



Ethernet NIC Controllers

DPDK 24.11 Performance Report

Test Report

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1 P425G 4x 25G Zero Frame Loss – PCIe 4.0

RFC2544 Zero Frame Loss Performance on Broadcom Ethernet NIC P425G with 4x 25G – PCIe 4.0.

Table 1: Setup of P425G 4x 25G Zero Frame Loss Test – PCIe 4.0

Item	Description
Server	Dell PowerEdge R7515
CPU	Single-Socket AMD EPYC 7713 64-Core Processor at 2.5 GHz (running at 3.1 GHz)
RAM	128GB: 16GB x 8 DIMMs at 3200 MHz
NIC	Broadcom Ethernet NIC controller P425G 4x25G, PCIe Gen4 x16
Operating System	Red Hat Enterprise Linux release 9.2
Kernel Version	5.14.0-284.25.1.el9_2.x86_64
Broadcom Firmware Version	233.0.124.0
Test Topology	One NIC and four ports are used. Each port receives a stream of 256 IP flows from IXIA. Frames that are received on Port 1 are transmitted on Port 2 (and vice versa) by testpmd. Frames that are received on Port 3 are transmitted on Port 4 (and vice versa) by testpmd. Eight queue pairs for four ports (two pairs per port) are assigned to two cores.

Figure 1: Topology of P425G 4x 25G Zero Frame Loss Test – PCIe 4.0

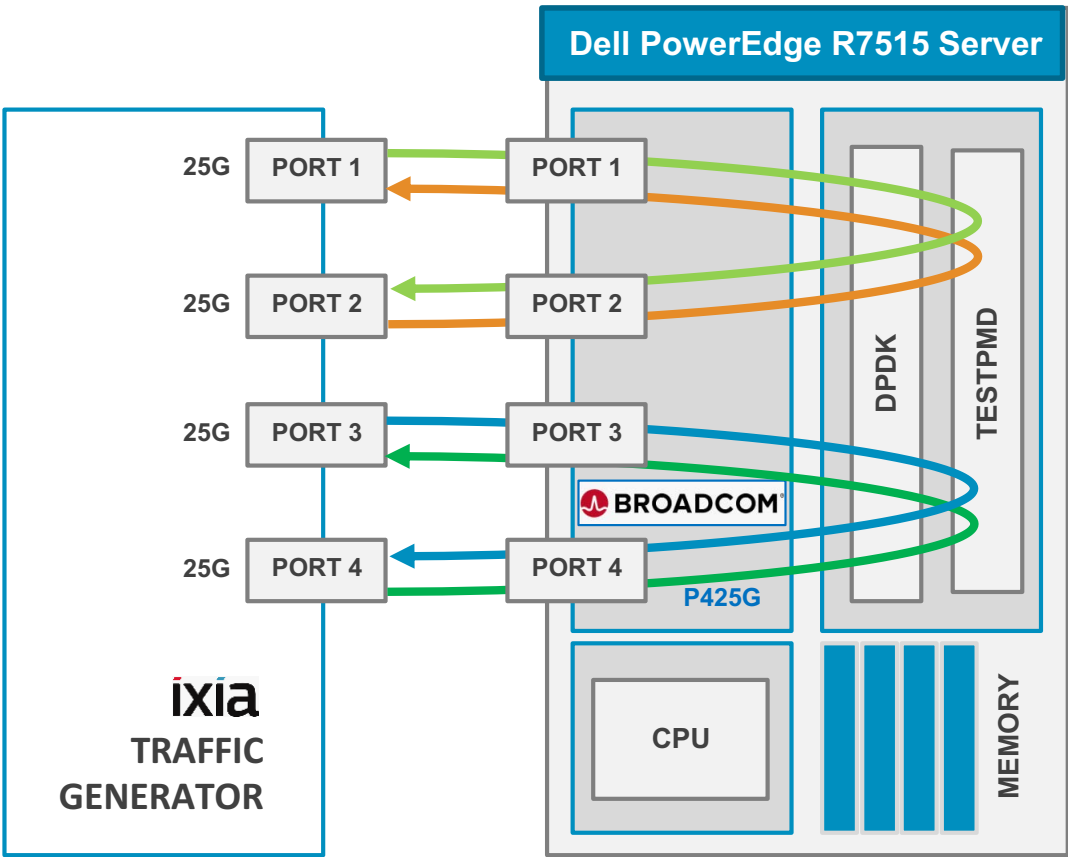


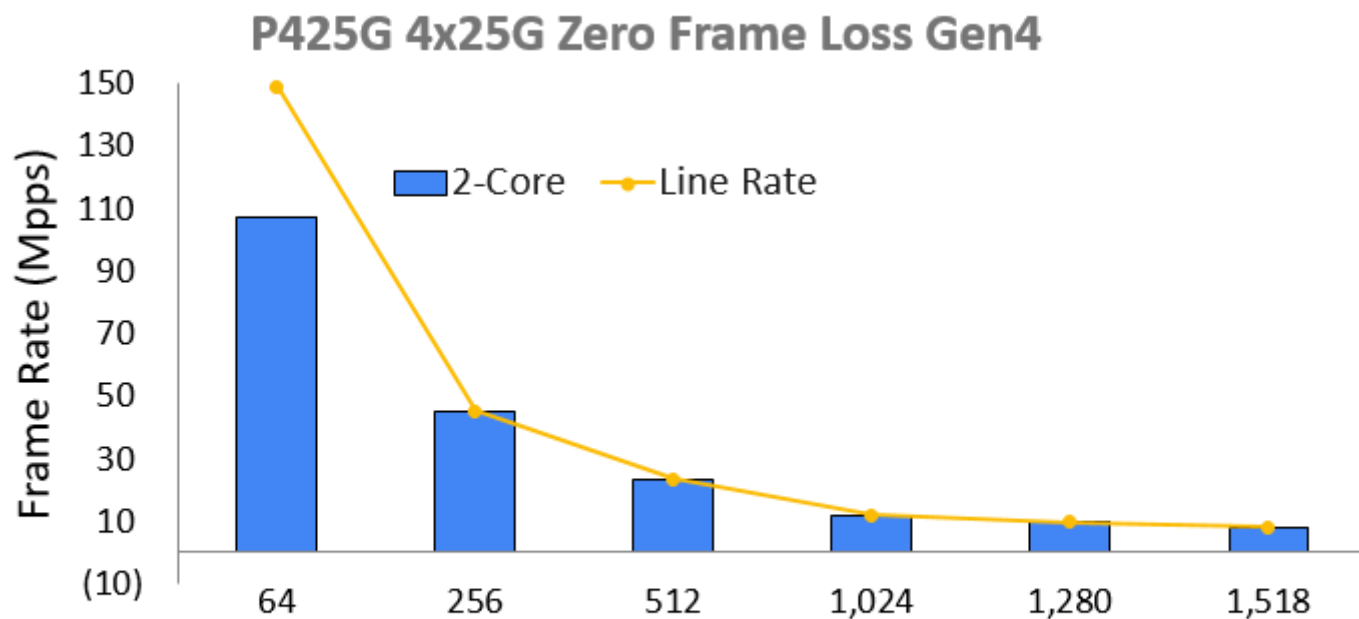
Table 2: Configuration of P425G 4x 25G Zero Frame Loss Test – PCIe 4.0

