

Agilent N2X
**Ethernet Link OAM
(802.3ah) Emulation
Software**

N5589A
Technical Data Sheet



A comprehensive and user-intuitive emulation to verify the operation of IEEE 802.3ah link OAM implementations for point-to-point Ethernet.

Complements the N2X N5581A (CFM) and N5585A (Y.1731) E-OAM emulations, allowing you to significantly reduce the time and investment to test complex Ethernet OAM scenarios.



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Key Features

- **Stateful emulation of Link-OAM messages on pt-pt Ethernet links**
 - **Verify Discovery state machine operation**
 - **Generate link Event Notifications on demand**
 - **Simulate Remote Fault Indications**
 - **Perform remote loopback testing**
- **User interface intuitively mapped to test scenarios from configuration through to results**
- **'On the fly' simulation of fault conditions and events**
- **Comprehensive results and statistics**

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 delivers unparalleled test realism to verify the ultimate performance, scalability and resilience of carrier grade services and infrastructure.

The N5589A Link-OAM Protocol Emulation software is one component of the N2X Carrier Ethernet test solution, which includes emulation and conformance testing of technologies such as CFM, Y.1731, LACP, STP, RSTP, MSTP, BFD, L2oMPLS, VLANs, MEF 9, MEF 14 and MEF 21

The N5589A enables stateful testing of the primary Link OAM functions described in the IEEE standard, maps them closely to a user-intuitive GUI (and associated automation API) continuing this work-flow logic through to the results and statistics.

Product Features

Stateful Emulation of Link-OAM messages on pt-pt Ethernet links

The N5589A emulation facilitates rapid and easy testing of the four main functions of the 802.3ah Link OAM standard: Discovery, Link Events, Remote Failure Indication and Remote Loopback.

Typical test scenarios associated with these four functions are summarized below:

Discovery - The complete Discovery process with associated capabilities is statefully emulated. Thus N2X can detect a remote DTE OAM configuration and ensure proper operation of the Discovery state machine.

Link Events - Link Event Notifications can be generated on demand at a user-specified rate to simulate a response to a link event. The N2X Traffic Generation/Analysis Subsystem, (accessed via the E7881B application) can also send errored frames as an event stimulus to a DUT and the emulation can be used to check that the DUT responds with the appropriate Event Notification(s).

Remote Failure Indication - Remote Failure Indications OAMPDU's can be configured, sent and counted to simulate a link failure thereby verifying that a DUT correctly generates and responds to all Remote Failure Indications.

Remote Loopback - N2X can place a DUT into remote Loopback such that N2X-generated traffic is looped back on the originating port to measure latency, jitter, loss and throughput (measured via the traffic subsystem). The DUT can also change the state of the N2X test port to loopback mode, but DUT-sourced traffic will not be looped back.

User interface intuitively mapped to test scenarios from configuration through to results

The N5589A product is designed to facilitate user workflow of the above-described scenarios, from test definition through configuration to obtaining results and statistics as shown in figure 1. This approach minimizes the user learning curve and is consistent with the use model of the complementary N2X Carrier Ethernet emulations, providing multiprotocol color-coded real-time system state at-a-glance.

'On-the-fly' simulation of capabilities, fault conditions and events

The N5581A CFM emulation allows the user to enable and disable various configuration parameters interactively, while the test is running (i.e. 'on the fly'). This interactive capability is essential in order to emulate and measure the impact of realistic network faults such as a lost link timeout, or sending a critical Event Notification. It is also useful in verifying correct discovery state machine operation, for example by mismatching discovery capabilities in real-time.

Comprehensive results and statistics

Extensive results and statistics for each of the main scenarios allows rigorous functional testing for both Network Equipment Vendors and Service Providers.

Perform Negative Testing via flexible XML PDU builder

Essential to interoperability testing is the establishment of DUT behaviour in the event of an unexpected or malformed PDU. N2X's flexible XML-based PDU builder allows the user (via the GUI) to easily create and transmit a non-conforming Link OAM frame.

