

MONASH UNIVERSITY
DEPARTMENT OF ELECTRICAL & COMPUTER SYSTEMS ENGINEERING
Performance of Telecommunication Networks

Assignment III: Simulation of an Input-Queued Packet Switch

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1 Overview

In this assignment, you will be modifying the network layer of our packet switching network simulation model [Şek06] to implement an input-queueing packet switch (router) model [KMK04, Chapter 1].

2 Procedure

In the *delay and queueing in packet switching networks* experiment [Şek06], we use a set of models to simulate a network of hosts and routers. If you examine the `router.ned` and `networklayer.cc` files, you will see that I model the routers as output-queueing packet switches.

By taking my model as a starting point, create the model of an input-queueing packet switch. You need to take care of this important point: The *simple* switching fabric model I have implemented in the `networklayer.cc` is not suitable for the input-queueing packet switches. You need to design your own switching fabric module by considering the following issues:

- You need to modify the `router.ned` to place passive queues between the input ports and switching module. There should *not* be any output queues in your model (`router.ned`).
- Switching fabric module should be modelled as such that when it starts processing a packet (i.e. begins transmitting, remember that we will not have output queues connected to the downstream links), it should not process any other packet that wants to go to the same output port as any of the packets currently being transmitted. All incoming packets should first be queued in their respective queues and processed in first-in-first-out (FIFO) basis.
- The switching fabric module should be fair. Whenever there is a free output port, it should check all the input queues, determine which ones have packets waiting in them and their respective intended output ports. If there are multiple packets waiting to go to this free output port, it then should choose one of these packets randomly.

3 Submission Requirements

I will check your implementation by inserting your `router.ned` and `networklayer.cc` files into the rest of the original models we use for *delay and queueing in packet switching networks*

experiment [Şek06] (Note: *not* the modified ones we use for Assignment II, since we do not deal with routing algorithm issues in this assignment). Please pay attention to the following points:

1. Submit only your own `router.ned` and `networklayer.cc` as a basic *ASCII text* files through the Web submission page by zipping them into a single file. Do *not* submit anything else!
2. In a comment block at the top of the submitted `networklayer.cc`, write the methodology you have used to validate your model. In other words, tell me the procedure you have applied to gain the confidence that your model is a fairly realistic simulation of an input-queueing packet switch.
3. Remember that you cannot use any global variable.

References

- [KMK04] A. Kumar, D. Manjunath, and J. Kuri. *Communication Networking : An Analytical Approach*. Morgan Kaufmann, 2004.
- [Şek06] Y. A. Şekercioğlu. Delay and Queueing in Packet Switching Networks Experiment for the Performance of Telecommunication Networks Unit, 2006. (available online) <http://titania.ctie.monash.edu.au/netperf/netperf-omnetpp-pkswitch.pdf>.