Item	Description
BIOS	NPS=1 L3 Cache as NUMA: Disabled IOMMU: Enabled, x2APIC Mode: Enabled Determinism Slider: Performance Determinism MADT Core Enumeration: Linear, Logical Processor: Disabled Algorithm Performance Boost Disable (ApbDis): Enabled, ApbDis Fixed Socket P-State: P0 Root Complex LCLK Frequency: 593 MHz Set Preferred IO: Enable, Enhanced Preferred I/O: Enabled
NVM Settings	PCIe Relaxed Ordering: Enabled <code>niccli -i 1 nvm -setoption pcie_relaxed_ordering -value 0x1</code>
Boot Settings	<code>isolcpus=1-36 rcu_nocbs=1-36 amd_iommu=on iommu=pt default_hugepagesz=1G hugepagesz=1G hugepages=64 nohz=off selinux=0 processor.max_cstate=0 nosoftlockup rcu_nocb_poll audit=0 mce=ignore_ce</code>
Other Optimizations	Disable Linux realtime throttling: <code>echo -1 > /proc/sys/kernel/sched_rt_runtime_us</code>
Command Line	<code>chrt -r 1 ./dpdk-testpmd -l 4,5,6 --main-lcore 4 -n 4 --socket-mem=4096 -- -i --nb-cores=2 --nb-ports=4 --rxq=2 --txq=2 --rxd=1024 --txd=1024 --burst=64 -a</code> <code>testpmd> set portlist 0,1,2,3</code>

Table 3: Results of P425G 4x 25G Zero Frame Loss Test – PCIe 4.0

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		2-Core
64	148.81	106.87
128	84.45	84.45
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 2: Results of P425G 4x 25G Zero Frame Loss Test – PCIe 4.0



2 P2100G 1x 100G Zero Frame Loss – PCIe 4.0

RFC2544 Zero Frame Loss Performance on Broadcom Ethernet NIC P2100G with 1x 100G traffic – PCIe4.0.

Table 4: Setup of P2100G 1x 100G Zero Frame Loss Test – PCIe 4.0

Item	Description
Server	Dell PowerEdge R7515
CPU	Single-Socket AMD EPYC 7713 64-Core Processor at 2.5 GHz (running at 3.1 GHz)
RAM	128GB: 16GB x 8 DIMMs at 3200 MHz
NIC	Broadcom Ethernet NIC controller P2100G 2x100G, PCIe Gen4 x16
Operating System	Red Hat Enterprise Linux release 9.2
Kernel Version	5.14.0-284.25.1.el9_2.x86_64
Broadcom Firmware Version	233.0.124.0
Test Topology	One NIC and two ports are used. Port 1 receives a stream of 8,192 IP flows from IXIA. Frames received on port 1 are forwarded to port 2 by testpmd. Four queue pairs for two ports (two pairs per port) are assigned to two cores.

