Intelsat

PLEASE NOTE: The following paragraphs respond only to Question 8 of Ofcom's consultation document published on 18 March 2013, and relate only to those of the bands listed in Table A6.2 in which there are FSS allocations in the ITU Radio Regulations.

***Question 8**: What are your views about the pros and cons of the frequency ranges in Table A6.1 in Annex 6 for mobile broadband and for existing applications using this spectrum? Do you have views on other bands that are not in Table A6.1?*

3400-3600 MHz: It is noted that there is no FSS allocation in this band in the UK national Frequency Allocation table. However it is also noted that the band is extensively used by FSS applications in many other countries, and that existing studies demonstrate that co-frequency, co-coverage sharing between FSS and mobile broadband systems is not feasible in the band. Therefore Intelsat agrees with proposals that this band should not be considered further by JTG4-5-6-7.

3600-4200 MHz: This band, which is part of the C-band range, is heavily used by FSS down-links in most countries of the World, including the UK. Currently there are more than 160 geostationary satellites operating in the band (including 42 from Intelsat), and further such satellites continue to be launched, reflecting an on-going demand for additional FSS applications.

For the FSS, one of the advantages of the C-band allocations is their relatively low rainfall attenuation and hence higher availability when compared to the Ku-band and Ka-band allocations. Another is that in C-band the favourable spreading loss makes wide coverage beams more feasible, thus facilitating the provision of service in remote areas. These features have led to the use of C-band for satellite distribution of TV broadcast channels in many parts of the World, which provides service to a large number of TV receive-only terminals for which registration is not required and protection from interference would be impracticable in a shared-frequency scenario.

ITU-R studies on sharing of this band by FSS and IMT have already been carried out in preparation for WRC-07, and subsequently in Report ITU-R M.2109, showing that large separation distances would be needed. It may thus be concluded that sharing between the two services in the same geographical area would not be feasible. As an example, for the purposes of this consultation an analysis has been made of the particular case of earth stations in the south-east of England currently receiving from Intelsat satellites in the 3600-4200 MHz band, and the results are given in the Annex to this response. Intelsat concludes that this band should not be considered further by JTG4-5-6-7.

4500-4800 MHz: It is noted that existing ITU-R studies demonstrate that in this part of C-band, which is allocated for satellite down-links in the FSS Allotment Plan 30B, co-frequency, co-coverage sharing between FSS and mobile broadband systems would not be feasible. Therefore, whilst it is also noted that at present there are no satellite earth stations operating in this band in the UK, it is evident that the introduction of IMT would create problems for countries where such earth stations **are** deployed. Furthermore it would inhibit the **future** use of the band for FSS in the UK. Therefore Intelsat agrees with proposals that this band should not be considered further by JTG4-5-6-7.

5850-6425 MHz: This band, which is also part of the C-band range, is allocated for FSS up-links and is heavily used by earth stations in most countries of the World, including the UK. (For example the earth stations shown in the Annex have up-links in the band.) Earth station transmissions require high EIRP levels in order to achieve a reliable communication link. If IMT systems were deployed in the band significant separation distances would be required to avoid unacceptable interference from those earth stations, which would severely constrain the geographical deployment of the mobile broadband service. Furthermore, the deployment of additional FSS earth stations in the future would be severely hampered. Therefore, Intelsat concludes that this band should not be considered further by the JTG.

13.75-14.0 GHz: Although the allocation to FSS Earth-to-space links in this band occurred more recently than the FSS allocation in the adjacent band 14.0-14.5 GHz, it is now used by a considerable number of satellites globally, including 8 Intelsat satellites, and is also planned to be used by additional satellites to be launched within the next few years. Moreover, Earth station transmissions require high EIRP levels in order to achieve a reliable communication link. The deployment of IMT services in the band would thus be geographically constrained by the need to maintain separation distances to limit interference from existing FSS earth stations. Furthermore the expansion of both FSS and IMT services in the future would be mutually constrained. Therefore Intelsat concludes that this band should not be considered further by the JTG.

18.1-18.6 GHz: The sub-band 18.1-18.4 GHz is used by a number of countries for BSS up-links, and in many parts of the World (including the UK) the band 18.1-18.6 GHz is used by FSS down-links, in some cases on an uncoordinated basis. Here again sharing of the band between FSS and IMT systems would impose substantial geographical constraints, and Intelsat therefore considers that 18.1-18.6 GHz should not be considered further by the JTG.

