

Spectrum compass 2020

Current situation

The Bundesnetzagentur's objective is to decide on the provision of available spectrum at an early stage in order to give the market legal and planning certainty for the further roll-out of high-speed telecommunications networks. This applies in particular to the re-provision of spectrum with expiring usage rights. Suitable spectrum is a fundamental resource for high-speed mobile networks. Mobile communications today already account for a key proportion of telecommunications traffic.

Uninterrupted mobile broadband coverage on the basis of suitable spectrum as well as the provision of spectrum in objective, transparent and non-discriminatory proceedings are of considerable importance for the implementation of the regulatory objectives of the German Telecommunications Act (Telekommunikationsgesetz – TKG).

In the past, spectrum in the bands at 700 MHz, 800 MHz, 900 MHz, 1.5 GHz, 1800 MHz, 2 GHz, 2.6 GHz and 3.6 GHz has been assigned for MFCN. Spectrum in the 26 GHz band is being provided and assigned for high-capacity applications (including 5G technology). Further spectrum resources are anticipated in the 42 GHz band, especially as this spectrum was harmonised worldwide at the world radiocommunication conference in 2019. The European Commission has already issued a mandate to the CEPT to develop the European harmonised technical conditions.

Spectrum in the bands below 1 GHz and, to a limited extent, up to 2 GHz contribute in particular to providing coverage in rural areas. This spectrum thus also constitutes a key building block in imposing and implementing coverage obligations for rural areas. With regard to user and consumer interests, in particular, the re-provision of spectrum with expiring assignments must not result in interruption to or a deterioration in coverage.

The expiry of spectrum usage rights must not lead to a standstill in network roll-out. The spectrum must therefore be re-provided at an early stage.

At the same time, proceedings for the provision of available spectrum are to promote sustainable competition in the interest of consumers. The early provision of spectrum resources enables incentives to be created for the further development of the mobile market, with 5G applications also in mind. Price and infrastructure-based competition as well as further network roll-out contribute to promoting user and consumer interests in the long term as well by maintaining the status quo.

With regard to further network roll-out in rural areas, the federal government stated the following in its mobile communications strategy in 2019:¹

"The next spectrum award (probably in 2022/2023) will present an opportunity to establish more far-reaching coverage obligations and thus 5G-specific requirements to be met by the network quality over larger areas. This will happen in the light of the development of 5G deployment as well as 5G applications that has taken place by then. The rollout

¹ Available (in German) at:

https://www.bmvi.de/SharedDocs/DE/Anlage/DG/Digitales/Mobilfunkstrategie.pdf?__blob=publicationFile.

*In case of divergent interpretation of the German and English text, the German text prevails.

commitments to be established then will be an important building block for implementing comprehensive 5G infrastructure in Germany and achieving further densification in rural areas too."

The President's Chamber at the Bundesnetzagentur raised the possibility of further coverage requirements in the course of the award proceedings for the spectrum at 2 GHz and 3.4 - 3.7 GHz.²

The questions as to which award proceedings are to be considered and whether an award decision is necessary depend in particular on the scarcity or non-scarcity of the spectrum concerned. If the available spectrum is scarce, competitive award proceedings are to be conducted. According to supreme court rulings, it is only possible not to conduct award proceedings if justified by the regulatory aims.

The federal government's mobile communications strategy drew attention to the following in connection with the next spectrum award:

"The next spectrum award (probably in 2022/2023) will present an opportunity to establish more far-reaching coverage obligations and thus 5G-specific requirements to be met by the network quality over larger areas. [...] Ahead of this, consideration is to be given as to whether, and if so how, the rules governing spectrum award can be adapted in such a way that mobile communications coverage in rural areas is the crucial benchmark in the award and the latter is not based primarily on highest financial bids.

This will also include the options of extending spectrum use rights from the 700, 800 and 900 MHz ranges, which will expire in 2025 or 2033. It should also be borne in mind that in the years ahead, a discussion will start on how permanent use can be made of other frequencies below 1 GHz. The Federal Government will request the Federal Network Agency at short notice to thoroughly examine the potential implications of a frequency extension for mobile communications coverage and to present the outcome of this examination by the end of 2020."

Furthermore, the Bundesrat drew up a resolution concerning the design of award proceedings:³

"The Bundesrat requests the federal government, in cooperation with the federal states, to conduct a fundamental, open-minded review of the current practice of awarding spectrum by auction. Accompanied by neutral expertise, it should include an assessment of alternative award models with a view to finding a market-oriented and pro-competitive solution that will lead to a noticeable improvement in mobile coverage."

