Title:

Dr

Forename:

Klaus-Dieter

Surname:

Kohrt

Name and title under which you would like this response to appear:

Dr. Klaus-Dieter Kohrt

Representing:

Organisation

Organisation (if applicable):

Siemens Networks GmbH & Co. KG

Email:

klaus.kohrt@siemens.com

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?:

Siemens welcomes the opportunity to comment Ofcom?s Consultation on the award of spectrum in 2.6 GHz and associated frequency bands. We believe that the approach and the associated timeline will be recognized by the industry as a clear positive signal forward. The comprehensive and substantial material provided by Ofcom, in particular on the technical aspects, is of key value for both operators and manufacturers.

Siemens supports the view that

? Authorization of the bands should be done for individual ?licensed? use and
? Assignment should take place by end of 2007 or early 2008.

The market growth and the evolution of 3G/UMTS technology as well as technology innovation in general clearly indicate the need for additional spectrum. 3G/UMTS surpassed the 100 million subscriptions, high speed mobile internet access is increasingly being used via HSDPA and HSUPA and mobile TV is for introduction using MBMS in the HSDPA transport channels.

Initially, the 2.6 GHz band has been identified by the IMT-2000 community for capacity expansion of existing 3G networks after full utilization of the WARC-92 band, however, it is also seen as spectrum for new entrants arriving later on the market place. Such candidates ? especially in the UK ? have lately expressed significant interest for other technologies than IMT-2000, in particular for mobile WiMAX at 2.6 GHz.

Ofcom plans to release the 2.6 GHz and 2010 ? 2025 MHz spectrum in a technology and service neutral manner for both fixed and mobile use. Clearly mobile use has the highest value, but it requires harmonization of the spectrum usage in order to support international roaming and circulation of terminals. Therefore, the envisaged spectrum usage conditions should acknowledge and respect relevant binding international agreements and avoid conflict with related international standards.

After several years of debates within ITU-R and CEPT the international band arrangements in the 2.6 GHz range are well defined. Siemens clearly supports the CEPT band plan as a harmonized mobile band arrangement satisfying the needs for both FDD and TDD technologies.

For reasons of market demand toward more unpaired spectrum, Ofcom prefers not to join the relevant ECC decision on 2.6 GHz, but just to keep some of the key parameters. While Siemens believes that the major spectrum demand in this band will be for paired lots, we feel that Ofcom?s approach may hamper the expectations of industry and consumers in terms of mobile usage across Europe. For this reason, we recommend staying with the CEPT/ECC band plan.

Siemens has done intensive study work in the past for FDD and TDD spectrum use and is aware of potential sources of harmful interference between these two access types as well as between TDD at the relevant boundaries. Please refer to our specific comment to question 10.

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

Siemens agrees with the technical analysis made by Ofcom for the band 2010 ? 2025 MHz and supports Ofcom?s views.

The substantial technical material in this consultation which is elaborated by Ofcom and Mason confirms that the industry cannot expect a 100% clean 2.6 GHz spectrum. We share the view that additional technical measures like extra filtering, antenna arrangements etc. need to be taken in order to

achieve an acceptable Quality of Service level which is in the interest of the consumer. However such measures are implying the risk of high uncertainty in network planning. They come in addition to the impacts from aeronautical radar.

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

Siemens agrees with most of the objectives listed for the authorisation of 2500-2690 MHz and 2010 ? 2025 MHz. On 2290 ? 2300 MHz Siemens does not want to express an opinion.

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 experience was painfully made in the UMTS auctions in Europe in the past and blocked the investment into 3G infrastructures for years. Therefore there a good reasons to improve Auctions in order to avoid that high license fees impact network investment. In this context Siemens welcomes the improvement steps taken by Ofcom and wishes to introduce further measures/tools to keep the outcome of the auction down 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).

Another issue in the auction is the valuation of spectrum. In case of a technology neutral award where the interference situation is not clear enough, it will be difficult for the bidder to estimate spectrum value. One improvement could be that bidders disclose their technology choice prior to the auction.

