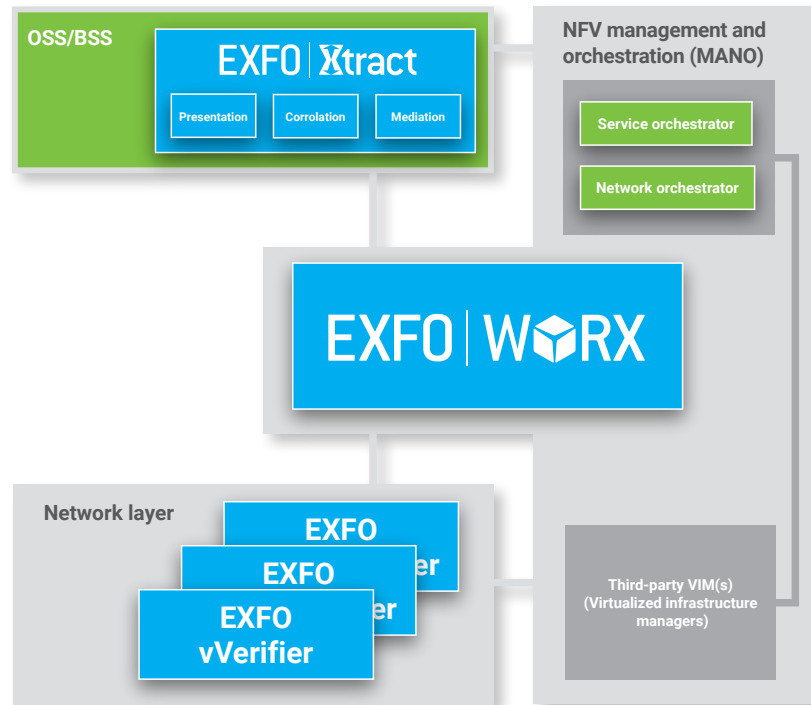


# Virtual Verifier

- Virtualized, multifunction service assurance verifier with integrated monitoring and troubleshooting capabilities designed for NFV architectures.



## KEY FEATURES

- Compliant with ETSI NFV architecture and specification
- MANO supports major hypervisors: VMware, Xen, KVM, OpenStack, Virtual Box
- Designed for carrier-class availability
- Full support of lifecycle testing, including turn-up, transport and QoE testing capabilities
- IPv4 and IPv6 support
- Hardware acceleration with SR-IOV, DPDK and VPP capabilities
- End-to-end service testing
- 24/7 service-level agreement (SLA) monitoring

## BENEFITS

- Optimize network performance and customer satisfaction throughout service lifecycle
- First-time-right turn-up and troubleshooting of Ethernet/IP services using standards-based Y.1564 test methodology
- Continuously monitor performance to identify service degradation before it impacts subscribers
- Fault detection and availability monitoring
- Troubleshoot effectively to reduce mean-time-to-repair (MTTR) and optimize service performance
- Optimize quality of service (QoS) and quality of experience (QoE) while reducing churn and operational expenses (OPEX)

## VIRTUALIZATION BENEFITS

- Reduce the costs deploying verifiers and expand the scope of deploying them in every service segment
- Enable the full lifecycle of a circuit by turning up, monitoring and troubleshooting Ethernet/IP circuits through a single VNF
- Accelerate time-to-market by enabling fast deployment of assured services on demand
- Reduce design to deployment time
- Take advantage of an open system that is easy to integrate with NFV/SDN architectures
- Enable operational efficiency by fixing faults and introduce assured services in real time
- Reduce OPEX and CAPEX by enabling fully automated service delivery and monitoring lifecycle
- Open up new markets and monetization opportunities

## VERSATILE IN-NETWORK PERFORMANCE MANAGEMENT

The Virtual Verifier is the virtual network function infrastructure (VNFI). It enables operators to monitor and troubleshoot new services quickly and efficiently. The Virtual Verifier leverages the flexibility of NFV/SDN, monitors the quality of those services and assures a high QoE for end users. Carriers can deploy the Virtual Verifier using the third-party orchestrator to turn up and assure multiple new circuits simultaneously—in addition to measuring the real-time performance of data transport, wireless backhaul, metro Ethernet, VoIP, mobile and video services. The extremely competitive value and performance of the Virtual Verifier makes it ideally suited for deployment in a wide variety of service provider and enterprise locations, including metro hubs, regional headends, points of presence, mobile switching centers and data centers.

