SDN tools at AmLight: an OpenFlow sniffer

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Outline

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Context: AmLight

4 x 10G links and two topologies:

- **SDN ring**: Miami-Sao Paulo-Chile-Miami
  - 20 Gbps of total capacity
  - Full OpenFlow 1.0 and network virtualization support

- **MPLS ring**: Miami-Brazil-Miami
  - 20 Gbps of total capacity
  - Layer 2/3 support

Soon: new **100 Gbps** between Sao Paulo and Miami

Consortium involving FIU(USA), RNP and ANSP(Brazil), RedClara(Latin America) and AURA(Chile)
AmLight SDN

AmLight’s NRENs

IDCP

NSI

Other NRENs

OSCARS

OESS

ONOS

OpenNSA

NOX

NOX

ONOS Internet2

Other Testbeds

Virtualization/Slices (FlowSpace Firewall)

SDN-IP ONOS

FIBRE

Univ. Twente

Andes1

Andes2

Ampath1

Ampath2

SouthernLight

Northbound: Users' APIs

Southbound API: OpenFlow 1.0

Physical Layer
Motivation

• As troubleshooting SDN is still complex, a few tools are being developed at AmLight:
  – TestbedSanitizer (10/06, 9am, Grand Ballroom A)
  – **An OpenFlow sniffer (10/05, 12:10pm, Room 15)**
  – A multi-slice SDN traceroute
  – Integration tools: Zabbix NMS w/ OESS and FSFW

• Why a new OpenFlow sniffer?
  – Wireshark requires X or capture/send and dissector for OF
    • OF 1.0: < 50% dissected
  – Tshark uses Wireshark dissectors
  – There are other tools, but they are not specific for real time and command line OpenFlow troubleshooting (lack of OpenFlow filters)
Features – Version 0.1

- OpenFlow 1.0 support
- Runs on Linux shell
  - No need for X Windows
- Supports OpenFlow types Hello, Error, FlowRemoved, FlowMod, BarrierReq and BarrierRes
- Colors important user fields
- Easy to install \(\text{install python-pcapy} \& \& \text{git clone}\)
- Supports OpenFlow type filtering using a JSON file
- Converts FlowMods to OVS-OFCTL commands
  - Help “reproduce” some problems
- Apache License
Outputs

OpenFlow Version: 1.0(1) Type: FlowMod(14) Length: 88 XID: 4959165
4959165 OpenFlow Match - wildcards: 4194300 dl_vlan: 1116 in_port: 4
4959165 OpenFlow Body - Cookie: 0x00 Command: Add(0) Idle/Hard Timeouts: 0/0 Priority: 32768 Buffer ID: 4959165
OpenFlow Action - Type: SetVLANID Length: 8 VLAN ID: 3221 Pad: 0
4959165 OpenFlow Action - Type: OUTPUT Length: 8 Port: 67 Max Length: 65535

2015-09-15 11:10:29.658553 10.0.2.15:44950 -> 190.103.187.35:6633 Size: 126
OpenFlow Version: 1.0(1) Type: FlowMod(14) Length: 72 XID: 2
2 OpenFlow Match - wildcards: 3678453 dl_vlan: 31 dl_dst: 10:00:00:01:20:00
2 OpenFlow Body - Cookie: 0x00 Command: Delete(3) Idle/Hard Timeouts: 0/0
ovs-ofctl del-flows tcp:190.103.187.35:6633 "priority=32768 dl_vlan=31,dl_dst:

2015-09-14 19:00:49.591812 190.103.187.35:6633 -> 10.0.2.15:44797 Size: 66
OpenFlow Version: 1.0(1) Type: Error(1) Length: 12 XID: 2
2 OpenFlow Error - Type: BadRequest Code: BadVendor

2015-09-15 11:10:29.736198 190.103.187.35:6633 -> 10.0.2.15:44950
OpenFlow Version: 1.0(1) Type: BarrierRes(19) Length: 8 XID: 3
3 OpenFlow Barrier Reply
Roadmap

• Version 0.2 – By Nov 15\textsuperscript{th} 2015
  – All OpenFlow 1.0 Types will be added
  – Read from Libpcap files
  – Logging specific FlowMod based on match and/or actions
  – Better documentation
  – Better code organization
  – Bugs fixes: “Ubuntu vs VirtualBox: timeout” and “unlock the terminal"

• Version 0.3 – By December 24\textsuperscript{th} 2015
  – Full OF 1.3 support
  – Output to log and Libpcap files at the same time

• Version 0.4 - ?
  – Integration with Flow Space Firewall (associate Switch with Controller)
  – More filters
  – Full NICIRA/OVS support
  – SSL/TLS support
  – Suggestions??
2015-09-15 08:33:18.349577 190.103.187.35:6633 -> 10.0.2.15:44835 Size: 362
OpenFlow Version: 1.0(1) Type: StatsRes(17) Length: 308  XID: 4
4 StatRes Type: Flow(1)
4 StatRes Length: 96 Table_id: 0 Pad: 0
4 StatRes  OpenFlow Match - wildcards: 3678447 dl_type: 0x806
4 StatRes  duration_sec: 372922, duration_nsec: 889000000, priority: 1, idle_timeout: 0, ha
4 StatRes Type: Flow(1)
4 StatRes Length: 96 Table_id: 0 Pad: 0
4 StatRes  OpenFlow Match - wildcards: 3678447 dl_type: 0x88cc
4 StatRes  duration_sec: 372922, duration_nsec: 889000000, priority: 100, idle_timeout: 0,
4 StatRes Type: Flow(1)
4 StatRes Length: 104 Table_id: 0 Pad: 0
4 StatRes  OpenFlow Match - wildcards: 3678455 dl_dst: 10:00:00:01:20:00
4 StatRes  duration_sec: 68231, duration_nsec: 128000000, priority: 32768, idle_timeout: 0,

https://github.com/jab1982/ofp_sniffer.git