A Method for Validating Data Communication Circuit Deployments using MonIPE

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Internet2 Technology Exchange 2018
A Method for Validating Data Communication Circuit Deployments using MonIPE

Agenda

• The challenge and its solution
  • Defining the challenge
  • Developed Solution
  • Results

• Behind the solution
  • Software Architecture
  • Requirements
  • Preliminary solution (pending automation)
  • Revised Software Architecture
  • Considerations
  • Demonstration
The challenge and its solution
Defining the challenge

- RNP business model: customer data communication circuits are provided by RNP
- 3 connection modes
  - Leased Lines
  - Metroethernet circuits (most popular)
  - Via IXPs
- 3 physical transmission media
  - Fiber optics (preferred)
  - Radio circuits
  - Satellite
- RNP engineers and PoP technical staff supervise suppliers (Telcos or ISPs) work
- Final result: circuit delivered (it must be technically validated)
Defining the challenge and its context

• Technical parameters expected
  • MTU = 1.500 Bytes
  • BER ≤ 10^{-8}
  • Packet Loss Rate ≤ 0,01%
  • Throughput ≥ 99% (rated capacity)
  • RTT ≤ 110 ms (fiber or radio) or ≤ 700 ms (satellite)

• How to validate these parameters?
  • Many RFCs (2544, 6201, 6349, 6815, etc.)
  • Market does not use all RFCs (larger Telcos use some of it and ISPs neither this)
  • There is no standardized method (hard to technically validate a circuit)
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Developed Solution

Routing between subnets: 10.100.0.0/30 → 10.100.1.1/30

Subnets IP addresses:
- 10.100.0.2/30
- 10.100.1.2/30

RNP’s customer

Supplier’s CPE

Data Communication Circuit

Supplier Backbone

RNP’s PoP

MonIPE Measurement Point

Subnets IP addresses:
- 10.100.0.1/30
- 10.100.1.1/30

Dashed lines = packets flows direction
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Developed Solution

Supplier Backbone (own ASN)

IP addresses of asymmetric test (upload):
Source: 200.133.241.206
Destination: 200.133.241.204

IXP
IXP’s switch

Supplier’s router

IP addresses of asymmetric test (download):
Source: 200.133.241.203
Destination: 200.133.241.205

RNP’s customer

Supplier’s router

IP address:
200.133.241.205/27

MonIPE Measurement Point
(low cost hardware)

RNP’s PoP

MonIPE Measurement Point
IP addresses:
200.133.241.203/27
200.133.241.204/27

= packets flows direction
Results

- Automation
  - Technical performance tests being scheduled and running without human interference
  - Final reports being automatically generated (PDF version)

- Standardization
  - All last mile’s circuits are validated likewise
  - Final reports have the same format (easy validation)

- Ease of use
  - Tests configured using user-friendly web interface
Behind the solution
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Software Architecture

- Integrated Portal
- NMWG
- CLMP
- Tools (iperf)

MonIPE Measurement Point

<table>
<thead>
<tr>
<th>Tool</th>
<th>iperf -c ...</th>
<th>iperf -s</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>10.100.0.1/30</td>
<td>10.100.1.1/30</td>
</tr>
<tr>
<td>VLAN</td>
<td>ethx.100</td>
<td>ethx.200</td>
</tr>
<tr>
<td>Namespace</td>
<td>ns0</td>
<td>ns1</td>
</tr>
<tr>
<td>Interface</td>
<td>ethx</td>
<td></td>
</tr>
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</table>
Requirements (not met by perfSONAR yet)

New test type: throughput-lookback
• Support instantiation of source and destination tools isolated on the same host
• Support context configuration (ns, vlan, ip) for each instance isolatedly
• Tests should be scheduled by a third host (Portal)

Preliminary solution (pending automation)
• Use two perfsonar/testpoint container instances (master, slave)
• Master pScheduler exposed on a public IP
• Use Docker API to configure each macvlan network and IP address
  • docker network create -d macvlan --subnet=10.100.0.0/24 --gateway=192.168.100.2 -o parent=eth.100 macvlan100
  • docker network connect macvlan100 src-testpoint --ip 10.100.0.1
• Schedule a standard throughput test through master node (--dest 10.100.1.1)
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Revised Software Architecture

<table>
<thead>
<tr>
<th>Central Portal</th>
<th>perfSONAR testpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>iperf -c ...</td>
</tr>
<tr>
<td>IP</td>
<td>10.100.0.1/30</td>
</tr>
<tr>
<td>Macvlan</td>
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<tr>
<td>Container</td>
<td>ps-testpoint1</td>
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<tr>
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<tr>
<td></td>
<td>iperf -s</td>
</tr>
<tr>
<td></td>
<td>10.100.1.1/30</td>
</tr>
<tr>
<td></td>
<td>ethx.200</td>
</tr>
<tr>
<td></td>
<td>ps-testpoint2</td>
</tr>
</tbody>
</table>
Considerations

From PoC to Production

- Remove duplicated pScheduler instances.
  - What if pScheduler use docker/k8s to support context, isolation, simultaneous tools?
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Demonstration

- Web Interface
- Circuit Validation Templates
- Scheduling and results
Thanks!

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