-reaching coverage obligations, therefore the purpose of use should be restricted to crisis communications and smart meter applications should be excluded.

256 The Chamber judges the possible service offering to be limited, given the specific purpose of use. By contrast, an MFCN assignment holder that acquired the spectrum at auction is able to offer a far greater variety of services given the spectrum portfolio and the existing nationwide network roll-out. In particular, such a holder can complement powerful broadband services with narrowband ones. It is not possible to provide these services only with the available 2 x 4.74 MHz (paired) of spectrum. In relation to the point raised that an existing MFCN assignment holder could gain a competitive edge by obtaining spectrum under 1 GHz, the Chamber notes that all MFCN assignment holders are equally able to decide to participate in the tendering proceedings and therefore have equal access to the resource. Article 12 GG merely protects competition, it does not provide protection from competition. The argument that making available the dedicated spectrum would in effect carve out the critical infrastructure applications from the 5G market potential and lower the possibility of refinancing 5G networks is therefore not convincing.

257 Contrary to the responses received, there is no relevant risk of distortion of competition by cross-subsidisation from the proceeds of the applications for the operators of critical infrastructure. The security-critical applications mean that particularly high network investments are likely to occur (for example, to maintain coverage if the primary external electricity supply were down), which are likely to reduce the expected profits from such service provision. Regarding comments that the assignment holder could pass on the network investments to customers from the energy industry and therefore not have to factor in network costs, it seems unlikely that this would lead to a significant distortion of competition. Particularly if the assignment holder were to use significant amounts of remaining capacity of MFCN – as respondents fear – it may be practically ruled out that all the network costs could be passed on to energy sector customers, including in view of the offer and negotiation requirement. Moreover, this remaining capacity can only make up a part of the 2 x 4.74 MHz of capacity, which is already a small amount, so the scope of any potential cross-subsidisation of accessible services is significantly reduced.

258 It should also be noted that in other proceedings for MFCN spectrum, the amount of spectrum on offer was much larger and mostly came from multiple spectrum bands, too. These proceedings served to provide spectrum for different business models in competition. By contrast, these proceedings are subject to a specific purpose of use, even though the spectrum is also designated for MFCN.

259 Regarding the comments that it would be possible to extend the spectrum to 5 MHz, the Chamber points out that this would do nothing to change its current views. Furthermore, the provision of the other 0.26 MHz (paired) is not the subject of these proceedings. It will have to be examined in separate proceedings when the time comes.

Re III.2.2 Nationwide use

The following was said on this:

260 Most respondents were in favour of the key element on nationwide use, saying that this was the only way to ensure efficient use of the spectrum. An offer and negotiation requirement for applications in line with demand also took the interests of local and regional users into account.

261 One respondent expressed the opinion that spectrum leasing should be enabled immediately after assignment upon request, ie local/regional needs would have to be offered to a requesting party immediately after the spectrum assignment.

262 Respondents also stated that, given the fact that there are several thousand operators of critical infrastructure, with a regional award of spectrum it would hardly be possible to ensure that every operator could access wireless services everywhere necessary.

263 In this context, one respondent was of the opinion that existing regional wireless services for critical infrastructure in this band would have to be taken into account in an appropriate and non-discriminatory manner by the assignment holder.

264 By contrast, it was said that numerous critical infrastructure operators were only active locally or regionally. A critical view was therefore taken of provision on a nationwide basis in light of security concerns. In addition, regional assignments would make it possible for independent communications systems to be established efficiently, operated and used cost-effectively and made available to third parties on an application-specific basis.

265 It was accepted that the 450 MHz band's propagation conditions mean that it can achieve a large range, but this is also associated with large interference ranges, so efficient use of the spectrum can only be achieved by a nationwide assignment, especially in light of the limited amount of spectrum being made available. In this case, it would be necessary for the assignment holder to offer wireless services to the market in a non-discriminatory manner, for there to be an offer and negotiation requirement and for the spectrum leasing procedure to enable dedicated network operation for local or regional operators of critical infrastructure.

266 One respondent wanted attention to be drawn to the fact that, in accordance with the national usage provision, three individual frequencies are used for military purposes and wished a note to be added to this effect.

The Chamber has ruled as follows:

267 The 450 MHz spectrum will be provided for nationwide use.

268 The Chamber takes the view that a nationwide assignment corresponds to the provisions of section 55(5) sentence 2 TKG and the regulatory aims set out in section 2 TKG. In particular, it will secure the efficient and interference-free use of spectrum in accordance with section 2(2) para 7 TKG.

269 As stated, the 450 MHz band's propagation conditions mean that it can achieve a large range, but this is also associated with large interference ranges, which is an argument against a regional or local assignment in the interests of efficient spectrum use. The limited amount of available spectrum, in particular, means that interference can only be minimised by spatial distancing, for which a nationwide assignment is necessary. A nationwide assignment can achieve cost-effective coverage in line with requirements.

270 As intended by the Bundesnetzagentur and welcomed by the majority of respondents, local and regional requirements can be met with a roll-out obligation and possible spectrum leasing as well as an offer and negotiation requirement for applications in line with demand (see section III.3.3).

271 Regarding comments that many critical infrastructure operators are only locally or regionally active, the Chamber would like to point to the offer and negotiation requirement for applications in line with demand and the possibility of spectrum leasing. These will allow existing local/regional operators of critical infrastructure to continue their network operation.

272 Regarding comments about specific requirements, eg for security, the Chamber would like to point out the following: the future assignment holder is required to enter into negotiations with local and regional operators of critical infrastructure about their particular requirements. There is also the possibility of spectrum leasing to local and regional operators of critical infrastructure. Moreover, the Chamber points out that

there are also other spectrum bands (eg PMR, PTMR, 3.7 – 3.8 GHz) for autonomous local networks with particularly high security requirements.

273 Alongside critical infrastructure applications, spectrum in the 450 MHz band is required on a local basis to train soldiers on military training areas and on a regional basis and for strictly limited periods for large-scale military training exercises. The use of the spectrum is based on usage provision 3 of the Frequency Ordinance of 27 August 2013 (Federal Law Gazette I page 3326), as last amended by Article 1 of the Act of 27 November 2018 (Federal Law Gazette I page 2026). This usage provision allows individual frequencies in the 410 - 862 MHz band to be used for military purposes. The assignment holder will be required to make spectrum in this band available to military users as required for local use as well as time and geographically limited use.

274 The Bundesnetzagentur will provide potential applicants upon request with more detailed information on the military training area locations in the form of a cartographic representation of the locations and specific coordinates. At present, it is assumed that no more than 20 military training areas within the Federal Republic of Germany are concerned. All potential applicants will thus be guaranteed access to the same information and different levels of information among applicants will be prevented.

275 With regard to the request for attention to be drawn to the fact that three individual frequencies are used for military purposes, the Chamber points out that shared use by the federal armed forces – as shown above – is based on usage provision 3 of the Frequency Ordinance and is thus guaranteed (see also section 1.2). No further clarification is necessary.

Re III.3 Spectrum usage conditions, section 61(3) sentence 2 para 4 TKG

276 In accordance with section 61(3) sentence 2 para 4 TKG, prior to award proceedings the Chamber determines the spectrum usage conditions, including the degree of coverage with the spectrum usage and the time limit for achieving such coverage. These spectrum usage conditions cover the technical requirements and the type and scope (eg location in the band, size of the blocks) of the spectrum to be assigned.

Re III.3.1 Spectrum usage conditions

The following comments were made:

277 Some respondents were of the opinion that there should be no firm restriction of the BS in-block EIRP with the block edge mask as this would restrict the spectral efficiency regardless of any interference. Accordingly, the ETSI standard for wide area base stations did not specify any limit for the maximum in-block BS power. Moreover, out-of-block emissions had already been defined independently of the BS in-block EIRP. Therefore, it should be at the assignment holder's discretion to increase the BS in-block EIRP, provided that there was no interference with adjacent services. This would enable the spectrum to be used more efficiently.

278 It was already permissible to have 55 dBm EIRP in 1.25 MHz for the 450 MHz wireless services in operation. Transferring the existing usage conditions to the 4.74 MHz bandwidth would lead to a transmitter power of 61 dBm EIRP, for example.

279 One respondent noted that in the reasoning of the draft, it was assumed that talks would take place between the assignment holder and the federal armed forces (margin number 171). Since it could not be expected that the operators would have a central contact point and the planned technical applications of the energy sector in this field differed from those of the armed forces, the respondent envisaged that the Bundesnetzagentur would remain the contact partner for both parties.

280 One respondent argued that from a technical point of view, the refarming mentioned by the Bundesnetzagentur of the existing spectrum assignment to a whole 2 x 5 MHz block in conformity with the LTE band 72 (451 - 456 MHz/461 - 466 MHz) should be aimed for, at least in the medium term. There were similar harmonisation and refarming efforts taking place in Austria and other European countries for the band 72.

281 Several respondents welcomed the fact that the Bundesnetzagentur wanted to specify the usage of the 450 MHz spectrum in border regions with neighbouring countries, based on the Recommendation T/R 25-08, in order to enable a rapid, smooth network roll-out in such regions, too. The rules still in place at many borders meant that it was not possible to use the 450 MHz spectrum for its intended purpose, particularly for the necessary coverage of buildings, in a strip at the edge of border regions. Plans showed that the necessary coverage could not even be achieved by particularly small-cell planning. The T/R 25-08 offered an acceptable basis for this kind of use and should be implemented at the earliest opportunity by the frequency administrations in agreements with neighbouring countries.

282 One respondent proposed that the agreement for broadband systems that had been made with a few frequency administrations abroad (such as Austria) should be extended to include the bandwidths in question here and implemented as a rule at all borders. These rules, converted for higher bandwidths, had been included in April 2020 as best practices in the user guide of the HCM agreement as examples for possible bilateral and multilateral arrangements.

283 One respondent pointed out that parts of the spectrum under discussion comprising 2 x 0.26 MHz (paired) were used by paging services, which served thousands of critical infrastructure operators. The assignment holder would need to provide particular protection for these parts of the spectrum, with the associated minimum separation. Demand for this efficiently used part of the spectrum from paging services was increasing. The operators of the critical infrastructures had made considerable investments in their solutions. Full use of a 2 x 5 MHz block for the assignment holder would be contrary to the assignment purpose and needed to be ruled out.

The Chamber has ruled as follows:

284 The spectrum usage conditions are determined on the basis of international recommendations and decisions, among other things.

285 Key framework conditions of the relevant CEPT and European Commission decisions form the basis for deploying the spectrum available in a manner that is efficient and interference-free, including across national borders. The spectrum usage conditions can be modified subsequently, particularly if this is necessary to secure efficient and interference-free spectrum use or as a result of international harmonisation agreements.

286 The spectrum usage conditions in Annex 1 for 450 MHz spectrum also aim to safeguard the interference-free coexistence of different applications in adjacent bands. This is of particular relevance when determining site-related spectrum usage parameters for base stations.

