Swisscom: Network Incident Network Analytics Postmortem

Describes an incident in terms of
what happened,
which operational metrics where available,
which analytical metrics described the symptoms and
what improvements in the network anomaly detection
system and network telemetry protocols are proposed.

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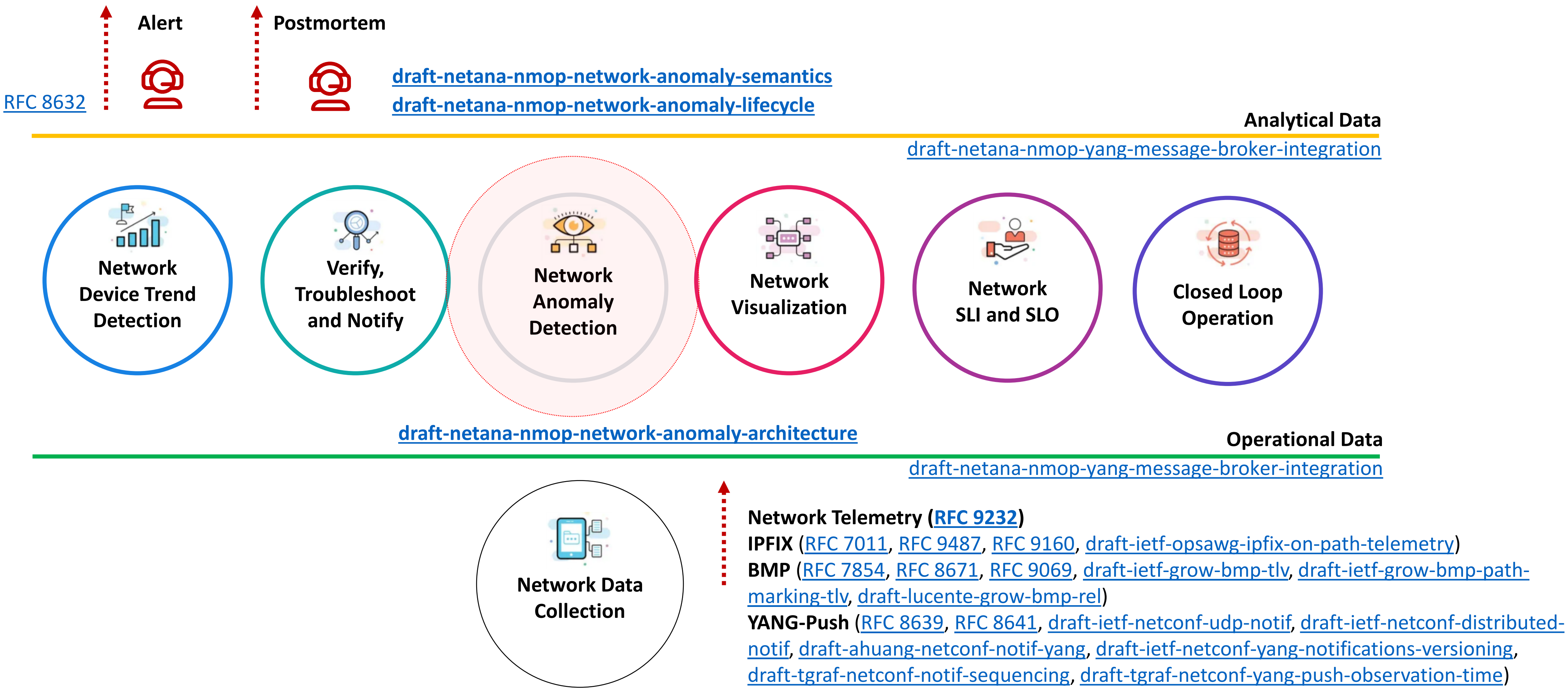
01. March 2025

Data Mesh organizes Data in Organizations

Enables Network Analytics use cases



Alert

Postmortem

RFC 8632

draft-netana-nmop-network-anomaly-semantics

draft-netana-nmop-network-anomaly-lifecycle

Analytical Data

draft-netana-nmop-yang-message-broker-integration

Network Device Trend Detection

Verify, Troubleshoot and Notify

Network Anomaly Detection

Network Visualization

Network SLI and SLO

Closed Loop Operation

draft-netana-nmop-network-anomaly-architecture

Operational Data

draft-netana-nmop-yang-message-broker-integration

Network Data Collection

Network Telemetry (RFC 9232)

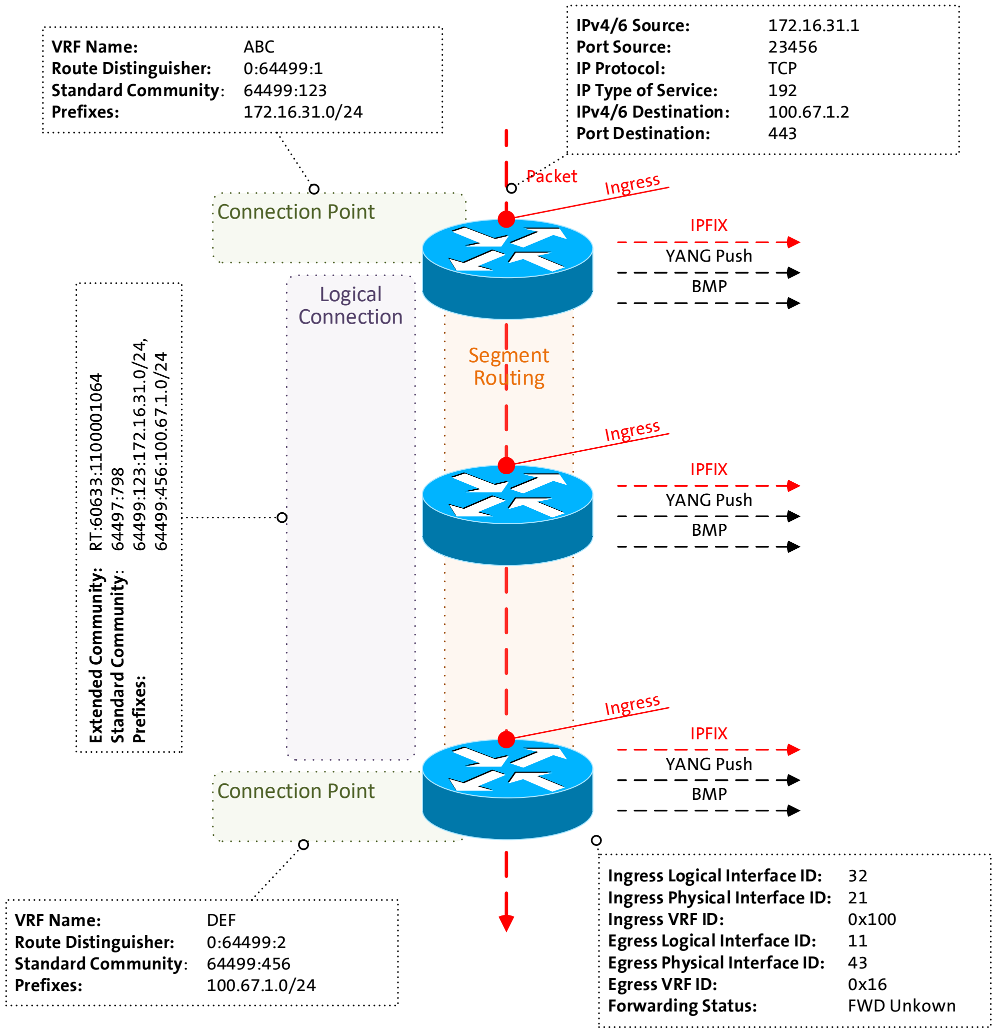
IPFIX (RFC 7011, RFC 9487, RFC 9160, draft-ietf-opsawg-ipfix-on-path-telemetry)

BMP (RFC 7854, RFC 8671, RFC 9069, draft-ietf-grow-bmp-tlv, draft-ietf-grow-bmp-path-marking-tlv, draft-lucente-grow-bmp-rel)

YANG-Push (RFC 8639, RFC 8641, draft-ietf-netconf-udp-notif, draft-ietf-netconf-distributed-notif, draft-ahuang-netconf-notif-yang, draft-ietf-netconf-yang-notifications-versioning, draft-tgraf-netconf-notif-sequencing, draft-tgraf-netconf-yang-push-observation-time)

Monitoring L3 VPN's with IPFIX, BMP and YANG Push

From Connectivity Service to Realtime Network Analytics



VRF Name:	ABC
Route Distinguisher:	0:64499:1
Standard Community:	64499:123
Prefixes:	172.16.31.0/24

IPv4/6 Source:	172.16.31.1
Port Source:	23456
IP Protocol:	TCP
IP Type of Service:	192
IPv4/6 Destination:	100.67.1.2
Port Destination:	443

Extended Community:	RT:60633:1100001064
Standard Community:	64497:798
Prefixes:	64499:123:172.16.31.0/24, 64499:456:100.67.1.0/24

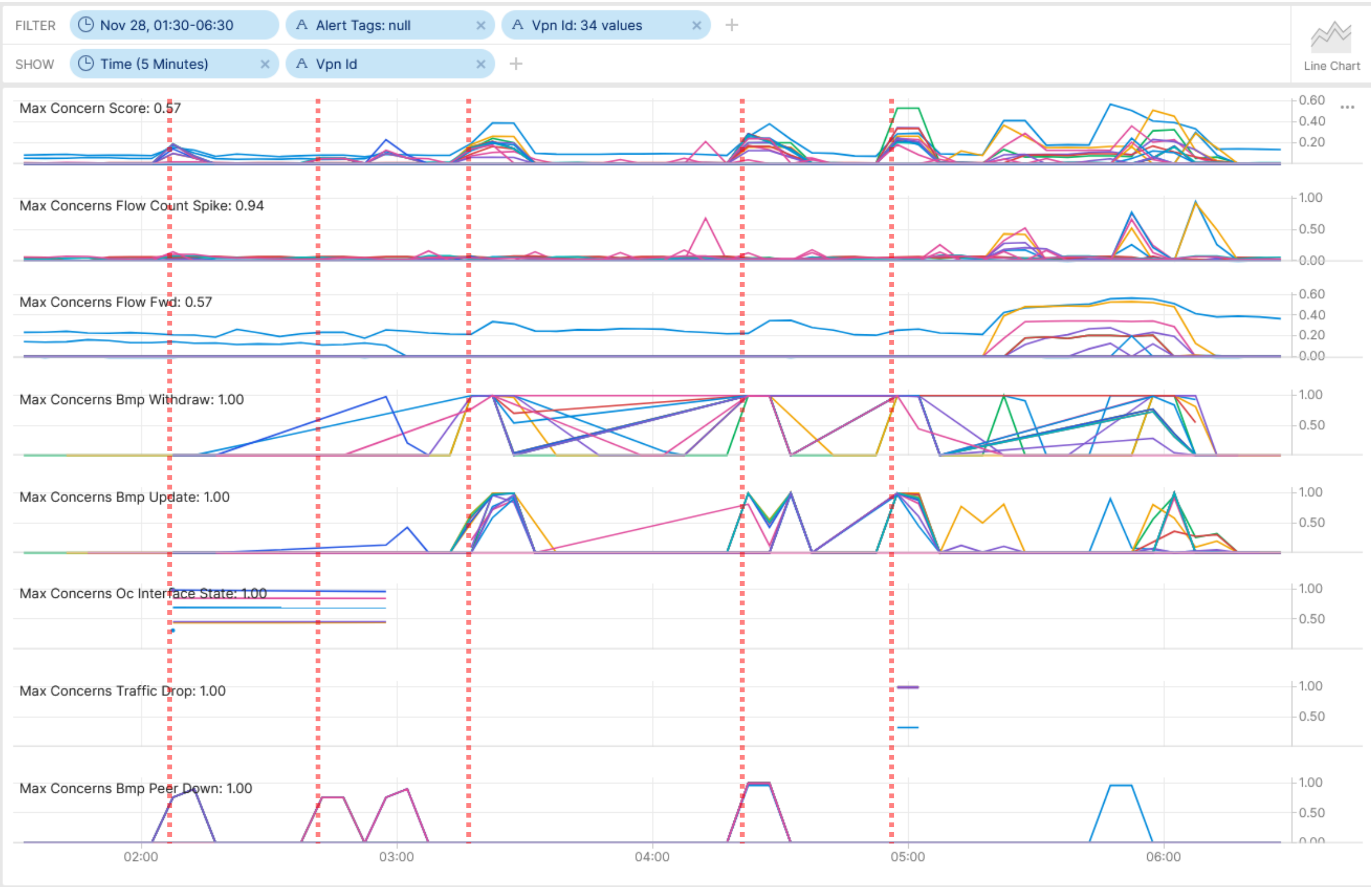
VRF Name:	DEF
Route Distinguisher:	0:64499:2
Standard Community:	64499:456
Prefixes:	100.67.1.0/24

Ingress Logical Interface ID:	32
Ingress Physical Interface ID:	21
Ingress VRF ID:	0x100
Egress Logical Interface ID:	11
Egress Physical Interface ID:	43
Egress VRF ID:	0x16
Forwarding Status:	FWD Unkown

- **Connectivity Service perspective,** Connection Points are connected through Logical Connections.
- **From a BGP control-plane perspective,** IPv4/6 unicast prefixes in VRF's are tagged with BGP standard communities.
  - One BGP standard community to identify the Logical Connection. One BGP standard community to identify each Connection Point.
  - When IPv4/6 prefixes are exported from VRF's, a BGP route-distinguisher, BGP extended community route-targets and a SRv6 VPN SID for the IPv6 next-hop are allocated.
- **From a forwarding plane perspective,** when IPv4/6 unicast traffic is received from the edge at the SRv6 PE, a lookup is performed, the SRv6 VPN SID is obtained and IPv6 next-hop is added when forwarded to the core.
- **Swisscom collects** MPLS and SRv6 provider data plane, IPv4/6 unicast customer data-plane in IPFIX and at provider edge BGP VPNv4/6 unicast **in production** to perform real-time data correlation.

