

Agilent N2X

**10/100/1000BASE-T and  
1000BASE-X (GBIC)  
XP Test Card**

E5214A



Technical Datasheet

The Agilent N2X 10/100/1000BASE-T and 1000BASE-X (GBIC) XP Test Card provides Internet-scale wire-speed traffic generation and analysis for tri-rate Ethernet electrical interfaces throughout development and deployment.

Agilent N2X XP Test Cards are designed specifically for '*packet blasting*' test applications where support of routing or signaling protocols is not required.



**Agilent Technologies**

## Key Features

- **Tri-Rate electrical interface plus GBIC capability**
- **Full control over all traffic generation parameters**
- **Powerful PDU builder**
- **Full support for all common Ethernet features**
- **Hot-swap capability**
- **Unprecedented capture and analysis capabilities**
- **Industry’s highest scalability**
- **Threshold ‘triggers’ that isolate performance issues**
- **Comprehensive open-library of automated test scripts**

## Product Overview

Agilent N2X is the industry's most comprehensive test solution for testing the development and deployment of network services for converging network infrastructures. Service providers, network equipment manufacturers (NEMs), and component manufacturers can verify service attributes of entire networks end-to-end, while also isolating problems down to individual networking devices and subsystems.

Agilent N2X incorporates the strength of the RouterTester 900 to deliver unparalleled test realism to verify the ultimate performance, scalability and resilience of carrier grade services and infrastructure.

The Agilent N2X tri-rate electrical XP Test Card in conjunction with the N2X Packets and Protocols application provides unprecedented scalability and unique flexibility for verifying the traffic performance parameters of Ethernet networking devices throughout development and deployment.

Users can define, generate and analyze up to 32,000 traffic streams per port. Agilent's unprecedented scalability allows you to easily identify the maximum traffic performance parameters of the system under test.

Agilent N2X's and flexible 'PDU builder technology' delivers the most advanced solution for traffic generation and analysis available. Any kind of data-plane frame and packet can be generated and analyzed including custom, proprietary, experimental and multi-level encapsulations.

The powerful Packets and Protocols application enables event triggered capture, off-line data and capture analysis, graphing, decodes, and easy diagnosis of erratic or transient network behavior. Features such as real-time traffic generation 'slider bar', intuitive GUI, and comprehensive library of automated test scripts make the setup and management of comprehensive test cases easy.

For more complex testing that requires the integration of routing and signaling protocols with traffic, Agilent N2X offers a different class of test card. The Agilent XR Test Cards are designed to fully integrate the powerful traffic generation and analysis capabilities detailed above, with realistic emulation of routing and signaling protocols, including BGP, OSPF, ISIS and RIP and the latest MPLS protocols, including RSVP-TE, LDP/CR-LDP, L2oMPLS (Martini), VPLS, and Multicast protocols. For information relating to integrated routing protocol, signaling protocol and traffic testing visit [www.agilent.com/comms/N2X](http://www.agilent.com/comms/N2X).

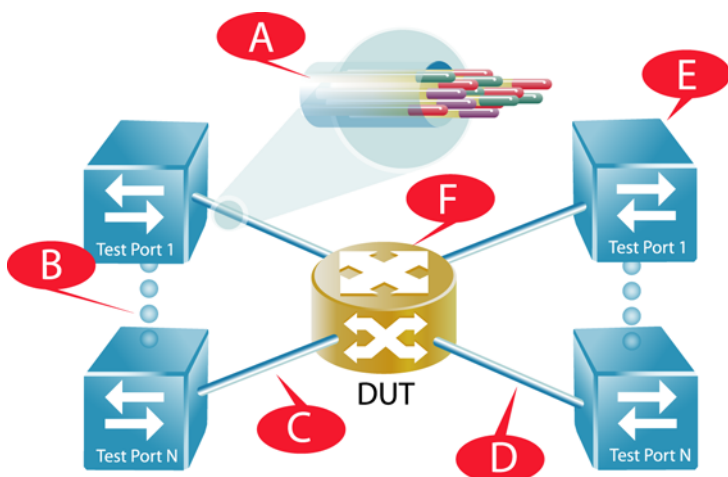


Figure 1: Typical test scenario using the Tri0rate Ethernet XP Test Card

### **Full support for all common Ethernet features**

Agilent N2X tri-rate XP Test Card ensures testing under realistic conditions by supporting all common Ethernet features including:

- MDI/MDI-X auto-detect and auto-configure.
- Auto-negotiation that ensures parameters like speed and duplex mode are automatically established/confirmed, as they would be in a live network.
- Jumbo frames up to 9022 octets can be generated to analyze the device under test's ability to efficiently transmit and receive large payloads
- Flow control can be analyzed to ensure the device under test can correctly initiate and respond to pause frames, ensuring efficient buffer management.
- Optical (and electrical) Gigabit Interface Converters that are compliant with version 5.5 of the GBIC standard

### **Unprecedented capture and analysis capabilities**

N2X allows users to set a specific event threshold as a 'trigger'. This trigger can initiate capture and provides the capacity to quickly isolate, analyze and debug performance issues.

The N2X tri-rate XP Test Card provides the industry's highest capture capacity. Users can capture up to 256Mb of data for detailed analysis from a single test session.

Features specific to Ethernet traffic testing include:

- Monitor mode to observe traffic on a link (GBIC only)
- Transmit loop-back mode to receive data sent on the Tx port (GBIC only)
- Support for VLAN 802.1p and 802.1Q
- Support for 'Q-in-Q' tag including frame generation, statistics, capture, decode and analysis
- Support for Cisco ISL and other proprietary encapsulations.

### **Industry's highest scalability**

Agilent N2X generates and analyzes more traffic streams than any other test tool in the industry. You will be able to make simultaneous measurements on 32,000 individual traffic streams on each port, allowing you to quickly identify the performance limitations of your device, network or service implementation.

### **Full control over ALL traffic generation parameters**

Agilent N2X's flexible packet generator lets you manipulate and define the contents of all protocol fields. You no longer have to wait for industry standards, or write unique test scripts to test new and proprietary protocol encapsulations. Agilent's unique PDU builder (patent pending) allows you to define all known (any many unknown) parameters quickly.

### **Comprehensive open-library of automated test scripts**

N2X's automated QuickTests, based on Agilent's Journal of Internet Test Methodologies, make it easy to perform even the most complex tests. N2X's powerful API makes it easy to customize scripts to match your specific test needs. In addition, proprietary scripts can be created using the Tcl/Tk scripting environment. With only a few lines of code, powerful test scenarios can be executed with precision.

### **Multi-User Remote Access**

Agilent N2X can be controlled via the local system controller, or multiple sessions can be controlled remotely from any PC attached to a corporate LAN.

## Technical Specifications

### Physical layer specifications

#### Connectivity

Port Density	2 full duplex test ports active Either 2 electrical, 2 GBIC, or 1 of each
Connection Type	Supports GBIC rev 5.5 (optical) RJ 45 (Tri-rate) Auto-detect of MDI/MDI-X and auto-configure

#### Interface Operation Modes

Terminal	Normal operation - transmit and receive interfaces operate independently
Transmit loop-back	Transmitted data is electrically looped back to the receive interface. The optical receive interface is disabled in this mode. (GBIC interface only)
Monitor	Received data is looped back to the transmit interface. Received data is also copied into the test port where all real time Rx measurements are made. Capture and subsequent analysis are also fully functional in this mode. (GBIC interface only)

#### Transmit Clock Sources

Clock source	Internally generated based on chassis system reference
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#### Front Panel Indicators:

Common Indicators	<p><b>Power:</b> Green when module has power</p> <p><b>Status:</b> Yellow - Card start-up Green - Test application running Red - Card error</p> <p><b>TXEN:</b> Green when GBIC transmitter is enabled.</p> <p><b>Tx:</b> Green when an Ethernet frame is transmitted. Does not indicate integrity of the transmitted frame.</p> <p><b>Rx:</b> Green when an Ethernet frame is received. Indicates integrity of the received frame</p>
Ethernet Indicators	<p><b>Link:</b> Green - Ethernet framing is detected on the receive interface and link has been established with a link partner</p> <p><b>Activity:</b> Green - Data is transmitted or received</p>

