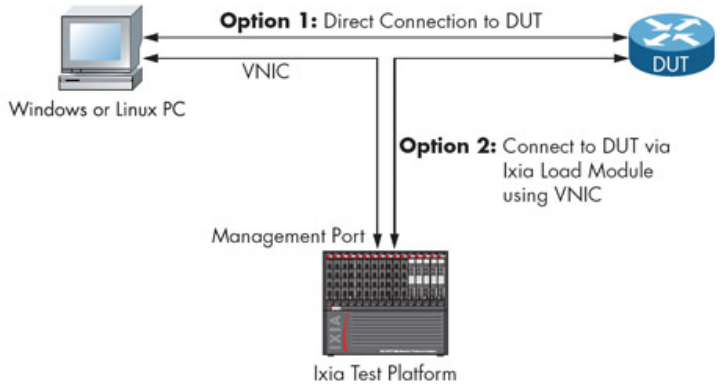
IxANVL — Automated Network Validation Library

Problem: Questioning Product Quality

Throughout your product's lifecycle, you need to verify your device design. Does the device's protocol software meet specifications? How well does the device handle traffic from non-complying network components? How might new development impact existing code? Not only do these questions demand accurate responses, but they also require speedy resolution, because identifying and addressing last-minute product reworks can be considerably time-consuming and costly.

Solution: Validation That Keeps Costs Down, Confidence Up

With Keysight's Automated Network Validation Library (IxANVL), you can quickly and effortlessly access a vast array of protocol libraries and utilities to validate protocol compliance and interoperability. Easy to use thanks to an enhanced Graphical User Interface (GUI) and flexible test-automation capabilities, IxANVL delivers many key advantages. By emulating large, multi-node networks, it not only reduces costs—it also leads to more efficient testing and faster product-release times. And extensive and thorough automated testing increases your confidence in product quality.



Though IxANVL can run on minimal hardware such as a PC with a Linux or Windows operating system and an Ethernet card, it is also well suited for operation on Keysight's powerful test and analysis platform through a Virtual Network Interface Card (VNIC) driver. This flexibility enables IxANVL to support industry-standard test interfaces, including 100 Mbps/1GE/10GE/25GE/40GE/100GE/400GE Ethernet. IxANVL provides conformance, negative, and regression testing on a vast selection of protocols.

KEYSIGHT

Highlights

Save Time and Money

IxANVL allows vendors to verify device design during the product's entire lifecycle. Problems can be identified earlier to prevent costly last-minute reworks. IxANVL emulates large, multi-node networks that previously were cost prohibitive, resulting in more efficient tests and quicker product release times.

Increase Confidence

IxANVL increases confidence in product quality by enabling extensive and thorough testing, performed automatically and without supervision.

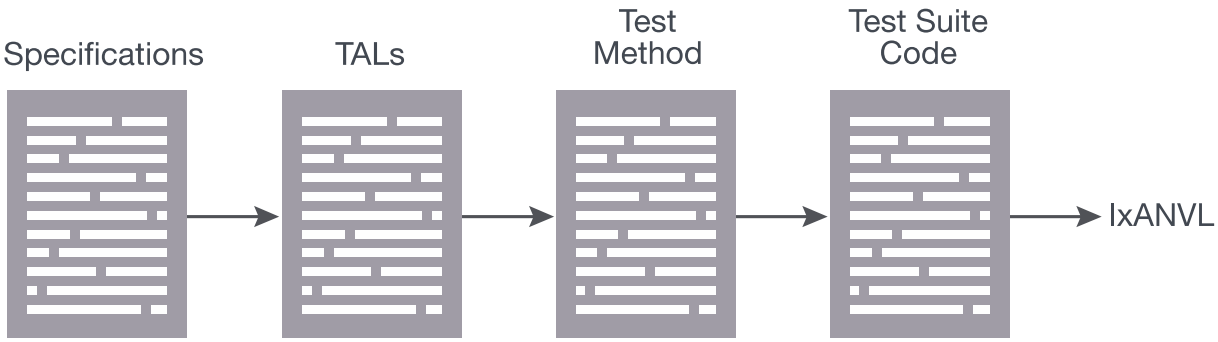
IxANVL's test results allow users to do the following:

- Determine exactly where a device's protocol software does and does not meet the specification.
- Observe how well the device handles traffic from non-complying network components.
- Determine how new development effects existing code, through regression testing.

Validate Broad Set of Protocols

- IxANVL supports a comprehensive list of protocols, including Bridging, Routing, PPP, TCP/IP, IPv6, IPsec, VPN, MPLS, Carrier Ethernet, Automotive Ethernet, Segment Routing, and Multicast.

Test Methodology



IxANVL Test Suite Development Process

IxANVL follows a rigorous test suite development process:

Specifications: Analyze a protocol specification line-by-line

Test Assertion Lists (TALs):

- Develop a TAL, which is a list of testable statements
- Augment TALs with more negative tests
- Prioritize and group TALs for the test suite

Test method: Develop a test method for each accepted test assertion

Test suite code validation: Continually perform verification of protocol standards (authors or implementers) during the development process.

