

PROCESS OF SPECTRUM
MANAGEMENT

Position paper

for the provision of the 800 MHz,
1,800 MHz and 2,600 MHz
spectrum for the rollout of digital
infrastructures



Bundesnetzagentur

Position paper

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digital infrastructures

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1 Introduction

The spectrum usage rights in the bands at 800 megahertz (MHz), 1,800 MHz and 2,600 MHz will expire at the end of 2025. This spectrum is currently being used and contributing to the nationwide coverage of consumers with high-speed broadband. The Bundesnetzagentur is carrying out objective, transparent and non-discriminatory proceedings for the re-provision of this spectrum.

In its points of orientation in January 2022, the Bundesnetzagentur identified facts whose ongoing development is important for the decision on this provision. The market response showed, however, that it is likely that some matters cannot be cleared up in the near future. 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. Planning certainty is necessary in particular if a new allocation of spectrum would necessitate modifications of the networks, as this certainty would be essential to allow network operators to start the work in good time so as to maintain coverage for their customers.

This position paper aims to make progress in these objective, transparent and non-discriminatory proceedings. To this end, it includes an initial assessment from the President's Chamber on the next steps. This is not, however, binding nor does it pre-empt the exercise of discretion. It enables stakeholders to comment at this stage on important questions such as the order for and choice of award proceedings. There follows a related, deeper consideration of regulatory instruments that can help to promote regulatory objectives by improving coverage or competition.

The starting point is this initial assessment based on the demand survey, which indicates a scarcity of spectrum. With the focus on objective, transparent and non-discriminatory proceedings, this is an argument in favour of award proceedings, rather than an extension of spectrum usage rights. Extensions secure the status quo, but they neither provide any incentive to further expand the networks nor do they promote competition.

If award proceedings are ordered, the type of proceedings has to be chosen. The initial assessment of the President's Chamber is that an auction is the suitable method. The focus here is on a transparent selection procedure in which the competing bidders can react to each other. In the case of tender proceedings, it would not be as transparent for those involved or the public which party had received the award on the basis of which explanations in its application.

The Chamber wishes to stress here that generating income is not the objective of the auction proceedings. It has already countered criticism multiple times that auctions reduce the funds available for the market to invest. Nevertheless, one of the intentions of the consultation is to identify whether and how the proceeds can be brought back into coverage. Moreover, there will be an examination of regulatory instruments that could transfer the advantages of the voluntary commitments usual in tendering to the transparent auction proceedings.

The proceedings will focus on the 800 MHz band. A spectrum swap is proposed to relieve the demand situation. With this, the usage rights

- for 800 MHz would not expire until the end of 2033, rather than at the end of 2025;
- for 900 MHz would expire at the end of 2025 already, rather than at the end of 2033;

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- for 900 MHz would be awarded (to the same extent) rather than those for 800 MHz.

With a view to the next steps, the first stage is to find out the needs and interests of current assignment holders and the market entrant as well as potential new entrants with regard to the efficient use of spectrum and other regulatory objectives. It is now up to market participants to improve their chances of access to the spectrum with a voluntary spectrum swap.

The proposed exchange of spectrum has the potential to avert the possible worsening of coverage flagged by the market. Indeed, the Chamber wishes the current coverage level not merely to be maintained but in fact aims for mobile coverage to be improved. There is to be a closer focus on user perspectives. Coverage obligations are a tried and tested mechanism but can reach the limits of proportionality as the networks become increasingly dense, which is why the Chamber is presenting a series of proven and new measures that could, alternatively or in combination, lead to an improvement in coverage.

The Chamber is also committed to promoting service-based competition. It therefore examines options of supporting access for service providers and mobile virtual network operators (MVNOs) to mobile wholesale services. Here, too, it is conceivable that an auction could contain the option for farther-reaching, asymmetric obligations building on the current symmetric negotiation requirement.

Given the complexity of the current starting situation and the regulatory tools examined, the President's Chamber is presenting the position paper for public consultation with the aim of identifying and weighing up the interests of affected parties and establishing a framework for improvements to coverage and competition.

Responses to the position paper are to be submitted in German by **21 November 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 relevant parts have been redacted, together with a list justifying the redactions.

2 Proceedings so far

In light of the expiry of the usage rights at 800 MHz, 1,800 MHz and 2,600 MHz, the Bundesnetzagentur published its "Spectrum compass 2020" on 19 August 2020.¹

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, 1,800 MHz and 2,600 MHz spectrum" on 21 June 2021.²

Most recently, the Bundesnetzagentur published its points of orientation and demand survey for the provision of the 800 MHz, 1,800 MHz and 2,600 MHz spectrum on 24 January 2022.³

The responses to the public consultations on these papers – insofar as they do not contain any business or trade secrets – were published on the Bundesnetzagentur's website.⁴ The responses will be taken into consideration in the next stages of the President's Chamber's proceedings. A summary of the responses to the points of orientation may be found in the annex.

¹ Communication No 237/2020, Bundesnetzagentur Official Gazette 16/2020 of 2 September 2020, page 848 et seq (in German); also available in English at www.bnetza.de/SpectrumCompass2020

² Communication No 187/2021, Bundesnetzagentur Official Gazette 12/2021 of 30 June 2021, page 821 et seq (in German); also available in English at www.bnetza.de/SzenariosPaper2021

³ Communication No 22/2022, Bundesnetzagentur Official Gazette 03/2022 of 9 February 2022, page 158 et seq (in German); also available in English at www.bnetza.de/orientationpoints2022

⁴ Available at www.bnetza.de/mobilebroadband

3 Overview of the positions

Following an evaluation of the comments received so far, this position paper includes an initial assessment from the President's Chamber on the next steps. This is not, however, binding nor does it pre-empt the exercise of discretion.

1. Open, transparent and non-discriminatory award proceedings

An evaluation of the notifications of demand indicates a scarcity of spectrum, which is an argument in favour of objective, transparent and non-discriminatory award proceedings rather than an extension.

2. Auction

An auction seems best suited to meet the statutory objectives. Auctions are objective, transparent and non-discriminatory and give all competitors equal access to spectrum.

3. Proposed spectrum swap

A "spectrum swap" is proposed to relieve the demand situation in the 800 MHz band and promote the regulatory objectives.

4. Uninterrupted, high-performance broadband coverage

To improve broadband coverage, a greater focus is placed on the perspective of users. There are various proven and new regulatory tools available for this purpose, which can be combined and applied in a targeted manner.

5. Promotion of service-based competition

The provision of spectrum is also intended to promote competition at the service level. As well as the proven obligations, there could also be incentives to enter into voluntary commitments. Market penetration with new technologies such as 5G could especially strengthen competition.

6. Competitive independence

Every undertaking can formally register its spectrum requirements in the spectrum provision proceedings. If an award of scarce spectrum usage rights is made, only competitively independent undertakings can take part.

4 Positions and considerations of the President's Chamber

4.1 Open, transparent and non-discriminatory award proceedings

An evaluation of the notifications of demand indicates a scarcity of spectrum, which is an argument in favour of objective, transparent and non-discriminatory award proceedings rather than an extension.