² See introduction to decision BK1-17/001 of 26 November 2018 (Administrative Order No 152/2018, Bundesnetzagentur Federal Gazette No 23/2018 of 5 December 2018, page 2551 et seq).

³ See Bundesrat printed paper 445/19 of 11 October 2019.

Section 61 TKG lays down a statutory preference for award proceedings. The general rule is that auction proceedings are to be conducted except where they are not suited to securing the regulatory aims.

In future award proceedings, account will need to be taken of whether new frequency 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. The frequency bands below 1 GHz and between 1 GHz and 7 GHz as well as the millimetre wave bands all need to be taken into consideration, depending on the specific applications. Further rural area spectrum and capacity spectrum for high data rates in, for example, the millimetre wave bands will be of importance, especially in light of future coverage obligations.

Finally, the provision of spectrum must also be legally sound. Award proceedings and assignments are designed on the basis of the national and European regulatory framework. In this context, account will need to be taken of the fact that the legal bases are undergoing change due to the implementation of Directive (EU) 2018/1972 establishing the European Electronic Communications Code.

In light of this current situation, the Bundesnetzagentur is now putting out its "Spectrum compass 2020" for consultation so as to identify the relevant facts and interests and explore the next possible steps in the spectrum provision process.

The Bundesnetzagentur welcomes responses from all interested stakeholders.

Responses are to be submitted in German

by **23 October 2020**

in writing to the postal address below

**Bundesnetzagentur
Referat 212
Kennwort: Frequenzkompass 2020
Tulpenfeld 4
53113 Bonn**

and

electronically in Microsoft Word (or Microsoft Word-compatible) or PDF format (copying and printing must be enabled) to the email address below

referat212@bnetza.de.

It is intended to publish the original responses on the Bundesnetzagentur's website. Respondents are therefore asked to give their consent to publication when they submit their comments. If comments contain business and trade secrets, 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.

Relevant facts

Regarding the availability of spectrum usage rights, the current assignments and expiry dates are to be taken into account:

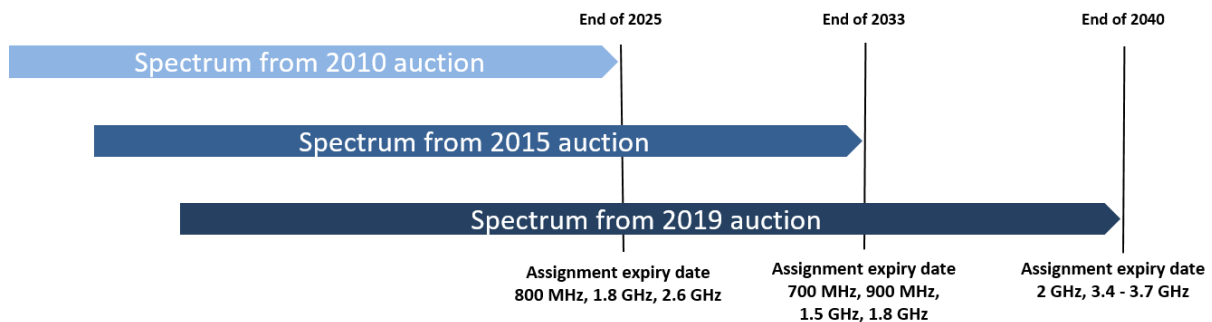


Figure 1: Overview of expiry dates (source: Bundesnetzagentur)

Spectrum available in the short term from 2026:

The following spectrum will be available as from 1 January 2026:

- Spectrum in the 800 MHz band
Spectrum comprising 2 x 30 MHz (paired) at 791 MHz - 821 MHz / 832 MHz - 862 MHz is currently assigned. In the Bundesnetzagentur's view, the spectrum contributes in particular to providing coverage for consumers in rural areas.
- Spectrum in the 1800 MHz band
This concerns parts of the band comprising a total of 2 x 25 MHz (paired) at 1710 MHz - 1725 MHz / 1805 MHz - 1820 MHz and 1740 MHz - 1750 MHz / 1835 MHz - 1845 MHz. Further spectrum in the 1800 MHz band is currently assigned until the end of 2033; the assignments in this band therefore have different expiry dates.
- Spectrum in the 2.6 GHz band
Spectrum comprising 2 x 70 MHz (paired) at 2500 MHz - 2570 MHz / 2620 MHz - 2690 MHz is currently assigned. In addition, spectrum comprising 1 x 50 MHz (unpaired) at 2570 MHz - 2620 MHz (FDD centre gap) is currently assigned.

