Implementing a Packet Filter using a P4 Programmable Switch

Gabriella Pinto and Cameron McDuffie
Advisors: Ali Mazloum and Jose Gomez

Department of Integrated Information Technology
University of South Carolina

April 22nd, 2022
Agenda

• Purpose
• Introduction
• Project Description
• Background
• Implementation
• Conclusion
Purpose

• Understand Software Defined Networking

• Understand the P4 language

• Understand the BMv2 architecture

• Implement a packet filter
Introduction

• P4
• Mininet
• Topology Creation
• Filtering Decisions
• Executing commands at runtime
**Background**

- **Traditional Switches**
  
  I. Hard coded chips that have a predetermined instruction set
  
  II. Manufacturer decides what the device will do

- **Software Switches (BMV2)**
  
  I. Software code and architecture
  
  II. Full control over the entire device
Project Description

- Program, compile, and run a P4 program on a programmable switch
- Block or forward packets based on certain criteria
- Creating a passive (stateless) firewall, ACL
Implementation

- Topology
- Headers
- Parsing
- Tables
- Runtime
Results

• Filter successfully drops or forwards based on the rules populated from the control plane

• Solution is fully customizable

• Why does this matter?

• Future research and projects