The ESnet Framework: Showcasing P4 Applications on Xilinx Alveo Cards

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Introduction

In an era of ever-growing data demands and complex networking requirements, the ESnet framework emerges as a versatile solution.

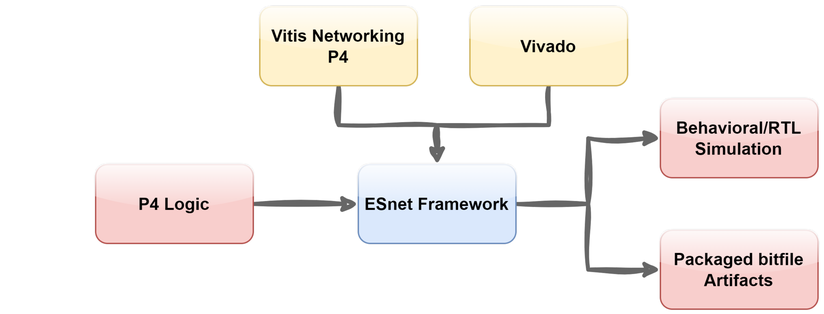
It seamlessly integrates Xilinx tools, streamlining the development and deployment of P4 applications on Alveo U280 cards within the FABRIC Testbed.

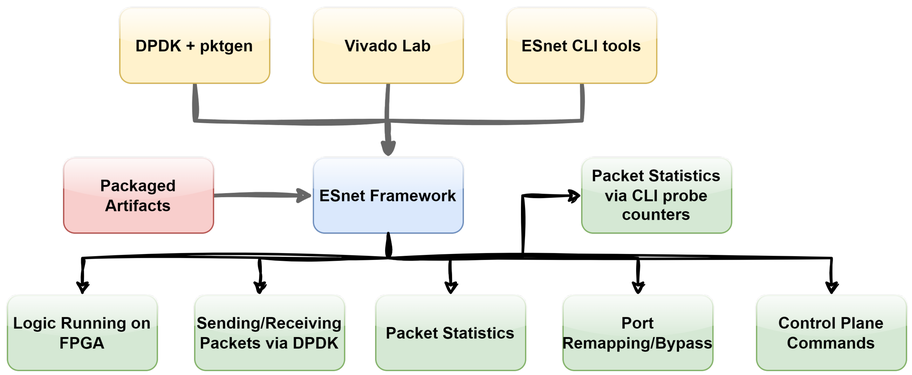
We present the ESnet framework in action, highlighting its role in optimizing network performance. Specifically, we delve into the deployment of P4 applications, including firewalls and overlays, on the SmartNIC to showcase its real-world utility.

Demonstration Setup

- **FABRIC Configuration:** We detail the setup of a slice on FABRIC that provisions an FPGA.
- **ESnet Framework Configuration:** We detail the setup of the ESnet framework and its integration with Xilinx tools and the use of containerized environments for modularity and automation.
- **P4 Application Deployment:** We describe the steps involved in deploying P4 applications and the different testing capabilities provided.
- **Live Demonstration:** We present a live demo of actual P4 programs with applications like firewalls and overlays in action on a U280 card.

Components





Results

Successful P4 Logic Deployment: Successful loading of our P4 logic onto the Alveo U280 card

Packet Sending and Receiving: Transmission and reception of packets through the SmartNIC

This validation occurs on both a **FABRIC slice** and a **local testbed at IIT**, showcasing the versatility and applicability of the ESnet framework across different network environments.

More Resources QRs

The ESnet Framework:
https://github.com/esnet/esnet-smartnic-hw

FABRIC Notebook for Provisioning:
https://github.com/fabric-testbed/jupyter-examples/blob/fpga-esnet-p4/start_here.ipynb

Our ESnet Tutorial Docs:
https://github.com/groundsada/esnet-smartnic-tutorial

Our ESnet Video Tutorial:
https://www.youtube.com/playlist?list=PL5Ght4QkHL8Sd7rTLNPv3TjYCZ3GorqPE

Our course on P4 apps for FPGAs:
http://www.cs.iit.edu/~nsultana1//teaching/F23CS595/

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