

Day 46 - RFC 2889 packet ordering and sending non-bursty traffic

Note: See Day9 if using 5.40 EA build, and use this Day46 for 5.40 EA SP1

Testing Challenge:

Frame Loss, Latency and Jitter are important metrics to measure data plane forwarding performance. These metrics can be affected by DUT queuing, buffer management, and the order/bursting of the transmitted traffic. The transmission of bursty vs. non-bursty traffic can make a big difference.

Test Engineers need to be able to send non-bursty traffic from the test equipment. An example of this is when the test equipment is emulating the aggregation of low-speed links and the transmission into the DUT needs to be very precise in regards to the ordering and spacing between test packets.

In addition, the packets from multiple TX ports may arrive at the same destination port. The result could be extensive packet loss at the egress port. The internet RFC 2889 section 5.1.3 has recommended a round robin style sending sequence in fully meshed test configuration in order to avoid the egress port congestion.

IxNetwork 5.40 SP1 Solution:

In IxNetwork 5.40 SP1, there is a “Frame Ordering” under Traffic -> Option designed to support RFC2889 round robin sending sequence.

The screenshot shows the 'Options' dialog box with the 'Statistics Configuration' tab selected. The 'Generate / Apply Settings' section contains several checkboxes and input fields. The 'Frame Ordering' dropdown menu is open, showing three options: 'No Ordering', 'By RFC 2889', and 'By Flow Group Setup'. The 'By RFC 2889' option is selected. The 'How many times to loop Flow Groups in Sequential Mode' input field is set to 1. The 'MPLS Label Learning Timeout' is set to 500. The 'Max Number of Traffic Generation Queries' is set to 500.

Option	Value
Regenerate Traffic before Apply	<input type="checkbox"/>
Retry failed DA MAC lookups	<input checked="" type="checkbox"/>
# Retries	1
Wait between retries	5 seconds
Enable DA MAC change on the fly (enabling this option requires traffic re-generation)	<input type="checkbox"/>
Enable Flow Groups Staggered Transmit	<input checked="" type="checkbox"/>
Enable Ports Staggered Transmit	<input type="checkbox"/>
Use 4 bytes Signature (enable this option to test traffic with smaller frame sizes)	<input type="checkbox"/>
Frame Ordering	By RFC 2889
How many times to loop Flow Groups in Sequential Mode	1
MPLS Label Learning Timeout	500
Max Number of Traffic Generation Queries	500

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Below are 3 sending sequences this option provides.

- 1. No Ordering – There is no round robin ordering with this option. Each TX port will send the packets the order that it is configured.**
- 2. By RFC2889 - If there are multiple Tx ports transmitting packets to the same Rx port, then streams at each Tx port will be reordered as recommended by RFC 2889 (**Stream Ordering**) to avoid them hitting same Rx port at same time. Below is required transmission order defined in RFC2889 for full mesh traffic.**

Source Port	Destination Ports (in order of transmission)					
Port #1	2	3	4	5	6	2...
Port #2	3	4	5	6	1	3...
Port #3	4	5	6	1	2	4...
Port #4	5	6	1	2	3	5...
Port #5	6	1	2	3	4	6...
Port #6	1	2	3	4	5	1...

- 3. By Flow Group Setup – This option is similar to “By RFC2889”. Instead of applying the round robin ordering across multiple TX ports, this option will apply the new ordering across all Flow Groups on all TX ports.**

Source	Destination Ports (in order of transmission)					
Flow Group #1	2	3	4	5	6	2...
Flow Group #2	3	4	5	6	1	3...
Flow Group #3	4	5	6	1	2	4...
Flow Group #4	5	6	1	2	3	5...
Flow Group #5	6	1	2	3	4	6...
Flow Group #6	1	2	3	4	5	1...

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The option “Enable Flow Group Staggered Transmit” is checked by default. This option automatically calculates transmit delay (**Staggered transmit**) for Flow Groups (streams) within same Tx port to create non-bursty traffic among multiple Flow Groups when in Interleaved transmission mode.

Example: 3 Flow Groups are configured on a Tx port



Bursty transmission without Flow Group Staggered transmit (checkbox OFF)



Non-bursty transmit with Flow Group Staggered transmit (checkbox ON)

There are few considerations for generating non-bursty traffic flows in fully meshed test configuration:

- a. All Flow groups should have same rate and frame size setting.
- b. There should be one and only one flow grouping option checked in the Advanced Traffic Wizard.

Conclusion:

With enhanced function provided through “Frame Ordering” and “Enable Flow Group Staggered Transmit” checkboxes, test engineers have flexibility to create non-bursty traffic and test the low bandwidth input device or get expected low latency result. Test engineers can also execute fully meshed traffic throughput test complied with RFC 2889 recommendation.