Considerations:

In the 800 MHz, 1,800 MHz and 2,600 MHz bands, the following spectrum usage rights are assigned up to 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 2,600 MHz 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

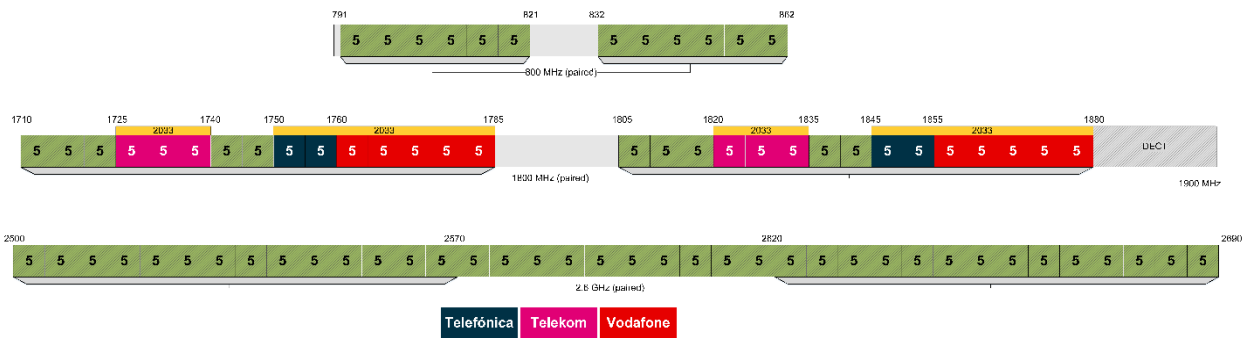


Figure 1: spectrum available at the end of 2025

These spectrum bands are therefore available in principle from 1 January 2026 onwards and are to be provided for mobile/fixed communications networks (MFCN) again.

Following an evaluation of the notifications of demand, early indications are that there is a scarcity of spectrum in these proceedings. It should be noted that these demand notifications are not yet based on firm key elements of future assignments, which could influence the amount of demand. The upcoming forecast of spectrum scarcity will be based on formal demand identification proceedings and include other facts. It is currently planned to launch the formal demand identification proceedings in 2023.

If spectrum is scarce, the President's Chamber can order that the assignment of the spectrum must be preceded by award proceedings. A decision is thereby taken about a possible extension of any expiring,

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assigned spectrum usage rights. The regulatory objectives, the specific criteria of section 92(2) sentence 2 of the Telecommunications Act (TKG) and the possibility of breaching the constitutional rights of potential assignment holders must be balanced in this process.

On the basis of initial considerations and the current situation, the following conclusions may be drawn.

On the one hand, the regulatory aims of connectivity and user/consumer interests could favour an extension of spectrum usage rights in order to maintain the existing mobile coverage. This could also apply to the statutory coverage target pursuant to section 87(2) para 1 TKG, since improved future coverage along transport routes – and therefore also across the country – will build on existing coverage. An extension could also avoid "service disruption" (section 92(2) para 6 TKG) if a change in coverage caused by a new assignment situation were to be classed as such. Finally, keeping the existing spectrum usage could be viewed as securing, albeit not promoting, efficient usage.

On the other hand, the regulatory aim of competition, in particular regarding equal access, could speak for the award of scarce spectrum resources. Current findings show that there is a demand for spectrum in these proceedings from undertakings other than those that already have usage rights in the relevant spectrum (section 92(2) para 7 TKG). Relatedly, the list given in section 92(2) TKG points to the need to render the use of spectrum more efficient in light of technological or market evolution (section 92(2) para 5 TKG). The entry of a fourth network operator into the market is likely to have constituted a market evolution that could justify an examination of the current spectrum allocation in competition. Technical developments such as the introduction of 5G could also support an examination of the spectrum allocation to promote the efficient use of spectrum. Accordingly, an award would have the potential not just to perpetuate the existing use of spectrum and mobile coverage but also to promote them. The promotion of competition and mobile coverage would in turn have a positive effect on the development of user and consumer interests.

While there were comments about a risk to mobile coverage from the loss of existing usage rights, this is an argument in favour of an extension only in very limited, exceptional cases.

If the protection of the existing coverage level were to be understood as an absolute, the time limit on usage rights set out in the law would be largely irrelevant. However, it is the responsibility of network operators to plan their networks on the basis of the efficient use of all spectrum resources available to them. It would therefore seem sensible not to make coverage largely dependent on individual resources that are available for a limited time.

The President's Chamber takes the view that the established mobile network operators essentially have the ability to make up for, partially or fully, a potential loss of usage rights with more efficient usage or relocation to other bands.

From the regulatory point of view, an early decision on the re-provision of spectrum can provide planning certainty and allow time for any necessary adjustments to the networks in order to mitigate the effects on coverage mentioned. It could also make time to roll out the networks with other spectrum resources. It should be noted in this context that the President's Chamber staggers its proceedings for the provision of spectrum. Consequently, network operators generally have a portfolio of other usage rights, some of which are comparable, so they can keep operating their networks in a way that would not be possible if all spectrum bands were to be provided in a synchronised manner.

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The coverage obligations arising from the proceedings BK1-17/001 are therefore not likely to mean that an extension is absolutely necessary. The companies have other spectrum resources available that can all be used to fulfil their obligations.

The involvement of constitutional rights is also an argument in favour of an open, objective, transparent and non-discriminatory award.

In principle, all potential assignment holders have an equal constitutional claim on assignment of the desired resource of spectrum. If spectrum is scarce, this claim becomes an entitlement to participate in award proceedings to enable the most suitable user to be selected for the scarce resources in competitive proceedings. To the extent that section 92(2) sentence 1 TKG suggests a right to extension, it was also set out in earlier versions of the TKG that temporary assignments were to be extended if the requirements for assignment were fulfilled. Section 92(2) sentence 2 TKG now specifies interests to be weighed up and, as it also addresses competition and the demand for spectrum, does not automatically lead to an extension. Rather, in line with the constitutional right to assignment, the rights concerned of all potential assignment holders must be included in the examination, from which it follows that in the event of demand from third parties, reasons of sufficient weight must contend for an extension.

As well as the established network operators, the fourth network operator also in principle has the possibility to make up for any lack of spectrum resources below 1 gigahertz (GHz) in the event that its participation in award proceedings is unsuccessful. If the fourth network operator does not receive any further spectrum usage rights, it can turn to national roaming. Firstly, there is already a roaming cooperation. Secondly, even after the end of the existing cooperation, the negotiation requirement imposed in BK1-17/001 for national roaming still applies. Regardless of this, the accelerated rollout of the already available spectrum resources above 1 GHz can also be used as compensation and, in the long term, there are likely to be further proceedings to acquire spectrum below 1 GHz.

With these aspects in mind, the President's Chamber does not currently see any concerns about the upholding of the rights of potential assignment holders. Both established network operators and the newcomer would have the chance to receive equal access to the spectrum in objective, transparent and non-discriminatory award proceedings.

It is also not possible to oppose an award on the grounds that the loss of expiring spectrum resources would jeopardise existing investments, since spectrum is assigned with a specific time limit to enable the costs associated with its use to be recovered. The end of the usage rights is transparent and can be factored in from the start, even if a subsequent extension is conceivable. The usage rights are then made available for the subsequent period in objective, transparent and non-discriminatory proceedings. Even if a network operator were unsuccessful in these, because of the staggered proceedings for the provision of spectrum the network operators generally have a portfolio of other usage rights, some of which are comparable, so they can keep operating their networks. Moreover, the President's Chamber assumes that the technology used can be flexibly configured in such a way that it should be possible to keep using it in an adjacent band.

The President's Chamber is also considering additional options to take account of the interests brought forward by all potential assignment holders in relation with these proceedings (see in particular position 3, "Proposed spectrum swap").

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The final weighing up of the aspects mentioned is reserved for a President's Chamber decision. In this, the facts covered in particular by the open questions identified in the points of orientation will be taken into consideration.

4.2 Auction

An auction seems best suited to meet the statutory objectives. Auctions are objective, transparent and non-discriminatory and give all competitors equal access to spectrum.

Considerations:

4.2.1 General objectives of the proceedings

The general objectives of the proceedings for the provision of spectrum comprise the improvement of broadband coverage, the promotion of competition and the efficient and interference-free use of spectrum. At the same time, the necessary service quality is to be guaranteed and innovation promoted.

