

Multicast Test Solution on RouterTester 900



Agilent Technologies

Presentation Overview

- Introduction to RouterTester 900
- Description of Multicast Test Solution
- What are the benefits?
- Examples of GUI and Test Scenarios
- Test Categories for PIM Conformance
- Release Summary
- Future Enhancements

What is RouterTester 900?

- RouterTester 900 is the latest generation of RouterTester, offering significantly increased traffic, protocol, and port scalability. It is the industry's most powerful test tool, including:
 - Multi-port, Wire-speed Traffic Generation
 - Scalable Protocol Emulation
 - Complex Network and Service Simulation
- Who uses RouterTester?
 - Network Equipment Manufacturers
 - Service Providers
- What type of devices are tested using RouterTester 900?
 - Core & Metro/Edge Routers
 - Optical Switches
 - Next Generation Networks & Services



Multicast Test Solution on RouterTester 900

What is new?

- Our Multicast Test Solution is now enhanced beyond IGMPv2 to include:
 - PIM Emulation & PIM-SM Conformance
 - IGMPv3 Emulation
 - Multi-session capability for both IGMP and PIM-SM
- These features are essential to Metro/Edge and Core router testing!
- Key Differentiators and Features:
 - The only test solution combining both unicast and multicast routing protocols
 - Combines both integrated traffic and routing protocol emulation

Multicast Test Solution in a “nutshell”

- IPv4 Multicast
- IGMPv2 & IGMPv3 Emulation with multi-session capability
- PIM-SM Protocol Module with multi-session capability
- PIM-SM Conformance Test Suite
- Multicast Test Solution is available on all RouterTester Interfaces

Agilent's Multicast Test Solution is the only solution combining IGMP, Unicast/Multicast Routing Protocols, and Unicast/Multicast Traffic.

What Benefits Does the Multicast Test Solution Offer You?

- You can measure mixed class (unicast and multicast) throughput
- You can determine how switching between source specific (S,G) and source-independent (*,G) group membership affects forwarding performance
- You can measure multicast packet forwarding latency and group join/leave (prune) latency
- You can determine how packet-forwarding performance is affected by both the number of multicast groups/sources and changes in group membership
- You can test how the delivery of multicast services is affected by unicast route flaps
- You can measure the performance of PIM-SM-enabled RP and non-RP routers and switches
- You can measure RPT to SPT switchover times
- [Test scenarios per methodology for IP Multicast Benchmarking RFC 2432](#)

Example of the Multicast Test Solution IGMP GUI

The screenshot displays the Multicast Test Solution IGMP GUI, which is divided into several functional windows:

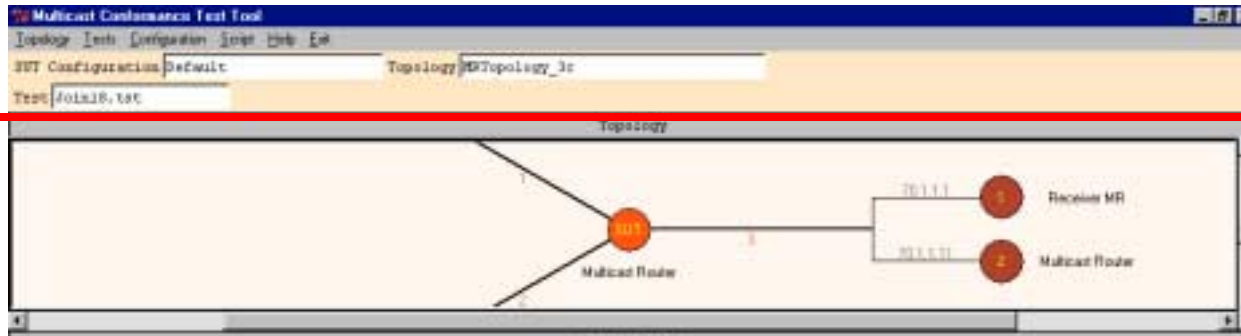
- Routing Window:** Features a green status indicator and buttons for "Routing Log...", "Start Routing Engine", and "IP Errors...". It includes tabs for "Summary", "BGP-4", "IS-IS", "OSPF", "RSVP", "LDP", "Multicast", "Static Labels", and "Static Routes". Below these are buttons for "Group Membership Profiles...", "Enable All Sessions", "Disable All Sessions", "IGMP Stats...", and "PIM Stats...". A table lists "Selected Ports" with columns for Port, State, Enable, Protocol, Interface IP Ad..., Router ID, Groups, and Sources. The table contains two entries for ports 1B and 1C, both in a "Disabled" state with "IGMPv3" protocol and "192.2.1.2" interface IP.
- Group Membership Profiles Window:** Contains buttons for "Set All Files to Include", "Set All Files to Exclude", "Join All", "Leave All", and "Multicast Group Pools". It has a "Selected Ports" list on the left and a table with columns for Session, State, Protocol, Join, Groups, First, Last, Modifier, Filter, and Sources. The table shows sessions for ports 1A, 1B, 1C, 1D, 3A, and 3B.
- IGMP Group Pool Window:** Has two tabs: "Group Pool" and "Source List". The "Group Pool" tab is active, showing a dropdown menu for "Group Pool" set to "AGT MULTICAST POOL" and an "Add Pools..." button. Below are input fields for "First Address" (225 . 0 . 0 . 0), "Num Addresses" (1), "Modifier" (1 / 32), and "Last Address" (225 . 0 . 0 . 0).