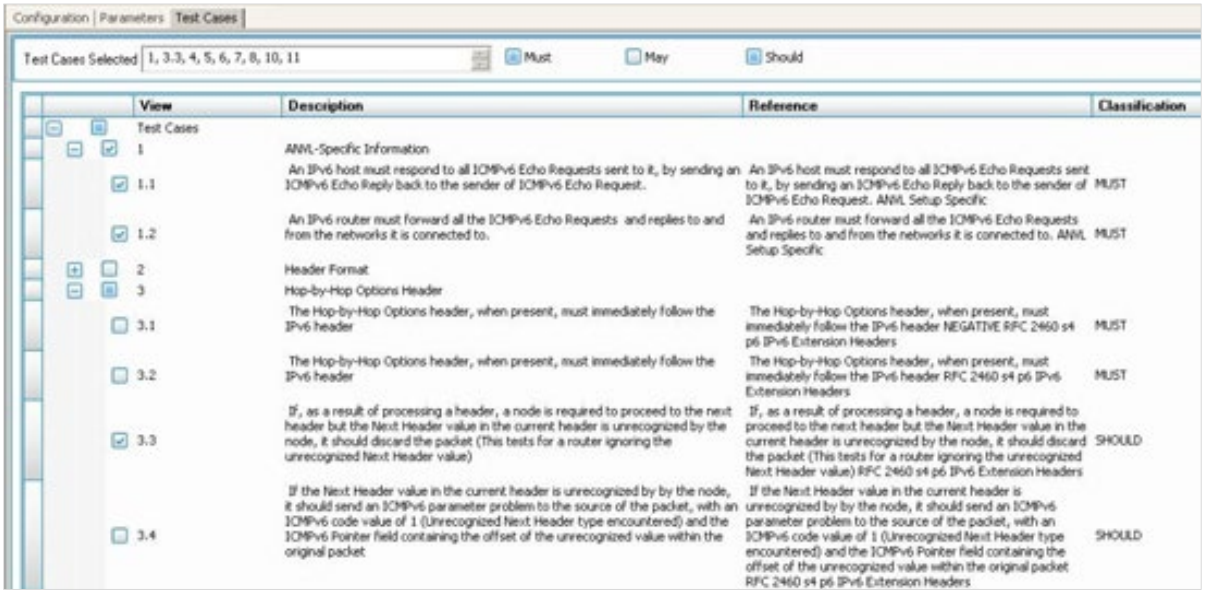
Test Configuration

The IxANVL test suite can run on a Linux or Windows PC with off-the-shelf network interface cards (NICs), or on Keysight load modules through a VNIC connection. The tester PC connects with the device under test (DUT) through test interfaces. Up to six interfaces may be used, depending on the test configuration. IxANVL flexibly emulates various system topologies and creates virtually any test scenarios for almost any DUT.

IxANVL offers both a command-line interface for test automation and a user-friendly GUI, allowing intuitive test execution management and detail reporting. A batch runner is also available for scheduling regression test-run sequences.

Test Execution

IxANVL classifies test cases into three categories: MUST, SHOULD, and MAY. Tests can be selected and executed based on their categories or test topologies.



The IxANVL test selection interface enables users to select and run tests individually or as a group.

The IxANVL test can be run by using two options — GUI or command line input. In GUI mode, the user selects which test suite and test cases to run. In command line mode, the user types a command with options indicating which tests should run and the required output level.

In the test, IxANVL sends packets to the DUT based on the test that is designed and compares the received DUT packets to what was expected. After receiving these packets, IxANVL reacts according to the returned information — it may continue the test, stop the test, log an error message, or perform a host of other functions.

