RECOMMENDATION 694

REFERENCE RADIATION PATTERN FOR SHIP EARTH STATION ANTENNAS

(Question 88/8)

(1990)

The CCIR,

CONSIDERING

(a) that for coordination studies and the assessment of interference between ship earth stations and terrestrial stations, and between ship earth stations and the space stations of different satellite systems sharing the same frequency bands, it may be appropriate to use a single radiation pattern for each type of ship earth station antenna;

(b) that the reference radiation pattern for ship earth station antennas must take account of the effect of local reflections from the sea, from ships' superstructure, etc.;

(c) that the use of antennas with the best achievable radiation pattern will lead to the most efficient use of the radio-frequency spectrum and the geostationary-satellite orbit;

(d) Report 922,

UNANIMOUSLY RECOMMENDS

1. that a single reference radiation pattern for each type of ship earth station antenna should be used for:

1.1 coordination studies and the assessment of interference between ship earth stations in the mobile-satellite service and terrestrial stations in other services which share the same frequency bands;

1.2 coordination studies and the assessment of interference between ship earth stations in the mobile-satellite service and the space stations of different satellite systems which share the same frequency bands;

2. that the reference radiation pattern in Annex I should be used for ship earth station antennas having circular paraboloidal reflectors with diameters between 0.8 m and 1.3 m and with an operating frequency range of about 1500 to 1650 MHz;

3. that studies should continue in order to define the requirement for other types of ship earth station antennas.

ANNEX I

REFERENCE RADIATION PATTERN FOR SHIP EARTH STATION
ANTENNAS HAVING CIRCULAR PARABOLOIDAL REFLECTORS WITH DIAMETERS BETWEEN
0.8 m AND 1.3 m AND WITH AN OPERATING FREQUENCY
RANGE OF ABOUT 1500 TO 1650 MHz

$G = G_{max} - 2.5 \times 10^{-3} \, (D/\lambda \, \varphi)^2$ dB for $0 < \varphi < \varphi_m$

$G = 2 + 15 \log \, (D/\lambda)$ dB for $\varphi_m \leq \varphi < 100 \, (\lambda/D)$

$G = 52 - 10 \log \, (D/\lambda) - 25 \log \, \varphi$ dB for $100 \, (\lambda/D) \leq \varphi < \varphi_1$

$G = 0$ dB for $\varphi_1 \leq \varphi$

where:

φ : angle from beam centre (degrees)

$\varphi_m = 20 \, \lambda/D \sqrt{G_{max} - 2 - 15 \log (D/\lambda)}$ (degrees)

$\varphi_1 = 120 \, (\lambda/D)^{0.4}$ (degrees)

G : gain of the antenna relative to isotropic (dB)

G_{max} : maximum gain of the antenna relative to isotropic (dB)

D : antenna diameter
λ : wavelength
} expressed in the same unit

Note – The reference radiation pattern should be assumed to be rotationally symmetrical.