International Telecommunication Union

ITU-R

Radiocommunication Sector of ITU

Recommendation ITU-R SA.2078-0
(08/2015)

Protection of space research service earth stations from mobile (aircraft) stations in the 2 200-2 290 MHz band

SA Series
Space applications and meteorology

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Foreword

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The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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SNG	Satellite news gathering
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Note: *This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.*

Electronic Publication
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RECOMMENDATION ITU-R SA.2078-0

Protection of space research service earth stations from mobile (aircraft) stations in the 2 200-2 290 MHz band

(2015)

Scope

This Recommendation gives the required coordination distance of 880 km between space research earth stations and transmitting mobile (aircraft) stations to protect the space research earth stations in the 2 200-2 290 MHz band.

Keywords

SRS earth stations, mobile (aircraft) stations, coordination distance, 2 200-2 290 MHz

The ITU Radiocommunication Assembly,

considering

a) that the band 2 200-2 290 MHz is allocated to the space operation (space-to-Earth) (space-space), Earth exploration-satellite (space-to-Earth) (space-to-space), fixed, mobile, and space research (space-to-Earth) (space-to-space) services (SRS) on a primary basis;

b) that the protection criteria for near-Earth SRS earth stations are given in Recommendation ITU-R SA.609 as −216 dBW/Hz with 0.1% exceedance probability for unmanned SRS missions and 0.001% for manned SRS missions;

c) that mobile (aircraft) stations flying over SRS earth stations can have line-of-sight (LoS) interference with the SRS earth stations;

d) that the LoS separation distance is determined by RF visibility limit, which is about 830 km for an aircraft at 17 km altitude and for exceedance probabilities less than 1%;

e) that transmissions from a mobile (aircraft) station at the RF visibility limit with 17 km altitude may cause interference to an SRS earth station, exceeding the protection level by up to 37 dB;

f) that, to meet the protection criteria of the SRS earth stations, distances larger than line-of-sight separations distances are required;

g) that for non-line-of-sight (NLoS) propagation analysis, the methodology in Recommendation ITU-R P.528 needs to be used;

h) that Report ITU-R SA.2276, using NLoS propagation methodology, has shown that the required separation distance would be about 880 km, as shown in the Annex,

recommends

that, in the 2 200-2 290 MHz band, 880 km should be used as the coordination distance between SRS earth stations and mobile (aircraft) stations.

Annex

Protection of space research service earth stations from mobile (aircraft) stations in the 2 200-2 290 MHz band

This Annex gives the required separation distances around the SRS earth stations such that the interferences from the aircraft stations meet the protection criterion of the SRS earth stations.

The separation distances are derived using the IF-77 program recommended in Recommendation ITU-R P.528, and the SRS earth station protection level specified in Recommendation ITU-R SA.609. The SRS earth station protection is specified as a threshold spectral density of −216 dBW/Hz with 0.001% exceedence probability to support manned near-Earth SRS spacecraft, and 0.1% exceedence probability to support unmanned SRS spacecraft.

Figure 1 below shows the required separation distance between SRS earth station supporting a manned mission and aircraft station as a function of the aircraft altitude for a −50 dBW/Hz aircraft transmit e.i.r.p. spectral density case. It shows that, in order to meet the protection criteria of the SRS earth station, the aircraft needs to be between 450 km and 880 km away from the SRS earth stations at Goldstone, Wallops, Madrid, Canberra, New Norcia, Perth, and Uchinoura, for aircraft altitudes between 4 km and 17 km. Note also that to protect the SRS earth stations, the required separation distances are about 200 to 300 km greater than the RF visibility limits given for $p < 1\%$.

FIGURE 1

Required separation distances between SRS earth station (p = 0.001%) and aircraft station transmitting −50 dBW/Hz e.i.r.p. vs aircraft altitude

