SECTION 10/11S-A: TERMINOLOGY

RECOMMENDATION 566-3*

TERMINOLOGY RELATING TO THE USE OF SPACE COMMUNICATION TECHNIQUES FOR BROADCASTING

(1978-1982-1986-1990)

The CCIR

UNANIMOUSLY RECOMMENDS

that the following terminology should be used when referring to the use of space communication techniques for broadcasting:

1. Broadcasting-satellite service (Note 1)

1.1 A radiocommunication service in which signals transmitted or retransmitted by space stations are intended for direct reception (Note 2) by the general public.

Note 1 – See No. 37 of the Radio Regulations.

Note 2 – In the broadcasting-satellite service, the term "direct reception" shall encompass both individual reception and community reception. (See No. 37 of the Radio Regulations.)

1.2 *Broadcasting-satellite space station*

A space station in the broadcasting-satellite service, on an earth satellite.

1.3 *Methods of reception*

1.3.1 *Individual reception* (in the broadcasting-satellite service) (Note 3)

The reception of emissions from a space station in the broadcasting-satellite service by simple domestic installations and in particular those possessing small antennas.

Note 3 – See No. 123 of the Radio Regulations.

1.3.2 *Community reception* (in the broadcasting-satellite service) (Note 4)

The reception of emissions from a space station in the broadcasting-satellite service by receiving installations, which in some cases may be complex and have antennas larger than those used for individual reception, and intended for use:

– by a group of the general public at one location, or

– through a distribution system covering a limited area.

Note 4 – See No. 124 of the Radio Regulations.

1.4 *Reception quality*

1.4.1 *Primary grade of reception quality* (in the broadcasting-satellite service)

A quality of reception of emissions from a broadcasting-satellite space station which is subjectively comparable to that provided by a terrestrial broadcasting station in its coverage area**.

1.4.2 *Secondary grade of reception quality* (in the broadcasting-satellite service)

A quality of reception of emissions from a broadcasting-satellite space station which is subjectively inferior to the primary grade of reception quality but is still acceptable (see Report 409).

---

* This Recommendation should be brought to the attention of the CCV.

** The coverage area for a terrestrial television broadcasting station is given in Recommendation 417 in terms of the minimum field strength for which protection may be sought when planning a television service. In the case of sound broadcasting, Recommendation 638 defines the coverage area for the LF, MF and HF bands when amplitude modulation is used, while Recommendation 412 recommends the minimum usable field strengths for the VHF band when using frequency modulation techniques.

1.5 *Power flux-densities*

To permit individual or community reception with either grade of reception quality, broadcasting-satellite space stations may provide a high, medium or low power flux-density at the receiving site.

1.5.1 *High power flux-density* (in the broadcasting-satellite service)

A power flux-density which enables signals radiated by broadcasting-satellite space stations to be received by simple receiving installations with a primary grade of reception quality.

1.5.2 *Medium power flux-density* (in the broadcasting-satellite service)

A power flux-density which enables signals radiated by broadcasting-satellite space stations to be received either by simple receiving installations with a secondary grade of reception quality or by more sensitive receiving arrangements with a primary grade of reception quality.

1.5.3 *Low power flux-density* (in the broadcasting-satellite service)

A power flux-density lower than the medium power flux-density, which enables the necessary grade of reception quality to be obtained using more specialized transmission and reception techniques than those required under § 1.5.1 and 1.5.2.

2. Definitions concerning the use of the fixed-satellite service for the distribution of broadcasting programmes to terrestrial broadcasting stations

2.1 *Indirect distribution*

Use of the fixed-satellite service to relay broadcasting programmes from one or more points of origin to various earth stations for further distribution to the terrestrial broadcasting stations (possibly including other signals necessary for their operation).

2.2 *Direct distribution*

Use of the fixed-satellite service to relay broadcasting programmes from one or more points of origin directly to terrestrial broadcasting stations without any intermediate distribution stages (possibly including other signals necessary for their operation).

3. Definitions concerning the planning of the broadcasting-satellite service

3.1 *Service area*

The area on the surface of the Earth in which the Administration responsible for the service has the right to demand that the agreed protection conditions be provided.

Note – In the definition of service area, it is made clear that within the service area the agreed protection conditions can be demanded. This is the area where there should be at least the wanted power flux-density and protection against interference based on the agreed protection ratio for the agreed percentage of time should be achieved.

