Bundesnetzagentur

Points of orientation and demand survey

for the provision of the 800 MHz, 1 800 MHz and 2.6 GHz spectrum for the rollout of digital infrastructures

In case of divergent interpretation of the German and English text, the German text shall prevail.

Table of contents

I. Introduction

In August 2020 the Bundesnetzagentur launched the public consultation on the spectrum compass and in June 2021 the consultation on the "Principles and scenarios for the provision of the 800 MHz, 1 800 MHz and 2.6 GHz spectrum" ("scenario paper").

The spectrum compass gave all stakeholders the opportunity to be involved at an early stage in the discussion about the provision of spectrum for mobile communications that will become available. To explore the next possible steps, the Bundesnetzagentur then consulted on the scenario paper. One of the reasons for involving stakeholders so closely was to draw future trends in mobile networks into the spectrum provision proceedings as far as possible and to ensure transparency in the decision-making process. The aim is to give all interested companies planning and investment certainty on the basis of stable framework conditions. Other public and individual interests have to be taken into account as well.

The Bundesnetzagentur has developed these points of orientation on the basis of the responses to the scenario paper. They present initial considerations for a framework for a possible decision on the spectrum provision proceedings and should provide a starting point for the initial demand survey. The Bundesnetzagentur is issuing a call for responses on the points of orientation and indications of forecast demand for the nationally available spectrum at 800 MHz, 1 800 MHz and 2.6 GHz.

The responses to the consultations carried out so far confirm that the spectrum – especially in the 800 MHz band – is of great importance both for nationwide mobile communications coverage and for the possible allocation of spectrum following the entry of the fourth mobile network operator into the market. These aspects require legal and planning certainty for the re-provision of spectrum that is currently still assigned.

The proceedings for the provision of the 800 MHz, 1 800 MHz and 2.6 GHz spectrum are to be clarified in good time before expiry of the current assignments, in order to give the companies concerned and other affected parties the necessary planning and investment certainty. The current usage rights will expire at the end of 2025.

The Bundesnetzagentur is aiming for a full proceedings framework for the provision of spectrum, covering the envisaged available spectrum, the needs of the market and market participants as well as the long-term advancement of regulatory objectives, in particular those related to competition and coverage.

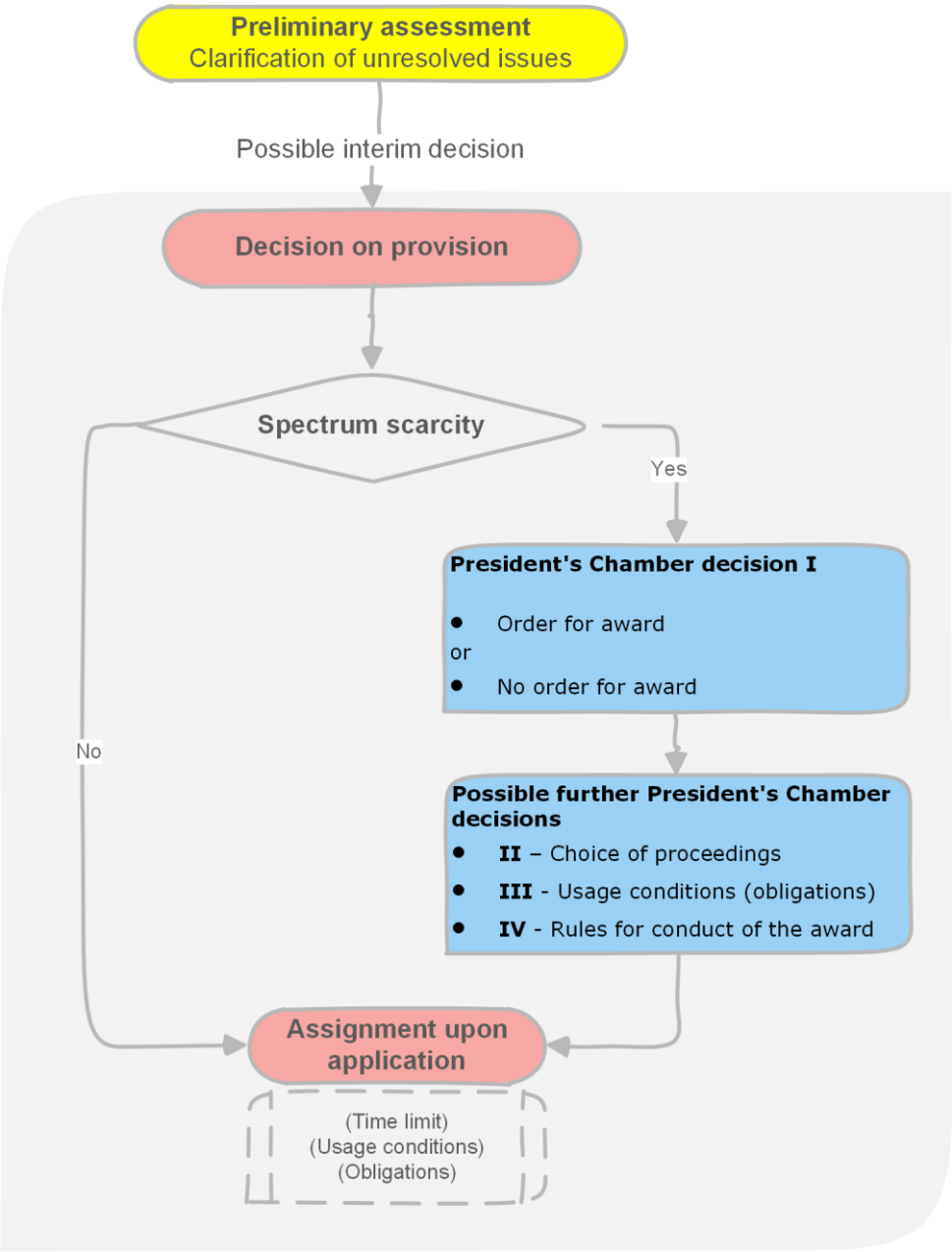

Figure 1 – overview diagram: spectrum provision proceedings

Before a decision is made, there are many issues that have to be clarified to create a factual basis:

- the overall development of the mobile market including the service level;
- the demand indicated by all companies and their assessment of the efficient use of spectrum, including with regard to the national use of already assigned spectrum and meeting existing coverage obligations;
- the positioning of the fourth mobile network operator and the restoration of competitive independence;
- equal access to spectrum or capacity (national roaming) nationwide;
- the shift in significance in the use of spectrum with regard to the development of capacity demand and the associated need for cell densification;

- the development of a long-term strategy for the market-driven provision of spectrum, also with regard to a harmonisation of assignment durations with a possible (early) inclusion of spectrum.

In addition, the Bundesnetzagentur is consulting on the following regulatory considerations in the points of orientation:

- the conduct of formal, objective, transparent and non-discriminatory proceedings;
- combined provision of the 800 MHz, 1 800 MHz and 2.6 GHz spectrum and possibly other spectrum;
- provision of contiguous spectrum, if necessary by relocation;
- provision with appropriate durations;
- provision in 5 MHz blocks;
- provision for mobile/fixed communications networks (MFCN);
- considerations on the restoration of competitive independence;
- considerations on competition-related obligations;
- considerations on coverage obligations;
- promotion of cooperation.

The next steps for the spectrum provision proceedings are to be explored on the basis of the consultation on these points of orientation and an initial demand survey with the participation of stakeholders.

The points of orientation are intended to describe the circumstances relevant to the decision-making process and formulate areas where clarification is needed. They are therefore combined with an initial demand survey. The aim of this is to form a base upon which to determine the next steps for an objective, transparent and non-discriminatory process for the provision of spectrum. The initial demand survey is to examine signs of possible spectrum scarcity.

In the Bundesnetzagentur's view, the issues raised in relation to the provision of spectrum are particularly complex and the decision to be made of great importance for the market. As part of effective spectrum management, there needs to be a particular focus on ensuring that the spectrum in question can be used as efficiently as possible, particularly due to its great economic and social value for nationwide broadband coverage. This requires direct, nationwide use in rural as well as urban areas, especially with regard to the spectrum below 1 GHz.

The decision on the spectrum provision proceedings must therefore be based on a stable and secure foundation that gives all companies involved the necessary planning and investment certainty and equal access to spectrum resources.

The Bundesnetzagentur's aim is to decide on the method and conditions for the provision of spectrum in an objective, transparent and non-discriminatory manner in good time before the usage rights expire on 31 December 2025, in order to create a basis for efficient, continued use at an early stage. This assumes that all relevant facts can be clarified in time.

Stakeholders are hereby given the opportunity to state their views on the points of orientation.

Please note that the projected demand for spectrum is also to be indicated and presented as set out in point VI (Demand survey).

Responses to the points of orientation are to be submitted in German

by **21 March 2022**

electronically in PDF format (copying and printing must be enabled) by

email to referat212@bnetza.de

or

in writing to

Bundesnetzagentur
Referat 212
Tulpenfeld 4
53113 Bonn.

It is intended to publish the original responses on the Bundesnetzagentur website. Respondents are therefore asked to give their consent to publication when they submit their comments. If comments contain business and trade secrets and/or personal data, respondents are asked to submit an additional version for publication in which the business and trade secrets have been blacked out, together with a list justifying the blacked-out parts.