Figure 3: Topology of P2100G 1x 100G Zero Frame Loss Test – PCIe 4.0

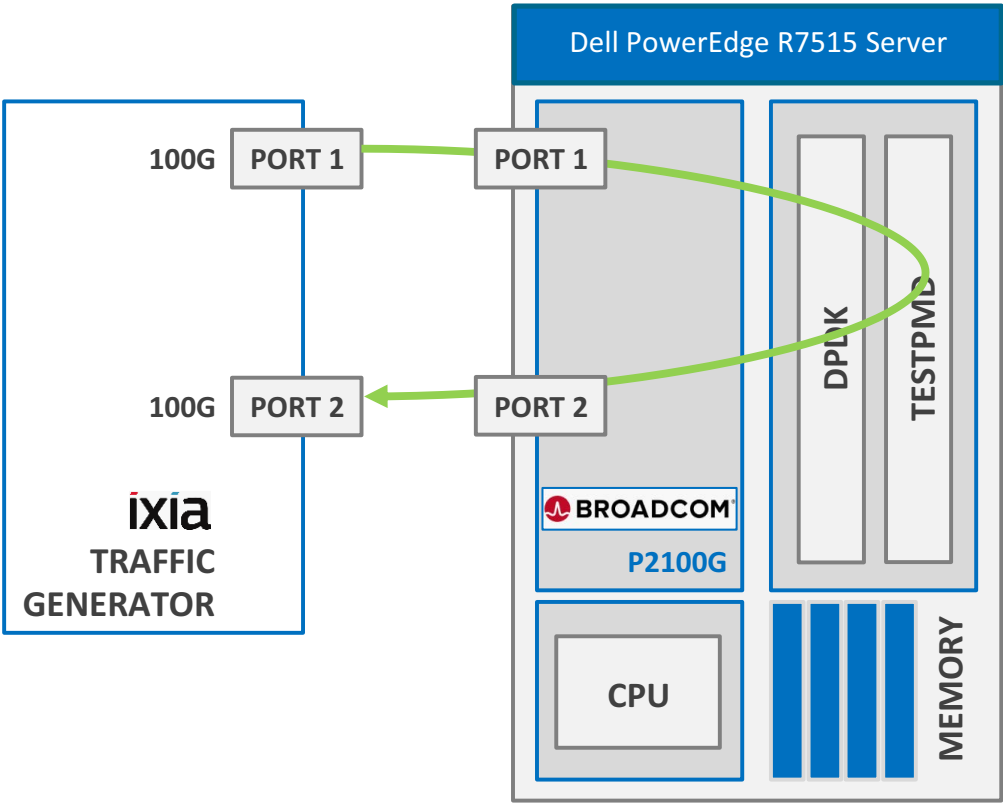


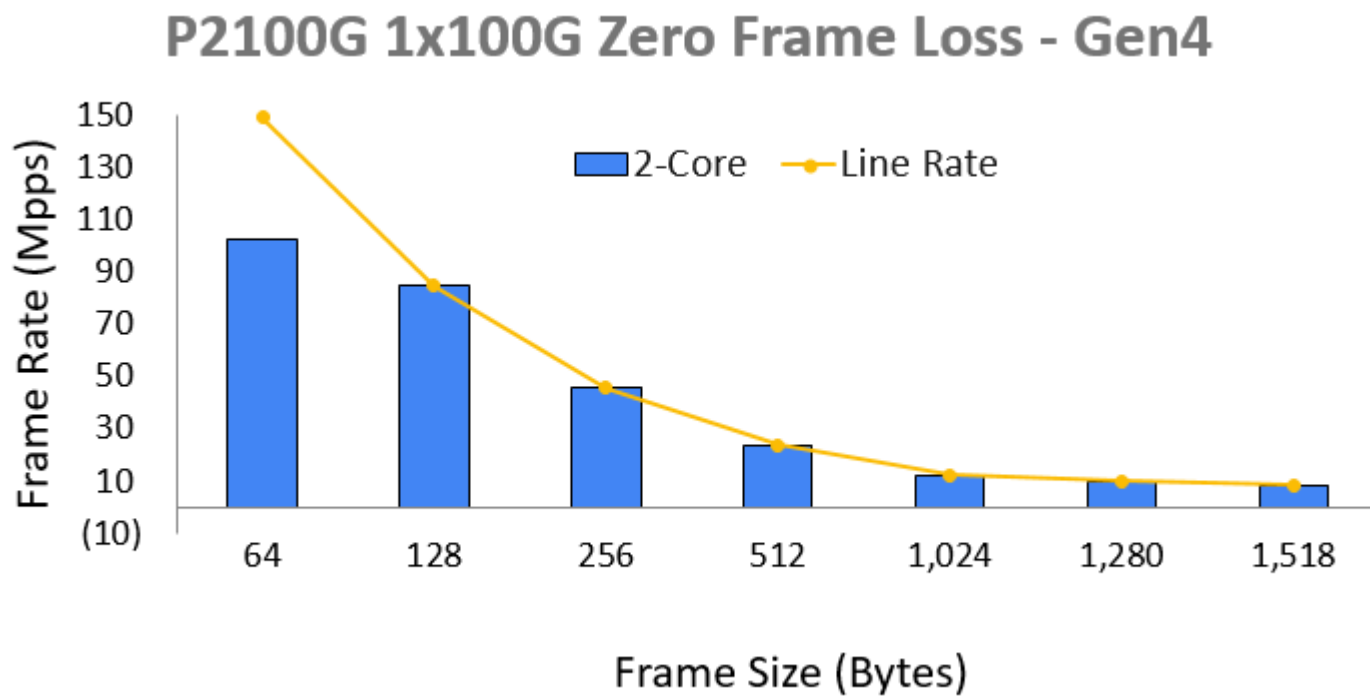
Table 5: Configuration of P2100G 1x 100G Zero Frame Loss Test – PCIe 4.0

Item	Description
BIOS	NPS=1, L3 Cache as NUMA: Disabled IOMMU: Enabled, x2APIC Mode: Enabled Determinism Slider: Performance Determinism MADT Core Enumeration: Linear, Logical Processor: Disabled Algorithm Performance Boost Disable (ApbDis): Enabled, ApbDis Fixed Socket P-State: P0 Root Complex LCLK Frequency: 593 MHz Set Preferred IO: Enable, Enhanced Preferred I/O: Enabled
NVM Settings	niccli -i 1 nvm -setoption pcie_relaxed_ordering -value 0x1
Boot Settings	isolcpus=1-161-36 rcu_nocbs=1-161-36 default_hugepagesz=1G hugepagesz=1G hugepages=64 nosoftlockup processor.max_cstate=0 amd_iommu=on iommu=pt numa_balancing=disable selinux=0 nohz=off rcu_nocb_poll audit=0 mce=ignore_ce
Other Optimizations	Disable Linux realtime throttling: echo -1 > /proc/sys/kernel/ sched_rt_runtime_us
Command Line	chrt -r 1 ./dpdk-testpmd -l 4,5,6 --main-lcore 4 -n 4 -- -i --nb-cores=2 --nb-ports=2 --rxq=2 --txq=2 --rxd=2048 --txd=2048 --socket-num=0 --burst=64 -a

Table 6: Results of P2100G 1x 100G Zero Frame Loss Test – PCIe 4.0

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		2-Core
64	148.81	102.13
128	84.45	84.45
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 4: Results of P2100G 1x 100G Zero Frame Loss Test – PCIe 4.0



3 P2100G 2x 100G Zero Frame Loss – PCIe 4.0

RFC2544 Zero Frame Loss Performance on Broadcom Ethernet NIC P2100G with 2x 100G traffic.

Table 7: Setup of P2100G 2x 100G Zero Frame Loss Test – PCIe 4.0

Item	Description
Server	Dell PowerEdge R7515
CPU	Single-Socket AMD EPYC 7713 64-Core Processor at 2.5 GHz (running at 3.1 GHz)
RAM	128GB: 16GB x 8 DIMMs at 3200 MHz
NIC	Broadcom Ethernet NIC controller P2100G 2x100G, PCIe Gen4 x16
Operating System	Red Hat Enterprise Linux release 9.2
Kernel Version	5.14.0-284.25.1.el9_2.x86_64
Broadcom Firmware Version	233.0.124.0
Test Topology	One NIC and two ports are used. Each port receives a stream of 8,192 IP flows from IXIA. Frames received on one port are forwarded to the other port by testpmd. Four queue pairs for two ports (two pairs per port) are assigned to two cores.