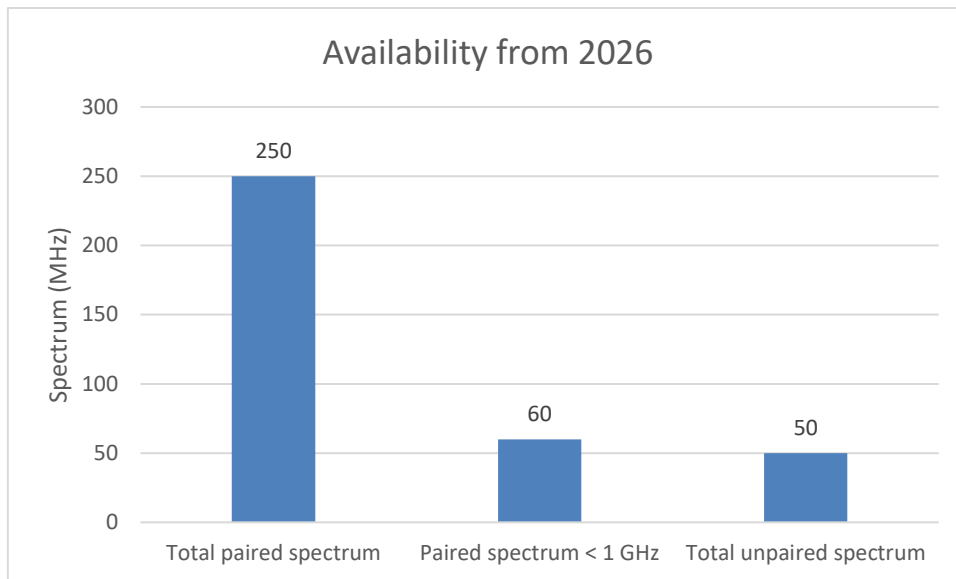


Figure 2: Overview of availability from 2026 (source: Bundesnetzagentur)

The frequency band 2010.5 - 2024.7 MHz has been excluded from European harmonisation and will no longer be available for MFCN after 31 December 2025.

Spectrum available in the long term from 2034:

The following spectrum will be available as from 1 January 2034:

- **Spectrum in the 700 MHz band**
Spectrum comprising 2 x 30 MHz (paired) at 703 MHz - 733 MHz / 758 MHz - 788 MHz is currently assigned. In the Bundesnetzagentur's view, the spectrum contributes in particular to providing coverage for consumers in rural areas.
- **Spectrum in the 900 MHz band**
Spectrum comprising 2 x 35 MHz (paired) at 880 MHz - 915 MHz / 925 MHz - 960 MHz is currently assigned. In the Bundesnetzagentur's view, the spectrum contributes in particular to providing coverage for consumers in rural areas.
- **Spectrum in the 1800 MHz band**
This concerns sub-bands comprising a total of 2 x 50 MHz (paired) at 1725 MHz - 1740 MHz / 1820 MHz - 1835 MHz and 1750 MHz - 1785 MHz / 1845 MHz - 1880 MHz. Further spectrum in the 1800 MHz band will be available as early as 2026. The current assignments in this band therefore have different expiry dates.
- **Spectrum in the 1.5 GHz band**
Spectrum comprising 1 x 40 MHz (unpaired) at 1452 MHz - 1492 MHz is currently assigned.