Example of the Multicast Test Solution PIM Emulation GUI

The screenshot displays the 'Group Membership Profiles' application window. It features a 'PIM' tab and a control panel with buttons for 'Start Routing Engine', 'Join All', 'Prune All', 'Enable All (S,G)', 'Disable All (S,G)', and 'Multicast Group Pools...'. A table lists session details, with session 1B selected. A 'PIM Group Pool' dialog box is open, showing configuration for 'AGT_MULTICAST_POOL' with a first and last address of 225.0.0.0 and a membership mode of 'Send Join/Prune'.

Session	State	R...	Group ...	Mode	(*G)	(S,G)	Source...	Groups	First	Last	Modifier	Sources
1A												
5	Disabled							0				0
1B												
4	Disabled							0				0

Example of the Multicast Test Solution PIM Conformance Test Suite GUI



Shows topology for particular test

Test Started

Event	Source	Category	Date/Time	Se
Cleanup	Join18.tst	General Info	Nov 06 20:48:06	Ep
Test Passed	Join18.tst	Test Status	Nov 06 20:48:06	Ep
Test Started	Join18.tst	Test Status	Nov 06 20:48:06	Ep
Startup	Join18.tst	General Info	Nov 06 20:48:06	Fr
Startup	Join19.tst	General Info	Nov 06 20:48:09	Fr
SendPkg	Intf_3/Node_1	Event Info	Nov 06 20:48:10	Se
RecvPkg	Intf_3/Node_2	Event Info	Nov 06 20:48:10	Re
RecvPkg	Intf_3/Node_1	Event Info	Nov 06 20:48:11	Re
RecvPkg	Intf_1/Node_1	Event Info	Nov 06 20:48:12	Re
SendPkg	Intf_3/Node_1	Event Info	Nov 06 20:48:13	Se
SendPkg	Intf_3/Node_1	Event Info	Nov 06 20:48:14	Se
SendPkg	Intf_1	Event Info	Nov 06 20:48:15	Se
RecvPkg	Intf_3	Event Info	Nov 06 20:48:28	Re
Cleanup	Join18.tst	General Info	Nov 06 20:48:28	Ep
Cleanup	Join18.tst	General Info	Nov 06 20:48:41	Ep
Test Passed	Join18.tst	Test Status	Nov 06 20:48:41	Ep
Test Started	Join19.tst	Test Status	Nov 06 20:48:41	Ep
Startup	Join19.tst	General Info	Nov 06 20:48:41	Fr
SendPkg	Intf_1/Node_1	Event Info	Nov 06 20:48:42	Se
RecvPkg	Intf_3/Node_1	Event Info	Nov 06 20:48:43	Re

Test Passed

MULTICAST Packet Information

TIMESTAMP: 00:32:30:289702

SOURCE IP: 70.1.1.1 DESTINATION IP: 224.0.0.13

Pin Join/Trans

Pin Version 1, Type 1

Checksum 0x3885

IPv4 Encast Address 70.1.1.2

Group-Count:1

Hold Time:30

IPv4 Group Address 229.3.3.14/32

Joins:0

Prunes:1

IPv4 Source Address 100.101.100.100/32(8)

```

0000: 23 00 00 00 01 00 46 01 01 02 00 01 00 1e 01 00  | #.....f.....
0010: 00 20 e5 03 03 10 00 00 00 01 01 00 04 20 64 65  | .....de
0020: 64 67  | fg
    
```