Figure 5: Topology of P2100G 2x 100G Zero Frame Loss Test – PCIe 4.0

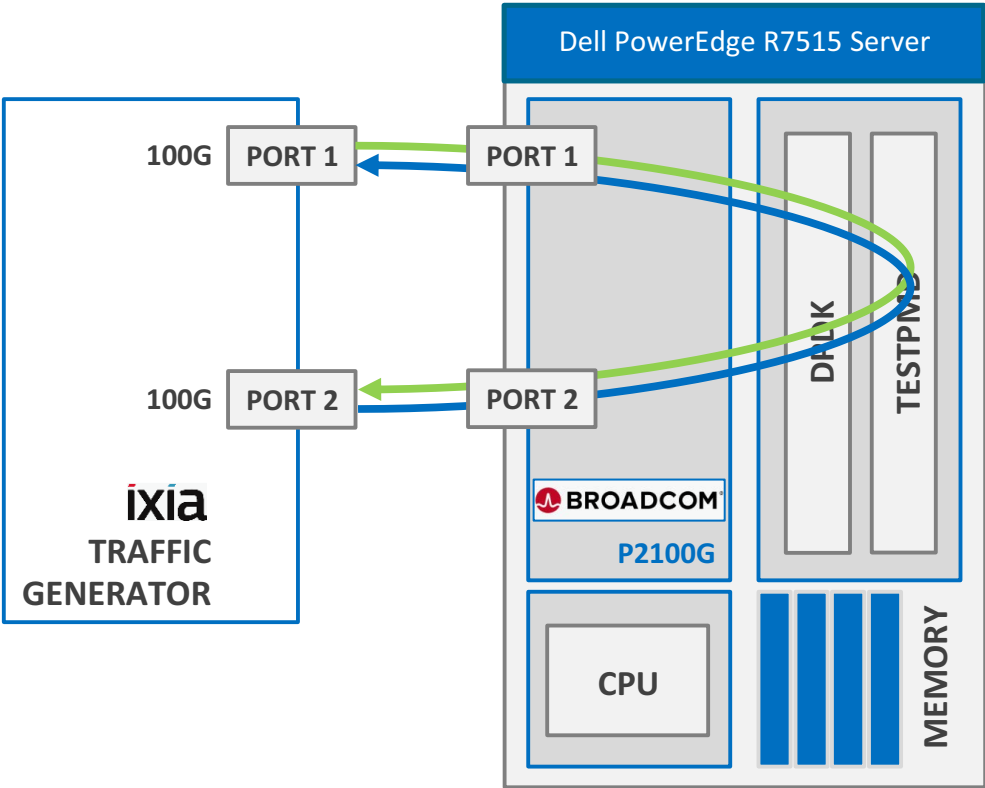


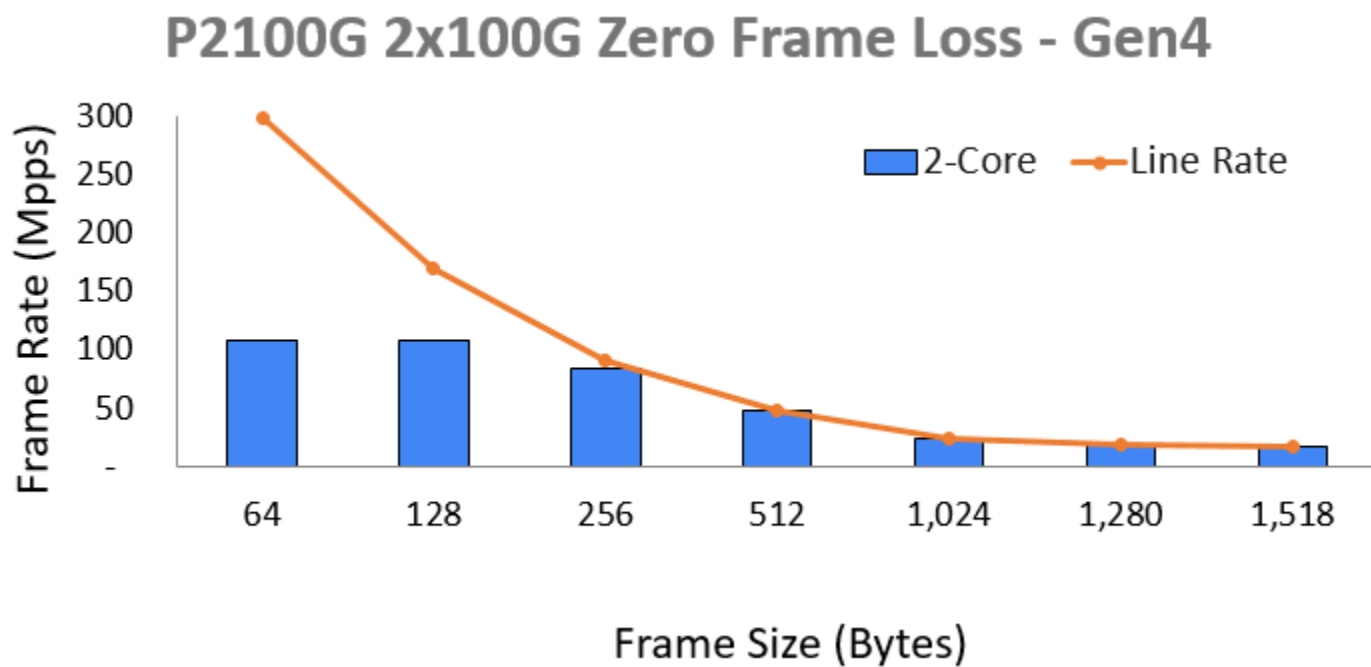
Table 8: Configuration of P2100G 2x 100G Zero Frame Loss Test – PCIe 4.0

Item	Description
BIOS	NPS=1, L3 Cache as NUMA: Disabled IOMMU: Enabled, x2APIC Mode: Enabled Determinism Slider: Performance Determinism MADT Core Enumeration: Linear, Logical Processor: Disabled Algorithm Performance Boost Disable (ApbDis): Enabled, ApbDis Fixed Socket P-State: P0 Root Complex LCLK Frequency: 593 MHz Set Preferred IO: Enable, Enhanced Preferred I/O: Enabled
NVM Settings	niccli -i 1 nvm -setoption pcie_relaxed_ordering -value 0x1
Boot Settings	isolcpus=1-36 rcu_nocbs=1-36 default_hugepagesz=1G hugepagesz=1G hugepages=64 nosoftlockup processor.max_cstate=0 amd_iommu=on iommu=pt numa_balancing=disable selinux=0 nohz=off rcu_nocb_poll audit=0 mce=ignore_ce
Other Optimizations	Disable Linux realtime throttling: echo -1 > /proc/sys/kernel/ sched_rt_runtime_us
Command Line	chrt -r 1 ./dpdk-testpmd -l 4,5,6 --main-lcore 4 -n 4 -- -i --nb-cores=2 --nb-ports=2 --rxq=2 --txq=2 --rxd=2048 --txd=2048 --socket-num=0 --burst=64 -a

Table 9: Results of P2100G 2x 100G Zero Frame Loss Test – PCIe 4.0

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		2-Core
64	297.62	106.84
128	168.92	106.89
256	90.58	82.74
512	46.99	46.99
1,024	23.94	23.94
1,280	19.23	19.23
1,518	16.25	16.25

Figure 6: Results of P2100G 2x 100G Zero Frame Loss Test – PCIe 4.0



4 P2100G 2x 100G Zero Frame Loss (Icelake) – PCIe 4.0

RFC2544 Zero Frame Loss Performance on Broadcom Ethernet NIC P2100G with 2x 100G traffic.

Table 10: Setup of P2100G 2x 100G Zero Frame Loss Test – PCIe 4.0

Item	Description
Server	Dell PowerEdge R750
CPU	Intel Xeon Platinum 8358 CPU at 2.60 GHz (running at 3.3 GHz)
RAM	128GB: 16GB x 8 DIMMs at 3200 MHz
NIC	Broadcom Ethernet NIC controller P2100G 2x100G, PCIe Gen4 x16
Operating System	Red Hat Enterprise Linux release 9.2
Kernel Version	5.14.0-284.25.1.el9_2.x86_64
Broadcom Firmware Version	233.0.124.0
Test Topology	One NIC and two ports are used. Each port receives a stream of 8,192 IP flows from IXIA. Frames received on one port are forwarded to the other port by testpmd. Two/four queue pairs for two ports (one/two pairs per port) are assigned to one/two cores.

