



BCM574XX/BCM575XX/BCM588XX

Performance Report with DPDK 20.02

Test Report

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1 Introduction

This document provides DPDK test results for the Broadcom® NetXtreme®-E and NetXtreme-S family of devices.

2 Test 1: PS225 2x 25G Zero Frame Loss

Test Description – RFC2544 Zero Frame Loss Performance on Broadcom NetXtreme-S Series PS225 2x 25G.

Table 1: Test 1 Setup

Item	Description
Test	Dual-port throughput at zero frame loss
Server	Dell PowerEdge R730
CPU	Intel Xeon CPU E5-2667 v3 at 3.20 GHz
RAM	128 GB:16 GB × four DIMMS × two NUMA nodes at 2400 MHz
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	4.14.144
Broadcom Firmware Version	217.0.49.0
DPDK Version	20.02
Test Configuration	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: Bi-directional 2x 25G Zero Packet Loss with PS225 – A72 Hairpin

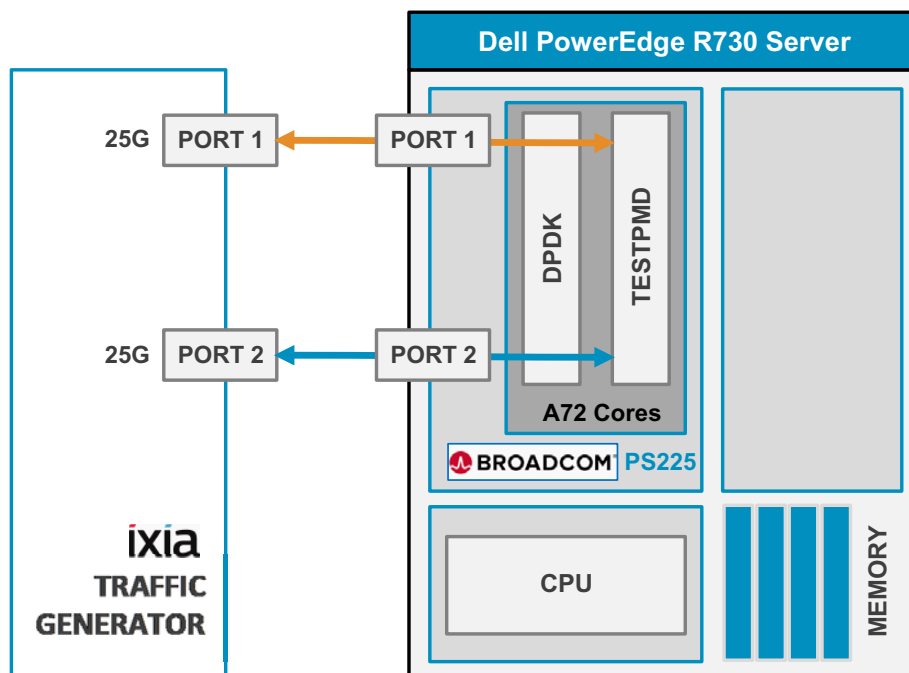


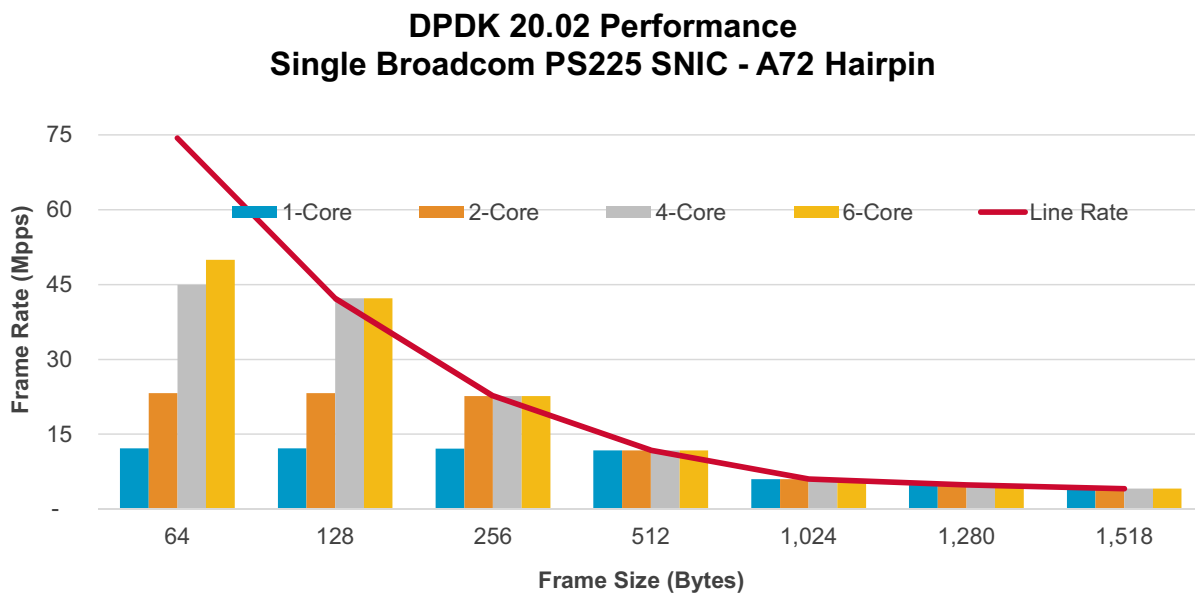
Table 2: Test 1 Configuration

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: Test 1 Results

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)			
		1-Core	2-Core	4-Core	6-Core
64	74.40	12.13	23.25	44.95	49.99
128	42.23	12.17	23.22	42.23	42.23
256	22.64	12.11	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: Test 1 Results



3 Test 2: P225p 2x 25G Zero Frame Loss

Test Description – RFC2544 Zero Frame Loss Performance on Broadcom NetXtreme-E Series P225p 2x 25G.

