

## SOLUTION BRIEF

Communications Service Providers  
Service Assurance



# Measuring TCP Performance with Creanord\* TrueTCP\*

Creanord and Intel “supercharge” performance of RFC 6349 to emulate millions of connections,<sup>1</sup> helping MNOs test how many device connections a virtualized mobile service can sustain.



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### Overview

Traditional service assurance technology tests performance of L2/L3 networks to help mobile network operators (MNOs) and other communications services providers (CommSPs) determine network and service response times to meet service level agreements (SLAs) and ensure successful launch and operation of consumer services. But as MNOs move to network functions virtualization (NFV), service assurance must evolve to measure these new services.

The RFC 6349 standard is a methodology for testing transmission control protocol (TCP) connectivity that better stresses both the network and virtualized network function (VNF)-based services. Creanord\* and Intel are working together to deliver TrueTCP,\* an RFC 6349-based implementation that has the performance and scalability to provide real-world TCP-based service assurance with the flexibility required by virtualized networks.

### Challenge

Service assurance systems are an essential component of every mobile or wireline communications service. They provide the key performance indicators (KPIs) that let customers know that they are receiving their contracted service and help CommSPs discover and fix network problems.

But the communication service provider's network is changing to support NFV, which changes the type and quantity of data needed from service assurance solutions.

In legacy networks, service assurance systems track L2/L3 network and physical hardware KPIs. Services are deployed in discrete, fixed-function appliances, so monitoring network connections is straightforward. At turn-up, service assurance solutions typically load a network with data to determine the available bandwidth and measure any latency or other connection issues.

In an NFV network, Intel® architecture-based servers with VNF software replace fixed-function appliances. Benefits of NFV include hosting multiple VNFs on a single server for more cost-effective service deployments. Additionally, new NFV-based services can be commissioned and decommissioned in minutes by remotely installing new VNF software on the server. Using service chaining techniques, a unique data path through a series of VNFs can be implemented for each data flow based on the services or data type.

NFV changes service assurance dynamics, both for service activation and for ongoing quality of service measurements. This is because the performance of the network is not the only contributor to the service quality; shared NFV resources can also have an impact. This raises the importance of testing of the VNFs to ensure that there is a great quality of experience (QoE) for the service overall.

For example, a service may violate its SLA or even fail if the network or service provisioning VNFs, such as virtual firewalls, load balancers, etc., are stressed with higher-layer stateful traffic even though Ethernet and IP layers are functioning as expected. Traditional service assurance would measure the network, but not necessarily see the challenges occurring with the VNFs.

One of the answers to this challenge is to test TCP performance. The IETF has created RFC 6349 as a standard methodology for testing sustained TCP layer performance. Testing TCP performance gives MNOs a better picture of the real-world pressure on their networks caused by up to millions of smartphone or mobile device users simultaneously using the network—each device with multiple apps requesting a network connection.

IETF RFC 6349 is implemented in service assurance systems to benchmark TCP throughput performance. It is also used to establish the performance benchmark for stateful end-to-end services and applications. For VNFs, service assurance systems based on RFC 6349 must emulate real application traffic to validate end-user oriented performance KPIs. The challenge for RFC 6349 service assurance systems is to be able to emulate this traffic both in terms of creating a large number of connections and also in supporting the resulting high bandwidth levels.

## Solution

To solve this challenge, Creanord has developed its own implementation of RFC 6349 called TrueTCP that leverages the Data Plane Development Kit (DPDK), an open source set of software libraries and drivers originally developed by Intel, to “supercharge” the data plane performance for more realistic MNO applications. TrueTCP runs on the company’s hardware-based CreaNODE 3000, CreaNODE 500, and virtual CreaNODE vProbe.

**CreaNODE 3000:** This advanced probe is a 1U-high, rack-mount system that can scale up to 10,000 targets with hardware timestamping and support of standards-based measurement technologies, including Y.1564, RFC 6349, Y.1731 L2 loopback, two-way active measurement protocol (TWAMP), and user datagram protocol (UDP) Echo. The performance and scalability of the system provides expanded service visibility because it can extract performance and health data from a wide variety of installed equipment. The probe works with Creanord’s EchoVault\* Management and Performance Assurance system to aggregate performance data and for network-wide probe management, automation, and reporting.

