# Summary of Statements

Consultation on the

700/1500/2100 MHz Award Procedure

NON BINDING TRANSLATION



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# 1 Introduction

## 1.1 General information

RTR has carried out a consultation procedure on the key terms of the planned spectrum award in the 700, 1500 and 2100 MHz bands.

The consultation involved the presentation of considerations and options relating to key issues. In addition to product and auction design, two areas in particular were addressed that are closely related to the most recent amendment to the Telecommunications Act 2003. The amendment places the regulatory objectives of the TKG 2003—and competition in particular—more clearly and explicitly at the centre of auction procedure planning. At the same time revenue interests have been relegated even further to the background. The regulatory authority carried out a competition analysis, the results of which will be used to derive measures to safeguard competition in the downstream markets over the next few years. The second area concerns the provision of modern mobile services, specifically 5G, to the Austrian population and to Austrian companies. Based on European and Austrian 5G strategies, such as the federal government's 5G strategy, the regulatory authority has identified three central coverage targets, to be addressed by means of appropriate coverage obligations.

Given the great economic importance of the aforementioned topics, the regulatory authority addressed with this consultation not only potential bidders, but also expressly invited all stakeholders and the interested public to submit statements. This document presents a summary of the statements received.

The content addressed below is non-binding and is therefore without prejudice to any future decisions of the Telekom-Control-Kommission.

## 1.2 Statements

A total of 19 statements were received, of which the following 17 companies and organisations may be mentioned by name:

- Office of the Provincial Government of Lower Austria
- Broadband Commissioner for the Province of Upper Austria
- Deutsche Bahn AG
- Association of the Austrian Electrical and Electronics Industries (*Fachverband der Elektro- und Elektronikindustrie*)
- Austrian Association of Municipalities
- Hutchison Drei Austria GmbH
- Inmarsat
- MASS Response Service GmbH
- ÖBB Infrastruktur AG
- ORF
- Österreichische Rundfunksender GmbH & Co KG and ORS comm GmbH & Co KG

- Pöttinger Landtechnik GmbH
- simpli services GmbH & Co KG
- T-Mobile Austria GmbH
- Ventocom GmbH
- Austrian Association of Private Broadcasters (*Verband Österreichischer Privatsender*)
- Austrian Federal Economic Chamber

A total of 15 participants have agreed to the publication of their statement on the RTR website (see https://www.rtr.at/de/inf/stn_konsult700-1500-2100-mhz in German).

The regulatory authority also issued invitations to a hearing with the Telekom-Control-Kommission on 28 January 2019.

# 2 Award objectives

The TKK is focusing the award procedure on the objectives listed below:

- Objective 1: Legal certainty
- Objective 2: Ensure efficient utilisation of spectrum
- Objective 3: Safeguard/promote effective competition
- Objective 4: Promote coverage
- Objective 5: Promote innovation

Maximising auction revenue is expressly ruled out as an award objective, as is actively supporting new market entrants through actions such as reserving spectrum. The regulatory authority will especially target these objectives, where relevant and applicable, when designing the award procedure.

Efficient frequency use is ensured where bidders are able to acquire spectrum to meet their individual needs, and where a frequency lot is assigned to the bidder who puts the highest value on that lot and submits the highest bid for it.[1] This requires a *product design* that matches the demands of potential users, ensures fair and equal participation of all users and allows competition for incremental spectrum. This needs to be complemented by an *auction design* suited to identifying the bidder with the highest valuation. The award procedure also needs to be designed so as to largely avoid any *unnecessary fragmentation* of spectrum within a single band. *Aggregation and substitution risks* are to be minimised in the auction through a suitable design. Bidders should, for example, be allowed to acquire larger frequency blocks for 5G. Exercising such an option should not be impaired by switching barriers or aggregation risks.

The significance of the third award objective (competition) for the design of the award procedure is underscored by the most recent amendment to the TKG 2003. By means of a suitable selection of appropriate instruments, the regulatory authority intends to safeguard competition on the downstream mobile telecommunications markets in the coming years. The aim here is not only to prevent an excess concentration of usage rights in the hands of a single network operator, but also to ensure that a sufficient number of effective providers (mobile network operators and MVNOs) will be active on the market after the auction.

The 700 MHz band may be the last coverage spectrum to be awarded for mobile services for some time. Therefore, and in order to take into account the ambitious 5G targets of the federal government and the European Commission, the TKK will give special priority to the objective of providing the best possible coverage for the Austrian population and for Austrian companies. This approach is intended to achieve key coverage targets on the one hand, while also ensuring that spectrum is in fact used and not hoarded for the purposes of long-term strategy. Given the

[1] Cf. Art. 55 Telecommunications Act (TKG 2003) and ruling 2013/03/0149 of 4 December 2014 by the Austrian Administrative Court (complaint by a mobile network operator against the TKK decision of 19 November 2013, F 1/11-283)

importance of this objective, the regulatory authority plans to impose ambitious *coverage obligations*.

Following the awarding of the 3410 to 3800 MHz range and the publication of a position paper on infrastructure sharing, the TKK sees the award of the 700/1500/2100 MHz bands as an additional significant contribution to the introduction of 5G in Austria. Through a timely award ensuring legal certainty as well as a design focusing on award objectives, the regulatory authority is laying the groundwork for 5G innovation.

# 3 Frequency bands and frequency usage

*Question 3.1: Do you have any comments about the spectrum to be awarded?*

The consultation participants are generally in agreement with the list of frequency ranges to be awarded.

One consultation participant states that a distinction between core and extension bands should not be made for the 1500 MHz band. Another participant remarks that restrictions arising from broadcasting stations should be taken into account in the coverage obligations for the 700 MHz band. One consultation participant is keen to point out that the 2100 MHz band is a core band and that changes should be careful to account for ramp-up periods. Another consultation participant notes that the 700 MHz band would be the last band below 1 GHz for the foreseeable future and its propagation characteristics make it an ideal candidate for large-scale coverage. One consultation participant recommends assigning blocks B00 and B16 to the winner of the lowest/highest block.

*Question 3.2: Do you share our opinion that the 1500 MHz range should used for SDL (LTE band 75, NR band n75)? If not, why not? (Please give reasons for your answer); which concrete specifications (e.g. guard bands, synchronisation or duplex distances) would be necessary from your point of view?*

Several consultation participants agreed with this opinion.

One participant also says that they expect the entire band, including extension bands, to be usable for 5G from the outset. Another participant is of the opinion that 5G usage, while expected, is difficult to evaluate at the current point in time.

# 4 Product design

*Question 4.1: Do you share the view that in the 1500 MHz band the core band and extension bands should be awarded jointly? Please give reasons for your answer.*

In the 1500 MHz band, the mobile services industry generally prefers the combined assignment of the core band and extension bands. The following reasons are given:

- Investment security and legal certainty are essential to ensure efficient infrastructure setup and optimum usage of spectrum. The industry therefore views commercial clarity for the entire bandwidth as essential in order to avoid a fragmentation of spectrum.
- Furthermore, the combined assignment of core band and extension bands in conjunction with spectrum from *low-band* frequencies is crucial in order to permit a sustainable combination of 700 MHz and 1500 MHz (SDL). Differences in terms of the dates of availability (of user devices) can be addressed at the assignment stage.
- Separate assignment of band 32 sub-ranges would result in a fragmentation of the spectrum, which would in turn lead to an inefficient level of usage. The timing of band 75 assignment should be linked to the assignment of band 28.

One consultation participant voices opposition to the assignment of the extension bands on account of MSS-related protective requirements, and recommends a restriction of the auction to the core band.

Another participant argues that, given the lack of technology for the extension bands and the fact that, as things stand, legal certainty for the entire 700 MHz band would not be given until April 2023, it would perhaps be advisable to postpone the award of the 1500 MHz band plus extension bands to April 2023, along with the 700 MHz band.

*Question 4.2: How do you estimate the value differences within the 1500 MHz band? Are the value differences materially relevant for product design or can the blocks be awarded as generic lots in a single category? Do you agree to not awarding the two blocks at the lower edge of the band in the principle stage but instead to the winner of the neighbouring block? Give reasons for your answers.*

Most mobile service providers in the industry prefer generic lots to be awarded in one category per band. One consultation participant specifically states that the potential differences in value caused by the different dates of availability for equipment and user devices are minor enough to be resolved at the assignment stage. Another consultation participant endorses the award of generic blocks in one category despite considering the value differences to be difficult to assess.

Yet another participant is of the opinion that, because of the current lack of technology for the extension bands, the value differences should be seen as significant and this should therefore be accounted for in a suitable manner.

