The UMTS Forum represents a significant group of spectrum users who are directly interested in the development of public mobile networks, including UMTS/IMT-2000 and especially, the related spectrum topics. The UMTS Forum gathers all kinds of players involved in third generation mobile broadband systems, including equipment manufacturers, operators, administrations, service providers and software developers. The UMTS Forum has the view that availability of radio spectrum is of key importance for ensuring the achievement of the Lisbon agenda and the i2010 initiative in the EU to harness the potential of the digital economy to deliver growth, jobs and widespread availability of modern services.

The UMTS Forum would like to offer the following overarching opinions and comments:

- Consumers 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;
- the band 2500 – 2690 MHz is on a global basis identified to terrestrial IMT-2000, and designated in CEPT to IMT-2000/UMTS
- the whole band 2500 – 2690 MHz should be licensed based on ECC DEC(05)05 harmonised band plan and according to operators needs, at the same time in coordinated manner to provide fair and equal business opportunities for all the FDD and TDD licensees
- the band 2500 – 2570 MHz paired with 2620 – 2690 MHz should be used for FDD based on the ECC DEC/(05)05 harmonised band plan,
- the pairing of the sub-band 2570-2620 MHz with the bands 1900-1920 MHz and 2010-2025 MHz should be allowed in accordance with decision ECC DEC (05)05 and (06)01

The UMTS Forum detailed justifications in support of the above Opinions are provided in the answers to Ofcom questions.

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?

The UMTS Forum would like to stress that there are many reasons to consider the licensing of the extension band 2500 – 2690 MHz for IMT-2000/UMTS: the fast market growth (more than 100 million subscribers worldwide in the beginning of year 2007); the evolution towards the new innovative developments of HSPA (HSDPA, HSUPA; development of Mobile TV services within IMT-2000/UMTS networks, the standardisation of UMTS Long Term Evolution (LTE) of IMT-2000/UMTS. The expected capacity performance of LTE systems suggest that there will be a firm need to allocate 2 x 20 MHz blocks per operator to achieve the highest

transmission rates. This amount of spectrum is not available in any other IMT-2000/UMTS frequency band.

Therefore, UMTS Forum has great concerns with Ofcom plans to divert from the harmonised European Decision ECC DEC(05)05 and in particular from the harmonised FDD/TDD band plan. This would lead to confusion in the industry and would have a negative impact on the consumers' situation. UMTS Forum is convinced that such an approach, of diverting form the ECC DEC/(05)05, cannot be successful and therefore urges Ofcom to keep the usage in the UK, with regard to the band 2500 – 2690 MHz, in line with international harmonisation by retaining the CEPT band plan arrangement for FDD and TDD technologies.

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

The UMTS Forum agrees with the technical analysis performed by Ofcom on adjacent sharing.

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

The UMTS Forum agrees with Ofcom's plan to authorise the bands 2500-2690 MHz and 2010 – 2025 MHz concurrently. The UMTS Forum does not wish to express an opinion with regards to the band 2290-2300 MHz.

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?

The UMTS Forum has no strong views on award and licensing practices that need to be adopted nationally, but would like to share its experience that auctions might not necessarily be the most efficient spectrum assignment practice as it could lead to excessively high spectrum licensing fees leading to distortions of the market situations in comparison to competing usages in other bands or other market segments. Despite warnings from the UMTS Forum, such experience of excessive fees was painfully made in the UMTS auctions in the late 90's in some countries in Europe which in our view slowed down the industry's investment capital) into 3G infrastructures for years consequently and led to considerable market delay in the UK and Europe compared with other parts of the world. In other words, such high entry fees amounted to merely transferring public dept onto the private sector with the sole effect of hampering market developments, innovative R&D and, more importantly, the capacity of operators to adequately invest in their first phase 3G service offerings.

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?

The UMTS Forum urges Ofcom to allow the use of the 900 MHz and 1800 MHz bands for IMT-2000/UMTS services in line with ECC Decision (06)01 as soon as possible in order to provide market players additional regulatory certainties with regards to the award of the bands 2.6 GHz and 2010 MHz.

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?

The UMTS Forum supports the timeline established by Ofcom for the award of the bands 2.6 GHz and 2010 MHz while Ofcom is following the harmonised European approach for these bands in particular with regards to the 2.6 GHz channelling arrangement and the split between the FDD and TDD access schemes.

The UMTS Forum supports Ofcom proposal to keep the position on the 2.6 GHz and 2010 MHz under review in the light of possible development in Europe as only a pan-European harmonised approach is beneficial to the industry and the consumers. Therefore, the Forum finds it particularly important for Ofcom to keep its positions aligned with the rest of Europe.

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

The UMTS Forum acknowledges that balancing between flexibility and harmonization is not a simple task, and the benefits of either approach should be carefully considered on a case–by–case basis. In the case of public mobile communications, the UMTS Forum is a dedicated proponent of harmonised spectrum as it leads to efficient use of spectrum, economies of scale and economic growth. The Forum therefore has concerns with the technology and service neutral approach proposed by Ofcom concerning the 2.6 GHz band.

