



NetXtreme-E/NetXtreme-S DPDK 20.05 Performance Report

Test Report

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1 PS225 2x 25G Bi-directional Zero Frame Loss – A72 Hairpin

RFC2544 Zero Frame Loss Test on Broadcom NetXtreme-S Series PS225 with 2x 25G Bi-directional traffic – A72 Hairpin.

Table 1: Setup of PS225 2x 25G Bi-directional Zero Frame Loss – A72 Hairpin

Item	Description
Server	Dell PowerEdge R730
NIC	Broadcom PS225-H16 NetXtreme-S Dual-port 25Gb PCIe SmartNIC
SNIC CPU	Eight 64-bit Arm Cortex-A72 cores at 3.0 GHz
SNIC RAM	16 GB memory on-board at 2400 MHz
Operating System	Broadcom Yocto Linux
Kernel Version	4.14.174
Broadcom Firmware Version	217.0.59.0
Test Topology	One NIC and two ports are used. Frames are transmitted and received on the same port. Each port receives a stream of 256 IP flows from IXIA. Data points are taken using one, two, four, and six logical cores.

Figure 1: Topology of PS225 2x 25G Bi-directional Zero Frame Loss – A72 Hairpin

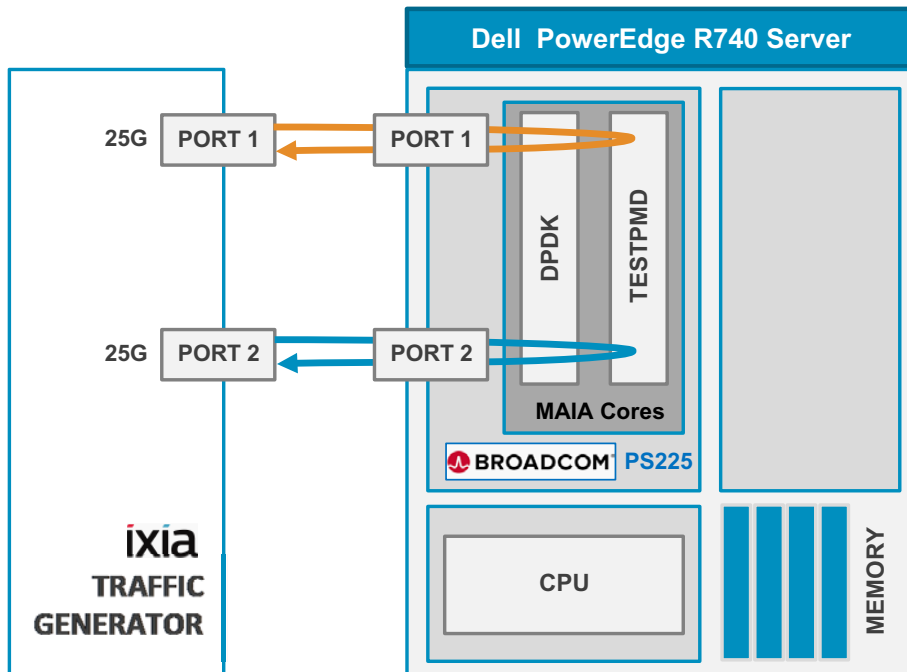


Table 2: Configuration of PS225 2x 25G Bi-directional Zero Frame Loss – A72 Hairpin

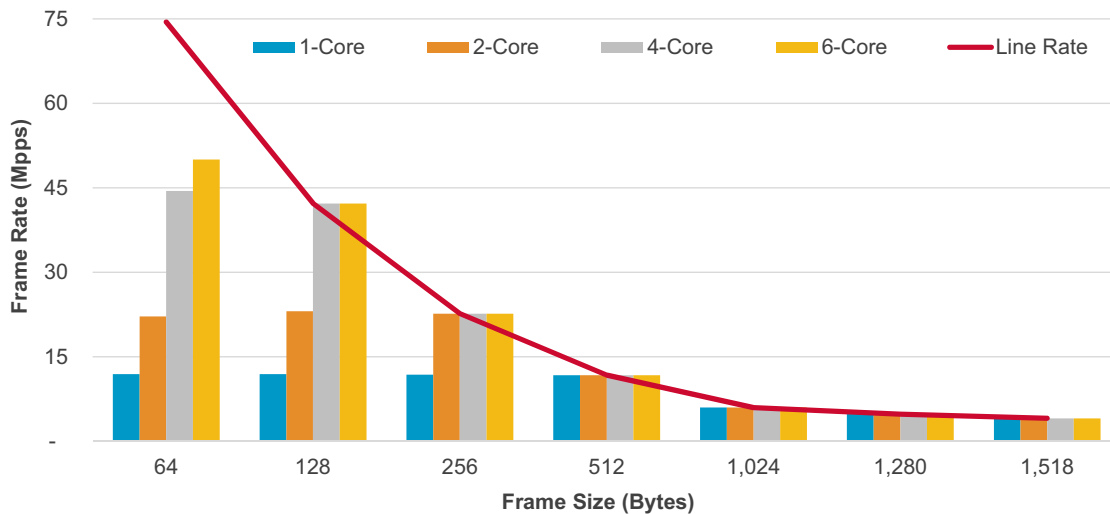
Item	Description
BIOS	Set System Profile to Performance Disable Virtualization and SR-IOV
Boot Setting for A72	(Execute the following command under boot shell) set extraarg "isolcpus=1,2,3,4,5,6,7 nohz_full=1-7 rcu_nocbs=1-7" nvsync
Command Line	testpmd -l 1,2 -w 0008:01:00.0 -w 0008:01:00.1 -n4 -- --txq=1 --rxq=1 --rxd=256 --txd=256 --nb-cores=1 -i --burst=32 --port-topology=loop testpmd -l 1,2,3 -w 0008:01:00.0 -w 0008:01:00.1 -n4 -- --txq=2 --rxq=2 -- rxd=256 --txd=256 --nb-cores=2 -i --burst=32 --port-topology=loop testpmd -l 1,2,3,4,5 -w 0008:01:00.0 -w 0008:01:00.1 -n4 -- --txq=4 --rxq=4 -- rxd=256 --txd=256 --nb-cores=4 -i --burst=32 --port-topology=loop testpmd -l 1,2,3,4,5,6,7 -w 0008:01:00.0 -w 0008:01:00.1 -n4 -- --txq=6 --rxq=6 --rxd=256 --txd=256 --nb-cores=6 -i --burst=32 --port-topology=loop

Table 3: Results of PS225 2x 25G Bi-directional Zero Frame Loss – A72 Hairpin

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)			
		1-Core	2-Core	4-Core	6-Core
64	74.40	11.92	23.14	44.46	50.00
128	42.23	11.91	23.07	42.23	42.23
256	22.64	11.84	22.64	22.64	22.64
512	11.75	11.75	11.75	11.75	11.75
1,024	5.99	5.99	5.99	5.99	5.99
1,280	4.81	4.81	4.81	4.81	4.81
1,518	4.06	4.06	4.06	4.06	4.06

Figure 2: Results of PS225 with 2x 25G Bi-directional Traffic – A72 Hairpin

PS225 2x 25G Bi-Directional Zero Frame Loss – A72 Hairpin



2 P225p 2x 25G Bi-directional Zero Frame Loss

RFC2544 Zero Frame Loss Test on Broadcom NetXtreme-E Series P225p with 2x 25G Bi-directional traffic.