287 The Bundesnetzagentur specifies block edge masks (BEM) as part of the spectrum usage conditions. These masks relate to the borders of the assigned frequency blocks. The BEMs use technical parameters to describe both permissible in-block emissions and out-of-block emissions (with in-block and out-of-block power limits). These regulatory requirements aim to reduce the likelihood of harmful interference occurring between adjacent spectrum usages.

288 The assignment holder may depart from these conditions if it has made mutual arrangements with adjacent assignment holders (known as operator arrangements) to this effect and departure is without detriment to the frequency usage rights of third

parties. This gives the assignment holder a high degree of flexibility when using spectrum for specific applications. In order to ensure the rapid and proper resolution of reports of interference, the Bundesnetzagentur must be informed of this in writing.

289 The onus is on the operator to decide how it restricts out-of-block emissions (eg by using special filter technology) in its block. As a result, there is no need to apply a general restriction on radiated power for base stations.

290 With out-of-block emissions, a distinction is made between general and specific requirements. Since the minimum requirements are defined via the BEMs, additional local or regional measures may be necessary to enable coexistence with other spectrum users. This must then be assessed taking the exact locations and prevailing local or regional framework conditions into consideration when determining site-related frequency usage parameters.

291 Spectrum between 450 and 470 MHz is also designated in the Frequency Plan for public paging (nationwide assignment), analogue railway radio communications (nationwide, regional and local assignments) and maritime mobile radio on board ships at sea and on inland waterways. The future assignment holder will be required to provide protection for these – generally narrowband – spectrum usages, especially given the intended broadband usages.

292 Regarding comments to the effect that a general determination of a BS in-block EIRP was unnecessary and inappropriate and an increase should be at the assignment holder's discretion, provided there was no interference with adjacent services, the Chamber wishes to clarify the following: no in-block EIRP for base stations is determined. However, the ECC Decision (19)02 recommends an optional value of 56 dBm/cell as a maximum in-block EIRP. The out-of-block emissions specified still have to be complied with.

293 Alongside critical infrastructure applications, spectrum in the 450 MHz band is required on a local basis to train soldiers on military training areas and on a regional basis and for strictly limited periods for large-scale military training exercises. The use of the spectrum is based on usage provision 3 of the Frequency Ordinance of 27 August 2013 (Federal Law Gazette I page 3326), as last amended by Article 1 of the Act of 27 November 2018 (Federal Law Gazette I page 2026). This usage provision allows individual frequencies in the 410 - 862 MHz band to be used for military purposes. The assignment holder will be required to make spectrum in this band available to military users as required for local use as well as time and geographically limited use.

294 The military must use the spectrum in such a way that any protection areas can be kept as small as possible. While the military has to reduce its spectrum usages to the minimum transmitter power necessary, the necessary protection radius for efficient use of spectrum has to be maintained by the original assignment holder. The Bundesnetzagentur assumes that efficient spectrum usages will be organised by the two sides bilaterally. It is assumed that talks will be held between the assignment holder and the federal armed forces. The aim is to make the spectrum available nationwide.

295 Regarding calls for the Bundesnetzagentur to remain the point of contact in discussions between the assignment holder and the armed forces, the Chamber wishes to stress that the usage of the armed forces on training grounds and the resulting restrictions in the networks for critical infrastructure depend greatly on the topology, morphology and network roll-out actually needed in the relevant area. The Chamber is of the view that it is absolutely necessary for talks to be held regionally between the armed forces and the assignment holder in order to keep the impact of shared use as low as possible. The Bundesnetzagentur can assist in establishing contact, as it has done in the past.

296 The future assignment holder will be informed during the assignment process of the geographic location of the military training areas concerned in order to guarantee efficient and interference-free spectrum use to the greatest possible extent. Spectrum coordination for the military training areas will be based on the latest version of ECC Recommendation T/R 25-08 (Planning criteria and cross-border coordination of frequencies for land mobile systems in the range 29.7-470 MHz).

297 Regarding the call by one respondent for paging services to be protected, the Chamber points out that other wireless applications must be protected by maintaining the BEM specified in the ECC Decision (19)02 (in accordance with the results of the compatibility studies in ECC Report 283).

Cross-border coordination

298 In the border areas of the Federal Republic of Germany and some other exposed areas near the borders, only a limited amount of spectrum is available because of the need for coordination with neighbouring countries.

299 The possible restrictions with respect to the usable bandwidth of the spectrum will vary from area to area, depending on whether one, two or possibly three neighbouring countries need to be included in the coordination process.

300 Since the whole band from 450 – 470 MHz is not yet harmonised at European level, the possible restrictions will also depend on the transmission methods and bandwidths in use either side of the borders.

301 Mobile spectrum usage in the whole band from 440 – 470 MHz has developed in a fragmented way both in Germany and in all its neighbours for historical reasons, ie there are very different narrowband uses next to each other.

302 Various countries have already implemented the first broadband uses or are planning to do so in the near future. As the European harmonisation process is still outstanding, these activities currently take place exclusively according to national spectrum planning approaches, both in Germany and elsewhere.

303 The Bundesnetzagentur has concluded coordination agreements with all the neighbours of the Federal Republic of Germany enabling broadband roll-out in Germany in the 440 – 470 MHz band.

304 It is intended for further, gradual improvements in border coordination to be achieved through additional negotiations with the frequency administrations of all neighbouring countries. One means for this could be using the ECC Recommendation T/R 25-08 as a basis. The coordination approach mentioned by one respondent as "best practice" is an alternative.

305 The Chamber expects the future assignment holder in the sub-bands where there is overlap with broadband usage in neighbouring countries to make operator arrangements with the assignment holders of broadband usage rights in those countries in accordance with the HCM agreement and in conjunction with the respective coordination agreements to improve usage possibilities at the borders.

306 In the sub-bands where is no overlap between domestic and foreign broadband spectrum usage, it is still necessary to carry out coordination, taking account of narrowband mobile spectrum usage in Germany's neighbours that has already been coordinated individually and is thus protected and existing preferential rights in the neighbouring countries.

307 As the assignment holder is granted freedom in the technology used as part of the spectrum assignment, the Chamber expects the holder to use all technical possibilities for broadband coverage at its disposal, particularly in Germany's border areas, in its wireless network planning and roll-out and to continually develop these.

308 The Chamber would here like to reiterate its recommendation of small-cell wireless network planning, even if this does require greater efforts in network planning and roll-out.

309 Regarding the argument about in-house coverage that was also raised in relation to the cross-border coordination of mobile systems, the Chamber points to the technical approaches of NB-IoT, repeaters, home base stations, etc already implemented in the bands assigned nationwide for MFCN and considers that these provide equally useful solutions for broadband spectrum usages in the 450 MHz band as well.

310 The Chamber further wishes to draw attention to the use of in-building radio equipment, an approach that has been pursued by authorities and organisations concerned with public safety as standard for many years already for secure in-house coverage.

Protection of the radio monitoring stations of the radio monitoring and inspection service

311 To ensure that spectrum usage can be monitored effectively in accordance with section 64 TKG, spectrum usages must not cause interference to the Bundesnetzagentur's radio monitoring stations. Electromagnetic fields from transmitters operated in the vicinity of the Bundesnetzagentur's receivers can lead to desensitisation and overloading, thus impairing the reception of the Bundesnetzagentur's measuring equipment (see Bundesnetzagentur Official Gazette No 17/2012, Communication No 613/2012).

312 The Bundesnetzagentur has evolved its administrative practice for setting MFCN parameters in line with the above regulation and feels that it will continue to offer a fair framework for balancing the individual interests of mobile network operators as regards their network roll-out efforts with the Bundesnetzagentur's legal mandate.

313 In order to protect the fixed radio monitoring stations operated and planned by the Bundesnetzagentur's radio monitoring and inspection service in Germany, the field strength from emissions in the band below 694 MHz may not exceed 80 dBµV/m at these sites (cf Bundesnetzagentur Official Gazette No 23/2019, Communication No 646/2019).

Protection of other radio services

314 Spectrum from 450 – 470 MHz is also designated in the Frequency Plan for public paging (nationwide assignment), analogue railway radio communications (nationwide, regional and local assignments) and maritime mobile radio on board ships at sea and on inland waterways. The future assignment holder will be required to provide protection for these – generally narrowband – spectrum usages, especially given the intended broadband usages.

Re III.3.2 Expiry of usage rights

Essentially, the following was said on this:

315 The majority of respondents were in favour of limiting the usage rights until the end of 2040 as the (minimum) duration. However, many expressed the opinion that a longer duration of 25 or 30 years would be more useful for operators of critical infrastructure, as it had longer than average durations of use and correspondingly long investment cycles. Two respondents argued explicitly for a duration of 30 years.

316 Some respondents thought the period of 20 years was appropriate to ensure long-term technological certainty for critical infrastructure operators and to recoup the necessary investments.

The Chamber has ruled as follows:

317 The spectrum assignment will be valid until 31 December 2040. In accordance with section 55(9) sentence 1 TKG, spectrum is, as a rule, assigned for a limited period. Under section 55(9) sentence 2 TKG, time limits must be reasonable with respect to the service in question and must take reasonable account of the associated investment costs to be recouped.

318 When setting the time limit, the Chamber considered, on the one hand, the interests of potential frequency assignment holders in keeping the spectrum for a period of time that is reasonably sufficient for recouping the investment costs involved.

319 On the other hand, it also gave due consideration to ensuring that the Bundesnetzagentur's decision-making leeway with respect to frequency planning was not restricted to an unreasonable degree, ie that the time limit as a control mechanism did not exceed a reasonable period of time.

320 The time limit of 31 December 2040 will fulfil the requirements of the European Electronic Communications Code (Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code, EECC). In accordance with Article 49(2) EECC, individual rights of use for radio spectrum for which harmonised conditions have been set in order to enable its use for wireless broadband services are to be assigned for a period of at least 15 years. The provision envisages an adequate extension for the assignment to ensure regulatory predictability for the holders of the rights over a period of at least 20 years regarding conditions for investment in infrastructure which relies on the use of such radio spectrum. Setting a duration until 31 December 2040 fulfils these requirements. At this point, the Chamber wishes to highlight the fact that the TKG may be amended to transpose the EECC before the spectrum is assigned.

321 The duration of 20 years arising from the time limit of the end of 2040 thus corresponds both to the European legal provisions and to the previous administrative practice in the provision of spectrum for MFCN applications, for which the spectrum usage rights were awarded with durations of between 15 and 20 years.

322 In view of the need to give assignment holders a period of time considered reasonable for recouping the investment costs involved, the expiry date set of 31 December 2040 seems to be both reasonable and necessary. Assignment holders will have enough time to establish and roll out the network, implement their business model and recoup the investment volume. It was taken into consideration in particular that establishing and rolling out a telecommunications network with security-related requirements is particularly expensive and it correspondingly takes time to recoup the investment. It was not possible to accede to respondents' call for even longer durations.

Re III.3.3 Offer and negotiation requirement to ensure coverage for critical infrastructure operators in line with demand

The following comments were made:

323 The majority of respondents welcomed the setting of an offer and negotiation requirement. Non-discriminatory negotiations were particularly important from the operators' perspective. The offer and negotiation requirement was suitable to relieve the tension between general interest services and commercial exploitation of the spectrum. A demand-focused offer and negotiation requirement would ensure that infrastructure operators could select the communicative connection best suited for their purposes, which would contribute to the economical implementation of the necessary digitalisation.