II. Current situation

Available in the short term: 800 MHz, 1 800 MHz and 2.6 GHz

Spectrum in the 800 MHz, 1 800 MHz and 2.6 GHz bands is currently assigned for MFCN as follows:

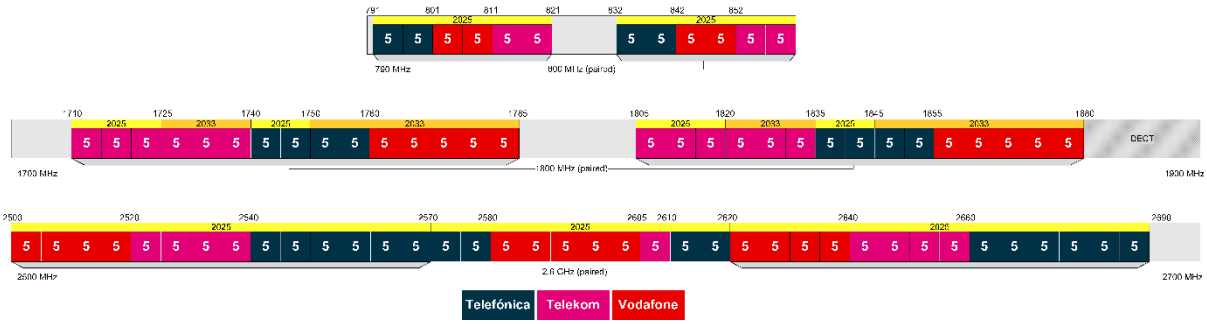

Figure 2 – overview: current assignments and durations[1]

The following usage rights will expire on 31 December 2025:

- Spectrum in the 800 MHz band
  2 x 30 MHz (paired) at 791-821 MHz / 832-862 MHz
- Spectrum in the 1 800 MHz band
  Parts of the band comprising a total of 2 x 25 MHz (paired) at 1 710-1 725 MHz / 1 805-1 820 MHz and 1 740-1 750 MHz / 1 835-1 845 MHz
  (other spectrum in the 1 800 MHz band comprising 2 x 50 MHz (paired) is currently assigned until the end of 2033)
- Spectrum in the 2.6 GHz band
  2 x 70 MHz (paired) at 2 500-2 570 MHz / 2 620-2 690 MHz;
  50 MHz (unpaired) at 2 570-2 620 MHz

Other spectrum

Available in the long term: 700 MHz, 900 MHz, 1 800 MHz and 1.5 GHz

The following usage rights will expire on 31 December 2033:

- Spectrum in the 700 MHz band
  2 x 30 MHz (paired) at 703-733 MHz / 758-788 MHz
- Spectrum in the 900 MHz band
  2 x 35 MHz (paired) at 880-915 MHz / 925-960 MHz
- Spectrum in the 1 800 MHz band
  2 x 50 MHz (paired) in the sub-bands at 1 725-1 740 MHz / 1 820-1 835 MHz and 1 750-1 785 MHz / 1 845-1 880 MHz

[1] A full overview of MFCN assignments and their durations in the bands from 700 MHz to 3.8 GHz is available at https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/TelecomRegulation/FrequencyManagement/ElectronicCommunicationsServices/FrequencyAward2018/20200128_SpectrumDiagram_pdf.png?__blob=publicationFile&v=3.

- Spectrum in the 1.5 GHz band
  40 MHz (unpaired) at 1 452-1 492 MHz

470-694 MHz

The 470-694 MHz band is allocated on a primary basis to the broadcasting service and on a secondary basis to the land mobile service. The use of the 470-694 MHz band by the land mobile service is currently limited to applications ancillary to broadcasting and programme making.[2] In accordance with this, spectrum is currently assigned in Germany for terrestrial broadcasting and PMSE until the end of 2030.

International bodies are currently considering the possibility of an additional allocation in the Radio Regulations that would allocate the 470-694 MHz band internationally to the mobile service on a co-primary basis. A decision on this will be taken at the World Radiocommunication Conference 2023 (WRC-23) but would not oblige the Federal Republic of Germany to make use of this additional allocation. Implementation of the additional allocation in Germany would be a matter of national legislation only. All stakeholders are involved transparently in the preparations for WRC-23.

The fact must also be taken into account that the 470-694 MHz band is reserved in the EU until the end of 2030 exclusively for broadcasting on a primary basis and PMSE on a secondary basis. However, the Lamy Report recommended a review of this arrangement in 2025.[3] By way of preparation, developments relating to the 470-694 MHz band are currently being assessed at European level as well (see https://rspg-spectrum.eu/) with the aim of developing a strategic vision for sub-700 MHz use beyond 2030.

The Bundesnetzagentur will take into account the dynamic developments in the field of wireless technologies and their potential uses as well as the international and European frameworks in its future spectrum planning for this band. A study commissioned by the Bundesnetzagentur and published in December 2021 provides an overview of the diverse interests and possible future usage scenarios.[4]

6 425-7 125 MHz

The future use of the 6 425-7 125 MHz band by the mobile service for MFCN applications will also be discussed at WRC-2023.

In addition to the use of the whole band by the fixed service, the 6 650-6 675.2 MHz band is currently used by the radio astronomy service. This service is to be given the best possible protection in accordance with usage provision D149 of the Frequency Ordinance (*Frequenzverordnung*). The 6 425-7 075 MHz band is also used for applications of the fixed-satellite service in both directions – in the Earth-to-space direction in the whole band and in the space-to-Earth direction from 6 525 MHz. However, the space-to-Earth allocation to the fixed-satellite service is limited to feeder links for non-geostationary satellite systems of the mobile-satellite service (usage provision D458B). The 7 075-7 125 MHz band is currently used by the space research service (Earth-to-space).

The band is also used internationally for RLAN technology (eg Wi-Fi 6E). CEPT is currently studying the technical feasibility of the (shared) use of the band independent of the studies for WRC-23.

---

[2] See Frequency Ordinance (*Frequenzverordnung*), usage provision D296.
[3] Report on the results of the work of the High Level Group on the future use of the UHF band (470-790 MHZ), 2014, available at https://digital-strategy.ec.europa.eu/en/library/report-results-work-high-level-group-future-use-uhf-band.
[4] Available at https://www.bundesnetzagentur.de/uhf-studie.html (in German).

The Bundesnetzagentur is not able to develop any framework conditions for the assignment and use of this spectrum until these studies have been completed.

3.8-4.2 GHz and 42 GHz

The use of other spectrum in the 3.8-4.2 GHz and 42 GHz bands for mobile communications is also being discussed internationally.

The 3.8-4.2 GHz band is allocated on a primary basis to the fixed service and the fixed-satellite service. It is used by the fixed-satellite service among other things as an alternative band for applications no longer protected in the 3.4-3.6 GHz band. The band is also allocated on a secondary basis to the "mobile, except aeronautical mobile, service".

The European Commission issued a mandate to CEPT in December 2021 to study the use of the 3.8-4.2 GHz band by terrestrial wireless broadband systems providing local-area (low/medium power) network connectivity. CEPT is due to deliver its response to the mandate by March 2024.

The 40.5-43.5 GHz band had already been studied in preparation for WRC-19 and was allocated to the mobile service on a primary basis and identified for IMT at WRC-19.

CEPT is currently developing suitable technical conditions for next-generation (5G) terrestrial wireless systems for the 40.5-43.5 GHz band in response to a mandate from the European Commission. The work is due to be completed in November 2022.

Alongside this, CEPT will use the results of the work for the CEPT Report as the basis for an ECC Decision and two accompanying ECC Recommendations on the implementation of wireless access applications in co-existence with the fixed-satellite service in the same band or adjacent bands. Work on the ECC Decision and the two ECC Recommendations is also due to be completed in November 2022.

The Bundesnetzagentur will develop framework conditions for the assignment and use of this spectrum. In view of the physical characteristics of the spectrum at 42 GHz and compatibility with existing satellite systems in the 3.8-4.2 GHz band, an initial assessment would suggest the use of the spectrum on a local – and thus not nationwide – basis.

III. Previous proceedings

In light of the expiry of the usage rights at 800 MHz, 1 800 MHz and 2.6 GHz, the Bundesnetzagentur published its "Spectrum compass 2020" on 19 August 2020.[5]

Building on the responses to the consultation on the spectrum compass, the Bundesnetzagentur published its "Principles and scenarios for the provision of the 800 MHz, 1.8 GHz and 2.6 GHz spectrum" on 21 June 2021.[6]

The responses to the consultations on the spectrum compass and the scenario paper – as far as they do not contain any business or trade secrets – were published on the Bundesnetzagentur's website.[7]

---

[5] Communication No 237/2020, Bundesnetzagentur Official Gazette 16/2020 of 2 September 2020, page 848 et seq (in German); also available in English at https://www.bundesnetzagentur.de/EN/Areas/Telecommunications/Companies/FrequencyManagement/ElectronicCommunicationsServices/ElectronicCommunicationServices_node.html.

[6] Communication No 187/2021, Bundesnetzagentur Official Gazette 12/2021 of 30 June 2021, page 821 et seq (in German); also available in English at https://www.bundesnetzagentur.de/EN/Areas/Telecommunications/Companies/FrequencyManagement/ElectronicCommunicationsServices/ElectronicCommunicationServices_node.html.

[7] Available at www.bnetza.de/StellungnahmenSzenarienpapier2021 (in German).

The respondents to the consultation on the scenario paper essentially said the following:

Principles

The scenario paper set out specific scenarios as well as principles for the provision of the spectrum at 800 MHz, 1 800 MHz and 2.6 GHz. These principles focussed on improving coverage (principles 1 to 3) and on competition (principles 4 to 7).

The principles relating to improving coverage and coverage quality (principles 1 to 3) met with wide approval from most of the respondents. Some respondents called for nationwide coverage beyond areas where most people live and work with a view to creating equal living conditions. There was also a call for a greater focus on the specifics of coverage along transport routes (high customer requirements, high speed, need for cooperation), and especially rail routes.

It was said that coverage obligations had to be defined precisely. Ambitious obligations had to be balanced out by taking account of MIG's activities and state funding.

It was also said that the aspects of public safety and protection had to be supplemented.

The principles relating to competition (principles 4 to 7) met with approval from most respondents, but service provider and roaming obligations were the subject of discussion.

Attention was drawn to the importance of infrastructure-based and service-based competition. Permanent competitive independence between the mobile network operators was important, it was said. However, with regard to improving coverage (see above), there were also isolated calls for the creation of competition to take second place to the creation of incentives for investment.