Table 4: Setup of P225p 2x 25G Bi-directional Zero Frame Loss Test

Item	Description
Server	Dell PowerEdge R740
CPU	Intel Xeon Gold 6154 CPU at 3.00 GHz. All cores used are on the local socket
RAM	192 GB:16 GB × six DIMMS × two NUMA nodes at 2666 MHz
NIC	Broadcom NetXtreme-E Series P225p 2x 25G PCIe Gen3 x8
Operating System	Red Hat Enterprise Linux Server release 7.5
Kernel Version	3.10.0-862.el7.x86_64
Broadcom Firmware Version	214.4.105.0
Test Configuration	Two NICs each using one port. Frames are transmitted and received on the first port of each of the NICs. Each port receives a stream of 8,192 IP flows from IXIA. One TX/RX queue pair per port per logical core is used. Two TX/RX queue pairs for two ports are assigned per logical core. Data points are taken with one and two logical cores.

Figure 3: Topology of P225p 2x 25G Bi-directional Zero Frame Loss Test

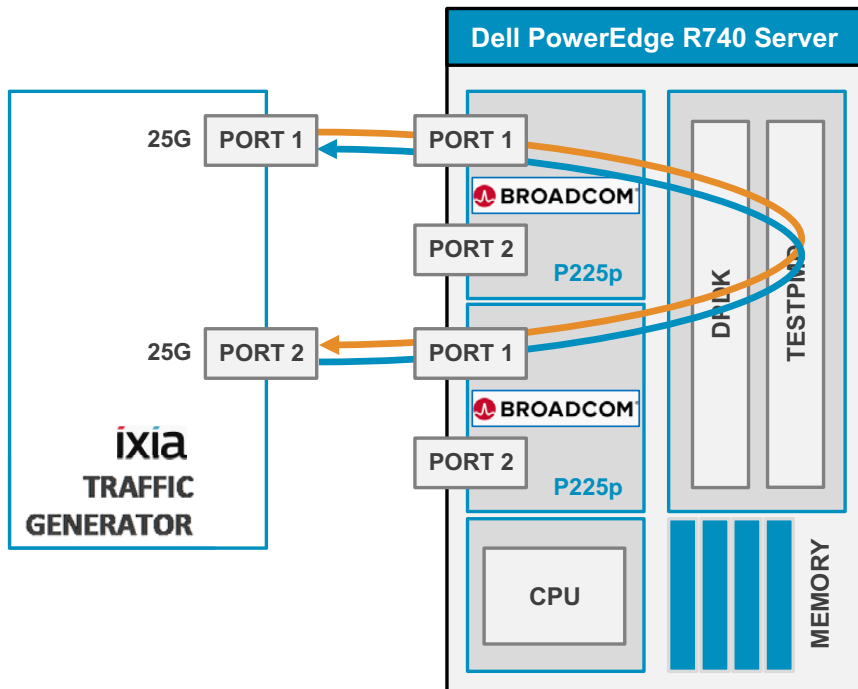


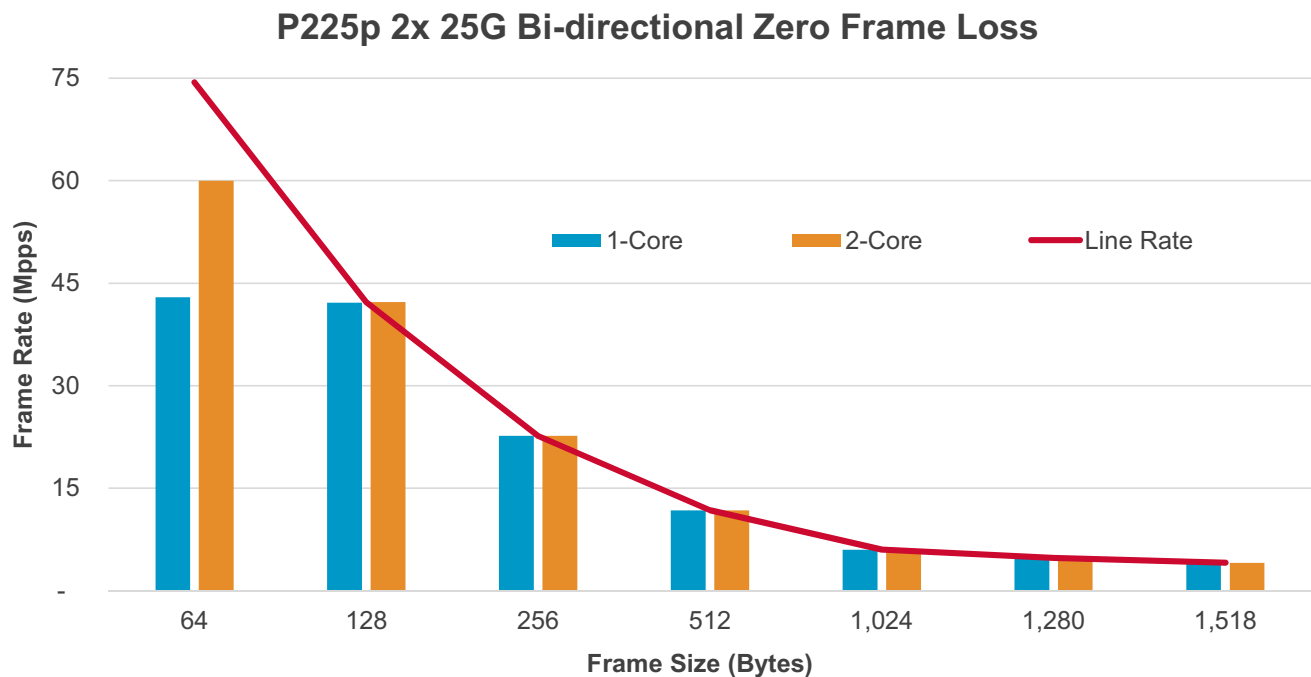
Table 5: Configuration of P225p 2x 25G Bi-directional Zero Frame Loss Test

