APPENDIX 2

to the Consultation
on the 3.4-3.8 GHz
Award Procedure

Measures Safeguarding
Competition

NON-BINDING TRANSLATION

Rundfunk und Telekom Regulierungs-GmbH (RTR-GmbH)

Mariahilfer Straße 77–79
1060 WIEN, ÖSTERREICH
www.rtr.at

E: rtr@rtr.at
T: +43 1 58058-0
F: +43 1 58058-9191

FN 208312t, HG Wien
DVR-Nr.: 0956732
UID-Nr.: ATU43773001

1 Introduction

1.1 Measures safeguarding competition

One of the main goals of the Telekom-Control-Kommission (TKK) in awarding the spectrum is to ensure and encourage effective competition (Award Goal 2). To achieve this objective, the TKK has the following instruments at its disposal:

- Spectrum caps can be used to prevent a network operator or a group of network operators from acquiring too much spectrum and therefore a dominant position. Spectrum caps can be defined for individual bands and for groups of bands (for example for all frequency bands). By defining very narrow caps, spectrum can be implicitly reserved.
- Spectrum can be implicitly reserved by means of competition constraints (spectrum floors), ensuring that a minimum number of network operators have a minimum number of frequencies. This concept can only be implemented as part of auction designs involving a method of identifying winners, such as a combinatorial clock auction (CCA), and requires the normative determination of minimum spectrum portfolios for each (type of) network operator.
- The TKK also has the option of explicitly reserving (or setting aside) spectrum for certain groups of network operators (for example new entrants or very small operators). Reserving spectrum is a measure with far-reaching impact and is justified only where a corresponding lack of competition exists.
- Reserving spectra can be supplemented by additional measures to support new entrants, potentially compensating for the disadvantages of entering the market at a later date (entry assistance). These include, for example, obliging existing network operators to provide new entrants with temporary access to their networks especially in rural areas (i.e. national roaming, site-sharing or other measures).

In choosing measures to ensure competition, prime consideration is given to potential competition challenges. The regulatory authority has identified three potential competition challenges (competition problems) with relevance for the present award procedure:

- Fewer than three actual competitors on the mobile telecommunications market
- Excessively asymmetric spectrum assignment
- Negative impact on intermodal broadband competition

The risk of the competition challenge materialising in the auction is analysed in a second step. Here the regulatory authority bases assessment on the usual criteria for economic competition:

- Is one company (unilaterally) or are several companies jointly (through coordinated action) capable of limiting competition through a strategic purchase of frequencies in the auction?

- Do (unilateral or coordinated) incentives exist for the company or companies to pursue such a strategic purchase? Do the expected gains exceed the costs?

In a third step, eight options for measures safeguarding competition are presented based on industry proposals, and subject to an initial evaluation under criteria normally relevant for regulatory measures:

- How effectively could the measure help contain the potential competition challenge?
- Is the measure the mildest form of intervention?
- Is the measure proportionate?

With this consultation, the regulatory authority wishes to engage with potential bidders and the industry in order to achieve a better appreciation of the relevance of the specific competition challenges and an evaluation of the options. Based on these insights, the Telekom-Control-Kommission will select the particular option that is suited to addressing the potential competition challenges while at the same time representing the mildest form of intervention and qualifying as a proportionate measure.

1.2 Inputs from industry

The regulatory authority has already discussed the topic of measures safeguarding competition as part of the consultation on the Spectrum Release Plan. The regulatory authority's website contains a summary of the results. Besides this, the regulatory authority has collected additional input on the topic during industry talks.

The industry proposals were varied and very wide-ranging (see Table 1). A few consultation participants are calling for certain bidder groups to be excluded from certain frequency ranges, while others demand asymmetric caps taking the existing frequency spectrum into account. Some participants in the consultation call for very liberal caps.

Table 1: Spectrum caps proposed by participants

700 MHz (2 x 30 MHz)	800 MHz (2 x 30 MHz)	900 MHz (2 x 30 MHz)	1500 MHz (40 MHz)[b]	1800 MHz (2 x 75 MHz)	2100 MHz (2 x 60 MHz)	2300 MHz (100 MHz)[b]	2600 MHz (2 x 70 MHz + 50 MHz)	3400-3600 MHz (190 MHz)[b]	3600-3700 MHz (100 MHz)[b]	3700-3800 MHz (100 MHz)[b]	Maximum spectrum assignment from – to (in %)[a]
								X			53% - 100%[d]
									X	X	50% - 100%[d]
X	X	X									40% - 67%
X	X	X	X	X	X	X	X	X			0%[c]
X	X	X	X	X	X	X	X	X	X	X	43%
X	X	X	X	X	X		X	X	X	X	42%
X	X	X		X	X		X	X			0%[c]-67%
X					X			X			0%[c]-67%
							X	X	X	X	40%
								X	X	X	26% - 100%[d]

[a] All percentages are rounded up.
[b] For the amount of spectrum available in the bands, please refer to chapter 3 of the consultation document.
[c] Stems from the requirement that mobile telecommunication companies should not be able to acquire spectrum in the 3400-3600 MHz range.
[d] The 100% threshold stems among other things from the proposal to only have caps if demand in the auction is low.

Some of the proposals are not compatible with the award goals of the TKK: for example, some of the stated caps are so tight that they impair the goal of efficiency (because a network operator that attributes a high intrinsic value to certain frequencies may not be able to acquire them). On the other hand, some of the caps are so generous that, following the auction, competition challenges cannot be ruled out (impairing the goal of competition).

During the consultation the regulatory authority also gathered information about various demand indicators (minimum spectrum requirement, needs, maximum permissible spectrum amount). This information can be used to deduce how many potential bidders are effectively restricted by a certain frequency cap. This information can be useful when evaluating appropriateness.

