

ByteBucket rate at 98%

General Simulation Information

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Num Servers Per TOR:      4      Num Sender Hosts:      31      Load Factor:           %1.6129
Num TORs:                 8      Num Receiver Hosts:    1      Start Time:            0s
Server Link Speed:       10Gb/s  Workload Type:         DCTCP   Stop Time:             9.5s
Fabric Link Speed:       40Gb/s  InterArrival Dist:    exponential Warmup Time:         0ms
  
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Traffic Characteristic (Rates, Bytes, and DutyCycle)

| Measurement Point | AvgRate (Gb/s) | CumRate (Gb/s) | MinRate (Gb/s) | MaxRate (Gb/s) | CumBytes (MB) | Avg Duty Cycle (%) | Min Duty Cycle (%) | Max Duty Cycle (%) |
|-------------------|----------------|----------------|----------------|----------------|---------------|--------------------|--------------------|--------------------|
| SX Apps Send: | 0.15 | 4.58 | 0.07 | 0.28 | 5360.53 | | | |
| SX NICs Send: | 0.15 | 4.64 | 0.08 | 0.28 | 5528.20 | 1.51 | 0.76 | 2.84 |
| All NICs Send: | 0.15 | 4.84 | 0.08 | 0.28 | 5761.27 | 1.53 | 0.76 | 2.84 |
| TORs Down Recv: | 0.15 | 4.84 | 0.08 | 0.28 | 5761.27 | 1.53 | 0.76 | 2.84 |
| TORs Up Send: | 0.54 | 4.28 | 0.17 | 0.72 | 5097.32 | 1.35 | 0.49 | 1.80 |
| TORs Up Recv: | 0.54 | 4.28 | 0.02 | 4.11 | 5097.32 | 1.35 | 0.05 | 10.32 |
| TORs Down Send: | 0.15 | 4.84 | 0.00 | 4.64 | 5761.27 | 1.53 | 0.04 | 46.68 |
| ALL NICs Recv: | 0.15 | 4.84 | 0.00 | 4.64 | 5761.27 | 1.53 | 0.04 | 46.68 |
| RX NICs Recv: | 4.64 | 4.64 | 4.64 | 4.64 | 5528.20 | 46.68 | 46.68 | 46.68 |
| RX Apps Recv: | 4.50 | 4.50 | 4.50 | 4.50 | 5360.53 | | | |

Queue Length (Stats Collected At Pkt Arrivals)

| Queue Location | Mean (Pkts) | StdDev (Pkts) | Mean (KB) | StdDev (KB) | Min (Pkts) | Min (KB) | Max (Pkts) | Max (KB) |
|----------------|-------------|---------------|-----------|-------------|------------|----------|------------|----------|
| SX Transports | 0.03 | 0.15 | 203.80 | 1327.80 | 0.00 | 0.00 | 2.00 | 29440.00 |
| SX NICs | 60.03 | 63.17 | 91.12 | 95.89 | 0.00 | 0.00 | 510.00 | 774.18 |
| All NICs | 58.15 | 61.20 | 88.27 | 92.89 | 0.00 | 0.00 | 510.00 | 774.18 |
| SX TORs Up | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| All TORs Up | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RX TORs Down | 303.27 | 429.19 | 460.24 | 651.35 | 0.00 | 0.00 | 2615.00 | 3968.12 |
| All TORs Down | 9.48 | 13.41 | 14.38 | 20.35 | 0.00 | 0.00 | 2615.00 | 3968.12 |

Queue Wait Time Stats

Packet Type: Request

| Queue Location | mean (us) | mean (%) | stddev (us) | min (us) | median (us) | 75%ile (us) | 99%ile (us) | max (us) | count |
|---------------------|-----------|----------|-------------|----------|-------------|-------------|-------------|----------|-------|
| Host NICs: | 1.64 | 1.01 | 12.12 | 0.00 | 0.00 | 0.00 | 103.36 | 487.89 | 2410 |
| TORs upward NICs: | 0.01 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.23 | 0.29 | 2185 |
| Aggr Switch NICs: | 0.02 | 0.01 | 0.07 | 0.00 | 0.00 | 0.00 | 0.28 | 0.30 | 2185 |
| TORs downward NICs: | 160.80 | 98.97 | 380.05 | 0.00 | 0.00 | 0.00 | 1810.85 | 3217.27 | 2410 |
| Total: | 162.47 | 100.00 | | | | | | | |

