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What do you want Ofcom to keep confidential?:

Keep nothing confidential

If you want part of your response kept confidential, which parts?:

Ofcom may publish a response summary:

Yes

I confirm that I have read the declaration:

Yes

Ofcom should only publish this response after the consultation has ended:

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Question 1: Do you agree with these proposals for the awards of the three bands or have any other comments on the contents of this document?:

GSA believes that the timing of assigning spectrum in the 2 - 2.6 GHz range is appropriate: after the introduction of 3G technology in the period 2002 / 2004, GSA has observed considerable market growth and technology innovation taking place, signalling the need for additional frequency bandwidth. 3G/UMTS has now surpassed 100 million subscriptions worldwide, broadband mobile Internet access is reality with HSDPA and HSUPA, and mobile TV services are being introduced using MBMS - HSDPA transport channels.

GSA does not share Ofcom's view that - for reasons of market demand - it is necessary to move away from the particular ECC decision on 2.6 GHz. There is no real market demand visible except for 3G services. Predictions from market analysts for new services and new technologies have often resulted in very low take-up rates. GSA does not believe that too much weight should be attached to such predictions when determining policy.

Licences to be awarded by Ofcom are foreseen for fixed and mobile use. GSA strongly supports mobile use as the main trend and driver in the market. Harmonised bands, international roaming and international circulation of terminals according to international standards play an eminent role. Since fixed use has no such stringent requirements, there is some risk that mobile specific characteristics would not attract sufficient attention, or may even be ignored. GSA therefore urges that the 2.6 GHz and 2010 -2025 MHz band use should not be in conflict with these international mobile standards. GSA consequently supports the CEPT band plan as a harmonised mobile band arrangement satisfying the needs for both FDD and TDD technologies.

The comments from GSA to this consultation focus on
§ The flexible band approach on 2.6 GHz
§ The spectrum cap
§ Technology and service neutrality
§ Impacts because of adjacent interference

Question 2: Do you agree with the analysis in section 5 or have any comments on adjacent interference issues?:

The substantial technical material elaborated by Ofcom and Mason in this consultation shows clearly that consumers and industry cannot expect 100% clean 2.6 GHz spectrum. We share the view that additional technical measures have to be taken in order to achieve an acceptable Quality of Service level, which is in the interest of the consumer. The essential measures will be proprietary and UK specific. Relatively high uncertainty also exists regarding the impact coming from aeronautical radar.

On 2010 -2025 MHz, GSA fully agrees with the technical analysis made by Ofcom and supports Ofcom's views.

Question 3: Do you agree that Ofcom should authorise use of the spectrum bands 2500-2690 MHz, 2010-2025 MHz and 2290-2300 MHz?:

GSA agrees with most of the objectives listed for the authorisation of 2500-2690 MHz and 2010 - 2025 MHz. Regarding 2290 - 2300 MHz, GSA has no precise opinion; the bands may be sufficient for PMSE services, but are too restricted to be of immediate interest to mass market services. Spectrum usability in the year 2012 prior to, or during the Olympic Games is a huge uncertainty.

The 90 MHz cap is an issue which highlights the risk of monopolising the total band. In addition, the proposed conditions for trading may increase an attraction for spectrum hoarding e.g. a licensee can sell

single lots of acquired spectrum immediately after its award (compare to the case where typically smaller pieces of land gain a relatively higher price). Another approach is to stipulate a lower cap and allowing the licensee to acquire additional spectrum (via trading) later - which could be more logical where its market share is increasing. We comment on this aspect further in our response to question 8 below.

Question 4: Do you agree that awarding licences by auction would be the appropriate mechanism for authorising use of the spectrum bands 2500-2690 MHz, 2010-2025 MHz and 2290-2300 MHz?:

Auctions may lead to high licence fees. This was the general experience from the 3G/UMTS auctions in Europe in 2000-2001. The UK conducted the world's first 3G/UMTS auction which resulted in huge payments being made for spectrum before networks could be built and services developed. There was a rapid change in market sentiment, especially amongst the financial community, during the period of the initial auctions in Western Europe. It was some time before 3G gained traction in Western Europe, including the UK. In the intervening years the industry has faced a period of considerable uncertainty, and consolidation. It is therefore with some justification that the mobile industry expresses concerns that auctions need to be improved in order to avoid the situation where high license fees would impact network investment. In this regard, GSA welcomes the improvement steps in the 2-stage auction process as proposed by Ofcom, and wishes to introduce further measures/tools in order to keep the auction outcome to an affordable price level (e.g. introducing lower spectrum cap, or allowing infrastructure sharing where two licensees could flexibly share their amounts of spectrum).