3.2 *Coverage area*

The area on the surface of the Earth delineated by a contour of a constant given value of power flux-density which would permit the wanted quality of reception in the absence of interference.

Note 1 – In accordance with the provisions of No. 2674 of the Radio Regulations, the coverage area must be the smallest area which encompasses the service area.

Note 2 – The coverage area, which will normally encompass the entire service area, will result from the intersection of the antenna beam (generally elliptical or circular) with the surface of the Earth, and will be defined by a given value of power flux-density. For example, in the case of a service planned for individual reception at 12 GHz, it would be the area delineated by the contour corresponding to a power flux-density level exceeded for 99% of the worst month of –103 dB(W/m^2) for a Region 1 and 3 country, and –107 dB(W/m^2) for a Region 2 country. There will usually be an area outside the service area but within the coverage area in which the power flux-density will be at least equivalent to the minimum specified value; however, protection against interference will not be provided in this area.

Note 3 – Non-classical beams (other than circular or elliptical) are finding increased use to cover large service areas. These are "shaped beams" whose cross-sections are designed to match as nearly as practicable the (generally irregular) boundaries of the service areas being covered. Such beams generally conform to the definition that the coverage area is delineated by the 3 dB contour of the antenna beam and where the power flux-density will be at least equivalent to the minimum required in the service area. In this case the coverage area and service area are more nearly the same than in the case of elliptical and circular beams. The power within the service/coverage area is more nearly uniform and is generally down by less than 3 dB at the edge of the service area. In some cases, the shaped beam may include one or more peaks within the service area in order to permit the use of smaller antennas or to provide higher rain margins in parts of the service area. It should be noted that Study Group 4 have adopted an Annex to Report 558 giving design objectives for shaped beam antennas.

3.3 *Beam area*

The area delineated by the intersection of the half-power beam of the satellite transmitting antenna with the surface of the Earth.

Note – The beam area is simply that area on the Earth's surface corresponding to the –3 dB points on the satellite antenna radiation pattern. In many cases the beam area would almost coincide with the coverage area, the discrepancy being accounted for by the permanent difference in path lengths from the satellite throughout the beam area, and also by the permanent variations, if any, in propagation factors across the area. However, in the case of 12 GHz, for a service area where the maximum dimension as seen from the satellite position is less than the minimum satellite antenna half-power beamwidth value adopted for planning purposes (0.6° for the Regions 1 and 3 Plan and 0.8° for the Region 2 Plan), there could be a significant difference between the beam area and the coverage area.

3.4 *Nominal orbital position*

The longitude of a position in the geostationary-satellite orbit associated with a frequency assignment to a space station in a space radiocommunication service. The position is given in degrees from the Greenwich meridian.

4. Definitions concerning the planning of broadcasting-satellite space stations and their feeder links

4.1 *Feeder link*

The term feeder link, as defined in No. 109 of the Radio Regulations, is further qualified to indicate a fixed-satellite service link from any earth station within the feeder-link service area to the associated space station in the broadcasting-satellite service.

4.2 *Feeder-link beam area*

The area delineated by the intersection of the half-power beam of the satellite receiving antenna with the surface of the Earth.

4.3 *Feeder-link service area*

The area on the surface of the Earth within the feeder-link beam area within which the administration responsible for the service has the right to locate transmitting earth stations for the purpose of providing feeder links to broadcasting-satellite space stations.

4.4 *Adjacent channel*

The RF channel in the broadcasting-satellite service frequency plan, or in the associated feeder-link frequency plan which is situated immediately higher or lower in frequency with respect to the reference channel as illustrated in Fig. 1.

4.5 *Second adjacent channel*

The RF channel in the broadcasting-satellite service frequency plan, or in the associated feeder-link frequency plan, which is situated immediately beyond either of the adjacent channels as illustrated in Fig. 1.

