

Introduction of Sky-TV Service in the 12 GHz Downlink Band

The interference environment of the frequency band used in the Broadcasting Satellite Plan is predicted by the M-Space computer program developed by the ITU. For ITU Region 2 (i.e. the America • s) the Plan was first approved at SAT 83, although changes and adjustments have been proposed over time.

In order to share this frequency band (12.2 - 12.7 GHz) with other services, the interference potential needs to be carefully evaluated in order to ensure that existing and future systems being implemented under the BSS Plan will not be adversely impacted. One approach being investigated that has the potential to increase the spectrum utilization without detrimental impact to the satellite Plan services, is described below.

Interference Avoidance Approach

The present BSS Plan systems provides for United States coverage from locations in the geostationary arc between 61.3°W longitude and 175.2°W. U.S. BSS TV users will expect to be able to access any, or all, of the usable satellite locations, from any point on the ground. An outside system may not cause unacceptable interference to signals emanating from this segment of the geostationary arc. Sky-TV is proposing the use of a series of airplanes circling at an altitude of 60,000 feet. With the airplane located North of rather than above its coverage area, the airplane transmissions are offset from the range of possible pointing angles of BSS users within the Sky-TV service area, and consequently the potential for interference will be minimized. The location of the airplane in relation to the service area would be optimized for each specific service area. Figures 1 and 2 show a typical example in planar and vertical plane views.

The Sky-TV digital TV signal would be transmitted from the Sky-TV plane at a power density level generally comparable to that of the satellite systems. Therefore, interference protection will be obtained primarily by ensuring that the airplane antenna pointing and consequently the transmitted signal coverage area, take maximum advantage of the signal discrimination available from the satellite earth station receive antennas.

An initial analysis has been carried out for one U.S. satellite system location in the Plan, in order to determine the impact of Sky-TV service at a plan test point location at the edge of CONUS coverage. This test has provided encouraging results, in that a Sky-TV signal, with a power density of $2\text{dB/m}^2/24\text{MHz}$ below that of the BSS plan, and using the specified stringent co-frequency and co-polar protection criteria of 35 dB, the resultant degradation at the edge of coverage will be less than 1 dB. For each service location, system optimization should enable improvements to be carried out in interference reduction. More detailed review will be undertaken, but we believe that the above approach will enable other systems to use this frequency band without causing unacceptable interference into planned and operating satellite broadcasting signals, and thus increase the capacity of this frequency band.