With regard to equal access, the fourth mobile network operator said that market entry had to be secured by regulation. This required access to low-band spectrum as swiftly as possible. In particular, deep indoor coverage was only possible for operators with their own low-band spectrum. A minimum amount of spectrum below 1 GHz was needed and should be secured for example as a basic spectrum package or by reserving spectrum. Additional capacity spectrum at 1 800 MHz and 2.6 GHz as well as roaming access were also necessary. Enforceable roaming obligations at competitive conditions were required. However, permanent national roaming could not be seen as a substitute for operators' own spectrum usage rights because of the technical and commercial disadvantages associated with it. Roaming was merely a "bridging tool".

Other respondents also agreed that national roaming was not a permanent tool but only suitable for a limited transitional period or in specific spatially or geographically limited areas. These respondents took a critical view of further roaming obligations. Regarding the requirement for efficient spectrum use, attention was drawn to the fact that the spectrum assigned to the operator accessing roaming would remain unused and there would be less incentive for network rollout. Permanent roaming also carried the risk of distorting competition. With regard to the competitive situation, ordering permanent roaming could not be justified and carried the risk of long-term path dependence and a continuous need for regulation.

Regarding fair competition, attention was drawn to the fourth mobile network operator's existing roaming agreement. Fair competition with respect to spectrum below 1 GHz could also be ensured with a competitive selection procedure following an extension of usage rights.

It was said that if a new entrant/the fourth mobile network operator received sub-1 GHz spectrum, obligations for coverage of more than 95% of the population and at least 85% of the area would be reasonable. Spectrum should also only be assigned if there was a discernible, serious and proven intention to use the spectrum.

In connection with strengthening competition, service provider regulations were also discussed. Some respondents were in favour of service provider/MVNO obligations because

of the low level of competition in the market. In light of the experience with the negotiation requirement, binding access obligations were necessary. The Bundesnetzagentur should therefore make its position known at an early stage on the legal basis in section 105 of the Telecommunications Act (*Telekommunikationsgesetz* – TKG), which enabled such obligations. Other respondents said that service provider obligations were neither necessary nor legally permissible. There was no necessity for access obligations because of the well-functioning competition. In any case, a careful study of the retail markets based on market analysis methods first had to be made.

Regarding the principle of "Roaming as an engine for more competition", some respondents were in favour of cooperation to fill gaps in coverage. Cooperation between network operators should be encouraged instead of obstructed, it was said. Infrastructure-based competition was not an end in itself and should be restricted wherever setting up parallel infrastructures would lead to a waste of resources from an economic perspective. However, some respondents criticised the reference to roaming as a tool to promote competition and advocated freely negotiated cooperation based on the principle of reciprocity. This cooperation would, however, need a clear set of rules and planning certainty.

Scenarios

The respondents essentially said the following regarding the specific scenarios:

Scenario 1 (auction)

Some respondents were generally in favour of an auction as a suitable procedure. It was said that auctions were particularly suitable for removing gaps in information regarding business models and achieving efficient spectrum assignment. They prevented anti-competitive spectrum hoarding. An auction, as a dynamic procedure, had an advantage over static procedures because in static procedures companies could not respond to their competitors' bids. Practical experience had shown that an auction, as an objective, transparent and non-discriminatory award procedure, also enabled market entry and therefore promoted competition. The argument that auctions took much-needed financial resources from the market was not sound, particularly in light of the current low-interest period. With regard to equal opportunities for all market players, the proceedings framework chosen should be as large as possible.

Other respondents took a critical view of auctions. The past practice of spectrum auctions had to be called into question more than had been done before. Auctions took important investment resources from the market. Furthermore, taking account of the auction costs in the proportionality led to less ambitious coverage obligations.

Regarding the specific provision of the spectrum in the 800 MHz, 1 800 MHz and 2.6 GHz bands, there was a call for swift auction proceedings. Another form of assignment should only be considered when access by the fourth mobile network operator to other necessary spectrum available from 2026 was secured by regulation.

By contrast, other respondents called for a short-term extension of usage rights and drew attention to risks from an immediate auction. There was a risk of regulation-induced scarcity and high spectrum acquisition costs. If an established operator lost spectrum usage rights in the 800 MHz band, there would also be a risk of deterioration in coverage, especially in rural areas.

A combination of auction proceedings and a "negative/white spots" auction was discussed. Some respondents were in favour of this with regard to improving coverage. However, there was also concern about the risk of competition-distorting cross-subsidisation and advantages for individual network operators with historically nationwide coverage targets.

Scenario 2 (extension of rights at 800 MHz)

Some respondents advocated extending the 800 MHz spectrum usage rights. Otherwise, there would be a risk of regulation-induced scarcity and high spectrum acquisition costs. If an

established operator lost spectrum usage rights in the 800 MHz band, there would be a risk of deterioration in coverage, especially in rural areas. At the same time, extending spectrum usage rights was a sensible intermediate solution until other spectrum was available to which all market players would have access. Some respondents also called for an extension of the usage rights for the 1 800 MHz and 2.6 GHz spectrum together with the 800 MHz spectrum.

In this context, different extension periods were discussed. Some respondents called for a five-year extension of the 800 MHz spectrum usage rights in light of the allocation of other spectrum resources from the UHF band for mobile communications. The spectrum could also be awarded jointly with the spectrum with usage rights expiring in 2033, which implied an eight-year extension. Some respondents also called for an extension until 2040 in light of the period of applicability of the coverage obligations.

Potential coverage obligations had to take account of the duration and costs of an extension. They had to be taken into account with lower fees. The fact also had to be taken into account that improving coverage was being discussed before the coverage obligations from the last spectrum auction had been met. Other respondents said that any extension had to be linked to conditions limiting the negative effects on competition.

Other respondents took a critical view of the extension scenario. It was said that extensions were neither necessary nor legally permissible. Attention was drawn to a high legal risk. In addition, not having a selection mechanism carried the risk that the spectrum would not be used efficiently. Furthermore, there would presumably be fewer possibilities for coverage obligations than with an auction. An extension would only favour the established network operators but would not improve the coverage situation. Just extending spectrum usage rights would also exclude new entrants from the award. Extending current assignments carried the risk of distorting competition because it would not benefit all companies equally. Ultimately, not giving the fourth mobile network operator the opportunity to acquire rural area spectrum was not compatible with fair competition. The fourth mobile network operator therefore considered it essential to be secured spectrum usage rights in the event of an extension.

Scenario 3 (one-operator model at 800 MHz)

Several respondents supported the one-operator model. It was said that the model was suitable for achieving nationwide coverage with mobile services, which had not yet been attained, promoting efficient spectrum use and avoiding spectrum scarcity. One mobile communications infrastructure was sufficient, especially in areas where expansion was not economically viable. Service-based competition could still be maintained. However, a one-operator model had to include strict legal rules for nationwide coverage and non-discriminatory network access for interested parties and especially for service providers.

Other respondents rejected a one-operator model. Such a model was not compatible with either telecommunications or constitutional law. There was a risk of a network monopoly again. Fragmented regulation of upstream service conditions, including rates regulation, would then be necessary. The existing infrastructure-based competition should not be given up. Networks operated in parallel were to be welcomed, also in light of their redundancy in the event of a crisis. The current scarcity across all rural area spectrum would be increased further. In addition, switching off at least two of the existing 800 MHz networks would badly affect the present coverage quality. This carried the risk of devaluing the established mobile network operators' existing 800 MHz infrastructures. Operators still needed their own rural area spectrum for deep indoor coverage.

Furthermore, there might be the risk of distortion of competition if other network operators' customers were treated less favourably than an operator's own customers. There was the risk of a slow pace of innovation because modernisation cycles would no longer be driven by quality-based competition.

Scenario 4 (combination of elements from an extension of spectrum usage rights and an auction)

The vast majority of respondents had concerns and called for further clarification about this scenario.

With regard to extending some of the spectrum usage rights, the comments essentially reflected the disadvantages put forward in the comments on scenario 2 (see above), especially regarding insufficient incentives for efficient spectrum use, limited possibilities for coverage obligations, and questions about legal certainty. Extending some of the usage rights would be an advantage for the established operators and therefore had to be linked to obligations promoting competition. In addition, extending the rights for 2 x 5 MHz (paired) in the 800 MHz band was not sufficient to achieve the coverage quality, especially in rural areas. It did not resolve the problem of rural area spectrum scarcity – rather, the bidding competition would be concentrated on a smaller amount of freely auctioned spectrum. However, if 2 x 5 MHz (paired) of spectrum in the 800 MHz band were sufficient to maintain the coverage obligations, then the coverage obligation did not prevent auctioning all the spectrum in the 800 MHz band.

Extending the established mobile network operators' spectrum usage rights was also a disadvantage for new entrants. In the fourth mobile network operator's view, the demand had to be met by a "direct assignment" instead of auctioning the spectrum for which usage rights would not be extended.

Scenario 5 (tendering)

The majority of the respondents took a critical view of this scenario. It particular, it was said that further clarification was needed because there was no detailed description of the tendering conditions.

Tendering did not provide for an efficient allocation of spectrum in the same way as other procedures. Tendering proceedings were non-transparent by nature and linked to considerable uncertainties in light of the required official discretionary decisions when developing the procedure in detail. Ultimately, the main problem with tendering was that it was not possible to check the plausibility of an applicant's submission and therefore the firmness and reliability of any commitments made.

Furthermore, tendering was not suitable for enabling fair participation by a new entrant or new network operator because it would be considerably easier for established network operators to make full commitments on network coverage because of their spectrum package.

Other respondents were generally in favour of tendering and said that previous auctions had proved inadequate because they had taken investment resources from the market and set too narrow limits for the coverage obligations. Alternative award models urgently needed to be developed. Tendering could also lay down conditions and enable voluntary commitments regarding non-discriminatory network access.

