Power Density

$$Pd = Pt * Gt / (4 * p * R^2)$$

where Pd is the power per unit area at any point or the power density
Pt is the total power transmitted
Gt is the gain of the transmitting antenna
R is the radius of the sphere

Receive Signal Level

$$RSL = Pt * Gt * Gr * (? / 4 * p * R)^2$$

where Pt is the total power transmitted
Gt is the gain of the transmitting antenna
Gr is the gain of the receiving antenna
R is the radius of the sphere

Free Space Loss

$$FSL = (? / 4 * p * R)^2$$

where R is the radius in meters
? is the wavelength in meters or ? = C/f

Free Space Path Loss

$$L_f = 32.4 + 20 \log_{10} R + 20 \log_{10} f_c$$

where R is the distance from cell site, in km
f_c is the transmit frequency, in MHz
L_f is the free space path loss, in dB

OR

$$L_f = 96.6 + 20 \log_{10} R + 20 \log_{10} f_c$$

where R is the distance from cell site, in miles
f_c is the transmit frequency, in GHz
L_f is the free space path loss, in dB

Path Loss Between Points

$$\mathbf{L_{12} = 20 * \log (d_2/d_1)}$$

where the reference point is usually 1 mile or I km from the transmitter

RSL at a point = $RSL_{1\ mi}$ + 20 log (distance at a point / reference distance)

where RSL_{1mi} is the 1-mile intercept
reference distance is usually 10 miles