Another consultation participant expects that MSS safeguards would be accompanied by restrictions for the upper extension band and that the upper extension band would accordingly have a significantly lower market value.

General agreement is expressed for the regulatory authority's proposal to not award the two blocks at the lower edge of the band in the principle stage but assign them to the winner of the neighbouring block. Potential preferences for these specific blocks could be expressed in the assignment stage.

One consultation participant recommends assigning blocks B00 (1427 MHz–1432 MHz) and B16 (1512 MHz–1517 MHz) automatically to the winner of the lowest/highest block. These two blocks would be subject to usage restrictions.

*Question 4.3: Do you agree with selecting option A1) in view of the possible uncertainties as to when the 700 MHz band will be freed up? If not, which option should be selected? Please give reasons for your answer.*

One group of participants agrees to the A1 option preferred by the regulator, which envisages one category with generic lots because value differences have no material relevance. The value differences are considered minor enough to be expressed in the assignment stage. A further assumption is that the matter will be clarified by the time of the auction in early 2020.

Another group of participants favours a separate assignment as envisaged by option A4, while also considering the freeing-up of the band as necessary for its trouble-free usage. The band should also be available soon after the auction. The value differences resulting from the restrictions are not considered insignificant nor should they be underestimated. This group also flags up the risk of non-contiguous blocks being assigned. Accordingly, the 2100 MHz band should be awarded first and then

(*at a later point in time* after the freeing-up of the 700 MHz band), 700/1500 MHz should then be awarded jointly.

*Question 4.4: If the regulatory authority selects model A in section 7: Which product design option among B1 to D3 would you prefer? Give reasons for each answer.*

In the context of model A, the majority of the consultation participants who have given a statement on the matter prefer small lot sizes with a high degree of flexibility in the auction. This, it is asserted, would be the right level of granularity to express demand. One participant argues that small lot sizes would offer new market entrants a better chance of acquiring a frequency. Smaller lot sizes are thus one way to strengthen competition in the market.

Specifically, option B1 (2 x 5 MHz) is clearly preferred for the 700 MHz band, while option C1 (1 x 10 MHz) and option D1 (2 x 5 MHz) are preferred for 1500 and 2100 MHz, respectively. One consultation participant prefers an even finer granularity of 1 x 5 MHz for the 1500 MHz band. That participant considers a 10 MHz lot size to be too coarse and hence rejects it.

One participant rejects the simultaneous award of the three bands and prefers broader lot sizes, in the event of these bands being awarded separately. Specifically, this participant recommends options B2 or B3 (2 x 10 MHz) in the 700 MHz band, also noting that a minimum bandwidth of 2 x 10 MHz is needed to achieve a profitable network rollout. For the 1500 MHz band, the participant recommends a lot size of 1 x 20 MHz (option C2), claiming that profitable deployment is possible only with at least 20 MHz, which is needed to avoid fragmentation. For the 2100 MHz band, the participant proposes a lot size of 2 x 20 MHz (option D3), remarking that 5G usage is reasonable only with 20 MHz.

Another consultation participant advocates the use of a regional spectrum award, since new entrants could only be successful if spectrum were to be provided (*for them*) outside the auction process.

*Question 4.5: If the regulatory authority selects model B in section 7: Which product design option among B1 to D3 would you prefer? Give reasons for each answer.*

In the context of model B, consultation participants favour the 700 MHz band both for the proposed lot size option B2 (2 x 10 MHz) as well as for option B1 (2 x 5 MHz)—which is in actual fact not compatible with this model. As regards the 1500 MHz band, the consultation participants favour option C1 (2 x 10 MHz) as well as a lot size of 1 x 5 MHz. Option D1 (2 x 5 MHz) is preferred for the 2100 MHz band.

One participant rejects the simultaneous award of the three bands and prefers broader lot sizes, in the event of these bands being awarded separately. Accordingly,

for the joint award of 700/1500 MHz, a lot size of 2 x 10 MHz (option B2 or B3) is proposed for the 700 MHz band, with 1 x 20 MHz in the 1500 MHz band (option C2).

*Question 4.6: If the regulatory authority selects model C in section 7: Which product design option among D1 to D3 would you prefer? Give reasons for each answer.*

In the context of model C, most participants prefer the option with the smallest lot size, namely option D1 (2 x 5 MHz). This, it is argued, would offer maximum flexibility in the auction and be the right level of granularity to express demand. One consultation participant rejects lot sizes of 2 x 10 MHz as too coarse.

One participant prefers option D3 (2 x 20 MHz), arguing that 5G usage is advisable only from 20 MHz.

# 5 Coverage targets and coverage obligations

*Question 51: What is your opinion of the band-specific obligations for ensuring the use of frequencies? Please give reasons for your answer.*

While mobile network operators are generally receptive to the idea of applying band-specific obligations, there are a number of relevant criticisms or suggestions. One mobile network operator considers the data rates specified to be too high (especially at the cell edge). Here, it is proposed that coverage also be measured based on signal strength. The same mobile network operator also states that the obligation would hardly be logical for the 1500 MHz band, since this would not reflect the character of this band as a 'supplement band'. It should also be possible to fulfil the obligation in this frequency band later on (five years).

Another mobile network operator suggests that coverage in the 700 MHz band should initially be made available no sooner than in late 2022. However, the same statement also suggests that the scheduling conditions for potential newcomers are not ambitious enough.

Another mobile network operator proposes for the 700 MHz band the obligation to commission 200 locations within two years and 500 locations within five years instead of a population coverage of 25%. That mobile network operator also does not view the proposed obligation in the 1500 MHz band as expedient. Here, similarly to the 700 MHz band, the commissioning of 200 locations within five years is proposed instead. The obligation in the 2100 MHz band is acceptable to this mobile network operator.

The band-specific obligations are acceptable to other mobile network operators (e.g. MVNOs) or no input was provided.

The broadband commissioners in some provinces would prefer the obligation for the 700 MHz band to focus on rural areas. Accordingly, a population coverage of 25% should not apply nationwide but should target a number of specified regions with poor coverage. The data rate should also be increased to 10 Mbps. One statement proposes data rates of 30 Mbps for downlink traffic and 10 Mbps for uplink traffic. The same applies to the 1500 MHz band. Here it is suggested to include a bundling option with 700/800/900 MHz spectrum. In the 2100 MHz band, a higher bandwidth and a lower latency should also be stipulated.

Another consultation participant points out that this frequency band is envisaged for use as a 'supplement band', making a population coverage figure appear illogical.

*Question 5.2: What is your opinion of the coverage targets from a political, legal and economic point of view? Please give reasons for your answer.*

One of the mobile network operator participants broadly welcomes policymakers' interest in promoting the expansion of broadband in Austria, while also noting that the achievement of these goals is not possible solely by means of this spectrum award— the economic challenges are too great. In this context, the participant also points out that lagging broadband expansion in Austria is not simply a mobile telecommunications issue but also a fixed network problem.

The question of the economic sustainability of the obligations is also addressed by another mobile network operator, who also welcomes measures such as active and passive sharing to reduce the costs of network expansion. The proposal for operators to commit to a wholesale offer is viewed more critically, with the lack of a relevant market analysis being cited.

While the third mobile network operator also agrees to the goals being pursued, this operator does suggest in this context that it would be considerably more helpful to Austria as a region if funding were made available for network expansion and population coverage rather than for minimum or auction bids in the context of the spectrum award.

Other mobile network operators (MVNOs) consider the coverage targets to be acceptable from a political, legal and economic point of view—or have no opinion either way.

One broadband commissioner believes a coverage obligation for organisations and public institutions with poor coverage is to be welcomed from an economic perspective, arguing that mobile usage in rural areas and areas having poor coverage to date is viewed by organisations as a basic precondition for successful business development.

One consultation participant welcomes the fact that the implementation of the coverage targets takes into account telecommunications policy goals and 5G development, and further, that improvements in coverage are being sought in particular in those regions in which coverage is not guaranteed by the market itself.

The point is also made, however, that these targets to a certain extent compete with those of preferring urban areas and transport hubs. In this context, a concern is also aired that the promotion of 5G mobile technology will mean not merely deployment as a transitional technology but could effectively curb investment interest in fibre-optic infrastructure—and especially in areas with inadequate coverage. To a certain degree, the target of covering 'inhabited areas' tallies with the request of the consultation participant to provide coverage for rural areas. The draft clearly sets out the objective of equivalent conditions for the entire permanent settlement area (PSA). This objective also agrees with the most striking commitment made in the consultation paper and the draft of the 2030 broadband strategy that, citing the government programme, clearly declares its support for the large-scale availability of

gigabit connections. It is suggested to at the same time give greater attention to the practicability of this coverage target when working out the details. Furthermore, it is also noted that the large-scale coverage target is somewhat weakened by giving first priority to motorways and then to strategic roads.

