

DRAFT



# Leveraging Dataplane Disaggregation to Improve Testing Pipeline

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# Acknowledgements



## Blackbox Testing of Stratum-Enabled Switches

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Google Inc

<https://vimeo.com/307167637>



# Problem Statement

Cost efficient, automated testing continues to be a major challenge for Network Operators.

- Vendor-specific testing is not scalable; even for single box testing.
- Integration / Solution testing compounds the problems exponentially.

# Goals

1. Advancing vendor-agnostic, “black box” testing
1. Topology-agnostic, “multi-box” testing
1. Automated Testing
1. Virtual Testing for cost-efficiency

# Review - Test Vectors

- Test Vectors are a set of Test Cases.
- Each Test Case is defined as...
  - Set of Operations
  - Set of External Stimuli
  - Set of Expected Behaviors

# Our Approach

Vendor-agnostic, “black box” testing with Test Vectors

- Leveraging Test Vectors
- Injecting network traffic into Test Cases for realistic External Stimuli use cases
- Initial and iterative rounds of testing performed in an orchestrated, virtual network environment

# “Black Box” Workflow - Vendor Agnostic

1. Test Vector feeds
  - a. Topology orchestration
  - b. Traffic profile generation
  - c. Ordered operations
1. Any additional external stimuli are applied
1. Exhibited behavior is compared to Expected Behavior



Demo will replace this slide

# Demo 1 - “Black Box”

## Adding Traffic to the Testing Pipeline

### - Black box - Loopback TC

Test case with expected packet that goes in port 1 and exits port 2

- Show Topology
  - Traffic endpoint
  - Test Framework node
  - Stratum BMv2 container (black box)
- Visual here is showing p4 code example
- Compile / Execute
- Visual state verification (before and after)
  - Live subscribe
  - traffic/grafana



# Introduction - Test Matrices

- Test Matrices are a set of Test Cases designed to validate a multi-box topology.
- Each Test Case is defined as...
  - Set of Operations
  - Set of External Stimuli
  - [A Set of Expected Behaviors across multiple devices](#)
- Set of Expected Behaviors is fed into a database and saved for comparison and validation

# Our Approach

Vendor-agnostic, “multi-box” testing with Test Matrices

- Leveraging Test Matrices
- Injecting network traffic into Test Cases for realistic External Stimuli use cases
- Initial and iterative rounds of testing performed in an orchestrated, virtual network environment

# “Multi-Box” Workflow - Topology Agnostic

## Initial State Validation

Ex; BGP Process Restart

1. Test Matrix feeds “Initial State”
  - a. Multi-box topology orchestration
  - b. Traffic profile generation
  - c. Ordered operations
  - d. “Initial State recorded”
2. Any additional external stimuli are applied
3. “Exhibited State” is compared to “Initial State”
4. Test Case can be re-run on any topology.



Topology pic here

Demo2 will replace this slide

# Demo 2 - “Multi-box”

Adding multiple platforms to the testing pipeline

## - Multi-box - Forwarding TC

Test case with expected packet that enters switch 1 port 1, exits switch 1 port 2 and then enters switch 2 port 1 and exits switch 2 port 2

- Show Topology
  - Traffic endpoint
  - Test Framework node
  - Stratum BMv2 container (switch1)
  - Stratum BMv2 container (switch2)
- Visual here is showing p4 code example
- Compile / Execute
- Visual state verification (before and after)
  - Live subscribe
  - traffic/grafana



# “Multi-Box” Workflow - Topology Agnostic

## Desired State Validation

Ex; Link Failure, Fast Re-Route Validation

1. Test Matrix feeds “Initial State”
  - a. Multi-box topology orchestration
  - b. Traffic profile generation
  - c. Ordered operations
2. Any additional external stimuli are applied
3. Snapshot of “Desired State”
4. Exhibited State is compared to “Desired State”
5. Test Matrix can be re-run on any topology (requires new State Captures)



Topology pic here

# Recap

1. Demonstrated adding traffic and virtualization to accelerate and reduce cost of “black box” testing.
1. Demonstrated methodologies for automating topology-agnostic, “multi-box” solution testing.



Thank You

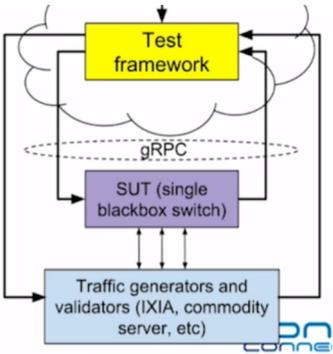
Any Questions?

For further information please contact us at  
[info@osi.io](mailto:info@osi.io)

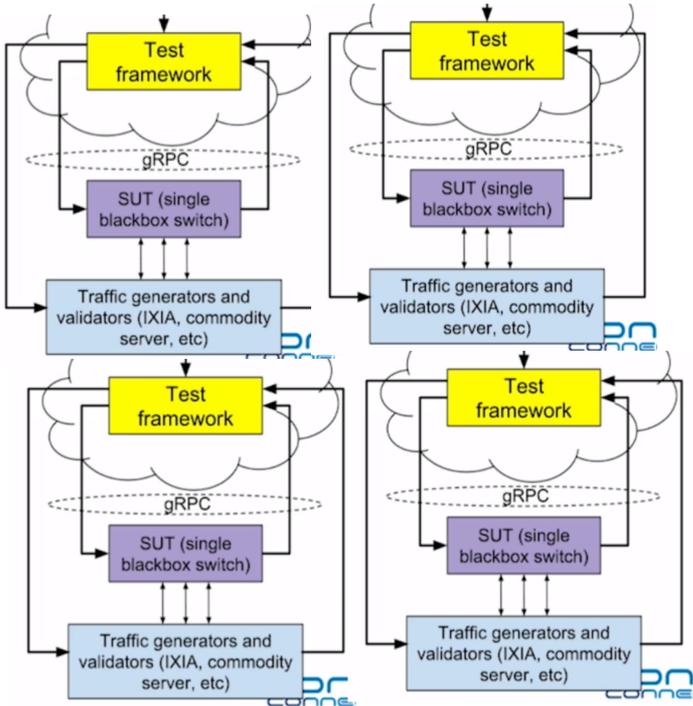


Backup

Virtual Single  
(Stratum BMv2)  
Testing



Virtual Solution  
(Stratum BMv2)  
Testing



# The End-to-End Test Framework

