Report

Phase 3 csce575

Tung Thanh Le

ttl8614@louisiana.edu

I. General description:

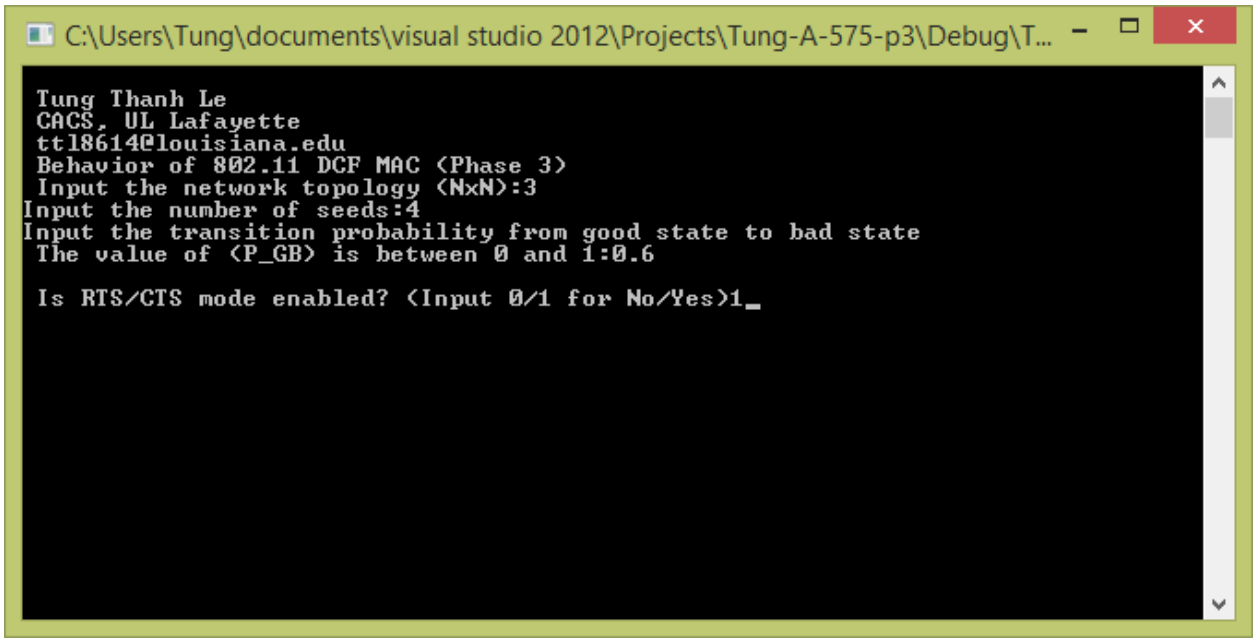
In this phase, we are asked to implement the RTS/CTS mode into the program. In addition, the network topology is created as well as source destination pairs are involved. In the 2x2, 4x4, 8x8, 10x10 networks, we assume that the even nodes are the source nodes, and the odd nodes are the destination nodes. In the 3x3 network, because the number of nodes is an odd number, so we force the last node become a source node. For example, in 3x3 network, we have 9 nodes, including 4 pairs and 1 source node will be connected to the adjacent node (node 8 connects to node 7).

In terms of the collision domain, this phase has non-uniform collision domain, compared with the previous work. For example, each node has its transmission range, so if other nodes that reside inside this footprint would probably impact to that node's transmission, especially in the case of the same backoff timers. If other nodes are outside the range of the node's transmission, they can transmit without any collision.

