8 March 2007

Nokia response to Ofcom 2.6GHz auction consultation

We are pleased to have the opportunity to comment on the proposals to auction the 2.6GHz band in the UK. In our answers below paragraph numbers refer to the main consultation document.

Overview of issues related to 2.6GHz band

At ITU-R WRC-2000, the band 2500-2690MHz was globally identified for IMT-2000. Nokia strongly supports this identification as this band has great potential to become a global extension band for IMT-2000/UMTS and its future enhancements including HSPA and LTE.

Nokia supports the migration towards the new innovative developments of HSDPA which is now commercially available, and also HSUPA and the Long Term Evolution (LTE), which are being consolidated within 3GPP. The expected capacity performance of enhanced 3G systems like HSPA and LTE suggests that there will be a need to allocate wider blocks (up to 20MHz) to achieve the highest transmission rates, particularly in the downlink direction.

Nokia believes that mobile WiMAX technology, based on the IEEE 802.16-2005 standard, will also play an important role in Broadband Wireless Access, as a complementary technology for cellular operators, as well as a mobility extension for FWA and fixed broadband operators. Among the Certification Profiles defined by the WiMAX Forum, Nokia believes that the ones that will benefit from the largest economies of scale will be Band Classes 3 and 5 (2496-2590 MHz and 3400-3800 MHz, respectively). TDD will be the dominant duplex mode for WiMAX. The frequency allocation for WiMAX should take place in continuous blocks in order to maximize the cost-efficiency of base stations. The minimum block size to serve a large customer base of broadband wireless users is 15-20 MHz.

Global harmonization of spectrum for mobile and wireless communications should be supported. Common frequencies for mobile and wireless networks facilitate the availability of equipment, roaming, spectrum efficiency and reduce cost, complexity of equipment and network deployment and cross border interference. All parties will benefit from economies of scale and a wider choice of devices and service providers. The use of internationally coordinated bands is crucial to the benefit of the end-users and to the success of industry. Country specific bands results in lower equipment volumes, lower choice and higher prices and hence would make the operator using such spectrum inherently less competitive.

Nokia supports the CEPT/ECC band plan in ECC/DEC(05)05, based on ITU Recommendation ITU-R M.1036, which designates 2x70 MHz for IMT-2000 technologies, such as WCDMA/HSPA/LTE. The duplex gap of 50MHz (2570-2670MHz) can be used by IMT-2000 TDD technologies, and when IEEE 802.16-2005 TDD becomes an IMT-2000 family member in ITU, that can also be used in this 50MHz duplex gap, provided that interference issues are taken care of.

To avoid interference in IMT-2000 identified bands using a “technology neutrality” approach, all technologies that are expected to operate in frequency blocks adjacent to IMT-2000 blocks should do so without producing more interference or requesting more protection than IMT-2000.

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?

While we support much of the reasoning in the reports and consultation we are concerned that there is a serious risk that the approach may result in a band plan that is unique to the UK. This will increase the price of equipment and services and lead to an inefficient outcome.

In a communication 8 February 2007 the EC said they would "push for a common European approach to the 2.6 GHz band" and we support this. UK should follow the band plan developed in CEPT/ECC. For technical reasons described later we believe some aspects of the flexibility proposed to be unworkable.

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

Section 5.25: We agree that Ofcom is not obliged to protect Bluetooth and Wifi (which operate 2.4-2.5GHz) from licensed 2.6GHz users, but that only increases the need to consider those unlicensed users when deciding the permitted powers of the new 2.6GHz users. It would not be in the interests of users if existing equipment ceased to work satisfactorily. See also our response to Q17.

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

Yes

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?

Yes

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?

Yes

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

Our view is that the UK should adopt the band plans agreed in CEPT/ECC. While we support the idea of increased flexibility within IMT-2000 family, an entirely technology neutral approach will endanger the benefits of interoperability, in particular the competition in equipment and services which thrives on the ability of consumers to switch phones and providers.

