Maximum Permissible Exposure (MPE) analysis. For MPE, we use EIRP and calculate the exposure vs distance to show compliance. Below we use equation 4 in OET 65 to calculate the safe distance from the antenna.

$$S = \frac{EIRP}{4\pi d^2}$$ (Equation 4 from OET 65)

Solving for d gives:

$$d = \sqrt{\frac{EIRP}{4\pi S}}$$

The antenna is a C-band active electronically scanned array (AESA) operating from 5.25 GHz to 5.65 GHz. It comprises 2,816 radiating elements arranged as 44 subarrays (a 6 × 8 grid with the four corner subarrays removed) across a 1.6 m^2 aperture, with each element radiating 100 W peak, for a total peak radiated power of 281.6 kW. At the upper band edge (the worst case for exposure) the realized array gain is 36.5 dBi (38.5 dBi directivity less approximately 2 dB for amplitude taper and feed and element losses) and the half-power beamwidth is approximately 2.4° in azimuth by 1.8° in elevation. The transmit duty factor is 20%.

The peak EIRP in the main beam is therefore 281.6 kW × 36.5 dBi = 1.26 GW. Because the FCC MPE limits are time-averaged, exposure is evaluated using the time-averaged EIRP, equal to the peak EIRP scaled by the 20% duty factor: 1.26 GW × 0.20 = 0.252 GW. The threshold for general population (uncontrolled) exposure at these frequencies is S = 1 $\frac{mW}{cm^2}$. The main beam is held above a minimum elevation angle (see below) so that it is not directed toward areas accessible to people; the controlling exposures are therefore the antenna sidelobes in the horizontal direction and the back lobe, evaluated below.

In order to reduce the minimum safe distance, applicant will apply a minimum elevation angle to ensure that the main beam of the antenna is not pointed in a direction that could cause human exposure above the FCC guidelines.

The maximum EIRP in the horizontal direction when the main beam of the antenna is pointed at 10 degrees from the horizon is 1.00 MW (1.00 x 10^9 mW), corresponding to a sidelobe level of −24 dB relative to the main-beam peak at 10° off boresight. Solving Equation 4 from OET 65 for the maximum side lobe in the horizontal direction is then:

$$d = \sqrt{\frac{1.00\ x\ 10^{9}\ mW}{4\pi\left(1\frac{mW}{cm^{2}}\right)}} = 8.93\ x\ 10^{\ 3} cm = 89\ m$$

The maximum EIRP in the back lobe of the antenna is 0.252 MW (2.52 x 10^{8} mW), corresponding to a front-to-back ratio of −30 dB relative to the main-beam peak. Solving Equation 4 from OET 65 for the maximum side lobe in the back lobe direction is then:

$$d = \sqrt{\frac{2.52\ x\ 10^{8}\ mW}{4\pi\left(1\frac{mW}{cm^{2}}\right)}} = 4.47\ x\ 10^{\ 3} cm = 45\ m$$

Applicant will comply with RF Exposure requirements by ensuring that the main beam of the antenna is a minimum of 10 degrees above the horizon, and by marking and using signs and barriers consistent with the mitigation requirements in 47 C.F.R. §1.1307(b)(4), to prevent a person from getting within **89 meters** of the antenna when the equipment is transmitting, or within **45 meters** of the backside of the antenna.