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Wireless and Mobile Networking

HW 5

**P 8.8**

1. Static allocation distributed based on load traffic

Total avg. number of calls per time unit: 10,500

Percentage of calls/units of time = avg\_number\_calls\_in\_cell/10500

Number channels = percentage\*num\_channels\_available = percentage\*49

= avg\_calls\_in\_channel\*49/10500

Cell Number 1: 900\*49/10500 = 4.2 = 4 channels

Cell Number 2: 2000\*49/10500 = 9.33 = 9 channels

Cell Number 3: 2500\*49/10500 = 11.67 = 12 channels

Cell Number 4: 1100\*49/10500 = 5.13 = 5 channels

Cell Number 5: 1200\*49/10500 = 5.6 = 6 channels

Cell Number 6: 1800\*49/10500 = 8.4 = 8 channels

Cell Number 7: 1000\*49/10500 = 4.67 = 5 channels

1. FCA Simple borrowing scheme (no traffic load considered)

Num of channels available = 49

Num of cells = 7

Num of channels per cell = 49/7 = 7

Give each cell 7 channels by default and allow borrowing when one channel has a lot of traffic

**P 8.18**

1. Value of Bo & Bh

P(3) = 0.4 (see b)

P(4) = 0.4 (see b)

S = 4

Bo = Sum[from I = sc to s](P(i))

= P(3) + P(4)

= 0.4 + 0.4

= 0.8

Bh = P(s)

= P(4)

= 0.4

1. Find P(0), P(1), P(2), P(3), P(4)

lambdaO = lambdaH = 0.001

i = 0,1,2,3,4

Sc = 3

S = 4

mu = 0.0003

P(0) = [sum[from i=0 to Sc]( (lambdaO + lambdaH)^i / (i! \* mu^i) ) + sum[from I = sc + 1 to s]( (lambdaO + lambdaH)^Sc \* lambdaH^(i-Sc) / (i! \* mu^i) )]^-1

= sum[from i=0 to 3]((0.001+0.001)^i / (i! \* 0.0003^i)) + sum[from i= 3+1 to 4]((0.001 + 0.001)^3 \* 0.001^(i-3) / i!\*0.0003^i)

= (1 + 6.7 + 22.2 + 49.4 + 5.1)^-1

= 0.01

P(1) = (lambdaO + lambdaH)^i / (i! \* mu^i) \* P(0)

= (0.001 + 0.001)^1 / (1! \* 0.0003^1) \* 0.01

=0.06

P(2) = (lambdaO + lambdaH)^i / (i! \* mu^i) \* P(0)

= (0.001 + 0.001)^2 / (2! \* 0.0003^2) \* 0.01

= 0.2

P(3) = (lambdaO + lambdaH)^i / (i! \* mu^i) \* P(0)

= (0.001 + 0.001)^3 / (3! \* 0.0003^3) \* 0.01

= 0.4

P(4) = (lambdaO + lambdaH)^Sc \* lambdaH^(i-Sc) / (i! \* mu^i) \* P(0)

= (0.001 + 0.001)^3 \* 0.001^(4-3) / (4! \* 0.0003^4) \* 0.01

= 0.4

1. Average number of occupied channels

Average = sum[from i=0 to S] (P(S)\*S)

= P(0) \* 0 + P(1) \* 1 + P(2) \* 2 + P(3) \* 3 + P(4) \* 4

= 0 + 0.06 + 0.4 + 0.6 + 1.6

= 3.16

= 3 (number of channels should be a whole number)