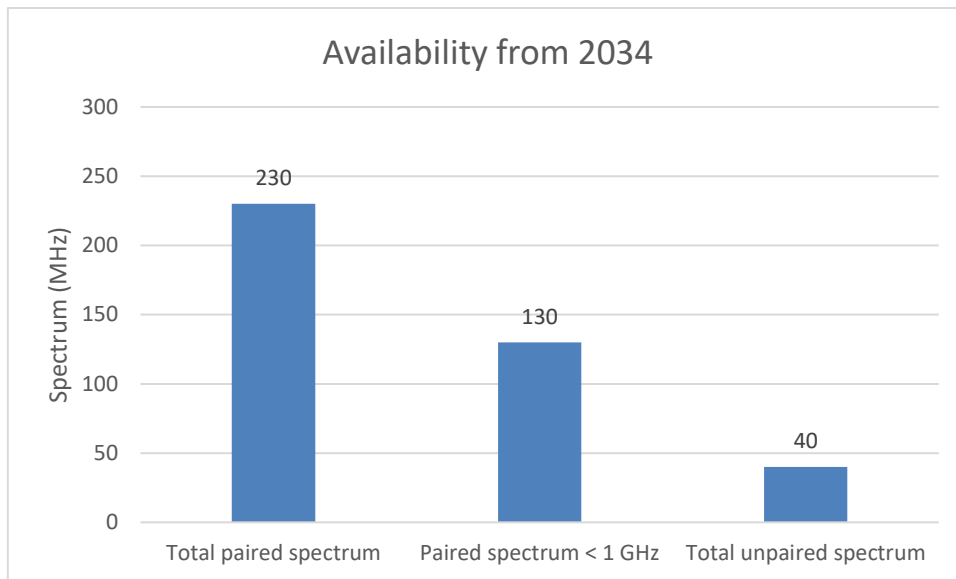


Figure 3: Overview of availability from 2034 (source: Bundesnetzagentur)

International situation

The European regulatory framework for the use of the frequency bands 800 MHz, 900 MHz, 1800 MHz and 2.6 GHz with regard to accommodating 5G applications is as follows:

1. 800 MHz

No changes to the usage conditions for the 800 MHz band compared to the expiring assignments are currently necessary.

Commission Decision 2010/267/EU continues to apply. There will therefore be no changes compared to the assignments from the award in 2010.

ECC Decision (09)03 continues to apply unchanged but is currently undergoing scheduled revision. No major changes are expected at present. The ECC confirmed during its 47th meeting at the beginning of 2018 that the decision already allows the deployment of 5G systems. It should be noted in this context that the use of AAS in this band is not provided for.

2. 900 MHz/1800 MHz

ERC Decision (95)03 – designation for GSM 1800 – is currently undergoing scheduled revision.

ECC Decision (06)13 – designation for UMTS, LTE, 5G NR, WiMAX and IoT cellular (900 MHz, 1800 MHz) – was revised in March 2019 to accommodate 5G, but did not include the definition of LRTC with respect to technology and service neutrality. The usage conditions therefore need to be updated.

ECC PT 1 is currently drawing up Report B from the CEPT in response to a mandate from the European Commission. The aim is to create technology and service-neutral usage conditions by developing LRTC for the 900 MHz and 1800 MHz bands. This is to be achieved in these bands as well by introducing an appropriate BEM.

It is expected that there will be a band plan based on multiples of 200 kHz blocks and the provision of at least 5 MHz of contiguous spectrum per operator to support the introduction of broadband systems.

After work on Report B has been completed (scheduled for the beginning of 2021) a fundamental update of the usage conditions (ECC Decision (06)13) will be necessary. However, it is intended that these future technology-neutral usage conditions will take account of all the systems permitted in the currently applicable version of ECC Decision (06)13.

It is then expected that the European Commission will amend its relevant decision on the 900 MHz and 1800 MHz bands (2009/766/EC, last amended by Commission Implementing Decision (EU) 2018/637) on the basis of Report B.

3. 2.6 GHz

Technology und service-neutral usage conditions for 5G (non-AAS and AAS) in the 2.6 GHz band were already included in CEPT Report 72. ECC Decision (05)05 was revised accordingly and adopted on 5 July 2019.

Commission Decision 2008/477/EC was revised on the basis of the CEPT report and published in May 2020 (Commission Implementing Decision (EU) 2020/636).

A total of 2 x 70 MHz (paired) at 2500 - 2570 MHz and 2620 - 2690 MHz can be used for FDD. The centre gap at 2570 - 2620 MHz (1 x 50 MHz unpaired) can be used for TDD or as SDL capacity. It should be noted in this context that the flexible use of the sub-bands 2500 - 2570 MHz / 2620 - 2690 MHz for TDD is to be avoided in future due to the resulting risk of interference at national borders. If TDD or SDL applications are operated outside the unpaired band (2570 - 2620 MHz) in Member States, a transitional period for implementation of the above requirements can be requested from the European Commission.

Additional baseline requirements were included for the adjacent band 2690 - 2700 MHz for AAS FDD base stations to reduce the size of the coordination zone to protect the radio astronomy service. Cross-border coordination may also be necessary to guarantee the required protection.

Measures to protect radars above 2700 MHz are decided at national level.

The use of the higher 5 MHz blocks in the band 2680 - 2690 MHz for wide area outdoor AAS base stations is only feasible using the additional baseline requirements and requires further development of the filters. However, these two blocks can be used for base stations with lower power.

