Wireless Networking

Homework 4

**P5.9**

1. D=sqrt(3\*N)\*R

N = 12

R = 2km

D = sqrt(3\*12)\*2 = 12km

1. Simplex channel = 25kHz

One duplex channel (BW os simple channel) = 2\*25 = 50kHz

Total bandwidth available = 30MHz = 30000kHz

Number control channels = 10

N = 12

Number of channels = (30000kHz/50kHz) – 10\*12 = 480 channels

Number of channels per cell = 480/12 = 40 channels per cell

Multiplexed between 8 users

Total number of calls per cell = 8\*40 = 320 calls/cell

1. a = lambda\*T

lambda = 0.05 hours/call

T = 60 req/hour

a = 60\*0.05 = 3 Erlangs

**P6.8**

No. CSMA/CD relies on the system to cease transmitting when a collision is detected, which is not possible with wireless devices. If two user’s signals collide on a wireless network, they will get angry and will deem the network unreliable. The system relies on the data to re-transmit, but that is not possible in a wireless network with calls, especially when collisions can’t be detected.

**P6.13**

The contention window should be chosen randomly over a pre-determined range of possible values. Selecting the value of the contention window should depend on how many users are on the network. To avoid collisions, the range should be larger than the amount of users and should get larger as the traffic increases and smaller as traffic decreases.

The CSMA/CA timeslot it determined as a random value up to the value of the contention window. The transmission will wait during the timeslot, but may also have to pause the countdown if another transmission begins while it’s waiting.

**P7.2**

1. Data = 270.833 kbps

Users per frame = 8

Raw data per user = Total\_Data/Users\_per\_frame

= 270.833/8

= 33.85 kbps per user

1. Guard & Synchronization = 10.1 kbps

Amount spent on traffic = total\_per\_user – guard\_and\_synch

= 33.85 – 10.1

= 23.75 kbps

Traffic efficiency = percentage of time used by traffic

= 23.75/33.85

= 0.7016 or 70.16%

1. (7,4) code used -> used to indicate how many bits contain data

Amount of time bits contain data = 4/7

Traffic efficiency = 0.7016

Total efficiency = amount\_of\_time\_bits\_contain\_data \* traffic\_efficiency

= (4/7)\*0.7016

= 0.4009 or 40.09%