



Agilent N2X  
**Carrier Ethernet  
Protocol Conformance  
Test Suites**

N5712A, N5713A, N5714A, N5715A,  
N5716A, N5717A, N5718A, N5719A

Technical Data Sheet



**The most comprehensive Carrier Ethernet protocol conformance test suites, enabling rapid verification and problem isolation with the industry-leading N2X Test Manager.**



**Agilent Technologies**

## Key Features

- **Comprehensive STP, RSTP, MSTP, LACP, IEEE 802.1x, VLAN, CFM, and BFD conformance testing**
- **Industry-leading Test Manager designed to simplify conformance testing**
- **Rapid result diagnosis and problem isolation**
- **Easily extendable test suites**
- **Automatic configuration and control of the device under test**
- **Comprehensive test documentation and reporting tools**

## Product Overview

The Agilent N2X is the industry's most comprehensive test solution for testing the development and deployment of network services for converging network infrastructures. Agilent N2X delivers unparalleled test realism to verify the ultimate performance, scalability and resilience of carrier grade services and infrastructure.

N2X Productivity Advantage delivers a rich set of automated applications designed to maximize testing productivity. Service providers and network equipment manufacturers will save months of engineering effort by eliminating the need for developing and supporting customized applications.

N2X Productivity Advantage incorporates a comprehensive protocol conformance solution with a unique Test Manager that provides industry-leading usability and reporting features for rapid result diagnosis and problem isolation.

The N2X Carrier Ethernet Protocol Conformance Test Suites have been designed to quickly and comprehensively verify the conformance of Ethernet switches, switch/routers, access nodes, broadband network gateways (BNGs), and other layer-2 devices to applicable protocol standards. Equipment manufacturers and service providers can expect to achieve a higher confidence with regard to their Carrier Ethernet protocol implementations in Ethernet switches being deployed in large Carrier Ethernet and Enterprise networks.

- **N5712A** – Spanning Tree Protocol (STP) Conformance Test Suite
- **N5713A** – Rapid Spanning Tree Protocol (RSTP) Conformance Test Suite
- **N5714A** – Multiple Spanning Tree Protocol (MSTP) Conformance Test Suite
- **N5715A** – Link Aggregation Control Protocol (LACP) Conformance Test Suite
- **N5716A** – 802.1x Conformance Test Suite
- **N5717A** – VLAN Conformance Test Suite
- **N5718A** – Connectivity Fault Management (CFM) Conformance Test Software
- **N5719A** – Bidirectional Forwarding Detection (BFD) Conformance Test Software

## Industry-leading Test Manager

The N2X protocol conformance test solution incorporates a unique Test Manager with industry-leading usability and reporting features. This allows for rapid result diagnosis and problem isolation, saving engineers time and effort in developing and validating protocol implementations. The Test Manager also has the flexibility to be easily integrated within a user's regression strategy.

The tree-based navigation and test suite configuration, dynamic graphical protocol sequence diagram, and comprehensive reporting features of the N2X Conformance Test Manager simplify testing. Detailed packet-decode and filtering capabilities and granular test result evaluation (pass, conditional pass, inconclusive and fail for each individual test case) accelerate resolution of test-case errors.

The test configurations (including tester and DUT parameters) can be saved and restored to ensure the exact replication of a previous test run. At the completion of each test, the test results (along with all the configuration and result details) are automatically saved and are subsequently available for loading using an integrated result-selection panel.

The N2X Conformance Test Manager and the conformance test suites together provide a comprehensive solution for ensuring protocol compliance and device interoperability.

## Rapid result diagnosis and problem isolation

The Conformance Test Manager window instantly displays progress at multiple levels, to summarize the status of the test case, test group, and test suite. The progress and results for each test case and for the test as a whole can be viewed in real-time.

Users can view a log of test-case events, the actual PDU sequence, and PDU decodes. The outcome of each test case is color-coded for instant recognition of the result. These features enable users to assess the outcome of a particular test case or test group at a glance and isolate problems quickly.

Multiple instances of the Test Manager can be open at the same time. This allows for easy comparison between tests that use the same configuration but have been run at different times.