Table 4: Test 2 Setup

Item	Description
Test	Dual-port throughput at zero frame loss
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	214.4.76.0
DPDK Version	20.02 – BNXT Vector Mode Driver
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 (two TX queues and two RX queues → four total queues) are assigned per logical core. Data points are taken with one and two logical cores.

Figure 3: Bi-Directional 25G Zero Frame Loss with Two P225p Devices

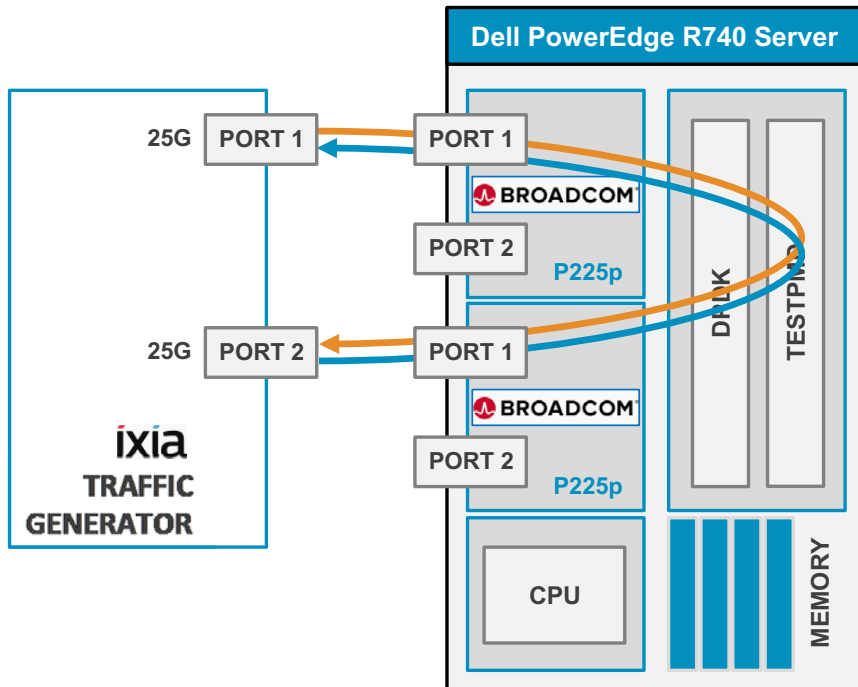


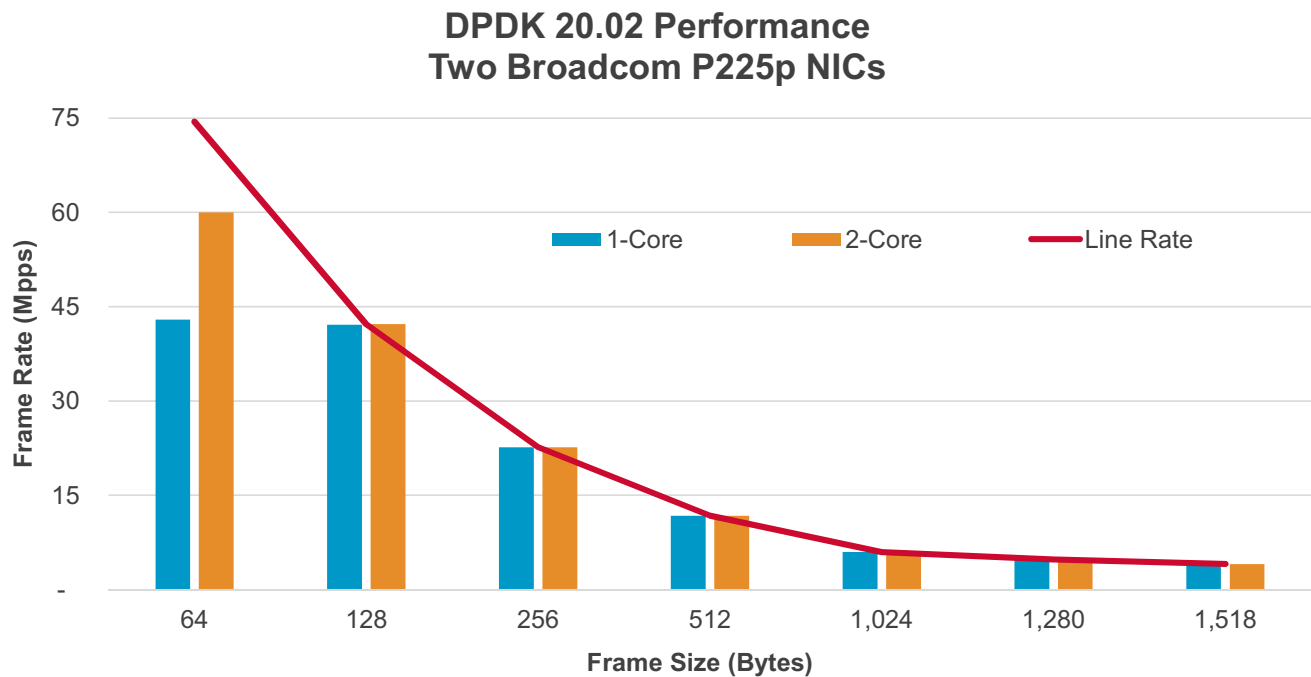
Table 5: Test 2 Configuration

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: Test 2 Results

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)	
		1-Core	2-Core
64	74.40	42.93	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: Test 2 Results



4 Test 3: P425G 4x 25G Zero Frame Loss

Test Description – RFC2544 Zero Frame Loss Performance on Broadcom NetXtreme-E Series P425G 4x 25G.