Item	Description
BIOS	Set System Profile to Performance Disable Virtualization and SR-IOV
Boot Settings	isolcpus=1,3,5 nohz_full=1,3,5 rcu_nocbs=1,3,5 default_hugepagesz=1G hugepagesz=1G hugepages=64 intel_idle.max_cstate=0 processor.max_cstate=0 intel_pstate=disable rcu_nocb_poll audit=0 nosoftlockup intel_iommu=off
Command Line	testpmd -l 1,3 --master-lcore 1 -n4 -- --socket-num=1 --txq=1 --rxq=1 --rxd=4096 --txd=4096 --nb-cores=1 -i testpmd -l 1,3,5 --master-lcore 1 -n4 -- --socket-num=1 --txq=2 --rxq=2 -- rxd=4096 --txd=4096 --nb-cores=2 -i

Table 6: Results of P225p 2x 25G Bi-directional Zero Frame Loss Test

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)	
		1-Core	2-Core
64	74.40	42.88	60.00
128	42.23	42.15	42.23
256	22.64	22.64	22.64
512	11.75	11.75	11.75
1,024	5.99	5.99	5.99
1,280	4.81	4.81	4.81
1,518	4.06	4.06	4.06

Figure 4: Results of P225p 2x 25G Bi-directional Zero Frame Loss Test



3 P425G 4x 25G Bi-directional Zero Frame Loss

RFC2544 Zero Frame Loss Test on Broadcom NetXtreme-E Series P425G with 4x 25G Bi-directional traffic.

Table 7: Setup of P425G 4x 25G Bi-directional Zero Frame Loss Test

Item	Description
Server	Dell PowerEdge R740
CPU	Intel Xeon Gold 6154 CPU at 3.00 GHz. All cores used are on the local socket
RAM	192 GB:16 GB × six DIMMS × two NUMA nodes at 2666 MHz
NIC	Broadcom NetXtreme-E Series P425G 4x 25G, PCIe Gen3/4 x16 (Gen3 was used in the test)
Operating System	Red Hat Enterprise Linux release 8.1
Kernel Version	4.18.0-147.el8.x86_64
Broadcom Firmware Version	216.4.56.0
Test Configuration	One NIC and four ports are used. Frames are received and transmitted on the same port. Each port receives a stream of 256 IP flows from IXIA. One TX/RX queue pair per port per logical core is used.

Figure 5: Topology of P425G 4x 25G Bi-directional Zero Frame Loss Test

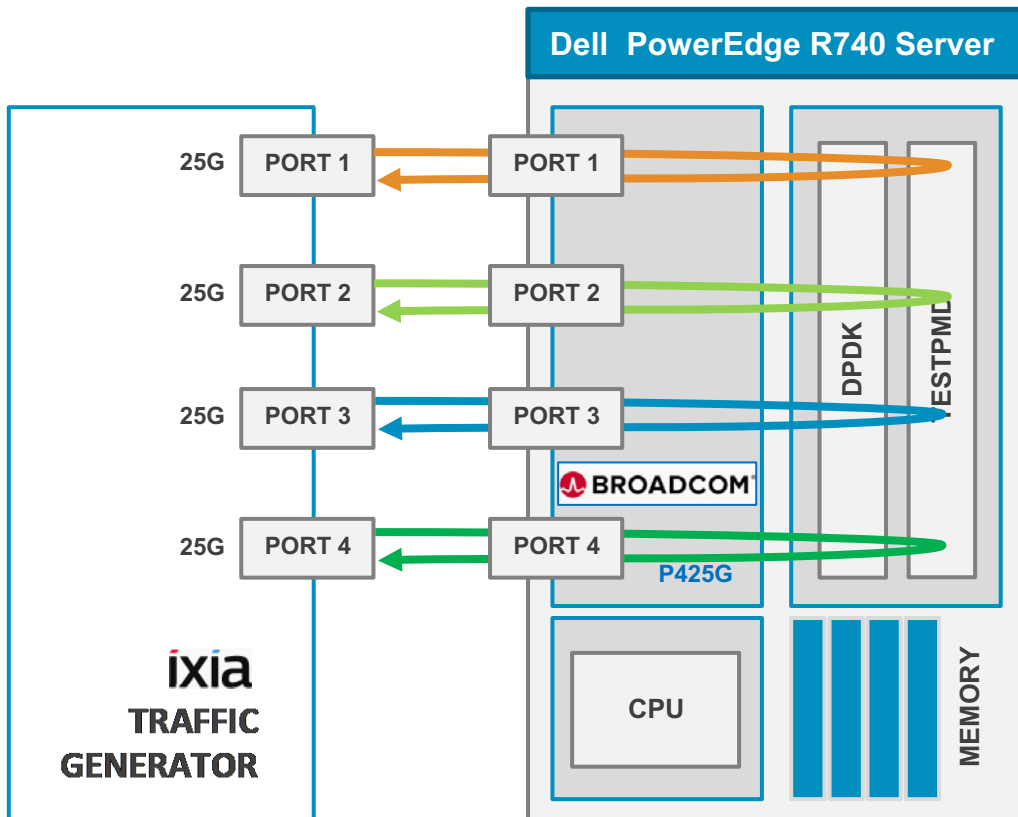


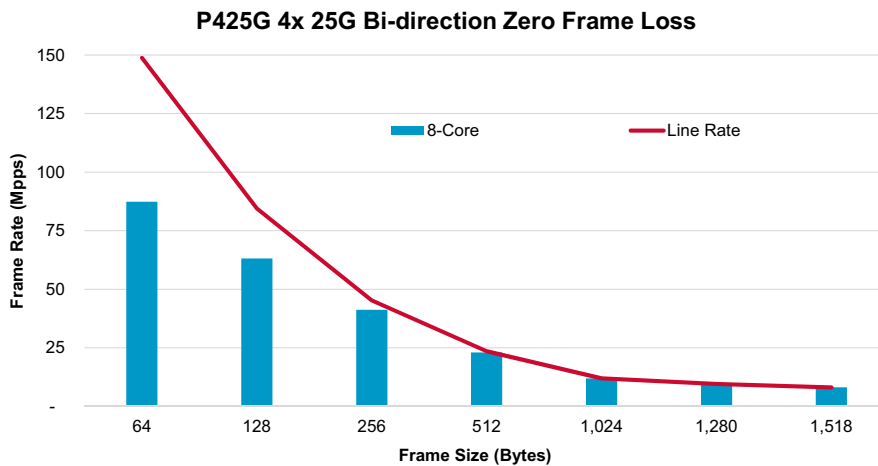
Table 8: Configuration of P425G 4x 25G Bi-directional Zero Frame Loss Test

