Three's response to Ofcom's consultation on future use of the 700MHz band.

Confidential

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1. Three supports Ofcom's proposal to make the 700MHz spectrum available for mobile use.

Hutchison 3G UK Ltd (Three) welcomes the opportunity to respond to Ofcom's consultation on future use of the 700MHz spectrum in the UK.

Three fully supports Ofcom's proposal to make the 700MHz spectrum available for mobile broadband use. 700MHz is low frequency (sub-1 GHz) spectrum, which is particularly valuable due to its superior propagation characteristics. This spectrum is well-suited for providing coverage and consistent quality of service both geographically and deep indoors.

We understand that the band plan for 700MHz spectrum in Europe has not yet been finalised, but it is expected to be aligned with the Asia-Pacific Telecommunity (APT) band plan. According to this band plan, 2x30 MHz of spectrum will become available to mobile operators[1].

An alternative band-plan considered is a Europe-specific band plan that would make 2x40MHz of spectrum available. Although this band plan would provide more paired spectrum, it is less likely to be adopted due to a lack of economies of scale and potential handset-design complications[2].

In principle, Three would prefer a Europe-specific band plan as it would make more paired spectrum available. Nevertheless, we understand its drawbacks and accept that such a band plan may not be desirable from vendors' perspectives.

However, if the 2x30MHz band plan is adopted, then Ofcom must consider its implications for competition and pay particular attention to the auction design in order to maintain a competitive market.

We note in particular that low frequency spectrum is currently distributed very unevenly in the UK. This is likely to have a negative impact on competition in the medium-to-long term unless this distribution is remedied in the 700MHz auction, among other things. Indeed, if the inequalities in the sub-1 GHz spectrum distribution persist, the operators with insufficient amount of spectrum may not be able to compete effectively in the future. This could lead to less intense competition overall, manifesting itself in higher prices and/or lower quality of service.

Three recommends therefore that Ofcom should address these competition concerns in the intended 700MHz auction design. Ofcom

[1] This band plan also involve a centre gap of 1x25MHz. Three supports the use of this spectrum as Supplemental downlink (SDL).
[2] Ofcom's consultation on the 700MHz spectrum, para. 4.26

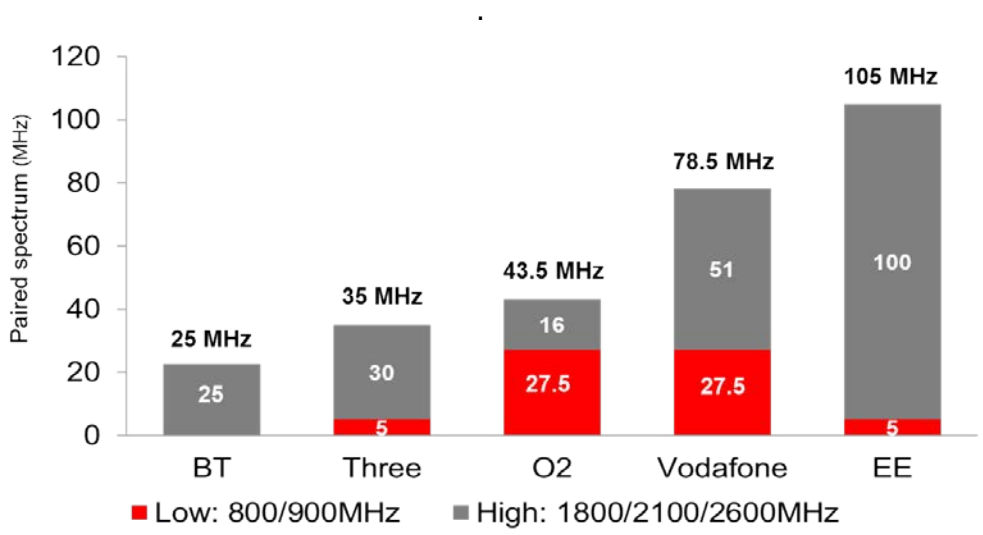
should also take into account the benefits of stronger competition in its cost-benefit analysis (CBA) as wider benefits to consumers.

Below we discuss these points in more detail.

