

Agilent N2X  
**SIP Protocol  
Emulation Software**

N5588A  
Technical Data Sheet



**The most comprehensive tool for realistic and high scale testing of SIP-enabled devices such as BNGs, B-RASs, and edge routers.**

## Key Features

- **High scale testing – emulation of thousands of SIP subscribers per test port**
- **MOS measurements for VoIP Quality of Experience assessment**
- **Integration with N2X's access protocols and Multiplay solution for realistic subscriber simulation**
- **Supported on existing N2X Ethernet cards, including 10GbE**

## Product Overview

**In order to offer voice services over a converged IP infrastructure, service providers are deploying VoIP services to their subscribers with increasing vigor. This is occurring in the context of a broader Multiplay offering, which also includes IP video and data services. In order to ensure that network devices involved in the delivery of VoIP perform acceptably and provide adequate subscriber quality of experience (QoE), these network elements must be rigorously tested. Such testing involves injecting control plane stress with signaling protocols such as Session Initiation Protocol (SIP), as well as data plane stress in the form of RTP media. Relevant VoIP quality measurements such as MOS must also be used in order to validate QoE for each and every subscriber.**

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 N5588A SIP emulation software and VoIP subscriber simulation components of N2X, in conjunction with N2X's IPTV and data test solutions, provide an industrial strength, comprehensive test solution for VoIP and Multiplay network equipment. Devices with SIP awareness such as SBCs, media gateways, SIP-enabled BNGs, B-RASs, and edge routers can be tested with high scale and realism, ensuring that deployments validated in the lab using N2X will meet subscriber quality expectations once deployed.

## Features

### High scale testing

N2X is a high scale SIP test solution. Thousands of SIP/VoIP subscribers can be simulated on each test port, with RTP media streams associated with each simulated VoIP call. Several codecs are supported, including different variants of G.711, G.723 and G.729 (See figure 1). N2X simulated traffic is hardware generated and therefore deterministic in nature and scalable enough to fill a GbE or 10 GbE link.

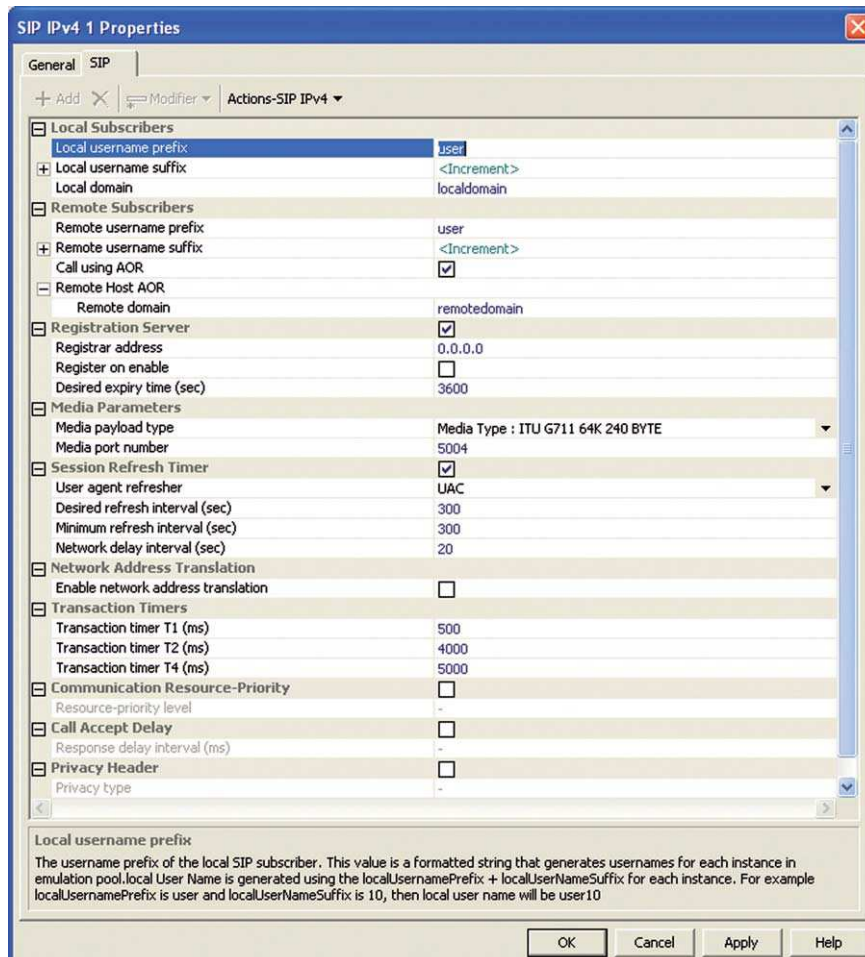


Figure 1: Highly scalable SIP test solution.