Item	Description
BIOS	Set System Profile to Performance Disable Virtualization and SR-IOV
Boot Settings	isolcpus=0-45 nohz_full=0-45 rcu_nocbs=0-45 default_hugepagesz=1G hugepagesz=1G hugepages=64 rcu_nocb_poll audit=0 nosoftlockup intel_iommu=off intel_idle.max_cstate=0 processor.max_cstate=0 intel_pstate=disable
Command Line	testpmd -l 3,5,7 --master-lcore 3 -n4 -w 0000:d8:00.0 -- --socket-num=1 --txq=2 --rxq=2 --rxd=2048 --txd=2048 --nb-cores=2 -i --burst=32 --port- topology=chained testpmd -l 9,11,13 --master-lcore 9 -n4 -w 0000:d8:00.1 --file-prefix pg2 -- --socket-num=1 --txq=2 --rxq=2 --rxd=2048 --txd=2048 --nb-cores=2 -i --burst=32 --port-topology=chained testpmd -l 15,17,19 --master-lcore 15 -n4 -w 0000:d8:00.2 --file-prefix pg3 - --socket-num=1 --txq=2 --rxq=2 --rxd=2048 --txd=2048 --nb-cores=2 -i -- burst=32 --port-topology=chained testpmd -l 21,23,25 --master-lcore 21 -n4 -w 0000:d8:00.3 --file-prefix pg4 - --socket-num=1 --txq=2 --rxq=2 --rxd=2048 --txd=2048 --nb-cores=2 -i -- burst=32 --port-topology=chained

Table 9: Results of P425G 4x 25G Bi-directional Zero Frame Loss Test

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		8-Core
64	148.81	87.32
128	84.46	63.15
256	45.29	41.27
512	23.50	23.00
1,024	11.97	11.97
1,280	9.62	9.62
1,518	8.13	8.13

Figure 6: Results of P425G 4x 25G Bi-directional Zero Frame Loss Test



4 P2100G 1x 100G Bi-directional Zero Frame Loss

RFC2544 Zero Frame Loss Test on Broadcom NetXtreme-E Series P2100G with 1x 100G Bi-directional traffic.

Table 10: Setup of P2100G 1x 100G Bi-directional Zero Frame Loss Test

Item	Description
Server	Dell PowerEdge R740
CPU	Intel Xeon Gold 6154 CPU at 3.00 GHz. All cores used are on the local socket
RAM	192 GB:16 GB × six DIMMS × two NUMA nodes at 2666 MHz
NIC	Broadcom NetXtreme-E Series P2100G 2x 100G, PCIe Gen3/4 x16 (Gen3 was used in the test)
Operating System	Red Hat Enterprise Linux Server release 7.5
Kernel Version	3.10.0-862.el7.x86_64
Broadcom Firmware Version	216.4.56.0
Test Configuration	One NIC and two ports are used. Frames are received on Port 1 and transmitted on Port 2. Port 1 receives a stream of 8,192 IP flows from IXIA. One TX/RX queue pair per port per logical core is used. Two TX/RX queue pairs for two ports are assigned per logical core. Data points are taken with one, two, and four logical cores.

Figure 7: Topology of P2100G 1x 100G Bi-directional Zero Frame Loss Test

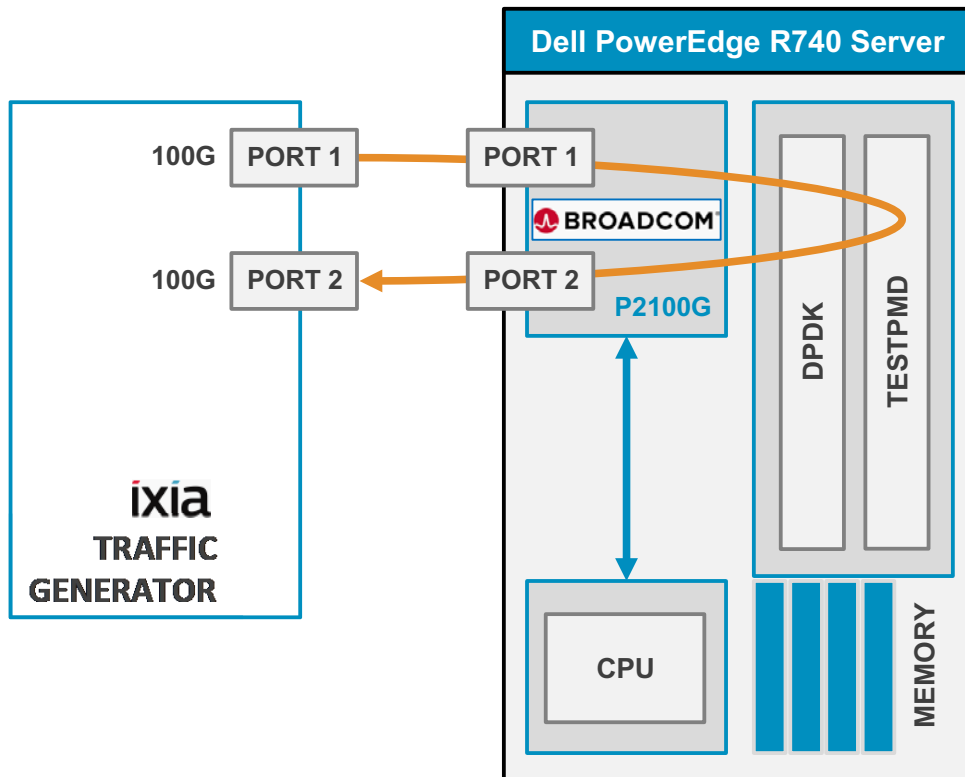


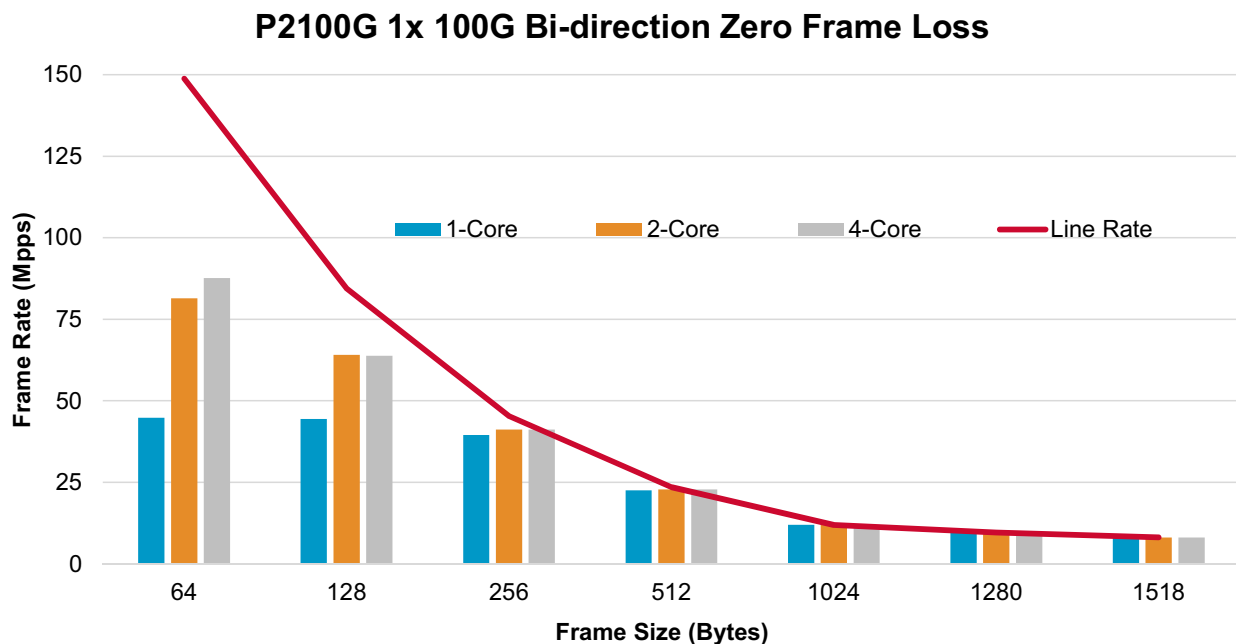
Table 11: Configuration of P2100G 1x 100G Bi-directional Zero Frame Loss Test