SRv6 Resilience Analysis & Tests in Production

SRv6 Blackholing



FILTER: Nov 28, 01:30-06:30 | Alert Tags: null | Vpn Id: 34 values

SHOW: Time (5 Minutes) | Vpn Id

Cosmos Bright Lights monitoring 34 L3 VPN's in real-time during maintenance window – Pivot Link

Between 02:05-08 AM, use case 1, physical links on ipt-zhb790-a-des-01 Bundle-Ether10011 (**CE facing interface** to TC-GW Inter-AS Option A) had been disconnected. Interface and BGP peering state changes, BGP topology changes and interface traffic shift were observed **and not alerted.**

Between 02:56-59 AM, use case 2, physical links on ipt-zhb790-a-des-01 Bundle-Ether10031 (**CE facing interface** to MV-GW Inter-AS Option A) had been disconnected. Interface and BGP peering state changes, BGP topology changes and interface traffic shift were observed **and not alerted.**

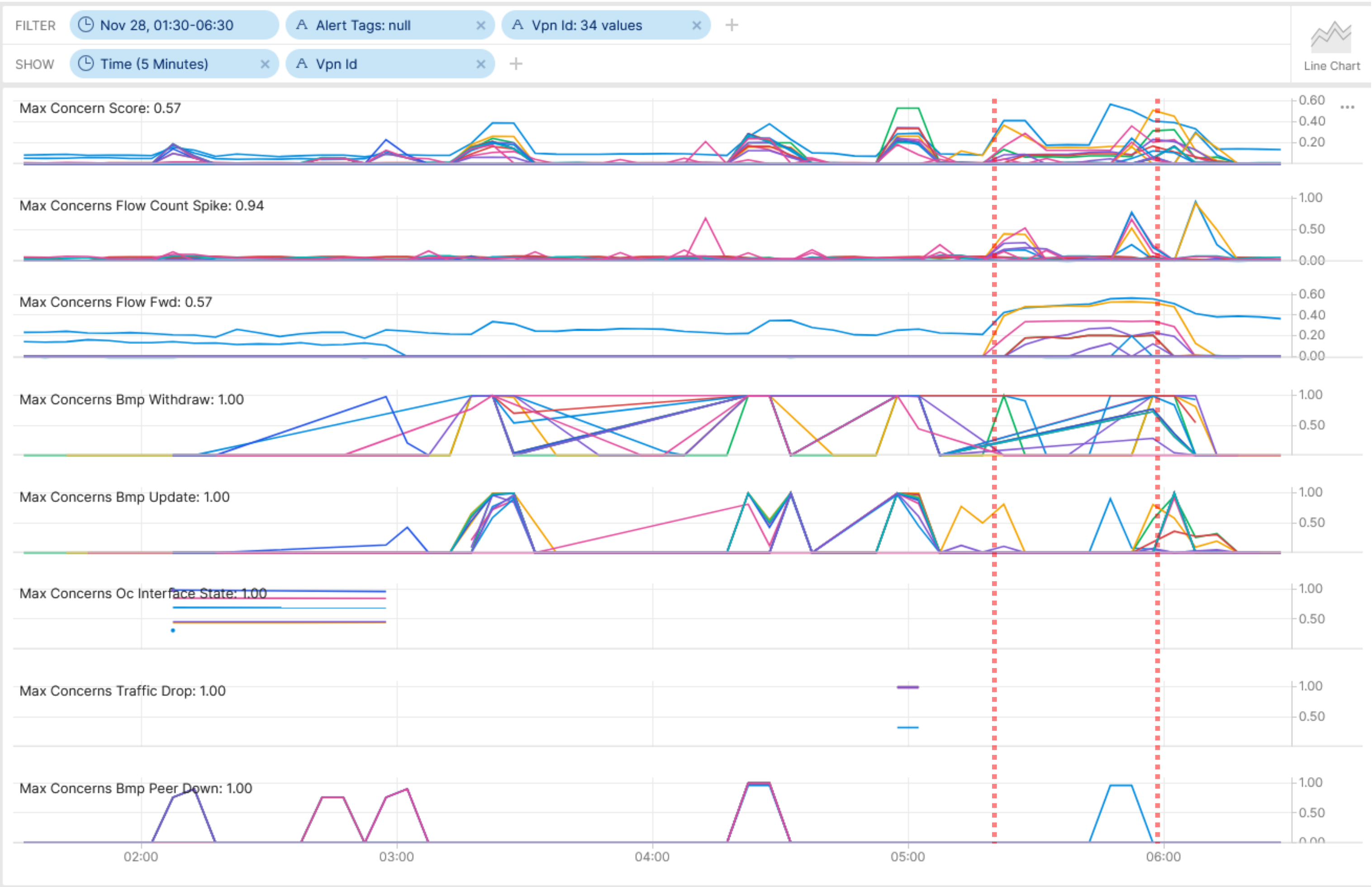
Between 03.17-24 AM, use case 3, physical links on ipt-zhb790-a-des-02 Bundle-Ether2000 and Bundle-Ether2100 (**P ABR facing**) had been disconnected. Interface state changes, BGP topology changes and interface traffic shift were observed **and alerted**.

Between 04:22-30 AM, use case 4, BGP process was terminated and restarted at ipt-zhb790-a-des-02 (**PE node** Inter-AS Option A to SMEN) had been disconnected. BGP peering state changes, BGP topology changes and interface traffic shift were observed **and alerted**.

Between 04:53-57 AM, use case 5, IS-IS process was terminated and restarted at ipt-zhb790-a-des-02 (**PE node** Inter-AS Option A to SMEN) had been disconnected. BGP topology changes, traffic drop and interface traffic shift were observed **and alerted**.

SRv6 Resilience Analysis & Tests in Production

SRv6 Blackholing



FILTER: Nov 28, 01:30-06:30 | Alert Tags: null | Vpn Id: 34 values

SHOW: Time (5 Minutes) | Vpn Id

Line Chart
Max Concern Score: 0.57
0.60
0.40
0.20
Max Concerns Flow Count Spike: 0.94
1.00
0.50
0.00
Max Concerns Flow Fwd: 0.57
0.60
0.40
0.20
0.00
Max Concerns Bmp Withdraw: 1.00
1.00
0.50
Max Concerns Bmp Update: 1.00
1.00
0.50
Max Concerns Oc Interface State: 1.00
1.00
0.50
Max Concerns Traffic Drop: 1.00
1.00
0.50
Max Concerns Bmp Peer Down: 1.00
1.00
0.50
0.00
02:00
03:00
04:00
05:00
06:00

Cosmos Bright Lights monitoring 34x L3 VPN's in real-time during maintenance window – Pivot Link

At 05:17 AM, use case 6, RSP failover at ipt-zhb790-a-des-02 (**PE node** Inter-AS Option A to SMEN) was been performed. **Missing traffic and NPU "IPv6 next-hop index invalid transmit adjacency" drops were observed** **and alerted**.

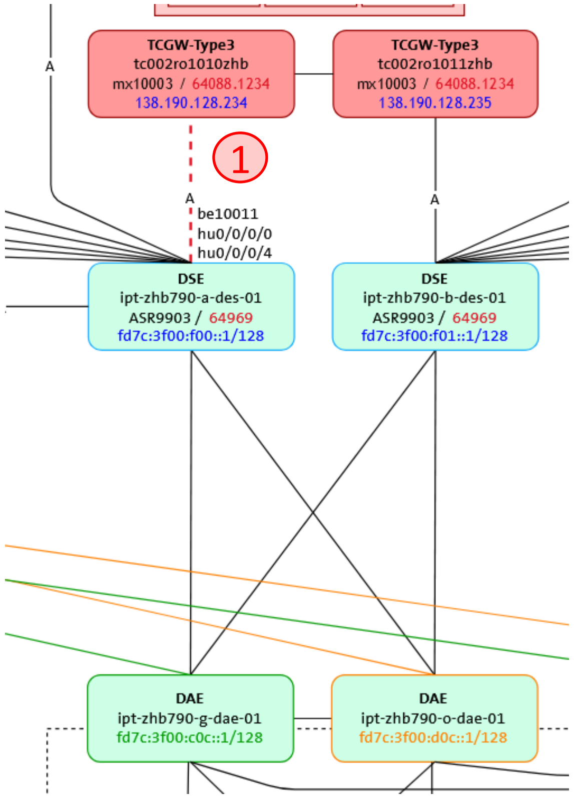
At 05:43 and 05:47 AM, BGP peerings at pt-zhb790-a-des-02 (**PE node** Inter-AS Option A to SMEN) were being reset to update BGP routing tables. Along BGP peering state and topology changes, Missing traffic and NPU "IPv6 next-hop index invalid transmit adjacency" drops **were still unchanged observed and alerted**.

At 06:00 AM, ipt-zhb790-a-des-02 Bundle-Ether2000 and Bundle-Ether2100 (**P ABR facing**) were being shutdown. Missing traffic and NPU "IPv6 next-hop index invalid transmit adjacency" **drops were no longer observed and traffic shifted to redundant ipt-zhh790-b-des-02.**

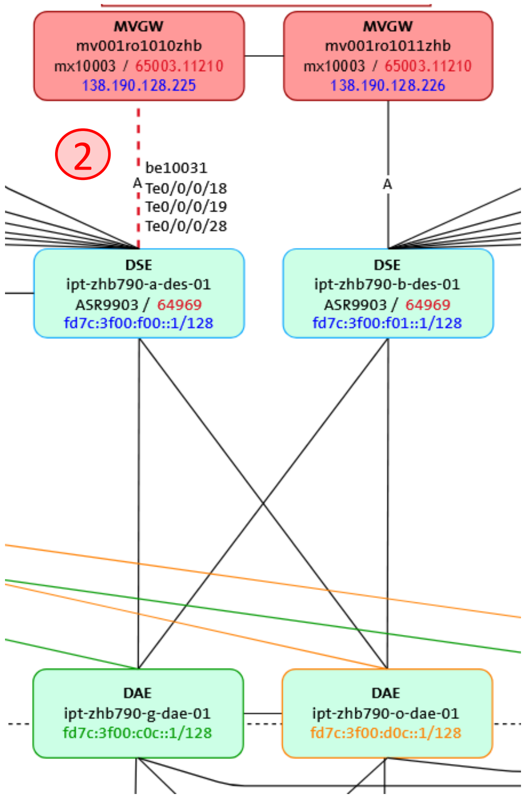
At 06:54 AM, Cisco TAC SR 698355511 case has been opened to investigate traffic blackholing after RSP fail back.