## Automatic configuration and interaction with device under test

Automatic device-under-test (DUT) control and configuration capabilities further simplify the testing process and allow the N2X Conformance Test Suites to be integrated into the user's own test environment. The N2X Test Manager provides some commonly used device types with sample configuration parameters that the user can easily modify from within the GUI. The user can also create a new DUT type using the XML and Tcl templates provided. Once the DUT type has been setup, the user will never need to manually configure the DUT during test execution - saving a great deal of time and effort during testing.

## **Comprehensive test documentation and reporting tools**

The N2X Conformance Test Manager has an integrated test description and expected-PDU sequence diagram that provide rapid understanding of the test purpose, procedure, implementation, and desired result. These features are crucial when trying to isolate and understand problems encountered during a test execution.

All information displayed before and after a test execution can be saved into many different file formats for future analysis or printing. This includes test-case description documentation, sequence diagrams, test-run results, as well as a purpose-designed test-run report

## **Test Suites and Applicable Standards**

### **N5712A STP Conformance Test Suite**

This suite provides automatic conformance verification for various scenarios of active topology and Spanning Tree Protocol (STP) port role types.

The N5580A N2X Spanning Tree Protocol (STP, RSTP & MSTP) Emulation Software complements this test suite for verifying the performance, scalability and robustness of Carrier Ethernet devices.

#### **N5712A-001 STP Basic CTS License**

This test suite comprises of 69 test cases for the following standards.

- Spanning Tree Protocol IEEE 802.1D - 1998

### **N5713A RSTP Conformance Test Suite**

This suite provides automatic conformance verification for the Rapid Spanning Tree Protocol (RSTP) standard, including comprehensive coverage of scenarios for active topology and RSTP port role types. In addition, the test cases verify compatibility with legacy STP switches and networks.

The N5580A N2X Spanning Tree Protocol (STP, RSTP & MSTP) Emulation Software complements this test suite for verifying the performance, scalability and robustness of Carrier Ethernet devices.

#### **N5713A-001 RSTP Basic CTS License**

This test suite comprises of 132 test cases for the following standards.

- Rapid Spanning Tree Protocol - IEEE 802.1W – 2001 (now integrated into IEEE 802.1D – 2004)

## N5714A MSTP Conformance Test Suite

Multiple Spanning Tree Protocol (MSTP) test cases perform conformance testing for both Common and Internal Spanning Tree (CIST) and Multiple Spanning Tree Instance (MSTI) scenarios for active topology, port roles and port states. In addition, the test cases verify compatibility with legacy STP and RSTP switches and networks.

The N5580A N2X Spanning Tree Protocol (STP, RSTP & MSTP) Emulation Software complements this test suite for verifying the performance, scalability and robustness of Carrier Ethernet devices.

### N5714A-001 MSTP Basic CTS License

This test suite comprises of 239 test cases for the following standards.

- Multiple Spanning Tree Protocol - IEEE 802.1S - 2005 (now integrated into IEEE 802.1Q – 2005)

## N5715A LACP Conformance Test Suite

The Link Aggregation Control Protocol (LACP) test suite includes conformance testing for link aggregation group (LAG) selection logic, Receive State Event machine functionality, as defined in the Link Aggregation Control Protocol (LACP).

The N5582A N2X Link Aggregation Control Protocol (LACP) Emulation Software complements this test suite for verifying the performance, scalability and robustness of Carrier Ethernet devices.

### N5715A-001 LACP Basic CTS License

This test suite comprises of 69 test cases for the following standards.

- Link Aggregation Control Protocol – IEEE 802.3AD 2002–Clause 43

## N5716A 802.1x Conformance Test Suite

This suite comprehensively tests for 802.1x conformance to IEEE 802.1x – 2001 in five series of tests grouped by functionality. The suite provides support for testing both the Authenticator and Supplicant functionalities, while internally simulating the functionality of a RADIUS authentication server. The suite also includes tests for Extensible Authentication Protocol Over LANs (EAPOL) processing scenarios, Port Access Control Management, and state machine tests for both the Authenticator and Supplicant.

### N5716A-001 802.1x Basic CTS License

This test suite comprises of 102 test cases for the following standards.

- Client – server based access control and authentication protocol - IEEE 802.1x - 2001

## N5718A CFM Conformance Test Suite

This suite comprehensively tests for conformance to IEEE standards for Connectivity Fault Management (CFM), which is a major component of Ethernet Operations, Administration and Maintenance (OAM). The test cases cover all four categories of Ethernet CFM mechanisms:

- Continuity Check Protocol
- Loopback Protocol
- Link Trace Protocol
- Fault Alarms

### N5718A-001 CFM Basic CTS License

This test suite comprises of over 150 test cases for the following standards.