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?:

Siemens definitely believes that it is likely to be in the interest of consumers to proceed with the award of the 2.6 GHz and the 2010 MHz bands as soon as practicable. One target which is in the interest of the consumer should not be ignored: that the consumer should be awarded the ?neutral choice? to be able to select between operators to get the preferred service offering, but without the need to change the end-user terminal equipment; this means that excessive spectrum fragmentation into many different technologies should be avoided because of incompatibility and lack of interoperability as well as roaming. If we consider 3G as one example for users choice: several hundred FDD terminal models exist on the market place and there are more than 100 million UMTS users and 45 million CDMA 2000 1X EV DO users worldwide represent already a huge customer base. Higher access rates which are increasingly asked by the users can only be provided if the higher coding schemes of HSDPA and HSUPA can be applied to additional carriers in order to exploit fully the promised channel capacity.

Latest forecasts indicate a fast growing mobile communication market, requiring additional spectrum. It is therefore not desirable to wait until other spectrum use will be clarified in future.

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 view is strongly supported. However ? if Ofcom decides for a band plan in line with ECC ? we do not a see a need to wait because many European countries intend to implement the harmonised band plan..

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

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 in the world and Ofcom needs to ensure that the risks and benefits ? to consumers, equipment suppliers and network operators ? of deviating from this approach are sufficiently considered.

On technology neutrality:

More than 2 billion GSM users and around 100 million UMTS subscriptions underline the success of harmonised spectrum use. Such use is characterised by assigning spectrum in consideration of international radio standards. ITU is continuously working on harmonisation of framework standards in order to allow coexistence in frequency bands which are allocated to certain services. From Siemens? view designating an appropriate amount of spectrum to bands characterised by harmonisation is a prerequisite for the long term R&D investments to be accomplished by the industry. This is required specifically in the sector of wide area networks in particular on mobile communication and broadcast technologies, because in these cases harmonisation is the means to foster roaming and interoperability.

Siemens supports the approach to designate the use of the band 2500 ? 2690 MHz for IMT-2000 framework standards. It supports this decision since it favours the global harmonisation of the band 2500-2690 MHz which is taken into account through the industry efforts within the ITU and the standardisation projects worldwide, ensuring coexistence of technologies, global benefits for users, operators and manufactures, taking advantage of economies of scale, global roaming, network and services interoperability. We feel confirmed in this position by the fact that the most likely alternative technology ? mobile WiMAX ? is in the process of becoming an accepted member of the IMT-2000 family of standards.

Our view on service neutrality is as follows:

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

If we understand ?services? as the various types of data-streams (e.g. bidirectional 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, but not regarding the type of service.

As a radio technology is the platform for services, service neutrality does not imply technology

neutrality. In this case service neutrality is a means of encouraging innovation and competition by introduction of new service types on top of existing or emerging radio technologies (e.g. introduction of a broadcast capability or a location determination capability on top of the UMTS-radio technology). It is consequently proposed to treat service neutrality and (radio) technology neutrality as two separate issues. Siemens supports service neutrality as described above. However, we differentiate service neutrality if service means radio services as defined by ITU-R.

For the sake of end-to-end interoperability of services, it is proposed to prefer those services based on standardised protocols.

Regarding Trading, Siemens supports basically the approach to introduce trading as long as the technical obligations/rights of spectrum use will be kept. If ownership changes, it may be assumed that technology also changes. 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 - impacts will be unavoidable. Also the question arises who bears the costs for network tuning, filters antenna arrangements etc. in the neighbour systems.

Avoiding fragmentation of spectrum use is another issue which could come up because Ofcom will allow spectrum parts of the initially received licence 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 would be traded, the 2.6 GHz band is likely to turn gradually into disharmonised spectrum used by a multitude of incompatible proprietary systems mixed with standardised radio technologies. The result would be reduced economies of scale.

On absence of rollout obligations: If competition is implied ? we expect that the market players will care about reaching sufficient coverage in order to get their desired market share. Siemens agrees with Ofcom?s proposal not to put roll-out obligations into the license. We expect that a large part of spectrum is anyway for more capacity of already existing services thus, there is no real reason to predetermine coverage conditions for this frequency band. As the licences are anyway service neutral including the maximum bitrate a service related roll-out condition would make no sense.

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 cap of 90 MHz seems to be fairly large and would allow monopolisation either on the paired or on the unpaired spectrum side. We have to state that fixing a cap will be difficult in the case of a technology- and service-neutral assignment approach. Nevertheless ? by having some key technologies in mind we recommend to decide upon a lower spectrum cap that would 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 broadband high data-rate services as they are under discussion 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 the potential applicants? choice. Also - the regulator has taken the

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: the majority of operators today have either 2 x 10 MHz or
2 x 15 MHz for FDD in use today, as well as one 5 MHz lot for TDD ? in most cases still unused.