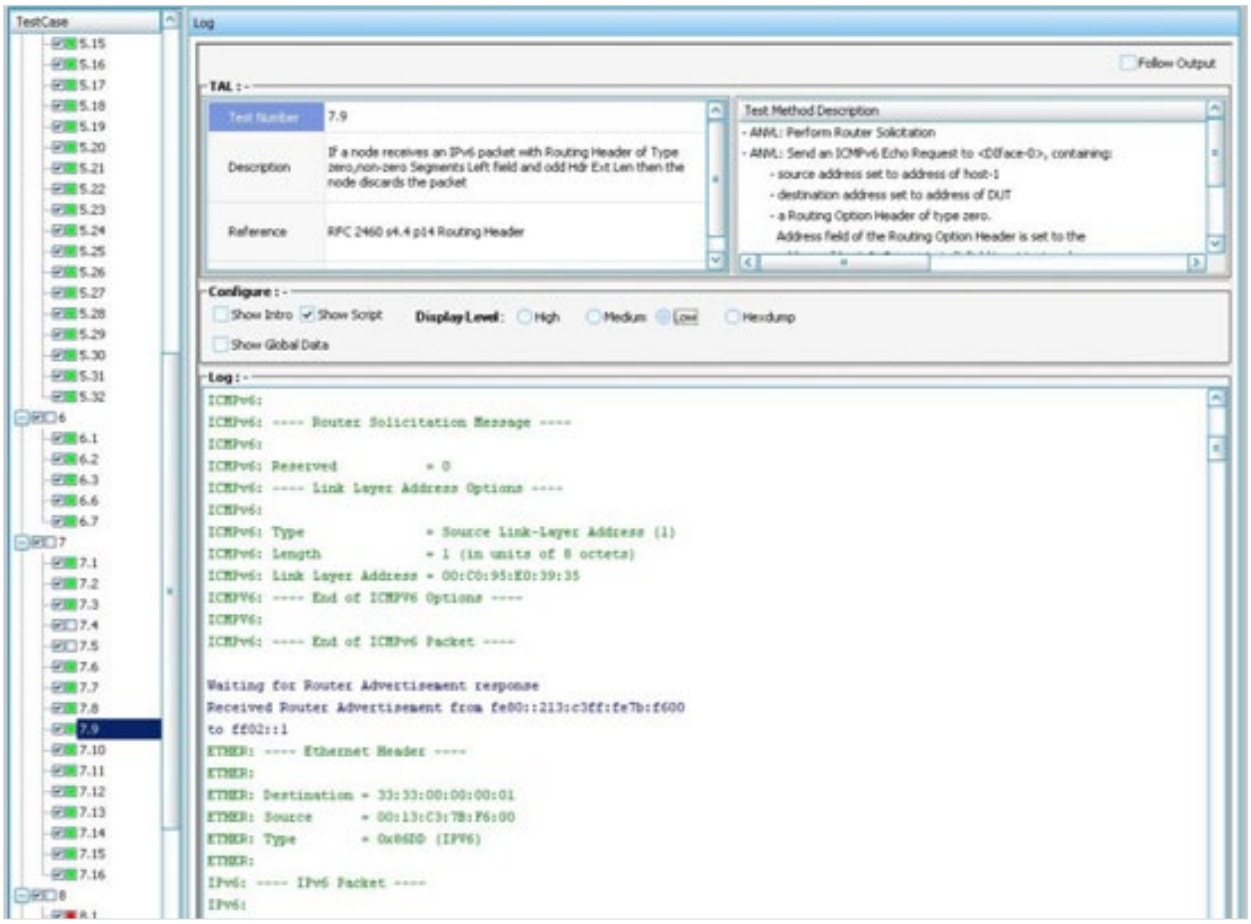
During the test, IxANVL logs the progress in real-time. After completion, it indicates whether the test passed or failed, and then repeats the process with the next test until all selected tests have been run.

Test Results

Users can specify four levels of test outputs:

1. High level: basic pass/fail
2. Medium level: pass/fail and test event status
3. Low level: comprehensive report with packet decode
4. Hexdump: detail report with hexdump of every packet exchanged between tester and DUT

IxANVL results include detailed trace outputs with a description of the test methodology for side-by-side reference.



In addition to log outputs, IxANVL provides a timing diagram that represents the relationship of the test packets exchanged between IxANVL and the DUT.



IxANVL provides comprehensive packet-by-packet analysis for every test case.

Platform

- An IxANVL workstation supports the following configuration: Debian 12.7 (Linux debian 6.1.0-25-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.1.106-3 (2024-08-26) x86_64 GNU/Linux)
- Debian 12.11 (Linux version 6.1.0-41-amd64 (debian-kernel@lists.debian.org) (gcc-12 (Debian 12.2.0-14+deb12u1) 12.2.0, GNU ld (GNU Binutils for Debian) 2.40) #1 SMP PREEMPT_DYNAMIC Debian 6.1.158-1 (2025-11-09))
- Windows 10 Enterprise (64-bit), Windows Server 2016
- Windows 11 Enterprise 64-Bit
- CPU: 64-bit Processors
- RAM: 2 GB or more
- Disk: 4 GB free or more

Supported Interfaces

IxANVL supports a wide range of network interface cards that directly attach to a Linux or Windows PC:

- Ethernet 10/100
- Gigabit Ethernet

IxANVL also supports Keysight VNIC, an interface driver that resides on a Linux workstation and Keysight chassis and allows the IxANVL test suites to access Keysight load modules.

Keysight VNIC supports the following types of Keysight load modules (per-port CPU required):

- 10 Gigabit Ethernet, including NGY family
- 25GE / 40GE / 100GE / 400GE Ethernet
- Ethernet family (10 / 100 / 1000 Mbps)
- Novus ONE appliance/Novus ONE PLUS appliance

