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A response to Ofcom's discussion document Award of available spectrum in the 2.6GHz and 2010MHz bands

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Nortel is pleased to contribute to the discussion on the award of spectrum in the 2.6GHz band. Our response derives from Nortel's significant expertise across the globe in many wireless access and core network technologies, including CDMA, GSM including GSM-R, GPRS/EDGE, UMTS Core Network, WLAN/Wireless Mesh and WiMAX. We have not commented on the 2010MHz band.

Nortel has long supported Ofcom's promotion of innovation in spectrum uses, through competition and technology neutral, application neutral licensing. We note some parts of industry would prefer Ofcom to prioritise scale efficiencies, by adopting a European band plan. But Nortel considers that the pace of innovation in spectrum use is so rapid – both introducing new services for consumers and reducing the costs of supplying existing services - that the benefits of innovation will likely quickly overtake any short term scale efficiencies achieved from adopting a rigid band plan. Therefore we consider a market driven approach to management of the 2.6GHz band (whilst still preserving the FDD duplex distance and so retaining some scale efficiencies in the production of handsets) will bring the greatest benefit to citizens and consumers.

Along with Intellect, Nortel calls for awards in this band to take place as soon as reasonably practical and our comments reflect this view. We agree the timeliness of awards in this band is critical to promote innovation and competition in mobile and broadband markets.

Question 1: Do stakeholders agree with Ofcom's assessment of the blocking effect and of its implications for spectrum packaging?

Nortel considers any further assessment of the blocking effect would not result in different decisions on spectrum packaging.

Nortel agrees it is valuable for Ofcom to share information with bidders on the value of spectrum in this band, and in this context we appreciate the study on the potential for blocking of FDD mobiles by TDD devices published in August 2007, but we believe our customers will seek more information on the potential for blocking and the cost of mitigation options. However, we agree with Intellect that the auction does not depend on the publication of more studies; the auction can proceed successfully without publication of complete information on blocking or other interference.

We believe it is unnecessary for Ofcom to further assess blocking because we consider bidders can factor the potential for blocking into their business plans and their bids and because Nortel considers it preferable in the first instance to rely on commercial negotiations to determine the most efficient approach to possible blocking rather than rely on regulation (albeit backed up by Ofcom's dispute resolution procedures).

In particular, commercial negotiation seems possible in the case of TDD/ FDD device blocking as neighbouring band holders may have similar negotiating power.

For example, at an inter-operator boundary of FDD downlink and TDD, transmitting TDD terminals may interfere with individual FDD terminals; however the flip side is that FDD base station transmissions may interfere with TDD base station reception affecting the uplink performance of many TDD users.

The consequence of this is that in metropolitan areas at least, the greater the interference from FDD base stations into TDD base stations, then the higher the power at which the TDD terminal will have to transmit to 'close the link' to the base station. In turn, the higher the power the TDD terminal transmits the more probable it becomes that an FDD terminal within a few metres will experience harmful interference.

Therefore, there is an incentive for an FDD operator to reduce interference into the TDD operator from the base station provided the TDD operator is willing to reciprocate, for example by designing networks to provide 'good coverage' and implement uplink power control (meaning few TDD terminals operate at full power). Therefore both neighbours have the power to disrupt the other, and thus the incentive to reach an agreement. This suggests commercial discussions could address interference concerns even though the situation is not 'symmetrical'; the FDD downlink operator is concerned to manage mobile to mobile blocking, whilst the TDD operator is concerned to address base station interference.

At the boundary of FDD uplink and TDD a different (reversed) problem occurs from that described above – here the TDD base station potentially interferes with an FDD base station uplink (affecting many users intermittently) and an FDD terminal may interfere with a TDD terminal (affecting a stationary user constantly). A similar argument suggests commercial discussions may provide a route to mitigation.

However, in the event that an incumbent operator is content to endure blocking in the 2.6GHz band, as the cost of limiting the success of competitive new entrants, then new entrant operators will value reassurance that Ofcom will prioritise resolving any such disputes that arise. Nortel asks Ofcom to make this clear in its statement on this subject later this year.

