

Antenna problems:

1. Transmitting and receiving antennas operation at 1 GHz with gains (over isotropic) of 20 and 15 dBi respectively, are separated by a distance of 1 km. Find the maximum power delivered to a matched load at the receiver when 150 W of power is supplied to the transmitter. Assume both antennas are well matched in impedance and polarization and are aligned for maximum transmission.
2. A roof-top dish antenna (max gain = 40.0 dBi) is used to communicate to an Direct TV satellite in the Ku band (~ 12 GHz). Assume the communication satellite has antenna that has a maximum directivity of 30 dBi and is orbiting at a distance of 36,000 km above the earth. How much transmitter power is required to receive 100 pW of power at your home? Assume the antennas are aligned for maximum radiation between them and the polarizations are matched, find the power delivered to the receiver. Assume the two antennas are well matched with a negligible amount of loss.
3. You are designing a pair of walkie talkie radios that operate at 450 MHz. You are restricted to a maximum of 800 mW of transmit power and wish to communicate with an identical walkie talkie a distance of 1.0 mile away. What is the minimum antenna gain needed for your design? Assume the antennas are well matched with negligible losses.