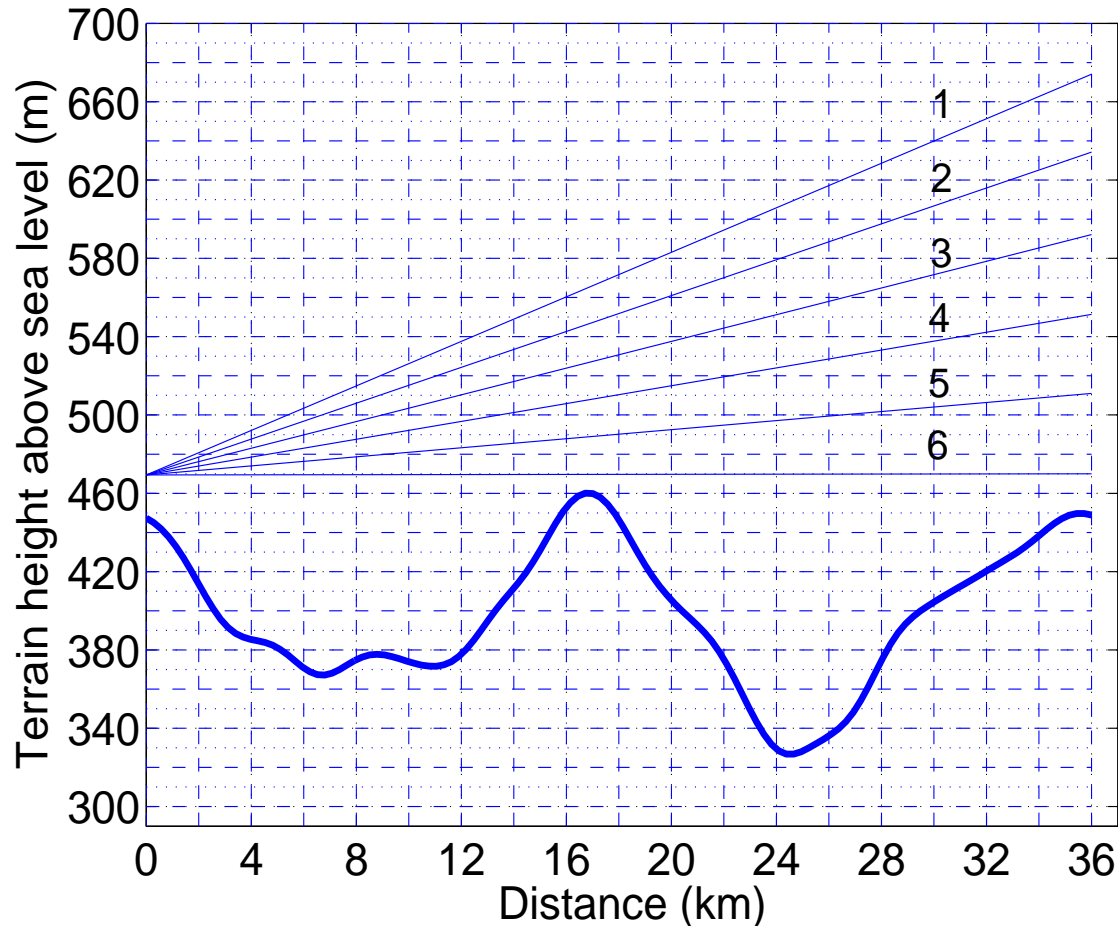


A 1.2 GHz transmitter is located 22 m above the local terrain. A receive antenna is located 36 km away. The Figure below illustrates several rays drawn from the transmitter location to the receiver distance. Assume standard refractive conditions ($k_{eff} = 4/3$) apply.



- (i) Which of the following is the maximum radius of the first Fresnel zone for this path?
 (a) 19.07 m (b) 28.46 m (c) 47.43 m (d) 67.08 m (e) none of the above
- (ii) For which ray above would the received power likely be approximately equal to that that would be received in free space? **[Need to clear hill @ 17 km by bulge plus 0.6 F1=47.4 m]**
 (a) Ray 1 (b) Ray 2 (c) Ray 3 (d) Ray 4 (e) Ray 5 (f) Ray 6
- (iii) For which ray above would the received power likely be a minimum in the height gain pattern if it is known that a reflection point exists at distance 17 km? **[Clear by bulge+ F2=85.9 m]**
 (a) Ray 1 (b) Ray 2 (c) Ray 3 (d) Ray 4 (e) Ray 5 (f) Ray 6
- (iv) If the transmitter frequency were decreased from 1.2 GHz to 300 MHz, the lowest height of the receiver required to obtain a free space propagation level would probably **[F1 gets larger]**
 (a) increase (b) decrease (c) stay the same (d) insufficient information to answer