# Chelsio T5 Packet Rate Performance Report

Highest RFC2544 Packet Rate for Cyber Security and Data Analytics

As Ethernet networking speeds increase from 1Gbps to 10Gbps and 40Gbps, cyber security and data analytics requirements for line rate performance at minimum packet sizes scale accordingly. Network security and firewall appliances, traffic analyzers and generators all require maximum performance to process the ever increasing data rates.

Chelsio's T5 based T520LL adapter now delivers line rate performance at minimum packet size across 2x10Gbps ports, in receive as well as the demanding bidirectional RFC2544 tests. In recent tests with Chelsio partners, the T520-LL-CR dual ported adapter was found to deliver 29.76Mpps (Million Packets per Second) using the minimum 64 byte Ethernet frame size. This bidirectional test translates to 14.88Mpps for RX and TX on each port, for a total of 59.52Mpps handled by the Chelsio adapter with no packet loss.
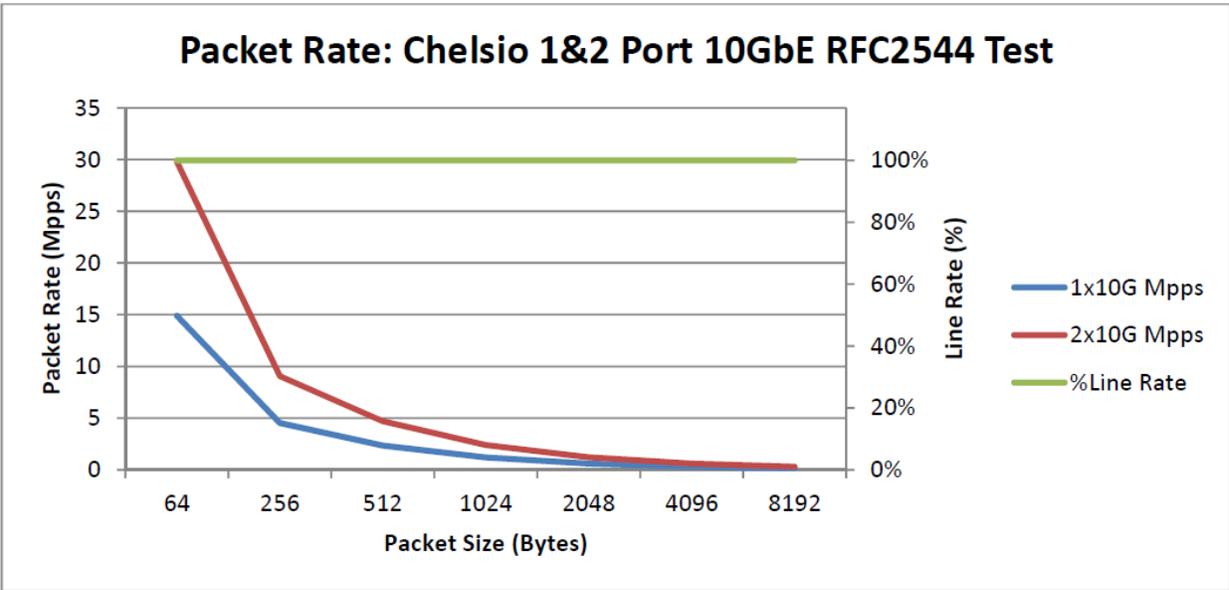
WireDirect WD-Sniffer and WD-Trace

Chelsio's *WD-Sniffer* and *WD-Trace* allow bi-directional packet tracing, packet sniffing and packet filtering at line rates up to 20Gbps by bypassing the host OS kernel and I/O stack and going directly to user space, where packet capture applications like *tcpdump*, *wireshark*, *snort*, and *suricata* can be used. Traced packets carry hardware packet timestamps with an ultra-precise 1.5nsec resolution. Additionally, *WD-Trace* allows concurrent normal networking operation, i.e. trace traffic travels on a separate path through the NIC, and goes to a dedicated DMA queue that's handled by a dedicated core without disrupting the regular ingress traffic.

Competitive Analysis: Chelsio, Solarflare, Intel, Napatech and Endace

As the table below shows, Chelsio's T520-LL-CR is the most cost effective adapter capable of sustaining line packet rate performance at industry leading timestamping accuracy, making it an ideal fit for cyber security and data analytics.

Metric	Chelsio	Solarflare	Intel X520	Napatech	Endace
Max 10G Packet Rate (Mpps)	14.88	11.43	4	14.88	14.88
Cost Range ($)	$1,500	$1,500	$500	$10,000	$10,000
Timestamp Resolution (ns)	1.5	200	8	4	7

Setup Details

This diagram below shows the test setup used in collecting the RFC2544 numbers.

Ixia Setup   **Chelsio T520-LL-CR**
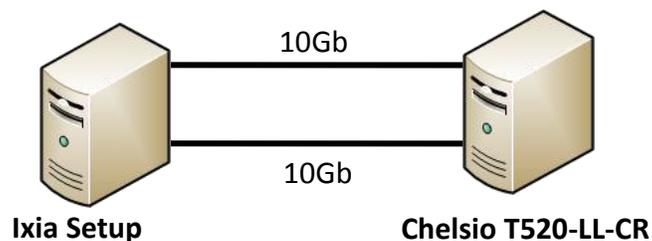
An Ixia setup running IxOS operating system version 5.30.450.31 and IxAutomate version 6.70.76.19, was connected back-to-back to a server with Chelsio's T520-LL-CR adapter. Chelsio Unified Wire software version 2.8.0.0 was installed on the server. The *RFC2544 Throughput* test was used to determine the line rate performance.

Server configuration commands:

```
# ifconfig ethX promisc up
# ifconfig ethY promisc up
# t4-forward.sh ethX ethY <qsets>
# sysctl -w net.ipv4.ip_forward=0


//Create loopback filters to forward packets from ethX to ethY and vice-versa
# cxgbtool ethX filter 1 action switch iport 0 eport 1 hitcnts 1
# cxgbtool ethY filter 2 action switch iport 1 eport 0 hitcnts 1
//Set the register to disable hash and disable CMDOVERLAPDIS to get better
performance
# cxgbtool ethX reg 0x19c04=0x620c10
```

Conclusion

With line rate performance and hardware based timestamping, tracing and sniffing capabilities, Chelsio's T520-LL-CR network interface card meets all the requirements for the cyber security and data analytics markets.

Chelsio's adapters deliver the highest performance for bandwidth, latency and packet rate while concurrently enabling a full suite of networking features, including user space IO with WireDirect, full offload of TCP/IP and UDP/IP, iSCSI and FCoE as well as RDMA over Ethernet with iWARP, all traffic managed and firewalled. High performance and a complete feature set at 10Gbps and 40Gbps make the Chelsio T5 based adapters the ideal choice for network appliances, cyber security, data analytics, low latency, storage, clustering, cloud, data center and virtualization environments.