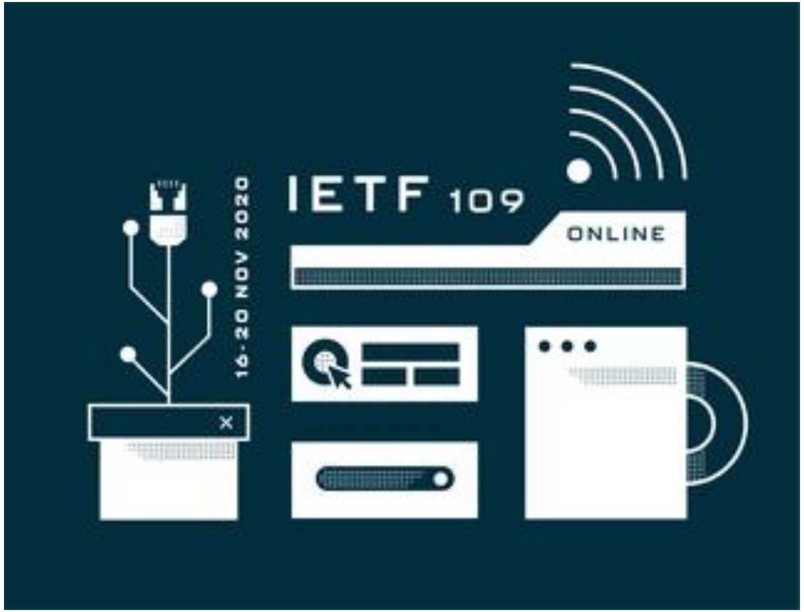
BMP & YANG

GROW and NETCONF WG

IETF 109

November 9-13th, 2020

Virtual Hackathon



BMP Hackathon - Plan

Functionality

- Test BMP BGP Local RIB to IPFIX metric correlation and interoperability between router and data-collection for peer and route monitoring for message type extensions defined in
  - draft-ietf-grow-bmp-local-rib (BGP Local RIB)
  - draft-grow-bmp-tlv (TLV support for BMP Route Monitoring and Peer Down Messages)
  - draft-lucente-grow-bmp-tlv-ebit (Support for Enterprise-specific TLVs)
  - draft-cppy-grow-bmp-path-marking-tlv (Path Marking TLV)
  - draft-xu-grow-bmp-route-policy-attr-trace (BGP Route Policy and Attribute Trace)
- Test BMP BGP Local RIB to IPFIX metric correlation with IE90 (BGP route-distinguisher).

Performance

- Test performance impact of BMP on router CPU/Memory resources and BGP route propagation with YANG push.

YANG Hackathon - Plan

Functionality

- Develop and test UDP-based Transport for Configured Subscriptions data export and collection.
- Collect the YANG schema tree of a YANG subscription, convert to JSON and register at Confluent JSON schema registry.
    - draft-ietf-netconf-udp-notif (UDP-based Transport for Configured Subscriptions)
    - draft-ietf-netconf-distributed-notif (Subscription to Distributed Notifications)