Item	Description
BIOS	Set System Profile to Performance Disable Virtualization and SR-IOV
Boot Settings	isolcpus=0-45 nohz_full=0-45 rcu_nocbs=0-45 default_hugepagesz=1G hugepagesz=1G hugepages=64 rcu_nocb_poll audit=0 nosoftlockup intel_iommu=off
Command Line	testpmd -l 4,6 --master-lcore 4 -n4 -- --socket-num=0 --txq=1 --rxq=1 --rxd=4096 --txd=4096 --nb-cores=1 -i testpmd -l 4,6,8 --master-lcore 4 -n4 -- --socket-num=0 --txq=2 --rxq=2 -- rxd=4096 --txd=4096 --nb-cores=2 -i testpmd -l 4,6,8,10,12 --master-lcore 4 -n4 -- --socket-num=0 --txq=4 --rxq=4 --rxd=4096 --txd=4096 --nb-cores=4 -i

Table 12: Results of P2100G 1x 100G Bi-directional Zero Frame Loss Test

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)		
		1-Core	2-Core	4-Core
64	148.81	41.86	75.48	86.15
128	84.46	43.73	64.03	63.83
256	45.29	39.74	39.98	41.42
512	23.50	21.16	23.12	23.09
1,024	11.97	11.97	11.97	11.97
1,280	9.62	9.62	9.62	9.62
1,518	8.13	8.13	8.13	8.13

Figure 8: Results of P2100G 1x 100G Bi-directional Zero Frame Loss Test



5 P425G 4x 25G Bi-directional Zero Frame Loss – PCIe 4.0

RFC2544 Zero Frame Loss Performance on Broadcom NetXtreme-E Series P425G with 4x 25G Bi-directional – PCIe 4.0.

Table 13: Setup of P425G 4x 25G Bi-directional Zero Frame Loss Test – PCIe 4.0

Item	Description
Server	AMD Rome Server Reference Platform
CPU	Single-Socket AMD EPYC 7742 64-Core Processor at 2.25 GHz (running at 3.38 GHz)
RAM	128 GB : 16 GB x 8 DIMMs at 3200 MHz
NIC	Broadcom NetXtreme-E Series P425G 4x 25G, PCIe Gen4 x16
Operating System	Red Hat Enterprise Linux Server release 7.6
Kernel Version	Linux Upstream 5.3.4
Broadcom Firmware Version	216.4.56.0
Test Configuration	One NIC and four ports are used. Frames are received and transmitted on the same port. Each port receives a stream of 256 IP flows from IXIA. Two TX/RX queue pairs per port per logical core are used.

Figure 9: Topology of P425G 4x 25G Bi-directional Zero Frame Loss Test – PCIe 4.0

