Network World Clear Choice Test: Access Switches
Scheduled for publication in Network World in March 2008
Test Methodology

PDF version: http://networktest.com/10g07/10g07meth.pdf

1 Executive summary

This document describes benchmarking procedures for gigabit/10 gigabit access switches. Test results are scheduled for publication in Network World in March 2008.

Given that Network World's readership is comprised of enterprise network managers, the key emphases of this project will be performance, security, and features in an enterprise context. As described in detail below, tests cover the following areas:

- L2 unicast performance
- L3 unicast performance
- IGMP multicast group capacity
- L2 multicast performance
- L3 multicast performance
- NAC/802.1X support
- Storm control
- Power consumption
- Switch management and usability
- Switch features (VLANs, routing, discovery, etc.)

This document is organized as follows. This section introduces the tests to be conducted. Section 2 describes the test bed. Section 3 describes the tests to be performed. Section 4 provides a change log.

2 The test bed

This section discusses requirements of systems under test and introduces the test equipment to be used.

2.1 Devices under test

Participating vendors should supply the following:

- One access switch equipped with at least two 10-gigabit Ethernet uplinks and at least 48 10/100/1000 access ports.

- At least two optical transceivers for the 10-gigabit ports. We assume the use of 10GBASE-SR XFP transceivers but may be able to accommodate other transceiver types such as XENPAK or X2. Please let us ASAP if your system uses some other transceiver type.

  Vendors are *strongly* encouraged to include at least one extra transceiver for sparing.

2.2 Test instruments

2.2.1 Spirent TestCenter

The primary instrument for performance assessment in this project is Spirent TestCenter. Spirent has supplied a 5U test chassis equipped with CPR-2001B gigabit Ethernet and XFP-2001B 10-gigabit Ethernet modules with XFP 10GBase-SR transceivers.

We use Spirent TestCenter Application version 2.15 and Spirent ScriptMate 2.0.74.

Some tests may use Spirent's TeraDot1XTester version 1.2 for SmartBits, using either LAN-3325 XD or LAN-3301A modules.

2.2.2 Juniper Steel-Belted Radius Enterprise Edition 6.1

The authentication server for this project is Juniper Steel-Belted Radius (SBR) Enterprise Edition Version 6.1 running on Windows Advanced Server 2003 R2.

In 802.1X and NAC testing, the authentication server's IPv4 address is 10.0.0.11/16 and the device under test (DUT) address should be 10.0.0.1/16. Clients will use the 10.0.0.0/16 space, with addresses granted by the Windows Server DHCP service also at 10.0.0.11.

2.2.3 Fluke True-rms Clamp Meter 335

The power consumption measurement instrument for this project is a Fluke True-rms Clamp Meter 335. Power consumption tests also use a WaveTek Meterman ELS2 line splitter to avoid the need to split power cords.

3 Test procedures

This section describes the test procedures. For each procedure in this section, this document describes:

- the test objective(s);
- the configuration to be used;

- the procedure to be used;
- the test metrics to be recorded;
- reporting requirements.

3.1 Switch management and usability

3.1.1 Objectives

To determine the types of device management supported by the DUT
To determine which cleartext and encrypted management methods are supported by default
To determine all supported management methods
To determine whether any management method is vulnerable to published exploits

3.1.2 Test bed configuration

The DUT should be tested in its default factory configuration. If the DUT already has been configured, it should be reset to the configuration state a first-time user would encounter.

3.1.3 Procedure

1. Attach a serial console and attempt to give the device at least one IP address for management. (serial pass/fail)
2. Over an IP connection, determine which of the following management methods are enabled by default:
    a. SSHv2
    b. SSHv1
    c. telnet
    d. http
    e. https
    f. SNMPv1
    g. SNMPv2C
    h. SNMPv3
    i. proprietary GUI
    j. proprietary CLI
    k. Other (note)
3. Repeat previous step to determine which methods are not enabled by default, but can be enabled through user configuration. Also determine whether DUT can write log entries to external syslog server or other external auditing platform.
4. Determine whether the IPv6 management is possible for each of the previous three steps
5. During the course of this and all other events, testers will record subjective comments about relative ease of device management for common tasks. These tasks include initial setup; L2 and L3 configuration; 802.1X configuration; QoS

configuration; configuration reloads and system reloads; and storm control configuration.