SRv6 Resilience Analysis & Tests in Production

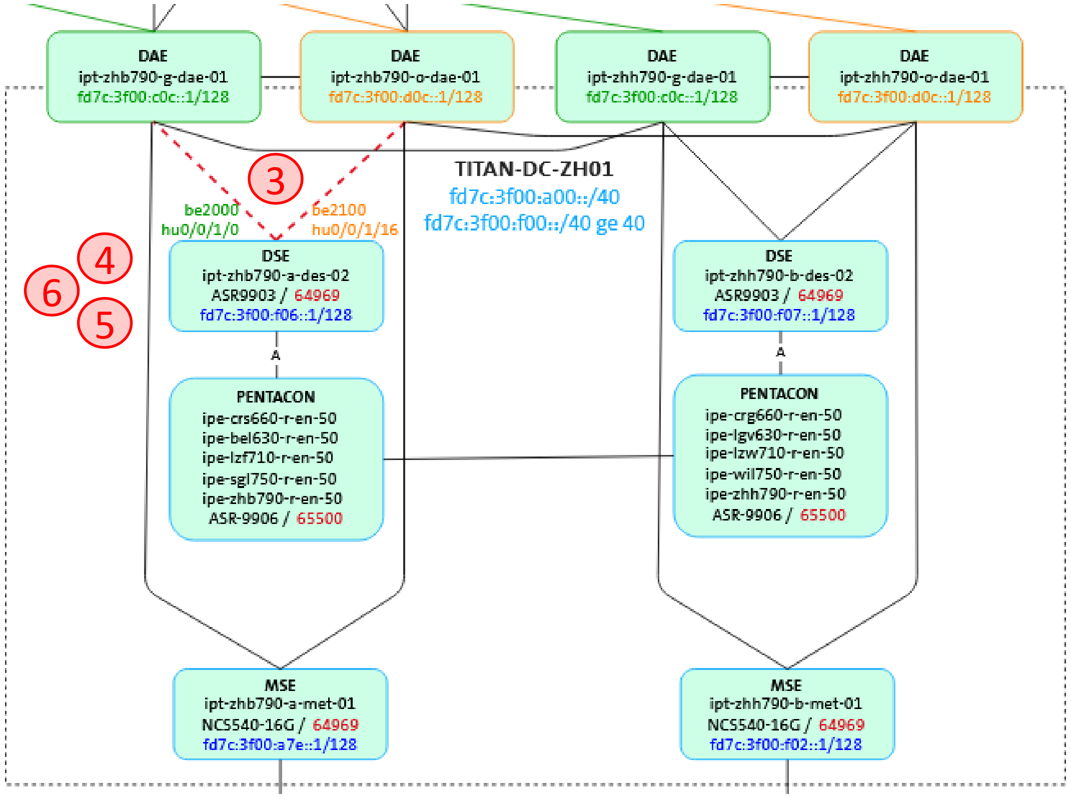
L1-3 Topology



Use Case 1, Edge Facing Link State Change



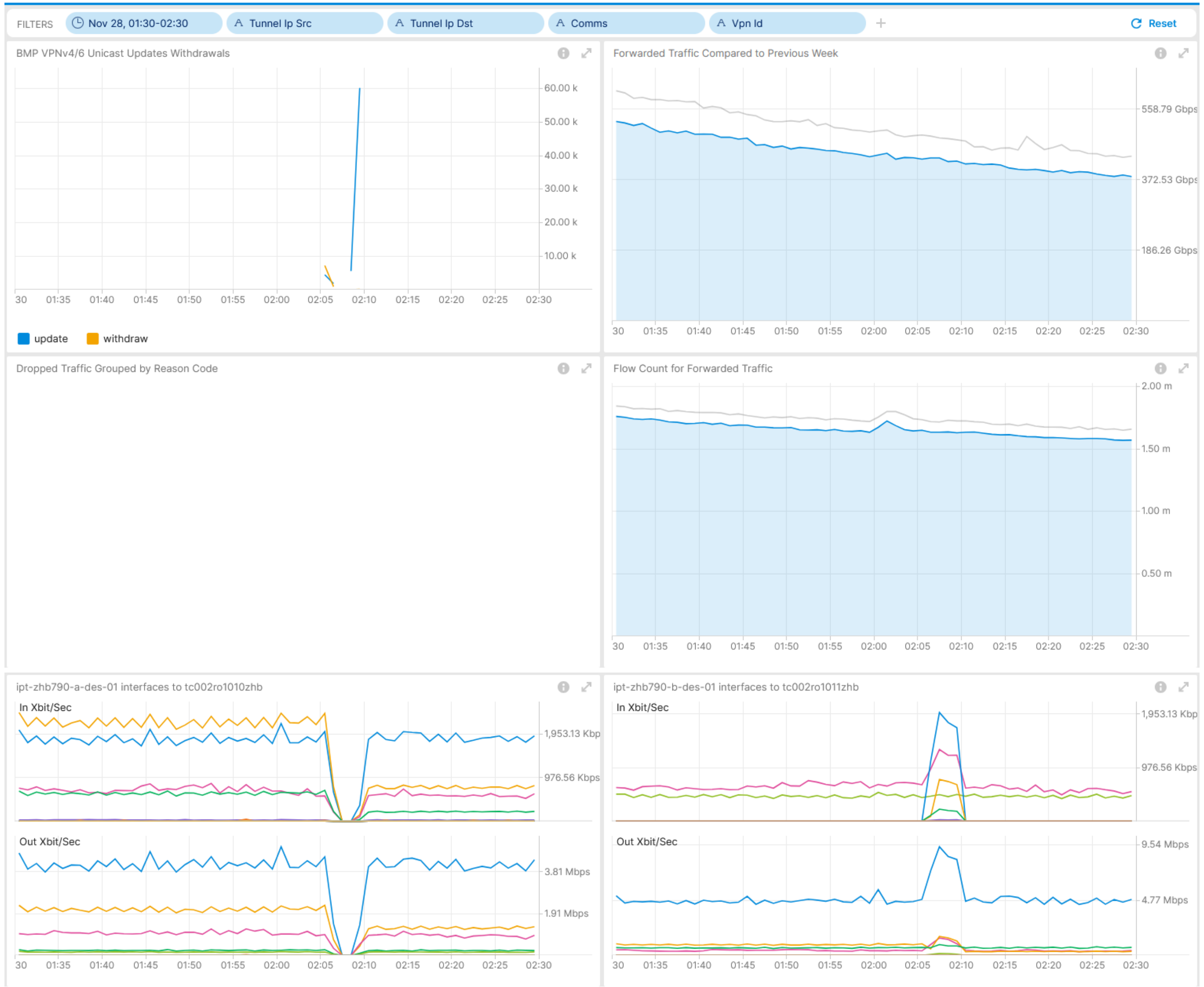
Use Case 2, Edge Facing Link State Change



Use Case 3, Core Facing Link State Change
Use Case 4, BGP Process Restart
Use Case 5, IS-IS Process Restart
Use Case 6, RSP Failover

November 28th, SRv6 Resilience Analysis & Tests in Production

Use Case 1 – Inter-AS Option A Interface State Change – Real-Time Maintenance Window Analysis



Shows BGP topology change and no traffic volume change. Measured with IPFIX and Correlated with BMP Local RIB.

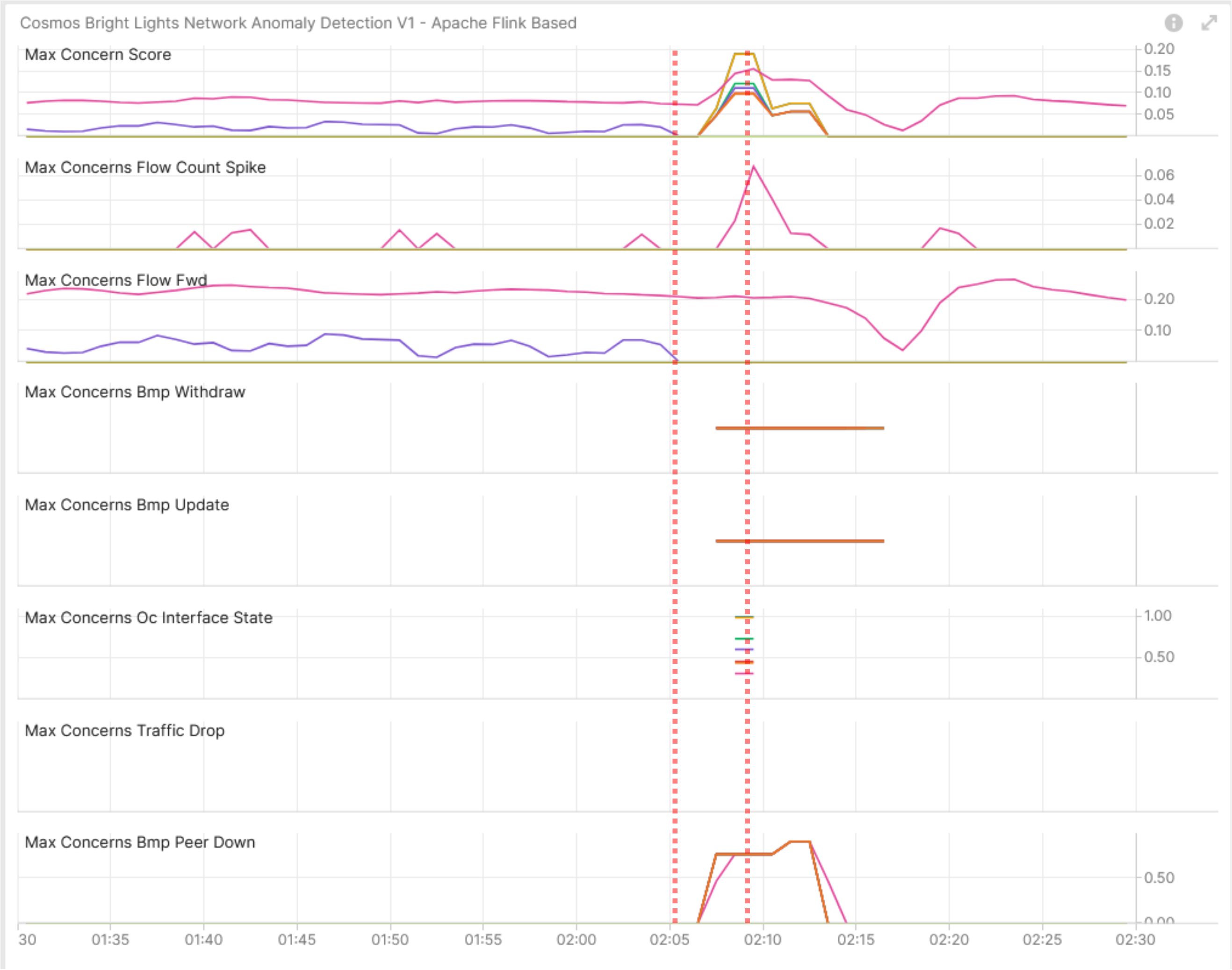
Shows flow count spike due to BGP topology change. Measured with IPFIX and Correlated with BMP Local RIB.

Shows traffic shift among Inter-AS Option A ASBR's. Measured with YANG-Push openconfig-interface.yang.

Operational Network Telemetry forwarding plane, YANG-Push, IPFIX, BMP and BGP measured control plane metrics

November 28th, SRv6 Resilience Analysis & Tests in Production

Use Case 1 – Network Anomaly Detection – Live



Cosmos Bright Lights Anomaly Detection – 8x L3 VPN's

Concern Score: 0.19
Flow Count Spike: **0.07**
Missing Traffic: **0.26**
Traffic Drop: **0.00**
BMP Peer/Interface Down: **0.91/0.99**
BMP Update/Withdrawal: **0.00/0.00**

BMP route-monitoring Update/Withdraw check did not recognize topology change.

BMP peer Down/Up check recognized BGP peering state change.

Interface Down/Up check recognized Interface state change.

Traffic Drop spike recognized did not apply.

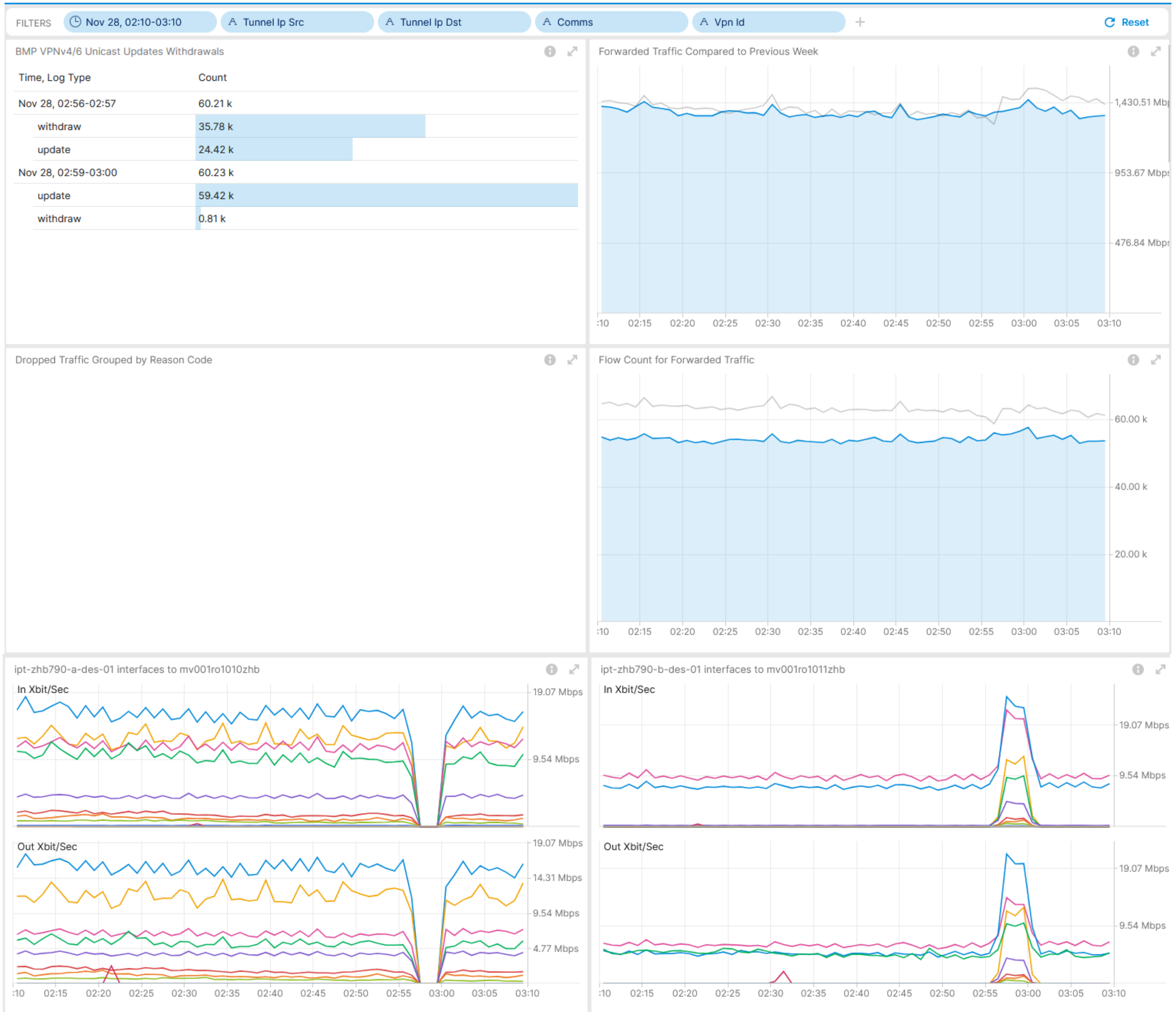
Missing Traffic check recognized long term traffic loss on 64498:2949.

Increased or decreased Flow Count check did recognize flow spike decrease.

Overall: 4 out of 6 checks have detected the Interface and BGP topology change and flow count spike. Why BGP topology changes were not identified needs to be investigated.

November 28th, SRv6 Resilience Analysis & Tests in Production

Use Case 2 – Inter-AS Option A Interface State Change – Real-Time Maintenance Window Analysis



FILTERS: Nov 28, 02:10-03:10 | Tunnel Ip Src | Tunnel Ip Dst | Comms | Vpn Id | Reset

BMP VPNv4/6 Unicast Updates Withdrawals

Time, Log Type	Count
Nov 28, 02:56-02:57	60.21 k
withdraw	35.78 k
update	24.42 k
Nov 28, 02:59-03:00	60.23 k
update	59.42 k
withdraw	0.81 k

Forwarded Traffic Compared to Previous Week

Dropped Traffic Grouped by Reason Code

Flow Count for Forwarded Traffic

ipt-zhb790-a-des-01 interfaces to mv001ro1010zhb

ipt-zhb790-b-des-01 interfaces to mv001ro1011zhb

Shows BGP topology change and no traffic volume change. Measured with IPFIX and Correlated with BMP Local RIB.

Shows no flow count change. Measured with IPFIX and Correlated with BMP Local RIB.