We have specific and serious concerns about the proposals to allow the use of TDD terminal equipment in bands which in the rest of Europe will be paired FDD bands.

3GPP standards for 2.6 GHz FDD (TS 25.101, 25.104) and TDD (TS 25.102, 25.105) and the corresponding Harmonised Standards ('HENs') have been designed to facilitate compatibility between

FDD and TDD around the 2570 and 2620 MHz duplex reversal points in line with the CEPT/ECC band plan. This is reflected in additional spurious emission requirements for FDD and TDD base stations and terminals with the aim of reducing mutual interference. However, as the implementation of these reduced spurious emissions will rely on filters specifically designed for the 2570 and 2620 band edges, the benefit of mutual interference protection will be lost if TDD is deployed within the FDD paired band.

For example deploying TDD within the FDD UL band (2500 – 2570 MHz) will increase the likelihood of blocking of 3GPP HEN compliant FDD BS. Also, as the TDD BS spurious emissions are not yet specified for this case, it is difficult to assess the overall interference impact on the 2500 – 2570 MHz band. Furthermore, TDD terminals operating within 2500 – 2570 MHz will suffer increased interference from geographically close FDD terminals.

Turning to the DL band, TDD BS deployed within 2620 – 2690 MHz will suffer from increased unwanted emissions of the 3GPP HEN compliant FDD BS since the reduced spurious emission limit of -52 dBm/MHz for TDD band protection does not apply (instead only the -15 dBm/MHz limit applies). There will be also an increased probability of FDD terminal blocking due to close TDD terminals operating within the FDD terminal receiver filter passband, a case not covered by the above standards. As the TDD terminal spurious emissions are not yet specified for this case, it is again also difficult to assess the overall interference impact on the 2620 – 2690 MHz DL band.

As a conclusion, any benefits in terms of improved RF compatibility provided by the 3GPP HEN standards for 2.6 GHz FDD equipment will be largely lost if TDD is deployed within the FDD paired bands (2500 – 2570 MHz, 2620 – 2690 MHz).

Deploying interference mitigation at FDD (or TDD) BS to cover for BS – BS interference scenarios not supported by RF standards will lead to increased network deployment cost and performance degradation. Interference mitigation for terminal-terminal interference scenarios is not viable.

The Ofcom study predicts noticeable interference to a distance of several meters between terminals (section 4.1, conclusions):

http://www.ofcom.org.uk/consult/condocs/2ghzawards/technicalassessment/assessment.pdf

In practice different kinds of mobile phones/laptops may be in use in close proximity (or even by the same person, who cannot be expected to understand the causes of interference or poor performance.) The resulting strength of the received interference may far exceed design parameters.

The study by Masons came to similar conclusions, and agreed that additional filtering for UK mobiles is not economic (or even possible in the ‘single European market’?)

http://www.ofcom.org.uk/consult/condocs/2ghzawards/masonresearch.pdf

However we disagree with the assessment of the scale of the problem (electronic page 85)

Masons conclude that it will only affect 1.9% of users and only for 1.4% of time. We contend that the assumption that only 5% of phones will be using the 2.6GHz band (which is even larger than the core 3G

band) carries a large uncertainty. Therefore the impact on spectrum value also carries a large uncertainty, rendering the auction economically inefficient.

We also disagree with the objective here of estimating the probability of interference at a location. What matters is the probability of a particular user experiencing a problem. Even using the assumptions provided in the report the probability of an FDD phone user experiencing interference at this location is not 1.4% but 12% which becomes very significant.

We are also concerned that a poor quality of service may not reliably provide the access to emergency services, which consumers have come to expect.

We therefore disagree with Ofcoms conclusion in the main consultation document that the mobile-mobile interference is acceptable (Para 7.40) (noting that in 7.51 the mobile to mobile case has been omitted.)

Regarding an assessment of the potential impact on service quality involved in mobile-mobile interference please refer to the enclosed Nokia paper “Capacity effects of the WCDMA GHz DL due to UE-UE interference”.