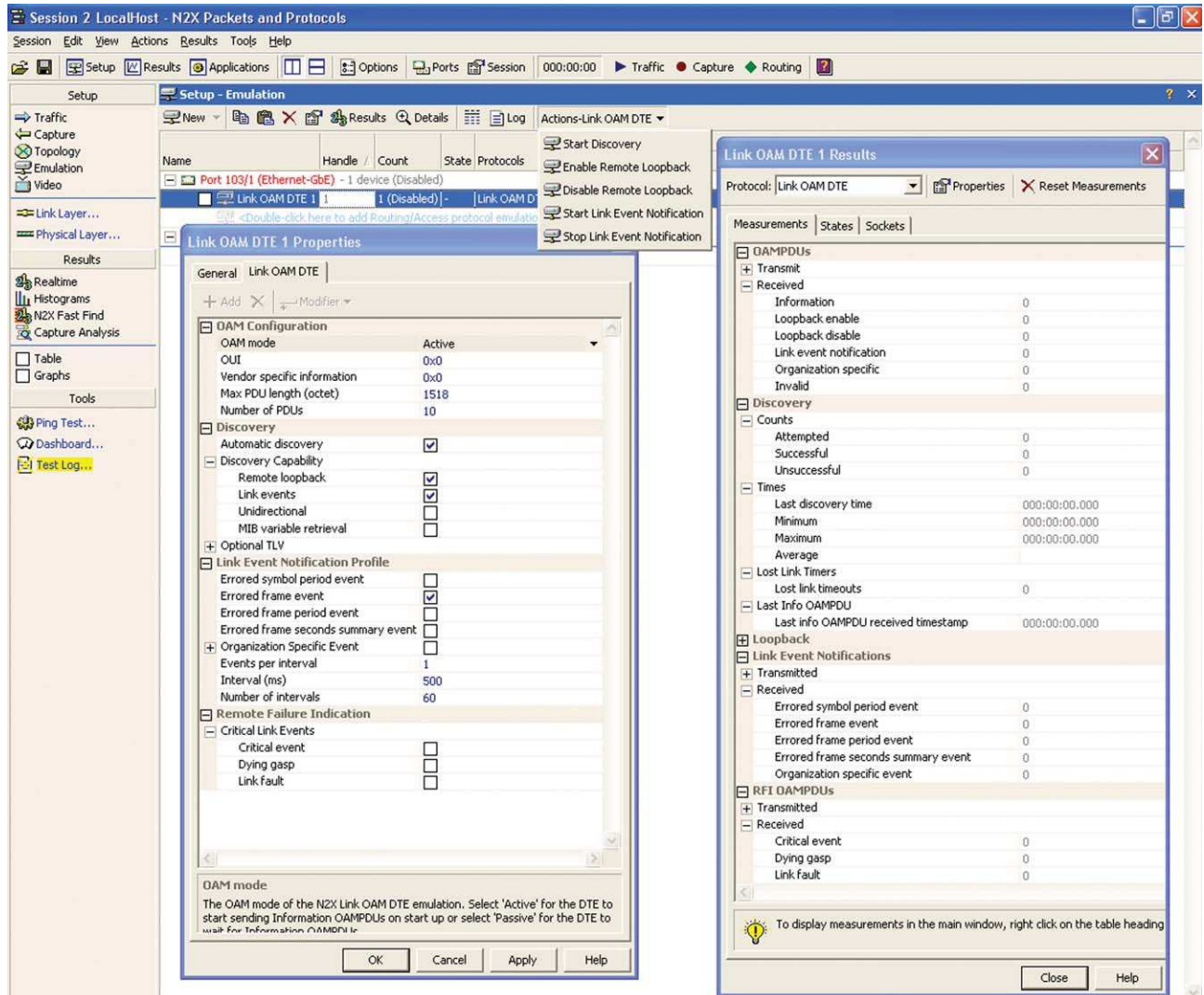


Figure 1 : N2X Link OAM Configuration and Results

Applicable Standards

- IEEE 802.3ah / IEEE 802.3 (2005)
Clause 57 Link OAM

Configuration and Ordering Details

Hardware

To use the N5589A Link-OAM Emulation software, the following Agilent N2X hardware and software are required.

A N2X system is required with:

- System controller
- Chassis
- One or more Ethernet Test Cards

The N5589A Link-OAM CFM Emulation software is supported on all N2X XR, XR-2, XS and XS-2 Ethernet test cards.

The N5589A software is NOT supported on N2X XP or XP-2 test cards.

Software

Required software packages:

- E7881B Packets and Protocols
Application Software

Optional complementary software packages:

- MEF 21 Conformance Test Suite
Software

Your local Agilent field engineer can provide more details on how to order and configure a test system.

Online Help

An extensive online help system provides complete descriptions and detailed usage instructions for every component of N2X. Dialog-level, context-sensitive help provides rapid access to the relevant sections of the online help.

Technical Specifications.

This section lists the protocol-specific parameters that are configurable through the GUI or the Tcl scripting environment.

