RESOLUTION 750 (REV.WRC-19)

Compatibility between the Earth exploration-satellite service (passive) and relevant active services

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

considering

a) that primary allocations have been made to various space services such as the fixed-satellite service (Earth-to-space), the space operation service (Earth-to-space) and the inter-satellite service and/or to terrestrial services such as the fixed service, the mobile service and the radiolocation service, hereinafter referred to as "active services", in frequency bands adjacent or nearby to frequency bands allocated to the Earth exploration-satellite service (EESS) (passive), subject to No. **5.340**;

b) that unwanted emissions from active services have the potential to cause unacceptable interference to EESS (passive) sensors;

c) that, for technical or operational reasons, the general limits in Appendix **3** may be insufficient in protecting the EESS (passive) in specific frequency bands;

d) that, in many cases, the frequencies used by EESS (passive) sensors are chosen to study natural phenomena producing radio emissions at frequencies fixed by the laws of nature, and therefore shifting frequency to avoid or mitigate interference problems is not possible;

e) that the frequency band 1 400-1 427 MHz is used for measuring soil moisture, and also for measuring sea-surface salinity and vegetation biomass;

f) that long-term protection of the EESS in the frequency bands 23.6-24 GHz, 31.3-31.5 GHz, 50.2-50.4 GHz, 52.6-54.25 GHz and 86-92 GHz is vital to weather prediction and disaster management, and measurements at several frequencies must be made simultaneously in order to isolate and retrieve each individual contribution;

g) that, in many cases, the frequency bands adjacent to or nearby passive service frequency bands are used and will continue to be used for various active service applications;

h) that it is necessary to ensure equitable burden-sharing for achieving compatibility between active and passive services operating in adjacent or nearby frequency bands,

noting

a) that some of the compatibility studies between relevant active and passive services operating in adjacent and nearby frequency bands are documented in Report ITU-R SM.2092 and in Report ITU-R S.2463;

b) that the compatibility studies between International Mobile Telecommunications (IMT) systems in the frequency bands 1 375-1 400 MHz and 1 427-1 452 MHz and EESS (passive) systems in the frequency band 1 400-1 427 MHz are documented in Report ITU-R RS.2336;

c) that Report ITU-R F.2239 provides the results of studies covering various scenarios between the fixed service, operating in the frequency bands 81-86 GHz and/or 92-94 GHz, and the EESS (passive), operating in the frequency band 86-92 GHz;

d) that Recommendation ITU-R RS.2017 provides the interference criteria for satellite passive remote sensing,

noting further

that, for the purpose of this Resolution:

– point-to-point communication is defined as radiocommunication provided by a link, for example a radio-relay link, between two stations located at specified fixed points;

– point-to-multipoint communication is defined as radiocommunication provided by links between a single station located at a specified fixed point (also called “hub station”) and a number of stations located at specified fixed points (also called “customer stations”),

recognizing

a) that studies documented in Report ITU-R SM.2092 do not consider point-to-multipoint communication links in the fixed service in the frequency bands 1 350-1 400 MHz and 1 427-1 452 MHz;

b) that, in the frequency band 1 427-1 452 MHz, mitigation measures, such as channel arrangements, improved filters and/or guardbands, may be necessary in order to meet the unwanted emission limits for IMT stations in the mobile service specified in Table 1 of this Resolution;

c) that, in the frequency band 1 427-1 452 MHz, IMT mobile stations typically perform better than the equipment specifications as stated by relevant standards organizations, which may be taken into account in meeting the limits specified in Table 1 (see also sections 4 and 5 of Report ITU-R RS.2336),

resolves

1 that unwanted emissions of stations brought into use in the frequency bands and services listed in Table 1 below shall not exceed the corresponding limits in that table, subject to the specified conditions;

2 to urge administrations to take all reasonable steps to ensure that unwanted emissions of active service stations in the frequency bands and services listed in Table 2 below do not exceed the recommended maximum levels contained in that table, noting that EESS (passive) sensors provide worldwide measurements that benefit all countries, even if these sensors are not operated by their country;

3 that the Radiocommunication Bureau shall not make any examination or finding with respect to compliance with this Resolution under either Article **9** or **11**.