Hackathon – Software

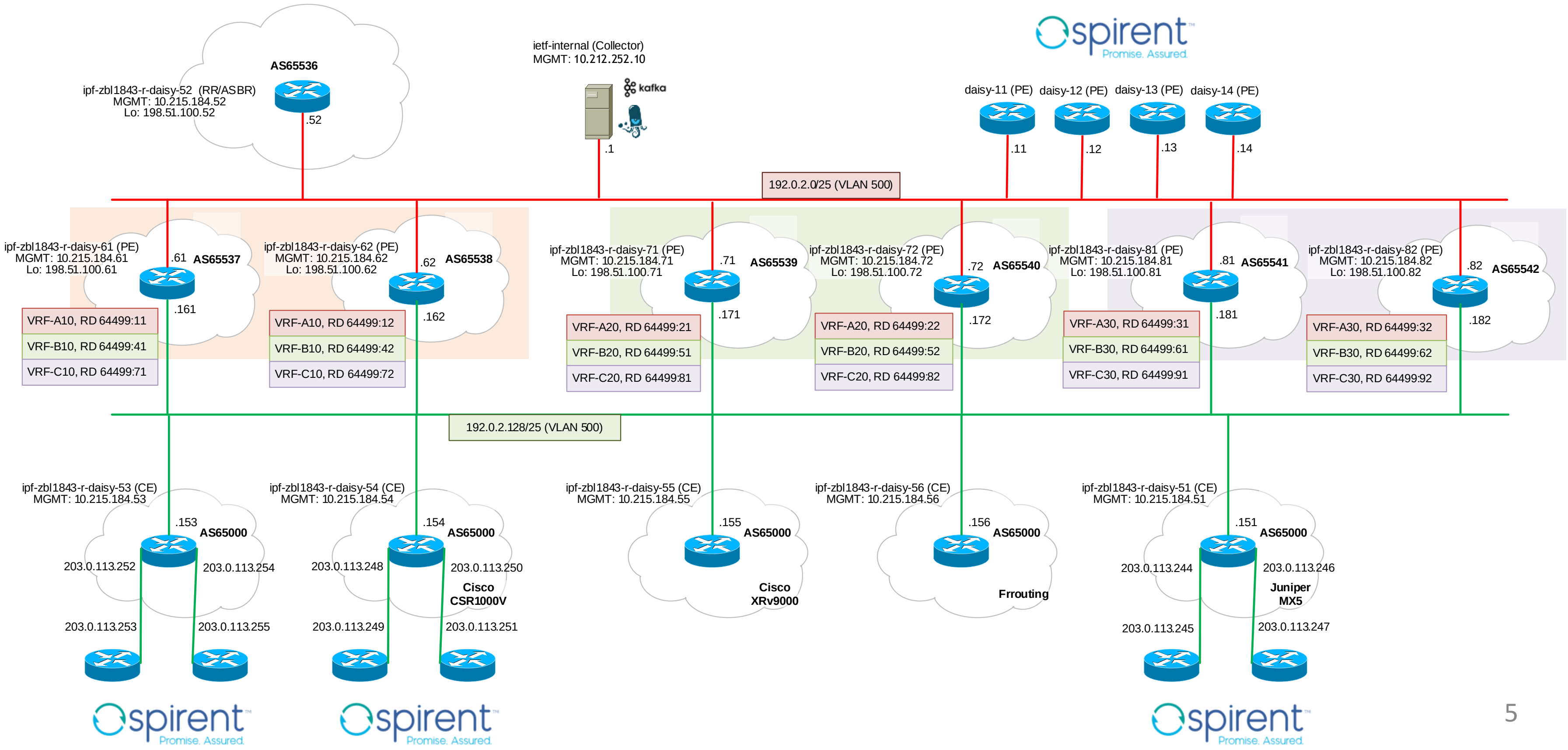
Software

- pmacct nfacctd for IPFIX and BMP data collection
- pmacct udp-notif for YANG push data collection
- ncclient to create subscription and collect YANG schema
- Apache Kafka as message broker
- Apache Druid as timeseries DB
- Pivot as user interface
- Wireshark BMP dissector for packet analysis
- Spirent Testcenter for BGP VPnv4/6 route and IPV4/6 traffic generation

Tutorial

- https://imply.io/post/add-bgp-analytics-to-your-imply-netflow-analysis

Hackathon - Network



Swisscom – lab environment

Achievements

- Cisco IOS XR and XE, Juniper Junos and frrouting in the topology for IPFIX and BMP added
- YANG recursive schema collection with netconf <get-schema>, JSON conversion and schema registration.

Gaps Identified

- Big Data test setup needs to be scaled to accommodate peaks at BMP and YANG push stress tests.

Next Steps

- Optimize and increase the parallelization of time series data ingestion.