Configuration Parameters

Emulation • Local MAC address

OAM Configuration

OAM Mode • Active, Passive

OUI • Hex value

Vendor Specific Information • Hex Value

Max PDU Length • Number of Octets

Number of PDUs per second • Integer

Discovery

Automatic • Enable/Disable

Discovery Capability • Remote Loopback (Enable/Disable)
• Link Events (Enable/Disable)
• Unidirectional (Enable/Disable)
• MIB Variable Retrieval (Enable/Disable)

Organizational Specific Information • Enable/Disable
• Hex Value

Link event notification profile

Errored Symbol Period Event • Enable/Disable

Errored Frame Event • Enable/Disable

Errored Frame Period Event • Enable/Disable

Errored Frame Seconds Summary Event • Enable/Disable

Organization Specific Event • Enable/Disable
• Hex Value

Events per Interval • Integer

Interval • Millisecond

Number of Intervals • Integer

Remote failure indication

Critical Link Events • Critical Event (Enable/Disable)
• Dying Gasp (Enable/Disable)
• Link Fault (Enable/Disable)

Results and Statistics

OAM PDUs

Transmitted

- Information
- Loopback Enable
- Loopback Disable
- Link Event Notification

Received

- Information
- Loopback Enable
- Loopback Disable
- Link Event Notification
- Organization Specific
- Invalid

Discovery

Counts

- Attempted
- Successful
- Unsuccessful

Times (h:m:s:ms)

- Last Discovery Time
- Minimum
- Maximum
- Average

Lost Link Timers

- Lost Link Timeouts

Last Info OAMPDU

- Received Timestamp

Loopback

Enable Counts

- Attempted
- Successful
- Unsuccessful

Disable Counts

- Attempted
- Successful
- Unsuccessful

Times (h:m:s:ms)

- Enable Time
- Disable Time

Link Event Notifications

Transmitted	<ul style="list-style-type: none"> • Errored Symbol Period Event • Errored Frame Event • Errored Frame Period Event • Errored Frame Seconds Summary Event • Organization Specific Event • Number of MEPs in Link Trace Idle State • Number of MEPs in Link Trace Waiting State • Number of MEPs in Link Trace Received State • Number of MEPs in Link Trace Failed State
Received	<ul style="list-style-type: none"> • Errored Symbol Period Event • Errored Frame Event • Errored Frame Period Event • Errored Frame Seconds Summary Event • Organization Specific Event

RFI OAMPDU's

Transmitted	<ul style="list-style-type: none"> • Critical Event • Dying Gasp • Link Fault
Received	<ul style="list-style-type: none"> • Critical Event • Dying Gasp • Link Fault

Emulation Status (per-instance = per-port)

Discovery	<ul style="list-style-type: none"> • IDLE • ACTIVE SEND LOCAL • PASSIVE WAIT • SEND LOCAL REMOTE • SEND LOCAL REMOTE OK • SEND ANY • FAULT
Loopback	<ul style="list-style-type: none"> • IDLE • REMOTE LB INPROGRESS • REMOTE LB COMPLETED • REMOTE LB DISABLING • LOCAL LB COMPLETED
Link Event Notification	<ul style="list-style-type: none"> • IDLE • TRANSMITTING • RECEIVED
Remote DTE MAC	<ul style="list-style-type: none"> • MAC Address

Remote Information

- OAM Version
- Revision
- Multiplexer Action (FWD/DISCARD)
- Parser Action (FWD/LB/DISCARD/RESERVED)
- Link Events Support
- MIB Variable Retrieval Support
- Remote Loopback Support
- Unidirectional Support
- OAM Mode
- Maximum OAM PDU Size
- OUI
- VSI
- Details

Error Notification

- Details

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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.

Software and Support Agreement

To protect your investment in the Agilent N2X, every new system includes an initial 12-month comprehensive system-based warranty and Software and Support Agreement (SSA).

Renewing Agilent support services ensures uninterrupted technical support and software upgrades, giving you confidence in N2X throughout the life of your system.

The N2X technical support portion of your SSA includes assistance with product operation and measurements, and verification that the N2X equipment is in correct working order.

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.

Ordering Information

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

Sales, Service and Support

N2X must be serviced by an approved Agilent Technologies service centre, please contact us for more information.

United States:

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

1-800-829-4444

Canada:

Agilent Technologies Canada Inc.
2660 Matheson Blvd. E
Mississauga, Ontario
L4W 5M2
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
Tel: 1-800-629-485 (Australia)
Fax: (61-3) 9272-0749
Tel: 0-800-738-378 (New Zealand)
Fax: (64-4) 802-6881

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