Secondary Trading

It follows from the above that any secondary trading that takes place should be on the basis that TDD is not introduced in the FDD band. It is our strong preference that the band plans developed in 3GPP and CEPT/ECC which exclude this option be used.

With regards to the circumstances which could result in licence revocation after the 20 year period we think spectrum management reasons might be important without being necessarily being ‘pressing’ (the term used in the consultation) which implies an urgency which is not always present in sound long term planning. Ofcom should be able to make management decisions without the need to demonstrate urgency. (para 6.107)

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 is too large to be considered a ‘safeguard’ against adverse competitive effects. Ofcom will need to intervene as soon as possible if it appears that the auction is heading in a direction that would harm competition, if the design itself cannot achieve this.

If a cap is used it should clearly also apply to secondary trading.

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?

Yes

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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)?

No, for reasons we discussed in response to Q7.

We also believe the proposals have incorrectly assumed that unidirectional broadcast (e.g. MBMS) should abide by regulations pertaining to TDD, e.g. to guard band requirements. (para 7.58, note 102) Broadcast services that can meet the FDD masks should be treated as such, and should not be required to have guard bands.

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

Our preference is for conventional power limits until a SUR scheme based on PFD is agreed in ECC. A scheme based on PFD will also require power limits to remain to avoid EMC field strengths (e.g. 1 or 3V/m) or radio blocking parameters being exceeded. Otherwise there is a risk that the transmitter could be deemed to contravene the EMC Directive if it interfered with non-radio equipment (or radio equipment in non-adjacent bands) in close proximity. Even though Bluetooth and Wifi at 2.4-2.5GHz are not protected the effect of any interference needs to be considered at this stage.

We also believe the use of Sitefinder should be technology neutral (i.e. all base stations should be entered.) (para 9.110)

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

We believe the masks will need to be reviewed later when the LTE 3GPP masks are more stable (especially those using wider bandwidths of up to 20MHz.) In balancing practicality with spectrum efficiency we would normally expect the masks to be scaled up in the frequency domain to allow for the increased use of wider bandwidths. This is not the case in the consultation, so use of wider bandwidths means that the masks become more challenging (and more expensive.)

We present here some early observations on other aspects of the masks.

9.15 For bases station operating in paired spectrum which are not adjacent to an unpaired

spectrum block, the following out-of-block emissions in the bands immediately

adjacent to the assigned spectrum block will apply

While the proposed EIRP block edge mask appears to be basically in line with the UTRA spectrum emission mask, Nokia would like to point out that the UTRA spectrum emission mask may not be appropriate for evolved UTRA (LTE) with carriers bandwidths larger than 5 MHz (e.g. 10, 15, 20 MHz). This is due to the fact that that transmitter impairments (e.g. IMD3 products) scale with the carrier bandwith. LTE ACLR and emission mask are currently under discussion in 3GPP and no final

conclusions have been reached yet. Mandating the proposed EIRP block edge mask may unduly constrain a 10 MHz LTE system.

9.18 For bases station operating in paired spectrum which are adjacent to an unpaired spectrum block in the spectrum immediately above, the following out-of-block emissions in the bands immediately adjacent to the assigned block will apply:

The proposed block edge mask is 25 dB more stringent than the UTRA spectrum emission mask (i.e. the requirement +5.0 to +10.0 MHz (upper edge) –22 dBm/ MHz). This requirement is also not in line with the 2.6 GHz FDD BS specifications at the FDD/TDD block edge as per TS 25.104. Meeting such a requirement will require non-standardised BS TX filter solutions with added size, cost and insertion losses.

9.19 For bases station operating in paired spectrum which are adjacent to an unpaired spectrum block in the spectrum immediately below, the following out-of-block emissions in the bands immediately adjacent to the assigned block will apply:

The same answer as for 9.18 applies.

Comments on Impact Assessment

Greater value could have been derived from this if it had concentrated on open issues or issues which are likely to be disputed (whether to allow TDD in FDD bands being one example.) Some attempt at quantifying the impacts would also be useful.

ENDS