Spectrum capacity in the UK continues to be very unevenly distributed between MNOs, creating a risk to competition in mobile markets.

Low frequency spectrum remains highly concentrated in the UK. Two operators - Vodafone and Telefonica - own 85% of all available sub-1GHz spectrum currently used by mobile operators (Figure 1).

Figure 1: Unequal distribution of low frequency spectrum in the UK

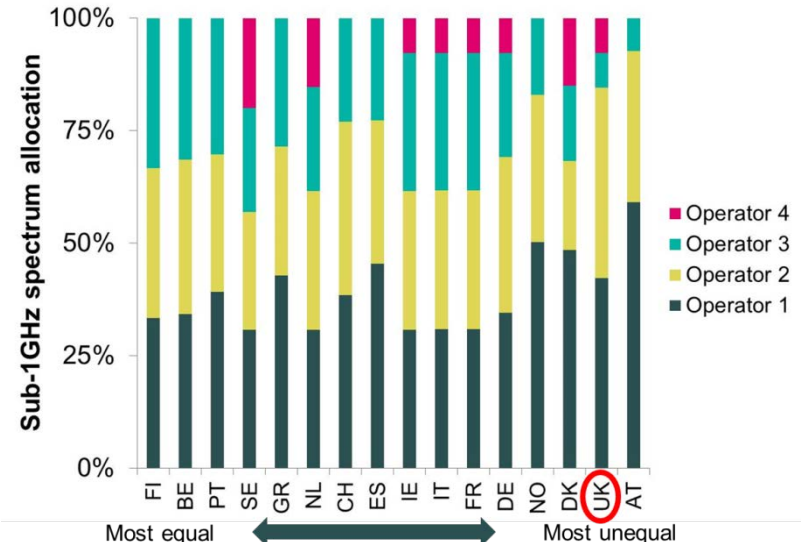


Source: Ofcom.

This is second most uneven distribution[3] of low frequency spectrum in Western Europe (Figure 2), which represents only a marginal improvement on the pre-auction allocation when two operators owned 100% of all available low frequency spectrum.

[3] Inequality of distribution is measured using a Gini coefficient. The Gini coefficient is a standard measure of inequality measured between 0 and 1. 0 corresponds to complete equality, i.e. each operator has the same amount of spectrum; 1 corresponds to maximum inequality, i.e. only one operator holds all spectrum. The Gini coefficient is defined as a ratio of the area that lies between the line of equality and the spectrum distribution curve over the total area below the line of equality.

Figure 2: The UK represents second most unequal allocation of low frequency spectrum in Western Europe.



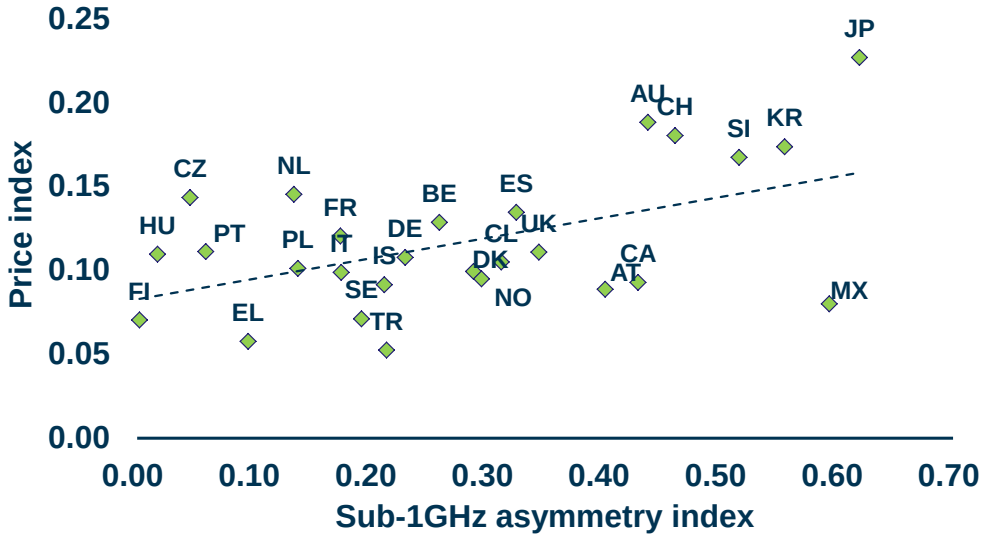
Source: Cullen International.