Two statements submitted by railway operators call for the inclusion of railway lines in the coverage targets. These statements note that mobile coverage along railway lines is extremely important to ensure the competitiveness of rail as a transport mode. One railway operator recommends in this context downlink data rates of 30 Mbps and uplink rates of 1 Mbps.

One broadcaster representative would be keen to supplement the goals of the award procedure by (at least) the objective of "ensuring a low barrier for all Austrians to access the range of programming made available online by Austrian radio and TV broadcasters". In addition, the specific tender regulations should be supplemented by an obligation that imposes a commitment on the winners of frequency usage rights in the 700 MHz band to provide their end users with straightforward, free-of-charge access to programme content made available online by Austrian radio and TV broadcasters. These measures would be proportionate, it is argued, since this would not impose any economic burden on the parties acquiring the 700 MHz frequency usage rights.

*Question 5.3: What is your opinion of the 5G basic coverage obligation? Which changes would you propose, if any? Please give reasons for your answer.*

One of the mobile network operators explains that achieving in-car coverage of 95% with 10 Mbps downlink and 1 Mbps uplink along roads and motorways would be possible only by doubling the number of locations and is therefore economically unfeasible. This, it is argued, also applies to the data speeds assumed for inhabited areas and extended inhabited areas. In this context, it is noted that uplink constitutes the real challenge, since this is limited by the transmission power of the mobile phone. The following specifications are proposed: motorway 90% with 2 Mbps DL and 0.5 Mbps UL, inhabited areas 90% (*of the PSA*) with 10 Mbps DL and 0.5 Mbps UL. This mobile network operator considers stationary outdoor coverage of 1 Mbps DL and 0.5 Mbps UL along transport routes to be realistic.

Another mobile network operator also believes that the 5G basic coverage obligations are too high. The problem in this case is that the operator is setting up its network on a grid that is designed for high-band spectrum, and which uses stations that are set up in the immediate vicinity of the coverage population—so typically within towns or villages. Accordingly, the switch from a population-based to an area-based coverage obligation would demand from this operator a considerably higher level of capex and opex (in comparison with competitors) in order to fulfil the coverage obligations. Accordingly, this operator calls for the coverage obligations to be formulated in a way that ensures a level playing field regardless of the severity of the obligations. Apart from the area-based coverage obligation, this operator also

views the data rate specifications as problematic, pointing out that a data transfer rate of 30 Mbps with an isolated frequency spectrum of 2 x 10 MHz in the 700 MHz band is very difficult to achieve in practice. In total, a maximum of 100 Mbps would be available as the gross cell data rate (with MIMO 2 x 2). However, this data rate would be available in total to all end users only if all end users enjoyed optimum coverage conditions. In the real world, cell capacity would be around 50%, meaning that a data rate of 30 Mbps could not be achieved with two customers active concurrently.

A third mobile network operator views the basic coverage obligation for roads as ambitious, although noting that this could be provided with an acceptable level of investment. Not so for the inhabited areas category, particularly the 'habitable areas', where this mobile network operator thinks an extremely high level of investment will be necessary. With existing network infrastructure and distribution and number of stations, it is argued, achieving coverage at the required data rates is neither feasible nor economically practicable. The result would be a marked concentration of locations and the establishment of multiple 'low-frequency layers' in undeveloped areas. An initial estimate of EUR 100 million is given here for the expected capex volume. There would also be a long-term increase in operating expenses necessitated by substantially more broadcasting locations.

The required data rate of 30 Mbps for 98% of the Austrian population is seen as overly ambitious. In the context of the required data rate, it is noted that stationary consumption currently accounts for 80% of data traffic in settled areas. The data rates required in the short term would lead to entirely unnecessary excess capacity, it is argued. The operator also points out that other infrastructure for data services is available to a large extent, in addition to mobile telecommunications, in the settlement area concerned, the basis for the population calculation.

One mobile network operator (MVNO) considers the obligations to be ambitious but welcomes them in view of the outlook for the Austrian economy.

Another consultation participant views the basic coverage obligations as adequate but calls for an additional coverage target, namely railway lines, and suggests coverage of 30 Mbps DL and 1 Mbps UL.

Some consultation participants consider the scope of the envisaged obligations as too narrow: according to this view, the basic coverage requirements are adequate neither for achieving the federal and provincial government broadband targets nor for enabling autonomous or automated driving. The specifications made here should therefore be increased accordingly (at least 50 Mbps DL and 20 Mbps UL).

A 'basic population coverage' targeting only the provincial capitals and major cities or municipalities would, it is argued, not meet the objective of large-scale 5G coverage. The coverage obligations for existing operators should be raised over time and also be measured in terms of area covered (700/800/900 cumulatively). In the opinion of these consultation participants, one conceivable alternative would be a bonus system for guaranteed large-scale coverage by a provider. The amount of area

covered would need to be routinely measured, disclosed and sanctions possibly imposed if not achieved.

Another consultation participant stresses the importance of good mobile coverage for Austria as a place to do business and Austrian manufacturing in general, arguing that private and other professional kinds of usage should be supported alongside public mobile networks. This would be required to develop industrial 5G applications.

Another consultation participant categorised the obligations for the 1500 MHz band as being too weak, while also criticising a lack of tunnel coverage that would ensure uninterrupted service along transport routes.

As regards the stated coverage targets (tables 13 and 14 in section 5.3.2 of the consultation document), it was noted that the output levels required for uninterrupted service in tunnels were not mentioned and should therefore be included to reflect consumer interests.

Contrary to the view of the regulatory authority, one consultation participant was of the opinion that it would be useful to plan for a secondary usage of (unused) frequencies for temporary use cases.

Another statement highlighted the importance attached to large-scale coverage with high-performance broadband networks using the 5G standard, as is envisaged by the government programme.

Another consultation participant considers it important to ensure that this spectrum award would enable the establishment of a large-scale 5G broadcasting network. In this context, a variety of use cases were enumerated, including

- terrestrial indoor and outdoor broadcasting coverage for the population;
- terrestrial coverage for the population with broadcasting/information/messaging in the context of autonomous driving;
- the transmission of broadcasting/information/messaging in the event of a natural disaster and other emergency events in which there is a particular public interest in having access to information, especially as a result of the provisioning of a high-quality, robust service (quality of service), regardless of the number of simultaneous viewers;
- relieving the load on mobile networks during live broadcasting events with a high number of users (especially in the context of a sharp rise in future bandwidth by broadcasts in ultra-high-definition format).

A further statement characterises a large-scale 5G broadcasting network as not only securing nationwide broadcasting coverage but—assuming the corresponding general conditions in conjunction with the mobile network operators—also resulting in more efficient usage of the frequencies, through demand-oriented capacity utilisation of this 5G broadcasting network.

Another statement stresses just how important it is to use modern mobile broadband technology to provide end-to-end coverage for all major road and rail connections.

In this context, the following changes/additions are proposed for the basic coverage obligations:

While the bandwidths requested (in-car, stationary) appear adequate to the consultation participant, the latter argues that the distinction between motorways/limited-access highways (= 95% coverage) and regional roads (federal and provincial roads; = 90% coverage) should not only be removed but a coverage level for regional roads of 95% (at least until the end of 2023) and then 98% (until the end of 2024) should also be required.

Another consultation participant believes the extended coverage obligations are adequate, although another coverage target is also requested here—namely railway lines, where suggested coverage is 30 Mbps DL and 1 Mbps UL.

*Question 5.4: What is your opinion of the extended coverage obligations? Which changes would you propose, if any? Suggest potential coverage targets and areas outside of the permanent settlement area. Please give reasons for your answer.*

For this question, one of the mobile network operators refers to the answers given to question 5.3. The data rates required are possible only with significant network consolidation and are not economically feasible to implement.

The following specifications are proposed: motorway 90% with 2 Mbps DL and 0.5 Mbps UL, inhabited areas 90% (*of the PSA*) with 10 Mbps DL and 0.5 Mbps UL. This mobile network operator considers stationary outdoor coverage of 1 Mbps DL and 0.5 Mbps UL along transport routes to be realistic.

The statement made by another mobile network operator is in a similar vein: the extended coverage obligations in the categories of road, inhabited areas, coverage targets outside the permanent settlement area (PSA) and terrestrial transport routes are generally overambitious.

This opinion is justified as follows: the existence of many smaller route sections with poor or zero coverage mean that enabling 98% (motorway/limited-access highway) and especially 95% (federal/provincial road) with 10 Mbps in-car would be exceptionally difficult at a justifiable level of investment (estimated capex of EUR 50–100 million).

