



Recommendation ITU-R SA.1414-2
(07/2017)

**Characteristics of data relay satellite
systems**

SA Series
Space applications and meteorology



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Foreword

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SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R SA.1414-2

Characteristics of data relay satellite systems

(Question ITU-R 118/7)

(1999-2013-2017)

Scope

This Recommendation provides parameters for data relay satellite (DRS) systems worldwide to be used as guidance for deriving sharing criteria and coordination thresholds.

Keywords

DRS, space-to-Earth, Earth-to-space, space-to-space, forward feeder link, return feeder link

Related ITU-R Recommendations

Recommendations ITU-R SA.510, ITU-R SA.1018, ITU-R SA.1019, ITU-R SA.1155, ITU-R SA.1274, ITU-R SA.1275, ITU-R SA.1276

The ITU Radiocommunication Assembly,

considering

- a) that data relay satellite (DRS) systems operate as described in Recommendation ITU-R SA.1018 – Hypothetical reference system for systems comprising data relay satellites in the geostationary orbit and user spacecraft in low-Earth orbits;
- b) that there is an increase in mission requirements and in space research activity conducted particularly in low-Earth orbit;
- c) that DRS provide support to many programmes/missions in the space research service and are vital to supporting both manned and unmanned space research telecommunications;
- d) that it is necessary to establish relevant criteria for sharing between DRS systems and other services operating in co-frequency bands;
- e) that the technical characteristics of representative DRS systems need to be considered in order to derive relevant sharing criteria,

recommends

- 1 that the characteristics of DRS systems, as described in Annex, may be used in interference sharing studies;
- 2 that the information provided in Annex should also be used as guidance for deriving sharing criteria and coordination thresholds as appropriate for DRS systems.

Annex

Characteristics of existing Data Relay Satellite (DRS) systems

TABLE 1

Forward Earth-to-DRS feeder link characteristics

<i>Transmitting earth station</i>					
Network	Russian Federation	United States of America	Europe	Japan	China
Location	Russian Federation ⁽¹⁾	United States of America ⁽¹⁾	Europe	Japan	China
Frequency range (GHz)	Ku=14.5-15.34 Ka=27.5-28.6 selectable	14.6-15.25 selectable	Selectable 27.5-27.51	29.5-31 selectable	29.4-30.2 selectable
Link description	Forward feeder-links Ku/Ka-bands ⁽⁵⁾	Composite ⁽²⁾	Decentralized ⁽³⁾	Decentralized (3), (4)	Composite ⁽⁷⁾
Transmission rate	≤ 90 Mbit/s	≤ 25 Mbit/s	1 Mbit/s	≤ 50 Mbit/s	≤ 100 Mbit/s
Modulation	QPSK/SSM ⁽⁶⁾ , QPSK	PSK	PSK	PSK	PSK
Polarization	Left-hand circular	Linear	Circular	Circular	Linear
Antenna size (m)	13.1(Ku)/9 (Ka)	18.3	6.8	5, 9.2 and 13	3, 12 and 15
Tx antenna gain (dBi)	63.3 (Ku)/66.4 (Ka)	66.4	59.3	63, 68.2 and 71.4	56.9, 68.2 and 70.1
Tx antenna radiation pattern	Rec. ITU-R S.580	RR Appendix 8, Annex III			
Necessary bandwidth (MHz)	≤ 80 per channel	650 (composite)	1	≤ 978 (composite)	≤ 800 (composite)
Maximum power spectral density (dB(W/Hz))	−52.8 (Ku)/−52 (Ka)	−58	−36	−32.5	−47
Maximum e.i.r.p. spectral density (dB(W/Hz))	10.5 (Ku)/14.4 (Ka)	8.8	23.3	38.9	23.1
<i>Receiving DRS</i>					
Orbital locations	Rec. ITU-R SA.1275 or Rec. ITU-R SA.1276 and 31° E (for Europe)				
Antenna size (m)	0.6 (Ku)/1.2 (Ka)	1.8	2.2 ⁽⁸⁾	2.0	1.5
Rx antenna gain (dBi)	36 (Ku)/49.6 (Ka)	47.0	34 ⁽⁸⁾	53	49.5
Rx antenna radiation pattern	Rec. ITU-R S.672				
System noise temperature (K)	550	977	438	890 and 579	1 318
Link availability (%)	99.9	99.9	99.6	99.9	99.9
Interference criterion	Rec. ITU-R SA.1155				