324 There were calls for the offer and negotiation requirement to ensure that entitled, potential users had access to detailed information on the current and planned network roll-out in the respective coverage area, particularly with a view to

geographically overlapping uses by other infrastructure operators, so that they could formulate their requirements efficiently. It was also argued that the assignment holder must provide potential users and the Bundesnetzagentur with detailed information on how they base their calculations for their offers.

325 There were isolated calls for the offer and negotiation requirement to be more specific. It was not expedient to leave the detailed negotiations to market partners. There would be a risk that the assignment holder could abuse its market power. It was necessary to specify contractual conditions on a national basis. The level of charges, in particular, would have a direct influence on the basis of general interest services because of the risk of them being passed on to consumers.

326 There were calls to attach a deadline to the offer and negotiation requirement.

327 Many respondents welcomed the fact that the Bundesnetzagentur would take on an arbitrator role in the offer and negotiation requirement. One respondent proposed firm rules be established setting out the procedure to be followed in the event that negotiations failed.

328 Some respondents welcomed the possibility of spectrum leasing. This would enable operators to set up their own communication systems if required, use them and operate them in a cost-effective manner. One respondent pointed out that professional, mission-critical mobile networks required the use of suitable products from different manufacturers, and this would remain possible thanks to the option of local/regional leasing.

329 On the other hand, there were also comments that spectrum leasing was not a suitable method of ensuring coverage for wireless applications for critical infrastructure operators in line with demand and should only be permissible on a subsidiary basis. In particular, it must not be permitted that services offered in a non-discriminatory manner were rejected merely with the aim of demanding spectrum leasing. Spectrum leasing should only come into consideration as a secondary option if spectrum was not already being used or its use was not foreseeable and this had been shown transparently by the assignment holder. One respondent wanted a binding procedure for spectrum leasing to be determined.

The Chamber has ruled as follows:

330 The assignment holder must negotiate with critical infrastructure operators upon request about coverage with wireless applications and must submit offers for coverage to meet operators' requirements within a reasonable period.

331 The determination of an offer and negotiation requirement is based on section 61(3) sentence 2 para 4 TKG in conjunction with section 60(2) sentence 1 TKG and section 2 TKG.

332 Prior to award proceedings the President's Chamber determines the spectrum usage conditions, including the degree of coverage with the spectrum usage and the time limit for achieving such coverage, section 61(3) sentence 2 para 4 TKG. In accordance with section 60(2) sentence 1 TKG, secondary conditions may be attached to spectrum assignments in order to secure efficient and interference-free use of spectrum and pursue the regulatory objectives stated in section 2 TKG. In the 450 MHz band, the assignment holder is required to negotiate with critical infrastructure operators upon request about coverage with wireless applications and must submit offers for coverage to meet operators' requirements within a reasonable period.

333 Determining an offer and negotiation requirement will serve the regulatory aims of ensuring efficient and interference-free use of spectrum (section 52 in conjunction with section 2(2) para 7 TKG), safeguarding the interests of telecommunications

users, particularly those of consumers (section 2(2) para 1 TKG) and securing fair competition (section 2(2) para 2 TKG).

334 Imposing an offer and negotiation requirement will serve the regulatory aim of safeguarding the interests of telecommunications users, particularly those of consumers (section 2(2) para 1 TKG).

335 Determining an offer and negotiation requirement serves the practical implementation of the abstract specification of use particularly from the perspective of the critical infrastructure operators acting as requesting parties, ie it particularly serves the safeguarding of user interests. The offer and negotiation requirement to ensure coverage for critical infrastructure operators in line with demand thus serves the aim of expansion in line with demand. The Chamber is of the view that this is the best way to take account of the different demands of critical infrastructure operators. For example, it is conceivable that there might be a demand for ready-to-use applications including the setting up of underlying network infrastructure. However, there might also be demand to integrate applications in existing structures, to build on existing structures or to implement them in cooperation with the assignment holder. This sort of demand could include the regional/local leasing of spectrum, even if this may be technically demanding, as respondents noted. The offer and negotiation requirement is addressed to the future assignment holder. The assignment holder must negotiate with critical infrastructure operators and make an offer for the requested mobile coverage.

336 The intention is to meet demand from critical infrastructure operators for special mobile coverage as a matter of priority. The Chamber expects there to be particular demand for a highly available and blackout-resilient wireless network infrastructure to maintain the provision of general interest services in the event of a crisis. This concerns the electricity, gas, wastewater, water and district heating sectors. A reinforced wireless network is required in particular in the event of a crisis in order to guarantee the functionality and/or restoration of critical infrastructure networks.

337 The Chamber is therefore working on the assumption that wireless network infrastructure needs to fulfil the following requirements in particular:

1. Communications are to be maintained in the event of a failure of a data line. This could be achieved using redundant data connections for all major network infrastructure elements via two separate lines/transmission media.
2. It is to be possible to maintain coverage for a certain period of time even if the primary external power supply fails. This is to ensure that in exceptional situations a basic level of communication (for example voice calls and control of network elements) is still possible in order to prevent greater damage and restore normal system operation.
3. There is to be a high level of network stability and availability. This is to ensure that virtually uninterrupted communication and data transmission is possible as required even in the event of critical operation. Disruptions to network operation are to be promptly remedied so as to promptly restore the high level of network stability and availability.

338 These requirements are covered by the offer and negotiation requirement.

339 Moreover, the determination of an offer and negotiation requirement serves to achieve section 2(2) para 2 TKG, which sets out the aims of regulation of fair competition and the promotion of sustainable competitive markets for telecommunications services and networks and for associated facilities and services, including in rural areas, and the Bundesnetzagentur thus also ensures that users will receive the greatest possible benefits in terms of selection, prices and quality.

340 This applies particularly with regard to the fact that there is only limited availability of the underlying spectrum resources and they can only be assigned to one undertaking. Market entry is thus not free but heavily restricted by the limiting resource of spectrum. It is therefore also justified in this case to impose not merely an instruction to negotiate but an offer and negotiation requirement. For the sake of clarity the Chamber would like to point out that this requirement is not an obligation to grant access (section 21 TKG), which is conditional on the network operator having significant market power, something that has not been identified by either the Bundeskartellamt or the Bundesnetzagentur.

341 The intention of the offer and negotiation requirement is to ensure in accordance with section 2(2) para 2 sentence 2 TKG that users – ie critical infrastructure operators – will receive the greatest possible benefits in terms of selection, prices and quality. To achieve this, it is necessary that critical infrastructure operators are not disadvantaged by the nationwide assignment holder in negotiations about offers for wireless applications. Negotiations between the assignment holder and the critical infrastructure operators are to be non-discriminatory. To that end, the assignment holder is not to adopt arbitrary positions during the negotiations and, on request, is to provide the Bundesnetzagentur with transparent information on the course the negotiations take (section 127 TKG). Non-discriminatory negotiations are intended to result in agreement between the two parties on reasonable terms that are not detrimental to either side. It must be prevented, for example, that negotiations on wireless applications are simply refused, that negotiations are held in an abusive way or unreasonable terms are applied to services.

342 The imposition of an offer and negotiation requirement serves the regulatory aim of securing efficient and interference-free spectrum use (section 2(2) para 7 TKG).

343 The determined offer and negotiation requirement is intended to meet demand from critical infrastructure operators at all levels. Local and regional critical infrastructure operators, in particular, should be able to approach the future assignment holder as requesting parties and achieve coverage from these negotiations and offers. The Chamber takes the view that this will be able to ensure that, even given the fact that the valuable resource of spectrum will be assigned nationwide, the largest possible group of users will be able to benefit from it and the greatest added value for the critical infrastructure operators will be generated.

344 The Chamber agrees with the argument repeatedly put forward by respondents that the possibility of spectrum leasing should not replace the assignment holder's other obligations. The aim of the offer and negotiation requirement is to ensure that the future assignment holder cannot merely restrict itself to leasing spectrum. The Chamber's standard of reasonable cooperation by the requesting party also rules out it rejecting services offered in a non-discriminatory manner without sufficient reason, merely with the aim of demanding spectrum leasing. The requirement to enter into negotiations and make corresponding offers for mobile coverage is focused on demand, with the scope of services offered by the assignment holder being primarily based on those requested by operators of critical infrastructure in each individual case. The Chamber considers that this will be able to take account of the strongly diverging demand from critical infrastructure operators. For example, it is conceivable that there might be a demand for ready-to-use applications including the setting up of underlying network infrastructure. There might also be demand to integrate applications in existing structures, to build on existing structures or to implement them in cooperation with the assignment holder. Finally, requesting parties could turn to existing applications and infrastructure and only need local or regional leasing of spectrum usage rights.

345 The Chamber assumes that it is in the interest of both the assignment holder and requesting parties to develop solutions that are in line with demands and can be tailored to individual cases. The Chamber wishes to stress here that it expects a

reasonable amount of cooperation from both parties in the offer and negotiation requirement with the common aim of achieving a balanced contract.

346 As far as the assignment holder is concerned, this should include, as one respondent had requested, the providing of information about existing usages in the coverage area based on the spectrum at issue and whether such uses will exist in the foreseeable future. This should enable requesting parties to formulate their requirements efficiently, where necessary taking into account geographically overlapping uses by other infrastructure operators.

347 The Chamber acknowledges that an offer requirement solely based on demand might not take sufficient account of the needs of the assignment holder in individual cases.

348 In this context, the Chamber assumes that requesting parties will also play their part in the setting up and operating of infrastructure as far as is reasonable. For example, requesting parties should make suitable sites for wireless infrastructure available on their premises where applicable and contribute by making a power supply available. Where this is a possibility, the assignment holder can take appropriate cooperation by the requesting party into account in a non-discriminatory manner when making its offer.

349 The offer to the requesting party is to include the main bases for calculation used by the assignment holder. The Chamber is certain that disclosing the main bases for calculation will lead to greater transparency in offers, promoting the application of fair and appropriate terms between the potential contracting parties. The aim is to make it easier to compare offers to different requesting parties and thus ensure to a sufficient extent that non-discriminatory contract terms and conditions are applied equally. With this in mind, the Chamber judges that it is sufficient to restrict the disclosing of individual calculation elements to those necessary to enable comparability. Regarding what intervention is reasonable, the Chamber does not consider it appropriate to require a detailed breakdown of the assignment holder's economic calculation for each requesting party, as one respondent had suggested.

350 In accordance with the determinations of the Chamber, offers are to be made by the assignment holder on this basis within a reasonable time frame. The Chamber hereby expresses the expectation that the assignment holder fulfil its offer and negotiation requirement without undue delay and that an appropriate period for the making of an offer should generally not exceed eight weeks. This assumes that the potential user has provided the information necessary for the offer to be made.