For a given company, a specific cap represents a restriction in effect where that model – as indicated in the consultation – or may not satisfy the demand articulated in the consultation. There is no effective restriction if the company itself suggests setting the maximum frequency spectrum at a lower level (than the specified demand).[1]

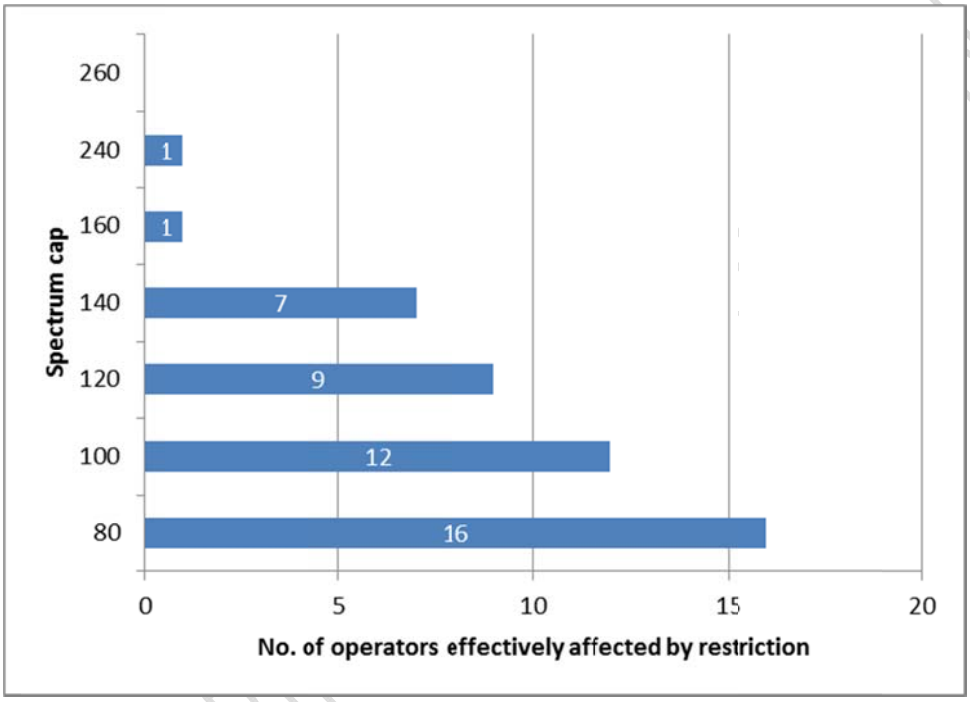

Figure 1: Which caps are effective restrictions for how many bidders?

According to information from the consultation participants, a spectrum cap of 260 MHz is not a restriction for any potential bidder, while a cap in the range of 160-240 MHz would restrict one company. A cap of 140 MHz (or even 150 MHz) would restrict seven potential bidders; this means seven participants in the consultation stated that they wanted to (or might) purchase up to 160 MHz, but not (necessarily) more than 160 MHz.

Conclusion: The proposals on spectrum caps made during the consultation are extremely wide-ranging, and to some extent are not compatible with the TKK's award goals. Spectrum caps of 160 MHz (or higher) only represent an effective restriction for one participant in the consultation. With an increment of 20 MHz, the next tighter cap of 140 MHz is an effective restriction for 44% of the participants. So

[1] Some companies have a relatively high ceiling for individual spectrum needs, but suggest at the same time that the maximum spectrum amount that one bidder is allowed to acquire should be set at a lower level. Here the regulatory authority used the lower of the two values.

tighter caps in particular require competitive justification to comply with the principle of proportionality.

2 Market analysis

Interest in the frequencies to be awarded has been expressed in particular by mobile network operators, regional wireless broadband providers, power suppliers and wholesalers.

Competitive concerns are most obvious with mobile telecommunications; other bidders acquiring frequencies is often not associated with competitive concerns. This is why the following market analysis focuses primarily on mobile telecommunications and their interaction with wired broadband and regional wireless broadband providers.

Figure 2 gives an overview of retail revenues in mobile telecommunications. Alongside the three mobile network operators, the total of other, virtual mobile network operators is shown as well. Revenues in recent years were relatively constant in nominal terms at around EUR 600 million per quarter. The share of market leader A1TA fell from well over 40% after the takeover of yesss! customers during a merger in 2012 to just under 40%. The two alternative mobile network operators, TMA and H3A, exhibit a share of close to or just under 30%. Mobile telecommunications is therefore a highly concentrated market with an oligopolistic structure. One of the conditions of the H3A/Orange Austria merger was to require H3A to make a wholesale offer to virtual mobile network operators. The share of the virtual mobile network operators ('Others') has been increasing ever since, but relative to retail revenues falls well short of 5%.

CONFIDENTIAL DATA

Figure 2: **Retail revenue shares in mobile telecommunications (left axis in %, right axis in EUR millions, absolute terms); source: KEV**

The spectrum to be awarded is especially well suited for expanding data transmission capacities. Figure 3 shows the transmitted data volume for downloads and uploads. The volume of data is growing exponentially. The shares of mobile telecommunication providers in terms of data volume differ markedly from their percentages in retail revenues. H3A is the market leader, achieving a 70% share in the data volume at times and recently holding just under 60%. A1TA – the market leader in terms of revenues, SIM cards and frequency usage rights – has had a share of less than 20% in the data volume for years, and occasionally just over 10%. A slight increase in shares has been seen for both A1TA and TMA recently. The other (virtual) mobile network providers play but minor roles as regards data transmission volumes.

CONFIDENTIAL DATA

Figure 3: Volume of downloaded and uploaded data – market shares in % (left axis) and absolute changes in GB (right axis)

According to the individual providers, unlimited data plans that are used by consumers as substitutes for wired broadband connections are responsible for 90% or more of the data transmission volume. Drei has offered unlimited data packages since 2010. TMA followed suit in 2013 with its own unlimited data plan. A1, which also offers unlimited broadband products via wired infrastructure, only joined these ranks in 2016. Since then A1 has been offering hybrid broadband products, which use both the capacity of the A1 fixed network and mobile broadband.

Figure 4 shows the prices and maximum download speeds for the unlimited mobile data packages on offer. The best price/speed ratios are offered by TMA, Drei or other providers, depending on the speed. A1 is the most expensive provider with all of the bandwidths offered.