3.1.4 Metrics

Default cleartext management methods
Default encrypted management methods
Supported management methods
Exportability to external log server
Usability

3.1.5 Reporting requirements

DUT configuration
Test results

3.2 Switch features

3.2.1 Objective

To determine the feature set supported by the DUT

3.2.2 Test bed configuration

Not applicable

3.2.3 Procedure

We ask participating vendors to complete a features questionnaire listing various attributes supported by the DUT. Examples of such attributes include the number and type of physical interfaces; routing protocols; VLAN support; spanning tree support; discovery protocol support; anti-spoofing and anti-DOS protection mechanisms; and management methods.

The questionnaire includes space for vendors to describe features not covered by the various questions.

Network World will publish the results of the features questionnaire, usually in its online edition. The publication should include a caveat that responses are supplied by vendors, and not all features have been verified by Network World.

3.2.4 Metrics

Features supported

3.2.5 Reporting requirements

Features questionnaire

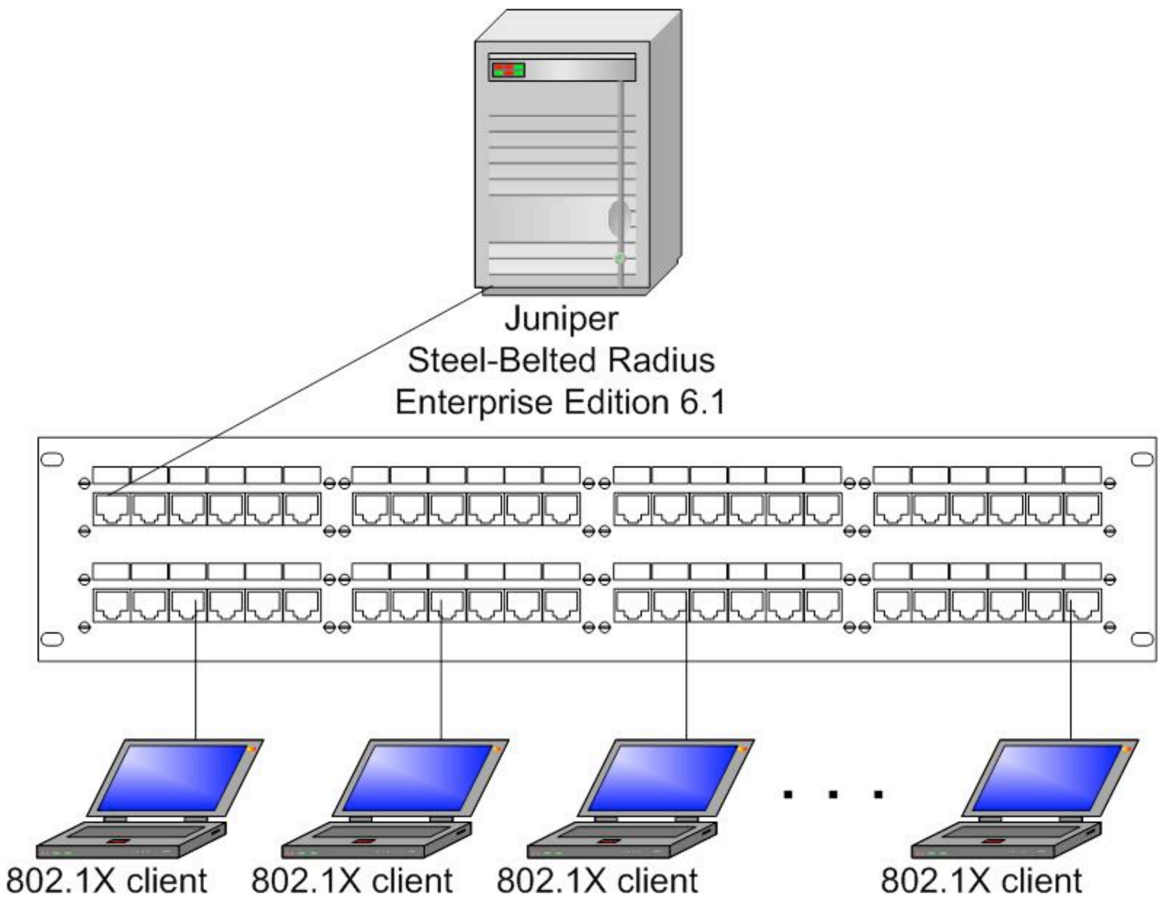
3.3 NAC/802.1X support

3.3.1 Objective

To determine the 802.1X and NAC features the DUT supports.

3.3.2 Test bed configuration

In this test, all devices reside on the 10.0.0.0/16 subnet. All hosts are members of the FREEDONIA Windows domain. The following figure shows the 802.1X test bed:



This table gives the addresses and VLANs in use:

Device	VLAN ID	IPv4 address
Switch	101	10.0.0.1
DHCP server/primary domain controller	101	10.0.11
Authentication server	101	10.0.0.11
Clients	101, (102)	10.0.0.20-10.0.255.254

The authentication server for this project is Juniper Steel-Belted Radius (SBR) Enterprise Edition Version 6.1 running on Windows Advanced Server 2003 R2. We configure the authentication server and clients to use PEAP and MS-CHAPv2 for logins.

The same Windows Advanced Server 2003 R2 machine acts as a primary domain controller for the domain FREEDONIA and as a DHCP server.

The clients will use Windows Active Directory usernames and passwords.

3.3.3 Procedure

1. Using 802.1X login(s), determine which of the following procedures the switch supports:
