

RECOMMENDATION ITU-R SA.1807

System characteristics and interference criteria for meteorological satellite systems operating around 18 GHz

(2007)

Scope

This ITU-R Recommendation presents interference criteria for meteorological satellite (MetSat) systems operating around 18 GHz and the system parameters used for its derivation. These criteria provide the basis for determining the sharing possibilities with the other allocated services.

The ITU Radiocommunication Assembly,

considering

- a) that interference criteria are needed to ensure that meteorological satellite systems can be designed to achieve adequate performance in the presence of interference;
- b) that frequency bands around 18 GHz allocated to the meteorological satellite (MetSat) service are shared with the fixed service, the mobile service and the fixed-satellite service (FSS) on a co-primary basis;
- c) that interference criteria assist in the development of criteria for sharing bands among systems, including those that will operate in other services;
- d) that interfering signals from nearby satellites on the GSO are likely to be attenuated by rain to the same extent as the wanted signal;
- e) that interfering signals from terrestrial sources will in general have quite different attenuation to the wanted signal,

recommends

- 1 that the interference criteria contained in Table 1 should be used for triggering coordination with future terrestrial and space service systems;
- 2 that the system characteristics and methods specified in Annex 1 should be used as the baseline for deriving interference parameters for the MetSat service operating in frequency bands near 18 GHz;
- 3 that a 6% increase in equivalent link noise temperature should be used for triggering coordination between transmitting space stations and receiving earth stations operating in the MetSat service;
- 4 that antenna side-lobe specifications for meteorological earth stations should be based on Recommendation ITU-R S.580.

TABLE 1

**Interference criteria for stations in the MetSat service using
spacecraft in geostationary orbit**

Function and type of earth station	Interfering signal power in the reference bandwidth to be exceeded for no more than 20% of the time (dB(W/10 MHz))		Interfering signal power in the reference bandwidth to be exceeded for no more than $p\%$ of the time (dB(W/10 MHz))	
	Space	Terrestrial	Space	Terrestrial
Direct data readout 61 dBi antenna System A	-129.1 ⁽¹⁾	-140.7 ⁽²⁾	-114.4 ⁽³⁾ $p = 0.025$	-114.4 ⁽⁴⁾ $p = 0.025$
Direct data readout 66 dBi antenna System B	-132.0 ⁽¹⁾	-145.7 ⁽²⁾	-117.3 ⁽³⁾ $p = 0.025$	-117.3 ⁽⁴⁾ $p = 0.025$

System A is optimized for 2° orbital spacing in an interference limited operating environment and System B is optimized for operation in a noise limited environment.

- (1) Level per satellite based on aggregate interference from eight neighbouring satellites equally spaced at 2° on the GSO and 50% interference attribution to space services.
- (2) Level for a single terrestrial system based on 50% interference attribution to terrestrial sources.
- (3) Based on occasional short-term interference from two non-GSO satellites and 50% interference attribution to space services.
- (4) Based on occasional short-term interference from two sources and 50% interference attribution to terrestrial services.

Annex 1

Technical characteristics of MetSat systems operating around 18 GHz

This Annex presents the parameters used to determine the interference criteria for meteorological direct readout systems. Typical system designs for the next-generation meteorological satellites focus on a GSO satellite transmitting data into a relatively large earth station at carrier frequencies around 18.2 GHz. Relevant system characteristics are shown in Table 1. Antenna side-lobe patterns of meteorological stations should be in accordance with Recommendation ITU-R S.580 for FSS antennas based on a $29 - 25 \log \theta$ roll-off in order to facilitate the sharing situation with the FSS.

A system availability of 99.9% is commonly required and has been assumed as the baseline although a trend towards 99.99% is noticeable. Bit-error rates around 10^{-7} are standard practice for systems using channel coding. The required S/N is based on 8-PSK modulation with $R = 1/2$ convolutional channel coding and technical losses of 2 dB.

Two different types of systems have been considered. System A is optimized for 2° orbital spacing in an interference limited operating environment and System B is optimized for operation in a noise limited environment.