351 The Chamber is convinced that it is appropriate to leave it mainly up to the parties to come to an agreement on this basis. The Chamber assumes that the parties concerned will find their way to balanced contract terms and conditions through fair and non-discriminatory negotiations and by making use of any potential for cooperation. There is no compulsion here to enter into and conclude a contract or agreement, nor is the content of the contract specified. The Chamber reiterates that neither the Bundeskartellamt nor the Bundesnetzagentur has identified significant market power, so specifying contractual conditions on a national basis, including the level of charges in a reference offer (section 23 TKG), as requested by one respondent, is not appropriate.

352 Assignment holders will not be forced to enter into a contract with any interested party or under any terms. However, the requirement includes the aim of negotiating and concluding a contract within the freedom of contract. Without the intention to conclude a contract, the offer and negotiation requirement would be devoid of purpose and hence not suitable to promote the regulatory objectives laid down in the TKG.

353 At the same time, the Chamber is aware that conflicts arising in individual cases could make it necessary for a third party to act as intermediary. The Bundesnetzagentur is therefore prepared to arbitrate in a subsidiary role in the event of a dispute in order to

ensure that an appropriate solution is found to implement the determined requirements.

354 The Bundesnetzagentur is therefore entitled, in the event of infringements of the negotiation requirement, to intervene in order to ensure the regulatory aims, ie by acting as an arbitrator. What is needed in such a case is a comprehensive balancing of the interests of the parties in question along the lines indicated above.

355 The Chamber is aware of the fact that any potential breaches of the offer and negotiation requirement can only be properly combated by an effective form of this arbitrator role. At the same time, in a market economy, agreements between parties in line with their interests should primarily be based on private sector contractual negotiations. The Bundesnetzagentur will therefore only play a role if negotiations fail. The Chamber assumes that it will only be necessary for the authority to intervene in exceptional cases and in a subsidiary manner, not as part of the ongoing monitoring of anti-competitive practices.

356 The Bundesnetzagentur is prepared to act as an arbitrator in the event of conflict in order to reach a binding decision after hearing the parties concerned. The Chamber points out that, in accordance with the determined primacy of private sector contractual negotiations and the legal principle of proportionality, there will be no positive determination of the contents of the contract.

357 Against this background and given the many different possible scenarios, the Chamber takes the view that the required intensity of influence by the arbitrator may vary significantly from case to case. According to the experiences and expectations of the Chamber, it may be in a specific case that the mere involvement of the Bundesnetzagentur as a neutral third party helps to solve the conflict and can be useful to achieve a balanced contract without the need for more intensive intervention measures. It is therefore necessary to accord the Bundesnetzagentur the greatest possible amount of flexibility in exercising its arbitration role, so the Chamber does not consider it appropriate to accede to the calls from one respondent to set out fixed – ie rigid – rules for the procedure to be followed in arbitration proceedings.

358 If, despite all efforts, the negotiations conducted under the freedom of contract do not lead to the conclusion of a contract governing coverage for critical infrastructure operators in line with demand, the Chamber considers that an appropriate solution, depending on the interests involved, may be the assignment holder leasing the critical infrastructure operators the spectrum with which to implement their business model on non-discriminatory, objective, appropriate and fair terms, insofar as this spectrum is not demonstrably already being used efficiently or will be in the foreseeable future. Given the differing interests that may be involved in a particular case and the many different possible requirement scenarios, an appropriate solution will not necessarily always be leasing, so the Chamber has decided not to determine a binding procedure for spectrum leasing to apply in every case, as one respondent had wanted.

359 In this context, the Chamber wishes to highlight that, in accordance with section 61(5) sentence 2 TKG, in the case of otherwise equal eligibility, the applicant guaranteeing a higher degree of geographic coverage with the relevant telecommunications services is to be selected. This higher degree of coverage could also be achieved through spectrum leasing if negotiations about the coverage provided by the assignment holder were not promising. This is based on the idea that spectrum leasing can lead to efficient use by the critical infrastructure operators (requesting parties) of spectrum that would otherwise be unused. Therefore, when making the selection in accordance with section 61(5) TKG, the voluntary commitments made by an undertaking in the course of the comparative selection procedure will also be taken into account. At the same time, it should be noted that each individual case of spectrum leasing requires the consent of the Bundesnetzagentur.

360 In addition, the Chamber draws attention to the following: the offer and negotiation requirement imposed here does not free the assignment holder from its obligation to advance an efficient national spectrum usage within the framework of the purpose of use. Even though it is not imposing a coverage obligation in the traditional sense, the Chamber expects the assignment holder to undertake and push forward network roll-out, including acquiring customers and sites, on the basis of its business model and possibly on the basis of voluntary commitments (section 61(6) TKG).

Re III.3.4 Reporting requirement

The following comments were made:

361 The majority of comments received were generally in favour of a reporting requirement.

362 There were calls to provide more detail on the reporting requirement by determining the main areas of focus of the report. The report should contain the indoor and outdoor network coverage actually achieved, the implementation of blackout resilience and redundancies as well as security aspects, it was said.

363 It was also suggested to increase the reporting interval to a year, given that the Bundesnetzagentur was already aware of the state of network roll-out from the applications it received for the setting of parameters for base station sites.

The Chamber has ruled as follows:

364 The assignment holder must report to the Bundesnetzagentur twice a year and upon request on the progress in planning, building and rolling out the network and on compliance with all obligations entered into in connection with the tendering, in particular on the number of requests for and the progress in negotiations within the framework of the offer and negotiation requirement.

365 The operative part will be clarified to this effect.

366 The imposition of a reporting requirement will serve to ensure that critical infrastructure receives priority coverage from the assignment holder, as determined. As the reports will be presented twice a year and upon request, the Bundesnetzagentur will be able to keep up to date on the actual progress of network roll-out and on the use of spectrum in the 450 MHz band and, where necessary, to use regulatory means to deal with developments.

367 The Chamber does not consider it necessary to provide more detail on the reporting requirement by determining the main areas of focus of the report. Given the very different possible requirements of services provided by the assignment holder to critical infrastructure operators, which may range from ready-to-use wireless solutions to simple spectrum leasing, it does not seem expedient to set out general requirements. Rather, the Chamber takes the view that the determined offer and negotiation requirement in conjunction with the Bundesnetzagentur's arbitration role is enough to ensure service provision to meet requirements, including the implementation of specific features in individual cases. This corresponds to the determinations of the Chamber not to impose ongoing checks of the negotiation process.

368 The Chamber does not agree with comments that the Bundesnetzagentur is already aware of the state of network roll-out from the applications it receives for the setting of parameters for base station sites and that therefore two reports a year are not necessary. For one thing, information that may be available about base station sites that have merely been applied for cannot replace information about stations that have actually been taken into operation and the network roll-out that has actually taken place. For another, assumptions made by the authority are not binding in the way that reports provided by the assignment holder itself are, the correctness of which the

holder is responsible for. There would be a risk that the assumptions made by the authority would not coincide with the actual state of the network roll-out.

369 By requiring two reports a year, the Bundesnetzagentur will be able to respond early to any undesirable developments in the interests of all concerned, without having to wait for problems to occur.

370 The Chamber highlights the fact that, without prejudice to the reporting requirement imposed here, the assignment holder will in future have to provide map data, in particular, within the framework of the provisions on transparency and publication of information in the Telecommunications Legislation Modernisation Act (Telekommunikationsmodernisierungsgesetz).

Re III.4 Fees and contributions

The following was said on this:

371 The majority of the respondents supported what was set out in the consultation draft with regard to the fees and contributions and did not have any further comments. Some respondents welcomed moderate fees being set to avoid a negative impact on network roll-out and investment behaviour.

372 By contrast, one respondent expressed the view that the one-off assignment fee set should take particular account of the fact that the fee was for the award of exclusive usage rights for a band of spectrum that was distinguished by special characteristics and that discrimination against the national mobile network operators was to be avoided. In particular the strong response to the Bundesnetzagentur's spectrum demand survey reflected the high demand, the particular attractiveness and thus the value of the spectrum.

373 Another respondent took the view that an assignment holder at 450 MHz would be able to offer services in competition with the public mobile networks yet would acquire the spectrum at a lower price per megahertz.

374 Some respondents stated that it would be desirable to know before submitting applications which fees and contributions would be payable so that they could be taken into consideration in the business plans to be submitted with the applications.

375 One respondent also called for clarification that the provision of additional spectrum at a later stage to achieve an unrestricted 5 MHz carrier (see section I.2) should only be possible against payment of further fees.

376 Another respondent stated that if the national assignment holder leased spectrum for use by third parties, the spectrum usage contribution charges and EMVG and FUAG contributions charged to the third parties by the assignment holder should not be allowed to be higher than those charged by the Bundesnetzagentur.

The Chamber has ruled as follows:

377 A fee will be imposed for spectrum assignment in accordance with section 142 TKG.

378 The exact fee will be set in the Ninth Ordinance amending the Frequency Fee Ordinance, which is currently undergoing interministerial coordination. The ministries responsible by virtue of section 142(3) TKG for amending the Frequency Fee Ordinance (FGebV) – the Federal Ministry for Economic Affairs and Energy, the Federal Ministry of Finance and the Federal Ministry of Transport and Digital Infrastructure – were able to reach agreement on a fee of €113,760,000 for the assignment in the 450 MHz spectrum award proceedings before the entry into force of the Ninth Ordinance amending the Frequency Fee Ordinance.

379 In light of the level of the assignment fee and the long period of use of 20 years as well as the planned amendment of the TKG, under which payment by instalments is to be made possible (new section 220 TKG-E, similarly Article 42 EECC), the

ministries involved and the President's Chamber believe that it is appropriate to introduce this form of payment already in these award proceedings in order to enable small and medium-sized companies to participate in the tendering proceedings.

380 Once the proposed section 220 TKG-E has entered into force, the arrangements will ultimately enable twenty equal annual instalments to be paid. Interest will not be payable.

381 The fees provisions in the TKG currently allow up to five consecutive annual instalments within five years of the fee being set; an amount of a least €5,688,000 will be payable on each due date and the total amount of €113,760,000 must have been paid by the last specified due date.

382 Subject to the Telecommunications Legislation Modernisation Act coming into force or the fees provisions in the TKG being amended accordingly, it will be possible, upon request, to arrange for the amount then still outstanding to be paid in instalments of at least €5,688,000 due on consecutive annual dates within the remaining assignment period.

383 In addition, spectrum usage contribution charges in accordance with section 143(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 Frequency Protection Contributions Ordinance (FSBeitrV), as amended.

384 Regarding the call for more details about the various contributions, the Chamber would like to make it clear that the contributions are calculated retrospectively each year on the basis of the expense-related costs to be allocated and are given in the FSBeitrV. The level of the contributions is therefore not known in advance.

385 There will be no explicit determination on the level of the spectrum usage contribution charges and EMVG and FUAG contributions chargeable by the assignment holder to third parties, as called for by one respondent, because it is primarily up to the parties concerned to agree the terms of a contract on the basis of the main bases for calculation that are to be disclosed (see section III.3.3.).

Re IV. Tendering rules

386 Under section 61(5) sentence 1 TKG, the Chamber must determine the criteria against which applicants' eligibility will be assessed prior to the award proceedings.