This consultation participant believes that the category of inhabited areas and 'habitable areas' in particular would involve a very high level of investment. With existing network infrastructure and distribution and number of stations, it is argued,

achieving coverage at the required data rates is neither feasible nor economically practicable. Furthermore, the specific requirement to implement the extended coverage obligations without exception in each of the approx. 2,000 municipalities is not feasible.

This consultation participant rejects coverage obligations outside of the permanent settlement area (PSA).

Another mobile network operator also states that the extended coverage obligations aim too high. In particular, the high data rates of 30 Mbps appear extremely overambitious to this consultation participant. The same applies to a potential nationwide area coverage of 90%.

One group of consultation participants views the extended coverage obligations as not ambitious enough for just one MNO, although well-considered in principle. It is pointed out that the method used to monitor and potentially sanction the fulfilment of the coverage obligations is also crucial, as is the time frame defined for fulfilment. The definition of the amount of minimum bandwidth in the coverage obligations was also felt to be critical. For the 26,000 households currently lacking good coverage, a coverage obligation of 10/1 Mbps for a spectrum award extending 20 years into the future is not seen as offering much consolation. Considerably more ambitious targets should therefore be formulated (at least 50/20). One solution approach suggested here is to implement a staggered increase in minimum bandwidths over time. One problem noted stems from the fact that it is difficult to explain to the citizens affected why widespread ultrafast broadband is touted on the one hand (gigabit targets) while coverage obligations are so modestly formulated on the other.

These consultation participants also believe that the existing data sets for broadband coverage in rural areas do not always reflect the real-world situation (mobile services data in particular should be improved in the broadband atlas). It is argued that some municipalities have a very piecemeal geographic layout with remote settlements or farmsteads, making generalised statements about broadband coverage impossible.

*Question 5.5: What is your opinion of the costs of the extended coverage obligations? Should the scope of the extended coverage obligations be specified at the time of auction? Please give reasons for your answer.*

In the opinion of one mobile network operator, this would result in a significant consolidation of locations (*in order to comply with the specified data rates*) and the setup of multiple low-frequency 'layers' in undeveloped areas (*in order to ensure coverage outside the settlement area)*. As an initial estimate, the expected capex level for the extended coverage obligations is calculated to be in the area of EUR 400–600 million. There would also be a long-term increase in operating expenses necessitated by substantially more broadcasting locations.

On the view of this consultation participant, it is unclear whether networks could even cover costs while operating under this model. The idea of 'negotiating

obligations' during the auction or bidding on various options for the 'extended obligations' is rejected.

Another mobile network operator repeatedly states that basic coverage is no longer possible even now without extensive consolidation (*to meet the specified data rates*); that this is itself not feasible, since it is becoming increasingly difficult to find lessors for mobile service locations.

Another mobile network operator states that fulfilment of the extended coverage obligations would, in addition to the necessary expansion of the majority of existing locations, require several thousand new locations as well. Accurately calculating the number of new locations required would depend on many criteria, it is argued, and especially on the quality criteria given in section 5.3.6 of the consultation document and their verification methods.

Here reference is also made to the legal uncertainty currently affecting the market following the latest TKG amendment. It is suggested that mixed signals have been given by public and 'semi-public legal entities' in relation to the cost reduction envisaged (*by policymakers*) for access to their locations, while actual cost reduction does not appear practicable. Some public lessors, it is asserted, would expressly refuse any implementation of the reduced-cost access obligations set out in the TKG amendment. Yet without the legal certainty of access to locations held by public lessors, this kind of coverage obligation would be unattainable.

No other consultation participants responded to this question.

*Question 5.6: Is it desirable for the extended coverage obligations to be distributed among several operators, or should a single operator be selected to be responsible for meeting all extended coverage obligations? Should the extended obligations be disaggregated (e.g. for northern, southern, eastern and western Austria)? Please give reasons for your answer.*

One mobile network operator is of the opinion that the award should be designed to secure competition in the long term. For this reason, coverage obligations should be rejected that favour some applicants with their current portfolio or which work to increase the distances between operators. Levying coverage obligations equally across participating operators would therefore be a welcome approach. It would appear advisable to assign extended coverage obligations on a regional basis. The coverage target of 26,000 households should therefore also be distributed accordingly across the regions of Austria.

This statement also notes that a nationwide assignment differentiated by coverage targets (transport routes, inhabited population areas and households with inadequate internet access) also creates some substantial negative synergies. This kind of assignment is therefore rejected. Obligations pursuing the goal of increased area coverage (transport routes, permanent settlement area) give an advantage to the present holders of low-band spectrum, it is argued, since the low-band spectrum currently assigned in developed areas is sufficient to fulfil the envisaged obligations. This would also apply to an obligation for a data rate of 30/3 Mbps for 98% of the population. This, it is argued, also benefits current low-band spectrum owners.

Another mobile network operator also speaks out in favour of giving operators symmetric obligations—but which should be met using shared infrastructure, however. All other options are rejected in principle and for practical reasons by this operator.

Another statement also calls for coverage obligations to be distributed across all mobile network operators and across different regions. At the same time, however, the requirements (*relating to the obligation*) must be reduced to a realistic minimum.

One group of consultation participants notes that distributing the obligation geographically would make the procedure more complicated and more time-consuming overall. The economic viability of individual locations is not dependent on the province but the operator's individual situation, it is argued. It should therefore be ensured that multiple providers are available for the respective network and that no monopolies can arise.

In this context, one of the consultation participants believes that for minor railway lines, expansion should be mandated for one mobile network operator only, whose infrastructure should then be offered to the other operators via national roaming.

*Question 5.7: What is your opinion of the regulatory authority's proposal for addressing the third coverage target, in particular as this relates to the procedures outlined above? The regulatory authority invites all respondents to the consultation to submit alternative proposals. Please give reasons for your answer.*

For one mobile network operator, a well-founded cost estimate or risk appraisal is not possible at the moment in the absence of sufficient reference items. Additional data and information is needed, it is argued, to evaluate the economic and technical implications.

Another mobile network operator proposes the definition of 'cost-effective areas' as the regions in which the three MNOs are currently operating a network, and compete with one another at both technical and commercial levels. The three MNOs have already expanded their networks as far as is economically viable, it is argued. Further expansion has therefore not occurred since not cost-effective for the MNOs. Accordingly, one should define 'cost-ineffective areas' as those areas in which no relevant mobile network coverage is currently present. Here, policymakers' intentions can be interpreted to mean that network coverage should be significantly increased in these cost-ineffective areas. To this end, a model is proposed in this statement, in which the basic principle of the conventional auction—'spectrum for money'—is replaced by the principle of 'spectrum for a commitment to cost-ineffective expansion':

1. Award of the 700 MHz and 2,100 MHz bands not by competitive auction but as fair share packages (each of 2 x 10 MHz in the 700 MHz band and 2 x 20 MHz in the 2,100 MHz band) for an administrative fee (spectrum prices cannot increase).
2. Impose obligations symmetrically across all operators.
3. Option to fulfil the obligations in cost-ineffective areas by means of shared infrastructure. In addition, removal, in the cost-ineffective areas, of all restrictions on collaboration in terms of infrastructure, including national roaming, RAN sharing and spectrum pooling.
4. Details will be stipulated between licensees in a private-law contract. Since obligations are identical and negotiating positions similarly strong, this kind of contract should be realistic and more efficient than any ad hoc regulation.

The consultation participant is aware that this proposal would act to limit infrastructure competition somewhat in the cost-ineffective areas. However, this does not affect competition in the cost-effective areas, which is further safeguarded through competition in the existing bands and in the 1,500 MHz band. The operator finds this limitation acceptable since expanded coverage would result, which would otherwise not be possible.

Another statement recommends additional measures to ensure better coverage:

Areas to which 5G services have not been extended by frequency owners (*by a certain deadline*) should be forcibly reassigned to those providers who undertake to establish 5G coverage in these areas within a defined period of time; this

reassignment should be exclusive for the entire term of the frequency assignment and offered at no charge. This could help to reduce areas with no coverage ('gaps on the map') while supporting the federal government's 5G strategy and all of the TKK's regulatory goals.

The consultation participant imagines a situation where, following the identification of such target areas (operator requiring spectrum has a complete implementation plan), the frequency owners could extend service to the areas within six months or be forced to relinquish the frequencies to the demand-side party, who would then commit to set up 5G coverage within six months. Commitments (by the frequency owner/demand-side party) to provide service should be enforced by penalty.

