



# What Just Happened™ (WJH) Telemetry

## Fully-integrated, Open and Actionable Network Visibility

With the increase in the number of mission-critical workloads running on denser and faster datacenter infrastructures, network downtimes have a bigger impact on business and revenue. According to an [IHS](#) report, the cost impact of downtime can range from \$1M a year for a typical mid-size company to \$60M for a large enterprise. The biggest challenge in reducing downtime is identifying the root-cause of problems. According to [Microsoft and others](#), issue reassignments caused by incorrect root-cause have led to a ten-fold increase in time to resolution. As data center network speeds rapidly increase, so must the tools and mechanisms being used for network visibility.

### Challenges with Legacy Telemetry

Traditional network monitoring approaches like SNMP polling, sFlow sampling, and streaming telemetry, use a central collector for telemetry data storage and problem identification. As data speeds increase, these traditional approaches present a growing challenge to the transportation, processing, and storage of telemetry data. Even a small network can generate petabytes of data per day. Some networks use powerful server clusters to cope with collecting and analyzing the data. Even with this expensive infrastructure, it is hard to pinpoint the root-cause of problems without the appropriate network context.

The difficulty with commodity Ethernet switches is that they are unable to provide the critical telemetry data needed for root cause problem identification or issue resolution. This forces operators to process massive amounts of telemetry data centrally, creating an artificial bottleneck to problem resolution.

### What Just Happened™ (WJH)

Mellanox Spectrum® Ethernet switches provide rich, contextual and actionable insights on a variety of topics including Layer-1 through Layer-4, ACLs, buffer occupancy, and latency. A WJH agent collects events and visibility insights locally from Mellanox Spectrum Ethernet switches, to provide instant answers to When, What, Why, Who and Where – critical questions in problem-solving. WJH is available on every Mellanox Spectrum platform running any Network Operating System (NOS) including Onyx, Cumulus Linux, Linux Switch/DENT and SONiC.

With WJH, traffic inspection, filtering, and issue identification are done by the switch platform where the network context is readily available. As a result, only issue-relevant data is streamed out. When packets are dropped, for example, WJH provides packet headers along with a detailed reason as to why the packet was dropped, thus enabling more thorough analysis.

WJH also helps network operators by dramatically reducing mean time to innocence (MTTI) or issue resolution. Additionally, WJH provides insights to help improve resource utilization and capacity planning.

### Highlights

- Faster troubleshooting
- Switch-based accelerated telemetry
- Works in multi-vendor networks
- Isolates network issues from servers/storage issues
- Easy to use
- No license required

*“Nimbix accelerates HPC, AI and machine/deep learning applications by providing purpose-built cloud computing technology that is optimized for these workloads,” said Rob Sherrard, Co-Founder & VP of Service Delivery at Nimbix Inc. “Mellanox’s switches are part of our best-in-class cloud computing infrastructure and we are excited to use WJH to increase the utilization of the data center fabric while improving the visibility of the overall network.”*



Figure 1. WJH - How does it work?

## How Does it Work?

WJH is an advanced streaming telemetry technology that provides real-time visibility into network-based problems. WJH goes beyond conventional telemetry solutions by providing actionable details on abnormal network behavior. Traditional solutions try to extrapolate root causes of network issues by simply analyzing network counters and statistical packet sampling; WJH eliminates the guess-work from network troubleshooting.

The WJH solution leverages the unique hardware capabilities built into the Mellanox Spectrum and Mellanox Spectrum-2 Ethernet switch ASICs to inspect packets at multi-terabit speeds – faster than software or firmware-based solutions. WJH inspects packets across all ports at line-rate, at speeds that overwhelm traditional Packet Inspection (PI) solutions.

WJH can be configured to monitor certain type of events in the switch and filter out others. Rich telemetry and contextual and actionable telemetry data related to the events of interest are collected from the switch platform. The collected information is locally accessible via a CLI. Detailed packet payload information can be captured in pcap files. The captured packet information can later be analyzed using tools such as Wireshark.

```

WJH [standalone: master] (config) # show what-just-happened recently
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PktID  Timestamp      sPort  dPort  Size(B)  VLAN  Src MAC      Dst MAC      EthType  Src IP      Dst IP      L4 sPort  L4 dPort  Drop Group  Drop Reason
-----
1  2018/12/05 10:51:27  eth1/15  N/A    9234    101    00:10:94:00:00:02  00:10:94:00:00:03  IPv4     192.85.1.101  192.101.0.1  3101     65101    Layer-2/port  VLAN Filter
2  2018/12/05 10:51:27  eth1/15  N/A    124     10     01:00:5e:00:00:01  00:10:94:00:00:02  IPv4     192.85.1.2    192.0.0.1    3700     4300    Layer-2/port  Source MAC is multicast
3  2018/12/05 10:51:27  eth1/15  N/A    9234    101    00:10:94:00:00:02  00:10:94:00:00:03  IPv4     192.85.1.101  192.101.0.1  3101     65101    Layer-2/port  Source MAC is multicast
4  2018/12/05 10:51:27  eth1/15  N/A    124     15     00:10:94:00:00:02  01:80:c2:00:00:01  IPv4     192.66.66.2   192.66.66.1  3766     4366    Layer-2/port  Reserved DMAC=01-80-C2-00-00-0x
5  2018/12/05 10:51:27  eth1/15  N/A    124     10     01:00:5e:00:00:01  00:10:94:00:00:02  IPv4     192.85.1.2    192.0.0.1    3700     4300    Layer-2/port  Source MAC is multicast
6  2018/12/05 10:51:27  eth1/15  N/A    9234    101    00:10:94:00:00:02  00:10:94:00:00:03  IPv4     192.85.1.101  192.101.0.1  3101     65101    Layer-2/port  VLAN Filter
7  2018/12/05 10:51:27  eth1/15  N/A    124     15     00:10:94:00:00:02  01:80:c2:00:00:02  IPv4     192.66.66.2   192.66.66.1  3766     4366    Layer-2/port  Reserved DMAC=01-80-C2-00-00-0x
8  2018/12/05 10:51:27  eth1/15  N/A    124     10     01:00:5e:00:00:01  00:10:94:00:00:02  IPv4     192.85.1.2    192.0.0.1    3700     4300    Layer-2/port  Source MAC is multicast
9  2018/12/05 10:51:27  eth1/15  N/A    9234    101    00:10:94:00:00:02  00:10:94:00:00:03  IPv4     192.85.1.101  192.101.0.1  3101     65101    Layer-2/port  VLAN Filter
10 2018/12/05 10:51:27  eth1/15  N/A    124     10     00:10:94:00:00:02  7c:fe:90:f3:98:88  IPv4     192.85.1.2    127.0.0.10   3700     4300    Layer-3      Destination IP is loopback
11 2018/12/05 10:51:27  eth1/15  N/A    124     10     00:10:94:00:00:02  7c:fe:90:f3:98:88  IPv4     192.85.1.2    127.0.0.10   3700     4300    Layer-3      Destination IP is loopback
12 2018/12/05 10:51:27  eth1/15  N/A    124     10     00:10:94:00:00:02  7c:fe:90:f3:98:88  IPv4     192.85.1.2    127.0.0.10   3700     4300    Layer-3      Destination IP is loopback
-----
WJH [standalone: master] (config) # _

```

Figure 2. WJH via CLI

As an alternative to CLI, WJH functionality can be accessed via Mellanox NEO®. The filtering and packet data capture capabilities that are available via CLI are also available via Mellanox NEO. Below is a screenshot of Mellanox NEO and its WJH interface.

The screenshot shows the Mellanox NEO interface. On the left is a navigation menu with options like Dashboard, Managed Elements, Network Map, Services, Configuration Management, Telemetry, Network Health, Tasks, Jobs, Events, Notifications, System Health, and Settings. The main area is titled 'Dashboard' and has tabs for 'General', 'RoCE', and 'What Just Happened?'. The 'What Just Happened?' tab is active, showing 'Last Dropped Packets' with a pie chart and a legend. The legend includes categories like 'Ingress spanning tree filter' (21.13%), 'Ingress VLAN filtering' (14.31%), 'VLAN tagging mismatch' (12.91%), 'Source MAC equals destination MAC' (12.91%), 'Source MAC is multicast' (12.91%), 'Port loopback filter' (12.91%), and 'Destination MAC is reserved (DMAC=01-80-C2-00-00-0x)' (12.91%). Below the pie chart is an 'Issues' table with columns for Timestamp, Switch IP, Interface, Source MAC, Destination MAC, Source IP, Destination IP, and Reason. The table lists several issues with their respective details and reasons.

Figure 3. Mellanox NEO® interface for WJH

WJH is an Open Ethernet solution that can be integrated into open source tools like Grafana, and Kibana, but it also works with turn-key data center-wide monitoring solutions like Cumulus NetQ. The data collected on the switch can be streamed out of the switch via gRPC in either the JSON format or InfluxDB line format, using a containerized agent (provided by Mellanox). The streamed telemetry data can be centrally stored in a time-series database such as InfluxDB. Visualization tools such as Grafana can be used to display the data from the database.



Figure 4. Cumulus NetQ dashboard

WJH can also be integrated with third-party software such as Apstra and Cumulus NetQ to provide rich and comprehensive visibility into datacenter networks.

## Summary

Traditional network visibility methods fall short as datacenters adopt 100GbE and higher speeds. WJH provides an open, extensible and actionable telemetry that can help operators dramatically reduce Mean Time to Issue Resolution and improve infrastructure uptimes at even higher data rates. WJH leverages Mellanox Spectrum silicon level capabilities to provide granular, contextual and actionable telemetry information on datacenter networks. Mellanox Spectrum SDK is tightly integrated with WJH and provides an open and extensible API framework to build fully-integrated visibility frameworks using 3rd party as well as open-source tools.

WJH can directly be used on the switch platforms via CLI. Alternatively, the WJH functionality is also available through a Web UI or Mellanox NEO. A containerized WJH streaming agent can be used to stream out WJH events out of the switch. Open-source time series databases such as InfluxDB and visualization tools such as Grafana can be used to visualize the data in a central dashboard.