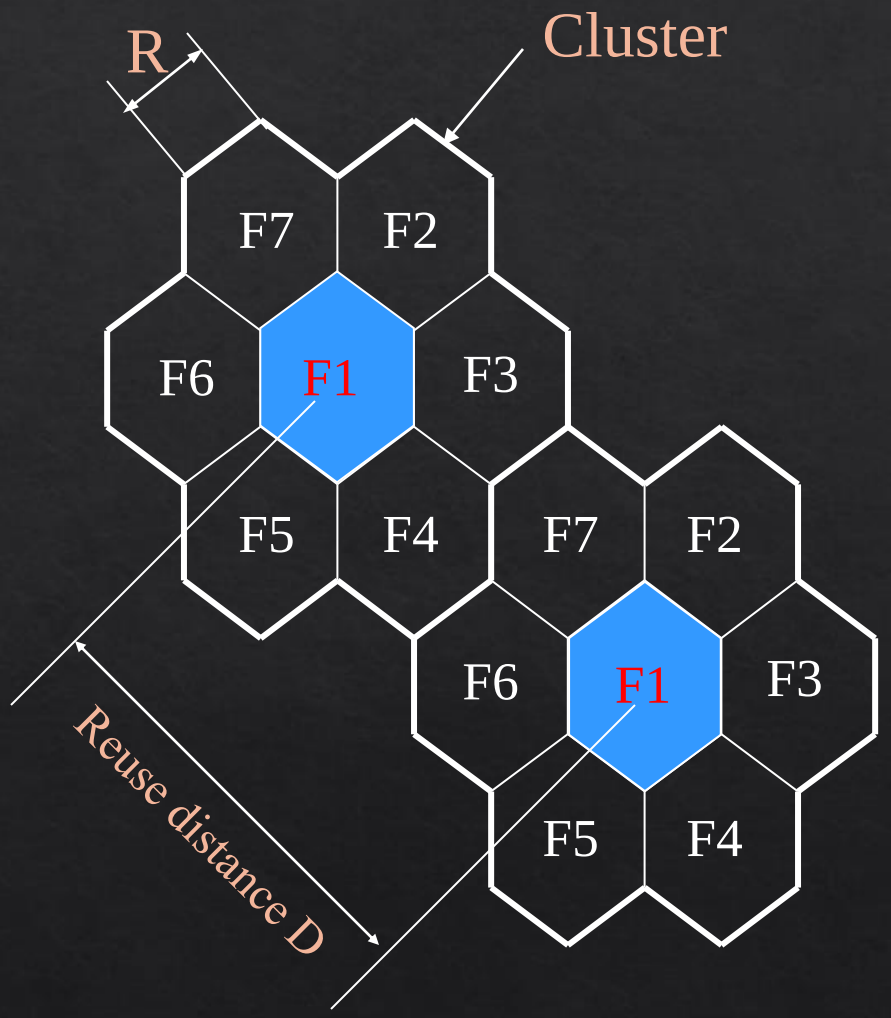
Reuse Distance & Cochannel Interference



- For Hexagonal cells, the Reuse Distance is given by

$$D = \sqrt{3NR}$$

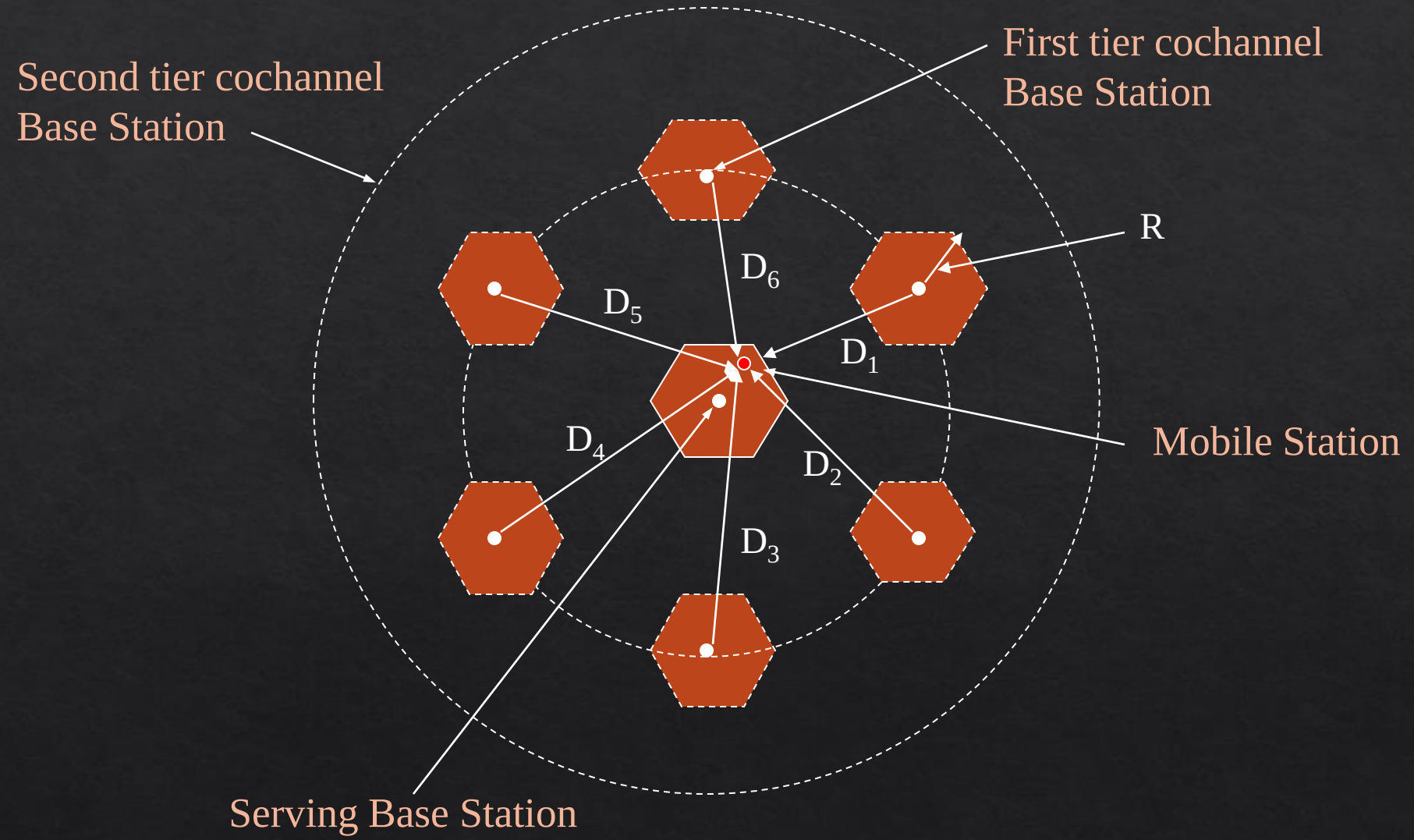
where R is cell radius and

N is the reuse pattern (the cluster size or the number of cells per cluster).