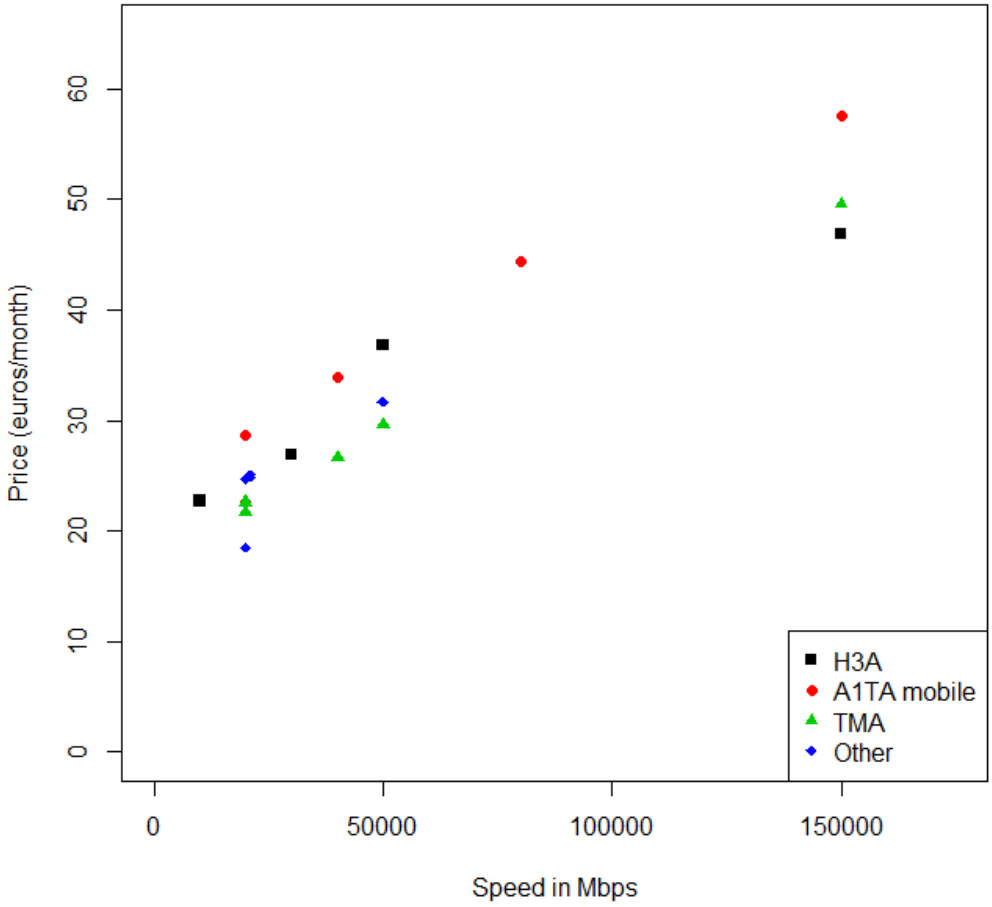

Figure 4: Price/speed in mobile telecommunications with unlimited data volumes (March 2017)

A1 was the last MNO to offer packages on the market that included unlimited data. A1 also has a nationwide fixed network throughout Austria that offers wired broadband products. The order of unlimited mobile broadband products based on the date first introduced thus tallies with the ranking of shares in the volume of data. If we look at the acquired frequency usage rights relative to the data volume transmitted in a month, this benchmark (terabyte/MHz/month) for Drei is more than twice that for TMA and four times the figure for A1. In terms of the price/speed ratio, A1 is the most expensive provider. Overall, these figures indicate that A1 generates the least amount of competitive pressure in the area of wired broadband products.

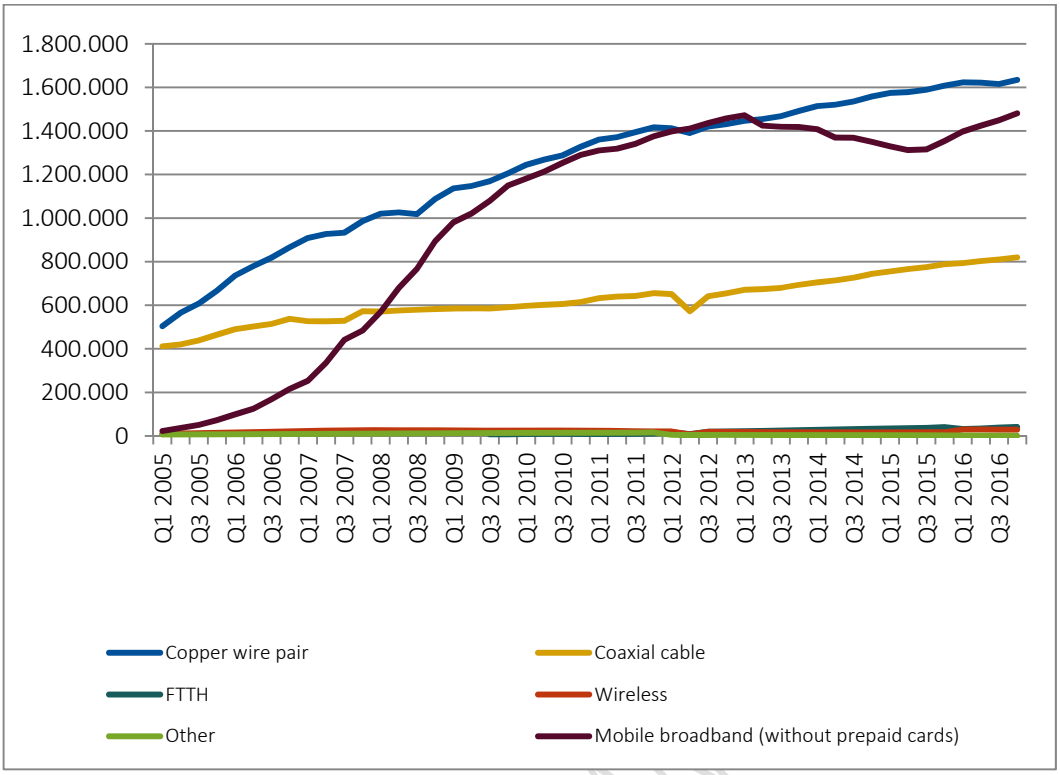

Figure 5: Broadband - changes in connection types (excluding prepaid cards and smartphone tariffs)

The changes in types of broadband connections is shown in Figure 5. Connections via A1 copper wire pair cables and the coaxial cables of cable network operators increased over the entire period between 2005 and 2016. Mobile broadband connections[2] rose particularly strongly after the expansion of 3G networks in 2007-2009 and LTE networks from mid-2015. During these periods, the increase of wired broadband connections was slower on average. The connections of regional wireless broadband providers that are referred to as 'radio' do not play a significant role; such connections are provided on the basis of either licensed spectrum (to be awarded in this procedure) or unlicensed spectrum. The trend in the quantity of connections over time indicates that mobile broadband does in fact exert competitive pressure on wired broadband. A crucial factor in the level of competitive pressure is the free capacity of mobile telecommunication networks, which is particularly large in the wake of the rollout of a new generation of technology. This finding plays an important role in the award of frequencies in the 3.4-3.8 GHz range, as after the rollout this award will increase the capacity of mobile telecommunications and thus presumably also the competitive pressure on wired broadband.

[2] Prepaid and smartphone tariffs are not included here. It is assumed that these are used increasingly in the case of smartphones with small screens and supplementary pure data tariffs.

