IS8055556: Data and Computer Communications	**Recitation 6**
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Ethernet

1 Ethernet Capture

Let A and B be two stations attempting to transmit on an Ethernet. Each has a steady queue of frames ready to send; A's frames will be numbered A_1, A_2, and so on, and B's similarly. Let $T = 51.2\mu$s be the exponential backoff base unit. Suppose A and B simultaneously attempt to send frame 1, collide, and happen to choose backoff times of $0 \times T$ and $1 \times T$, respectively, meaning A wins the race and transmits A_1 while B waits. At the end of this transmission, B will attempt to retransmit B_1 while A will attempt to transmit A_2. These first attempts will collide, but now A backs off for either $0 \times T$ or $1 \times T$, while B backs off for time equal to one of $0 \times T, \ldots, 3 \times T$.

(a) Give the probability that A wins this second backoff race immediately after this first collision; that is, A's first choice of backoff time $k \times 51.2$ is less than B's.

(b) Suppose A wins this second backoff race. A transmits A_3, and when it is finished, A and B collide again as A tries to transmit A_4 and B tries once more to transmit B_1. Give the probability that A wins this third backoff race immediately after the first collision.

(c) Give a reasonable lower bound for the probability that A wins all the remaining backoff races.

(d) What then happens to the frame B_1?

This scenario is known as the *Ethernet capture* effect.