**CreaNODE 500:** This miniaturized probe is a palm-sized device that is loaded with packet performance. The Mini Probe is ideal for advanced, segmented, and distributed IP network assurance in access and cloud networks. The mini probe supports line-rate TCP testing, precision time-

stamping, and a range of activation testing and monitoring protocols.

**Creanord vProbe:** This VNF provides virtualized, powerful, and accurate end-to-end network performance measurements and monitoring. The NFV-compliant vProbe extracts performance metrics from virtualized and legacy networks providing full network visibility without extra hardware at the remote sites or the customer premises. The Creanord vProbe can measure and assure eight or more class of service levels and supports eXtended SNMP for monitoring network health and interface statistics. The vProbe transmits performance data to EchoVault to enable performance monitoring from a central location using TWAMP or UDP Echo.

On the vProbe, TrueTCP can create up to 4 million unique and simultaneous data flows with up to 100 Gbps of data traffic, giving a true picture of how many users a service can sustain.<sup>1</sup> The CreaNODE 3000 systems supports up to 10 Gbps aggregate throughput to a service. TrueTCP also can test quality of service with the ability to generate up to 12 different service levels. The real-time result preview lets you see immediately how the test is proceeding and results are stored in a nice report as PDF in a single repository, from which they can be shared.

TrueTCP has integrated DPDK technology to improve its data plane performance. DPDK is a set of open source drivers and libraries that improve packet processing performance on general purpose CPUs, including Intel Xeon processors. DPDK works to boost packet processing performance and throughput by minimizing the number of CPU cycles required to send and receive packets, implementing fast packet capture algorithm and running a variety of fast path stacks.

## TrueTCP Features and Highlights

- Supercharged RFC 6349 probe-to-probe L4-L7 SAT testing and troubleshooting
- Up to 4 million simultaneous TCP connections<sup>1</sup>
- Supports up to 100 Gbps data rates
- Testing up to 12 simultaneous services
- Real-time result preview
- Shareable PDF reports with repository
- Future-proof with NFV capabilities and SDN interfaces (REST)
- Supported in hardware-based CreaNODEs and vProbe

## Conclusion

Creanord's TrueTCP improves on the value of RFC 6349 by providing the performance and scalability that MNOs need to really validate the user experience of their services. By teaming with Intel to reach these performance levels, TrueTCP gives the MNO more confidence in understanding its services and the end user network experience. Because the network is the foundation for value creation for an MNO, detailed understanding of and control over its performance are prerequisites to implementing a winning strategy in highly competitive environments.

### About Creanord

Creanord empowers carriers and service providers with True SLA Network Experience,\* through a complete service assurance solution for SDN/NFV, Carrier Ethernet, and IP networks. The solution comes with the Creanode

Probes and NFV-based vProbe, EchoVault Performance and SLA Management system, and EchoVault Portal. This comprehensive solution for Performance and SLA Management provides predictive analytics and improves network visibility to strengthen customer loyalty. More information is available at [www.creanord.com](http://www.creanord.com).

### About Intel

Intel (NASDAQ: INTC) is a world leader in computing innovation. The company designs and builds the essential technologies that serve as the foundation for the world's computing devices. As a leader in corporate responsibility and sustainability, Intel also manufactures the world's first commercially available "conflict-free" microprocessors.<sup>2</sup> Additional information about Intel is available at [newsroom.intel.com](http://newsroom.intel.com) and [blogs.intel.com](http://blogs.intel.com) and about Intel's conflict-free efforts at [conflictfree.intel.com](http://conflictfree.intel.com).



<sup>1</sup> Test performed by Creanord. Hardware Configurations: 2 x Intel® Xeon® Processor E5-2699 v3, 128 GB quad channel DDR4 RAM @2133 MHz, Mellanox ConnectX-4 100 Gbps PCIe3 x 16 NIC, OFED 3.4, and Debian Testing / 4.6.2-2 (2016-06-25) x86\_64 GNU/Linux. For more information, see the [Creanord vProbe TrueTCP 100G with 4 Million Connections - Test Report Dec 12, 2016](#).

<sup>2</sup> Conflict-free" refers to products, suppliers, supply chains, smelters, and refiners that, based on our due diligence, do not contain or source tantalum, tin, tungsten or gold (referred to as "conflict minerals" by the U.S. Securities and Exchange Commission) that directly or indirectly finance or benefit armed groups in the Democratic Republic of the Congo or adjoining countries.

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