   a. One user per port, successful 802.1X authentication, switch permits user traffic onto predefined VLAN 101 (untagged)
   b. Multiple users per port, successful 802.1X authentication, switch permits all users traffic onto predefined VLAN 101 (untagged)
   c. Same as (a), but switch dynamically assigns VLAN 101 (untagged) to port (port is not a VLAN member to begin with)
   d. Same as (a), but switch dynamically assigns an access control list (ACL) covering user traffic on that port
   e. Same as (a), authentication fails, user placed in guest/fallback VLAN
   f. Fallback to MAC authentication for non-802.1X client, eg., a printer

3.3.4 Metrics

802.1X (and other) authentication methods supported

3.3.5 Reporting requirements

DUT configuration
DUT software version
Radius server configuration
Test results

3.4 *Storm control*

3.4.1 Objective

To determine the ability of the DUT to repel or block various forms of flooding attacks

3.4.2 Test bed configuration

For L2 and L3 tests, the DUT should be configured as in the L2 and L3 basic performance tests above, respectively. If anti-flooding mechanisms are not enabled by default, they should be for this test.

These tests examine the ability of the DUT to block or repel various types of flooding attacks. On the principle that "crackers don't make appointments," we do not release the specific attacks to vendors before test time. What we can say is that attack sources will be a combination of commercial and/or open-source tools and may involve some or all of the following traffic types:

L2: BPDU flooding, random MAC flooding, 802.1X auth request flooding
L3 and above: ARP spoofing, DHCP spoofing, IP spoofing, SSH redirection, SSL redirection

3.4.3 Procedure

1. Configure the switch in L2 mode. Offer various L2 attacks to multiple gigabit and/or 10 gigabit interfaces at rates exceeding at least 10 percent of line rate. While offering attack traffic, determine the following:
    a. the switch drops all attack packets
    b. the switch drops all attack packets by default (i.e., no additional user configuration is needed for this safeguard)
    c. the command-line remains responsive (i.e., a user can log in and view the running configuration)
    d. the switch logs the attack attempt