With regards to technology and service neutrality, as a radio technology is the platform for user services, service neutrality does not imply technology neutrality. It is consequently proposed to treat service neutrality, (radio air-interface) technology neutrality and band plan neutrality (i.e; TDD-FDD interference issues) as three separate issues.

Concerning technology neutrality, The UMTS Forum clearly supports to assign the band 2500 – 2690 MHz for IMT-2000 standards providing freedom on technology choices within the IMT-2000 family.

Concerning service neutrality, the UMTS Forum considers that if "service" is understood as "Radio Service" as defined by the ITU in the Radio Regulation (Satellite, Broadcast, Mobile, Fixed Services), then extreme care should be taken when introducing Service neutrality

within the bands as it would lead to inefficient use of spectrum and high risk of interference. However, “services” can also be understood as transport means for types of data streams or as products offered by operators/ service providers to a user. Under this definition, the UMTS Forum sees no issue with regards to service neutrality.

Regarding trading of spectrum rights, the UMTS Forum could support an approach to introduce trading as long as the type of usage, the technical obligations and rights of spectrum users are kept unchanged in relation to European harmonised bands.

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?

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 regulators have taken the competition into account by predefining the number of licenses. In interactions with regulators, the minimum suitable bandwidth per operator for a certain service was often identified and recommended by industry forums. This practice was applied in the process of the 3G licensing case in Europe: subsequently, the majority of operators have today 2 x 10 MHz or 2 x 15 MHz for FDD in use today, as well as in some cases one 5 MHz lot for TDD.

The since long confirmed positive 3G subscriber developments around the globe and the increasing data rate demands indicate additional requirements for paired spectrum.

The proposed “safeguard” cap of 90 MHz, which is nearly half of the available spectrum, seems to be too large and could possibly be leading to an unwelcome “monopoly” situation. If this kind of concept is needed, the UMTS Forum prefers a spectrum cap of a lower value in order to foster on one side competition and would allow on the other side sufficient space for the deployment of evolutionary technologies such as UMTS LTE and other evolution in the IMT-2000 family.

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?

The UMTS Forum supports Ofcom’s proposal to package spectrum in the 2.6 GHz band as lots of 2 x 5 MHz for paired use and 5 MHz lots for unpaired use.

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)?

The UMTS Forum has serious concerns on the Ofcom approach to consider deviation from the European harmonised channelling arrangements as specified in ECC DEC(05)05. A varied frequency plan in terms of TDD and FDD spectrum arrangements would also lead to a less efficient use of spectrum (significant amount of spectrum is wasted in guard bands) and ultimately impact consumers' benefits. A national band plan would lead to UK specific equipments that will be more costly and with reduced roaming capabilities with other European countries denying the UK consumers access to new capable high bit rate services while visiting neighbouring countries.

Sharing studies between FDD and TDD base stations show that the lowest frequency block of a licensee's unpaired spectrum is not viable to use due to requirements for very high level of filtering (up to 74 dB additional filtering required for FDD → TDD or TDD → TDD and around 49 dB for TDD → FDD). It is also highly questionable whether the second lowest block of a licensee's unpaired spectrum is viable to use for co-located base stations (up to 100 dB additional filtering required for FDD → TDD or TDD → TDD and 75 dB for TDD → FDD). The efficiency of spectrum use is therefore considerably reduced.

Sharing studies between FDD and TDD mobile user terminals show that the lowest block of a licensee's unpaired spectrum is not viable to use (up to 40.3 dB additional filtering required for TDD → FDD at 5 m separation, up to 42.5 dB additional filtering required for FDD → TDD at 5 m separation and similar additional filtering required for TDD → TDD at 5 m separation). The 2nd lowest block of a licensee's unpaired spectrum is also not viable to use (up to 22.3 dB additional filtering required for TDD → FDD at 5 m separation, up to 32.5 dB additional filtering required for FDD → TDD at 5 m separation and similar additional filtering required for TDD → TDD at 5 m separation). The efficiency of spectrum use is considerably reduced in this case, and mitigation techniques envisaged are questionable.

Although, it would be envisaged that the risk of interference on the base stations can be mitigated by additional measures such as filtering, the impact on user terminals cannot be mitigated. Therefore, UK might need country specific terminals and the availability of wide range of cost-efficient terminal could be limited. In addition, the design of terminals that would be able to roam into countries or regions with non harmonized FDD/TDD band plans will lead to higher power consumption, increased insertion loss, reduced quality of service and coverage etc.

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?**

In line with the response to Question 10, the UMTS Forum believes that neither the 5 MHz restricted block between FDD and TDD neighbours nor the 5 MHz block between TDD and TDD neighbours are usable and, in addition, it is highly questionable whether the second adjacent 5 MHz would be usable.

