CWM Programmable Networks

Exercise 6: Mini Project

Introduction

In this exercise, you will develop a mini project of your choice on P4Pi. The project does not need to be complex, but should demonstrate the concepts taught during the CWM.

You are required to submit a pdf file describing the project, its architecture and operation, and any performance tests (if relevant). You also need to submit any written code (p4, table configurations, scripts etc.).

Project ideas

1. Tic-Tac-Toe
   Implement a game of tic-tac-toe on P4Pi, in a manner similar to the calculator: the user is player 1, and the switch is player 2. The user sends a packet with their move, and the switch replies with its move and the status of the 3x3 board.
2. Firewall
   Implement a simple firewall, which passes only certain types of traffic and blocks others. Be careful not to lock yourself out of the Raspberry Pi!

3. In-Network Classification

   Use an in-network ML framework (Planter) to support a classification task, for example, ML based firewall.

4. Smart traffic lights

   Implement a smart traffic lights control system. The system receives indications from sensors every time a car approaches a junction or finishes crossing a junction, including the direction of the car. The system sends (as one or more packets) an indication to the traffic lights to change their colour (red/amber/green). Assume that you can ignore the car's speed. First, assume that only one car can approach the junction at a time. Once this works, add support for multiple cars approaching the junction.

5. Header scrambling

   Implement a simple scrambling mechanism using a predefined key, which scrambles incoming headers. The key can be uploaded through the control plane.

   Start with a simple scramble, which XORs the header and the key.

These are just a few ideas, you can come up with your own project ideas!

Please consult with the CWM's team before starting your project, regardless if it is from the proposed project ideas or your own idea.