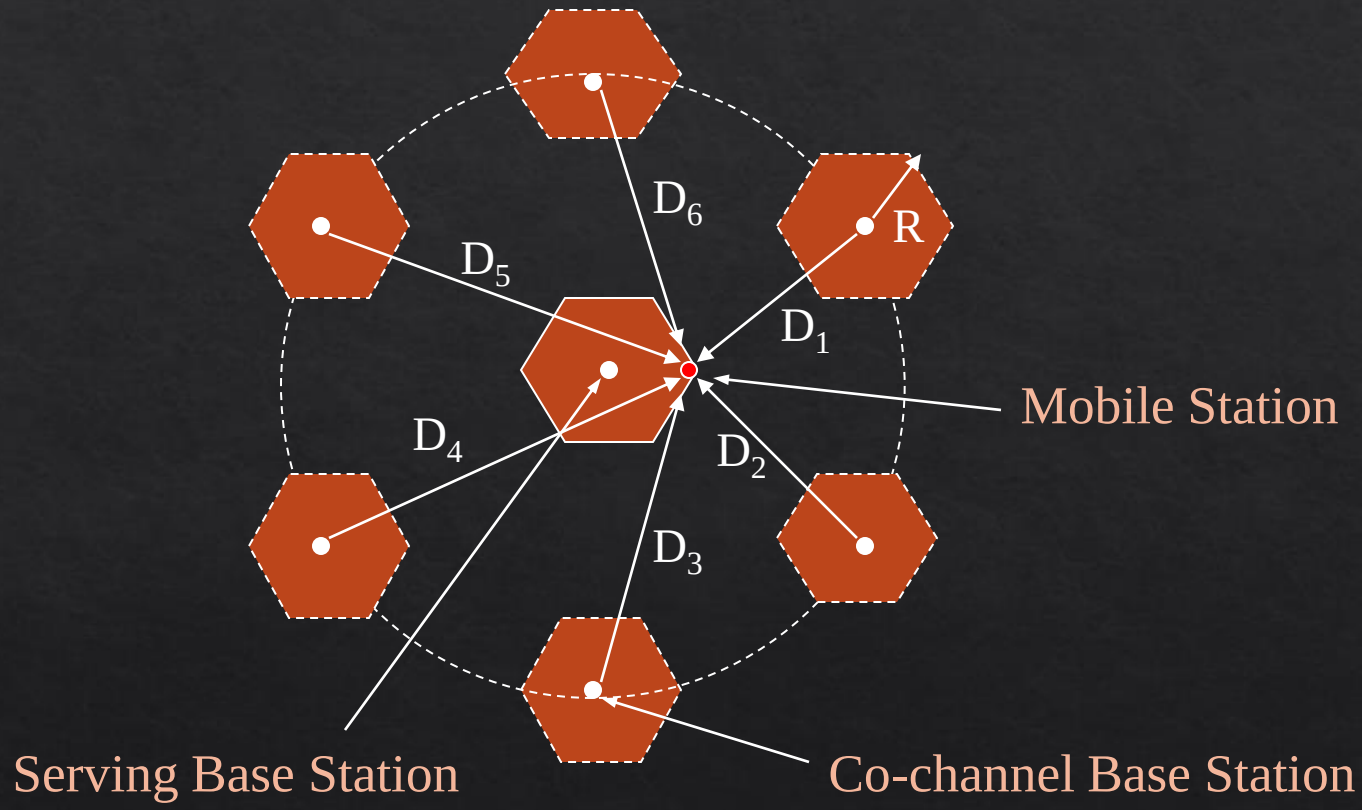
- Reuse factor is

$$q = \frac{D}{R} = \sqrt{3N}$$

Cochannel Interference



Worst Case of Cochannel Interference



Signal to Interference Ratio (Cochannel Interference)

- Cochannel interference ratio is given by

$$\frac{S}{I} = \frac{Signal}{Interference} = \frac{S}{\sum_{k=1}^{M} I_k}$$

where I is co-channel interference and

M is the maximum number of co-channel interfering cells.

- For M = 6, S/I is given by

$$\frac{S}{I} = \frac{S}{\sum_{k=1}^{6} \left(\frac{D_k}{R} \right)^{-\gamma}}$$

where γ is the propagation path loss slope and $\gamma = 2 \sim 5$.

$$\frac{S}{I} = \frac{S}{\sum_{k=1}^{M} \left(\frac{D_k}{R} \right)^{-\gamma}}$$

Signal to Interference Ratio (Cochannel Interference)