Re IV.1 Eligibility criteria

The following was said on this:

387 The respondents largely welcomed the eligibility criteria.

388 Several respondents stated that the reliability to meet the requirements of critical infrastructure operators and the willingness to offer these wireless services on reasonable or at least not anti-competitive terms had to be made a key assessment criterion. There was a clear connection here with the degree of potential influence of critical infrastructure operators on the spectrum holder and wireless network operator's business developments and policies. This could be realised by, for example, giving critical infrastructure operators the option to acquire interests in the spectrum holder's company.

389 On account of the urgency of providing the 450 MHz network against the background of the transition in the energy and transport sectors, the rapid construction of the network should be a further key assessment criterion. Due account should be taken of current investments and usages in the field of the planned purpose of use.

390 Furthermore, account should be taken of the fact that companies specifically not currently active as public mobile providers would be best qualified to serve this niche market in line with requirements and without conflicting interests.

391 One respondent stated that the eligibility criteria listed only related to technical issues. There was, however, no criterion assessing the pricing of the service offering. The price of the service to be provided was usually a decisive selection criterion in public tendering procedures. The respondent was not unaware that the current plans for the provision of a network also for critical infrastructure applications offered scope for various technical options from standard solutions to (local) spectrum leasing, which would ultimately influence the price of the service to be provided. However, the fact that an economic assessment of the service offerings was entirely excluded from the list of selection criteria seemed problematic. It was to be expected, for instance, that the planned award design would result in a monopolistic service offerings structure, with the risk of excessive prices to the detriment of the potential users.

392 One respondent called for the Bundesnetzagentur to publish and consult on the criteria in the tendering proceedings. Publishing the weighting of the criteria in the tendering in advance would increase the transparency of the proceedings and of decisions.

The Chamber has ruled as follows:

393 Applications will be assessed against the criteria as prescribed by law in section 61(5) sentence 2 TKG. These are:

- reliability
- specialist knowledge
- financial capacity
- suitability of the plans to be submitted for using the spectrum for tender
- promotion of a sustainable competitive market
- degree of geographic coverage.

394 Regarding the comments that the reliability to meet the requirements of critical infrastructure operators and the willingness to offer these wireless services on reasonable terms had to be made an essential key assessment criterion, the Chamber would like to point out that applications must include details of the applicant's spectrum usage concept, details of how the requirements for critical infrastructure applications will be met, details of network roll-out with respect to resilience and software-related and physical security, details of the specific procedure and details of the planning. These points will therefore also be checked and assessed in the proceedings.

395 Regarding one respondent's call for the award proceedings to include a criterion assessing the pricing of the service offering, the Chamber would like to point out that economic aspects will also be taken into due account in the award proceedings. For instance, applicants must provide information on their medium-term business plans and demonstrate how they will promote a sustainable competitive market. The Chamber believes, however, that it is not already possible at the time of application to make specific, binding plans for a service offering for critical infrastructure operators that can be checked and assessed in tendering proceedings.

396 The Chamber has not followed the call from one respondent to publish the weighting of the criteria. The criteria have been made known to applicants in a public and transparent manner. Unlike procurement law rules, the TKG does not provide for publication of the weighting. The Chamber has, however, provided more details of the requirements for applications and information on each assessment criterion.

397 Furthermore, applicants are free to provide further information in addition to that required in this Decision, which will also be assessed appropriately.

398 With regard to the applications to be submitted and the assessment criteria, the Chamber would like to point out the following: under section 61(6) TKG, any commitments entered into by applicants in the course of auction or tendering proceedings become constituent parts of the spectrum assignment. This applies beyond the obligations of the award conditions, and especially to voluntary commitments made by applicants. Voluntary commitments are welcomed by the President's Chamber and will be taken into consideration when assessing the applications.

Re IV.2 Contents of applications

Re IV.2.1 Applicant details

399 The applicant must provide the following information:

1. name and address
2. legal form
3. seat
4. extract from the commercial register
5. name of authorised agent with telephone and fax numbers and email address
6. name of a person authorised to take delivery, with an address enabling service (street, house number, place).

Re IV.2.2 Applicant's financial interests

400 In their application, applicants must include details of the ownership structure – including indirect ownership – of their undertaking. This applies in particular to the description of the participation structure and any voting rights of an undertaking that has a controlling influence on the applicant. In the event that an application is filed by a consortium, the obligation to present the facts applies to all members of the consortium. The description must include the shares in the consortium.

401 The applicant must confirm in its application that there are no grounds for concern under the German Competition Act (GWB).

Re IV.2.3 Reliability

402 Applicants must state whether:

- a frequency assignment has been revoked in the past;
- conditions have been imposed on them for failure to comply with obligations arising from frequency assignments;
- legal action has been taken on account of having breached telecommunications or data protection regulations;
- proceedings have been conducted in connection with serious criminal offences (section 100a of the German Code of Criminal Procedure – StPO) or other relevant offences, in particular offences violating the privacy of personal and private sphere (section 201 et seq of the German Criminal Code – StGB) or endangering external security (section 93 et seq StGB);
- administrative, administrative fines or criminal proceedings in the above cases are pending and, if so, with which public authority; and
- the relevant security requirements within the meaning of section 109(6) TKG are met.

403 In particular with regard to the special use for critical infrastructures, applicants must demonstrate how the reliability of their company (or consortium) will be ensured, for instance by means of security checks or certifications. In this context, applicants must demonstrate how it will be ensured that the personnel deployed in security-related areas are selected and monitored properly. In this connection, voluntary commitments are welcomed by the President's Chamber and will be taken into consideration when assessing the applications.

404 Applicants commissioning another company to plan, build or operate the network must provide relevant details for that company.

405 Applicants are to be regarded as unreliable if the overall impression they give is that they do not offer the guarantee that they will implement the relevant spectrum usage properly, in other words in compliance with the applicable statutory provisions.

406 In order to assess an applicant's reliability, the Bundesnetzagentur will make a prediction on the basis of all the facts known to it in each case about whether the applicant would represent a danger to public order when exercising the spectrum usage rights. The assessment of reliability must be purpose-oriented, which is why the statutory provisions to be complied with include in particular those that the future assignment holder will have to observe when exercising the spectrum usage rights. The prediction must also take account of the planned purpose of use. Since the spectrum in the 450 MHz band is to be provided primarily for critical infrastructure applications, it is in the public interest that the spectrum usage rights are exercised securely.

407 The Bundesnetzagentur will makes its prediction on the basis of all the facts known to it in each case. A decisive factor here is whether there are facts in the past that would indicate unreliability in the future. Should application documents or other information sources provide indications pointing to an applicant's unreliability, the Bundesnetzagentur will investigate these indications in order to create a sufficient factual basis for its prediction. If necessary, the Bundesnetzagentur will also request assistance from other authorities.

408 With regard to the information requirements set out in Annex 3, attention is drawn to the following in connection with the information to be provided by applicants on possible administrative or criminal offences: the actions of a person convicted of an offence are to be ascribed to a company if the person acted as the person

responsible for the management of the company; this includes supervising management of the company or otherwise exercising powers of control in a managerial position.

Re IV.2.4 Specialist knowledge

The following was said on this:

409 It was stated that particular account should be taken of existing experience specifically in the field of the planned purpose of use because the requirements for critical infrastructures and the associated communications systems were very different from those for public access networks.

410 Internal expertise should be assessed as better than bought-in expertise because it was considerably more reliable and flexible than only contracted, bought-in services.

The Chamber has ruled as follows:

411 Applicants must include proof that the persons engaged in planning, building and operating the wireless network have the necessary knowledge, experience and skills. Applicants must include clear and conclusive details of their specialist knowledge.

412 In this regard, applicants can submit CVs along with certificates and final certificates or evidence of previous activities (references) in the field of telecommunications. With regard to the planned technology, applicants must demonstrate that the persons operating the transmission paths have the required knowledge, experience and skills.

413 If a consortium submits an application, corresponding information about the relevant expertise of the members of the consortium must be provided. In addition, it must be explained how the expertise of the members of the consortium is to be transferred to the applicant.

414 Applicants must also demonstrate their knowledge, experience and skills for planning, building and operating a wireless network, in particular with regard to the purpose of use for critical infrastructure and how they intend to meet the required coverage for critical infrastructure operators.

415 Regarding the comment that particular account should be taken of existing experience specifically in the field of the planned purpose of use, the Chamber would like to draw attention to the information requirements set out in Annex 3 (sections 4.1 to 4.3). Two of the three points relate to requirements specific to these proceedings.

416 Regarding the comment that internal expertise should be assessed as better than bought-in expertise, the Chamber would like to point out that the decision taken by the spectrum holder/applicant to buy in external expertise does not necessarily result in a disadvantage. Adequate availability of the relevant personnel can be ensured in organisational terms through both employment and other civil-law contracts.

Re IV.2.5 Financial capacity and business planning

The following was said on this:

417 It was stated that financial capacity should be assessed using a detailed breakdown of standardised services and products with prices. In addition, the medium-term business plan should be defined in more detail. The respondent assumed that a period of five years was meant, as was the practice in other award proceedings.

The Chamber has ruled as follows:

418 Applicants must include details and proof of permanent and sufficient financial resources for the build and roll-out investments set out in the spectrum usage concept and for operation of the wireless network or of how financing is to be secured.

419 It will be checked that the means of production required for building and operating the network and exercising the spectrum usage rights are available and are expected to be available on a permanent basis. Any documents required to support the conclusive account are to be included in the check (securities, loans, own funds, guarantees, letters of comfort). The submission of a balance sheet does not release the applicant from the obligation to present the facts. In order to evaluate the plausibility of the account of financial capacity, any information available on the applicant's general economic situation in the past three years (for example annual reports, balance sheets) will also be used.

420 Proof that financing is in place must be furnished by supporting documents, for example written financing declarations of the parent undertaking, other affiliated undertakings or credit institutions. Mere declarations of intent or commitments to undertake efforts are not recognised as evidence of security. Where financing commitments are given by parent undertakings or other affiliated undertakings, they must be made in the form of "hard letters of comfort". Such letters of comfort must in particular contain declarations by the parent company that it accepts an unlimited obligation to ensure that all investments in the build, roll-out and operation of the mobile network will be permanently available.

421 According to section 61(5) TKG, one criterion to be used to assess applicants is the suitability of the plans to be submitted for using the tendered spectrum. Applicants are required to present a conclusive and comprehensible statement of their financial capacity in relation to their business plan (medium-term business planning). The Chamber would like to make it clear in this context, as requested by one respondent, that the medium-term business plan should cover a period of five years. Further details of the medium-term business plan, which were also requested, are set out below. The operative part has been amended accordingly.

422 The medium-term business plan should include a market and marketing analysis. The description and plausibility of an applicant's current position and that of the applicant's environment as well as expected future developments will be checked. This includes the description of the target group(s) and target market(s) for applications using the spectrum to be assigned for a period of at least five years. Information regarding a possible migration of current usages in the 450 MHz band must also be included. The assumptions and forecasts made, in particular about market size, market growth, market potential and pricing, must be set out conclusively.