Packet Type: Grant

| Queue Location | mean (us) | mean (%) | stddev (us) | min (us) | median (us) | 75%ile (us) | 99%ile (us) | max (us) | count |
|---------------------|-----------|----------|-------------|----------|-------------|-------------|-------------|----------|---------|
| Host NICs: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3641664 |
| TORs upward NICs: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3221985 |
| Aggr Switch NICs: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3221985 |
| TORs downward NICs: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3641664 |
| Total: | 0.00 | 0.00 | | | | | | | |

Packet Type: Data

| Queue Location | mean (us) | mean (%) | stddev (us) | min (us) | median (us) | 75%ile (us) | 99%ile (us) | max (us) | count |
|---------------------|-----------|----------|-------------|----------|-------------|-------------|-------------|----------|---------|
| Host NICs: | 77.89 | 17.25 | 81.23 | 0.00 | 42.61 | 48.89 | 48.89 | 628.70 | 3641664 |
| TORs upward NICs: | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 3221985 |
| Aggr Switch NICs: | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 3221985 |
| TORs downward NICs: | 373.64 | 82.75 | 528.12 | 0.00 | 0.00 | 0.00 | 0.00 | 3216.93 | 3641664 |
| Total: | 451.54 | 100.00 | | | | | | | |

packet Type: All Pkts

| Queue Location | mean (us) | mean (%) | stddev (us) | min (us) | median (us) | 75%ile (us) | 99%ile (us) | max (us) | count |
|--------------------|-----------|----------|-------------|----------|-------------|-------------|-------------|----------|---------|
| SX Host NICs: | 77.84 | 17.25 | 81.22 | 0.00 | 42.49 | 48.75 | 48.75 | 628.70 | 3644105 |
| SX TORs UP NICs: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 6446191 |
| Aggr Switch NICs: | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 6446191 |
| RX TORs Down NICs: | 373.50 | 82.75 | 528.06 | 0.00 | 0.00 | 0.00 | 0.00 | 3217.27 | 3644075 |
| Total | 451.34 | 100.00 | | | | | | | |

|End To End Message Latency For Different Ranges of Message Sizes|

| Msg Size Range | mean (us) | stddev (us) | min (us) | median (us) | 75%ile (us) | 99%ile (us) | max (us) | count |
|---------------------|-----------|-------------|----------|-------------|-------------|-------------|----------|-------|
| (0, 1Pkt] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| (1Pkt, 3Pkts] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| (3Pkts, 6Pkts] | 367.34 | 775.49 | 8.82 | 0.00 | 0.00 | 3506.26 | 4781.27 | 350 |
| (6Pkts, 13Pkts] | 242.99 | 494.51 | 17.44 | 0.00 | 0.00 | 1699.25 | 2832.08 | 102 |
| (13Pkts, 33Pkts] | 377.06 | 829.07 | 24.82 | 0.00 | 0.00 | 3837.29 | 6395.48 | 500 |
| (33Pkts, 133Pkts] | 424.88 | 746.91 | 66.65 | 0.00 | 0.00 | 3453.96 | 5180.94 | 512 |
| (133Pkts, 1333Pkts] | 1691.54 | 1037.77 | 822.12 | 1538.69 | 1538.69 | 5128.98 | 7693.46 | 471 |
| (1333Pkts, Huge] | 11781.04 | 12393.44 | 4102.36 | 5324.85 | 10649.71 | 63898.23 | 79872.79 | 475 |

|End To End Message Stretch For Different Ranges of Message Sizes|

| Msg Size Range | mean | stddev | min | median | 75%ile | 99%ile | max | count |
|---------------------|-------|--------|------|--------|--------|--------|--------|-------|
| (0, 1Pkt] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| (1Pkt, 3Pkts] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| (3Pkts, 6Pkts] | 50.15 | 105.87 | 1.20 | 0.00 | 0.00 | 478.68 | 652.75 | 350 |
| (6Pkts, 13Pkts] | 15.31 | 31.16 | 1.10 | 0.00 | 0.00 | 107.07 | 178.45 | 102 |
| (13Pkts, 33Pkts] | 12.96 | 29.49 | 1.04 | 0.00 | 0.00 | 128.67 | 275.72 | 500 |
| (33Pkts, 133Pkts] | 4.91 | 9.29 | 1.02 | 0.00 | 0.00 | 42.71 | 80.07 | 512 |
| (133Pkts, 1333Pkts] | 1.45 | 0.84 | 1.01 | 1.03 | 1.54 | 4.62 | 7.70 | 471 |
| (1333Pkts, Huge] | 1.39 | 0.50 | 1.01 | 0.95 | 1.27 | 3.18 | 4.76 | 475 |