IV. Points of orientation

The evaluation of the comments on the scenario paper essentially shows that there is no support for one single scenario on its own. Some respondents proposed staggered proceedings. This could involve extending the spectrum usage rights for a short term and awarding the spectrum at a later date together with other rural area spectrum. This could be when other rural area spectrum is expected to be available. By contrast, there was also a call for immediate award proceedings.

However, there are many issues that have to be clarified before a final decision on the long-term provision of the spectrum is made. The first is the question of actual spectrum scarcity. It has to be clarified which spectrum requirements the individual stakeholders identify for the period from 2025. The amount of available spectrum is also a decisive factor here.

The Bundesnetzagentur has begun with the proceedings at an early stage in view of the expiry of the spectrum usage rights in 2025 and the need to ensure continuity of coverage. In light of the complexity of the issues and various exogenous factors, however, it might not be possible to sufficiently clarify the relevant circumstances providing the basis for a stable decision in good time.

Even in the event that important issues with regard to the timely provision of the spectrum usage rights from the end of 2025 cannot be clarified in good time, the Bundesnetzagentur will make a decision on the further course of action. Short-term provision may be necessary for a temporary period until long-term provision is possible, in order to take account of important circumstances while ensuring continuity of mobile coverage until the procedure has been completed. Such short-term provision would be part of a full proceedings framework and is not the same as a long-term extension of spectrum usage rights as called for by respondents.

In light of the extensive comments on the scenario paper, it is not appropriate at this stage to expand further on all the scenarios, as called for by some respondents. The scenarios for the choice of procedure (auction or tendering) require regulatory considerations that are only possible at a later stage in the provision proceedings.

Decisions on specific usage provisions and possible obligations also belong to later stages of the proceedings. Obligations promoting mobile coverage and competition are, however, essentially possible with both an auction and an extension of spectrum usage rights. If a spectrum assignment is extended, the Bundesnetzagentur can retain, revoke, alter or restipulate the type and scope of the spectrum usage and side provisions under section 99 TKG in order to uphold the regulatory aims of sections 2 and 87 TKG. However, the duration of an assignment must be appropriate to enable amortisation of the investment. If there is only a short duration, for example in the event of an extension, high obligations might be disproportionate to the usage time. Moreover, the fact would have to be taken into account that a new decision on imposing obligations would be needed after expiry of the usage rights.

However, it is first necessary to prepare a decision on the spectrum provision proceedings within the necessary time frame.

Preliminary assessment

The Bundesnetzagentur will decide on the re-provision of the spectrum in good time before the spectrum usage rights expire. There are many issues that first have to be clarified to create a factual basis for a decision.

- The decision to be made on the award of the relevant spectrum usage rights, in particular in the band below 1 GHz, is of great importance for the market. The decision on the spectrum provision proceedings must therefore be based on a stable and secure foundation. This assumes that in particular the following points can be clarified/assessed:
    - The overall development of the mobile market including the service level
        - ➢ See in particular points of orientation 8 and 10.
    - The demand indicated by all companies and their assessment of the efficient use of spectrum, including with regard to the national use of already assigned spectrum and meeting existing coverage obligations
        - ➢ See in particular VI Demand survey.
    - The positioning of the fourth mobile network operator and the restoration of competitive independence

    - ➢ See in particular point of orientation 9.
  - Equal access to spectrum or capacity nationwide for all network operators including the fourth mobile network operator
    - ➢ See in particular points of orientation 1 and 8.
  - The shift in significance in the use of spectrum with regard to the development of capacity demand and the associated need for cell densification
    - ➢ See in particular point of orientation 3.
  - The possible inclusion of other spectrum
    - ➢ See in particular point of orientation 3 and VI Demand survey.
  - The development of a long-term strategy for the market-driven provision of spectrum, also with regard to a harmonisation of assignment durations
    - ➢ See in particular point of orientation 5.

- The aim is to achieve the fullest possible level of information for a stable decision by the Bundesnetzagentur and to enable existing and potential competitors to make future-proof decisions. A decision on the basis of incomplete information could be contrary to the regulatory aims and detrimental to the competitors and, ultimately, the consumers.
- In addition to these still developing circumstances, the earlier inclusion of spectrum from the 700 MHz and/or 900 MHz bands and parts of the 1 800 MHz band that are currently assigned until the end of 2033 could be considered at a later stage in the proceedings.
- In light of the current expressions of interest, a scarcity of spectrum at least in the 800 MHz band can be assumed, which is to be investigated further with a demand survey (see VI Demand survey). If demand exceeds the available spectrum, award proceedings can be ordered, taking into account the regulatory aims of the TKG and with regard to the basic rights of interested users.
- In taking into account the regulatory aims, the fact also has to be considered that a large surplus of demand can essentially lead to increased competition for spectrum. This could result in a negative effect both on the interests of all stakeholders and ultimately on the interests of consumers with respect to nationwide coverage. The possibility of long-term effects on the competitive situation can also not be ruled out.
- It is therefore important whether, when and under which conditions a procedure can be initiated with a view to providing objective, transparent and non-discriminatory proceedings for all interested parties and enabling equal access. In this context, it would also be relevant whether, when and to what extent other spectrum can be provided, possibly at an earlier stage.
- In light of the expiry of the usage rights at 800 MHz, 1 800 MHz and 2.6 GHz at the end of 2025, a decision on the further course of action has to be made in 2023, taking into account the above-mentioned developing circumstances.

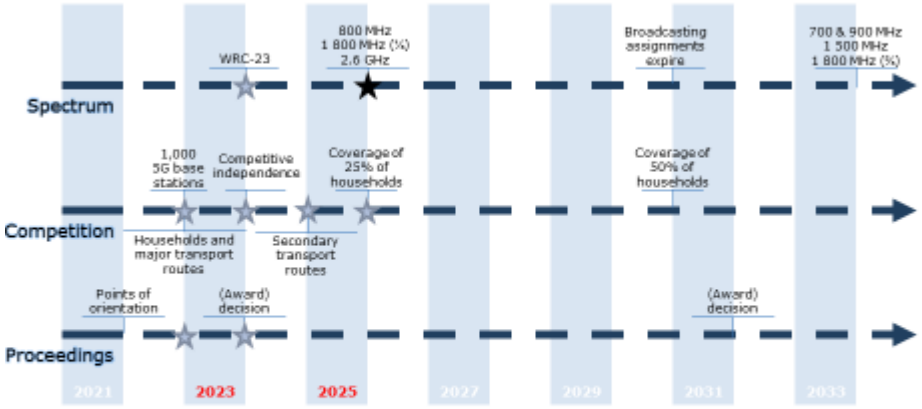

Figure 3 – overview of developing circumstances

- Should the facts relevant to the decision-making process not be sufficiently clarified by 2023, the decision on the long-term provision of the spectrum usage rights would have to be made at a later date when the time is ripe. Objective, transparent and non-discriminatory award proceedings for the long-term provision of the spectrum within the meaning of section 92(3) sentence 1 TKG would then have to take place. The aim of this would be to make sure that the spectrum usage rights do not expire without clarifying the continued use of the spectrum should the facts relevant to the decision-making process not be sufficiently clarified two years before the rights expire. Depending on developments, a decision could be made either on long-term provision or on short-term provision for a temporary period. Should the spectrum be provided for a temporary period, this would have to be part of a full proceedings framework for the subsequent long-term provision of the spectrum. This would give existing network operators, the fourth mobile network operator and potential new entrants a firm basis for planning their long-term investments.
- The Bundesnetzagentur published strategic aspects of the availability of spectrum for broadband rollout in 2005 and 2016. The strategic aspects set out in the paper are to be updated in line with market and technical developments alongside these proceedings with a view to creating long-term planning certainty especially with regard to the durations of spectrum usage rights and the associated access to spectrum resources.[8] When and to what extent spectrum will be provided can be particularly important for the market. While a large number of successive proceedings would frequently provide a flexible opportunity to (re-)acquire spectrum, especially for

[8] Available at https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/TelecomRegulation/FrequencyManagement/ElectronicCommunicationsServices/DemandIdentificationProceedings/StrategicAspects.pdf?__blob=publicationFile&v=1.

new entrants, dividing up the spectrum between a large number of separate proceedings could foster regulation-induced spectrum scarcity.

The Bundesnetzagentur is therefore presenting the following points of orientation for the proceedings:

1. Formal, objective, transparent and non-discriminatory proceedings

The spectrum usage rights will be made available by the Bundesnetzagentur in formal, objective, transparent and non-discriminatory proceedings.

- The spectrum will be assigned in accordance with the TKG. Each spectrum usage requires prior assignment. Spectrum is assigned for a specific purpose in line with the spectrum plan and in a non-discriminatory manner on the basis of understandable and objective procedures.
- The Bundesnetzagentur will also take account of Directive (EU) 2018/1972 establishing the European Electronic Communications Code (EECC) when exercising its decision-making powers.[9] Article 8 of the EECC states:

  > *"Without prejudice to Article 10, national regulatory authorities shall act independently and objectively, including in the development of internal procedures and the organisation of staff, shall operate in a transparent and accountable manner in accordance with Union law, and shall not seek or take instructions from any other body in relation to the exercise of the tasks assigned to them under national law implementing Union law.* […]*."*

- With regard to objective, transparent and non-discriminatory proceedings and to ensuring equal access to spectrum resources, a formal decision on whether or not to order award proceedings is of particular importance. The question of spectrum scarcity will be a guiding factor and will be examined on the basis of objective facts by means of consultations, demand surveys and official demand identification proceedings by the Bundesnetzagentur (see VI Demand survey).

[9] Available at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L1972.
In case of divergent interpretation of the German and English text, the German text shall prevail.