Nortel advises potential bidders that a minimum 5MHz guard band is required at any inter-operator FDD/TDD boundary to reduce unwanted emissions and to provide deployment flexibility. (By contrast, intra-operator FDD/TDD boundaries may be reduced to zero since full co-ordination is feasible – thus the need for restrictions should be lifted if the auction results in a single operator owning spectrum on both sides of an FDD/TDD boundary.)

Question 2: Do stakeholders agree with Ofcom's analysis of interference conditions that are relevant to the use of generic lots?

Nortel believes interference may reduce the value of some lots. However, we believe the auction design allows for this.

Nortel considers the most significant cost of interference is reduced cell sizes (even with filters since we are not aware of filters available today that do not reduce the reach of signals). The consequence of reduced cell size is the need to invest in more sites to reach the same population, if you are aware of this cost before building your network. However, these costs will escalate if interference becomes an issue after the network is built, since every transmitter will need to be moved closer together. (This may be relevant if neighbouring spectrum is sold for a new use after initial allocation.)

Since the cost of interference may therefore be material, the value of spectrum packages may vary materially depending on neighbouring spectrum uses. We understand that so long as every bidder in the primary (clock) round of the auction, bids on the basis of the least valuable package (with the most interference) eg for TDD bidders the block at the top of the band, then bidders use the secondary phase of the auction to indicate the additional value of preferred blocks with less interference.

Question 3: Do stakeholders agree with Ofcom's updated proposals for technical conditions or have views on the possibility of:

- extending out-of-block masks out to an offset of ± 20 MHz from assigned blocks;
- placing additional restrictions on the use of restricted blocks between the FDD uplink and TDD; or
- a reduction in mobile station in-band power to 18dBm/MHz EIRP?

Nortel agrees with the Intellect response which notes the need to maximise the use and value of the awarded spectrum.

To this end we consider the case has not been made to extend out-of-block masks; we consider it is unnecessary and possibly counter-productive at the present time, as extending masks may simply result in additional costs of a 'UK special' conformance test without any practical benefit.

Similarly, the restricted channels should only be constrained to the degree necessary to avoid significant interference problems; we do not consider Ofcom should place additional restrictions between FDD uplink and TDD users.

Lastly, Nortel does not agree with the power limit as it is written. Restricting power to 18dBm/MHz may not be technology neutral since some technologies concentrate energy into a contiguous block (for example LTE uses a 'single carrier' paradigm - SC-FDMA) whereas others spread the transmit power across the nominal band (WiMAX uses OFDMA using multiple tones). This could lead to regulation precluding a 21 dBm terminal which concentrates power into 1MHz of a 10MHz nominal channel, but including a 27dBm power terminal that spread power evenly across a 10MHz nominal channel. Nortel suggests Ofcom considers setting limits on 'per 5MHz block' or 'per radio Channel' basis where 'channel' is the nominal RF bandwidth of the system (or interpreting for purposes of regulation the 18dBm/MHz as an average).

Question 4: Do stakeholders agree with the proposed changes to the auction design set out in the December 2006 consultation?

Nortel supports the changes set out in the August 2007 document to the auction process from the proposals in the 2006 consultation. However, we urge Ofcom to provide more clarity on the auction process appropriate to the wide audience of people interested in this award, and with the aim of ensuring that spectrum is sold most efficiently.

Other comments: Spectrum cap to limit hoarding

Nortel supports the use of a cap to limit spectrum hoarding to the detriment of competition. However, we note our customers may want to bid for more than 90MHz of spectrum, if they have a business case for two networks addressing the needs to two distinct groups of customers. We conclude this because a technically viable business plan for a single national TDD network may require 50MHz (comprising 3x10MHz for outdoor use, 1x10MHz for indoor use and 2x5MHz to reduce the impact of neighbouring interference). Therefore, we recommend Ofcom raise the limit from 90MHz, as currently proposed.

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