ByteBucket rate at 97%

|General Simulation Information|

| | | | | | |
|----------------------|--------|---------------------|-------------|--------------|---------|
| Num Servers Per TOR: | 4 | Num Sender Hosts: | 31 | Load Factor: | %1.6129 |
| Num TORs: | 8 | Num Receiver Hosts: | 1 | Start Time: | 0s |
| Server Link Speed: | 10Gb/s | Workload Type: | DCTCP | Stop Time: | 9.5s |
| Fabric Link Speed: | 40Gb/s | InterArrival Dist: | exponential | Warmup Time: | 0ms |

|Traffic Characteristic (Rates, Bytes, and DutyCycle)|

| Measurement Point | AvgRate (Gb/s) | CumRate (Gb/s) | MinRate (Gb/s) | MaxRate (Gb/s) | CumBytes (MB) | Avg Duty Cycle(%) | Min Duty Cycle(%) | Max Duty Cycle(%) |
|-------------------|----------------|----------------|----------------|----------------|---------------|-------------------|-------------------|-------------------|
| SX Apps Send: | 0.15 | 4.63 | 0.09 | 0.27 | 5415.12 | | | |
| SX NICs Send: | 0.15 | 4.70 | 0.09 | 0.28 | 5584.50 | 1.52 | 0.89 | 2.80 |
| All NICs Send: | 0.15 | 4.90 | 0.09 | 0.28 | 5819.94 | 1.55 | 0.89 | 2.80 |
| TORs Down Recv: | 0.15 | 4.90 | 0.09 | 0.28 | 5819.94 | 1.55 | 0.89 | 2.80 |
| TORs Up Send: | 0.55 | 4.40 | 0.18 | 0.71 | 5224.16 | 1.39 | 0.50 | 1.77 |
| TORs Up Recv: | 0.55 | 4.40 | 0.02 | 4.22 | 5224.16 | 1.39 | 0.06 | 10.61 |
| TORs Down Send: | 0.15 | 4.90 | 0.00 | 4.70 | 5819.94 | 1.55 | 0.04 | 47.27 |
| ALL NICs Recv: | 0.15 | 4.90 | 0.00 | 4.70 | 5819.94 | 1.55 | 0.04 | 47.27 |
| RX NICs Recv: | 4.70 | 4.70 | 4.70 | 4.70 | 5584.50 | 47.27 | 47.27 | 47.27 |
| RX Apps Recv: | 4.56 | 4.56 | 4.56 | 4.56 | 5415.12 | | | |

 |Queue Length (Stats Collected At Pkt Arrivals)|

| Queue Location | Mean (Pkts) | StdDev (Pkts) | Mean (KB) | StdDev (KB) | Min (Pkts) | Min (KB) | Max (Pkts) | Max (KB) |
|----------------|-------------|---------------|-----------|-------------|------------|----------|------------|----------|
| SX Transports | 0.02 | 0.10 | 133.81 | 883.23 | 0.00 | 0.00 | 1.00 | 29360.51 |
| SX NICs | 31.40 | 32.24 | 47.66 | 48.94 | 0.00 | 0.00 | 266.00 | 403.79 |
| All NICs | 30.41 | 31.23 | 46.17 | 47.41 | 0.00 | 0.00 | 266.00 | 403.79 |
| SX TORs Up | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| All TORs Up | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RX TORs Down | 165.41 | 267.94 | 251.02 | 406.63 | 0.00 | 0.00 | 1664.00 | 2525.95 |
| All TORs Down | 5.17 | 8.37 | 7.84 | 12.71 | 0.00 | 0.00 | 1664.00 | 2525.95 |

 |Queue Wait Time Stats|

Packet Type: Request

| Queue Location | mean (us) | mean (%) | stddev (us) | min (us) | median (us) | 75%ile (us) | 99%ile (us) | max (us) | count |
|---------------------|-----------|----------|-------------|----------|-------------|-------------|-------------|----------|-------|
| Host NICs: | 0.41 | 0.43 | 2.78 | 0.00 | 0.00 | 0.00 | 22.12 | 100.02 | 2410 |
| TORs upward NICs: | 0.01 | 0.01 | 0.03 | 0.00 | 0.00 | 0.00 | 0.22 | 0.30 | 2185 |
| Aggr Switch NICs: | 0.02 | 0.02 | 0.07 | 0.00 | 0.00 | 0.00 | 0.27 | 0.59 | 2185 |
| TORs downward NICs: | 93.17 | 99.54 | 243.29 | 0.00 | 0.00 | 0.00 | 1302.67 | 2047.47 | 2410 |
| Total: | 93.60 | 100.00 | | | | | | | |