Pmacct – nfacctd/udp-notif

BMP Achievements

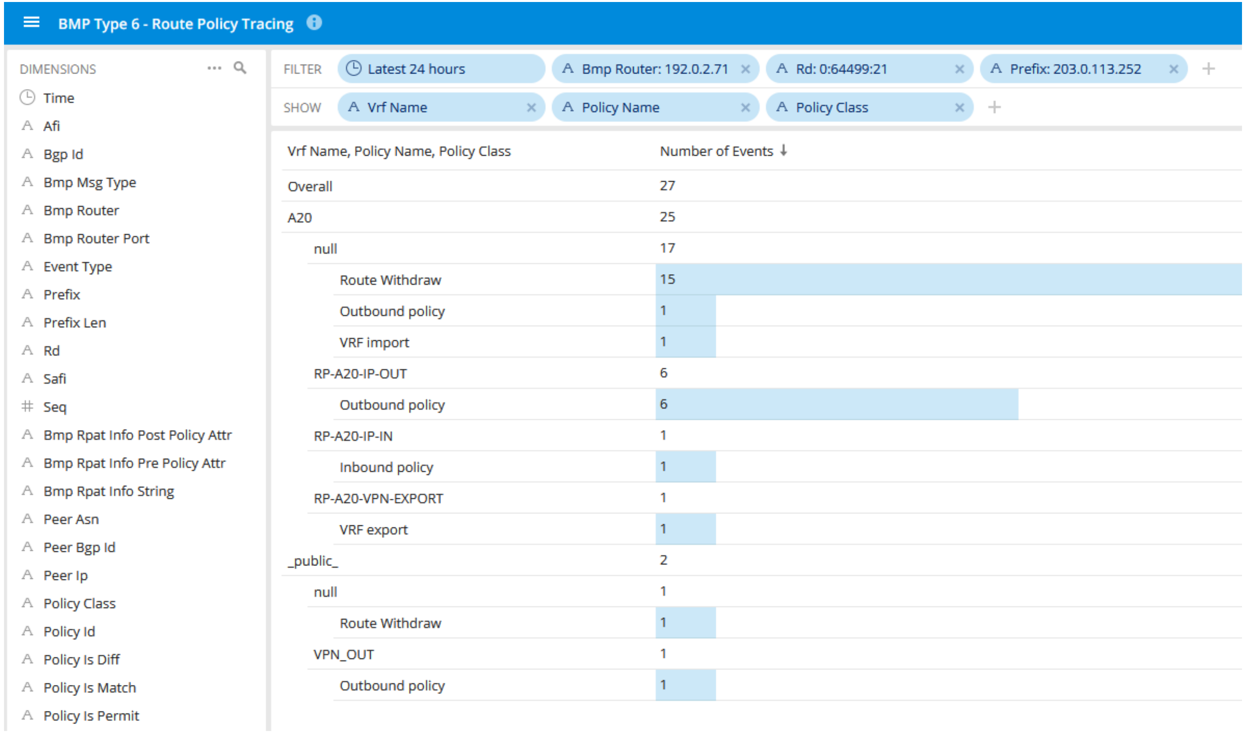
- 3 of 5 TLV's decoded of draft-xu-grow-bmp-route-policy-attr-trace
- 1 of 1 TLV decoded of draft-cppy-grow-bmp-path-marking-tlv
- BMP BGP Local RIB to IPFIX data correlation with IPFIX IE90 (BGP route-distinguisher) attribute.