Test Coverage

IxANVL Test Suites	Target Protocols	Reference Specification	Test Cases/Req. Test Interfaces
IPv6 Test Suites			
IPv6 Core	IPv6	RFC 2460, 2464, 8200	126 / 2
	IPv6CP	RFC 2472	17 / 1
	ICMPv6	RFC 4443	46 / 2
IPv6 Advanced	NDP	RFC 4861	228 / 2
	Generic Packet Tunneling	RFC 2473	46 / 2
	AutoConfig	RFC 4862	37 / 2
	V6oV4	RFC 4213, 2529, 3056, 3068	66 / 2
	PMTU	RFC 1981, 8201	10 / 1
	IP Router Alert	RFC 2711	13 / 2
DHCPv6	DHCPv6 Client	RFC 3315	103 / 1
	DHCPv6 Server	RFC 3315	141 / 2
DHCPv6 Client PD	DHCPv6 Client Prefix Delegation	RFC 3633 RFC 8415	35/ 1
IPv4 Test Suites			
IPv4	IPv4	RFC 791, parts of 1122, 1812	70 / 2
	ICMP	RFC 792, parts of 1812	32 / 2
ARP	ARP	RFC 826 RFC 1027	61 / 2
DHCPv4	DHCPv4 Client	RFC 2131	90 / 2
	DHCPv4 Server	RFC 2131	74 / 2
Routing Test Suites			
IP RIP	RIP	RFC 2453	53 / 2
	IPGW	RFC 1812, 1122	18 / 2
RIPng	RIPng	RFC 2080	60 / 2
OSPF Core	OSPF	RFC 1583, 2328	312 / 3
OSPF Extensions	Opaque LSA, NSSA, DB Overflow, Stub Router Ext	RFC 2370, 3101, 1765, 3137	56 / 3
	OSPF TE	RFC 3630	54 / 2
OSPFv3	OSPFv3	RFC 5340, parts of RFC 2328	328
OSPF-GR	OSPFv2-GR	RFC 3623	56 / 2
VRRP	VRRP	RFC 3768 RFC 5798	83 / 2
BGP4 Core	BGP	RFC 4271	217 / 3
BGP4 Extensions	BGP-OSPF, Communities, Route Flap Damping, Route Reflection, Route Refresh, Confederations	RFC 1403, 1997, 2439, 2918, 4456, 5065, 1771, 4360	150 / 3
BGP Plus	BGP+ with IPv6	RFC 4271, 4760, 2545	236 / 3
OSPFv3-AF	Support of Address Families in OSPFv3	RFC 5838	37 / 2
BGP 4-Byte AS	4-byte AS for BGP and BGPPlus	RFC 4893	52 / 3
ISIS	ISIS	RFC 1195, 3719, 5303, 5309	237 / 2
ISIS-TE	ISIS-TE	RFC 3784	31 / 1
ISISv6	ISISv6	ISO/IEC 10589:1992(E) RFC 1195 RFC 3719 RFC 5308	220/2
ISIS-MT	ISIS-MT	RFC 5120, 5303, 5309	105 / 3
VRRPv6	VRRPv3 over IPv6	RFC 5798	77 / 2
BFD	BFD Base, BFD Generic, BFD-v4v6-1hop for OSPFv2/v3, ISIS, BFD-BGP, BFDv6-BGPPLUS, BFD-MPLS	draft-ietf-bfd-base-09.txt, draft-ietf-bfd-generic-05.txt, draft-ietf-bfd-v4v6-1hop-09.txt, draft-ietf-bfd-mpls-07.txt	178 / 3

IxANVL Test Suites	Target Protocols	Reference Specification	Test Cases/Req. Test Interfaces
MPLS Test Suites			
MPLS	Label Encapsulation	RFC 3032	59 / 2
RSVP-TE	RSVP-TE	RFC 3209, draft-ietf-mpls-rsvp-lsp-tunnel-07	87 / 3
RSVP-TE	RSVP-TE P2MP	RFC 4875	48 / 3
LDP	LDP	RFC 3036	329 / 3
mLDP	mLDP P2MP	draft-ietf-mpls-ldp-p2mp-10	97 / 4
LSP-Ping-Tr	LSP Ping and Traceroute	RFC 4379	128 / 2
VCCV	Pseudo wire VCCV	RFC 5085	70 / 2
L2VPN (PWE3)	PWE3-Control	RFC 4447	69 / 2
	PWE3-Encapsulation	RFC 4448, 4618, 4717, 4385, 4623	78 / 2
VPLS	VPLS	RFC 4762	58 / 4
VPLS-BGP	VPLS with BGP AD and signaling	RFC 4761	46 / 4
L3 VPN	L3 VPN	RFC 4364	101 / 3
MPLS-TP-Y1731-CC-LD	MPLS-TP-Y1731-CC-LD	RFC 5586 (GACH), draft-bhh-mpls-tp-oam-y1731-06.txt, ITU-T-REC Y.1731-200605-I	85 / 1
MPLS-TP-IETF-CC-CV-LD	MPLS-TP-IETF-CC-CV-LD	RFC 5586 (GACH), draft-ietf-mpls-loss-delay-01, draft-ietf-mpls-tp-on-demand-cv-02, draft-ietf-mpls-tp-cc-cv-rdi-03	210 / 1
MPLS-TP-G.8031-APS-Y.1731	MPLS-TP-G.8031-APS-Y.1731	G.8031_Y.1342-2006-06	140 / 2
Multicasting Test Suites			
IGMP	IGMPv2	RFC 2236	49 / 2
	IGMPv3	RFC 3376 RFC 4604	169 / 2
DVMRP	DVMRP	draft-ietf-idmr-dvmrp-v3-07	66 / 3
PIM	Dense Mode	draft-ietf-pim-dm-new-v2-04	162 / 3
	Sparse Mode, SSM	RFC 4601, draft-ietf-pim-sm-bsr-12	327 / 3
PIMv6	Sparse Mode	draft-ietf-pim-sm-v2-new-12, draft-ietf-pim-sm-bsr-12	283 / 3
MLD	MLDv1	RFC 2710	98 / 2
	MLDv2	RFC 3810	202 / 2
Transport Test Suites			
TCP Core	TCP	RFC 793, 1122, 2460	179 / 2
TCP Advanced	Slow Start, Congestion Control, PMTU Disc, MD5	RFC 2001, 2581, 1191, 2385, 2463, 1981	57 / 1
TCP High Performance	Ext for High Performance, Selective Ack	RFC 1323, 2018	48 / 1
UDP	UDP	RFC 768, 1122	35 / 1
VPN Test Suites			
IPSec AH	MD5, SHA	RFC 4301, 4302	58 / 2
IPSec ESP	MD5, SHA, DES, 3DES, Blowfish, AES	RFC 4301, 4303, 2403, 2404, 2405	72 / 2
IPSec IKE	ISAKMP, IKE	RFC 2407, 2408, 2409	373 / 2
IPSec AH / IPv6	MD5, SHA, IPSecv6	RFC 4301, 4302	66 / 2
IPSec ESP / IPv6	MD5, SHA, DES, 3DES, Blowfish, AES	RFC 4301, 4303, 2403, 2404, 2405, 2406	74 / 2
IPSec IKE / IPv6	ISAKMP, IKE	RFC 2407, 2408, 2409	384 / 2
IKEV2	IKEV2, DES, 3DES, AES-128, 256, 192, MD5, SHA, DH-768, 1024, 1536, 2048, 3072, AES_GCM_128, AES_GCM_256	RFC 7296	296 / 2
L2TP	L2TP	RFC 2661	105 / 1
PPTP	PPTP	draft-ietf-pppext-pptp-02	55 / 1
IKEV2-IPV6	IKEV2-IPV6	RFC 4306, RFC 5996	204 / 2

