

Example 1

We consider a cellular system in which total available voice channels to handle the traffic are 960. The area of each cell is 6 km^2 and the total coverage area of the system is 2000 km^2 . Calculate

- (a) the system capacity if the cluster size, N (reuse factor), is 4 and
- (b) the system capacity if the cluster size is 7. How many times would a cluster of size 4 have to be replicated to cover the entire cellular area?
- (c) Does decreasing the reuse factor N increase the system capacity? Explain.

Solution

- Total available channels 960
- Cell area 6 km^2
- Total coverage area 2000 km^2
- For $N = 4$
- Area of a cluster with reuse $4 \times 6 = 24 \text{ km}^2$
- Number of clusters for covering total area with $N = 4$, $= \frac{2000}{24} = 83.33 \approx 84$

- Number of channels per cell $= \frac{960}{4} = 240$
- System capacity $= 84 \times 960 = 80640$ channels
- For N=7
 - Area of a cluster with reuse $7 \times 6 = 42km^2$
 - Number of clusters for covering total area with $N = 4$, $= \frac{2000}{42} = 47.62 \approx 48$
 - Number of channels per cell $= \frac{960}{7} = 137.15 \approx 137$
 - System capacity $= 48 \times 960 = 46080$ channels

It is evident when we decrease the value of N from 7 to 4, we increase the system capacity from 46,080 to 79,680 channels. Thus, decreasing the reuse factor (N) increases the system capacity.