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## RESOLUTION 773 (WRC-19)

**Study of technical and operational issues and regulatory provisions for  
satellite-to-satellite links in the frequency bands 11.7-12.7 GHz,  
18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz**

The World Radiocommunication Conference (Sharm-el-Sheikh, 2019),

*considering*

- a) that the definition of fixed-satellite service (FSS) in No. **1.21** includes the possibility, in some cases, of satellite-to-satellite links, which may also be operated in the inter-satellite service (ISS);
- b) that the definition of ISS in No. **1.22** includes only links between space stations, and that the term *inter-satellite link* in this Resolution is taken to mean a radiocommunication service link between artificial satellites;
- c) that frequency bands allocated to the FSS are used for links between earth stations and space stations, and that such links may not be operated in the ISS;
- d) that using some frequency bands allocated to the FSS for transmissions between space stations may increase spectral efficiency in those frequency bands;
- e) that there is growing interest for utilizing satellite-to-satellite links for a variety of applications and that there have been expressions of interest by some administrations in using the FSS frequency bands 27.5-30 GHz (Earth-to-space) and 11.7-12.7 GHz, 18.1-18.6 GHz and 18.8-20.2 GHz (space-to-Earth) for links between space stations;
- f) that all FSS allocations include a space-to-Earth or Earth-to-space direction indicator;
- g) that the ITU Radiocommunication Sector (ITU-R) has begun preliminary studies on the technical and operational issues associated with the use of non-geostationary (non-GSO) satellites transmitting towards the geostationary-satellite orbit (GSO) in the FSS frequency band 27.5-30 GHz, and that such studies are expected to continue in this frequency band and other frequency bands after this conference,

*recognizing*

- a) that it is necessary to study the compatibility of satellite-to-satellite transmissions with other primary services in the frequency bands taking into account applicable footnotes, and the need to protect the primary services in the frequency bands referred to in *considering e*);
- b) that the use of the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz and 18.8-20.2 GHz (space-to-Earth) and 27.5-30 GHz (Earth-to-space) for transmissions between space stations should ensure compatibility with, and impose no additional regulatory or technical constraints on, services to which the frequency band is currently allocated on a primary basis and services using adjacent frequency bands allocated on a primary basis;

c) that it is necessary to study whether space-to-Earth direction transmissions from space stations at higher orbital altitudes, including GSO satellites, can be successfully received by lower orbital altitude non-GSO satellites, without imposing any additional constraints on all allocated services in these frequency bands;

d) that the sharing scenarios are likely to differ as the orbital characteristics of the non-GSO satellites vary;

e) that out-of-band emissions, signals due to antenna pattern sidelobes, reflections from receiving space stations and in-band unintentional radiation due to Doppler shifts may impact services operating in the same and adjacent frequency bands;

f) that some administrations have authorized these satellite-to-satellite transmission links under Article 4, No. 4.4, without recognition and on a non-harmful interference/non-protected basis,

*recognizing further*

a) that a precedent for satellite-to-satellite links sharing with Earth-to-space and space-to-Earth exists for the space operation (SOS), Earth exploration-satellite (EESS) and space research (SRS) services in the frequency bands 2 025-2 110 MHz and 2 200-2 290 MHz through the inclusion of a space-to-space allocation;

b) that the use of the frequency bands 27.5-28.6 GHz and 29.5-30 GHz by the non-GSO FSS is subject to the application of the provisions of Nos. **5.484A**, **22.5D** and **22.5I**;

c) that the use of the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz by the non-GSO FSS is subject to the application of the provisions of Nos. **5.484A**, **22.5C** and **22.5I**;

d) that use of the frequency band 28.6-29.1 GHz by GSO and non-GSO FSS networks is subject to the application of the provisions of No. **9.11A**, and No. **22.2** does not apply (see No. **5.523A**);