One group of consultation participants does not believe the proposed process for the regulatory authority to evaluate individual municipalities is expedient. In almost all provinces, processes are underway that are being steered by the competent broadband coordinators. An uncoordinated parallel system for funding individual municipalities would be an additional overhead at this level, it is argued, and would create more problems than it aims to solve.

The introduction of a bonus/penalty system is proposed for all operators instead. If obligations are not fulfilled, fines should be imposed and the fulfilment deadlines should then be postponed accordingly. The proceeds would be made available to the provinces based on need, who would use a 'broadband fund' to provide solutions for actual gaps in coverage, down to individual connections, on a neutral basis (e.g. via companies owned by the provinces). This, it is argued, would ensure cost-effective evaluations across operators as well as corresponding solutions.

One consultation participant is firmly convinced that the market can ensure connectivity for these households, expressing doubts as to any relevant number of households without broadband in the medium to long term. Almost all operators have positioned themselves by now as convergent providers. Accordingly, it is foreseeable that in future these households will receive service via mobile broadband (cubes), fixed-line broadband or a hybrid solution, where corresponding demand exists.

*Question 5.8: What possibilities do you see for including the required data transmission rates in the obligations? Which quality requirements should be defined (e.g. with regard to the availability of services)? How might these best be framed in operational terms? How should compliance with obligations be verified? Please give reasons for your answer.*

One of the mobile network operators reiterates that the demand for higher end-user data rates is still seen very critically. No MNO can influence the number of users, it is argued, nor their usage patterns or their time of service use at a particular location. For this reason, the provision of a minimum data rate cannot be guaranteed for a specific time or format. The idea of imposing tens of millions of euros in fines is therefore vehemently opposed. Once again, the proposal is cited whereby coverage obligations are specified based on transmission points. The consultation participant believes this to offer several advantages:

- Provisioning of maximum capacity per location on the basis of the licences acquired
- Simple evaluation of transmission points based on quarterly frequency registration
- Avoiding measuring campaigns that tie up time, money and resources
- Plannable and controllable rollout minimises the risk of fines for MNOs
- Market-regulated assurance of high quality criteria via benchmarks (cf. Europe-wide connectivity tests)

Another mobile network operator believes the specification of a high data rate is justified from the end-user perspective. From the provider side, however, it is problematic to require this for each individual customer in the coverage area. It is also argued that the measurement of data transfer rates in the live network (to verify compliance with obligations) depends on usage, disadvantaging operators with higher levels of usage because their cells have less reserve capacity available. The request is therefore made to base the data transfer rate on the theoretical cell capacity only and to limit verification to cell configuration. The guaranteed end-user data rate of 30/3 Mbps is difficult to provide with an assignment of 2 x 10 MHz in the low bands, it is argued. For this reason, the obligation would constitute unfair preferential treatment of operators having enough additional low-band capacity. For this consultation participant, adequate capacity would additionally need to be provided using mid-band spectrum—which would thwart the advantage of low bands for area coverage.

This is another reason why the required data rate should be based only on theoretical cell capacity. It is noted that this approach has been taken in Germany for the current spectrum award procedure, as per the tender conditions applicable there. When verifying coverage, network outages should not negatively impact scores. For coverage calculations, operators only have prediction tools available. Typically, a coverage probability of 95% is applied here. Any coverage targets exceeding this figure would lead to a disproportionate increase in the number of locations. For this reason, coverage verification should also apply a 95% probability

criterion. In the view of this consultation participant, coverage at 95 measuring points in 100 would therefore be adequate, for example.

One of the consultation participants was firmly convinced that connecting up the last households in Austria could be achieved by market forces. It was also noted that data transfer rate testing depends on various parameters, such as the capacity utilisation of the cell itself and neighbouring cells, the number of simultaneous and other factors. In these circumstances, coverage targets relating to 'basic coverage' and 'extended coverage' in rural areas could not be met even by quadrupling the number of transmitters.

One group of consultation participants points out that the investment in 4G should continue to be utilised for a number of years to ensure high data rates for area coverage. Over time, however, the required data rates should nonetheless be raised. If 5G is preferred despite a technology-neutral tender, then appropriate requirements for latency (e.g. <10 ms) should be specified. In light of the relatively long term of the licences to be issued, one should expect to see at least two new generations of network technology.

Experience gained in past spectrum assignments demonstrates the need for verification of obligation compliance to be transparent, it is argued. Municipalities having a large area should not be considered compliant only once the centre of the municipality has coverage. Area coverage should be measured, the results disclosed and possibly subject to sanction if not achieved (payment of fines into a broadband fund).

Regional and local authorities should be involved in the compliance verification process or at the least given full rights of access to the results. This would be essential to ensure actual fulfilment of the obligation and unequivocally confirm sustainability.

# 6 Other conditions of use

*Question 6.1: Do you agree with the planned period of use? If no, what period of use would you propose? Please give reasons for your proposal.*

With the exception of one consultation participant, all participants accept the terms proposed by the regulatory authority, namely up to the end of 2042 for the 700/1500 MHz bands and up to the end of 2044 for 2100 MHz. One consultation participant believed "a better driver for competition would be to award spectrum with only a ten-year usage period, since future technologies will increasingly be developed based on software, which means technology transitions will become easier."

*Question 6.2: What is your opinion of the proposals for estimating the market value? Do you have any alternative proposals? Please give reasons for your answer. Please also provide specific values.*

Three participants recommend that the regulatory authority should be guided by the TKGV when specifying the minimum bid and should not specify any other minimum bid. This would avoid any need to estimate the market value. Supporting arguments include the following:

- The region would be much better served if funds would be used for network expansion and providing coverage to the population rather than for 'modified' minimum bids.
- No experiments should be allowed regarding the minimum bid and therefore no deviations from the TKGV.
- Arguments against market value-based derivation include the fact that this implies an extensive analysis that, in turn, must form part of a consultation. Ofcom provides an example of how this procedure can be resource-intensive without offering legal certainty. Spectrum prices cannot normally be compared. The amount at which a good is priced by an auction is only conditionally dependent on its actual value.
- Ideally, any pricing should be transparent, ensuring that sources and procedures are made public. Apart from this, minimum price setting proved its worth as a method in the spectrum auction for 3.4 GHz to 3.8 GHz and should be adopted without deviations.

One participant recommends not holding an auction, since this necessarily has the effect of maximising earnings, a result that flatly contradicts the regulatory goal of pursuing a strategy of not maximising earnings. Even a minimum bid as per the TKGV of EUR 11 million is prohibitive, it is argued, and effectively represent for new entrants an economic barrier to the frequency award procedure.

*Question 6.3: Do you consider the 700 MHz, 1500 MHz and 2100 MHz frequency ranges suitable for potential secondary use? Please give reasons for your answer.*

Three participants reject the idea of secondary usage in these bands, offering the following key arguments:

- This would seriously endanger interference-free operation and hugely devalue this spectrum.
- The goods are of great relevance for operators: any secondary usage would render deployment and valuation unknown variables; the high coverage targets demanded are also diametrically opposed to any secondary usage (and associated unknowns).
- One should define this method in other, less-relevant bands and also trial it there (e.g. 2300 MHz or in selected 'millimetre-wave bands').
- A secondary usage would limit the flexibility of licence holders when rolling out the band as well as its usage in terms of time and place; limiting usage by time does not allow any sustainable business model even for the secondary user. The issue of spectrum fees is also not resolved, it is argued.

One consultation participant suggests arranging secondary usage for unused frequencies, since this kind of usage could be practical for a range of temporary use cases.

*Question 6.4: The rules on infrastructure sharing refer to the same definitions as for the 3.4–3.8 GHz award. In your view, do these definitions require any adaptations (passive elements, active elements including active antennas as defined there, or core network)?*

One consultation participant requests that repeaters be treated as passive parts of the access network. Examples of repeater use are cited, such as in buildings and in tunnels. The sole aim here is to boost the signal to bridge extended distances, it is claimed. However, support is offered for the idea that components handling signal generation, processing and control are to be considered active parts of the access network.

Several consultation participants also cite or repeat their earlier statements on the infrastructure sharing position paper.

*Question 6.5: Do you have any other suggestions regarding the intended rules for infrastructure sharing?*

One consultation participant views the sharing prohibition in Vienna, Graz and Linz as ill-advised, arguing that the network topology in other towns and cities is similar. The restriction could significantly increase costs, it is argued.

Several consultation participants also cite or repeat their earlier statements on the infrastructure sharing position paper.

In relation to infrastructure specific to one consultation participant, where expansion is economically challenging, this participant proposes permitting expansion by one operator only, with the obligation to offer or enable national roaming for other operators.

One participant favours lifting all restrictions on sharing in cost-ineffective areas.

Multiple participants mention area expansion explicitly, calling for an option for joint expansion here as this would be more economical.