IxANVL Test Suites	Target Protocols	Reference Specification	Test Cases/Req. Test Interfaces
Automotive Ethernet Test Suites			
Supported automotive test specifications: OPEN Alliance TC11 specification—TC11_TestSpecification_Switch_V1.0_final-2019.pdf OA_Automotive_Ethernet_ECU_TestSpecification_Layer_3-7_v3.0 _final.docx OA_Automotive_Ethernet_ECU_TestSpecification_Layer_2_v3.0 AUTOSAR Acceptance Tests 1.1 AUTOSAR Testability Protocol and Service Primitives 1.1—execution by using the latest stub protocol AUTOSAR Specification of TCP/IP Stack V1.1.0 R4.1 Rev2 AUTOSAR Example for a Serialization Protocol (SOME/IP) V1.1.0 R4.1 AUTOSAR Specification of Service Discovery V1.2.0 R4.1 Rev 3			
AUTO-ETH-ARP	AUTO-ETH-ARP	RFC 826	52 / 1
AUTO-ETH-DHCP-SERVER	AUTO-ETH-DHCP-SERVER	RFC 2131 RFC 2132	74 / 1
AUTO-ETH-DHCPV4-CLIENT	AUTO-ETH-DHCPV4-CLIENT	RFC 2131, RFC 2132	90 / 1
AUTO-ETH-DHCPV6-CLIENT	AUTO-ETH-DHCPV6-CLIENT	RFC 3315	104 / 1
AUTO-ETH-DHCPV6-SERVER	AUTO-ETH-DHCPV6-SERVER	RFC 3315	141 / 1
AUTO-ETH-ICMP	AUTO-ETH-ICMP	RFC 792, RFC 1122	21 / 1
AUTO-ETH-ICMPV6	AUTO-ETH-ICMPV6	RFC 2463, RFC 4443	24 / 1
AUTO-ETH-IP	AUTO-ETH-IP	RFC 791, RFC 1122, RFC 894 AUTOSAR_ATS_IPv4.pdf	29 / 1
AUTO-ETH-IPV4-ACONF	AUTO-ETH-IPV4-ACONF	RFC 3927	56 / 1
AUTO-ETH-IPV6	AUTO-ETH-IPV6	RFC 2460 and RFC 2464	80 / 1
AUTO-ETH-IPV6-AUTOCONFIG	AUTO-ETH-IPV6-AUTOCONFIG	RFC 4862	34 / 1
AUTO-ETH-IPV6-MLD	AUTO-ETH-IPV6-MLD	RFC 2710	46 / 1
AUTO-ETH-IPV6-NDP	AUTO-ETH-IPV6-NDP	RFC 4861	83 / 1
AUTO-ETH-TCP-ADVANCED	AUTO-ETH-TCP-ADVANCED	RFC 793, RFC 2001, RFC 1191, RFC 2385, RFC 2463, RFC 1981, RFC 813, RFC 896 and AUTOSAR_SWS_TcpIp.pdf (AUTOSAR Specification of TCP/IP Stack V1.1.0 R4.1 Rev2) AUTOSAR_ATS_TCP.pdf	63 / 1
AUTO-ETH-TCP-CORE	AUTO-ETH-TCP-CORE	RFC 793, RFC 1122, RFC 2460 and AUTOSAR_SWS_TcpIp.pdf (AUTOSAR Specification of TCP/IP Stack V1.1.0 R4.1 Rev2) AUTOSAR_ATS_TCP.pdf	177 / 1
AUTO-ETH-IPV6-MLDV2	AUTO-ETH-IPV6-MLDV2	RFC 3810	85 / 1
SOMEIP-SERVER	SOMEIP-SERVER	Example for a Serialization Protocol (SOME/IP) V1.1.0 R4.1 Rev 3, Document ID 637. AUTOSAR_TR_SomeIpExample.pdf Specification of Service Discovery V1.2.0 R4.1 Rev 3, Document ID 616:AUTOSAR_SWS_ServiceDiscovery.pdf	105 / 1
AUTO-ETH-IPV6OV4	AUTO-ETH-IPV6OV4	RFC 4213, RFC 2529	37 / 1
AUTO-ETH-UDP	AUTO-ETH-UDP	RFC 768 and AUTOSAR_SWS_TcpIp.pdf (AUTOSAR Specification of TCP/IP Stack V1.1.0 R4.1 Rev2) AUTOSAR_ATS_UDP.pdf	35 / 1
TC8-AUTO-ETH-IPV4-ACONF	TC8-AUTO-ETH-IPV4-ACONF	OpenAlliance v3.0 test specification	56 / 1
TC8-AUTO-ETH-UDP	TC8-AUTO-ETH-UDP	OpenAlliance v3.0 test specification	74 / 1
TC8-AUTO-ETH-ARP	TC8-AUTO-ETH-ARP	OpenAlliance v3.0 test specification	52 / 1
TC8-AUTO-ETH-DHCPV4-CLIENT	TC8-AUTO-ETH-DHCPV4-CLIENT	OpenAlliance v3.0 test specification	90 / 1

