

Principle of network communication HW4 0716074 李育王

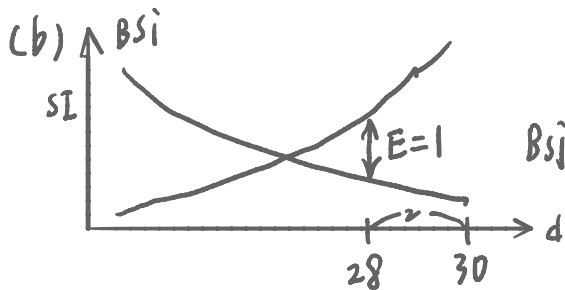
#1 (a) According to the formula, The loss for BSi to Ms:

$$L_i = 69.55 + 26.16 \log_{10} 300 - 13.82 \log_{10} 40 - 3.5 \cdot 4 + (44.9 - 6.55 \log_{10} 40) \log_{10} 1 = 98.21 \text{ (dB)}$$

And then Bs_j to Ms:

$$L_j = 69.55 + 26.16 \log_{10} 300 - 13.82 \log_{10} 40 - 3.5 \cdot 4 + (44.9 - 6.55 \log_{10} 40) \log_{10} 29 = 148.52 \text{ (dB)}$$

Hence, $\frac{G_t G_r P_i(t)}{L_i} = \frac{G_t G_r P_j(t)}{L_j} \Rightarrow \frac{P_j(t)}{P_i(t)} = 50.31 \text{ (dB)} \Rightarrow P_j(t) = 10 \times 10^{\frac{50.31}{10}} = 1.1074 \times 10^6 \text{ W}$
 \downarrow
 dB \rightarrow W



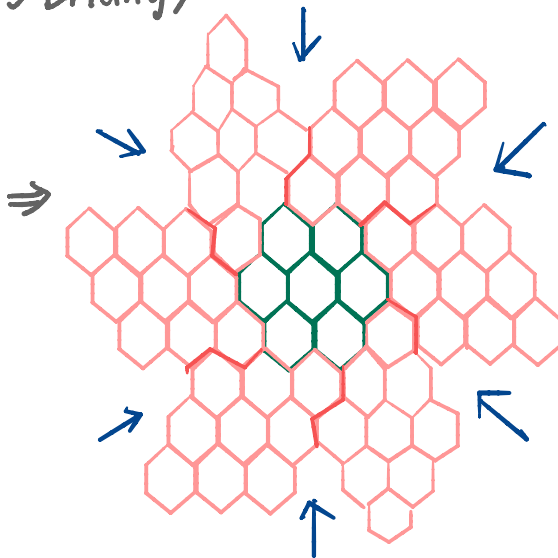
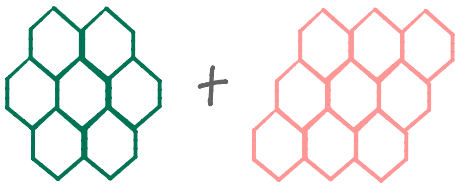
$$L_i = 69.55 + 26.16 \log_{10} 300 - 13.82 \log_{10} 40 - 3.5 \cdot 4 + (44.9 - 6.55 \log_{10} 40) \log_{10} 28 = 148 \text{ (dB)}$$

$$L_j = 69.55 + 26.16 \log_{10} 300 - 13.8 \log_{10} 40 - 3.5 \cdot 4 + (44.9 - 6.55 \log_{10} 40) \log_{10} 2 = 108.56 \text{ (dB)}$$

$$\frac{G_t G_r P_j(t)}{L_j} - \frac{G_t G_r P_i(t)}{L_i} = 1 \Rightarrow \frac{P_j(t)}{P_i(t)} = -38.44 \text{ (dB)} \Rightarrow P_j(t) = 10 \cdot 10^{\frac{-38.44}{10}} = 1.432 \times 10^{-3} \text{ W}$$

#2 $a = \lambda T = \frac{60}{3600} \times 3600 \times 50\% = 3 \text{ Erlangs}$

#3



在圍了一圈之後，
會發現缺口只能
接受 9 cells 的 cluster
 \downarrow
1 cell 無法被放入

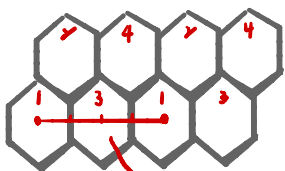
#4

(a) each cell is distributed: $\left(\frac{12.5 \text{ (MHz)}}{30 \text{ (KHz)}} - 20 \right) \div 9 = 44.074$
 (channels / cell)
 \uparrow
 # of total channels # of control channels

(b) $\text{Area} = \frac{\sqrt{3}}{4} R^2 \cdot 6 = 8 \Rightarrow R^2 = \frac{16}{3\sqrt{3}} \Rightarrow R = \frac{4}{3} \sqrt{3}$

Hence, Reuse distance: $D = \sqrt{3} N \cdot R = \sqrt{3} \cdot 9 \cdot \frac{4}{3} \sqrt{3} = 4\sqrt{3} \cdot \sqrt{3} = 12 \text{ (km)}$

#5



六角形的中心到邊: $\frac{\sqrt{3}}{2} R$

Reuse distance: $4 \times \frac{\sqrt{3}}{2} = 2\sqrt{3} = \sqrt{12}$