Packet Type: Grant

| Queue Location | mean (us) | mean (%) | stddev (us) | min (us) | median (us) | 75%ile (us) | 99%ile (us) | max (us) | count |
|---------------------|-----------|----------|-------------|----------|-------------|-------------|-------------|----------|---------|
| Host NICs: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3678753 |
| TORs upward NICs: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3302161 |
| Aggr Switch NICs: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3302161 |
| TORs downward NICs: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3678753 |
| Total: | 0.00 | 0.00 | | | | | | | |

Packet Type: Data

| Queue Location | mean (us) | mean (%) | stddev (us) | min (us) | median (us) | 75%ile (us) | 99%ile (us) | max (us) | count |
|---------------------|-----------|----------|-------------|----------|-------------|-------------|-------------|----------|---------|
| Host NICs: | 40.48 | 16.56 | 40.82 | 0.00 | 23.82 | 28.40 | 28.40 | 327.59 | 3678753 |
| TORs upward NICs: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 3302161 |
| Aggr Switch NICs: | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 3302161 |
| TORs downward NICs: | 203.96 | 83.44 | 329.73 | 0.00 | 0.00 | 0.00 | 0.00 | 2046.95 | 3678753 |
| Total | 244.44 | 100.00 | | | | | | | |

packet Type: All Pkts

| Queue Location | mean (us) | mean (%) | stddev (us) | min (us) | median (us) | 75%ile (us) | 99%ile (us) | max (us) | count |
|--------------------|-----------|----------|-------------|----------|-------------|-------------|-------------|----------|---------|
| SX Host NICs: | 40.45 | 16.56 | 40.82 | 0.00 | 23.75 | 28.32 | 28.32 | 327.59 | 3681194 |
| SX TORs UP NICs: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 6606543 |
| Aggr Switch NICs: | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.59 | 6606543 |
| RX TORs Down NICs: | 203.89 | 83.44 | 329.70 | 0.00 | 0.00 | 0.00 | 0.00 | 2047.47 | 3681164 |
| Total | 244.34 | 100.00 | | | | | | | |

 |End To End Message Latency For Different Ranges of Message Sizes|

| Msg Size Range | mean (us) | stddev (us) | min (us) | median (us) | 75%ile (us) | 99%ile (us) | max (us) | count |
|---------------------|-----------|-------------|----------|-------------|-------------|-------------|-----------|-------|
| (0, 1Pkt] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| (1Pkt, 3Pkts] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| (3Pkts, 6Pkts] | 196.73 | 472.72 | 8.82 | 0.00 | 0.00 | 2629.90 | 3287.38 | 353 |
| (6Pkts, 13Pkts] | 166.12 | 396.08 | 17.44 | 0.00 | 0.00 | 2551.28 | 2733.52 | 116 |
| (13Pkts, 33Pkts] | 249.93 | 507.82 | 24.82 | 0.00 | 0.00 | 2694.44 | 3368.05 | 506 |
| (33Pkts, 133Pkts] | 299.59 | 503.95 | 66.65 | 0.00 | 0.00 | 2743.18 | 4114.76 | 486 |
| (133Pkts, 1333Pkts] | 1517.38 | 725.71 | 822.12 | 1516.71 | 1516.71 | 4170.95 | 5687.66 | 466 |
| (1333Pkts, Huge] | 11595.89 | 12914.54 | 4102.36 | 7768.06 | 7768.06 | 54376.40 | 116520.86 | 483 |

 |End To End Message Stretch For Different Ranges of Message Sizes|

| Msg Size Range | mean | stddev | min | median | 75%ile | 99%ile | max | count |
|---------------------|-------|--------|------|--------|--------|--------|--------|-------|
| (0, 1Pkt] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| (1Pkt, 3Pkts] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| (3Pkts, 6Pkts] | 26.86 | 64.54 | 1.20 | 0.00 | 0.00 | 359.04 | 448.80 | 353 |
| (6Pkts, 13Pkts] | 10.47 | 24.96 | 1.10 | 0.00 | 0.00 | 160.76 | 172.24 | 116 |
| (13Pkts, 33Pkts] | 8.37 | 17.42 | 1.04 | 0.00 | 0.00 | 74.24 | 139.20 | 506 |
| (33Pkts, 133Pkts] | 3.43 | 6.42 | 1.02 | 0.00 | 0.00 | 30.42 | 50.69 | 486 |
| (133Pkts, 1333Pkts] | 1.27 | 0.56 | 1.01 | 0.73 | 1.10 | 3.29 | 5.49 | 466 |
| (1333Pkts, Huge] | 1.37 | 0.60 | 1.01 | 0.94 | 1.41 | 3.76 | 7.04 | 483 |

ByteBucket rate at 96%