#### Alarms and Errors

Real-Time Alarm Detection	<ul style="list-style-type: none"> <li>Current module status is indicated on the user interface and front panel LEDs</li> <li>Alarm events are reported in a trace log during the measurement interval</li> <li>Number of errored seconds is reported per alarm type (count of 1s intervals in which the alarm is detected at least once)</li> </ul>
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Error Monitoring	<p>For the selected Ethernet statistics the following parameters are recorded:</p> <ul style="list-style-type: none"> <li>Number of individual occurrences of the event</li> <li>Number of seconds during which at least one event occurred</li> </ul> <p>Statistics are User selectable, dependant on the application. These may include, but are not limited to, the following: Frames transmitted, Valid frames received, Octets transmitted, Octets received, Runts, Short events, Jumbo frames, Jabbers, FCS errored frames, ARP frames, Flow control frames, VLAN tagged frames.</p>
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### Link layer specifications

#### Auto-negotiation

The Test Card supports auto-negotiation. This may be disabled independently on each port.

#### PAUSE Frames

The Test Card can generate, count and respond to PAUSE frames.

#### Measurement System

Measurements are synchronized across all cards within the test system

Result types	<ul style="list-style-type: none"> <li><b>Cumulative:</b> Measurements are reported from the start of the measurement interval</li> <li><b>Sampled:</b> Measurements are reported from the most recently completed sampling interval</li> <li><b>Measurement Interval:</b> 1 second to 7 days</li> <li><b>Sampling Interval:</b> 1 second to 1 hour</li> <li><b>Measurement clock:</b> 10 ns resolution +/- 0.5 ppm/year clock drift</li> <li><b>3 ppm max.</b> difference between systems</li> </ul>
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### Real-time Statistics

Unless otherwise specified all statistics are on a per port basis.

#### Glossary

Short event	A sequence of bytes of insufficient length to form a valid Ethernet frame (<18 bytes)
Runt	A frame with less than 64 bytes (excluding preamble) and a valid FCS.
Long frame	A frame longer than 1522 bytes (or 9022 for jumbo frames) with a valid FCS.
Jumbo frame	A frame between 1519 and 9022 bytes with a valid FCS and an Ethertype of 0x8870.
Jabber frame	A frame longer than 1522 bytes (or 9022 for jumbo frames) with an invalid FCS.
Pattern Match	Count of frames matching specified fields in the header

<b>PPIC</b>	<p>Packet Payload Integrity Check. The PPIC field contains a 16-bit CRC calculated over the "protected payload. The "protected payload" refers to any of the following:</p> <ul style="list-style-type: none"> <li>IP packet payload (default)</li> <li>MPLS frame payload</li> <li>L2 frame payload</li> <li>User-defined</li> </ul>
<b>General Statistics</b>	
<b>Per Port Stats.</b>	<ul style="list-style-type: none"> <li>• Tx and Rx % line use</li> <li>• Misdirected packets</li> <li>• Error rate</li> </ul>
<b>Per Stream Stats.</b>	<ul style="list-style-type: none"> <li>• Rx and Tx stream packets and octets</li> <li>• Misordered packets</li> </ul>
<b>Per Stream &amp; Port Stats.</b>	<ul style="list-style-type: none"> <li>• Tx and Rx test packets and octets</li> <li>• Expected Rx packets</li> <li>• Throughput</li> <li>• Packets not received</li> <li>• Average latency</li> <li>• Minimum/maximum latency</li> <li>• PPIC violations (ie. Count on payload error)</li> </ul>
<b>IPv4</b>	<ul style="list-style-type: none"> <li>• Tx and Rx octet counts</li> <li>• Header checksum errors</li> <li>• Fragmented packet count</li> <li>• Throughput</li> </ul>
<b>IPv6</b>	<ul style="list-style-type: none"> <li>• Tx and Rx packet and octet counts</li> <li>• Throughput counts</li> </ul>
<b>MPLS</b>	<ul style="list-style-type: none"> <li>• Tx and Rx packets</li> </ul>
<b>Ethernet</b>	<ul style="list-style-type: none"> <li>• Tx and Rx frame and Octet counts</li> <li>• Tx and Rx Throughput</li> <li>• Tx and Rx MAC control frames</li> <li>• Short events received</li> <li>• Runt frames received</li> <li>• Tx &amp; Rx long frames</li> <li>• Jabber frames received</li> <li>• Tx &amp; Rx invalid FCS frames</li> </ul>
<b>VLAN</b>	<ul style="list-style-type: none"> <li>• Tagged Tx and Rx frame and Octet counts</li> </ul>
<b>User Defined Statistics</b>	<ul style="list-style-type: none"> <li>• Powerful features allow statistics collection on a per stream, per-MPLS tag, per-VLAN tag or other user-defined-index basis</li> </ul>