The recent 3G subscriber development and the increasing bitrate demand indicates 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 reasonable to leave it to the auction what amount of spectrum will finally be awarded to operators. The disadvantage is that a monopolization of 2.6 GHz by one or two operators is possible without a suitable spectrum cap.

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 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 Siemens admits, that UK?s exclusive geographical position would allow more flexibility on deviating band arrangements than in any other country in Europe. Siemens also admits that Ofcom analysed carefully the risk of harmful interference for a technology neutral approach including the band plan discrepancy with neighbouring countries. From Siemens? point of view however there is still uncertainty: although the infrastructure side impacts can be minimized by additional proprietary measures the terminal impact cannot be mitigated. Extra filters for signal attenuation on the base station transmitter and receiver side in the order of 50 -70 dB will become costly. Harmful interference remains on the user terminal side because it cannot be assumed that the industry will develop UK specific user terminals e.g. for WiMAX and UMTS ? which are built for the world market according to global equipment standards.

Industry analysis on IMT-2000 FDD/TDD coexistence shows a loss of forward link capacity in the overlapping parts 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. The question remains, whether the impacts can be neglected if users are in close proximity (Mason mentions less than 10 meters, this seems too optimistic) because of dependency on technology and on user distribution/environment. The effects can only be analysed further if scenarios are known. If such harmful interference occurs users cannot be instructed to keep distance from other people using a mobile device.

Presently the whole issue can only be analysed from a theoretical point of view. This is risky for operators. We therefore recommend to stay as close as possible to the CEPT band plan.
In this context the Ofcom 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 the

right direction.

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. This was already stated in the Siemens response to the Ofcom Consultation from January 2005. 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 are also supporting Ofcom?s approach to assign the band 2010-2020 MHz to be a licensed band. The 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 get spectrum under fair conditions. Thus, the TDD and FDD blocks in the 2.6 GHz and 2010 ? 2025 MHz bands should be treated in a combined auction process.

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 control of out-of-band emissions for both - inside and outside the 2.6 GHz spectrum.

Siemens has the view ? when going away from spectrum management related to international standards ? 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 todays international practice with international standards. The more criteria will be used in such methods the more technology derived parameters may occur, 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. It is no surprise because the international standards are the result of global projects taking into account the interests of the involved countries in order to reach compatibility. They imply coexistence 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 typically no proprietary additional measures have 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 ? considering backward compatibility. With the introduction of one of the above methods however, it is not described how Ofcom will deal with an update process and how this will be done in a formal way in the licence.

Another missing item is that the proposed methods only consider the transmit side. Our experience from the past indicates that in any case always both ? transmitter and receiver - have to be considered in order to estimate mutual coexistence. If different systems with different capabilities and characteristics have to coexist it is never 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 although the used parameters are derived from 3GPP and CEPT which are implicitly linked to receiver sensitivity parameters of the standards considered. We therefore recommend in such case to include a benchmark e.g. a receiver performance, it should be referenced by Ofcom.

We conclude:

? for 2.6 GHz in-band system coexistence as well as for maximum capacity reasons we have the view 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 it would be appropriate to use the traditional method based on transmitter masks as it can be assumed that the existing systems in the neighbour bands remain unchanged..

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

Siemens finds the transmitter spectrum masks defined section 9.15, in general, acceptable, particularly, as they are derived from 3GPP specifications. It should be noted, however, that this mask may constrain

the implementation of e.g. LTE with wider bandwidths than 5 MHz, in the future.

The masks defined in 9.18 and 9.19 are about 25 dB more stringent, than the standardized 3GPP equipment. To achieve these out-of-band emission levels will require non-standardized BS TX filters, which will add cost, size and insertion losses.

Regarding UE side in sections 9.20 and 9.21, it is expected that the situation is even more critical than in the base station side.

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

In addition to what is said in our comment to Question 17, in Siemens opinion there is no single answer on which parameters and methods criteria should be added or modified or confirmed. Practical experience shows there is 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; technology specifics cannot completely be ignored. On the infrastructure side - if it comes to the insertion of proprietary filters in order to achieve system coexistence ? radio networks will show 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 and 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 implies more complexity. As there is not 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 by the industry today are optimized for efficient spectrum use 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 shall be used or integrated. Currently, Siemens cannot give a precise opinion on that issue.

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

No further comments

Comments: