



AEON Packet Broker For TAP Aggregation

INTRODUCTION

Traffic monitoring is becoming a fundamental and crucial part of every robust mission critical infrastructure. Traffic Monitoring typically is used for troubleshooting, security, capacity planning and sometimes is necessary to meet regulatory standards. Monitoring is used in diverse settings, from enterprise storage to Media and Entertainment, CDNs, mobile, and telecom NFV.

The volume of traffic is exploding and existing closed monitoring solutions cannot keep pace at an acceptable cost and scale. AcceleratEd Open Network (AEON) Packet Broker fabric comprises high performance, open and standards-based components – Mellanox Spectrum Ethernet switches, Open source visualization tools, Open SDN controllers and a choice of open programmatic interfaces the controller can use to talk to the switches.

THE AEON PACKET BROKER FABRIC

The AEON packet broker fabric is built using Mellanox Spectrum switches configured in Packet Broker mode. In this mode, the standard switching/routing features are disabled and Spectrum is used to selectively filter, replicate, process and transmit packets from the production network to various tools for further analysis. It is important to note the packet broker capability comes built-in with the base system and there are no additional licenses needed to enable this functionality. Furthermore, the fabric policies and functioning are controlled using a centralized controller

The AEON packet broker functionality itself can be split into three layers (See Figure 1):

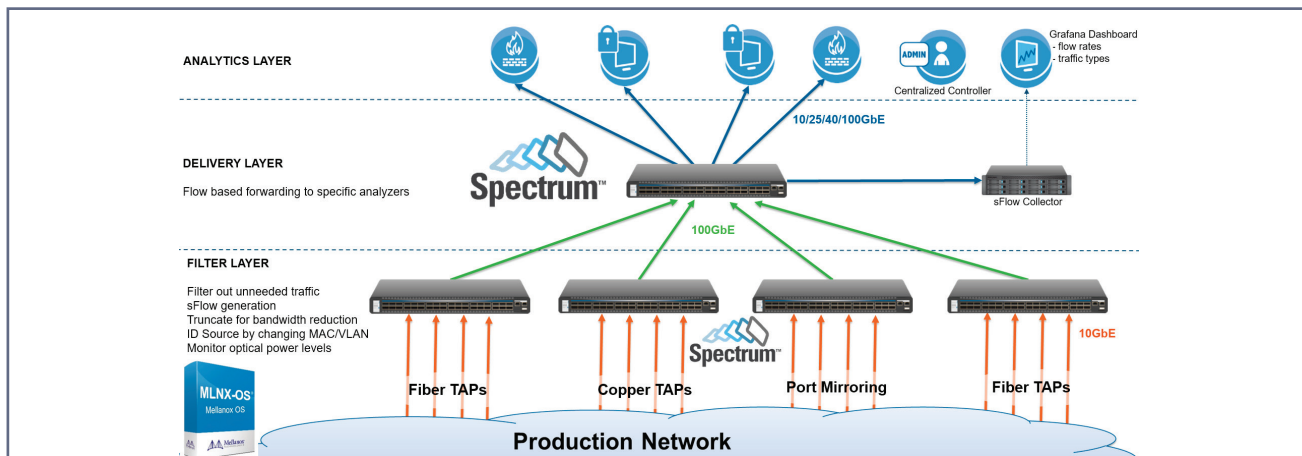


Figure 1: Mellanox Monitoring Fabric

FILTER LAYER

The primary purpose of the Filter layer is to select portions of the traffic that need to be analyzed and send them to the delivery layer. Traffic not selected by the Filter layer is dropped. The Filter layer is the first layer of the Packet Broker Fabric. The traffic sources can be directly identified in this layer. The identity of the sources can then be optionally embedded into the packets by encoding it in the MAC or VLAN fields in the packet. With this feature, the Delivery and Analytics layers will have the production network traffic source context embedded in every packet.

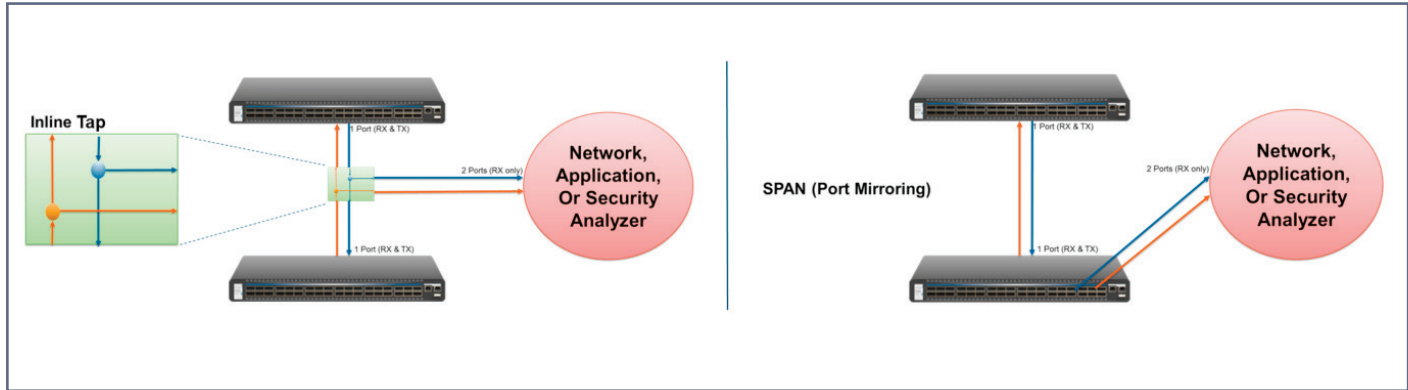


Figure 2: Inline TAP or mirrored ports can be used to get traffic from production network

The Filter layer receives traffic snooped via optical/copper TAPS or via mirrored ports from the production network. In the case of links snooped using TAPS, the receive and transmit parts of the snooped links will have to be independently connected to two different Mellanox Spectrum switch ports, which function in receive only mode (see Figure 2). In addition to providing filtering capabilities, Mellanox Spectrum can also monitor the power levels of the optical TAPs.

The Filter layer can provide additional visibility into the state of the production network by the use of sFlow sampling in hardware. The sFlow data can be sent to Open Source collectors for analysis providing a picture of the busiest flows, top talkers, top protocols, most flows per application, and various traffic anomalies. It can detect network problems and provide a glimpse into which applications are using the network most. It can also alert when something significant changes and can identify what flows should be sent on for further analysis.

Delivery Layer

The primary purpose of the delivery layer is to perform flow-based one-to-one or one-to-many packet forwarding, to one or many analyzers in the analytics layer. This layer aggregates traffic from the filter layer, load balances traffic as needed and passes it to the analytics layer.

Analytics Layer

The analytics layer is built of various analysis tools, each one receiving different traffic streams that originated in the production network and enabling different monitoring capabilities such as: security, application performance measurement, network performance verification and SLA compliance.

KEY FEATURES OF AEON PACKET BROKER

Spectrum for Enhanced Packet Filtering

Widespread adoption of network virtualization and tunneling protocols are challenging the capabilities of legacy network monitoring platforms. Mellanox Spectrum™ switches have a built in flexible parser that can be configured to extract packet fields up to 500B deep into the packet. This is especially useful while processing tunnel encapsulated packets. Mellanox Spectrum can retain outer header contexts while matching on the inner fields of the header. With this capability, Spectrum can provide rich filtering functionality even for overlay and tunneled traffic.

The Packet Broker fabric needs to be scalable and should be able to support a large number of rules that can be used to provide rich filtering capabilities. Mellanox Spectrum switches have a flexible ACL block which can support up to 18K filtering rules. The flexible ACL engine can match on various header fields including TTL, SRC/DST MAC, VLAN ID, VLAN PCP, IP DSCP, IP ECN etc. and can forward single or multiple copies of the packets to one or more destinations.

Spectrum for Advanced Packet Header Editing

Depending on the specific use case, the Packet Broker fabric should be able to perform packet transformations. With powerful packet editing capabilities, Mellanox Spectrum switches can:

- Embed the production traffic source information by modifying the MAC address and VLAN fields in the packet
- Be programmed to strip VLAN tags and tunnel encapsulations so that the analysis tools can just work on the inner payload
- Truncate packets in order to save bandwidth into upstream packet analyzer appliances
- Optionally pass through packets with bad CRC for further analysis.

Spectrum Smart Load Balancing

The Packet Broker fabric may need to load balance traffic across multiple instances of analysis tools. Mellanox Spectrum switches can load balance traffic based on a hash computed using a flexible and programmable set of packet header fields.

Some of the analysis tools such as Intrusion Detection Systems (IDS) need to receive bidirectional traffic to identify handshakes and higher level transactions. Mellanox Spectrum switches support symmetric hashing which ensures that bidirectional traffic specific to a flow are sent to the same physical analysis appliance.

Flexible Choice of Control

The AEON Packet Broker fabric is open and can be programmed via a choice of CLI, python scripting, OpenFlow 1.3, Web GUI and REST API. Mellanox Spectrum switches can host containers that run third party agents. The container provides complete SDK access to the data path, providing new switch capabilities to users to build customized network applications. Mellanox monitoring fabric can be easily integrated into existing orchestration and automation frameworks. The OpenFlow 1.3 implementation can be controlled using controllers like: ODL, ONOS, RYU and others.

Flexible Form Factors

Mellanox provides various flexible and and scalable switch products in different form factors, which are ideal for various IT infrastructures and topologies:



Figure 3: SN2700 - 32x100GbE (64x50GbE)



Figure 4: SN2410 - 8x100GbE + 48x25GbE



Figure 5: SN2100 - 16x100GbE

Spectrum switches are available in both half width and full width form factors. Half width SN2100 switches support 16x100GbE ports and are ideal for customer racks with tighter cost/power constraints. SN2700 is the high density 32x100GbE spine. SN2410 supports 48x25GbE and 8x100GbE ports. All Spectrum platforms support line rate packet processing for all packet sizes.

Table 1: Key Mellanox Fabric Features vis-a-vis the Competition

Feature	Mellanox	Arista	Big Switch	Gigamon
Open programmability	✓	✗	✗	✗
Line rate 100GbE packet capture	✓	✗	✗	✗
1GbE/10GbE/25GbE/40GbE/100GbE support	✓	✓	✓	✓
Filtering/ Aggregation/ Replication/Load Balancing	✓	✓	✓	✓
Service layer (with timestamping)	✓	✓	✓	✓
Symmetric hashing	✓	✓	✓	✓
Support for container on switch with complete SDK access	✓	✗	✗	✗
Option to preserve packet errors	✓	✗	✗	✗
Deep packet matching (Match up to 500B into the packet)	✓	✗	✗	✗
Half rack width form factor platform	✓	✗	✗	✗
Monitoring fabric included without license	✓	✗	—	—

CONCLUSION

Network data traffic volumes are exploding and current monitoring solutions are falling short in terms of scale, performance and cost efficiency. There is a need for high performance open Ethernet based monitoring solutions. Mellanox Spectrum™ open Ethernet switches with flexible filtering capabilities, advanced packet editing features and high performance datapath are ideal for TAP aggregation and network monitoring use cases. AEON Packet Broker fabric built using the Spectrum open Ethernet switches can be programmed using a choice of methods such as CLI, REST API or OpenFlow 1.3 and can easily be integrated into existing orchestration infrastructure. Mellanox Spectrum supports all these features without any need for additional software license.

About Mellanox

Mellanox Technologies (NASDAQ: MLNX) is a leading supplier of end-to-end Ethernet and InfiniBand intelligent interconnect solutions and services for servers, storage, and hyper-converged infrastructure. Mellanox intelligent interconnect solutions increase data center efficiency by providing the highest throughput and lowest latency, delivering data faster to applications and unlocking system performance. Mellanox offers a choice of high performance solutions: network and multi-core processors, network adapters, switches, cables, software and silicon, that accelerate application runtime and maximize business results for a wide range of markets including high performance computing, enterprise data centers, Web 2.0, cloud, storage, network security, AI, telecom and financial services. More information is available at www.mellanox.com.



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