Table 7: Test 3 Setup

Item	Description
Test	Four-port throughput at zero frame loss
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	216.4.14.0
DPDK Version	20.02 – BNXT Vector Mode Driver
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: Bi-Directional 4x 25G Zero Frame Loss with P425G

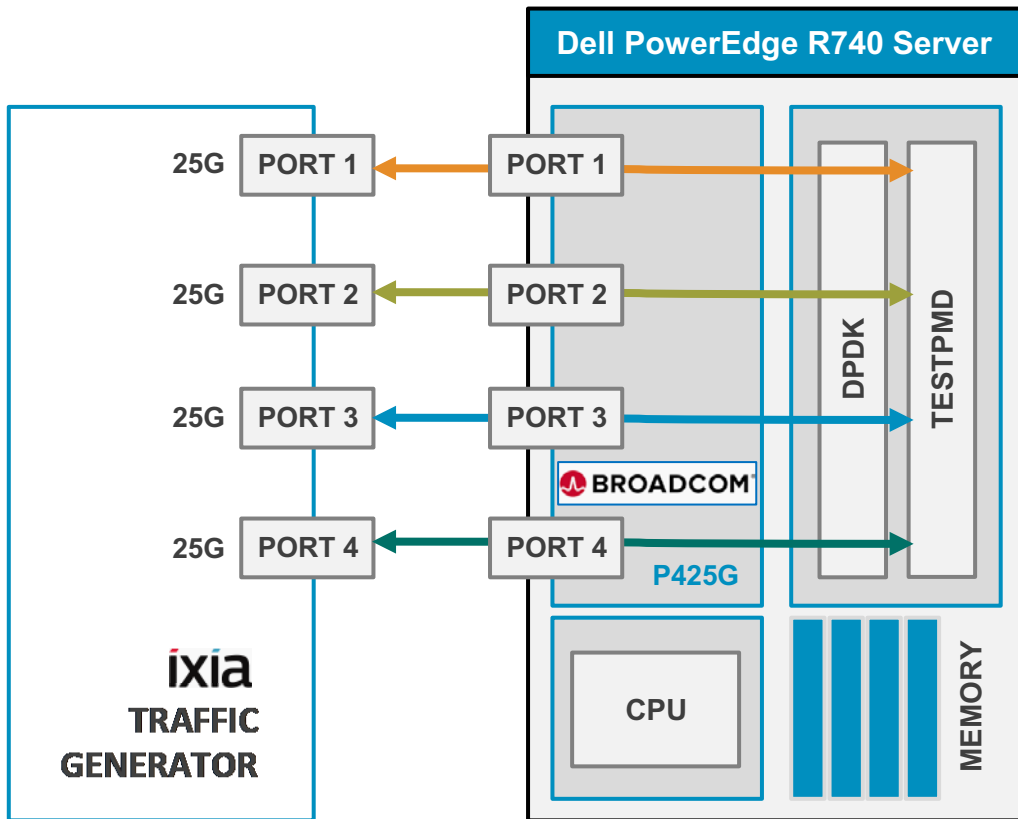


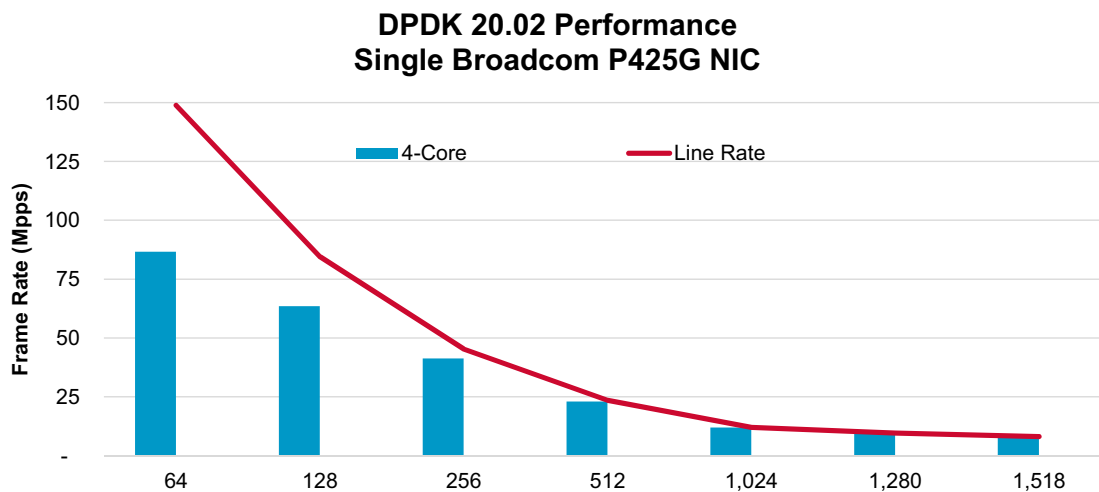
Table 8: Test 3 Configuration

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 --master-lcore 3 -n4 -w 0000:d8:00.0 -- --socket-num=1 --txq=1 --rxq=1 --rxd=1024 --txd=1024 --nb-cores=1 -i --burst=32 --port- topology=chained testpmd -l 7,9 --master-lcore 7 -n4 -w 0000:d8:00.1 --file-prefix pg2 -- -- socket-num=1 --txq=1 --rxq=1 --rxd=1024 --txd=1024 --nb-cores=1 -i --burst=32 --port-topology=chained testpmd -l 11,13 --master-lcore 11 -n4 -w 0000:d8:00.2 --file-prefix pg3 -- -- socket-num=1 --txq=1 --rxq=1 --rxd=1024 --txd=1024 --nb-cores=1 -i --burst=32 --port-topology=chained testpmd -l 15,17 --master-lcore 15 -n4 -w 0000:d8:00.3 --file-prefix pg4 -- -- socket-num=1 --txq=1 --rxq=1 --rxd=1024 --txd=1024 --nb-cores=1 -i --burst=32 --port-topology=chained

Table 9: Test 3 Results

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		4-Core
64	148.81	86.64
128	84.46	63.52
256	45.29	41.27
512	23.50	23.04
1,024	11.97	11.97
1,280	9.62	9.61
1,518	8.13	8.13

Figure 6: Test 3 Results



5 Test 4: P2100G 1x 100G Zero Frame Loss

Test Description – RFC2544 Zero Frame Loss Performance on Broadcom NetXtreme-E Series P2100G 1x 100G.

Table 10: Test 4 Setup

Item	Description
Test	Dual-port throughput at zero frame loss
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	216.4.14.0
DPDK Version	20.02 – BNXT Vector Mode Driver
Test Configuration	<p>One NIC and two ports are used.</p> <p>Frames are received on Port 1 and transmitted on Port 2.</p> <p>Port 1 receives a stream of 8,192 IP flows from IXIA.</p> <p>One TX/RX queue pair per port per logical core is used. Two TX/RX queue pairs for two ports (two TX queues and two RX queues --> four total queues) are assigned per logical core. Data points are taken with one, two, and four logical cores.</p>