YANG Achievements

- Support of draft-ietf-netconf-udp-notif

https://github.com/pmacct/pmacct/

BMP route-policy attribute tracing



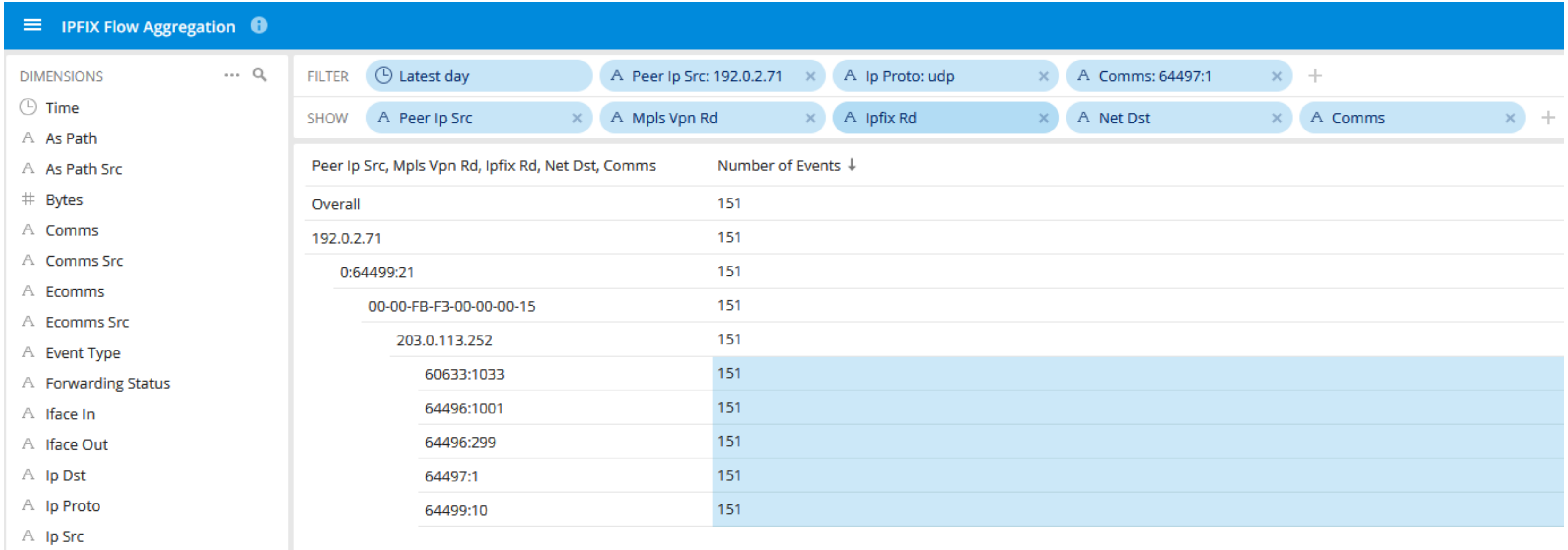
FILTER: Latest 24 hours | Bmp Router: 192.0.2.71 | Rd: 0:64499:21 | Prefix: 203.0.113.252

SHOW: Vrf Name | Policy Name | Policy Class

Vrf Name, Policy Name, Policy Class	Number of Events ↓
Overall	27
A20	25
null	17
Route Withdraw	15
Outbound policy	1
VRF import	1
RP-A20-IP-OUT	6
Outbound policy	6
RP-A20-IP-IN	1
Inbound policy	1
RP-A20-VPN-EXPORT	1
VRF export	1
public	2
null	1
Route Withdraw	1
VPN_OUT	1
Outbound policy	1

On a MPLS PE router for a particular VPNv4 prefix which route-policies and attachment points were involved

BMP BGP Local RIB with IPFIX Correlation



IPFIX Flow Aggregation

DIMENSIONS

- Time
- As Path
- As Path Src
- Bytes
- Comms
- Comms Src
- Ecomms
- Ecomms Src
- Event Type
- Forwarding Status
- Iface In
- Iface Out
- Ip Dst
- Ip Proto
- Ip Src

