L3 Router

Abstract

Routers are traditionally very expensive and complicated devices. In this project you will develop a modern layer 3 router using a novel Switch programmable language (P4). The hardware of the router is based on RaspberryPi 4 Single Board Computer(SBC) and the software is based on the P4 open source compiler T4PAS.

The Router’s design is separated to a Data Plane – programmed in P4 and a Control Plane – programmed in python.

P4PI reference architecture:
Further information can be found in the P4Pi repo: https://github.com/p4lang/p4pi

Objective
The purpose of this project is to develop an Internet Router (Layer 3) on RaspberryPi SBC using P4 language for the data plane and Python for the control plane.

Project Overview
1. Study the P4 language: https://github.com/p4lang/tutorials and the videos: https://www.youtube.com/playlist?list=PLf7HGRMAIJBw2uudODtQT2B7JRcNgm-vV
2. Study the P4Pi and its components through executing the examples: https://github.com/p4lang/p4pi/wiki/Running-P4-examples-on-P4Pi
3. Install image file to the RaspberryPi SD card.
4. Develop the Router: Detailed instructions and Started Code can be found at: https://github.com/p4lang/p4pi/wiki/Building-an-Internet-Router-with-P4Pi
5. Define KPIs (Key Performance Indicators) and analyze the performance of the system. Several routers can be connected in the lab to a private network.

Notes
- The above list is an estimate. Goals and tasks might be modified during the first few weeks of the projects before the finalization of High Level Design Document.
- General requirements for all LCCN Projects are specified at the lab website: https://lccn.cs.technion.ac.il/lab-courses/

Prerequisites
Introduction to Computer Networks – 236334
Internet Networking - 236341

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