IxANVL Test Suites	Target Protocols	Reference Specification	Test Cases/Req. Test Interfaces
TC8-SOMEIP-SERVER	TC8-SOMEIP-SERVER	OpenAlliance v3.0 test specification	117 / 1
TC8-AUTO-ETH-TCP-CORE	TC8-AUTO-ETH-TCP-CORE	OpenAlliance v3.0 test specification	197 / 1
TC8-AUTO-ETH-TCP-ADVANCED	TC8-AUTO-ETH-TCP-ADVANCED	OpenAlliance v3.0 test specification	71 / 1
TC8-AUTO-ETH-IP	TC8-AUTO-ETH-IP	OpenAlliance v3.0 test specification	53 / 1
TC8-AUTO-ETH-ICMP	TC8-AUTO-ETH-ICMP	OpenAlliance v3.0 test specification	21 / 1
TC8-SOMEIP-ETS	TC8-SOMEIP-ETS	OA_Automotive_Ethernet_ECU_TestSpecification _Layer_3-7_v3.0 _final.docx	146 / 1
TC11	ARP, VLAN, Filtering, QoS, General, Diagnostic	TC11_TestSpecification_Switch_V1.0_final-2019.pdf	161 / 4
TC8-AUTO-ETH-L2	TC8-AUTO-ETH-L2	OA_Automotive_Ethernet_ECU_TestSpecification _Layer_2_v3.0	70/16
PPP Test Suites			
PPP	LCP, PPP, PPP in HDLC	RFC 1661, 1662	111 / 2
	Authentication (PAP, CHAP)	RFC 1334, 1994	37 / 1
IPCP	IPCP	RFC 1332	19 / 2
VJ	VJ Compression	RFC 1144	48 / 2
PPPoE	PPP over Ethernet	RFC 2516	75 / 2
Multilink PPP	MPPP Multi-class Extension	RFC1717, 1990, RFC 2686	59 / 3
Carrier Ethernet Test Suites			
MEF9	MEF9	MEF1, MEF9, Iometrix Test Plan version 1.4	247 / 6
EtherCFM	Ethernet CFM	IEEE P802.1ag/D8.1 2007	246 / 3
EtherOAM	Ethernet OAM	IEEE 802.3-ah-2004	166 / 3
MEF OAM	MEF21 OAM	MEF 21 Abstract Test Suite for UNI Type 2	187 / 2
Service OAM	Y.1731	ITU-T Y.1731 05/2006, IEEE P802.1ag/D8.1 June 8,2007	106 / 2
Provider BB	PBB	IEEE 802.1ah D4.2 2005	55 / 2
MEF Service OAM	MEF Service OAM	ATS for UNI Type 2 Part 3 - Service OAM	157 / 2
CE2.0	CE2.0	CARRIER ETHERNET 2.0 TEST PLAN - PART 1: SERVICES ATTRIBUTES - Version 1.0 CARRIER ETHERNET 2.0 TEST PLAN - PART 2: TRAFFIC MANAGEMENT - Version 2.0	635 / 6
MEF ELMI	MEF ELMI	D00063_004 ATS for UNI Type 2 Part 2 ELMI TC MEF 16	239 / 2
G8031	G.8031 1:1 protection	Ethernet Automatic Protection Switching – ITU-T G8031/Y.1342	283 / 3
G_8265_1	G_8265_1	IEEE 1588 Conformity Test Suite for Frequency Synchronization in Telecommunications Networks, Draft Version 2.0	348 / 1
Bridging Test Suites			
STP	802.1d	IEEE Std. 802.1D-1998	53 / 3
RSTP	802.1w	IEEE Std. 802.1D-2004	126 / 4
EAPOL	802.1x, MD5, TLS, TTLS	IEEE 802.1x-2004	83 / 3
MSTP	802.1s	IEEE 802.1Q-2005	247 / 4
LLDP	LLDP	IEEE 802.1AB 2005 IEEE Std 802.1AB-2016	131 / 3