423 Regarding the comment that financial capacity should be assessed using a detailed breakdown of standardised services and products with prices, the Chamber would like to point out that that it is not already possible at the time of application to make specific, binding plans for a service offering for critical infrastructure operators that can be checked and assessed in tendering proceedings. The forecast of markets, services and products and of pricing to be made in the market and marketing analysis is not comparable with a complete or standardised product catalogue because the specific practical details of the abstract specification of use will not be worked out until the negotiations with the potential users take place (see section III.3.3).

424 The medium-term business plan should also include an investment and financial plan. This plan must set out the assumptions on which the business plan is based. It must include the quantities and values used in the investment plan, as well as a projected balance sheet and a projected profit and loss account together with explanatory information. It must also set out the financial resources available. Proof of the financial resources required for network build must be based on the planning and construction costs and on the costs of ongoing operation. It must include a breakdown between equity financing and external financing, broken down into own and borrowed capital, and between immediate financial requirements and financial requirements for the subsequent periods.

425 The medium-term business plan should also contain project management details. Applicants must provide a description of the resources, including details of planning, organisation, quality and risk management, current personnel and personnel recruitment. A description of the means of production required must also be provided. It will be checked how an applicant envisages resolving the planning and project management issues associated with building and operating the wireless network. This includes checking how the applicant intends to resolve the resource issues associated with building and operating the wireless network (in particular sites, technology, personnel, capital).

426 The medium-term business plan should also include an evaluation of planning up to forecasted roll-out in line with demand. Account must be taken of the assumptions made in the technical plans. The plausibility of the business plan in conjunction with the technical plans presented must also be assessed.

Re IV.2.6 Spectrum usage concept

The following was said on this:

427 The respondents welcomed the requirements to be met by the spectrum usage concept.

428 One respondent called for specific technical requirements to ensure the minimum requirements.

The Chamber has ruled as follows:

429 Applicants must describe how they intend to ensure efficient and interference-free spectrum usage by submitting a spectrum usage concept. In particular, they must describe how they intend to meet the needs of critical infrastructure applications.

430 The spectrum usage concept must be conclusive and comprehensible. Assumptions and forecasts must be based on verifiable facts. In addition, details of network roll-out with respect to resilience and software-related and physical security must also be provided in light of the purpose of use pursuant to section III.2.1 of this Decision and the criteria laid down there.

431 In particular, applicants must show in their spectrum usage concept how they can meet the requirements of critical infrastructure. The spectrum is to be used for applications in the field of critical infrastructure, to enable general interest services to be maintained, to avoid crises and to manage crisis situations. For this reason, the physical and software-related security and resilience of the network are subject to higher standards. Applicants must show these in their offer so that they can be taken into account on the basis of the determined criteria. The information on the technical planning should demonstrate that applicants are familiar with the planned procedure and are able to use the planning instruments at their disposal. Applicants must provide details of the specific procedure (for example system concept, network structure), of the planning (for example detailed statements on network roll-out planning and the timescale for the network build), of the optimisation of the network, of user and traffic forecasts and of the operating and maintenance concept (for example network performance, reliability, network and fault management). The assumptions on which the technical planning is based must be conclusive and comprehensible.

432 Applicants must further show:

- how crisis-resilient communications will be secured in the event of a blackout and how long the network will remain functional without electricity supply;

- how redundant data connections for all major network infrastructure elements will be secured;
- how a high level of network stability and availability will be achieved and how disruptions to network operation will be promptly remedied.

433 Details must also be provided of how the requirements of the federal armed forces mentioned in the explanation to section I.2 will be taken into account and how this will be implemented within the framework of the specific wireless network planning.

434 Regarding the call from one respondent for specific technical requirements to ensure the minimum requirements, the Chamber would like to point out that spectrum-related technical requirements will be included in the spectrum usage conditions and that no further minimum requirements are necessary.

435 With regard to the information to be provided by applicants, the individual points relating to the spectrum usage concept in Annex 3 have been supplemented with further details.

Re IV.2.7 Promotion of a sustainable competitive market

The following was said on this:

436 The respondents largely welcomed this point.

437 This was of key importance in light of the existing oligopoly in the mobile market. Assigning the spectrum to a company not connected with one of the four mobile network operators would enable a limited amount of fringe competition. A non-public operator was best qualified to serve the market in line with requirements and without conflicting interests.

438 One respondent stated that the details relating to the promotion of a sustainable competitive market were too vague. Applicants were required to prove how they would promote a sustainable competitive market within the meaning of section 2(2) para 2 sentence 1 TKG. In the first instance, it was unclear to what extent competitive markets for telecommunications services and networks and for associated facilities and services in accordance with section 2(2) para 2 sentence 1 TKG were to be created. Even if the winner of the tendering proceedings provided wholesale products enabling other telecommunications providers to offer suitable services to critical infrastructure operators, the prices of these downstream services would always be restricted by the wholesale prices. There would therefore be no guarantee that potential users of critical infrastructure applications would actually receive the applications at low prices.

The Chamber has ruled as follows:

439 According to section 61(5) sentence 2 TKG, promoting a sustainable competitive market is one of several criteria to be used to assess an applicant's suitability.

440 The Bundesnetzagentur needs to make a prediction about how the relevant product and geographical market would develop if a given applicant offered telecommunications services on the basis of the tendered spectrum on the market.

441 Promoting a sustainable competitive market is interrelated with an applicant's specialist experience because especially those companies already active in the relevant or at least an adjacent market can bring relevant experience. Overrating specialist experience would therefore considerably reduce the chances of newcomers entering the market. This is not desirable, also in light of the regulatory aim of section 2(2) para 2 sentence 1 TKG. An applicant that has not been active at all in the relevant product market or an adjacent market promotes sustainable competition to a larger extent than an applicant that has been active to a certain extent in the relevant product market or an adjacent market.

442 In its decision-making relating to this criterion, the Chamber will therefore look at an applicant's potential contribution to competition in the national market for MFCN primarily for critical infrastructure applications. Applicants already operating telecommunications networks that could be used to become active in this market will be assumed to make a smaller contribution to competition, while applicants not operating telecommunications networks that could be used to serve this market will be assumed to make a larger contribution to competition.

443 This assessment of competition will focus on MFCN networks, although other wireless and fixed telecommunications networks can be taken into consideration if they can be used to offer telecommunications services for critical infrastructure applications (as well).

444 Applicants must therefore state whether and which telecommunications networks are already being operated that can be used to offer telecommunications services for critical infrastructure applications (as well). Applicants operating such networks must state the revenue generated with these networks in the last three years.

445 Applicants must also provide details of how, in light of the offer and negotiation requirement determined in section III.3.3, non-discriminatory negotiations will be guaranteed and it will be ruled out that negotiations about wireless applications can be refused outright or held in an abusive way or unfair terms can be attached to services.

Re IV.2.8 Degree of geographic coverage

The following was said on this:

446 It was stated that the degree of geographic coverage had to relate to the requirements for the applications of critical infrastructure operators with respect to area but also quality; in other words, the coverage offered especially had to be blackout-resilient with an emergency power supply lasting for at least 72 hours or several days, and all essential network components had to be duplicated with redundant components and used exclusively for the autonomous 450 MHz wireless network.

447 Several respondents called for the degree of coverage to relate to producing the coverage required for the critical infrastructure applications (coverage in line with demand).

448 One respondent called for a coverage of 99% in each coverage area, and an essential indoor coverage of 95%, including into the basement.

449 Several respondents also called for the issue of cross-border coordination to be resolved. This required implementation of ECC Recommendation T/R 25-8 on cross-border coordination.

450 The Bundesnetzagentur had to verify by means of documentary evidence and, if necessary, random checks whether coverage was ensured in the event of a crisis.

The Chamber has ruled as follows:

451 Applicants must particularly give details of the extent to which demand from critical infrastructure operators will be met in line with the purpose of use and in a timely manner. This must not be based solely on area coverage but especially on the extent to which they intend to meet the required coverage for critical infrastructure operators. This demand might include the regional/local leasing of spectrum. Applicants must show how coverage will be provided in line with demand and in a timely manner and how the relevant degree of geographic coverage is plausible.

452 Regarding the comments that the degree of geographic coverage had to relate to the requirements for the applications of critical infrastructure operators with respect to area but also quality – which in the Chamber's view also covers cross-border coordination, for example – the Chamber would like to point out that applicants had to take account of the relevant national and EU legal frameworks in their usage concepts.

453 Regarding the comments that the Bundesnetzagentur should verify, by means of documentary evidence and, if necessary, random checks, whether coverage was actually ensured in the event of a crisis, the Chamber would like to point out that the network operator will be subject to reporting requirements and will have to report to the Bundesnetzagentur on progress in rolling out the network and on meeting the specific demand from critical infrastructure operators.

Re IV.3 Binding effect of the application

454 To ensure that the proceedings are objective, the contents of the applications submitted cannot be changed up until the award is made. This is to ensure that all applicants are subject to the same conditions because their applications are assessed on this basis.

455 Applicants may withdraw their application at any time up to when the award is made. Applications must be withdrawn by the applicant in writing.

Re IV.4 Exclusion from the proceedings

456 Applicants not complying with the tendering rules can be excluded from the proceedings to ensure that the tendering can proceed swiftly and smoothly. Reasons for exclusion include any irregular conduct that jeopardises the tendering proceedings, contravenes the rules or is unlawful.

457 If the rule-breaking or unlawful conduct is discovered only after the end of the tendering proceedings, the award and/or spectrum assignment can be revoked.

Re IV.5 Award decision and assignment

The following was said on this:

458 One respondent stated that deciding on the award by drawing lots if there were equally eligible applicants was not appropriate. Single-bid competitive proceedings could be conducted instead.

459 In light of the high importance of the 450 MHz spectrum, the decision should not be made by drawing lots. If applicants were apparently equally eligible for the spectrum, competitive proceedings such as the submission of single sealed bids should lead to assignment to the participant in the award proceedings promising the most efficient use of the spectrum.

The Chamber has ruled as follows:

460 The award will be based on an assessment of each bid against the specified criteria. The Chamber's decision will take the form of an official notice. The award decision will be published. The award decision will form the basis for assignment of the spectrum, which is made upon application.

461 In the case of equal eligibility, the applicant guaranteeing a higher degree of geographic coverage (see section IV.2.8) with the relevant telecommunications services is to be selected. If in the case of equal eligibility more than one applicant guarantees the same degree of geographic coverage, the award will be made by drawing lots.

462 The Chamber has not followed the call from one respondent to make the decision in competitive proceedings with single sealed bids and not by drawing lots if there are equally eligible applicants.

463 If, after a final assessment based on the specified criteria, two applicants also guarantee the same degree of geographic coverage, the Chamber assumes that both applicants would be equally suitable to make efficient use of the spectrum and satisfy the requirements of the critical infrastructure users and that the decision can therefore be made by drawing lots. As stated under "II. Choice of award proceedings", the Chamber does not consider the proposal made by one respondent to conduct auction proceedings if there were equally eligible applicants in these tendering proceedings to be either appropriate or admissible. Deciding by drawing lots is a quicker and simpler way of making the award in a non-discriminatory manner.

Re IV.6 Application documents, application costs

464 Applicants that are not selected will receive an official notice that their application was not successful after the award decision has been made.

