Testing network devices has never been easier!

- Fine-grained measurements on up to 32k customers or services
- Quick and easy stream creation
- Powerful PDU builder designed for future flexibility

Test your forwarding performance application with Agilent’s multi-port Packets and Protocols Application.

Performance testing is a critical component of any test plan. It allows equipment manufacturers to publish performance data for new devices and regression-test software versions in existing ones. Service providers use performance testing to compare and evaluate equipment from different vendors, and to ensure that network devices can handle both typical and exceptional conditions.

Whether your device is a switch or router, whether it resides in an access, edge, or core network, its performance must be determined for many diverse scenarios.

You may be testing a new switch fabric or route processor for consistency of performance. Or you may want to see how your device handles a problem packet size. Because customizing test parameters can be a laborious task, Agilent’s N2X provides a quick and easy way to generate Layer-2 and Layer-3 traffic containing virtually any type of encapsulation. You can vary packet sizes, offered loads, and other test parameters, then immediately view real-time measurements to observe the effect on your router or switch. This application note explains how to measure a device’s performance when forwarding Layer-2 traffic containing a random distribution of frame sizes.
Agilent N2X Packets and Protocols — Testing Forwarding Performance

Testing with Agilent N2X

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 N2X Packets and Protocols application enables N2X to verify the traffic forwarding performance, protocol scalability and services delivering capabilities of switching and routing devices across the enterprise, metro/edge and core.

A powerful and flexible PDU builder makes it easy to build streams of Layer-2 Layer-7 Protocol Data Units (PDUs) containing multiple encapsulations and even proprietary formats. With the PDU builder, you can define a packet length distribution and common header type, and then edit any field, including the payload. You can also set a field modifier to vary a header field’s values, creating a separate flow or measurable stream for each one. This tool reduces the time needed to generate multi-encapsulated traffic types thereby allowing you to get more out of your testing time.

Users can also generate and analyze more streams per port than any other tester available (up to 32,768 transmit and receive streams per port), making it easy to scale your tests beyond the maximum performance parameters of your network or device. Your test can include 256 test ports per system, with 15 traffic profiles and up to 1023 - 4095 stream groups per port, depending on the port type. In total, the Traffic Generation and Analysis application can generate and measure statistics on 32,768 streams per port, using either four separate measurements over 32,768 streams or twelve measurements over 4,096 streams.

Forwarding performance test

This application note describes how to determine a switch’s performance when forwarding Ethernet frames with randomly varying lengths to a range of MAC addresses.

Test configuration

As shown in the illustration below, a source test port sends Ethernet frames of different lengths through the device under test (DUT) to a range of addresses on the destination test port while real-time performance statistics are taken. In this test the DUT is a switch or switch-enabled router.

![Forwarding performance test configuration](image)

Because N2X can generate and measure Layer-2 or Layer-3 traffic with equal facility, you can easily adapt this test for an edge router forwarding IP traffic. You can also change the packet size, traffic profile, and other important test parameters.
Test summary

**Step 1: Select test modules and ports.** Configure two test ports on any Ethernet interface or one port on two different Ethernet interfaces (e.g., 10/100 Fast Ethernet, GbE, 10GbE LAN/WAN).

**Step 2: “Teach” DUT the addresses of simulated hosts.** On the destination test port, use the new PDU builder to define an Ethernet stream containing a range of source MAC addresses to simulate hosts behind the port, then send the traffic from the destination test port to the source test port to teach the DUT the addresses.

**Step 3: Define traffic on the first test port.** On the source test port, define Ethernet streams with randomized Layer-2 lengths, randomized IP packet payloads, and destination MAC addresses identical to the source addresses simulated behind the destination test port. A field modifier allows you to create a separate stream for each destination address. You can specify the value of any field, including the fields of packets encapsulated within the Ethernet frame.

**Step 4: Set the traffic properties.** Define the traffic profile as constant or bursty, set the offered load, and specify the number of packets to send (e.g., continuous stream, \( n \) packets, or just one packet).

**Step 5: Set up the statistics to view.** Configure the destination test port to display a range of port- and stream-level performance measurements.

**Step 6: Start traffic and measurements.** Send traffic from the source test port to the range of MAC addresses simulated behind the destination test port while you view real-time performance measurements in table, line graph, or bar chart format.

**Step 7: Increase the offered load.** Move N2X’s dynamic slider bar to increase the offered load while the test is in progress, then monitor the effect on the DUT’s performance.

**Step 8: Stop the test.** If you are sending traffic in Continuous mode, you must manually stop the test.

**Step 9: Save the test configuration.** You can save the entire test configuration as an XML file, including any profiles and streams you have defined.
Apply a field modifier to a field of interest to vary its value.

Generate a separate measurable stream for each field value.

Edit any PDU field at any layer — including packet payloads.
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