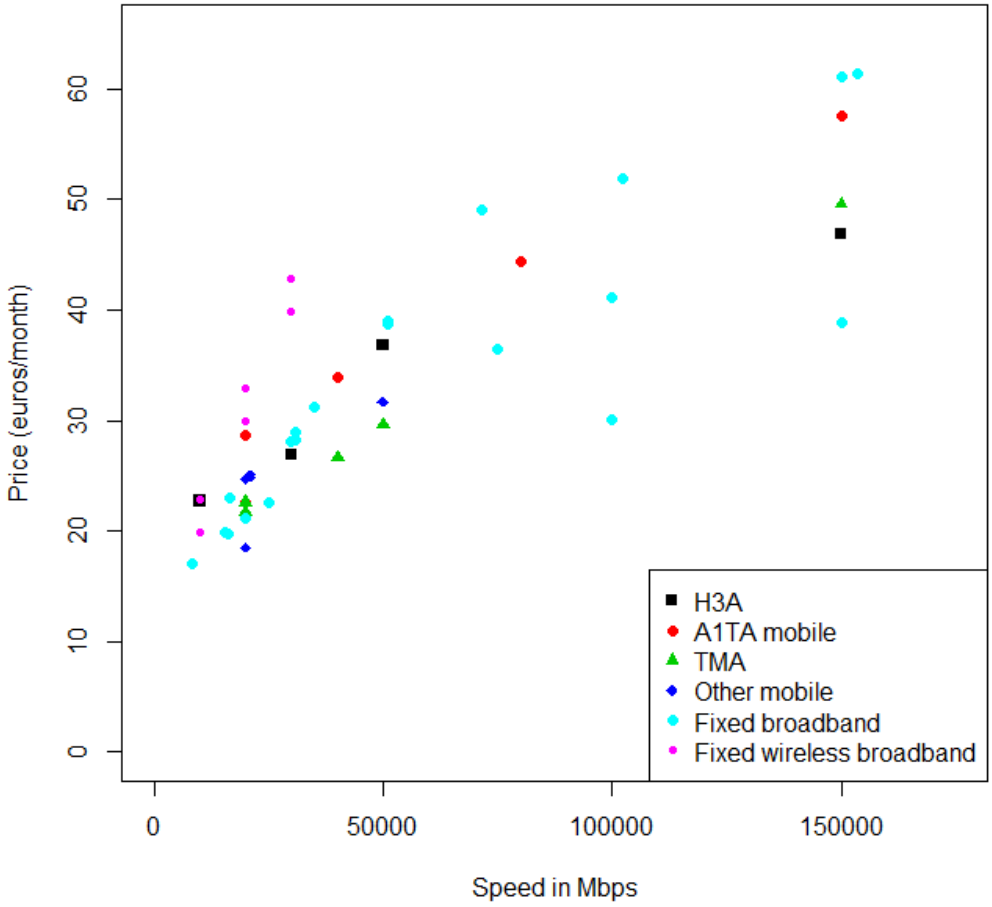

Figure 6: Price/speed with unlimited data volumes (March 2017)

Figure 6 endeavours to show the price competitiveness of the different broadband infrastructures. Alongside the price/speed ratios of mobile network operators it also shows the corresponding figures for wired, fixed broadband providers and regional wireless broadband providers. While the prices for mobile broadband providers and fixed broadband providers overlap at the given speed, the plans offered by regional wireless broadband providers are more expensive than the others. Regional wireless broadband providers are particularly expensive with higher bandwidths. It can therefore be assumed that the regional wireless broadband providers do not exert effective competitive pressure in the segment of products for private customers.[3] Regional wireless broadband providers have a unique selling point in remote locations, where neither mobile telecommunication operators nor wired broadband providers can offer suitable connections.

[3] The competitive pressure brought on by unlicensed frequencies is not addressed here because these frequencies can continue to be used after the award.

A survey revealed that significantly more than 50% of the customers served by the 3.4-3.6 GHz frequencies are non-private customers.[4] Considerably more than one third are supplied with symmetric bandwidths. Thus many of these customer connections have very reliable or guaranteed bandwidths. The regional wireless broadband providers differ in this respect from mobile broadband services. Mobile services offer high downlink bandwidths, but these bandwidths are just best-effort figures and therefore often not attainable in practice. The uplink bandwidth of mobile broadband services is frequently lower given the low transmission power of the terminal equipment. Offering symmetric and guaranteed bandwidths is therefore a unique selling point for regional wireless broadband providers, provided there is no wired infrastructure available. There is additional demand for the products offered by regional wireless broadband providers as redundant broadband connections, for the event that alternative infrastructure fails. Wireless regional broadband providers therefore have a considerable competitive strength in providing reliable or guaranteed and, in some cases, symmetric bandwidths, as well as in redundancy for existing services.

When considering interaction with wired broadband, what is important is that A1 has significant power on the market for local and regional access owing to its nationwide broadband network, and thus is required to offer virtual unbundling as a wholesale service to others. The procedure regarding the compulsory offer is still under way,[5] but A1 already offers a wholesale product via its own fixed network, which includes bandwidths of up to 100 Mbit/s depending on availability. In future therefore it will possible for other mobile telecommunication providers in particular to offer hybrid products in combination with the regulated wholesale product. This opens up the potential for a substantial part of the growing data volume to be transmitted over the A1 fixed network at a regulated wholesale price.

Conclusion: In summary, in light of the high concentration, maintaining competition in mobile telecommunications is crucially important. While the current users of the frequencies to be awarded (wireless regional broadband providers) exert no effective competitive pressure on private customers, they do contribute to the additional supply of remote areas and are successful on the market with symmetric, reliable and sometimes guaranteed bandwidths especially for non-private-customer products.

[4] There are no figures for two regional providers. Without these figures, the number of customers supplied with the frequencies to be awarded was around 6,000. In another survey, the number of customers connected via fixed radio connections totalled around 11,000.

[5] https://www.rtr.at/de/inf/Konsult_M_1_6_15_Zugang_zentral and https://www.rtr.at/de/inf/Konsult_M_1_5_15_Zugang_lokal (in German)

3 Potential competition challenges

The regulatory authority has identified three potential competition challenges with relevance for the present award procedure:

- Competition challenge 1: Fewer than three effective competitors
- Competition challenge 2: Excessively asymmetric spectrum assignment
- Competition challenge 3: Negative impact on intermodal broadband competition

The regulatory authority has examined another potential competition challenge, namely the potential squeezing out of existing regional broadband providers by mobile network operators, but after an in-depth analysis of the significance of this group of operators for competition, it was concluded that no relevant challenge exists (cf. chapter 2).

3.1 Fewer than three effective competitors

The Austrian market currently has three active mobile network operators. This means that infrastructure-based competition is limited to these providers. Consequently, the regulatory authority believes that maintaining (at least) three effective competitors on the market is a key goal for competition.

A certain minimum frequency spectrum is required to be able to function as an effective competitor. The UK regulatory authority OFCOM for example takes this to be 10%-15% of the total spectrum.[6] OFCOM underlines this with a series of European examples. Even if ending the auction empty-handed, none of the Austrian MNOs would fall under this threshold, even though two operators would fall below a share of 20%.

