# CHAPTER 1
# INTRODUCTION

## 1.1 Background

As we all know, the internet is the biggest source of information where we can get information and share information to others [13]. There are many applications in the internet where each application is increasingly increasing its needs in the scope of performance in order to be satisfied by internet users satisfactorily [13]. The higher level of performance required for each application it automatically also leads to increased traffic in the internet network when internet users access this application online. This causes the utilization of internet network is not optimal [14]. The issue of a full buffer is persistent by a queue of data packets that flood the internet network waiting to be served. The buffer trend is always full-hold by the queue of data packets known as Bufferbloat [14].

There are a variety of techniques that can be used to overcome Bufferbloat in a network, one of which is network-based congestion avoidance. This technique is used to monitor network traffic loads in order to anticipate and avoid bufferbloat, so the router will minimize packets sent before the queue in the buffer becomes full by dropping packets based on probability [4].

Routers are network connecting devices that have the ability to pass IP packets from one network to another network that may have multiple paths between them. Initially, all routers on the internet network use the PQM (Passive Queue Management) DropTail mechanism [7]. In short, PQM DropTail allows all packets to be absorbed by the buffer as long as the buffer is not full and drop the packet if the buffer is fully loaded. However, the vital deficiencies of PQM DropTail are Global Synchronization [4] and Lock-Out [7]. Therefore in 1998, the IETF (Internet Engineering Task Force) recommended AQM (Active Queue Management) mechanism to be implemented on next-generation Internet routers. In April of 1998, the IETF

issued RFC 2309 recommendations for queue management and congestion avoidance on the internet. The first issue mentioned is the need for the development of a queue management router called AQM (Active Queue Management) [2]. The recommended AQM mechanism is RED (Random Early Detection).

But this mechanism has the drawback that there are many drop packets in the network and is difficult to configure because the RED mechanism has many parameters that depend on the packets coming to the router and the state of the network (μ (t)). Then in 2012, Van Jacobson created an innovative method to become the current Internet service solution that is CoDel. CoDel is an algorithm designed to overcome bufferbloat on network links by setting limits on packet delays in the network. Codel aims to improve the overall performance of the RED algorithm by addressing some fundamental errors in the RED algorithm and make the algorithm easy to set up because unlike RED, the CoDel algorithm does not require manual configuration [9].

In this research will be analyzed the advantages of AQM CoDel algorithm compared to PQM Droptail algorithm because both of these algorithms have easy configuration to apply on router unlike AQM RED algorithm.

## 1.2 Problem Identification

With reference to the background above, then the problem identification in this research is how the influence of traffic load variation on Packetloss, Average Delay, Average Jitter and Throughput in TCP / IP network using Passive Queue Management Droptail mechanism using mechanism Active Queue Management Controlled Delay.

## 1.3 Objective

In this research, concentration is preferred in Active Queue Management Controlled Delay mechanism analysis with variation of traffic

load on Packetloss ratio, Average Delay, Average Jitter and Throughput in TCP / IP network.

## 1.4 Scope of Work

In order that the analysis and discussion conducted in this research can be focused and focused as on the objectives of the research, the scope of work will be limited as follows:

- The simulation will be carried out with dumbell topology with the purpose of understanding of Congestion Control with AQM CoDel mechanism.
- Parameters of simulation results that will be analyzed are: packet loss ratio, Average delay, Average jitter and throughput.
- The analysis is devoted to the AQM CoDel algorithm.
- The network used is a wired point-to-point Ipv4 network.
- The TCP Congestion Control used is TCP New Reno.
- This research do not discuss the mechanism of TCP Congestion Control in detail (mechanism of slow start, fast retransmit, fast recovery and Additive Increase Multiplicative Decrease).
- The flow of packets used is TCP.
- This research do not discuss about system security in network.
- The simulator used is Network Simulator version 3.23 (NS-3.23).

## 1.5 Research Method

The research methods on this work are divided into several steps, they are:

- Problem identification

  The problem identification in this research are performed with study of literature. The literatures are derived from the results of recent studies, either paper or journal from international conference and related text book.

- Model system design

  In this process the network was designed for simulation and evaluation process the algorithm. The observed network is a star

network dumbell topology with 10 nodes each side that was connected with 2 routers. In the network there are 3 component that are servers, routers and hosts.

- Algorithm design

  In this steps, PQM DropTail and AQM CoDel will be designed. The designed scheme must represented the pseudocode each algorithm, so the each algorithm can be analyzed appropriately.

- System Integration

  After all process was designed, model system and algorithm designed will be integrated with other process. So the improved performance can be analyzed appropriately.

- Simulation Process

  Simulation will be conducted on the network of system that was designed. Simulation will performed through several scenario to see how the algorithm works.

- Simulation Results Analysis

  The results of the simulation will be reviewed and analyzed. In this step all simulation scheme will be analyzed rather the scheme achieved the research purpose or not.

- Drawing Conclusion

  The conclusion will be pulled according to simulation and results analysis. The final conclusion must meet the research main purpose.