One consultation participant cites the case of fibre-optic networks, advocating expansion by a wholesale-only operator and avoiding the duplication of fibre-optic networks.

# 7 Auction design

*Question 7.1: Which model do you consider suitable for assigning the additional coverage obligations, and why? From your point of view, how important is it to allow the additional obligations to be distributed among various operators? What in your view are the advantages and disadvantages of a single operator fulfilling the additional obligations?*

One consultation participant suggests the use of an incentive auction for the assignment of the various obligations, citing discussions of this topic from Ireland, Norway and the UK. This would permit more extensive obligations to be acquired based on price reductions in the auction.

Another consultation participant did not comment on the proposed models but defined the following criteria for the assignment of obligations:

- It must be ensured that this does not result in a unique feature distinguishing a specific operator.
- Achieving synergy effects should not be prevented. Splitting the obligation, for example into transport routes and inhabited areas, is therefore viewed as problematic.
- Existing rights should not be affected: accordingly, wholesale offers must not be imposed that do not relate to the spectrum being awarded.

One consultation participant views the model B proposed in the consultation and the associated model for implementing the extended coverage obligations as problematic:

- The model is not practicable, it is argued, and not suitable for achieving the coverage targets.
- An asymmetric assignment of obligations constitutes an intervention in the market and forces operators into certain 'niches'. This would also apply to alternative asymmetric assignments such as by region. The market would not accept this kind of assignment, it is argued.
- The differences in value between the proposed obligations are claimed to be so significant that it would subsequently be difficult or even impossible to negotiate a solution (pricing for example) to be implemented jointly (for instance through national roaming). Effective collaboration among several licensees would be possible only if these had the same objectives after the auction and could negotiate as equal partners.
- One essential precondition stated for an auction (and therefore for efficient use of spectrum) is that participants can determine the value of their spectrum as precisely as possible. Some of the options proposed (e.g. asymmetric obligations, later bidding for a reduction of award prices, potential cooperation between licensees with strongly asymmetric goals and negotiating positions), it is claimed, increase uncertainty to an extent that makes it impossible to determine spectrum value precisely.
- The proposed option of later bidding for a reduction of award prices in exchange for obligations is not considered to be practicable. Due to internal processes and approvals required by group companies, it would be impossible to acquire spectrum for a negative business case at a principle

stage in the hope of turning this into a positive business case from 'refunds' in a later auction stage.

Some consultation participants also point out that additional coverage obligations in the past led to an imbalance in spectrum resources, without achieving any long-lasting effect from the obligations in question. Distributing obligations to various operators based on category (roads, population) would lead to inefficiency and unnecessarily redundant coverage, it is claimed. If a single operator were to fulfil the additional obligations, this would promote a monopoly in rural areas previously lacking coverage, where no competition previously existed anyway.

One consultation participant favours an alternative model. Areas to which 5G services have not been extended by frequency owners should be forcibly reassigned to those providers who undertake to establish 5G coverage in these areas within a defined period of time; such reassignment should be exclusive for the entire term of the frequency assignment and offered at no charge. This could help to reduce areas with no coverage ('gaps on the map') while simultaneously supporting the federal government's 5G strategy and all of the TKK's regulatory goals. One could imagine a situation where, following the identification of such target areas, the frequency owners could extend service to the areas within six months or be forced to relinquish the frequencies to a competitor who would commit to set up 5G coverage within six months. Commitments (by the frequency owner/competitor) to provide service should be enforced by penalty.

One consultation participant recommends joint fulfilment (by all three mobile network operators) of ambitious obligations in cost-ineffective areas in exchange for the assignment of frequencies in the 700 MHz and 2100 MHz bands and payment of an administrative fee.

*Question 7.2: If the assignment of coverage obligations is not linked to specific frequency blocks, how important do you think it is that spectra and coverage obligations are assigned simultaneously? From your point of view, what are the advantages and disadvantages of a sequential award?*

One consultation participant opposes model B. In the context of this question, the regulatory authority interprets the comment as meaning that the assignment of coverage obligations—as in model B—should not take place in a separate stage of the procedure. The argument is made that the ability of participants to determine the value of their spectrum as precisely as possible is an essential precondition for an auction (and therefore for efficient use of spectrum). The option of later bidding for a reduction of award prices would increase uncertainty to an extent that would make it impossible to determine spectrum value precisely. The option of later bidding for a reduction of award prices in exchange for obligations is therefore not considered to be practicable. Due to internal processes and approvals required by group companies, it would be impossible to acquire spectrum for a negative business case at a principle stage in the hope of turning this into a positive business case from 'refunds' in a later auction stage.

Another consultation participant suggests the use of an incentive auction for the assignment of the various obligations, citing discussions of this topic from Ireland, Norway and the UK. This would permit more extensive obligations to be acquired based on price reductions in the auction. In the context of this question, the regulatory authority interprets this reference to the various solutions in the countries named to mean that spectrum and coverage obligations do not necessarily need to be assigned jointly.

Another consultation participant prefers a sequential assignment as in model B. In the context of this question, the regulatory authority interprets this as meaning that the assignment of coverage obligations—as in model B—can take place in a separate stage of the procedure.

*Question 7.3: Do you agree with the regulatory authority's evaluation concerning potential competition challenges in relation to spectrum assignment and the measures to safeguard competition currently under consideration? In particular, are the minimum spectrum portfolio and the caps defined too narrowly or too broadly? Please base your assessments on appropriate arguments and provide facts and figures to support them. Please note that implementation of the measures to safeguard competition depends on the specific auction design (see the relevant questions below).*

One consultation participant approves of the proposed spectrum caps.

Another consultation participant rejects a cap of 50% for sub-1-GHz frequencies and advocates an option (*for all bidders*) to acquire at least 2 x 20 MHz in each of the 700 MHz and 2100 MHz bands, and 20 MHz in the 1500 MHz band. During the last multiband auction, there was no such cap in the sub-1-GHz range: the financial outlay was tremendous and the coverage obligations were very extensive, it is noted. Symmetric caps are to be preferred and it should be possible to acquire 100 MHz.

Another consultation participant calls for tighter caps. Together, the proposed caps for 700 and 2100 MHz would squeeze out an effective third competitor, it is claimed. A cap of 45% for sub-1-GHz spectrum is also called for: caps of less than 50% are typically specified, it is claimed.

Another consultation participant advocates a regional award combined with a beauty contest for suitable new market entrants.

*Question 7.4: Do you agree with the recognised risk of tacit collusion over mobile services and broadband products for private customers? In your answer, please distinguish between the market for mobile services and broadband products for private customers. Explain why you consider tacit collusion to be relevant or irrelevant, while presenting for your position business arguments (focus points, individual incentive, transparency, sanctioning or external competitive pressure) and referring to facts and figures to support your arguments.*

For one consultation participant, the discussion is essentially incomprehensible: the risk of tacit collusion is as good as unheard of in current practice. There is accordingly no need to become involved in this discussion with any counterarguments.

Another consultation participant considers the competition analysis to be inadequate, but without figures, data and facts, the consultation participants cannot supply an alternative analysis. The participant points to one of the lowest pricing levels in Europe— even before the H3A/Orange merger. Ex ante regulation would therefore be inappropriate. The first MVNO did not enter the market via the mandatory wholesale offer, it is noted; all MNOs offer access to MVNOs. MVNO contracts also extend beyond 2022. The 3.4–3.8 GHz auction brought new regional competitors into the market, it is observed: with MVNO access, these could exert competitive pressure nationwide. Since this would allow competition without owning infrastructure, incentives to expand infrastructure would be much reduced. At regional level, flat-fee offers could be combined with attractive wholesale MVNO offers.

Another consultation participant does not see the preconditions for collusion as being present in mobile telecommunications services. There is no internal stability, as is required for tacit collusion. Cost structures are too different, it is claimed. Recent takeovers were aimed at securing market leadership: keeping the status quo is not an option in view of that goal. In a convergent bundle market, market shares are distributed asymmetrically. Overall, there is a lack of individual incentives and points of focus— in other words, the internal stability that favours tacit collusion. MVNOs exert external competitive pressure on the three MNOs, it is claimed. The analysis should not overlook MVNOs and their wholesale earnings—and therefore their buyer power. A tacit collusion needs effective options for sanctioning, which are also unavailable;: it is not possible to make a targeted offer solely to the customers of a non-conformist. It is claimed that contractual relationships between MNOs are overestimated—some of these are subject to regulation. Developments from 2013 to 2015 were a consequence of the costly auction and network expansion. There is no clear evidence for a causal link between the rise in the pricing level and the reduction in competitors from four to three.