FILTER: Latest day | Peer Ip Src: 192.0.2.71 | Ip Proto: udp | Comms: 64497:1

SHOW: Peer Ip Src | Mpls Vpn Rd | Ipfix Rd | Net Dst | Comms

Peer Ip Src, Mpls Vpn Rd, Ipfix Rd, Net Dst, Comms	Number of Events ↓
Overall	151
192.0.2.71	151
0:64499:21	151
00-00-FB-F3-00-00-00-15	151
203.0.113.252	151
60633:1033	151
64496:1001	151
64496:299	151
64497:1	151
64499:10	151

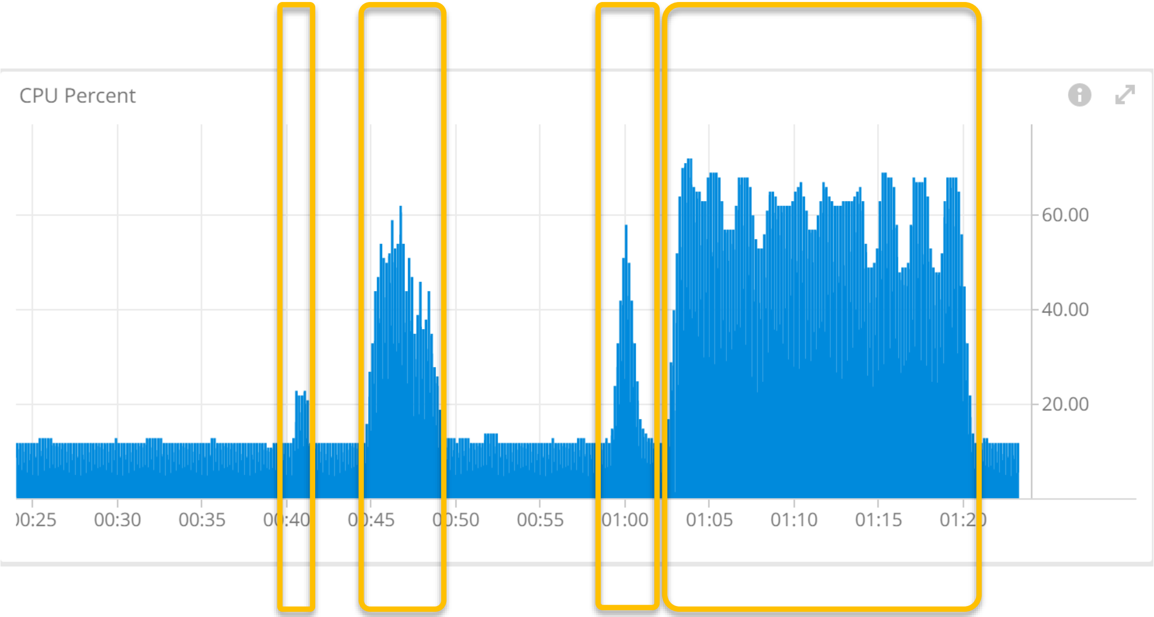
UDP Testflow between two IPv4 Addresses with
BMP BGP Local RIB dimensions measured on MPLS PE in a VRF

Huawei - VRP

Achievements

- Supporting latest path status of draft-cppy-grow-bmp-path-marking-tlv-07
- Supporting latest route-policy attribute tracing draft-xu-grow-bmp-route-policy-attr-trace-05
- Supporting draft-ietf-netconf-udp-notif-01 and draft-ietf-netconf-distributed-notif-01
- Test and compare CPU and memory usage with and without BMP in stress tests with 100'000, 500'000 and 1'000'000 BGP VPNv4 routes.