Figure 7: Uni-Directional 100G Zero Frame Loss with One P2100G Device

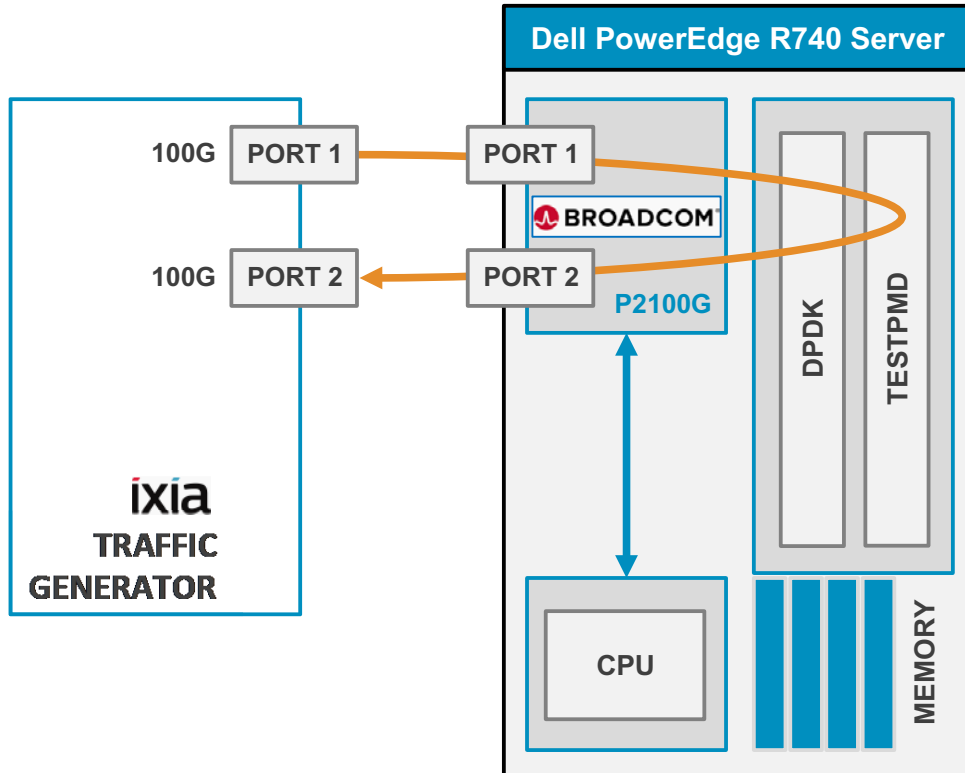


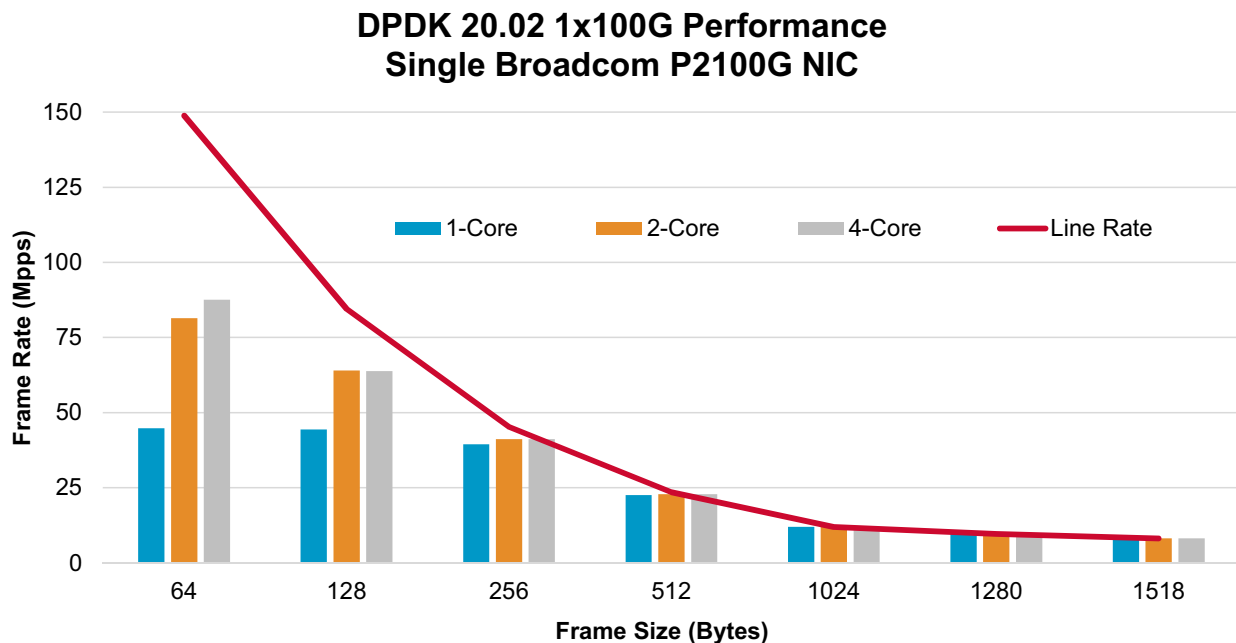
Table 11: Test 4 Configuration

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=pt iommu=pt
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: Test 4 Results

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)		
		1-Core	2-Core	4-Core
64	148.81	44.75	81.15	87.95
128	84.46	44.33	64.18	63.84
256	45.29	39.43	41.64	41.42
512	23.50	22.53	23.13	23.09
1,024	11.97	11.97	11.97	11.97
1,280	9.62	9.61	9.61	9.61
1,518	8.13	8.13	8.13	8.13

Figure 8: Test 4 Results



6 Test 5: P425G 4x 25G Zero Frame Loss with PCIe 4.0

Test Description – RFC2544 Zero Frame Loss Performance on Broadcom NetXtreme-E Series P425G 4x 25G.

Table 13: Test 5 Setup

Item	Description
Test	Four-port throughput at zero frame loss
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	216.4.14.0
DPDK Version	20.02 – BNXT Vector Mode Driver
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: Bi-Directional 4x 25G Zero Frame Loss with P425G