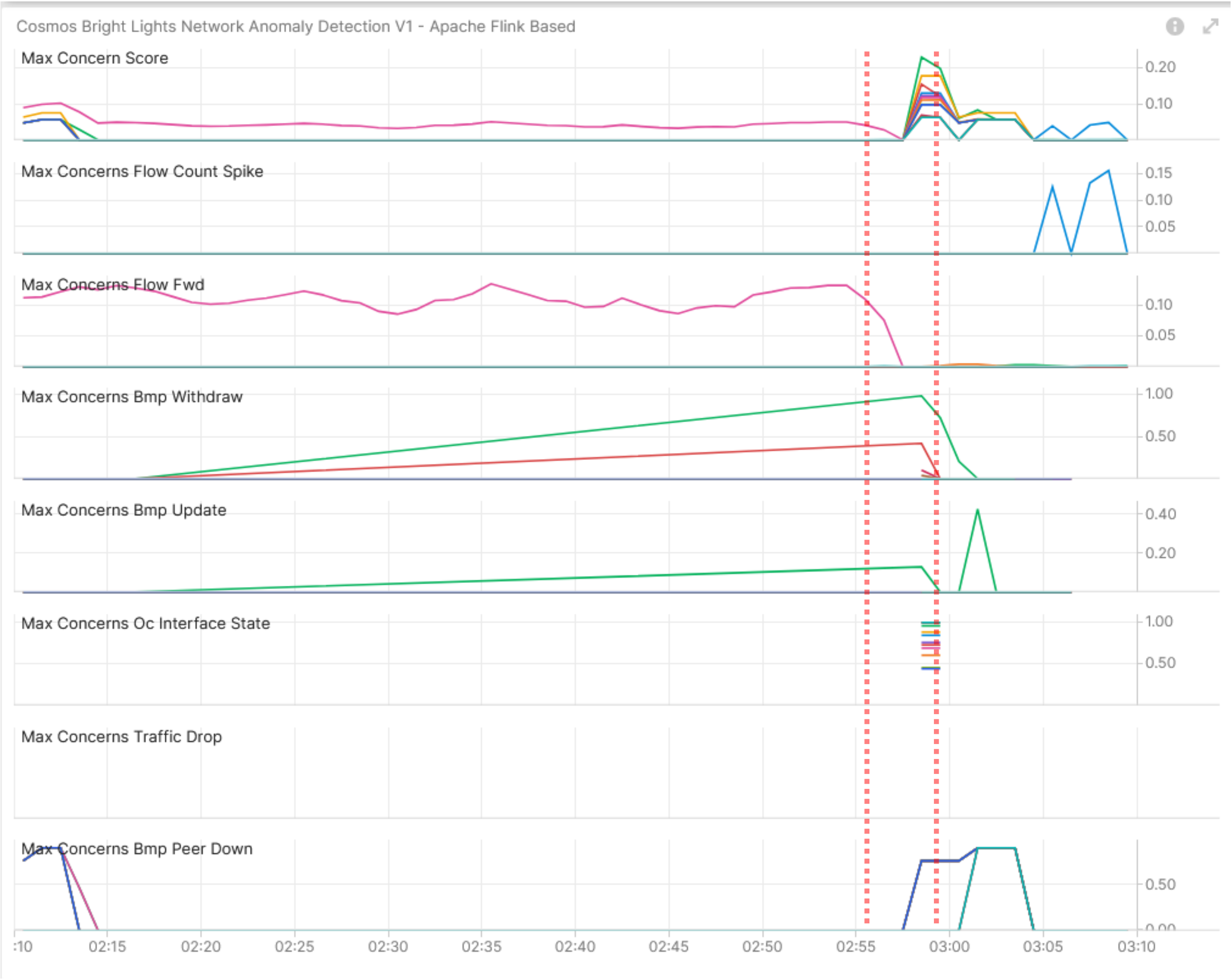
Shows traffic shift among Inter-AS Option A ASBR's. Measured with YANG-Push openconfig-interface.yang.

Operational Network Telemetry forwarding plane, YANG-Push, IPFIX, BMP and BGP measured control plane metrics.

November 28th, SRv6 Resilience Analysis & Tests in Production

Use Case 2 – Network Anomaly Detection – Live

Concern Score: 0.23
Flow Count Spike: **0.16**
Missing Traffic: **0.00**
Traffic Drop: **0.00**
BMP Peer/Interface Down: **0.91/1.00**
BMP Update/Withdrawal: **0.43/0.98**

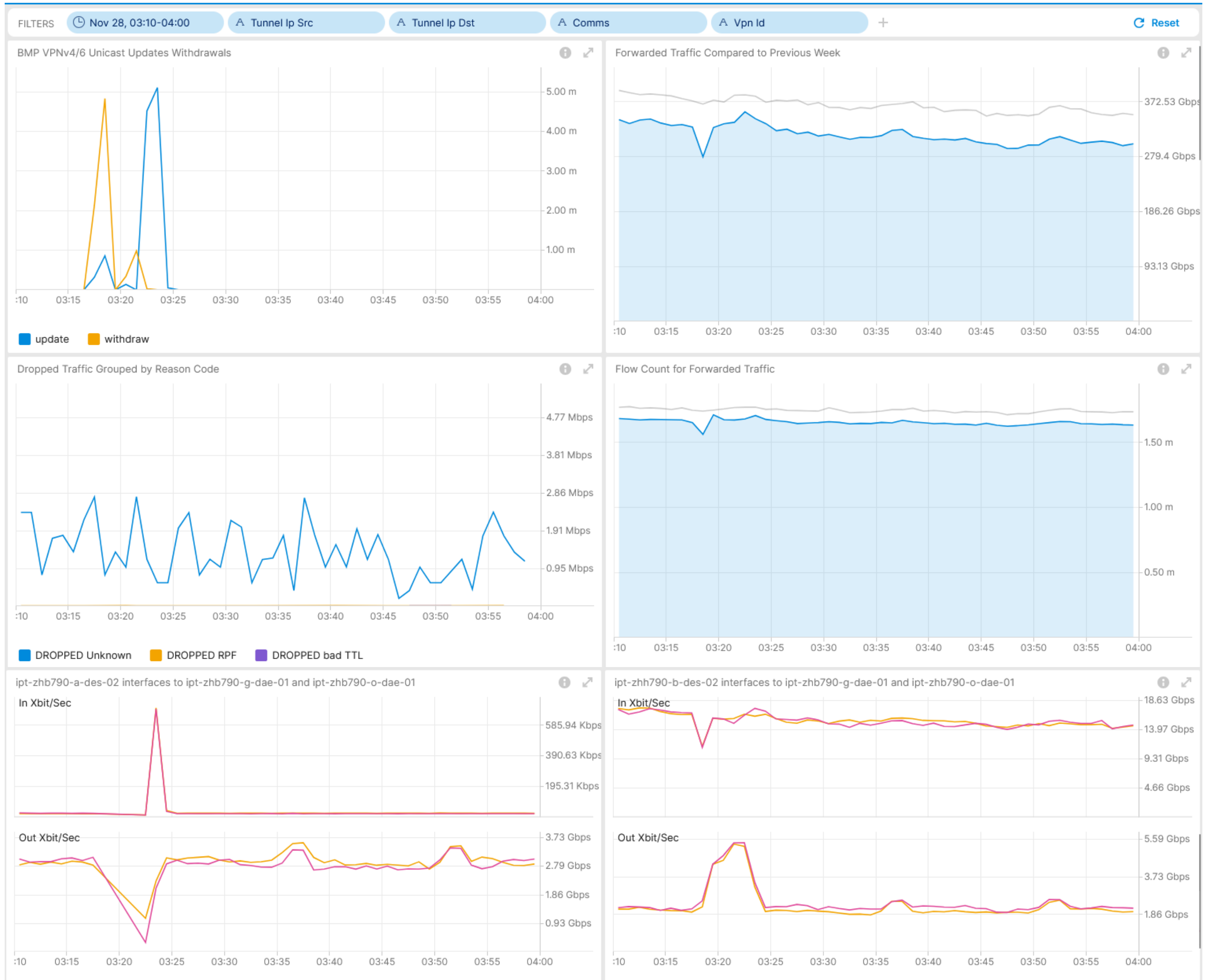


Cosmos Bright Lights Anomaly Detection – 12x L3 VPN's

- **BMP route-monitoring Update/Withdraw check recognized topology change.**
- **BMP peer Down/Up check recognized BGP peering state change.**
- **Interface Down/Up check recognized Interface state change.**
- Traffic Drop spike recognized did not apply.
- **Missing Traffic check did not apply.**
- **Increased or decreased Flow Count check did recognize flow spike increase.**
- **Overall: 5 out of 6 checks have detected the interface and BGP topology change and flow count spike. Meets perfectly our expectations.**

November 28th, SRv6 Resilience Analysis & Tests in Production

Use Case 3 – SRv6 Provider Interface State Change – Real-Time Maintenance Window Analysis



←

Shows BGP topology change and brief missing traffic volume. Measured with IPFIX and Correlated with BMP Local RIB.

←

Shows brief flow count change. Measured with IPFIX and Correlated with BMP Local RIB.

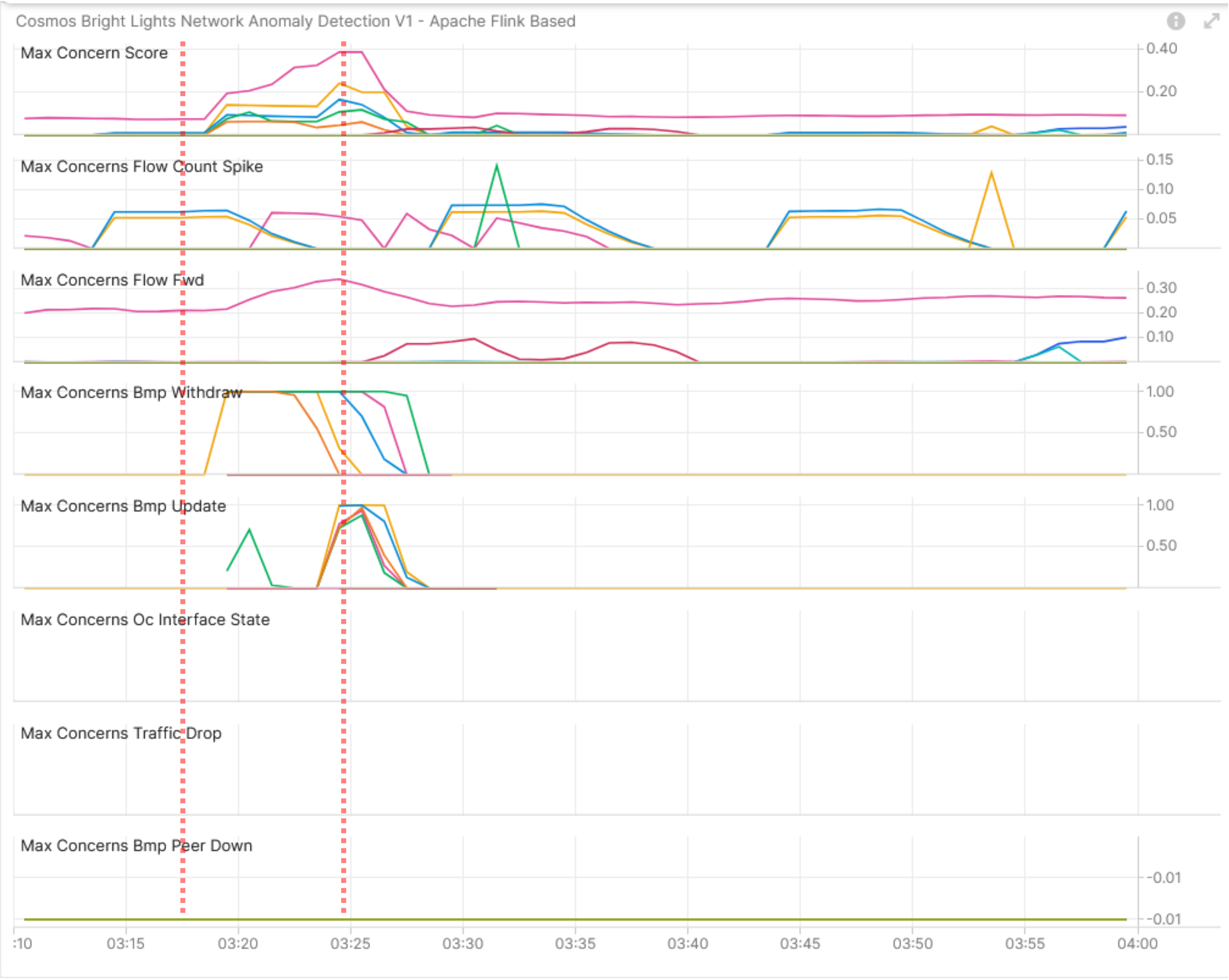
←

Shows traffic shift among Inter-AS Option A ASBR's. Measured with YANG-Push openconfig-interface.yang.

Operational Network Telemetry forwarding plane, YANG-Push, IPFIX, BMP and BGP measured control plane metrics

November 28th, SRv6 Resilience Analysis & Tests in Production

Use Case 3 – Network Anomaly Detection – Live



Cosmos Bright Lights Anomaly Detection – 16x L3 VPN's

Concern Score: 0.39
Flow Count Spike: **0.14**
Missing Traffic: **0.34**
Traffic Drop: **0.00**
BMP Peer/Interface Down: **0.00/0.00**
BMP Update/Withdrawal: **1.00/1.00**

BMP route-monitoring Update/Withdraw check recognized topology change.

BMP peer Down/Up check did not apply.

Interface Down/Up did not apply.

Traffic Drop spike recognized did not apply.

