

RECOMMENDATION ITU-R S.727-2

Cross-polarization isolation from very small aperture terminals (VSATs)

(1992-2002-2007)

Scope

This Recommendation provides cross-polarization isolation levels for linearly polarized very small aperture terminal (VSAT) antennas to be used as reference limits for the VSAT antennas cross-polar gain in the main beam angular region.

The ITU Radiocommunication Assembly,

considering

- a) that it is necessary to provide protection of the wanted VSAT earth station signals from signals on the orthogonal polarization in the fixed-satellite service;
- b) that cross-polarization isolation in prime focus axisymmetric parabolic antenna systems (centre fed), is usually higher than in prime focus offset-fed paraboloid systems;
- c) that for small aperture antennas (e.g. 1.2-2.4 m in the 14/12 GHz bands), offset fed antenna geometry has the advantage of providing significantly lower side-lobe levels than from centre fed antennas;
- d) that offset fed antennas are widely used for VSAT operation;
- e) that the reduction in the efficiency of frequency reuse by dual polarization has to be taken into account when using prime focus offset fed antennas with relatively low polarization discrimination,

recommends

1 that the ratio of the on axis co-polar gain to the cross-polar gain of a linearly polarized antenna in the allocated transmit frequency band should be not less than:

- 25 dB within the 0.3 dB contour of the main beam, and
- 20 dB between the 0.3 dB and 20 dB contours of the main beam;

2 that beyond the 20 dB contour of the main beam of the antenna, the cross-polar gain should comply with the most recent version of Recommendation ITU-R S.731 (see Note 3).

NOTE 1 – Some administrations may require higher cross-polar isolation than specified above.

NOTE 2 – Further studies are needed to assess the applicability of this Recommendation for receiving VSAT antennas as well as for VSAT antennas in frequency bands above 18 GHz.

NOTE 3 – In the absence of the actual antenna measured pattern for the co-polar gain reference in the main beam region, the angular limits for the 0.3 dB and 20 dB contours of the main beam may be estimated by the following expressions:

$$\varphi_{0.3} = 10.95 \lambda/D$$

$$\varphi_{20} = 89.44 \lambda/D$$

Given that the starting angle for the application of Recommendation ITU-R S.731 is φ_r , which is the greater angle between 1° or $100 \lambda/D$, it is expected that some discontinuity or gap between Recommendations ITU-R S.727 and ITU-R S.731 may occur in the angular region from φ_{20} to φ_r . The angular size and level of this discontinuity are dependent on the antenna relative size (i.e. D/λ ratio). In this case, cross-polarization gain limit expressions of both Recommendations could be extended to this intermediate angular region and the higher limit between them should be used as a reference.