Nor are the conditions for collusion met in the private customer broadband product segment, it is claimed. Market shares are asymmetric. The takeovers and investments made in virtual unbundling have pre-empted any incentive for a tacit collusion agreement. It is noted that the TKK could enable competition from without, by means of virtual unbundling as a nationwide, regulated wholesale offer, especially by acting to reduce complexity and increase margins. A further MVNO obligation would be the wrong approach. The 3.4–3.8 GHz auction has also strengthened

regional players, it is claimed, whose activity could possibly be expanded to the nationwide level. For sanctions to work, MNOs would have to make offers below the A1 wholesale price, which could only be a short-term strategy.

Another consultation participant expects tacit collusion, however, pointing to the small market share of MVNOs in mobile telecommunications services. The three MNOs are said to have a market share of over 95%, with roughly symmetric shares and comparable networks. Barriers to entry are described as high, and economic links between MNOs are also claimed to exist at the wholesale level. According to the new SMP guidelines, inappropriate access conditions in the wholesale segment are a focal point of potential tacit collusion. In a related staff working document, it is claimed, explicit reference is made in Article 7 procedures to coordinated refusals of access at wholesale level. Other MNOs would not necessarily retaliate to one MNO awarding access by awarding access in turn, as other adequate means of retaliation exist. High barriers to entry mean competitive pressure is not to be expected from third parties or customers.

For private customer broadband products, customers see fixed-line and mobile solutions as largely interchangeable. MNOs are said to have about 95% market share, with a high degree of symmetry in terms of product type, quality and price. There have been price increases since 2012/2013.

Another consultation participant is of the opinion that economically sound wholesale offers are no longer ensured since the expiry of the merger-based wholesale offer, and calls for technology-neutral access to the whole network, both per unit as well as a retail minus offer (for example -30%); price changes should also be announced twelve months in advance. For existing customers, the old tariff plans should continue to apply, assuming the MNO also allows the respective end-user offers to be prolonged. Non-discrimination and transparency are also seen as important in terms of quality, prioritisation and minimum criteria for service level agreements.

Another participant expects to see the disappearance of full MVNOs if wholesale products are not extended into the roaming dimension. The remaining resellers lack negotiating power and will also lack it in future.

*Question 7.5: How do you foresee future demand-side power of MVNOs—in particular after the expiry of mandatory MVNO access? What incentives are there for MNOs to grant such access to MVNOs, allowing MVNOs to exert effective competitive pressure? What elements, if any, must a future wholesale offer for MVNOs contain in order to allow sufficient competitive pressure to develop in both markets? What changes, if any, must be made to the 2012 wholesale offer to ensure the effective competitiveness of MVNOs? In particular, what form of wholesale price indexing, if any, should be applied?*

One participant cites the high number of MVNOs, resellers and their customers as evidence of the health of the mobile telecommunications market. Unregulated wholesale offers are also seen as being more successful.

Another participant notes that the merger-based wholesale offer was intentionally limited to ten years after the merger. The regulator is apparently trying to anticipate a potential competitive situation in ten to twelve years, although the number of providers is not dropping, nor do any developments point in this direction.

All MNOs have MVNOs: MVNOs can pick their host as they wish and exert huge buyer power, it is claimed. The expiry of the merger-based wholesale offer will have virtually no impact and one cannot assume that buyer power will decline. The analysis presented in the consultation document lacks solid arguments. The wholesale-only operators envisaged in the Code would trigger new developments: those lacking their own networks would need hosts and those with networks would require customers. A market analysis is needed, based on corresponding principles (triple criteria test) and not vague hypotheses about competition a decade hence.

Competition will change significantly, it is claimed: eSims will enable smart switching between operators, while virtual SIMs (from manufacturers, not standardised) will be forced onto the market by manufacturer power. Third parties will then simply select the network to use, with no control by the end user. Network slices are also mentioned as part of future competition.

Regulation would only—or disproportionately—benefit third parties such as OTT providers.

Any wholesale offer would also have to be available to MNOs directly (i.e. active sharing without any restrictions). Services need to be limited to a reasonable extent within the framework of the MVNO offer: Providers should only be allowed to purchase wholesale services from a single MNO.

One participant reports that MVNOs can switch hosts and that MVNOs contribute to the host MNO's net sales. Since host contracts do not all expire at the same time, tacit collusion for the purpose of non-renewal is not therefore possible.

Deciding to become a light MVNO or a full MVNO is described as the respective provider's business decision. Their market success also proves that MVNOs can

negotiate attractive conditions. Hosting an MVNO makes sense for strategic reasons—such as for other partnerships or to ensure that another MNO does not have the opportunity to do so.

One participant sees UPC Mobile's contract as an example of the buyer power of MVNOs. MVNOs can already offer extensive data packages—for example Spusu or UPC Mobile—while Spusu even offers all-inclusive data plans.

One participant takes the following stance. The MVNOs' competitive advantage will be markedly weakened by the expiry of the mandatory wholesale offer. There will no longer be an obligation to conclude a host contract with regulated conditions. Access to relevant wholesale products for the private customer broadband market has been denied for years, it is claimed. The current general obligation to make a retail minus offer is described as inadequate. Since the end of the merger-based wholesale offer, there has been neither an obligation nor incentive to offer access on appropriate terms.

One participant states that the buyer power of MVNOs is limited: MVNOs cannot offer access in exchange for roam like at home. Effective competition cannot be exercised in tariff plans with high or unlimited data volumes because of the price-per-unit billing model. A lack of support for IMSI porting means light MVNOs have to meet stricter requirements when switching operators. This reduces their buyer power, it is claimed.

The wholesale offer should include packaged price offers as well as per-unit pricing. Apart from price, the standardised wholesale offer also needs to specify volume, speed and prioritisation. A detailed indexing system is seen as necessary, perhaps using the ratio of revenues to data volume in other tariff plans within the scope of KEV data. Economically sound wholesale access is needed for private customer broadband products, it is said. Regional restrictions should also be excluded. MNOs should have to make at least 20% of their capacity available. Access to new technologies should also be assured, perhaps with a delay (e.g. 18 months). The wholesale obligation (in certain bands) should be imposed on all bidders. On request, existing host agreements should be adjusted to more favourable provisions in the mandatory wholesale offer so as to avoid disadvantaging MVNOs already active in the market.

One consultation participant fears a situation where full MVNOs vanish, leaving merely reseller-only providers without negotiating power. The market shake-out in 2018 (UPC, Tele2) is cited as an example, and the registration ordinance would cause further consolidation. Without a general legal framework and obligations linked to the spectrum award, no more new MVNOs will be seen and MVNOs could be deprived of their source of income. Internationally, MVNOs are excluded from the GSMA, it is claimed, especially regarding access to technical documents and to RAEX. Access of this kind is a prerequisite for long-term survival. Purely national wholesale offers are said to be inadequate and the roaming dimension must therefore be addressed.

*Question 7.6: According to one option, the regulatory authority is considering linking a wholesale offer to a package that can be purchased on a voluntary basis, and which should therefore be particularly attractive. What would make such a package particularly attractive from your point of view? What conditions would have a particular impact on attractiveness? Please describe the relevant impact; use facts and figures to support your arguments where possible.*

Several consultation participants reject the MVNO obligation.

One consultation participant criticises the general vagueness of the MVNO package, which makes it difficult to assess. A market analysis should therefore be done before imposing an MVNO obligation. Within the scope of the spectrum award, an MVNO obligation is neither necessary nor appropriate.

One consultation participant highlights the difficulty involved in specifying conditions, fearing that existing MVNOs with existing conditions could then be discriminated against by subsequently regulated conditions. Furthermore, the MNOs could not accept the frequency packages with an MVNO obligation even for free.

On the other hand, conditions could be defined so as to make prices too high for new entrants: this would lead to inefficient use of spectrum and make it unavailable to these new entrants. A beauty contest should therefore be preferred in order to better support the regulatory objectives.

*Question 7.7: Do you prefer Model A or Model B? Which model would you reject? Provide specific reasons for why you prefer or reject a specific model.*

One consultation participant prefers model B to model A, since a multi-stage approach is thought to be more suited to addressing the coverage targets. Another consultation participant also favours model B because this model would focus squarely on the award objectives; this model is not considered to be suitable for stimulating competition, however.

One consultation participant rejects model B, essentially preferring a multiband auction (model A) that is as simple as possible. However, given the coverage targets intended by policymakers, a competitive auction with such stringent obligations would not be economically feasible. If the coverage targets being pursued are not modified significantly, a model would be preferred that envisages assigning frequencies in the 700 MHz and 2100 MHz bands for an administrative fee, and where the ambitious obligations in cost-ineffective areas would be met as a joint effort by mobile network operators.