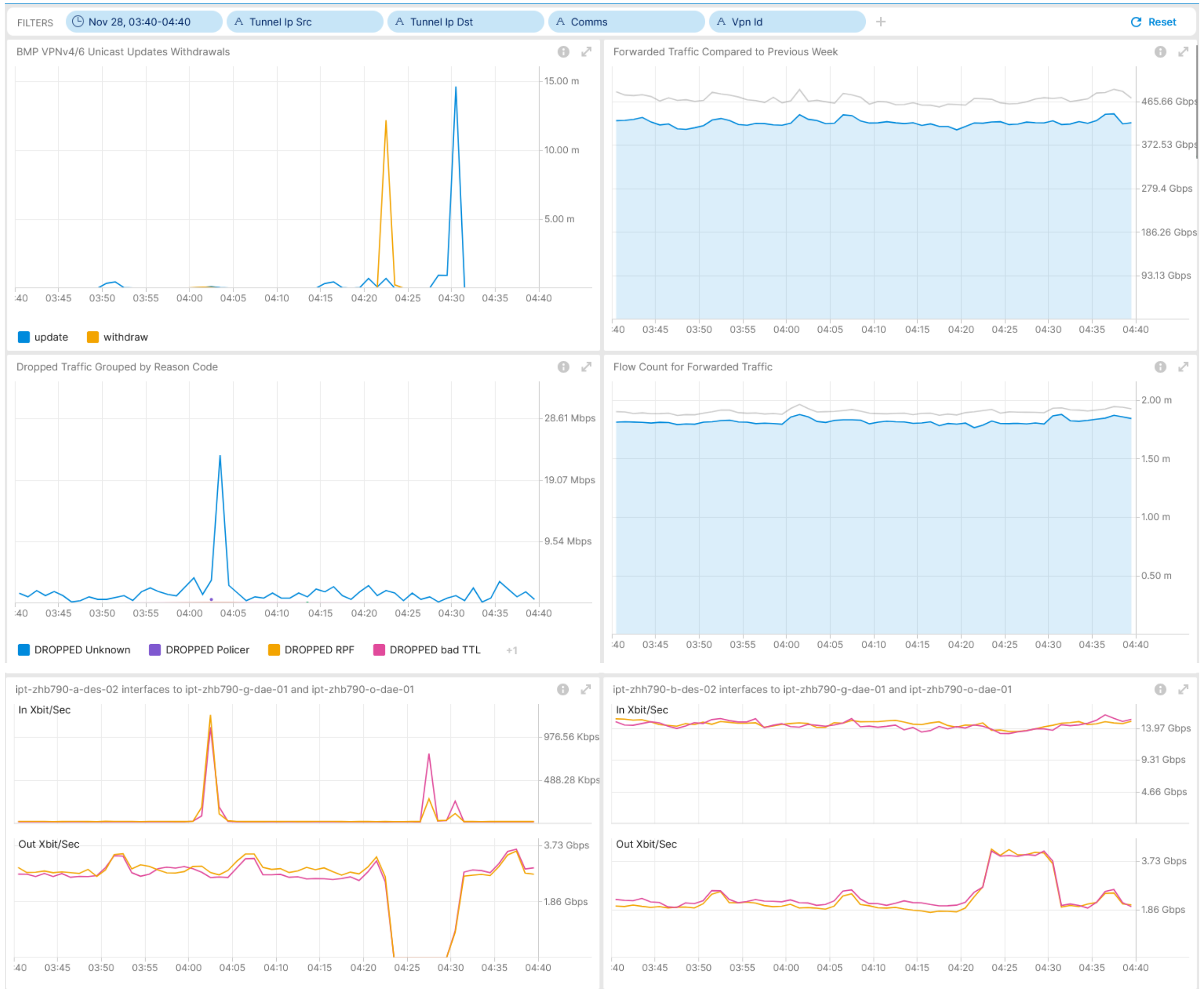
Missing Traffic check did not recognize brief traffic loss.

Increased or decreased Flow Count check did not recognize decreased and increased flow count spike.

Overall: 1 out of 6 checks have detected the BGP topology change. Missing traffic and Flow Count changes are hard to recognize when many changes occur in short period of time. Nevertheless, lets investigate wherever we have a chance to improve.

November 28th, SRv6 Resilience Analysis & Tests in Production

Use Case 4 – BGP Process Restart – Real-Time Maintenance Window Analysis



Shows BGP topology change. Measured with IPFIX and Correlated with BMP Local RIB.

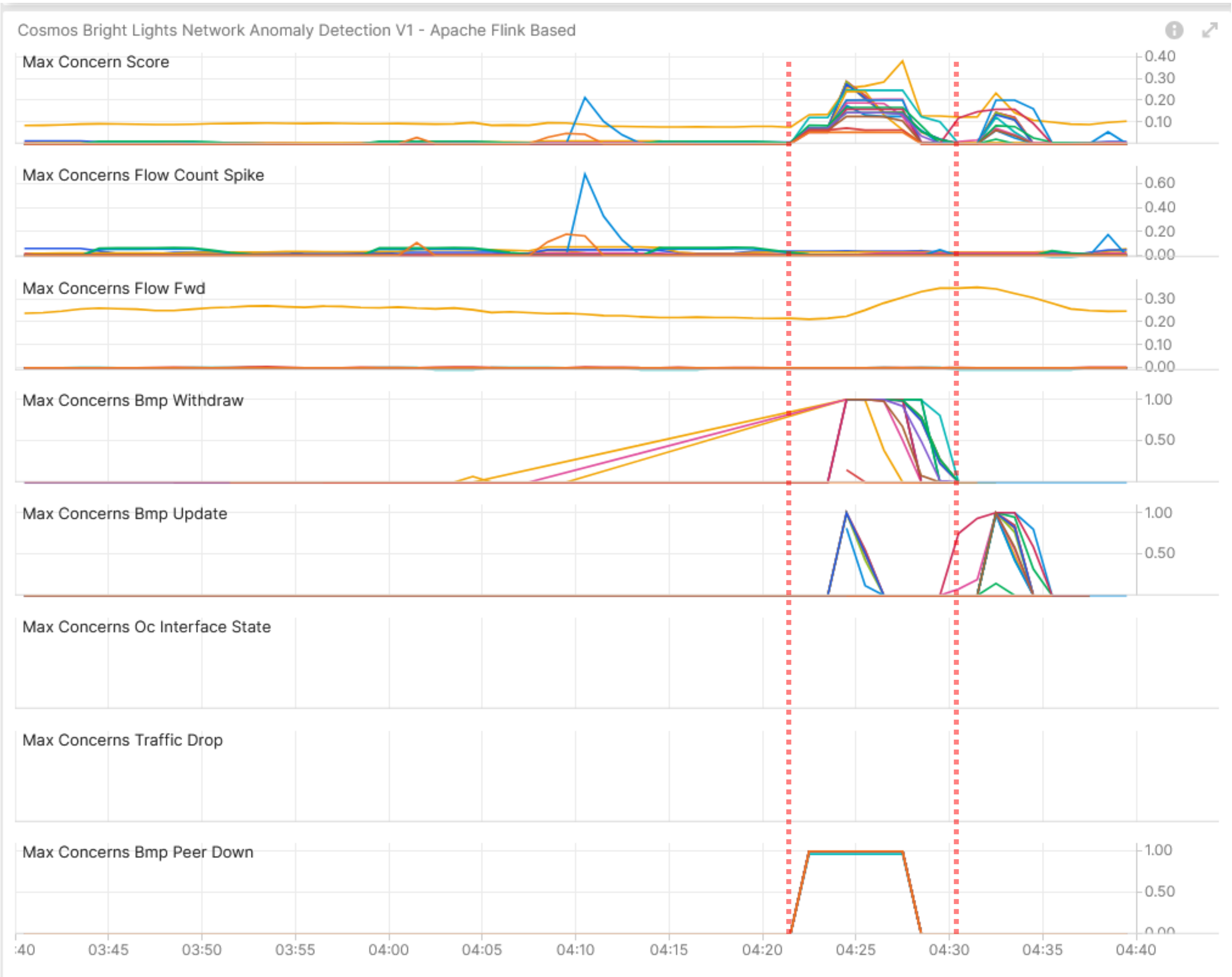
Shows no change in drops or flow count. Measured with IPFIX and Correlated with BMP Local RIB.

Shows traffic shift among Inter-AS Option A ASBR's. Measured with YANG-Push openconfig-interface.yang.

Operational Network Telemetry forwarding plane, YANG-Push, IPFIX, BMP and BGP measured control plane metrics

November 28th, SRv6 Resilience Analysis & Tests in Production

Use Case 4 – Network Anomaly Detection – Live



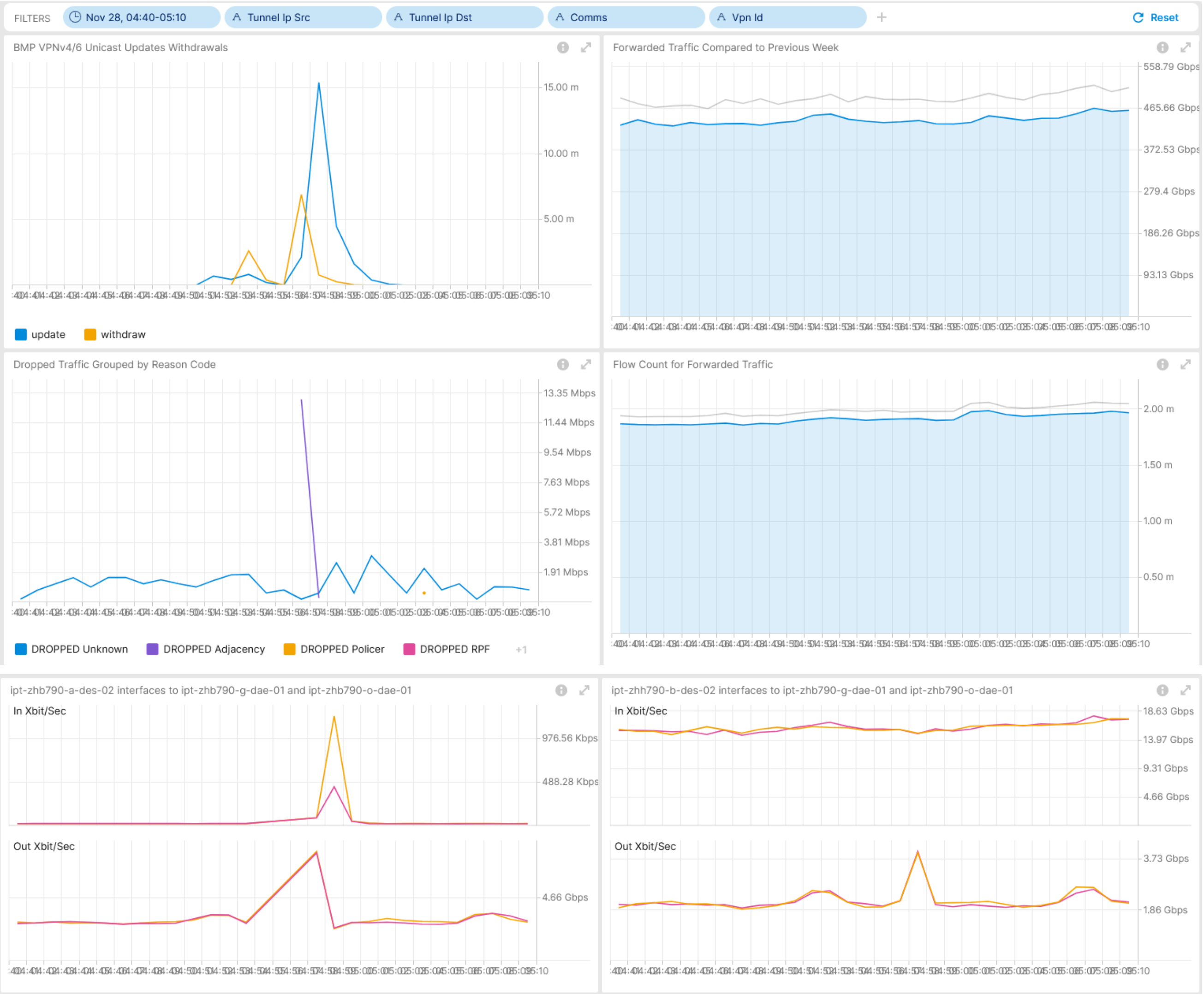
Cosmos Bright Lights Anomaly Detection – 19x L3 VPN's

Concern Score: 0.38
Flow Count Spike: **0.04**
Missing Traffic: **0.35**
Traffic Drop: **0.00**
BMP Peer/Interface Down: **1.00/0.00**
BMP Update/Withdrawal: **1.00/1.00**

- **BMP route-monitoring Update/Withdraw check recognized topology change.**
- **BMP peer Down/Up check recognize peering state changes.**
- Interface Down/Up did not apply.
- Traffic Drop spike recognized did not apply.
- **Missing Traffic check recognized long term traffic loss on 64498:2949.**
- Increased or decreased Flow Count check did not apply.
- **Overall: 2 out of 6 checks have detected the BGP topology and peering state change. Meets perfectly our expectations.**

November 28th, SRv6 Resilience Analysis & Tests in Production

Use Case 5– IS-IS Process Restart – Real-Time Maintenance Window Analysis



FILTERS: Nov 28, 04:40-05:10 | Tunnel Ip Src | Tunnel Ip Dst | Comms | Vpn Id | Reset

Shows BGP topology change. Measured with IPFIX and Correlated with BMP Local RIB.

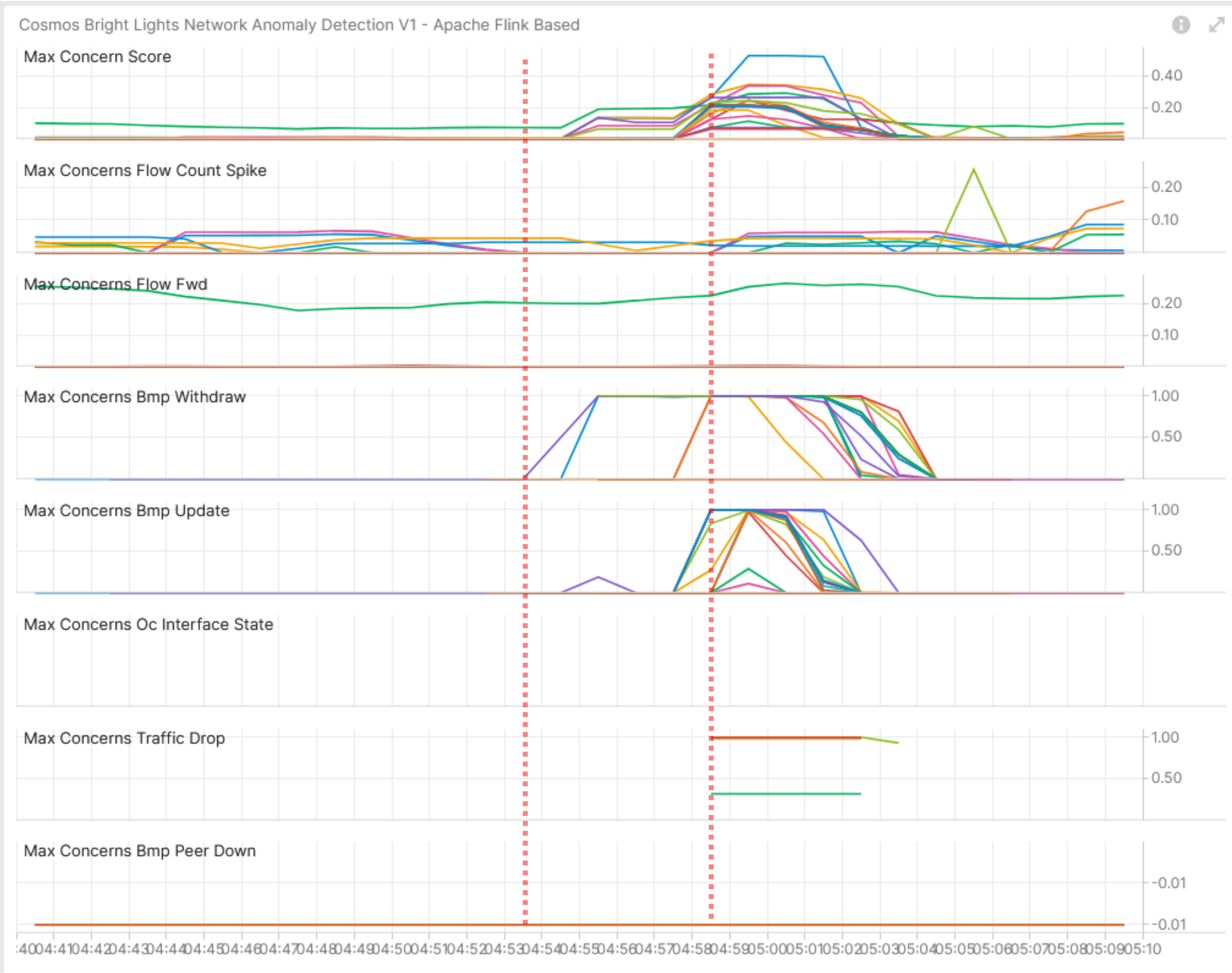
Shows drop adjacency. Measured with IPFIX and Correlated with BMP Local RIB.