2. Repeat previous step with switch configured in L3 mode, and L3 (and possibly higher) attacks offered to DUT.

3.4.4 Metrics

Attacks blocked
Attacks forwarded
Storm controls supported
Storm controls supported by default
Responsiveness while under attack
Attack logging

3.4.5 Reporting requirements

DUT configuration
DUT software version
Attack source(s) configuration
Test results

3.5 Power consumption

3.5.1 Objectives

To determine the power consumption of the DUT when idle
To determine the power consumption of the DUT when fully loaded

3.5.2 Test bed configuration

This test uses the following equipment:

- Fluke 335 True-RMS clamp meter
- WaveTek ELS2 AC line splitter
- Spirent TestCenter chassis

The DUT plugs into the line splitter and the clamp meter measures power consumption through the line splitter. The Spirent TestCenter chassis attaches to two 10G Ethernet and 48 gigabit Ethernet interfaces of the DUT.

This test will measure power consumption when idle and again when fully loaded. "Fully loaded" in this context means maximum utilization of the DUT's control and data planes.

Test traffic will comprise 64-byte UDP/IP frames with at least one IP option set to force "slow-path" processing by the DUT. The tester should verify that CPU utilization rises when IP options are in use; if not, other mechanisms such as management requests or flooding may be used, provided it has the effect of maximizing CPU utilization.

3.5.3 Procedure

1. Using the clamp meter and leads, measure AC voltage from the power outlet. We refer to this measurement as V.
2. Plug the DUT into the line splitter and verify the system has booted up.
3. Place the clamp meter jaws around the "10X" receptacle of the line splitter. The clamp meter will display AC amps drawn by the DUT times 10. We refer to this figure as 10A.

4. Derive idle-DUT power consumption in watts (W) using the formula W = V * (10A/10).
5. Using Spirent TestCenter, offer 64-byte frames to all interfaces at the throughput rate as determined in the previous test of L3 basic performance. The traffic orientation must be directional between the 10G interfaces and fully meshed between all gigabit Ethernet interfaces. Also, see comments about setting IP options in "Test Bed Configuration" above.
6. Repeat steps 3-4 to determine maximum-load power consumption.
7. For devices with multiple power supplies, repeat all previous steps for each power supply. Add wattage from each power supply to determine total system power consumption.

3.5.4 Metrics

Supplied power (volts AC)
Idle power consumption (watts)
Maximum-load power consumption (watts)

3.5.5 Reporting requirements

DUT configuration
DUT software version
Spirent TestCenter configuration
Test results

3.6 L2 unicast performance

3.6.1 Objectives

To determine throughput, delay, and sequencing of the DUT when forwarding unicast Ethernet frames based on L2 forwarding criteria

3.6.2 Test bed configuration

This device under test (DUT) is equipped with two 10-gigabit Ethernet interfaces and 48 gigabit Ethernet interfaces. We attach Spirent TestCenter 1- and 10-Gbit/s Ethernet test interfaces to the DUT. We assume the use of XFP SR optics for the 10G interfaces unless otherwise specified, and 1000Base-T copper interfaces with RJ-45 connectors for the gigabit interfaces.

We configure Spirent TestCenter to offer two sets of streams: bidirectional traffic between the 10G interfaces, and fully meshed traffic between the gigabit Ethernet interfaces. RFC 2285 describes traffic orientation and distribution. As described in the procedures section, tests will measure gigabit and 10 gigabit performance separately and together.

Test traffic offered to all ports will have 10 MAC addresses per port, and will use pseudorandom MAC addresses as described in RFC 4814.

The DUT must be configured so that entries in its bridging table will not age out during the test.

The DUT must be configured to disable spanning tree, routing protocols, multicast and any other protocols that might put control-plane traffic on the wire during the test duration. The goal of this test is to determine maximum data-plane performance, and the existence of even one extra frame other than test traffic can lead to frame loss.

3.6.3 Procedure

1. Perform a learning run to populate the DUT's bridging table.
2. Using a binary search algorithm, we offer bidirectional streams of test traffic to 10G interfaces for 60 seconds to determine the throughput rate, latency (using LILO method), and frames received out of sequence (if any).
3. We repeat the previous step for each of the following Ethernet frame lengths: 64, 256, and 1518 bytes.
4. We repeat steps 2-3 for gigabit interfaces. In this case, we offer fully meshed traffic to all 48 gigabit interfaces.
5. We repeat steps 2-4 with 10G and gigabit traffic offered concurrently.

3.6.4 Metrics

Throughput (64, 256, and 1518 byte frames) (gigabit, 10G, and combined)
Average and maximum latency (64, 256, and 1518 byte frames) (gigabit, 10G, and combined)
Out of sequence frames

3.6.5 Reporting requirements

DUT configuration
DUT software version
Spirent TestCenter configuration
Test results

3.7 L3 unicast performance

3.7.1 Objectives

To determine throughput, delay, and sequencing of the DUT when forwarding unicast IPv4 traffic

3.7.2 Test bed configuration

This device under test (DUT) is equipped with two 10-gigabit Ethernet interfaces and 48 gigabit Ethernet interfaces. We attach Spirent TestCenter 1- and 10-Gbit/s Ethernet test interfaces to the DUT. We assume the use of XFP SR optics for the 10G interfaces unless otherwise specified, and 1000Base-T copper interfaces with RJ-45 connectors for the gigabit interfaces.

We configure Spirent TestCenter to offer two sets of streams: bidirectional traffic between the 10G interfaces, and fully meshed traffic between the gigabit Ethernet interfaces. RFC 2285 describes traffic orientation and distribution. As described in the procedures section, tests will measure gigabit and 10 gigabit performance separately and together.

We use static routing for this test. The following table lists the IPv4 addressing in use on the DUT and test instrument:

Interface type	Port IP address length/prefix length	Interface type	Port IP address length/prefix length	Host(s) emulated
GE	10.1.0.1/16	GE	10.1.0.2/16	10.1.0.3-10.1.0.12
GE	10.2.0.1/16	GE	10.2.0.2/16	10.2.0.3-10.2.0.12
GE	10.3.0.1/16	GE	10.3.0.2/16	10.3.0.3-10.3.0.12
GE	..	GE	..	..
GE	10.48.0.1/16	GE	10.48.0.2/16	10.48.0.3-10.48.0.12
10GE	10.101.0.1/16	10GE	10.101.0.2/16	10.101.0.3-10.101.0.12
10GE	10.102.0.1/16	10GE	10.102.0.2/16	10.102.0.3-10.102.0.12

The DUT must be configured so that entries in its ARP and bridging tables will not age out during the test duration. This can be done either by disabling aging or setting it to a value larger than the test duration.

The DUT must be configured to disable spanning tree, routing protocols, multicast and any other protocols that might put control-plane traffic on the wire during the test duration. The goal of this test is to determine maximum data-plane performance, and the existence of even one extra frame other than test traffic can lead to frame loss.

Test traffic will use pseudorandom MAC addresses as described in RFC 4814.

3.7.3 Procedure

1. Perform a learning run to populate the DUT's bridging table.
2. Using a binary search algorithm, we offer bidirectional streams of test traffic to 10G interfaces for 60 seconds to determine the throughput rate, latency (using LILO method), and frames received out of sequence (if any).
3. We repeat the previous step for each of the following Ethernet frame lengths: 64, 256, and 1518 bytes.
4. We repeat steps 2-3 for gigabit interfaces. In this case, we offer fully meshed traffic to all 48 gigabit interfaces.

5. We repeat steps 2-4 with 10G and gigabit traffic offered concurrently.

3.7.4 Metrics

Throughput (64, 256, and 1518 byte frames) (gigabit, 10G, and combined)
Average and maximum latency (64, 256, and 1518 byte frames) (gigabit, 10G, and combined)
Out of sequence frames

3.7.5 Reporting requirements

DUT configuration
DUT software version
Spirent TestCenter configuration
Test results

3.8 IGMP multicast group capacity

3.8.1 Objectives

To determine the maximum number of IGMP multicast groups the DUT can support while maintaining the ability to forward multicast frames to all multicast groups registered to the DUT (adapted from RFC 3918).

3.8.2 Test bed configuration

The DUT should be configured to support IGMPv3. Spirent TestCenter should be configured to support IGMPv3 multicast transmitters and receivers, with one receiver and one transmitter per multicast group. Multicast group addresses will begin at 225.0.0.1.

The DUT and Spirent TestCenter must be configured in L2 mode, similar to the configured in the L2 unicast performance test, with two exceptions: In this test, only 47 gigabit Ethernet interfaces join multicast groups. Also, IGMPv3 should be enabled, including IGMP snooping. The DUT should be configured with an IP address 10.101.0.1/16 to act as a source for IGMP queries.

The test procedure will determine the DUT's query interval. To avoid the possibility that the test tool sends report (join) messages too fast for the DUT to process, the test script will wait 2X the DUT's IGMP query interval. This will allow the DUT to go through the normal IGMP query/report process, "filling out" any missing entries in its IGMP membership table.

The DUT must be configured to disable spanning tree and unicast routing protocols.

A 10G interface on Spirent TestCenter will act as transmitter for all multicast groups, and 47 gigabit interfaces on Spirent TestCenter will act as receivers for all multicast groups. The 48th gigabit interface of Spirent TestCenter will act as a monitor port; if the switch forwards any multicast frames to that port, the test iteration is considered a failure.

This test runs from a TCL script generated by Spirent ScriptMaster. Since the DUT is in L2 mode, all hosts are in the same IP subnet. The following table lists IP addresses used by the test script:

Port type	Multicast role	Emulated host address
Gigabit Ethernet	Receiver	10.101.0.3/16
Gigabit Ethernet	Receiver	10.101.0.4/16
..	..	..
Gigabit Ethernet	Receiver	10.101.0.50/16
10G Ethernet	Source	10.101.0.51/16

3.8.3 Procedure

1. Prior to offering test traffic but after enabling IGMP, capture traffic from a DUT receiver port for at least 5 minutes. Note the frequency of IGMP queries, as it will be used in the next step.
2. Each of 47 receiver ports will join 100 multicast groups. After a delay of 2X the DUT's query interval, Spirent TestCenter will transmit 1,518-byte multicast traffic to all receivers in all groups at an aggregate rate of 0.1 percent of 10G line rate for a duration of 60 seconds. If Spirent TestCenter receives one or more frames per group, the iteration is said to pass at the current capacity, per RFC 3918. If the 48th (monitor) port receives multicast traffic and/or if one or more multicast groups on the 47 gigabit test ports fail to receive traffic, the iteration is said to fail.
3. The test instrument will use a binary search algorithm to determine the maximum number of groups supported. The test stops iterating when one or more of the egress interfaces fails to forward traffic on one or more of the configured multicast groups.

3.8.4 Metrics

Total number of multicast group addresses successfully forwarded through the DUT

3.8.5 Reporting requirements

DUT configuration
DUT software version
Spirent TestCenter configuration
Test results

3.9 L2 multicast performance

3.9.1 Objectives

To determine the throughput and average latency of the DUT when forwarding IPv4 multicast traffic to hosts on a single VLAN/IP subnet (RFC 3918 aggregated multicast throughput and multicast forwarding latency)

3.9.2 Test bed configuration

These tests use TCL scripts generated by Spirent ScriptMaster 2.0.74. The scripts measure RFC 3918 aggregated multicast throughput and multicast forwarding latency.

