

Draft ITU-R Report Preliminary Draft New Report ITU-R RS.[Above 275] Passive Bands Of Interest To EESS/SRS From 275 To 3 000 GHZ



World Radio Conference-12 Agenda Item 1.6 and Resolution 950

- Call for review and possible revision of
 - Radio Regulations (RR) No. 5.565
- Address existing and projected EESS and SRS requirements
 - 275 GHz - 3 000 GHz

Current Radio Regulations (2008)

- No allocations above 275 GHz
- Above 275 GHz may be used for **experimentation** with, and **development** of, various active and passive services

Primary EESS Measurement Classes

- Meteorology/climatology
 - Vertical nadir sounders below 600 GHz - limb sounders above
- Atmospheric chemistry
 - Limb sounding

Meteorology/Climatology

Water vapour and oxygen resonance spectral lines

The sensitivity of millimeter and sub-millimeter frequencies to atmospheric temperature and water vapour variations, Journal of Geophysical Research-Atmospheres, 13, from A.J. Gasiewski and M. Klein.

Atmospheric Chemistry

- Measurements
 - Large number of atmospheric species
 - Spectral lines (compared to water vapour and oxygen resonance lines)
 - Narrower
 - More numerous

Atmospheric Chemistry

- Earth's atmosphere is virtually opaque at frequencies above 1 000 GHz

Total vertical atmospheric opacity between 1- and 3-TeraHertz

Sharing the Spectrum Above 275 GHz

- EESS system
 - Assume there will be EESS polar orbiting applications where systems monitor the edge of the Earth's atmosphere
 - For this study, a limb scanning instrument was affixed to a polar-orbiting satellite.

EESS satellite orbit and instrument parameters	
EESS satellite parameters	Value
Altitude	705 km
Inclination	98.2°
EESS sensor parameters	
Beamwidth	0.46°
Pointing in azimuth	0.0°
Pointing in elevation	-25.9°

Sharing the Spectrum Above 275 GHz

- ISS System
 - Short links between satellites in LEO
 - Four sensors
 - Two for tracking satellites in the same plane (one forward and one aft)
 - Two receive signals from the port and starboard sides of the spacecraft

ISS satellite orbit and receiver parameters	
ISS satellite parameters	Value
Altitude	700 km
Inclination	84.4°
ISS receiver parameters	
Receiver beamwidth	0.46°
Forward receiver azimuth	0°
Forward receiver elevation	-17.5°
Starboard receiver azimuth	90°
Starboard receiver elevation	0°
Rear receiver azimuth	180°
Rear receiver elevation	-17.5°
Port receiver azimuth	270°
Port receiver elevation	0°

Sharing the Spectrum Above 275 GHz

- 1-year simulation
 - Instances when ISS satellite is within the field of view of the EESS sensor
 - EESS sensor's beam never intersects with any ISS receiver
 - ISS satellite comes into the EESS FOV 114 times
 - Total of 187.4 seconds or 0.00059% of the year
 - The minimum duration of an occurrence was 0.73 seconds
 - The maximum duration was 17.8 seconds
 - The mean duration was 5.07 seconds
 - All occurrences beyond ISS receiver fields of view
- Results
 - sharing between EESS systems and short range ISS links in the range 1 000 to 3 000 GHz is feasible due to the relative speeds of the spacecraft and very small beamwidths.

If You are interested what You can do

- For electronic draft copy of ITU-R report
 - Contact
 - Dave McGinnis, NESDIS spectrum manager (dave.mcginis@noaa.gov),
 - Rich Kelley (richard.kelley@noaa.gov), or
 - Jean Pla (jean.pla@cnes.fr)
- Provide input by 1 May 2010
 - International deadline approaches rapidly

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