### MOS measurements (based on R-Factor) for VoIP QoE

VoIP service traffic is vulnerable to different types of impairments introduced at the network level. Excessive packet loss can affect perceived voice quality. Latency, particularly beyond 200 ms, can make a conversation seem unnatural and of poor quality. Jitter is also a problem, because its elimination requires buffers, which adds to the end-to-end latency of the VoIP packets. N2X provides measurements to detect these network problems for each subscriber, in addition to sophisticated filtering and threshold-based analysis to rapidly isolate issues of interest. Furthermore, N2X provides MOS measurements based on the E-Model and R-Factor, which provide a quality score summarizing VoIP call quality on a per subscriber basis. MOS measurements are only supported on newer (XR-2 and XS-2) N2X Ethernet test cards.

Note: R-Factor measurements are only supported on N2X Ethernet cards in the XR-2 and XS-2 families.

### Integration with Access Protocol and Multiplay Test Solution

VoIP is only one service in the network, and in real deployments, it is generally transported in the presence of other traffic types such as IP video and data. Additionally, VoIP services run in conjunction with lower layer protocols such as PPPoE and DHCP, which provide network layer connectivity, as shown in figure 3. It is mandatory to test SIP and VoIP under such conditions in order to ensure that the test is fully realistic and can accurately predict device performance in a real network. N2X's SIP emulation can run concurrently with any access protocol on the same port. Furthermore, realistic Multiplay testing can be performed with N2X, as VoIP subscribers can be simulated on the same test port as IPTV or IPTVv6 subscribers, making for a true Multiplay household simulation.

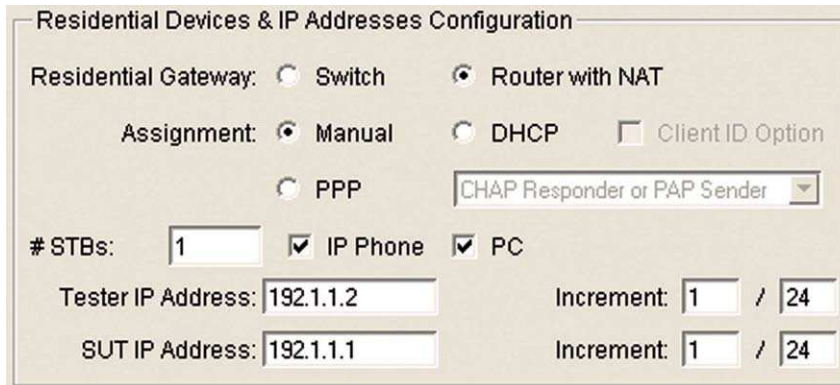


Figure 2: Residential devices and IP address configuration.

Name	Count	State	Action Control	Tester IP
Port 6501/1 (Ethernet-GbE) - 5004 devices (Disabled)				
<input type="checkbox"/> DHCP Client 2	1 (Disabled)	-	-	-
<input type="checkbox"/> IGMP Host over PPPoE Client 3	1 (Disabled)	-	-	-
<input type="checkbox"/> MLD Host 5	1 (Disabled)	-	-	-
<input type="checkbox"/> PPP over L2TP LAC 6	1 (Disabled)	-	-	192.1.1.:
<input type="checkbox"/> SIP IPv4 1	5,000 (Disabled)	-	-	100.1.1.:

Figure 3: Integration with N2X access protocol and Multiplay test solution.