Figure 7: Topology of P2100G 2x 100G Zero Frame Loss Test – PCIe 4.0

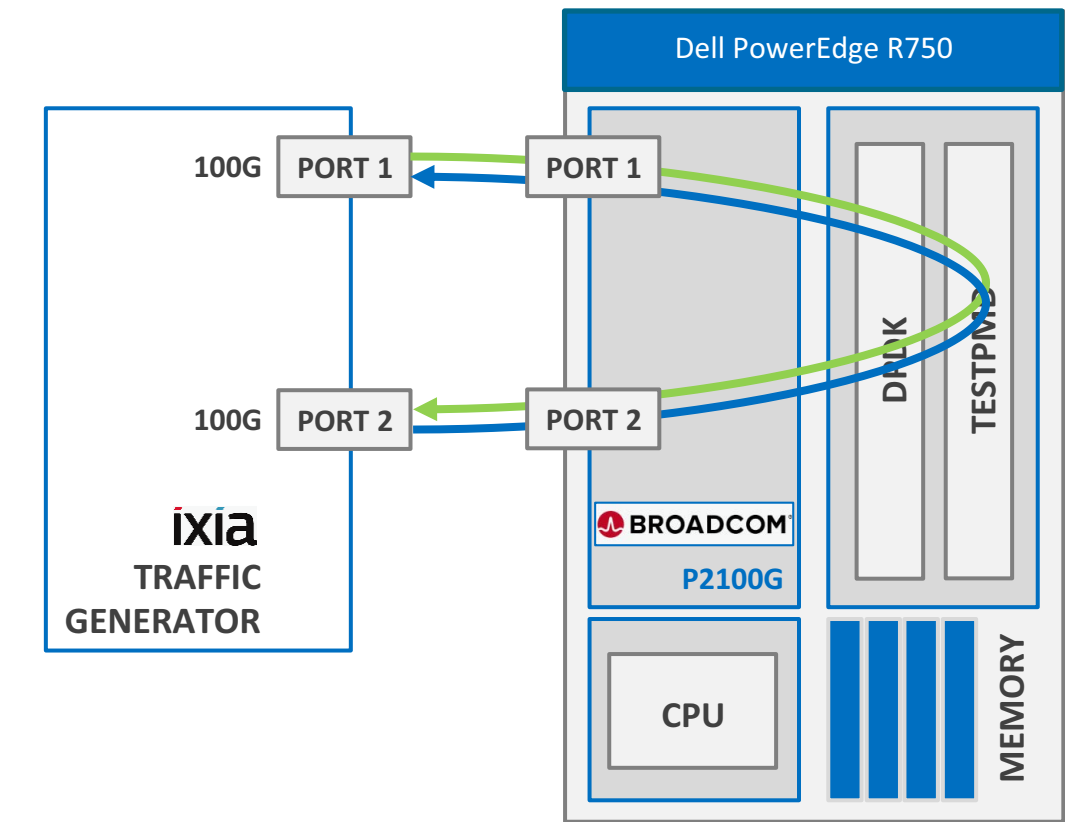


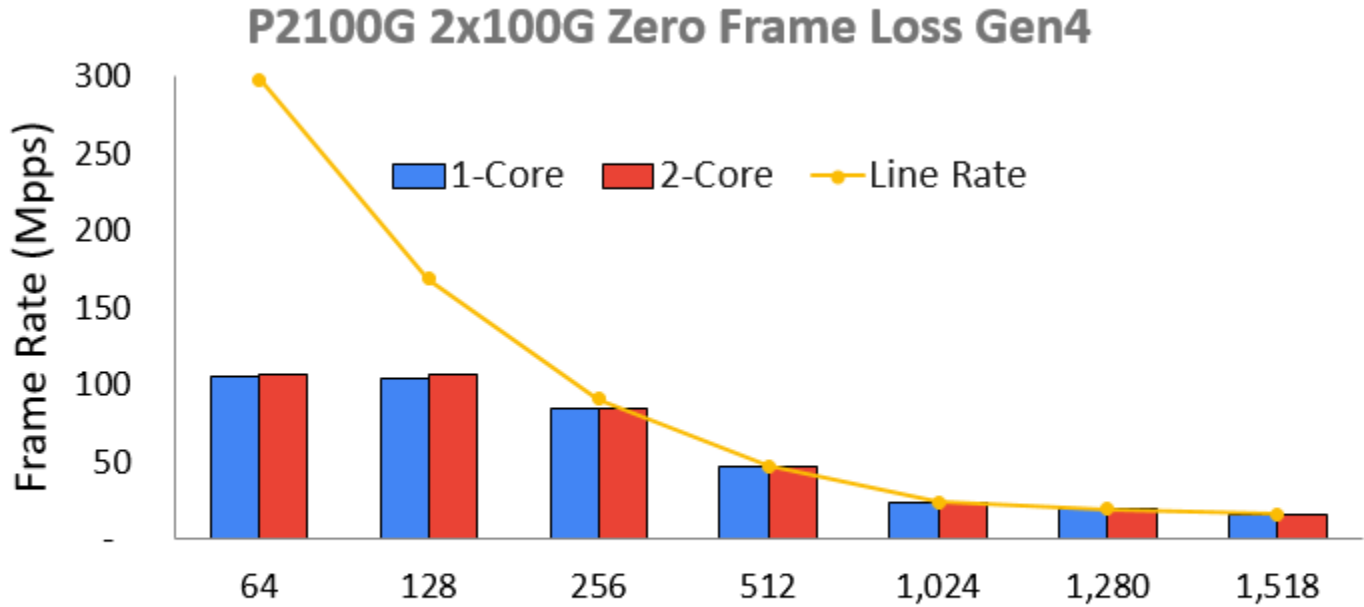
Table 11: Configuration of P2100G 2x 100G Zero Frame Loss Test – PCIe 4.0

Item	Description
BIOS	Logical Processor: Disabled Sub NUMA Cluster: 2-Way Clustering MADT Core Enumeration: Round Robin I/O Snoop Hold Off Response: 2K Cycles System Profile: Performance
NVM Settings	–
Boot Settings	default_hugepagesz=1G hugepagesz=1G hugepages=64 intel_iommu=on iommu=pt intel_idle.max_cstate=0 processor.max_cstate=0 intel_pstate=disable rcu_nocb_poll audit=0 nosoftlockup mce=ignore_ce isolcpus=4,7,8,11,12,15,16,19,20,23,24,27,28,31,32,35,36,39 nohz_full=4,7,8,11,12,15,16,19,20,23,24,27,28,31,32,35,36,39 rcu_nocbs=4,7,8,11,12,15,16,19,20,23,24,27,28,31,32,35,36,39
Other Optimizations	Disable Linux realtime throttling: echo -1 > /proc/sys/kernel/ sched_rt_runtime_us
Command Line	chrt -r 1 ./dpdk-testpmd -l 4,8 --main-lcore 4 -n 4 -a 17:00.0 -a 17:00.1 -- - i --nb-cores=1 --nb-ports=2 --rxq=1 --txq=1 --rxd=2048 --txd=2048 --socket- num=0 --burst=64 --mbcache=512 --record-core-cycles --record-burst-stats -a chrt -r 1 ./dpdk-testpmd -l 4,8,12 --main-lcore 4 -n 4 -a 17:00.0 -a 17:00.1 - - -i --nb-cores=2 --nb-ports=2 --rxq=2 --txq=2 --rxd=2048 --txd=2048 --socket- num=0 --burst=64 --mbcache=512 --record-core-cycles --record-burst-stats -a