BMP Stress Test – CPU usage



Dataset 1
BMP disabled

Dataset 1
BMP enabled

Dataset 2
BMP disabled

Dataset 2
BMP enabled

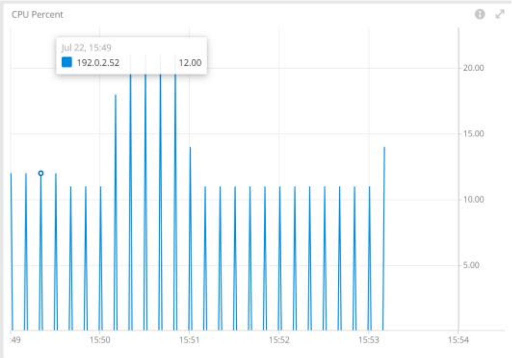
CPU usage monitoring of 192.0.2.52

Dataset:

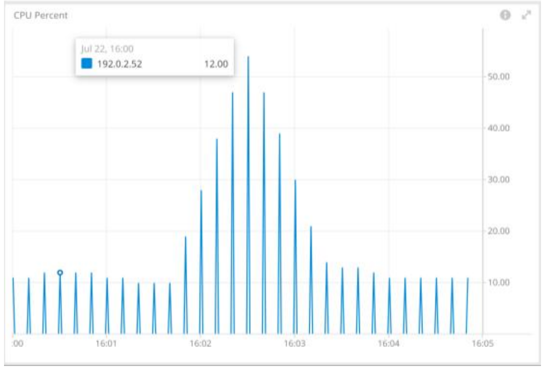
- Dataset 1: 100K routes from Spirent
- Dataset 2: 500K routes from Spirent

BMP Stress Test – CPU usage

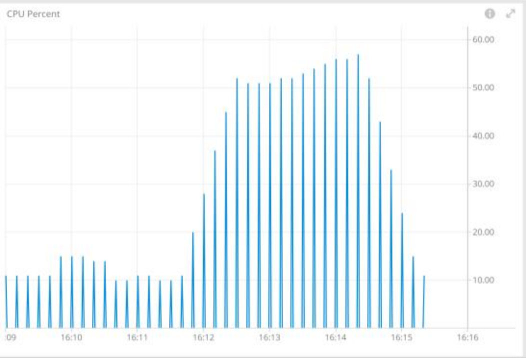
Before BMP enabled: 100K routes adv.



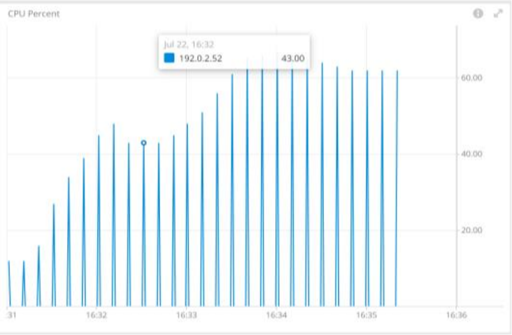
Before BMP enabled: 500K routes adv.



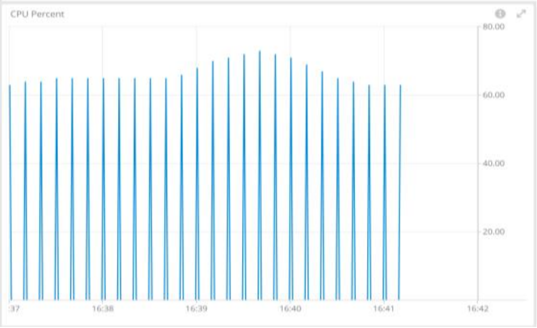
Before BMP enabled: 1000K routes adv.



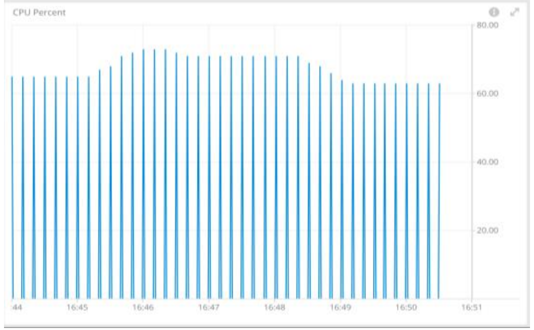
After BMP enabled: 100K routes adv.



After BMP enabled: 500K routes adv.



After BMP enabled: 1000K routes adv.



