

## RESOLUTION 158 (WRC-15)

### **Use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a)* that the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) are globally allocated on a primary basis to the fixed-satellite service (FSS) and that there are a large number of geostationary FSS satellite networks operating in these frequency bands, as well as non-geostationary FSS systems;
- b)* that in these frequency bands there are a large number of fixed-service stations, as well as mobile-service stations;
- c)* that regulatory and technical procedures exist in these frequency bands between geostationary FSS networks and non-geostationary FSS systems;
- d)* that there is an need for mobile communications, including global broadband satellite services, and that some of this need can be met by allowing earth stations in motion to communicate with space stations of the FSS operating in the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space);
- e)* that some administrations have already deployed, and plan to expand their use of, earth stations in motion with operational and future geostationary FSS networks;
- f)* that geostationary FSS networks in the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) are required to be coordinated and notified in accordance with the provisions of Articles **9** and **11** of the Radio Regulations;
- g)* that the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) are also allocated to several other services on a primary basis, the allocated services are used by a variety of different systems in many administrations and these existing services and their future development should be protected without undue constraints;
- h)* that currently there is no specific regulatory procedure for the coordination of the earth stations in motion with regard to stations of terrestrial services,

*considering further*

- a)* that a consistent approach to deployment of these earth stations in motion will support these important and growing global communication requirements;
- b)* that the ITU Radiocommunication Sector (ITU-R) has adopted Reports ITU-R S.2223 and ITU-R S.2357;

c) that the technical characteristics of the earth stations in motion operating within a given geostationary-satellite network should be within the envelope of the coordination agreements reached between administrations,

*recognizing*

a) that Article **21** contains power flux-density (pfd) limits for geostationary fixed-satellite services;

b) that earth stations in motion addressed by this Resolution are not to be used for safety-of-life applications;

c) that this conference has adopted footnote No. **5.527A** and Resolution **156 (WRC-15)** related to earth stations in motion;

d) that advances in technology, including the use of tracking techniques, allow earth stations in motion to operate within the characteristics of fixed earth stations of the FSS;

e) that No. **1.21** defines the fixed-satellite service and No. **1.25** defines the mobile-satellite service (MSS);

f) that the use of earth stations in motion under the FSS regime is not much different from MSS applications, taking into account the definition of mobile-satellite service in No. **1.25**;

g) that the main difference between earth stations in motion and mobile earth stations is that earth stations in motion comply with the technical requirements of fixed-satellite earth stations,

*recognizing further*

a) that parts of the frequency band 17.7-18.1 GHz are used by feeder links for the broadcasting-satellite service, subject to Appendix **30A** (No. **5.516**);

b) that the frequency bands 18.3-19.3 GHz (Region 2), 27.5-27.82 GHz (Region 1), 28.35-28.45 GHz (Region 2), 28.45-28.94 GHz (all Regions), 28.94-29.1 GHz (Regions 2 and 3), 29.25-29.46 GHz (Region 2) and 29.46-29.5 GHz (all Regions) are identified for use by high-density applications in the fixed-satellite service (No. **5.516B**);

c) that use of the frequency band 18.1-18.4 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links of geostationary-satellite systems in the broadcasting-satellite service (No. **5.520**);

d) that use of the frequency band 18.6-18.8 GHz by the fixed-satellite service is limited to geostationary systems and systems with an orbit of apogee greater than 20 000 km (No. **5.522B**);

e) that the use of the frequency bands 17.8-18.6 GHz and 27.5-28.6 GHz by non-geostationary fixed-satellite service systems is subject to the application of the provisions of Nos. **5.484A**, **22.5C** and **22.5I**;

f) that use of the frequency bands 18.8-19.3 GHz and 28.6-29.1 GHz by geostationary and non-geostationary fixed-satellite service networks is subject to the application of the provisions of No. **9.11A**, and No. **22.2** does not apply (No. **5.523A**);

*g)* that use of the frequency band 19.3-19.7 GHz by geostationary fixed-satellite service systems and by feeder links for non-geostationary satellite systems in the mobile-satellite service is subject to the application of the provisions of No. **9.11A**, but not subject to the provisions of No. **22.2**, and that the use of this frequency band for other non-geostationary fixed-satellite service systems, or for the cases indicated in Nos. **5.523C** and **5.523E**, is not subject to the provisions of No. **9.11A** and shall continue to be subject to Articles **9** (except No. **9.11A**) and **11** procedures, and to the provisions of No. **22.2** (No. **5.523D**);

*h)* that use of the frequency band 29.1-29.5 GHz (Earth-to-space) by the fixed-satellite service is limited to geostationary-satellite systems and feeder links to non-geostationary satellite systems in the mobile-satellite service, 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 Articles **9** (except No. **9.11A**) and **11** procedures, and to the provisions of No. **22.2** (No. **5.535A**);

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

*j)* that feeder links of non-geostationary networks in the mobile-satellite service and geostationary networks in the fixed-satellite service 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 (No. **5.541A**);

*k)* that the fixed and mobile services are allocated on a primary basis in the frequency bands 27.5-29.5 GHz on a global basis;

*l)* that the frequency band 18.6-18.8 GHz is used by the Earth exploration-satellite service (EESS) (passive) in remote sensing by Earth exploration and meteorological satellites, and protection from interference is essential for passive sensing measurements and applications, especially for measurements of known spectral lines, which are of particular importance;

*m)* that the frequency bands 28.5-29.5 GHz (Earth-to-space) are also allocated to the Earth exploration-satellite service on a secondary basis, and no additional constraints should be imposed on the EESS;

*n)* that all allocated services in these frequency bands should be taken into account,

*resolves to invite ITU-R*

*1* to study the technical and operational characteristics and user requirements of different types of earth stations in motion that operate or plan to operate within geostationary FSS allocations in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz, including the use of spectrum to provide the envisioned services to various types of earth station in motion and the degree to which flexible access to spectrum can facilitate sharing with services identified in *recognizing further a) to n)*;

2 to study sharing and compatibility between earth stations in motion operating with geostationary FSS networks and current and planned stations of existing services allocated in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz to ensure protection of, and not impose undue constraints on, services allocated in those frequency bands, and taking into account *recognizing further a) to n)*;

3 to develop, for different types of earth stations in motion and different portions of the frequency bands studied, technical conditions and regulatory provisions for their operation, taking into account the results of the studies above,

*resolves*

that these earth stations not be used or relied upon for safety-of-life applications,

*resolves to further invite the 2019 World Radiocommunication Conference*

to consider the results of the above studies and take necessary actions, as appropriate, provided that the results of the studies referred to in *resolves to invite ITU-R* are complete and agreed by ITU-R study groups.