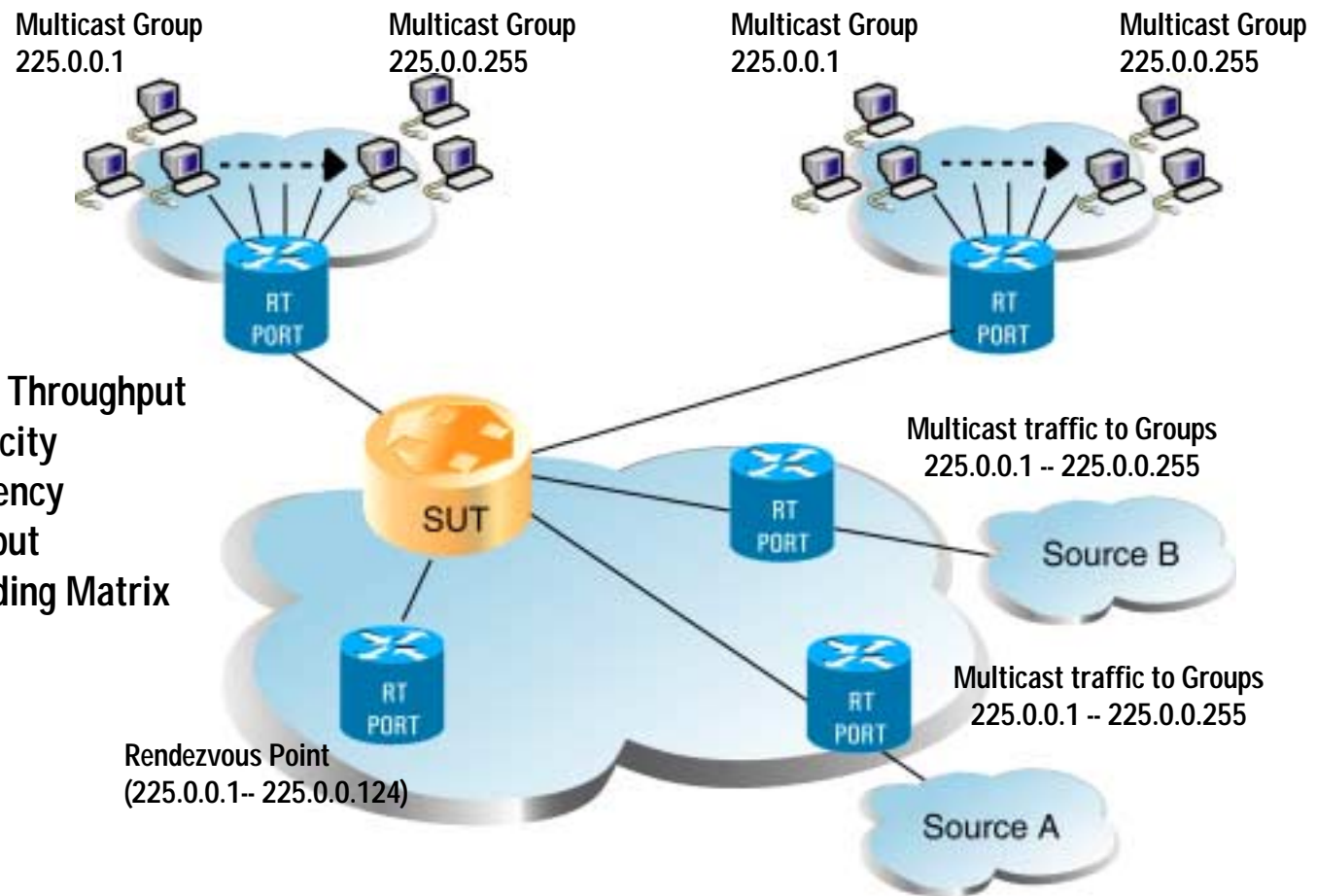
Packet by packet decode

Window for capturing test

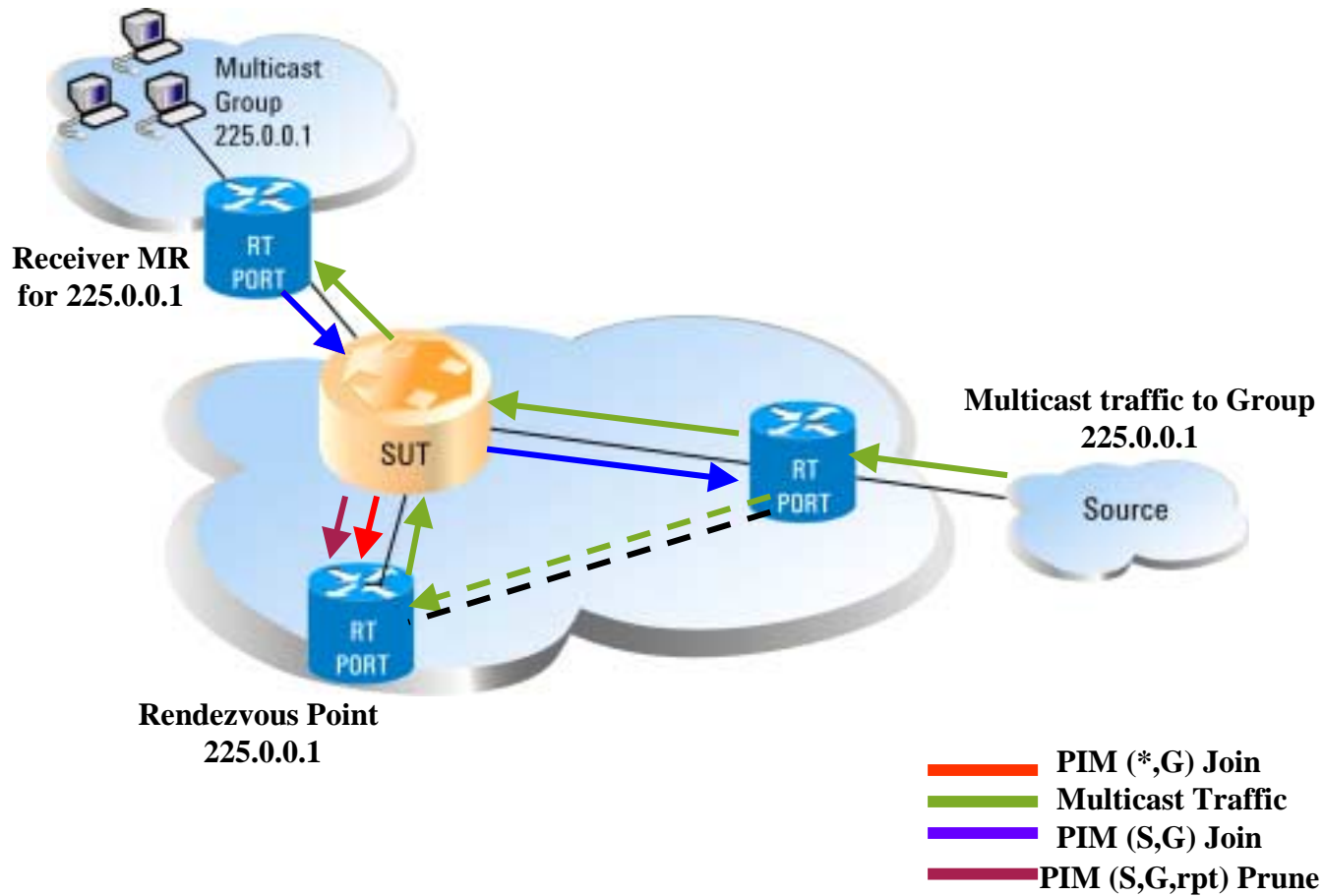
Bytes during execution

PIM Scalability Test Scenario

- Multicast Latency
- Aggregated Multicast Throughput
- Multicast Group Capacity
- Group/Prune Join Latency
- Mixed Class Throughput
- Scaled Group Forwarding Matrix



PIM-SM Conformance Test Scenario



PIM Conformance Test Categories

- Data
- Assert
- Hello
- Register
- Join/Prune
- Packet Formats
- RP Discovery
- SSM
- BSR

Release Summary (December 2002)

- **IGMP Emulation**
 - **IGMPv3: draft-ietf-idmr-igmp-v3-07**
 - **IGMPv2: RFC2236**
 - **IGMP multi-session capability over VLAN and ATM PVCs**
- **PIM-SM**
 - **Emulation and Conformance Test Suite**
 - **Multi-session capability over VALN and ATM PVCs**
 - **draft-ietf-pim-sm-v2-new-03 (obsoletes RFC2362)**
- **Enhanced Multicast GUI**

Available Multicast QuickTest Scripts

The QuickTest library includes predefined scripts that automate testing of router and network behavior. These automated tests have been developed to reflect the Test Plans published in [Agilent's Journal of Internet Test Methodologies](#).

IGMP QuickTests

- IGMP/AggregatedMulticastThroughput
- IGMP/GroupJoinDelay
- IGMP/GroupLeaveDelay
- IGMP/MixedClassThroughput
- IGMP/MulticastGroupCapacity
- IGMP/MulticastLatency
- IGMP/ScaledGroupForwardingMatrix

PIM QuickTests

- PIM/Aggregated MulticastThroughput
- PIM/GroupJoinDelay
- PIM/GroupJoinDelayMatrix
- PIM/GroupPruneDelay
- PIM/MixedClassThroughput
- PIM/MulticastGroupCapacity
- PIM/MulticastLatency
- PIM/RptToSptSwitchDelay
- PIM/ScaledGroupForwardingMatrix



Future Enhancements

- Multicast Extensions for IPv6
 - Multicast Listener Discovery Protocol (MLD)
 - PIM-SM Extension for IPv6
- Support for bi-directional PIM-SM
- IGMP over PPPoX
- Multicast Source Discovery Protocol (MSDP)

Questions?



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