TABLE 1

EESS (passive) frequency band	Active service frequency band	Active service	Limits of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) frequency band[1]
1 400- 1 427 MHz	1 427- 1 452 MHz	Mobile	−72 dBW in the 27 MHz of the EESS (passive) band for IMT base stations −62 dBW in the 27 MHz of the EESS (passive) band for IMT mobile stations[2, 3]
23.6-24.0 GHz	22.55-23.55 GHz	Inter-satellite	−36 dBW in any 200 MHz of the EESS (passive) band for non-GSO inter-satellite service (ISS) systems for which complete advance publication information (API) is received by BR before 1 January 2020, and −46 dBW in any 200 MHz of the EESS (passive) band for non-GSO ISS systems for which complete API is received by BR on or after 1 January 2020
	24.25-27.5 GHz	Mobile	−33 dBW[a] in any 200 MHz of the EESS (passive) band for IMT base stations[5] −29 dBW[b] in any 200 MHz of the EESS (passive) band for IMT mobile stations[5]
31.3-31.5 GHz	31-31.3 GHz	Fixed (excluding HAPS)	For stations brought into use after 1 January 2012: −38 dBW in any 100 MHz of the EESS (passive) band. This limit does not apply to stations that have been authorized prior to 1 January 2012
50.2-50.4 GHz	49.7-50.2 GHz	Fixed-satellite (E-to-s)[4]	For GSO earth stations brought into use after the date of entry into force of the Final Acts of WRC-07 and prior to 1 January 2024: −10 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 57 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 57 dBi For GSO earth stations with antenna gain greater than or equal to 57 dBi brought into use on or after 1 January 2024: −25 dBW into the 200 MHz of the EESS (passive) band for earth stations having an elevation angle below 80° −45 dBW into the 200 MHz of the EESS (passive) band for earth stations having an elevation angle equal or above 80° For GSO earth stations with antenna gain less than 57 dBi brought into use on or after 1 January 2024: −30 dBW into the 200 MHz of the EESS (passive) band for earth stations having an elevation angle below 80° −45 dBW into the 200 MHz of the EESS (passive) band for earth stations having an elevation angle equal or above 80°

EESS (passive) frequency band	Active service frequency band	Active service	Limits of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) frequency band[1]
			For non-GSO earth stations brought into use after the date of entry into force of the Final Acts of WRC-07 and before the date of entry into force of the Final Acts of WRC-19: −10 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 57 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 57 dBi For non-GSO earth stations brought into use after the date of entry into force of the Final Acts of WRC-19[6]: −42 dBW into the 200 MHz of the EESS (passive) band for earth stations not employing uplink power control −42 dBW into the 200 MHz of the EESS (passive) band at zenith increasing to a maximum level of −35 dBW into the 200 MHz of the EESS (passive) band at a minimum elevation angle of 15° for earth stations employing uplink power control
50.2-50.4 GHz	50.4-50.9 GHz	Fixed-satellite (E-to-s)[4]	For GSO earth stations brought into use after the date of entry into force of the Final Acts of WRC-07 and prior to 1 January 2024: −10 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 57 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 57 dBi For GSO earth stations with antenna gain greater than or equal to 57 dBi brought into use on or after 1 January 2024: −25 dBW into the 200 MHz of the EESS (passive) band for earth stations having an elevation angle below 80° −45 dBW into the 200 MHz of the EESS (passive) band for earth stations having an elevation angle equal or above 80° For GSO earth stations with antenna gain less than 57 dBi brought into use on or after 1 January 2024: –30 dBW into the 200 MHz of the EESS (passive) band for earth stations having an elevation angle below 80° −45 dBW into the 200 MHz of the EESS (passive) band for earth stations having an elevation angle equal or above 80°

EESS (passive) frequency band	Active service frequency band	Active service	Limits of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) frequency band[1]
			For non-GSO earth stations brought into use after the date of entry into force of the Final Acts of WRC-07 and before the date of entry into force of the Final Acts of WRC-19: −10 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 57 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 57 dBi For non-GSO earth stations brought into use after the date of entry into force of the Final Acts of WRC-19[6]: −42 dBW into the 200 MHz of the EESS (passive) band for earth stations not employing uplink power control −42 dBW into the 200 MHz of the EESS (passive) band at zenith increasing to a maximum level of −35 dBW into the 200 MHz of the EESS (passive) band at a minimum elevation angle of 15° for earth stations employing uplink power control
52.6-54.25 GHz	51.4-52.4 GHz	Fixed-satellite (E-to-s)[4]	For earth stations operating in GSO FSS networks, in order to protect non-GSO EESS (passive) space stations: −37 dBW in any 100 MHz of the EESS (passive) band for FSS earth stations with elevation angles lower than 75° −52 dBW in any 100 MHz of the EESS (passive) band for FSS earth stations with elevation angles equal to or higher than 75° For earth stations operating with a GSO FSS space station whose nominal geocentric orbital separation Δ is equal to or smaller than 2.5° from any GSO EESS (passive) space station from the time of its notification in accordance with No. **11.44** with nominal orbital positions: 0°, 9.5° E, 76° E, 79° E, 99.5° E, 105° E, 123.5° E, 133° E, 165.8° E, 14.5° W and 137.2° W: $-84 + 200\ \Delta$ dBW for $0° \le \Delta < 0.1°$ $-67 + 22.8\ \Delta$ dBW for $0.1° \le \Delta < 0.5°$ $-61 + 11.3\ \Delta$ dBW for $0.5° \le \Delta < 1.9°$ $-47 + 4\ \Delta$ dBW for $1.9° \le \Delta \le 2.5°$ in any 100 MHz of the EESS (passive) band
52.6-54.25 GHz	51.4-52.6 GHz	Fixed	For stations brought into use after the date of entry into force of the Final Acts of WRC-07: −33 dBW in any 100 MHz of the EESS (passive) band

Notes to Table 1:

[1] The unwanted emission power level is to be understood here as the level measured at the antenna port, unless it is specified in terms of total radiated power (TRP).