e) that No. **22.2** applies to the frequency bands 19.7-20.2 GHz and 29.5-30 GHz, in which the mobile-satellite service (MSS) has a co-primary allocation in Region 2 and in the 20.1-20.2 GHz and 29.9-30 GHz portions of the frequency bands in Regions 1 and 3;

f) that use of the frequency band 29.1-29.5 GHz (Earth-to-space) by the FSS is limited to GSO systems and feeder links to non-GSO systems in the MSS, and that such use is subject to the application of the provisions of No. **9.11A**, but not subject to the provisions of No. **22.2**, except as indicated in Nos. **5.523C** and **5.523E**, where such use is not subject to the provisions of No. **9.11A** and shall continue to be subject to Article 9 (except No. **9.11A**) and 11 procedures, and to the provisions of No. **22.2** (see No. **5.535A**);

g) that the frequency band 27.5-30 GHz may be used by the FSS (Earth-to-space) for the provision of feeder links for the broadcasting-satellite service (BSS) (see No. **5.539**);

h) that feeder links of non-GSO MSS networks and GSO FSS networks operating in the frequency band 29.1-29.5 GHz (Earth-to-space) shall employ uplink adaptive power control or other methods of fade compensation, such that the earth station transmissions shall be conducted at the power level required to meet the desired link performance while reducing the level of mutual interference between both networks (see No. **5.541A**);

i) that the fixed and mobile services are allocated on a primary basis in the frequency bands 10.7-11.7 GHz, 17.7-17.8 GHz, 18.1-19.7 GHz and 27.5-29.5 GHz on a global basis, in the frequency band 17.7-17.8 GHz in Regions 1 and 3, in the frequency band 12.2-12.7 GHz in Regions 2 and 3 and in the frequency band 11.7-12.5 GHz in Regions 1 and 3, and the fixed service is also primary in the frequency band 17.8-18.1 GHz globally and in the frequency band 11.7-12.1 GHz in Region 2;

j) that the frequency band 28.5-29.5 GHz (Earth-to-space) is also allocated to the EESS on a secondary basis, and no additional constraints should be imposed on the EESS, and the conditions of FSS operation are described in Resolution **750 (Rev.WRC-19)**;

k) that the allotments of the Appendix **30B** Plan, assignments in the Plans and the List subject to Appendix **30** and **30A** and assignments in the Appendix **30B** List must be protected;

l) that the frequency band 29.5-30 GHz (Earth-to-space) is also allocated to the MSS on a primary basis in the frequency band 29.5-30 GHz in Region 2, on a primary basis in the frequency band 29.9-30 GHz in Regions 1 and 3, and on a secondary basis in the frequency band 29.5-29.9 GHz in Regions 1 and 3;

m) that use of the frequency band 18.1-18.4 GHz by the FSS (Earth-to-space) is limited to GSO BSS feeder links (No. **5.520**);

n) that the use of the frequency band 17.8-18.4 GHz is subject to the application of No. **22.5F** and  $epfd_{is}$  limits,

*resolves to invite the ITU Radiocommunication Sector*

1 to develop the technical and operational characteristics of different types of space stations that plan satellite-to-satellite transmissions in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz, taking into account *considering e)* above;

2 to study the technical and operational characteristics, including spectrum requirements, off-axis equivalent isotropically radiated power (e.i.r.p.) values and out-of-band emission limits, for transmissions between space stations in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz;

3 to study sharing and compatibility between satellite-to-satellite links intending to operate between space stations in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz and current and planned stations of the FSS and other existing services allocated in same frequency bands and adjacent frequency bands, including passive services, with a view to ensuring protection of the primary services referred to in *recognizing further i)*;

4 to develop, for different types of space stations, the technical conditions and regulatory provisions for satellite-to-satellite operations in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz, or portions thereof, including new ISS allocations, as appropriate, taking into account the results of the studies above,

*invites administrations*

to participate in the studies and to provide input contributions,

*invites the 2023 World Radiocommunication Conference*

to consider the results of the above studies and take necessary regulatory actions, as appropriate.