THE GAINS OF TRANSMITTING ANTENNAS RELATIVE TO DISTANCE ANGLES IN THE DIRECTION FROM THE MAIN RADIATION CONCERNING RADIO EQUIPMENT FOR A RADIO STATION THAT PROVIDES A LAND MOBILE SERVICE USING AN 18-GHZ BAND FREQUENCY, WHICH THE MINISTER OF PUBLIC MANAGEMENT, HOME AFFAIRS, POSTS AND TELECOMMUNICATIONS ANNOUNCES

(Article 49-25-2, paragraph (1), item vii); Article 58-2-6, paragraph (1), item vii); and Article 58-2-9-2, paragraph (1), item (vii) of the Ordinance Regulating Radio Equipment)

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Subject to provisions in the Ordinance Regulating Radio Equipment (Radio Regulatory Commission Regulations No. 18 of 1950), Article 49-25-2, paragraph (1), item vii); Article 58-2-6, paragraph (1), item vii); and Article 58-2-9-2, paragraph (1), item (vii), the MPHPT announces that it has defined, as follows, the gains of transmitting antennas relative to distance angles in the direction from the main radiation concerning radio equipment for a radio station that provides a land mobile service using an 18-GHz band frequency, which the Minister of Public Management, Home Affairs, Posts and Telecommunications announces.

The Ga gain for a transmitting antenna relative to a distance angle in the direction from the main radiation shall be the following values or less:

a) When the aperture diameter of the transmitting antenna is less than 0.6 meters:

$$Ga(\theta) \le Ga\max - 2.2\times10^{-3}\cdot\left[\left(\frac{f\cdot D}{0.3}\right)\cdot\theta\right]^2 \ [\mathrm{dBi}] \quad 0° \le \theta \le \theta_q$$

$$Ga(\theta) \le 2 + 15\log\left(\frac{f\cdot D}{0.3}\right) [\mathrm{dBi}] \quad \theta_q < \theta \le \theta_r$$

$$Ga(\theta) \le 43 - 4\log\left(\frac{f \cdot D}{0.3}\right) - 20\log(\theta)\ [\mathrm{dBi}]$$

$\theta_r < \theta \le \theta_s$ (if $\theta_s < \theta_t$), or $\theta_r < \theta \le \theta_t$ (if $\theta_t \le \theta_s$)

$Ga(\theta) \le 3$ [dBi] $\theta_s < \theta \le \theta_t$ (if $\theta_s < \theta_t$)

$Ga(\theta) \le 3 - 0.0075(\theta - (97.5 - Ga\max))^2$ [dBi] $\theta_t < \theta \le 90°$

$Ga(\theta) \le 10 - 10\log\left(\frac{f \cdot D}{0.3}\right)$ [dBi] $90° < \theta \le 180°$

However, θ shall be the angle of an antenna in the direction from the main radiation [°].

$$Ga\max = 43.96 + 20\log D + 20\log\left(\frac{f}{18}\right)\ [\mathrm{dBi}]$$

D shall be the diameter of an antenna aperture [m] and f shall be a frequency [GHz].

$$\theta_q = \frac{21.2}{\left(\frac{f \cdot D}{0.3}\right)} \cdot \sqrt{\left\{Ga\max - \left[2 + 15 \cdot \log\left(\frac{f \cdot D}{0.3}\right)\right]\right\}}\ [°]$$

$$\theta_r = 10^{\left[2.12 - \log\left(\frac{f \cdot D}{0.3}\right)\right]}\ [°]$$

$$\theta_s = 10^{\left[2.05 - 0.25 \cdot \log\left(\frac{f \cdot D}{0.3}\right)\right]}\ [°]$$

$$\theta_t = 97.5 - Ga\max\ [°]$$

b) When the aperture diameter of the transmitting antenna is 0.6 meters or more:

$$Ga(\theta) \le Ga\max - 2 \times 10^{-3}\left[\left(\frac{f \cdot D}{0.3}\right) \cdot \theta\right]^2\ [\mathrm{dBi}] \quad 0° \le \theta \le \theta_q$$

$$Ga(\theta) \le 2 + 15\log\left(\frac{f \cdot D}{0.3}\right) [\mathrm{dBi}] \quad \theta_q < \theta \le \theta_r$$

$$Ga(\theta) \le 43 - 4\log\left(\frac{f \cdot D}{0.3}\right) - \left(6.2 + \frac{2Ga\max}{5}\right)\log(\theta) [\mathrm{dBi}] \quad \theta_r < \theta \le \theta_s$$

$$Ga(\theta) \le 15.83 - \frac{Ga\max}{3} [\mathrm{dBi}] \; \theta_s < \theta \le \theta_t$$

$$Ga(\theta) \le 15.83 - \frac{Ga\max}{3} - (0.02675 - 0.0005Ga\max) \cdot (\theta - 177.56 + 3.08Ga\max)^2 \; [\mathrm{dBi}]$$

$$\theta_t < \theta \le \theta_u$$

$$Ga(\theta) \le 10 - 10\log\frac{f \cdot D}{0.3} [\mathrm{dBi}] \quad \theta_u < \theta \le 180°$$

However, θ shall be the angle of an antenna in the direction from the main radiation [°] .

$$Ga\max = 43.96 + 20\log D + 20\log\left(\frac{f}{18}\right) [\mathrm{dBi}]$$

D shall be the diameter of an antenna aperture [m] and f shall be a frequency [GHz].

$$\theta_q = \frac{22.5}{\left(\frac{f \cdot D}{0.3}\right)} \cdot \sqrt{\left\{Ga\max - \left[2 + 15 \cdot \log\left(\frac{f \cdot D}{0.3}\right)\right]\right\}} \quad [° \;]$$

$$\theta_r = 10^{\left[1.82 + \frac{Ga\max}{150} - \log\left(\frac{f \cdot D}{0.3}\right)\right]} \quad [° \;]$$

$$\theta_s = 94.55 - 1.5Ga\max \quad [° \;]$$

$$\theta_t = 177.56 - 3.08Ga\max \quad [° \;]$$

$$\theta_u = 130.8 - Ga\max \quad [° \;]$$