[2] This limit does not apply to mobile stations in the IMT systems for which the notification information has been received by BR by 28 November 2015. For those systems, −60 dBW/27 MHz applies as the recommended value.

[3] The unwanted emission power level is to be understood here as the level measured with the mobile station transmitting at an average output power of 15 dBm.

[4] The limits apply under clear-sky conditions. During fading conditions, the limits may be exceeded by earth stations when using uplink power control.

[5] The unwanted emission power level is considered in terms of TRP. The TRP is to be understood here as the integral of the power transmitted from all antenna elements in different directions over the entire radiation sphere.

[a] A limit of −39 dB(W/200 MHz) will apply to IMT base stations brought into use after 1 September 2027. This limit will not apply to IMT base stations which have been brought into use prior to this date. For those IMT base stations, the limit of −33 dB(W/200 MHz) will continue to apply after this date.

[b] A limit of −35 dB(W/200 MHz) will apply to IMT mobile stations brought into use after 1 September 2027. This limit will not apply to IMT mobile stations which have been brought into use prior to this date. For those IMT mobile stations, the limit of −29 dB(W/200 MHz) will continue to apply after this date.

[6] Compliance with these limits may include the consideration of additional mitigation techniques, which require further studies by ITU-R.

TABLE 2

EESS (passive) frequency band	Active service frequency band	Active service	Recommended maximum level of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) frequency band[1]
1 400-1 427 MHz	1 350-1 400 MHz	Radiolocation[2]	−29 dBW in the 27 MHz of the EESS (passive) band
		Fixed	−45 dBW in the 27 MHz of the EESS (passive) band for point-to-point
		Mobile	−60 dBW in the 27 MHz of the EESS (passive) band for mobile-service stations except transportable radio-relay stations −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations
	1 427-1 429 MHz	Space operation (E-to-s)	−36 dBW in the 27 MHz of the EESS (passive) band
	1 427-1 429 MHz	Mobile except aeronautical mobile	−60 dBW in the 27 MHz of the EESS (passive) band for mobile-service stations except IMT stations and transportable radio-relay stations[3] −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations
		Fixed	−45 dBW in the 27 MHz of the EESS (passive) band for point-to-point
	1 429-1 452 MHz	Mobile	−60 dBW in the 27 MHz of the EESS (passive) band for mobile-service stations except IMT stations, transportable radio-relay stations and aeronautical telemetry stations −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations −28 dBW in the 27 MHz of the EESS (passive) band for aeronautical telemetry stations[3]
		Fixed	−45 dBW in the 27 MHz of the EESS (passive) band for point-to-point
31.3-31.5 GHz	30.0-31.0 GHz	Fixed-satellite (E-to-s)[4]	−9 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 56 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 56 dBi
86-92 GHz[5]	81-86 GHz	Fixed	$-41 - 14(f - 86)$ dBW/100 MHz for $86.05 \leq f \leq 87$ GHz −55 dBW/100 MHz for $87 \leq f \leq 91.95$ GHz where f is the centre frequency of the 100 MHz reference bandwidth expressed in GHz
	92-94 GHz	Fixed	$-41 - 14(92 - f)$ dBW/100 MHz for $91 \leq f \leq 91.95$ GHz −55 dBW/100 MHz for $86.05 \leq f \leq 91$ GHz where f is the centre frequency of the 100 MHz reference bandwidth expressed in GHz

Notes to Table 2:

[1] The unwanted emission power level is to be understood here as the level measured at the antenna port.

[2] The mean power is to be understood here as the total power measured at the antenna port (or an equivalent thereof) in the frequency band 1 400-1 427 MHz, averaged over a period of the order of 5 s.

[3] The frequency band 1 429-1 435 MHz is also allocated to the aeronautical mobile service in eight Region 1 administrations on a primary basis exclusively for the purposes of aeronautical telemetry within their national territory (No. **5.342**).

[4] The recommended maximum levels apply under clear-sky conditions. During fading conditions, these levels may be exceeded by earth stations when using uplink power control.

[5] Other maximum unwanted emission levels may be developed based on different scenarios provided in Report ITU-R F.2239 for the frequency band 86-92 GHz.