Three considers that this highly uneven distribution presents a risk to future competition in mobile markets. In particular, there is strong evidence that mobile markets with uneven low frequency spectrum allocation tend to have higher prices on average than markets with more equal spectrum allocations.

Three commissioned Analysys Mason to collect data[4] and analyse the relationship between mobile prices and spectrum allocations in the OECD countries. This relationship is illustrated by Figure 3. Mobile price index is calculated as ARPU divided by the average number of minutes per month. Sub-1GHz spectrum asymmetry index is measured using the Gini coefficient described above. The graph shows that countries with more equal sub-1 GHz spectrum allocation (such as Finland) tend to have lower prices than countries where spectrum distribution is highly asymmetric (e.g. South Korea and Japan).

[4] The data used in the study is the GSMA Intelligence effective price per minute data. The prices were expressed in one currency (£ per minute) and PPP adjusted. Other sources of data have also been considered (i.e. OECD price per a monthly basket of calls and ITU price per call minute data). The latter sources were rejected due to a patchy coverage and/or unclear methodology. For example, the OECD data uses one tariff plan per country without explaining the criteria for the choice.

Figure 3: Prices are lower in countries with more equal sub-1GHz spectrum allocation.



Source: GSMA Intelligence data, Analysys Mason analysis.

The relationship is even stronger in countries with 'challenger' operators[5] present, such as Three in the UK or Free in France (Figure 4). This relationship makes clear intuitive sense: challenger operators are more aggressive in their propositions, i.e. they are more likely to offer large/ unlimited bundles at low prices[6]. However, these propositions are appealing to customers only if the quality of service in general and coverage in particular are good. With poor coverage, mobile operators cannot compete even if their prices are low.

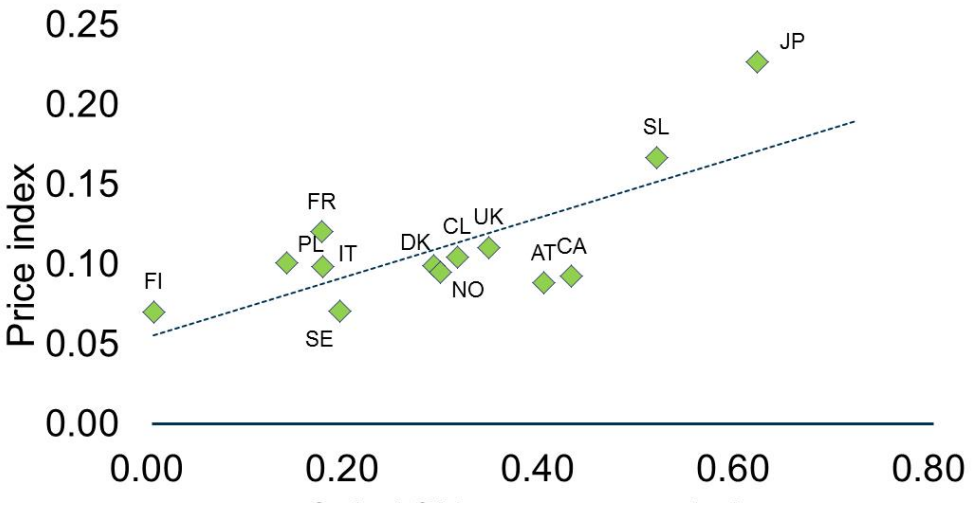
Moreover, countries with asymmetric spectrum distributions tend to be countries with challenger operators present, as challenger operators tend to be the most recent market entrants and do not enjoy the benefits of legacy spectrum allocations (especially 2G), unless national regulators have specifically redistributed or re-auctioned legacy spectrum holdings.