## Technical Specifications

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

### SIP Client Configurable Parameters

<b>Ethernet subinterface</b>	<ul style="list-style-type: none"> <li>Local MAC address</li> <li>VLAN ID (two VLAN tags may be stacked)</li> </ul>
<b>IP interface</b>	<ul style="list-style-type: none"> <li>Tester IP address</li> <li>Gateway IP address</li> <li>SUT IP address</li> </ul>
<b>SIP Options</b>	<ul style="list-style-type: none"> <li>Local username prefix</li> <li>Local domain</li> <li>Remote username prefix</li> <li>Call using AOR (enable/disable)</li> <li>Remote host AOR domain</li> <li>Proxy server – override SUT IP address</li> <li>Registrar address</li> <li>Register on enable</li> <li>Deregister on disable</li> <li>Desired expiry time</li> <li>Media payload type</li> <li>Media port number</li> <li>User agent refresher (UAC/UAS)</li> <li>Desired refresh interval</li> <li>Minimum refresh interval</li> <li>Enable network address translator</li> <li>Transaction timer T1</li> <li>Transaction timer T2</li> <li>Transaction timer T3</li> <li>Resource priority level</li> <li>Delayed 200 OK response for UAS</li> </ul>

### SIP Statistics

<b>General</b>	<ul style="list-style-type: none"> <li>Established sessions</li> </ul>
<b>Measurements</b>	<ul style="list-style-type: none"> <li>Active sessions</li> </ul>
<b>Sessions Counts</b>	<ul style="list-style-type: none"> <li>Attempted sessions</li> <li>Successful sessions</li> <li>Unsuccessful sessions</li> <li>Attempted terminations</li> <li>Successful terminations</li> <li>Unsuccessful terminations</li> </ul>
<b>Session Times</b>	<ul style="list-style-type: none"> <li>Average establishment time</li> <li>Minimum establishment time</li> <li>Maximum establishment time</li> <li>Average termination time</li> <li>Minimum termination time</li> <li>Maximum termination time</li> </ul>
<b>Registration Counts</b>	<ul style="list-style-type: none"> <li>Attempted registrations</li> <li>Successful registrations</li> <li>Unsuccessful registrations</li> <li>Attempted deregistrations</li> <li>Successful deregistrations</li> <li>Unsuccessful deregistrations</li> </ul>

### Registration Times

- Average registration time
- Minimum registration time
- Maximum registration time
- Average deregistration time
- Minimum deregistration time
- Maximum deregistration time

### Messages

- Invites transmitted and received
- Registers transmitted and received
- Cancels transmitted and received
- Acks transmitted and received
- Byes transmitted and received
- 1xx messages transmitted and received
- 2xx messages transmitted and received
- 3xx messages transmitted and received
- 4xx messages transmitted and received
- 5xx messages transmitted and received
- 6xx messages transmitted and received

### Retransmissions

- Retransmitted requests
- Retransmitted responses

### Protocol Message Counts

### Protocol Errors

- Transaction timeouts

### State Transitions

- No session
- Establishing
- Established
- Refreshing
- Terminating

### Jitter and MOS

(only supported on XR-2 and XS-2 Ethernet cards)

- Maximum latency variation
- Average latency variation
- Estimated MOS (R-Factor) value

### Data Plane Statistics

- All standard N2X data plane statistics are supported. Refer to the E7881B datasheet for more details.
- N2X capture supports the decoding of SIP messages.

## Applicable Standards

- RFC 3261 SIP: Session Initiation Protocol
- RFC 4028: Session Timers in the Session Initiation Protocol (SIP)
- RFC 4412: Communications Resource Priority for the Session Initiation Protocol (SIP)

## Configuration

To use the N5588A SIP emulation software, the following Agilent N2X hardware and software are required.

### Hardware

A N2X system is required with:

- System controller
- Chassis
- One or more Ethernet test cards

The N5588A SIP emulation software is supported on all N2X Ethernet XR, XR-2, XS, and XS-2 interfaces at speeds up to 10 Gb/s. MOS measurements are only supported on XR-2 and XS-2 Ethernet cards.

### Software

The following N2X software licenses are a pre-requisite to supporting the SIP emulation:

- E7881A or E7881B - Packets and Protocols Application Software

Although not required, the following software licenses are complementary to the SIP test solution:

- E7887A DHCP Protocol Emulation Software License
- E7888A Access Protocol Emulation Software License (PPPoX/L2TP)
- E7829A DHCP, IGMP, PPPoX and L2TP emulation bundle

## Support

The N5588A SIP emulation software license has a Software and Support Agreement (SSA) contract options associated with it

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

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

## 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.

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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

### United States:

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

### Canada:

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