Pursuant to section 100(1) sentence 2 TKG, in the later decision on the choice of the award proceedings in accordance with sentence 1 of the provision, the general objectives of the proceedings are to be set out. In addition to improving coverage, especially in rural areas and for the promotion of competition, the objectives are restricted to one or more of the following aspects: ensuring the required quality of service, promoting efficient use of spectrum or promoting innovation and business development.

As already explained in the scenario paper and the points of orientation, the key goal of the spectrum provision is to improve coverage of mobile broadband for the population. Expanding existing country-wide network infrastructures and rolling out new networks are essential for the spread of digital technology in urban and rural areas. Delivering high-performance broadband to communities across the country on the basis of existing digital infrastructures is to be improved. High-performance, nationwide broadband coverage is essential for education and employment and thus for prosperity and economic growth. High-performance broadband makes a decisive contribution to creating equal living conditions in urban and rural areas. Both infrastructure-based and service-based competition is also to be promoted. In the interests of promoting competition, the President's Chamber expressly welcomes the strong level of participation of the different stakeholders in the consultation held on the points of orientation and the demand survey.

One of the objectives of the proceedings is to expand existing network infrastructures, including the continuous coverage of consumers with high-performance mobile connections and the efficient and interference-free use of spectrum. It must therefore still be ensured that these regulatory objectives can be attained even if the distribution of spectrum is changed.

At the same time, the new market player and potential new entrants are to be given the chance to roll out new networks and offer mobile services. It is in the nature of infrastructure competition that it is limited both by the scarce resource of spectrum and the fact that it does not make business sense for an unlimited number of competitors to set up parallel mobile networks nationwide.

The efficient use of spectrum is also a central aim of the provision of spectrum and is not restricted to efficiency in the technical sense. It also comprises economic efficiency in the sense of reaching the greatest possible number of consumers and achieving the greatest possible benefit for the wider economy. The socio-

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economic potential of the scarce spectrum resources should also be exploited to the greatest possible extent with a view to implementing the regulatory objectives. This means that the greatest possible number of end-users should be enabled to use the services provided with the help of the spectrum and thus profit directly from the spectrum usage. In this way, the necessary service quality should also be guaranteed and innovation promoted.

4.2.2 Choice of proceedings

Under section 100(1) sentence 1 TKG, if award proceedings are ordered they may take the form of auction or tendering proceedings. Pursuant to section 100(2) sentence 1 TKG, the award proceedings to be implemented are those most suited to attaining the regulatory aims under sections 2 and 87 TKG.

In the initial assessment of the President's Chamber, auction proceedings seem basically better suited than tendering proceedings to ensuring the regulatory aims set out in section 2(2) TKG and section 87 TKG and the aims determined in section 100(1) sentence 2 TKG for these spectrum award proceedings.

These proceedings could best take account of the mandate to ensure the availability of infrastructure laid down in Article 87f of the Basic Law (GG). At the same time, sustainable competitive telecommunications markets in the fields of services and networks could be promoted, including in rural areas. Auctions have proven their worth many times in the past as 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 President's Chamber's initial assessment is that an auction serves the regulatory objective of ensuring connectivity and promoting access to and take-up of very high capacity networks by citizens and businesses (section 2(2) para 1 TKG). These kinds of proceedings could provide incentives to deploy the spectrum up for award quickly and in line with demand to expand high capacity networks so that the costs of acquiring the spectrum can be recovered as quickly as possible.

Auction proceedings seem the more suitable proceedings as regards the regulatory objective of ensuring fair competition and promoting sustainable competitive telecommunications markets in the field of telecommunications services and networks – including efficient infrastructure-based competition – as well as the associated facilities and services, also in rural areas (section 2(2) para 2 TKG). An auction is a competitive process that gives all companies – especially the new network operator, but also potential new entrants – equal access to the limited spectrum resources. An auction of usage rights could also make it possible to allocate spectrum transparently and give competitors the right scope to react in an open bidding process. Unlike in tendering proceedings, in auction proceedings all bidders have maximum transparency and flexibility concerning the value and usage interdependencies between the different bands.

Auction proceedings also seem the more suitable awards proceedings as regards the regulatory objective of safeguarding the interests of telecommunications users, particularly those of consumers (section 2(2) para 3 TKG).

In the initial estimation of the President's Chamber, auction proceedings are likely to be suited to ensuring connectivity, widespread availability and the accelerated expansion of very high capacity networks and of telecommunications services and promoting their use (section 2(2) para 3a TKG). The maximum bids in an auction, in particular, would create incentives for prompt use of the spectrum in line with demand to expand

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very high capacity networks, so that the costs of acquiring the spectrum can be recovered as quickly as possible. Despite the criticism received on this issue, the President's Chamber does not currently see any indication in its early findings that an auction would hinder the broadband rollout by taking up funds that were needed to expand the network. This has been confirmed by previous auctions, which have provided no specific indication that companies that invested higher sums in acquiring spectrum have subsequently invested less in the network rollout than other companies that acquired lower payment obligations. It is not possible to follow the argument put forward in the responses to the points of orientation that there is a connection between spectrum costs and investment volume and that this has a negative effect on the broadband rollout.

The payment obligations from past award proceedings are only likely to play a minor role in relation to total revenue and therefore should not be a deciding factor for investments in network rollout. On the contrary, it can be seen that the factors determining decisions on investments in network rollout are the specific business models, the development of demand, and the level of competition in the market.

In its 12th Sector Report, the Monopolies Commission stated:

"The Monopolies Commission does not currently have any indications that spending on the auctions held in Germany is a major factor in the corporate risk of mobile network operators (margin no 129 et seq, page 57 et seq)"

What is more, the President's Chamber will examine additional options in the course of the auction proceedings to counter the concerns raised about the investment resources (see position 4, "Uninterrupted, high-performance broadband coverage").

The President's Chamber initial assessment is that awarding spectrum in incentive-focused auction proceedings can optimise the allocation of spectrum (section 2(2) para 3b TKG). It gives the market maximum flexibility to accommodate its individual business models with which network operators can meet the interests of consumers in terms of price, quality and choice. Awarding the spectrum in auction proceedings would create incentives to encourage prompt use of the spectrum in the interest of the consumers for the provision of innovative services in a competitive environment.

By contrast, in tendering proceedings, the degree of geographic coverage would also be decisive as well as the criteria of the applicant's reliability, specialist knowledge and financial capability, the suitability of their plans for using the relevant spectrum and the promotion of a sustainable competitive market. If applicants are otherwise equally suitable, the applicant to be selected would be the one ensuring a higher level of geographic coverage with the relevant telecommunications services (section 100(6) TKG).

In a tender, a voluntary commitment is submitted and checked by the Bundesnetzagentur. Established network operators could have an advantage here, as they already have a higher degree of geographic coverage. The result could be a market development with negative effects for users in terms of choice, price and quality as well as possibly making it more difficult for the new network operator and potential new entrants to gain entry to the market. A network operator not already established in the market would actually have to show they filled the other relevant criteria of the tendering proceedings better in order to ultimately be chosen.

Therefore, the initial assessment is that auction proceedings are better suited to ensuring the regulatory objective of section 2(2) para 3b TKG.

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Auction proceedings are also suited to securing efficient spectrum use as envisaged in section 2(2) para 5 TKG. Auction proceedings could promote optimal and economical use of the resources and create incentives to encourage the use of the most efficient possible radio systems and consequently the best possible use of the spectrum resources in a competitive environment.

The majority of respondents commenting on the points of orientation were generally 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."*⁵

With these points, too, in mind, the President's Chamber currently judges the more suitable method of achieving the regulatory objectives set out in sections 2 and 87 TKG and the objectives set out in section 100(1) sentence 2 TKG to be auction proceedings.

4.3 Proposed spectrum swap

A "spectrum swap" is proposed to relieve the demand situation in the 800 MHz band and promote the regulatory objectives.