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

Introducing guard bands within the band 2010 MHz between TDD operations will lead to inefficient use of this band. The UMTS Forum therefore supports Ofcom's proposal for having the band 2010 -2025 MHz packaged into one single 15 MHz lot either for FDD (uplink) paired with the 2.6 GHz band or TDD in line with ECC /DEC/(05)05 and ECC/DEC/(06)06.

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

The UMTS Forum does not wish to express an opinion on the award of the band 2290-2300 MHz.

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?

The UMTS Forum is of the view that it is important that interested parties have an equal opportunity to obtain spectrum under fair conditions. The bands 2.6 GHz and 2010 MHz are close substitutes (e.g. TDD blocks) or complements (e.g. FDD pairing). Thus, the UMTS Forum supports Ofcom's proposals to combine the award of the 2.6 GHz and 2010 MHz bands; however, within the UK either one or the other of the FDD or TDD schemes should be considered according to market demand, in order to avoid fragmented inefficient use of spectrum due to the needed guard band.

The 2290 -2300 MHz band is neither identified nor designated to IMT-2000 and is therefore fairly independent in terms of spectrum use from the two other bands and 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?

The UMTS Forum supports an auctioning format with regards to the 2.6 GHz band that is in line with the channelling arrangement and other conditions as defined in the ECC Decision ECC DEC(05)05. Ofcom might find it useful to consider to follow ECC/DEC/(05)05 in this case, and there would accordingly be no need for a two stage auction design.

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

The UMTS Forum does not wish to express an opinion on the award design in regard to the band 2290-2300 MHz.

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: transmitter spectrum mask approach and Spectrum Usage Rights. The UMTS Forum is not convinced that these methods can be an equal substitute for today's European proven practice with international standards.

The parameters chosen by Ofcom – which are derived from 3GPP specifications as well as from relevant CEPT reports – confirm the value of globally harmonised and proven standards as key sources for defining the technical usage rights. This is certainly no surprise to us, because the international standards are the result of global collaboration taking into account the interests of the involved countries and manufacturers in order to reach harmonisation and compatibility. The chosen parameters taken from 3GPP and CEPT provide for coexistence with operations in adjacent bands. In addition, by including parameters of both the transmitter and receiver sides, will provide for coexistence in the subject band and will lead to standard implementation as the user terminal device and infrastructure equipments will need no costly individual measures that would have to be implemented.

Standards development organisations, driven by the industry, have processes in place for innovations. Radio parameters will therefore be modified over time as part of these processes while taking into account backward compatibility. With the introduction of either one of the above methods, it is not clear to us how Ofcom would deal with the update processes and how this will be done in a formal way within the technical licence conditions.

The UMTS Forum has also concerns that Ofcom proposes methods only considering the transmitter side of a two folded issue. Proven experiences conclude that both the essential parameters of transmitters and receivers need to be considered in order to ensure coexistence and compatibility in situations where a multitude of networks are operated in the same band and in the same geographical area. If different networks with very different capabilities and characteristics would have to coexist, it is under normal circumstances impossible 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.

The UMTS Forum therefore recommends that:

- In order to ensure 2.6 GHz in-band systems coexistence and optimal spectrum efficiency, Ofcom would replace the two proposed methods by the inclusion of

international standards parameters or appropriate CEPT sharing studies conclusions in the licenses conditions.

- For out-of-band emissions, beyond the upper and lower boundaries of the 2.6 GHz, it would be appropriate to use of the traditional method using 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?

The UMTS Forum 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 the views expressed in Question 17, the UMTS Forum considers that defined SUR parameters are not appropriate to ensure optimal use of spectrum and coexistence between spectrum users. On the infrastructure side - if it comes to the insertion of proprietary filters in order to achieve system coexistence – radio networks become highly costly as they will not benefit from economies of scale, eventually to the detriment of the consumers. Concerning user terminal devices, they will be manufactured according to international standards and therefore, it cannot be assumed that the industry would be able at all times developing a full line of UK specific user terminals that else will be built in full products lines for users in other European countries according to harmonised band plans.

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

The yet unproven SUR methodology may be seen as an adequate regulatory tool towards more flexibility, compared to the traditional method of using spectrum masks; however, in our view, this methodology implies many more complexities that are still needed to be ironed out. Therefore, as there is not sufficient practical experience available from using this methodology. The UMTS Forum is of the view that the UK is taking huge risk and it is not regarded appropriate to apply an unproven SUR methodology to a large amount of prime spectrum of around 200 MHz where it is likely that many spectrum users providing public mobile communication services will be coexisting for a long time in the future.

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 frequently used by the mobile communication industry today, are exceptionally specialised and related to international equipment standards. It has therefore to be investigated how such generic tools needs to be modified in order to cope with a broad and technology neutral environment, and without consideration of receiver parameters. It would need to be validated how accurate and helpful such generic tool really would be under those circumstances. The UMTS Forum is also concerned with the general availability of a planning tool and the level of openness of the software.

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

The UMTS Forum has no specific comment on this issue.