

QUESTION ITU-R 22-1/6

Satellite orbits and space station technology for the broadcasting-satellite service (sound and television)

(1993-2002-2003)

The ITU Radiocommunication Assembly,

considering

- a) that the choice of satellite orbit and the technology available for the design of the space station affect nearly all of the other characteristics of a broadcasting-satellite system, e.g., the RF bandwidth available for transmission, the e.i.r.p. of the feeder-link earth stations, the size of receiving earth station antennas, the number of satellites required for continuous coverage, the interval between satellite replacement, and the amount of interference caused to systems outside the intended service area;
- b) that the e.i.r.p. of space stations in the broadcasting-satellite service (BSS) are often high compared with those in the fixed-satellite service (FSS). The control of unwanted emissions into adjacent bands is an important requirement for such space stations;
- c) that locally variable e.i.r.p. within the service area may be an appropriate means of coping with the high rain attenuation at BSS bands at 17 GHz and above;
- d) that the recent progress of satellite antenna technologies facilitates the development of large-aperture antennas and of antenna systems that control the e.i.r.p. of a specific sub-area arbitrarily by means of reconfigurable and/or steerable beam antennas;
- e) that, by combining variable e.i.r.p. with digital hierarchical, multilevel or RF time-multiplex modulation and channel coding, flexible and efficient BSS can be implemented in order to cope with rain attenuation, for example, high density data rates can be implemented for reception under nominal receive conditions and lower density data rates for reception during rain fades,
- f) that the coordination arc is defined as the part of geostationary orbital arc within which the Radiocommunication Bureau identifies those administrations likely to be affected and with which coordination may need to be effected,

decides that the following Question should be studied

- 1** What are the most satisfactory satellite orbits for broadcasting from satellites, from the point of view of orbit and frequency-sharing, satellite power requirements, and a high angle of elevation at the receiving site?
- 2** What accuracy of attitude control can be achieved?
- 3** What maximum primary power is likely to be available to operate a transmitter in a satellite, and what other factors associated with the space environment operate to limit the power that could be developed in the transmitter at the various frequencies that might be used?
- 4** What gain, directivity and stability of orientation are attainable for satellite transmitting antennas at various frequencies?

- 5 What antenna technology is available to shape the transmitter and receiving antenna patterns both within the desired coverage area and in the sidelobe regions?
- 6 What new techniques can be recommended for static or dynamic e.i.r.p. variation locally within the service area in order to cope with high rain fades at BSS frequencies 17 GHz and above?
- 7 What is the probable working life of a satellite, bearing in mind that failure in accurate positioning or antenna orientation may shorten its useful life?
- 8 What technology is available for limiting coverage to specified geographic areas?
- 9 What reduction in the radiation of unwanted emissions from the satellite transponder can be achieved?
- 10 What values may be applicable for a coordination arc for bands not subject to a Plan?

NOTE 1 – See Recommendation ITU-R BO.652,

further decides

- 1 that this Question should lead to the revision of pertinent Recommendations such as Recommendation ITU-R BO.652 and to the establishment of (a) new Recommendation(s) as appropriate;
- 2 that these studies should be completed by 2006.

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