

**Satellite Industry Association**  
**Use of Spectrum Bands Above 24 GHz For Mobile Radio Services Notice of Proposed Rulemaking,**  
**GN Docket No. 14 – 177, IB Docket Nos. 15-256 & 97-95; RM-11664; WT Docket No. 10-112**  
**December 2015**

**Discussion in Paragraphs 275 and 278-279 Regarding the Antenna Gain of 5G Base or Mobile Stations:**

The NPRM does not specify anything about the antenna gain of 5G base or mobile stations. From an interference point of view it would be necessary to have more knowledge about the antenna characteristics, otherwise the worst case needs to be considered.

This information is needed both for analyzing sharing with transmitting FSS earth stations with receiving 5G base (or mobile) stations, and to assess the interference from transmitting 5G base (or mobile) stations into satellite receivers.

What are the antenna characteristics (i.e. the peak gain and off-axis antenna pattern) for 5G base (or mobile) stations? Would the FCC consider limiting the directivity of such antennas, e.g. define a maximum transmit power (towards the geosynchronous arc or above X degrees elevation) in addition to an EIRP requirement? What are the receiver performance characteristics, e.g. noise figure, receiver bandwidth filter roll-off, etc.?

**Discussion in Paragraphs 278-279 Regarding Assumed Cell Radius:**

What is the assumed cell radius for a 5G network? The NPRM states in paragraph 272 that the cell radius might be between 100-200 m. However, in paragraph 279 the FCC accepts Straight Path's recommendation of 43 dBm EIRP based on a cell radius of 1 km. 43 dBm seems too high for the mobile terminal EIRP. Samsung in its Aug. 28 ex-parte uses a value of 32 dBm for the mobile station EIRP value.

What is the assumed smallest channel bandwidth for a 5G system? This is not clear from the NPRM. The NPRM only proposes a max. EIRP value based on a 100 MHz channel. However, it could be that a 10 MHz or even 5 MHz channel would be used. Therefore, wouldn't it be reasonable to also define a maximum EIRP density in terms of dBm/MHz in terms of a minimum allowed bandwidth?

**Discussion in Paragraphs 316-317 Regarding Propagation models:**

What propagation model should be used for the interference analysis in 28 GHz and 39 GHz? We recognize that the NPRM is asking for input on the propagation model, however, when will they be available? Is surface clutter included?

We know that research (NYU Wireless) is underway in that area, but it does not look as if the results of that research will be available soon. Ideally, these results should be available already to make an assessment of the interference scenario. We also want to note that for interference into the satellite, the reflections from the terrain and buildings need to be considered in addition to free space loss (line of sight).

### **Discussion in Paragraphs 284-285 and Paragraph 290 Regarding Emission Limits and Interference Protection Level:**

Proposed rule §30.6 (c) states “Fixed Satellite Service shall be provided in a manner consistent with Part 25 of this chapter.” This would mean that for FSS the technical rules from Part 30 would not apply to FSS, right?

In particular, can we assume proposed rules §30.202 (Power Limits), §30.203 (Emission Limits) and §30.204 (Field Strength Limits) would not apply to FSS?

### **Discussion in Paragraph 290 Regarding Interference Protection Level:**

Proposed rule §30.204 (Field Strength Limits) defines the interference protection level as not to exceed 47 dB $\mu$ V/m. However, this does not incorporate a spectral density. Shouldn't such a spectral density be incorporated? E.g. define the requirement in terms of dBm/(m<sup>2</sup>\*MHz)?

### **Discussion in Paragraph 270 Regarding the Band Plan:**

We assume that the proposed band plans would apply only to fixed and mobile operations. Is this correct? Due to the nature of FSS operation, the band plan for 28.6-40 GHz (2x50 MHz) would not be suitable for satellite operations. Is this band plan intended to be used, in combination with proposed rules §30.202 and §30.203, for interference calculations between the FS/MS and FSS?

### **Discussion in Paragraphs 163-164 Regarding VSATs in 37.5-40 GHz**

The FCC is planning that 5G operators need to provide information about their services to FSS operators. The 5G parameters are not known yet, so we don't know if this will be enough. Would the FCC also consider mitigation techniques to be implemented to facilitate the deployment of VSAT in this band?

### **Other Questions:**

When do you expect the 5G standards process for operations in these bands to begin? For example, the ITU-R WP 5 5G technical parameters are not required to be made available until Q1 2017. How will this rulemaking incorporate developments from that process?