Question 5: Do you agree that it is likely to be in the interests of citizens and consumers to proceed with the award of the 2.6 GHz and 2010 MHz bands as soon as practicable, rather than to delay the award pending reduction in uncertainty relating to other bands?:

GSA believes that two targets in the interest of the consumer should not be ignored:
§ The consumer should be awarded the 'neutral choice' of being able to select between operators to obtain the preferred service offerings, but without the need to change their end-user terminal equipment. This means that spectrum fragmentation into many different technologies should be avoided otherwise it would create incompatibility, and lack of interoperability as well as roaming. If we consider 3G as one example for users to exercise choice: several hundred 3G/UMTS FDD user devices models exist in the marketplace, and there are today more than 100 million UMTS users, and a further 45 million CDMA 2000 1X EV DO users worldwide - taken together, these figures already represent a huge customer base. The higher access rates which are increasingly demanded by users can only be provided if higher coding schemes facilitated by HSDPA and HSUPA (which are the standardised evolution of 3G WCDMA/UMTS systems) can be applied to additional carriers in order to fully exploit the promised channel capacity and performance.
§ The consumer should have access to clean spectrum - free of harmful interference.

These issues are important. It is not desirable to delay until use of other spectrum becomes clarified.

Question 6: Do you agree Ofcom should aim to award the bands 2500-2690 MHz, 2010-2025 MHz and 2290-2302 MHz by the end of 2007, while keeping the position on the 2.6 GHz and 2010 MHz bands under review in the light of possible developments in European regulatory fora?:

This approach is strongly supported, and it should be underlined that GSA promotes an aligned harmonised European approach. Taking into account the strong growth of 3G subscriptions as earlier mentioned, which at present are served by the existing harmonised core band allocations in the 1900/2100 MHz range, we recommend starting the assignment process by 2007/2008.

Question 7: Do you agree with Ofcom's proposals for licence conditions (technology neutrality, tradability, conditions of tenure and absence of roll-out obligations)?:

GSA is in favour of harmonised spectrum use and therefore sees the risk of conflicts on the technical approach chosen for 2.6 GHz by Ofcom. To date, a harmonised approach to spectrum management has been a key success factor in the development of the GSM/UMTS family within Europe, and across the world. Harmonisation means defining technical conditions, including the spectrum band plan and technology, at a regional or global level, to ensure efficient spectrum use, seamless services over wide areas including roaming, system co-existence, and global circulation of user equipments across borders. It is assumed that service flexibility can be provided through access-agnostic converged core network architectures. Whereas, liberalisation refers to a spectrum use proposition of generalised technology neutrality with limited technical conditions enabling so-called spectrum flexibility in support of new market entrants.

A recent study conducted by Booz Allen &Hamilton addresses the current debate around the most appropriate spectrum use proposition for wide area mobile communications. It considers the relative merits of the two alternative spectrum usage scenarios: continuation of a harmonised spectrum regime, or the introduction of a more liberalised approach to spectrum management. The European market (EU-15) is used as the basis of the assessment. By considering the impact of liberalisation on mobile industry growth from 2006, it can be seen that the growth in end-user service penetration is 37% higher in the harmonised case. In contrast, for a liberalised spectrum use proposition, the industry would see 3% less usage per subscriber, 5% lower end-user service penetration with a 7% higher ARPU, and an overall loss in consumer surplus of Euros 244 billion compared to a harmonised case. In other words, continuation of the harmonised approach within Western Europe will facilitate more consumers to use services more often, while paying less in total, i.e. securing Euros 244 billion increase in discretionary budget.

On technology neutrality:
GSA supports the approach to designate the use of the band 2500 - 2690 MHz for IMT-2000 framework standards. There is already enough freedom on technology choices within the IMT-2000 family of standards, which also ensures coexistence of technologies, global benefits for users, operators and manufactures, taking advantage of economies of scale, global roaming, network and services interoperability.

On Service neutrality:
'Services' can be understood as transport means for types of data streams, or as products offered by operators/service providers for users. In the Radio Regulations ITU-R uses the term 'radio services' in relation to spectrum allocations. It defines radio Services as e.g. Satellite, Broadcast, Mobile, Fixed Services, which have been defined in order to manage the planning aspects, including interference avoidance in different radio environments. Therefore care has to be taken when discussing radio Service neutrality.