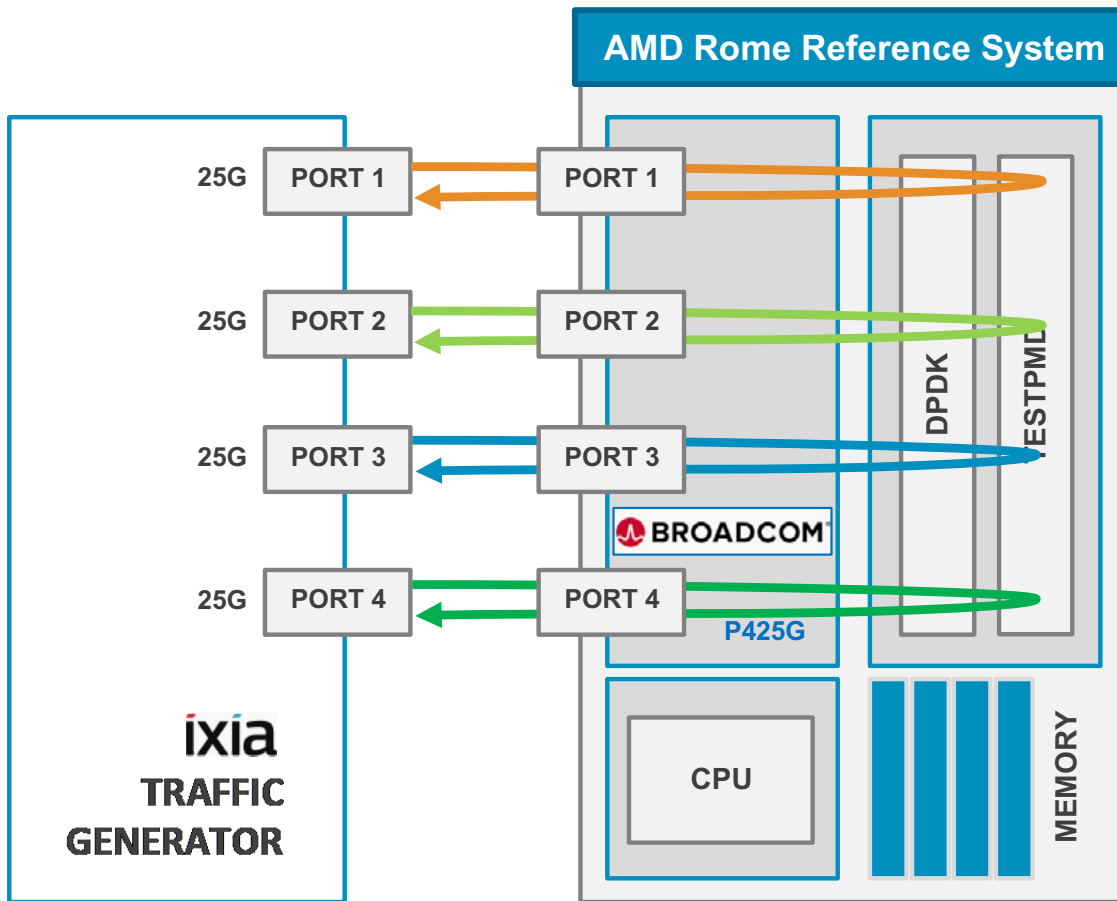


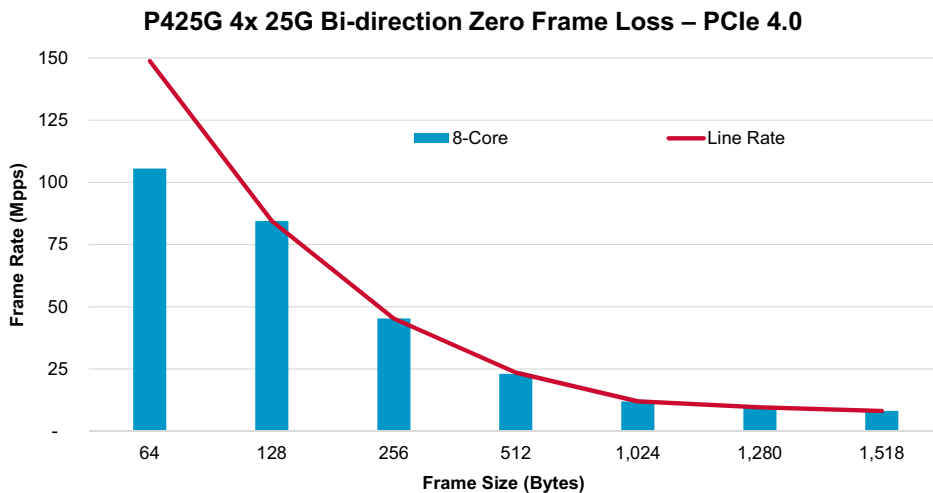
Table 14: Configuration of P425G 4x 25G Bi-directional Zero Frame Loss Test – PCIe 4.0

Item	Description
BIOS	NPS=1, Preferred IO: Enable, PCIE 10 Bit Tag: Enable, APIC Mode: X2APIC Deterministic Slider: Performance
Other Settings	MRRS = 4K (default), PCIe Relaxed Ordering: Enabled
Boot Settings	amd_iommu=on iommu=pt nohz=off default_hugepagesz=1G hugepagesz=1G hugepages=64 numa_balancing=disable rcu_nocbs=16-31 isolcpus=16-31 nosoftlockup selinux=0 processor.max_cstate=0
Command Line	testpmd -l 16,17,24 --master-lcore 24 -n4 -w 0000:81:00.0 -- --txq=2 --rxq=2 - -rxd=4096 --txd=4096 --nb-cores=2 -i --burst=32 --port-topology=chained testpmd -l 18,19,25 --master-lcore 25 -n4 -w 0000:81:00.1 --file-prefix pg2 -- --txq=2 --rxq=2 --rxd=4096 --txd=4096 --nb-cores=2 -i --burst=32 -port- topology=chained testpmd -l 20,21,26 --master-lcore 26 -n4 -w 0000:81:00.2 --file-prefix pg3 -- --txq=2 --rxq=2 --rxd=4096 --txd=4096 --nb-cores=2 -i --burst=32 -port- topology=chained testpmd -l 22,23,27 --master-lcore 27 -n4 -w 0000:81:00.3 --file-prefix pg4 -- --txq=2 --rxq=2 --rxd=4096 --txd=4096 --nb-cores=2 -i --burst=32 -port- topology=chained

Table 15: Results of P425G 4x 25G Bi-directional Zero Frame Loss Test – PCIe 4.0

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		8-Core
64	148.81	105.19
128	84.46	84.46
256	45.29	45.29
512	23.50	23.50
1,024	11.97	11.97
1,280	9.62	9.62
1,518	8.13	8.13

Figure 10: Results of P425G 4x 25G Bi-directional Zero Frame Loss Test – PCIe 4.0



6 P2100G 1x 100G Bi-directional Zero Frame Loss – PCIe 4.0

RFC2544 Zero Frame Loss Performance on Broadcom NetXtreme-E Series P2100G with 1x 100G Bi-directional – PCIe4.0.

Table 16: Setup of P2100G 1x 100G Bi-directional Zero Frame Loss Test – PCIe 4.0

Item	Description
Server	AMD Rome Server Reference Platform
CPU	Single-Socket AMD EPYC 7742 64-Core Processor at 2.25 GHz (running at 3.38 GHz)
RAM	128 GB : 16 GB x 8 DIMMs at 3200 MHz
NIC	Broadcom NetXtreme-E Series P2100G 1x 100G, PCIe Gen4 x16
Operating System	Red Hat Enterprise Linux Server release 7.6
Kernel Version	Linux Upstream 5.3.4
Broadcom Firmware Version	216.4.14.0
Test Configuration	Frames received on port 1 are forwarded to port 2 by testpmd. Port 1 receives a stream of 8,192 IP flows from IXIA. One NIC and two ports are used. One TX/RX queue pair per port per logical core was used. Two TX/RX queue pairs for two ports were assigned per logical core. Data points were taken with eight logical cores.

Figure 11: Topology of P2100G 1x 100G Bi-directional Zero Frame Loss Test – PCIe 4.0