The DUT should be configured to support IGMP. Spirent TestCenter should be configured to support multicast transmitters (on the DUT's first 10G interface) and receivers (on 48 gigabit interfaces).

Each of 48 Spirent TestCenter gigabit interfaces should be configured to join 500 multicast groups, each with 1 transmitter. All receivers will join the same 500 groups. Multicast group addresses will begin at 225.0.1.0. The IGMPv3 report (join) messages will include a source filter to include traffic from the transmitter at 10.101.0.51.

If the IGMP group capacity tests determine the DUT cannot support 500 multicast groups, tests instead will be run at the capacity level (with this setup detail noted along with test results).

The DUT and Spirent TestCenter must be configured with all IP addresses in the same VLAN/IP subnet. The script for this test uses the same IP addresses as those in the "IGMP group capacity" test.

The test procedure will determine the DUT's query interval. To avoid the possibility that the test tool sends report (join) messages too fast for the DUT to process, the test script will wait 2X the DUT's IGMP query interval. This will allow the DUT to go through the normal IGMP query/report process, "filling out" any missing entries in its IGMP membership table.

The DUT must be configured to disable spanning tree and unicast routing protocols.

3.9.3 Procedure

1. Prior to offering test traffic but after enabling IGMP, capture traffic from a DUT receiver port for at least 5 minutes. Note the frequency of IGMP queries, as it will be used in the next step.

2. Each receiver port will join 500 multicast groups beginning at 225.0.1.0 using IGMPv3 reports (joins). The report messages use an include filter for traffic sourced from 10.101.0.51.
3. After a delay of 2X the DUT's query interval (determined in step 1), perform a learning run to populate the DUT's bridging table.
4. Using a binary search algorithm, we offer test traffic to the DUT's first 10G port destined to all 500 multicast group addresses to determine the throughput rateand frames received out of sequence (if any). The test duration is 60 seconds.
5. At the throughput rate, we again offer traffic to all 500 multicast groups to measure average and maximum latency.
6. We repeat the previous two steps for each of the following Ethernet frame lengths: 64, 256, and 1518 bytes.

3.9.4 Metrics

Multicast throughput (64, 256, and 1518 byte frames)
Average and maximum latency (64, 256, and 1518 byte frames)
Out of sequence frames (pass/fail)

3.9.5 Reporting requirements

DUT configuration
DUT software version
Spirent TestCenter configuration
Test results

3.10 L3 multicast performance

3.10.1 Objectives

To determine the throughput and average latency of the DUT when forwarding IPv4 multicast traffic to hosts on a multiple VLAN/IP subnets (RFC 3918 aggregated multicast throughput and multicast forwarding latency)

3.10.2 Test bed configuration

These tests use TCL scripts generated by Spirent ScriptMaster 2.0.74. The scripts measure RFC 3918 aggregated multicast throughput and multicast forwarding latency.

The DUT should be configured to support IGMP. Spirent TestCenter should be configured to support multicast transmitters (on the DUT's first 10G interface) and receivers (on 48 gigabit interfaces).

The physical topology of this test is similar to that in the test for "L2 multicast performance." However, this time each DUT port should be configured to use a different IP subnet. The IP subnetting is identical to that used in the "L3 unicast performance" tests.

Each of 48 Spirent TestCenter gigabit interfaces should be configured to join 500 multicast groups, each with 1 transmitter. All receivers will join the same 500 groups. Multicast group addresses will begin at 225.0.1.0. The IGMPv3 report (join) messages will include a source filter to include traffic from the transmitter at 10.101.0.3.

If the IGMP group capacity tests determine the DUT cannot support 500 multicast groups, tests instead will be run at the capacity level (with this setup detail noted along with test results).