## ONE SOLUTION FOR VIRTUALIZED ETHERNET SERVICES

The virtual network verifier (VNF) is a key part of EXFO's solution to optimize Ethernet service delivery. In conjunction with EXFO's service assurance software, the VNF can simultaneously perform monitoring functions across the core and access, while initiating remote or automated service monitoring tests. The result is a single platform that fulfills the requirements of two or more functions in competing solutions. By initiating monitoring and troubleshooting tests from a central location to service endpoints, operators can avoid costly, time-consuming truck rolls. The Virtual Verifier allows service providers to deploy a verifier VNF anywhere in the virtualized service chain to perform testing and then seamlessly evolve to real-time performance monitoring or vice versa—all with minimal capital expenditures. With unprecedented test scalability to thousands of locations, the Virtual Verifier ensures complete end-to-end NFV/SDN network visibility. When combined with the comprehensive reporting and analytics capabilities of EXFO Work and its ability to seamlessly integrate with the operator's consolidated NFV/SDN OSS/BSS, the Virtual Verifier uses EXFO's solution to provide unmatched service lifecycle management capability and service assurance functionality.

## CRITICAL COMPONENT OF END-TO-END VIRTUALIZED SERVICE TESTING

The Virtual Verifier is a critical component of the EXFO's end-to-end service testing approach. It delivers both the essential end-user QoE monitoring along with the visibility and detail network administrators need to easily troubleshoot performance problems and identify their root causes.

The Virtual Verifier enables simultaneous core-to-core, edge-to-core and edge-to-end-user testing. By deploying the VNF at key locations in the NFV/SDN network core and edge, and by leveraging flexibility and elasticity provided by the NFV/SDN architecture, network administrators can effectively segment the network in order to gain the needed visibility into the enterprise, access, core and backhaul networks. Tests can be performed for any other EXFO Physical or Virtual Verifier, third-party physical or virtual functions, such as network interface devices (NIDs)/(vNID) or cell site routers (CSRs)/(vCSR) using industry standards, such as 802.1ag, Y.1731 or TWAMP. By leveraging operators' existing equipment, CAPEX costs are reduced and operational efficiencies are maximized. This flexibility enables service providers to gradually—and with minimum impact—evolve from traditional networks to fully NFV/SDN networks.

## OPERATIONAL SIMPLICITY

The Virtual Verifier offers reliability and management features that are required for seamless integration into NFV/SDN environments. It supports and takes advantage of the flexibility of an orchestrated NFV/SDN end-to-end service chain. Installation simply requires to click, configure and drop a Virtual Verifier anywhere in the Virtual Service Chain, the orchestrator completes the rest. Upon instantiation, the Virtual Verifier performs system integrity checks, automatically discovers its EXFO Worx server and then downloads all system configurations, test modules and test schedules over a secure, encrypted connection from the server.

## SERVICE ACTIVATION

The Virtual Verifier supports high throughput service activation capabilities using the Y.1564 methodology to validate the creation and the compliance of the orchestrated circuit. The Virtual Verifier VNF can be combined with various acceleration technologies, such as SR-IOV and DPDK to improve throughput performance, reaching in some cases throughputs of 5Gbps and above. These capabilities can be combined with other end-to-end tests through an on-demand mechanism, which launches tests and returns results at completion. Service activation can be performed when orchestrating new services as well as troubleshooting performance failures.

## TRANSPORT-TO-APPLICATION LAYER PERFORMANCE MANAGEMENT

The Virtual Verifier supports a comprehensive suite of more than 70 active tests. These tests address a wide array of network transport protocols and IP services, including Carrier Ethernet, IP, VoIP, video, VPN, wireless and web-based applications, as well as a variety of performance tests. The Virtual Verifier calculates a comprehensive set of performance statistics by measuring transport quality and the performance of transport and application-specific protocols. The proactive tests precisely simulate network and user-level activity.