Considerations:

The starting point is the current assumption that spectrum is scarce, especially in the 800 MHz band, and that therefore objective, transparent and non-discriminatory award proceedings must be held.

The spectrum is currently assigned to the three established mobile operators until 31 December 2025. They have argued that the 800 MHz band is of considerable significance for nationwide coverage with LTE (Long Term Evolution, 4G). Losing the spectrum, or even just part of it, would probably lead to considerable negative impacts for coverage from 2026, they stated. As well as the established mobile network operators, the new market participant, 1&1 Mobilfunk GmbH (1&1), has also expressed interest in more spectrum for use from 2026 onwards. 1&1 sees spectrum below 1 GHz as essential for its nationwide and indoor coverage.

Only 2 x 30 MHz in the 800 MHz band will become available in the short term for (at least) four interested parties, but splitting it up among more than three users is technically inefficient. The available spectrum cannot be fully utilised in that case. Further splitting up the spectrum would mean it would not be possible to make the full bandwidth available to consumers. The networks, both in Germany and in other European

⁵ Monopolies Commission, 12th Sector Report Telecommunications (2021), page 50, available (in German) at www.monopolkommission.de/images/PDF/SG/12sg_telekommunikation_volltext.pdf

countries, usually use two paired 5 MHz blocks for broadband mobile communications, as this seems the most sensible division, technically and economically, to ensure adequate broadband coverage nationwide.

Other spectrum for MFCN below 1 GHz is assigned until the end of 2033. The current assignment situation below 1 GHz is as follows:

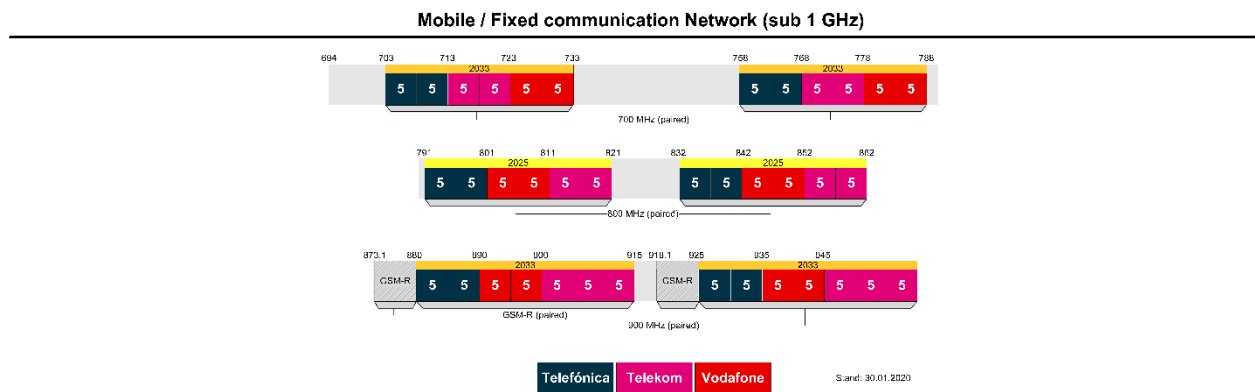


Figure 2: MFCN in the band below 1 GHz

The 800 MHz spectrum is mainly used for mobile broadband coverage, especially in semi-urban and rural areas. The "grey spot" cooperation currently being implemented also takes place on the 800 MHz spectrum. On the one hand, therefore, the established network operators want to keep their assignments at 800 MHz so as to maintain their existing mobile coverage, while on the other the new, fourth market participant seeks equal opportunity to access spectrum below 1 GHz. Yet to meet the regulatory objectives set out in the TKG, ensuring mobile coverage – existing and future – and fair competition are both important. Both aspects serve the interests of users and consumers.

The President's Chamber seeks a balanced way to meet both aspects of the regulatory objectives to the greatest extent possible. The coverage for the population with mobile broadband should remain at least to the extent that it exists today on the basis of the assigned 800 MHz spectrum. Yet there is a possibility for the new, fourth market participant and any potential new entrants to access equivalent spectrum.

To reconcile these objectives, the President's Chamber proposes taking account of the different interests with a "spectrum swap".

With this, the usage rights:

- for 800 MHz would not expire until the end of 2033, rather than at the end of 2025;
- for 900 MHz would expire at the end of 2025 already, rather than at the end of 2033;
- for 900 MHz would be awarded (to the same extent) rather than those for 800 MHz.

The 900 MHz spectrum would then be offered to the market in objective, transparent and non-discriminatory proceedings in place of the 800 MHz spectrum. As far as the physical properties of the spectrum and the type and extent of network infrastructure are concerned, the 800 MHz and 900 MHz spectrum are essentially interchangeable.

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A spectrum swap could not resolve the scarcity situation mentioned but it could relieve the demand situation by making other spectrum below 1 GHz available in place of the 800 MHz which, according to the established network operators, is particularly important for broadband coverage.

The President's Chamber sees the 900 MHz spectrum as particularly suited to a swap with the 800 MHz. If the 900 MHz spectrum were re-awarded, all current assignment holders would probably be able to reacquire at least part of their spectrum.

The 900 MHz spectrum is currently used almost completely for GSM (Global System for Mobile Communications) services, such as voice telephony or M2M (Machine-to-Machine) applications, in some areas in all three national mobile networks. These services can alternatively be provided using LTE-based technology (Voice over LTE, VoLTE).

Even taking account of old devices and M2M applications as well as eCall, it should be possible to reduce the spectrum used by GSM. 2 x 5 MHz seem sufficient for this. In contrast to the 800 MHz band, therefore, it seems possible for each established network operator to have one paired 5 MHz block in the 900 MHz band.

It is also conceivable that the other applications that rely on GSM could be served by a shared GSM network or one provided by one network operator. The President's Chamber does not therefore see it as absolutely necessary for each network operator to have its own usage rights in the 900 MHz band.

If, in the event of the swapped 900 MHz spectrum being awarded, the potential assignment holders acquire long-term spectrum usage rights, possibly a small amount of them, the following should be noted: even if a network operator were to halt the spread of GSM, the relevant spectrum could be used efficiently for other radio technologies. It is possible to convert smaller blocks, such as 2 x 5 MHz, to, say, LTE. As far as broadband is concerned, if it is only possible to offer end-users lower speeds, the spectrum could be combined using carrier aggregation or, for example, via NB-IoT (narrowband Internet of Things), for specific applications. It should also be noted that assignment holders will have the opportunity to adjust their spectrum to their altered needs in future proceedings, aside from the basic options of spectrum trading and cooperation.

A spectrum swap with the 700 MHz spectrum would also be possible, but a fragmentation of the spectrum usage rights below 1 GHz beyond different bands is to be avoided.

As the 900 MHz band is larger (2 x 35 MHz), it should be noted that following a swap with the 2 x 30 MHz at 800 MHz, one paired block of 900 MHz would remain. This would be, as before, assigned until the end of 2033 to Telekom Deutschland GmbH, which acquired 2 x 15 MHz in the 2015 auction but would, like the other assignment holders, only swap 2 x 10 MHz. However, it is likely to be expedient to include the duration of this block after 2033 in the proceedings so as to avoid a fragmentation of the 900 MHz band.

With a view to the next steps, the first stage is to find out the needs and interests of current assignment holders and the market entrant as well as potential new entrants with regard to the efficient use of spectrum and other regulatory objectives. Following the consultation process, the President's Chamber will, if necessary, have to examine whether this method would come into consideration ex officio even if not all relevant assignment holders were to participate.

4.4 Uninterrupted, high-performance broadband coverage

To improve broadband coverage, a greater focus is placed on the perspective of users. There are various proven and new regulatory tools available for this purpose, which can be combined and applied in a targeted manner.