- Depending on the spectrum scarcity, the further steps in the proceedings will be as follows:

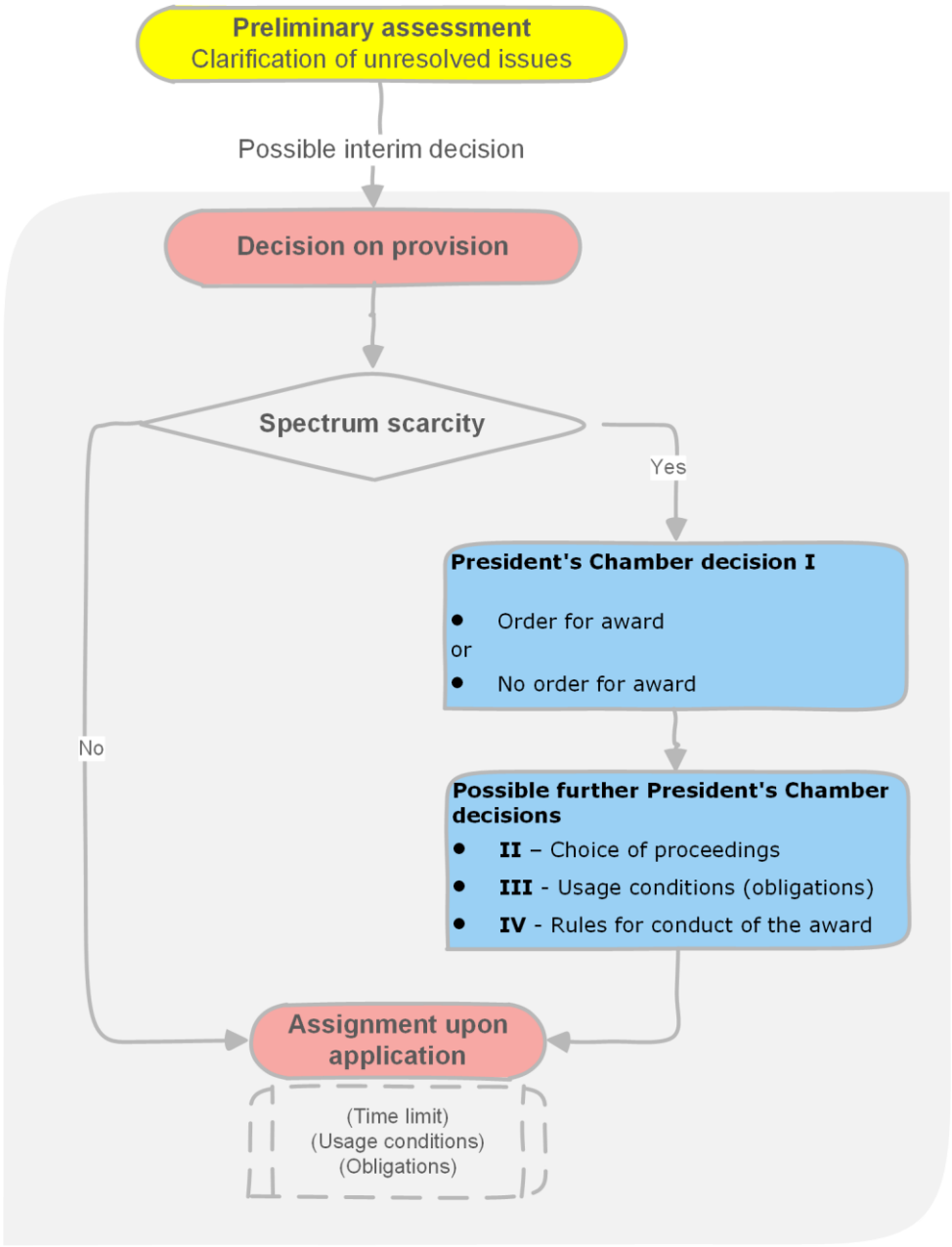

Figure 4 – overview diagram: spectrum provision proceedings

- Should the spectrum that is the subject of the proceedings not be scarce, the spectrum usage rights would have to be assigned on application.
- Should spectrum be found to be scarce, the possibility of ordering award proceedings would have to be examined. In accordance with the provisions of the TKG, the Bundesnetzagentur essentially has the discretion to decide whether to order award proceedings to address an existing scarcity situation: "If spectrum is not sufficiently available for spectrum assignments or if several applications are made for certain frequencies, the Bundesnetzagentur can order that the assignment of the spectrum must be preceded by an assignment award procedure under section 100" (section 91(9) sentence 1 TKG).

- The Bundesnetzagentur would take account of all interests concerned and especially the regulatory aims set out in legislation when making this discretionary decision. There would be a general tendency towards ordering award proceedings in light of basic rights being affected and the principle of non-discrimination.
- However, should not all facts relevant to a decision (and to the positioning of the fourth mobile network operator) be reliably clarified, the decision on an order could be postponed by extending the spectrum usage rights for a temporary period in order to give existing network operators, the fourth mobile network operator and potential new entrants a firm basis for planning their long-term investments.
- A long-term extension on application – as called for by respondents – would, on the basis of current case law and in light of the regulatory aims, be conceivable as an exception even if spectrum was scarce. With regard to already assigned spectrum resources, section 92(2) sentence 3 in conjunction with section 91(9) TKG now specifies a wider range of factors to be considered when weighing up between a decision ordering proceedings and a possible extension. With regard to extending the assignments for harmonised spectrum for wireless broadband services when pre-defined general criteria are met (section 92(3) sentence 3, section 99(1) sentence 1 para 2, section 92(3) sentence 6 TKG), attention must be drawn to the fact that the spectrum usage rights that are the subject of the proceedings were awarded under the old legal framework without such criteria. In light of this, their time frame would have to be examined within the context of a decision on ordering proceedings (see IV.5 Duration). In this connection, a decision would have to be made on the conditions attached to the relevant usage right (see section 92(2) in conjunction with section 99 TKG).
- In the past, auctions have proven to be objective, transparent, non-discriminatory and legally secure award proceedings. Nevertheless, each individual case has to be examined with regard to ensuring the regulatory aims. The majority of respondents commenting on the scenario paper were positive about an auction as a tool to resolve scarcity. The Monopolies Commission also still recommends an auction as the most suitable procedure for awarding mobile spectrum when spectrum is scarce, concluding in its 12th Sector Report Telecommunications that:

  > *"auction proceedings should, from an economic perspective, take priority over tendering proceedings and, with regard to the aims according to sections 2 and 87 TKG 2021, are usually the most suitable proceedings for awarding scarce mobile spectrum (see chapters 2.2.3, 2.2.5). Secondly, the removal of the priority increases the risk that the choice of proceedings will be the subject of legal disputes and spectrum award could be delayed. This is likely to increase legal uncertainty."*[10]

2. Combined provision

The 800 MHz, 1 800 MHz and 2.6 GHz spectrum is to be made available in joint proceedings.

[10] Monopolies Commission, 12th Sector Report Telecommunications (2021), page 50, available at https://www.monopolkommission.de/images/PDF/SG/12sg_telekommunikation_volltext.pdf (in German).

- The spectrum in question comprises the following:
  - 800 MHz band
    - 791.0-821.0 MHz / 832.0-862.0 MHz
      → 2 x 30 MHz (paired)
  - 1 800 MHz band
    - 1 710-1 725 MHz / 1 805-1 820 MHz
    - 1 740-1 750 MHz / 1 835-1 845 MHz
      → 2 x 25 MHz (paired)
  - 2.6 GHz band
    - 2 500-2 570 MHz / 2 620-2 690 MHz
      → 2 x 70 MHz (paired)
    - 2 570-2 620 MHz (FDD centre gap)
      → 50 MHz (unpaired)

    Alternatively
    - 2 500-2 690 MHz
      → 190 MHz (unpaired)

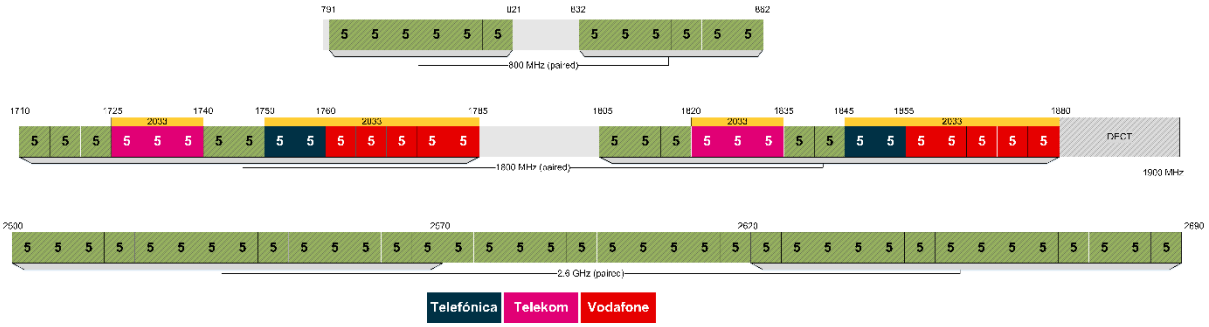

Figure 5 – spectrum usage rights expiring on 31 December 2025[11]

- All the spectrum usage rights expiring at the end of 2025 are to be made available in joint proceedings.
- The combined award of the spectrum reflects the principle of simple, appropriate and prompt administrative proceedings.
- Combined provision can give companies the greatest possible planning and investment certainty, especially with regard to the introduction of new broadband mobile technologies.
- The future assignment holders are to be enabled to have contiguous spectrum for broadband applications.

[11] A full overview of MFCN assignments and their durations in the bands from 700 MHz to 3.8 GHz is available at https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/TelecomRegulation/FrequencyManagement/ElectronicCommunicationsServices/FrequencyAward2018/20200128_SpectrumDiagram_pdf.png?__blob=publicationFile&v=3.

3. Other spectrum and future significance of rural area spectrum

Spectrum (including for rural areas) that is expected to become available is also to be taken into account in the provision of the above-mentioned spectrum. A future shift in the significance of the spectrum is also an area of focus.

