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

**Stress test your device’s data plane with Agilent’s multi-port Packets and Protocols Application.**

High traffic loads place heavy demands on both the hardware and software components of a Layer-2 device. Before deployment, its interfaces, switching fabric, memory, buffering and scheduling mechanisms, and Address Resolution Protocol (ARP) tables must be thoroughly stressed to ensure the device can switch traffic from its input buffers to the appropriate output queues at full line rate.

This application note describes how to use Agilent N2X to define and generate up to 32,768 streams per port to help you stress a Layer-2 device’s data plane. You can build any type of Layer-2 to Layer-7 Protocol Data Unit (PDU) and receive per-port or per-stream statistics on the test traffic to help identify problems with your device quickly and easily.
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.

Data plane stress test

This application note describes how to stress your Layer-2 device with data traffic.

Test configuration

As shown in the illustration below, a source test port sends thousands of Ethernet streams containing the full range of VLAN IDs to a destination test port through the system under test (DUT). The traffic load is increased while performance statistics are observed and saved in comma separated value (.csv) format to a log file.

The test in this application note uses two test ports on a Gigabit Ethernet interface, but you can easily add multiple GbE destination test ports and create 32,768 streams on each one. Because N2X can generate and measure Layer-2 or Layer-3 traffic with equal facility, you can also adapt this test to stress test a router’s data plane.
Test summary

**Step 1: Select test modules and ports.** Configure two test ports on a Gigabit Ethernet interface.

**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 the PDU content and length.** On the source test port, define eight stream groups containing encapsulated Layer-2 traffic. For each stream group, use a field modifier to create a separate stream for each possible VLAN ID, generating a total of 32,678 streams. You can also vary frame lengths or specify the value of any field, including the fields of packets encapsulated within the Ethernet frame.

**Step 4: Set the traffic profile properties.** Define each 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.

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**A** Define, generate and analyze up to 32,768 traffic streams per port.

**B** Easily scale the test bed by adding hundreds of additional ports.

**C** Utilize Agilent's unique PDU builder to ensure correct forwarding of standard, proprietary and experimental encapsulations.

**D** Analyze latency, loss, throughput, QoS and other key performance attributes under varying conditions.
Apply a field modifier to the VLAN ID field to vary its value.

Generate a separate measurable stream for each VLAN ID value.

For each test transmit port, create up to 32,678 streams.
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