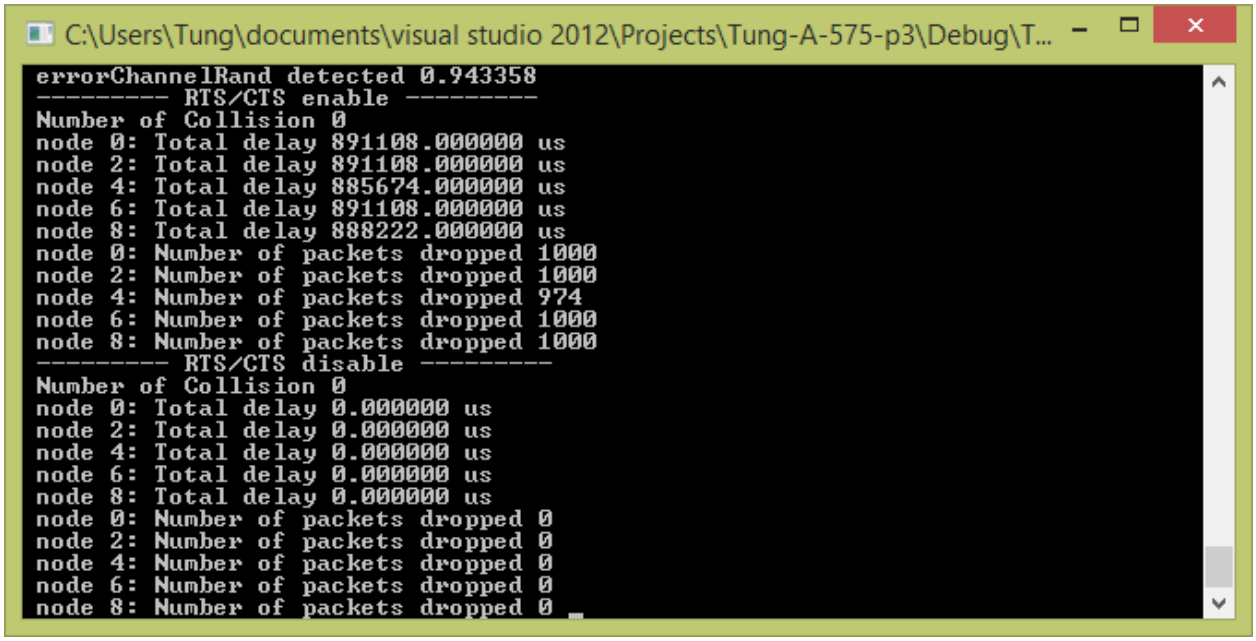
If the node fails to transmit CTS or ACK because of the channel conditions, it can retry around 7-8 times before dropping that frame.

II. How to run the program

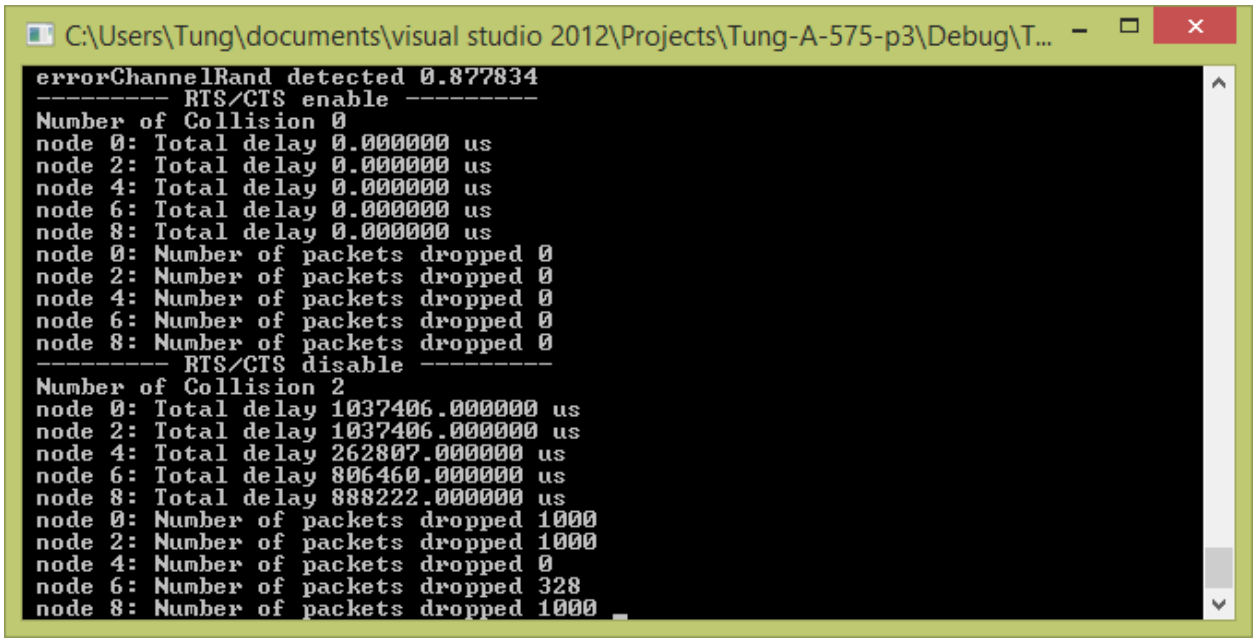
The inputs include the size of a network, the seed value, the probability of transition state from a good state to a bad state, and the RTS/CTS option mode. Thus, you can input the parameters as follows.