Therefore, if low frequency (and total) spectrum allocation is more symmetric, all operators, including challenger operators, can compete on

[5] We use Rewheel's definition for challenger operators. See http://dfmonitor.eu/downloads/Rewheel_EU27_mobile_data_cost_competitiveness_report_May_2013_FINAL.pdf for more details.
[6] This has been recently analysed and confirmed by Rewheel in the study "EU27 mobile data competitiveness report"

a more level playing field. If, on the other hand, the allocation is highly skewed towards the incumbents, challenger operators are less credible, lacking the same spectrum coverage and/or capacity as incumbents, and competition is then less intense.

Figure 4: The price-to-spectrum asymmetry relationship is stronger in countries with challenger operators.



Source: GSMA data, Analysys Mason analysis.

Three considers that Ofcom needs to take this into account when designing an auction for the 700MHz spectrum (and any other future spectrum auctions, sales or trades). In particular, Three is of the view that Ofcom should continue to use low frequency and total spectrum caps as in the 4G auction. Failure to do so might lead to an even more extreme spectrum allocation and a major reduction in competition as illustrated by the international evidence above and discussed further below.

On the other hand, if spectrum inequalities were addressed, then we would expect stronger competition in mobile markets going forward, with lower prices and a wider range of services (for example, as is currently the case in Finland and Sweden, which enjoy almost symmetric spectrum allocations and low consumer prices).

Furthermore, these benefits should be taken into account specifically in Ofcom's CBA.

This could be done by modelling scenarios of the 700MHz spectrum allocation and forming a view on the impact it would have on competition. For example, if, as a result of more equally distributed capacity, inclusive bundles are expected to double in size, while the monthly prices remain constant, this would be equivalent to a 50% reduction in price per minute or per GB and to a corresponding increase in consumer surplus.

Three is of the view, that the benefits of competition are additional benefits, over and above those captured by Ofcom in its CBA. These benefits would arise because mobile operators are incentivised to compete stronger (i.e. raise output) if their capacity constraints were relaxed.

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Three therefore urges Ofcom to take these considerations into account for the purposes of quantifying benefits in the CBA and when designing the 700MHz spectrum award.

International auction evidence illustrates the risk to competition of having too high or no spectrum caps.

Auction spectrum caps are widely recognised as a way to prevent risk to downstream competition. Peter Crampton, a world leading expert on spectrum auctions, notes:

> *" …part of the willingness to pay for the incumbent in the auction comes from the value of deterring new entry, which is bad for overall efficiency…If a regulator decides that it is better to avoid creating a monopoly, then all that is required is a spectrum cap limiting each bidder to a maximum quantity of spectrum"*[7]*.*

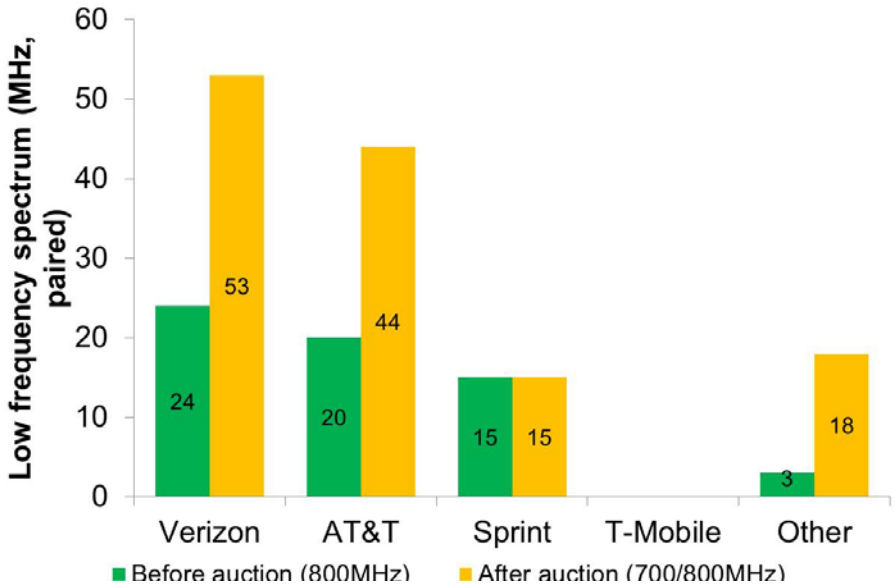
Evidence from auctions where no caps were set or caps set too high highlights the risk to competition.