Shows brief traffic shift among Inter-AS Option A ASBR's. Measured with YANG-Push openconfig-interface.yang.

Operational Network Telemetry forwarding plane, YANG-Push, IPFIX, BMP and BGP measured control plane metrics

November 28th, SRv6 Resilience Analysis & Tests in Production

Use Case 5 – Network Anomaly Detection – Live



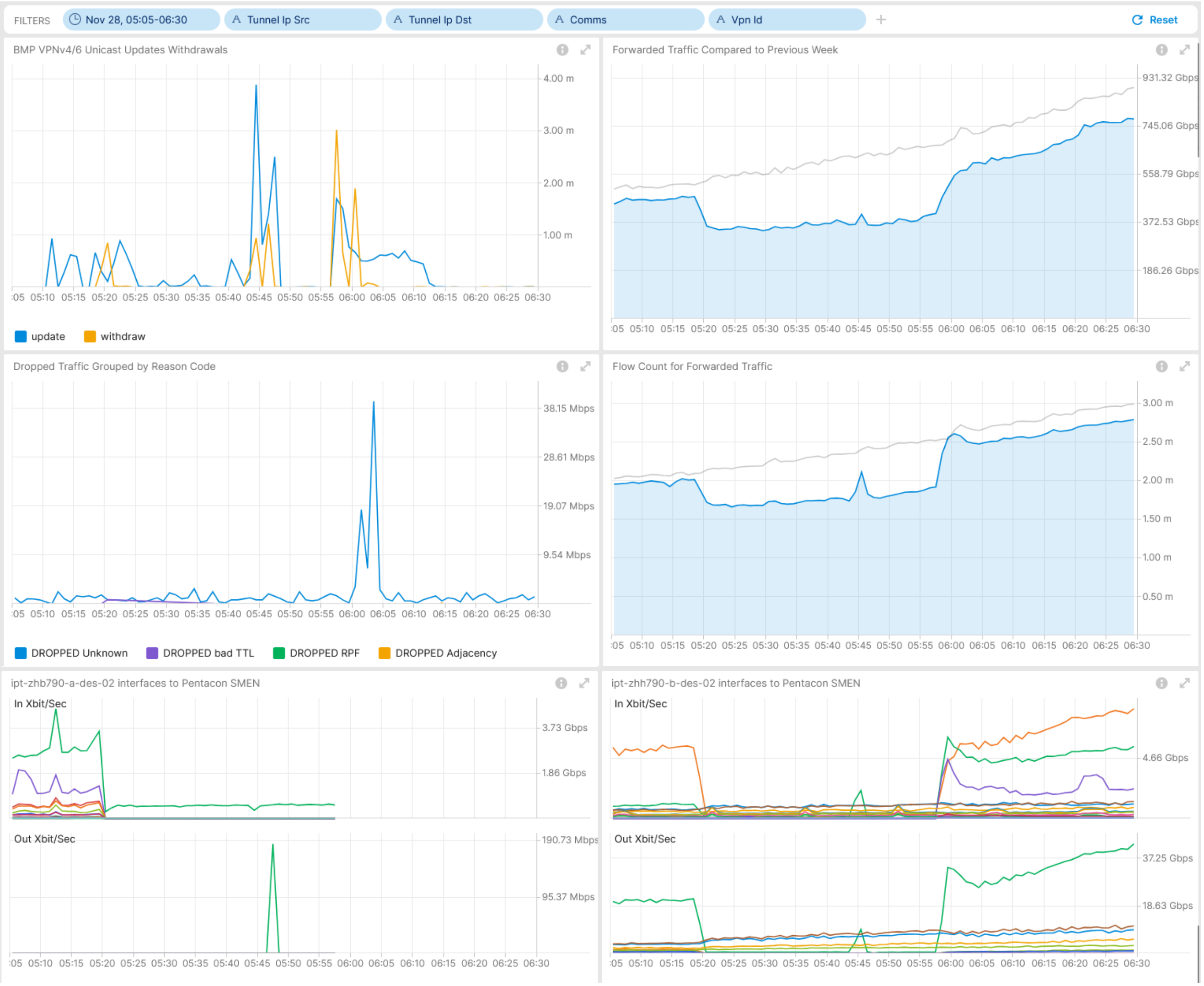
Cosmos Bright Lights Anomaly Detection – 19x L3 VPN's

Concern Score: 0.53
Flow Count Spike: **0.25**
Missing Traffic: **0.27**
Traffic Drop: **1.00**
BMP Peer/Interface Down: **0.00/0.00**
BMP Update/Withdrawal: **1.00/1.00**

- **BMP route-monitoring Update/Withdraw check recognized topology change.**
- BMP peer Down/Up check did not apply.
- Interface Down/Up did not apply.
- **Traffic Drop spike recognized topology change.**
- **Missing Traffic check recognized long term traffic loss on 64498:2949.**
- Increased or decreased Flow Count check did not apply.
- **Overall: 2 out of 6 checks have detected the BGP topology change, and traffic drop spike. Meets perfectly our expectations.**

November 28th, SRv6 Resilience Analysis & Tests in Production

Use Case 6– RSP Failover – Real-Time Maintenance Window Analysis



←

Shows BGP topology change and missing traffic during blackholing. Measured with IPFIX and Correlated with BMP Local RIB.

←

Shows drop unknown at recovery and reduced flow count during blackholing. Measured with IPFIX and Correlated with BMP Local RIB.

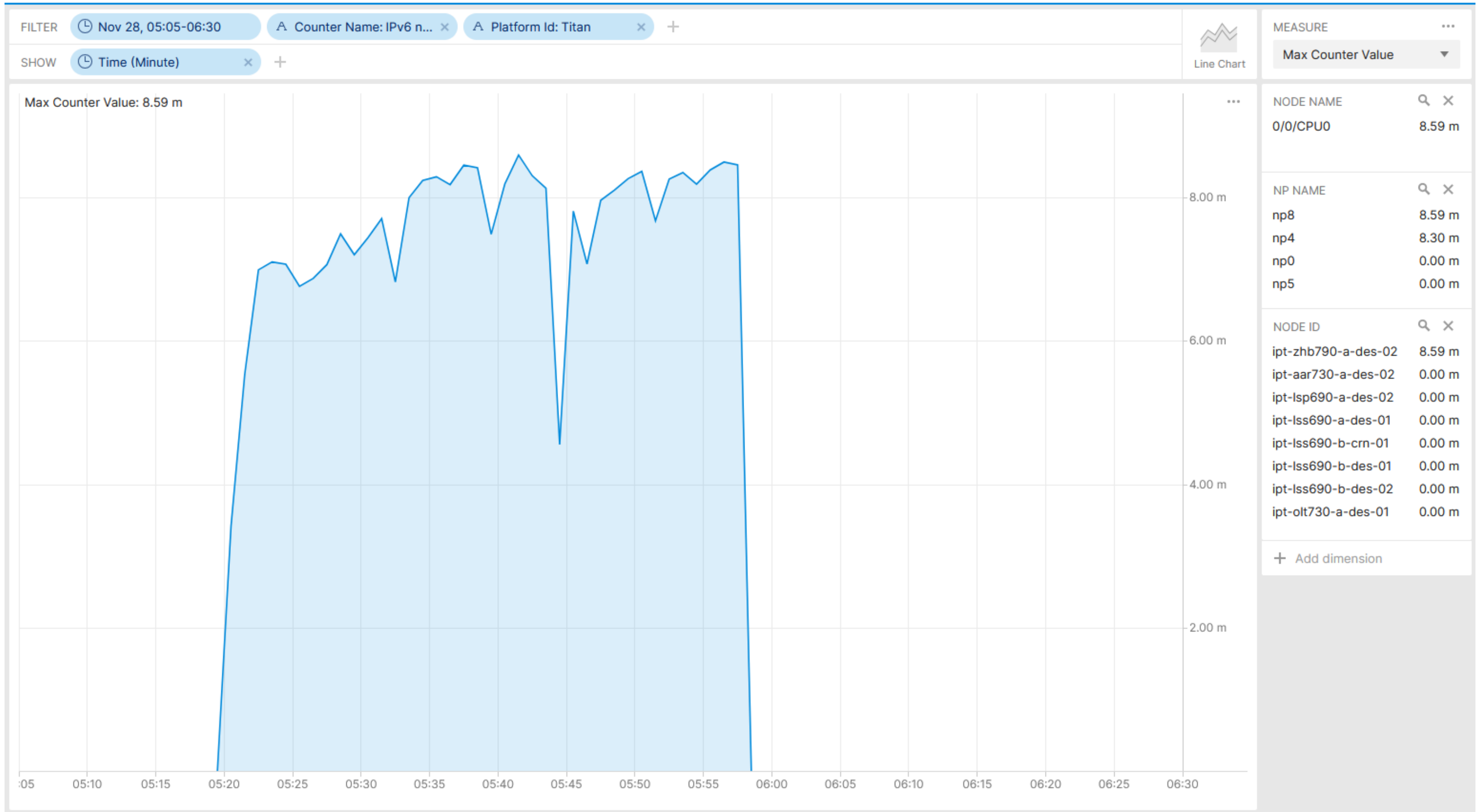
←

Shows traffic shift among Inter-AS Option A ASBR's. Measured with YANG-Push openconfig-interface.yang.

Operational Network Telemetry forwarding plane, YANG-Push, IPFIX, BMP and BGP measured control plane metrics

November 28th, SRv6 Resilience Analysis & Tests in Production

IPv6 next-hop index invalid transmit adjacency drops - Real-Time Maintenance Window Analysis



FILTER: Nov 28, 05:05-06:30 | Counter Name: IPv6 n... | Platform Id: Titan

SHOW: Time (Minute)

MEASURE: Max Counter Value

Max Counter Value: 8.59 m

NODE NAME	
0/0/CPU0	8.59 m

NP NAME	
np8	8.59 m
np4	8.30 m
np0	0.00 m
np5	0.00 m

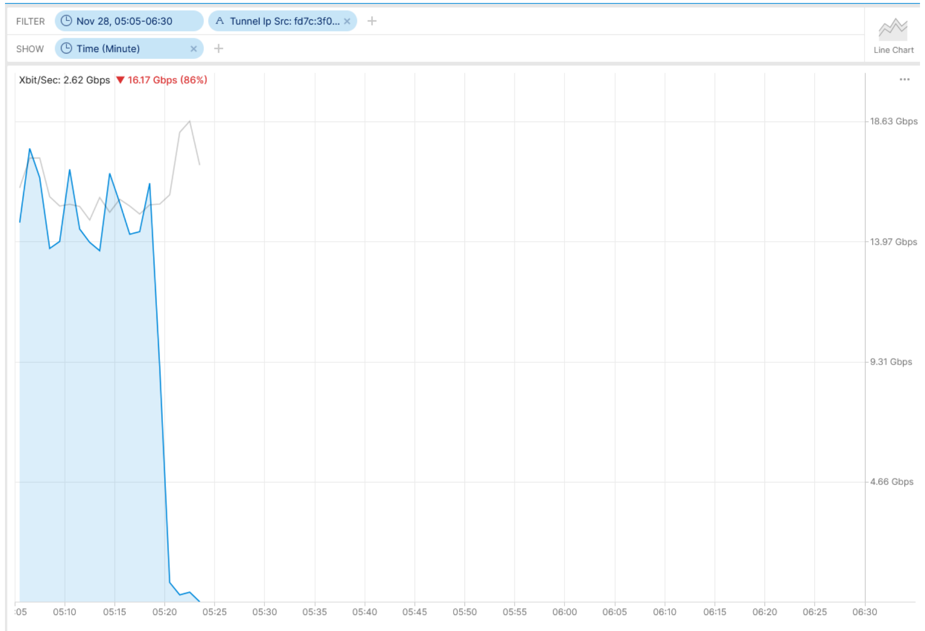
NODE ID	
ipt-zhb790-a-des-02	8.59 m
ipt-aar730-a-des-02	0.00 m
ipt-lsp690-a-des-02	0.00 m
ipt-lss690-a-des-01	0.00 m
ipt-lss690-b-crn-01	0.00 m
ipt-lss690-b-des-01	0.00 m
ipt-lss690-b-des-02	0.00 m
ipt-olt730-a-des-01	0.00 m

Shows egress NPU drops on NPU 4 and 8 on line card 0/0/CPU0 at ipt-zhb790-a-des-02. Measured with YANG-Push.

Operational Network Telemetry YANG-Push collected
NPU drop counter (IPv6 next-hop index invalid transmit adjacency) metrics.

