6.263 Problem Set 5

MIT, Fall 2005

Issued: Tuesday, Oct 18

Due: Never (Solutions will be on the Web next week)

Problem 5.1   Why CTS/RTS is not so useful in environments like MIT where the traffic is only between mobile devices and an access point?

Problem 5.2   In 802.11 what's the value of the NAV in an ACK (assuming no fragmentation)?

Problem 5.3   In MACAW, assume there is no ACK packet. In this case, does the exchange of RTS/CTS solve the exposed terminal problem? Explain. What happens when we introduce the ACK packet? How does MACAW address this case (Read paper). How is this problem addressed in 802.11?

Problem 5.4   The 802.11 backoff algorithm is said to "favor the latest successful node". Why?

Problem 5.5   In 802.11, the interfering rage is usually twice as much as the transmission range. Assume interfering range is about $550m$ and transmission range is $250m$. A's transmission to D traverses a chain of nodes $A \to B \to C \to D$, where the distance between any two nodes is slightly less than $250m$. What's the best throughput we can expect for this transfer?

Problem 5.6   It has been shown that in an ad hoc network (with no mobility), the per-node available bandwidth decreases as $O(n^{-1/2})$, where n is the number of nodes. Can you construct a simple/intuitive argument to explain this result?