465 Application documents will not be returned even after the proceedings have been completed. The application documents form part of the file and will be needed later in order to be able to understand the selection decision.

466 Costs incurred by applicants in connection with preparing and submitting their applications will not be reimbursed by the Bundesnetzagentur.

Information on legal remedies

Actions against this notice may be filed with the administrative court in Cologne, Appellhofplatz, 50667 Köln, Federal Republic of Germany, within one month of its announcement. Under section 137(1) TKG legal actions do not have suspensory effect.

Bundesnetzagentur für Elektrizität, Gas,
Telekommunikation, Post und Eisenbahnen

The President's Chamber Bonn, 16 November 2020

Dr Eschweiler	Homann	Franke
Vice Chair	Chair	Vice Chair

List of abbreviations

5G	fifth generation (of mobile technology)
BDBOS	Federal Agency for Public Safety Digital Radio (Bundesanstalt für den Digitalfunk der Behörden und Organisationen mit Sicherheitsaufgaben)
BEM	block edge mask
BfDI	Federal Commissioner for Data Protection and Freedom of Information (Bundesbeauftragter für den Datenschutz und die Informationsfreiheit)
BMWi	Federal Ministry for Economic Affairs and Energy (Bundesministerium für Wirtschaft und Energie)
BS	base station
BSI	Federal Office for Information Security (Bundesamt für Sicherheit in der Informationstechnik)
BSI-KritisV	BSI Critical Infrastructure Ordinance (BSI-Kritisverordnung)
BVerwG	Federal Administrative Court (Bundesverwaltungsgericht)
CDMA	code division multiple access
CEPT	European Conference of Postal and Telecommunications Administrations
CV	curriculum vitae
dBm	decibel milliwatt
dBµV/m	decibel microvolts per metre
ECC	Electronic Communications Committee
EECC	European Electronic Communications Code
EIRP	equivalent isotropically radiated power
EMVG	Electromagnetic Compatibility of Equipment Act (Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln)
ERC	European Radiocommunications Committee
ETSI	European Telecommunications Standards Institute
EU	European Union

FGebV	Frequency Fee Ordinance (Frequenzgebührenverordnung)
FreqV	Frequency Ordinance (Frequenzverordnung)
FSBeitrV	Frequency Protection Contributions Ordinance (Frequenzschutzbeitragsverordnung)
FUAG	Radio Equipment Act (Funkanlagengesetz)
GG	Basic Law (Grundgesetz)
GHz	gigahertz (unit of frequency)
GWB	Competition Act (Gesetz gegen Wettbewerbsbeschränkungen)
HCM	harmonised calculation method
IoT	Internet of Things
ITU	International Telecommunication Union
kHz	kilohertz (unit of frequency)
LTE	Long Term Evolution
LTE-M	Long Term Evolution for Machines
M2M	machine-to-machine
MFCN	mobile/fixed communications networks
MHz	megahertz (unit of frequency)
mMTC	massive machine type communications
MsbG	Metering Act (Messstellenbetriebsgesetz)
NB-IoT	narrowband Internet of Things
OOBE	out-of-block emission
PMR	private mobile radio
PTMR	private trunked mobile radio
StGB	Criminal Code (Strafgesetzbuch)

StPO	Code of Criminal Procedure (Strafprozessordnung)
TKG	Telecommunications Act (Telekommunikationsgesetz)
UE	user equipment
VG Köln	Cologne Administrative Court (Verwaltungsgericht Köln)
WRC	World Radiocommunication Conference

Annex 1: Spectrum usage conditions

Spectrum usage conditions for mobile/fixed communications networks (MFCN) primarily for critical infrastructure applications in the 450 MHz band (451 - 455.74 MHz and 461 - 465.74 MHz)

The following spectrum usage conditions apply to the use of the radio spectrum for mobile/fixed communications networks (MFCN) primarily for critical infrastructure applications in the 450 MHz band (451 - 455.74 MHz and 461 - 465.74 MHz). The spectrum usage conditions are technology-neutral and are not tied to particular standards/specifications. The spectrum usage conditions set out below take account of applications with channel bandwidths larger than or equal to 1.25 MHz.

The spectrum usage conditions are based on ECC Report 283 and ECC Decision (19)02.

It should be noted that, in comparison to ECC Decision (19)02, a maximum bandwidth of only 2 x 4.74 MHz is available at present. The following technical conditions therefore apply accordingly to the relevant band edges 455.74 MHz and 465.74 MHz.

Depending on the further development of ECC decisions, ECC reports, standards and specifications, it may be necessary to modify or supplement these spectrum usage conditions in the course of the application and/or assignment proceedings or even after spectrum has been assigned.

Technical conditions for channel bandwidths larger than or equal to 1.25 MHz

User equipment (UE) transmit band (uplink): 451 - 455.74 MHz

Base station (BS) transmit band (downlink): 461 - 465.74 MHz

1) Limits/transmitter masks

a) Base station (BS)

No in-block limits have been specified for base stations.

Limits for out-of-block emissions are listed in the following tables:

Table 1: BS frequency range of out-of-block emissions (OOBE) (1.4 MHz, 3 MHz and 5 MHz channel bandwidth)

Channel bandwidth	**Delta F_c (MHz) from centre frequency**	**Out-of-band-emissions (transmitter output power)**	**Measurement bandwidth**
1.4 MHz	0.7 to 2.1	-1 dBm -10/1.4 * (Delta F_c – 0,7) dB	100 kHz
	2.1 to 3.5	-11 dBm	100 kHz
	3.5 to 9.95	-16 dBm	100 kHz
3 MHz	1.5 to 4.5	-5 dBm -10/3 * (Delta F_c – 1.5) dB	100 kHz
	4.5 to 7.5	-15 dBm	100 kHz
	7.5 to 9.995	-16 dBm	100 kHz
5 MHz	2.5 to 7.5	-7 dBm -7/5 * (Delta F_c – 2.5) dB	100 kHz
	7.5 to 9.95	-14 dBm	100 kHz
Note 1: For the maximum mean out-of-block EIRP the antenna gain and cable losses are to be considered. Note 2: An additional out-of-band emission reduction may be necessary for the protection of other land mobile systems in the adjacent bands (see ECC Report 283). For the protection of the uplink frequencies of land mobile systems within 450 - 460 MHz, a maximum mean out-of-block EIRP of -43 dBm/100 kHz may be needed.			

Table 2: BS frequency range of out-of-block emissions (OOBE) (1.25 MHz channel bandwidth)

Frequency offset from centre frequency (MHz)	**Channel bandwidth 1.25 MHz**	**Measurement bandwidth**
±0.885-1.98	-17 dBm	30 kHz
±1.98-4	-22 dBm	30 kHz

In addition to the values in Tables 1 and 2, BS operating in the 461 - 465.74 MHz band must meet the maximum out-of-block emission (OOBE) levels specified in Table 7 for the protection of the broadcasting service.

b) User equipment (UE)

Table 3: UE transmitter characteristics

Parameter	**Value**
Channel bandwidth	1.25 MHz, 1.4 MHz, 3 MHz or 5 MHz
Maximum mean in-block power	23 dBm (Note)
Note: A higher UE maximum mean in-block power up to 31 dBm can be used for special scenarios provided that the protection of other services is not compromised. Vice-versa, the maximum mean in-block power of UEs for the protection of other services may be limited on a cell-by-cell basis.	

Table 4: UE maximum unwanted emission levels (1.4 MHz, 3 MHz and 5 MHz channel bandwidth)

Frequency offset from channel edge (MHz)	**Channel bandwidth**			**Measurement bandwidth**
	1.4 MHz	**3 MHz**	**5 MHz**	
± 0-1	-10 dBm	-13 dBm	-15 dBm	30 kHz
± 1-2.5	-10 dBm	-10 dBm	-10 dBm	1 MHz
± 2.5-2.8	-25 dBm	-10 dBm	-10 dBm	1 MHz
± 2.8-5		-10 dBm	-10 dBm	1 MHz
± 5-6		-25 dBm	-13 dBm	1 MHz
± 6-10			-25 dBm	1 MHz

Table 5: UE maximum unwanted emission levels (1.25 MHz channel bandwidth)

Frequency offset from centre frequency (MHz)	**Channel bandwidth 1.25 MHz**	**Measurement bandwidth**
±0.885-1.98	-24 dBm	30 kHz
±1.98-4	-44 dBm	30 kHz

In addition to the UE masks in Tables 4 and 5, UE operating in the 451 - 455.74 MHz band must meet the maximum out-of-block emission (OOBE) levels specified in Table 7 for the protection of the broadcasting service.

c) Protection of the broadcasting service above 470 MHz

The risk of interference between MFCN and the broadcasting service above 470 MHz can be reduced by a set of technical measures, for example an appropriate limit of the corresponding MFCN BS out-of-band emissions.

MFCN UE with a channel bandwidth of 1.25 MHz, 1.4 MHz, 3 MHz or 5 MHz must meet the maximum out-of-block emission (OOBE) levels specified in Table 6 for the protection of the broadcasting service.

Table 6: UE maximum out-of-block emission (OOBE) levels for the protection of the broadcasting service above 470 MHz

Frequency range	**UE maximum mean OOBE**	**Measurement bandwidth**
Above 470 MHz	-42 dBm	8 MHz

MFCN BS with a channel bandwidth of 1.25 MHz, 1.4 MHz, 3 MHz or 5 MHz must meet the out-of-block emission (OOBE) EIRP levels specified in Table 7 for the protection of the broadcasting service above 470 MHz.

Table 7: BS maximum out-of-block emission (OOBE) levels for the protection of the broadcasting service above 470 MHz

Frequency range	**In-block EIRP conditions P (dBm/cell)**	**Maximum mean OOBE EIRP (dBm/cell)**	**Measurement bandwidth**
Above 470 MHz where broadcasting is protected	P ≥ 60	-7	8 MHz
	P < 60	(P – 67)	8 MHz
Above 470 MHz where broadcasting is subject to an intermediate level of protection or when mitigation techniques are used; at a national level depending on the type of mobile network deployment	P ≥ 56	-4	8 MHz
	P < 56	(P – 60)	8 MHz

2) Unwanted emissions (spurious domain)

The unwanted emissions (spurious domain) during operation may not exceed -36 dBm for frequencies up to 1 GHz and -30 dBm for frequencies above 1 GHz. In standby mode, the unwanted emissions may not exceed -57 dBm for frequencies up to 1 GHz and -47 dBm for frequencies above 1 GHz. See also ERC Recommendation 74-01.

3) Protection of the radio monitoring stations of the Bundesnetzagentur's radio monitoring and inspection service

To ensure that spectrum usage can be monitored effectively in accordance with section 64 TKG, spectrum usages must not cause interference to the Bundesnetzagentur's radio monitoring stations. Electromagnetic fields from transmitters operated in the vicinity of the Bundesnetzagentur's receivers can lead to desensitisation and overloading, thus impairing the reception of the Bundesnetzagentur's measuring equipment (see Bundesnetzagentur Official Gazette No 17/2012, Communication No 613/2012).