## SIMPLE, INTUITIVE REPORTING

The Virtual Verifier supports a wide range of troubleshooting and monitoring tests that provide operators with valuable network status data. EXFO Worx provides a number of customizable reports and dashboards that turn this data into accessible and actionable information. These web-based reporting tools make it easy for operators to quickly and intuitively understand the test results and therefore, eliminate the need for expensive training. Moreover, since the reports are all web-based, they can be easily presented to subscribers as proof that SLAs are being met.

## GLOBAL PROVIDER

EXFO is a global provider of converged service assurance solutions that allow the world's largest service providers and companies to offer reliable and high-quality experiences in voice, video, data and mobile services to their customers, partners and employees. EXFO brings a proven track record of IP expertise that is unique to the service assurance marketplace, and collaborates closely with its customers and partners to assure the delivery of any IP-based service—over any network and to any endpoint. EXFO's seamlessly integrated hardware and software products are converged service assurance solutions that proactively monitor IP service and application quality. Network operators use their various IP services.

## SPECIFICATIONS

<b>Active tests</b>	1 x CPU at 1 GHz, 512 M RAM, 2 GB storage, 1 x 1 Gbit/s test ports virtual resources		
<b>Compatibility</b>	<p>The Virtual Verifier supports the OVF portability class 1 and is packaged in compliance with specification V2.1.0 supporting the following environments:</p> <table border="0"> <tr> <td style="vertical-align: top;"> <p><b>NFV/SDN/NFVI</b></p> <ul style="list-style-type: none"> <li>• Openstack</li> <li>• vmWare</li> <li>• XEN</li> <li>• Hyper-V</li> </ul> </td> <td style="vertical-align: top; padding-left: 20px;"> <p><b>Hypervisors</b></p> <ul style="list-style-type: none"> <li>• KVM</li> <li>• QEMU</li> <li>• Virtual Box</li> <li>• VmWare</li> <li>• XEN</li> <li>• Hyper-V</li> </ul> </td> </tr> </table>	<p><b>NFV/SDN/NFVI</b></p> <ul style="list-style-type: none"> <li>• Openstack</li> <li>• vmWare</li> <li>• XEN</li> <li>• Hyper-V</li> </ul>	<p><b>Hypervisors</b></p> <ul style="list-style-type: none"> <li>• KVM</li> <li>• QEMU</li> <li>• Virtual Box</li> <li>• VmWare</li> <li>• XEN</li> <li>• Hyper-V</li> </ul>
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<b>Active tests<sup>a</sup></b>	<ul style="list-style-type: none"> <li>• Layer 4 IPv4/IPv6</li> <li>• 802.1ag and Y.1731 loopback and link trace</li> <li>• IP ping and traceroute</li> <li>• Network infrastructure: DHCP, DNS, SNMP</li> <li>• Carrier Ethernet: 802.1ag, Y.1731</li> <li>• IP transport: TCP, TWAMP, UDP</li> <li>• VoIP: H.323, MGCP, NCS, RTP, SCCP, SIP</li> <li>• Video: H.323, RTP, RTSP</li> <li>• VPN: full-mesh availability/performance</li> <li>• Applications: HTTP, e-mail, FTP, NTP, SFTP, TFTP</li> <li>• QoS and VLAN support</li> </ul>		
<b>Turn-up tests</b>	<ul style="list-style-type: none"> <li>• L2/L3/L4 Y.1564</li> <li>• Test compatibility against standards-based responder and L2 L3 loopback</li> <li>• Performance <ul style="list-style-type: none"> <li>– Unaccelerated performance up to 600 Mbit/s</li> <li>– Leverage hardware acceleration (SR-IOV and DPDK), up to 10 Gbit/s and above</li> </ul> </li> <li>• Multi-stream and multi-instance capabilities for additional operational benefits</li> </ul>		

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EXFO serves over 2000 customers in more than 100 countries. To find your local office contact details, please go to [www.EXFO.com/contact](http://www.EXFO.com/contact).

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