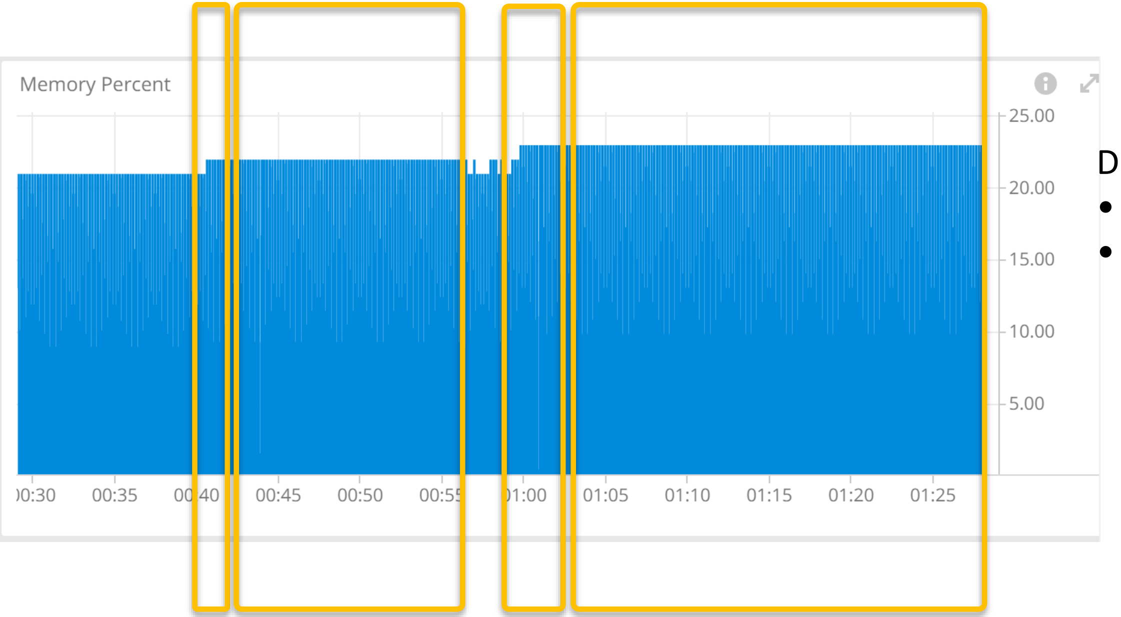
BMP Stress Test – Memory Usage

Dataset 1
BMP disabled

Dataset 1
BMP enabled

Dataset 2
BMP disabled

Dataset 2
BMP enabled



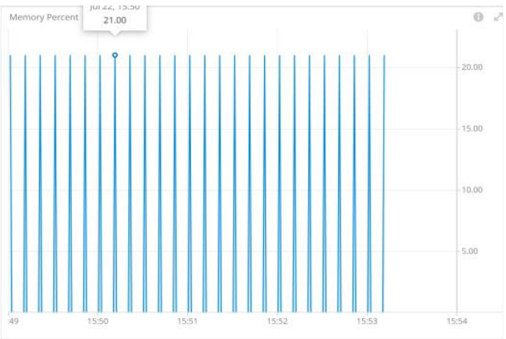
Memory usage monitoring of 192.0.2.52

Dataset:

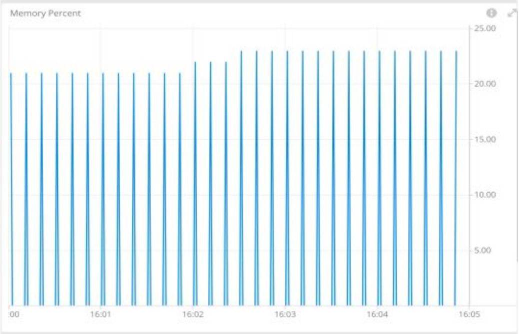
- Dataset 1: 100K routes from Spirent
- Dataset 2: 500K routes from Spirent