Table 2: Share in total spectrum if MNO ends auction empty-handed (as of 1 January 2020)[7]

MNO	Share in %
A1	26%
TMA	16%
Drei	18%

Alongside the total spectrum, the significance for 5G of the bands to be awarded also plays a role in the award.[8] It cannot yet be predicted when 5G services will actually be ready for the market. However, the 3.4-3.8 GHz range is considered the first 5G

[6] Refer to https://www.ofcom.org.uk/__data/assets/pdf_file/0026/93545/award-of-the-spectrum-bands-consultation.pdf.

[7] With due consideration of the following bands: 800 MHz, 900 MHz, 1800 MHz, 2100 MHz (FDD), 2600 MHz (FDD and TDD) and 3400-3800 MHz.

[8] For example, the capacity band could play a role in connection with enhanced broadband services.

band, and the availability of usage rights could facilitate an early trajectory towards 5G. An overly strong concentration of usage rights in the 3400-3800 MHz range with one or two successful bidders could cause temporary competition challenges and enable the successful bidders to temporarily charge higher prices and generate excess profit until additional 5G bands are available, with similar impacts on capacity and average data rates (new award or refarming).

To ensure three winners each have at least a spectrum share of 15% in the 3.4-3.8 GHz range, each of the three network operators would have to win around 60 MHz. This tallies with the information conveyed to the regulatory authority during the preparatory work. In the consultation on the Spectrum Release Plan for example, a package of 40-60 MHz in the 3400-3800 MHz frequency range was referred to as the minimum spectrum requirement.

As an initial, provisional estimate, the regulatory authority assumes that at least three bidders should win 5G spectrum in the auction. In the event that only three bidders win spectrum, each of the three bidders should win at least around 60 MHz. Otherwise, the regulatory authority believes there is a material risk for competition (competition challenge 1).

To justify measures to safeguard competition, an assessment should be made of the seriousness of the risk of one or two bidders collectively acquiring enough spectrum that a third bidder does not have a minimum amount of 5G spectrum after the auction. According to the regulatory authority, the risk of only one bidder acquiring so much spectrum is rather low. One such bidder would have to acquire 270 MHz to be sure that fewer than three bidders control 5G spectrum in the given quantity after the auction. Aside from the fact that the risk will be ruled out by the spectrum caps currently under discussion, this strategy would be very costly in the eyes of the regulatory authority because of the large amount of spectrum and the high intrinsic valuation of the marginal bidder (with relatively uncertain benefits).[9,10]

However, the regulatory authority does identify a risk of two bidders being able to acquire enough spectrum to prevent a third bidder from having the specified minimum 5G spectrum requirement after the auction. For this to happen, two existing MNOs would have to acquire at least 340 MHz collectively. The regulatory authority believes this outcome cannot be ruled out. There are doubts as to whether the kind of coordination required for a coordinated strategy is possible in the auction.[11] Having said that, the amount of spectrum to be acquired by each of the two bidders is not excessive compared to the (maximum) requirement specified in the consultation on future awards. Moreover, the risk for certain outcomes is likely to be higher; for example if the market leader A1 is involved in the strategic

9 Even if the TKK followed the proposal of the network operator that suggested the most liberal caps in the consultation, no single bidder would be allowed to acquire 270 MHz.

10 We can assume that, because of its importance for 5G, a package of this size would have a relatively high intrinsic value for all existing MNOs, but especially for the MNOs that previously reached their capacity limits.

11 This requires a certain level of transparency in relation to the bidding behaviour of co-bidders. With a very few exceptions, at most aggregate demand is transparent in frequency auctions but normally not bidders' individual bids.

investment because it has a greater incentive for a strategic acquisition of frequencies for other reasons (such as interaction with wired broadband). For a second bidder, this situation could offer greater security in view of the question as to whether a second bidder could participate in strategic coordination.

Finally, it should be pointed out that from a competition perspective it is not necessarily the three existing mobile network operators that have to be successful to avoid competition challenge 1, even though the likelihood of a new entrant being successful and an existing network operator being unsuccessful in the auction is very low (reputational effects and cost advantages, lack of coverage spectrum etc.).

Conclusion: The provisional opinion of the regulatory authority is that there is a low but material risk of two bidders being able to acquire enough spectrum collectively, for strategic reasons, that a third party is denied access to the first spectrum made available for 5G (competition challenge 1). The risk is estimated to be higher if market leader A1 were part of the group making the strategic investment and lower if A1 were a victim of such a strategy.

3.2 Excessively asymmetric spectrum assignment

Another potential competition challenge identified by the regulatory authority is excessively asymmetric spectrum assignment. Frequencies are a key input factor for mobile network operators. Excessively asymmetric spectrum assignment can be detrimental for competition because of a company being assigned either significantly more or significantly less spectrum (relative to its market share) than its rivals. Nonetheless, the regulatory authority is very sceptical of a forced regulatory alignment of spectrum assignment. Assigning symmetrical packages is neither necessarily efficient or conducive to competition.[12] To a certain extent it must be possible for network operators to differentiate between products and quality.

In the 2013 multiband auction, the regulatory authority set the limit at 40-45% of the overall spectrum and at 50% of the spectrum to be awarded. At that time the market share of one network operator was more than 45% (in terms of subscribers). Now, the largest market share (in terms of subscribers) is less than 40%. By contrast, the market share of the smallest network operator back then has grown.

The spectrum caps in the multiband auction were criticised by the industry for being too liberal.[13] Some participants in the consultation also urged for a narrower definition of the maximum amount of spectrum a network operator could control. In this context, caps of 40% or 45% of the total spectrum or the share in the frequencies of the bands 3.4-3.6 GHz and 3.6-3.8 GHz respectively were mentioned.

An overly asymmetric spectrum assignment can impact the competitiveness of individual providers. For example, a network operator who has significantly more

[12] For example, (cost) symmetry can promote collusion because it aligns companies in terms of a central competition factor.

[13] Refer amongst others to https://www.gsma.com/spectrum/wp-content/uploads/2017/02/Effective-Spectrum-Pricing-Full-Web.pdf

spectrum available – relative to its market share – than its rivals, can avoid facing competition in certain customer segments (customers that demand high quality). Conversely, there is a risk that a network operator that has much less spectrum than its rivals cannot function as an effective competitor in certain quality segments.

These frequencies play a rather minor role given their specific propagation characteristics for certain quality parameters, such as area coverage, the coverage of remote areas with mobile telecommunications or indoor coverage (from the outside). Conversely, these frequencies can exert significant impacts on capacity and therefore on average data rates owing to the large amount of spectrum. The regulatory authority considers average data rates to be a key quality parameter for competition. Although frequencies can be partially substituted, this can be associated with substantial additional costs and delays and therefore impacts on competition. Against such a background, the regulatory authority would like to avoid excessive asymmetry in the assignment of spectrum to the network operators (relative to their market share).