The block size of 5 MHz or multiples of 5 MHz remains unchanged.

Any protection measures required to avoid interference to the paired band at the boundaries (2570 MHz and 2620 MHz) from usage in the centre gap are decided on a national basis. These measures are to be taken in the centre gap at 2570 - 2620 MHz.

4. Possible future spectrum

- **1.5 GHz extension band**

Commission Implementing Decision (EU) 2018/661 applies to the 1.5 GHz band. It covers the frequency bands 1427 - 1452 MHz and 1492 - 1517 MHz bands in addition to the band 1452 - 1492 MHz already assigned. The frequency bands 1427 - 1452 MHz and 1452 - 1517 MHz are used in Germany by military services and are not available for MFCN.

- **42 GHz and 66 GHz**

At international level, the focus is currently on the provision of spectrum in the bands at 42 GHz und 66 GHz for high-capacity applications. The Bundesnetzagentur actively supports the provision of additional spectrum to ensure sufficient availability in the millimetre wave bands for MFCN into the future. Work is already in progress at European level to provide the 42 GHz spectrum harmonised at WRC-19 (40.5 - 43.5 GHz). The European Commission has issued a relevant mandate to the CEPT to develop harmonised technical conditions. The work under the mandate is to be completed by July 2021. The Bundesnetzagentur anticipates that the harmonisation measure will be implemented soon afterwards in the form of a Commission implementing decision.

Spectrum or part of the spectrum in the band 40.5 - 43.5 GHz is currently used in Germany above all by the fixed service and satellite services as well as by the radio astronomy service. The upper sub-band is currently allocated to the mobile service (42.5 - 43.5 GHz).

The German Frequency Ordinance (Frequenzverordnung – FreqV) is currently undergoing revision to implement the results of WRC-19, among other things. The frequency band 40.5 - 42.5 GHz is then to be allocated additionally to the land mobile service on a primary basis. The whole of the band 40.5 - 43.5 GHz is to be identified for possible use for mobile communications (IMT).

Additional use of the spectrum at 66 GHz for mobile communications – for 5G applications such as URLLC – will be possible within the framework of the general assignment for SRDs through implementation of the results of WRC-19 within the CEPT.

- **470 - 960 MHz (UHF band) and 6425 - 7125 MHz (7 GHz band)**

Additional use of spectrum may also be possible due to worldwide or regional harmonisation as a result of WRC-23. The frequency bands 470 - 960 MHz (UHF band) and 6425 - 7125 MHz (7 GHz band) are on the agenda for WRC-23 and are therefore the subject of preparatory work at national and international level.

Studies on future spectrum use in these bands are currently in progress at international level, with an open outcome. The initial aim of the groups responsible within ITU (UHF: TG 6/1; 7 GHz: WP 5D) in preparation for the next world radiocommunication conference (WRC-23) is to review the use and needs of all services in the frequency bands in order to recommend possible future regulatory actions within the framework of the RR.

The frequency band 694 - 960 MHz is designated for the mobile service and assigned accordingly. The frequency band 470 - 694 MHz is currently designated above all for the broadcasting service and professional wireless production applications and is assigned accordingly. The additional use of this UHF band for mobile services is currently the subject of discussion at national and international level. The aim will be to make this frequency band available in Germany in line with demand. Competition between different communication technologies can serve both as a means to take account of the specific interests of individual users and as a driver for innovation.

The possibility of additionally providing the 7 GHz band for mobile services is also under consideration. In addition to the use of the whole band by the fixed service, the band 6650 - 6675.2 MHz is currently used by the radio astronomy service. This service is to be given the best possible protection in accordance with usage condition D149 in the German Frequency Plan. The band 7075 - 7125 MHz is currently used by the space research service (Earth-to-space).

- **2.3 GHz**

The 2.3 GHz band is used in Europe for different purposes, and in several countries part of the spectrum is provided for mobile communications. This band is, however, not available for MFCN in Germany due to current long-term usages, for example for cordless cameras and applications for public safety authorities and organisations.