A major example is the US 700MHz auction in 2008, the sale of highly valuable low frequency spectrum (equivalent to the 4G 800MHz band in the UK and rest of the world), where no spectrum caps were applied and no reservation of spectrum for new entrants or smaller operators was made. This led to almost all the 700MHz spectrum on offer being

[7] P. Crampton et al. "Using Spectrum Auctions to Enhance Competition in Wireless Services", Journal of Law and Economics, vol. 54 (November 2011)

acquired by the two largest US mobile network operators, AT&T and Verizon Wireless, alongside their existing extensive spectrum holdings, especially in other low frequency bands, with some smaller operators not bidding at all, knowing their low chance of success. Figure 6 illustrates low frequency spectrum holdings before and after the 2008 700MHz auction.

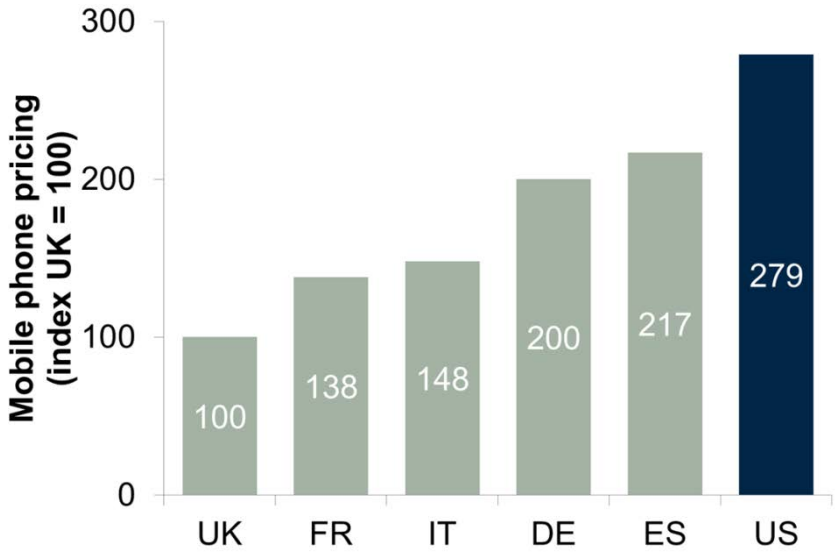
Figure 5: Distribution of low frequency spectrum in the US before and after the 2008 700MHz auction.



Source: Analysys Mason.

It is increasingly recognised by industry commentators and regulators that this auction outcome has been the main contributor to high mobile network consumer prices in the US, which are almost twice the levels in the EU5 and almost three times the level in the UK (Figure 7).

Figure 6: High mobile prices in the US vs. EU5.



Source: Ofcom International Communications Market Report (2013), Figure 1.13.

Indeed, the US telecoms regulator, the Federal Communications Commission (FCC), has recently entirely reassessed its approach to spectrum auctions. In addition to high prices generally, the FCC particularly found that the uneven distribution of low frequency spectrum led to a weaker competition in rural areas, where only 37% of population had access to 4 or more networks as opposed to urban areas, where the figure was 92%[8].

As a result of these findings, the FCC now recognises the importance of low frequency spectrum and is introducing spectrum caps and spectrum reservations in the upcoming incentive auction:

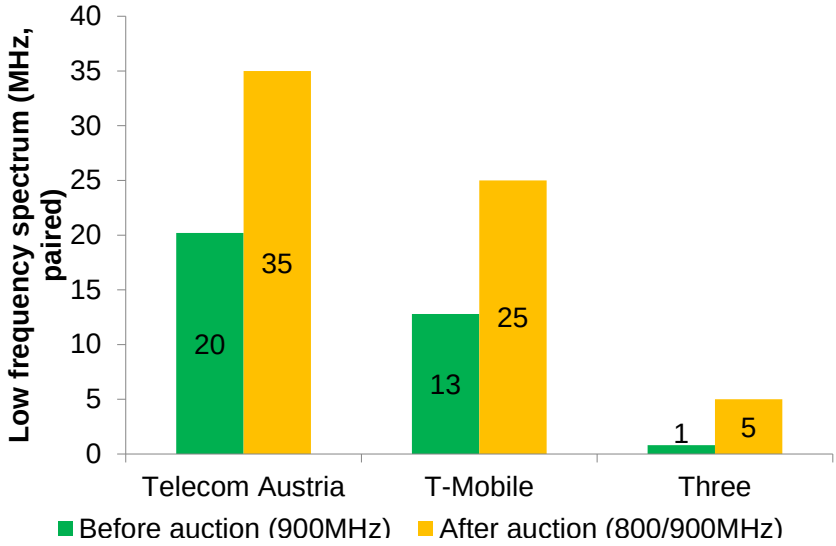
> *"Access to spectrum, particularly low-band spectrum, is essential for the provision of mobile wireless services…If a proposed transaction would result in a wireless provider holding approximately 1/3 or more of available [and/or low-band] spectrum, that transaction will trigger a more detailed, case-by-case competitive analysis".*
>
> *"To promote competition, the <FCC> rules establish a market-based reserve of no more than 30 megahertz of spectrum targeted*