November 28th, SRv6 Resilience Analysis & Tests in Production

IPFIX does not recognize at ingress the egress drop - Real-Time Maintenance Window Analysis

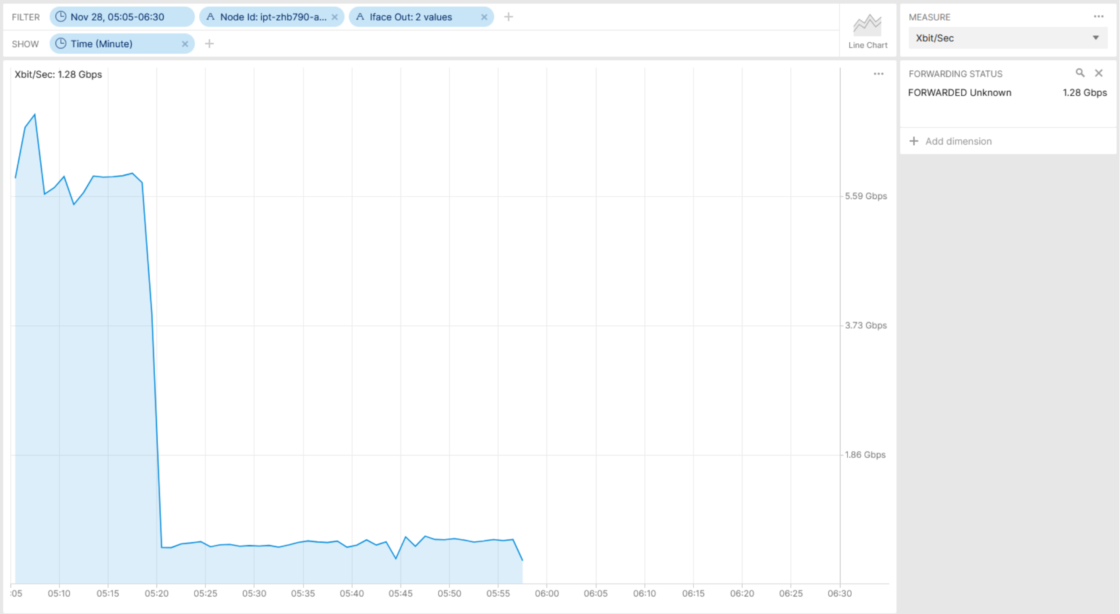


FILTER: Nov 28, 05:05-06:30 | Tunnel Ip Src: fd7c:3f0...

SHOW: Time (Minute)

Xbit/Sec: 2.62 Gbps ▼ 16.17 Gbps (86%)

Operational Network Telemetry IPFIX collected metrics showing traffic originated by IPv6 Tunnel source fd7c:3f00:f06::1 (ipt-zhb790-a-des-02).



FILTER: Nov 28, 05:05-06:30 | Node Id: ipt-zhb790-a... | Iface Out: 2 values

SHOW: Time (Minute)

MEASURE: Xbit/Sec

Xbit/Sec: 1.28 Gbps

FORWARDING STATUS	
FORWARDED Unknown	1.28 Gbps

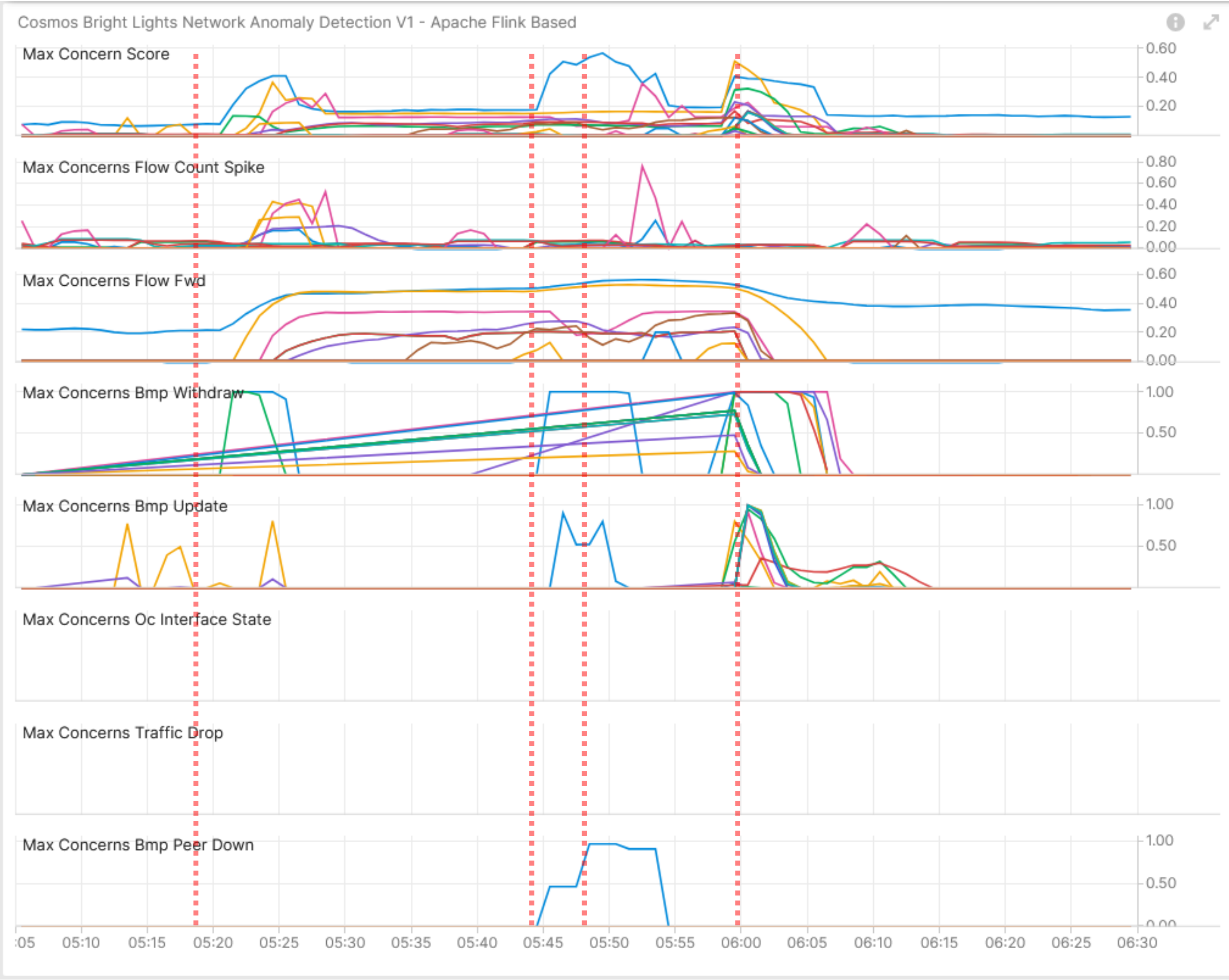
Operational Network Telemetry IPFIX collected metrics showing traffic on Bundle-Ether2000 and Bundle-Ether2100 egress (SRv6 P) at ipt-zhb790-a-des-02 captured ingress.

SOS

Shows that ingress captured traffic is measured forwarded mistakenly, however then dropped at egress on ipt-zhb790-a-des-02. Measured with IPFIX in different parts of the SRv6 domain.

November 28th, SRv6 Resilience Analysis & Tests in Production

Use Case 6 – Network Anomaly Detection – Live



Cosmos Bright Lights Anomaly Detection – 19x L3 VPN'

Concern Score: 0.57
Flow Count Spike: **0.76**
Missing Traffic: **0.57**
Traffic Drop: **0.00**
BMP Peer/Interface Down: **0.00/0.96**
BMP Update/Withdrawal: **1.00/1.00**

BMP route-monitoring Update/Withdraw check recognized topology change.

BMP peer Down/Up check recognized peering state changes.

Interface Down/Up did not apply.

Traffic Drop spike did not apply since IPFIX did not recognize egress drop.

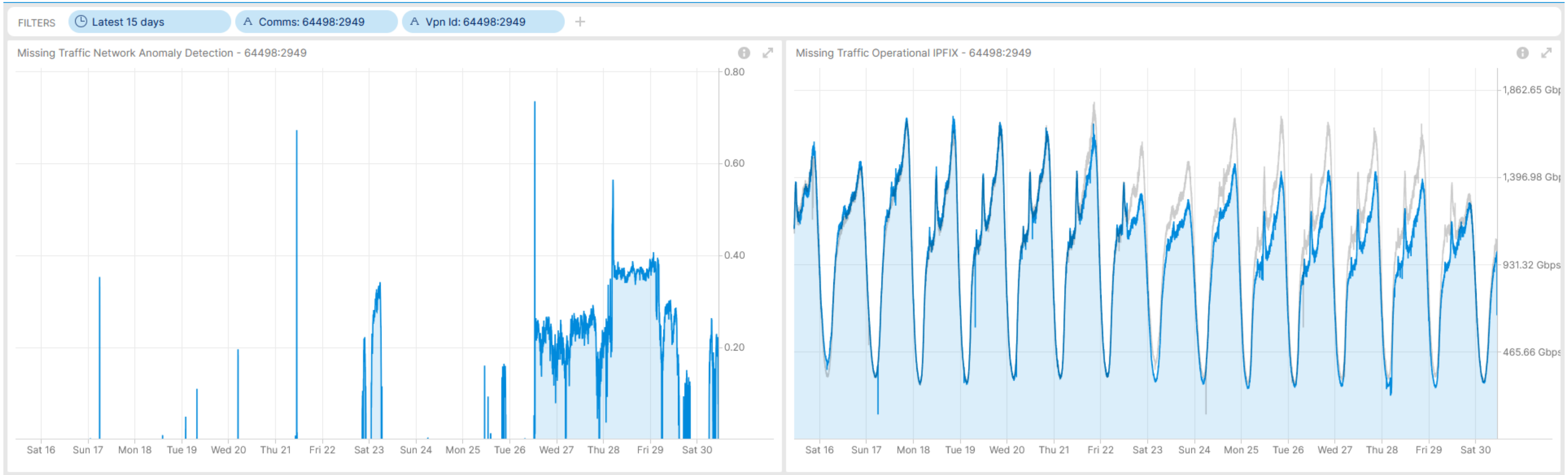
Missing Traffic check recognized blackholing.

Increased or decreased Flow Count check recognize drop spike due to topology change.

Overall: 4 out of 6 checks have detected the BGP topology change, missing traffic and traffic drop spike. Meets perfectly our expectations.

November 28th, SRv6 Resilience Analysis & Tests in Production

Missing Traffic doesn't have to be always a Network Incident

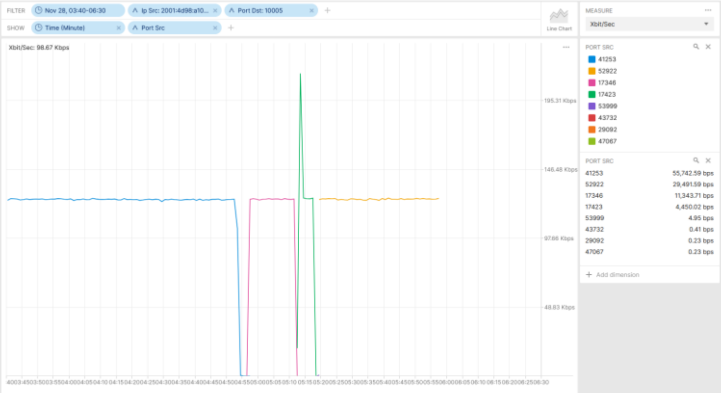


FILTERS | Latest 15 days | Comms: 64498:2949 | Vpn Id: 64498:2949

Shows Missing Traffic Anomaly Detected based on IPFIX Operational Metrics for 64498:2949.

November 28th, SRv6 Resilience Analysis & Tests in Production

Network Telemetry Packet Analysis at Data Collection



FILTER: Nov 28, 03:40-06:30 · Ip Src: 2001:4d98:a10... · Port Dst: 10005

SHOW: Time (Minute) · Port Src

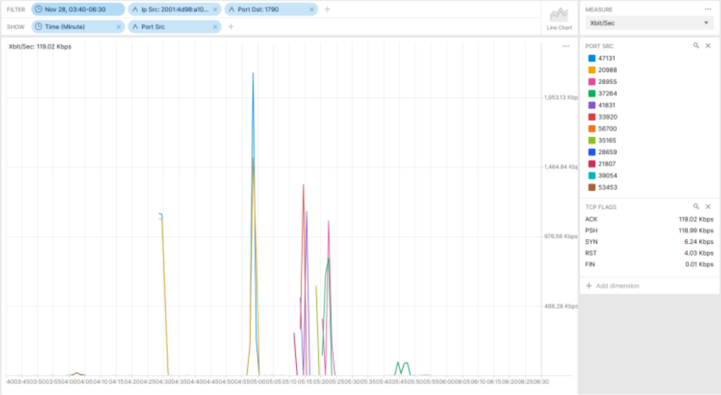
MEASURE: Xbit/Sec

Xbit/Sec: 98.67 Kbps

PORT SRC

PORT SRC	
41253	55,742.59 bps
52922	29,491.59 bps
17346	11,343.71 bps
17423	4,450.02 bps
53999	4.95 bps
43732	0.41 bps
29092	0.23 bps
47067	0.23 bps

Shows that YANG-Push Cisco TCP transport session has been re-established in use case 4 (IS-IS process restart) and use case 6 (RSP failover).



FILTER: Nov 28, 03:40-06:30 · Ip Src: 2001:4d98:a10... · Port Dst: 1790

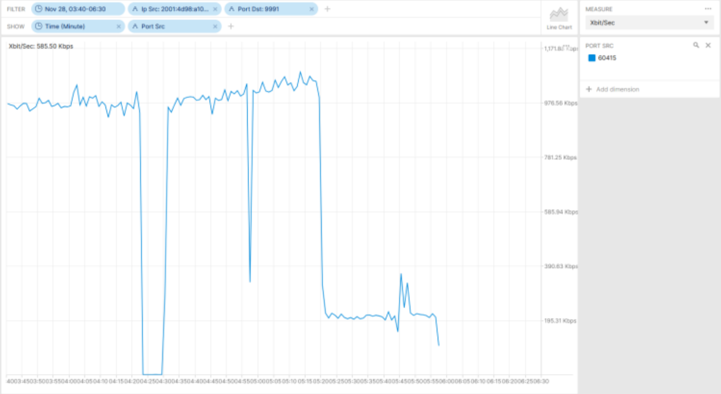
SHOW: Time (Minute) · Port Src

MEASURE: Xbit/Sec

Xbit/Sec: 119.02 Kbps

TCP FLAGS	
ACK	119.02 Kbps
PSH	118.99 Kbps
SYN	6.24 Kbps
RST	4.03 Kbps
FIN	0.01 Kbps

Shows that BMP TCP transport session has been re-established in use case 5 (BGP process restart) and use case 6 (RSP failover).