After running, the program will simulate the number of total delay, the number of packet dropped in each source node, and the number of collision in the network as in Figure below.



If selecting the RTS/CTS disabled mode, the result will be as follows.



III. Simulation results

In this section, we analyze the simulation results in terms of the delay, packet dropped, and collision.

As can be seen in Figure A, the comparison between RTS/CTS enabled and disabled in terms of the average delay is presented. When using RTS/CTS enabled mode, the average delay is lower than without using that. This is because RTS/CTS mode (virtual carrier sensing) can help reducing interference through preventing the hidden terminal problem.

At the meantime, RTS/CTS disabled mode does not support this function, resulting in the number of delay increased and the number of collision increased as can be seen in Figure C. In term of the number of packets dropped as in Figure B, it depends on many factors such as the size of packets, the error on the channel. This means that, with RTS/CTS enabled mode, a large number of control packets (RTS, CTS, ACK) during the transmission time will significantly impact to the network, leading to the number of delay increased in the network. However, the number of collisions is very low in RTS/CTS enabled mode, compared with RTS/CTS disabled mode, as in Figure C. This is because the RTS/CTS enabled mode can control the packets transceived through the transmission, therefore, it can reduce significantly the number of collisions in the network.

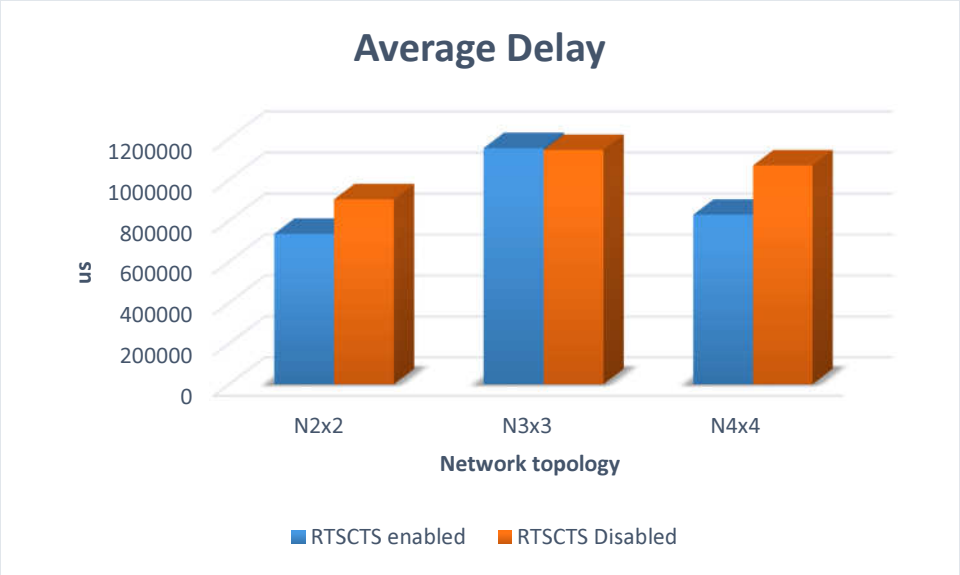


Fig. A: Average delay

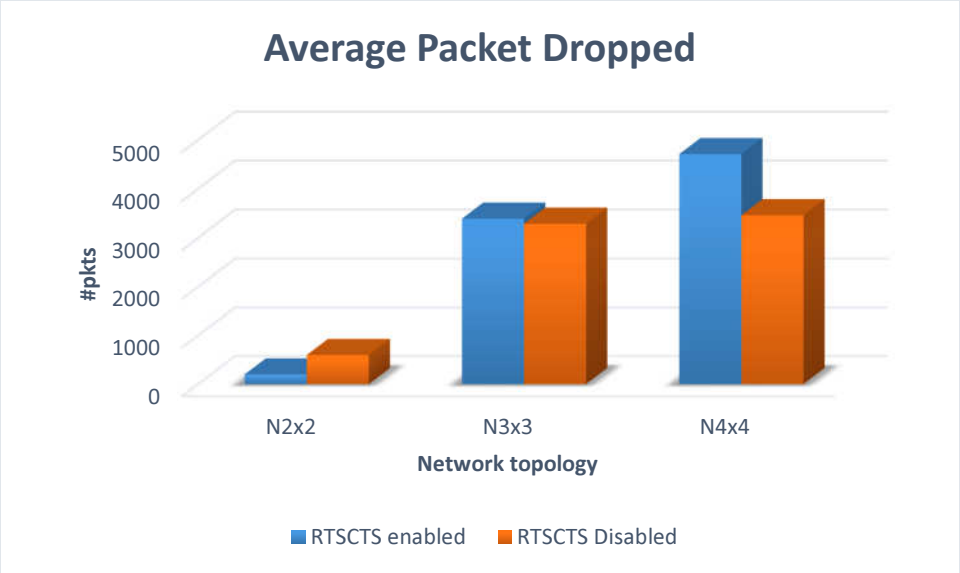


Fig. B: Average packet dropped

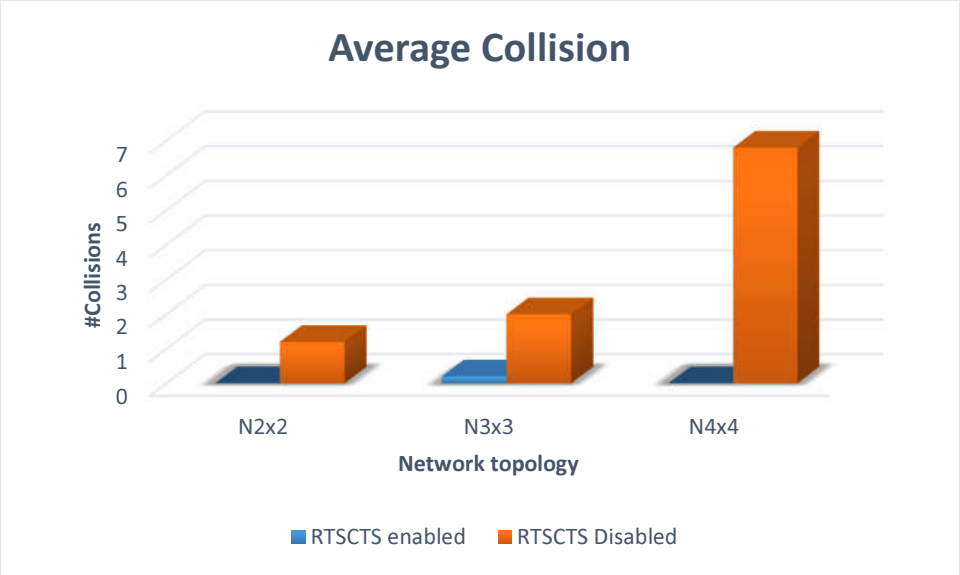


Fig. C: Average Collision

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