Infrastructure-based and service-based competition

At present competition in the mobile market is essentially shaped by three established mobile operators that all have a similar number of subscribers.⁴ With regard to the operators' business models, progress in network roll-out is at different stages. All the established operators are subject to symmetrical coverage obligations that result from the auctions held in 2015 and 2019 and require a high degree of coverage in particular for households and transport routes.⁵

At the auction in 2019, one new entrant acquired usage rights for spectrum in the bands at 2 GHz and 3.4 - 3.7 GHz. The coverage obligations for this operator differ from those for the three established mobile operators and require a lower degree of coverage because the operator was entering the market for the first time.⁶

National roaming on the basis of an established operator's network enables a new entrant to provide a national mobile network for customers at an early stage during network roll-out. The President's Chamber decision on the 2019 auction imposed a relevant negotiation requirement on the established mobile operators.⁷ The negotiations for national roaming between the parties concerned are currently still in progress.

Alongside the mobile operators, service providers and MVNOs also offer mobile services. These services are provided on the basis of the established mobile operators' networks. The President's Chamber decision on the 2019 auction imposed a relevant negotiation requirement on the established mobile operators and the new entrant.⁸ The relevant negotiations for cooperation between service providers and operators are also still in progress.

Areas for action

Procedural principles

The Bundesnetzagentur will provide the spectrum in objective, transparent and non-discriminatory proceedings.

- The procedural principles serve to create legal certainty and arise from the European legal framework. The decisions made by the Bundesnetzagentur can be subject to judicial review.
- Consistent administrative action and early involvement of market participants create planning and investment certainty.

⁴ Mobile subscriber numbers based on operators' publications:

https://www.bundesnetzagentur.de/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Marktbeobachtung/Deutschland/Mobilfunkteilnehmer/Mobilfunkteilnehmer_node.html.

⁵ President's Chamber decisions BK1-11/003 of 29 January 2015 (Communication No 141/2015, Bundesnetzagentur Official Gazette No 3/2015 of 11 February 2015, page 828 et seq) and BK1-17/001 of 26 November 2018 (loc cit).

⁶ BK1-17/001 of 26 November 2018 (loc cit), margin no 444 et seq.

⁷ BK1-17/001 of 26 November 2018 (loc cit), section III.4.17.

⁸ BK1-17/001 of 26 November 2018 (loc cit), section III.4.15.

- Irrespective of the outcome of the decision on provision (individual assignment, extension, award by auction or tendering), the decision must be reached in objective, transparent and non-discriminatory proceedings.
- This includes finding the suitable proceedings for each specific case. The Bundesnetzagentur will, as in the past, make a comprehensive assessment of the regulatory objectives laid down in the TKG. Suitability, however, involves many aspects and does not take account of just one objective. Rather, a way must be found that promotes all the regulatory objectives as a whole without placing undue weight on one objective and reaching it to the detriment of the others.
- To achieve this, the Bundesnetzagentur must identify the relevant facts and interests of significance for the decision at an early stage. This includes the framework conditions and implications of extending spectrum assignments, as a possibility to be considered, which was also referred to in the federal government's mobile communications strategy.

Scope of spectrum usage rights

The Bundesnetzagentur will need to decide which spectrum is included in the future award proceedings.

- According to section 55(10) TKG, a possible scarcity of spectrum resources is given where an insufficient amount of spectrum is available for assignment or where more than one application is made for particular spectrum. A scarcity of spectrum resources is therefore determined by existing or forecasted supply and demand.
- Different amounts of spectrum are available depending on which frequency bands and availability dates are included in one set of proceedings (see "Relevant facts").

Proceedings with too small a scope could lead to insufficient spectrum being available. This could foster spectrum scarcity and in the event of an auction, for instance, could lead to increased bidding behaviour.

By contrast, proceedings with too large a scope could affect equal access to spectrum resources. Here, a large amount of important spectrum resources would be included in one set of proceedings and assigned for a longer period. In this case, the ability for companies to remain active as network operators or enter the market as newcomers would depend on their being successful in just one set of proceedings, without them having another opportunity to access spectrum resources in a second set of proceedings relatively soon afterwards.

Improvement in mobile coverage

The Bundesnetzagentur will need to decide which coverage obligations will be attached to the spectrum usage rights to be awarded.