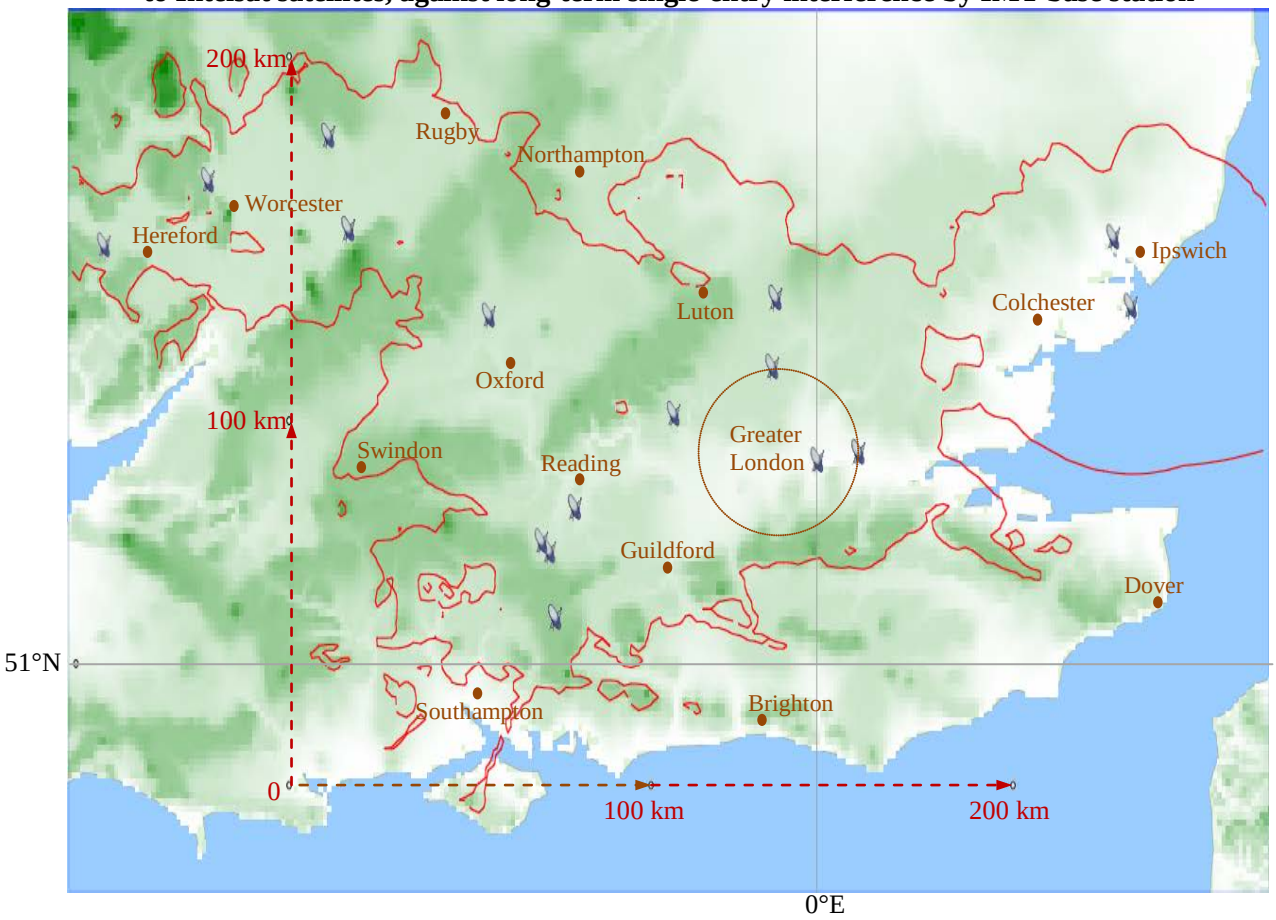
27.0-29.5 GHz: RR **5.516B** identifies substantial parts of this band for up-link use by HDFSS applications, in which earth stations in fixed locations are deployed without coordination. Furthermore, in recent years there has been much activity in the ITU-R and the CEPT to develop conditions enabling up-links from ESOMPs to operate within the band. Since the deployment of IMT systems without coordination would be impracticable, Intelsat considers that the band should not be considered further by the JTG.

38.0-39.5 GHz: In the RR there are primary allocations in this band to the Fixed, Fixed Satellite (space-to-Earth), and Mobile services, but at present the only extensive use is by point-to-point links in the Fixed service. Sharing between FS point-to-point terminals and FSS earth stations should be practicable owing to the antenna discrimination in both cases, but the introduction of IMT base stations in the MS would be likely to pose sharing problems owing to their wide beams in the horizontal plane.

{*See Annex on next page*}

Annex

Figure 1 Contour for protection of C-band FSS earth stations in South-East England operating to Intelsat satellites, against long-term single-entry interference by IMT base station



An IMT base station serving mobiles and located anywhere within the contour shown in red would cause interference exceeding the long-term single-entry criterion[1] to one or more of the 16 earth stations shown above ( ). The locations shown are those of transmit/receive earth stations currently operating[2] to INTELSAT C-band satellites in the GSO at longitudes ranging from 53°W to 62°E. The IMT macro base station is assumed to radiate an EIRP density of 16 dBW/MHz in all azimuth directions (as in ITU-R Report M.2109). The earth station antenna patterns are assumed to conform to Rec. ITU-R S.465. The contours were computed for the 4 GHz band, assuming the earth stations have antenna diameters of 3 m and receive noise temperatures of 100°K, and using a terrain data-base and the methods in Rec. ITU-R P.452-14 to calculate the interference path losses.

It can be seen that overall this long-term[3] single-entry interference contour encloses a considerable proportion of SE England and covers some areas of high population density no doubt attractive to IMT service providers. (Also, in any given area inside the contour multiple co-frequency IMT base stations would be likely to cause interference exceeding an acceptable **aggregate** protection criterion.) And if the earth stations working to satellites of operators other than INTELSAT were included in the computation it is likely that a larger contour would result. Furthermore, if the locations of TVRO terminals were available and TVROs could thus be included in the computation, the resulting contour would probably be even larger.

It may therefore be concluded that it would be impracticable for IMT to share with FSS in the 4 GHz band.

([1] I/N > -13 dB for no more than 20% of the time.)
([2] Note that the contour shown was computed assuming the existing antenna pointing directions, and its detail will change if one or more of the earth stations are re-pointed to receive from other Intelsat satellites.)
([3] It should be noted that a contour corresponding to a **short**-term single-entry criterion would have a larger coverage.)