If we are to understand 'services' as the various types of data-streams (e.g. bi-directional speech/video, web-access, unidirectional speech/ video, location determination, transport of IP-packets ?) which are transported on top of a radio technology, the type of service should not be restricted in a technical sense. Restrictions may only be acceptable and required regarding the content of a service, or on the type of

service where external benefits justify this.

As radio technology is the delivery platform for services, service neutrality does not imply technology neutrality. It is consequently proposed to treat service neutrality and (radio) technology neutrality as two separate issues. For the sake of end-to-end interoperability of services, it is proposed to prefer those services which are based on standardised protocols.

Regarding Trading, GSA basically supports the approach to introduce trading, as long as the technical and service obligations/rights of spectrum use are maintained. The risk for spectrum users in adjacent bands regarding harmful interference could - dependent on the technical obligations - be minimized, although not totally excluded. Practical experience will show whether the minimal technical conditions (e.g. Block Edge Mask or SUR) can sufficiently protect the neighbour system in cases of technology changes, or not. Our view is that gradual changes may not impact existing users, however if channel bandwidth and/or radio schemes change considerably, then impact will be unavoidable. Also the question arises of who bears the costs for network tuning, filtering, antenna arrangements, etc. in the neighbour systems. Avoiding fragmentation of spectrum use is another issue which could arise where Ofcom allows spectrum blocks of the initially received license to be traded. It is of course desirable to adapt the amount of spectrum related to the business case of a licensee. On the other hand - if small portions of already awarded spectrum are traded, the 2.6 GHz band is likely to gradually turn into non-harmonised spectrum, used by a multitude of incompatible proprietary technologies, mixed with standardised radio technologies. This would also result in reduced economies of scale.

On absence of rollout: If competition is implied, we expect that the market players will focus on achieving sufficient coverage in order to attract their desired market share. GSA supports that Ofcom proposes not to place roll-out obligations into the license. We expect that a large portion of spectrum is in any case for more capacity for already existing services thus, there is no reason to pre-determine coverage requirements for this frequency band. Since the licences are service neutral including the maximum bitrate, then a service related roll-out condition would not be appropriate.

Question 8: Do you have views on whether or not there should be a ‘safeguard’ cap on the amount of spectrum that any one bidder could win in an award for the 2.6 GHz bands and, if so, do you have a view on whether 90 MHz would be an appropriate size for a safeguard cap?:

A 90 MHz cap seems to be quite large and would potentially risk a monopoly situation occurring either for the paired or the unpaired spectrum. If a lower cap is to be considered, then the question arises whether the industry can provide an estimate of what would be the reasonable size - GSA believes that it will be difficult in the case of a technology- and service-neutral assignment approach. Nevertheless, having the known technologies in mind, we recommend a lower spectrum cap - probably derived from a minimum number of envisaged licensees - in the unpaired part as well as in the paired part of 2.6 GHz including 2010 - 2025 MHz.

By taking into account technology innovation over the next 10 years, we recommend a cap that should allow up to 2 x 20 MHz per single FDD operator or 30 - 35 MHz per single TDD operator. Such block sizes will facilitate the introduction of LTE (Long Term Evolution) high broadband data-rate services, as they are under discussion in 3GPP and by the wireless industry.

Regarding the limits on acquisition of spectrum and compensation issues:
In the past, regulators predefined a lower and upper amount of spectrum for acquisition per licensee, or offered different packages for potential applicants’ choice. Also - the regulator has taken competition

into account by predefining the number of licenses. The minimum bandwidth per operator for a certain service was identified by industry fora. This happened in the 3G licensing case in Europe: most operators have today either 2 x 10 MHz or 2 x 15 MHz for FDD, as well as one 5 MHz lot for TDD (in most cases the TDD allocation remains unused). Recent 3G subscriber growth and increasing bitrate demands indicate additional demand for paired spectrum. WiMAX spectrum demand is a matter of prediction in an early market stage. In this context we understand Ofcom's present proposal to leave it to the auction as to what amount of spectrum will finally be awarded to operators. The disadvantage is that a monopoly of 2.6 GHz by one (or two) operators is likely. The question arises therefore: is it fair to leave such a key competition issue to the market to decide?