- As part of the award proceedings the Bundesnetzagentur defines the degree of coverage to be achieved (section 61(3) sentence 2 para 4 TKG). In principle, coverage obligations could also be attached to the individual assignments (sections 55 and 60 TKG). When imposing such obligations, however, account needs to be taken of whether the spectrum for which usage rights are being awarded is scarce or whether it is freely available. When defining coverage obligations, account also needs to be taken of other aspects such as new technologies, service applications and expected consumer demand.
- The Bundesnetzagentur is seeking to achieve an improvement in mobile coverage. In the last award proceedings, it therefore laid down extensive obligations and raised the possibility of further obligations. The President's Chamber decision of 26 November 2018 presented the connection between spectrum availability and obligations as follows:⁹

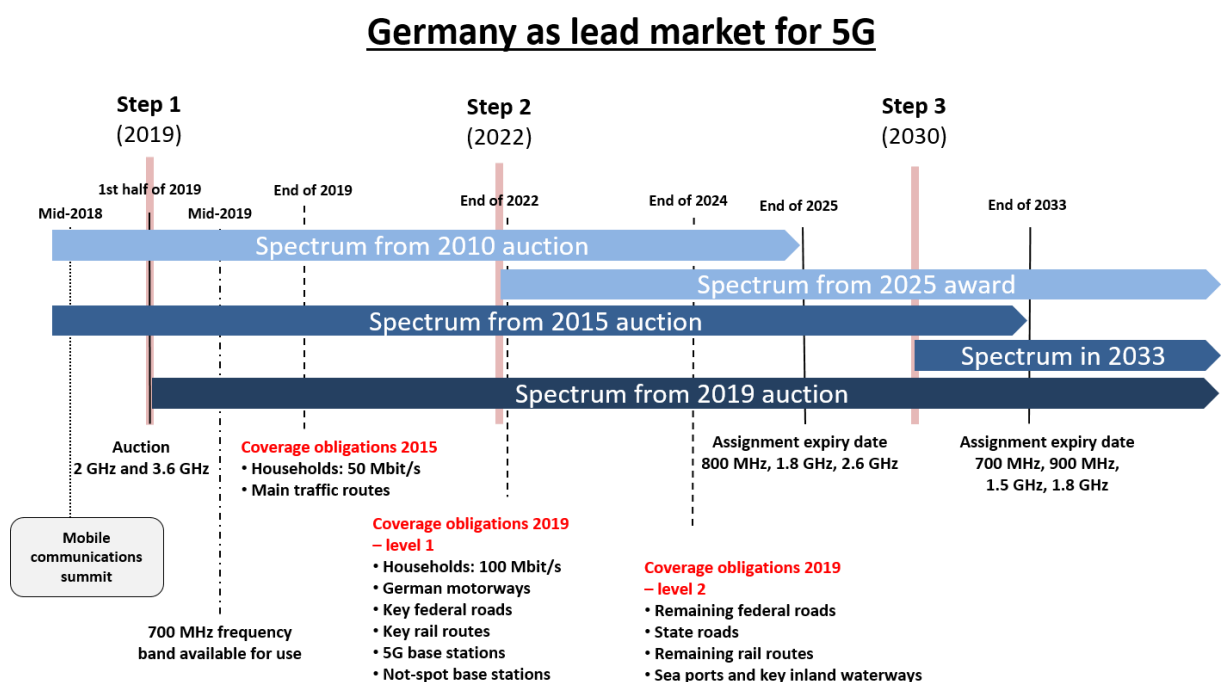


Figure 4: Timing of award proceedings (source: Bundesnetzagentur)

- In this context, the question of symmetrical coverage obligations will also need to be addressed. In the past, all operators – with the exception of new entrants – have been subject to symmetrical coverage obligations. The higher the requirements, however, the more the networks and therefore the business models become aligned. Although this is to be welcomed from the point of view of coverage, it could have an effect on

⁹ See introduction to BK1-17/001 of 26 November 2018 (loc cit).

pricing in the mobile market in the long term and reduce the range of choice for consumers between different products at different prices.

- Coverage obligations are, however, only one of several building blocks to achieve improved mobile coverage. As obligations in proceedings under the rule of law and administrative law, they are subject to the principle of proportionality.¹⁰ In addition to them, there are other state measures that could lead to an improvement in coverage such as the mobile communications summit and any resulting contracts, dead spot auctions or funding programmes. The scope of both the obligations under administrative law and the other state measures also provides a degree of freedom for cooperation or national roaming agreements between operators.