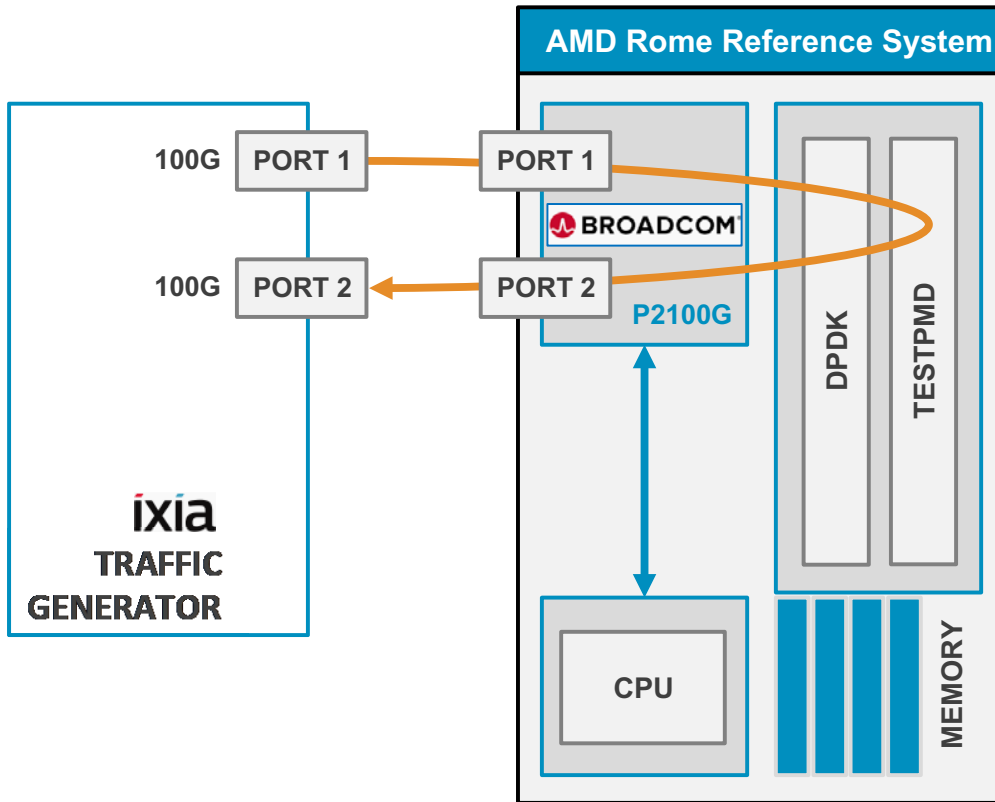


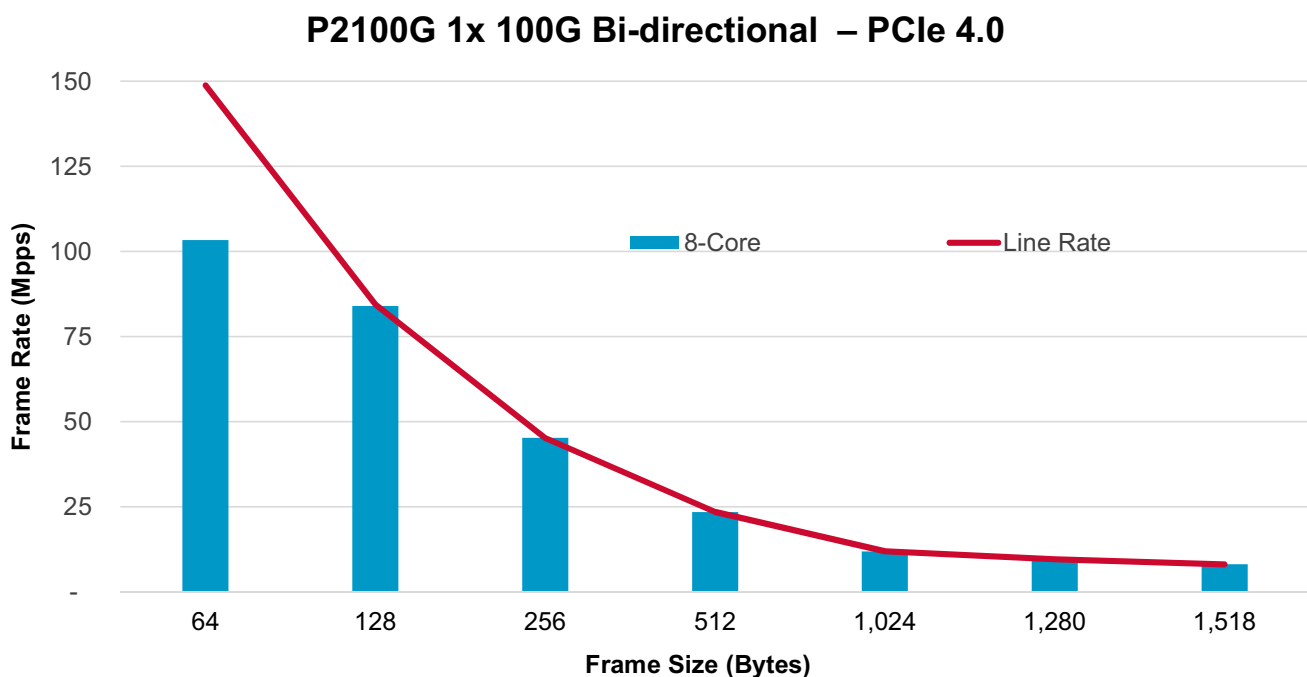
Table 17: Configuration of P2100G 1x 100G Bi-directional Zero Frame Loss Test – PCIe 4.0

Item	Description
BIOS	NPS=1, Set Preferred IO: Enable, PCIE 10 Bit Tag: Enable, APIC Mode: X2APIC Deterministic Slider: Performance SMT: Enabled APBDIS-> 1, Enhanced Preferred I/O: Auto (Enabled)
Other Settings	MRRS = 1K, PCIe Relaxed Ordering: Enabled
Boot Settings	amd_iommu=on iommu=pt nohz=off numa_balancing=disable rcu_nocbs=32-47 nosoftlockup isolcpus=32-47 selinux=0 processor.max_cstate=0
Command Line	testpmd -l 32,33,34,35,36,37,38,39,63 -n 4 --socket-mem=4096 --master-lcore 63 -- --txq=8 --rxq=8 --rxd=4096 --txd=4096 --nb-cores=8 -i

Table 18: Results of P2100G 1x 100G Bi-directional Zero Frame Loss Test – PCIe 4.0

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		8-Core
64	148.81	103.39
128	84.46	84.46
256	45.29	45.29
512	23.50	23.50
1,024	11.97	11.97
1,280	9.62	9.62
1,518	8.13	8.13

Figure 12: Results of P2100G 1x 100G Bi-directional Zero Frame Loss Test – PCIe 4.0



7 P2100G 2x 100G Bi-directional Zero Frame Loss – PCIe 4.0

RFC2544 Zero Frame Loss Performance on Broadcom NetXtreme-E Series P2100G with 2x 100G Bi-directional traffic.

Table 19: Setup of P2100G 2x 100G Bi-directional Zero Frame Loss Test – PCIe 4.0

Item	Description
Server	AMD Rome Server Reference Platform
CPU	Single-Socket AMD EPYC 7742 64-Core Processor at 2.25 GHz (running at 3.38 GHz)
RAM	128 GB : 16 GB x 8 DIMMs at 3200 MHz
NIC	Broadcom NetXtreme-E Series P2100G 2x 100G, PCIe Gen4 x16
Operating System	Red Hat Enterprise Linux Server release 7.6
Kernel Version	Linux Upstream 5.3.4
Broadcom Firmware Version	216.4.56.0
Test Configuration	Frames received on port 1 are forwarded to port 2 by testpmd. Port 1 receives a stream of 8,192 IP flows from IXIA. One NIC and two ports are used. One TX/RX queue pair per port per logical core was used. Two TX/RX queue pairs for two ports were assigned per logical core. Data points were taken with eight logical cores.

