

332:426

Wireless PCS Problems

Spring 2006

**1. Goldsmith: 1-1**

**Solution:** *In case of an accident, there is a high chance of getting lost. The transportation cost is very high each time. However, if the infrastructure is set once, it will be very easy to use it repeatedly. Time for wireless transmission is negligible as signals travel at the speed of light.*

**2. Goldsmith: 1-5**

**Solution:** *Video, music, web browsing.*

**3. Goldsmith: 1-9**

**Solution:** *Smaller the reuse distance, larger the number of users who can use the same system resource and so capacity (data rate per unit bandwidth) increases.*

**4. Goldsmith: 1-10**

**Solution:**

- *100 cells, 100 users/cell  $\rightarrow$  10,000 users*
- *100 users/cell  $\rightarrow$  2500 cells required  $100\text{km}^2$  Area=cell = 2500cells  $\rightarrow$  Area cell =  $0.04\text{km}^2$*
- *From Rappaport or iteration of formula, we get that 100 channels cell  $\rightarrow$  89 channels cell @  $P_b = :02$  Each subscriber generates 1/30 of an Erlang of traffic. Thus, each cell can support  $30 \times 89 = 2670$  subscribers.  
Macrocell:  $2670 \times 100 \rightarrow 267,000$  subscribers  
Microcell: 6,675,000 subscribers  
Macrocell: \$50M  
Microcell: \$1.25B*
- *Macrocell: \$13.35 M/month  $\rightarrow$  3.75 months approx 4 months to recoup  
Microcell: \$333.75 M/month  $\rightarrow$  3.75 months approx 4 months to recoup*

**5. Goldsmith: 1-11**

**Solution:**

*One CDPD line: 19.2Kbps so average  $W_{imax} \approx 40\text{Mbps}$ . Therefore the number of CDPD lines is approximately 2000.*