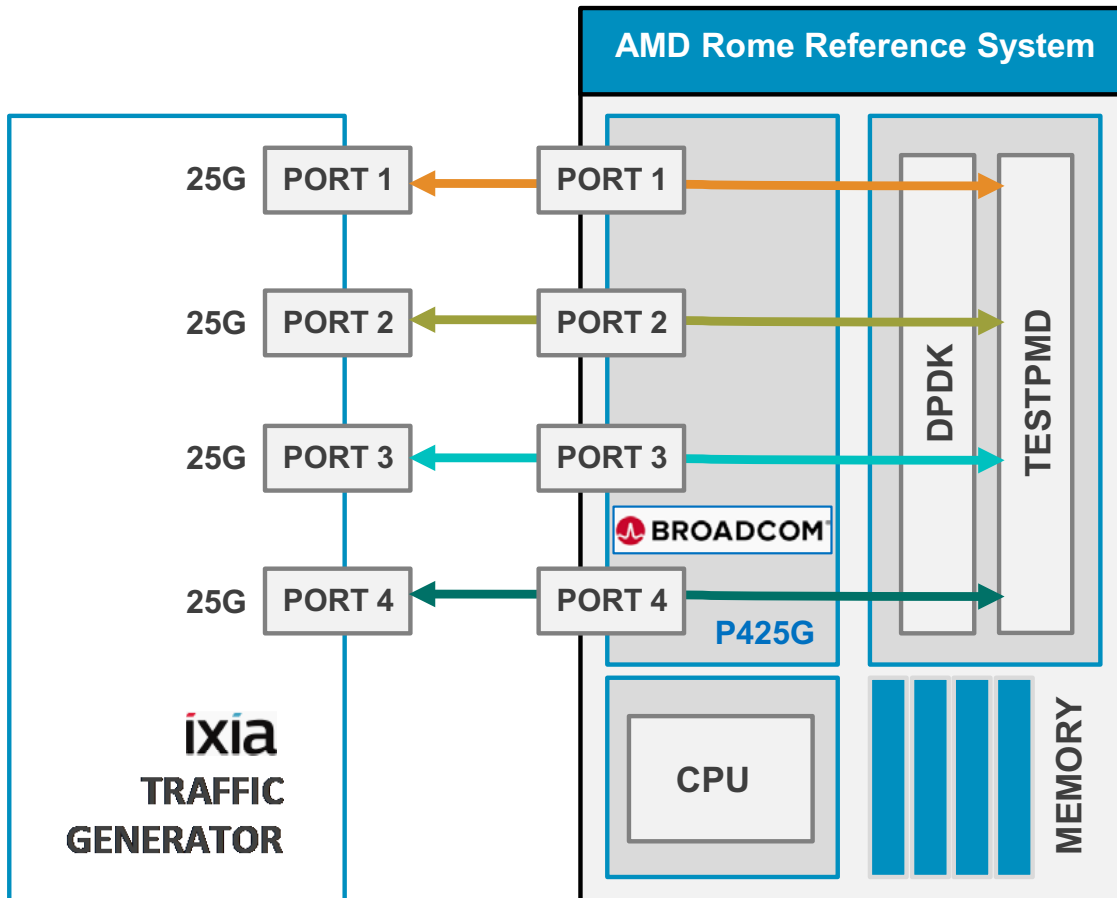


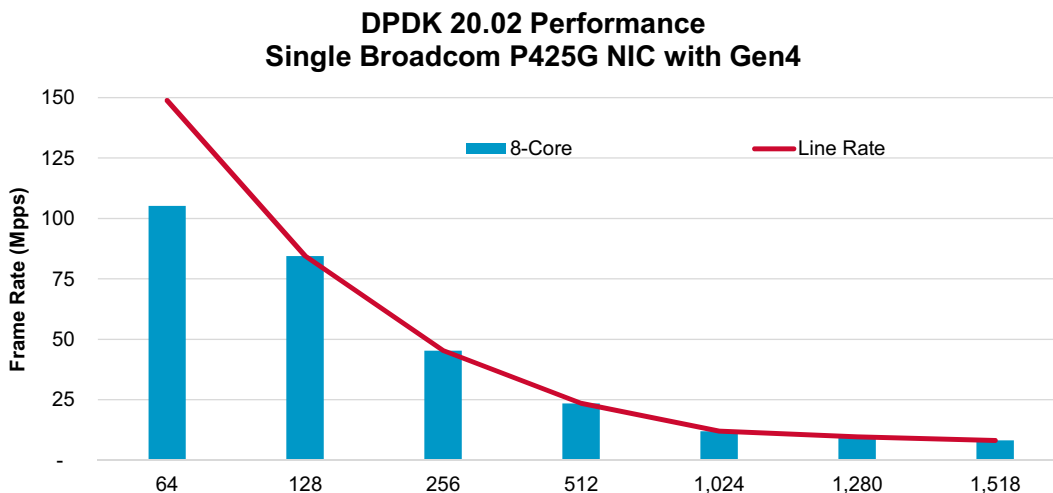
Table 14: Test 5 Configuration

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 numa_balancing=disable rcu_nocbs=16-31 and isolcpus=16-31 nosoftlockup isolcpus=32-47 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: Test 5 Results

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		8-Core
64	148.81	105.19
128	84.46	84.45
256	45.29	45.29
512	23.50	23.49
1,024	11.97	11.97
1,280	9.62	9.61
1,518	8.13	8.13

Figure 10: Test 5 Results



7 Test 6: P2100G 1x 100G Zero Frame Loss with PCIe 4.0

Test Description – RFC2544 Zero Frame Loss Performance on Broadcom NetXtreme-E Series P2100G 1x 100G.

Table 16: Test 5 Setup

Item	Description
Test	Dual-port throughput at zero frame loss
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
DPDK Version	20.02 – BNXT Vector Mode Driver
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. Data points are taken with eight logical cores. 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 (two TX queues and two RX queues → four total queues) were assigned per logical core. Data points were taken with eight logical cores