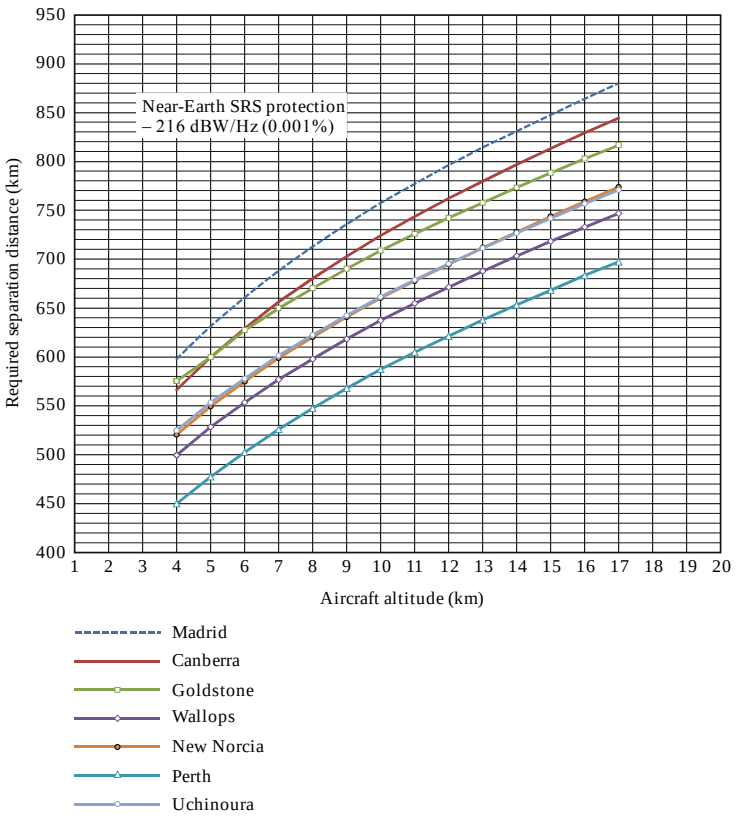

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Table 1 below gives the required separation distances between SRS earth stations and mobile (aircraft) stations for aircraft altitude of 17 km and transmit e.i.r.p. spectral density of −50 dBW/Hz for exceedance probability of p = 0.001%.

TABLE 1

Required separation distances for SRS earth stations supporting manned missions (p = 0.001%) and aircraft station at 17 km altitude transmitting at −50 dBW/Hz e.i.r.p. density

SRS earth station Site, Country	Required separation distance (km)
Goldstone, USA	817
Wallops, USA	747
Madrid, Spain	880
Canberra, Australia	845
New Norcia, Australia	774
Perth, Australia	698
Uchinoura, Japan	771

Figure 2 below shows the required separation distances between SRS earth stations, supporting an unmanned SRS mission, and aircraft station as a function of the aircraft altitude for the −50 dBW/Hz aircraft transmit e.i.r.p. density case. It shows that, in order to meet the protection criteria of the SRS earth station, the aircraft needs to be between 450 km and 825 km away from the SRS earth stations at Goldstone, Wallops, Madrid, Canberra, and Uchinoura, for aircraft altitudes between 4 km and 17 km.

Note that, again, to protect the SRS earth stations, the required separation distances are greater than the RF visibility limits given for p < 1%.

FIGURE 2

Required separation distances between SRS earth station (p = 0.1%) and aircraft station transmitting −50 dBW/Hz e.i.r.p. vs aircraft altitude

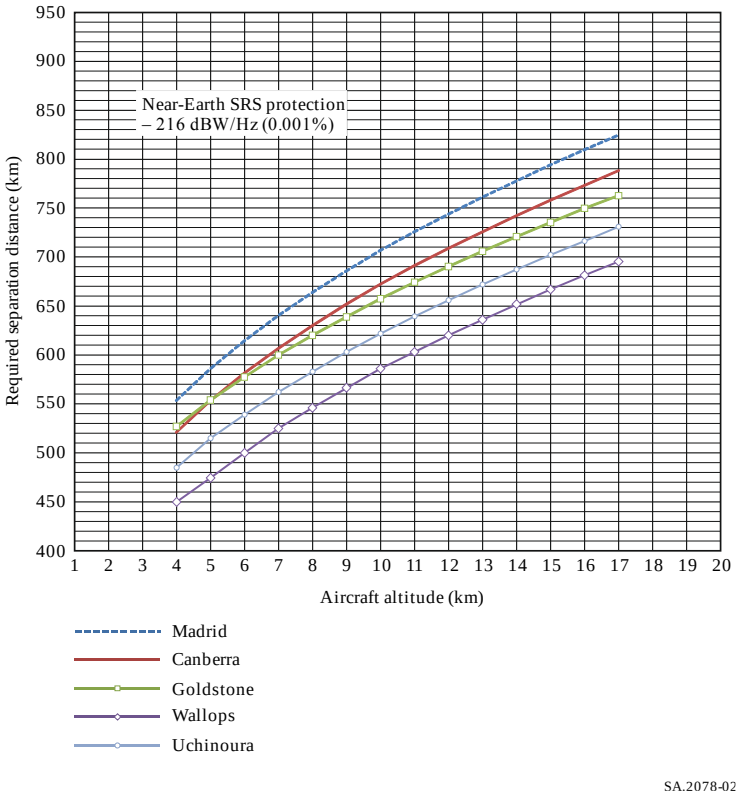

Table 2 below shows the required separation distances between SRS earth stations and mobile (aircraft) stations for aircraft altitude of 17 km and transmit e.i.r.p. spectral density of −50 dBW/Hz towards the horizon for exceedance probability of p = 0.1%.

TABLE 2

Required separation distances for SRS earth stations supporting unmanned missions (p = 0.1%) and aircraft station at 17 km altitude transmitting at −50 dBW/Hz e.i.r.p. density

SRS earth station Site, Country	Required separation distance (km)
Goldstone, USA	763
Wallops, USA	696
Madrid, Spain	825
Canberra, Australia	789
Uchinoura, Japan	731

Note that these distances for SRS earth stations supporting unmanned missions (p = 0.1%) are about 50 km less than the distances given for SRS earth stations supporting manned missions (p = 0.001%).

In conclusion, in order to meet the SRS earth station protection criterion for manned and unmanned SRS mission, separation distances greater than 880 km are required between the SRS earth stations and the aircraft stations.