Question 9: Do you agree with Ofcom's proposal to package spectrum as lots of 2 x 5 MHz for paired use and 5 MHz lots for unpaired spectrum and to allow the aggregation of lots by bidders? :

International practice today accepts lots of 5 MHz; for the 2.6 GHz band we support the proposal to consider 5 MHz lots for unpaired use, and 2 x 5 MHz lots for paired use, and to allow aggregation of lots up to a safeguard cap. The safeguard cap should be in the order of 2 x 20 MHz for paired use and in the order of 30 - 35 MHz for unpaired use.
The 2010 -2025 MHz band should be considered as one band with 15 MHz bandwidth.

Question 10: Do you agree with Ofcom's proposed approach to allowing the respective amounts of paired to unpaired spectrum for the band 2500-2690 MHz to be varied (maintaining the 120 MHz duplex spacing and allowing additional unpaired spectrum, if needed, at the top end of the band)? :

To the proposal of a flexible band plan with the accommodation of either additional paired or unpaired spectrum, we accept that the UK's exclusive geographical position would allow more flexibility on other band arrangements than on the continent, but we do not believe the proposals will result in efficient or optimal spectrum use. Ofcom's analysis shows there is a risk of harmful interference depending on the size of overlap of paired/unpaired spectrum with neighbour countries. On the infrastructure side it can be minimized by additional measures. The terminal impact cannot be mitigated as already commented in our answer to question 1. Whether the flexible band plan is feasible or not has to be proven by practical experience, because presently the whole issue can only be analysed from a theoretical point of view. Nevertheless we recommend following the CEPT band plan as closely as possible. Ofcom's preferred proposal to keep the 120 MHz duplex spacing as well as the FDD uplink/downlink directions and the 5 MHz block structure in line with the ECC decision is a step in this direction.

GSA is aware that one disadvantage of a national-specific band plan is harmful interference between uncoordinated/unsynchronised TDD operators as well as at the FDD/TDD boundary. Extra filters for signal attenuation on the base station transmitter and receiver side in the order of 50 dB will definitely improve the situation, but be costly. Harmful interference because of a different band plan compared to other countries would be painful on the user terminal side because it cannot be assumed that the industry will develop UK specific user terminals e.g. for WiMAX or UMTS - they will be built for the world market according to 3GPP and IEEE specifications. There is no means to mitigate harmful interference on the terminal side: industry analysis shows a loss of forward link capacity in the overlapping part of the 2.6 GHz band due to insufficient blocking and spurious emissions from a user TDD terminal transmitter falling into the FDD terminal receiver and vice versa. It cannot be filtered out if the distance between users is less than 100 - 200 meters, depending on user density/distribution/BS distance/environment. The effects lead to an increase in the noise floor. The downlink degradation could be between 0.5 and 35 %. If such harmful interference occurs, users cannot of course be instructed to

keep distance from other people using a mobile device.

Question 11: Do you agree with Ofcom's proposals for a 5 MHz restricted block between FDD and TDD neighbours and between TDD and TDD neighbours and with a modified out-of-band base station mask for second adjacent 5 MHz blocks? :

If neighbour technologies are unknown, the restricted 5 MHz may have to be transformed into a guard band which will be needed for additional filtering. This would result in loss of usable spectrum. A 5 MHz restricted block could be acceptable for operation only under well known neighbourhood conditions (e.g. outdoor/indoor separation, hotspots).

Question 12: Do you agree with Ofcom's proposals to award the 2010 MHz band as a single 15 MHz lot?:

A guard band loss in a 15 MHz band is not efficient. Thus we fully support to consider the 2010 MHz band as a single lot. Our view is that the spectrum arrangement should go with the standardisation options - either for TDD or for FDD out-of-band pairing with 2.6 GHz designated by ECC for FDD downlink (ECC /DEC/(05)05 and ECC/DEC/(06)06.
We also support Ofcom's approach to assign the band 2010-2020 MHz as a licensed band. Licensed use of this band would be most beneficial for users, operators and manufacturers.

Question 13: Do you agree with Ofcom's proposals to award the 2290 MHz band as a single 10 MHz lot?:

No comment.

Question 14: Do you agree with Ofcom's proposals to combine the award of the 2.6 GHz and 2010 MHz bands and to hold the award of the 2290 MHz band separately and in advance?:

It is important that all bidders have an equal chance to obtain spectrum under fair conditions. Thus, the TDD and FDD blocks in the 2.6 GHz and 2010 - 2025 MHz bands should not be treated through separate auction processes. The 2290 -2300 MHz band however should be treated in a separate process as proposed by Ofcom.