Figure 11: Uni-Direction 1x 100G Zero Packet Loss with P2100G

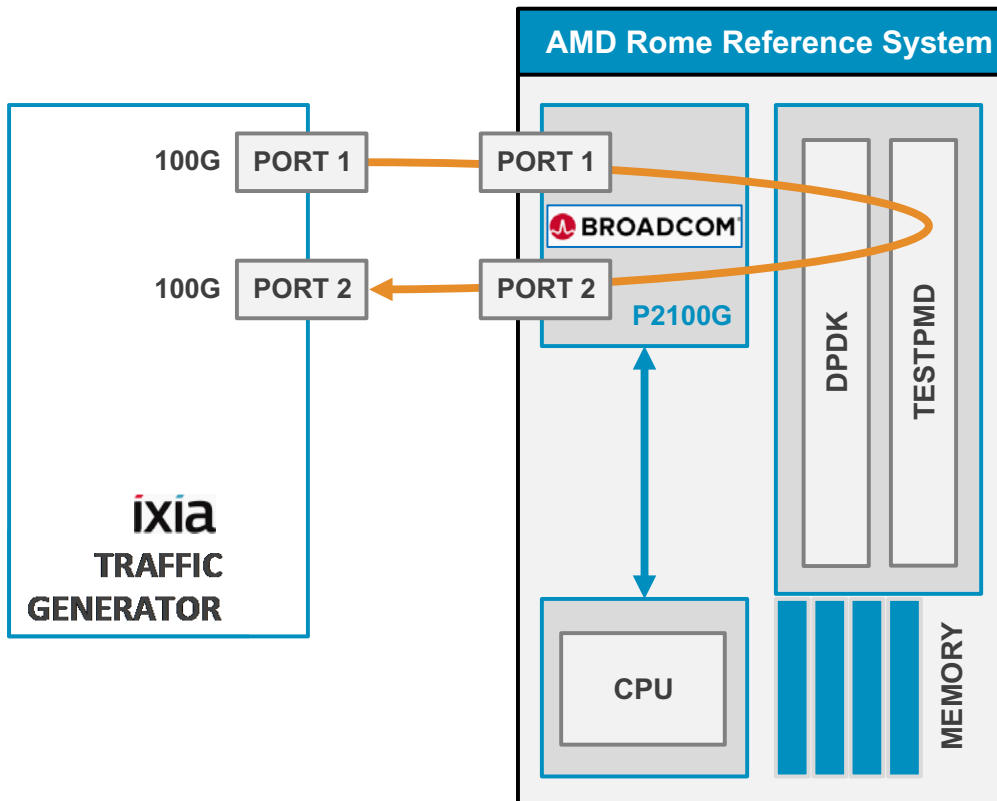


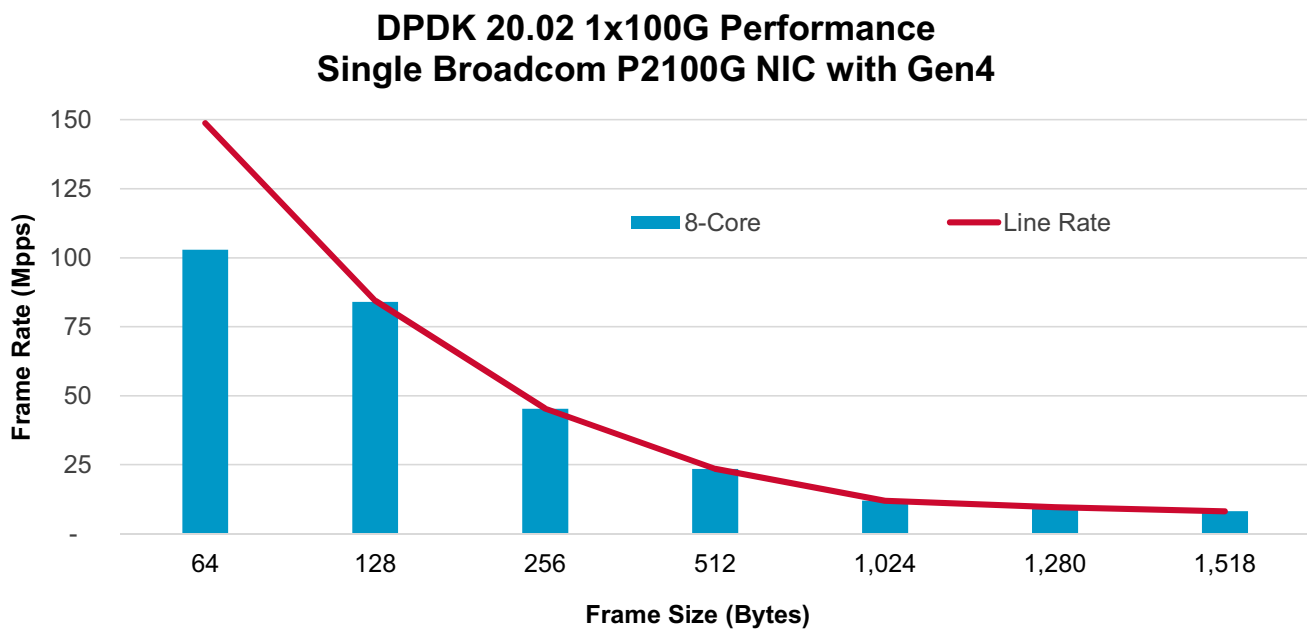
Table 17: Test 6 Configuration

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: Test 6 Results

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		8-Core
64	148.81	102.90
128	84.46	84.45
256	45.29	45.29
512	23.50	23.49
1,024	11.97	11.97
1,280	9.62	9.61
1,518	8.13	8.13

Figure 12: Test 6 Results



8 Test 7: P2100G 2x 100G Zero Frame Loss with PCIe 4.0

Test Description – RFC2544 Zero Frame Loss Performance on Broadcom NetXtreme-E Series P2100G 2x 100G.

Table 19: Test 7 Setup

Item	Description
Test	Dual-port throughput at zero frame loss
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	216.4.14.0
DPDK Version	20.02 – BNXT Vector Mode Driver
Test Configuration	<p>Frames received on port 1 are forwarded to port 2 by testpmd.</p> <p>Port 1 receives a stream of 8,192 IP flows from IXIA.</p> <p>Data points are taken with eight logical cores.</p> <p>One NIC and two ports are used.</p> <p>One TX/RX queue pair per port per logical core was used. Two TX/RX queue pairs for two ports (two TX queues and two RX queues → four total queues) were assigned per logical core. Data points were taken with eight logical cores</p>