[8] Statement of commissioner Mignon L. Clyburn, FCC, http://www.fcc.gov/article/doc-327109a3

for providers that hold less than 1/3 of available low-band spectrum in a license area"[9].

A more recent example is the auction of 800MHz, 900MHz and 1800MHz spectrum in Austria in 2013. In this auction, it is apparent that the main policy objectives were to increase revenue, rather than protect competition, reflected in the high caps on spectrum that any individual bidder could acquire. The outcome of this auction was that the market leader, Telekom Austria, acquired the maximum possible spectrum permitted by the auction rules, 2x35MHz of sub-1GHz spectrum, while Three only acquired 2x5MHz – 8% of all available low frequency spectrum (Figure 8).

Figure 7: Distribution of low frequency spectrum in Austria, before and after the auction



Source: Analysys Mason

At the same time, the Austria auction saw among the highest prices in any comparable auction, indicating the large strategic value to the existing largest operator of limiting the amount of spectrum that competitors could acquire. We understand that one of the Austrian operators is disputing the auction outcome as being anticompetitive and not in the interest of consumers, among other things.

[9] "FCC adopts revised mobile spectrum holdings policies to preserve and promote s competitive wireless marketplace", http://www.fcc.gov/document/fcc-adopts-revised-mobile-spectrum-holdings-policies

These examples clearly demonstrate that, in auctions with no spectrum caps (or with very high spectrum caps), smaller operators typically fail to acquire low frequency spectrum. This subsequently has implications for competition in the market, manifesting itself in higher average prices and less intense competition, particularly in rural areas (which is currently of great focus to Government).

Three strongly believes that Ofcom should continue to apply spectrum caps in future spectrum auctions to avoid adverse outcomes and to continue to promote competition in the mobile market in the UK.

We have addressed the specific questions raised by Ofcom in this consultation in Section 2 below.

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2. Responses to Ofcom's specific consultation questions.

Question 1: Do you have any comments on Analysys Mason's approach to quantifying the network cost savings and performance benefits?

Three broadly agrees with Analysys Mason's approach to quantifying the network cost saving and performance benefits. However, we believe that prospective competition benefits should also be taken into account. We discuss these in detail in Section 1 of this submission above.

Three also favours the use of the central gap as Supplemental Downlink (SDL). This would allow mobile networks to provide additional downlink capacity and would generate higher benefits for consumers.

Question 2: Do you have any comments on the other benefits we have identified including the likely magnitude or how they may be quantified?

Three believes that Ofcom has potentially underestimated the benefits of the 700MHz spectrum to the mobile industry. An award of additional low frequency spectrum to mobile operators provides an opportunity to create a more level playing field and to strengthen future competition. This would lead to additional benefits to consumers in the form of lower prices and/or better quality of service, over and above those captured by Ofcom in its CBA. More details are provided in Section 1 of this response.

Question 3: Do you agree with our assessment of the likely benefits of changing use of the 700 MHz band?

Broadly yes, subject to comments in response to questions 1 and 2.

Question 4: Do you have any comments on our analysis of the implications of change of use of the 700 MHz band would have for the DTT platform?

No.

Question 5: Do you agree with our assessment of the likely costs of upgrading DTT transmission infrastructure?