Table 12: Results of P2100G 2x 100G Zero Frame Loss Test – PCIe 4.0

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)	
		1-Core	2-Core
64	297.62	105.94	106.79
128	168.92	103.74	106.70
256	90.58	84.17	83.96
512	46.99	46.99	46.99
1,024	23.94	23.94	23.94
1,280	19.23	19.23	19.23
1,518	16.25	16.25	16.25

Figure 8: Results of P2100G 2x 100G Zero Frame Loss Test – PCIe 4.0



5 P2100G 1x 200G Zero Frame Loss (Icelake) – PCIe 4.0

RFC2544 Zero Frame Loss Performance on Broadcom Ethernet NIC P2100G with 1x 200G traffic.

Table 13: Setup of P2100G 1x 200G Zero Frame Loss Test – PCIe 4.0

Item	Description
Server	Dell PowerEdge R750
CPU	Intel Xeon Platinum 8358 CPU at 2.60GHz (running at 3.3 GHz)
RAM	128GB: 16GB x 8 DIMMs at 3200 MHz
NIC	Broadcom Ethernet NIC controller P2100G 1x200G, PCIe Gen4 x16
Operating System	Red Hat Enterprise Linux release 9.2
Kernel Version	5.14.0-284.25.1.el9_2.x86_64
Broadcom Firmware Version	233.0.124.0
Test Topology	One NIC and one port are used. Port receives a stream of 8,192 IP flows from IXIA. Frames received on one port are transmitted back on the same port by testpmd. Two queue pairs a port assigned to two cores.

Figure 9: Topology of P2100G 1x 200G Zero Frame Loss Test – PCIe 4.0

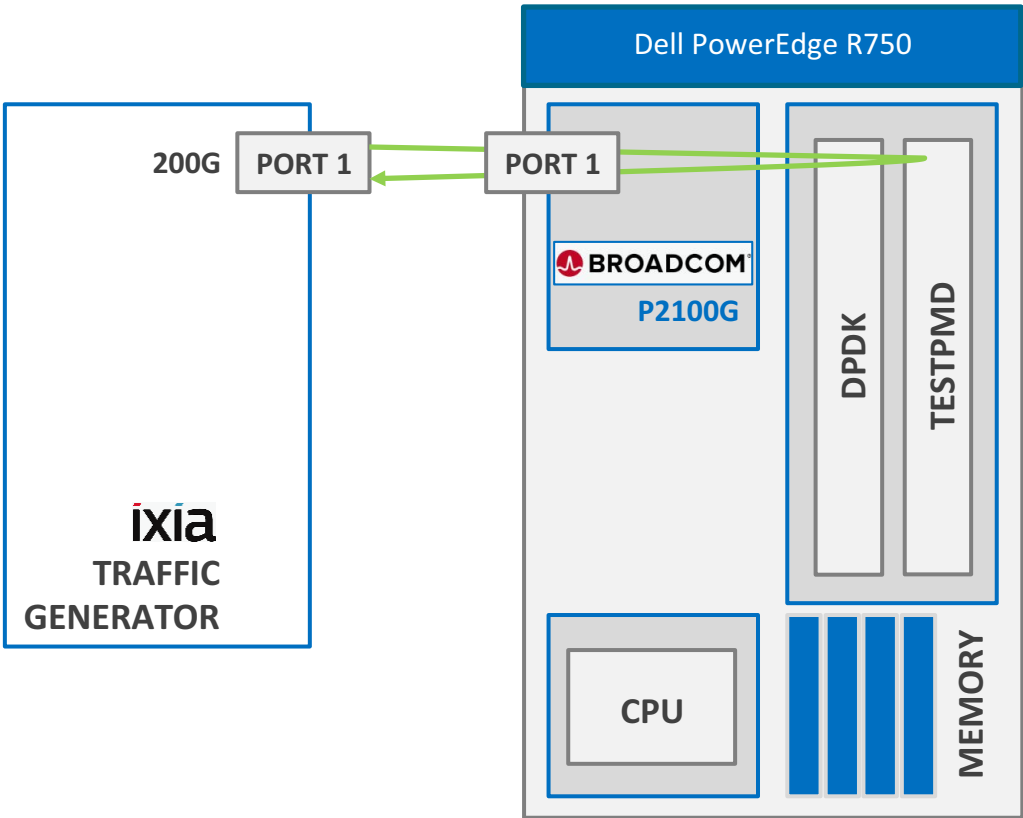


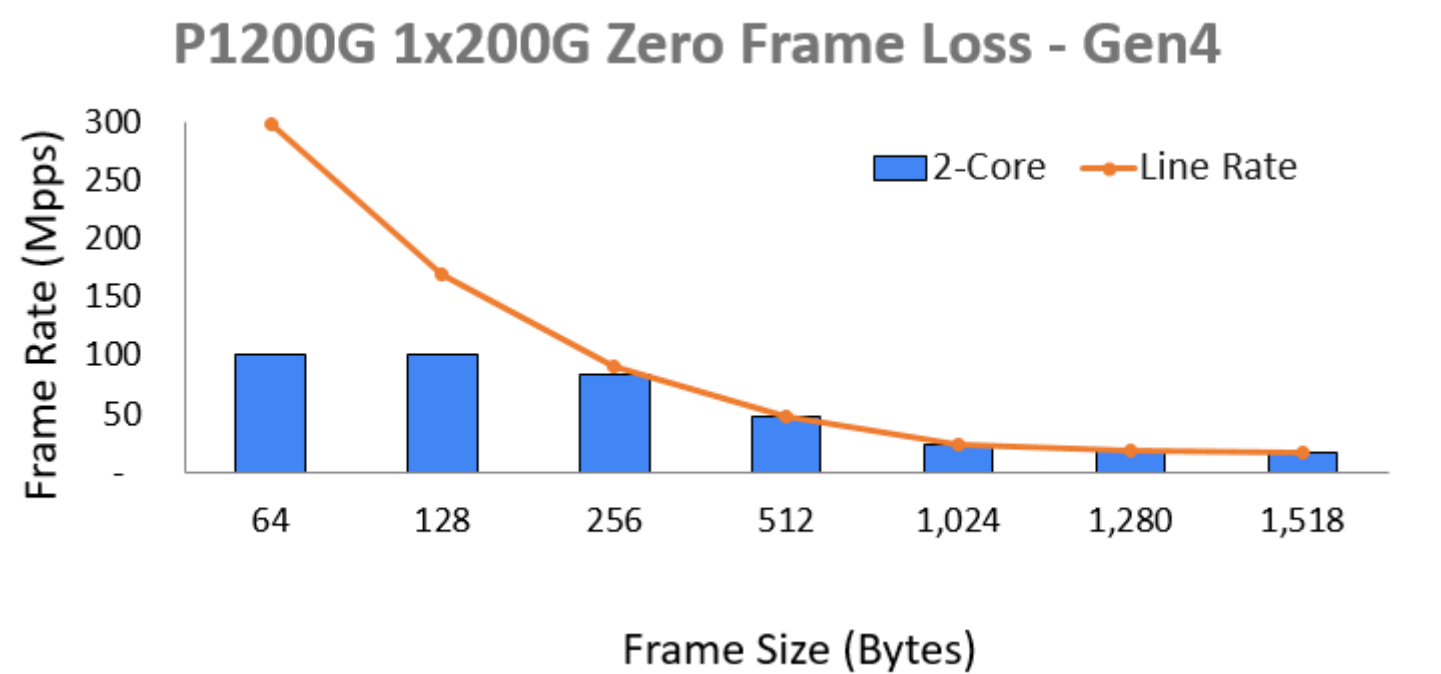
Table 14: Configuration of P2100G 1x 200G Zero Frame Loss Test – PCIe 4.0