Figure 13: Bi-Directional 2x 100G Zero Packet Loss with P2100G

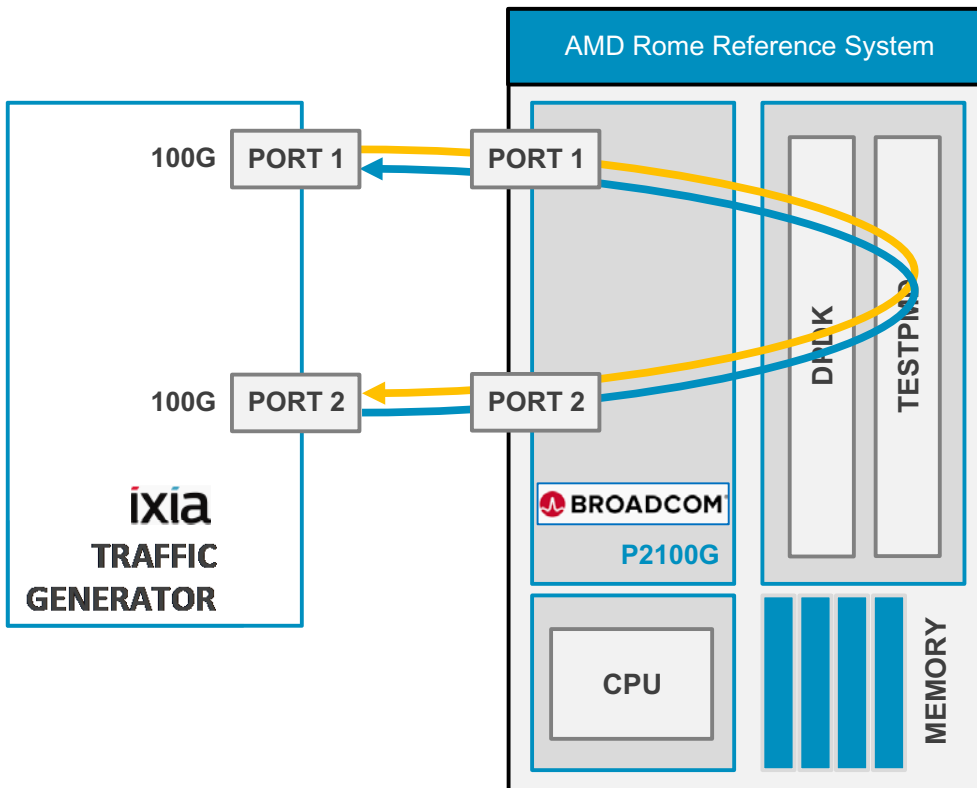


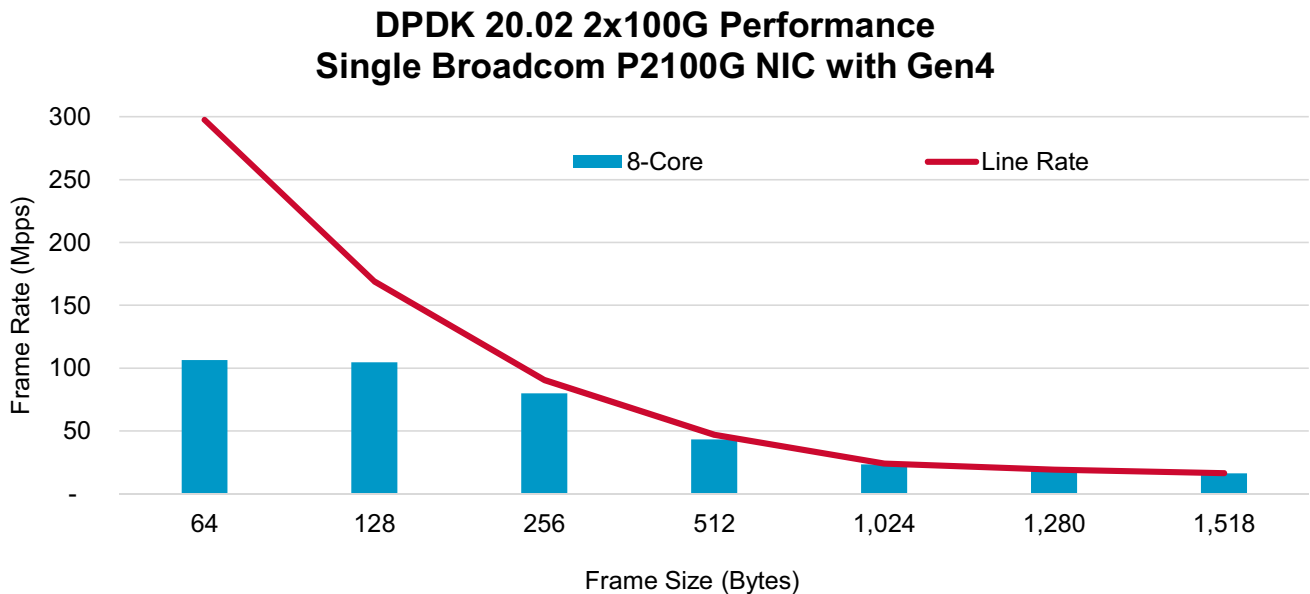
Table 20: Test 7 Configuration

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 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: Test 6 Results

Frame Size (Bytes)	Line Rate (Mpps)	Frame Rate (Mpps)
		8-Core
64	297.62	106.46
128	168.92	104.55
256	90.58	79.94
512	46.99	43.29
1,024	23.95	23.23
1,280	19.23	19.23
1,518	16.25	16.25

Figure 14: Test 7 Results



Revision History

574XX-575XX-588XX-TR101; May 14, 2020

Updated:

- Test 1: PS225 2x 25G Zero Frame Loss
- Test 2: P225p 2x 25G Zero Frame Loss
- Test 3: P425G 4x 25G Zero Frame Loss
- Test 4: P2100G 1x 100G Zero Frame Loss
- Test 6: P2100G 1x 100G Zero Frame Loss with PCIe 4.0
- Test 7: P2100G 2x 100G Zero Frame Loss with PCIe 4.0

Added:

- Test 5: P425G 4x 25G Zero Frame Loss with PCIe 4.0

574XX-575XX-588XX-TR100; March 18, 2020

Updated:

- Test 2: P225p 2x 25G Zero Frame Loss
- Test 3: P425G 4x 25G Zero Frame Loss
- Test 4: P2100G 1x 100G Zero Frame Loss

Added:

- Test 1: PS225 2x 25G Zero Frame Loss
- Test 5: P2100G 1x 100G Zero Frame Loss with PCIe 4.0
- Test 6: P2100G 2x 100G Zero Frame Loss with PCIe 4.0

574XX-575XX-TR100; October 9, 2019

Initial release.