Table 3 presents the indicators relevant for this issue: market shares (based on subscribers and data traffic), spectrum shares (without the 3.4-3.8-GHz award) in 2020, data volumes per Hz, and Hz per subscriber. As the table shows, the spectrum distribution roughly corresponds to the respective market shares in terms of subscribers. However, the figures also show that traffic per MHz is distributed very unevenly and the MNOs therefore probably have highly varying capacity reserves (relevant for the average data rate). The two smaller mobile network operators (with smaller spectrum assignments) transmit much more data per MHz than A1. This situation must be considered in the assessment of competition because the frequencies in question will have a substantial impact on capacity.

Table 3: Market shares and shares in available spectrum (relative to market shares)

MNO	Market share Subscribers	Market share Data traffic	Spectrum share 2020[1]	Data volume /MHz /Month	Hz /Subscriber
A1	39%	10-15%	43%	100-200	46
TMA	27%	25-30%	27%	400-500	40
Drei	29%	60-65%	30%	900-1000	46

[1] Share in spectrum currently available as of January 2020 (bands: 800 MHz, 900 MHz, 1800 MHz, 2100 MHz FDD, 2600 MHz FDD and TDD).

Source: Communications Survey Ordinance (KEV) for Q3/2016 for subscribers, RTR data

Against this background it is provisionally assumed that, including the new quantity of frequency usage rights, the following asymmetries should be avoided as they could be detrimental to competition:

- No bidder should control more than 40%-43% of the entire mobile telecommunication spectrum available after the auction.[14]
- If the auction ends with only the three active mobile network operators successfully acquiring spectrum, the risk of one of the three mobile network operators controlling less than 25% of the entire spectrum after the auction should be minimised.
- After the auction, none of the network operators should control more than 45%-50% of the 3400-3800 MHz spectrum to be awarded, with A1 positioned somewhat lower in this range and the other bidders somewhat higher if possible, on account of their smaller assignments, but certainly less than 50% as well.

A subsequent assessment should be made of the seriousness of the risk of one or two of the existing MNOs collectively buying enough spectrum that the asymmetries referred to emerge.

The question to be posed in connection with a unilateral strategy is whether a strategic acquisition of a larger amount of spectrum by one company can result in the aforementioned asymmetries; A1, the company with the largest package at present, is the initial focus of this analysis. Table 4 and Table 5 present potential distributions of frequencies that may arise if A1 purchases a certain amount of spectrum and the remainder is split between the other two MNOs; two scenarios are assumed: firstly, Drei and TMA split the remainder (based on a lot size of 10 MHz),

[14] This includes the bands 800 MHz, 900 MHz, 1800 MHz, 2100 MHz FDD, 2600 MHz TDD + FDD and 3400-3800 MHz.

and secondly, one of the two smaller network operators buys 100 MHz (5G package), with the rest going to the other network operators.

Table 4: Drei and TMA packages in the event that A1 purchases a certain amount of spectrum and the other two MNOs split the remainder (10 MHz segments)

A1 buys	A1 package[1]	Drei package[1]	TMA package[1]
390 MHz	100% / 66%	0% / 16%	0% / 18%
260 MHz	67% / 53%	15%-18% / 22%- 23%	15%-18% / 24%-25%
200 MHz	51% / 46%	23%-26% / 26%-27%	23%-26% / 27%-28%
180 MHz	46% / 44%	26%-28% / 27%-28%	26%-28% / 28%-29%
160 MHz	41% / 42%	28%-31% / 28%-29%	28%-31% / 29%-30%

[1] Package in 3.4-3.8 GHz range / total spectrum assignment (as of 1 January 2020 in each case)

Table 5: Drei and TMA packages in the event that A1 purchases a certain amount of spectrum and one of the other two MNOs acquires 100 MHz (10 MHz segments)

A1 buys	A1 package[1]	Drei package[1]	TMA package[1]
390 MHz	100% / 66%	0% / 16%	0% / 18%
260 MHz	67% / 53%	8%-26% / 19%-27%	8%-26% / 21%-28%
200 MHz	51% / 46%	23%-26% / 26%-27%	23%-26% / 27%-28%
180 MHz	46% / 44%	26%-28% / 27%-28%	26%-28% / 28%-29%
160 MHz	41% / 42%	26%-33% / 27% -30%	26%-33% / 28%-31%

[1] Package in 3.4-3.8 GHz range / total spectrum assignment as of 1 January 2020 (as of 1 January 2020 in each case)

Under the given assumptions, A1 does not have to acquire an excessive amount of spectrum to create the asymmetries mentioned (from 180 MHz). Since its rivals reach their capacity limits more quickly on account of the much higher traffic, it cannot be ruled out that buying an excessive number of frequencies could be profitable, especially since according to the current technological assessment the marginal intrinsic value is likely to decrease from 100 MHz, and thus the average price for such an amount of spectrum does not necessarily have to be higher than for an amount that A1 would acquire when focusing solely on the intrinsic valuation.

By contrast, there is much less likelihood of one of the two other network operators making a unilateral strategic investment that would be capable of generating the asymmetries referred to. Firstly, A1 cannot fall below the 25% threshold. Secondly, under these assumptions, Drei (or TMA) would have to acquire a relatively large

amount of spectrum to create asymmetries harmful to competition (between 210 and 280 MHz depending on the scenario).[15] In any case, the band-specific cap would kick in here (less than 50% of the 3.4-3.8 GHz range).

A coordinated investment capable of creating the aforementioned asymmetries harmful to competition would have to comprise 320-370 MHz of spectrum in each configuration (A1+TMA, A1+Drei) and scenario.[16] The regulatory authority does not believe such a coordinated strategic investment is probable since coordination is very difficult in the auction (provided the individual bids are not disclosed). However, this possibility cannot be discounted completely.

The possibility of a new network operator buying spectrum does not have to be examined in detail for two reasons: firstly, it is highly unlikely that such a network operator could squeeze out an existing MNO in the auction. Secondly, the continued market involvement or market entry of another network operator would primarily be conducive to competition and so there are no competition concerns.

Conclusion: The regulatory authority considers excessive asymmetry in the frequency spectrum to be harmful for competition. There is a risk that this challenge to competition could arise in the auction, either as a result of A1 buying more than 160 MHz (unilateral strategy) or A1 and one of the smaller MNOs collectively buying more than 320 MHz (coordinated strategy).