Three notes that the assessment of costs of upgrading DTT transmission infrastructure was undertaken by Arqiva. Arqiva is an important player in the DTT transmission market. The change of use of the 700MHz spectrum is expected to affect Arqiva and its DTT customers. This might

have potentially influenced Arqiva's assessment of the process of the 700MHz clearance and the costs involved. We recommend that Ofcom should appoint an independent advisor to verify Arqiva's estimates and to assess whether the clearance process could be completed sooner.

Question 6: Do you have any comments on our assessment of the timeframes within which it might be possible to complete a DTT replan?

Three recommends that the DTT replan should be completed as early as possible in order to maximise the benefits to consumers from the change of use of 700MHz spectrum. Three considers that it should be possible to make the 700MHz band available for mobile use by 2020 (the latest).

Please see our response to Question 5 above.

Question 7: Do you have any comments on our assessment of the loss of value from existing DTT services in case of change of use for the 700 MHz band?

Please see our response to Question 5 above.

Question 8: Do you have any comments on our analysis of the implications of potential changes for DTT viewers and for the platform? Are there any effects that may be important to viewers that we should consider further?

No comments.

Question 9: Do you have any comments on our consideration of consumer information and support measures and on the factors we should focus on in the next stages of work?

Three recommends that the experience of the 800MHz DTT coexistence should be studied closely, both in terms of consumer information and support that worked best, and in terms of interference costs expected. Three notes that when similar cost calculations were undertaken for the 800MHz spectrum, Ofcom had significantly overestimated potential costs of the interference to consumers.

Question 10: Do you have views on the activities that Ofcom and other stakeholders could undertake now to help ensure that DTT equipment that consumers might buy in the coming years is as future-proof as possible?

No comments.

Question 11: Do you have any comments on our assessment of the impact change of use of the 700 MHz band would have on PMSE?

No comments.

Question 12: Do you have any comments on the mitigations for loss of access to the 700 MHz band including whether we have correctly identified the replacement bands suitable for further study and whether we have correctly identified actions that the PMSE industry could adopt to improve spectrum efficiency?

No comments.

Question 13: Do you have any comments on our assessment of the impact of the change of use of the 700 MHz band on the TVWS availability?

No comments.

Question 14: Do you agree with our use of the Spackman method for discounting both the costs and benefits of change of use?

Yes, we agree.

Question 15: Do you agree with our approach of estimating the cost of early replacement or should we be considering the full cost? Do you have any comments on how we have estimated the costs of early equipment replacement?

Yes, we agree. Only the early replacement costs should be included in the CBA. This is because the other costs – the costs of replacing equipment on time as it approaches the end of its life - will be incurred in

any case and are not related to the change of use of the 700MHz spectrum.

Question 16: Do you agree with our overall assessment of the costs of change of use of the 700 MHz band?

Please see our response to Question 5.

Question 17: Do you have any comments on our assessment of the impact of earlier or later change of use of the 700 MHz band?

Three strongly recommends an earlier change of use – by 2020 or earlier. This would bring additional benefits to consumers in the form of stronger competition, lower prices for customers and/or better quality and more innovative services (discussed in Section 1 above).

Question 18: Do you agree with our proposal that we should make the 700 MHz band available for mobile broadband?

Yes. Three strongly supports Ofcom's recommendation. The benefits of the change of use of the 700MHz spectrum clearly outweigh the costs.

Question 19: Do you agree with our proposal that we should seek to implement this change at the earliest possible opportunity?

Yes. We strongly agree. This would maximise consumer benefits from the change of use.

Question 20: If, as a result of this consultation, we decided to go ahead with the proposed changes, what factors and evidence should we take into account when considering whether to hold an auction near to the time of availability of the spectrum or earlier?

Three would support an early auction (e.g. in 2016) if full payments were delayed until the time when the 700MHz spectrum becomes available (2020-2022). An early auction would increase certainty from mobile operators' perspectives and facilitate network planning and rollout.

If, however, the payments are expected to be made immediately after the auction, Three would oppose an auction taking place early. In particular,

we will not to be in a position to pay a significant amount of money in 2016 for an asset that would only become available in 2020-2022 and this could act as a barrier to competition.