

Barefoot Networks

Product Brief



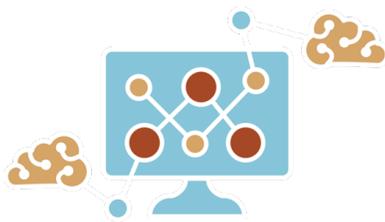
Barefoot Deep Insight™

PRODUCT BRIEF

Barefoot Deep Insight™

The world's first network monitoring system to provide full visibility into every packet in the network. Deep Insight detects any performance anomaly in the network, including microbursts, congestion problems, and load balancing issues.

Barefoot Deep Insight is the first network performance monitoring solution to uncover the four ground truths for every packet in the network:



- 1 How did it get here?
- 2 Why is it here?
- 3 How long was it delayed?
- 4 Why was it delayed?

HIGHLIGHTS

Background: Barefoot Deep Insight is an innovative network performance monitoring solution.

Why packet-by-packet telemetry? Sampling and statistics fail to capture the packet-level ground truths needed to characterize all network performance anomalies.

Why is accurate telemetry so important? Many network problems require an understanding of the path and origin of each packet involved, as well as a precise description of each delay.

Why should my network telemetry be programmable? The dataplane and its monitoring system must be programmable to enable diverse use cases and customer requirements.

In today's networks, even simple questions regarding visibility are impossible to answer. For example, we often want to examine a data packet in the network and ask, "How did this packet get here?" and "How long was it delayed at each switch, router and firewall along the way?" On most networks, current tools provide no answers.

This is because today's networks still use the same tools as 20 years ago: traceroute, ping, SNMP, and NetFlow. At best, such tools can collect statistics based on samples. This isn't enough to capture a transient event, such as a microburst, nor does it enable network operators to find the root cause of many network anomalies.

Barefoot Deep Insight is the world's first network monitoring system to provide full visibility into every packet in the network.

Barefoot Deep Insight software, running on commodity servers,

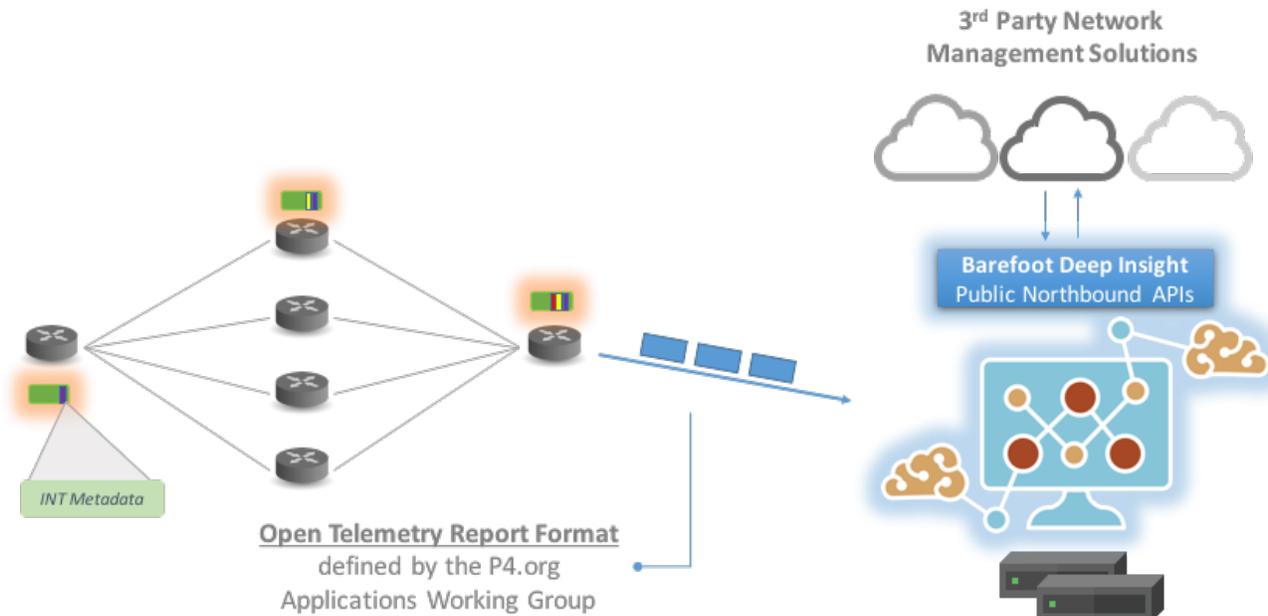
interprets, analyzes and pinpoints a myriad of conditions that can impede packet flow. Deep Insight does this analysis in real time and at line-rate.

Deep Insight's intelligent triggering mechanism ensures that only interesting network events are detected and reported, while irrelevant data is automatically filtered out.

Thanks to the P4 programmability of Barefoot's Tofino chip, changes to dataplane monitoring functionality are straightforward to implement. This flexibility allows OEMs and white-box customers to design for use cases that would otherwise require years of development and implementation in fixed function data-planes.

Machine learning can be employed to achieve stateful baselining of the network's performance and automatic detection of anomalies at any time scale and with nanosecond resolution.

KEY BENEFITS ASSOCIATED WITH BAREFOOT DEEP INSIGHT



End-to-End Network and Deep Insight View

KEY BENEFITS AND USE-CASES

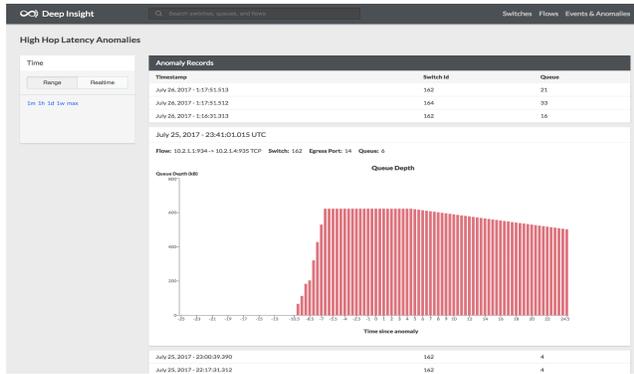
Enterprises and Financials - In enterprise data centers, many-to-one communication patterns commonly found in application frameworks such as Hadoop and HDFS can result in congestion, queue build-up, and increases in end-to-end latency. Similarly, applications in a financial trading environment produce bursty traffic, with short-lived periods of very high throughput.

Prolonged outages and lengthy root-cause analysis translate into high operational costs, lost productivity, and missed revenue opportunities. As a result, these customers need the ability to quantify the impact of any performance issue and quickly find its root cause by identifying aggressor flows. The Deep Insight engine can quickly analyze such anomalies and visualize the full dynamics of a congestion event, down to each individual packet, exposing the aggressor and victim flows along with the packet drops.

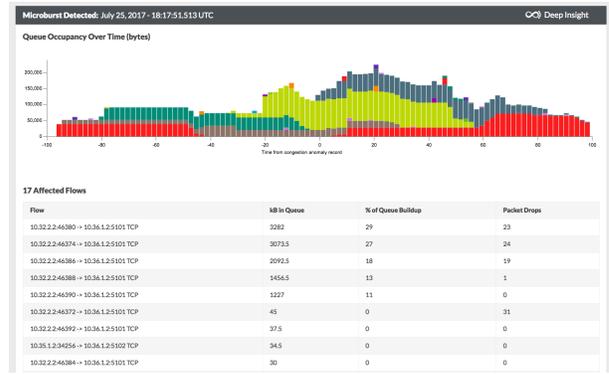
TELCOs and NFV/SDN - Network Function Virtualization (NFV) is a network architecture where network services and functions are virtualized into generic elements that can chain together to create an agile architecture that is easy to manage and orchestrate. SDN technology follows a similar approach, decoupling network functions from the physical infrastructure and providing a centralized view of the distributed network for more efficient orchestration and automation.

In such environments, it is very difficult to pinpoint performance issues that might have originated anywhere in the service chain. With Tofino and Barefoot Deep Insight, customers can easily triangulate performance issues in a service chain to switches, NICs, or Virtual Network Functions (VNFs), and precisely measure the performance degradation to identify impacted applications and flows. In such an architecture, Smart NICs can be leveraged to extend visibility into highly virtualized environments with VMs or containers.

KEY FEATURES AVAILABLE WITH BAREFOOT DEEP INSIGHT



Queue Depth Profiling



Queue Composition

KEY FEATURES

Deep Insight is licensed and sold by Barefoot Networks to run on commodity x86 servers. The Deep Insight application consumes telemetry and anomaly reports from programmable data-planes (for example the Barefoot Tofino switching ASIC, SmartNICs, or other devices capable of generating data-plane telemetry reports).

The Deep Insight analytics engine processes reports in real time and at a very high rate, implementing intelligent analytics and data correlation techniques to detect the network anomalies that are the most common causes of an outage or degradation in applications performance.

Anomalies can be detected and stored for deeper historical analysis. All of this is done at line rate and with multi-Tb/s throughput, without the overhead of additional hardware or additional packets.

Key Features supported by Deep Insight:

Feature	Description
Monitor UI	Topology View, Flow Table View, Event and Anomaly Dashboard, Top-down troubleshooting workflows
Ultra-accurate Resolution and Latency Granularity	Packet-by-packet visibility with nanosecond accuracy
Topology-Aware Analytics	Topology view and correlation of flows, anomalies and events with a defined network topology
Real-Time Network Anomaly Detection	Congested Flow, High End-to-End Latency, High Hop Latency, Path Loop
Real-Time Network Event Detection	New Flow, Flow Termination, End-to-End Latency Change, Hop Latency Change, Unused Link, Unused Switch, Path Change
Path and Latency Tracking	Identify path and latency changes when compared to a predetermined baseline
Congestion Analysis	Queue Profiling, Queue Composition and Microburst Analysis to identify aggressor flows and victim flows.
Packet-Drop Analysis	Packet drop details with granular and rich information, including: timestamp, drop reason, packet 5-tuple, packet metadata, switch-ID, ingress/egress port-ID, queue-ID
Open and Extensible	Support for INT and dataplane report formats as specified by P4.org. Extensible to the IETF IOAM definition.
Advanced Filtering	Monitor and visualize analytics for specific applications and thresholds
Easy Integration with 3rd-party monitoring solutions	Northbound APIs for easy integration with 3rd-party monitoring solutions
Historical analysis	Data retention for historical analysis
Easy Scale-Out and Flexible Deployment	Scale-out deployment to add capacity as network demand grows
System Health Monitoring	Integrated system health monitoring dashboard to detect and pinpoint issues

Information

Availability

Barefoot Deep Insight is available now to key customers and partners. Pricing follows a pay-as-you-grow model, where customers pay only for the volume of telemetry they need. Subscription-based licensing enables customers to make a balanced investment with limited commitment and no upfront CAPEX.

For more information, contact Barefoot at info@barefootnetworks.com or visit the [Barefoot Deep Insight Product Page](#)

ABOUT BAREFOOT NETWORKS

We are a team of visionaries, experienced technologists, and engineers who have created a blueprint for designing and operating the world's fastest and most programmable networks. Our goal is to make programming your network as simple as programming your CPU. We believe that when the network is fully programmable—that is, both the control plane and data plane are under the control of the end user—the networking industry will enjoy the same explosion of innovation we have seen in compute and storage.

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