IxANVL Test Suites	Target Protocols	Reference Specification	Test Cases/Req. Test Interfaces
DCBX	DCBX	DCB Capability Exchange Protocol Specification (Rev 1.0), DCB Capability Exchange Protocol Base Specification (Rev 1.01)	92 / 1
Mcast Snooping	IGMP/MLD Snooping	RFC 4541	42 / 3
VLAN	802.1q, GMRP, GVRP	IEEE Std. 802.1Q-2005	161 / 4
LACP	802.3ad	IEEE Std. 802 .3-2005 Clause 43	118 / 4
QinQ	QinQ	IEEE 802.1ad- 2005	127 / 2
MVRP/MMRP	MVRP, MMRP	IEEE Std 802.1ak-2007 IEEE Std 802.1Q™-2005/Cor 1-2008	321 / 3
SDN Test Suites			
OPENFLOW_1.0	OPENFLOW_1.0	OpenFlow Switch Specification Version 1.0.0 (Wire Protocol 0x01) and OpenFlow Switch Errata v1.0.1	194 / 5
OPENFLOW1.3	OPENFLOW1.3	OpenFlow Switch Specification Version 1.3.2 (Wire Protocol 0x04)	528 / 6
Segment Routing Test Suites			
ISIS-SR	ISIS Segment Routing	RFC 8667 RFC 7794	99 / 3
BGP4 SR-TE	BGP SR-TE Policy	draft-ietf-idr-segment-routing-te-policy-08	78 / 3
ISIS SRv6	ISIS SRv6	draft-ietf-lsr-isis-srv6-extensions-08	84 / 3
OSPFv2 SR	OSPFv2 Segment Routing	RFC 8665	73 / 3

Ordering Information

Part Number	Description
924-450-10PBF	IxANVL, Framework bundle, Floating Binary License. Includes Linux Framework, Windows Framework, Ipv6 Framework, Interface - Ethernet, Interface - Async Serial, Interface - Sync Serial, Interface - PPPoE, Interface - VNIC
924-450-10PF	IxANVL, Framework bundle, Floating Source License
924-430-10PBF	IxANVL, Protocol Test Package, IPv6 bundle, Floating Binary License; Includes single framework bundle to run test suites in sequence, IPv6 Core, IPv6 Advanced, DHCPv6. Simultaneous test suite runs requires purchase of additional framework licenses.
924-431-10PBF	IxANVL, Protocol Test Package, IPv4 bundle, Floating Binary License; Includes single framework bundle to run test suites in sequence, IPv4, ARP, DHCPv4. Simultaneous test suite runs requires purchase of additional framework licenses.
924-432-10PBF	IxANVL, Protocol Test Package, IPv4 Routing bundle, Floating Binary License; Includes single framework bundle to run test suites in sequence, IP RIP, OSPF Core, OSPF Extensions, OSPF-GR, VRRP, BGP4 Core, BGP4 Extensions, BGP 4 byte AS, ISIS, ISIS-TE, ISIS-MT, BFD. Simultaneous test suite runs requires purchase of additional framework licenses.
924-434-10PBF	IxANVL, Protocol Test Package, IPv6 Routing bundle, Floating Binary License. Includes single framework bundle to run test suites in sequence, RIPng, OSPFv3, BGP Plus, OSPFv3 -AF, VRRPv6, ISISv6. Simultaneous test suite runs requires purchase of additional framework licenses.
924-435-10PBF	IxANVL, Protocol Test Package, MPLS bundle, Floating Binary License; Includes single framework bundle to run test suites in sequence, MPLS, RSVP-TE, RSVP-TE P2MP, LDP, mLDP, LSP-Ping-TR, VCCV, L2VPN - PWE3, VPLS, VPLS-BGP, L3 VPN, MPLS-TP Y1731 CC LD, MPLSTP IETF CC CV LD, MPLSTP G8031 APS Y 1731. Simultaneous test suite runs requires purchase of additional framework licenses.
924-433-10PBF	IxANVL, Protocol Test Package, Multicast bundle, Floating Binary License; Includes single framework bundle to run test suites in sequence, IGMP, DVMRP, PIM, PIMv6, MLD. Simultaneous test suite runs requires purchase of additional framework licenses.
924-436-10PBF	IxANVL, Protocol Test Package, Transport bundle, Floating Binary License; Includes single framework bundle to run test suites in sequence, TCP Core, TCP Advanced, TCP High Perf, UDP. Simultaneous test suite runs requires purchase of additional framework licenses.
924-437-10PBF	IxANVL, Protocol Test Package, IPSecv4 bundle, Floating Binary License. Includes single framework bundle to run test suites in sequence, IPSec AH, IPSec ESP, IPSec IKE, IKEV2. Simultaneous test suite runs requires purchase of additional framework licenses.
924-438-10PBF	IxANVL, Protocol Test Package, IPSecv6 bundle, Floating Binary License. Includes single framework bundle to run test suites in sequence, IPSec AH / IPv6, IPSec ESP / IPv6, IPSec IKE / IPv6, IKEV2-IPV6. Simultaneous test suite runs requires purchase of additional framework licenses.
924-439-10PBF	IxANVL, Protocol Test Package, PPP bundle, Floating Binary License; Includes single framework bundle to run test suites in sequence, PPP, IPCP, VJ, PPPoE, MultiLINC PPP, L2TP, PPTP. Simultaneous test suite runs requires purchase of additional framework licenses.
924-440-10PBF	IxANVL, Protocol Test Package, Carrier Ethernet bundle, Floating Binary License; Includes single framework bundle to run test suites in sequence, MEF9, EtherCFM, EtherOAM, MEF OAM, Service OAM, Provider BB, MEF Service OAM, CE2.0, MEF ELMI, G8031, G_8265_1. Simultaneous test suite runs requires purchase of additional framework licenses.
924-441-10PBF	IxANVL, Protocol Test Package, Bridging bundle, Floating Binary License; Includes single framework bundle to run test suites in sequence, STP, RSTP, EAPOL, MSTP, LLDP, DCBX, Mcast Snooping, VLAN, LACP, QinQ, MVRP/MMRP. Simultaneous test suite runs requires purchase of additional framework licenses.
924-454-10BF	IXIA IxANVL, Conformance Test Suite, Floating Binary License; Test cases for ISIS-SR
924-442-10PBF	IxANVL, Protocol Test Package, SDN bundle, Floating Binary License; Includes single framework bundle to run test suites in sequence, OF1.0, OF1.3. Simultaneous test suite runs requires purchase of additional framework licenses.
924-427-10BF	Ixia IxANVL, Conformance Test Suite, Automotive Ethernet IPv4 network and transport layer tests for host, client and server protocol stack, INCLUDES Autosar, Open Alliance TC8, TC11 test cases, floating (worldwide) perpetual binary license, REQUIRES 924-450-10PBF Binary Framework Bundle.