- Connectivity Fault Management - IEEE 802.1ag

## **N5717A VLAN Conformance Test Suite**

This suite comprehensively tests for VLAN conformance to IEEE 802.1Q – 2005 in eight groups of tests based on functionality.

- VLAN Tests
- Frame Formats
- Basic Spanning Tree
- Ingress Egress Rules
- Filtering Database
- GVRP
- VLAN Bridge Management
- Port and Protocol based VLAN Ingress Egress
- Port and Protocol based VLAN Bridge Management

### **N5717A-001 VLAN Basic CTS License**

This test suite comprises of 87 test cases for the following standards.

- Virtual Bridged Local Area Networks - IEEE 802.1Q – 2003
- Mac Bridges - IEEE 802.1D – 2004 (GVRP only)

## **N5719A BFD Conformance Test Suite**

This suite comprehensively tests for conformance to IETF recommendations for Bidirectional Forwarding Detection (BFD), which is a protocol used in IP/MPLS networks – especially on Ethernet links – to accelerate the detection of link and node failures.

The test cases verify:

- Session initialization
- Session establishment
- Asynchronous and demand-mode sessions (association of received BFD packets)
- Echo packet generation and reception
- Authentication
- BFD timer negotiation
- BFD timer manipulation
- BFD state machine
- BFD management system configuration
- Negative testing (handling of invalid BFD control packets)
- Frame formats
- Backward compatibility

The N5583A N2X Bidirectional Forwarding Detection (BFD) Emulation Software complements this test suite for verifying the performance, scalability and robustness of Carrier Ethernet devices.

### **N5719A-001 BFD Basic CTS License**

This test suite comprises over 140 test cases for the following recommendations.

- Bidirectional Forwarding Detection IETF draft-ietf-bfd-base-04.txt
- BFD for IPv4 and IPv6 (Single Hop) IETF draft-ietf-bfd-v4v6-1hop-06.txt
- Bidirectional Forwarding Detection Management Information Base IETF draft-ietf-bfd-mib-03.txt

## Software Requirements

Each conformance test suite can be purchased with these Software and Support Agreement (SSA) options:

- PS-S12-001 – 1-year agreement included with initial purchase
- PS-S12-102 – 1-year agreement extended to 2 years
- PS-S12-103 – 1-year agreement extended to 3 years

Please ensure that you have a current SSA in order to automatically receive future releases and technical product support.

The following N2X software licenses are a pre-requisite for all protocol conformance test suites:

- E7880B Packets Application Software or E7881B Packets and Protocols Application Software

## Hardware Requirements

All of the N2X Carrier Ethernet protocol conformance test suites are supported on N2X Ethernet XR and XS test cards.

N2X XP test cards do not support the N2X conformance test suites.

[www.agilent.com/find/n2x](http://www.agilent.com/find/n2x)

## Agilent N2X

Agilent's N2X multi-service tester combines leading-edge services with carrier grade infrastructure testing and emulation. The N2X solution set allows network equipment manufacturers and service providers to more comprehensively test new services end-to-end, resulting in higher quality of service and lower network operating costs.

## Warranty and Support

### Hardware Warranty

All N2X hardware is warranted against defects in materials and workmanship for a period of 1 year from the date of shipment.

### Software Warranty

All N2X software is warranted for a period of 90 days. The applications are warranted to execute and install properly from the media provided.

This warranty only covers physical defects in the media, whereby the media is replaced at no charge during the warranty period.

## Software Updates

With the purchase of any new system controller Agilent will provide 1 year of complimentary software updates. At the end of the first year you can enroll into the Software and Support Agreement (SSA) contract for continuing software product enhancements.

## Support

Technical support is available throughout the support life of the product. Support is available to verify that the equipment works properly, to help with product operation, and to provide basic measurement assistance for the use of the specified capabilities, at no extra cost, upon request.

## Ordering Information

To order and configure the test system consult your local Agilent field engineer.

## Sales, Service and Support

### United States:

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Test and Measurement Call Center  
P.O. Box 4026  
Englewood, CO 80155-4026  
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