3.3 Negative impact on intermodal broadband competition

The frequencies to be awarded are a significant input factor for future mobile network coverage. On the one hand this is the first 5G band – owing to pending standards it is not yet possible to assess this technology – while on the other hand, the capacity of mobile service providers will likely increase sharply on account of the frequencies to be awarded. Capacities need to be increased in mobile telecommunications in order to maintain competitive pressure on wired broadband as demand continues to grow.

Below we examine whether a strategic acquisition of frequencies by wired broadband providers can be expected during the auction.[17] The first precondition is the ability to increase the costs of rivals or to isolate them completely from the awarded input. The second precondition is for there to be an appropriate incentive for such a strategic purchase of frequencies. Only where it is possible to recoup the costs incurred is a strategic acquisition of frequencies worthwhile. The third criterion examined is any impact on effective competition. Measures safeguarding

15 To achieve a total share of more than 45%, Drei (or TMA) would have to acquire at least 270 MHz (or 280 MHz). In order for one of the two smaller network operators to drop below 25% under these assumptions, Drei (or TMA) would have to acquire more than 210 MHz (or 230 MHz).

16 The TMA+Drei configuration does not have to be examined because A1 cannot fall below a spectrum share of 25% and the share of the smaller network operators cannot rise above 40% owing to the band-specific cap (less than 50%).

17 The frequencies in the 3.4-3.6 GHz range were once acquired by wired broadband providers; since the frequencies were not used in accordance with the coverage requirements, they were returned to the TKK and reassigned. See https://www.rtr.at/en/tk/Spektrum3600MHz_Verf

competition should be taken in the course of the award only if negative impact is expected on effective competition.

Possibility to increase costs for or isolate rivals

The reason for a strategic acquisition of frequencies is to increase the costs of rivals in some way, or to isolate them completely from using an input.

In a hypothetical case, however, were wired broadband providers to acquire the frequencies to be awarded, this would only ensure isolation of rivals from this frequency package. Yet, the other mobile telecommunication providers also have usage rights in other frequency ranges. Consequently, increased use of the existing spectrum in the form of an expansion of the existing network constitutes an alternative to buying these frequencies. For example, the number of antennas per location (sectors) could generally be raised from three to six sectors. Alternatively, further broadcasting locations or – in the event of high capacity demand – a network with much smaller cells could be established. All of these measures can increase data transmission capacity. But developing the network in this way to raise capacity is much more costly than using additional frequencies. Thus, complete isolation of the existing mobile network operators from the necessary frequencies can be ruled out. What cannot be ruled out, by contrast, is increasing the costs of other mobile network operators. Increasing the costs could force mobile network operators to make more expensive offers, especially with unlimited data packages, thereby reducing the competitive pressure on wired broadband.

The compulsory offer as part of virtual unbundling works counteracts any restriction of capacity. By using the price-regulated wholesale product in A1's fixed network, alternative mobile network operators have an option of lowering the utilisation rate in their own mobile networks. A1 will also benefit, however, from the potential increase in use of its wholesale offer.

Incentive for strategic frequency acquisition

A strategic acquisition of frequencies is only worthwhile if the return exceeds the costs.

Given the stated interest of mobile network operators and based on the results of recent awards in other countries, we can assume that the mobile providers have a relatively high willingness to pay for the frequency package to be awarded (intrinsic value). The costs of a strategic frequency acquisition are thus not insignificant. Among the reasons for the coverage requirements to be met is to prevent such a strategic acquisition of frequencies. Given the prescribed use of a certain number of locations, considerable costs are incurred purchasers previously not having their own radio communications networks.

What does a wired broadband provider stand to gain through of a strategic purchase of frequencies? Limiting capacity in mobile telecommunications and an associated reduction in the mobile broadband service would divert demand to wired

broadband. A1's margin with an existing, unused line in wired broadband is much higher than that of mobile network operators. In other words, we can assume that a sufficiently large strategic acquisition of frequencies by A1 would result in an increase of connections to A1's wired broadband sevice. In terms of expanding the connections it is irrelevant whether this takes place in the regulated wholesale market or in the end user market, in which competition is based on the wholesale product. The market share of A1 in wired broadband is also sufficiently large to prevent other wired broadband providers from primarily benefiting from the isolation.

Such a strategic acquisition of frequencies by other wired broadband providers can generally be ruled out mostly for the following reasons: firstly, the costs of meeting the coverage requirements are often too high if they have previously had no radio communications networks. Secondly, only where the wired network largely overlaps with the award region is there a reasonable chance of recouping costs. Nobody has operations nationwide apart from A1TA, so even with a regional structure the overlap with a provider's wired network is often limited. Where the wired network and the award region overlap to a minor extent, those making a strategic acquisition of frequencies would benefit only to a small degree from the higher costs of their rivals.

At present there is nothing to suggest any collective incentive for several wired broadband providers to make a strategic acquisition of frequencies, given that these providers are not homogeneous and that such coordination during an auction is difficult to achieve.

Impact on effective competition

A strategic acquisition of frequencies could trigger negative impact on effective competition among mobile network providers. Thus, care must be taken during the award to prevent this.

The contribution of wireless regional broadband providers to effective competition is not substantial enough to allow prior safeguarding of their broadband products with the help of these frequencies in the framework of newly awarding them. Nonetheless, any regional structuring should enable wireless regional broadband providers to acquire exclusive frequencies to maintain or expand their products.

Evaluation:

Although the regulatory authority recognises the relevance of this competition challenge in principle (see previous analysis), based on current information it is difficult to discern spectrum distributions that could have detrimental impact on intermodal broadband competition. This frequency range, unlike almost any other band to be awarded in the near future, impacts the future capacity of mobile telecommunications networks.[18] At the same time, high growth rates are still seen for mobile broadband services and this is expected to continue in the future too.[19] Therefore, to ensure mobile broadband services can still have a restrictive effect on wired broadband in future, it is crucial for one or more mobile network operators not having their own wired networks to acquire a certain portion of these frequencies.

As an initial, provisional estimate, the regulatory authority assumes that, alongside a minimum (collective) 5G bandwidth (60 MHz), mobile network operators without their own wired network will need to win 'additional bandwidth' of at least 100-120 MHz to maintain intermodal broadband competition. This gives rise to certain distributions that can be conducive or detrimental to competition.

A subsequent assessment should be made of the seriousness of the risk of one network operator (or two), with a fixed network, being able to acquire enough spectrum alone (collectively) so that a distribution of spectrum results which is detrimental for competition (as referred to in competition challenge 3). Given the requirements that must be met for a network operator to pursue such a strategy,[20] no other fixed network operators besides A1 are relevant here. In order for a spectrum distribution that is detrimental for competition to result, A1 (unilaterally) would have to purchase between 150 and 170 MHz. This is not an excessively large amount of spectrum, so it cannot be ruled out that a strategic acquisition of frequencies with the aim of weakening intermodal broadband competition could be truly profitable.