Considerations:

Electronic communications are becoming increasingly significant for a growing number of sectors. High-performance, uninterrupted broadband coverage is essential for public welfare and a flourishing economy. Capable networks are a prerequisite for consumers to use mobile broadband services and thus participate in the digital transformation. It is accordingly of great importance for the President's Chamber to create the necessary framework conditions and incentives for efficient spectrum usage. In previous spectrum award proceedings, ambitious coverage obligations were imposed, enabling significant progress in mobile broadband coverage to be achieved.

The improvement of mobile coverage can make a particular contribution to meeting the regulatory objectives of sections 2 and 87 TKG. Ensuring connectivity and promoting access to and take-up of very high capacity networks by all citizens and businesses (section 2(2) para 1 TKG) implies that mobile infrastructures exist across the whole country. This is set out specifically in the objective of the largely complete, uninterrupted coverage of transport routes for all end-users by the end of 2026 (section 87(2) para 1 TKG). Improvements in coverage generally lead to increased use of spectrum resources, so the efficient use of spectrum is promoted as well (section 2(2) para 5 TKG). The rollout of high speed telecommunications networks is ultimately also in the interests of users and consumers by providing the required connectivity (section 2(2) para 3a TKG). With a view to the rollout in not-spots, this applies in particular with regard to equivalent standards of living in urban and rural areas (section 2(2) para 3d TKG). The President's Chamber thus also sees the removal of remaining non-spots as a key objective. These are often areas that are difficult to reach, despite the continually expanding network, and particularly expensive to connect with mobile broadband.

Consultation responses and meetings with authorities have revealed a number of requirements for uninterrupted, high-performance coverage, including:

- high-bit-rate mobile coverage in places where people move around and spend time (households, local recreation areas, industrial estates, tourist sites, etc),
- uninterrupted basic coverage in remote areas so it is at least possible to use navigation or emergency call services; nationwide uninterrupted (voice) communications,
- indoor coverage,
- coverage of agricultural and forestry land to support automated management processes and sensor technology,
- particularly fast reaction times of the network (latency) on roads to support autonomous driving, including across borders,
- high-bit-rate mobile coverage of railway lines,
- uninterrupted coverage of inland waterways to support navigation and logistics,

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

- broadband coverage in areas near coasts, especially for pilot communications, and
- broadband coverage in the exclusive economic zone (EEZ), especially for communication in off-shore wind farms.

These needs have differences as regards the specific network performance. The applications typically used by private users are driven rather by capacity, but for autonomous driving, for example, particularly low latency is required. Control applications, meanwhile, rely on a high degree of availability, while for sensor technology the priorities are the cost sensitivity and longevity of the equipment, which is why networks are needed that can operate a multitude of devices. Different network requirements therefore have to be met depending on the application and sometimes different areas of spectrum are particularly suitable for these.

However, it is precisely the interests of users and consumers that show that the promotion of regulatory objectives by improving coverage has its limits, since the maximum benefits for users in terms of choice, price and quality also have to be worked towards on the basis of effective competition (section 2(2) para 3b TKG). Fair competition thus also has to be secured and sustainable competitive markets have to be promoted, including efficient infrastructure-based competition as well as the associated facilities and services, also in rural areas (section 2(2) para 2 TKG).

Improvements to coverage caused by obligations may not be implemented at the cost of competition. Otherwise, there would be a risk in the long-term that the ongoing harmonisation of network infrastructure could lead to reduced choice and higher prices for users. In infrastructure-based competition, it will probably only be possible to differentiate between competitors if the regulatory framework permits different business models with different infrastructure, which forms the basis on which to offer different prices and network qualities. However, this also means that not every network operator can be obliged to expand to every location. Cooperation projects among network operators, such as roaming, can in principle help to improve coverage for all end-users, but they can also lead to the harmonisation effects on the networks mentioned above if the network operators not present at particular locations have to replace rollout costs with roaming costs.

It also needs to be borne in mind that mobile communications infrastructure is not well-received everywhere, that is to say, the calls for better network coverage may clash with the concerns of other affected parties. This may lead to a lack of willingness to lease property for potential mobile sites or to resistance from citizens' action groups. Other aspects of public interest, such as environmental or building issues, have to be taken into account too. These have already led to delays in implementing existing coverage obligations.

The President's Chamber therefore intends to break new ground in these award proceedings and employ innovative measures to improve network coverage, especially in underserved areas. There are various possible regulatory instruments to do so. The President's Chamber is considering both tried and tested and new means of promoting uninterrupted, high-performance broadband coverage, as explained below.

4.4.1 Coverage obligations

Coverage obligations are a proven method of sustainably advancing network rollout. They involved specific requirements as to the degree of coverage (relating to households and transport routes) and the data rates to be achieved. All assignment holders were basically treated equally, ie the obligations were associated

symmetrically with all blocks assigned. Only new entrants got different obligations because of the nature of their starting position.

When setting obligations, it must be remembered that the deadline to fulfil the coverage obligations from the last award in 2019 has not yet been reached. Some of them have to be met by the end of 2022 and others by the end of 2024. The market entrant (1&1) has different obligations.

The President's Chamber takes the view that future obligations should be focused on removing non-spots and grey spots, with further emphasis on quality parameters as well. It is considering taking account of user perspectives in its determination. It should be noted that this will make the objective consideration and assessment of the coverage situation more complex. Users' actual experiences do not only depend on the available mobile network and the contractually agreed conditions. Other influencing factors include:

- the number of active users in a cell at any one time,
- the distance of the user from the mast/base station within a cell,
- the technical properties of the device,
- the temperature and battery level of the device,
- in the case of indoor use, the type of building or vehicle, and
- if the user is on the move, speed.

When designing obligations, the fact that network operators have no influence on these uncertainties must be factored in, but it also has to be taken into account that there are other technical solutions to create coverage inside buildings or vehicles, such as WLAN.

With a view to the existing, ambitious obligations, the President's Chamber is considering making asymmetric determinations with a greater focus on the user perspective. In this way, for example, individual blocks could incur special obligations so that interested parties would acquire specifically those blocks. The acquiring of individual blocks might possibly be associated with obligations to supply various, specific non-spots. Asymmetric obligations would be particularly suitable to permitting different business models with a view to the network rollout. Asymmetric obligations were already weighed up in the award proceedings BK1-17/001.

Under consideration here is additionally a determination of different times for the fulfilment of coverage obligations (staggered deadlines), which would involve setting interim targets to be met, for example, at yearly intervals. This would open up the possibility of stepping in early with countermeasures if deadlines were not being fully met and it would be possible to achieve discounts or bonuses more quickly. In particular, monetary incentives could cause coverage targets to be met more quickly. Regarding coverage in the EEZ, the Chamber wishes to point out that mobile broadband coverage in the EEZ largely depends on the type of provision of the spectrum, which in turn depends on the business models of the market players and the spectrum bands needed. The President's Chamber has already received the perspectives of individual market participants and expects the consultation responses to contain more comments from the market about how to achieve EEZ coverage in line with demand.

4.4.2 Rollout incentives

A spectrum auction is particularly suited for innovative instruments for improving coverage. Unlike with tendering proceedings, the bidders compete in transparent, multiround auctions for the spectrum blocks. Incentives to improve coverage aside from coverage obligations can be provided.

These may be tools that include coverage improvements in the submission of bids. Tools could also be chosen that redirect the funding gained from the highest bids right back into the network rollout, in line with the conviction of the President's Chamber that an auction does not serve to generate income.

One possibility would be submitting bids in the form of binding coverage obligations. The initial assessment is that this would require bundling the blocks into packages. The winner would be the bidder with the highest coverage obligation. Newcomers would have to be dealt with separately; it might be necessary to determine a deduction to ensure equal opportunities. This approach might only be applied to part of the spectrum, so that aspects of a tender could be combined with aspects of an auction.