## Physical and Environmental

<b>Physical</b>	<ul style="list-style-type: none"> <li>Width 206 mm</li> <li>Depth 313 mm</li> <li>Height 31.0 mm</li> <li>Weight 875g</li> </ul>
<b>Electrical</b>	Power consumption 50W

## Environmental

<b>Operating temperature</b>	5° C to 40 °C
<b>Storage temperature</b>	-40 °C to 70 °C
<b>Maximum Relative Humidity</b>	Maximum relative humidity 80% for temperatures up to 31 °C, decreasing lineally to 50% relative humidity at 40 °C (non-condensing).

## Regulatory Compliance

### Electrical (Electromagnetic Compliance - EMC)

As per IEC 61326-1:1997 + A1:1998 / EN 61326-1:1997 + A1:1998.

Electrical equipment for measurement, control and laboratory use. (ClassA)

EMC Directive 89/336/EEC (including 93/68/EEC)

For complete compliance information refer to Declaration of Conformity E7900-91300

(Tested for regulatory compliance with Agilent Technologies GBICs).

### Electrical (Safety)

IEC 61010-1:1990 + A1:1992 + A2:1995 / EN 61010-1:1993 + A2:1995.

Safety requirements for electrical equipment for measurement, control, and laboratory use

Low voltage directive 73/23/EEC

### Optical (Safety)

Complies with IEC 60825/CDRH Class 1, and 21 CFR 1040 - Class 1 Laser Products when equipped with Agilent HFBR-5601 or HFCT-5611 Gigabit Interface Converters.

## Applicable Standards

<b>PCS/MAC</b>	IEEE 802.3
<b>Address Resolution Protocol</b>	IETF RFC 826 An Ethernet Address Resolution Protocol
<b>IP IEEE 802 Networks</b>	IETF RFC 1042

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## 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 Enhancement Service (SES) 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.

### United States:

Agilent Technologies  
Test and Measurement Call Center  
P.O. Box 4026  
Englewood, CO 80155-4026  
1-800-452-4844

### Canada:

Agilent Technologies Canada Inc.  
5150 Spectrum Way  
Mississauga, Ontario  
L4W 5G1  
1-877-894-4414

### Europe:

Agilent Technologies  
European Marketing Organisation  
P.O. Box 999  
1180 AZ Amstelveen  
The Netherlands  
(31 20) 547-2323  
United Kingdom  
07004 666666

### Japan:

Agilent Technologies Japan Ltd.  
Measurement Assistance Center  
9-1, Takakura-Cho, Hachioji-Shi,  
Tokyo 192-8510, Japan  
Tel: (81) 426-56-7832  
Fax: (81) 426-56-7840

### Latin America:

Agilent Technologies  
Latin American Region Headquarters  
5200 Blue Lagoon Drive, Suite #950  
Miami, Florida 33126  
U.S.A.  
Tel: (305) 269-7500  
Fax: (305) 267-4286

### Asia Pacific:

Agilent Technologies  
19/F, Cityplaza One, 1111 King's Road,  
Taikoo Shing, Hong Kong, SAR  
Tel: (852) 3197-7777  
Fax: (852) 2506-9233

### Australia/New Zealand:

Agilent Technologies Australia Pty Ltd  
347 Burwood Highway  
Forest Hill, Victoria 3131  
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Fax: (61-3) 9272-0749  
Tel: 0-800-738-378 (New Zealand)  
Fax: (64-4) 802-6881

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