Figure 13: Topology of P2100G 2x 100G Bi-directional Zero Frame Loss Test – PCIe 4.0

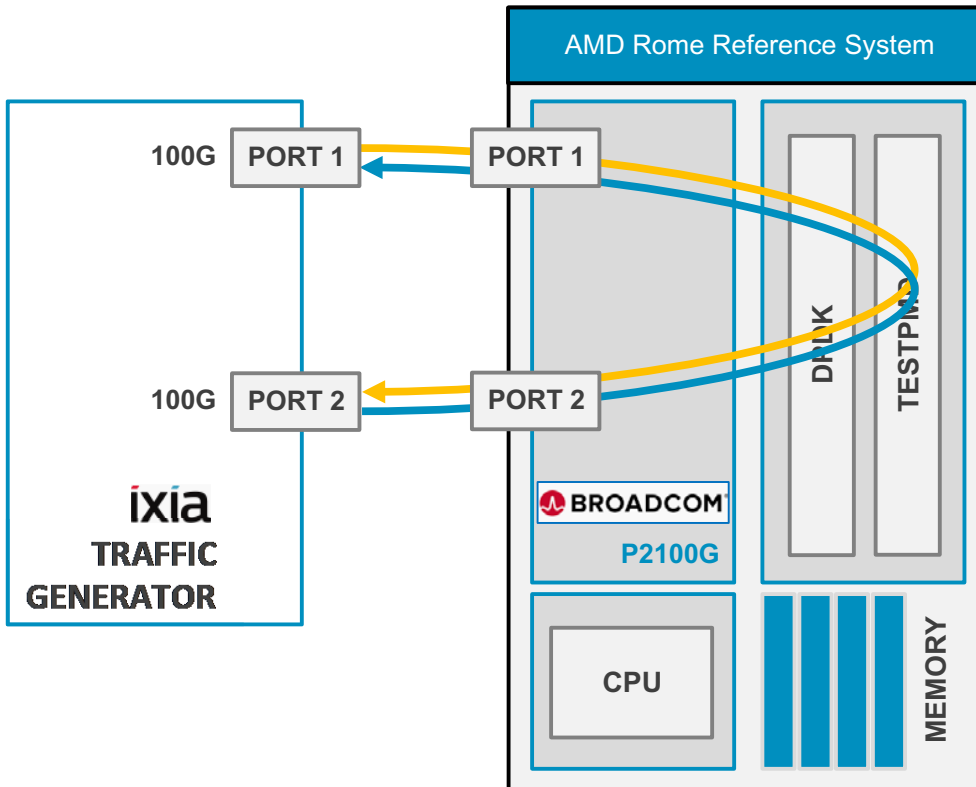


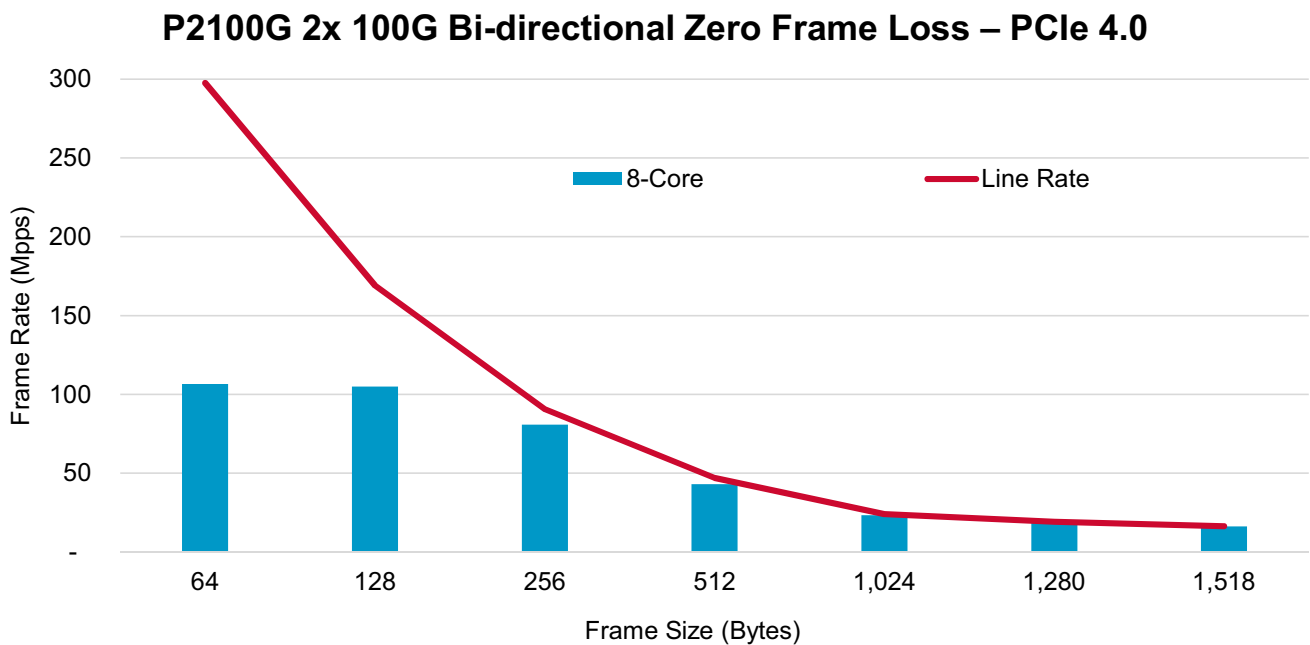
Table 20: Configuration of P2100G 2x 100G Bi-directional Zero Frame Loss Test – PCIe 4.0

Item	Description
BIOS	NPS=1, Preferred IO: Enable, PCIE 10 Bit Tag: Enable, APIC Mode: X2APIC Deterministic Slider: Performance SMT: Enabled APBDIS: 1, Enhanced Preferred I/O: Auto (Enabled)
Other Settings	MRRS = 1K, PCIe Relaxed Ordering: Enabled
Boot Settings	amd_iommu=on iommu=pt nohz=off default_hugepagesz=1G hugepagesz=1G hugepages=64 numa_balancing=disable rcu_nocbs=32-47 nosoftlockup isolcpus=32-47 selinux=0 processor.max_cstate=0
Command Line	testpmd -l 32,33,34,35,36,37,38,39,63 -n 4 --socket-mem=4096 --master-lcore 63 -- --txq=8 --rxq=8 --rxd=4096 --txd=4096 --nb-cores=8 -i

Table 21: Results of P2100G 2x 100G Bi-directional Zero Frame Loss Test – PCIe 4.0

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		8-Core
64	297.62	106.59
128	168.92	104.87
256	90.58	80.70
512	46.99	42.93
1,024	23.95	23.39
1,280	19.23	19.23
1,518	16.25	16.25

Figure 14: Results of P2100G 2x 100G Bi-directional Zero Frame Loss Test – PCIe 4.0



Revision History

NetXtreme-DPDK-20-05-Performance-TR100; August 5, 2020

Initial release.