- Mobile data volumes are continuing to increase steeply. While the volume of data traffic stood at 3,972 million GB at the end of 2020, the Bundesnetzagentur expects an increase to around 5,163 million GB at the end of 2021, based on initial calculations.[12] Demand for data is also expected to grow further in the coming years.
- Spectrum usage rights in the bands at 800 MHz, 1 800 MHz and 2.6 GHz will be expiring on 31 December 2025. In the context of a decision on the future provision of the spectrum, account will need to be taken of whether new bands can be made available to the market. Additional spectrum can have an impact on both the issue of scarcity and the development of competition. It could therefore be appropriate to consider other spectrum that is expected to become available when awarding the spectrum with a view to avoiding regulation-induced scarcity.
- Rural area spectrum (currently below 1 GHz) and capacity spectrum (currently above 1 GHz) will be important for high data rates, especially with regard to the future sizing of mobile networks.
- In view of the development of mobile data volumes, it can be assumed that there will be a growing need to increase network density using spectrum above 1 GHz in rural areas as well. Looking ahead, spectrum in the lower mid-band will therefore also contribute to nationwide coverage.
- Spectrum below 1 GHz is currently used where a large surface area needs to be covered, so in rural areas for example. However, the spectrum is also used in urban areas for indoor coverage because of its good propagation characteristics.
- By contrast, spectrum above 1 GHz is currently used in areas with a higher demand for mobile capacity, so in urban areas for example.

[12] Bundesnetzagentur, Telecommunication Activity Report 2020/2021, page 41, available at www.bnetza.de/TaetigkeitsberichtTelekommunikation2020 (in German).

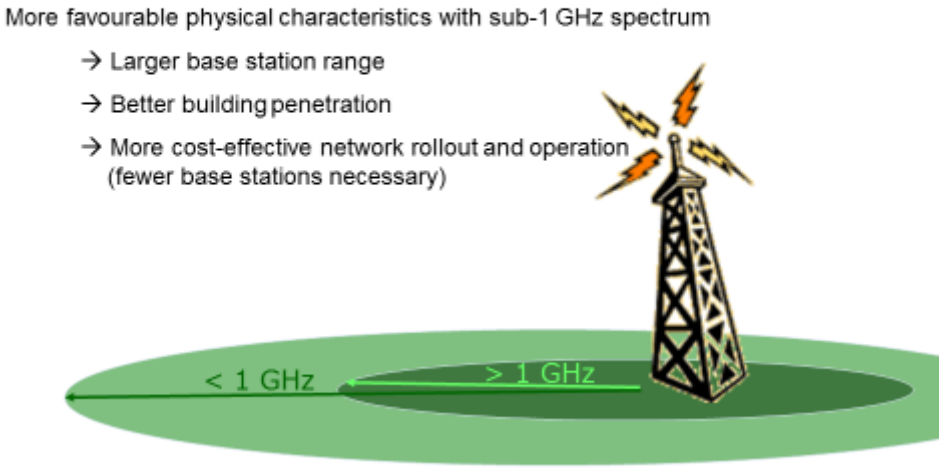

Figure 6 – overview diagram of the propagation conditions of spectrum above and below 1 GHz

- However, changes in mobile user behaviour and growing requirements for mobile apps are leading to a steady increase in mobile data volumes. The Bundesnetzagentur expects the volume of data to multiply by 2030. Providing more spectrum will not alone be sufficient in the long term to manage the data volumes. Instead, it will be necessary in the medium term to increase network density using the existing capacity spectrum both within and outside urban areas. This means that, in many cases, the spectrum below 1 GHz will not alone be sufficient for data transmission, including in rural areas.
- The fact must be remembered that the sub-1 GHz spectrum is highly important because of its very good wave propagation characteristics. The spectrum is technically and economically suitable both for indoor coverage and for coverage in remote areas. It is therefore necessary to take into account the fact that the fourth mobile network operator and potential new entrants should have equal access to nationwide network coverage. This could be achieved by the conclusion of a competitive national roaming agreement with a nationwide operator. Alternatively, it would be necessary to make sure that operators had equal access to their own spectrum for the relevant network expansion.
- Spectrum at 700 MHz and/or 900 MHz, as sub-1 GHz spectrum that is equivalent to the 800 MHz spectrum, could also be taken into consideration at an early stage. The spectrum at 700 MHz/900 MHz comprising 2 x 65 MHz (paired) is assigned until 31 December 2033. Attention is drawn to the following with regard to the possibility of using the spectrum for mobile coverage. The potential of cooperation arrangements could need to be considered. One possibility would be to share a block of spectrum for GSM. The remaining spectrum could then be opened up for new technologies.
- Another possibility would be to include other sub-1 GHz spectrum in the decision on the provision of spectrum. This band is currently designated primarily for broadcasting

services and programme making and is assigned accordingly until the end of 2030. The additional use of this UHF band for mobile services is currently the subject of open-ended discussions at national and international level. The Bundesnetzagentur published a study on scenarios for the use of the UHF band with a view to structuring the discussions.[13] The Bundesnetzagentur's aim is to create an appropriate balance between the interests of the different potential user groups from broadcasting, PMSE, public safety authorities and organisations, the federal armed forces and mobile communications as part of a national consensus and with the involvement of the federal states.

- However, other spectrum above 1 GHz should also be considered with a view to avoiding regulation-induced scarcity and especially in light of the increasing demand for data. Spectrum usage rights in the bands at 1 800 MHz (2 x 50 MHz) and 1.5 GHz (40 MHz) will be expiring on 31 December 2033. Other spectrum in the 6 425-7 125 MHz band could become available. This needs to be incorporated into an overall strategy. In particular, the use of already assigned spectrum and the fulfilment of existing coverage obligations also have to be taken into account.

4. Contiguous spectrum

The spectrum is to be assigned as contiguous spectrum as far as possible. This may make it necessary to relocate current assignments of the 1 800 MHz spectrum.

- Provision and assignment of the spectrum is to be in contiguous blocks, as far as possible, in particular to facilitate the efficient use of broadband wireless technologies.
- Spectrum assignments in the 1 800 MHz band will expire on 31 December 2025 and 31 December 2033. In view of these different expiry dates, it might be necessary to relocate the spectrum usage rights expiring in 2033 before they expire. This could increase efficiency in spectrum use because it would enable contiguous blocks of spectrum to be used for broadband applications at an early stage.

5. Duration

The Bundesnetzagentur will determine appropriate durations for the spectrum at 800 MHz, 1 800 MHz and 2.6 GHz and any other spectrum made available in the specific spectrum provision proceedings.

- Section 92(1) TKG lays down the general rule that spectrum is assigned for a limited period of time. The period of time must be appropriate for the intended usage and must take appropriate account of the amortisation of the investment needed. Section 92(3) sentence 1 lays down the general rule that harmonised spectrum for wireless broadband networks is assigned for at least 15 years, while section 92(3) sentence 4 provides for the possibility of extending an assignment to create predictability for a period of at least 20 years.
- Should an assignment be extended, the duration of the extension would also need to be determined – ultimately in line with a new time limit on the usage right. The TKG

[13] Loc cit.

works on the principle of long-term extensions. Section 92(2) sentence 2 TKG states that the provisions of subsection (3), which lays down the above-mentioned principle of a duration of "15 plus 5" years, still apply even when an assignment is extended.

- In the exercise of discretion when weighing up between ordering award proceedings and extending assignments for scarce spectrum, however, it will be necessary to take account of the special criteria listed in section 92(2) sentence 3 paras 1-7 TKG. The provisions of section 92(2) TKG infer that this applies not only to whether an extension should be made but also – through sentence 2 – to how long an extension should be. Thus the principle of a duration of "15 plus 5" years is modified by the discretionary decision on whether or not to order award proceedings.
- The actual duration of an extension largely depends on the weighing up of the criteria laid down in the legislation (section 92(2) sentence 3 paras 1-7 TKG), which include both improving coverage and promoting competition. With regard to the demand for spectrum from companies other than the current assignment holder (section 92(2) sentence 3 para 7 TKG), it is necessary to safeguard equal access for all interested parties. For these reasons, the actual duration of the extension can be a very short period of time (see IV. Points of orientation).

6. 5 MHz blocks

The spectrum is to be made available in blocks of 5 MHz. Guard bands to adjacent applications will not be determined.

- Spectrum in the 800 MHz and 1 800 MHz bands are to be provided in blocks of 2 x 5 MHz (paired). Spectrum in the 2.6 GHz band is to be provided in blocks of 5 MHz (unpaired). This reflects the smallest amount of spectrum that is technically feasible for both the LTE and 5G NR broadband technologies.
- Smaller amounts of spectrum would result in packages that rule out the use of broadband technologies.
- Larger blocks, by contrast, could restrict the flexibility of future users and would make access to this spectrum more difficult.
- The available bands are to be provided without guard bands. Adjacent applications are to be protected without guard bands being stipulated beforehand. However, it will be necessary to provide protection for adjacent applications by defining suitable block edge masks.

7. Intended use

All available spectrum from the 800 MHz, 1 800 MHz and 2.6 GHz bands is to be made available nationally for MFCN.

- The spectrum in the 800 MHz, 1 800 MHz and 2.6 GHz bands is designated and also currently assigned for MFCN. The spectrum will therefore be made available on a technology-neutral and service-neutral basis to enable the use of different wireless technologies. Should other spectrum be allocated to the mobile service, it can be assumed that it will be possible to designate and assign this spectrum for MFCN as well.

- This flexibility will allow the spectrum to be used for future-proof business models – especially with regard to 5G applications (eg augmented reality, virtual reality) – in line with demand. The aim is to provide spectrum for the implementation of a variety of business models.
- The spectrum is to be made available nationally to enable flexible use nationwide. With regard to already assigned spectrum, this will enable existing nationwide network coverage to be maintained and as far as possible expanded.

