

HOME WORK # 4

- 1) A C-band earth station has an antenna with a transmit gain of 54 dB. The transmitter output power is set to 100 W at a frequency of 6.1 GHz. The signal is received by a satellite at a distance of 37500 km by an antenna with a gain of 26 dB. The signal is then routed to a transponder with a noise temperature of 500 K, a bandwidth of 36 MHz, and a gain of 110 dB.
 - a) Calculate the path loss at 6.1 GHz.
 - b) Calculate the power at the satellite antenna in dBW.
 - c) Calculate the noise power at the transponder input in dBW, in a bandwidth 36 MHz.
 - d) Calculate the C/N ratio, in dB, in the transponder.

- 2) A geostationary satellite carries a transponder with a 20 W transmitter at 4 GHz. The transmitter is operated at an output power of 10 W and drives an antenna with a gain of 30 dB. An earth station is at the center of coverage zone of the satellite, at a range of 38500 km, using dB for all calculations, find:
 - a) The flux density at the earth station in dB/m².
 - b) The power received by an antenna with a gain of 39 dB, in dBW.
 - c) The EIRP of the transponder in dBW.

- 3) A satellite in geostationary orbit is at a distance of 39000 km from an earth station. The required power flux density at the satellite to saturate one transponder at a frequency of 14.3 GHz is -90.0 dBW/m². The earth station has a transmitting antenna with a gain of 52 dB at 14.3 GHz. Find:
 - a) The EIRP of the earth station.
 - b) The output power of the earth station transmitter.

- 4) A 12 GHz earth station receiving system has an antenna with a noise temperature of 50 K, a low noise amplifier with a noise temperature of 100 K and a gain of 40 dB, and a mixer with a noise temperature of 1000 K. Find the system noise temperature.