One consultation participant prefers model C (separate assignment of the 2100 MHz and 700/1500 MHz bands).

*Question 7.8: Which auction design do you prefer for Model A? Which auction formats would be acceptable, and which would not? What specific factors should the design take into account? In the event that (significantly) more than three categories are required, should the principal stage be spread over several stages? Please give reasons for your answer.*

As a result of the preference for another model (e.g. band assignment at different times), some consultation participants have not provided an answer to this question. The statements given can, however, be used to infer preferences, which are presented in the following summary.

One consultation participant favours the SMRA (or SMRA clock hybrid) format in the event of a non-combinatorial format being selected or the CCA format if a combinatorial format is more advantageous. The use of a tested set of rules is emphatically recommended. In the case of SMRA, the format used by the German Federal Network Agency is mentioned. If the award procedure uses CCA, a set of rules based on the 2013 auction would be preferred, although two changes are considered necessary. First, the aggregate demand in each category should be announced after each clock round. Second, the regulator should refrain from a potential relaxation of the bid restrictions at the sealed-bid stage.

One consultation participant prefers a combinatorial format (CCA or CMRA). One consultation participant prefers a simple clock auction.

One consultation participant states some basic requirements for the auction format, as follows: control over the last bid, a high degree of certainty concerning the price to be paid and prevention of strategic bidding— i.e. bidding that aims to drive up prices and is designed to weaken other bidders instead of a bidding strategy that focuses solely on one's own valuation and genuine intention to buy.

One consultation participant opposes the use of a combinatorial auction format (CCA or CMRA). One consultation participant opposes both the CMRA format and the clock auction with clinching format.

One consultation participant sees the use of a simple clock auction as problematic. The current auction carries a high risk of bidding to drive up prices since not all bidders will necessarily bid for all bands.

One consultation participant therefore calls for a regional award and prefers a beauty contest,

also stating that the selected format should be described as part of a second consultation and adequate time given to do so. In particular, parameters should be tested to determine whether they are appropriate.

*Question 7.9: Which mechanisms should be used in Model A to address the identified competition challenges? Include specific suggestions, e.g. for spectrum caps. Please give reasons for your answer.*

Several participants referred to or repeated their answers to question 7.3.

One participant advocates national roaming and infrastructure sharing obligations for established MNOs. Only new market entrants should be allowed to make use of such an obligation.

*Question 7.10: How should the extended coverage obligations in Model A be implemented? Which mechanisms should be used? Which should not be used? Please give reasons for your answer.*

As a result of the preference for another model (e.g. band assignment at different times), some consultation participants have not provided an answer to this question. The statements given can, however, be used to infer preferences, which are presented in the following summary.

Commenting on the assignment of the various obligations, one consultation participant cites international examples of incentive auctions that assign more stringent obligations based on price reductions. Examples are cited from Ireland, Norway and the UK.

Another consultation participant points out that a multi-stage approach (as has been proposed in model B by extended obligations at stage 1 and a procurement auction at stage 4) would be more suitable for ensuring the coverage targets.

One consultation participant prefers a multiband auction (model A) that is as simple as possible. However, given the coverage targets intended by policymakers, a competitive auction would not be economically feasible. An alternative model is proposed for the joint fulfilment of the coverage targets (see further above).

One group of consultation participants states that the coverage obligations should be economically justifiable but also challenging for all licensees. Any operator unable to fill all obligations in time should be required to pay 'instalments' (fines). These payments should be funnelled into regional funding pots ('broadband fund') as an alternative way of achieving the extended coverage targets.

One consultation participant is of the opinion that regional assignment in conjunction with an award procedure that does not maximise earnings would promote compliance with the extended coverage obligations.

*Question 7.11: What is your opinion of Model B? What are the pros and cons? Please give reasons for your answer.*

As a result of the preference for another model (e.g. band assignment at different times), some consultation participants have not provided an answer to this question. The statements given can, however, be used to infer preferences, which are presented in the following summary.

One consultation participant criticises the fact that only three lots are being awarded (*in the 700 MHz band*). This will weaken competition, it is argued, since established operators will buy the lots and force out potential new entrants at stage 2. The consultation participant calls for the assignment of regional usage rights.

One consultation participant welcomes the multistage approach to achieving the coverage targets as chosen in model B.

Citing international examples, one consultation participant welcomes the approach of assigning more stringent obligations on the basis of price reductions chosen at stage 4.

Another consultation participant opposes model B. In the context of this question, the regulatory authority interprets the comment as meaning that the assignment of coverage obligations—as in model B—should not take place in a separate stage of the procedure. The argument is made that the ability of participants to determine the value of their spectrum as precisely as possible is an essential precondition for an auction (and therefore for efficient use of spectrum). The option of later bidding for a reduction of award prices would increase uncertainty to an extent that would make it impossible to determine spectrum value precisely. The option of later bidding for a reduction of award prices in exchange for obligations is not considered to be practicable. Due to internal processes and approvals required by group companies, it would be impossible to acquire spectrum for a negative business case at a principle stage in the hope of turning this into a positive business case from 'refunds' in a later auction stage.

One consultation participant suggests linking the coverage targets to geographical regions. Only simultaneous rollout for all targets would be efficient, since the sites needed typically contribute to coverage of multiple targets. This approach would therefore significantly reduce the number of additional sites needed.

*Question 7.12: Which auction design do you prefer for the individual stages of Model B? Which auction formats would be acceptable, and which would not? What specific factors should the design take into account? Please give reasons for your answer.*

As a result of the preference for another model (e.g. model A or band assignment at different times), some consultation participants have not provided an answer to this question. The statements given can, however, be used to infer preferences, which are presented in the following summary.

One consultation participant favours the SMRA (or SMRA clock hybrid) format in the event of a non-combinatorial format being selected or the CCA format if a combinatorial format is more advantageous. The use of a tested set of rules is emphatically recommended. In the case of SMRA, the format used by the German Federal Network Agency is mentioned. If the award procedure uses CCA, a set of rules based on the 2013 auction would be preferred, although two changes are considered necessary. First, the aggregate demand in each category should be announced after each clock round. Second, the regulator should refrain from a potential relaxation of the bid restrictions at the sealed-bid stage.

One consultation participant prefers a combinatorial format (CCA or CMRA). One consultation participant prefers a simple clock auction.

One consultation participant states some basic requirements for the auction format, as follows: control over the last bid, a high degree of certainty concerning the price to be paid and prevention of strategic bidding— i.e. bidding that aims to drive up prices and is designed to weaken other bidders instead of a bidding strategy that focuses solely on one's own valuation and genuine intention to buy.

One consultation participant opposes the use of a combinatorial auction format (CCA or CMRA). One consultation participant opposes both the CMRA format and the clock auction with clinching format.

One consultation participant sees the use of a simple clock auction as problematic. The current auction carries a high risk of bidding to drive up prices since not all bidders will necessarily bid for all bands.

One consultation participant therefore calls for a regional award and prefers a beauty contest,

also stating that the selected format should be described as part of a second consultation and adequate time given to do so. In particular, parameters should be tested to determine whether they are appropriate.

*Question 7.13: Which mechanisms should be used in Model B stage 2 to address the identified competition challenges? Include specific suggestions, e.g. for spectrum caps. Please give reasons for your answer.*

Several participants refer to or repeat their answers to question 7.3.

One participant believes the caps are unable to prevent price gouging with no genuine intention to buy.

*Question 7.14: Which auction design do you prefer for Model C? Which auction formats would be acceptable, and which would not? What specific factors should the design take into account? Please give reasons for your answer.*

Two consultation participants prefer a simple clock auction for this model, Citing various reasons, such as reduced preparation time and lower transaction costs.

One consultation participant favours the SMRA (or SMRA clock hybrid) format in the event of a non-combinatorial format being selected or the CCA format if a combinatorial format is more advantageous. The use of a tested set of rules is emphatically recommended. In the case of SMRA, the format used by the German Federal Network Agency is mentioned. If the award procedure uses CCA, a set of rules based on the 2013 auction would be preferred, although two changes are considered necessary. First, the aggregate demand in each category should be announced after each clock round. Second, the regulator should refrain from a potential relaxation of the bid restrictions at the sealed-bid stage.

One consultation participant opposes a simple clock auction. The formats CMRA and clock auction with clinching are rejected by one consultation participant.

One consultation participant therefore calls for a regional award and prefers a beauty contest,

*Question 7.15: Which mechanisms should be used in Model C to address the identified competition challenges? Include specific suggestions, e.g. for spectrum caps. Please give reasons for your answer.*

Several participants refer to or repeat their answers to question 7.3.