8. Competition and equal access

The interests of the fourth mobile network operator and potential new entrants are also to be taken into account in the provision of spectrum for the rollout and expansion of digital infrastructures. With a view to promoting competition for infrastructure and the other regulatory objectives, the Bundesnetzagentur will take a close look at the necessary regulatory action, keeping an open mind as to the outcome.

- The Bundesnetzagentur's aim is to provide the spectrum in open, objective, transparent and non-discriminatory proceedings in order to give all interested parties equal access.
- Competition in infrastructure is to be promoted. Existing network infrastructures are to be reinforced and expanded.
- At the same time, the fourth mobile network operator and potential new entrants are to be given the chance to roll out new networks, offer mobile services and establish themselves as mobile operators.
- When deciding on the proceedings, the Bundesnetzagentur will take into account the fact that both the fourth mobile network operator and new entrants should have equal access to spectrum. When spectrum is scarce, the right to be assigned spectrum generally changes to the right to participate in objective, transparent and non-discriminatory award proceedings. Reserving spectrum or stipulating a basic spectrum package is generally conceivable in award proceedings. Should award proceedings be ordered, it would be necessary to look at all tools suitable for enabling equal access. This would not, however, involve secured access to spectrum as called for by respondents.
- The general right to participate in objective, transparent and non-discriminatory award proceedings would need to be considered and weighed up even when deciding on an extension (sections 91(9) and 92(2) sentence 3 TKG). With regard to the demand for spectrum from companies other than the current assignment holder (section 92(2) sentence 3 para 7 TKG), the weighing up would need to safeguard equal access for all interested parties. The Monopolies Commission stated the following on this in its 12th Sector Report Telecommunications:

"Since some companies have no possibility whatsoever of acquiring spectrum usage rights, an extension can take place in exceptional cases only while especially safeguarding the principle of proportionality." [14]

- Fair competition would still need to be ensured in the event of an extension. This could be done in particular by incorporating the fourth mobile network operator's existing roaming agreement into the decision on the further course of action by regulatory means.

9. Competitive independence

In line with the principle of competitive independence, the fourth mobile network operator must end its mobile virtual network operations at the latest before asserting further spectrum requirements as part of subsequent, formal demand identification proceedings.

- The President's Chamber decision of 26 November 2018 (BK1-17/001) lays down the principle of competitive independence.[15] The decision states the following (margin no 20 et seq):

  "In principle, it is not possible that a mobile network operator is at the same time also a service provider for another network operator (cf part C, subsection 2 UMTS/IMT-2000 licences). This is based on the stipulation that only competitively independent undertakings will be admitted to the respective spectrum award proceedings (principle of competitive independence).

  A key aim of this principle is to promote sustainable competitive markets (section 2(2) para 2 TKG). If a mobile network operator offers both its own products and products based on a rival network, this could have a negative effect on the intensity of competition. The same would also apply in principle to a service provider acquiring spectrum and setting up a proprietary network as a new entrant while also continuing to act as a service provider for one or more mobile network operators in parallel. […]*."*

- The fourth mobile network operator acquired spectrum in the above-mentioned proceedings and companies affiliated with the assignment holder are active as service providers/MVNOs. No specific date for implementing the principle of competitive independence has yet been set.

- The fourth mobile network operator and the established network operators directly affected as competitors were consulted on several occasions about the fourth mobile network operator ending its operations as a service provider/MVNO and migrating its customers to its own network.

---

[14] Loc cit, page 51.

[15] Decision of the President's Chamber of the Bundesnetzagentur für Elektrizität, Gas, Telekommunikation, Post und Eisenbahnen of 26 November 2018 on the determinations and rules in detail (award rules) and on the determinations and rules for conduct of the proceedings (auction rules) to award spectrum in the 2 GHz and 3.6 GHz bands, Administrative Order No 152/2018, Bundesnetzagentur Official Gazette 23/2018 of 5 December 2018, page 2551 et seq (in German); also available in English at https://www.bundesnetzagentur.de/EN/Areas/Telecommunications/Companies/FrequencyManagement/ElectronicCommunicationsServices/MobileBroadbandProject2018/Project2018.html.

- In light of the outcome of these consultations, it seems appropriate for the operator to end mobile virtual network operations at the latest before asserting further spectrum requirements as part of subsequent, formal demand identification proceedings in 2023. The mobile virtual network operations are to finish by the end of 2025 at the latest.

10. Service-based competition

The provision of spectrum is also intended to promote service-based competition. To this end, it will be necessary to consider whether measures going further than the current service provider regulation could be needed once the type of proceedings has been determined.

- The President's Chamber decision of 26 November 2018 (BK1-17/001) and the spectrum assignments based on the decision include a negotiation requirement relating to the use of mobile capacity by service providers/MVNOs with a view to promoting service-based competition for the benefit of consumers.[16]
- The Monopolies Commission recommends in its 12th Sector Report Telecommunications in connection with the negotiation requirement that it should be examined whether a sharper regulatory tool such as a service provider obligation in accordance with section 105 TKG is necessary.[17]
- In line with the EECC, measures to promote competition in accordance with section 105 TKG are possible when assigning spectrum and when amending or extending assignments. Such a decision would need be made taking account of the market conditions and available comparative variables and based on an objective, forward-looking evaluation of the competitive situation, the question as to whether such measures are necessary to maintain or achieve effective competition, and the likely effects of such measures on existing or future investments by the market participants, particularly in network expansion (section 105(2) TKG).
- At present, however, no decision has been made either on the type of spectrum provision or on assignment durations. In the Bundesnetzagentur's view, the effect of the current service provider regulation must first be evaluated with regard to the necessity of any measures. Further developments in the wholesale market – including with regard to providing 5G to service providers/MVNOs – need to be observed and incorporated into the decisions on the further course of action. The Bundesnetzagentur reserves the right to carry out detailed consultations at an early stage with a view to meeting the high examination standard set by legislation (section 105(2) in conjunction with section 11(3) TKG).
- Should the spectrum in the 800 MHz, 1 800 MHz and 2.6 GHz bands be provided in award proceedings, the possibility could be considered in these proceedings of incentives for assignment holders to encourage additional obligations on a voluntary basis. Obligations beyond the negotiation requirement, which currently applies equally to all mobile network operators, could create asymmetric access conditions that could ultimately have a positive effect on overall wholesale competition.

[16] Loc cit.
[17] Loc cit, page 110.

11. Coverage

The decision on the re-provision of spectrum usage rights is intended to advance coverage of the population with high-quality, efficient, comprehensive and uninterrupted wireless voice and data services, including in rural areas.

- The supply of usable radio spectrum is limited for technical reasons. Spectrum should therefore be considered a scarce public resource that has an important public and market value. The use of this scarce resource thus requires state coordination and management. It is in the public interest to make sure, through efficient and effective regulation, that such spectrum can be used with maximum efficiency from the economic and social points of view – especially considering the great importance of the spectrum for electronic communications.
- At present, this is particularly true of the spectrum below 1 GHz. This spectrum is currently used in particular for coverage in rural areas and areas where it is difficult to provide coverage (see, however, IV.3 Other spectrum and future significance of rural area spectrum). Because only a limited amount of this spectrum is available, however, efficient network rollout and expansion planning is essential. This is the only way to ensure efficient and targeted use of the spectrum.
- The Bundesnetzagentur wishes to point out here that all available spectrum is to be used efficiently. This includes using the acquired spectrum swiftly and incorporating the spectrum into existing mobile networks.
- Irrespective of the decision on the order for and choice of spectrum provision proceedings, side conditions can be attached to assignments in order to ensure efficient and interference-free spectrum use in accordance with section 99(1) TKG. If an assignment is extended, the type and scope of the spectrum usage and the side conditions attached in accordance with section 99 TKG can also be retained, revoked, altered or restipulated pursuant to sections 2 and 87 TKG. Nevertheless, the duration of the assigned usage right places limits on the terms of the coverage obligations with regard to their proportionality. In the case of very short assignment periods – for example in the event of a temporary extension until the time is ripe for a decision on ordering proceedings – new obligations may only be slightly proportionate or may not be proportionate at all, depending on the specific duration. By contrast, obligations imposed in the broader context of a larger-scale, long-term award strategy can set considerably more ambitious targets with regard to providing mobile coverage and promoting competition. A comprehensive approach would need to consider all tools aimed at improving coverage such as state funding programmes and network operators' own targets. In light of this, obligations should be incorporated into an overall concept.
- Coverage obligations function as an important regulatory tool to improve mobile coverage. Imposing ambitious coverage obligations at an early stage can generally have positive effects on mobile service coverage. Infrastructure-based competition has its limitations in certain areas, especially remote areas, and does not create incentives to achieve coverage within the framework of free competition alone. Targeted coverage obligations are therefore needed that include incentives for cooperation in particular.

