

18-544: Network Design and Evaluation

Assignment 2 – Simple Packet Counter

Handed out: 09/21/2006

Due: 10/6/2006

1) Objective

After completing this assignment, you would:

- i) be comfortable with using the IXP2400 hardware
- ii) have learnt the steps involved in modifying the core components and the microcode and loading them onto the hardware
- iii) have a better understanding of the Intel IXA portability framework and the interaction between microblocks, core components and the user interaction elements
- iv) progress one step towards the implementation of your respective projects as this assignment will help you get conversant with some of the APIs provided by the portability framework

2) Implementation

In this assignment, you are required to implement two simple counters that keep track of the total number of packets that arrive in the receiver module on the microengines and the number of packets which have TOS value in the header greater than 31. Moreover, you should be able to access these counters from the core and print their values to the terminal. In addition to this, you should reset the TOS field value in packets to 0 if it is greater than 31, and transmit the packet with the new TOS value and a new checksum (this builds on the assignment 1 that you completed). So the output at the console will show the total number of packets received and the number of packets with TOS values greater than 31.

Suggested Approach:

It is advisable to read Chapter 5 & 6 of the textbook ("IXP 2400/2800 Programming") before attempting to implement the counters. These chapters give a good overview of programming within the portability framework. You can also skim through the examples available with the IXA SDK as they can give you an insight into using the existing APIs. For this assignment you should try to modify the existing code in the proj_544fall04/ipv4_enp2611 to implement this functionality.

3) Lab setup

Unlike assignment 1, you will now need to use the Windows machine and the Linux machine hosting the ENP-2611 board. Instructions for setting up and booting the hardware are available online at:

<http://www-2.cs.cmu.edu/~prs/cap/setup/index.html>

4) Hint

You should allocate memory for the counters during the initialization of the core component (which will help you display the counter values on the terminal). 'Patch' the addresses of these memory locations to symbols that can be accessed in the microcode (refer Chapter 6 pages 170-181). Change the values stored in these locations whenever a packet arrives in the receive module (in microcode) and meets the criterion of TOS value greater than 31.

5) Submission

You should submit (email) a one page short report indicating the rational of the changes you made and the testing that you performed. Run the project in the lab, before the TAs. Set up an IP session (e.g. a telnet session as source of packets) and demonstrate the change in the packet counts by printing the counts to the terminal screen.

Please contact the TAs for any doubts or clarifications. Useful information for using the project is available at:

<http://www-2.cs.cmu.edu/~prs/cap/programming/index.html>

Note:

The IXP 2400 reference manuals are also a good source of information. They contain a lot of information which you would find useful in the implementation of this assignment and your projects as well.