Fair and sustainable competition

The Bundesnetzagentur will take particular account in the proceedings of the aspects of fair and sustainable competition.
--

- Competition is to ensure that users and consumers have maximum benefit in terms of choice, price and quality (section 2(2) para 2 TKG). Infrastructure-based competition enables customers to choose between different networks at different prices. This is consistent with the purpose of the TKG. According to section 1 TKG, the purpose is, through technology-neutral regulation, to promote competition and efficient infrastructures in telecommunications and to guarantee appropriate and adequate services throughout the country. Promoting infrastructure-based competition for broadband networks is of particular importance. The legislature's chosen wording "promote" makes it clear that regulation must actively promote infrastructure build. Furthermore, appropriate and adequate services throughout the country must be guaranteed.
- With regard to fair competition, it must be ensured in particular that all interested parties have equal access to spectrum resources. This can be achieved through open, objective, transparent and non-discriminatory proceedings that take account of all the relevant interests (see "Procedural principles").
- The sustainability of competition is also to be promoted in the sense of maintaining and, ideally, increasing the level of competition. Pro-competitive aspects should be maintained and should be able to develop further.
- Account is to be taken of service-based as well as infrastructure-based competition. With regard to the negotiation requirement and cooperation between service providers and network operators, the Bundesnetzagentur will take account of how the wholesale market develops.

¹⁰ For details see BK1-17/001 of 26 November 2018 (loc cit), margin no 222 et seq.

Regulatory instruments following revision of the TKG

In future spectrum award proceedings, the Bundesnetzagentur will need to consider which obligations on the basis of the revision of the TKG can serve to improve mobile broadband coverage.

The directive establishing the European Electronic Communications Code (EECC) entered into force on 20 December 2018. The directive served to update the Access Directive (2002/19/EC), the Authorisation Directive (2002/20/EC), the Framework Directive (2002/21/EC) and the Universal Service Directive (2002/22/EC) – the four directives previously regulating the telecommunications sector – and combine them into one act. The aim is to pave the way for a modernised and future-proof regulatory framework for the coming years. The EECC must be implemented in national law by the end of 2020. It will be implemented in Germany through a revision of the TKG. The changes will also affect the area of spectrum management.

The EECC includes a large number of regulations that serve to improve mobile coverage. The aims include promoting the deployment and take-up – as implemented in the revised TKG – of very high capacity networks, sustainable and effective competition and interoperability of telecommunications services as well as promoting end-users' interests by ensuring the provision of good quality and affordable telecommunications services for consumers.

In light of these aims, Article 47(2) EECC expressly states that, when assigning spectrum, provision can be made for the joint roll-out and use of infrastructure and for commercial roaming access agreements.

In addition, in accordance with Article 61(4) EECC, regulatory authorities may, on an exceptional basis where the market-driven deployment of infrastructure is subject to insurmountable economic or physical obstacles, impose obligations in relation to local roaming or infrastructure sharing where this possibility is clearly provided for when granting the rights of use for radio spectrum.

Planning and investment certainty

The Bundesnetzagentur will open proceedings for the future provision of spectrum in good time before spectrum usage rights expire in order to create maximum planning and investment certainty for companies.

Established administrative practice is that decisions on providing spectrum from expiring assignments are made in good time – or around three years – before the assignments expire in order to give market players sufficient planning and investment certainty. The aim is to complete the assignment proceedings for this spectrum in good time.

The Bundesnetzagentur intends in a first step in the course of this year to draw up and put out for consultation scenarios with possible options for providing spectrum for the roll-out of high-speed next-generation public telecommunications networks. The aim is to structure the discussion as early as possible and give all interested parties the opportunity to take part in shaping the proceedings at an early stage.

List of abbreviations

5G	fifth generation of mobile communications
5G NR	5G new radio
AAS	active antenna system
BEM	block edge mask
CEPT	European Conference of Postal and Telecommunications Administrations
ECC	Electronic Communications Committee
EECC	European Electronic Communications Code
ERC	European Radiocommunications Committee
EU	European Union
FDD	frequency division duplex
FreqV	Frequency Ordinance (Frequenzverordnung)
GHz	gigahertz
GSM	Global System for Mobile communication
IMT	International Mobile Telecommunications
IoT	Internet of Things
ITU	International Telecommunication Union
kHz	kilohertz
LRTC	least restrictive technical conditions
LTE	Long Term Evolution
MFCN	mobile/fixed communications networks
MHz	megahertz
MVNO	mobile virtual network operator
PT	project team
RR	Radio Regulations
SDL	supplemental downlink
SRD	short range device
TDD	time division duplex
TG	task group
TKG	Telecommunications Act (Telekommunikationsgesetz)
UHF	ultra-high frequency
UMTS	Universal Mobile Telecommunications System
URLLC	Ultra-Reliable and Low Latency Communications
WiMAX	Worldwide Interoperability for Microwave Access
WP	working party
WRC	World Radiocommunication Conference