- In light of the interests of users and consumers, a decision on the re-provision of the spectrum usage rights should not lead to a temporary reduction in coverage or even a permanent deterioration in the present coverage situation. The Bundesnetzagentur's objective is, rather, to improve coverage especially for rural communities, also with a view to promoting equal living conditions in urban and rural areas.
- Uninterrupted broadband coverage along transport routes is to be driven further forward. According to section 87(2) para 1 TKG, the Bundesnetzagentur is to ensure that the legislative aims are achieved by:

  > *"progressing the supply of the Federal Republic of Germany with high-performance, efficient, nation-wide and uninterrupted wireless voice and data services for all end-users and in particular the supply of broadband and the usable service quality in rural areas and ensuring end-to-end, uninterrupted access to voice and broadband data public mobile communications services if possible by 2026 for all end-users, at least along federal trunk roads, and also in the secondary road network and on all railways and waterways, [...]."*

- With regard to this target and time frame up to 2026, the Bundesnetzagentur expects a considerable improvement in broadband coverage along transport routes as a result of the coverage obligations from the 2019 auction being met. Cooperation in white and grey spots based on these obligations also contributes to improving coverage.
- In light of the aims of sections 2 and 87 TKG – and especially the interests of users and consumers – broadband coverage is to be rolled out not only for households and major transport routes but also for secondary transport routes. The aim is to create equal living conditions in urban and rural areas. This includes coverage with mobile broadband services. This is the only way, for instance, to overcome the ongoing restrictions in the global pandemic in both rural and urban areas.
- Incentives aimed at improving coverage can be created in addition to coverage obligations. In particular, should usage rights be assigned for a short period of time, which could make coverage obligations questionable (see above), incentives can serve to improve coverage of the population with high-quality, efficient, comprehensive and uninterrupted wireless voice and data services in rural as well as urban areas. The Bundesnetzagentur is therefore considering setting incentives linked to acquiring spectrum following a short-term extension that encourage investment in additional network expansion.
- Incentives linked to cooperation can also be set. Additional network expansion in rural areas is comparatively more cost-intensive than capacity expansion in densely populated areas. The Bundesnetzagentur expects network operators to build on their cooperation efforts. Joint network expansion can enable dynamic and thus efficient use of rural area spectrum. This can be a starting point for sustainable, resource-efficient and future-proof network expansion (see IV.12 Cooperation and further development of the Infrastructure Sharing Principles).

12. Cooperation and further development of the Infrastructure Sharing Principles

The aim of cooperation is to help improve mobile coverage. However, any cooperation must be in compliance with competition and telecommunications law and may not prevent an efficient use of spectrum by the cooperating parties.

- Sharing wireless network infrastructure and spectrum resources can make a significant contribution in the nationwide rollout and expansion and in the operation of mobile networks. This is frequently seen when looking at other countries as well.
- Cooperation can minimise costs and therefore foster swift and comprehensive network rollout and thus earlier availability of wireless access in rural areas. This can promote the aims in section 87(1) and (2) paras 1 and 5 TKG.
- Cooperation can also contribute to sustainability because it reduces the use of valuable resources (eg electricity, sites and equipment, building material for sites, as well as expansion capacity). Commission Recommendation (EU) 2020/1307 of 18 September 2020 encourages Member States to develop practices to incentivise the deployment of electronic communications networks with a reduced environmental footprint.[18] Climate action in the telecommunications sector will play a role in the revision of the Broadband Cost Reduction Directive (Directive 2014/61/EU), which is due to be adopted by the European Commission in 2022.[19] The Radio Spectrum Policy Group also published an Opinion on climate change on 24 November 2021.[20]
- The President's Chamber decision of 26 November 2018 (BK1-17/001) and the spectrum assignments based on the decision already include a negotiation requirement for when a nationwide assignment holder requests cooperation. With regard to the negotiation requirement and the coverage obligations set in these proceedings, cooperation arrangements aimed at improving coverage in white and grey spots are already in place.
- In a paper published in 2001 and revised in 2010 addressing the possibility of wireless infrastructure sharing, the Bundesnetzagentur set out the conditions under which cooperation would not raise concerns under telecommunications and competition law.[21] The infrastructure sharing principles presented in the 2010 paper are to be updated in line with market and technical developments.
- Older technologies will be used less in future because of technological progress. Nevertheless, some are indispensable (2G IoT devices; eCall technology in vehicles). The continued use of technologies like 2G can – given decreasing user numbers – be associated with higher marginal costs. Here, too, cooperation can help to address these business aspects and avoid parallel 2G networks being operated. More spectrum can then be dedicated to the use of efficient, future-proof technologies.

---

[18] Available at https://op.europa.eu/en/publication-detail/-/publication/49f36068-fbcf-11ea-b44f-01aa75ed71a1/language-en/format-PDFA2A#.
[19] Available at https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12463-High-speed-broadband-in-the-EU-review-of-rules_en.
[20] Available at https://rspg-spectrum.eu/wp-content/uploads/2021/11/RSPG21-041final-RSPG_Opinion_on_climate_change.pdf.
[21] Available at https://www.bundesnetzagentur.de/EN/Areas/Telecommunications/Companies/FrequencyManagement/InfrastructureSharing/InfrastructureSharing_node.html.

- Providing additional spectrum below 1 GHz could help to improve coverage, at least in rural areas. In the Bundesnetzagentur's view, however, a combination of additional spectrum, cell densification and technological advances will still be needed to meet the increasing demand in rural areas as well.[22]
- Cooperation in rural areas can help to achieve efficient use of the available rural area spectrum. One conceivable possibility would be to provide consumers with the capacity they need by dynamically allocating spectrum when demand in one or more competitors' networks is low.
- Cooperation on a voluntary basis can include roaming as a means of providing coverage to grey spots or expanding coverage in white spots. By contrast, should an obligation for (local) roaming be imposed, it would be necessary to examine the extent to which this would have negative implications for the further expansion of mobile networks in rural areas. It could be necessary to take into account that infrastructure-based competition has its limitations in certain remote areas and does not create incentives to achieve coverage within the framework of free competition. Such cooperation in grey and white spots shows that coverage obligations and relevant framework conditions (negotiation requirement) can create appropriate incentives for cooperation. In view of companies' internal expertise on network expansion, voluntary cooperation between the market players would again be preferable to a formal obligation.
- Cooperation can also serve as a means of enabling spectrum to be refarmed for new wireless technologies. One conceivable possibility under competition and telecommunications law is sharing spectrum blocks for older wireless technologies like GSM.
- With regard to the provision of the spectrum at 800 MHz, 1 800 MHz and 2.6 GHz, it will be necessary to examine whether and which tools are suitable, necessary and appropriate to encourage more extensive cooperation (eg section 106 TKG).

V. Further action

The Bundesnetzagentur will develop the further steps for the provision of the 800 MHz, 1 800 MHz and 2.6 GHz spectrum for the rollout of digital wireless infrastructures in line with requirements on the basis of the responses to the points of orientation.

A decision on the spectrum provision proceedings cannot be made until the facts relevant to the decision-making process have been clarified. In the Bundesnetzagentur's view, this involves complex issues that are of great importance for the decision to be made and potentially have significant consequences for the market. The aim is therefore to base the decision for the spectrum provision proceedings on a stable and secure foundation.

[22] See UHF study, loc cit, chapter 3.4.4. "Model calculation to meet future capacity requirements (data) for rural area coverage", page 41 (in German).

VI. Demand survey

On the basis of the above points of orientation, the Bundesnetzagentur will gather initial indications from affected companies about any anticipated spectrum demand in addition to comments from stakeholders.

- This initial demand survey is intended for use to estimate projected spectrum demand of the affected market participants or new entrants at a relatively early stage of the proceedings so that it can be incorporated into the preparation of the next steps where appropriate and expedient.
- In the demand survey, affected market participants or new entrants should give their projected demand for spectrum on the basis of the points of orientation as realistically as possible and substantiate it as far as possible. The Bundesnetzagentur does not merely intend to collect data on the likely existing pure demand for spectrum but also to gather specific information on its origin, taking account of the current and forecast market, competitive and technical conditions and requirements (eg changing significance of spectrum, see IV.3 Other spectrum and future significance of rural area spectrum).
- The demand indicated by all market participants will also be assessed with regard to the efficient use of spectrum, including with the view to the national use of already assigned spectrum and meeting existing coverage obligations. The information provided should therefore not be limited to the usage rights expiring in 2025 but include other spectrum usage rights already acquired and other options for nationwide coverage (eg national roaming).
- The Bundesnetzagentur acknowledges that indications of spectrum demand at this stage of the proceedings do not have the binding nature of formal demand identification proceedings at a later date. Nevertheless, it is evidently in the interests of all concerned to forecast spectrum demand as realistically as possible in the initial demand survey. It would be neither productive nor in the interest of those concerned to simply register unfounded expressions of interest or, as it were, maximum requirements.
- The information should be based – as far as possible at this stage of the proceedings – on the future planning horizon given in the TKG of up to 20 years.
- The purpose of the demand survey is primarily to attain initial indications to be used as a basis for the regulatory treatment of any surplus of demand. Demand will still actually be determined at a later date in formal demand identification proceedings, in line with established regulatory practice. In accordance with administrative practice, these generally take place two years before the usage rights expire, which in this case would be 2023.
- The Bundesnetzagentur wishes to point out here that, in line with the principle of competitive independence, the latest entrant must end its MVN operations at the latest before asserting further spectrum demand as part of these subsequent, formal demand identification proceedings (see IV.9 Competitive independence).

Interested companies are hereby requested to indicate and present their forecast spectrum demand for the 800 MHz, 1 800 MHz and 2.6 GHz bands as of 1 January 2026

by **21 March 2022**

electronically in PDF format (copying and printing must be enabled) by

email to referat212@bnetza.de

or

in writing to

Bundesnetzagentur
Referat 212
Tulpenfeld 4
53113 Bonn.

Each company must provide an account of its

- reliability
- specialist knowledge
- financial capacity and
- demand for spectrum using a spectrum usage concept

as far as possible at this stage of the proceedings.

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

List of abbreviations

2

2G second-generation mobile communication standard

5

5G NR 5G New Radio (fifth-generation mobile communication standard)

C

CEPT Conférence Européenne des Administrations des Postes et des Télécommunications (European Conference of Postal and Telecommunications Administrations)

E

ECC Electronic Communications Committee, a CEPT committee
EECC European Electronic Communications Code
EU European Union

G

GB gigabyte
GHz gigahertz

I

IMT International Mobile Telecommunications
IoT Internet of Things

L

loc cit loco citato (in the place cited)
LTE long term evolution (fourth-generation mobile communication standard)

M

MHz megahertz
MIG Mobile Communications Infrastructure Company
MVNO mobile virtual network operator

P

PMSE programme making and special events

R

RLAN radio local area network

W

WRC World Radiocommunication Conference