

## Cell radius

### Hata's Empirical formula

$$PL = 69.55 + 26.16 * \log_{10} f_c - 13.82 * \log_{10} h_b + (44.9 - 6.55 * \log_{10} h_b) \log_{10} R - a(h_m)$$

### Cell Radius estimate based on Hata's formula

$$R = \log_{10}^{-1} (PL - 69.55 - 26.16 * \log_{10} f_c + 13.82 * \log_{10} h_b + a(h_m) / (44.9 - 6.55 * \log_{10} h_b))$$

where  $h_b$  is the base station effective antenna height in meters

$f_c$  is the carrier frequency in MHz

$h_m$  is the mobile station effective antenna height in meters

PL is the propagation loss or path loss (EIRP) in dB

$a(h_m)$  is the correction factor for the mobile station antenna height,

$h_m$  in meter.  $A = 0$  for  $h_m = 1.5$  m.

R is the cell radius in kilometers

Note: it is important to use the correct model corresponding to the environment at which the cell site is located. The **Effective Antenna Height** is defined as the base station antenna height above the sea level minus the average level of ground within 3 to 15 km (or less) from the base station antenna.

## Cell Count Estimation

$$\text{Cell Count} = A / ((3 * \sqrt{3} / 2) * R^2)$$

where A is the market area

R is the cell radius from Hata's formula