One option would be for bidders in the auction to make pre-defined, voluntary commitments with their bids that would be taken into account with a discount or a higher valuation of the bids. Alternatively, a two-stage process would be possible. In the first stage, interested parties could make separate commitments and acquire pre-defined blocks. Then the remaining available spectrum would be auctioned off in the second stage. France took an approach like this in its award of the 3 400 – 3 800 MHz spectrum in 2020.⁶

Another possible means of turning monetary spending into rollout incentives in auction proceedings would be to connect investment commitments with bids. Sweden chose a model like this for its 800 MHz spectrum award in 2011. It set a basic sum for a block that formed part of the bid but did not have to be paid after the auction. Instead, it had to be shown that the sum was used for a specified expansion of the network.⁷

A further possibility would be combining an auction of the blocks with a reverse auction. The President's Chamber believes that combining the process with a reverse auction could be a suitable way of achieving coverage as quickly as possible for unserved or underserved areas. First the blocks would be auctioned, then in a second stage additional coverage obligations would be auctioned. Bidders could undercut each other and the bidder claiming the lowest costs would get the award. In this way, part of the proceeds of the first part of the auction would be offset against the bids from the second stage. Austria successfully carried out a process of this kind in 2020.⁸ However, it should be noted that not all the areas needing coverage would necessarily be awarded in this process.

4.4.3 Cooperation

There has been a clear increase in mobile broadband coverage in recent years. But in some cases, infrastructure-based competition is reaching its limits and it can no longer be expected that there can be a full,

⁶ ARCEP, decision 2019-1386, available (in French) at <https://en.arcep.fr/news/press-releases/view/n/5g-23.html>

⁷ PTS, 800 MHz award in 2011, available at www.pts.se/en/english-b/radio/auctions/licences-in-the-800-mhz-band/

⁸ RTR, reverse auction 2020, available (in German) at https://www.rtr.at/TKP/was_wir_tun/telekommunikation/spectrum/procedures/Multibandauktion_700-1500-2100MHz_2020/FRQ5G_2020.de.html

multiple network expansion using operators' own resources. The provision of mobile coverage for rural areas is complex and challenging. In areas where there is no mobile coverage in line with demand from one mobile network operator, further market-oriented, private investments only make limited economic sense because these areas are thinly populated and rolling out a mobile network incurs high costs.

Incentives, together with coverage obligations, are therefore to be set to encourage further cooperation, keeping rollout costs down and speeding up the expansion.

The existing cooperation projects among mobile network operators are to continue and the President's Chamber would welcome further ones. It therefore intends to expand the possibilities for cooperation and handle them flexibly.

In this context, the President's Chamber wishes to draw attention to the following:

The Bundesnetzagentur is revising the framework conditions for cooperation projects. It intends to permit network rollout cooperation in principle, provided that it

- maintains or improves spectrum usage efficiency, ie there may not be a worsening of overall coverage (area, speed),
- neither distorts competition nor is discriminatory,
- is not in opposition to the original award proceedings of a spectrum assignment,
- takes account of the resilience of the mobile networks,
- other legal framework conditions (in particular the conditions of use and international agreements on spectrum use) are complied with, and
- the fulfilment of the regulatory aims under sections 2 and 87 TKG is ensured.

Cooperation between mobile network operators is voluntary and based on private-law agreements between undertakings. In view of the negotiation requirement set out in the President's Chamber decision BK1-17/001 of 26 November 2018 and the greatest possible promotion of the regulatory objectives, it should be non-discriminatory.

Many different types of cooperation are possible, from the shared use of land, supply lines, masts, etc to radio access network (RAN) sharing and the joint use of spectrum resources.

Sharing of passive infrastructure does not need to be notified, whereas other types of cooperation have to be notified to the Bundesnetzagentur in advance. This is without prejudice to the assessment under competition law by the Bundeskartellamt or the competition authorities competent in an individual case.

Cooperation among all mobile network operators is essentially possible to achieve (basic) coverage for all end-users, particularly in sparsely populated areas. The Bundesnetzagentur also published its initial considerations on an "operator model" in the scenario paper.⁹ Besides a market initiative, the regulatory promotion of an

⁹ Bundesnetzagentur, Scenario paper 2021, page 8, available at www.bnetza.de/SzenariosPaper2021

operator model by linking a spectrum block to cooperation requirements or awarding it to a consortium would also be an option. There would be various means of implementing this. The basis of an operator model could be an existing network of one mobile network operator or sites of multiple operators.

This type of cooperation was achieved in the United Kingdom (UK) with its Shared Rural Network project.¹⁰ The main aim of the UK cooperation was to go beyond the coverage obligations imposed to remove almost all grey spots and to set up new mobile masts for shared use in non-spots. The improvement in LTE coverage is financed jointly by mobile network operators and the State. An example of an alternative, market-driven approach was in Sweden, where in the award of the 800 MHz spectrum in 2011 several network operators acquired spectrum together to achieve nationwide basic coverage.

Cooperation projects to continue to operate technology that is being phased out, such as GSM, are a further possibility. The available spectrum could then be used more efficiently with the newest technology and thus contribute to improved coverage.

4.4.4 Transparency

Transparency can foster competition for the best coverage if consumers can recognise the quality of the network rollout across the country and the progress made in meeting coverage obligations. For this reason, greater transparency concerning the expansion of each network operator is to be created. In addition to the actual fulfilment period, the gradual fulfilment of the obligations is also to be made transparent, for example in the form of status reports.

Information about the setting up of sites, at least in rural areas, might also be provided transparently, allowing for synergy effects in the removal of not-spots and improving consumer acceptance.

4.4.5 Participation

To improve mobile coverage, many more mobile sites will have to be set up in the coming years and many of the existing sites upgraded. The use of small cells will be necessary to increase the density of the mobile networks in metropolitan areas. These are to be installed increasingly around public transport and in, or on, objects in public areas, known as street furniture, but this requires federal, state and local authorities as well as providers of public infrastructure to work together.

Network operators and the federal states started a discussion in the course of implementing the coverage obligation "500 base stations in not-spots" from the President's Chamber decision BK1-17/001 of 26 November 2018 with the aim of identifying potential for support in, for example, the search for sites. It was possible to speed up the rollout of base stations in not-spots. This kind of dialogue could help to identify and target obstacles in network rollout in the future, too.

To accelerate the network rollout especially along transport routes (roads, railway lines and waterways), it is also necessary for those companies or organisations that actually control the organisation of the routes and their equipment to play a role. This is the only way to quickly create a framework for the rapid rollout of

¹⁰ Department for Digital, Culture, Media & Sport – Shared Rural Network, Transparency Commitment, available at www.gov.uk/government/publications/shared-rural-network-transparency-commitment-publication/shared-rural-network-srn-transparency-commitment-publication

mobile sites that make use of existing infrastructure along transport routes. One example of this is the "connectivity masterplan" in which the mobile network operators and Deutsche Bahn are developing ways to improve the coverage situation on rail routes.

It is also beneficial for speeding up the network rollout if representatives of the various levels (federal, state, local) contribute so that existing infrastructure can be made available on the best possible terms.

4.5 Promotion of service-based competition

The provision of spectrum is also intended to promote competition at the service level. As well as the proven obligations, there could also be incentives to enter into voluntary commitments. Market penetration with new technologies such as 5G could especially strengthen competition.

Considerations:

With their mobile offers, service providers and MVNOs help to strengthen competition at the service level and thus to promote consumer interests. The President's Chamber seeks to further foster and reinforce competition at the service level. The President's Chamber set the service provider regulation that currently applies in its last spectrum award decision in 2018. It includes a negotiation requirement (see President's Chamber decision of 26 November 2018, BK1-17/001, point III.4.15).