PIM-sparse mode should be enabled on the DUT. IP unicast routing protocol(s) may be enabled as well, if necessary. PIM-SM with source-specific multicast (SSM) may be enabled but this is not mandatory.

Definition of a PIM-SM rendezvous point (RP) is optional for this test. If an RP is needed, it must be statically defined either to a loopback interface address or to the first 10G interface (10.101.0.1/16), covering the entire IPv4 multicast space (224.0.0.0/4). A PIM-SM boostrap router (BSR) does not need to be configured for this test.

The test procedure will determine the DUT's query interval. To avoid the possibility that the test tool sends report (join) messages too fast for the DUT to process, the test script will wait 2X the DUT's IGMP query interval. This will allow the DUT to go through the normal IGMP query/report process, "filling out" any missing entries in its IGMP membership table.

The DUT must be configured to disable spanning tree protocol and any other extraneous control-plane traffic that might reduce throughput.

3.10.3 Procedure

1. Prior to offering test traffic but after enabling IGMP, capture traffic from a DUT receiver port for at least 5 minutes. Note the frequency of IGMP queries, as it will be used in the next step.
2. Each receiver port will join 500 multicast groups beginning at 225.0.1.0 using IGMPv3 reports (joins). The report messages use an include filter for traffic sourced from 10.101.0.3.
3. After a delay of 2X the DUT's query interval (determined in step 1), perform a learning run to populate the DUT's bridging table.
4. Using a binary search algorithm, we offer test traffic to the DUT's first 10G port destined to all 500 multicast group addresses to determine the throughput rateand frames received out of sequence (if any). The test duration is 60 seconds.
5. At the throughput rate, we again offer traffic to all 500 multicast groups to measure average and maximum latency.
6. We repeat the previous two steps for each of the following Ethernet frame lengths: 64, 256, and 1518 bytes.

3.10.4 Metrics

Multicast throughput (64, 256, and 1518 byte frames)
Average and maximum latency (64, 256, and 1518 byte frames)
Out of sequence frames (pass/fail)

3.10.5 Reporting requirements

DUT configuration
DUT software version
Spirent TestCenter configuration
Test results

4 Change log

Version 2008012101
21 January 2008
Title matter: Changed publication date from "December 2007" to "March 2008"

Section 3.8: Modified multicast group capacity test procedure to add monitor port. This addresses a logic flaw in RFC 3918, detailed here:

http://www1.ietf.org/mail-archive/web/bmwg/current/msg01657.html

Version 2007110401
4 November 2007
Title matter: Changed publication date from "late fall" to "December 2007"
Executive summary: Divided multicast performance tests into L2 and L3 events; retitled "basic" L2 and L3 tests to unicast L2 and L3 tests; deleted QoS enforcement test

Section 2.1: Changed device requirement to one switch

Section 2.2.2: Corrected addressing for Steel-Belted Radius (now runs on same machine as Windows Server PDC)

Section 3.3.2: Corrected addressing for Steel-Belted Radius (now runs on same machine as Windows Server PDC)

Sections 3.6 and 3.7: Clarified title and objective to indicate use of unicast traffic

Section 3.7.2: Corrected host addressing table for 10G interfaces (10 hosts/port, not 1024)

Deleted former section 3.8 on QoS enforcement

Section 3.8 (now IGMP group capacity): Changed from DUT L3 to L2 mode; increased receiver port count from two to 48; added addressing used by TCL scripts; increased group report delay from 10 seconds to 2X query interval; changed offered load for test traffic from 100 fps to 0.1 percent 10G line rate; added specification that test traffic duration is 60 seconds.

Section 3.9 (now L2 multicast performance)

Section 3.9.1: Dropped flooding from test objective

Sections 3.9.2-3: Tests now use 48 receiver ports (was 10)

Section 3.10 (now L2 multicast performance)

Section 3.10.1: Dropped flooding from test objective

Sections 3.10.2-3: Tests now use 48 receiver ports (was 10)

Version 2007092401
24 September 2007
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