In order to protect the fixed radio monitoring stations operated and planned by the Bundesnetzagentur's radio monitoring and inspection service in Germany, the field strength from emissions in the band below 694 MHz may not exceed 80 dBµV/m at these sites (cf Bundesnetzagentur Official Gazette No 23/2019, Communication No 646/2019).

4) Frequency coordination for radio stations in border areas

The availability of spectrum is limited in border areas of the Federal Republic of Germany and some other exposed areas near the borders due to the need for coordination with neighbouring countries.

The possible restrictions with respect to the usable bandwidth of the spectrum will vary from area to area, depending on whether one, two or possibly three neighbouring countries need to be included in the coordination process.

Since the whole band from 450 MHz to 470 MHz is not yet harmonised at European level, the possible restrictions will also depend on the transmission methods and bandwidths in use either side of the borders.

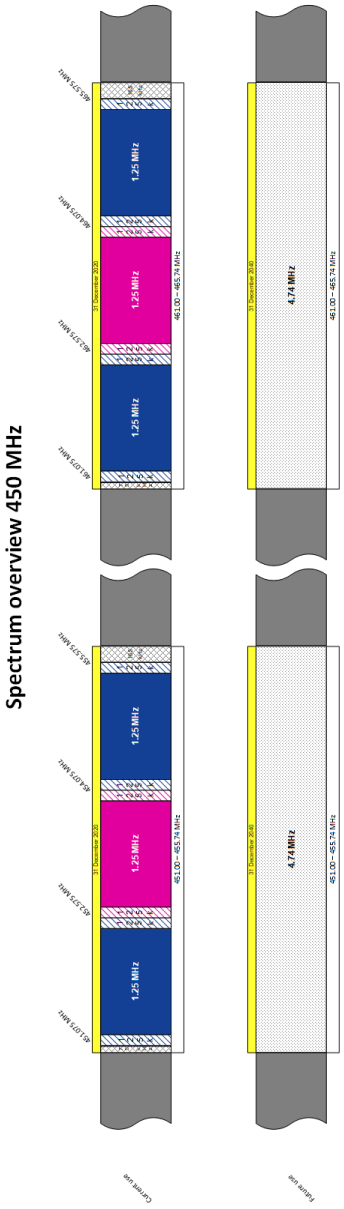
Small-cell wireless network planning is therefore recommended especially in Germany's border areas in order to minimise restrictions from the cross-border coordination of mobile systems.

Cross-border coordination is based on ECC Decision (19)02 with the referenced planning criteria set out in ECC Recommendation T/R 25-08. These criteria are specified

in more detail through bilateral or multilateral frequency coordination agreements with the neighbouring countries.

Translation - In case of divergent interpretation, the German text shall prevail.

Annex 2: Current and future use in the 450 MHz band



Translation - In case of divergent interpretation, the German text shall prevail.

Annex 3: Application structure

In their written application, applicants must apply for admission to the tendering proceedings.

Applications are to be submitted in German

by 12:00 noon on 18 December 2020

in writing, in triplicate, to

Bundesnetzagentur

Referat 212

Kennwort: 450 MHz

Tulpenfeld 4

53113 Bonn

and

also electronically in Microsoft Word (or Microsoft Word-compatible) or PDF format (copying and printing must be enabled) by email to referat212@bnetza.de or on data media.

A blacked-out version in which any business and trade secrets have been blacked out, together with a list justifying the blacked-out parts, is also to be submitted.

Only applicants providing the information set out in section III.1.3 (Admission to the tendering proceedings) in full will be admitted.

Applications should be structured as set out in the template below.

If necessary, applications can provide a greater level of detail than that of the template. Applicants considering it necessary to give more details that do not fit the categories of the template can add sections and subsections.

The template is the basis on which applications will be assessed. That is why the information required must be given in the place intended. Supporting documents – in particular proof of the applicant's specialist knowledge and financial capacity – should be provided in a form that enables a simple check.

Applications must be summarised. The summary should reflect the entire application.

Translation - In case of divergent interpretation, the German text shall prevail.

I. Application for admission

II. Application

1. Applicant details

1.1. Name and address

1.2. Legal form

1.3. Seat

1.4. Extract from the commercial register

1.5. Name of authorised agent with telephone and fax numbers and email address

1.6. Name of a person authorised to take delivery, with an address enabling service (street, house number, place)

2. Applicant's financial interests

2.1. Ownership structure

2.2. No grounds for concern under the German Competition Act (GWB)

3. Reliability

Applicants must state whether:

3.1. a frequency assignment has been revoked in the past;

3.2. conditions have been imposed on account of failing to honour obligations from frequency assignments;

3.3. legal action has been taken on account of having breached telecommunications or data protection regulations;

3.4. proceedings have been conducted in connection with serious criminal offences (section 100a of the German Code of Criminal Procedure – StPO) or other relevant offences, in particular offences violating the privacy of personal and private sphere (section 201 et seq of the German Criminal Code – StGB) or endangering external security (section 93 et seq StGB);

3.5 administrative, administrative fines or criminal proceedings in the above cases are pending and, if so, with which public authority; and

3.6. the relevant security requirements within the meaning of section 109(6) TKG are met.

In particular with regard to the special use for critical infrastructures, applicants must demonstrate how the reliability of their company (or consortium) will be ensured, for instance by means of security checks or certifications. In this context, applicants must demonstrate how it will be ensured that the personnel deployed in security-related areas are selected and monitored properly.

Applicants commissioning another company to plan, build or operate the network must provide relevant details for that company.

4. Specialist knowledge

4.1. Proof that the persons engaged in planning, building and operating a wireless network have the necessary knowledge, experience and skills

4.2. Details of knowledge, experience and skills relating to planning, building and operating a wireless network with respect to use for critical infrastructures and for the relevant supply networks

4.3. Details of how coverage meeting critical infrastructure operators' requirements will be secured

5. Financial capacity and business planning

5.1. Details and proof of permanent and sufficient financial resources for the build and roll-out investments set out in the spectrum usage concept and for operation of the wireless network or of how financing is to be secured

5.2. Medium-term business plan (covering a period of at least five years)

- Market and marketing analysis
  Applicants must describe their current position and that of their environment as well as expected future developments. This includes a description of the target group(s) and target market(s) for applications using the spectrum to be assigned. Information regarding a possible migration of current usages in the 450 MHz band must also be included. The assumptions and forecasts made, in particular about market size, market growth, market potential and pricing, must be set out conclusively.

- Investment and financial plan
  The plan must set out the assumptions on which the business plan is based. It must include the quantities and values used in the investment plan, as well as a projected balance sheet and a projected profit and loss account together with explanatory information. It must also set out the financial resources available. Proof of the financial resources required for network build must be based on the planning and construction costs and on the costs of ongoing operation. It must include a breakdown between equity financing and external financing, broken down into own and borrowed capital, and between immediate financial requirements and financial requirements for the subsequent periods.

- Project management details
  Applicants must provide a description of the resources, including details of planning, organisation, quality and risk management, current personnel and personnel recruitment. A description of the means of production required must also be provided.

- Evaluation of planning up to forecasted roll-out in line with demand
  Applicants must demonstrate the plausibility of the business plan in conjunction with the technical plans presented.

6. Spectrum usage concept

Spectrum usage concept

6.1. Details of how efficient and interference-free spectrum use will be secured

Applicants must set out the expected user data rates (data capacity) for the applications in the energy, water, wastewater, district heating and

transport sectors, including the associated metering services. Account must also be taken of error protection and the coding methods used.

6.2. Details of how the requirements for critical infrastructure applications will be met

Applicants must set out in particular which security requirements for telecommunications networks and services (for example catalogue of security requirements) are applied in the network planning.

6.3. Details of network roll-out with respect to resilience and software-related and physical security

Applicants must provide detailed and transparent information in particular on the following aspects:

- Physical security concept for the various network components (for example protection against fire, natural disaster, burglary, theft, vandalism and terrorism)
- Software-related security concept for the various network components (for example measures to protect against data compromise, measures to ensure the availability of IT applications, certification routines for the software used, data encryption)

6.4. Details of the specific procedure (for example system concept, network structure)

Applicants must provide detailed and transparent information about the network configuration. Applicants must provide details of all the technical parameters relevant to understanding the wireless network planning, for example:

- Details of the planned technology (base stations and user equipment)
- Details of the parameters assumed for the wireless network coverage (for example wanted field strengths, received levels, field strength prediction models and prediction tools, assumed time and location probabilities, topography and morphology data used)
- Presentations of nationwide coverage
- Details of how consideration is given to coverage in areas near Germany's borders with neighbouring countries
- Details of how consideration is given to protection for sites of the radio monitoring and inspection service

6.5. Details of the planning (for example detailed statements on network roll-out planning and the timescale for the network build)

Applicants must provide detailed information on the timetable for building and rolling out the wireless network in the next few years. Applicants must set out in particular when the wireless network will be available for operation in which regions. Applications must also provide transparent information about the acquisition of antenna sites.

6.6. Details of network optimisation

Applicants must provide detailed information about how the network will be rolled out/how the density of the network will be increased in line with demand. Applicants must also set out which measures are planned for further optimisation of the network when in operation (for example accompanying measurements during network roll-out).

6.7. Details of how crisis-resilient communications will be secured in the event of a blackout

Applicants must set out in particular which measures relating to the individual network elements will be taken in the event of a blackout in order to safeguard communications. Applicants must also set out which communications services will be guaranteed in the event of a blackout and how priorities will be assigned in the wireless network (for example with regard to data rates and voice communication). Applicants must provide transparent information about the emergency power supply that is independent of the electricity grid.

6.8. Details of how long the network will remain functional without electricity supply

Applicants must provide transparent information in particular about the measures to ensure the functionality of the individual network components and about the minimum length of time during which functionality will be guaranteed.

6.9. Details of how redundant data connections for all major network infrastructure elements will be secured

Applicants must provide transparent information in particular about the data connection for the network infrastructure elements (for example optical fibre, fixed links) and about the planned alternative connections.

6.10. Details of how a high level of network stability and availability will be achieved and how disruptions to network operation will be promptly remedied

Applicants must provide transparent information in particular about the individual measures planned at the different levels of the wireless network in order to ensure a high level of network stability and availability (eg maintenance schedule, repair schedules, including maximum acceptable repair times). Applicants must also set out the radio interference to be expected in the network and the planned remedial measures.

6.11. Details of how the requirements of the federal armed forces will be taken into account and how this will be implemented within the framework of the specific wireless network planning

7. Promotion of a sustainable competitive market

7.1. Details of how a sustainable competitive market within the meaning of section 2(2) para 2 sentence 1 TKG will be promoted

7.2. Details of whether and which telecommunications networks are already being operated that can be used to offer telecommunications services (also) for critical infrastructure applications. If such networks are operated, details of the revenue generated in the last three years

7.3. Details of how, in light of the offer and negotiation requirement, non-discriminatory negotiations will be guaranteed and the possibility will be ruled out of negotiations about wireless applications being refused outright or being held in an abusive way or of unfair terms being attached to services

8. Degree of geographic coverage

8.1. Details of the extent to which demand from critical infrastructure operators will be met in line with the purpose of use and in a timely manner

8.2. Details of local spectrum leasing