Part Number	Description
924-427-10F	Ixia IxANVL, Conformance Test Suite, Automotive Ethernet IPv4 network and transport layer tests for host, client and server protocol stack, INCLUDES Autosar, Open Alliance TC8, TC11 test cases, floating (worldwide) perpetual source license, REQUIRES 924-450-10PF Source Framework Bundle.
924-428-10BF	IxANVL, Conformance Test Suite, Automotive Ethernet IPv6 network and transport layer tests upgrade for host, client and server protocol stack, Floating Binary License; REQUIRES 924-040-91BF Framework Upgrade IPv6, 924-427-10BF AUTOMOTIVE-IPv4
924-428-10F	IxANVL, Conformance Test Suite, Automotive Ethernet IPv6 network and transport layer tests upgrade for host, client and server protocol stack, Floating Source License; REQUIRES 924-040-91F Framework Upgrade IPv6, 924-427-10F AUTOMOTIVE-IPv4
924-454-10BF	IXIA IxANVL, Conformance Test Suite, Floating Binary License; Test cases for ISIS-SR
924-429-10BF	IXIA IxANVL, Conformance Test Suite, Floating Binary License; Test cases for BGP SR-TE Policy
924-444-10BF	IXIA IxANVL, Conformance Test Suite, Floating Binary License; Test cases for ISIS-SRv6
924-443-10BF	IXIA IxANVL, Conformance Test Suite, Floating Binary License; Test cases for OSPF-SR
924-453-10BFS	IXIA IxANVL, Conformance Test Suite, Automotive Ethernet IPv4 and IPv6 network and transport layer tests for host, client and server protocol stack, Floating Binary Subscription License
924-456-10BFS	IXIA IxANVL, Conformance Test Suite, Automotive Ethernet TC8 Layer 2 Test Package, Floating Binary Subscription License (924-456-10BFS)
924-457-10BF	IXIA IxANVL, Conformance Test Suite, Automotive Ethernet TC8 Layer 2 Test Package, floating (worldwide) perpetual binary license. REQUIRES 924-450-10PBF IxANVL Framework.
924-461-10BF	IXIA IxANVL, Conformance Test Suite, Floating Binary License; Test cases for DHCPv6-Client-PD; REQUIRES 924-450-10PBF Framework Bundle

Note 1: TCP test suites require a connection with the DUT from both below and above the targeted TCP layer. Connection from below the TCP layer is achieved through a traditional physical layer interface. Connection from above the TCP layer can only be achieved with a unique application called ‘TCP Stub,’ developed by Keysight. The TCP Stub is controlled and managed remotely by Keysight TCP Test Suites. The purpose of the TCP Stub is to generate the necessary stimulus above the TCP layer required for testing. The TCP Stub is a portable C-code application bundled with TCP test suites. Customers are required to compile the TCP Stub onto their target systems.

Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.

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