BMP Stress Test – Memory Usage

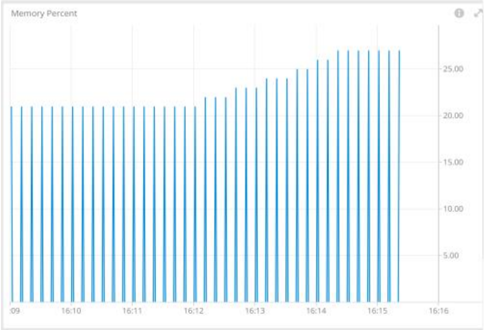
Before BMP enabled: 100K routes adv.



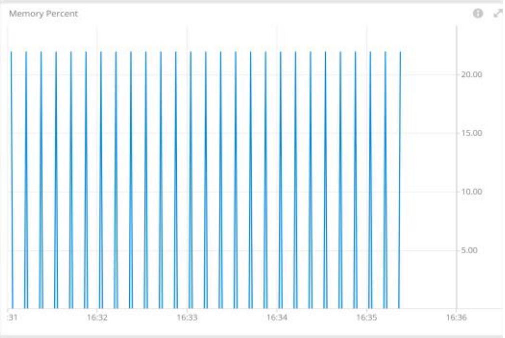
Before BMP enabled: 500K routes adv.



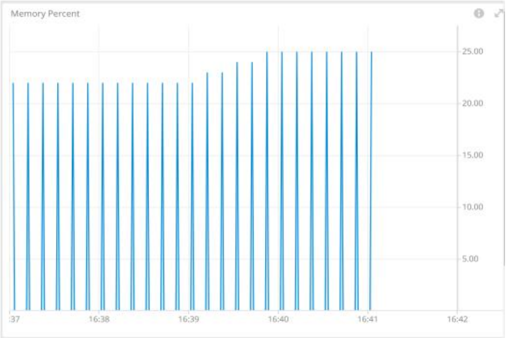
Before BMP enabled: 1000K routes adv.



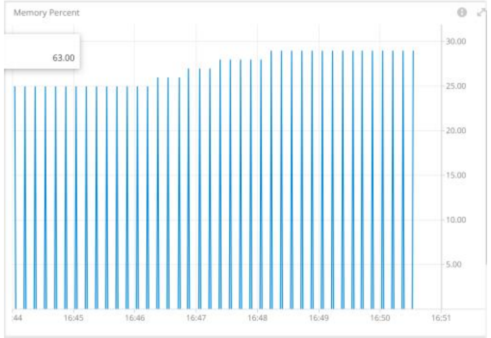
After BMP enabled: 100K routes adv.



After BMP enabled: 500K routes adv.



After BMP enabled: 1000K routes adv.



Wireshark – Dissector

Achievements

- Ongoing work on supporting draft-cppy-grow-bmp-path-marking-tlv-07
- Ongoing work on supporting draft-ietf-netconf-udp-notif

Next Steps

- Validate dissector and commit in next Wireshark release.

What we learned

- Good
  - With the 4th hackathon, nice team collaboration and good spirit.
  - Slack helped to keep connected through different time zones.
- Bad
  - Yet again, missing beers and cocktails after ☺

Thanks to…

- Alexis La Goutte – Wireshark
- Uli Heilmeier – Wireshark
- Pierre Francois – INSA
- Stephane Frenot – INSA
- Tom Sampic – INSA
- Axel Rosennstiehl – INSA
- Anurag Prakash - Ciena
- Kian Jones - CENGN
- Yunan Gu - Huawei
- Binyang Huang – Huawei
- Tianran Zhou - Huawei
- Paolo Lucente – NTT
- Marco Tollini - Swisscom
- Raphaël Barazzutti - Swisscom
- Matthias Arnold - Swisscom
- Thomas Graf - Swisscom

…Imply for providing us the big data and Huawei for the network environment.