

Assignment 2: Analyzing MAC Layer Misbehavior using ns-2

(SN 616 Wireless Security)

[Assignment Due: March 31st, 11:59 pm]

Description: The goal of this assignment is to modify the IEEE 802.11 MAC layer code to include various options for MAC layer misbehavior into your existing WiFi network simulation setup. The assignment has two primary components 1) familiarize yourself with the WiFi MAC implementation in ns-2 simulator, 2) demonstrate your understanding of MAC layer misbehavior. We recommend working on the assignment as soon as possible.

Modify the WiFi MAC - Directly modify the 802.11 MAC implementation in ns-2 to allow for cheating and misbehavior at the MAC layer, without breaking the native functionality of the WiFi MAC. To do this, define a new variable `cheatType` in the IEEE 802.11 MAC implementation `ns-allinone-2.35/ns-2.35/mac/`, then modify the logic in the `.cc` file such that

- 1) the default behavior is used when `cheatType = 0`,
- 2) the client sets a backoff value of lowest possible value when `cheatType = 1`, and
- 3) the client uses $1/2$ the normal contention window size (i.e., replace `cw` with `cw/2`) when `cheatType = 2`.

Create a new network setup that allows you to specify (1) the total number of WiFi clients, (2) the number of these clients that misbehave, and (3) which type of misbehavior each of these clients is using, all configurable through the `.tcl` file.

Simulate a Wi-Fi network with 20 clients using various combinations of cheaters, collect some data, and create the following plots.

- a) Throughput and latency when no nodes are misbehaving for variable packet sizes
- b) Throughput and latency when no nodes are misbehaving for variable number of source-sink pairs
- c) Throughput and latency when variable number of nodes are misbehaving for each of packet sizes
- d) Throughput and latency when variable number of nodes are misbehaving for variable number of source-sink pairs

Grading:

Grading will be based on the correctness of your plots, report and simulation sources as well as the observations made.