

Solaris/OpenIndiana at 40Gbps

Line Rate Throughput at Small I/O Sizes with Terminator 5

Executive Summary

This paper presents NIC performance results for Solaris/OpenIndiana using Chelsio's latest Terminator 5 (T5) ASIC running at 40Gbps. The results show 40Gbps line rate throughput with I/O sizes as low as 4KB for one-way traffic, and 16KB for bidirectional traffic.

Overview

The Terminator 5 (T5) ASIC from Chelsio Communications, Inc. is a fifth generation, high-performance 2x40Gbps/4x10Gbps server adapter engine with Unified Wire capability, allowing offload storage, compute and networking traffic to run simultaneously. T5 provides extensive support for stateless offload operation for both IPv4 and IPv6 (IP, TCP and UDP checksum offload, Large Send Offload, Larger Receive Offload, Receive Side Steering/Load Balancing, and flexible line rate Filtering). T5 is a fully virtualized NIC engine with separate configuration and traffic management for 128 virtual interfaces, and includes an on-board switch that offloads the hypervisor v-switch.

Thanks to integrated, standards based FCoE/iSCSI and RDMA offload, T5 based adapters are high performance drop in replacements for FibreChannel storage adapters and InfiniBand RDMA adapters. However, they also excel at normal server adapter functionality, providing high packet processing rate, high throughput and low latency for common network applications. This paper demonstrates T5's Solaris performance using the T580-CR adapter, showing line rate throughput at small I/O sizes.

Test Results

The following graph summarizes the TX, Rx and BiDi throughput numbers along with CPU utilization seen while varying the I/O sizes using the **iperf** tool.

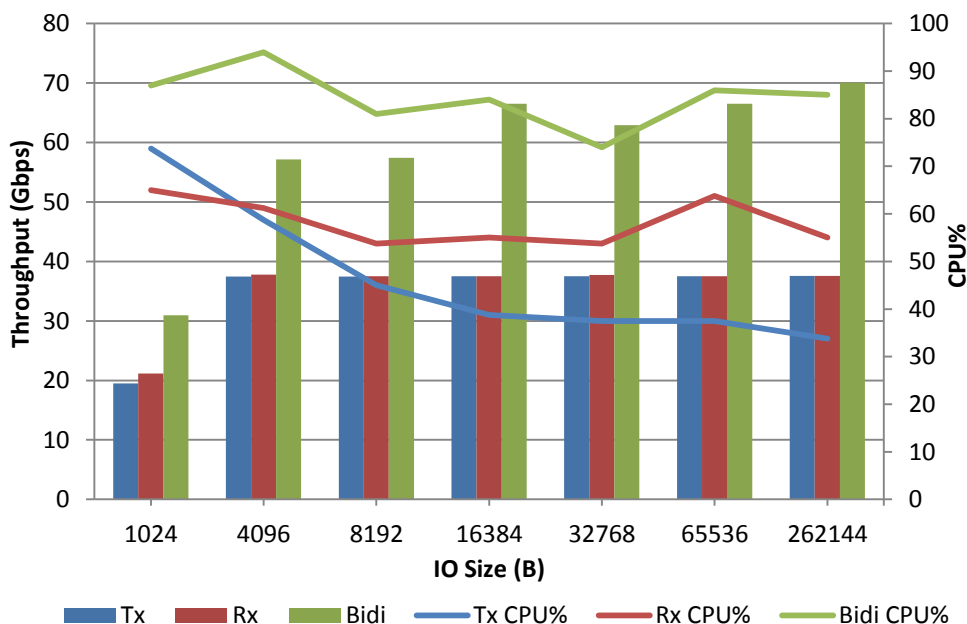


Figure 1 – Throughput and CPU Utilization

The maximum throughput numbers consistently reach line rate (throughput exceeds 37G) even at I/O sizes as small as 4KB.

Test Topology

The following diagram shows the test setup and topology.

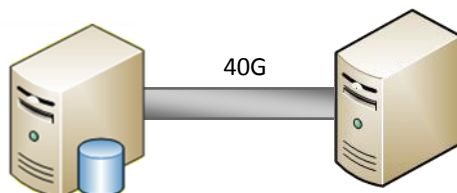


Figure 2 – Simple Back-to-Back Test Topology

Test Configuration

The following sections provide the test configuration details.

Network Configuration

The test configuration consists of 2 identical machines, each with Intel Xeon CPU E5-1660v2 processor running at 3.70GHz connected back-to-back using a single 40Gbps link. Standard MTU of 1500B was used.

One Chelsio T580-CR adapter was installed in each system with network driver v3.0.0.2 and OpenIndiana v151a8 operating system. Similar performance results were achieved with Solaris 11.1

I/O Benchmarking Configuration

iperf is used to measure network throughput. This test used sample IO sizes varying from 1KB to 256KB.

Commands Used

On the Server:

```
root@host:~# iperf -s -p <port>
```

On the Client

```
root@host:~# iperf -c <Server IP> -p <port> -l <IO Size> -t 30 -P <# Conn>
```

Conclusion

This paper provided performance results for Chelsio's T5 ASIC in Solaris/OpenIndiana, using Chelsio's T580-CR server adapter. T5 delivers line rate 40Gbps NIC performance from near 4KB IO size.

Related Links

[The Chelsio Terminator 5 ASIC
40Gb TOE vs NIC Performance](#)
[iSCSI over 40Gb Ethernet](#)
[FCoE at 40Gbps with FC-BB-6](#)