FILTER: Nov 28, 03:40-06:30 · Ip Src: 2001:4d98:a10... · Port Dst: 9991

SHOW: Time (Minute) · Port Src

MEASURE: Xbit/Sec

Xbit/Sec: 585.50 Kbps

Shows that IPFIX UDP transport session has been terminated when SRv6 P interfaces where shutdown.

What to do next?

- Evaluate why in use case 1 BGP topology changes were not recognized.
  -> Ongoing.
- Evaluate if in use case 3 Missing traffic and flow count changes could be detected.
  -> Ongoing.
- Clarify wherever egress IPFIX could have identified drops.
  -> Done.
- Persist operational data in TSDB for training purposes.
  -> Done.

What went well?

IPFIX, BMP and YANG-Push delivered the almost perfect operational view on the impacted network.

Cosmos Bright Lights Network Anomaly Detection was battelled in a series of tests and showed that is more then just ready for production. It excels in most of the areas.

We are real-time. BGP topology changes within 3 seconds. Interface traffic within 60 seconds. IPFIX flow aggregation within 90 seconds. Network Anomaly Detection within 180 seconds.

What could be improved?

Detect egress drops on data plane serialization in IPFIX.

Include NPU drop verification in resilience analysis and add semantics in Cisco-IOS-XR-asr9k-np-oper.yang describing drop counter meaning.

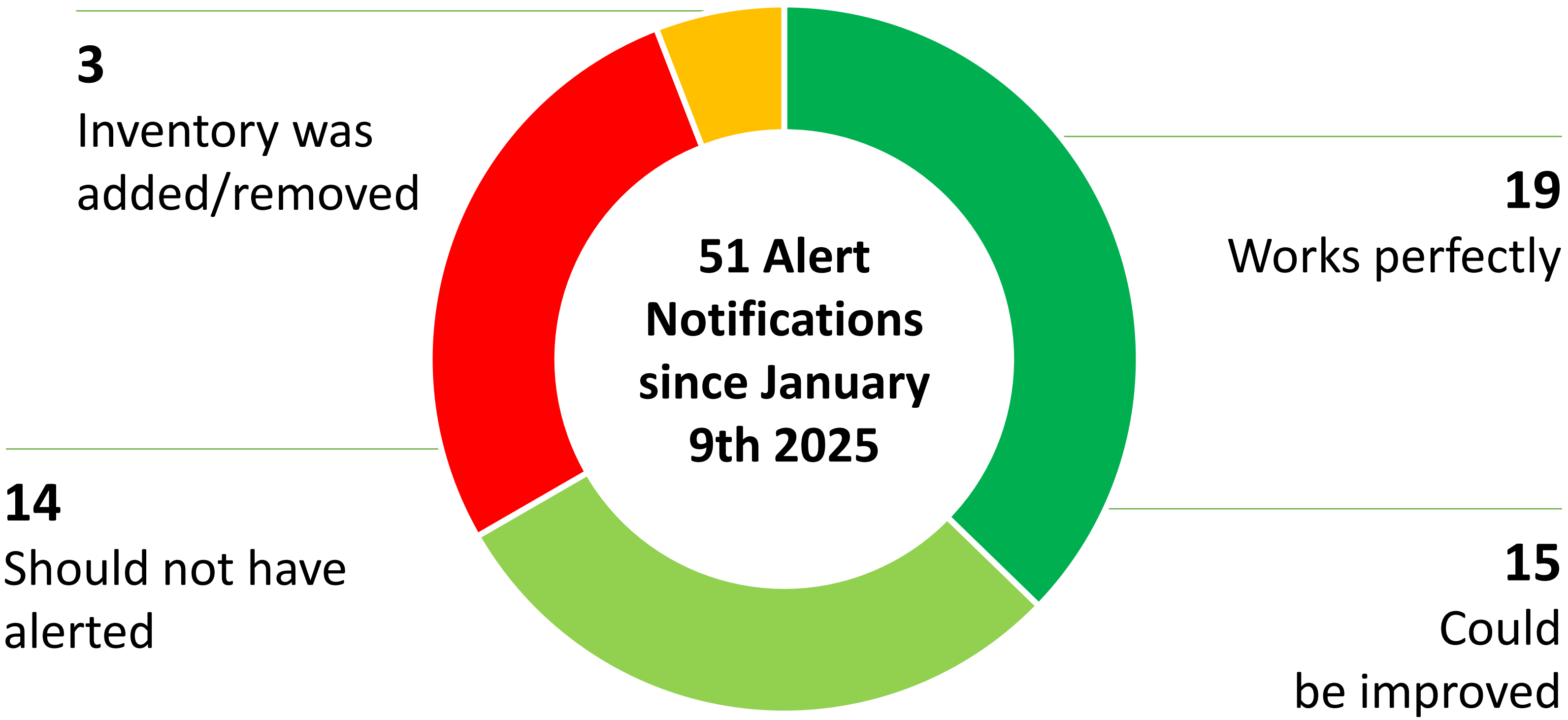
Add "Cisco-IOS-XR-wdsysmon-fd-oper:system-monitoring/cpu-utilization" xpath in YANG-Push configuration.

Restart of IS-IS process would have no impact if Network Telemetry transport sessions would have been established outband.

Cisco TAC having access to operative Network Telemetry and network node software process, management plane, tracing data.

Cosmos Bright Lights Full Scale Summary

With >13'000 L3 VPN's after 16 days and 31 Notifications

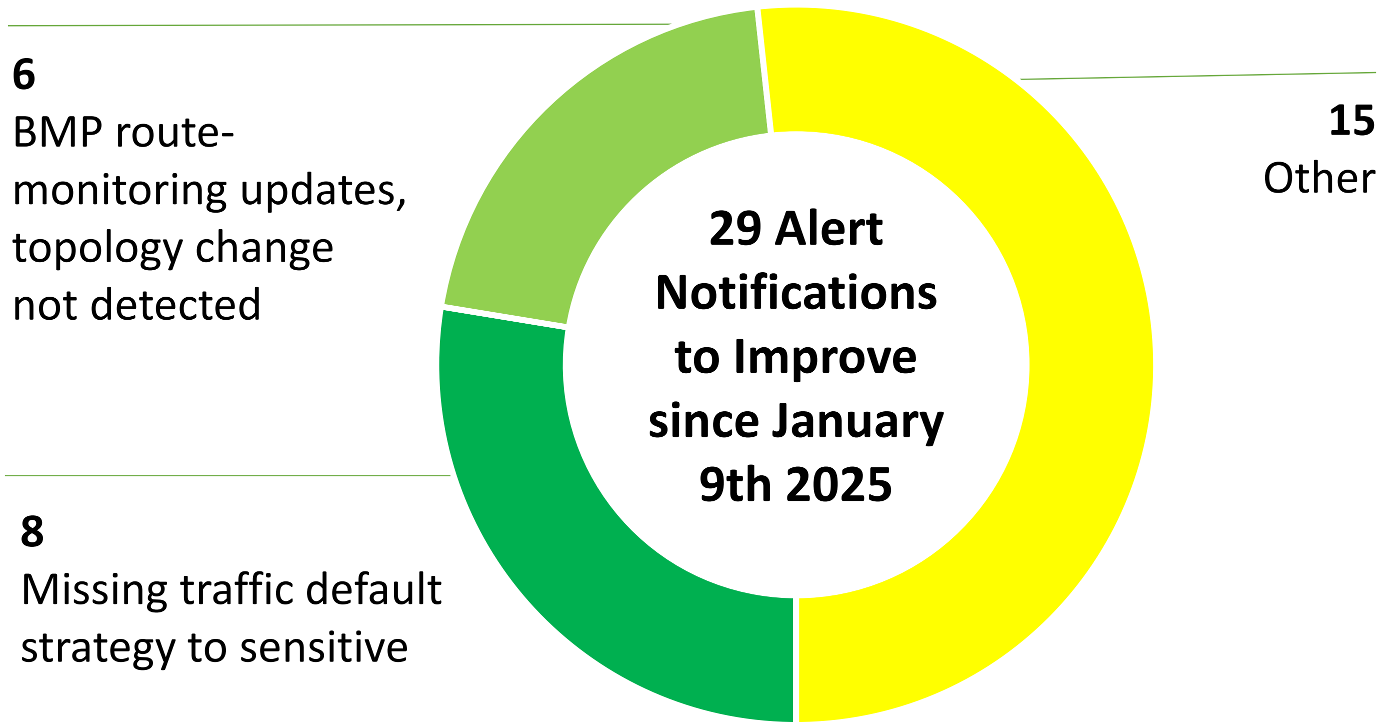


Key Facts in 2025

- **99.92% of the time the analytical conclusions are correct. Not considering false negatives yet.**
- **Even with >13'000 L3 VPN's monitored, only 0-5 alerts a day, far lower then expected.**
- The addition and removal of VPN's impacts false positives.
- Often, network operation is not aware of the connectivity service topology change or the forwarding impact.

Cosmos Bright Lights Full Scale Detail

Where to improve



Improvements in PI 25-1

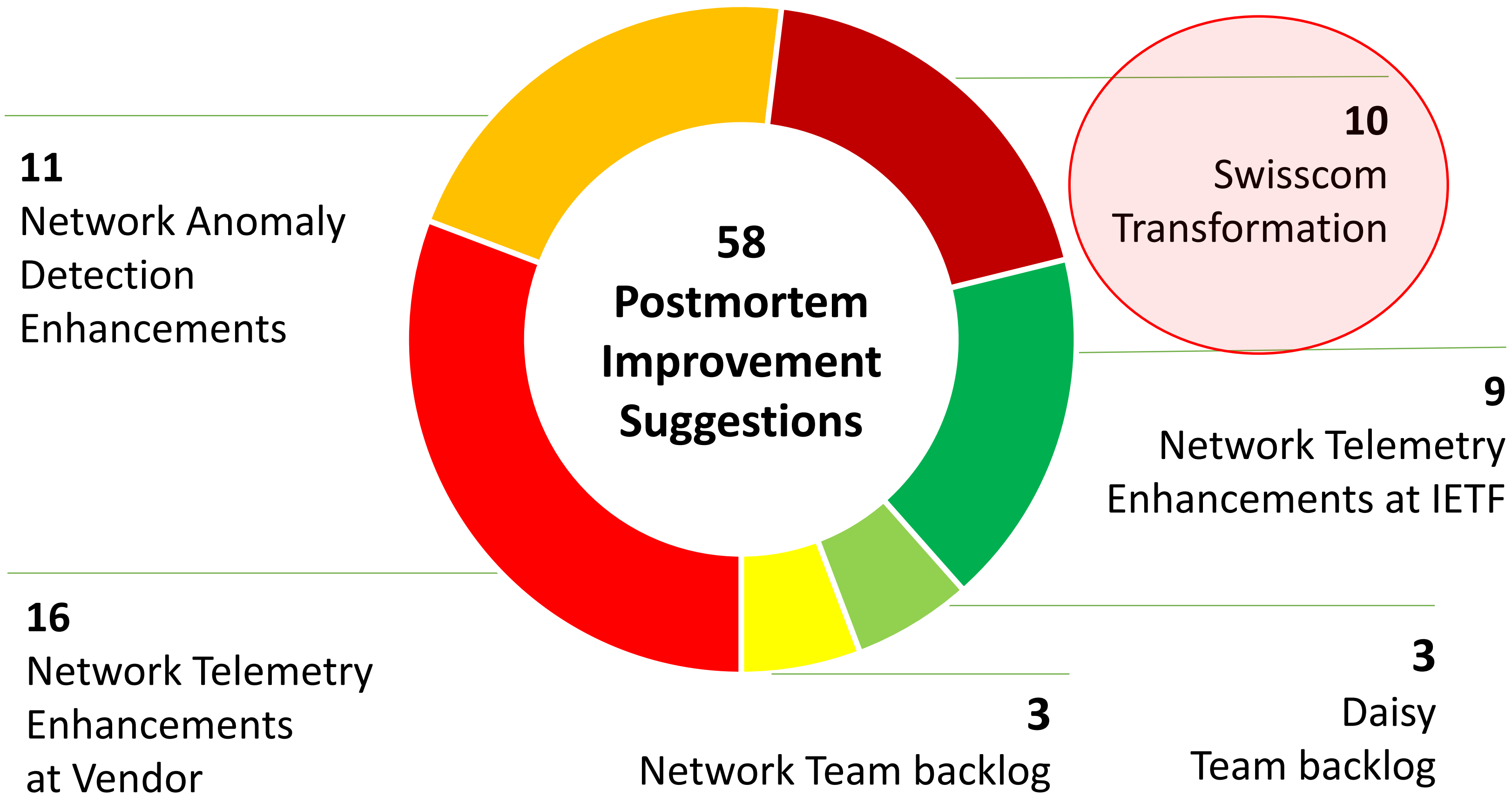
- **Adjust sensitivity in missing traffic default strategy (already deployed)**
- Suppress alerts when L3 VPN was removed in inventory.
- Add URL's in concern objects.

Improvements in 2025

- Improve profiling for BMP route-monitoring updates.
- Implement draft-ietf-nmop-network-anomaly-semantics information model.
- Implement draft-ietf-nmop-network-anomaly-lifecycle information model.
- Establish postmortem system to scale.
- Measure false negatives.

Network Analytics Postmortem 2022-2024 Summary

Steadily Improving in the last 36 months



Key Facts

- 66% of the suggestions have already been addressed at the IETF.
- 30% of the suggestions for Network Anomaly Detection has already been implemented.
- 33% of the Network and Daisy team backlogs has already been implemented.
- **0% of the Swisscom transformation items have been addressed.**
- BMP Local RIB All Path with Path Marking support has been missed 6 times and will be implemented by Huawei, Cisco and possibly 6Wind.
- **IPFIX ForwardingStatus not been implemented in Juniper JunOS has been missed 3 times. No plans for implementation.**
- Netconf transaction ID support has been missed 3 times.