The President's Chamber considers that the negotiation requirement can continue to be an effective means of promoting competition in future, while also being aware that the effectiveness of this tool is a subject of controversy among market participants. Market participants had the opportunity to comment on service-based competition, among other things, in the course of the publication of the points of orientation. Calls for more extensive obligations were made from one side, while from the other such obligations were rejected.

The negotiation requirement is linked to the current assignments and applies until these expire. Bearing in mind the comments made, it now needs to be examined whether measures going further are necessary to promote competition at the service level.

The existing negotiation requirement, like spectrum management as a whole, is designed to be technologically neutral. Assignment holders already have to negotiate with service providers and MVNOs on a non-discriminatory basis about wholesale products based on all available technology, including 5G.

The President's Chamber sees the penetration of the market with the latest radio technology, such as 5G, as extremely important to promote and uphold effective, service-based competition.

Service providers and MVNOs rely on the quality of wholesale products of the network operators for their offers on the market. Experience gained in the introduction of new standards such as LTE and 5G in the past indicates that network operators sometimes pass on these kinds of technology to service providers and MVNOs with a considerable delay.

Insofar as a network operator can claim a right to first-mover competition with the introduction of new technology, this can only be tightly limited in terms of time and subject, if it is even applicable to the passing on of radio technologies at all. Where spectrum access is regulated with particularly scarce resources, the

subjective rights of network operators always have to be weighed against the public interest, especially the duty of efficient spectrum use and the promotion of the interests of users and consumers.

It should be taken into account that the network rollout has to be viable for network operators, but this viability cannot entirely depend on whether, and when, they pass on new technology like 5G to service providers and MVNOs, but also on the pricing of wholesale products and retail products. Network operators are still free to market tariffs based on new technology to end-users as premium products initially and to restrict certain brands for themselves but, as providers of wholesale products, they should grant the same entrepreneurial freedom of decision to service providers and MVNOs as well.

The Chamber assumes that network operators, as well as service providers and MVNOs, use their pricing and service design to serve end-users in different segments, including the demand for premium, standard and discount products. New technology will always gain ground if it is meeting existing demand. Service providers and MVNOs show innovation not solely in the introduction of new technology itself but also in product and tariff design. The longer network operators use and market a new technology exclusively, the more the opportunities of service providers and MVNOs to exert competitive pressure on operators effectively are likely to be reduced. For this reason, negotiations on non-discriminatory access to new technology, including as wholesale products with the possibility of designing products and tariffs, should be concluded as soon as possible or service providers and MVNOs could be shut out from the competitively relevant use of new technology.

In the provision and marketing of new technology, all quality characteristics of the networks (such as data rate and latency) do not necessarily have to be offered equally for wholesale products right from the start – this is a matter for parties to negotiate as they exercise their freedom of contract. However, the use of new technology for consumers is to be promoted with the aim of enabling as many consumers as possible to benefit from its advantages in the interests of connectivity. This applies in particular for the mobile coverage related to the 5G rollout.

It should here be noted that more than three years have already passed since the provision of spectrum for 5G in 2019 and more than two years since the start of marketing of 5G by mobile network operators in 2020.¹¹

If negotiations are refused or carried out in a discriminatory manner, those affected can turn to the Bundesnetzagentur. They can either request arbitration proceedings, that is, call in the Bundesnetzagentur to act as "referee", or initiate a formal dispute resolution procedure before a ruling chamber. Both methods have been chosen by parties concerned in recent years and led to negotiations being started or restarted.

The President's Chamber is continually monitoring the competitive situation on the service provider market, focusing not least on the situation of foreign service providers and MVNOs on the German mobile market. If there are signs of a lack of insufficient competition on the service provider market, the President's Chamber will take an assessment of the competitive conditions as a basis for weighing up new means of promoting competition. An assessment of the competitive conditions is likely to focus in particular on market shares and

¹¹ Telekom: www.telekom.de/unterwegs/was-ist-5g/5g-mobilfunk, 2019/2020; Vodafone: <https://newsroom.vodafone.de/netz/5g-welches-smartphone-kann-welche-frequenz>, 2020; Telefónica: www.telefonica.de/5g.html, 2020

their development, especially the shares of those companies that can actually exert competitive pressure on the mobile network operators.

There is a wide range of participants in the service provider market (eg service providers, full MVNOs, light MVNOs and branded resellers), whose business models differ in the depth of their network use and the competitive pressure they exert on other market participants. In this context, the notification requirement set out in section 5 TKG becomes relevant. It enables the Bundesnetzagentur to maintain an overview of market participants (see Bundestag printed paper 15/2316, page 60, re section 6 of the old version of the TKG).

It would be conceivable to make the negotiation requirement more specific in order to promote competition. For example, a reporting requirement could be added so that parties concerned would have to provide regular information on the status of ongoing negotiations, progress, or the specific content of contracts. A general notification requirement on specific wholesale requests or the beginning and end of negotiations on them is another possibility.

In addition, possible award proceedings could set incentives for potential assignment holders to enter into voluntary additional commitments vis-à-vis service providers and MVNOs. These incentives could take the form of discounts on maximum bids with which a voluntary additional service provider obligation is entered into.

Asymmetric obligations also come into consideration. Such obligations would be attached to certain, pre-defined blocks but would apply to the whole spectrum portfolio of the assignment holder. They could consist of concluding contracts for wholesale products with a minimum number of service providers and MVNOs, which could also encourage assignment holders of other blocks to give service providers and MVNOs access to their networks because they could get a share of the proceeds and utilise their networks more efficiently.

Ultimately, symmetric obligations up to a general access obligation in favour of service providers and MVNOs are not ruled out from the start.

The measures and tools described here for strengthening competition on the service level are not to be understood as exhaustive. A final decision on whether, and which, measures are taken will be made at a later point in the proceedings as part of a possible award decision (President's Chamber decision III), in which the President's Chamber will assess the competitive conditions and examine the necessity and proportionality of such measures, especially with a view to the symmetric negotiation requirement.

4.6 Competitive independence

Every undertaking can formally register its spectrum requirements in the spectrum provision proceedings. If an award of scarce spectrum usage rights is made, only competitively independent undertakings can take part.

Considerations:

The proceedings of the Bundesnetzagentur are objective, transparent and non-discriminatory. In light of this, participation in past award proceedings was generally not restricted. Every undertaking can register spectrum requirements and seek to participate in the spectrum provision proceedings. How the requirements of

undertakings are to be assessed in the further stages of the proceedings with respect to their competitive independence is to be explored in the respective considerations of these stages.

The principle of competitive independence is fixed in administrative practice and is highly significant for the provision of spectrum. Competitive interests must be taken into account in every assignment in conjunction with an assessment of the regulatory objectives and the assignment is to be refused if necessary (section 91(5) sentence 2 TKG). In the case of award proceedings, the requirements for assignment would be examined at the latest in the admission process, including whether obligations arising from preceding award decisions or assignments had not been implemented, or not implemented in good time.

In the course of any order for award proceedings and the related examination of the registered requirements, it would have to be considered whether the requirements notified were sufficiently specific with regard to the requirements for assignment and the soundness of the plans submitted to be included in the forecast and possibly to justify spectrum scarcity.

Regarding the four mobile network operators, the following should also be noted:

1&1 Mobilfunk GmbH (1&1) acquired spectrum in the 2019 auction to provide coverage for end-users on the basis of its own mobile network. At the same time, associated companies sell mobile communication services on the basis of competitors' networks as service providers/MVNOs. This dual role as a network operator and a service provider/MVNO is only permissible for a transitional period, according to the President's Chamber decision

BK1-17/001 of 26 November 2018.

However, the President's Chamber decision did not specify a timeframe for it to come to an end. A specific date for implementing the principle of competitive independence is the subject of separate proceedings. The Bundesnetzagentur must ensure that the separate determination on competitive independence is not in contradiction with the decisions in these proceedings on the provision of spectrum in the 800 MHz, 1,800 MHz and 2,600 MHz bands.