Question 15: Do you agree with Ofcom's proposals for a two-stage auction design for the 2.6 GHz and 2010 MHz bands?:

In case of the proposed flexible packaging it is a necessary process in order to achieve a good result at a reasonable price.

Question 16: Do you agree with Ofcom proposals to award the 2290 MHz band through a second price sealed bid auction?:

No comment.

Question 17: Do you have a preference for either of the two approaches to specifying technical licence conditions? :

Ofcom proposes two approaches for the control of out-of-band emissions for both - inside and outside the 2.6 GHz spectrum. When moving away from spectrum management related to international standards, GSA has the view that it requires a trade-off between expected flexibility for a spectrum user and minimized risk of interference to other users. Neither the one nor the other method for technology neutral spectrum use can fully substitute today's international practice with international standards. The more criteria are used in such methods, then the more technology derived parameters may occur, and the more complex radio planning may be.

The chosen parameters - which are derived from 3GPP standards as well as from relevant CEPT reports - underline the value of globally harmonised and proven standards as key sources for defining the technical usage rights. This comes as no surprise, because the international standards are the result of global projects which take into account the interests of the involved countries, in order to reach compatibility. They imply co-existence in adjacent bands with maximum capacity by specifying the transmit and receive side; all this is finally implemented in the user terminal and infrastructure equipment and typically no proprietary additional measures need to be taken by the spectrum user.

Standards driven by the industry also have a process for innovation, radio parameters will be modified over time as part of this process, and backward compatibility is ensured. With the introduction of one of the above methods however, Ofcom does not describe how it will deal with an update process, and how this will be done in a formal way in the licence.

Another item to be addressed is that the proposed methods only consider the transmit side. Our experiences from the past show that in any case both transmitter and receiver always have to be considered in order to estimate mutual coexistence. If different systems with different capabilities and characteristics need to coexist, it can never be possible to estimate their mutual coexistence from the capabilities of only one of the systems involved. Ofcom's proposals make it difficult to estimate the coexistence of different systems, even though the used parameters are derived from 3GPP and CEPT, which are implicitly linked to receiver sensitivity parameters of the standards considered. We therefore recommend that in such case a benchmark e.g. receiver performance, should be stipulated and referenced by Ofcom.

We conclude:
§ for 2.6 GHz in-band system coexistence as well as for maximum capacity reasons, we consider that it would be better to replace the above mentioned technical license conditions by international standards.
§ for out-of-band emissions on the upper and lower boundary of the 2.6 GHz band, it would be appropriate to use the traditional method using transmitter masks as it can be assumed that existing systems in the neighbour bands remain unchanged.

Question 18: Do you have any comments on the transmitter spectrum masks defined below? :

See response to Question 19 below

Question 19: Do you have any comments on the SUR parameters defined below? :

In addition to what has been stated in our response to Question 17, GSA has no single answer on which parameters and methods criteria should be added or modified or confirmed. Practical experience shows there are always a multitude of unpredictable factors which have an influence on system coexistence: inter-modulation, propagation characteristics, non-ideal filters, EMC, signal to noise ratios, etc.; these technology points cannot completely be ignored. On the infrastructure side - when it comes to inserting

proprietary filters in order to achieve system coexistence, then the radio networks exhibit proprietary characteristics. On the other side, both methods cannot prevent harmful interference between user terminals, because they will be manufactured according to international equipment standards - therefore no UK-specific modification will be practical.

Question 20: Do you have any comments on the SUR methodology and assumptions detailed in this annex? :

The SUR method is definitely an improvement toward more flexibility compared to the traditional method of using spectrum masks, but it implies more complexity, and will not remove the need for power limits to avoid blocking 3rd party receivers close by. As there is no sufficient practical experience available using this method, we have the view that it is too risky to apply it to a large amount of spectrum of around 200 MHz, where it is likely that many spectrum users will be awarded.

Question 21: Do you have any comments on the use of the Visualyse tool as described, on the assumptions or the propagation model proposed in this annex? :

Radio planning tools which are in use today are related to the international equipment standards. It has therefore to be investigated how such tools shall be modified in order to cope with a technology neutral environment and how Visualyse could be used or integrated.

Question 22: Do you have any comments on the assumptions detailed in this annex?:

No further comments

Comments:

GSA thanks Ofcom for the opportunity to commint to this important consultation. More information about GSA - the Global mobile Suppliers Association, is found at www.gsacom.com