- If we assume D_k is same for the six interfering cells, then $\mathbf{D_k = D}$

$$\frac{S}{I} = \frac{1}{6 \left(\frac{D}{R} \right)^{-\gamma}}$$

$$\frac{S}{I} = \frac{(q)^{\gamma}}{6}$$

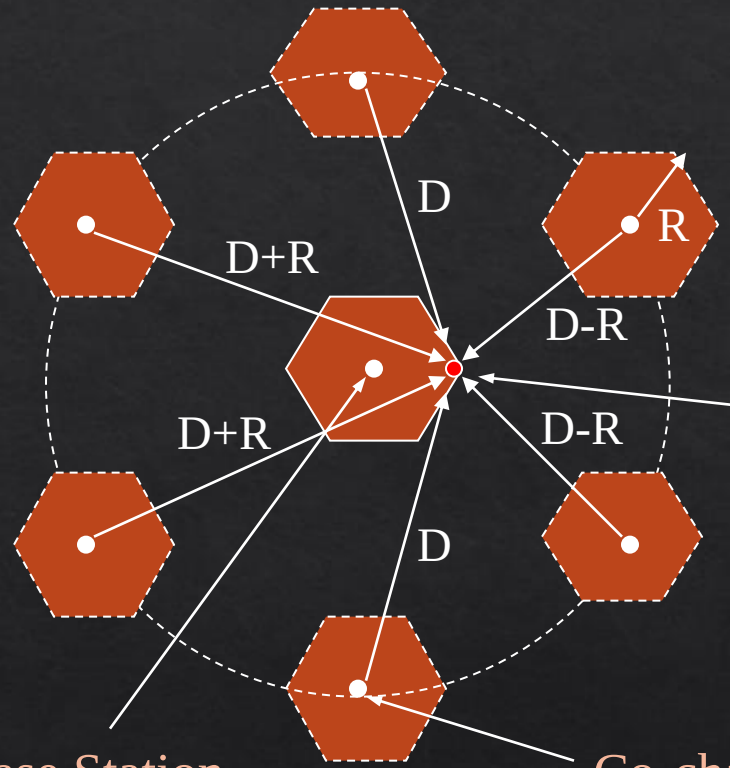
$$\frac{S}{I} = \frac{1}{6 \left(q \right)^{-\gamma}}$$

Because, $q = \frac{D}{R}$

$$q = \left[6 \left(\frac{S}{I} \right) \right]^{1/\gamma}$$

$$\frac{S}{I} = \frac{1}{6\left(\frac{D}{R}\right)^{-\gamma}}$$

Worst Case of Cochannel Interference



$$\frac{S}{I} = \frac{(R)^{-\gamma}}{2(D-R)^{-\gamma} + 2(D)^{-\gamma} + 2(D+R)^{-\gamma}}$$

$$\frac{S}{I} = \frac{1}{2(q-1)^{-\gamma} + 2(q)^{-\gamma} + 2(q+1)^{-\gamma}}$$

Problem due to Cochannel Interference

Take q = 4.6,

S/I = 54.3 or 17.3 dB (which is lower than 18 dB)