Item	Description
BIOS	Logical Processor: Disabled Sub NUMA Cluster: 2-Way Clustering MADT Core Enumeration: Round Robin I/O Snoop HoldOff Response: 2K Cycles System Profile: Performance
NVM Settings	niccli -i 1 nvm -setoption firmware_link_speed_d0 -scope 0 -value 0x7 niccli -i 1 nvm -setoption firmware_link_speed_d3 -scope 0 -value 0x7 niccli -i 1 nvm -setoption fwd_err_correct -value 0x16 niccli -i 1 nvm -setoption link_training -value 0x1 niccli -i 1 nvm -setoption port_hide -value 0x1
Boot Settings	default_hugepagesz=1G hugepagesz=1G hugepages=64 intel_iommu=on iommu=pt intel_idle.max_cstate=0 processor.max_cstate=0 intel_pstate=disable rcu_nocb_poll audit=0 nosoftlockup mce=ignore_ce isolcpus=4,7,8,11,12,15,16,19,20,23,24,27,28,31,32,35,36,39 nohz_full=4,7,8,11,12,15,16,19,20,23,24,27,28,31,32,35,36,39 rcu_nocbs=4,7,8,11,12,15,16,19,20,23,24,27,28,31,32,35,36,39
Other Optimizations	Disable Linux realtime throttling: echo -1 > /proc/sys/kernel/ sched_rt_runtime_us
Command Line	chrt -r 1 ./ dpdk-testpmd -l 6,10,14 --main-lcore 6 -n 4 -a 4b:00.0 -- -i --nb-cores=2 --nb-ports=1 --rxq=2 --txq=2 --rxd=2048 --txd=2048 --socket-num=1 --burst=64 --mbcache=512 --record-core-cycles --record-burst-stats --port-topology=chained -a testpmd> set fwd macswap

Table 15: Results of P2100G 1x 200G Zero Frame Loss Test – PCIe 4.0

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		2-Core
64	297.62	102.57
128	168.92	102.14
256	90.58	84.12
512	46.99	46.99
1,024	23.94	23.94
1,280	19.23	19.23
1,518	16.25	16.25

Figure 10: Results of P2100G 1x 200G Zero Frame Loss Test – PCIe 4.0



6 P2200G 2 x 200G Zero Frame Loss (EagleStream) – PCIe 5.0

RFC2544 Zero Frame Loss Performance on Broadcom Ethernet NIC P2200G with 2x200G traffic.

Setup of P2200G 2x200G Zero Frame Loss Test – PCIe 5.0

Item	Description
Server	Dell PowerEdge R760
CPU	Intel Xeon Gold 6430 CPU at 2.1GHz (running at 2.6 GHz)
RAM	256GB: 16GB x 16 DIMMs at 4400 MHz
NIC	Broadcom Ethernet NIC controller P2200G 2x200G, PCIe Gen5 x16
Operating System	Red Hat Enterprise Linux release 9.2
Kernel Version	5.14.0-284.25.1.el9_2.x86_64
Broadcom Firmware Version	233.1.97.0
Test Topology	One NIC and two ports are used. Each port receives a stream of 512 IP flows from IXIA. Frames received on one port are forwarded to the other port by testpmd. Eight queue pairs for two ports (four pairs per port) are assigned to eight cores.

