CSC467

Assignment 3

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1) Link 1 would have a rate of C/16 per flow on average. S1-16 @ C/16

   Link 2 would have a rate of C/5 per flow on average. S15 and S16 are limited to C/8 each, S17-19 can have C/4ths each

   Link 3 would have a rate of C/8 per flow on average. S19 is limited to 7C/24ths but is then further limited to C/8, S20-26 can have C/8

   Link 3 would have a rate of C/7 per flow on average. All receive same qty of flow.

2) Link 1 would have a rate of C/16 per flow on average.

   Link 2 would have a rate of C/5 per flow on average. S15 and S16 are limited to C/16, S17-19 can have 7C/24ths each

   Link 3 would have a rate of C/8 per flow on average. S19 is limited to 7C/24ths but is then further limited to C/8, S20-26 can have C/8

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3

1) At 40 packets, they would transmit all packets over 20 seconds. This would mean that if each packet was 500 bytes, it would be hitting the peak of the CBS token bucket each CIR and each packet would be marked as green (barely).
2) At 40 packets, they would transmit all packets over 16 seconds. This would mean that if each packet was 500 bytes, it would be transmitting 1250 bytes over a second. This would mean that we would get one green packet and one red packet every second as both the CBS and EBS token buckets would fill as they can only hold a maximum of 700 bytes at a time. Even if it is filling at 1000bytes per second, it would empty the green initially, then with none left in green, would empty yellow and go to red overflow. Approximately 1/3rd of the packets are marked Red. There are no packets marked Yellow as the EBS, and as such Te, is 100 bytes, not enough for a whole packet.
3) If the EBS was 500, we would have a green buffer(CBS) of 500, and the same for the yellow buffer. This would mean that we would be able to recover both buffers fully with the CIR utilization. In this case the packets that would have been marked Red are marked Yellow because the EBS is big enough.
4) The outcome would remain the same as all packets would be green, but they would completely deplete the green buffer.
5) The outcome would mean that the EBS buffer couldn't be filled and the CBS buffer was filled by the CIR, the packet stream would average out to having 4 green and one red per 2 second period.
6) I infer that the bucket system can help a network engineer determine what allocations need to be changed based on network traffic, there will always be some jitter and the yellow should be expected to

arrive on occasion. The appearance of red means that there needs to be some changes to the network design. CBS + EBS should always be greater than the average packet size.

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1) With = PCR/ABS = 0.001 can get that the λ = 0.0001 and γ = -0.01612. Using the equation for Ci, we can get the EBW as 0.00115 for 20AF. The remaining is link minus the sum of BW(EF), EBW(AF), BW(BE) which gives us 0.77.
2) variable bit rate: the statistical gain is PCR/EBW = 8.7184.
3) link has 77.7% bandwidth available, its utilization is 22.3%.
4) 1/u(1-p) = 1.287

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1) 0.1/0.2 = 0.5
2) 0.02294/0.40 = 0.05735
3) 0.1/0.40 = 0.25
4) 1.0 - 0.1 - 0.02294 = 0.877
5) The queues would be longer than those determined in question 5.