Competitive independence must also be taken into account in cooperation projects. The fact that network operators compete independently of each other should not rule out cooperation. On the contrary, the President's Chamber's aim is to promote cooperation projects that serve the regulatory objectives, in particular with a view to the further expansion of the networks in the interests of users and consumers (see position 4, "Uninterrupted, high-performance broadband coverage").

Annex - summary of responses to the points of orientation

The respondents essentially said the following regarding the points of orientation:

Respondents welcomed a joint provision of spectrum in the bands at 800 MHz, 1,800 MHz and 2,600 MHz, as this would bring the greatest possible planning and investment certainty for undertakings. It was also stated that including the spectrum set to expire in 2033 and other spectrum in the overall assessment could make sense. The greatest possible scope of proceedings would offer all potential bidders the optimal combination of spectrum. It was also argued that the spectrum should be assigned as contiguous spectrum as far as possible to avoid it becoming fragmented. A harmonisation of the assignment periods was also important, it was said.

It was pointed out that long-term planning and investment certainty could only be achieved with correspondingly long assignment periods. Several respondents put forward that these should be at least 20 years. Some respondents also called for an extension of existing usage rights.

It was argued that the blocks to be assigned must be big enough for their use to make technical sense. There should not be any less than a minimum size of 5 MHz per paired block. The provision should also be on a technology-neutral and service-neutral basis in order to secure the existing mobile coverage and ensure uninterrupted coverage and nationwide provision. A nationwide assignment would also be necessary for this purpose.

On the subject of competition and equal access, one side argued that there was intensive competition on the German mobile market with increasing demand and quality-based competition driving the network rollout. The promotion of infrastructure-based competition was welcomed, since competition was not then reduced to mere price competition. Moreover, equal access meant that all network operators, including new entrants, had the same chance of assignments with the same requirements. Privileges for later or new entrants must therefore be ruled out.

From the other side, it was argued that there was sufficient spectrum for the operation of four mobile networks and for that reason, another non-discriminatory award must be made. The Bundesnetzagentur was subject to an objective duty to balance out asymmetric spectrum packages. National roaming was no substitute for having one's own spectrum but only a necessary interim solution with far-reaching technical limitations for end-users. Moreover, the negotiation requirement had not had the desired result as no terms had been set out for it.

Linking spectrum requirements to the principle of competitive independence was regarded as surprising and inappropriate in the comments and was, if at all, part of the implementation of the 2019 auction proceedings. At the same time, binding requirements were also welcomed in other comments on the basis that these could create planning certainty for all concerned. Such requirements should be determined in separate proceedings. Those addressed in the points of orientation, on the other hand, were too late and the deadlines too long. The times of 2023 and 2025 were well behind the key elements from 2021. Missing deadlines must have direct consequences. In any case, deciding on the duration of any extension must not be influenced by the question of how long a network operator needs to create a legally compliant situation with regard to the principle of competitive independence.

With regard to service-based competition, some respondents considered the current service provider regulation on the negotiation requirement sufficient as the mobile market in Germany was characterised by effective competition on the services level. Service providers had access to the LTE network of all network operators and in some cases even to the 5G network and were therefore able to market competitive products. Moreover, the dispute resolution procedure on the service provider regulation showed that existing rules were effective and a service provider obligation was not necessary.

However, other respondents did call for a new service provider regulation or at least an assessment of the competitive conditions pursuant to section 105(2) TKG. They argued this on the basis that the current service provider regulation was ineffective since established mobile network operators were not actually negotiating with the aim of concluding a contract. Service providers had only been given access to the LTE network many years after its market launch and this is not currently non-discriminatory as the service providers were not offered the maximum possible speed. There was thus a need for an access obligation for service providers or special incentives in the awards proceedings to enable the networks to be opened up for service providers.

Respondents generally supported the explanations about the maintenance and improvement of mobile coverage.

In order to prevent a decline in coverage for millions of customers, there were some calls for an extension of existing assignments below 1 GHz, since it could take years to set up a new nationwide network.

The development of an overall concept taking account of rollout obligations and incentives such as reverse auctions, state funding programmes and network operators' own targets was positively received, but there were different proposals about the design of obligations. On the one hand, it was requested that only basic coverage should be stipulated for the nationwide coverage so that a differentiation in network quality was still possible and infrastructure-based competition would remain. Symmetric, high coverage obligations could lead to negative incentives and negative effects on the end-user price level. The free infrastructure competition of independent network operators was essentially the suitable means to create efficient and appropriate coverage with broadband mobile services, including in rural areas. On the other hand, there were calls for nationwide 5G coverage. All rural areas, including agricultural and forestry land and commercial areas in peripheral locations, would rely increasingly on high-speed internet based on fibre and 5G mobile technology in coming years. Some respondents also wished coverage parameters for coverage obligations to be set already during the award decision. Coverage obligations should moreover be more focused on the user experience, they argued.

New obligations should always be examined in terms of 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.

Incentives in the form of reverse auctions garnered some positive and some highly negative comments. The advantage of a bonus for the undertaking that could most easily manage the additional rollout could drive up prices in the spectrum auction. There would be a risk of an ongoing asymmetry in network quality and coverage at the expense of infrastructure competition.

Regarding coverage requirements along transport routes, it was stated that these should only refer to coverage outside vehicles and obligations should only be made if the necessary prerequisites could be created by the beneficiaries. Experience from abroad was highlighted in this context.

In light of geopolitical developments, the hardening and IT protection of mobile networks as an additional criterion for selection decisions for assignments was regarded as worthy of discussion.

Mobile rollout cooperation was essentially welcomed by all respondents. A nationwide rollout by all mobile network operators on the basis of their own passive and active wireless network infrastructure was not economically sustainable and not necessary from an economic or ecological point of view, it was stated. Only with the help of cooperation projects could regions that were economically difficult to develop, rural and structurally disadvantaged be opened up and minor gaps in coverage along transport routes closed. Cooperation also made sense to meet the EU's sustainability targets. Some respondents took a critical view of the rollout of a fourth nationwide network as far as the meeting of climate targets was concerned. However, it was also pointed out that cooperation projects may not lead to resilience being jeopardised if only one network was available locally.

A dynamic allocation of spectrum, also for rural areas, if there was low demand in the network of one or more competitors was not currently possible due to the lack of support from current network technology and terminal equipment.

While some respondents were in favour of voluntary, mutual cooperation as had been tried and tested in the past, others called for binding requirements on cooperation. They argued that fair conditions were essential for cooperation so that it could be neutral as far as competition was concerned. Then costs could be reduced as well and end-users could get better deals.

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List of abbreviations

4G, 5G	transmission method for fourth and fifth generation mobile communications
ARCEP	Autorité de régulation des communications électroniques, des postes et de la distribution de la presse – French regulatory authority
EEZ	exclusive economic zone
BK	ruling chamber – Ruling Chamber 1 of the Bundesnetzagentur is the President's Chamber
eCall	emergency call – an automated emergency-call system for vehicles prescribed by the EU
GG	Grundgesetz – Basic Law
GHz	gigahertz
GSM	Global System for Mobile Communications - second generation mobile radio system
IoT	Internet of Things
Long Term Evolution	fourth-generation mobile transmission method (4G)
MFCN	mobile/fixed communications networks
M2M	Machine-to-Machine
MHz	megahertz – unit of electromagnetic frequency
MVNO	Mobile Virtual Network Operator
PTS	Post- och telestyrelsen – Swedish regulatory authority
RAN	Radio Access Network
RTR	Rundfunk und Telekom Regulierungs-GmbH – Austrian regulatory authority
TKG	Telekommunikationsgesetz – Telecommunications Act
UK	United Kingdom
VoLTE	Voice over LTE – voice telephony method using the 4G network

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

WLAN

Wireless Local Area Network

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