Conclusion: The regulatory authority believes there is a material risk of a strategic investment by A1 that could weaken intermodal broadband competition. The relevance of this competition challenge is difficult to gauge given the information available, and the provisional assumptions underlying the analysis above are not necessarily correct. The regulatory authority therefore calls upon the consultation participants to give their opinion on the significance of this competition challenge and on the assumptions made.

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18 This award increases the spectrum available for electronic communication services by 66%. By comparison, the forthcoming awards described in the Spectrum Release Plan will lead to a much smaller expansion (award of 700+1500 MHz in 2019, i.e. +17% of the mobile telecommunication spectrum currently used, and the award of the 1500 MHz + 2300 MHz expansion band after 2020, i.e. +25% of the mobile telecommunication spectrum currently used).

19 See Ericsson Mobility Report (CAGR 2016-2022 of 40%), Cisco VNI (CAGR of 48%) or RTR (CAGR 2014-2016 of 86%) among others. Can be downloaded from the respective websites.

20 Including: no radio communications network and thus high costs to meet coverage requirements, insufficient market share of wired broadband products with regional structuring of the award, extent of substitutive use of frequencies relative to complementary use, relatively low intrinsic value in relation to strategic value.

4 Measures

4.1 Requirements for measures safeguarding competition

Since measures safeguarding competition potentially constitute intervention in the freedom of frequency users to carry out their business, they have to meet the following requirements:

- The measure must be **effective**. This means the measure must be suitable for remedying current challenges to competition or hindering potential challenges, which can be caused, for example, by overly strong concentration of frequency usage rights.
- The measure must represent the **mildest form of intervention**. The measure must not intervene more than is absolutely necessary, and if several measures are possible, then the one that is the least invasive must be chosen.
- The measure must be **proportionate** and trigger no unjustified, detrimental effects for individual network operators. Disproportionately tight caps, for example, can mean that a network operator is exposed to unreasonable growth barriers – owing to too little spectrum – or unjustified restrictions in quality competition. Measures are also not proportionate if they result in unsold lots or a disproportionate expense for the authority or the bidders (owing to an overly complex design for example). Measures that are effective and represent the mildest form of intervention are essentially considered proportionate.

The regulatory authority will focus on these requirements when identifying suitable measures.

4.2 Options for measures safeguarding competition

Based on industry input and mindful of the potential competition challenges, the regulatory authority would like to put up for discussion the following options regarding measures safeguarding competition:

- Option 1: symmetric spectrum cap of 260 MHz (67% of the 3.4-3.8 GHz range)
- Option 2: symmetric spectrum cap of 180 MHz (46% of the 3.4-3.8 GHz range)
- Option 3: spectrum cap of 140 MHz for A1 and 180 MHz for all other bidders
- Option 4: symmetric spectrum cap of 160 MHz (41% of the 3.4-3.8 GHz range)
- Option 5: spectrum cap of 140 MHz for A1 and 160 MHz for all other bidders
- Option 6: symmetric spectrum cap of 140 MHz (36% of the 3.4-3.8 GHz range)
- Option 7: symmetric spectrum cap of 120 MHz (31% of the 3.4-3.8 GHz range)
- Option 8: symmetric spectrum cap at 100 MHz (26% of the 3.4-3.8 GHz range).

In the regulatory authority's opinion, neither explicit nor implicit reservation by means of competition constraints (spectrum floors) is proportionate. These instruments are consequently not recommended. Competition constraints in conjunction with the potentially high number of lots and categories would create a level of complexity that is unmanageable for the authority and the bidders alike. What is more, it is currently unclear whether an auction format will be employed that is compatible with this instrument. An explicit reservation of spectrum for a bidder group (such as regional broadband providers or new entrants) is not appropriate given the potential competition challenges.

It follows that options are limited to various spectrum caps, tiered in 20 MHz segments in accordance with the technological requirements.

The first step of the analysis relates to the effectiveness criterion. The regulatory authority believes that not all options are suitable (in the same way) for tackling the potential challenges competition. The following table reflects an initial, provisional estimate by the regulatory authority.

Table 6: How effective are the spectrum caps?

Option	Competition challenge 1	Competition challenge 2	Competition challenge 3
1: 260 MHz for all	No	No	No
2: 180 MHz for all	No	No	No
3: 180 MHz for all, 140 MHz for A1	Unclear[1]	Yes	Yes
4: 160 MHz for all	Yes	Yes	Unclear[2]
5: 160 MHz for all A1 140 MHz	Yes	Yes	Yes
6: 140 MHz for all	Yes	Yes	Yes
7: 120 MHz for all	Yes	Yes	Yes
8: 100 MHz for all	Yes	Yes	Yes

[1] Option 3 would only be effective if the risk of A1 becoming the victim to a squeeze-out strategy were judged minimal. Otherwise, option 3 is not an effective measure for addressing competition challenge 1.

[2] Option 4 could be ineffective, depending on the validity of the assumptions associated with competition challenge 3.

The regulatory authority believes that options 1 and 2 are not suitable for preventing potential challenges to competition in any event. Whether option 3 is an effective measure depends on how high the deemed risk is of A1 falling victim to a strategically motivated frequency acquisition in connection with competition challenge 1. In this case, the caps (for bidders other than A1) would be too liberal. Whether option 4 is suitable for preventing the potential competition challenges referred to depends very much on the assumptions made in connection with competition challenge 3 (more details above).

Options 6-8 are suitable for addressing all three of the challenges to competition (under the given assumptions), but they are not proportionate as they do not represent the mildest form of intervention. The same applies for option 5, if options 3 or 4 prove to be effective. Beyond this, special justification is required for asymmetric caps (options 3 and 5).[21]

Consequently, the following table comprises the provisional estimate of the regulatory authority for the three criteria.

[21] If either a CCA were to be employed, with the price rule common for this format (minimum core price rule), or a clock auction with clinching, asymmetric caps would be very problematic given the asymmetric effects on pricing.

Table 7: Preliminary evaluation of options for spectrum caps

Cap options	Evaluation
1: 260 MHz for all	Not effective
2: 180 MHz for all	Not effective
3: 180 MHz for all, 140 MHz for A1	Possibly ineffective against first competition challenge; possibly disproportionate
4: 160 MHz for all	Possibly ineffective against third competition challenge
5: 160 MHz for all, 140 MHz for A1	Effective but possibly disproportionate
6: 140 MHz for all	Disproportionate
7: 120 MHz for all	Disproportionate
8: 100 MHz for all	Disproportionate

Since the evaluation of the previous analysis is subject to certain uncertainties, the regulatory authority would like to invite all interested parties to take part in the consultation and provide important input on the potential competition challenges and measures safeguarding competition.