

Midterm 2 Review solutions/hints

Problem 1. Suppose that Weighted Fair queuing scheduling policy is applied to a buffer that supports three classes, and suppose the weights are 0.2, 0.4, 0.4 for the three classes.

(a) Suppose that each class has a large number of packets in the buffer. In what sequence might the three classes be served in order to achieve the WFQ weights?

(b) Suppose that class 1 and 2 have a large number of packets in the buffer and there are no class 3 packets in the buffer. In what sequence might the three classes be served in to achieve the WFQ weights?

a) One possible sequence is 1 2 1 3 1 2 1 3 1 2 1 3 ...

Another possible sequence is 1 1 2 1 1 3 1 1 2 1 1 3 1 1 2 1 1 3 ...

b) 1 1 2 1 1 2 1 1 2 1 1 2 ...

Problem 2. Suppose nodes A and B are on the same 10Mbps Ethernet segment and the propagation delay between the two nodes is 225 bit times. Suppose A and B send frames at the same time, the frames collide, and then A and B choose different values of K in the CSMA/CD algorithm. Assuming no other nodes are active, can the retransmissions from A and B collide? For our purposes, it suffices to work out the following example.

Suppose A and B begin transmission at $t=0$ bit times. They both detect collisions at $t=225$ bit times. They finish transmitting a jam signal at $t=225+48=273$ bit times. Suppose $K_a=0$ and $K_b=1$. At what time does B schedule its retransmission? At what time does A begin transmission?

Time, t	Event
0	A and B begin transmission
225	A and B detect collision
273	A and B finish transmitting jam signal
$273+225 = 498$	B's last bit arrives at A; A detects an idle channel
$498+96=594$	A starts transmitting
$273+512 = 785$	B returns to Step2 B must sense idle channel for 96 bit times before it transmits
$594+225=819$	A's transmission reaches B

Because A's retransmission reaches B before B's scheduled retransmission time, B refrains from transmitting while A retransmits. Thus A and B do not collide. Thus the factor 512 appearing in the exponential backoff algorithm is sufficiently large.

Problem 2. Are the TCP receive buffer and the media player's client buffer the same thing? If not how do they interact?

No, they are not the same thing. The client application reads data from the TCP receive buffer and puts it in the client buffer. If the client buffer becomes full, then application will stop reading from the TCP receive buffer until some room opens up in the client buffer.

(Answers to the rest of the problems should be obvious from the lecture notes).