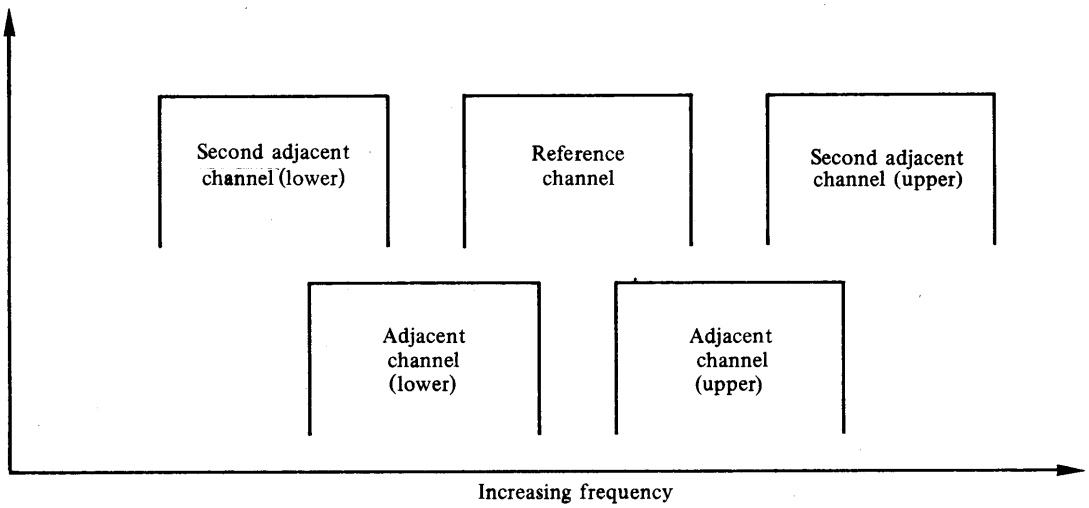

FIGURE 1 – *Channel designations in the case of overlapping frequency plans*

4.6 *Overall carrier-to-interference ratio*

The overall carrier-to-interference ratio is the ratio of the wanted carrier power to the sum of all interfering RF powers in a given channel including both feeder links and down links. The overall carrier-to-interference ratio due to interference from the given channel is calculated as the reciprocal of the sum of the reciprocals of the feeder-link carrier-to-interference ratio and the down-link carrier-to-interference ratio referred to the satellite receiver input and earth-station receiver input, respectively.

4.7 *Protection margin*

The protection margin is the difference in dB betweeen the carrier-to-interference ratio and the protection ratio (see RR 164). All powers are evaluated at the receiver input.

4.8 *Overall co-channel protection margin* (applicable to Region 2)

The overall co-channel protection margin in a given channel is the difference in dB betweeen the overall co-channel carrier-to-interference ratio and the co-channel protection ratio.

4.9 *Overall adjacent channel protection margin* (applicable to Region 2)

The overall adjacent channel protection margin is the difference, in dB, between the overall adjacent channel carrier-to-interference ratio and the adjacent channel protection ratio.

4.10 *Overall second adjacent channel protection margin* (applicable to Region 2)

The overall second adjacent channel protection margin is the difference, in dB, between the overall second adjacent channel carrier-to-interference ratio and the second adjacent channel protection ratio.

4.11 *Equivalent protection margin* (applicable to Regions 1 and 3)

The equivalent protection margin, M_c, for a channel, C, is given by the expression:

$$M_c = -10 \log \sum_{i=1}^{3} \left(10^{-M_i/10}\right) \quad \text{dB}$$

where:

M_1 : value (dB) of the protection margin (co-channel) for the wanted channel, C;

M_2, M_3 : values (dB) of the protection margins for the upper and lower adjacent channels respectively.

4.12 *Overall equivalent protection margin*

The overall equivalent protection margin, M, adopted by the RARC SAT-83 for the analyses of the Region 2 Plan, is given in dB by the expression:

$$M = -10 \log \left(\sum_{i=1}^{5} 10^{(-M_i/10)} \right) \quad \text{dB}$$

where:

M_1 : overall co-channel protection margin (dB) (as defined in § 4.7);

M_2, M_3 : overall adjacent channel protection margins for the upper and lower adjacent channels respectively (dB) (as defined in § 4.8);

M_4, M_5 : overall second adjacent channel protection margins for the upper and lower second adjacent channels respectively (dB) (as defined in § 4.9).

The adjective “equivalent” indicates that the protection margins for all interference sources from the adjacent and second adjacent channels as well as co-channel interference sources have been included.

The overall equivalent protection margin, M, adopted by the WARC ORB-88 for the analyses of the Regions 1 and 3 12 GHz band BSS Plan, is given in dB by the expression:

$$M = -10 \log \left(10^{-(M_u + R_{cu})/10} + 10^{-(M_d + R_{cd})/10}\right) - R_{co}$$

where:

M_u : equivalent protection margin for the feeder-link;

M_d : equivalent protection margin for the down-link;

R_{cu} : co-channel feeder-link protection ratio;

R_{cd} : co-channel down-link protection ratio;

R_{co} : co-channel overall protection ratio.