ILLINOIS TECH

College of Computing

An Attestation Capable Programmable Software Switch on FABRIC

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Introduction

- Programmable networking elements provides great flexibility on the dataplane.
- But it also creates new risks of misconfiguration and of attacks that dynamically modify security-critical functionality.
- Using **Remote Attestation** techniques we can enable dynamic assessment of network security and configuration characteristics.
- We can create RA policies for programmable networks that specify the generation, collection and evaluation of **evidence of network program and control plane rules integrity**.
- By utilizing such policies network elements in a programmable network can participate in proving their own **trustworthiness**.

Motivation

1) Configuration transparency of programmable networking elements in a federated testbed.

2) Using configuration transparency for improved diagnostic ability, and reproducibility of research.

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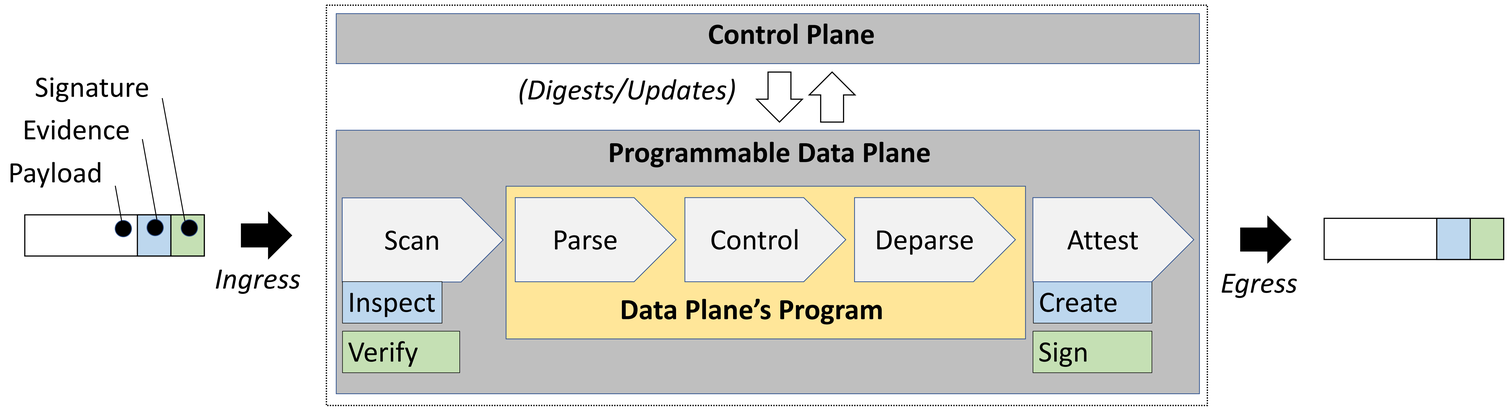

Approach

- Define security primitives (state elements) that generate evidence of programmable device's dynamic working state.
- Evidence consists of **md5 hash digests** for switch and path state.
- Evidence is transported using **IPv6 Hop by Hop Extension Headers** and ultimately checked by the verifier.
- We extend a programmable network element (**BMv2 switch**) to accommodate our Remote Attestation implementation.
- Conduct verification and performance tests to confirm the working of the programmable element as an attester.

Results

- We display the evidence of the switch STATE and PATH evidence using the command line to query the switch.
- We compare it with the HBH header as seen at the receiver and verify that the state values have been transmitted successfully and correctly.

(Evidence seen from the control plane)

```
RuntimeCmd: get_ra_data
Registers: D41D8CD98F00B204E9800998ECF8427E
Tables: 083908AB3929001D4F94CDC290DC6C53
Program: 99914B932BD37A50B983C5E7C90AE93B
```

(Evidence seen from the data plane)