Figure 11: Topology of P2200G 2x200G Zero Frame Loss Test – PCIe 5.0

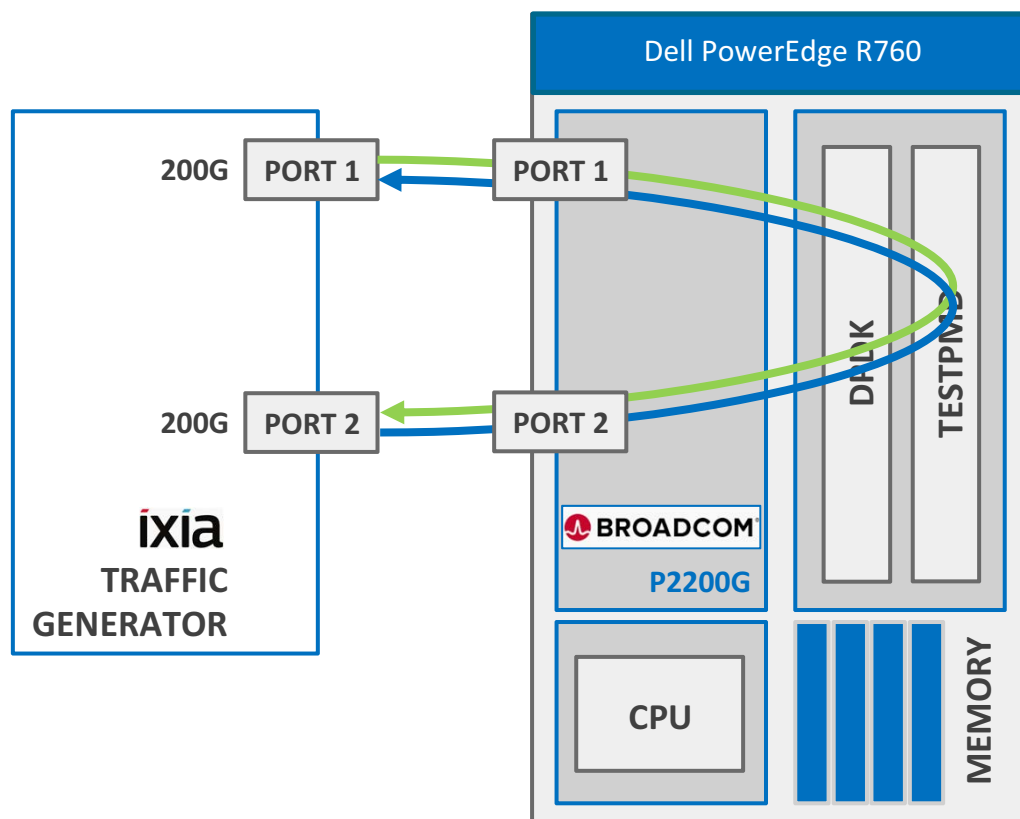


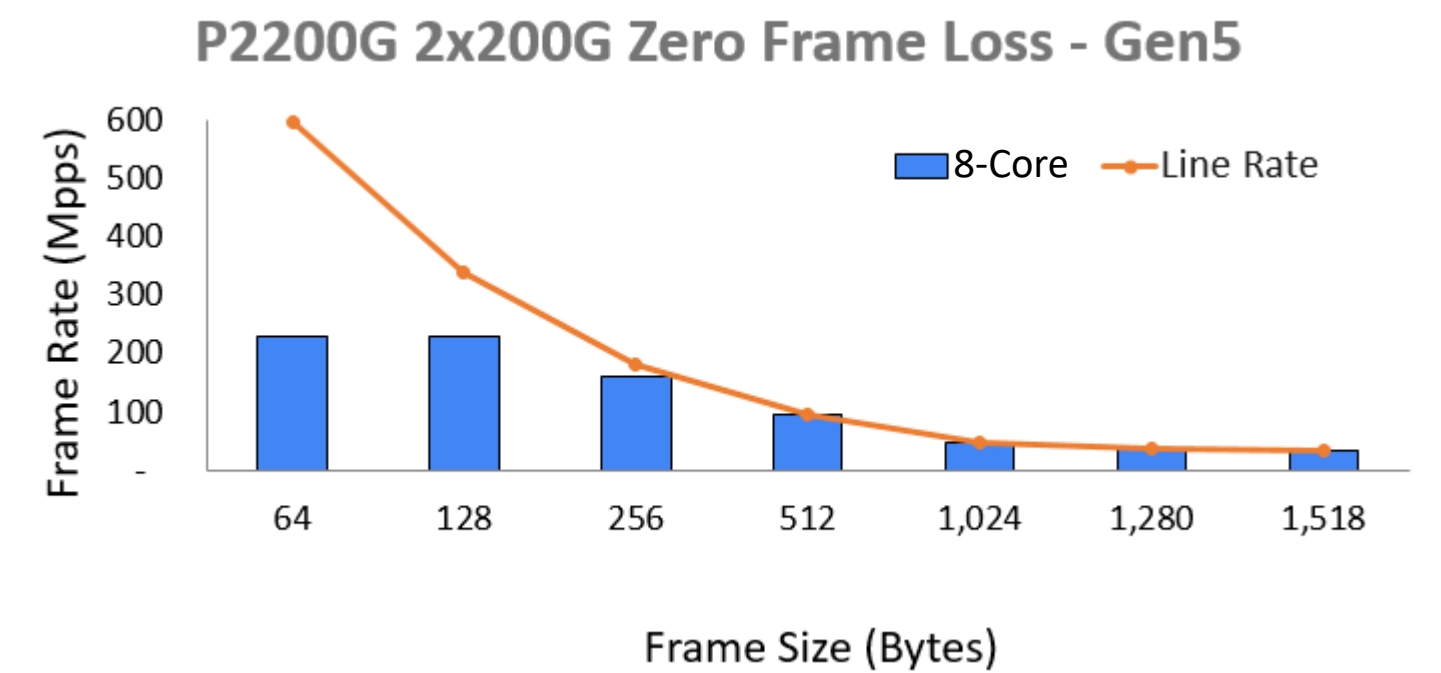
Table 16: Configuration of P2100G 1x 200G Zero Frame Loss Test – PCIe 4.0

Item	Description
BIOS	Logical Processor: Disabled Sub NUMA Cluster: Disabled MADT Core Enumeration: Round Robin I/O Snoop HoldOff Response: 2K Cycles System Profile: Performance
NVM Settings	rcu_nocb_poll audit=0 isolcpus=4,6,8,10,12,14,16,18,20 nohz_full=4,6,8,10,12,14,16,18,20 rcu_nocbs=4,6,8,10,12,14,16,18,20 intel_iommu=on iommu=pt intel_pstate=disable intel_idle.max_cstate=0 processor.max_cstate=0 nosoftlockup mce=ignore_ce default_hugepagesz=1G hugepagesz=1G hugepages=64
Boot Settings	default_hugepagesz=1G hugepagesz=1G hugepages=64 intel_iommu=on iommu=pt intel_idle.max_cstate=0 processor.max_cstate=0 intel_pstate=disable rcu_nocb_poll audit=0 nosoftlockup mce=ignore_ce isolcpus=4,7,8,11,12,15,16,19,20,23,24,27,28,31,32,35,36,39 nohz_full=4,7,8,11,12,15,16,19,20,23,24,27,28,31,32,35,36,39 rcu_nocbs=4,7,8,11,12,15,16,19,20,23,24,27,28,31,32,35,36,39
Other Optimizations	Disable Linux realtime throttling: echo -1 > /proc/sys/kernel/ sched_rt_runtime_us
Command Line	chrt -r 1 ./dpdk-testpmd -l 4,6,8,10,12,14,16,18,20 --main-lcore 4 -n 4 -a 0a:00.0,cqe-mode=1 -a 0a:00.1,cqe-mode=1 -- -i --nb-cores=8 --nb-ports=2 -- rxq=4 --txq=4 --rxd=2048 --txd=2048 --socket-num=0 --burst=64 --mbcache=512 -- record-core-cycles --record-burst-stats -a --forward-mode=io -a -i --cmdline- file=/root/cmd_file # cat cmd_file stop port stop all port config all speed_lanes 4 port config all speed 200000 duplex full port start all start

Table 17: Results of P2200G 2x200G Zero Frame Loss Test – PCIe 5.0

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		8-Core
64	595.24	228.46
128	337.84	229.08
256	181.16	159.38
512	93.98	93.98
1,024	47.89	47.89
1,280	38.46	38.46
1,518	32.51	32.51

Figure 12: Results of P2200G 2x200G Zero Frame Loss Test – PCIe 5.0



Revision History

EtherNIC-Ctrl-DPDK-24-11-Performance-TR100; May 6, 2025

Initial release.

