

CWM Programmable Networks

Exercise 3: Getting started with P4Pi

Introduction

In this assignment, you will learn how to execute an example P4 program on a Raspberry Pi.

You need to submit a short pdf as a report.

Running a P4 program

- Open a terminal and ssh to the Raspberry Pi
- Change folder to assignment 3:
`cd ~/CWM-ProgNets/assignment3`
- Open a terminal on the Raspberry Pi and continuously ping the lab machine:
`ping 192.168.10.1`

If ping is not working, configure the ARP table:

```
sudo arp -s [destination ip address] [destination  
MAC address]
```

Example: `sudo arp -s 192.168.10.1 cc:00:ff:ff:ee:11`

You need to configure ARP for the proper operation of the P4Pi as a host, not for it's operation as a switch!

- Compile the provided P4 program l2switch.p4:

```
p4c --target bmv2 --arch v1model --std p4-16
basic.p4
```

- Run the compiled program:

```
sudo simple_switch -i 0@eth0 basic.json
```

- Open another terminal, go to the same folder on P4Pi and start the CLI:

```
simple_switch_CLI
```

Then you should be able to see:

```
RuntimeCmd:
```

Your CLI is ready!

- Configure the Match-Action Table using CLI:

See existing tables:

```
show_tables
```

Add a table entry:

```
table_add [table name] [action name] [table
entry] => [action value] [action value 2]
```

Example:

```
table_add MyIngress.ipv4_lpm
MyIngress.ipv4_forward 192.168.10.5/24 =>
cc:00:ff:ff:ee:11 0
```

This means that when the destination IP address is 192.168.10.* (1-255), the packets will be sent to the mac destination cc:00:ff:ff:ee:11 with egress port 2.

If the flow rule is correctly configured, you should be able to see (DUP) in the window of ping.

Quit the CLI (using ctrl+c or EOF command)

- Repeat the iperf experiment from Assignment 2 (using sudo on the Raspberry Pi), and measure the bandwidth between the host and P4Pi. Check what happens as you change table entries, IP address, etc.
- Advanced (optional): Repeat the iperf experiment to measure the effective bandwidth between a Raspberry Pi and a lab machine, with a second Raspberry Pi acting as the switch.